

PREFACE

This supplement describes service procedures for the Honda BF40A•BF50A Outboard Motors.

For service information which is not covered in this supplement, please refer to the base manuals, part numbers 66ZV300, 66ZV300Z and 66ZV300Y.

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SERVICE PUBLICATION OFFICE

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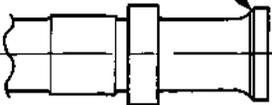
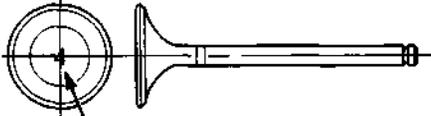
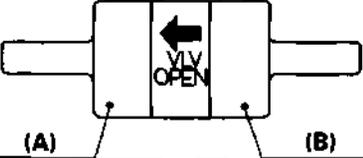
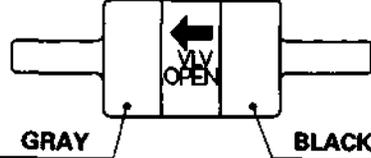
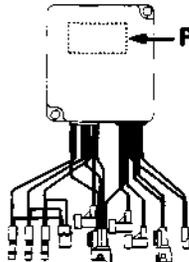
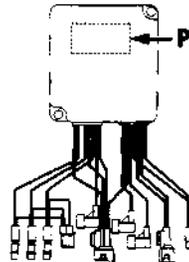
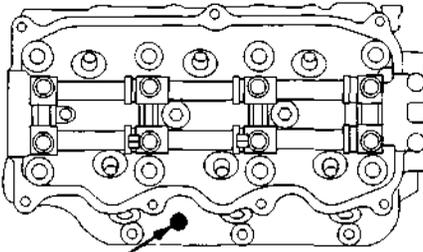
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OUTLINE OF CHANGES

HONDA
BF40A·50A

Model	BF40A·BF50A	BF35A·BF45A·BF40B									
CAMSHAFT	<p style="text-align: center;">COUNTERSUNK</p>  <p>BF40A: No Countersunk BF50A: Countersunk</p>	/									
INTAKE VALVE	 <p style="text-align: center;">MARKING</p> <p>BF40A: No Mark BF50A: Mark "4"</p>	/									
DASHPOT CHECK VALVE	 <table border="1" data-bbox="405 991 687 1092"> <thead> <tr> <th></th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>BF40A</td> <td>Black</td> <td>Black</td> </tr> <tr> <td>BF50A</td> <td>Gray</td> <td>Black</td> </tr> </tbody> </table>		A	B	BF40A	Black	Black	BF50A	Gray	Black	
	A	B									
BF40A	Black	Black									
BF50A	Gray	Black									
CDI UNIT	 <p style="text-align: center;">PART NUMBER</p> <p>BF40A: Part number in Orange BF50A: Part number in White</p>	 <p style="text-align: center;">PART NUMBER</p> <p>BF35A·BF45A·BF45B: Part number in White</p>									
CYLINDER HEAD	 <p style="text-align: center;">MARKING</p> <p>BF40A: No Mark BF50A: Marking White</p>	/									

1. SPECIFICATIONS

HONDA
BF40A·50A

1. SPECIFICATIONS

1. SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Model		BF40A			
Description code		BAYS	BAYL	BAYS	BAYL
Item	Type	SH	LH	SR	LR LRT
Overall length		*1: 725 mm (28.5 in) *2: 1,059 mm (41.7 in)		685 mm (27.0 in)	
Overall width		370 mm (14.6 in)			
Overall height		1,255 mm (49.4 in)	1,360 mm (53.5 in)	1,255 mm (49.4 in)	1,360 mm (53.5 in)
Dry weight		89 kg (196.2 lb)	91 kg (200.7 lb)	88 kg (194.0 lb)	90 kg (198.5 lb) 92 kg (202.9 lb)
Operating weight (incl. oil)		91.5 kg (201.8 lb)	93.5 kg (206.1 lb)	90.5 kg (199.6 lb)	92.5 kg (204.0 lb) 94.5 kg (208.4 lb)

*1: With handlebar raised

*2: With handlebar extended

Model		BF50A			
Description code		BAZL	BAZS		BAZL
Item	Type	LH	SR	SRT	LR LRT
Overall length		*1: 725 mm (28.5 in) *2: 1,059 mm (41.7 in)		685 mm (27.0 in)	
Overall width		370 mm (14.6 in)			
Overall height		1,360 mm (53.5 in)	1,255 mm (49.4 in)		1,360 mm (53.5 in)
Dry weight		91 kg (200.7 lb)	88 kg (194.0 lb)	90 kg (198.5 lb) 92 kg (202.9 lb)	
Operating weight (incl. oil)		93.5 kg (206.1 lb)	90.5 kg (199.6 lb)	92.5 kg (204.0 lb) 94.5 kg (208.4 lb)	

*1: With handlebar raised

*2: With handlebar extended

HONDA

BF40A•50A

FRAME

Item	Model	BF40A				
	Type	SH	LH	SR	LR	LRT
Transom height		416 mm (16.4 in)	521 mm (20.5 in)	416 mm (16.4 in)	521 mm (20.5 in)	521 mm (20.5 in)
Transom angle		5 stage adjustment (11.5°, 15.5°, 19.5°, 23.5°, 27.5°)				
Tilting angle		71.5°				
Swivel angle		37.5° right and left				
Trim angle		—				0 – 20°

Item	Model	BF50A				
	Type	LH	SR	SRT	LR	LRT
Transom height		521 mm (20.5 in)	416 mm (16.4 in)		521 mm (20.5 in)	
Transom angle		5 stage adjustment (11.5°, 15.5°, 19.5°, 23.5°, 27.5°)				
Tilting angle		71.5°				
Swivel angle		37.5° right and left				
Trim angle		—		0 – 20°	—	

TYPES OF HONDA BF40A/50A OUTBOARD MOTORS

It may be necessary to refer to this chart for reference purposes when reading this manual.

Model	Type	Shaft Length		Tiller Handle	Remote Control	Gas Assisted Tilt	Power Trim/Tilt	Tachometer	Trimmer
		S	L						
BF40A	SH	●		●		●			
	LH		●	●		●			
	SR	●			●	●			
	LR		●		●	●			
	LRT		●		●		●	●	●
BF50A	LH		●	●		●			
	SR	●			●	●			
	SRT	●			●		●	●	●
	LR		●		●	●			
	LRT		●		●		●	●	●

S: Short Shaft L: Long Shaft H: Tiller Handle R: Remote Control T: Power Trim/Tilt

The gas assisted tilt type motors use a gas damper to assist when manually tilting the motor.
The power trim/tilt type motors use an electric/hydraulic power cylinder to trim or tilt the motor.

ENGINE

Model	BF40A	BF50A
Type	4-stroke, O.H.C., 3-cylinder	
Displacement	808 cm ³ (49.4 cu in)	
Bore x stroke	70 x 70 mm (2.8 x 2.8 in)	
Rated power *1	40 PS (29.8 kW)/at 5,000 – 6,000 min ⁻¹ (rpm)	50 PS (36.8 kW)/at 5,500 – 6,000 min ⁻¹ (rpm)
Maximum torque	6.05 kg-m (43.8 ft-lb)/at 3,500 min ⁻¹ (rpm)	6.5 kg-m (47.1 ft-lb)/at 4,500 min ⁻¹ (rpm)
Compression ratio	9.2:1	
Fuel consumption ratio	276 g/kW-h (203 g/ps-h, 0.45 lb/hp-h)	265 g/kW-h (195 g/ps-h, 0.43 lb/hp-h)
Cooling system	Forced water circulation by impeller pump with thermostat	
Ignition system	CDI	
Ignition timing	5 – 28° B.T.D.C.	5 – 32° B.T.D.C.
Spark plug	DR7EA (NGK), X22ESR-U (NIPPONDENSO)	
Carburetor	Horizontal type, butterfly valve (3 carburetor)	
Lubrication system	Pressure lubrication by trochoid pump	
Lubrication capacity	2.4 ℓ (2.54 US qt, 2.11 Imp qt)	
Starter system	Electric starter	
Stopping system	Grounding of primary circuit	
Fuel	Regular automotive gasoline (86 pump octane; unleaded recommended)	
Fuel tank capacity	25 ℓ (6.6 US gal, 5.5 Imp gal)	
Fuel pump	Mechanical plunger type	
Exhaust system	Thru-hub type	
Recommended oil	SAE5W – 30 (API Classification Fuel Efficient SG, SH)	

*1: Full throttle range.

LOWER UNIT

Clutch	Dog clutch (Forward-Neutral-Reverse)
Gear ratio	0.48 (26/33 x 14/23)
Reduction	Spiral bevel
Gear case oil capacity	0.52 ℓ (0.550 US qt, 0.458 Imp qt)
Propeller No. of blades-Dia. x Pitch	3-286 x 330 mm (11-1/4 x 13.0 in)
Propeller rotating direction	Clockwise (viewed from rear)
Propeller driving system	Spline

2. SERVICE INFORMATION

HONDA
BF40A•50A

1. MAINTENANCE STANDARDS

1. MAINTENANCE STANDARDS

SHOP MANUAL NEWS

ENGINE

Unit: mm (in)

Part	Item		BF40A		BF50A	
			standard	service limit	standard	service limit
Carburetor	Main jet		#92	—	#130	—
	Jet set		#38	—	#42	—
	Pilot screw opening		2-1/4 turns out	—	1 turn out	—
	Float height		14 (0.6)	—	13 (0.5)	—
Valves	Spring free length	IN/EX	36.1 (1.42)	34.6 (1.36)	36.1 (1.42)	34.6 (1.36)
		IN	32 (1.26)	—	33 (1.30)	—
	Valve head diameter	EX	29 (1.14)	—	29 (1.14)	—
Camshaft		Cam height	IN	34.928 – 35.248 (1.3751 – 1.3877)	34.708 (1.3665)	35.306 – 35.546 (1.390 – 1.3994)
	EX		34.973 – 35.293 (1.3769 – 1.3895)	34.753 (1.3682)	35.351 – 35.591 (1.3918 – 1.4012)	35.091 (1.3815)

1. ENGINE OIL

2. ACCELERATION DEVICE/DIAPHRAGM ASSEMBLY

1. ENGINE OIL

INSPECTION

▲ WARNING

- Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil. **KEEP OUT OF REACH OF CHILDREN.**

- 1) Place the outboard motor in the vertical position.
- 2) Remove the engine cover.
- 3) Remove the oil dipstick and wipe it clean.
- 4) Insert it all the way down the dipstick hole, then pull it out and read the oil level.
- 5) If the oil level is low, add the necessary recommended engine oil to bring the oil level to the upper mark on the dipstick. Do not overfill.

Engine oil capacity	2.0 ℓ (2.11 US qt, 1.76 Imp qt)
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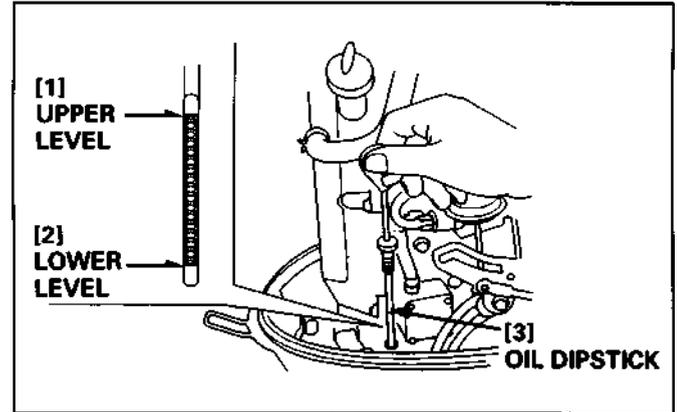
Recommended engine oil	SAE5W - 30 API Service classification Fuel Efficient SG, SH
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NOTE

- This oil is usually identified by words such as: "Energy Conserving II", "Gas Saving," "Fuel Saving," etc.
- When a new oil filter has been installed, recheck the engine oil level after running the engine for a few minutes.
- Draining can be performed rapidly and completely when the engine is still warm.
- Place a shop towel under the oil filter when removing the oil filter.

CAUTION

- Running the outboard motor without sufficient cooling water will damage the water pump and overheat the engine. Be sure that water flows from the cooling system indicator while the engine is running. If not, stop the engine and determine the cause of the problem.
- Keep clear of moving parts.



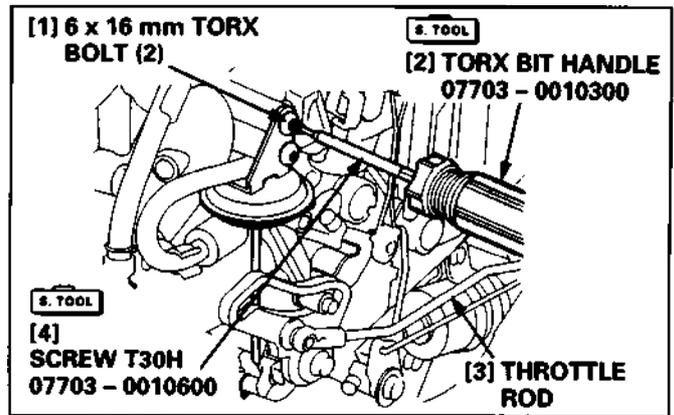
2. ACCELERATION DEVICE/DIAPHRAGM ASSEMBLY

Adjust the acceleration device/diaphragm assembly after adjusting the idle speed (P. 3-8 of the base shop manual [66ZV300]).

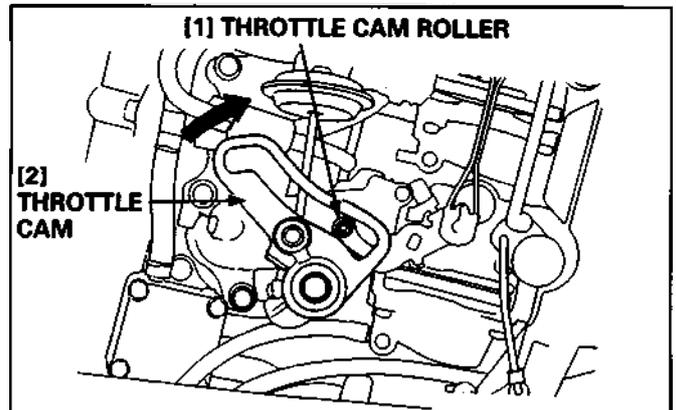
- 1) Loosen the 6 x 16 mm torx bolts using the special tools.

TOOLS:

Torx bit handle	07703 - 0010300
Screw T30H	07703 - 0010600



- 2) Remove the throttle rod from the throttle cam.
- 3) Move the throttle cam and hold it in a position where it does not contact the throttle cam roller.

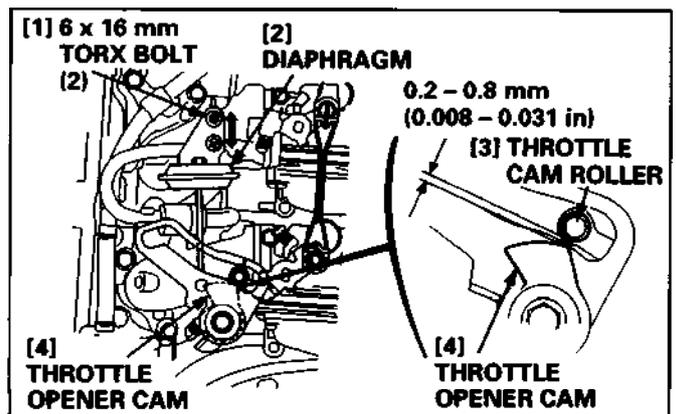


- 4) Move the diaphragm up or down slowly until the clearance between the throttle cam roller and throttle opener cam is 0.2 - 0.8 mm (0.008 - 0.031 in). While holding the clearance, tighten the 6 x 16 mm torx bolts using the special tools.

TOOLS:

Torx bit handle	07703 - 0010300
Screw T30H	07703 - 0010600

Attach the throttle rod to the throttle cam.



SOME PARTS OF CHANGES

The method of installing the water seal which had been described to the undermentioned shop manual was changed.

Applicable Information	Publication No.	Applicable Pages	Size of Water Seal
BF2D	66ZW600	15-1, 15-2	11 x 21 x 8 mm
BF20A/25A	66ZV700	12-2, 12-5	22 x 35 x 7 mm
		12-8, 12-9	17 x 30 x 7 mm
		12-8	6 mm
		11-5, 11-8	22 x 35 x 7 mm
BF35A/45A	66ZV300	11-10, 11-11	17 x 30 x 7 mm
		11-4, 11-5	10 x 21 x 6 mm
BF75A/90A	66ZW000Z	11-8, 11-11	30 x 45 x 7 mm
		12-5, 12-6	10 x 21 x 6 mm
BF115A/130A	66ZW500	12-10, 12-15	30 x 45 x 7 mm

CHANGE LOCATIONS

The liquid applied to the circumference of water seals has been changed.

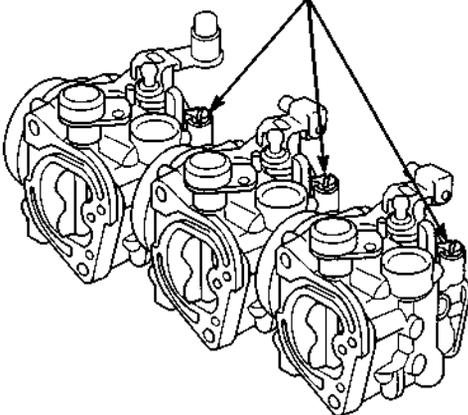
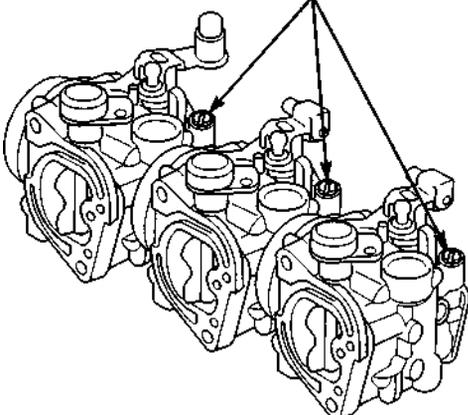
After Modification	Before Modification
<p>INSTALLATION:</p> <ul style="list-style-type: none"> Do not reuse. Apply grease to the mating surface and lips of the seals. Apply soapy water to the circumference of the seals. 	<p>INSTALLATION:</p> <ul style="list-style-type: none"> Do not reuse. Apply grease to the mating surface, circumference and lips of the seals.

SOME PARTS OF CHANGES

News No. P/P-093	Issue Date MAY., 01
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Model	Publication No.	Applicable Pages
BF30A	66ZV700Z	2-1
BF40A/50A	66ZV300X	2-1

CHANGE LOCATIONS

Item	After Modification	Before Modification
Engine Serial No.	BF30A/BF30AX: BAWE-1011107 and subsequent	BF30A/BF30AX: Up to BAWE-1011106
	BF30A1: BAWE-2000001 and subsequent	—————
	BF40A/BF40AX: BAYE-1016440 and subsequent	BF40A/BF40AX: Up to BAYE-1016439
	BF40A1: BAYE-2007400 and subsequent	BF40A1: Up to BAYE-2007399
	BF50A/BF50AX: BAZE-1033504 and subsequent	BF50A/BF50AX: Up to BAZE-1033503
BF50A1: BAZE-2000001 and subsequent	—————	—————
Carburetor BF30A1/BF40A1/BF50A1 Canadian models only	<p style="text-align: center;">PILOT SCREW WITH LIMITER CAP</p> 	<p style="text-align: center;">PILOT SCREW</p> 
Pilot Screw Opening	BF30A/BF30AX, BF30A1: 2 turns out	BF30A, BF30AX: 3 turns out
	BF40A/BF40AX, BF40A1: 1-5/8 turns out	BF40A/BF40AX, BF40A1: 2-1/4 turns out
	BF50A/BF50AX, BF50A1: 2 turns out	BF50A, BF50AX: 1 turn out

PILOT SCREW REPLACEMENT

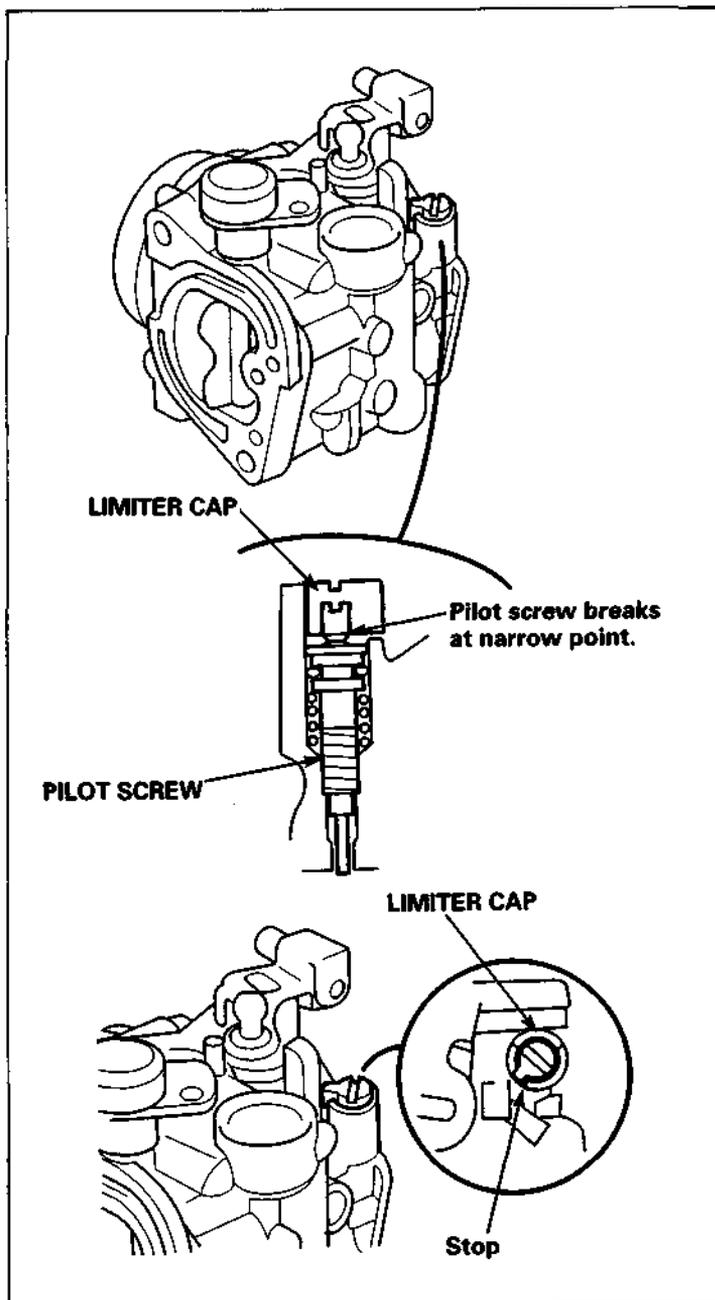
Leave the pilot screw and limiter cap in place during carburetor cleaning. Remove only if necessary for carburetor repair. Removal of the limiter cap requires breaking the pilot screw. A new pilot screw and limiter cap must be installed.

- 1) When the limiter cap has been broken off, remove the broken pilot screw.
- 2) Place a new O-ring on the replacement pilot screw, and install it on the carburetor.
- 3) Turn the pilot screw in until it is fully seated, then turn the screw out the required number of turns.

Pilot screw opening	BF30A1	2 turns out
	BF40A1 (BAYE 2000001-2007399)	2-1/4 turns out
	BF40A1 (BAYE 2007400~)	1-5/8 turns out
	BF50A1	2 turns out

- 4) Apply Locktite®638 to the inside of the limiter cap, then install the cap so its stop prevents the pilot screw from being turned counterclockwise.

Be careful to avoid turning the pilot screw while installing the limiter cap. The pilot screw must stay at its require setting.



BF35A·BF45A·BF40A·BF50A

Power Equipment

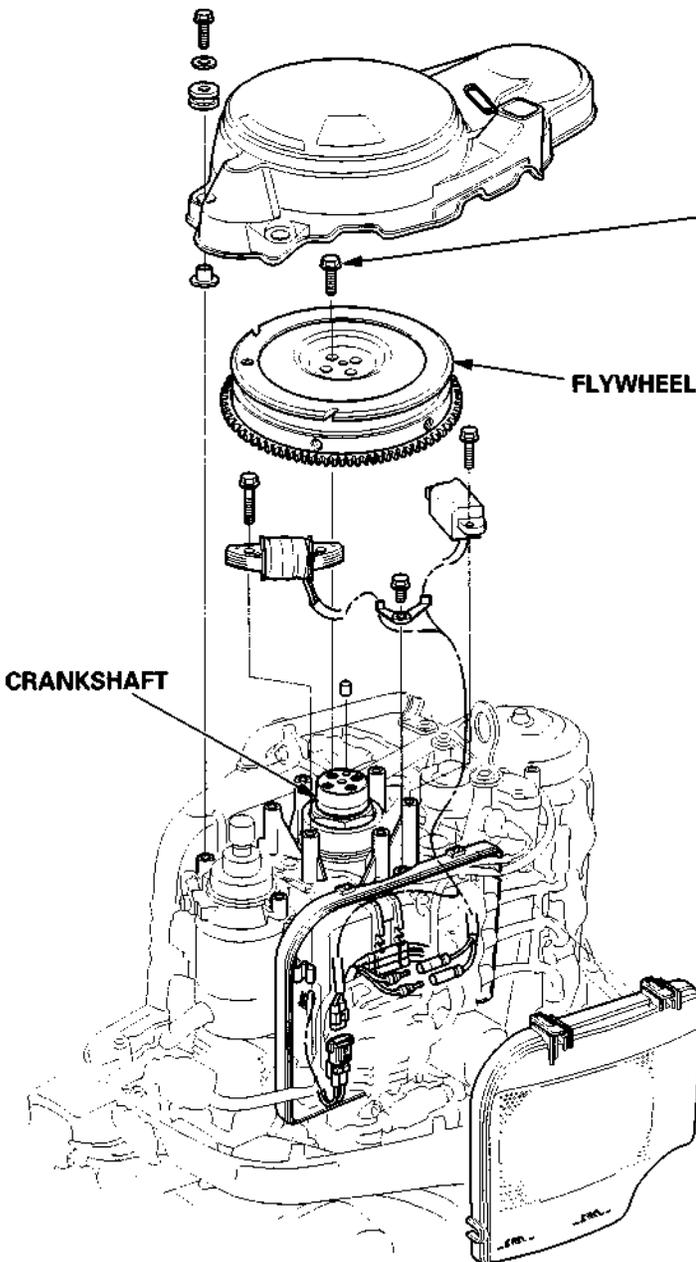
News No.	Issue Date
P/P-161	Mar. 2003

SOME PARTS OF CHANGES

Applicable Information	Publication No.	Applicable Page
BF35A·BF45A·BF40A·BF50A	66ZV300	6-2

CHANGE LOCATIONS

- Before installing the flywheel, degrease the back side (the crankshaft side) of the flywheel and the end face of the crankshaft. Also, install 10 × 25 mm flange bolts into the flywheel after applying engine oil to the flanged part and threaded part of the bolts.



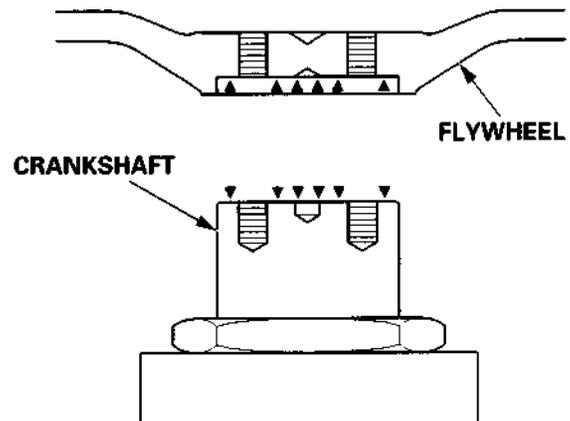
10 × 25 mm FLANGE BOLT (4)
65 N·m (6.6 kgf·m)

▲ : DEGREASING

Wipe the flywheel with a clean shop towel sprayed with degreasing agent.

● : APPLYING ENGINE OIL TO THE BOLTS

- Apply engine oil thinly to the flanged part and threaded part.
- Do not apply so much engine oil so that it drips from the bolts.

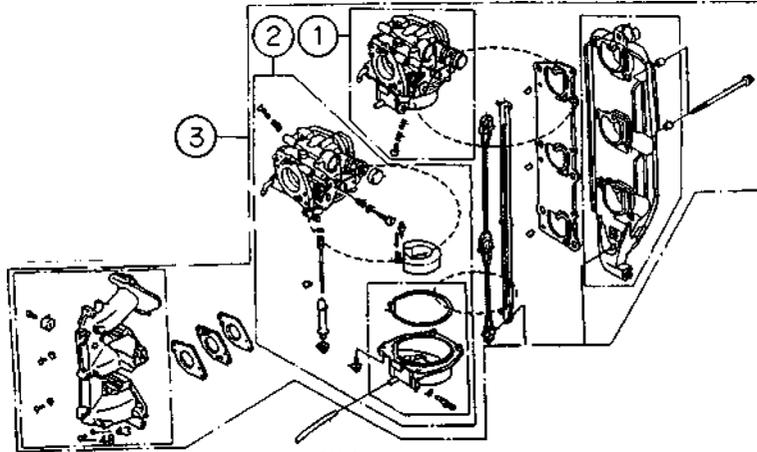


Model: BF50/30AY

Re: Carburetor assembly parts

Contents: We would like to inform you that the carburetor assembly parts have been changed from the following model numbers on.

Old	New	Compatibility	
		Old to new	New to old
CARBURETOR ASSY. (#1 #2)	CARBURETOR ASSY. (#1 #2)	No	No
CARBURETOR ASSY. (#)	CARBURETOR ASSY. (#)	No	No
CARBURETOR ASSY.	CARBURETOR ASSY.	No	Yes
CARBURETOR ASSY. (#1 #2)	CARBURETOR ASSY. (#1 #2)	No	No
CARBURETOR ASSY. (#)	CARBURETOR ASSY. (#)	No	No
CARBURETOR ASSY.	CARBURETOR ASSY.	No	Yes



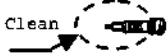
Change

Stabilization of the idle speed by change of the passage to the pilot screw part of the carburetor body

Applicable model numbers

[Redacted] (From the production of June 2000 on.)
 [Redacted] (From the production of June 2000 on.)

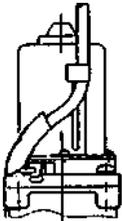
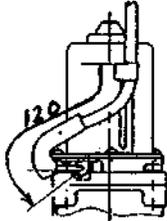
In case of problems with the idle speed stability for old models, please take the following measures.

<p>Confirmation of the phenomenon Idle speed not stable, engine stalls occur.</p> <p>Procedure</p> <p>{1} Wipe the tip of the pilot screw removed from the carburetor with a rag and wash it with kerosene or similar.</p> <p>{2} Return the pilot screw for the standard number of turns according to the service manual.</p> <p>{3} Follow the service manual to perform tuning adjustment and adjustment to the specified idle speed again.</p> <p>{4} If the problem occurs again with the passage of time after the above steps {1} to {3} have been performed, replace the old carburetor assembly by the countermeasure carburetor assembly.</p>	<p>Clean </p>
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Model: BF40/50AY

**Re: Change of the wiring method for the power trim
tilt motor**

Contents: We would like to inform you that the wiring method for the power trim tilt motor assembly cord has been changed from the following model numbers on.

Old	New
MOTOR ASSY., POWER TILT	MOTOR ASSY., POWER TILT (no change in part number/specifications)
 <p data-bbox="124 943 589 994">Motor cord fixed by clamping at any position</p>	 <p data-bbox="705 943 1261 994">Motor cord fixed by clamping at the 120 mm position</p>

Change purpose

Depending on the scatter for the motor cord fixing position, the motor cord tended to be pulled, causing deformation of the grommet at the motor cord outlet, reducing the seal performance, and causing entry of water into the motor. Maintaining of the seal performance by standardization of the clamping position.

Change contents

Old	New
Motor cord fixed by clamping at any position	Motor cord fixed by clamping at the 120 mm position

Applicable model numbers

.....	(From the production of October 1999 on.)
.....	(From the production of October 1999 on.)

In case of trouble with the operation of the power trim tilt assembly with old model numbers, please take the following measures.

Trouble confirmation
The motor of the power trim tilt assembly does not operate.
Procedure

- {1} Disassembly the motor according to the service manual, inspect all parts, and confirm that there is no internal rust or sticking of the brush to the holder.
- {2} In case of abnormalities, exchange the required parts or the motor assembly according to the service manual
- {3} Fix the cord by clamping it at the position 120 mm from the root.

PREFACE

This supplement describes the major features and repair procedures of the Honda BF40A and BF50A out-board motors.

For service information which is not covered in this supplement, please refer to the BF35A•45A base shop manual (part number 66ZV300, 66ZV300Z, 66ZV300Y, 66ZV300X and 66ZV300W).

Careful observance of these instructions will result in better, safer service work.

Pay attention to these symbols and their meaning:

⚠ WARNING Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

CAUTION: Indicates a possibility of personal injury or equipment damage if instructions are not followed.

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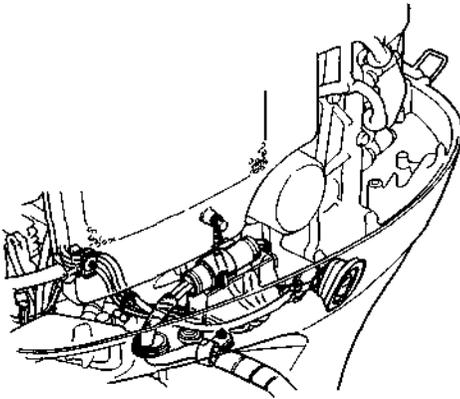
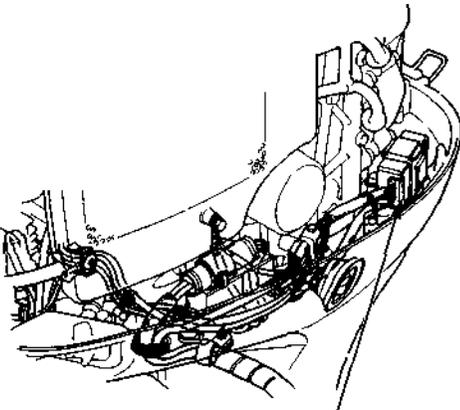
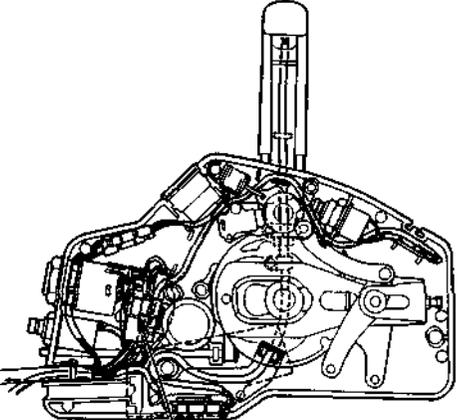
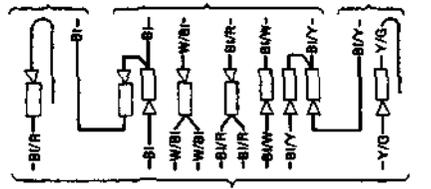
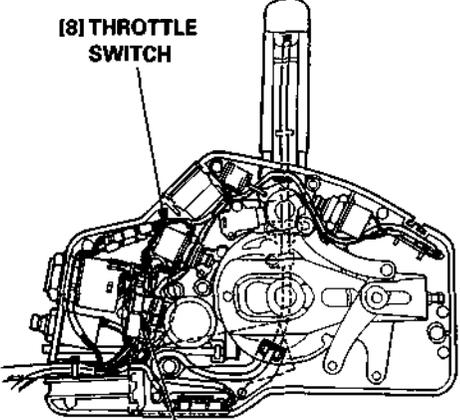
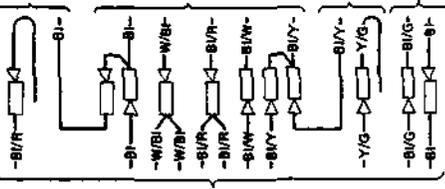
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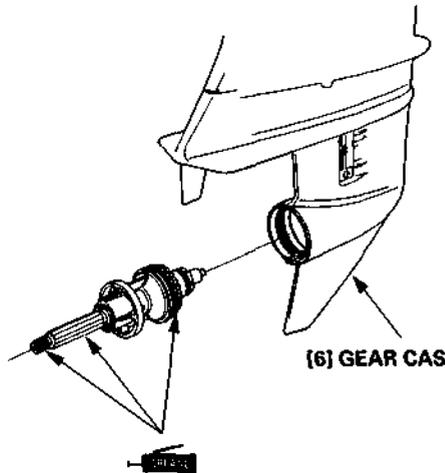
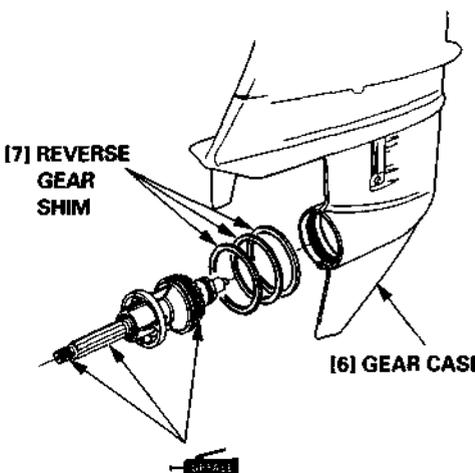
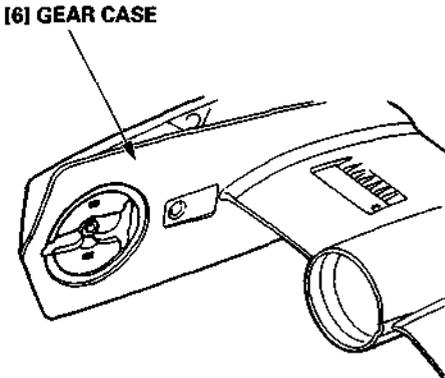
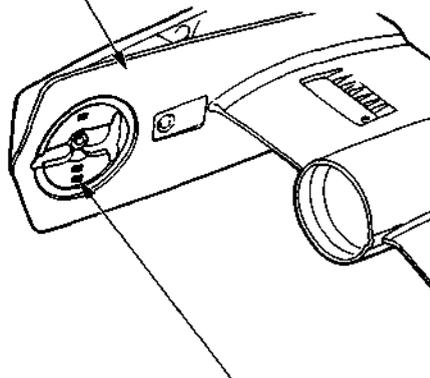
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OUTLINE OF CHANGES

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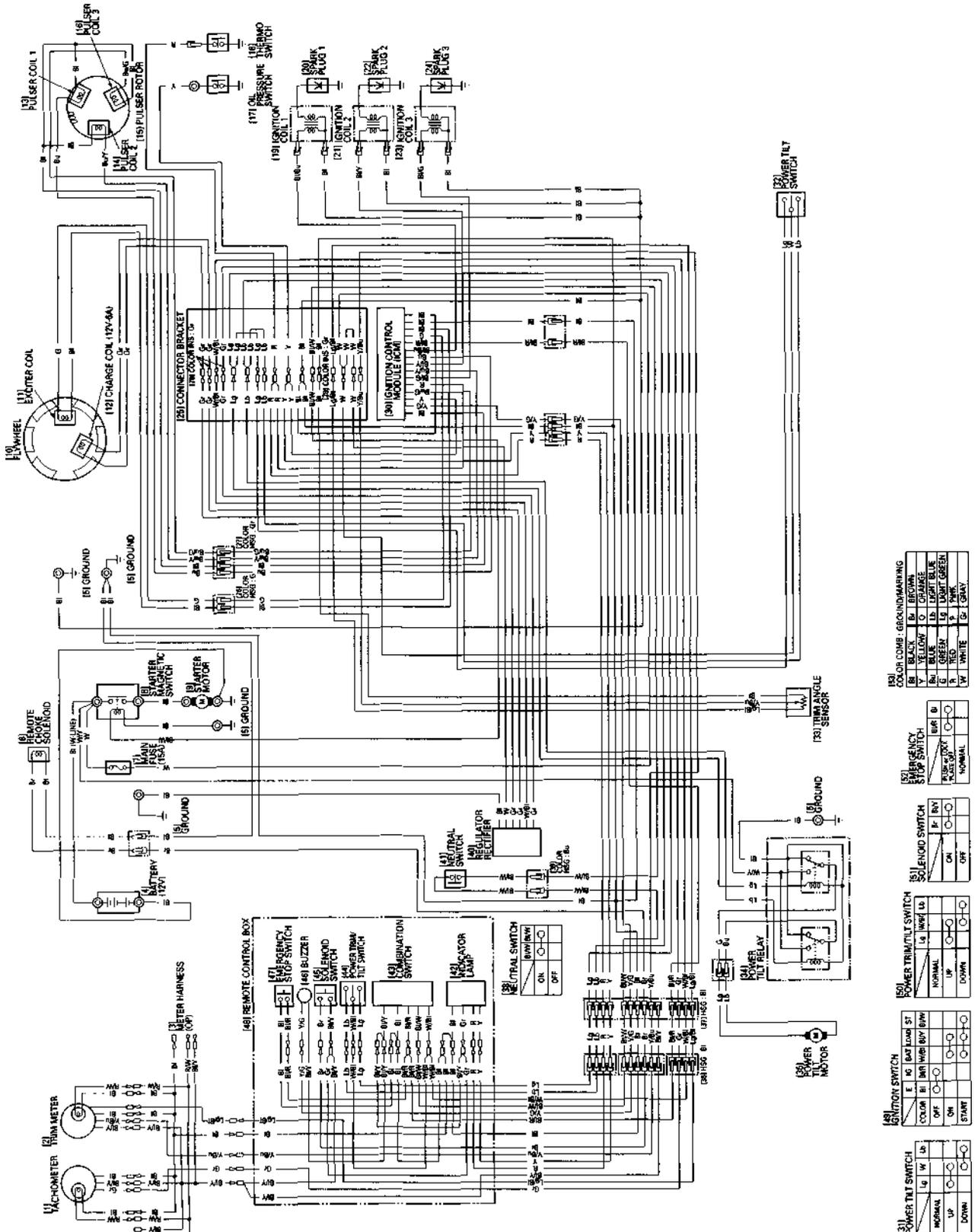
<p>[2] Frame serial number</p> <p>[1] Item</p>	<p>[3] BF40A: BAYS-3221532 and subsequent : BAYL-3100445 and subsequent BF50A: BAZS-3222752 and subsequent : BAZL-3100576 and subsequent : BAZU-3100088 and subsequent</p>	<p>[4] BF40A: Up to BAYS-3221531 : Up to BAYL-3100444 BF50A: Up to BAZS-3222751 : Up to BAZL-3100575 : Up to BAZU-3100087</p>
<p>[5] TRIM CONTROL UNIT</p> <p>The trim control unit for power trim warning is no longer installed.</p>		 <p>[6] TRIM CONTROL UNIT</p>
<p>[7] REMOTE CONTROL BOX</p> <p>The throttle switch is no longer installed in the control box.</p>	 <div data-bbox="393 1428 882 1732"> <p>[9] EMERGENCY STOP SWITCH [10] IGNITION SWITCH [11] WARNING BUZZER</p>  <p>[12] REMOTE CONTROL CABLE B</p> </div>	 <p>[8] THROTTLE SWITCH</p> <div data-bbox="905 1428 1394 1732"> <p>[9] EMERGENCY STOP SWITCH [10] IGNITION SWITCH [11] WARNING BUZZER</p>  <p>[12] REMOTE CONTROL CABLE B</p> </div>

<p>[2] Frame serial number</p> <p>[1] Item</p>	<p>[3] BF40A: BAYS-3221482 and subsequent : BAYL-3100298 and subsequent BF50A: BAZS-3222623 and subsequent : BAZL-3100412 and subsequent : BAZU-3100079 and subsequent</p>	<p>[4] BF40A: Up to BAYS-3221481 : Up to BAYL-3100297 BF50A: Up to BAZS-3222622 : Up to BAZL-3100411 : Up to BAZU-3100078</p>
<p>[5] GEAR CASE</p> <p>The reverse gear shims are not used.</p>	 <p>[6] GEAR CASE</p>	 <p>[7] REVERSE GEAR SHIM</p> <p>[6] GEAR CASE</p>
<p>[8] GEAR CASE</p> <p>The engagement mark for the reverse gear shims are not used.</p>	 <p>[6] GEAR CASE</p>	 <p>[6] GEAR CASE</p> <p>[9] ENGAGEMENT MARK</p>
<p>[10] REVERSE GEAR SHIM SELECTION TABLE</p>	<p>[11] Not applied</p>	<p>[12] Applied</p>

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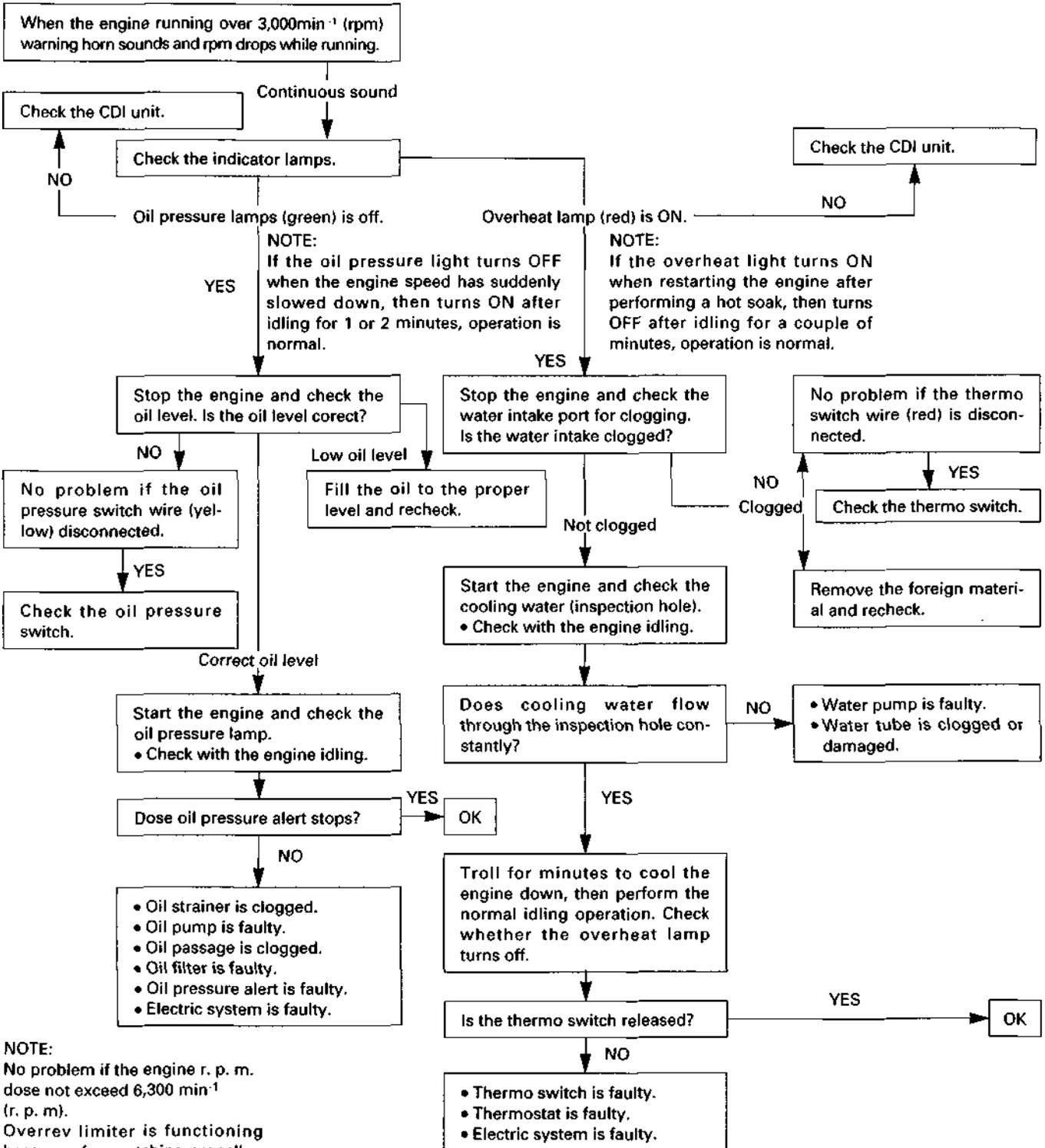
1. WIRING DIAGRAM

Power trim & tilt/remote control type



1. TROUBLESHOOTING

E. ALERT SYSTEM (Remote control type)



3. MAINTENANCE

BF40A•50A

1. MAINTENANCE SCHEDULE

1. MAINTENANCE SCHEDULE

REGULAR SERVICE PERIOD(3)		Each use	After use	First month or 20 hrs.	Every 6 months or 100 hrs.	Every year or 200 hrs.	Every 2 years or 400 hrs.	Ref. base shop manual page
Item	Perform at every indicated month or operating hour interval, whichever comes first.							
*	Engine oil	Check level	○					3-2
		Change		○	○			3-2
	Engine oil filter	Replace				○		3-3
	Gear case oil	Change		○	○			3-4
	Timing belt	Check-adjust				○		3-16
*	Carburetor linkage	Check-adjust		○	○			3-11
*	Valve clearance	Check-adjust		○		○		3-5
*	Spark plug	Check-adjust			○			3-4
		Replace				○		3-4
	Propeller and Cotter pin	Check	○					11-2
	Anode	Check	○					—
	Idling speed	Check-adjust		○	○			3-8
	Lubrication	Grease		○(1)	○(1)			2-33
*	Fuel tank and tank filter	Clean				○		3-8
*	Fuel filter	Check			○			3-7
		Replace					○	3-7
	Thermostat	Check				○		8-3
*	Fuel line	Check	○					5-4, 12
		Replace			Every 2 years (If necessary)			5-4, 12
	Battery and cable connection	Check level-tightness	○					—
	Bolts and Nuts	Check-tightness		○	○			—
*	Crankcase breather tube	Check				○		5-3
	Cooling water passages	Clean		○(2)				—

* Emission item for Borden sea model.

Note: (1) Lubricate more frequently when used in salt water.

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

(3) For professional commercial use, log hours of operation to determine proper maintenance intervals.

PREFACE

This manual covers the construction, function and servicing procedures of the Honda BF40A•BF50A Outboard motors.

For service information which is not covered in this supplement, please refer to the base shop manual (66ZV300, 66ZV300Z, 66ZV300Y, 66ZV300X, 66ZV300W, 66ZV300V).

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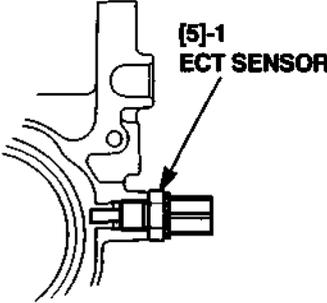
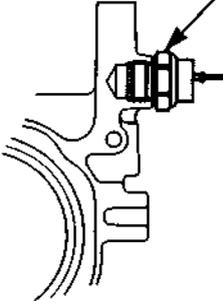
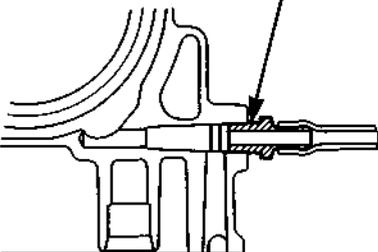
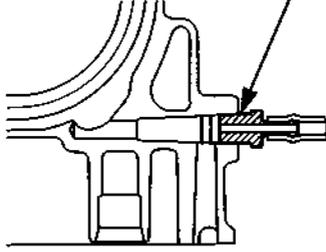
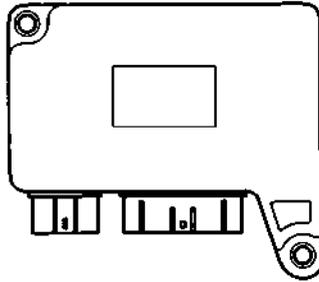
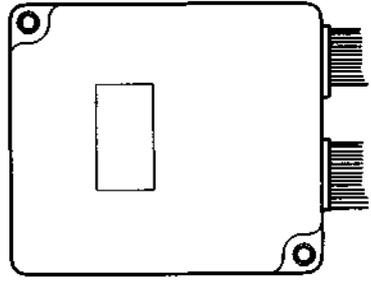
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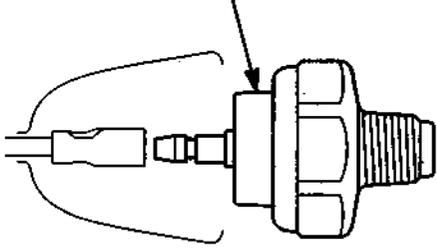
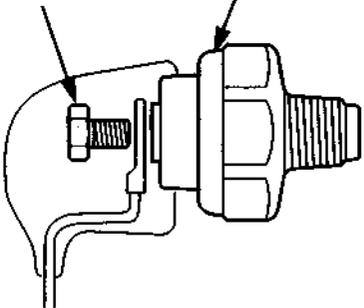
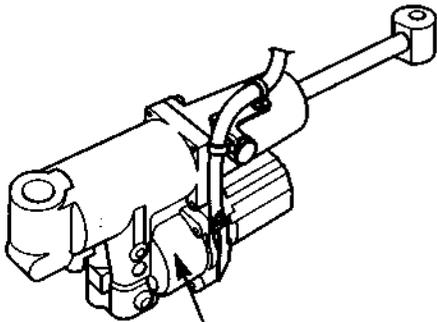
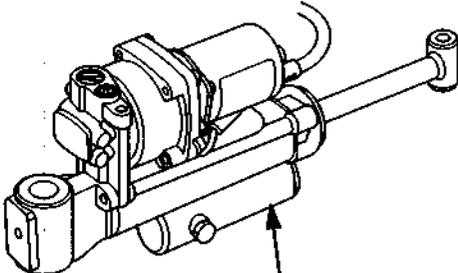
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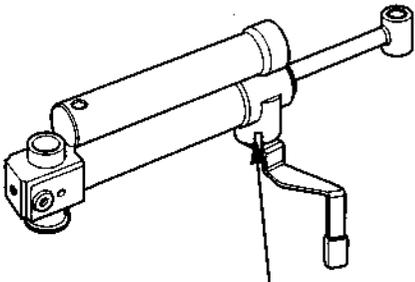
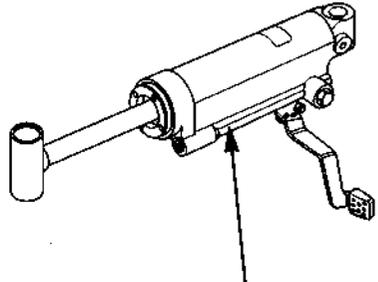
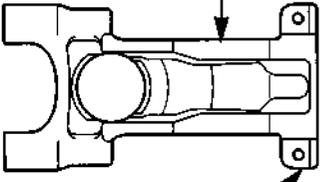
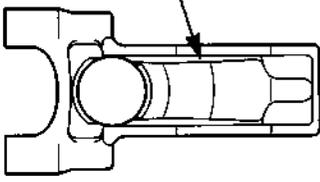
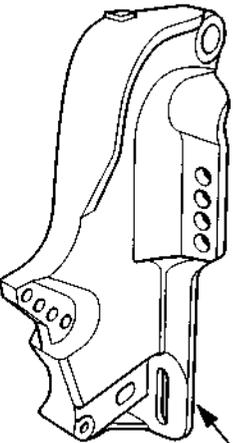
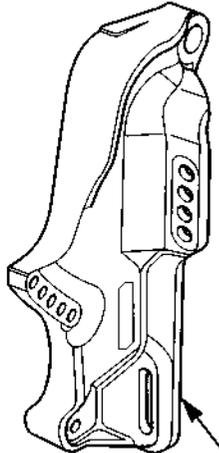
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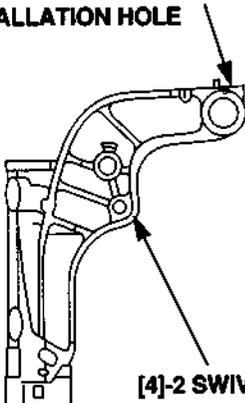
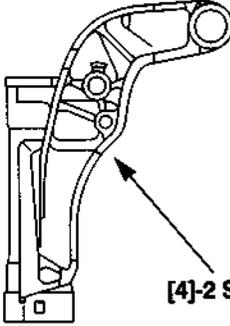
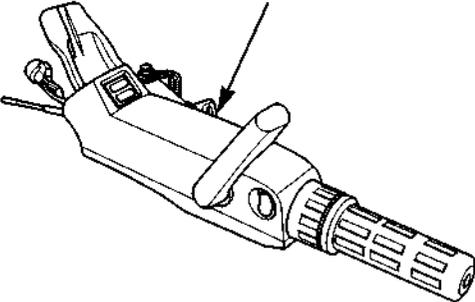
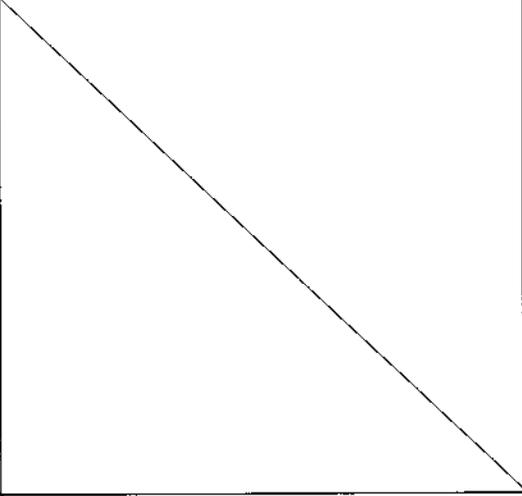
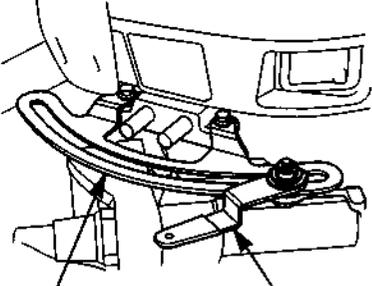
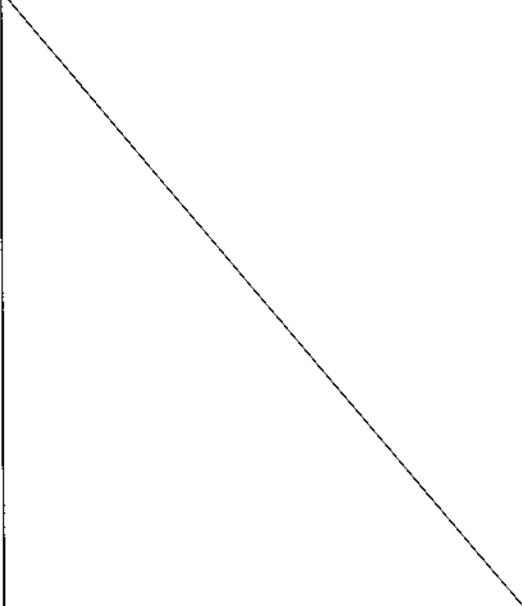
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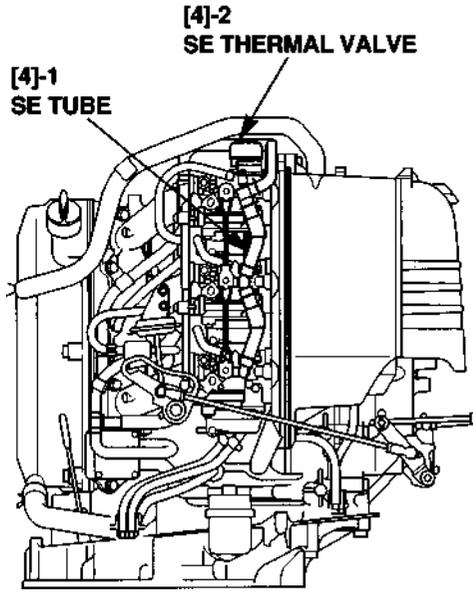
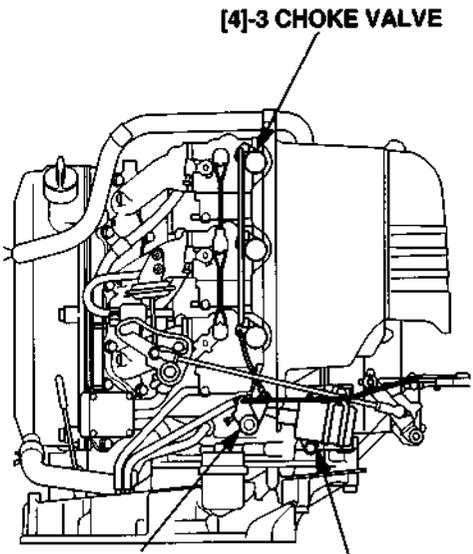
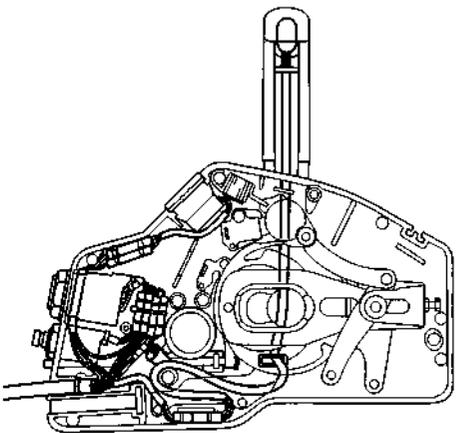
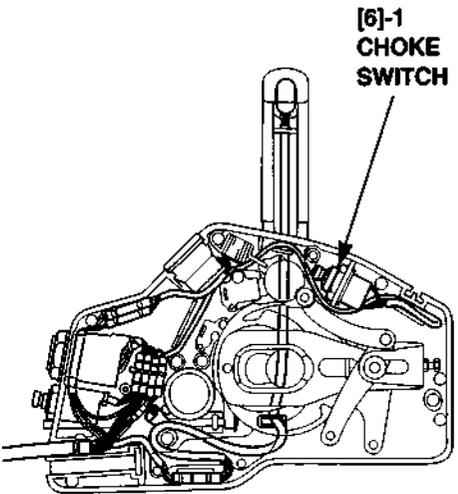
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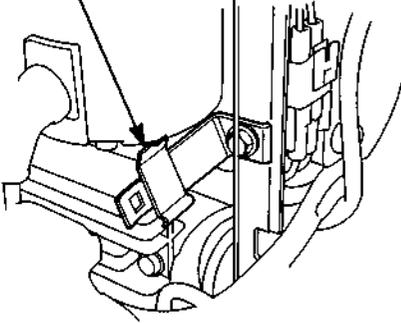
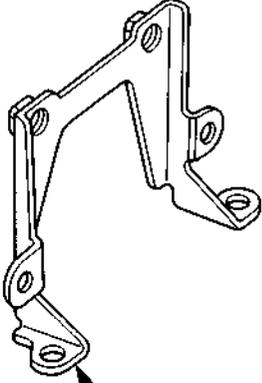
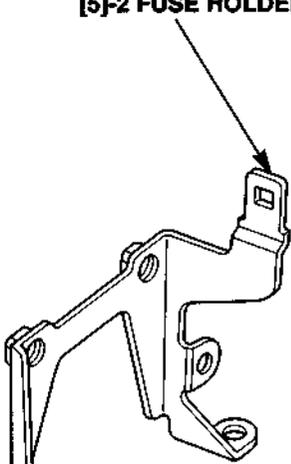
[1] Item	[2] After change	[3] Before change
[4] ECT switch, ECT sensor	[5] ECT sensor Installation position changed.  <p>[5]-1 ECT SENSOR</p>	[6] ECT switch  <p>[6]-1 ECT SWITCH</p>
[7] Water hose joint	[8] Inner diameter (I.D.) changed  <p>[8]-1 WATER HOSE JOINT</p>	  <p>[8]-1 WATER HOSE JOINT</p>
[9] CDI unit	[10] Change to digital CDI unit 	[11] Analogue CDI unit 

[1] Item	[2] After change	[3] Before change
[4] Oil pressure switch	<p>[5] Connecting terminal, connection method changed.</p> <p>[5-1 OIL PRESSURE SWITCH</p>  <p>[5-4 MALE CONNECTOR</p>	<p>[5-2 4 x 8 mm TERMINAL SCREW</p> <p>[5-3 OIL PRESSURE SWITCH</p> 
[6] Power coil	<p>[7] Change to power coil from exciter coil.</p> <p>[7-1 POWER COIL</p> 	<p>[7-2 EXCITER COIL</p> 
[8] Power trim/tilt assembly	 <p>[8-1 POWER TRIM/TILT ASSEMBLY</p>	 <p>[8-1 POWER TRIM/TILT ASSEMBLY</p>

[1] Item	[2] After change	[3] Before change
[4] Gas assisted damper	<p>[5] Erected type</p>  <p>[5]-1 GAS ASSISTED DAMPER</p>	<p>[6] Inverted type</p>  <p>[6]-1 GAS ASSISTED DAMPER</p>
[7] Mount frame	<p>[7]-1 MOUNT FRAME</p>  <p>[7]-2 FRICTION PLATE MOUNTING SECTION</p>	<p>[7]-1 MOUNT FRAME</p> 
[8] Stern bracket	 <p>[8]-1 STERN BRACKET</p>	 <p>[8]-1 STERN BRACKET</p>

[1] Item	[2] After change	[3] Before change
[4] Swivel case	<p>[4]-1 STEERING FRINCTION STUD INSTALLATION HOLE</p>  <p>[4]-2 SWIVEL CASE</p>	 <p>[4]-2 SWIVEL CASE</p>
[5] Tiller handle	<p>[6]-1 LONG TILLER HANDLE</p> 	
[7] Friction adjusting lever	<p>[8] Tiller handle friction lever being added in connection with addition of the long tiller handle type</p>  <p>[8]-1 FRICTION PLATE</p> <p>[8]-2 FRICTION ADJUSTING LEVER</p>	

[1] Item	[2] After change	[3] Before change
[4] Carburetor	 <p>[4]-1 SE TUBE</p> <p>[4]-2 SE THERMAL VALVE</p>	 <p>[4]-3 CHOKE VALVE</p> <p>[4]-4 CHOKE SOLENOID (REMOTE CONTROL TYPE)</p> <p>[4]-5 CHOKE ARM</p>
[5] Remote control box	<p>[6] Choke switch is no longer installed.</p> 	 <p>[6]-1 CHOKE SWITCH</p>

[1] Item	[2] After change	[3] Before change
[4] Fuse holder bracket	<p>[5] Newly provided.</p> <p>[5]-1 FUSE HOLDER BRACKET</p>   <p>[5]-3 REGULATOR/RECTIFIER BRACKET</p>	<p>[5]-2 FUSE HOLDER</p>  <p>[5]-3 REGULATOR/RECTIFIER BRACKET</p>

1. SPECIFICATIONS
2. DIMENSIONAL DRAWING

1. SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Model	BF40A						
Description code	BAYS						
Type	SH	LH	LHT	SR	SRT	LR	LRT
Overall length	770 mm (30.3 in)			685 mm (27.0 in)			
Overall width	370 mm (14.6 in)						
Overall height	1,260 mm (49.6 in)	1,365 mm (53.7 in)		1,260 mm (49.6 in)		1,365 mm (53.7 in)	
Dry weight (With propeller mounted)	93.5 kg (309 lb)	95.5 kg (316 lb)	97.5 kg (322 lb)	89 kg (294 lb)	91 kg (301 lb)	91 kg (301 lb)	93 kg (307 lb)
Operating weight	96 kg (317 lb)	98 kg (324 lb)	100 kg (322 lb)	91.5 kg (302 lb)	93.5 kg (309 lb)	93.5 kg (309 lb)	95.5 kg (316 lb)
Transom height	416 mm (16.4 in)	521 mm (20.5 in)		416 mm (16.4 in)		521 mm (20.5 in)	
Transom angle	5 stage adjustment (8°, 12°, 16°, 20°, 24°)						
Tilting angle	-4° ~ 63°						
Trimming angle	—	-4° ~ 12°		—	-4° ~ 12°		-4° ~ 12°
Swivel angle	37.5° right and left						

Types of Honda BF40A Outboard Motors

It may be necessary to refer to this chart for reference purposes when reading this manual.

Model	Type	Shaft length	Long tiller handle	Remote control	Electric starter	Power trim/tilt	Gas-assisted tilt	Starting enrichment system
BF40A	SH	S	●		●		●	●
	LH	L	●		●		●	●
	LHT	L	●		●	●		●
	SR	S		●	●		●	●
	SRT	S		●	●	●		●
	LR	L		●	●		●	●
	LRT	L		●	●	●		●

S: Short shaft, L: Long shaft

BF40A•BF50A

Model	BF50A			
Description code	BAZS			
Type	LH	YH	XH	YHT
Overall length	770 mm (30.3 in)			
Overall width	370 mm (14.6 in)			
Overall height	1,365 mm (53.7 in)	1,400 mm (55.1 in)	1,470 mm (57.9 in)	1,400 mm (55.1 in)
Dry weight (With propeller mounted)	95.5 kg (211 lb)	96.5 kg (213 lb)	99.5 kg (219 lb)	98.5 kg (217 in)
Operating weight	98 kg (216 lb)	99 kg (218 lb)	102 kg (225 lb)	101 kg (223 lb)
Transom height	521 mm (20.5 in)	556 mm (21.9 in)	622 mm (24.5 in)	556 mm (21.9 in)
Transom angle	5 stage adjustment (8°, 12°, 16°, 20°, 24°)			
Tilting angle	-4° ~ 63°			
Trimming angle	—			-4° ~ 12°
Swivel angle	37.5° right and left			

Model	BF50A				
Description code	BAZS				
Type	SRT	LR	LRT	YRT	XRT
Overall length	685 mm (27.0 in)				
Overall width	370 mm (14.6 in)				
Overall height	1,260 mm (49.6 in)	1,365 mm (53.7 in)		1,400 mm (55.1 in)	1,470 mm (57.9 in)
Dry weight (With propeller mounted)	91 kg (201 lb)	91 kg (201 lb)	93 kg (205 lb)	94 kg (207 lb)	97 kg (214 lb)
Operating weight	93.5 kg (206 lb)	93.5 kg (206 lb)	95.5 kg (211 lb)	96.5 kg (213 lb)	99.5 kg (219 lb)
Transom height	416 mm (16.4 in)	521 mm (20.5 in)		556 mm (21.9 in)	622 mm (24.5 in)
Transom angle	5 stage adjustment (8°, 12°, 16°, 20°, 24°)				
Tilting angle	-4° ~ 63°				
Trimming angle	—		-4° ~ 12°		
Swivel angle	37.5° right and left				

Types of Honda BF50A Outboard Motors

It may be necessary to refer to this chart for reference purposes when reading this manual.

Model	Type	Shaft length	Long tiller handle	Remote control	Electric starter	Power trim/tilt	Gas-assisted tilt	Starting enrichment system
BF50A	LH	L	●		●		●	●
	YH	LL	●		●		●	●
	XH	UL	●		●		●	●
	YHT	LL	●		●	●		●
	SRT	S		●	●	●		●
	LR	L		●	●		●	●
	LRT	L		●	●	●		●
	YRT	LL		●	●	●		●
	XRT	UL		●	●	●		●

S: Short shaft, L: Long shaft, LL: Semi-long shaft, UL: Extra long shaft

ENGINE

Model	BF40A	BF50A
Description code	BAYE	BAZE
Type	Water cooled 4-stroke, overhead valve, vertical 3 cylinders	
Displacement	808 cm ³ (21.5 cu. in)	
Bore x stroke	70 x 70 mm (2.8 x 2.8 in)	
Rated horsepower	29.4 kW (40 PS) at 5,500 min ⁻¹ (rpm)	36.8 kW (50 PS) at 6,000 min ⁻¹ (rpm)
Maximum torque	62.3 N-m (6.36 kgf-m, 46.0 lbf-ft) at 3,500 min ⁻¹ (rpm)	65.2 N-m (6.65 kgf-m, 48.1 lbf-ft) at 4,500 min ⁻¹ (rpm)
Compression ratio	9.2: 1	
Fuel consumption	329 g (11.6 oz.)/kWh	335 g (11.9 oz.)/kWh
Cooling system	Forced water circulation by impeller pump with thermostat	
Ignition system	CDI	
Ignition timing	5° - 26° B.T.D.C.	
Spark plug	DR7EA (NGK), X22ESR-U (DENSO)	
Carburetor	Horizontal butterfly valve type, vertical 3 carburetors	
Lubricating system	Forced lubrication by trochoid pump	
Oil capacity	2.4 ℓ (2.54 US qt, 2.11 Imp qt) 2.0 ℓ (2.12 US qt, 1.76 Imp qt) at oil change	
Recommended oil	SAE 5W-30, API Service classification SG/SH/SJ	
Starting system	Electric starter	
Stopping system	Ignition primary circuit ground	
Fuel used	Automotive unleaded gasoline (minimum 86 pump octane)	
Fuel tank capacity	25 ℓ (6.6 US gal, 5.5 Imp gal)	
Fuel pump	Mechanical plunger type	
Exhaust system	Under water type	
Recommended battery	12V 65Ah (65D23R)	

LOWER UNIT

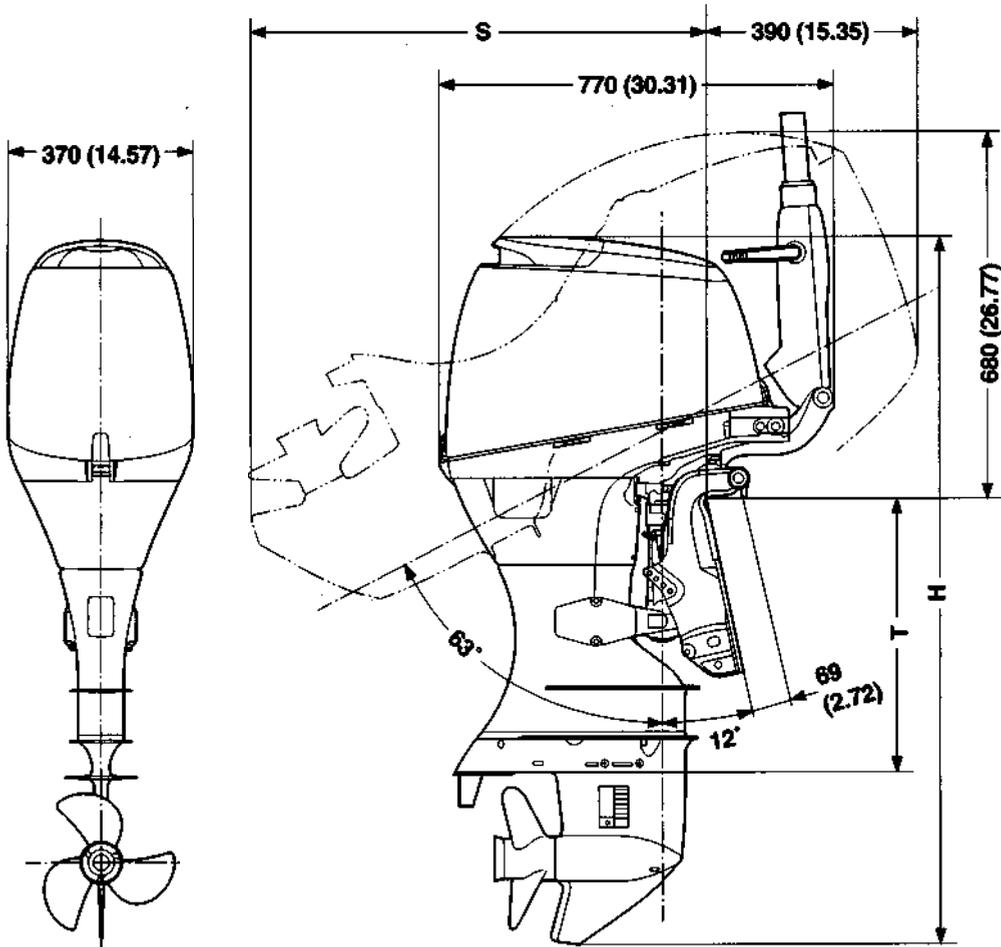
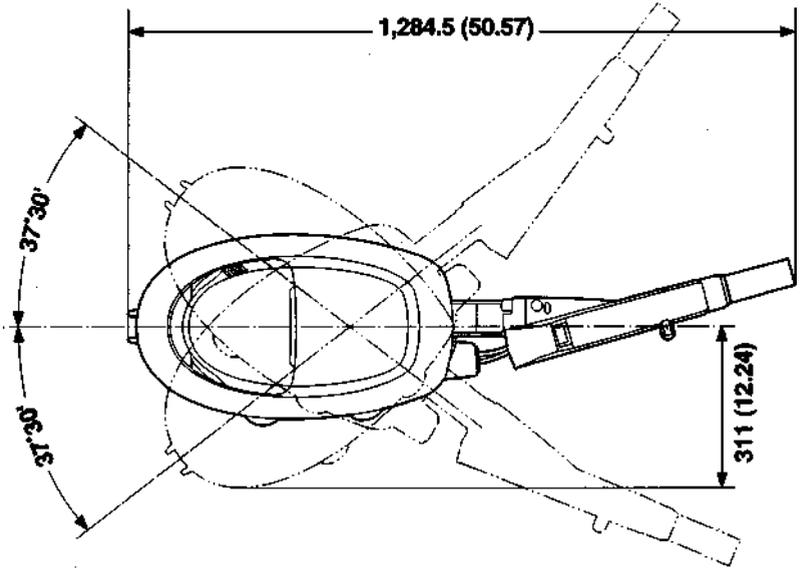
Model	BF40A, BF50A
Clutch	Dog clutch (Forward-neutral-reverse)
Gear ratio	0.48 (26/33 x 14/23)
Reduction type	Spiral bevel gear
Gear case oil capacity	0.41 ℓ (0.43 US qt, 0.36 Imp qt)
Propeller Rotating direction	Clockwise (viewed from rear)

2. DIMENSIONAL DRAWING

Unit: mm (in)

Tiller Handle Type

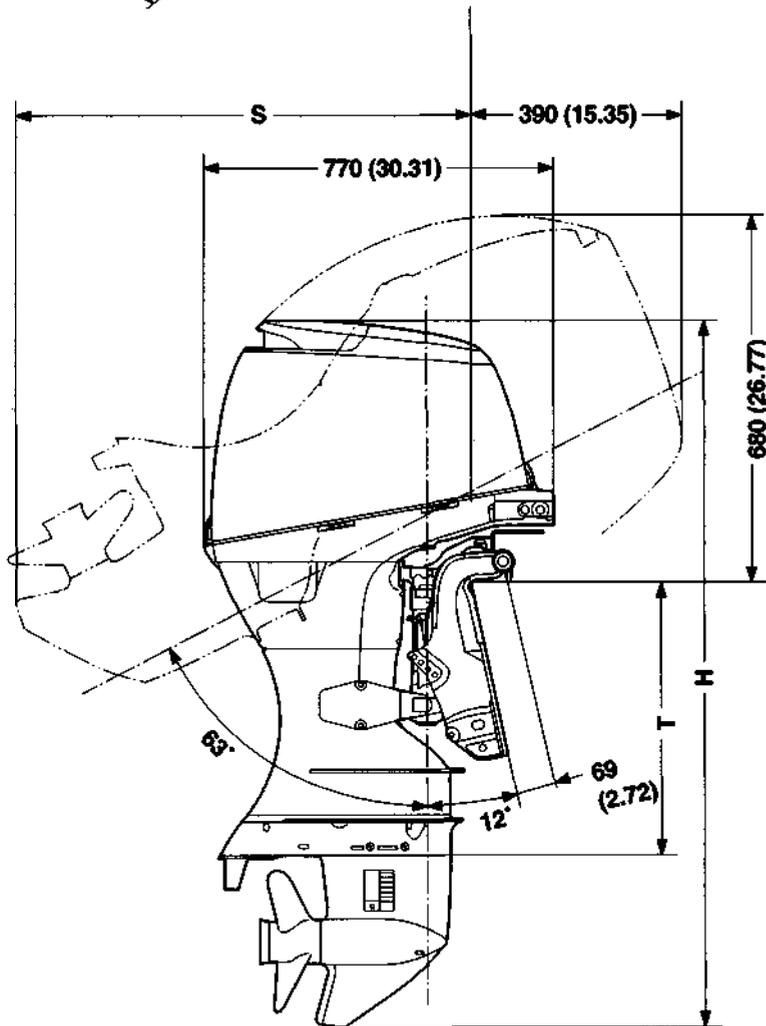
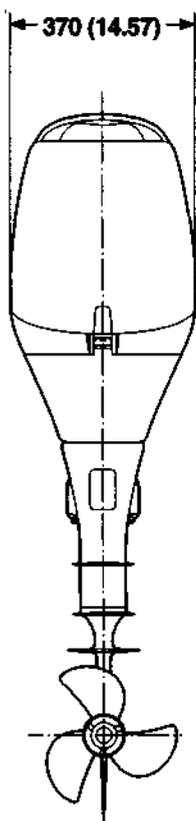
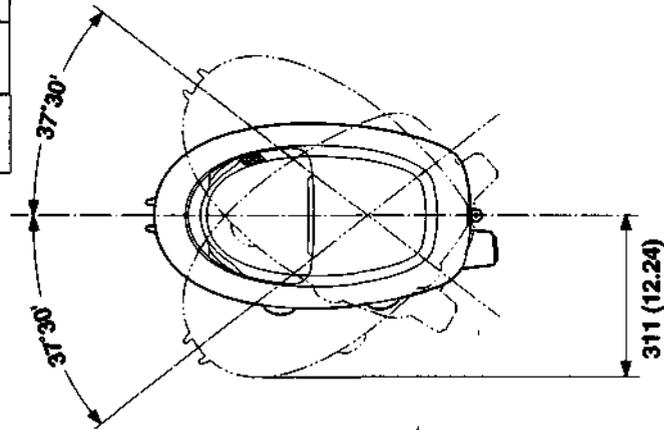
	H	T	S
S Type	1,260 (49.6)	416 (16.4)	805 (31.7)
L Type	1,365 (53.7)	521 (20.5)	900 (35.4)
LL Type	1,400 (57.9)	556 (21.9)	930 (36.6)
UL Type	1,470 (57.9)	622 (24.5)	990 (39.0)



Remote Control Type

Unit: mm (in)

	H	T	S
S Type	1,260 (49.6)	416 (16.4)	805 (31.7)
L Type	1,365 (53.7)	521 (20.5)	900 (35.4)
LL Type	1,400 (57.9)	556 (21.9)	930 (36.6)
UL Type	1,470 (57.9)	622 (24.5)	990 (39.0)



2. SERVICE INFORMATION

BF40A•BF50A

1. MAINTENANCE STANDARDS
2. TORQUE VALUES
3. SPECIAL TOOLS
4. APPLYING LIQUID SEALANT

5. TROUBLESHOOTING
6. CABLE & HARNESS ROUTING
7. TUBE ROUTING

1. MAINTENANCE STANDARDS

ENGINE

Part	Item		Standard	Service limit	
Carburetor	Main jet	BF40A	Bondensee type	#100	—
			Except Bondensee type	#105	—
		BF50A		#135	—
	Pilot screw opening	BF40A	Bondensee type	3-3/8 turns out	—
			Except Bondensee type	3-1/2 turns out	—
		BF50A		2-1/8 turns out	—
	Float height	BF40A		14.0 mm (0.55 in)	—
BF50A			13.0 mm (0.51 in)	—	
	SE valve heater resistance		15.8 - 24.2 Ω	—	
Exhaust emission Bondensee type only	CO ₂		10% min.	—	
	NOX		546 ppm max.	—	
	CO		7.0% max.	—	
	Measuring idle speed		950 - 1,150 min ⁻¹ (rpm)	—	
Power coil	Resistance		7.02 - 8.58 Ω	—	

2. TORQUE VALUES

Item	Thread dia. x pitch	Torque			Note
		N•m	kgf•m	lbf•ft	
• Engine					
Crankcase cover bolt	M8 x 1.25	27	2.8	20	(1)
	M6 x 1.0	12	1.2	9	
Cylinder head bolt	M10 x 1.25	39	4.0	29	(2)
	M8 x 1.25	26	2.7	20	
Oil strainer bolt	M6 x 1.0	13	1.3	9	
Water tube joint	PT1/8	9	0.9	6.5	
Flywheel bolt	M10 x 1.0	65	6.6	48	(3)
• Gear case					
Propeller castle nut	M16 x 1.0	1	0.1	0.7	(4)
Gear case end nut	M80 x 1.5	69	7.0	51	(5)
Gear case nut (UL type)	M10 x 1.25	34	3.5	25	
	M8 x 1.25	22	2.2	16	
Gear case stud (UL type)	M10 x 1.25	1.5	0.15	1.1	
	M8 x 1.25	1.3	0.13	0.9	
Water screen screw	M5 x 0.8	1	0.1	0.7	

BF40A•BF50A

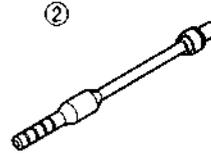
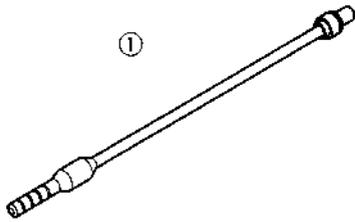
Item	Thread dia. x pitch	Torque			Note
		N•m	kgf•m	lbf•ft	
• Extension/Mount Steering friction lever nut (Long tiller handle type) Lower motor mount housing bolt	M8 x 0.75 M8 x 1.25	9.5 22	0.95 2.2	6.9 16	(6)
• Stern bracket Stern bracket left side nut Stern bracket right side nut	7/8-14UNF M10 x 1.25	39 34	4.0 3.5	29 25	
• Tiller handle Steering bracket pivot lock nut Steering bracket pivot nut Steering bracket nut Throttle arm holder bolt Throttle grip bolt Under cover screw Cable holder bolt Emergency stop switch nut Connector bracket bolt Throttle cable pivot lock nut Switch bracket bolt	M12 x 1.25 M12 x 1.25 M10 x 1.25 M5 x 0.8 M6 x 1.0 M5 x 0.8 M5 x 1.0 M16 x 1.0 M6 x 1.0 M6 x 1.0 M5 x 0.8	54 29 34 4.5 7 2.2 7 1.3 7 1.3 4.5	5.5 3.0 3.5 0.45 0.7 0.22 0.7 0.13 0.7 0.13 0.45	40 22 25 3.3 5.1 1.6 5.1 0.9 5.1 0.9 3.3	
• Gas assisted damper Tilt lever nut	M6 x 1.0	6.5	0.65	4.7	

NOTE:

- (1): Apply oil to the thread and seating surface.
- (2): Tighten to the specified torque first, then tighten an additional 90° - 120°.
- (3): Clean off oil or grease from the crankshaft and flywheel mating surfaces (see page 6-1). Apply oil to the thread and seating surface of the flywheel bolt, then tighten them to the specified torque.
- (4): If the split pin cannot be set by tightening the castle nut to the specified torque, tighten the castle nut additionally until the split pin can be set. Do not exceed the maximum torque of 34 N•m (3.5 kgf•m, 25 lbf•ft).
- (5): If the tab of the washer does not align with the groove of the gear case end nut by tightening it to the specified torque, tighten the castle nut additionally until the groove aligns with the tab. Do not exceed the maximum torque of 98 N•m (10.0 kgf•m, 72 lbf•ft).
- (6): Turn the friction lever to the right side fully, and hold it in this position and tighten the friction lever nut to the specified torque.
- (7): Tighten the stern bracket nut to the specified torque, then turn it back to 180 - 210°.

3. SPECIAL TOOLS

No.	Tool name	Tool number	Application
1	Vacuum gauge attachment 5 x 08 x 120L	07510-3000100 or 07510-3000200	} Carburetor synchronization
2	Vacuum gauge attachment 5 x 08 x 50L		



4. APPLYING LIQUID SEALANT

Apply liquid sealant to the primary gear case gasket and oil pan gasket as follows:

- Assemble the crankcase side cover and oil pan within the specified time after application of a sealing agent.

Example:

- Within 90 minutes when using Three Bond #1211.
- Within 30 minutes when using Three Bond #1216.

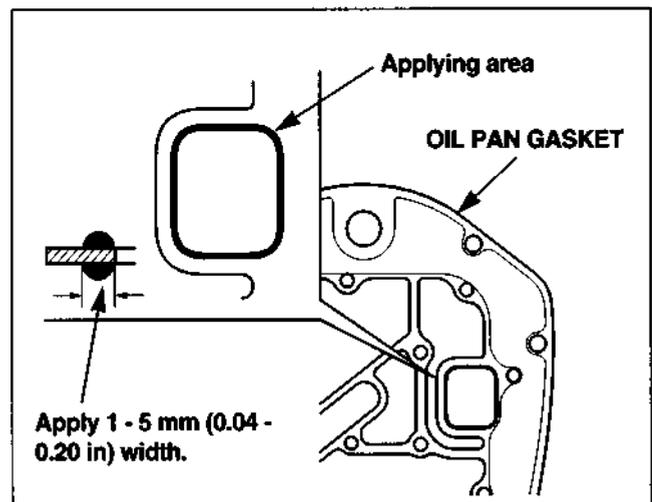
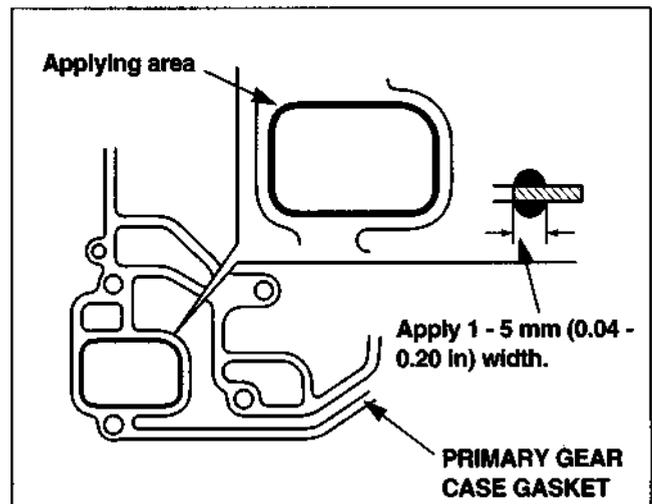
- Apply about 1 - 5 mm (0.04 - 0.20 in) width.
- Wait for 15 minutes after assembly. Do not add oil during this period.

• PRIMARY GEAR CASE GASKET

- 1) Clean the engine and primary gear case mating surfaces with a degreasing cleaning agent or a clean shop towel (see base shop manual).
- 2) Apply liquid sealant to the position shown on both side of a new primary gear case gasket.

• OIL PAN GASKET

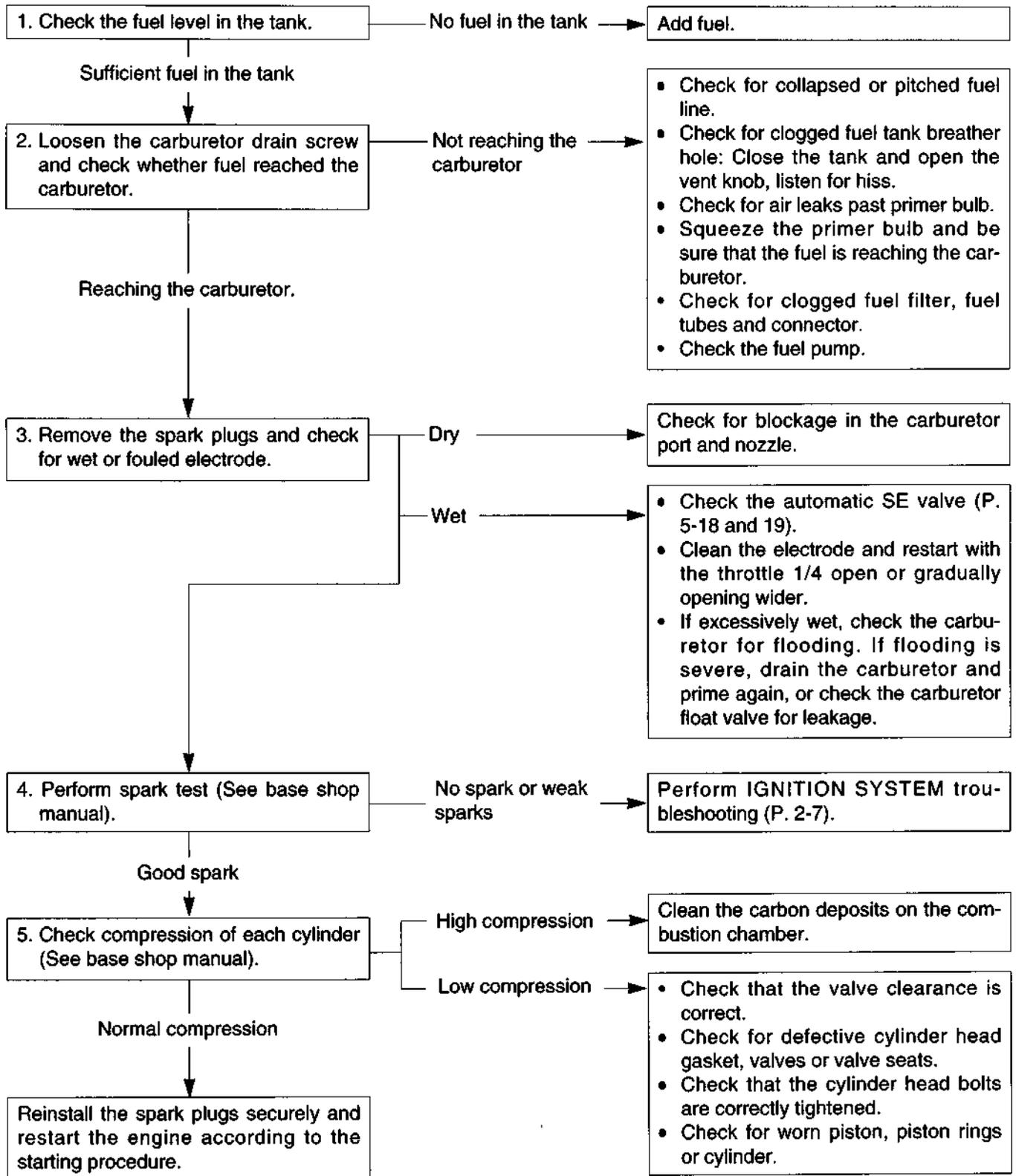
- 1) Clean the engine and oil pan mating surfaces with a degreasing cleaning agent or a clean shop towel (see base shop manual).
- 2) Apply liquid sealant to the position shown on both side of a new primary gear case gasket.

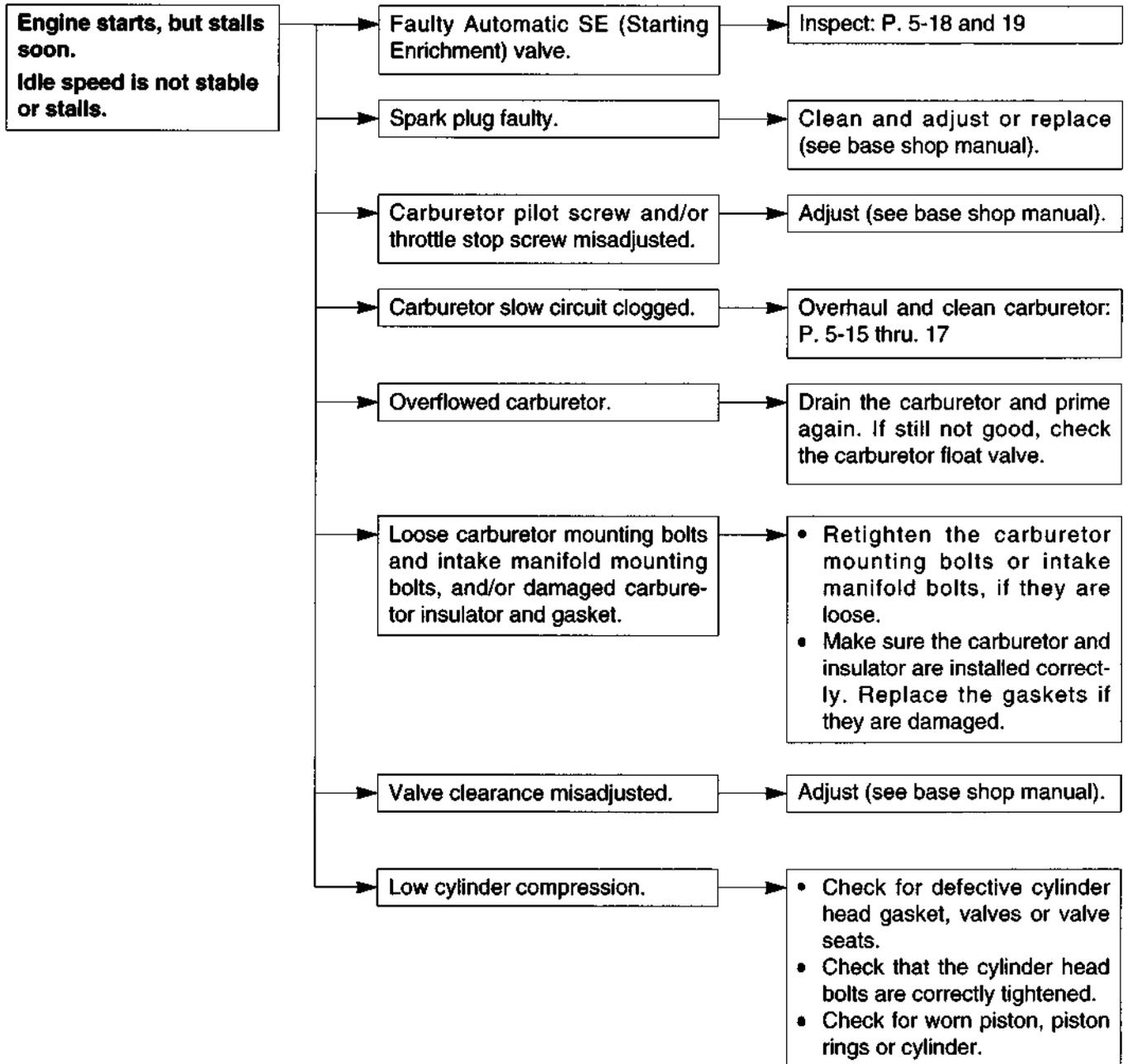


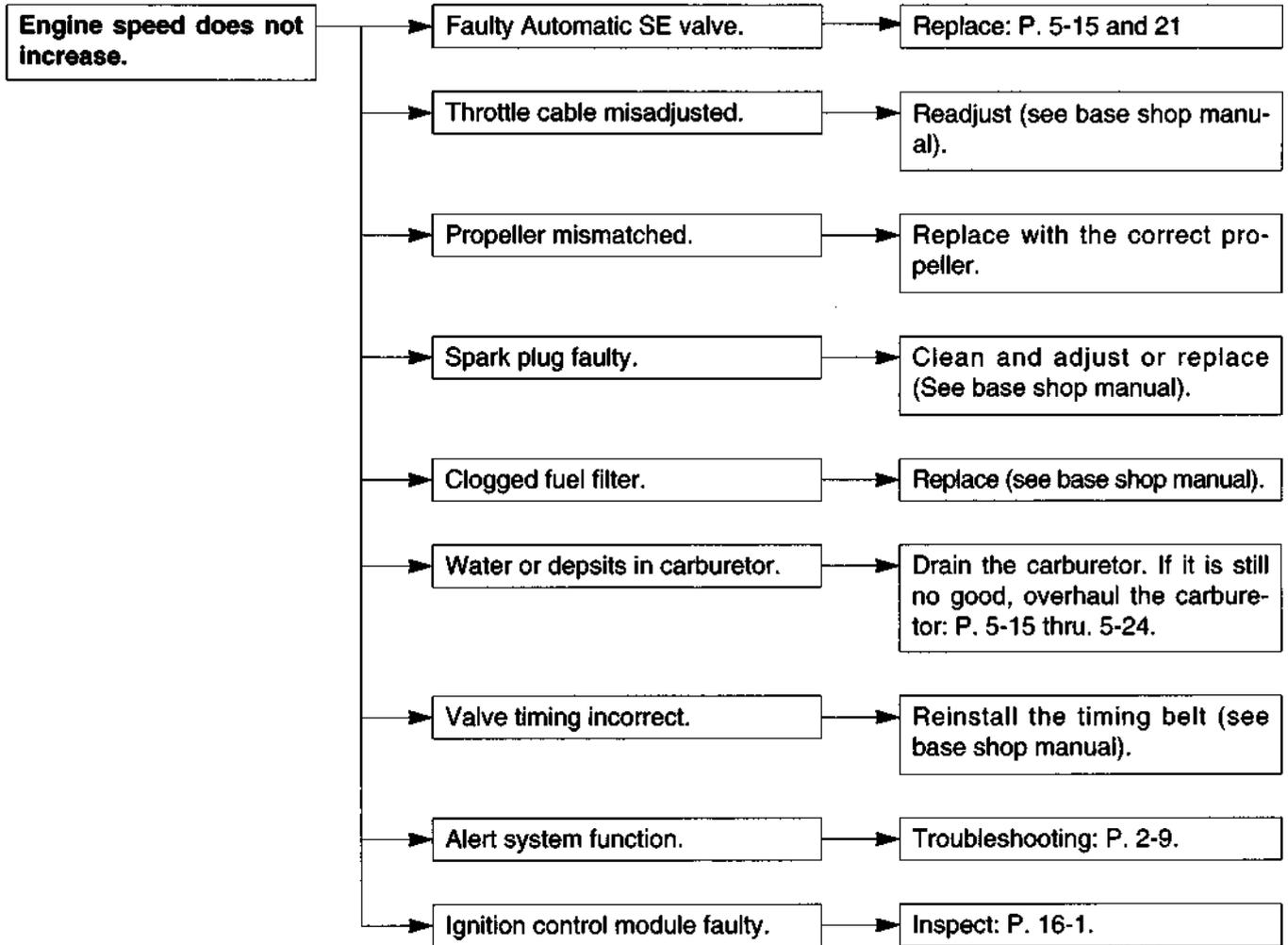
5. TROUBLESHOOTING

a. ENGINE

• Hard Starting

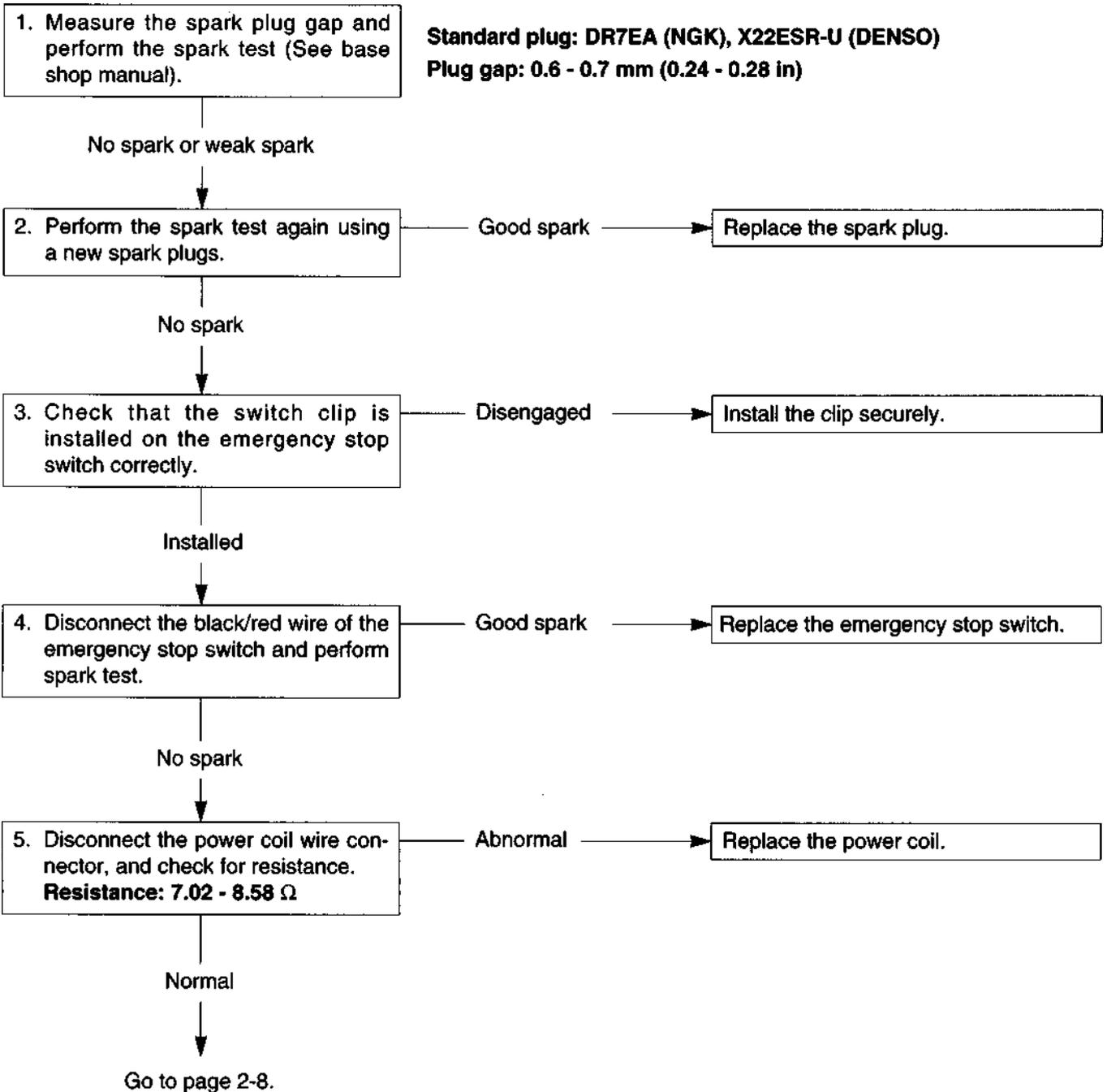


• Engine Does Not Run Smoothly



b. IGNITION SYSTEM

These outboard motors are equipped with an engine overrev limiter which is provided in the ignition control module. The overrev limiter is activated when the engine speed exceeds 6,300 rpm. When activated the sparks are emitted to the No. 1, No. 2 and No. 3 cylinders. The overrev limiter may be activated under such conditions as; light propeller load or propeller ventilation.

• Hard Starting

From page 2-7.

6. Disconnect the pulse generator coil wire connector, and check for resistance.
Resistance: 288 - 352 Ω

Abnormal

Replace the pulse generator coil.

Normal

7. Check for voltage leakage caused by damaged high tension wire insulation. Check the ignition coil resistances (see base shop manual).
Resistance:
Primary: 0.19 - 0.23 Ω
Secondary: 2.8 - 3.4 k Ω

Abnormal

Replace the ignition coil.

Normal

8. Remove the CDI unit and check for resistance between the terminals (P. 16-1).

Abnormal

Replace the CDI unit.

Normal

9. Bring a screwdriver or equivalent tool close to the magnetic section of the flywheel and cam pulley and check the magnetic force.

Abnormal

Replace the flywheel or cam pulley.

Normal

Check the wire harness for short or open circuit. Replace or repair the wire harness.

c. ALERT SYSTEM**Long Tiller Handle Type:**

Oil pressure indicator light (Green) turns OFF while the engine is running.

NOTE:

No problem if the oil pressure light comes OFF when the engine speed is slowed down suddenly, but goes ON after idling for 1 or 2 minutes.

1. Stop the engine and check the oil level. Is the oil level correct?

LOW LEVEL

Fill to the proper level and recheck.

CORRECT LEVEL

2. Start the engine and check the oil pressure light with the engine idling. Does the oil pressure light comes ON?

YES

System is OK (oil level was low).

NO

3. Disconnect the oil pressure switch wire. Does the oil pressure light ON?

NO

Check the CDI unit (P. 16-1).

YES

4. Check the oil pressure switch (see base shop manual). Is the oil pressure switch good?

NO

Replace the oil pressure switch.

YES

5. Check the oil pressure. Is the oil pressure normal?

NO

- Check the oil strainer for clogging. Clean the oil strainer if necessary.
- Check the oil pump. Replace or overhaul the oil pump if necessary.
- Check the oil passage for clogging. Clean the oil passage if necessary.
- Replace the oil filter.

YES

Check the CDI unit (P. 16-1). Replace or repair the wire harness if the CDI unit is in good condition.

Overheat indicator light (Red) turns ON while the engine is running

NOTE:

No problem if the overheat indicator light comes ON when restarting the engine after hot soak at high temperature, but comes OFF after idling for a few minutes

1. Stop the engine and check the water intake screen for clogging. Is the water intake screen clogged?

YES

Remove the foreign material and recheck.

NO

2. Start the engine and check the cooling system indicator with the engine idling. Does cooling water constantly flow through the cooling system indicator?

NO

- Check the discharge port for clogging, clean the discharge port if necessary.
- Check the water pump for wear or damage. Replace or repair the water pump.
- Check the water tube for clogging or damage. Clean or replace the water tube if necessary.

YES

3. Idle in gear for a few minutes to cool down the engine. Check the overheat indicator light. Does the overheat indicator light go OFF?

YES

System is OK (engine temperature was high).

NO

4. Check the thermostat. Is the thermostat good?

NO

Replace the thermostat.

YES

5. Disconnect the ECT (Engine coolant temperature) sensor 2P connector. Check the overheat indicator light. Does the overheat indicator light go OFF?

NO

Check the CDI unit (P. 16-1).

YES

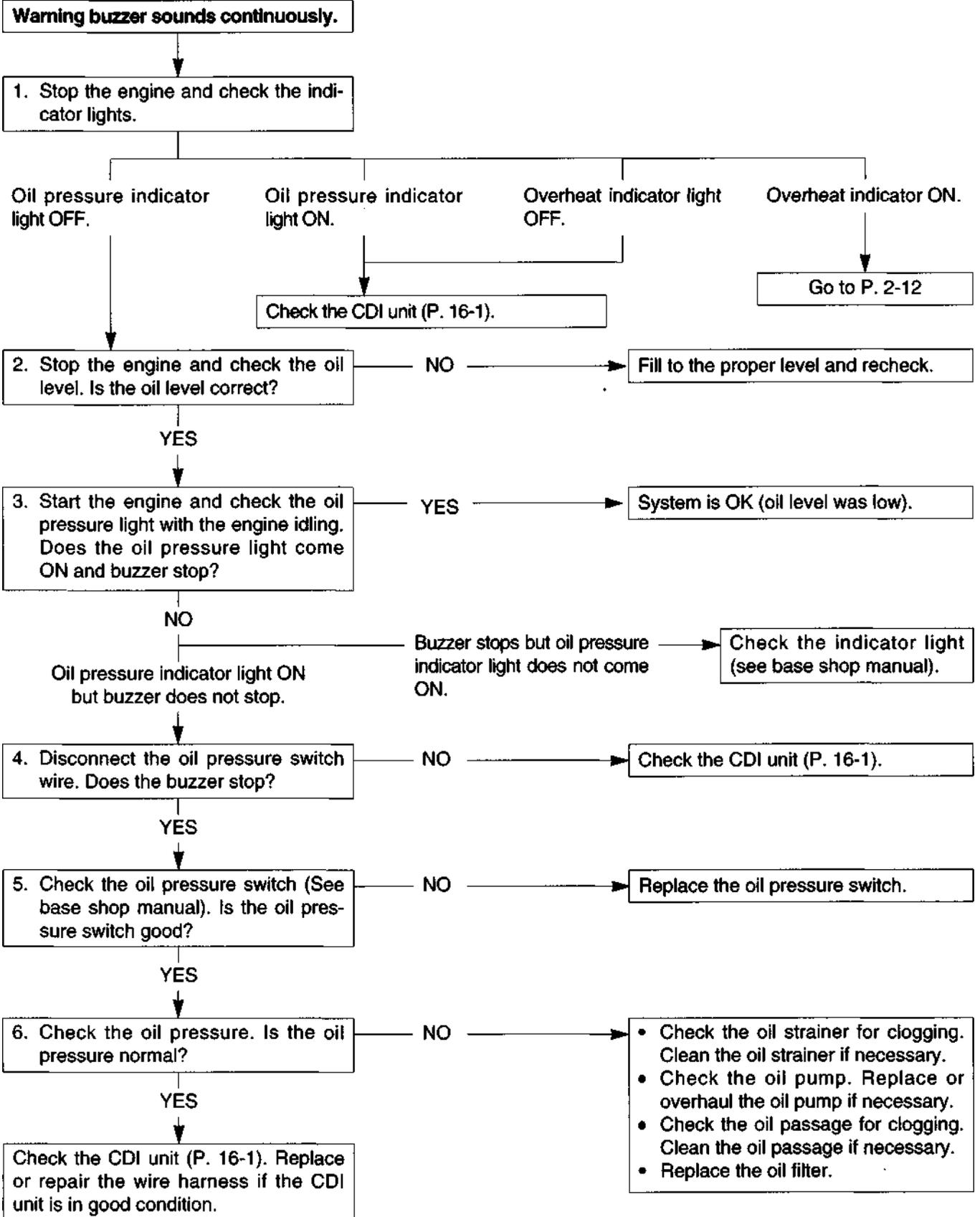
6. Check the ECT sensor (P. 16-3). Is the ECT sensor in good condition.

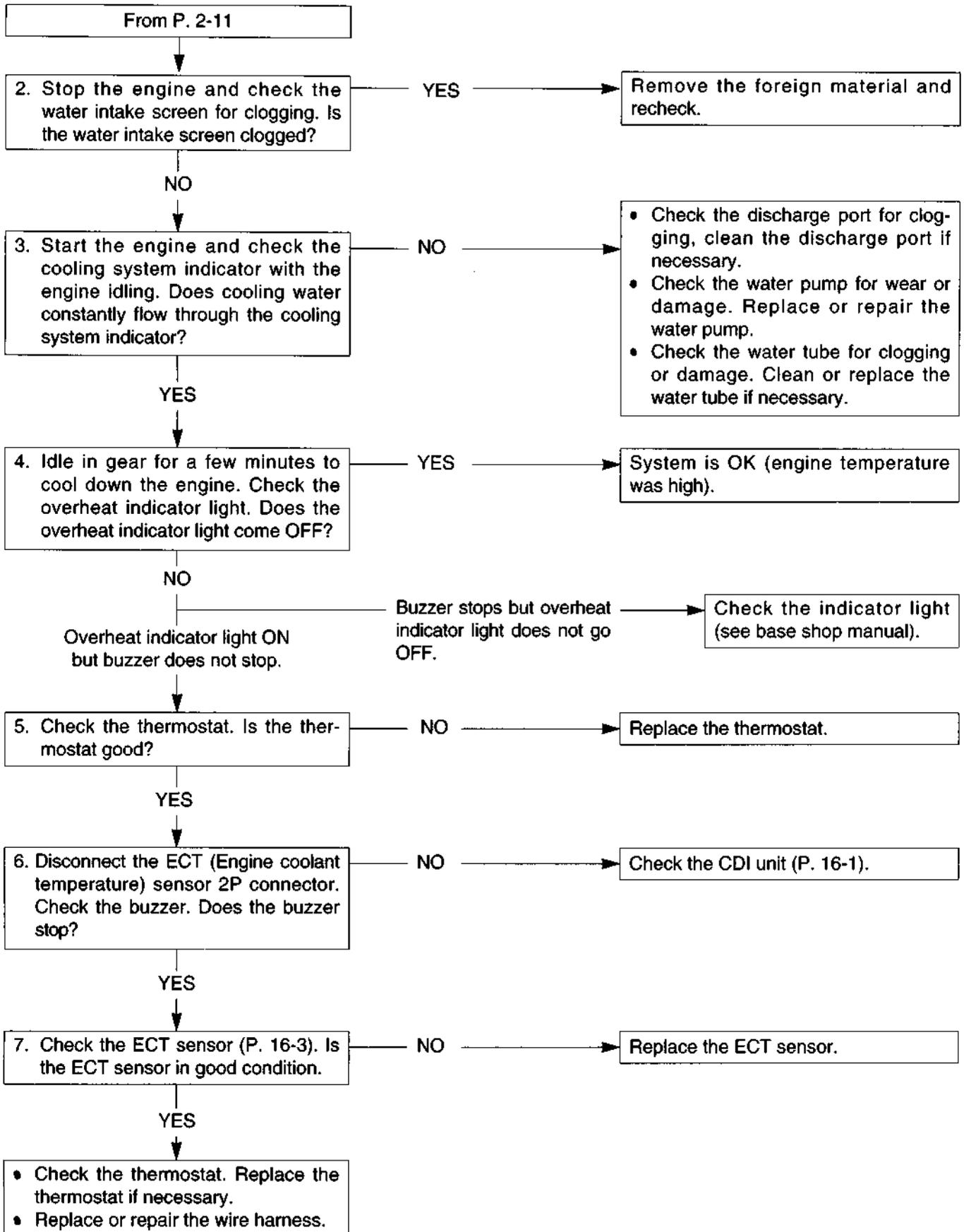
NO

Replace the ECT sensor.

YES

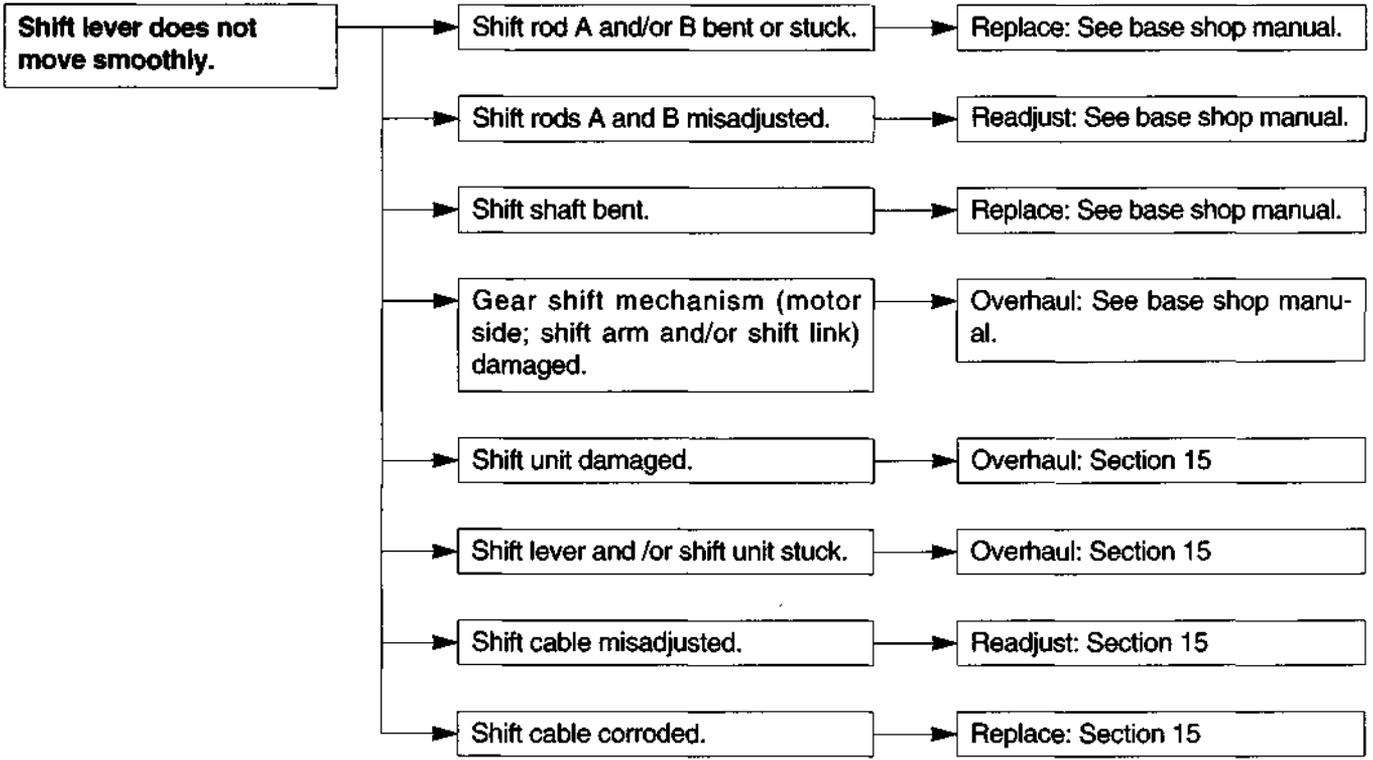
Replace or repair the wire harness.

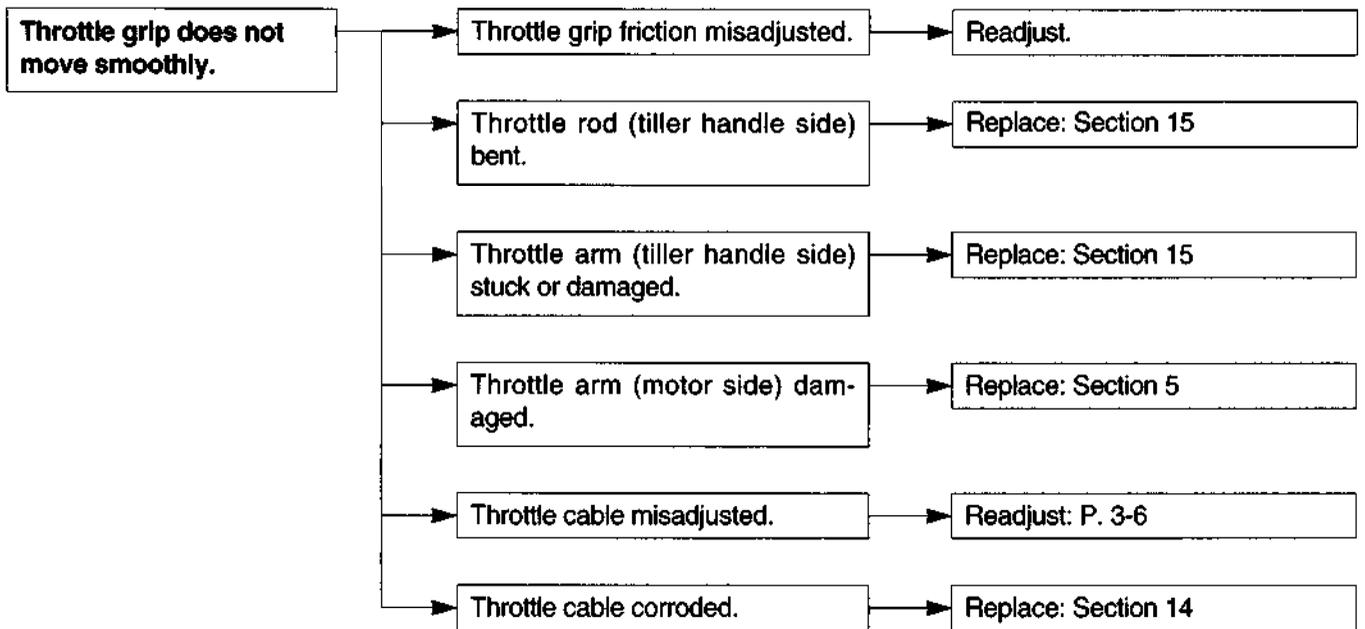
Remote Control Type:



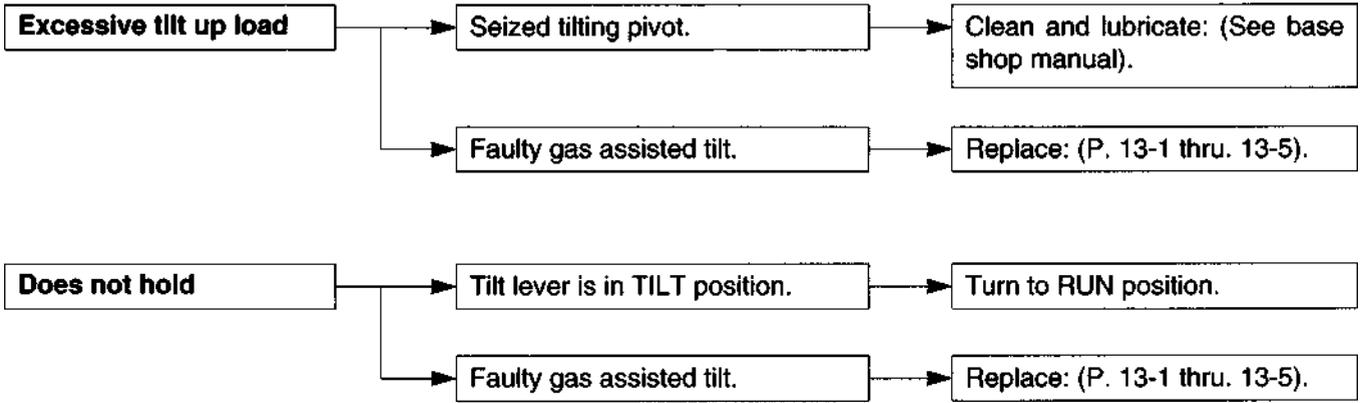
d. SHIFT LEVER

Long Tiller Handle Type:



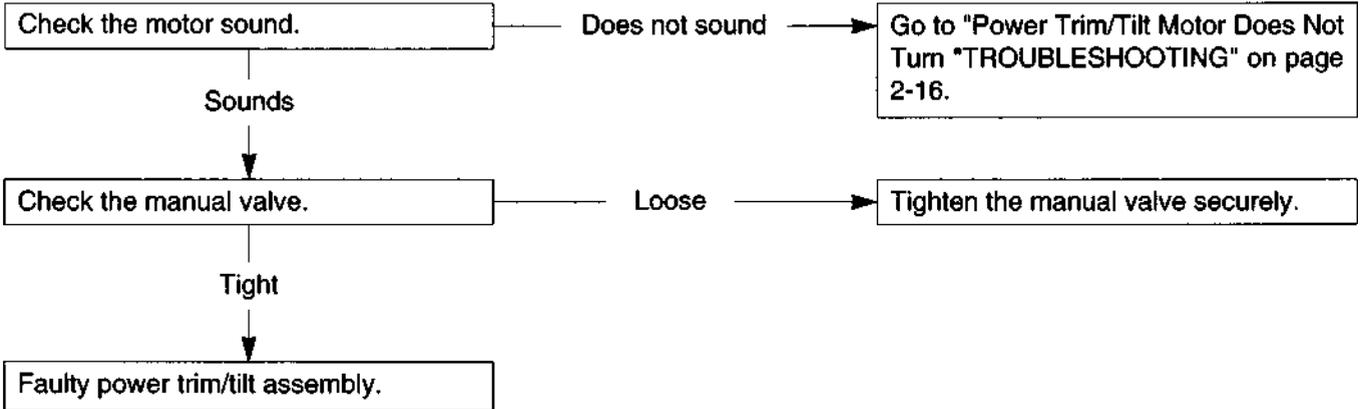
e. THROTTLE GRIP**Long Tiller Handle Type:**

f. GAS ASSISTED TILT

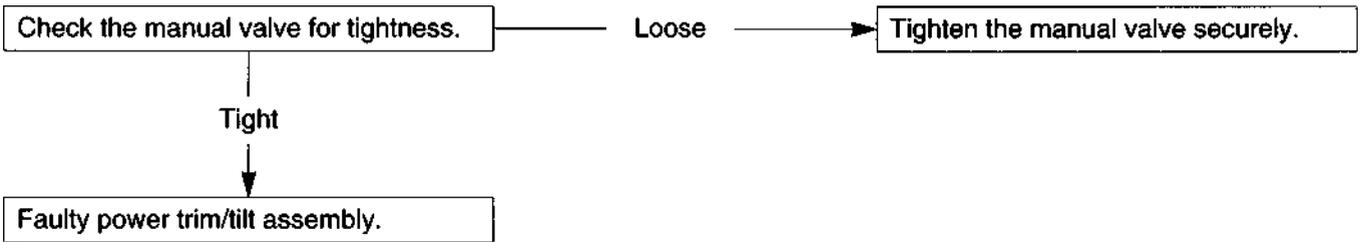


g. POWER TRIM/TILT

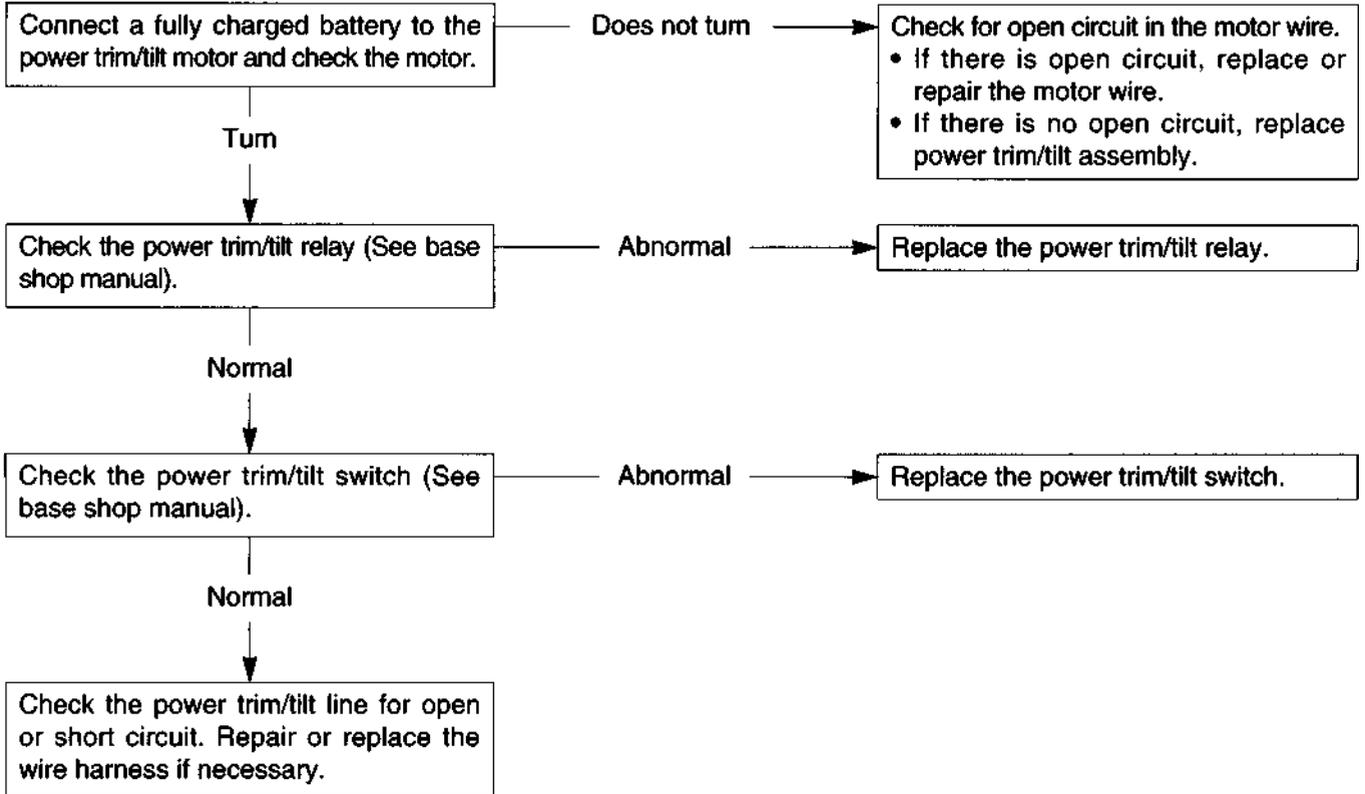
• Power Trim/Tilt Does Not Move



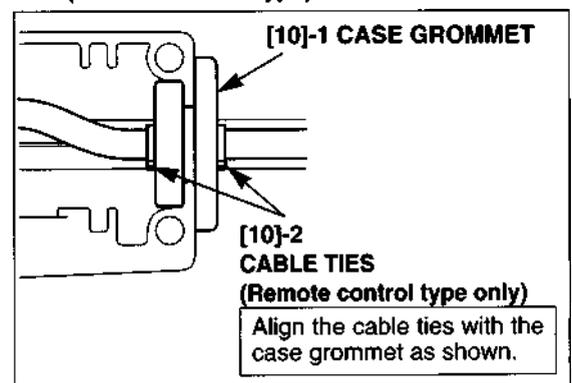
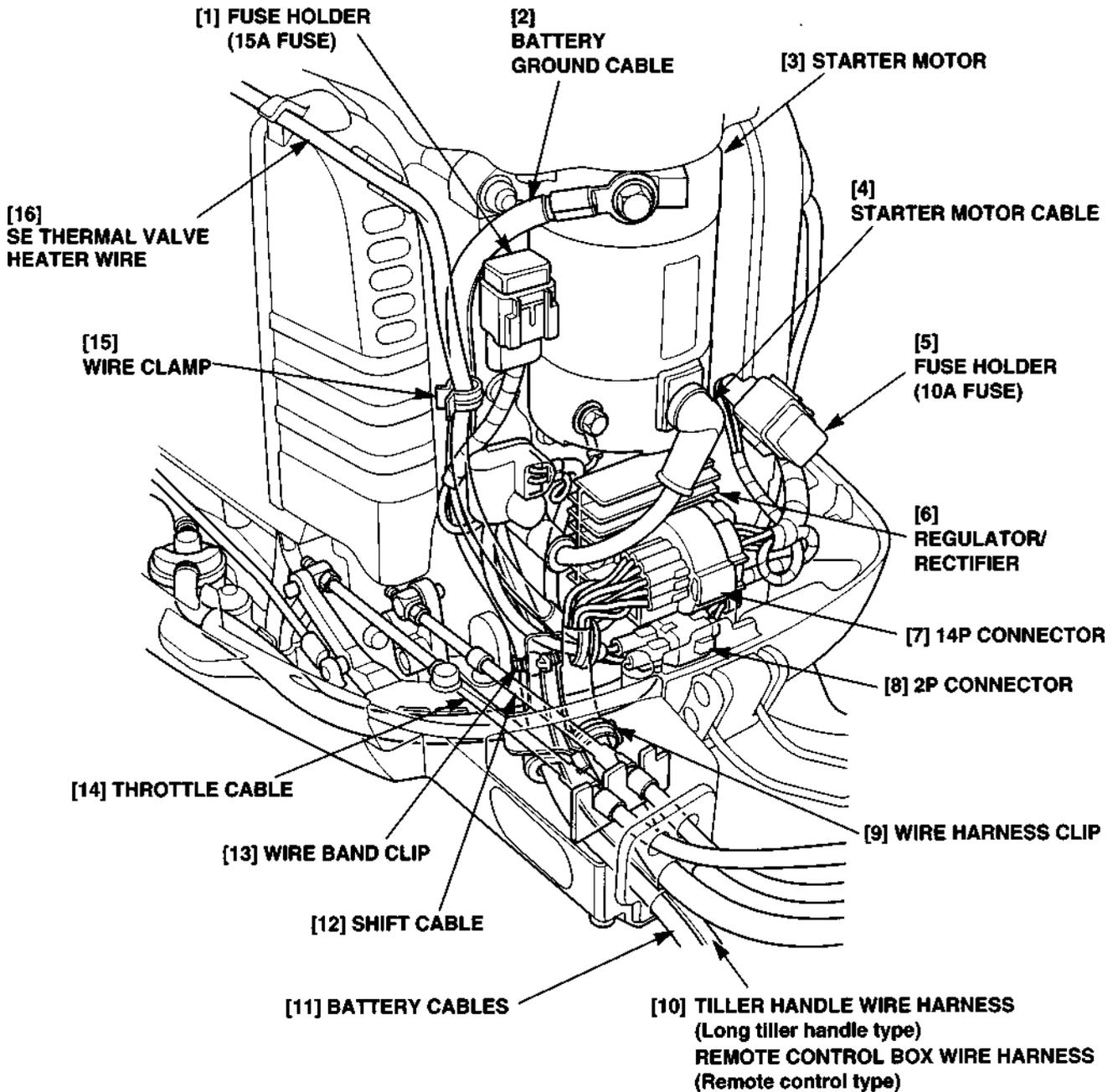
• Power Trim/Tilt Does Not Hold



• Power Trim/Tilt Motor Does Not Turn

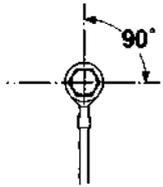


6. CABLE & HARNESS ROUTING



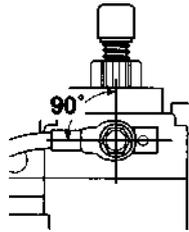
[1] STARTER MAGNETIC SWITCH GROUND TERMINAL

Install the ground terminal to the engine as shown.



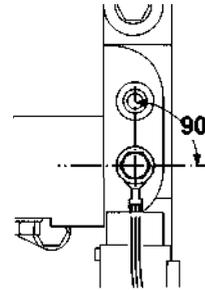
[2] BATTERY GROUND TERMINAL

Install the battery ground terminal to the starter motor as shown.



[3] MAIN WIRE HARNESS GROUND TERMINAL

Install the ground terminal to the engine as shown.

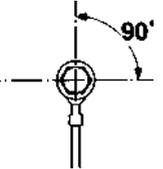


[9] WIRE HARNESS CLIP

Clamp the wires (SE thermal valve heater wire and battery ground cable) with the open end facing to the left as shown.

[8] REGULATOR/RECTIFIER GROUND TERMINAL

Install the ground terminal to the engine as shown.



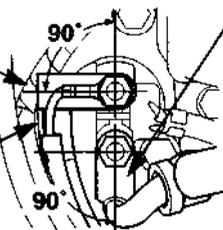
[7] BATTERY POSITIVE CABLE and STARTER MOTOR CABLE

Install the battery positive cable and power trim/tilt relay wire (power trim/tilt type only), and starter motor cable as shown.

[7]-1 BATTERY POSITIVE CABLE

[7]-2 STARTER MOTOR CABLE

[7]-3 POWER TRIM/TILT POWER SUPPLY WIRE (Power trim/tilt type only)



[4] WIRE HARNESS CLIP

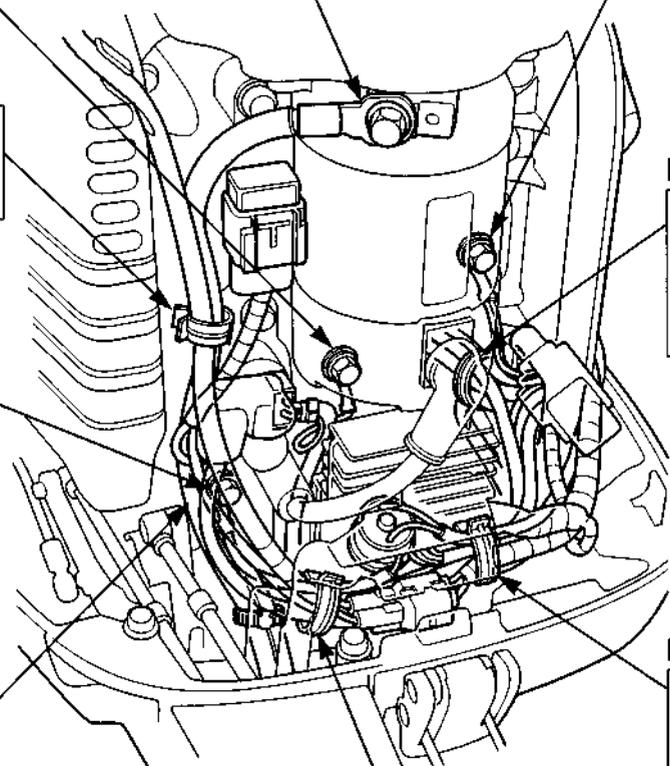
Clamp the wires (power trim/tilt switch wire, power trim/tilt relay wires, and trim angle sensor wire) with the open end facing up as shown.

[5] WIRE HARNESS CLIP

Clamp the wires (main wire harness, power trim/tilt relay wire, regulator/rectifier wire, neutral switch wire, and starter magnetic switch wire) with the open end facing up as shown.

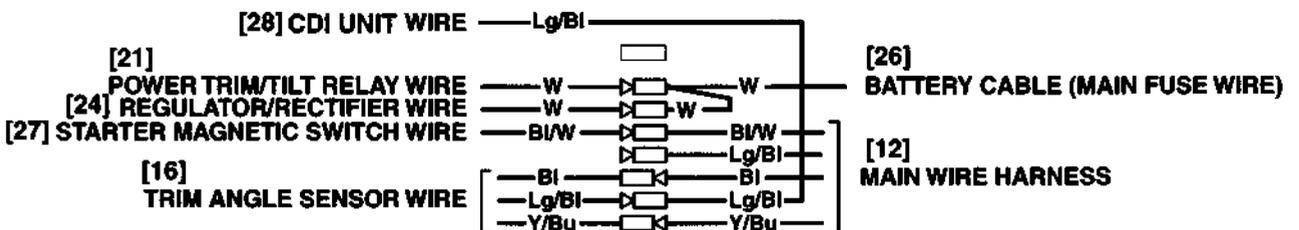
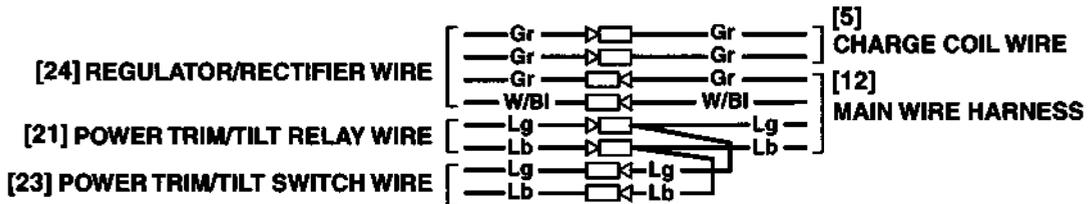
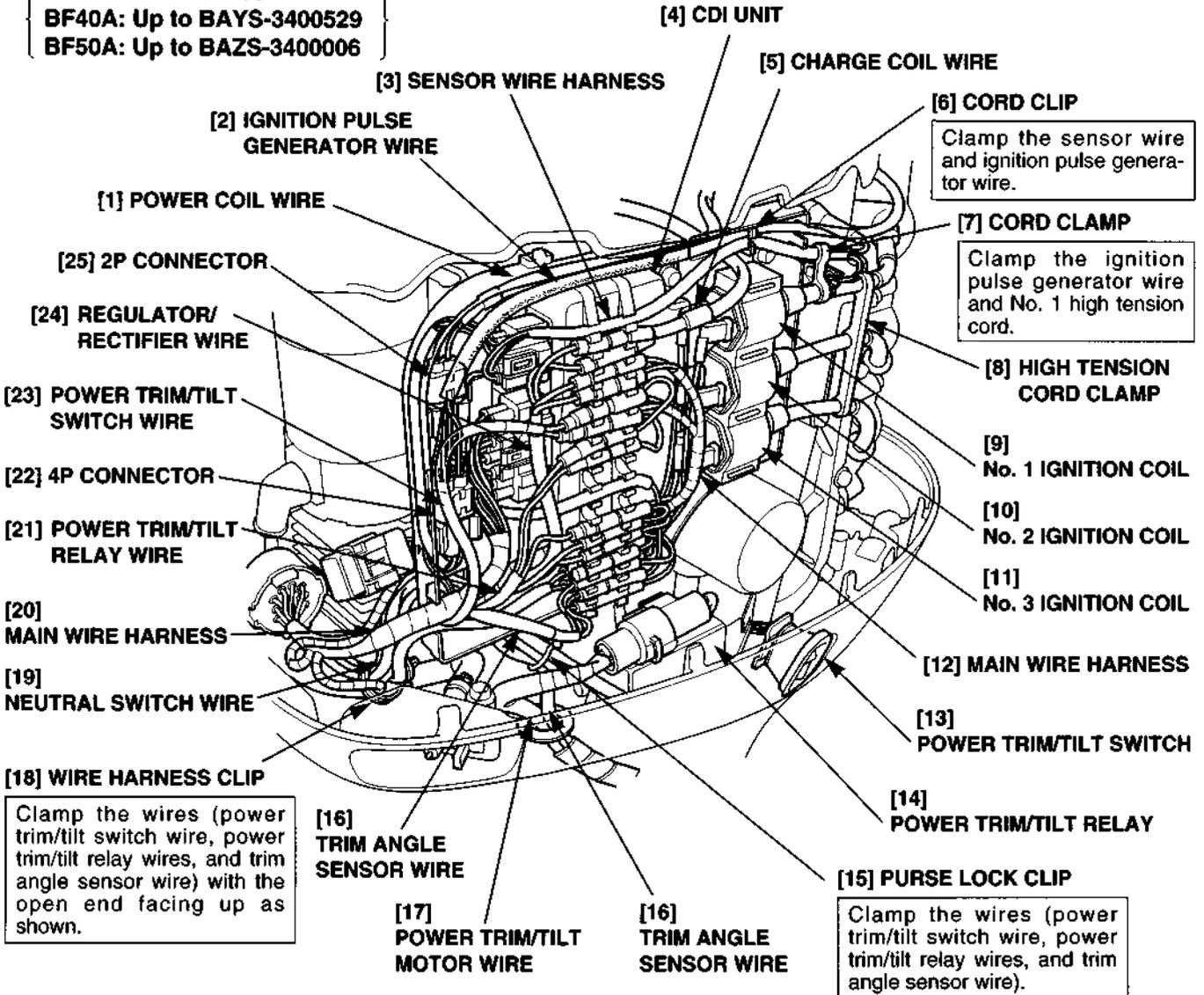
[6] WIRE HARNESS CLIP

Clamp the wires (SE thermal valve heater wire, power trim/tilt relay wire, regulator/rectifier ground wire, and starter magnetic switch wire) with the open end facing up as shown.



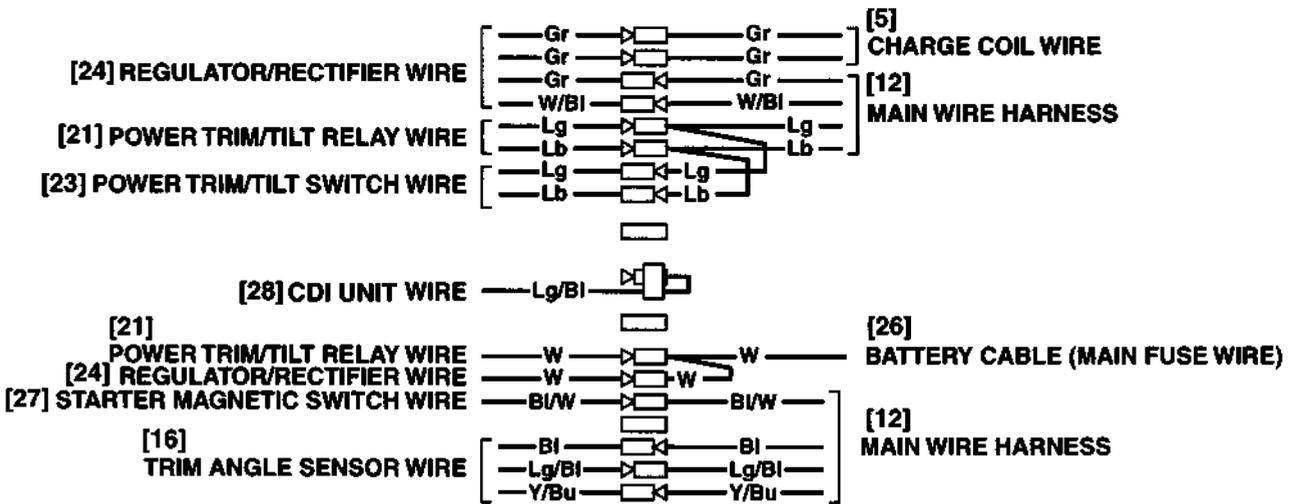
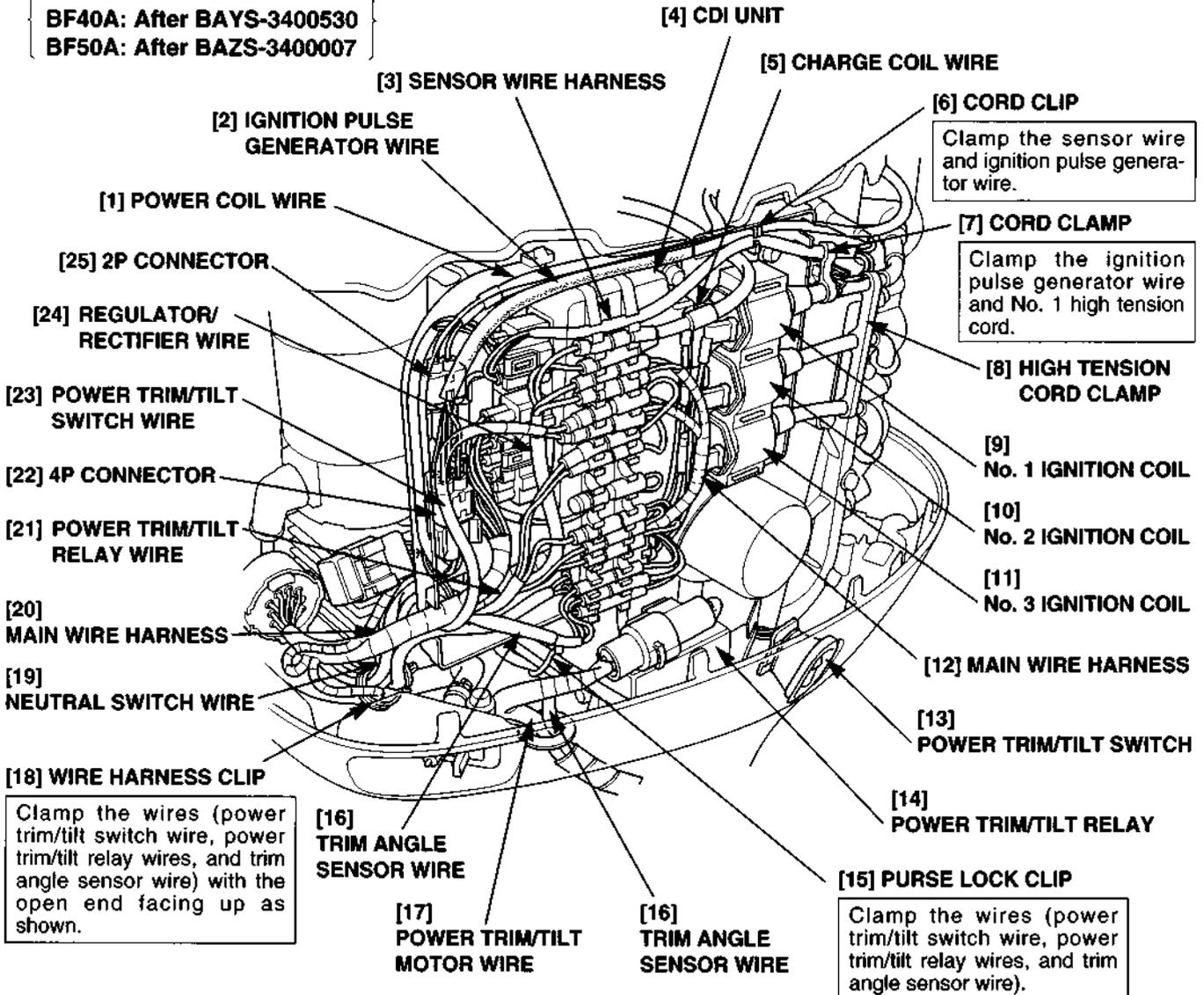
• Power Trim/Tilt Type

Frame serial number:
 BF40A: Up to BAYS-3400529
 BF50A: Up to BAZS-3400006

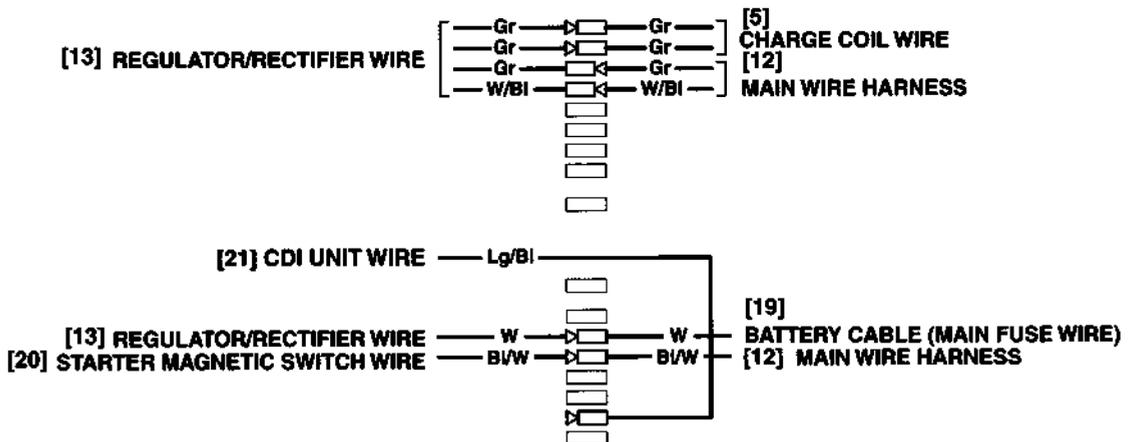
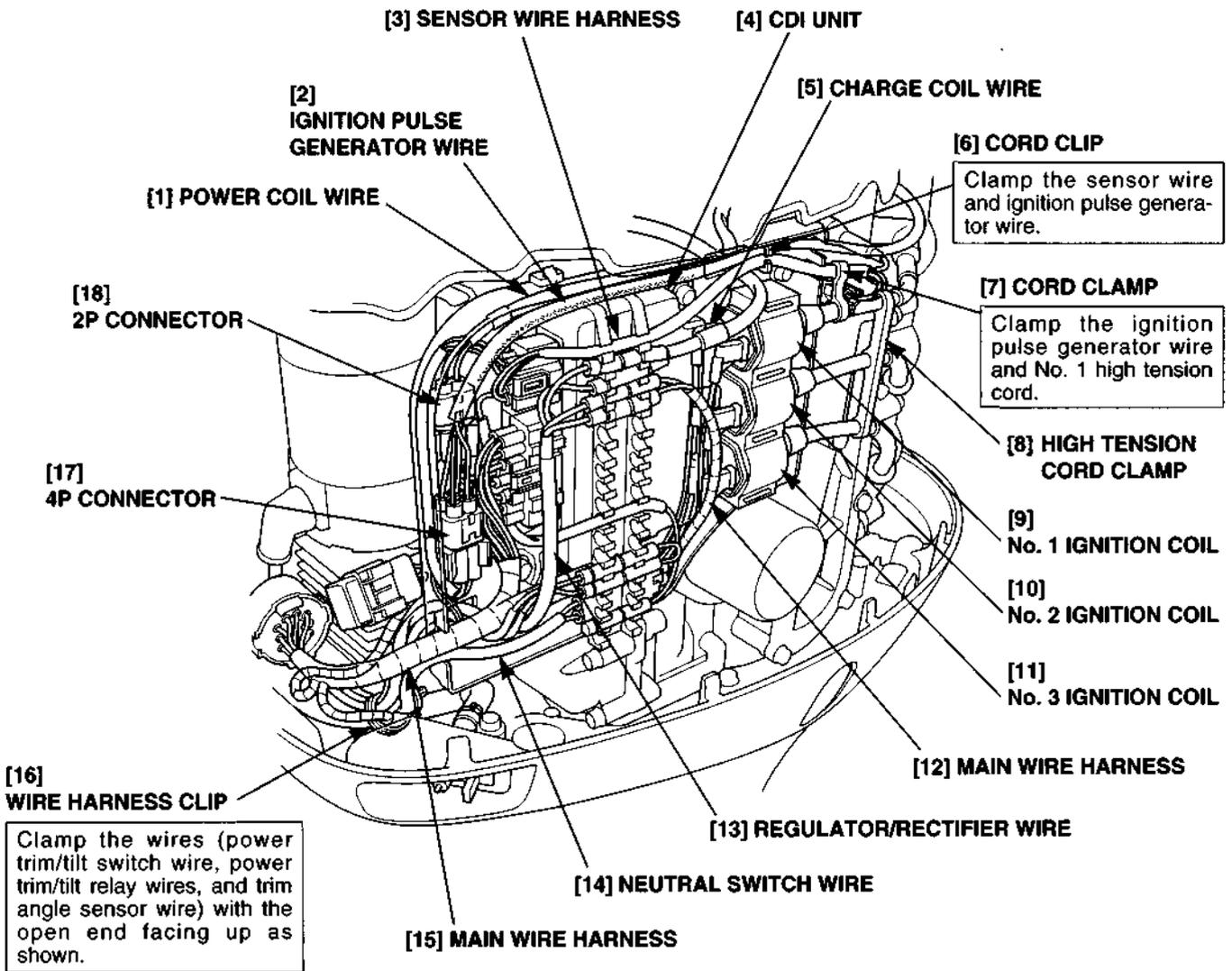


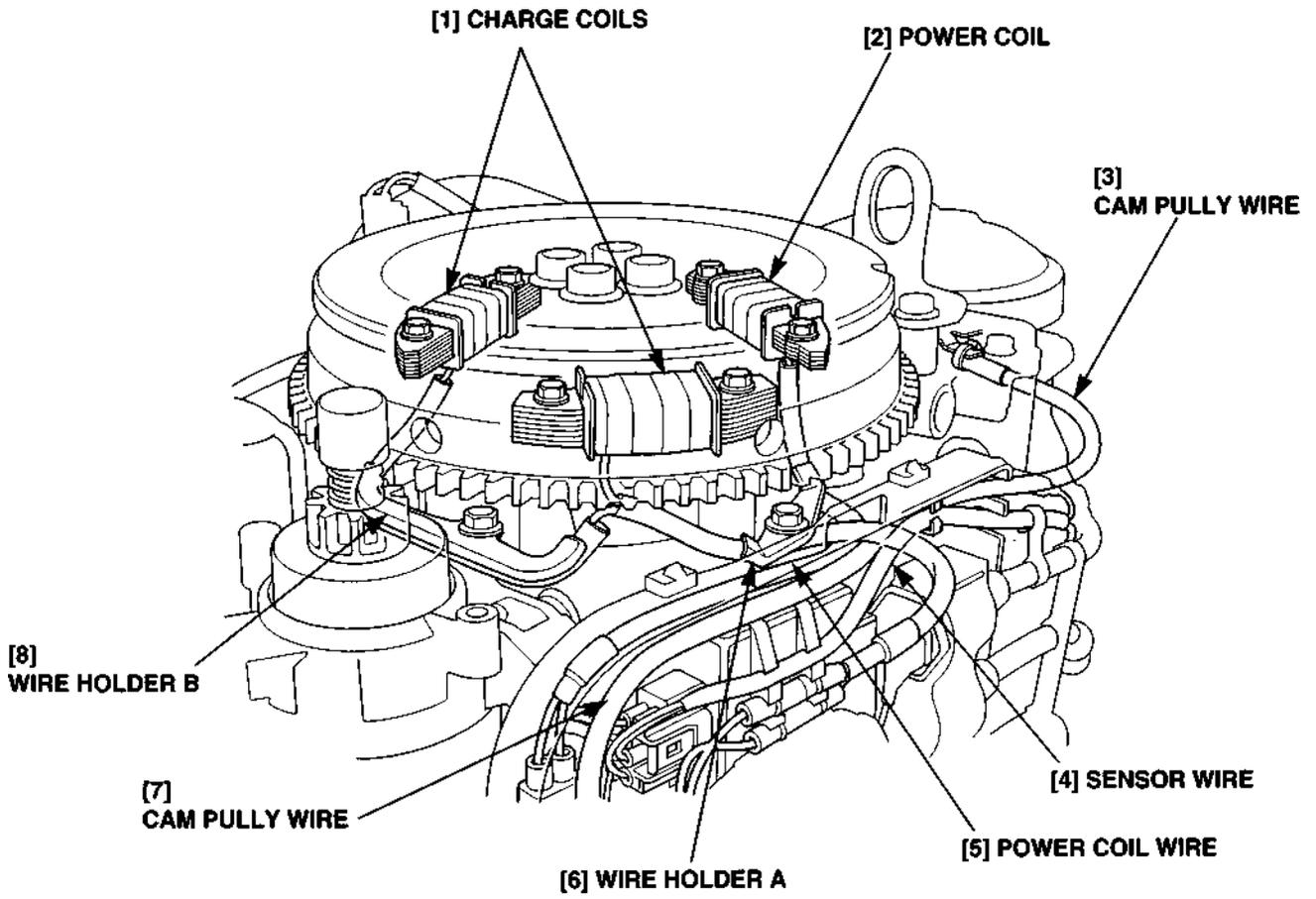
• Power Trim/Tilt Type

Frame serial number:
 BF40A: After BAYS-3400530
 BF50A: After BAZS-3400007

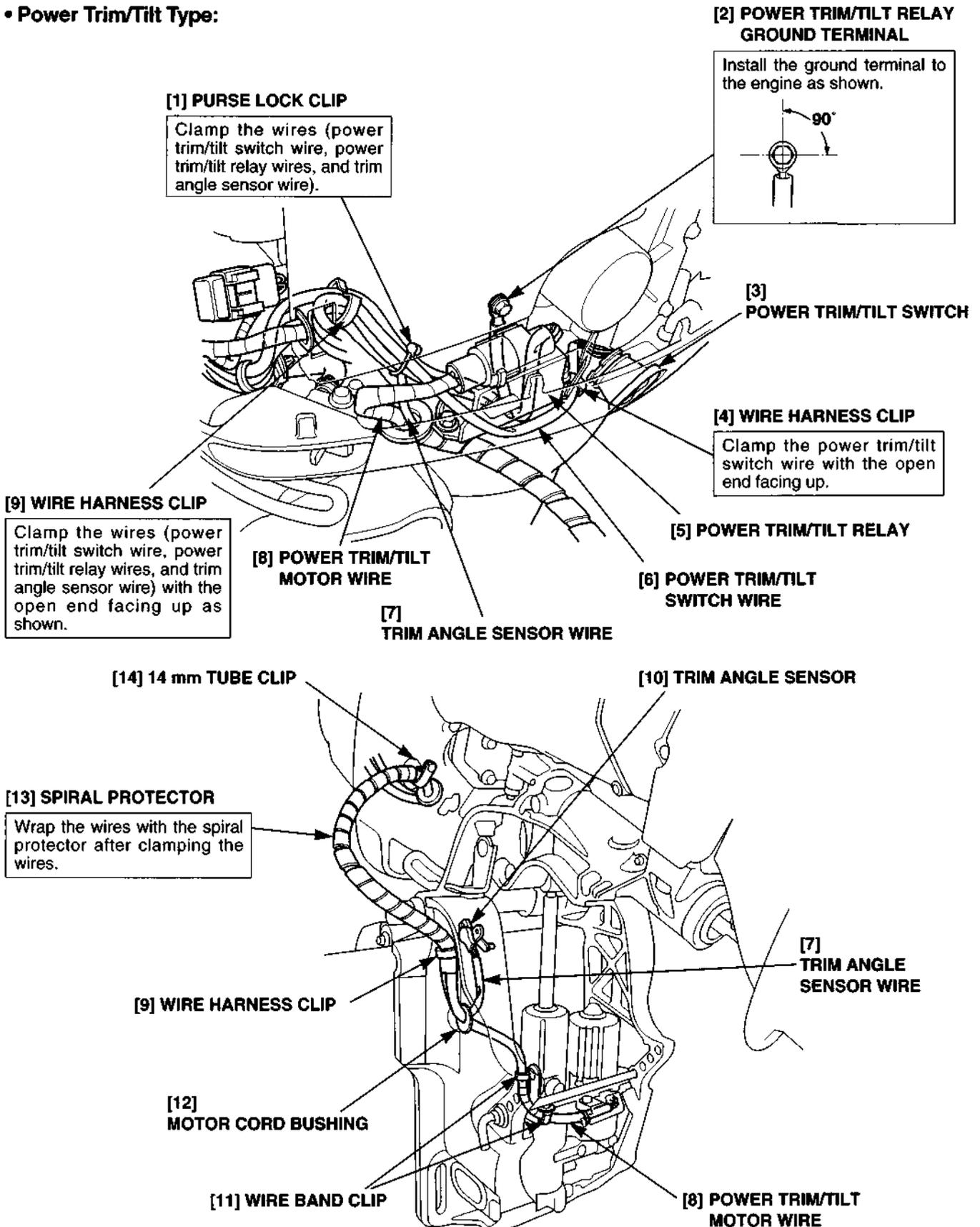


• Gas-Assisted Tilt Type:

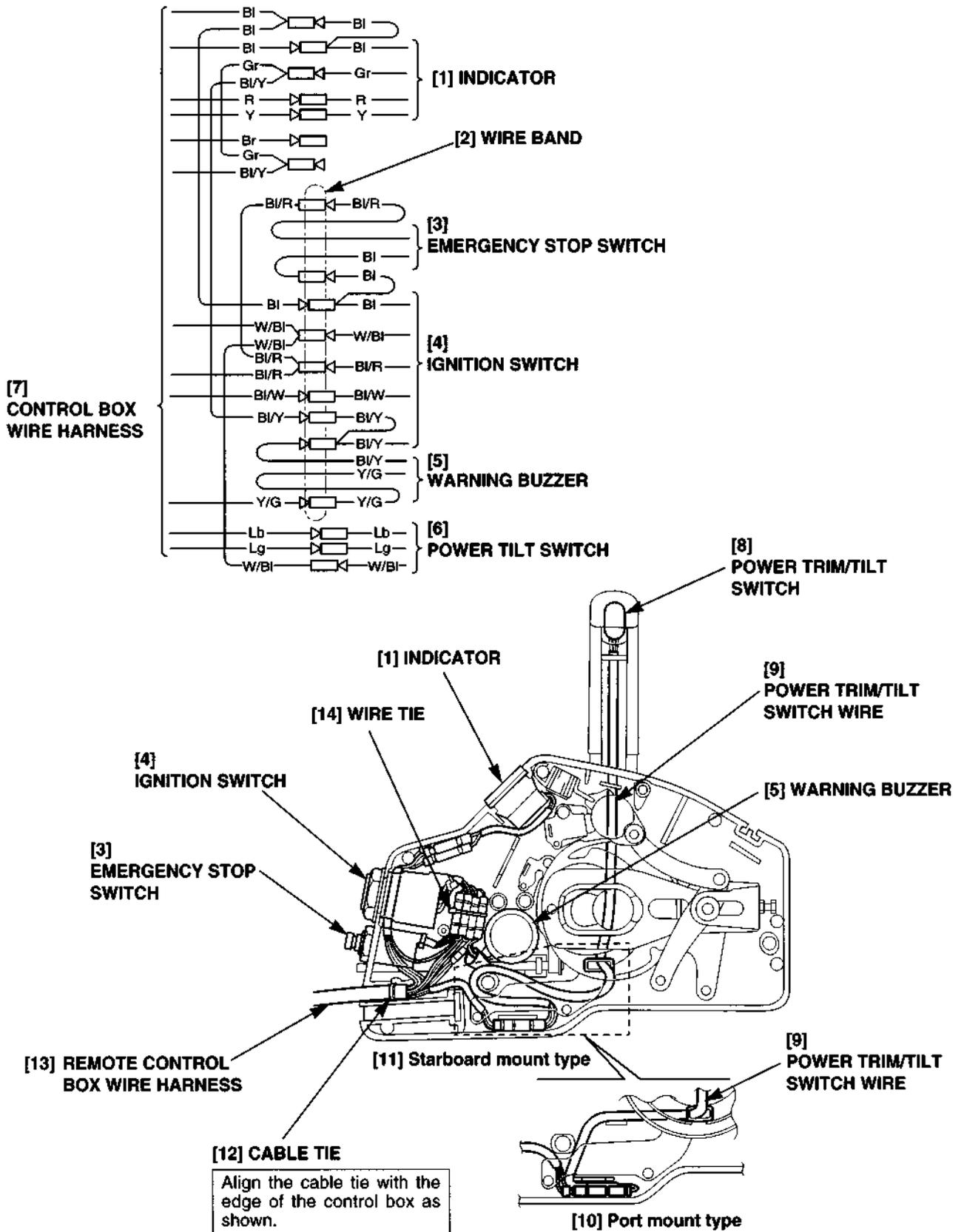




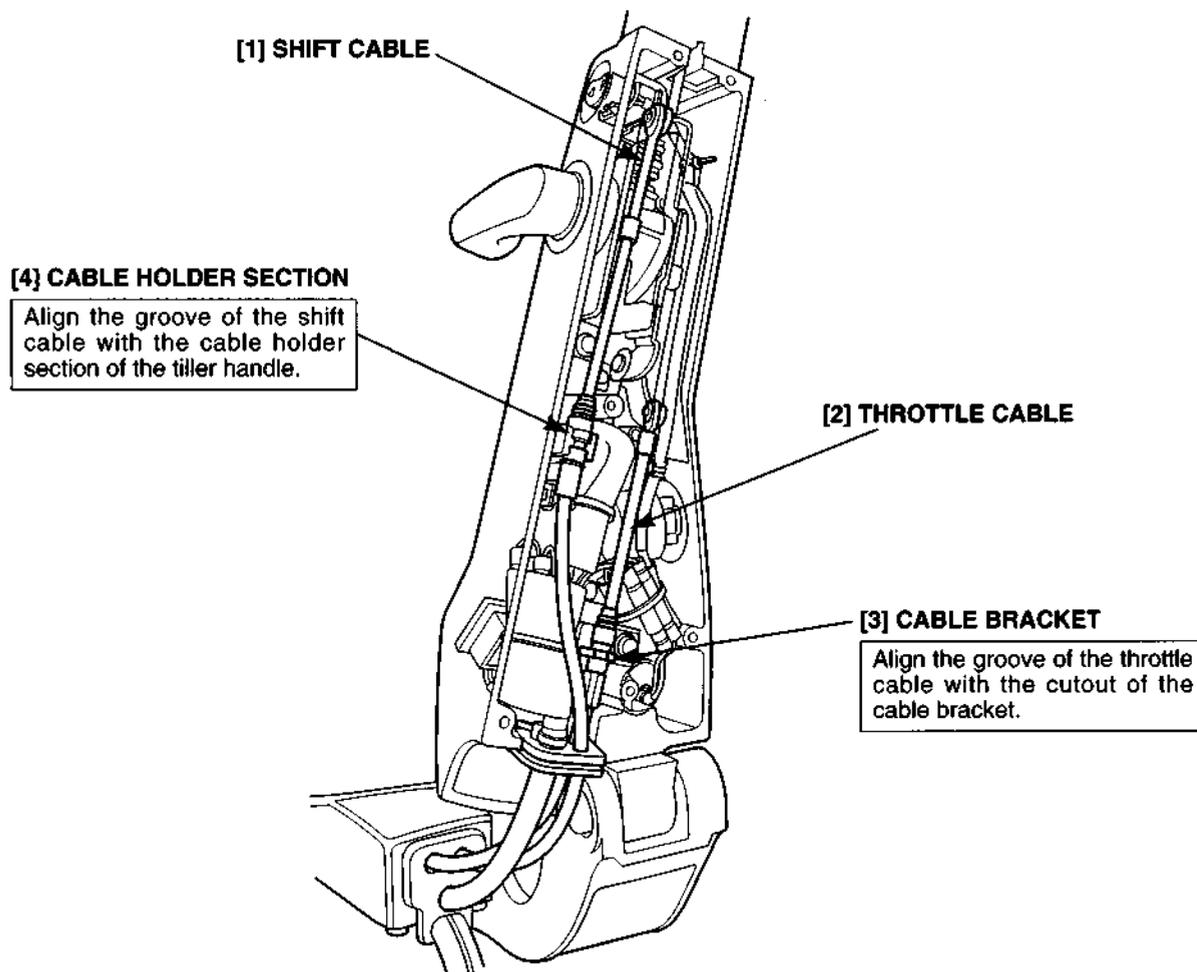
• Power Trim/Tilt Type:



• Remote Control Type With Power Trim/Tilt:

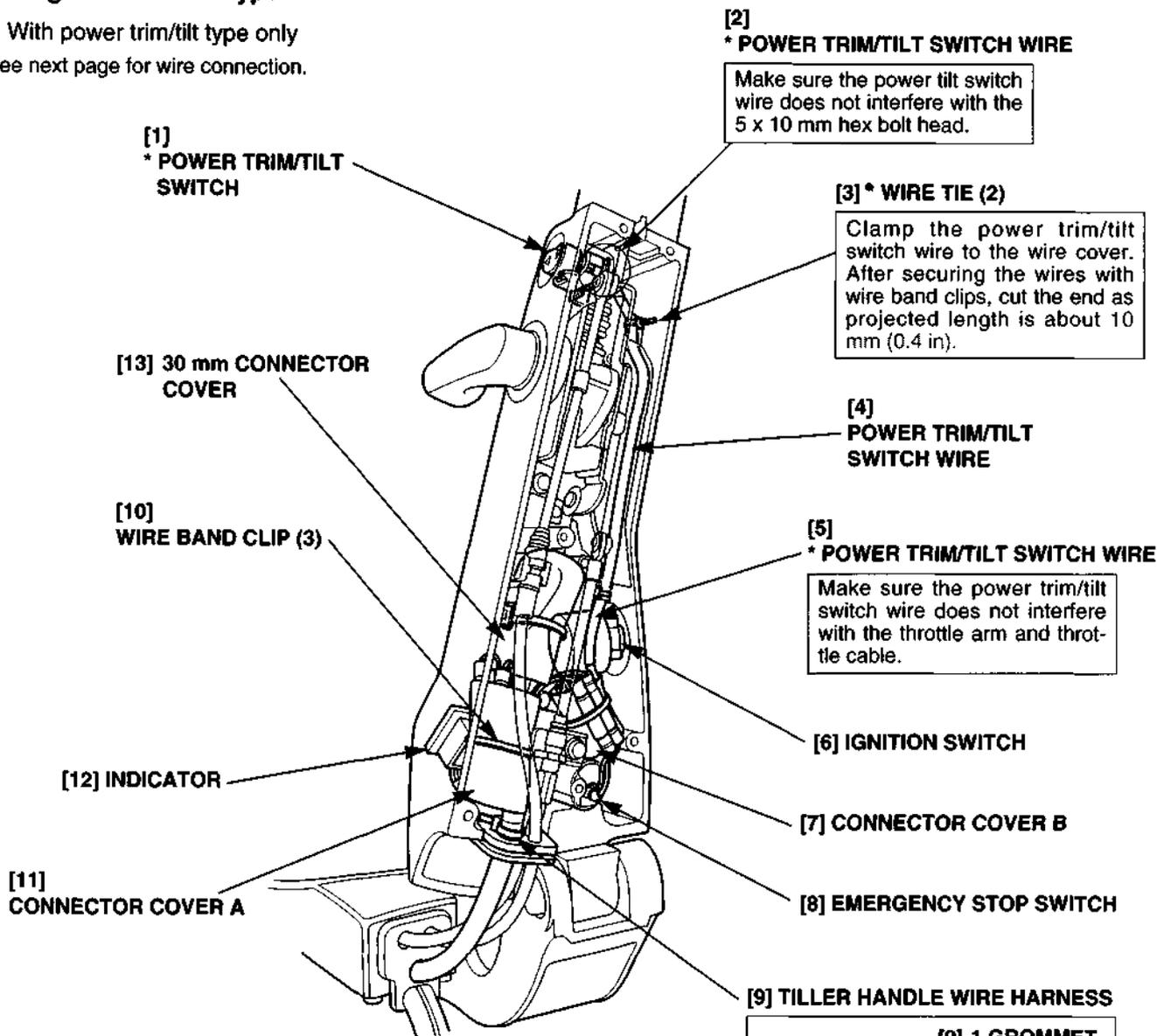


• Long Tiller Handle Type:



• Long Tiller Handle Type:

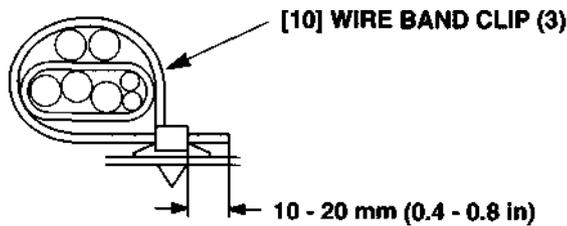
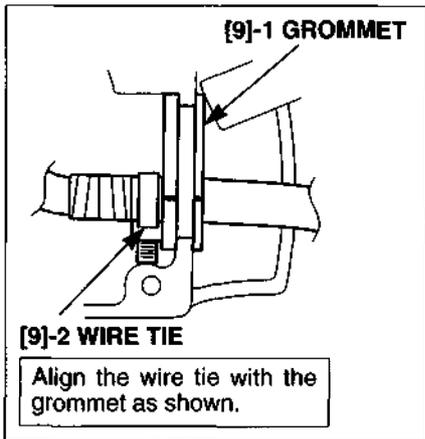
*: With power trim/tilt type only
See next page for wire connection.



Make sure the power tilt switch wire does not interfere with the 5 x 10 mm hex bolt head.

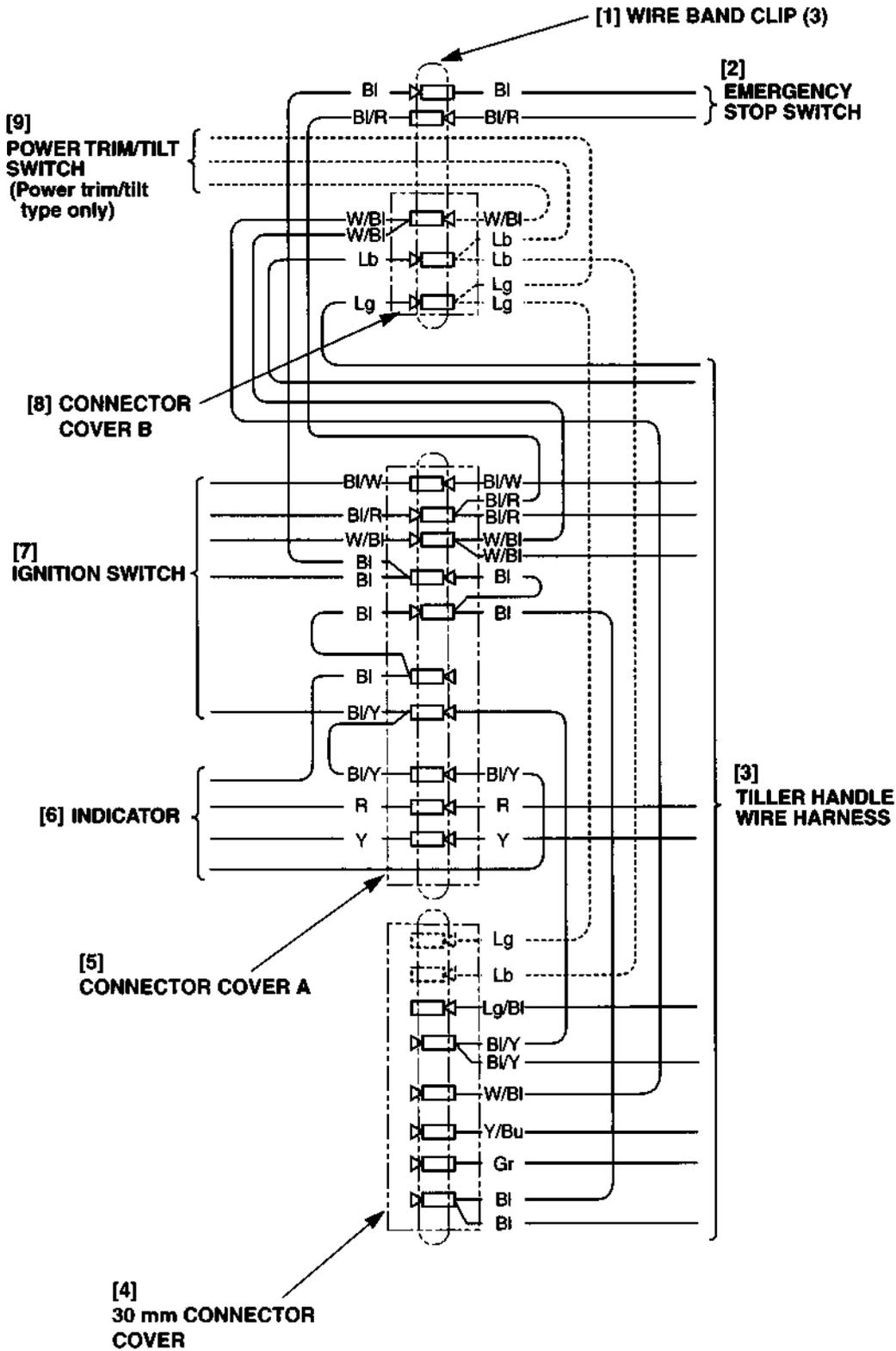
Clamp the power trim/tilt switch wire to the wire cover. After securing the wires with wire band clips, cut the end as projected length is about 10 mm (0.4 in).

Make sure the power trim/tilt switch wire does not interfere with the throttle arm and throttle cable.

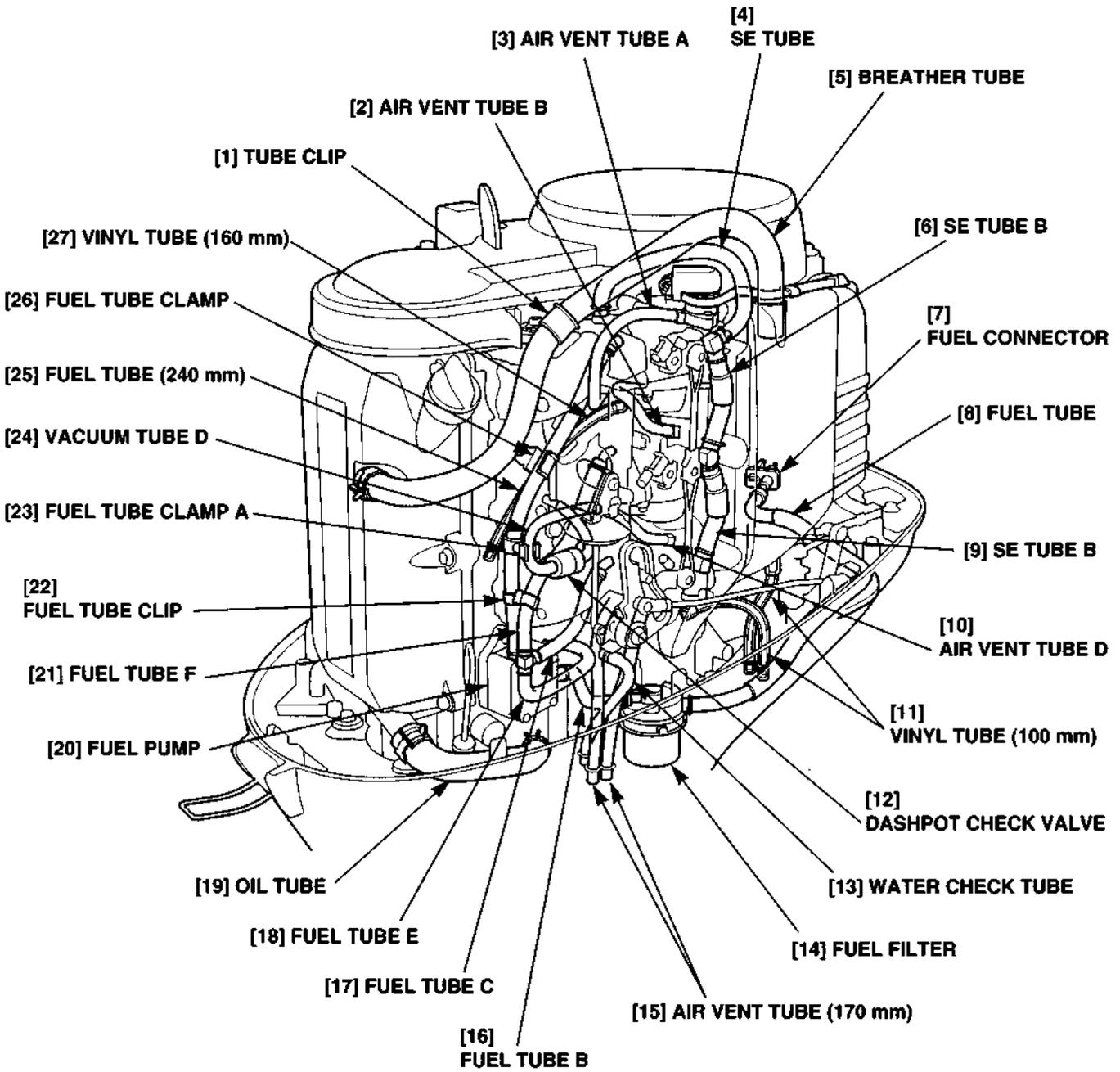


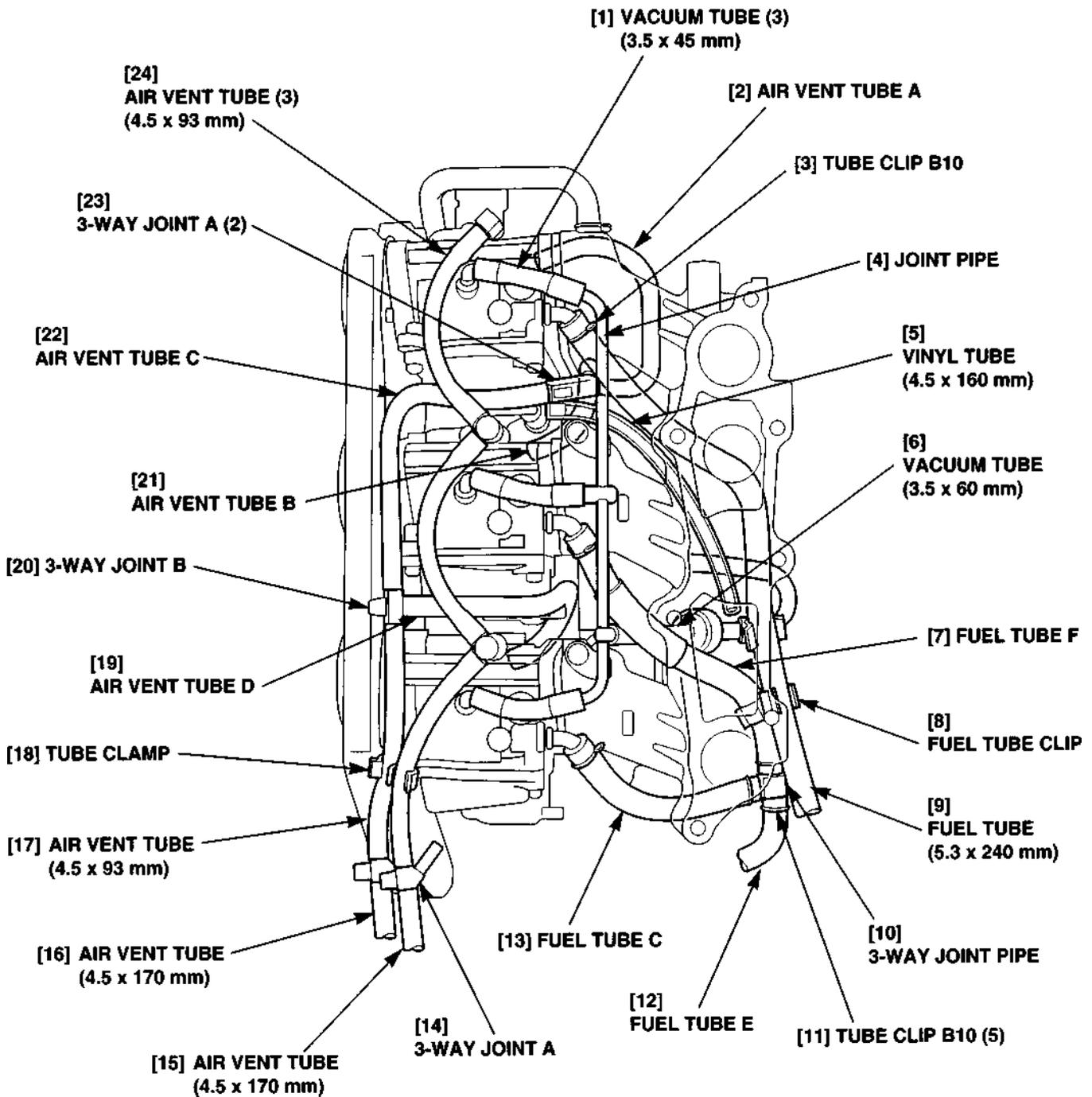
[10]-1
After securing the wires with wire band clips, cut the end as projected length is 10 - 20 mm (0.4 - 0.8 in), provided that the length is not specified in the corresponding drawings.

• Wire Connection in the Long Tiller Handle:



7. TUBE ROUTING





1. MAINTENANCE SCHEDULE
2. CARBURETOR SYNCHRONIZATION
3. DASHPOT DIAPHRAGM
4. THROTTLE LINKAGE ADJUSTMENT

5. SHIFT CABLE ADJUSTMENT
(Long Tiller Handle Type)
6. STEERING FRICTION ADJUSTMENT
(Long Tiller Handle Type)

1. MAINTENANCE SCHEDULE

ITEM	REGULAR SERVICE PERIOD (2) Perform at every indicated month or operating hour interval, whichever comes first.	Each use	After use	First month or 20 Hrs	Every 6 months or 100 Hrs	Every year or 200 Hrs	Every 2 years or 400 Hrs	Refer to page
• Engine oil	Check level	○						*3-2
	Change			○	○			
Gear case oil	Change			○	○			*3-4
• Engine oil filter	Replace					○		*3-3
Timing belt	Check-adjust					○		*3-16
Carburetor linkage	Check-adjust			○	○			3-5
• Idling speed	Check-adjust			○	○			*3-8
• Valve clearance	Check-adjust			○		○		*3-5
• Spark plugs	Check-adjust				○			*3-4
	Replace					○		
Propeller and cotter pin	Check	○						*11-2
Anode	Check	○						—
Lubrication	Grease			○ (1)	○ (1)			*2-35
• Fuel tank and tank filter	Clean					○		*3-8
Thermostat	Check					○		*8-3
• Fuel filter	Check				○			*3-7
	Replace						○	
• Fuel line	Check	○						*5-4
	Replace		Every 2 years (if necessary)					
Battery and cable connection	Check level-tighten	○						—
Bolts and nuts	Check-tighten			○	○			—
• Crankcase breather tube	Check					○		*5-3
Cooling water passage	Clean		○ (3)					—

*: Refer to the base shop manual.

- Emission related items (Bodensee type and Canadian type)

(1) Lubricate more frequently when used in salt water.

(2) For professional commercial use, log hours of operation to determine proper maintenance interval.

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

2. CARBURETOR SYNCHRONIZATION

CAUTION

Running the outboard motor without sufficient cooling water will damage the water pump and overheat the engine. Be sure that water flows from the cooling system indicator while the engine is running. If not, stop the engine and determine the cause of the problem.

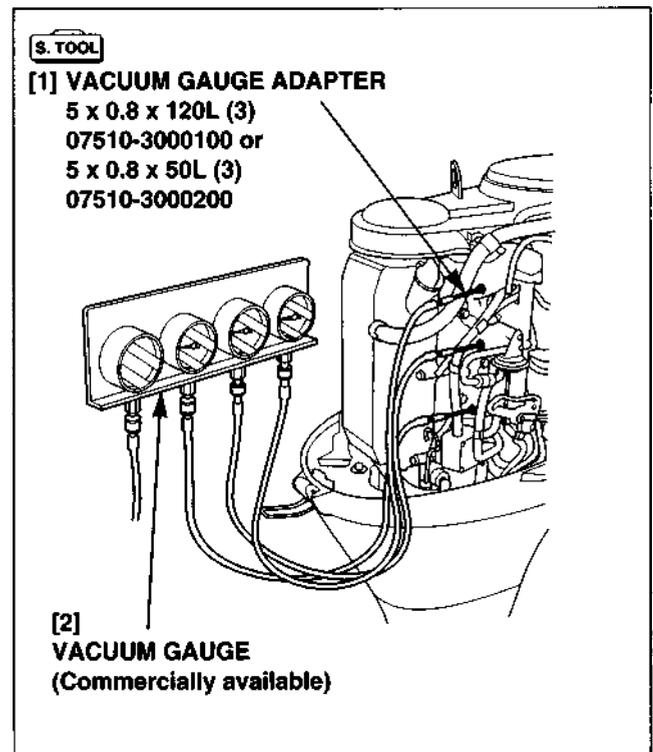
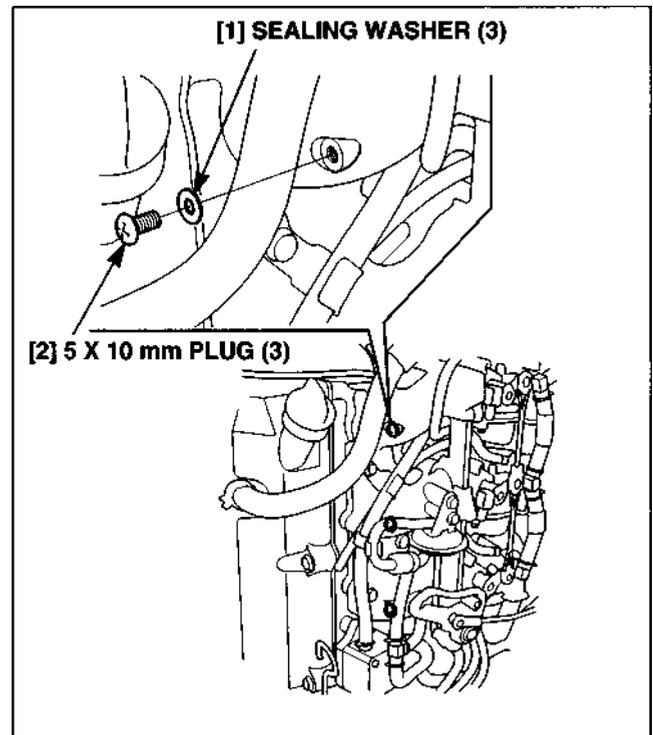
- 1) Remove the engine cover.
- 2) Remove the 5 x 10 mm plugs and sealing washers from the intake manifold of each cylinder.
- 3) Attach the vacuum gauge adapters to each intake manifold plug hole and connect the vacuum gauge hoses to the adapters.
 - Connect:
 - The No. 1 vacuum gauge hose to the No. 1 vacuum gauge adapter.
 - The No. 2 vacuum gauge hose to the No. 2 vacuum gauge adapter.
 - The No. 3 vacuum gauge hose to the No. 3 vacuum gauge adapter.
- 4) Attach an engine tachometer and restart the engine.
 - Follow the tachometer manufacturer's instructions.
- 5) Run the outboard motor in an outboard test tank with the water at least 4 inches above the antivibration plate. Allow the engine to warm up to normal operating temperature (Approx. 10 minutes).

⚠ WARNING

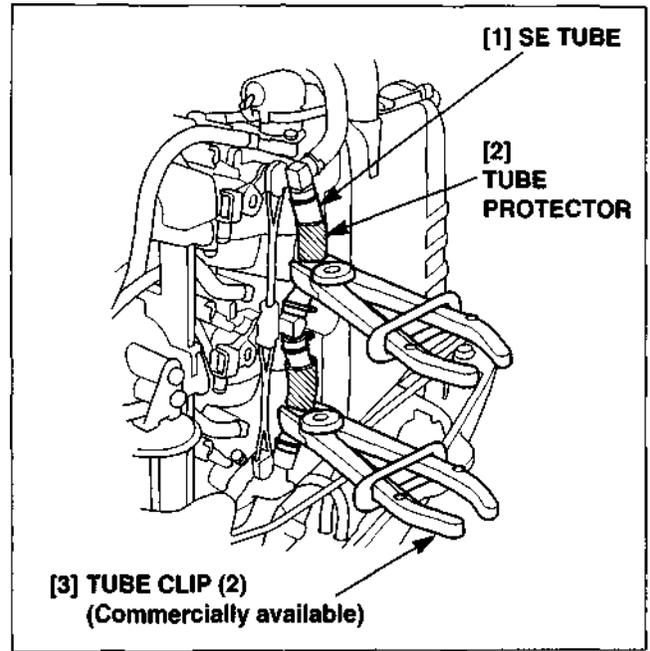
Engine exhaust contains poisonous carbon monoxide gas that can cause unconsciousness and death.

- If the engine must be running, make sure the area is well ventilated.

- 6) Check the idle speed (See base shop manual).

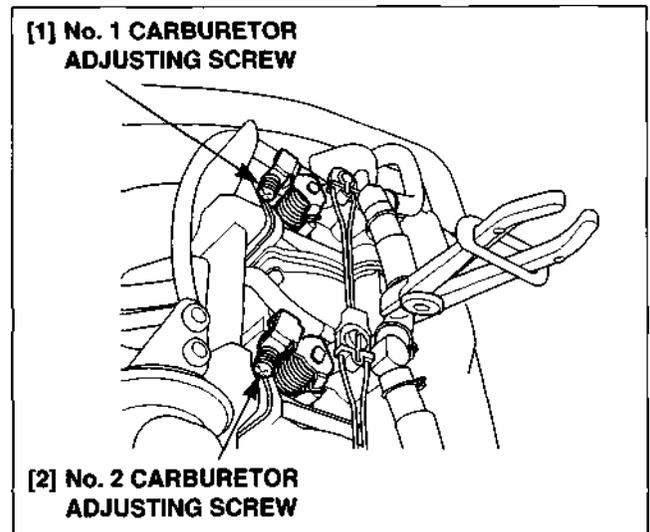


- 7) Pinch the SE tubes using commercially available tube clips keeping away from tube protector as shown.
- 8) Check the intake manifold vacuum difference between cylinders. Take maximum vacuum difference between each cylinder. It should be **20 mmHg (0.75 inHg)** or less.
- 9) If the vacuum difference between the cylinders is not 20 mmHg (0.75 inHg) or less, adjust as follows.



Adjustment:

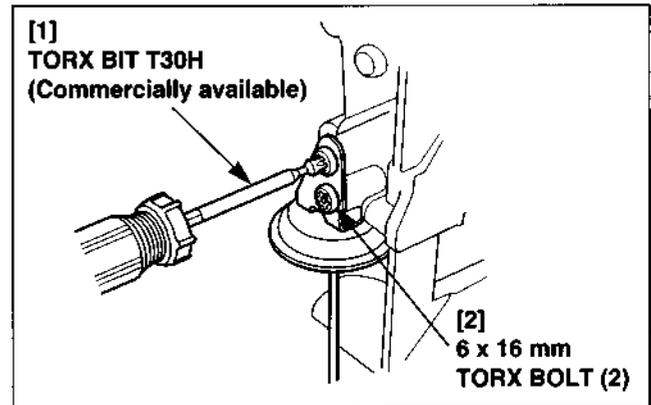
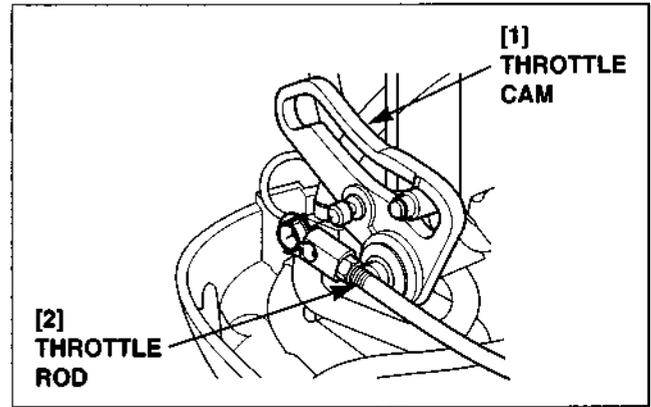
- The No. 3 carburetor is the synchronization base carburetor. This carburetor will not have a synchronization adjusting screw.
 - Adjust the carburetor to get the least amount of vacuum difference between the cylinders. As the manifold vacuum difference decreases, the idle speed will become more stable.
- 1) Turn the No. 1 and No. 2 adjusting screws so that the vacuum difference between each cylinder is 20 mmHg (0.75 inHg) or less.
 - 2) After adjustment, check the idle speed and adjust if necessary by turning the No. 3 carburetor throttle stop screw.
 - 3) Snap the throttle several times and allow the engine to return to idle. Check to be sure that the vacuum difference between each cylinder stays within 20 mmHg (0.75 inHg) or less. Readjust if necessary.
 - 4) Stop the engine, remove the vacuum gauge, adapters and tube clips.
 - 5) Install the 5 x 10 mm plugs and sealing washers.



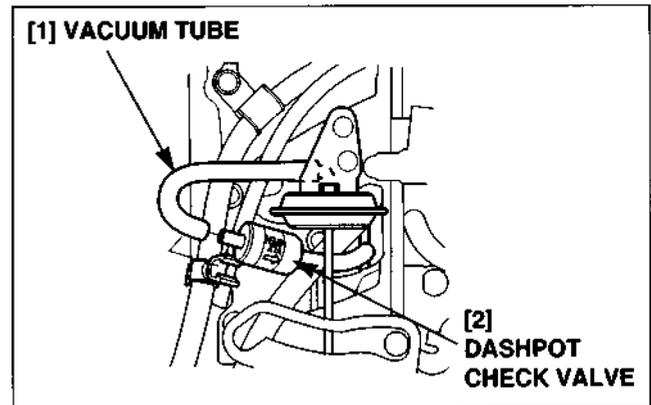
3. DASHPOT DIAPHRAGM

Adjust the dashpot diaphragm after adjusting the idle speed (see base shop manual).

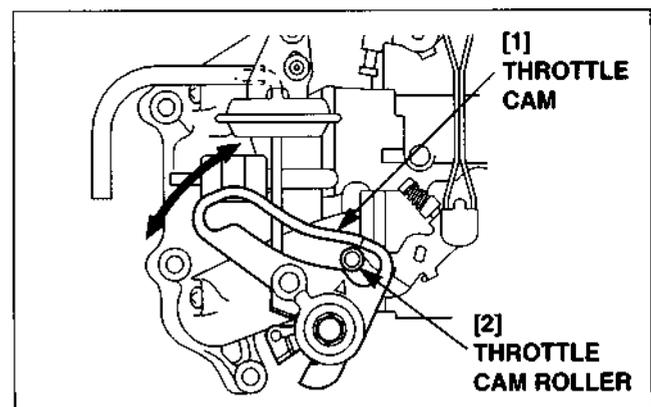
- 1) Remove the engine cover.
- 2) Remove the throttle rod from the throttle cam.
- 3) Loosen the 6 x 16 mm torx bolts using a commercially available torx bit (T30H).



- 4) Disconnect the vacuum tube from the dashpot check valve.



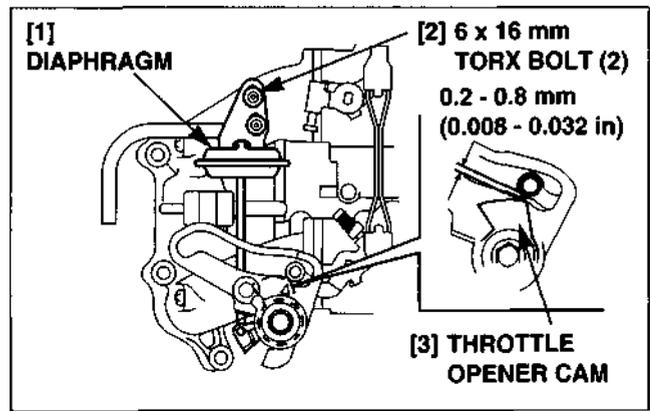
- 5) Move the throttle cam in the direction pointed by arrow until the throttle cam roller is set free from the throttle cam and hold the throttle cam.



- 6) Move the diaphragm up or down slowly until the clearance between the throttle cam roller and throttle opener cam is 0.2 - 0.8 mm (0.008 - 0.031 in). While holding the clearance, tighten the 6 x 16 mm torx bolts to the specified torque.

TORQUE: 9 N•m (0.9 kgf•m, 6.5 lbf•ft)

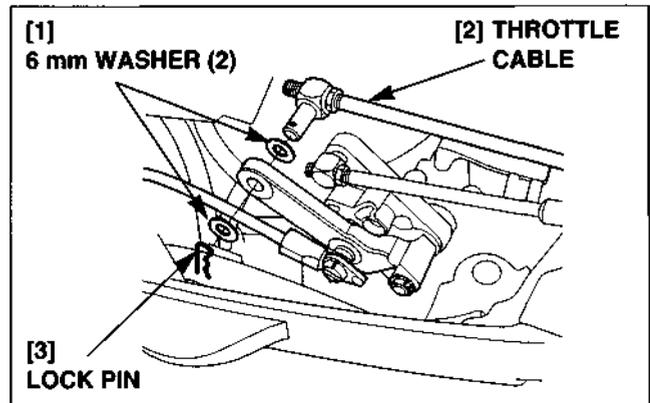
- 7) Connect the vacuum tube to the dashpot check valve and attach the throttle rod to the throttle cam.



4. THROTTLE LINKAGE ADJUSTMENT

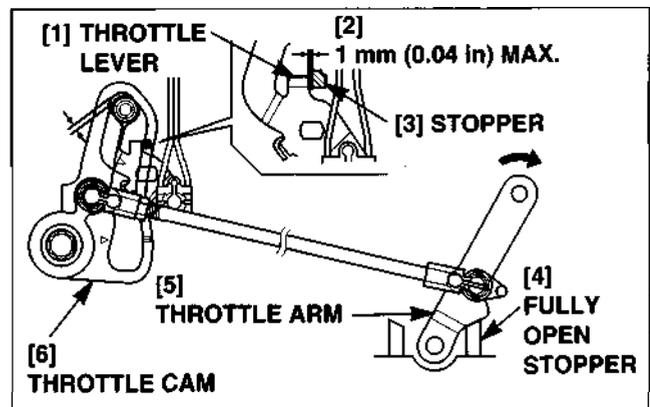
• Throttle Rod Length Adjustment

- 1) Remove the lock pin and washer, and disconnect the throttle cable from the throttle arm.



- 2) Move the throttle arm to the fully open position and be sure that the throttle arm contacts the fully open stopper.

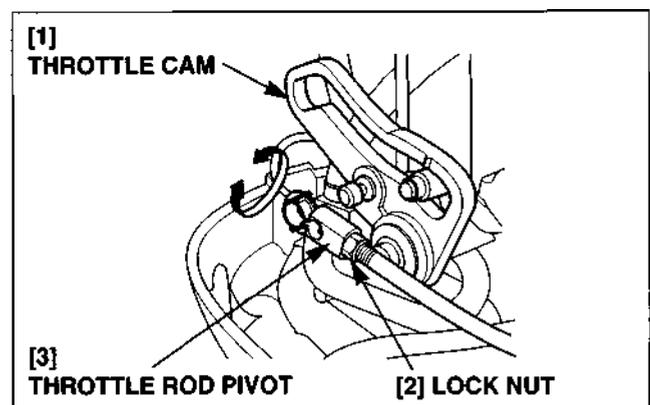
- 3) Check that the throttle cam is also at the fully open position and that there is clearance of 1 mm (0.04 in) or less between the carburetor throttle lever and stopper on the No. 3 carburetor.



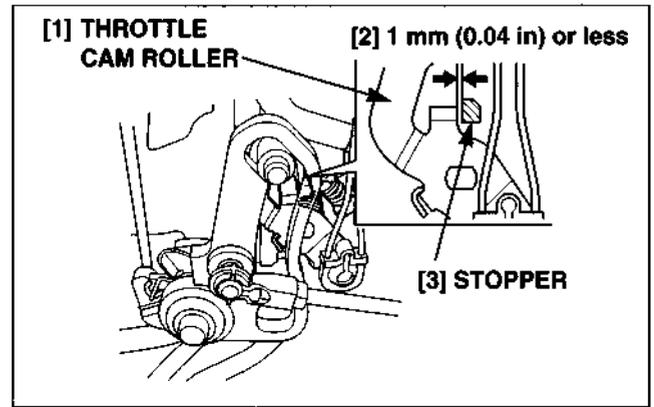
- 4) If either the throttle arm or throttle cam is not at the fully open position, adjust as follows.

- 5) Loosen the throttle rod pivot lock nut, detach the throttle rod pivot from the throttle cam, and adjust by turning the throttle rod pivot.

- 6) Attach the throttle rod pivot to the throttle cam and tighten the throttle rod pivot lock nut securely.



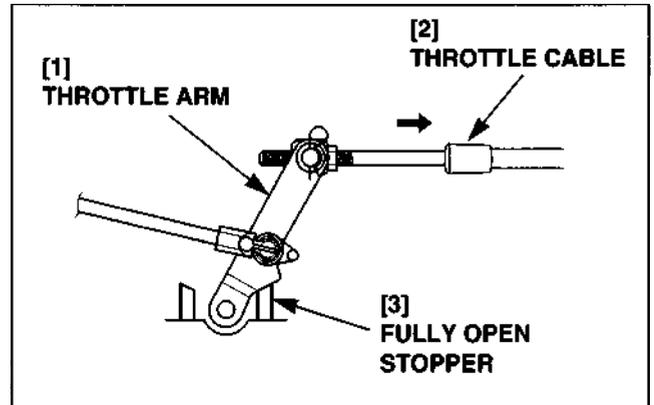
- 7) After adjustment, move the throttle cam to the fully open position and be sure that there is clearance of **1 mm (0.04 in) or less** between the carburetor throttle lever and stopper on the No. 3 carburetor.
- 8) If the clearance is more than 1 mm (0.04 in), readjust by turning the throttle rod pivot.
- 9) Adjust the throttle cable, then connect the throttle cable to the throttle arm.



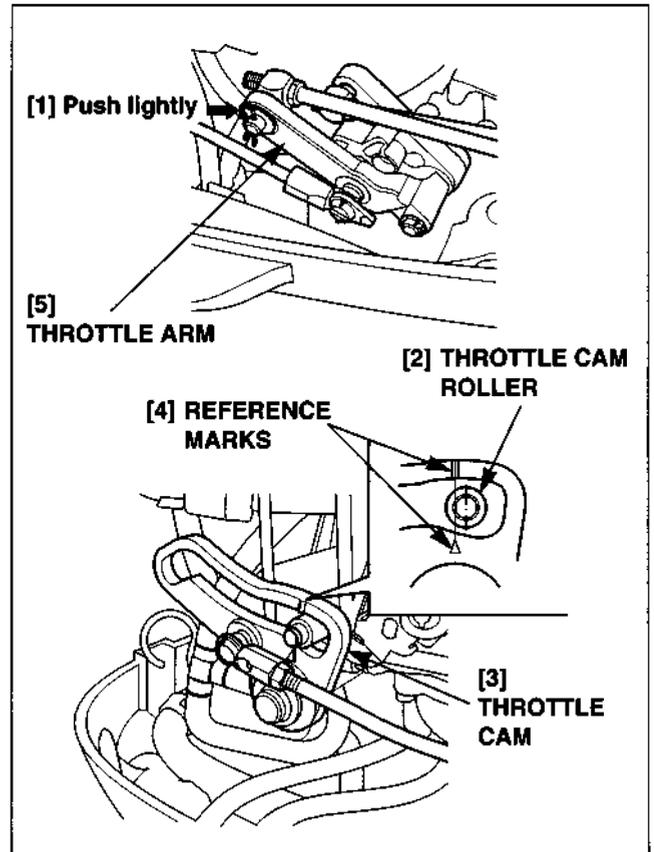
• Throttle Cable Length Adjustment

Adjust the throttle cable length after adjusting the throttle rod length.

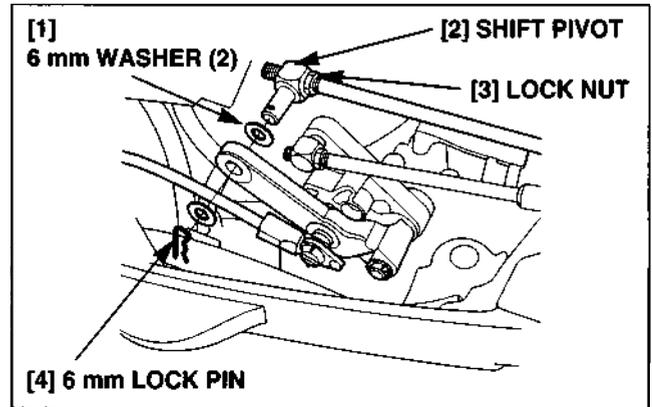
- 1) Turn the throttle grip to the fully open position and check that the throttle arm contacts the fully open stopper.



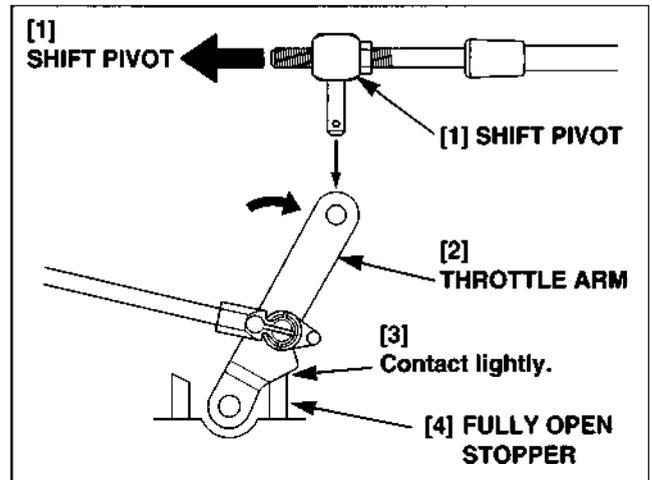
- 2) Return the throttle grip to the fully close position.
- 3) Pushing the throttle arm lightly (i.e. by the amount of throttle link play) in the direction of arrow, check whether the center of throttle cam roller is at the right side (i.e. advancing direction) to the reference marks.



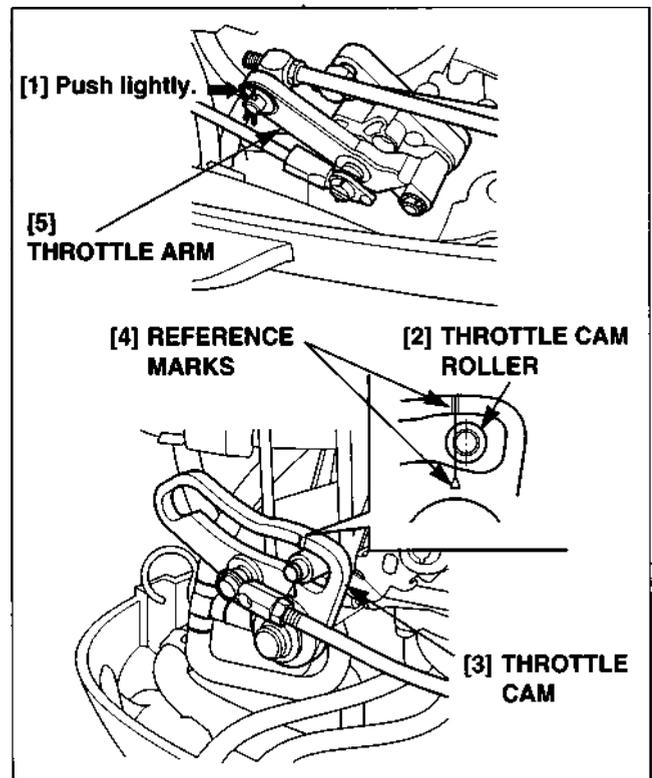
- 4) Adjust as follows, if necessary.
- 5) Loosen the shift pivot lock nut, remove the 6 mm lock pin and 6 mm washer, and disconnect the throttle cable.
- 6) Turn the throttle grip to the fully open position and hold it in the position using the friction grip.
- 7) Remove the throttle rod pivot from the throttle cam.



- 8) Pulling the throttle cable's shift pivot lightly, turn the shift pivot so that the throttle cable can be connected smoothly to the throttle arm that is set in the fully open position (i.e. throttle arm is lightly in contact with the fully open stopper).
- 9) Connect the throttle cable to the throttle arm and tighten the shift pivot lock nut securely.



- 10) Install the throttle rod pivot on the throttle cam.
- 11) Turn the throttle grip to the fully closed position. Pushing the throttle arm lightly in the direction of arrow, check whether the center of throttle cam roller is at the right side (advancing side) to the reference marks.

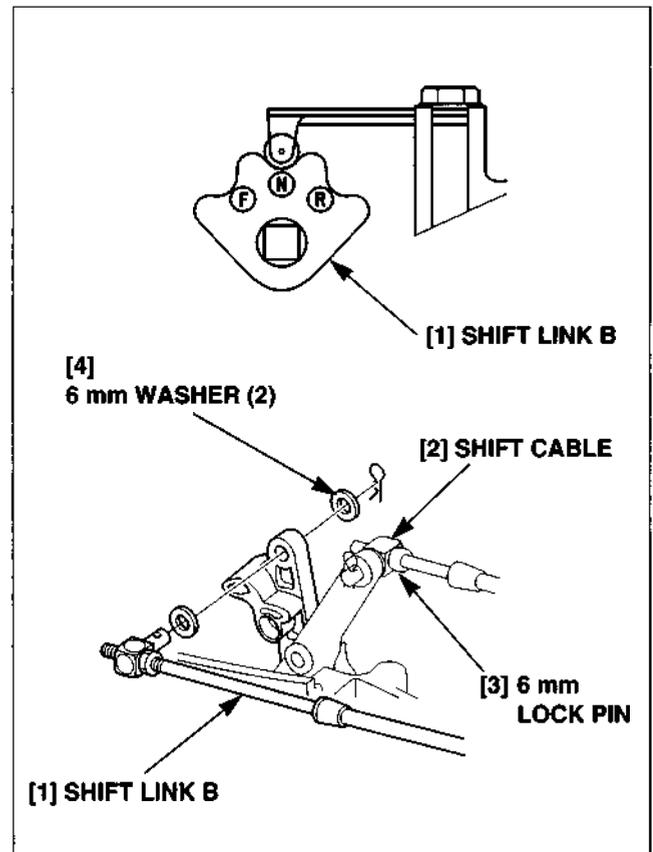


5. SHIFT CABLE ADJUSTMENT (Long Tiller Handle Type)

• Shift Cable Length Adjustment

Adjust the shift cable length after adjusting the shift rod adjustment (see base shop manual).

- 1) Loosen the shift link pivot lock nut, and remove the 6 mm lock pin and 6 mm washer.
- 2) Disconnect the shift cable from the shift link B and remove the 6 mm washer.
- 3) Set the shift link B in the "N" (neutral) position.
- 4) Set the shift lever in the neutral position.
- 5) Rotate the shift pivot by the necessary amount until it will easily insert into the shift link B.
- 6) Install the 6 mm washer over the pin of the shift pivot and connect to the shift link B using the 6 mm washer and 6 mm lock pin.
- 7) Tighten the shift pivot lock nut securely.
- 8) After adjustment, be sure that the shift lever moves smoothly into all positions.



6. STEERING FRICTION ADJUSTMENT (Long Tiller Handle Type)

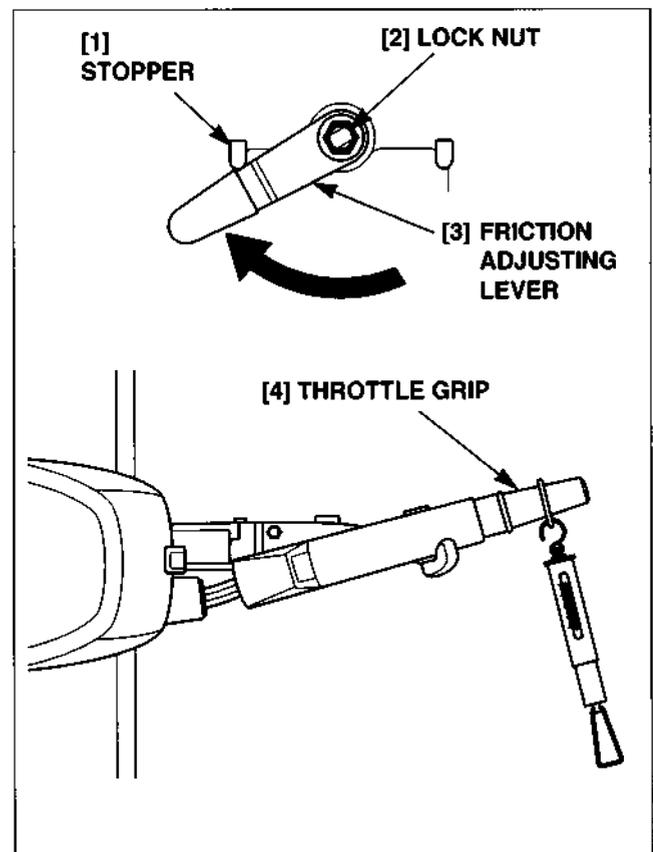
- 1) Move the friction adjusting lever to the left side fully until the friction lever contacts to the stopper as shown.
- 2) Check the starting torque by measuring the starting force using a spring scale at the center of the throttle grip as shown.

The motor should start to move with 100 N (10.0 kgf, 22.0 lbf).

- 3) If it does not, loosen the lock nut once. Then, retighten the self-locking nut to the specified torque by turning the adjusting lever to the left side fully.
 - Tighten the friction adjusting lever and tighten the lock nut to the specified torque.

TORQUE: 9.5 N•m (0.95 kgf•m, 6.9 lbf•ft)

- 4) Recheck the starting force. If the starting forces is less than 100 N (10.0 kgf, 22.0 lbf), check the friction discs for contaminated with grease (P. 12-1).



1. SILENCER COVER

2. CARBURETOR/MANIFOLD REMOVAL

3. CARBURETOR

4. CARBURETOR/MANIFOLD INSTALLATION

1. SILENCER COVER

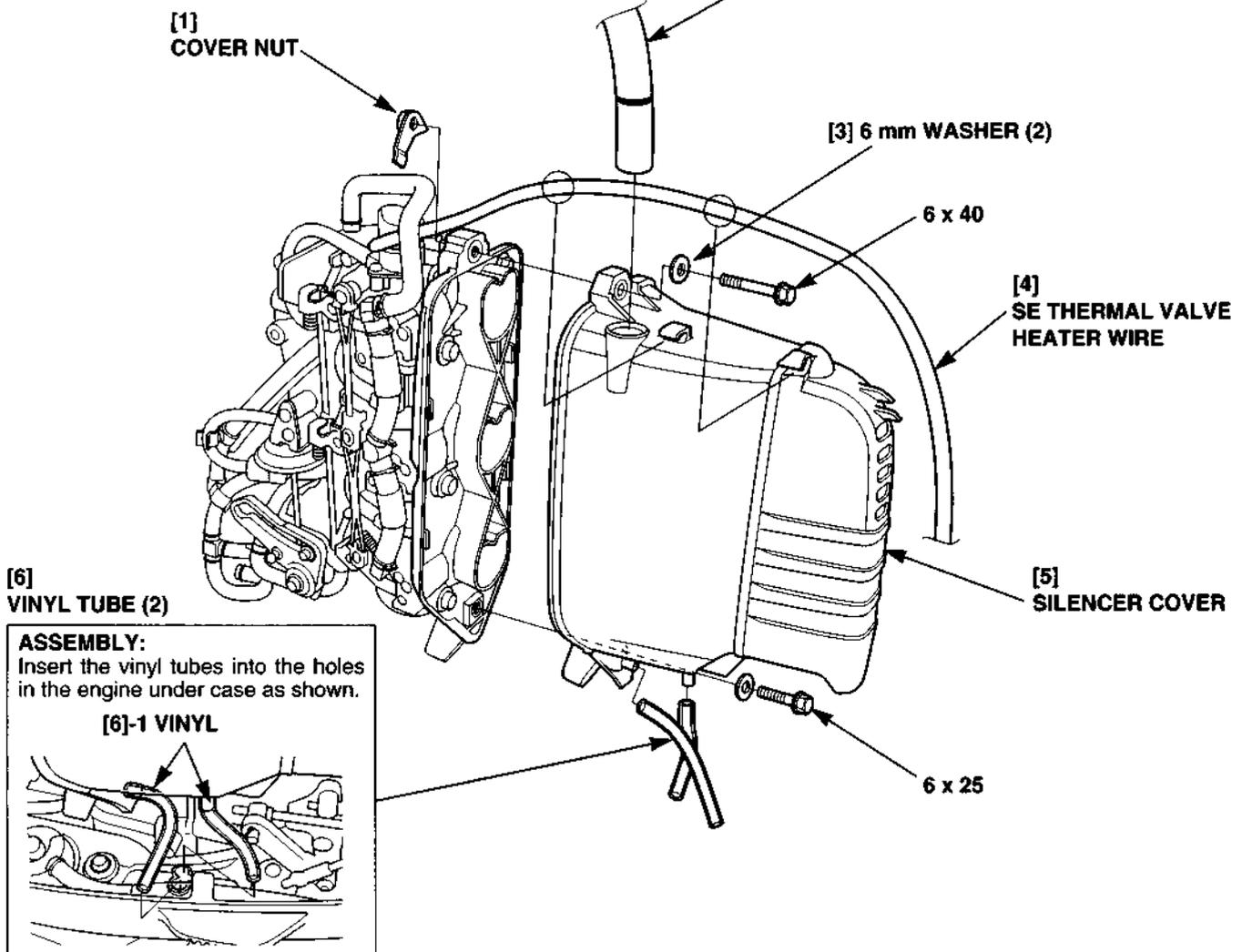
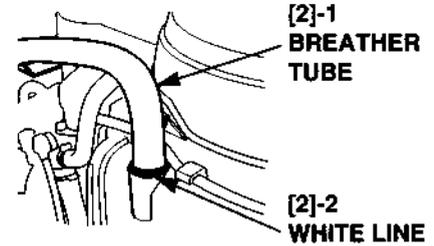
a. REMOVAL/INSTALLATION

- 1) Remove the engine cover.
- 2) Pull off the breather tube from the silencer cover.
- 3) Unfasten the SE thermal valve heater wire from the clamp on the silencer cover.
- 4) Pull off the vinyl tubes from the engine under case.
- 5) Remove the 6 mm flange bolts, washers and cover nut, then remove the silencer cover from the silencer plate.
- 6) Install the removed parts in the reverse order of removal.

[2] BREATHER TUBE

ASSEMBLY:

Insert until the white line aligns with the hole edge as shown.



2. CARBURETOR/MANIFOLD REMOVAL

▲ WARNING

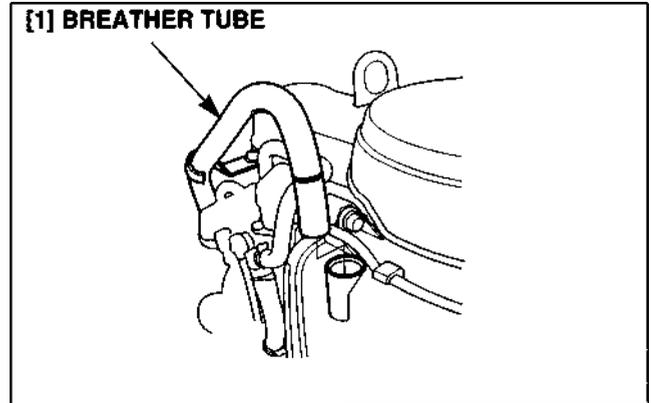
Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

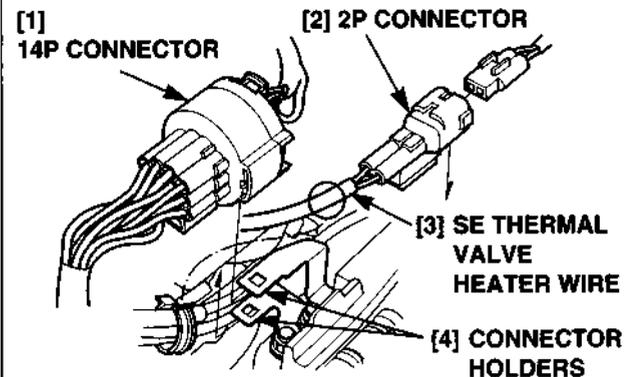
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

- 1) Remove the engine cover.
- 2) Remove the flywheel cover (P. 6-1).
- 3) Drain the carburetor by loosening the drain screws.
- 4) Pull off the breather tube from the silencer cover.

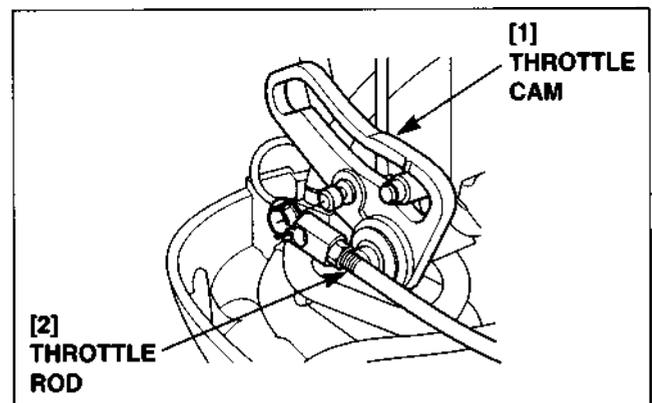
[1] BREATHER TUBE



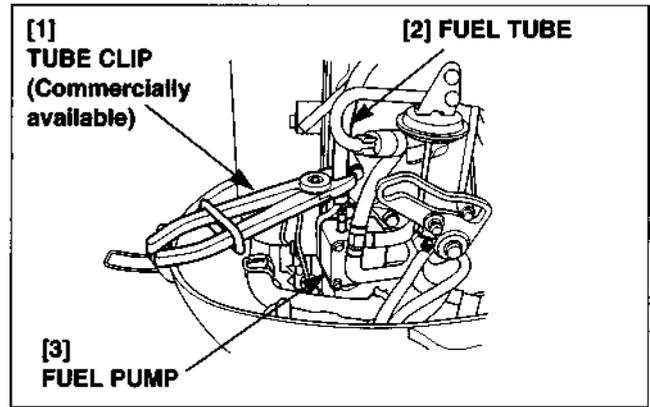
- 5) Remove the 14P connector (remote control box wire harness or tiller handle main wire harness) and 2P connector (SE thermal valve heater wire) from the connector holders, and disconnect the 2P connector.



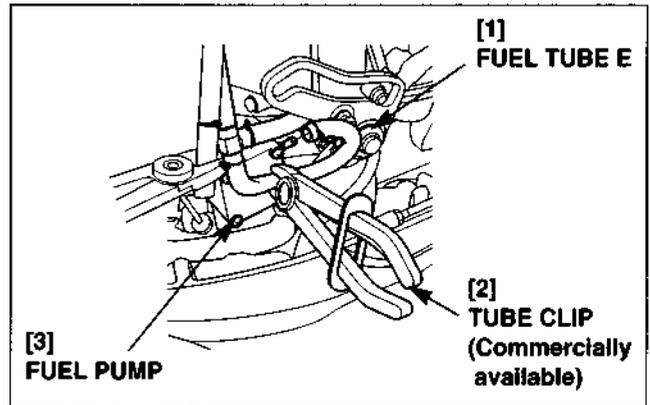
- 6) Disconnect the throttle rod from the throttle cam.



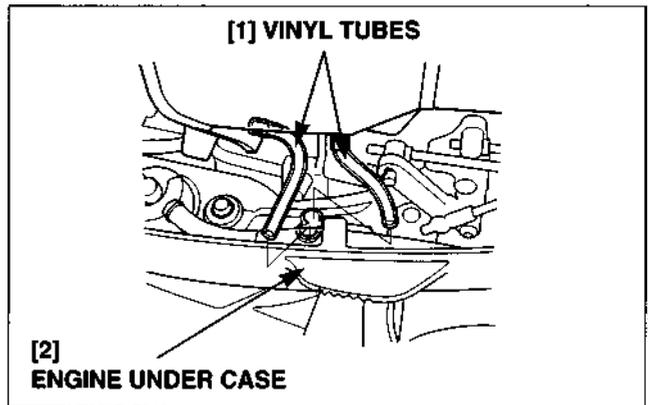
- 7) Pinch the fuel tube with a commercially available tube clip and disconnect the fuel tube (No. 1 carburetor supply line) from the fuel pump.



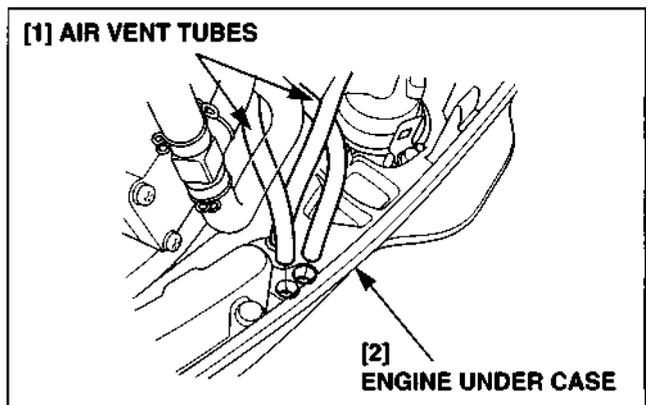
- 8) Pinch the fuel tube with a commercially available tube clip and disconnect the fuel tube E (No. 2 and 3 carburetor supply line) from the fuel pump.



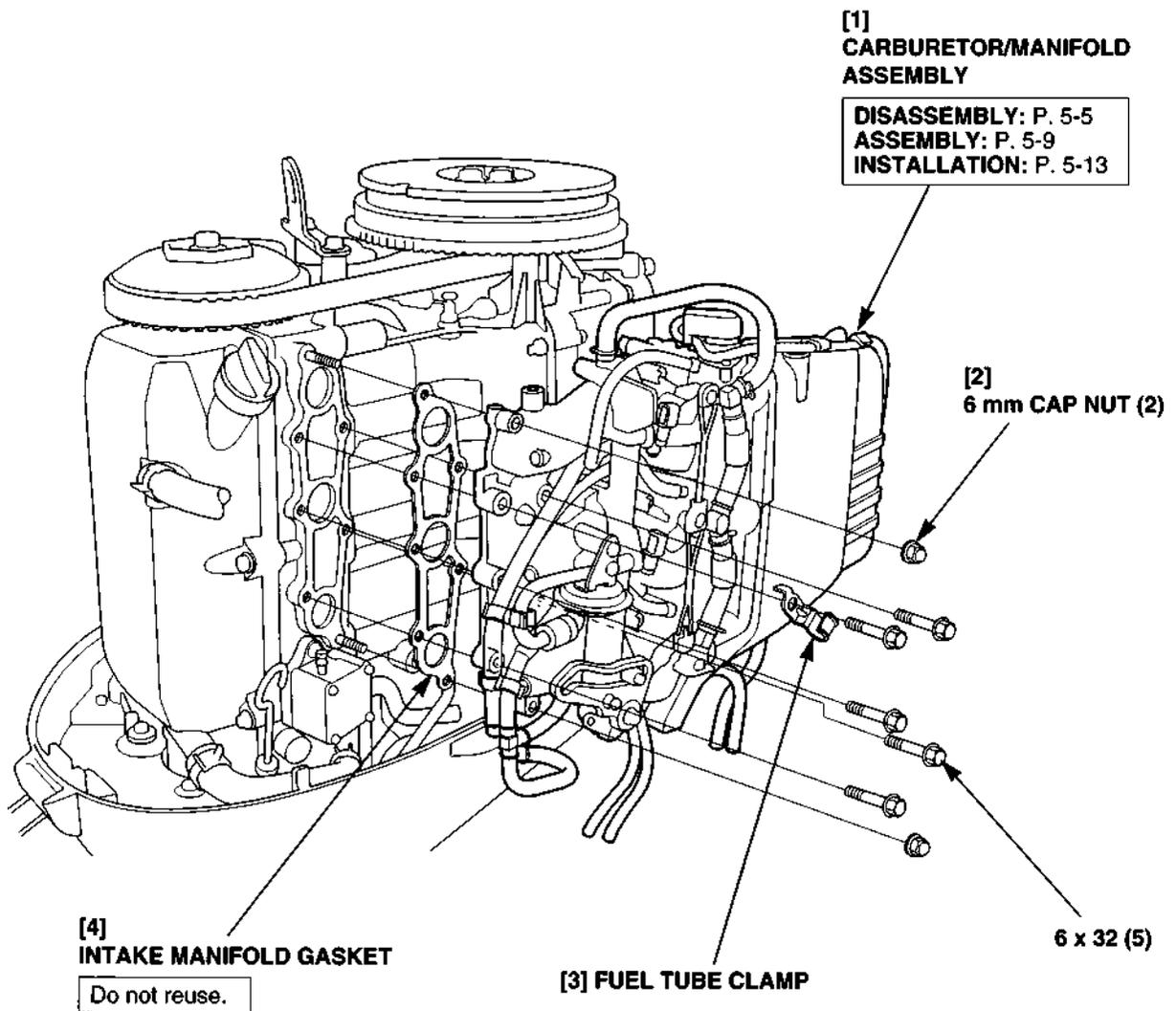
- 9) Pull off the vinyl tubes from the engine under case.



- 10) Pull off the air vent tubes from the engine under case.



- 11) Remove the two 6 mm cap nuts and five 6 x 32 mm flange bolts, then remove the carburetor and manifold assembly from the crankcase.



3. CARBURETOR

a. SEPARATION

⚠ WARNING

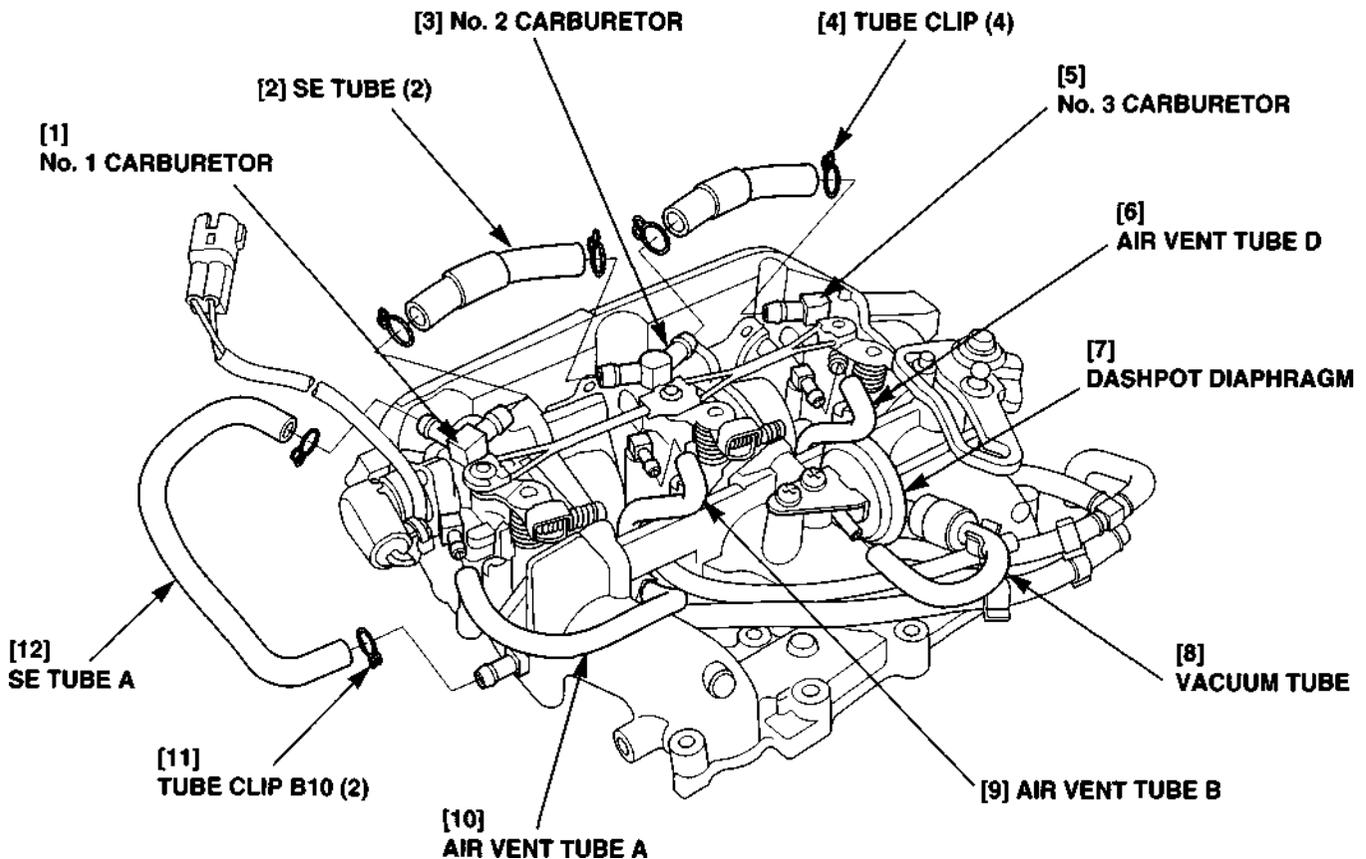
Gasoline is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

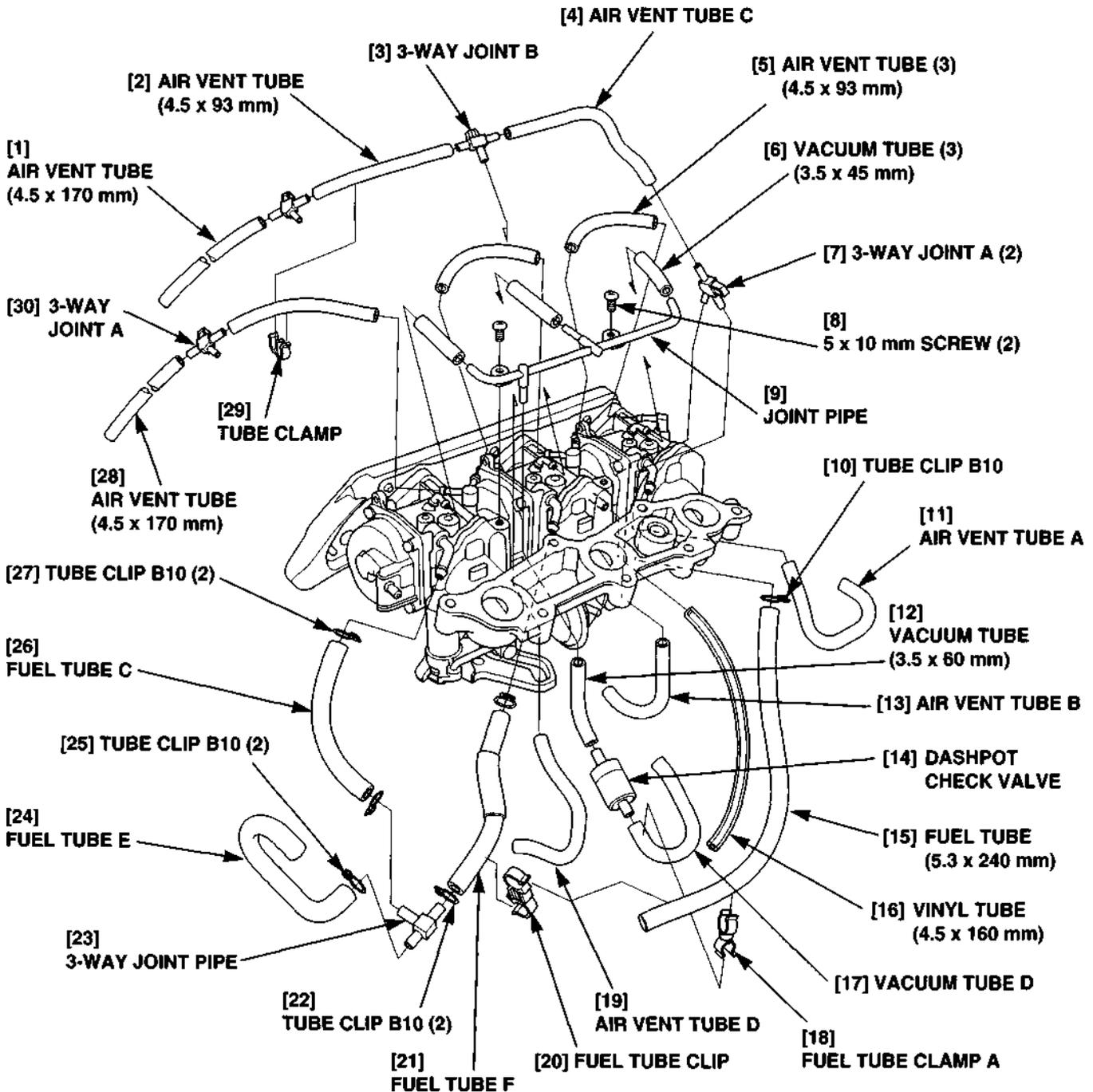
- Before disassembly, drain the fuel from the carburetor and fuel lines completely.

• TUBES

- 1) Remove the silencer cover (P. 5-1).
- 2) Disconnect the tubes:
 - air vent tubes from the carburetor.
 - vacuum tube from the dashpot diaphragm.
- 3) Remove the SE tubes.



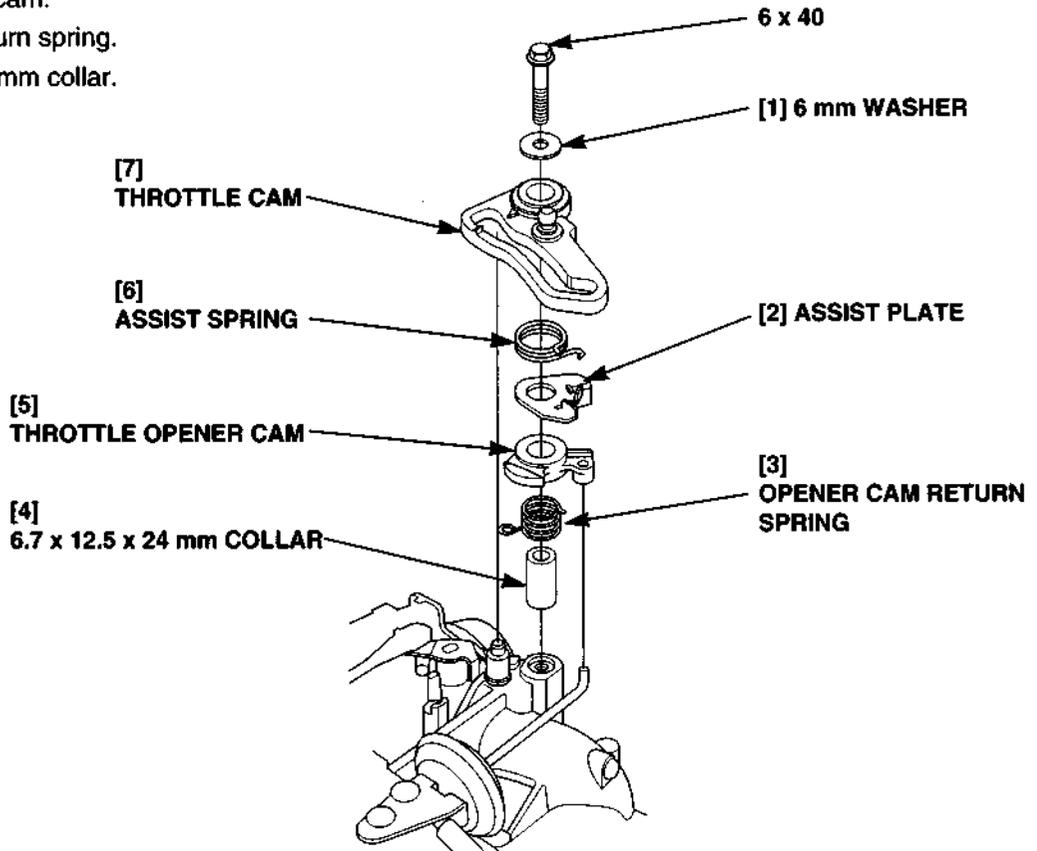
- 4) Remove the following:
- fuel tubes.
 - air vent tubes and tube joints.
 - overflow tubes, tube joint and joint pipe.
 - dashpot tubes and dashpot check valve.
 - tube clips.
 - vinyl tube.
- See pages 5-20 and 5-21 for tube routing and connection.



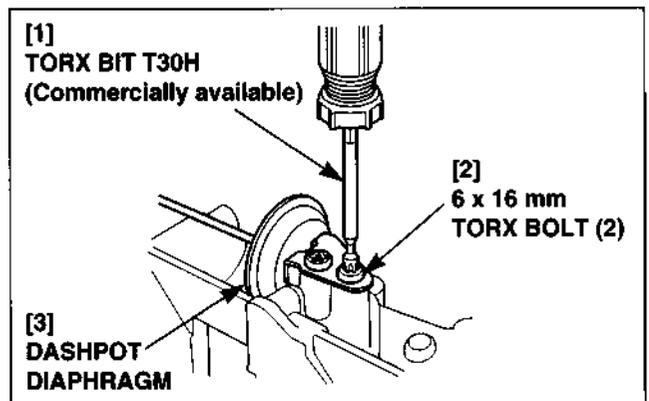
• THROTTLE CAM/DASHPOT DIAPHRAGM

• The throttle cam and dashpot diaphragm servicing can be made with the engine installed.

- 1) Disconnect the throttle rod pivot (P. 5-2).
- 2) Remove the 6 x 40 mm flange bolt and 6 mm washer.
- 3) Remove the following:
 - throttle cam.
 - assist spring.
 - assist plate.
 - throttle opener cam.
 - opener cam return spring.
 - 6.7 x 12.5 x 24 mm collar.

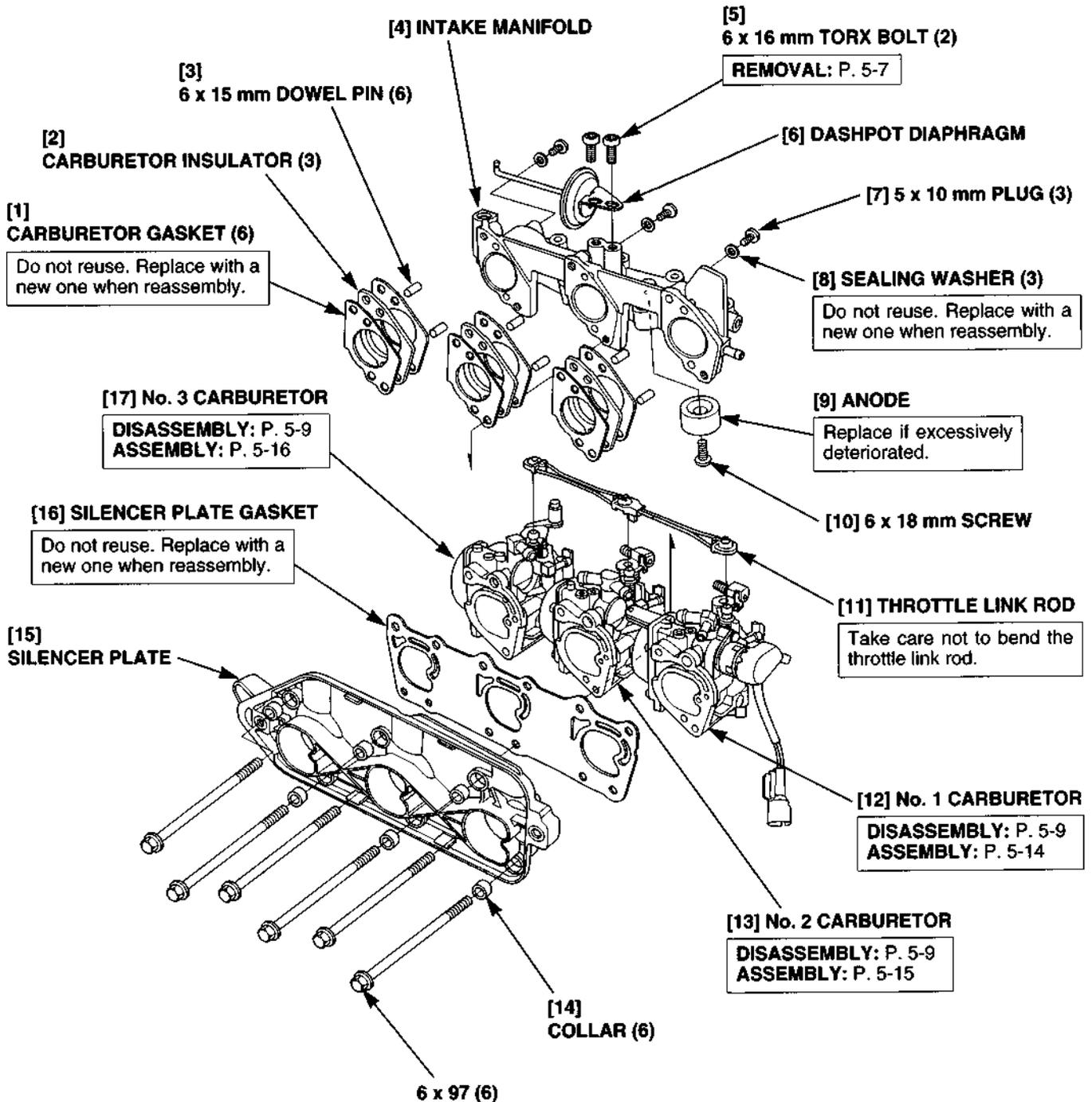


- 4) Remove the 6 x 16 mm torx bolts using a commercially available torx bit (T30H) and remove the dashpot diaphragm.



•INTAKE MANIFOLD

- 1) Remove the throttle link rod taking care not to bend it.
- 2) Remove the six 6 x 97 mm flange bolts.
- 3) Separate the intake manifold and carburetor as shown.



b. DISASSEMBLY

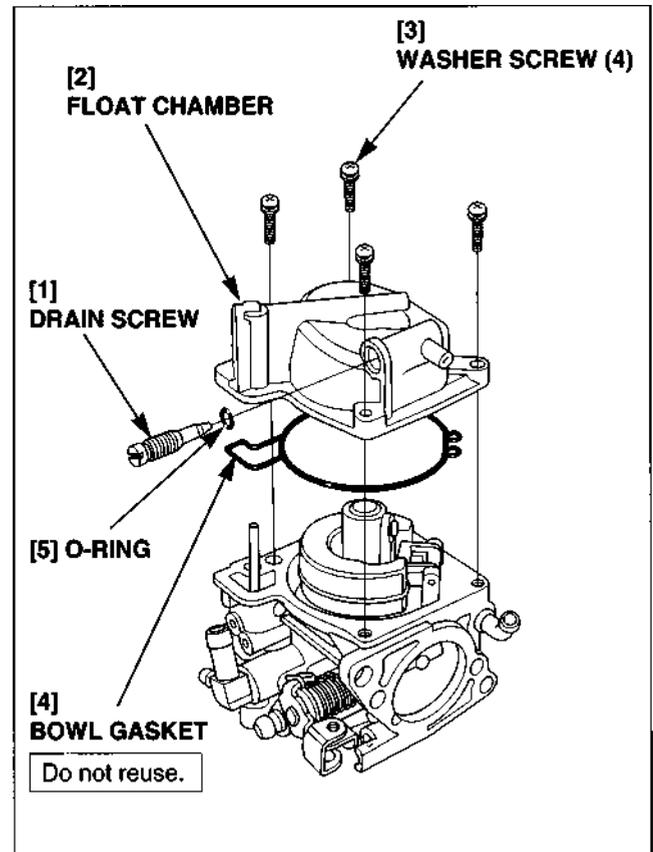
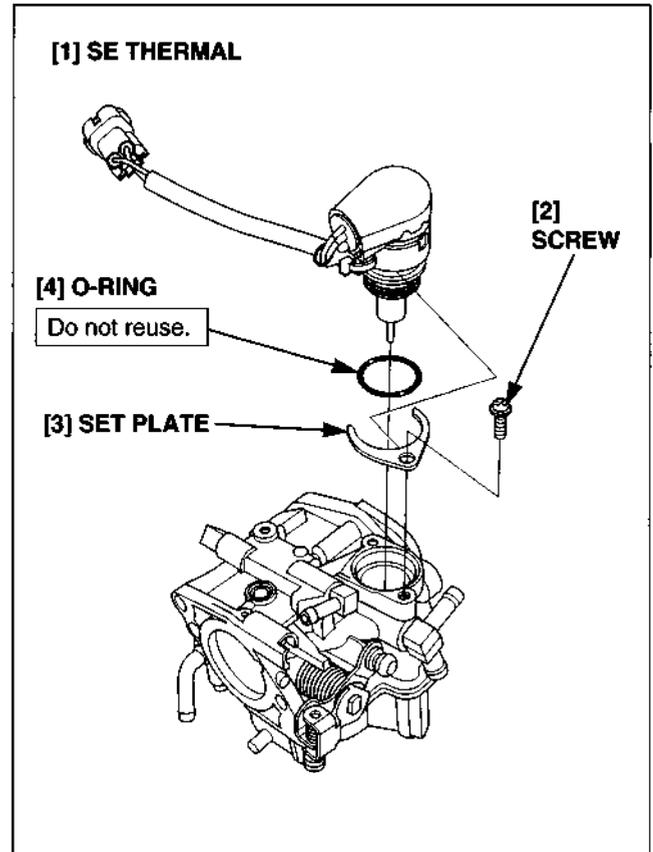
- Before disassembly, completely drain the carburetor by loosening the drain screw. Clean the outside of the carburetor before disassembly.

⚠ WARNING

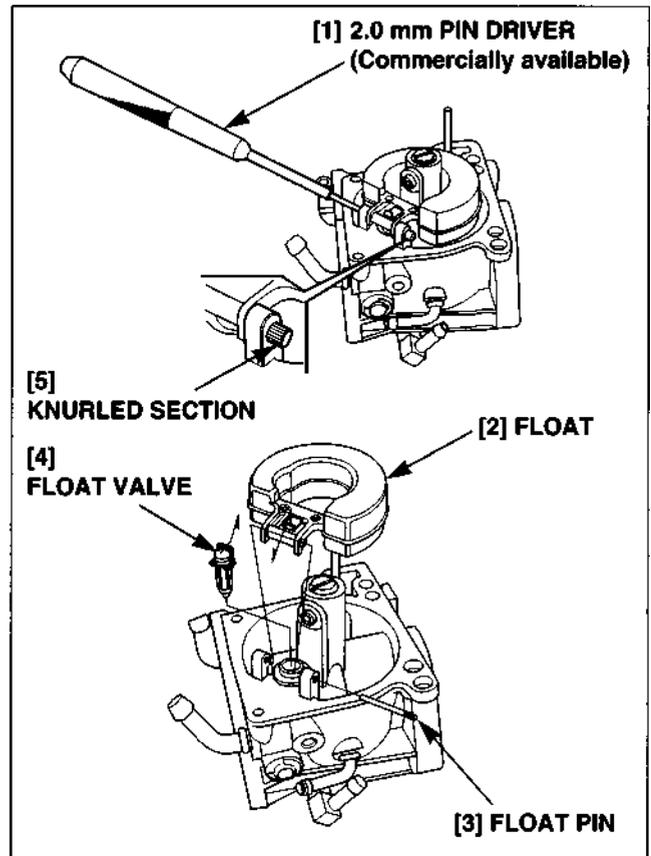
Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

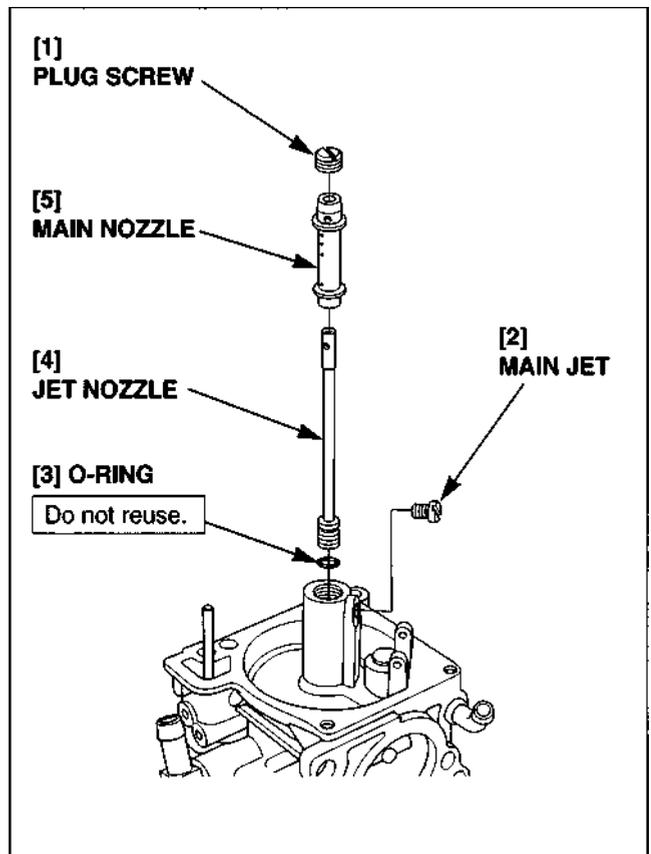
- 1) No. 1 carburetor only:
Remove the screw and set plate, then remove the SE thermal valve and O-ring with care not to damage the needle.
- 2) Remove the four washer screws, and remove the float chamber and bowl gasket.
- 3) Remove the drain screw and O-ring from the float chamber if necessary.



- 4) Remove the float pin by using a commercially available 2.0 mm pin driver.
 - Drive out the float pin by lightly tapping the pin driver from the opposite side of the knurled section of the float pin.
- 5) Remove the float and float valve.



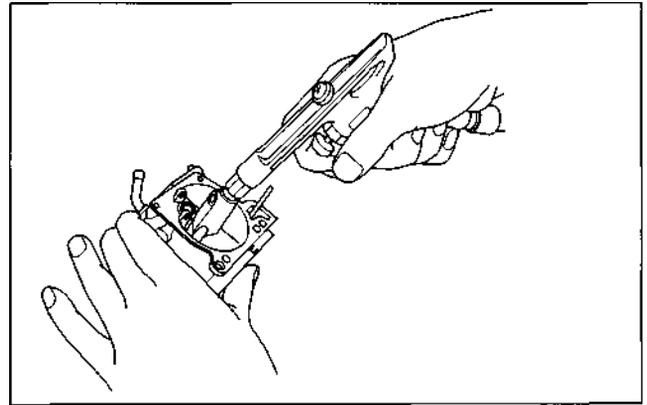
- 6) Remove the main jet taking care not to damage the main jet.
- 7) Remove the plug screw, main nozzle and jet nozzle taking care not to damage them.



c. CLEANING

CAUTION

- Some commercially available chemical cleaners are caustic. These cleaners may damage plastic parts such as O-rings, float and float valve. Check the container for instructions. If you are in doubt, do not use these products to clean carburetor.
- High air pressure may damage the carburetor. Use low pressure setting when cleaning the passages and parts.



- 1) Clean the carburetor body, removed parts and float chamber with cleaning solvent.
- 2) Use low air pressure and blow off the removed jets, nozzles and passages of the carburetor body and float chamber.

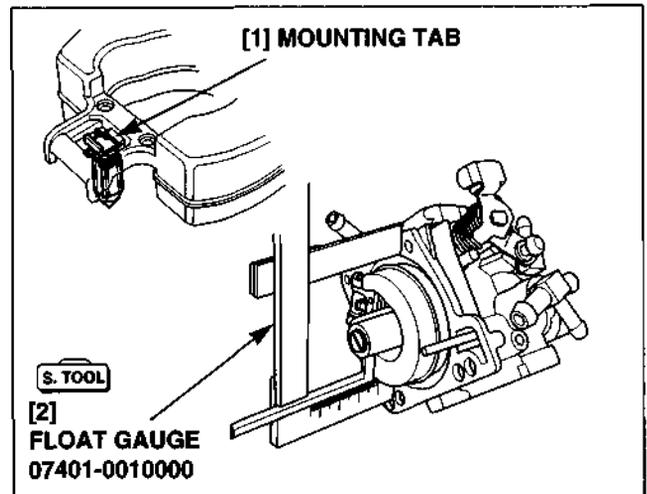
d. INSPECTION

• Float Level Height

Place the carburetor as shown and measure the distance between the float top and carburetor body when the float just contacts the seat without compressing the valve spring.

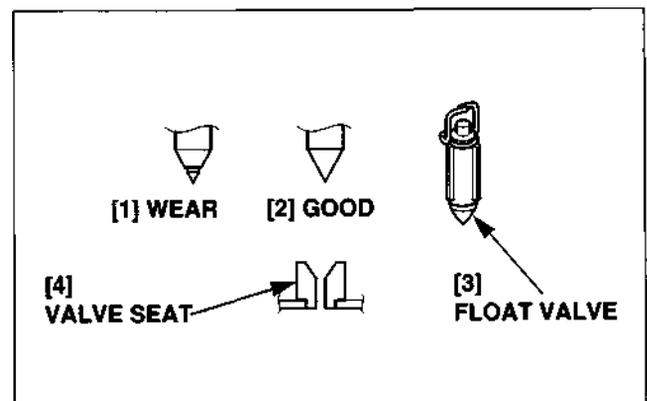
Standard float height	BF40A: 14 mm (0.55in)
	BF50A: 13 mm (0.51 in)

If the height is out of specification, adjust the float height by bending the float mounting tab carefully.



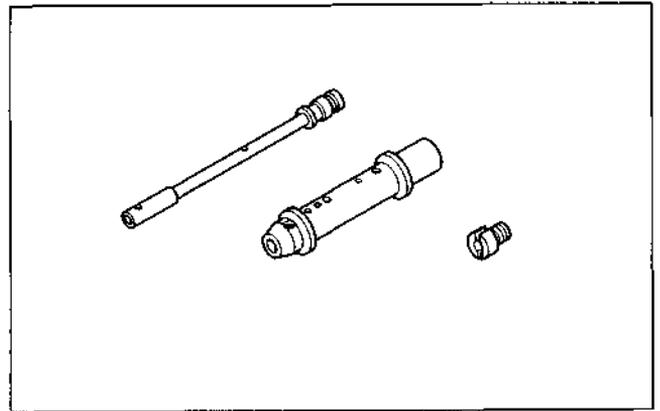
• Float/Float Valve/Float Valve Seat

- 1) Check the float for crack or damage. Replace if necessary.
- 2) Check the float valve for wear or damage. Replace if necessary.



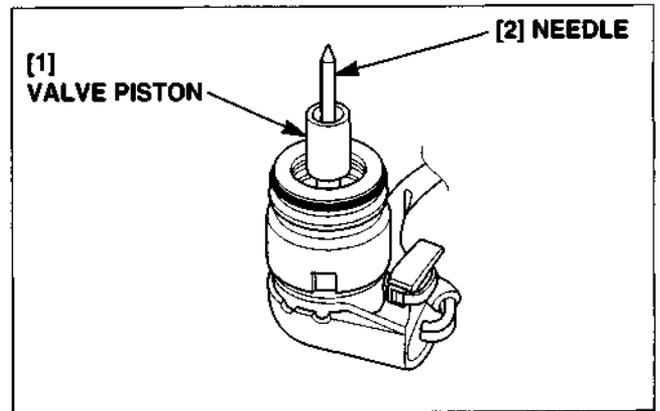
• **Nozzles/Jets**

Check the main jet, main nozzle and jet nozzle for debris or damage. Replace if necessary.



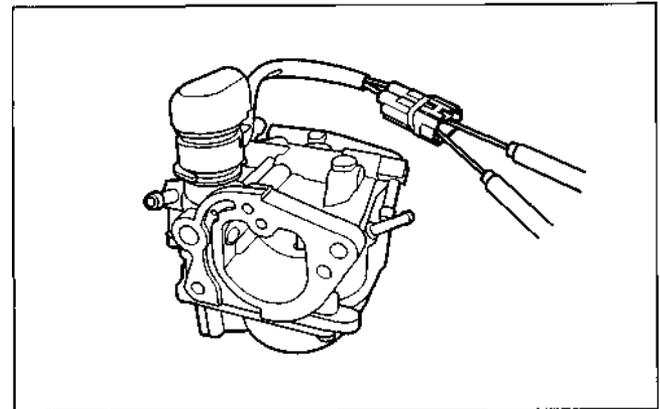
• **SE (Starter Enrichment) THERMAL VALVE**

1) Check the valve piston and needle for wear or scratches. Replace as assembly, if necessary.

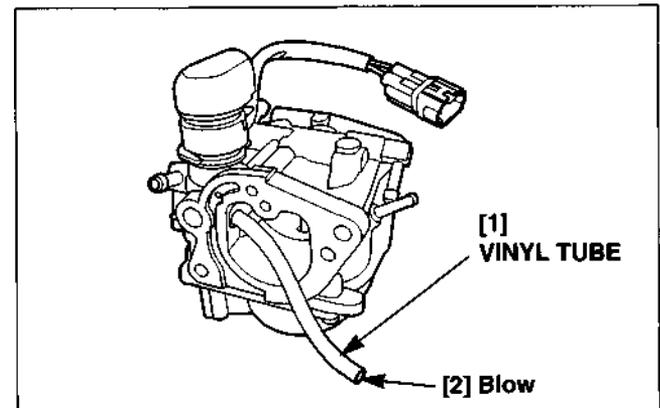


2) Measure the resistance between the terminals
 • This test can be done with the carburetor installed on the motor.

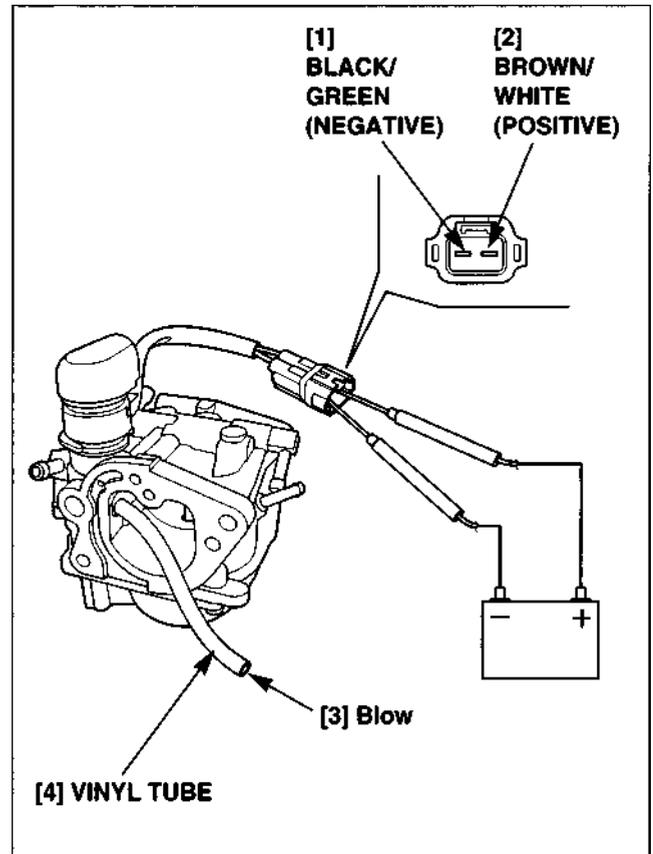
Resistance	15.8 - 24.2 Ω
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3) Install a vinyl tube as shown.
 4) At room temperature, gently blow into the tube and verify air passes through the passage.



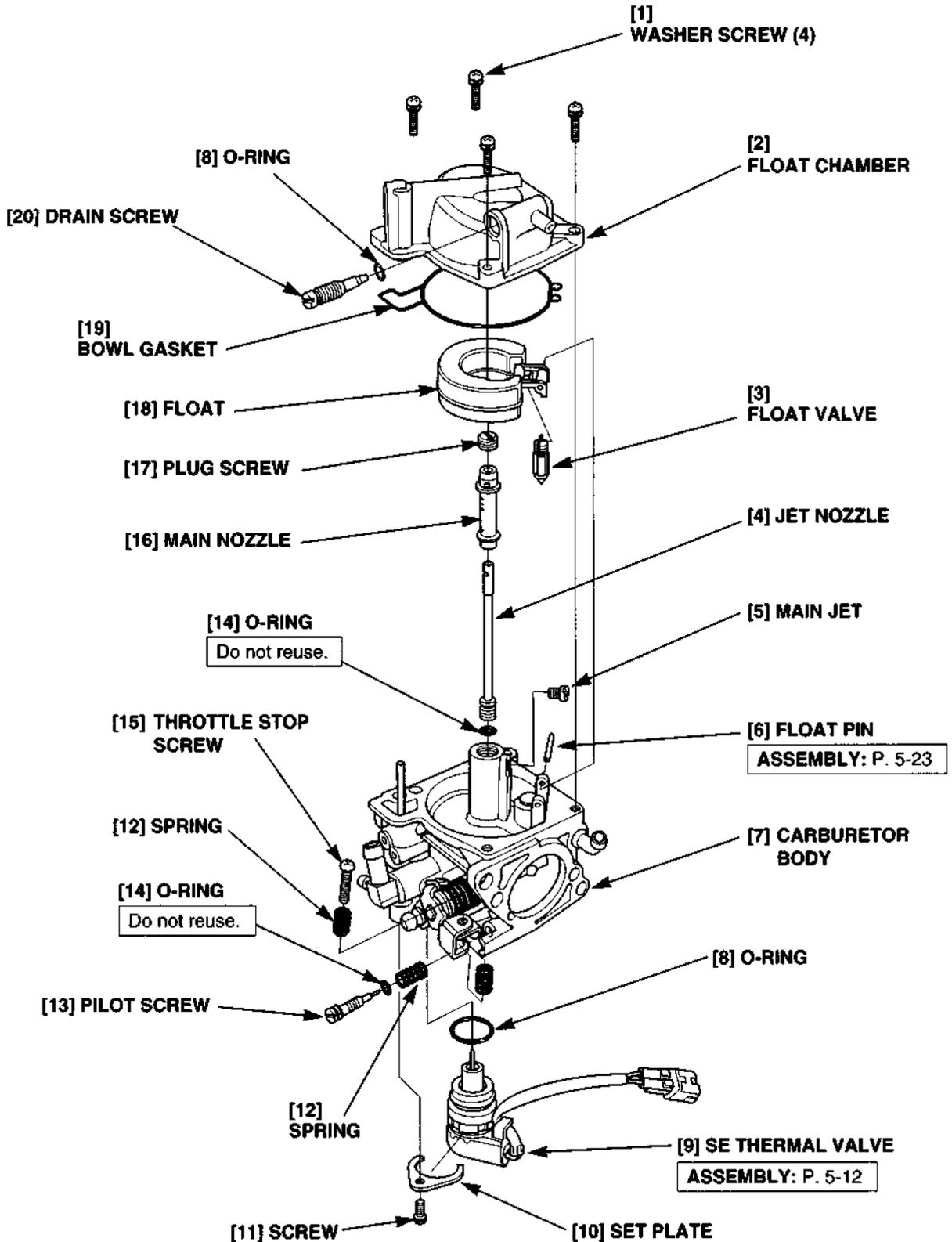
- 5) Connect the 12V battery positive terminal to the Brown/white terminal and negative to the Black/green terminal for about five minutes. A gentle puff of air should not pass through.
- Note that inspection with the battery connected must be made quickly.
 - The SE thermal valve heater becomes very hot when the battery is connected. Take care not to touch it.



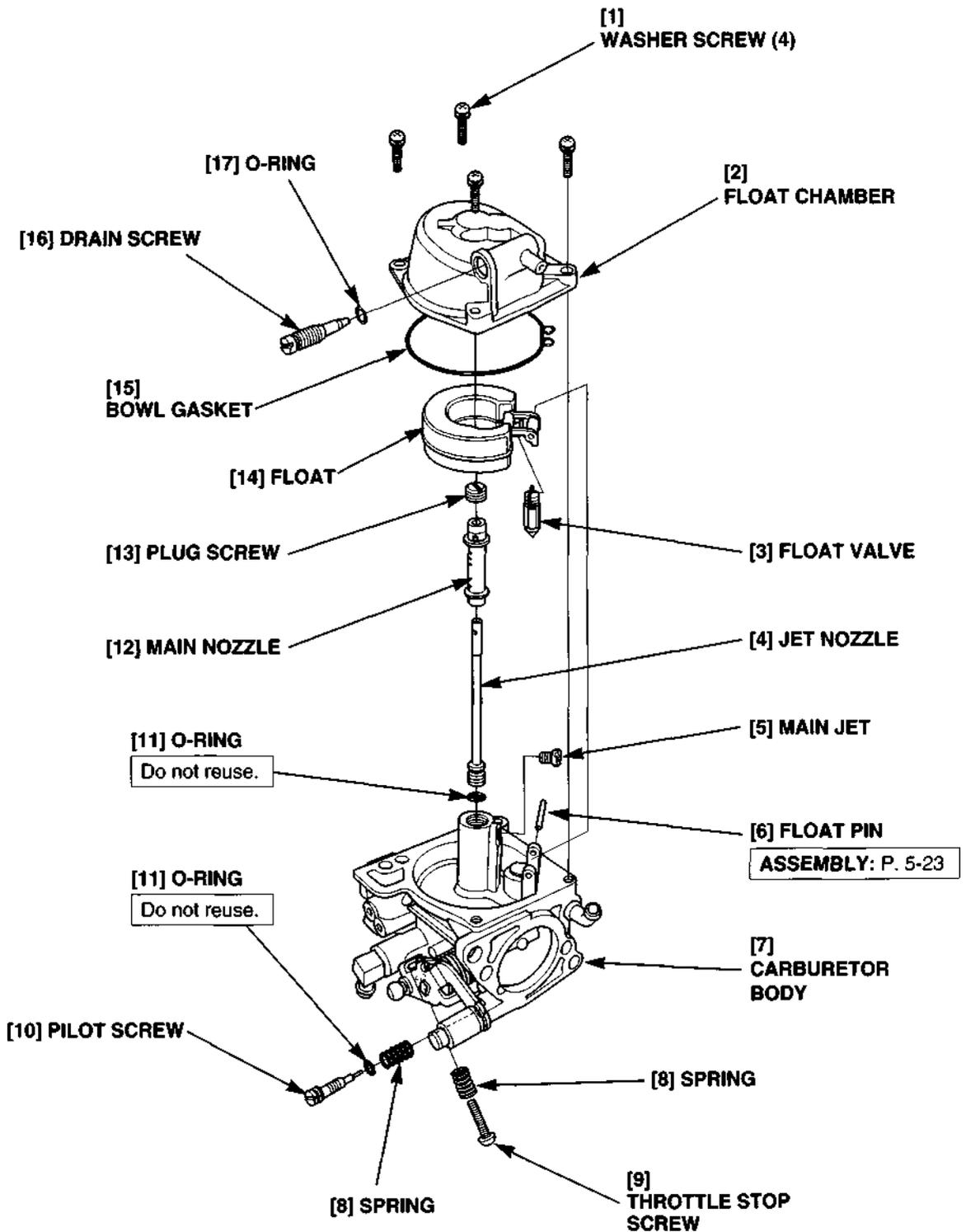
e. ASSEMBLY

Assembly is the reverse order of disassembly.

• No. 1 CARBURETOR

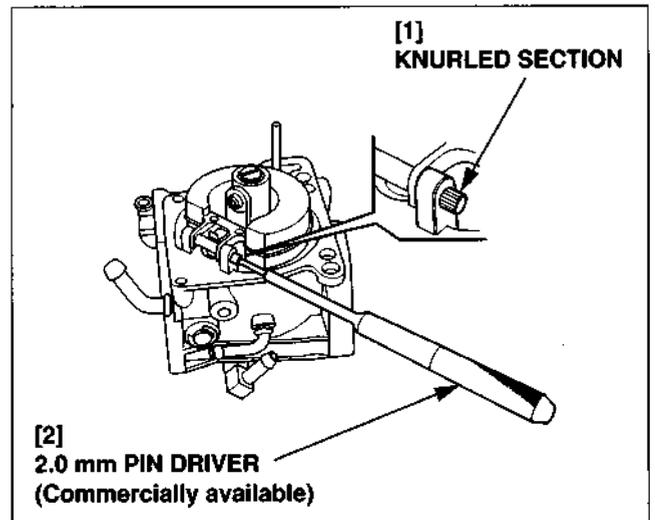


• No. 3 CARBURETOR



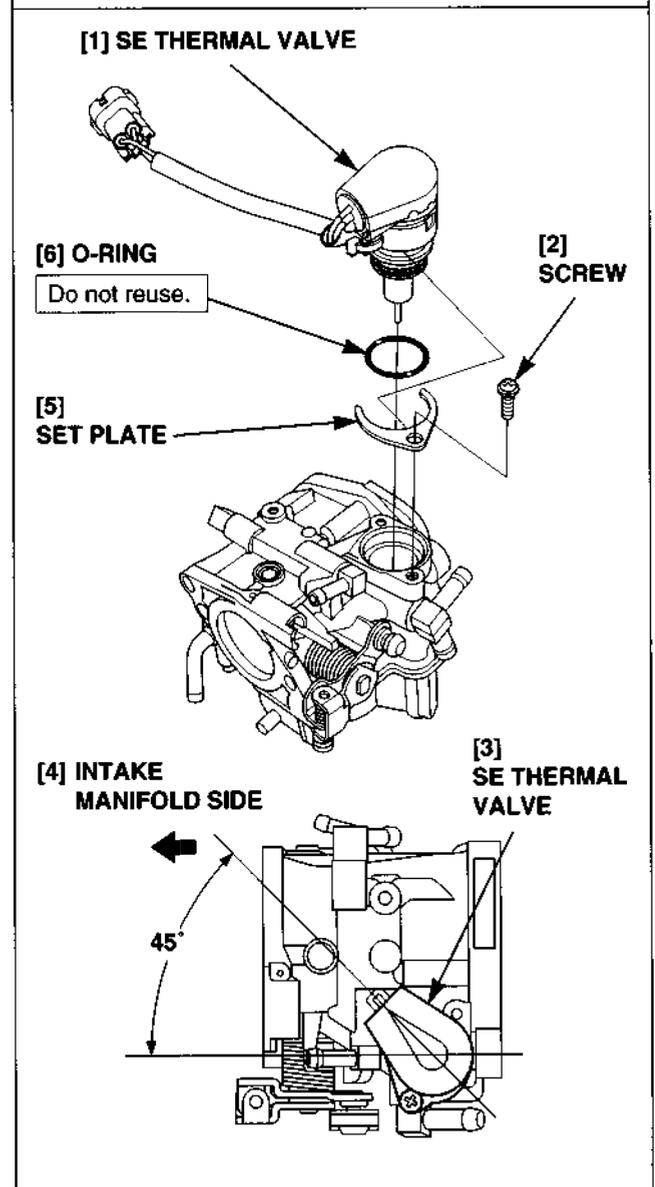
• FLOAT PIN INSTALLATION

- 1) Set the float onto the float tab, then set them on the carburetor body.
- 2) Install the float pin using the 2.0 mm commercially available pin driver.
 - Install the float pin by lightly tapping the pin at the knurled section side of the float pin.



• SE THERMAL VALVE INSTALLATION

- 1) Install a new O-ring to the SE thermal valve.
- 2) Install the SE thermal valve with the set plate and loosely install the screw.
- 3) Set the SE thermal valve as shown noting the direction and tighten the screw securely.



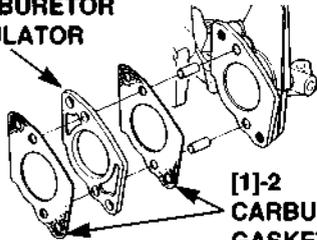
• CARBURETOR/INTAKE MANIFOLD

Assembly is the reverse order of disassembly.

[1] CARBURETOR INSULATOR (3)

Note the installation direction.

[1]-1
CARBURETOR
INSULATOR



[2]
CARBURETOR GASKET (6)

Do not reuse.

[3] 6 x 15 mm DOWEL PIN (6)

[4] INTAKE MANIFOLD

[5] ANODE

Replace if excessively deteriorated.

[13] THROTTLE LINK ROD

Install the throttle link rod with the "UP" mark facing toward the No. 1 carburetor. Take care not to bend the throttle link rod.

[13]-1
"UP" MARK



[12] No. 3 CARBURETOR

GREASE

[6]
6 x 18 mm SCREW

[11]
SILENCER PLATE GASKET

Do not reuse.

[7] No. 1 CARBURETOR

[8] No. 2 CARBURETOR

[9] SILENCER PLATE

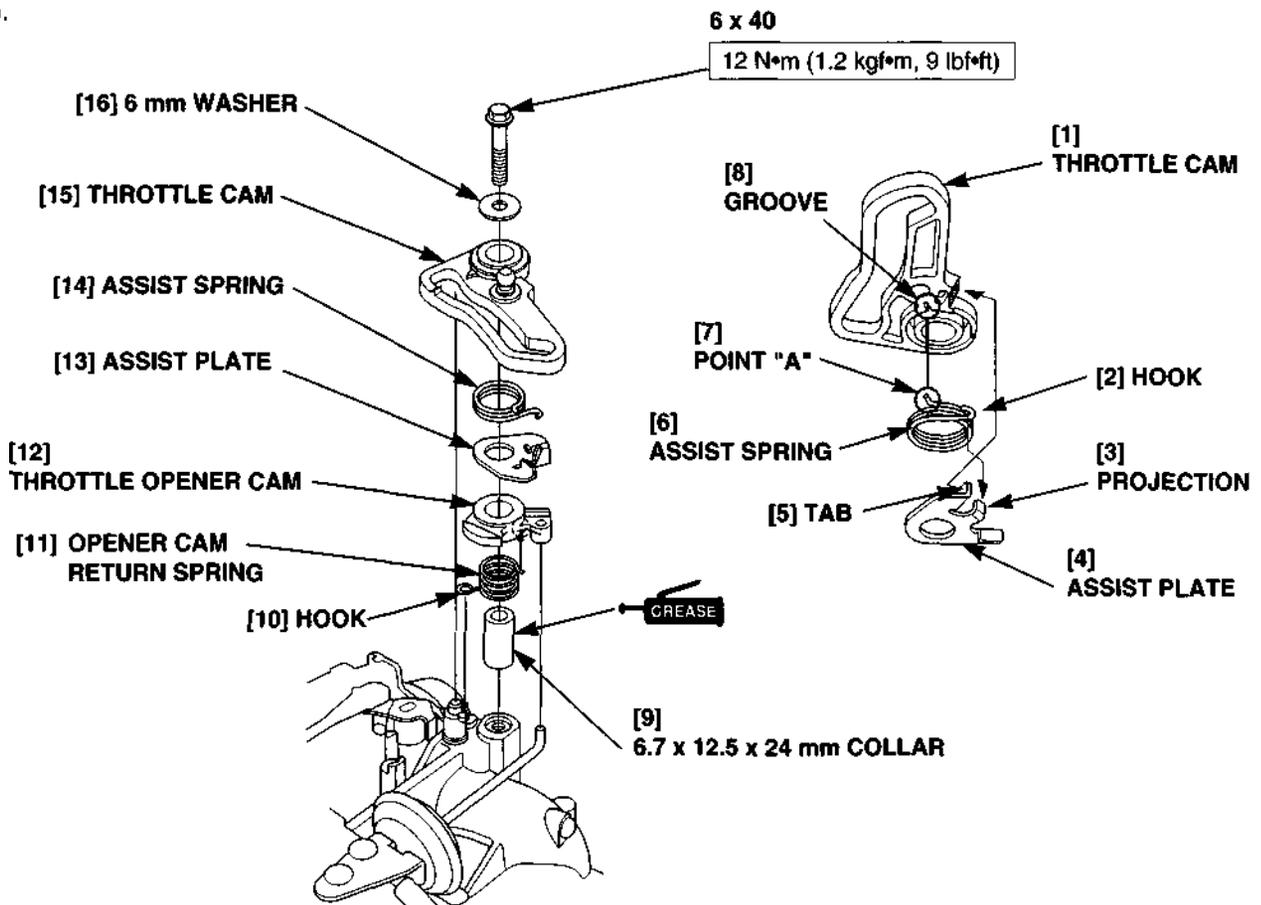
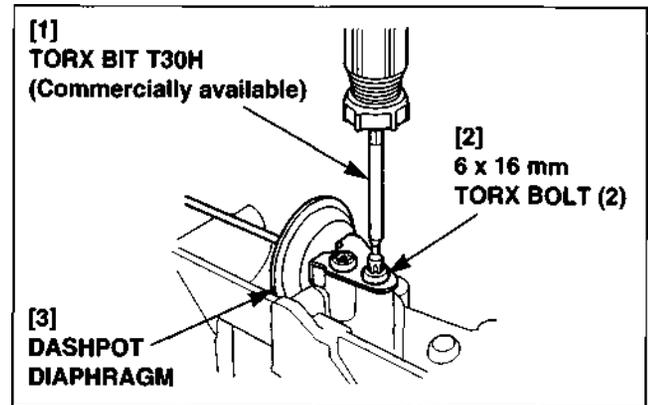
[10] COLLAR (6)

6 x 97 (6)

10 N•m (1.0 kgf•m, 7 lbf•ft)

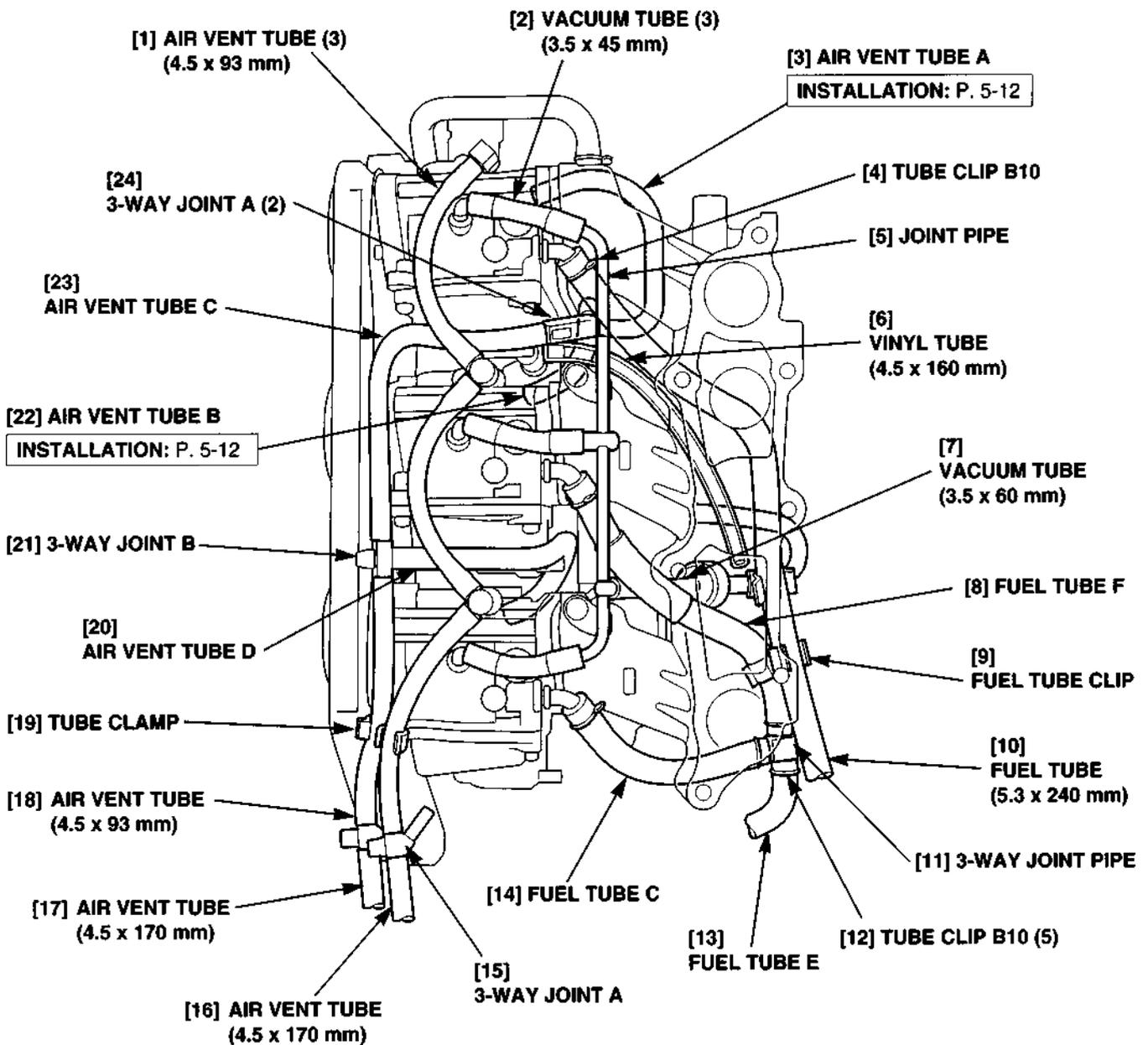
• THROTTLE CAM/DASHPOT DIAPHRAGM

- 1) Place the dashpot diaphragm on the intake manifold, and loosely install the 6 x 16 mm torx bolts.
- 2) Apply grease to the sliding surface of the 6.7 x 12.5 x 24 mm collar and install it.
- 3) Install the opener cam return spring by aligning the hook with the boss of the intake manifold.
- 4) Install the throttle opener cam by aligning the hole with the dashpot diaphragm rod end and the groove with the opener cam return spring end.
- 5) Align the point "A" of the assist spring with the groove in the throttle cam.
- 6) Set the projection of the assist plate in the hook of the assist spring and align the flat surface of the throttle cam with the tab of the assist plate.
- 7) Install the throttle cam, assist spring and assist plate on to the collar as an assembly.
- 8) Install the 6 mm washer and tighten the 6 x 40 mm flange bolt to the specified torque.
- 9) After assembly, adjust the dashpot diaphragm (P. 3-4).

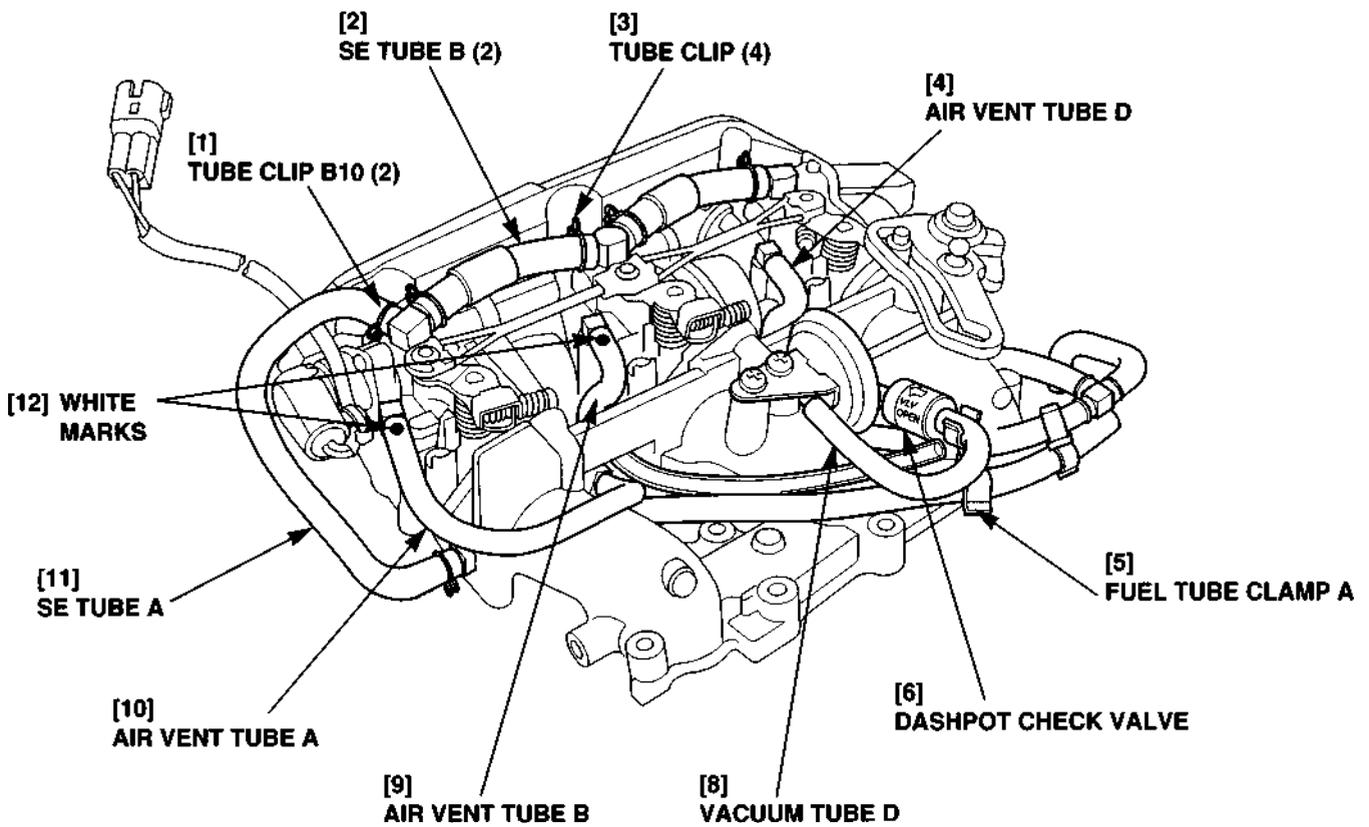


• TUBES

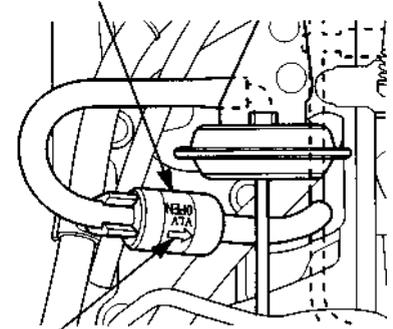
- 1) Install the following:
 - fuel tubes.
 - air vent tubes, joint pipe and tube joints.
 - vacuum tube.
 - tube clips.
 - vinyl tube.



- 2) Install the following:
- vacuum tube D and dashpot check valve.
 - fuel tube clamp A.
 - air vent tubes.
 - SE tube B and tube clips.
 - SE tube A and tube clip B10.



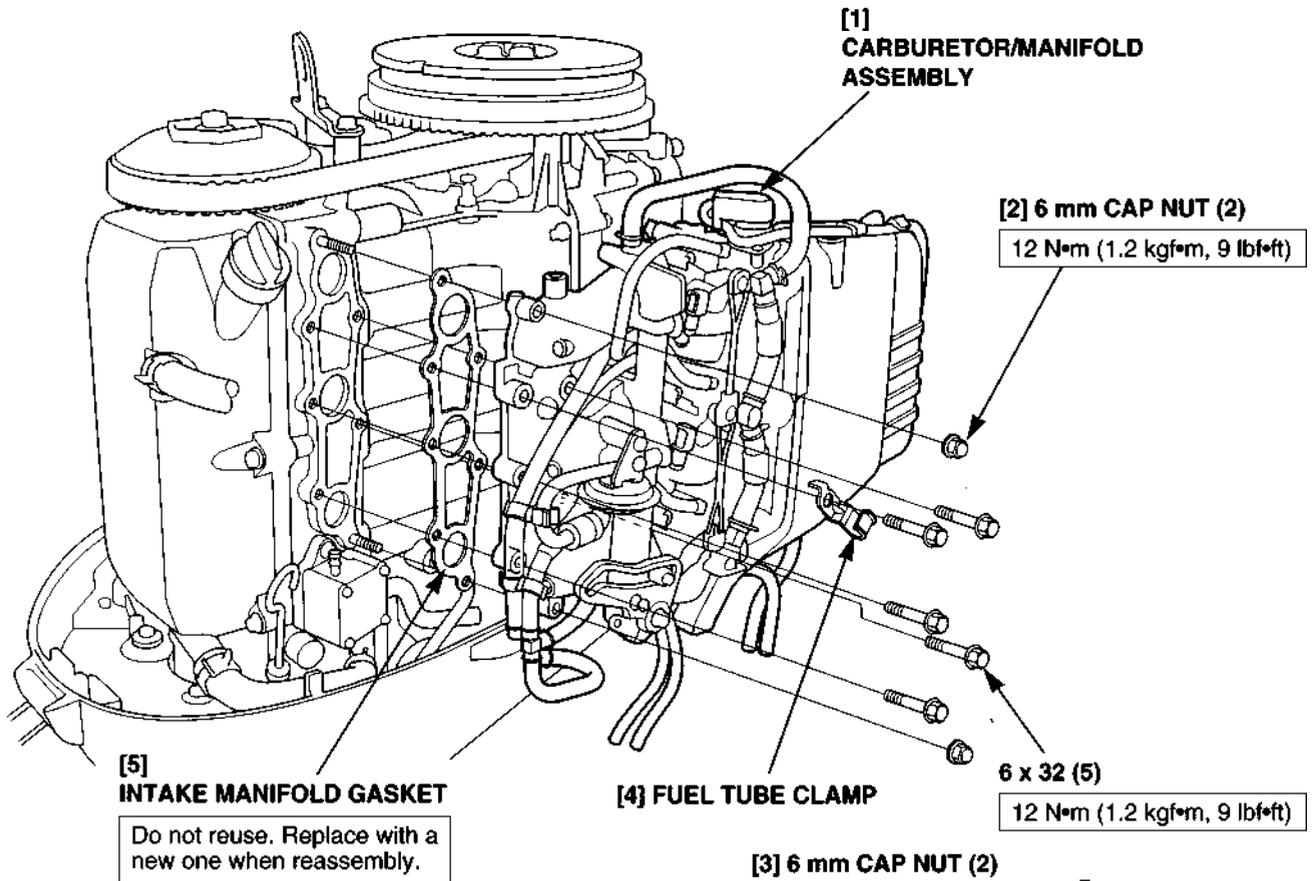
[6] DASHPOT CHECK VALVE



[7] ARROW MARK

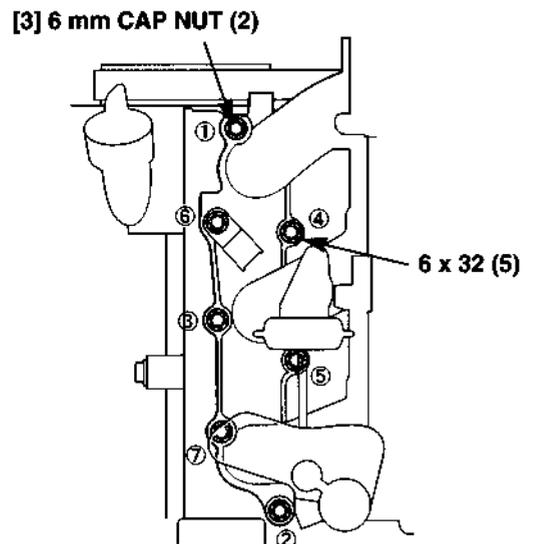
4. CARBURETOR/INTAKE MANIFOLD INSTALLATION

- 1) Install a new intake manifold gasket onto the cylinder head.
- 2) Install the carburetor and manifold assembly and loosely install the 6 mm cap nuts, fuel tube clamp and 6 x 32 mm flange bolts.

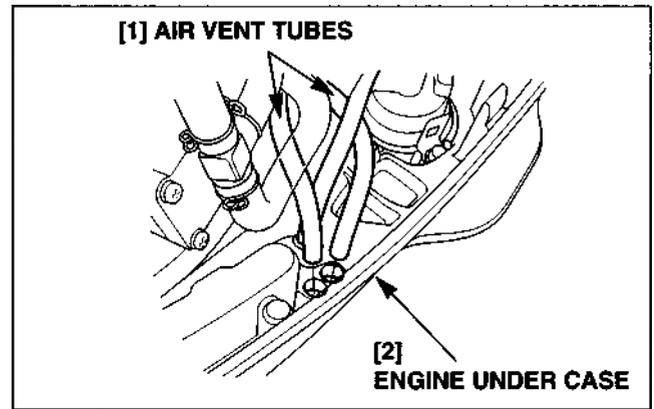


- 3) Tighten the 6 x 32 mm flange bolts and 6 mm cap nuts to the specified torque in the numbered sequence shown in 2 - 3 steps.

TORQUE: 26 N•m (2.7 kgf•m, 20 lbf•ft)

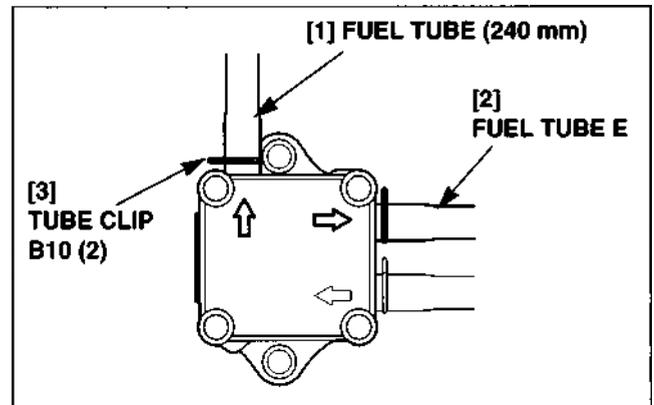


- 4) Insert the air vent tubes into the holes of the engine under case as shown.

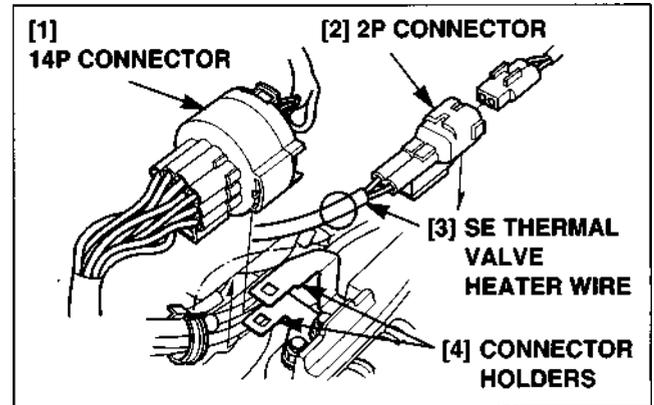


- 5) Connect the fuel tubes to the fuel pump and secure them with the tube clip B10.

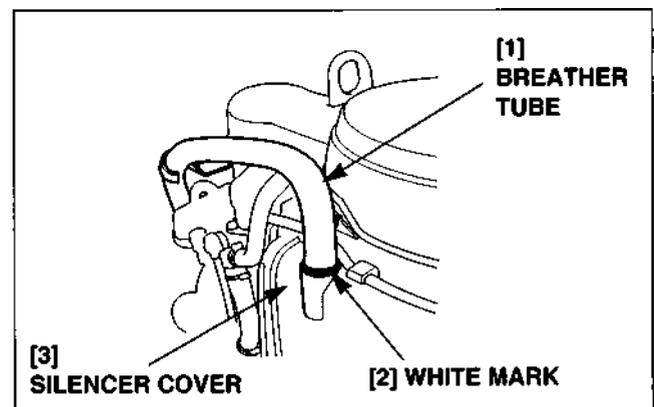
- Connect the fuel tube E (No. 2 and 3 carburetor supply line) to the "⇒" marked fitting.
- Connect the 240 mm fuel tube (No. 1 carburetor supply line) to the "↑" marked fitting.



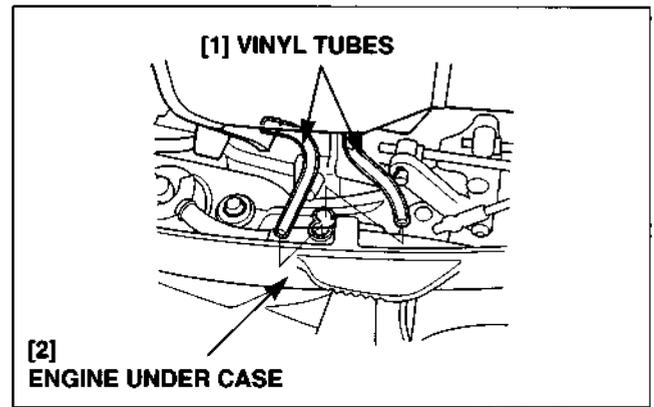
- 6) Connect the SE thermal valve heater wire 2P connector and set the 2P connector to the lower connector holder, then set the 14P connector to the upper connector holder.



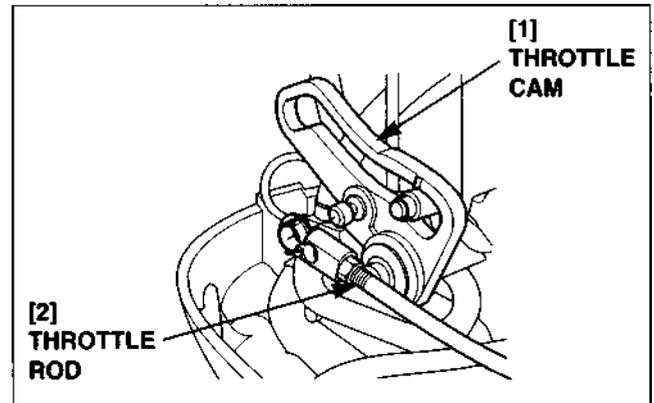
- 7) Insert the breather tube in the silencer cover until the white mark aligns with the hole edge as shown.



- 8) Insert the vinyl tube ends into the holes of the engine under case.



- 9) Connect the throttle rod to the throttle cam.
- 10) After installation, adjust the throttle linkage (P. 3-5).
- 11) Install the removed parts in the reverse order of removal.



1. FLYWHEEL

1. FLYWHEEL

a. DISASSEMBLY/ASSEMBLY

[1] 10 x 25 (4)

ASSEMBLY:

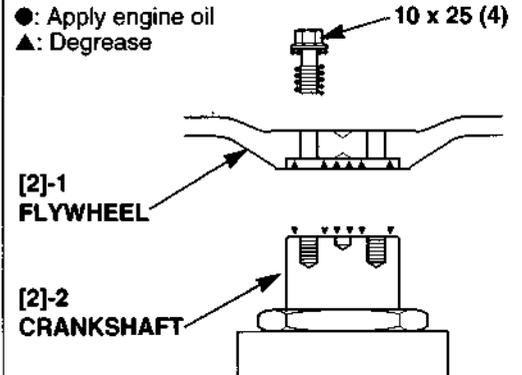
- Apply thin coat of engine oil to the flanged part and threaded part.
 - Do not apply too much engine oil so that it drips from the thread of the bolt.
 - Tighten the bolts to the specified torque in crisscross pattern in 2 - 3 steps.
- Torque: 65 N•m (6.6 kgf•m, 48 lbf•ft)

[2] FLYWHEEL

ASSEMBLY:

Wipe the flywheel and crankshaft mounting surfaces with a clean shop towel sprayed with degreasing agent.

- : Apply engine oil
- ▲: Degrease



[9] CHARGE COIL

INSPECTION: P. 16-20
of the base shop manual

[8] CORD HOLDER B

[7] 6 x 10 mm DOWEL PIN

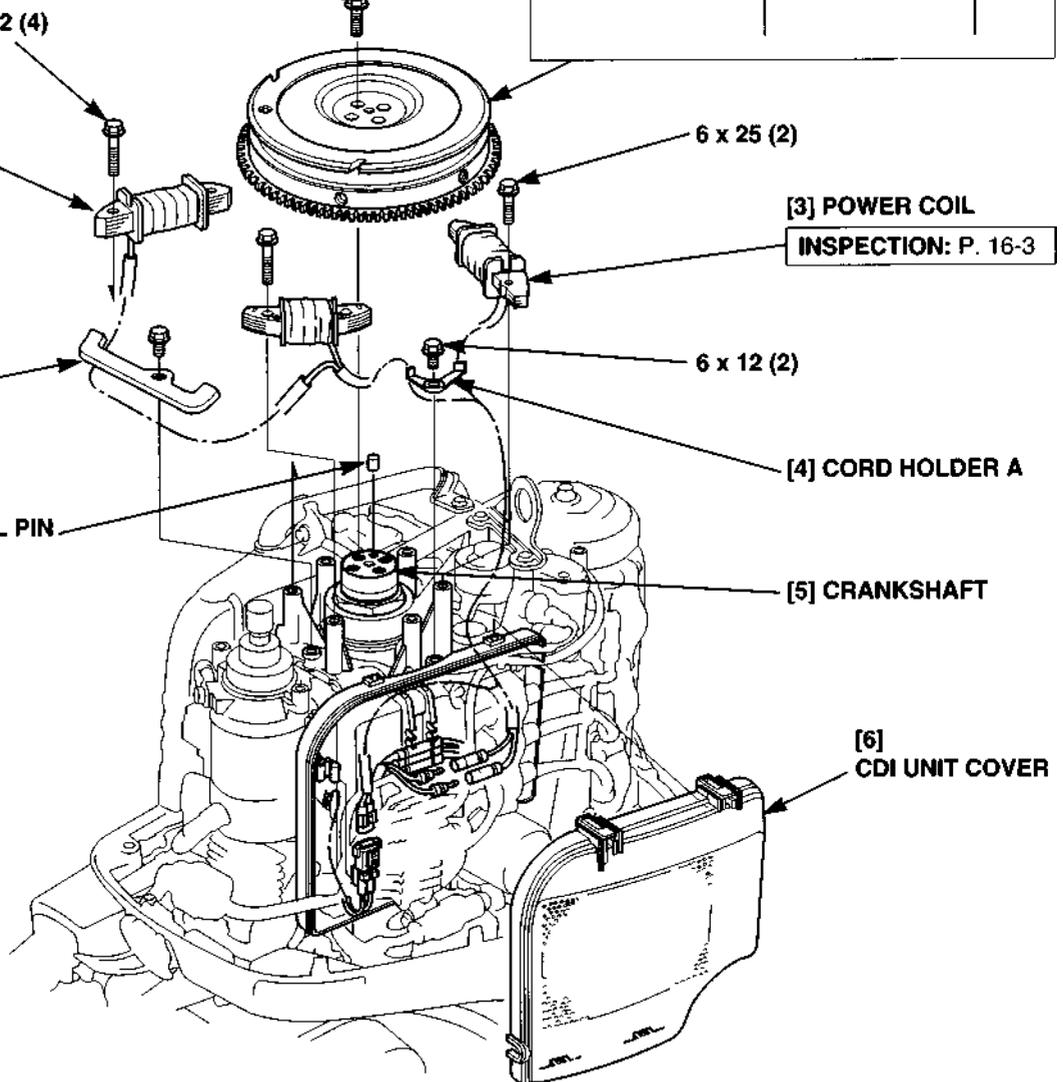
[3] POWER COIL

INSPECTION: P. 16-3

[4] CORD HOLDER A

[5] CRANKSHAFT

[6] CDI UNIT COVER

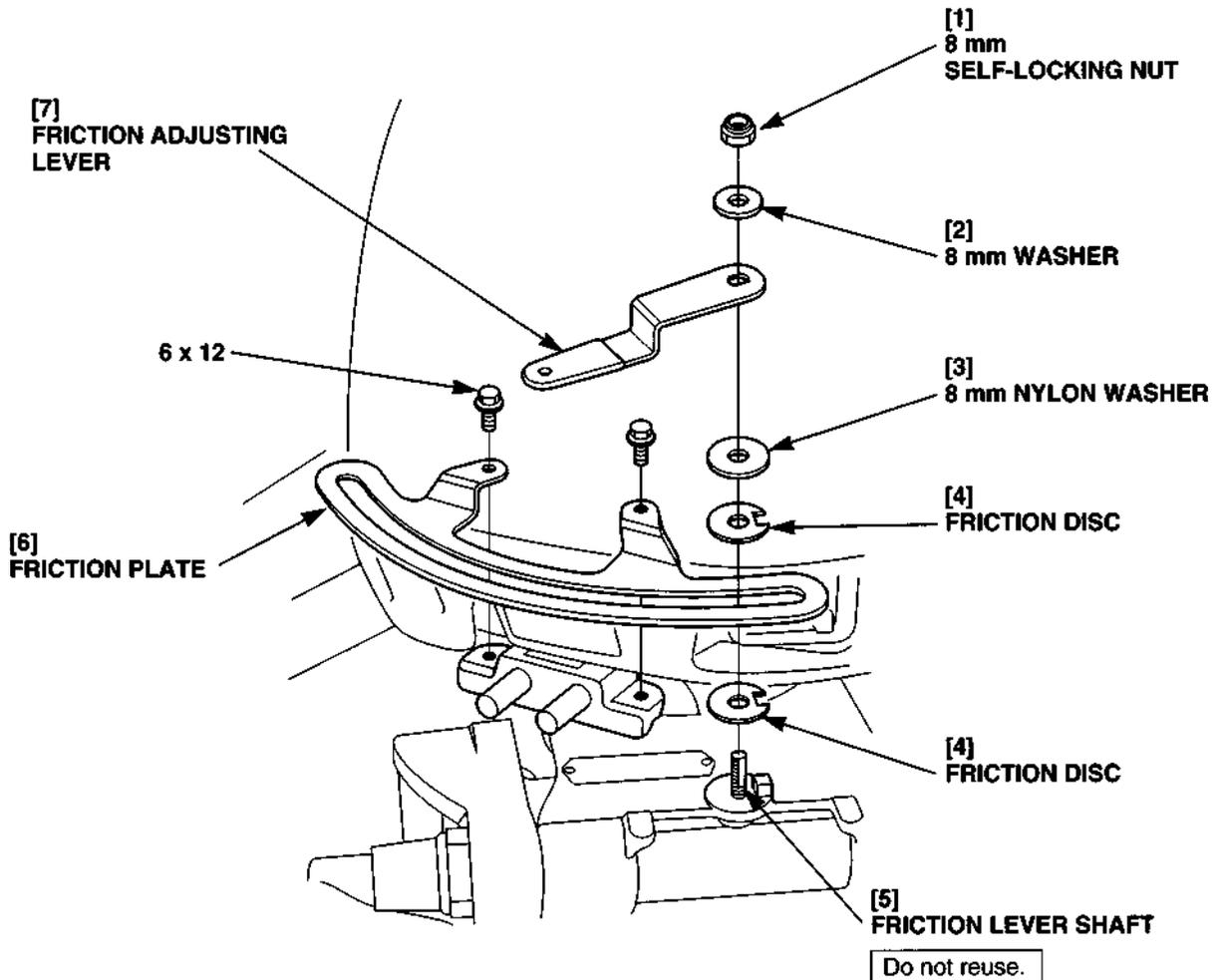


1. STEERING FRICTION LEVER (Long Tiller Handle Type)

1. STEERING FRICTION LEVER (Long Tiller Handle Type)

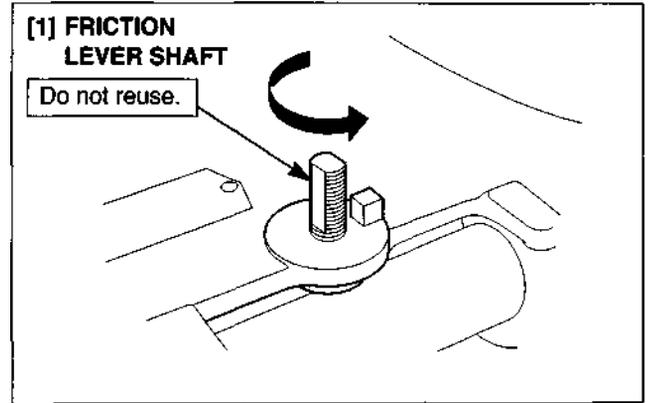
a. DISASSEMBLY

- 1) Remove the engine cover and tiller handle (P. 15-1).
- 2) Remove the 8 mm self locking nut.
- 3) Remove the 8 mm washer, friction adjusting lever, 8 mm nylon washer and friction disc.
- 4) Remove the two 6 x 12 mm flange bolts and friction plate.
- 5) Remove the friction disc.

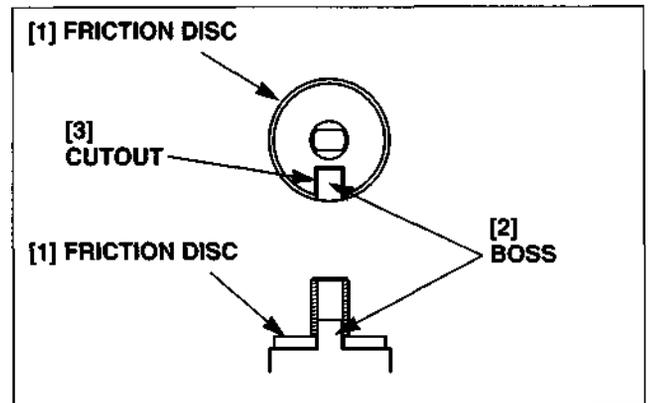


b. ASSEMBLY

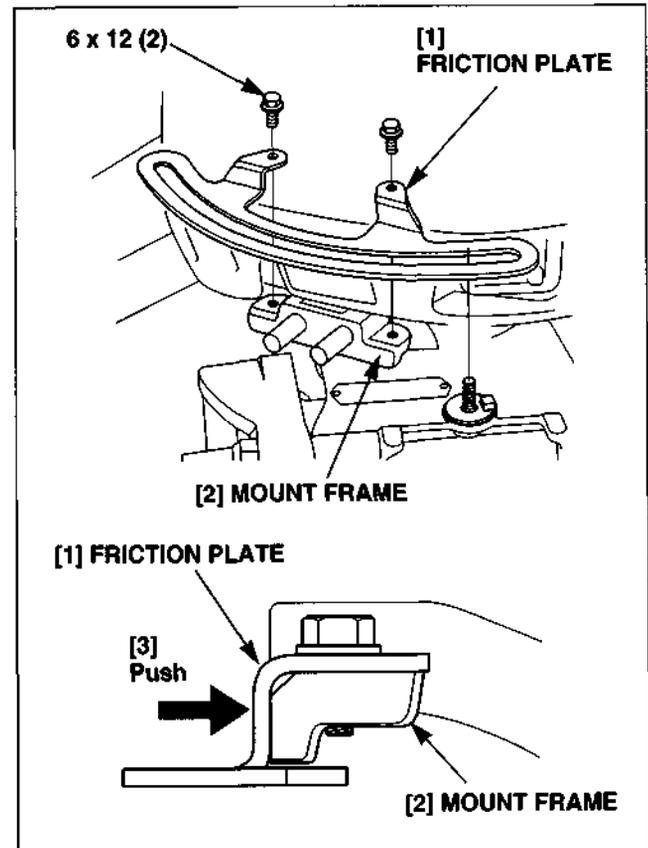
- 1) Install a new friction lever shaft. Turn the friction lever shaft until it stops.
- 2) Adjust the friction lever shaft direction as shown by turning back the friction lever shaft 1/4 - 3/4 turn.



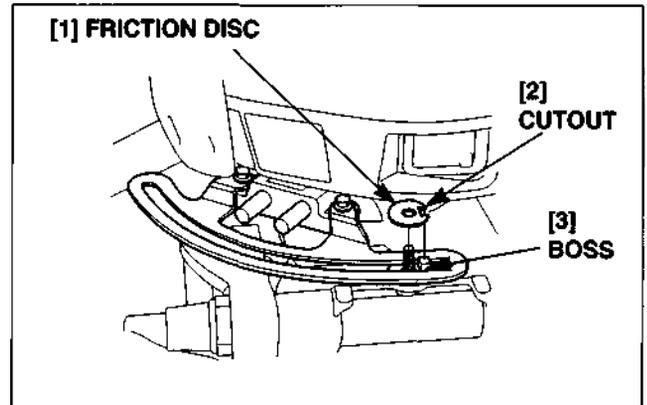
- 3) Before installation, check the disc surface of the friction discs for wear. Replace if necessary.
- 4) Clean off grease or oil from the disc surfaces of the friction discs and friction plate. Install one of the friction disc onto the friction lever shaft by aligning the cutout with the boss on the swivel case and facing the disc surface toward the friction plate as shown.



- 5) Install the friction plate to the mount frame by aligning the groove with the friction lever shaft and loosely install the two 6 x 12 mm flange bolts.
- 6) Push the friction plate toward the mount frame in the direction shown by arrow and tighten the 6 x 12 mm flange bolts securely.



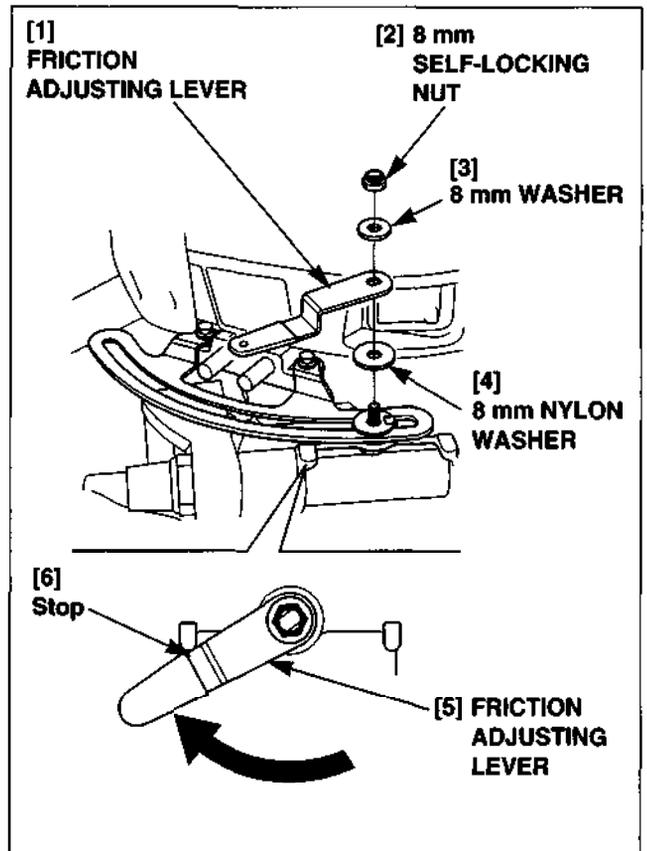
- 7) Install the other friction disc onto the friction lever shaft by aligning the cutout with the boss on the swivel case and facing the disc surface toward the friction plate.



- 8) Install the 8 mm nylon washer, friction adjusting lever and 8 mm washer.
- 9) Turn the adjusting lever to the left side fully, and hold it in this position and tighten the 8 mm self-locking nut to the specified torque.

TORQUE: 9.5 N•m (0.95 kgf•m, 6.9 lbf•ft)

- 10) Check the starting torque by measuring the starting force using a spring scale at the center of the throttle grip (P. 3-8).



1. GAS ASSISTED DAMPER

2. POWER TRIM/TILT ASSEMBLY

1. GAS ASSISTED DAMPER

a. REMOVAL

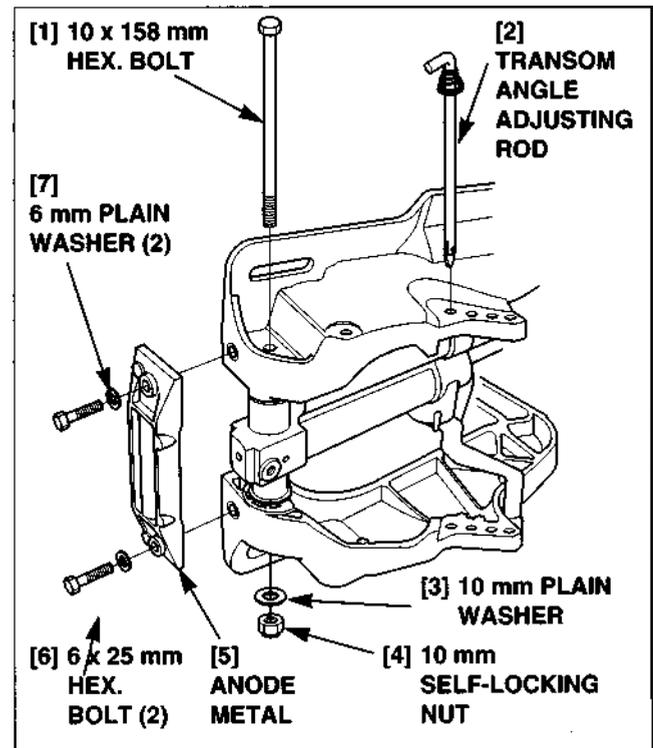
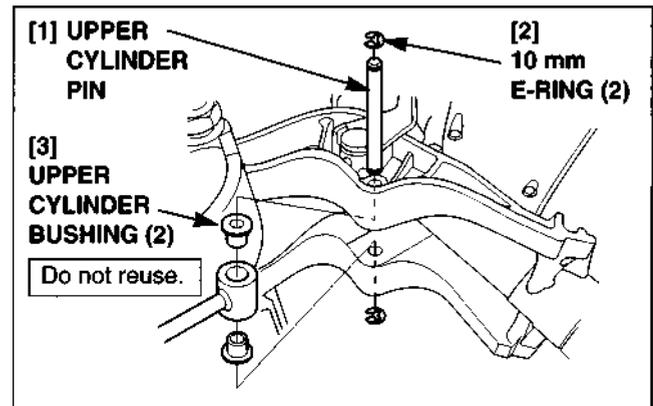
- 1) Drain the carburetor by loosening the drain screws.

⚠ WARNING

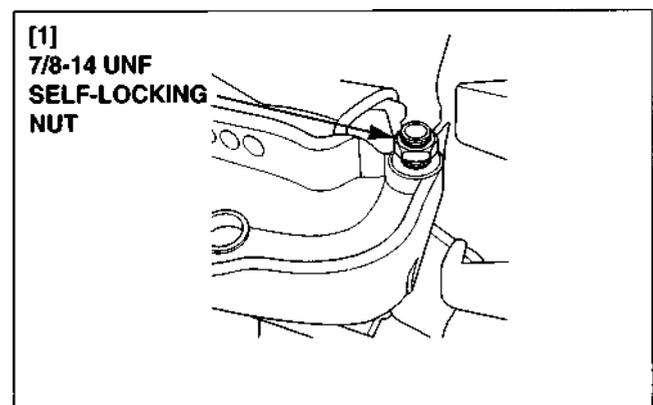
Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

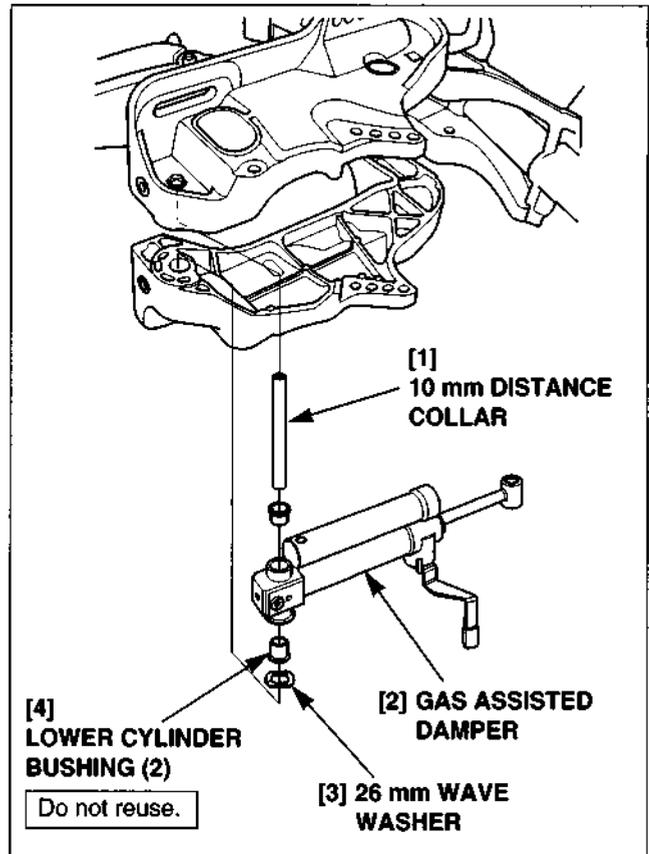
- 2) Lay the outboard motor on its right side (carburetor side).
- 3) Raise the outboard motor to the uppermost position and set the tilt stopper to the RUN position.
- 4) Remove the 10 mm E-ring from the upper cylinder pin, and then remove the upper cylinder pin.
- 5) Remove the upper mount of the gas-assisted damper from the swivel case.
- 6) Remove the upper cylinder bushings if necessary.
 - Replace with new ones when the upper cylinder bushings are removed.
- 7) Remove the transom angle adjusting rod.
- 8) Remove the 6 x 25 mm hex. bolts, 6 mm plain washers and anode metal.
- 9) Remove the 10 mm self-locking nut and remove the 10 mm plain washer and 10 x 158 mm hex. bolt.



- 10) Loosen the 7/8-14 UNF self locking nut.

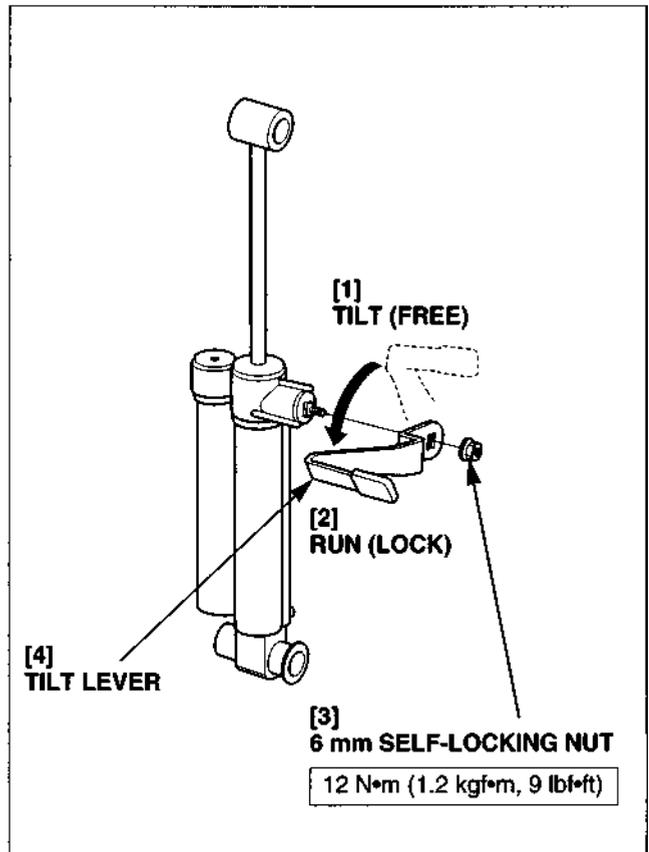


- 11) Lift the left stern bracket and remove the gas assisted damper.
 - Make sure that the tilt lever is in "RUN" position before removal.
 - Store the gas assisted damper with fully extended position
- 12) Remove the 26 mm wave washer and 10 mm distance collar.
- 13) Remove the lower cylinder bushings if necessary.
 - Replace with new ones when the lower cylinder busing is removed.



• TILT LEVER REPLACEMENT

- Before removing the tilt lever, set the tilt lever in the "RUN" position
- Install the tilt lever by aligning the mounting hole of the lever with the tilt lever shaft and noting the installation direction as shown.



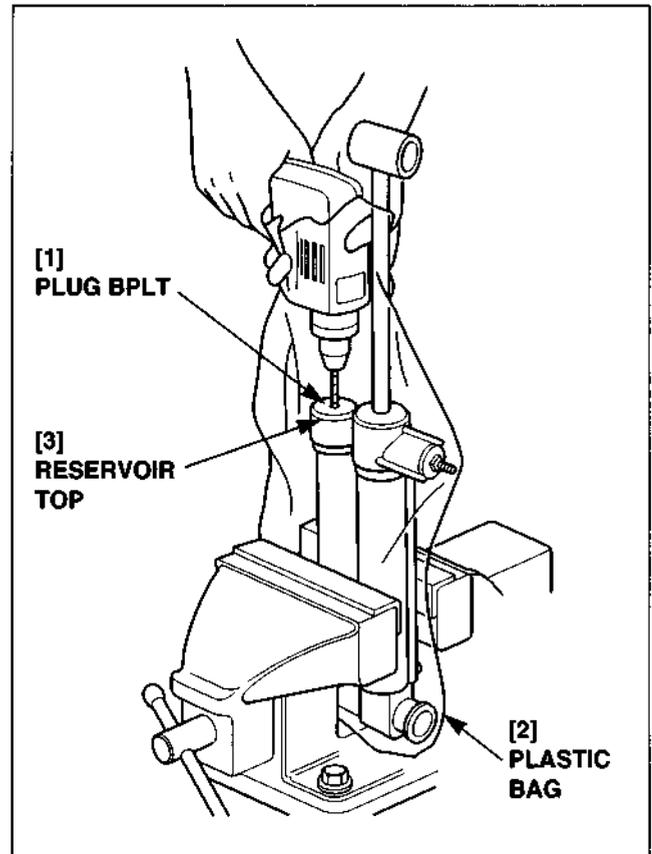
b. DISPOSAL

- 1) Set the tilt lever in the "TILT" position with the piston rod fully extended, then remove the tilt lever.
- 2) Wrap the damper inside a plastic bag and support the damper in a vice as shown.
- 3) Through the open end of the plastic bag, insert a drill motor with a sharp 2 - 3 mm (5/64 - 1/8 in) drill bit.

CAUTION

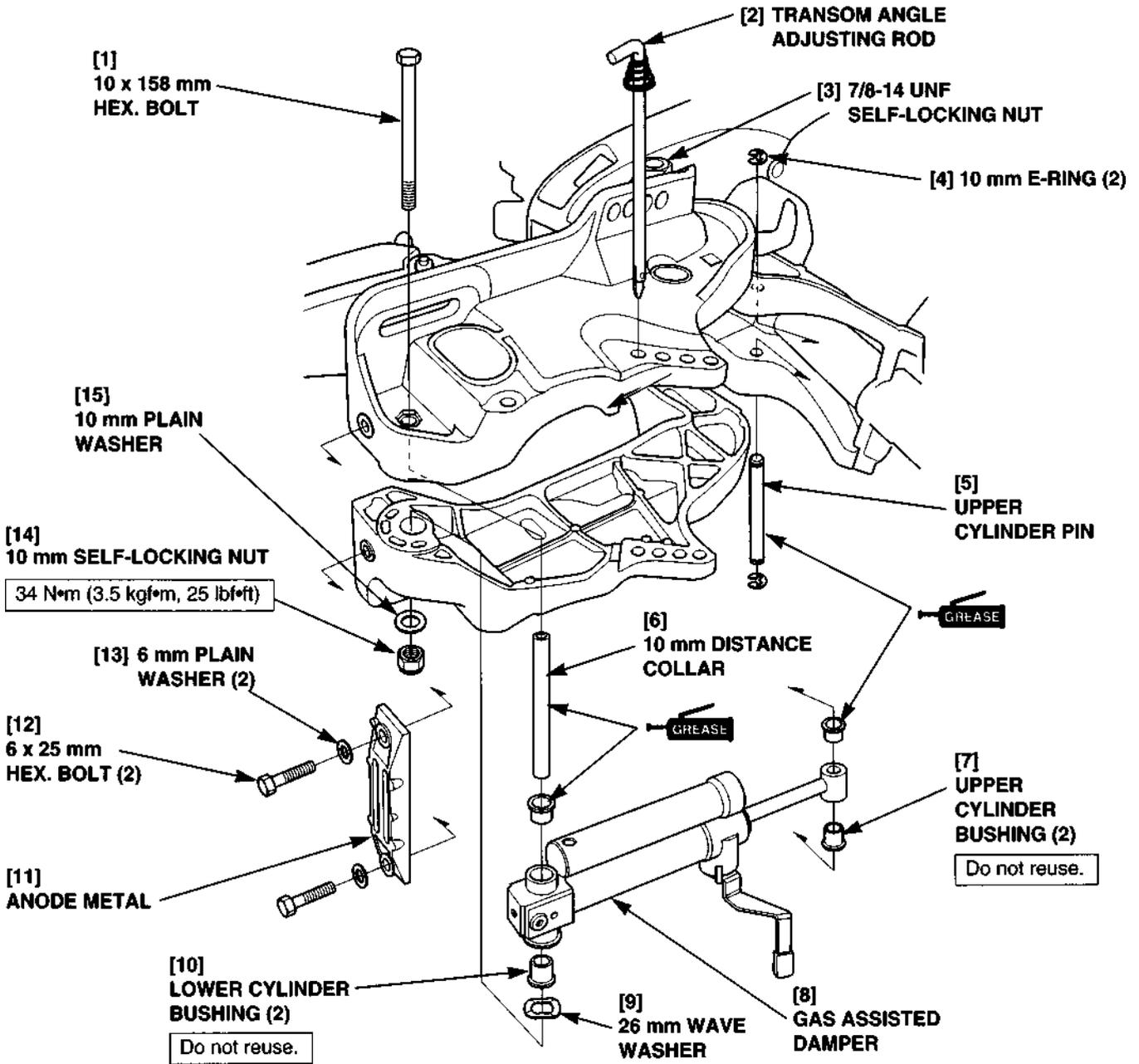
- The gas assisted damper contains nitrogen gas and oil under high pressure. Do not drill past the reservoir top, or you may drill into the oil chamber; oil escaping under high pressure may cause serious personal injury.
- Do not use a dull drill bit which could cause a build-up of excessive heat and pressure inside the damper, leading to explosion and severe personal injury.
- Always wear eye protection to avoid getting metal shaving in your eyes when the gas pressure is released. The plastic bag is only intended to shield you from the escaping gas.

- 4) Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the drill motor and keep the bag from getting caught in the bit when you start.
- 5) Drill the plug bolt on the reservoir top.

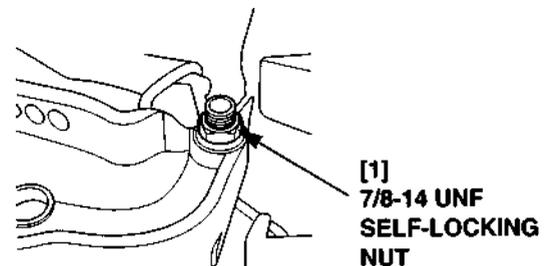


c. INSTALLATION

Install the gas-assisted damper in the reverse order removal.



- After installing the gas assisted damper, tighten the 7/8-14 UNF self-locking nut to the specified torque. Then turn it back 1/2 - 3/4 turns.
TORQUE: 39 N•m (4.0 kgf•m, 29 lbf•ft)



2. POWER TRIM/TILT ASSEMBLY

a. REMOVAL

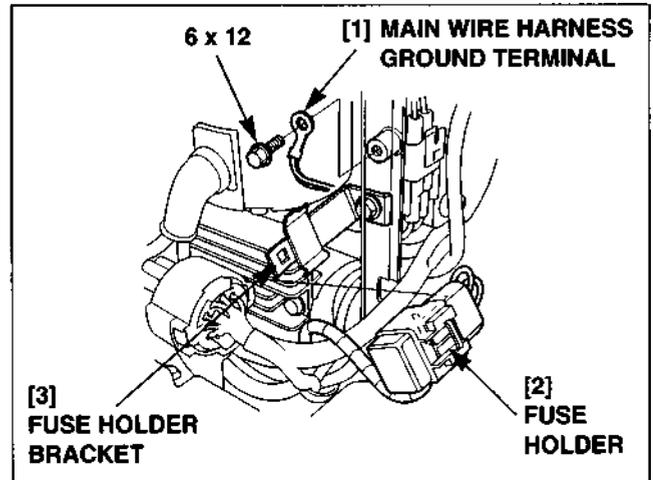
- 1) Drain the carburetor by loosening the drain screws and remove the motor from the engine.

⚠ WARNING

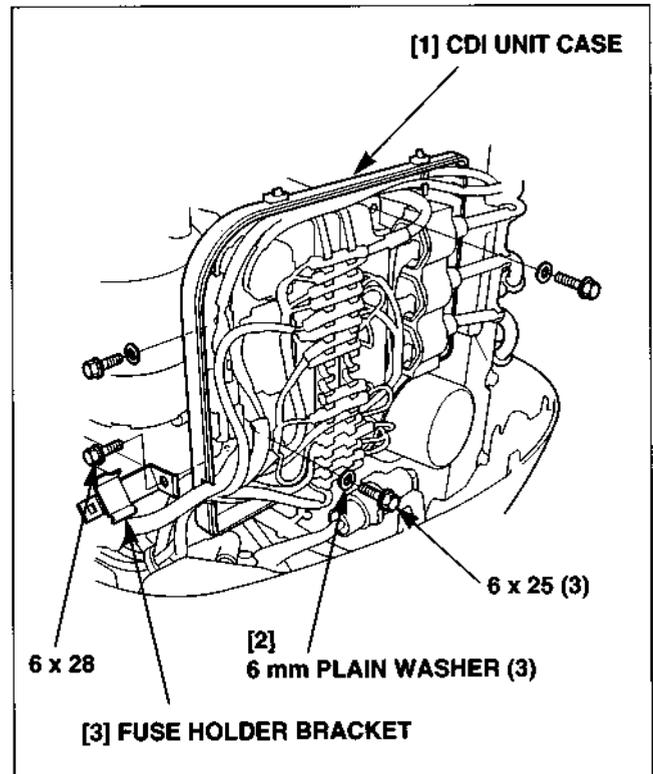
Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

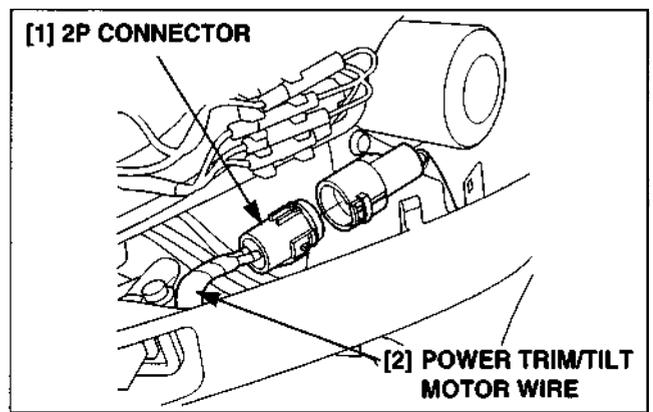
- 2) Lay the outboard motor on its right side (carburetor side).
- 3) Raise the outboard motor to the uppermost position and set the tilt stopper in the TILT position.
- 4) Remove the engine cover and CDI unit cover (see base shop manual).
- 5) Pull the fuse holder from the fuse holder bracket.
- 6) Remove the 6 x 12 mm flange bolt and main wire harness ground terminal.



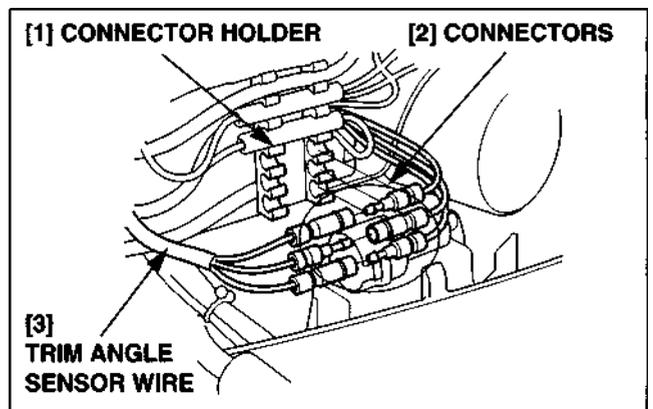
- 7) Remove the 6 x 25 mm flange bolt, 6 mm plain washer and fuse holder bracket.
- 8) Remove the CDI unit case mounting three 6 x 25 mm flange bolts and 6 mm plain washers, then pull out the CDI unit case slightly from the engine.



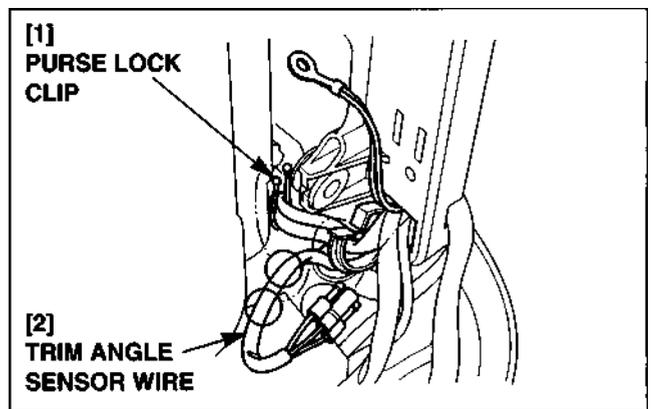
- 9) Disconnect the power trim/tilt motor wire 2P connector.



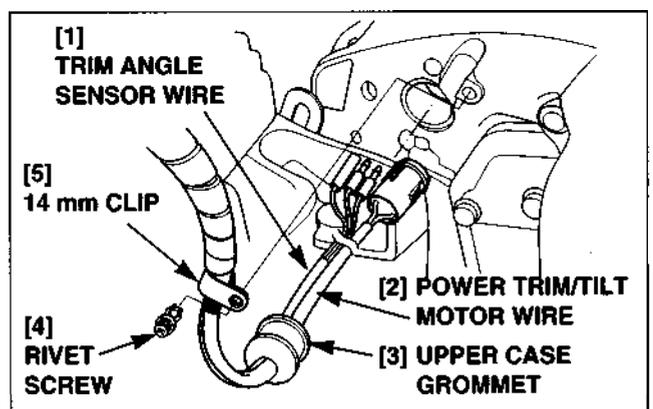
- 10) Pull off the trim angle sensor's three connectors from the connector holder and disconnect them.



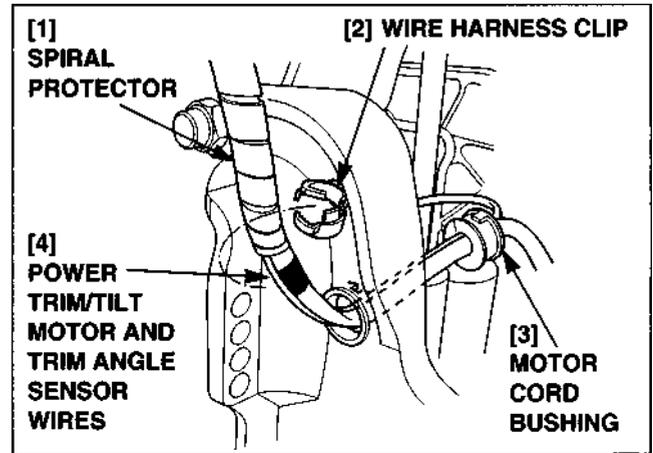
- 11) Unfasten the purse lock clip and pull out the trim angle sensor wire through the hole of the CDI unit case.



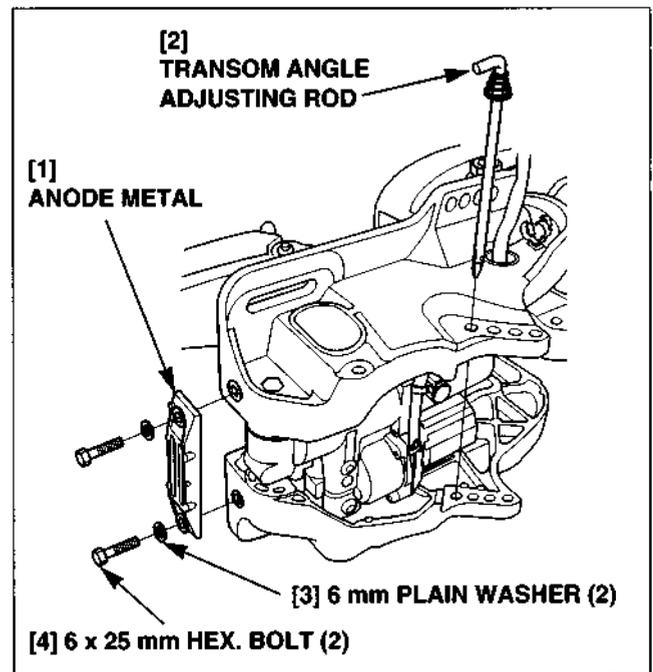
- 12) Loosen the rivet screw and remove the 14 mm clip.
- 13) Remove the upper case grommet C from the engine under case and pull the power trim/tilt motor and trim angle sensor wires from the engine under case.



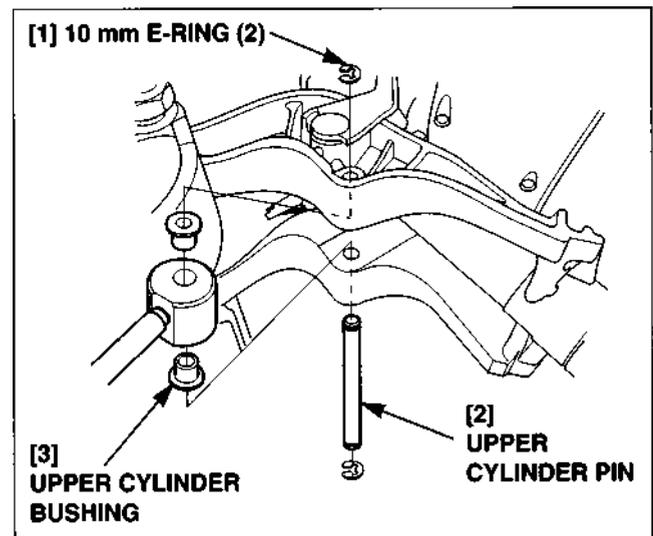
- 14) Remove the spiral protector, and open the wire harness clip and unfasten the power trim/tilt motor wire and trim angle sensor wire.
- 15) Remove the motor cord bushing from left stern bracket.



- 16) Remove the transom angle adjusting rod.
- 17) Remove the 6 X 25 mm hex. bolts, 6 mm plain washers and anode metal.

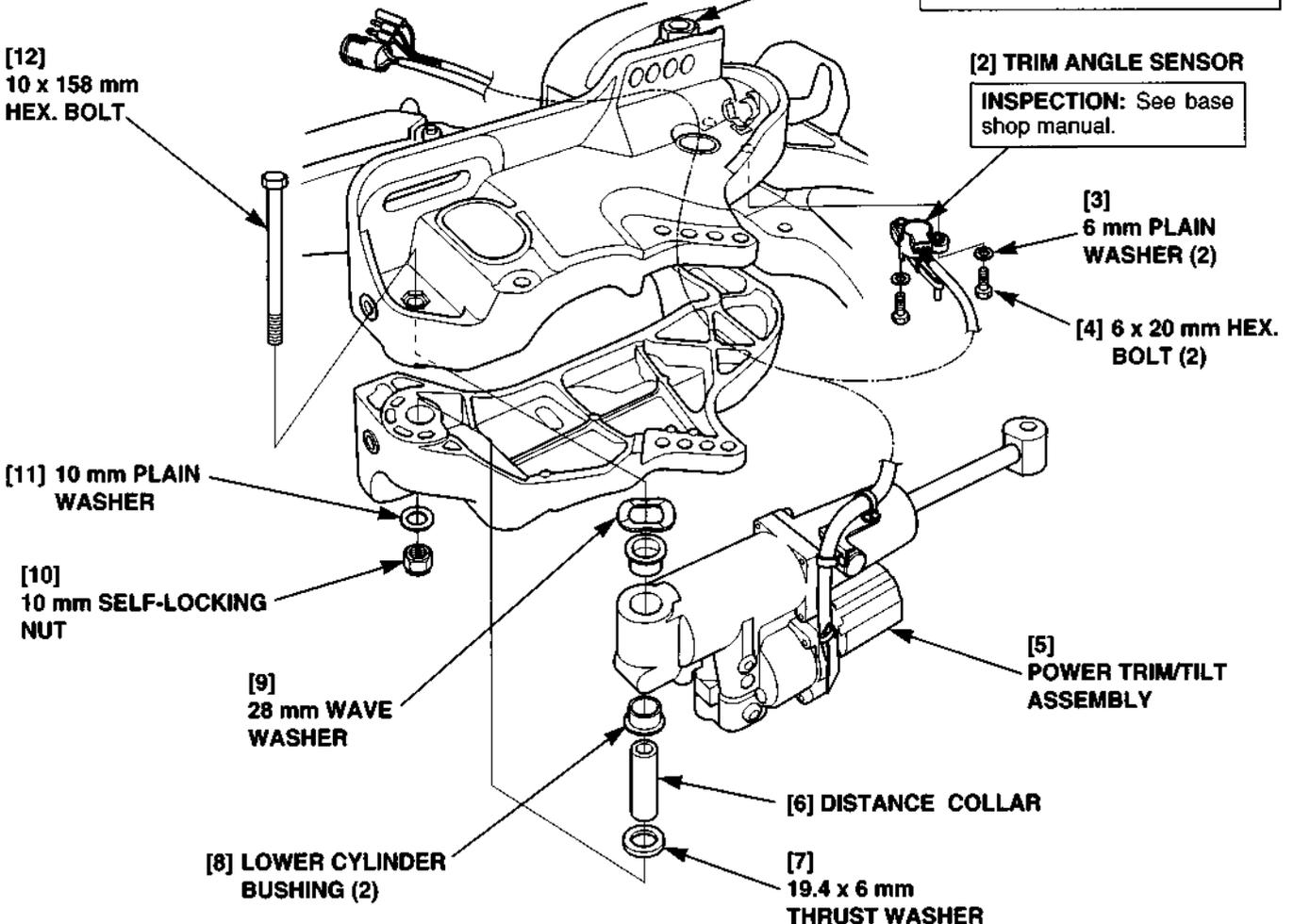
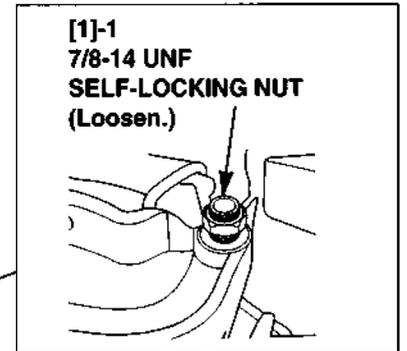


- 18) Remove the 10 mm E-ring from the upper cylinder pin, and then remove the upper cylinder pin.
- 19) Remove the upper mount of the power trim/tilt from the swivel case.
- 20) Remove the upper cylinder bushings if necessary.
 - Replace with new ones when the upper cylinder busing is removed.



- 21) Remove the two 6 x 20 mm hex bolts and 6 mm plain washers and remove the trim angle sensor if necessary.
- 22) Remove the 10 mm self-locking nut and remove the 10 mm plain washer and 10 x 158 mm hex. bolt.
- 23) Loosen the 7/8-14 UNF self locking nut.
- 24) Lift the left stern bracket and remove the power trim/tilt assembly.
- 25) Remove the 28 mm wave washer, 19.4 x 6 mm thrust washer and distance collar.
- 26) Remove the lower cylinder bushings if necessary.
 - Replace with new ones when the lower cylinder bushings are removed.

**[1]
7/8 - 14 UNF SELF-LOCKING NUT**



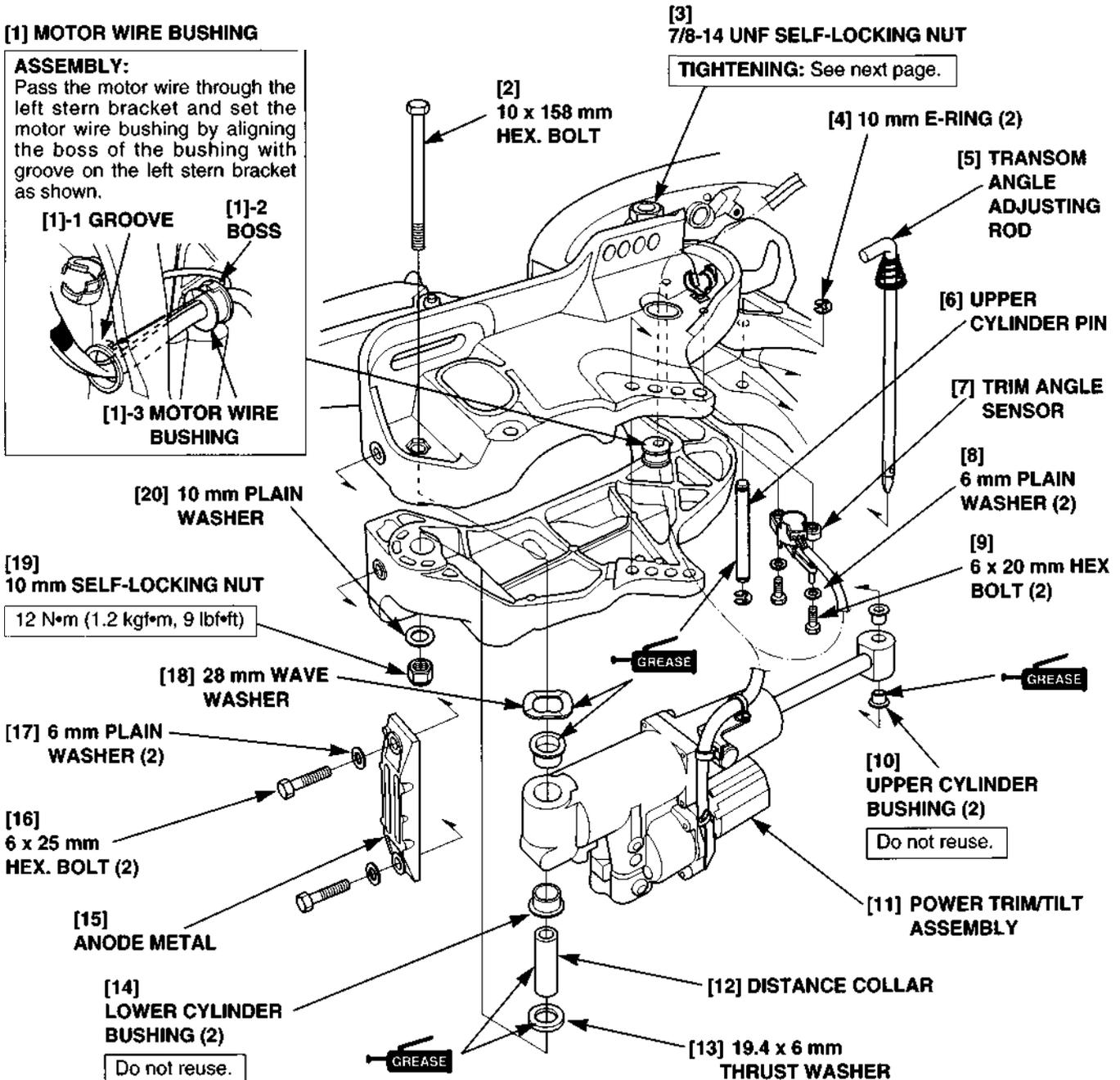
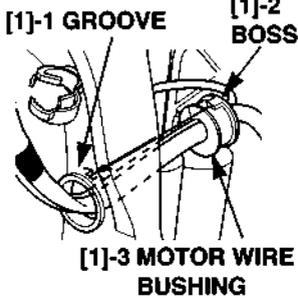
b. INSTALLATION

- 1) Install the power trim/tilt motor in the reverse order of removal.
 - Apply grease to the following:
 - upper cylinder bushings and upper cylinder pin.
 - lower cylinder bushings, 28 mm wave washer, distance collar and 19.4 x 6 mm thrust washer.
 - If the upper cylinder bushing and lower cylinder bushing have been removed, replace with new ones.

[1] MOTOR WIRE BUSHING

ASSEMBLY:

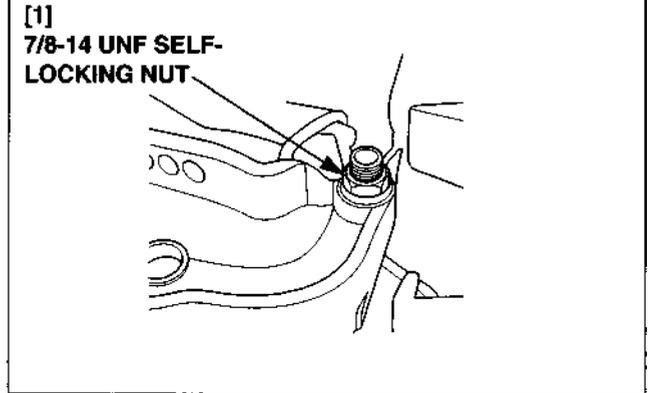
Pass the motor wire through the left stern bracket and set the motor wire bushing by aligning the boss of the bushing with groove on the left stern bracket as shown.



- 2) After installing the power trim/tilt assembly, tighten the 7/8-14 UNF self-locking nut to the specified torque. Then turn it back 1/2 - 3/4 turns.

TORQUE: 39 N•m (4.0 kgf•m, 29 lbf•ft)

- 3) Route the power trim/tilt motor and trim angle sensor wires and secure them with the clips.

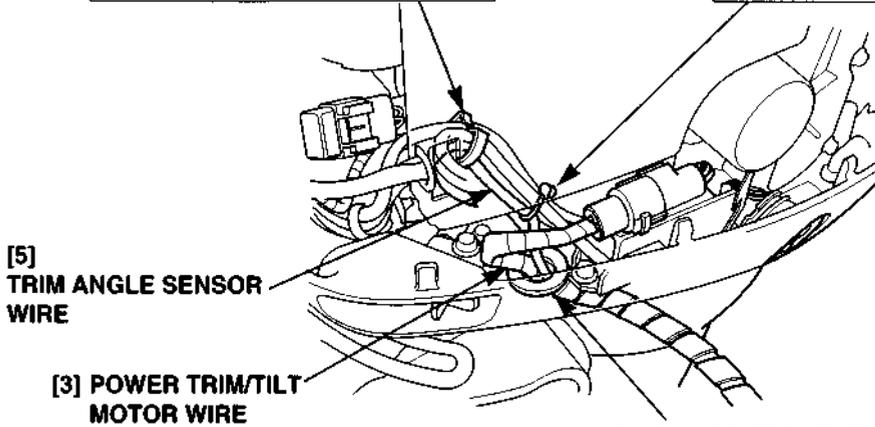


[1] WIRE HARNESS CLIP

Clamp the trim angle sensor wire together with the power trim/tilt switch wire and power trim/tilt relay wires as shown.

[2] PURSE LOCK CLIP

Clamp the wires (power trim/tilt switch wire, power trim/tilt relay wires, and trim angle sensor wire).



[3] POWER TRIM/TILT MOTOR WIRE

[9] 14 mm TUBE CLIP

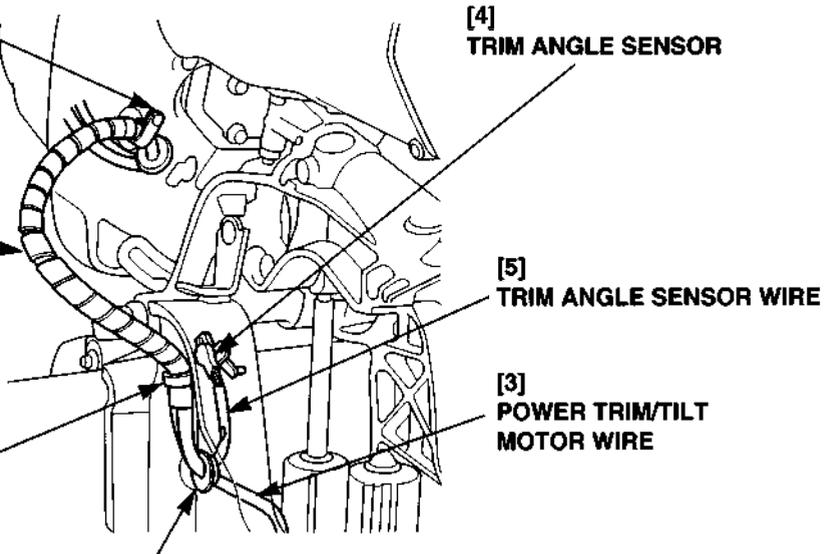
Clamp the center of the gray tape position of the power trim/tilt motor wire with the wire harness clip.

[8] SPIRAL PROTECTOR

After routing and clamping the power trim/tilt motor and trim angle sensor wires, wrap the wires between the 14 mm tube clip and wire harness with the spiral protector as shown.

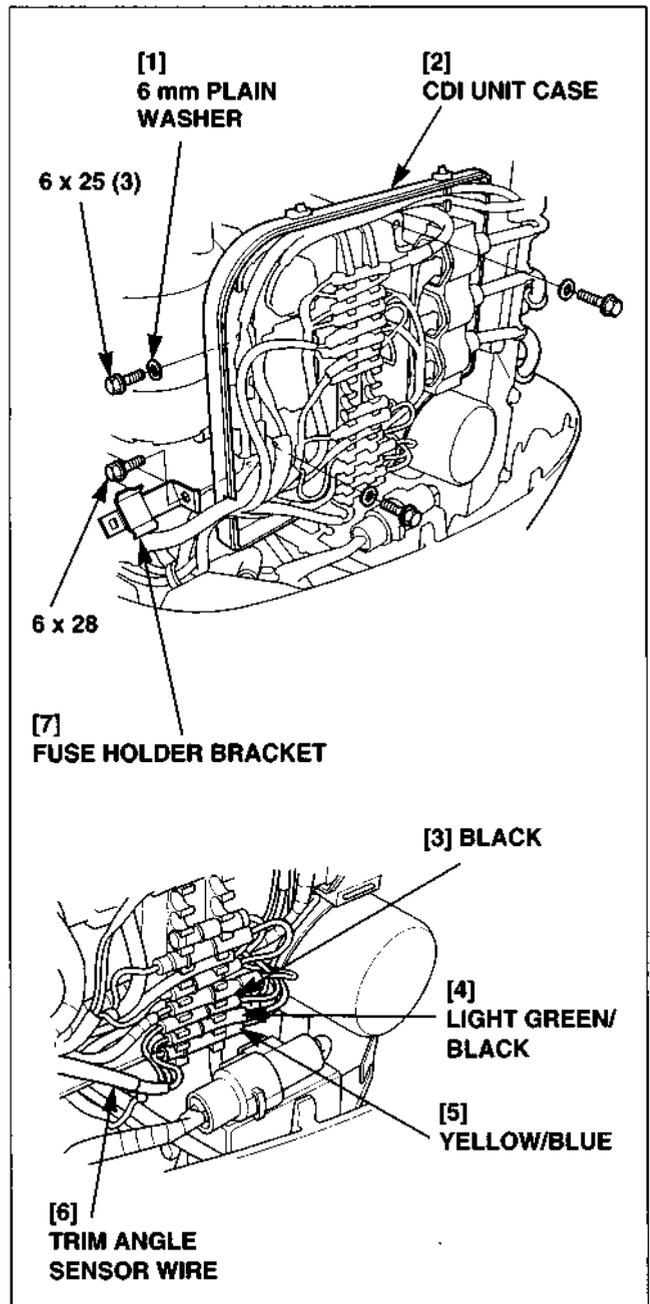
[7] WIRE HARNESS CLIP

Clamp the center of the gray tape position of the power trim/tilt motor wire with the wire harness clip.

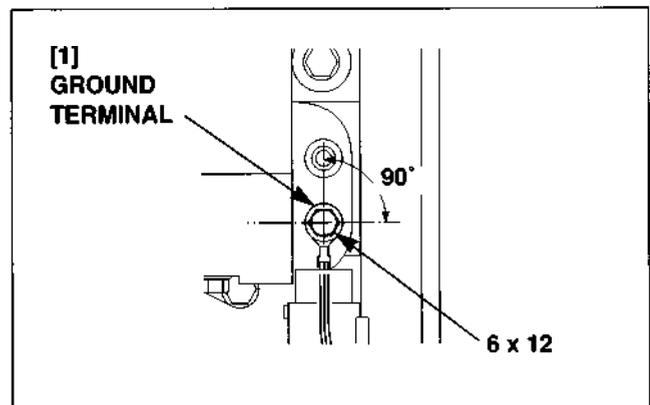


[6] MOTOR CORD BUSHING

- 4) Set the trim angle sensor wire connectors on the connector holder.
- 5) Set the CDI unit case in the place and install the 6 mm plain washers and 6 x 25 mm flange bolts, and tighten the bolts securely.
- 6) Install the fuse holder bracket with the 6 x 28 mm flange bolt, then install the fuse holder.



- 7) Set the ground terminal as shown and tighten the 6 x 12 mm flange bolt securely noting the terminal direction.



THROTTLE BRACKET/SHIFT LEVER/ 15. HANDLEBAR (TILLER HANDLE TYPE ONLY)

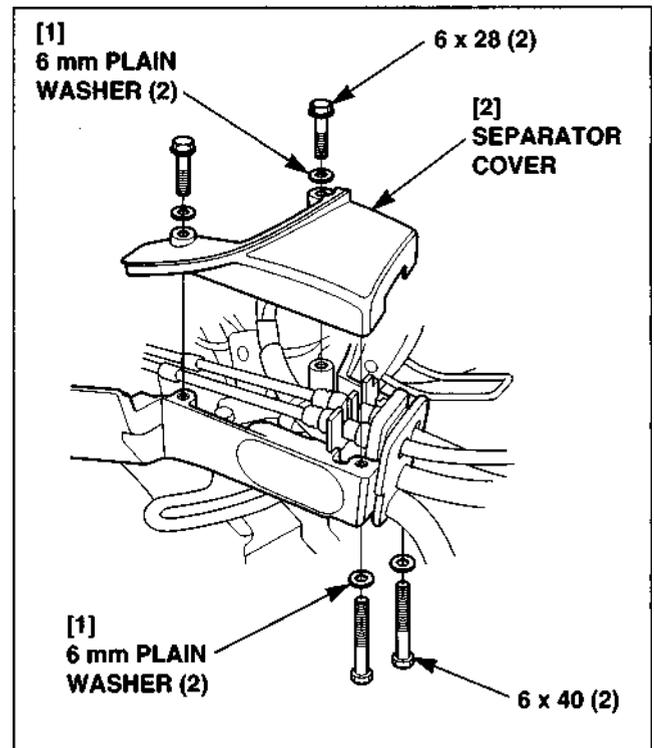
BF40A•BF50A

1. LONG TILLER HANDLE

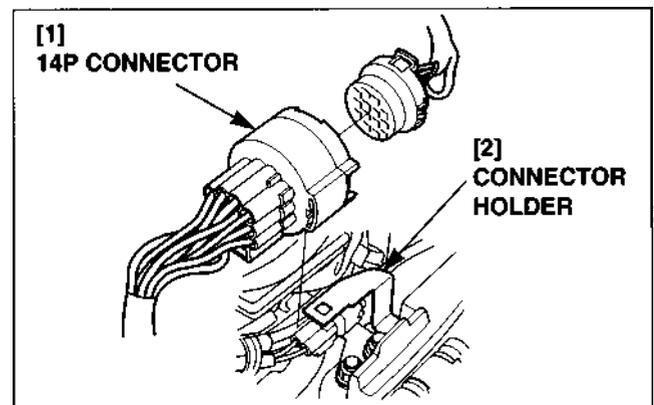
1. LONG TILLER HANDLE

a. REMOVAL

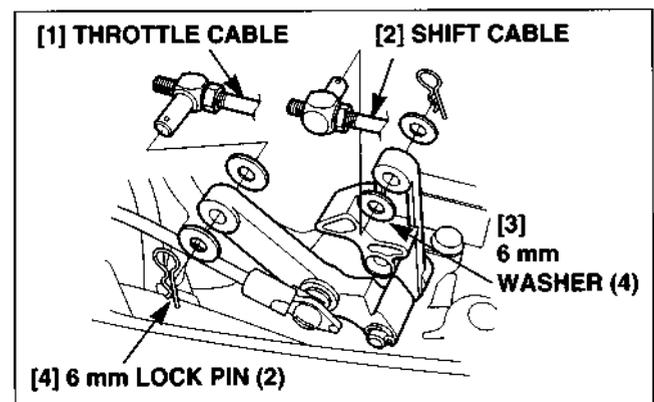
- 1) Remove the engine cover and set the shift lever in the neutral position.
- 2) Remove the two 6 x 28 mm flange bolts, two 6 x 40 mm flange bolts and four 6 mm plain washers, and remove the separator cover.



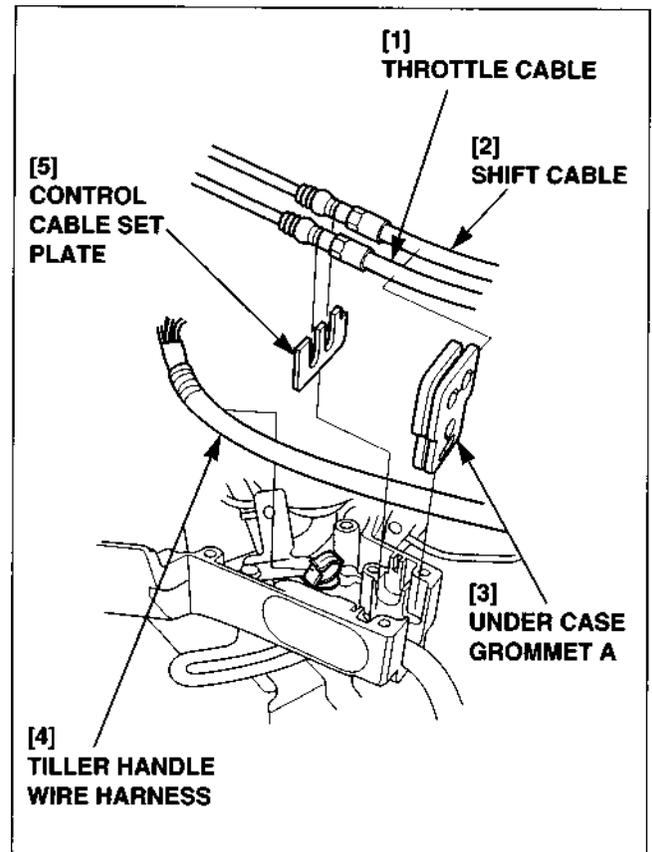
- 3) Remove the 14P connector from the connector holder and disconnect the 14P connector.



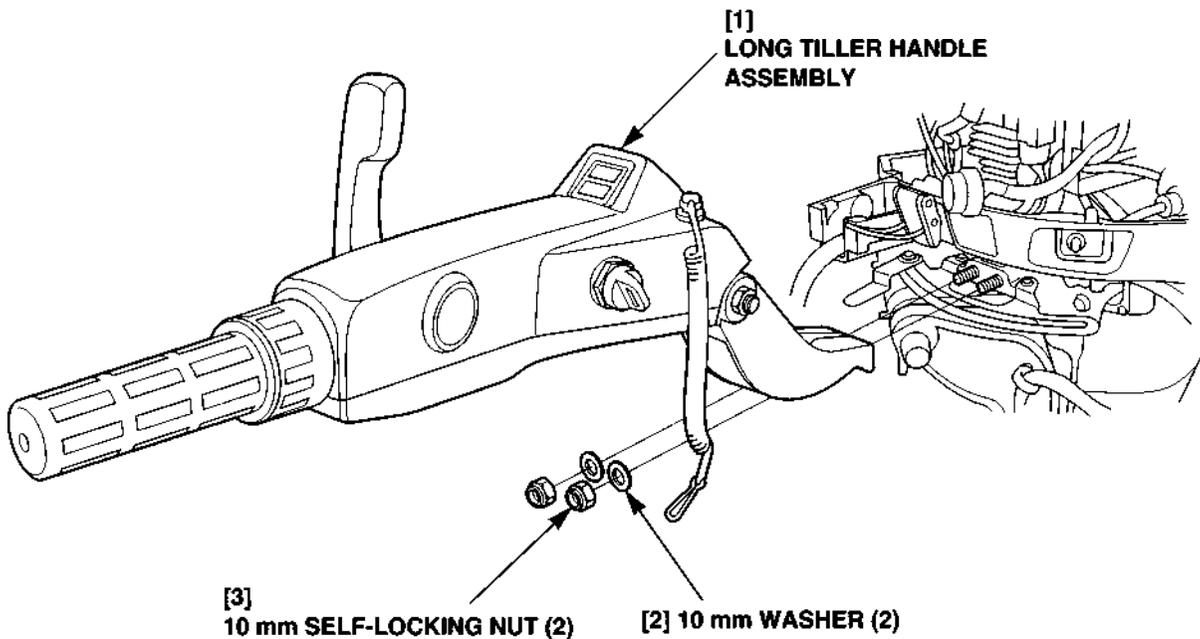
- 4) Remove the 6 mm lock pins and 6 mm washers, the disconnect the throttle and shift cables.



- 5) Pull up the control cable from the control cable set plate.
- 6) Remove the under case grommet.

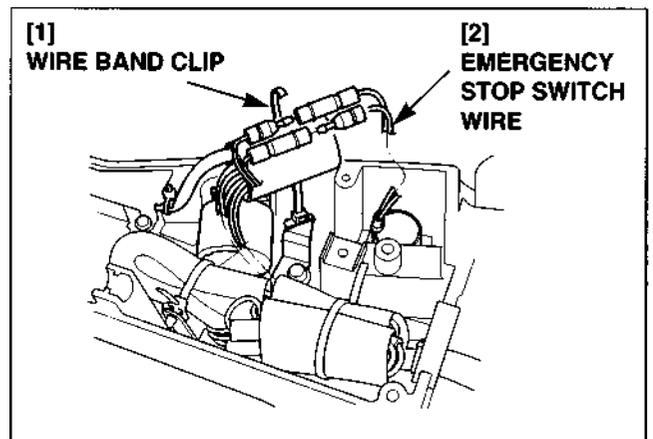
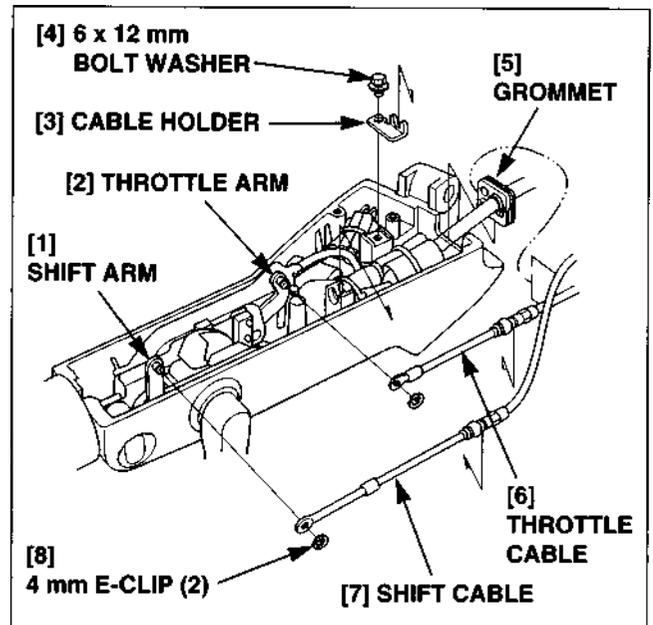
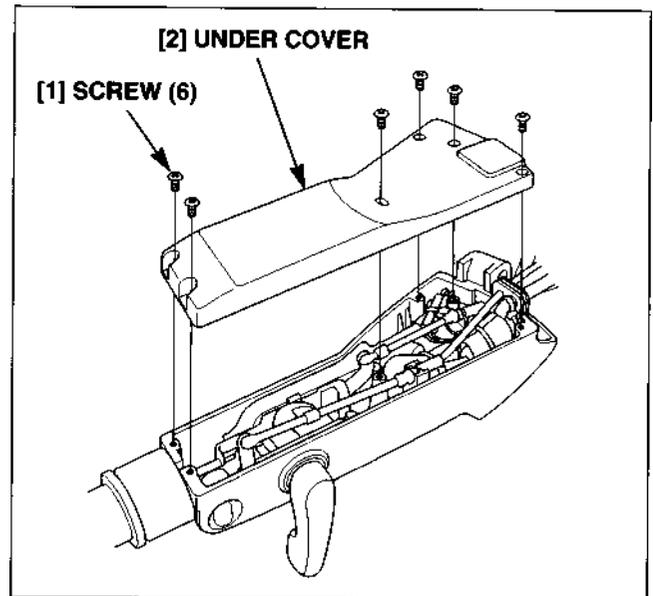


- 7) Remove the two 10 mm self-locking nuts and two 10 mm washers, then remove the long tiller handle assembly.

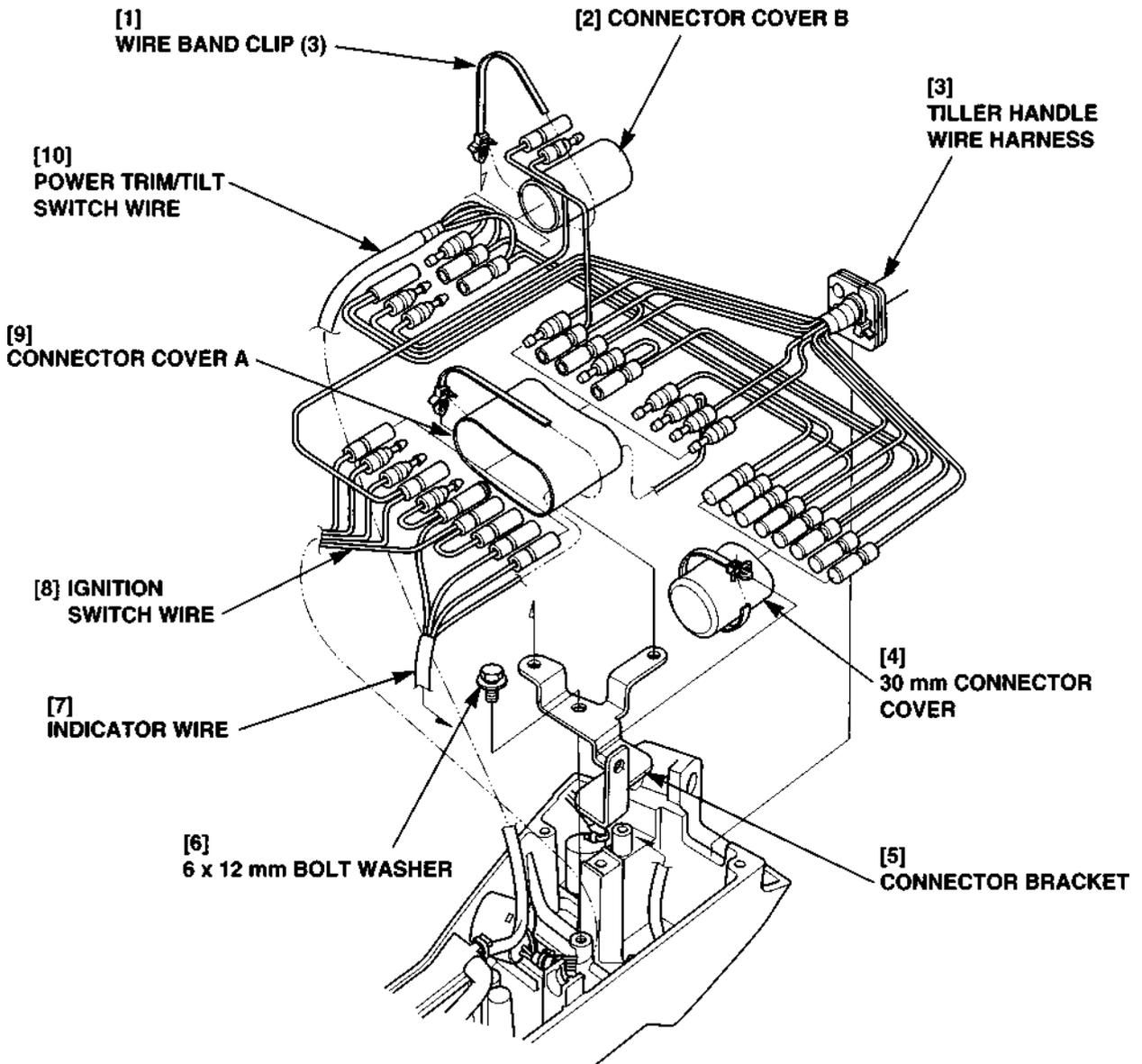


b. DISASSEMBLY

- 1) Remove the six screws and under cover.
- 2) Remove the 4 mm E-clips and disconnect the control cables from the throttle arm and shift arm.
- 3) Remove the control cables and grommet.
- 4) Remove the 6 x 12 mm bolt washer and cable holder.
- 5) Release the wire band clip and disconnect the emergency stop switch wire connectors.

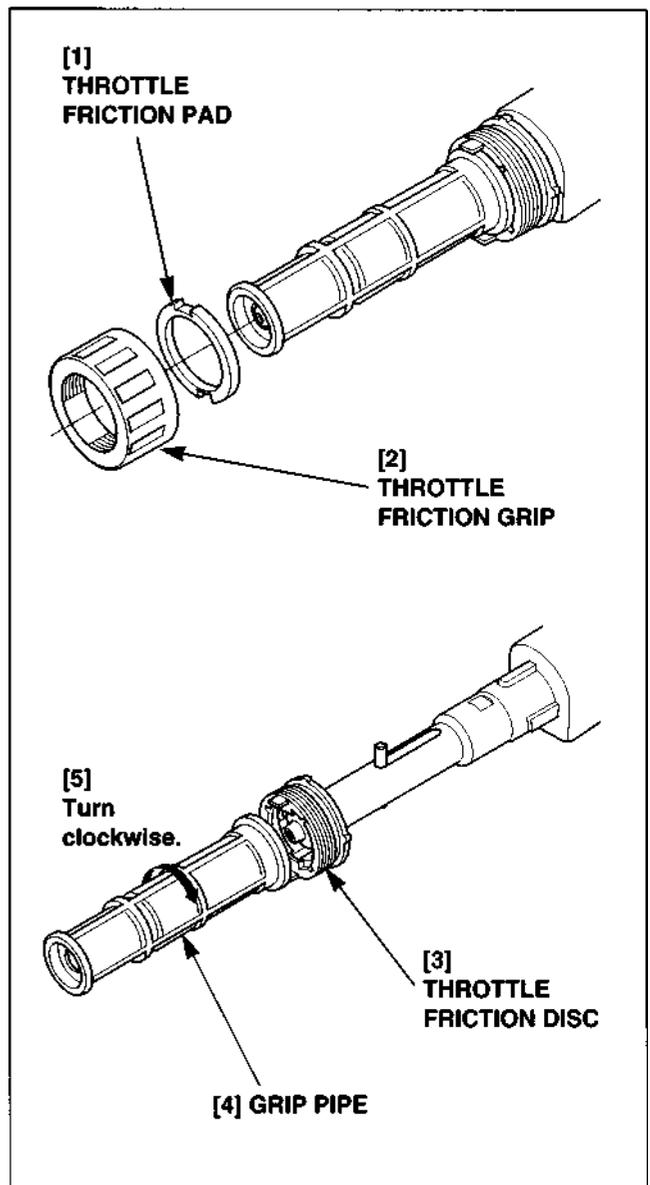
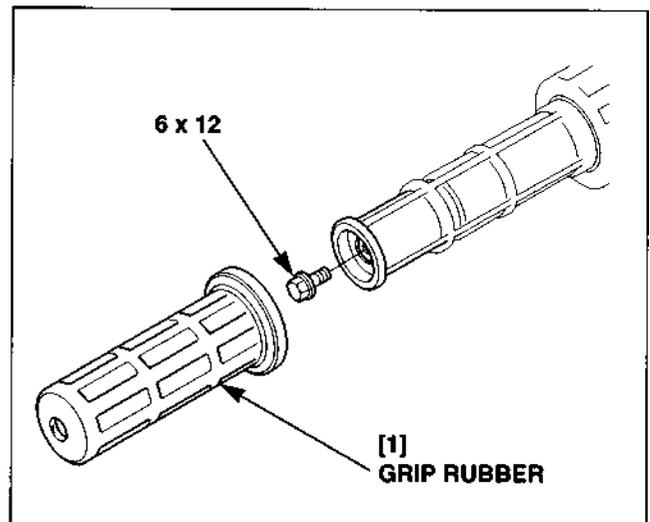


- 6) Remove the connector cover B and disconnect the power trim/tilt switch wire connectors (power trim/tilt type only).
- 7) Release the wire band clips and disconnect the connectors.
- 8) Remove the 30 mm connector cover.
- 9) Slide the connector cover A and disconnect the connectors, and then remove the tiller handle wire harness.
- 10) Remove the 6 x 12 mm bolt washer and connector bracket.

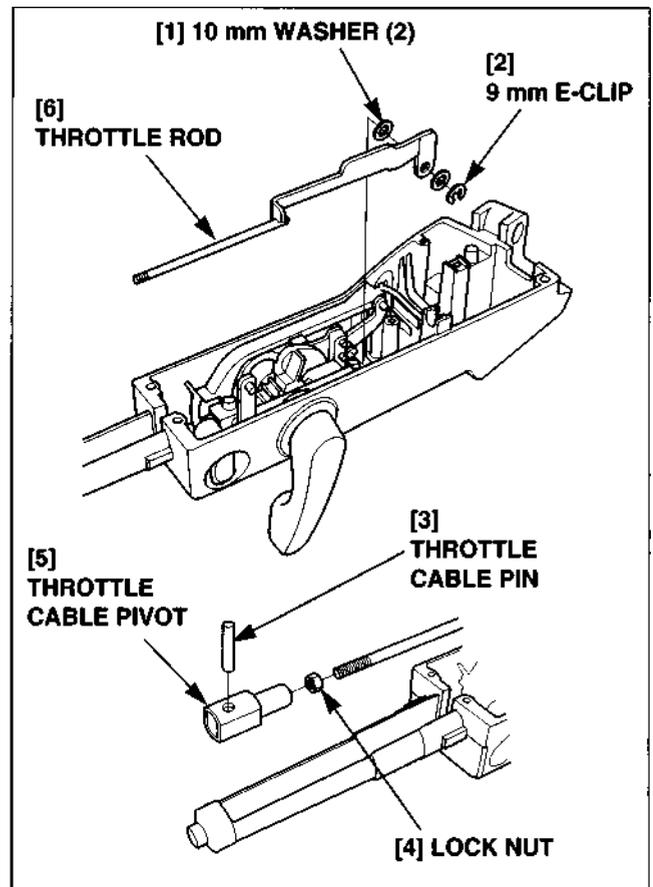


• THROTTLE GRIP, THROTTLE ROD

- 1) Remove the grip rubber, then remove the 6 x 12 mm flange bolt.
- 2) Remove the throttle friction grip and throttle friction pad.
- 3) Remove the throttle grip pipe by turning clockwise viewed from the grip end, and remove the throttle friction disc.



- 4) Remove the 9 mm E-clip and 10 mm washer.
- 5) Disconnect the throttle rod from the throttle arm and remove the 10 mm washer.
- 6) Remove the throttle cable pin from the cable pivot.
- 7) Loosen the lock nut and remove the throttle cable pivot.



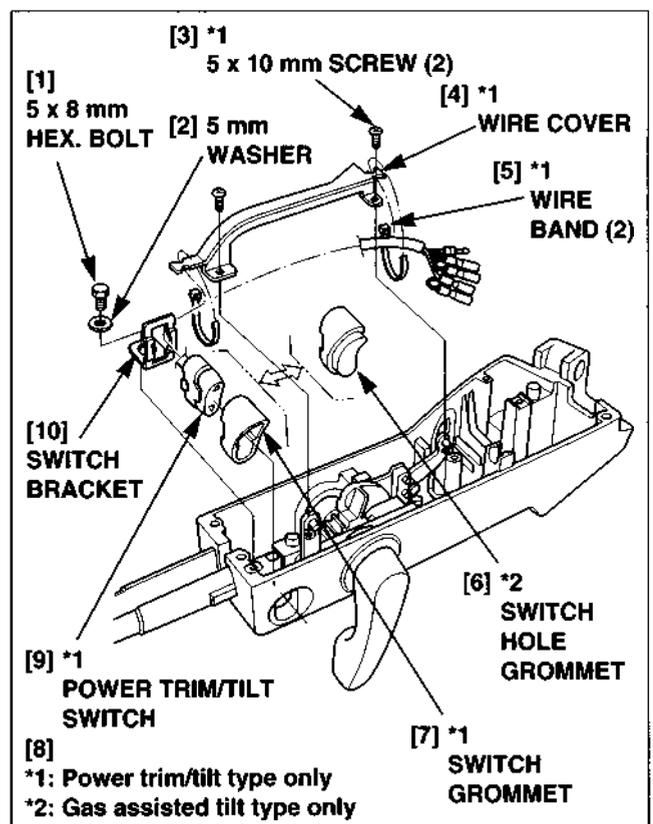
• **POWER TRIM/TILT SWITCH**

Power Trim/Tilt Type:

- 1) Release the wire bands, remove the 5 x 10 mm screws and remove the wire cover.
- 2) Remove the 5 x 8 mm hex. bolt and 5 mm washer and remove the power trim/tilt switch and switch grommet.

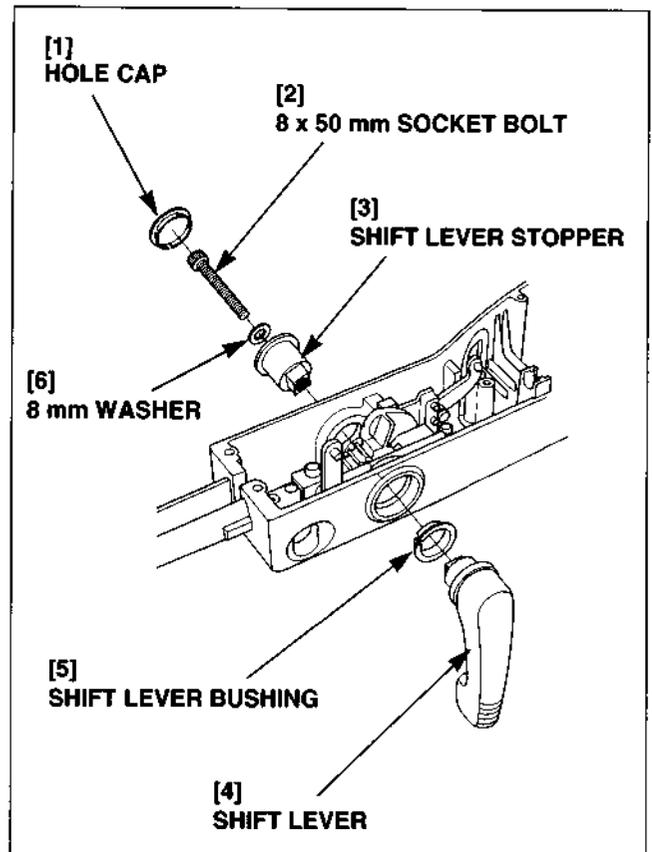
Gas Assisted Tilt Type:

- 1) Remove the 5 x 8 mm hex. bolt and 5 mm washer and remove the switch bracket and switch hole grommet.

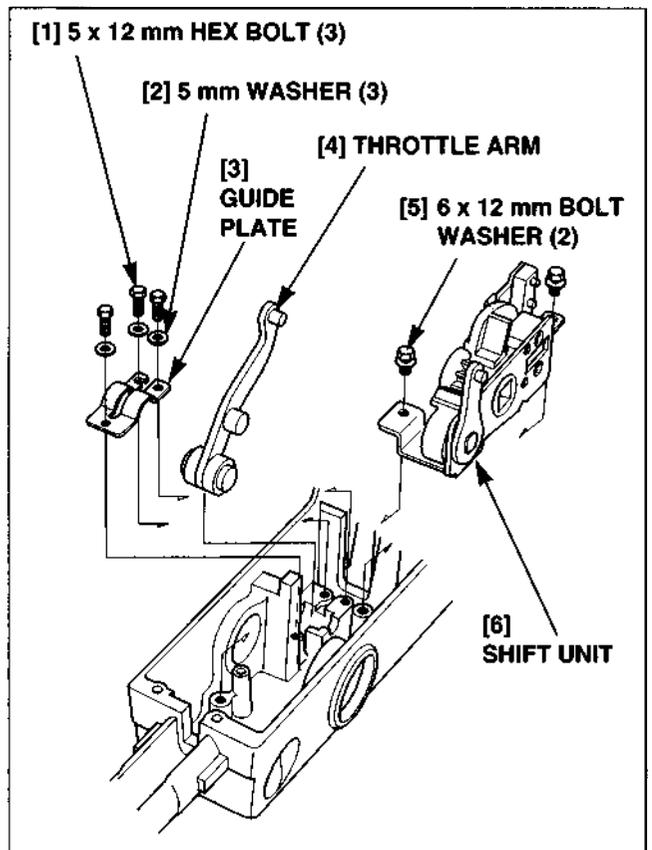


• **SHIFT LEVER, SHIFT UNIT, THROTTLE ARM**

- 1) Remove the hole cap and remove the 8 x 50 mm socket bolt.
- 2) Remove the shift lever stopper and shift lever.

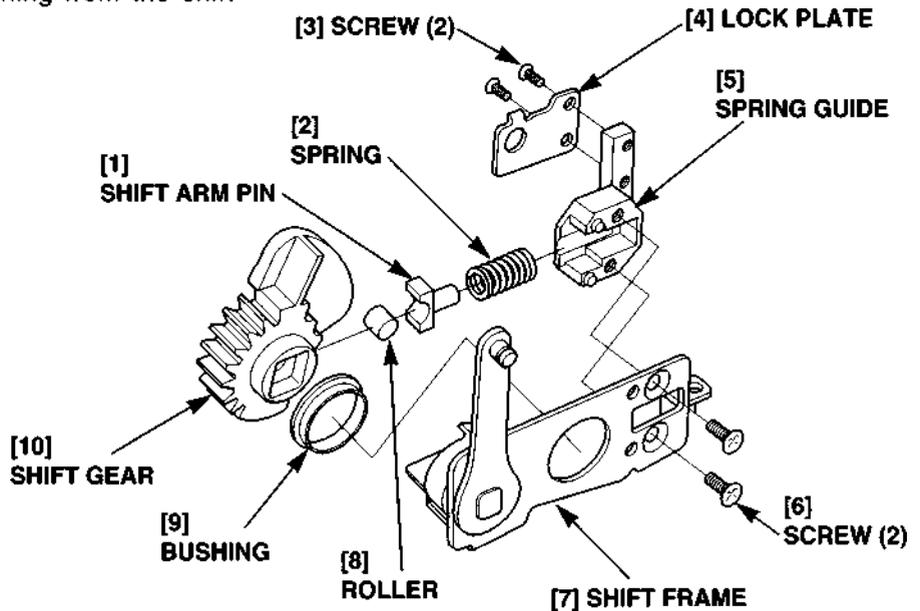


- 3) Remove the three 5 x 12 mm hex bolts and three 5 mm washers.
- 4) Remove the guide plate and throttle arm.
- 5) Remove the two 6 x 12 mm bolt washers and remove the shift unit.



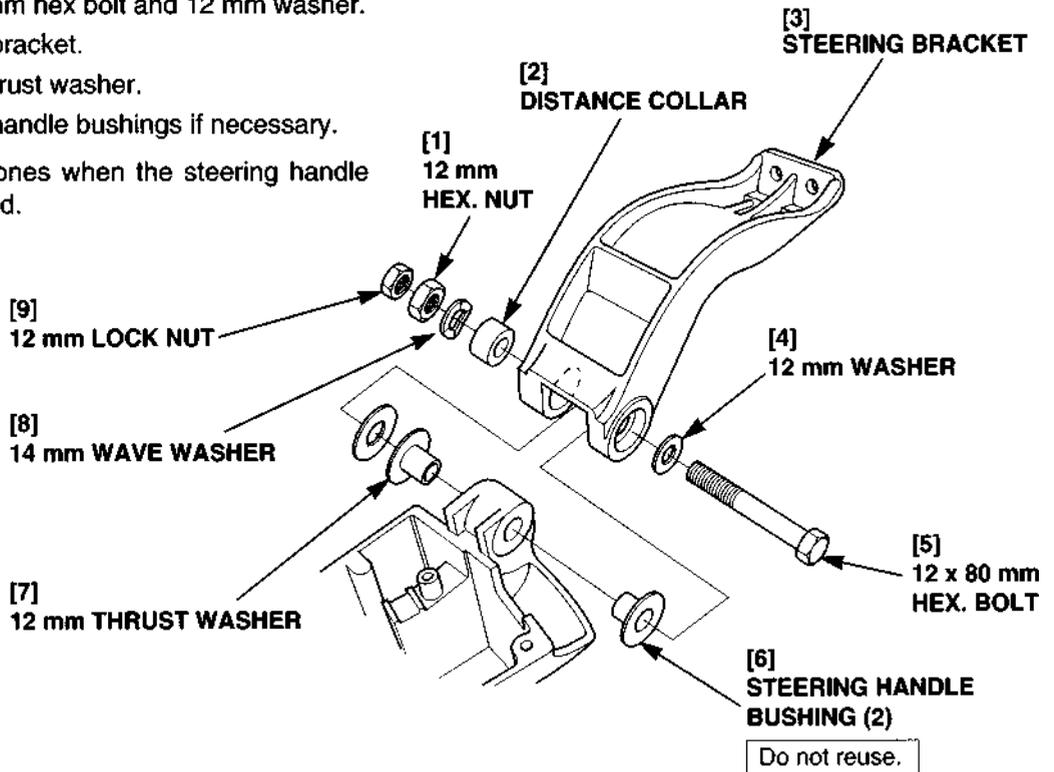
• **SHIFT UNIT DISASSEMBLY**

- 1) Remove the two screws and remove the lock plate.
- 2) Remove the two screws and remove the spring guide, spring, shift arm pin and roller.
- 3) Remove the shift gear and bushing from the shift plate.



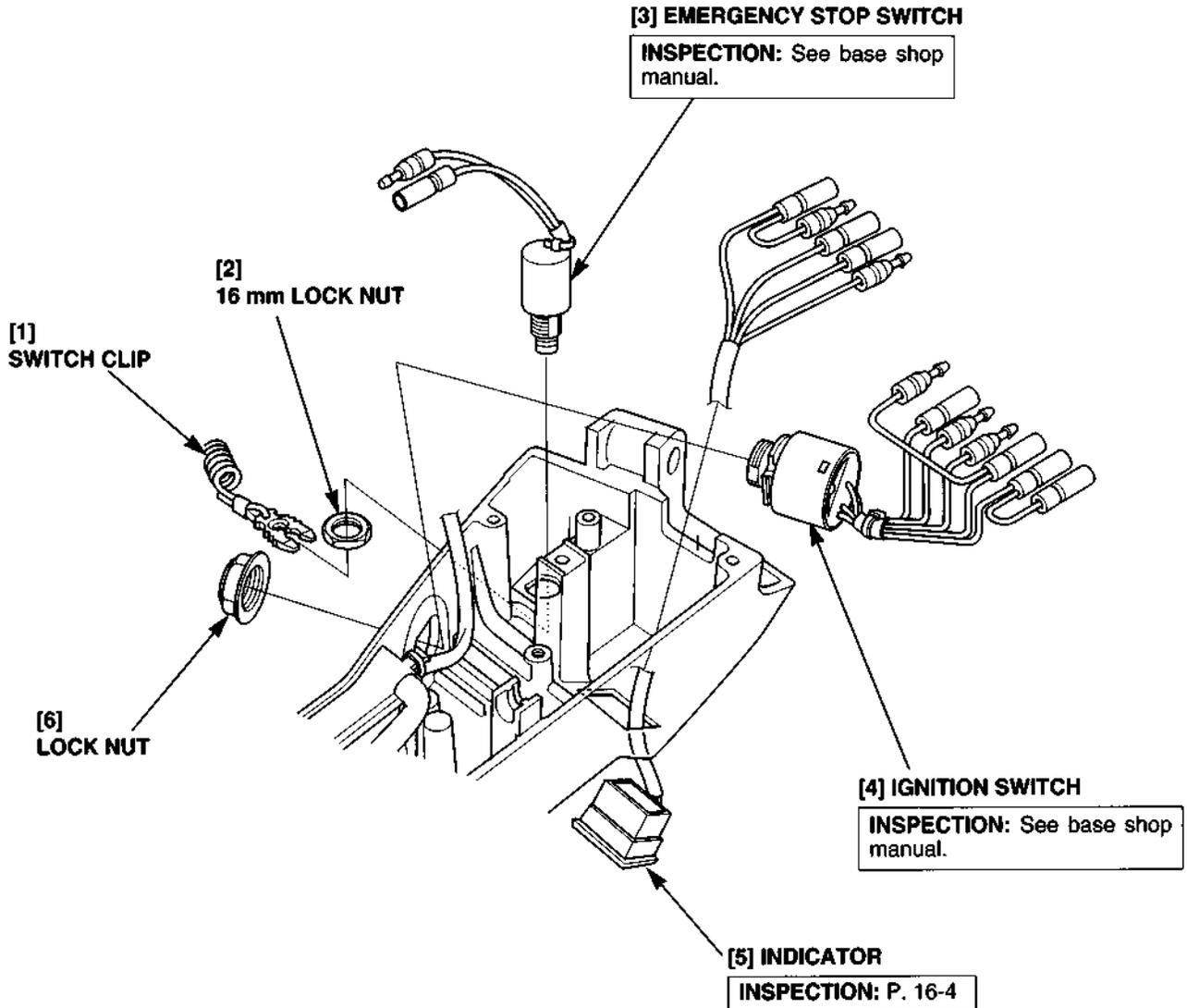
• **STEERING BRACKET**

- 1) Remove the 12 mm lock nut, 12 mm hex. nut, 14 mm wave washer and distance collar.
- 2) Remove the 12 x 80 mm hex bolt and 12 mm washer.
- 3) Remove the steering bracket.
- 4) Remove the 12 mm thrust washer.
- 5) Remove the steering handle bushings if necessary.
 - Replace with new ones when the steering handle bushings are removed.



• **IGNITION SWITCH, EMERGENCY STOP SWITCH, INDICATOR**

- 1) Remove the emergency stop switch clip and 16 mm lock nut, and remove the emergency stop switch.
- 2) Remove the lock nut and remove the ignition switch.
- 3) Remove the indicator.

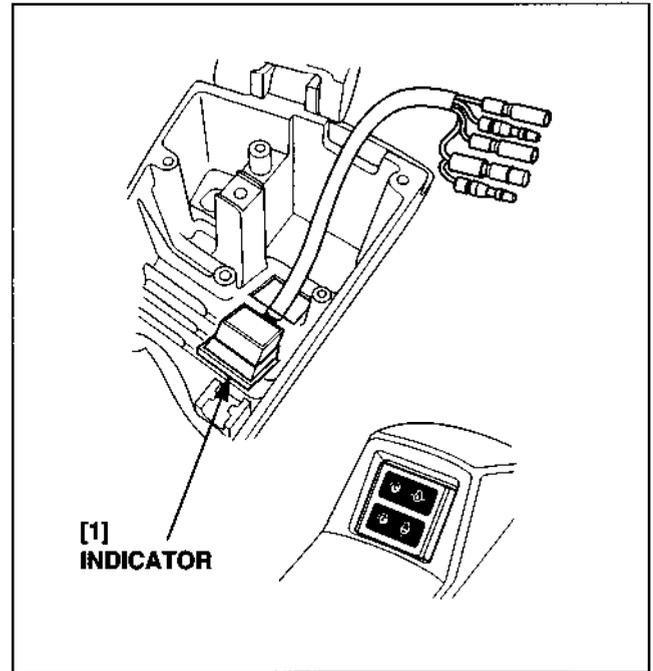


c. ASSEMBLY

Assembly is the reverse order of disassembly.

• INDICATOR

Install the indicator noting the direction.



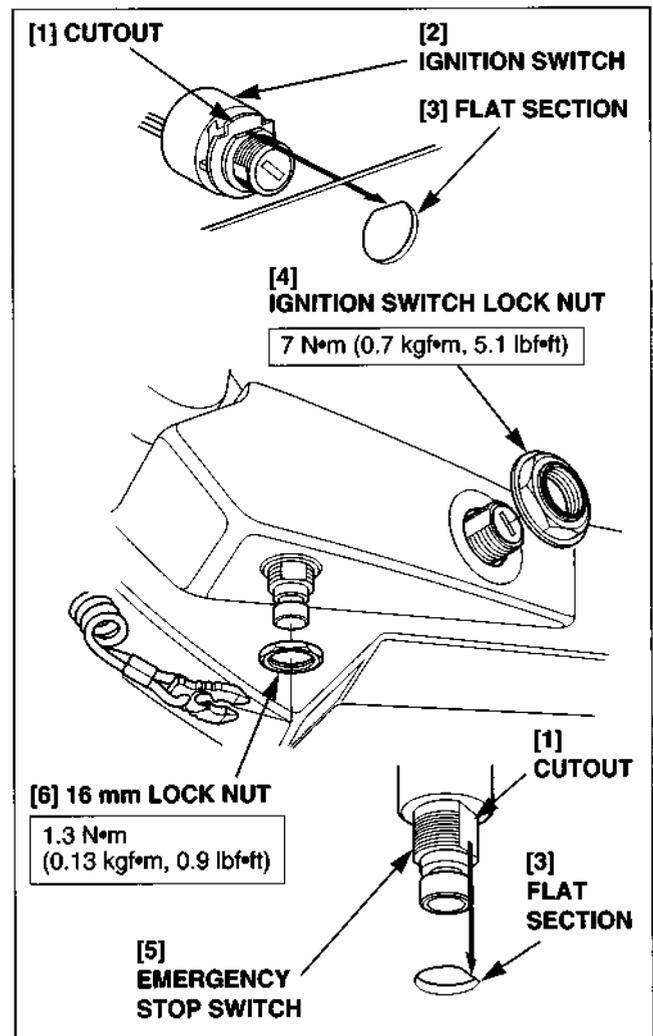
• IGNITION SWITCH, EMERGENCY STOP SWITCH

- Install the switch by aligning the cutout of the switch with the flat section of the installation hole as shown.
- Tighten the lock nut to the specified torque.

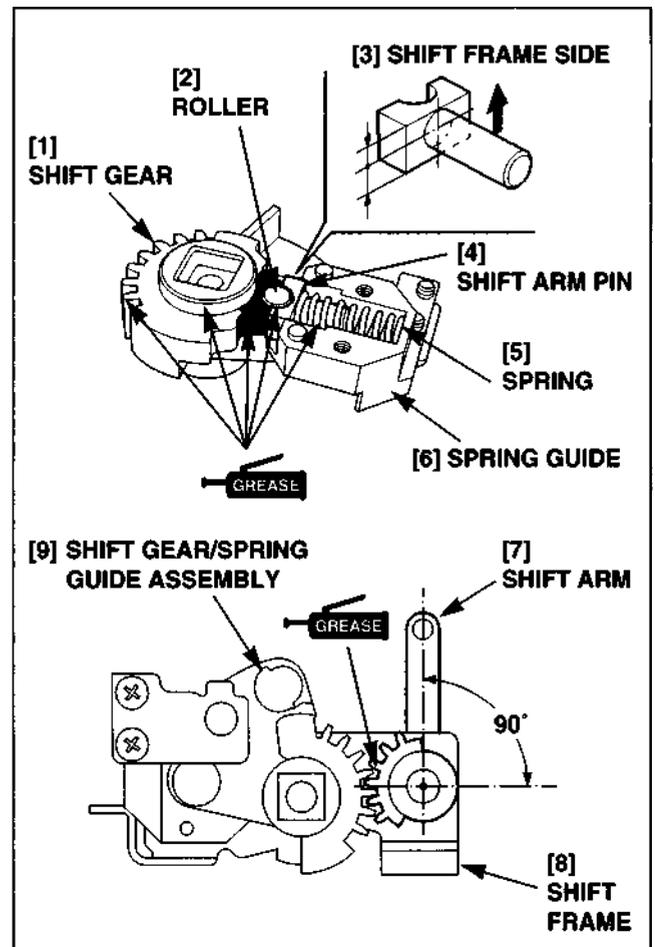
Torque:

Ignition switch lock nut: 7 N•m (0.7 kgf•m, 5.1 lbf•ft)

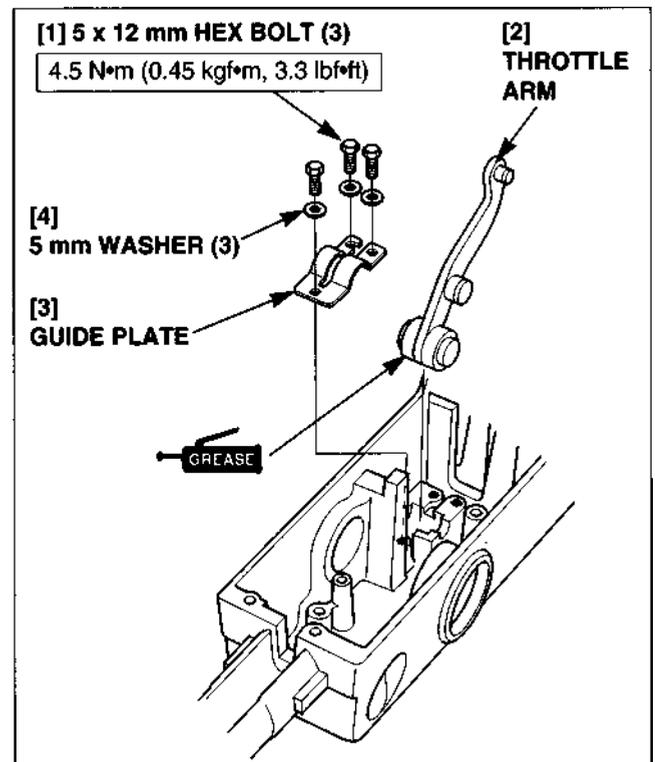
16 mm lock nut: 1.3 N•m (0.13 kgf•m, 0.9 lbf•ft)



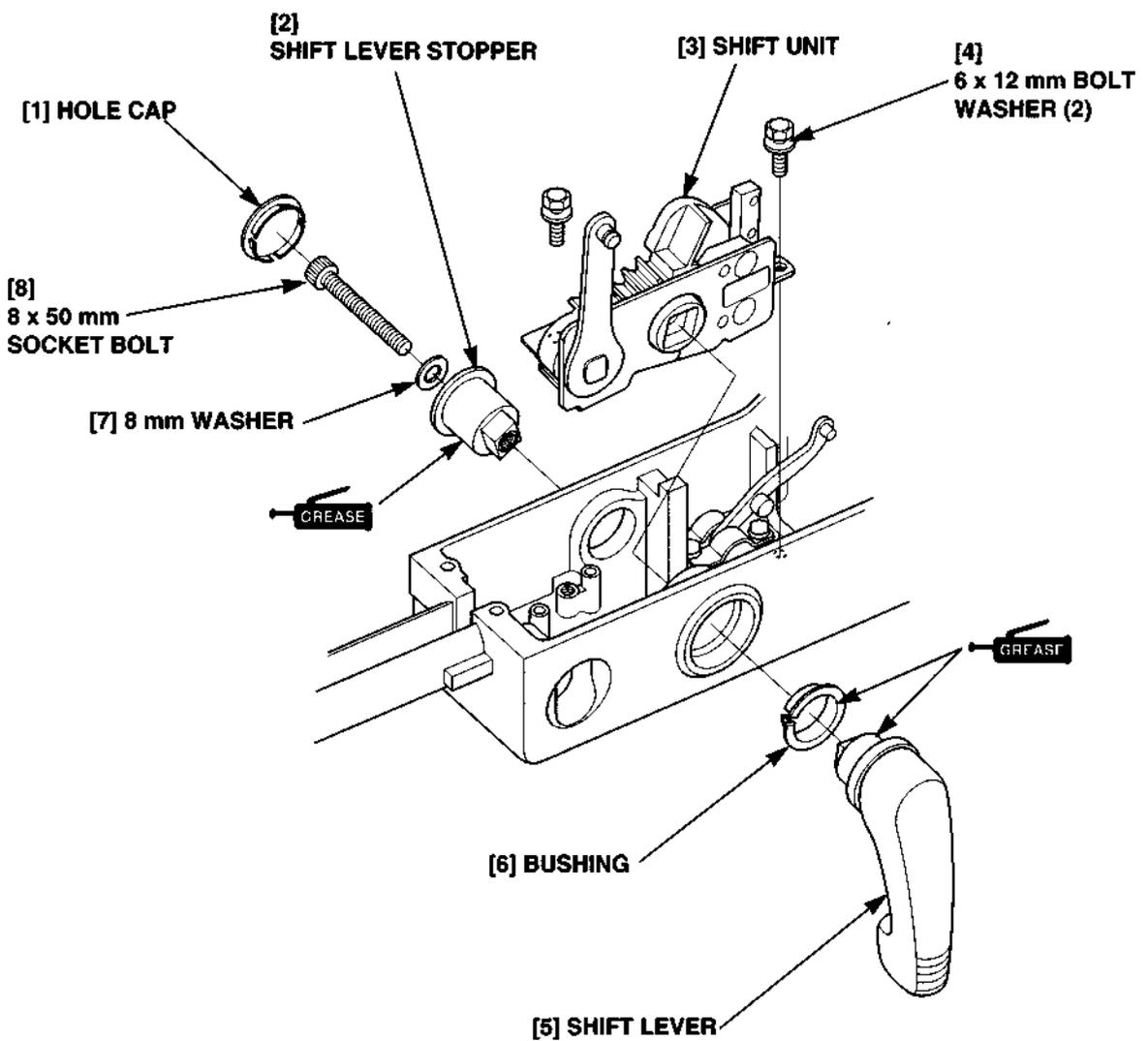
- Apply grease to the:
 - roller, shift arm pin and spring.
 - gear and roller sliding section of the shift gear.
 - bushing.
 - gear of the shift arm.
- Note the installation direction of the shift arm pin.
- Set the roller and shift gear in the neutral position as shown.
- Install the shift gear and spring guide assembly with the shift arm set in vertical position as shown.



- Apply grease to the pivot point of the throttle arm.
- Tighten the 5 x 12 mm hex bolt to the specified torque.
TORQUE: 4.5 N•m (0.45 kgf•m, 3.3 lbf•ft)



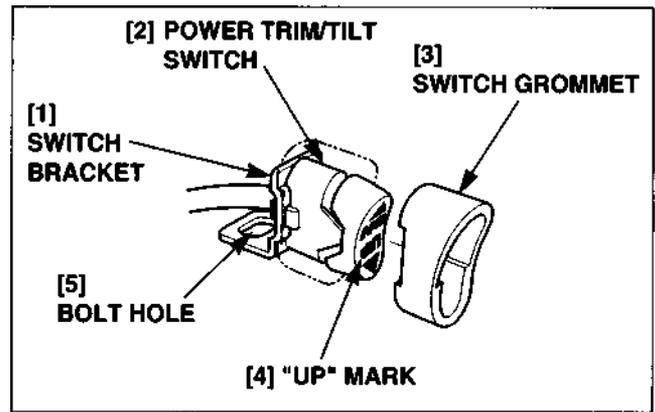
- Apply grease to the:
 - sliding surface of the lever stopper.
 - sliding surface of the shift lever.
 - busing.
- Position the shift arm in a vertical position to align the shift unit square and shift gear. Install the shift lever.
- Install the shift lever by aligning the square of the lever stopper and that of the shift gear.



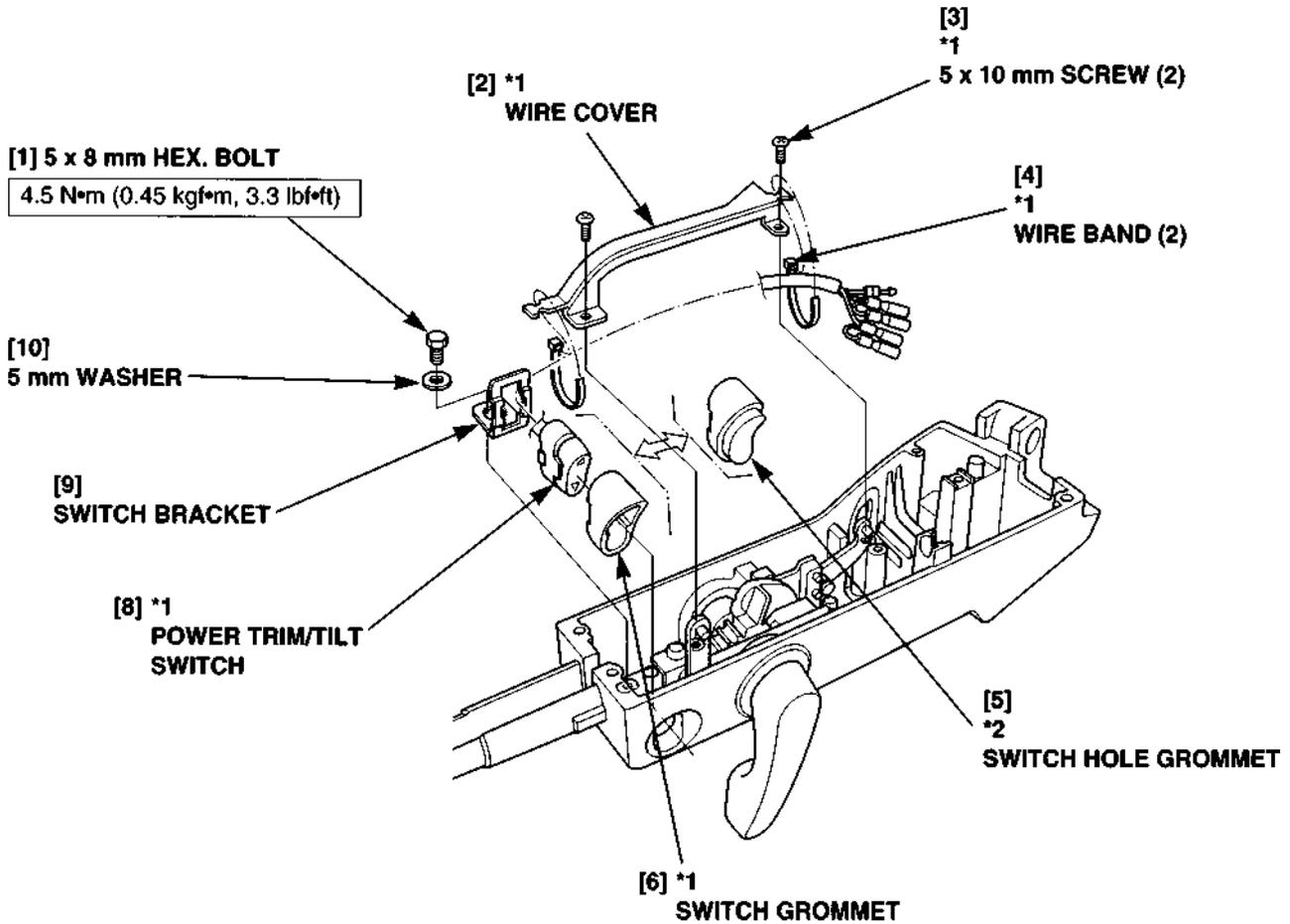
• **POWER TRIM/TILT SWITCH**

- Power trim/tilt type only: Install the power tilt switch so that the "UP" mark is at the bracket bolt installation hole side (lower side) as shown, and install the switch grommet noting the direction.
- Power trim/tilt type only: Replace the wire band with a new one, if it has been cut. After securing the wires with a new wire band, cut the end of the wire band so the projected end length is 10 - 20 mm (0.4 - 0.8 in).
- Tighten the 5 x 10 mm hex. bolt to the specified torque.

Torque: 4.5 N•m (0.45 kgf•m, 3.3 lbf•ft)

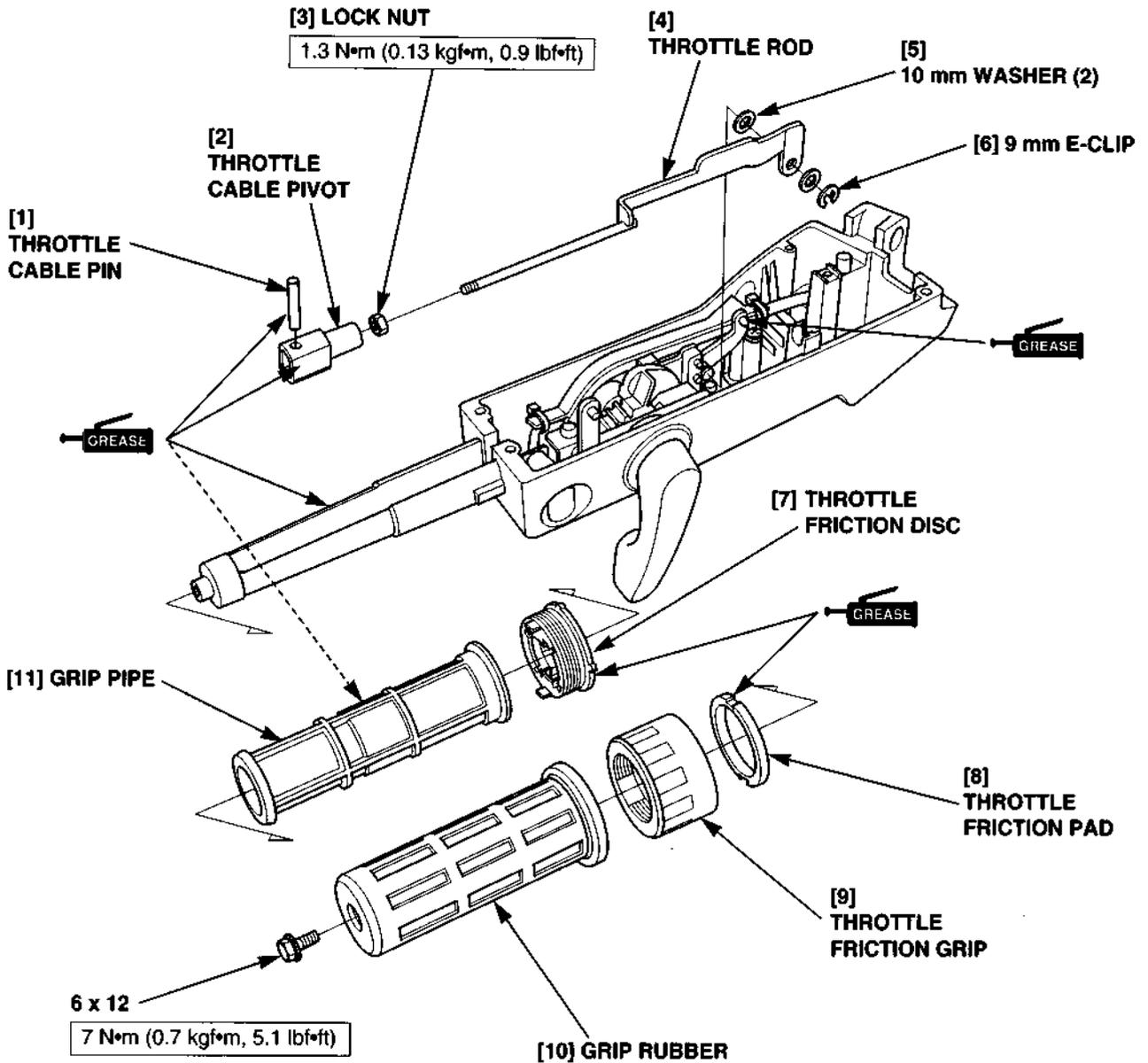


- Power trim/tilt type only: Check whether the power tilt switch wire does not interfere with the 5 x 8 mm hex bolt head.



[7]
 *1: Power Trim/Tilt Type
 *2: Gas assisted Tilt Type

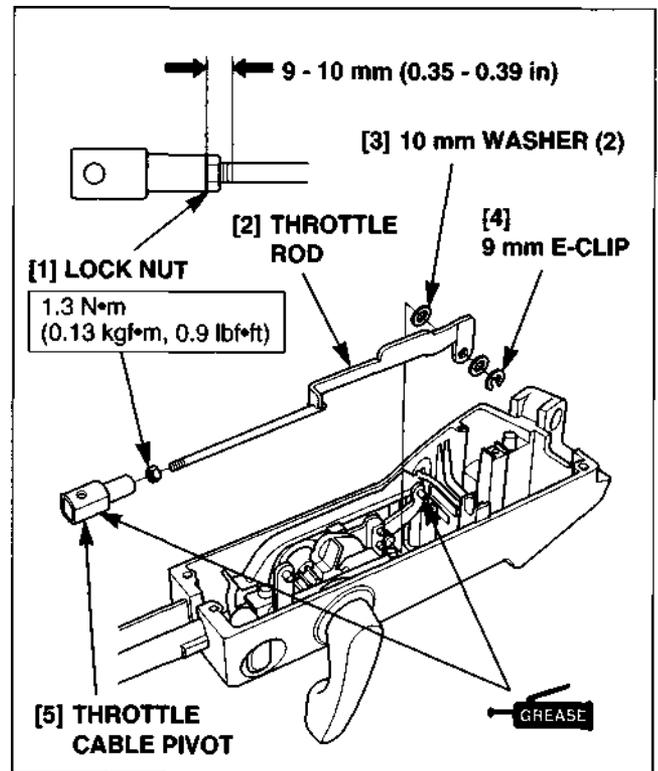
• THROTTLE ROD, THROTTLE GRIP



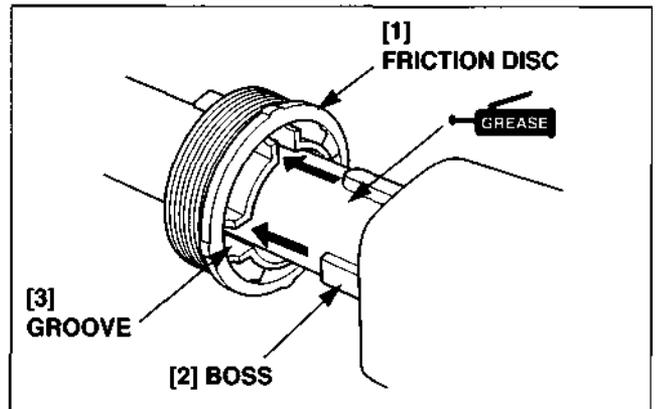
- Loosen the lock nut fully and screw the cable pivot as shown. Tighten the lock nut to the specified torque.

TORQUE: 1.3 N•m (0.13 kgf•m, 0.9 lbf•ft)

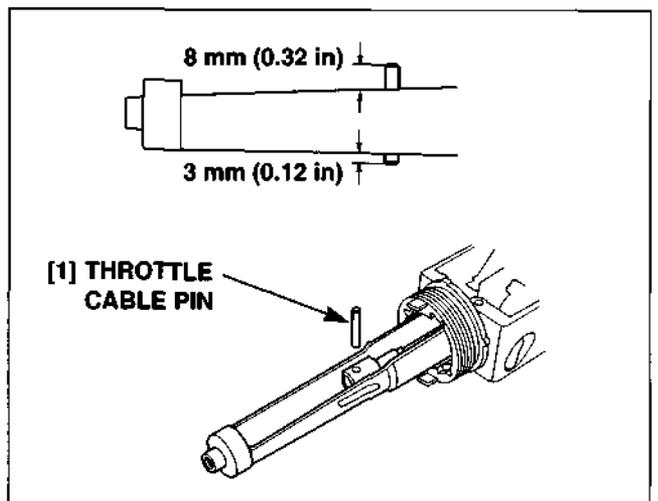
- Apply grease to the sliding surfaces of the cable pivot.
- Apply grease to the pivot point of the throttle arm, then install the throttle rod with the two 10 mm washers and 9 mm w-clip.
- Power trim/tilt type only: Check whether the power tilt switch wire does not interfere with throttle rod.



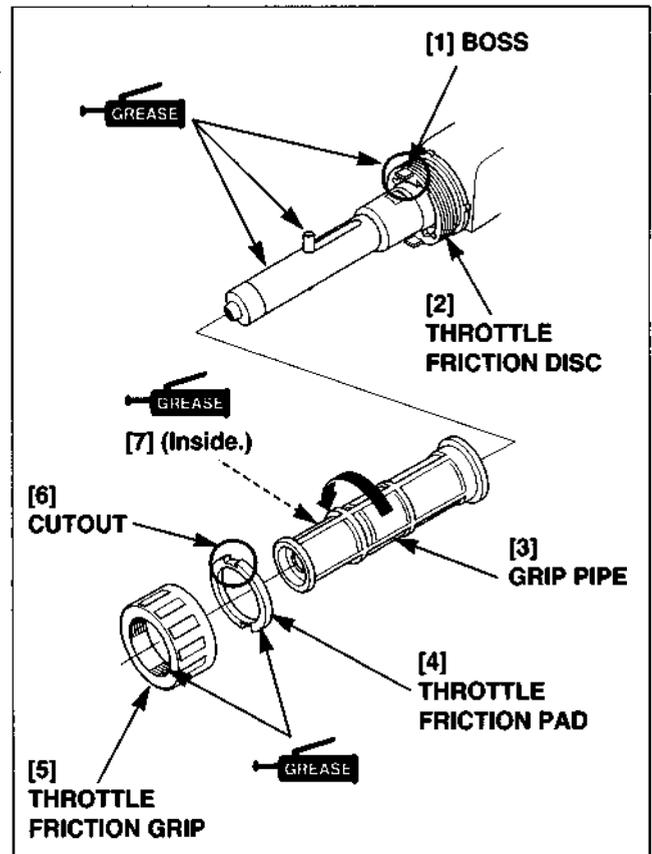
- Apply grease to the throttle grip installation surface of the tiller handle and friction disc. Install the friction disc by aligning the grooves of the throttle friction disc with the bosses of the tiller handle as shown.



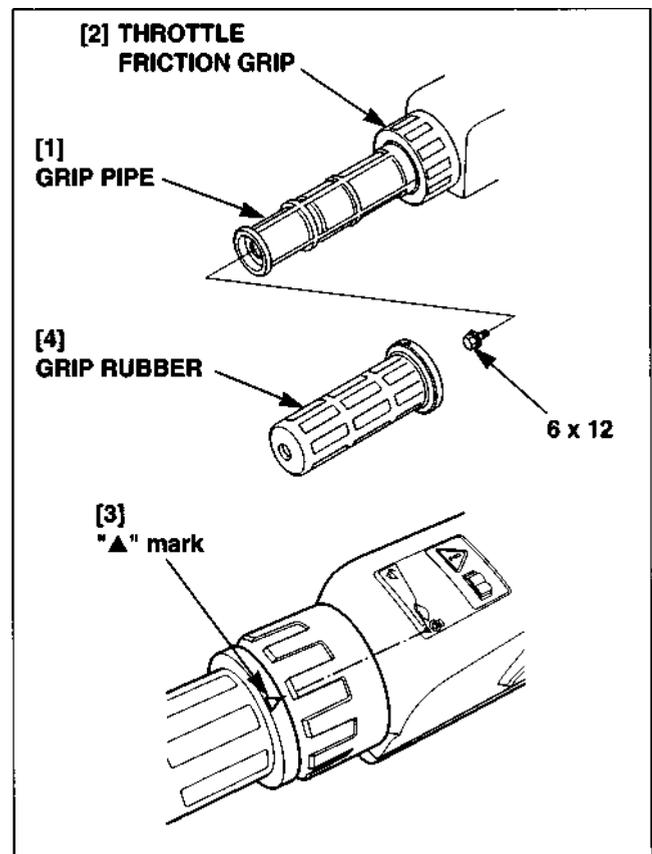
- Install the throttle cable pin on the cable pivot with the projected length at both ends of the pin equal as shown.



- Apply grease to the inside of the throttle grip pipe, inside of the friction grip, both ends of the throttle cable pin, handle pipe and both sides of the friction pad. Set the throttle friction pad on the grip pipe.
- Install the grip pipe on the tiller handle by slowly turning it clockwise.



- Tighten the throttle friction grip against the throttle friction disc by aligning the cutout of the friction pad with the boss of the friction disc. Tighten the 6 x 12 mm flange bolt securely.
- Turn the grip pipe to the fully close position and install the grip rubber by aligning the "▲" mark with fully close mark.



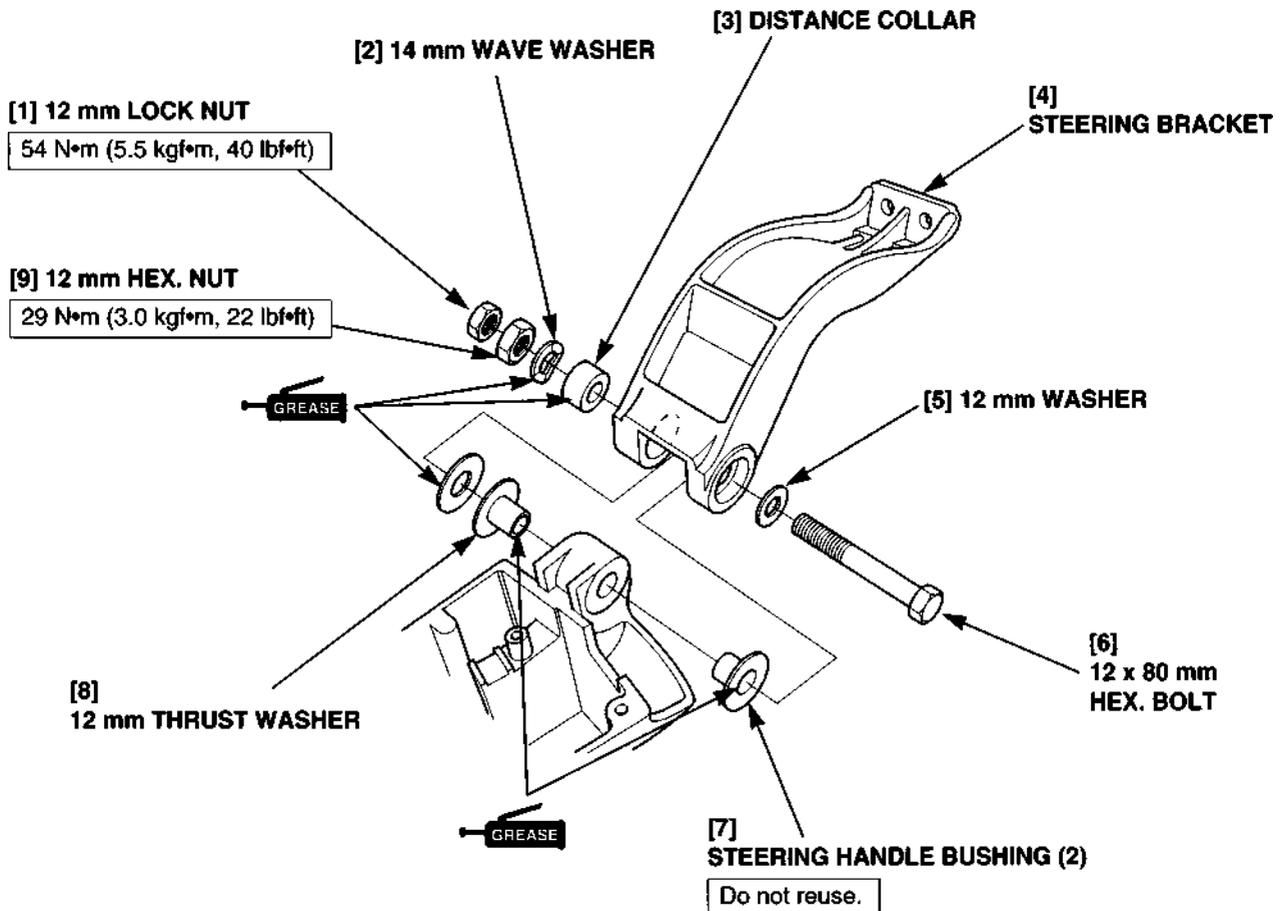
• **STEERING BRACKET**

- Install a new steering handle busing when it has been removed.
- Apply grease to the inside of the steering handle bushings, both ends of the 12 mm thrust washer, inside of the distance collar and both ends of the wave washer.
- Clean off grease on the threads of the 12 x 80 mm hex. bolt, then tighten the 12 mm hex. nut to the specified torque.

TORQUE: 29 N•m (3.0 kgf•m, 22 lbf•ft)

- Hold the 12 mm hex. nut and tighten the 12 mm lock nut to the specified torque.

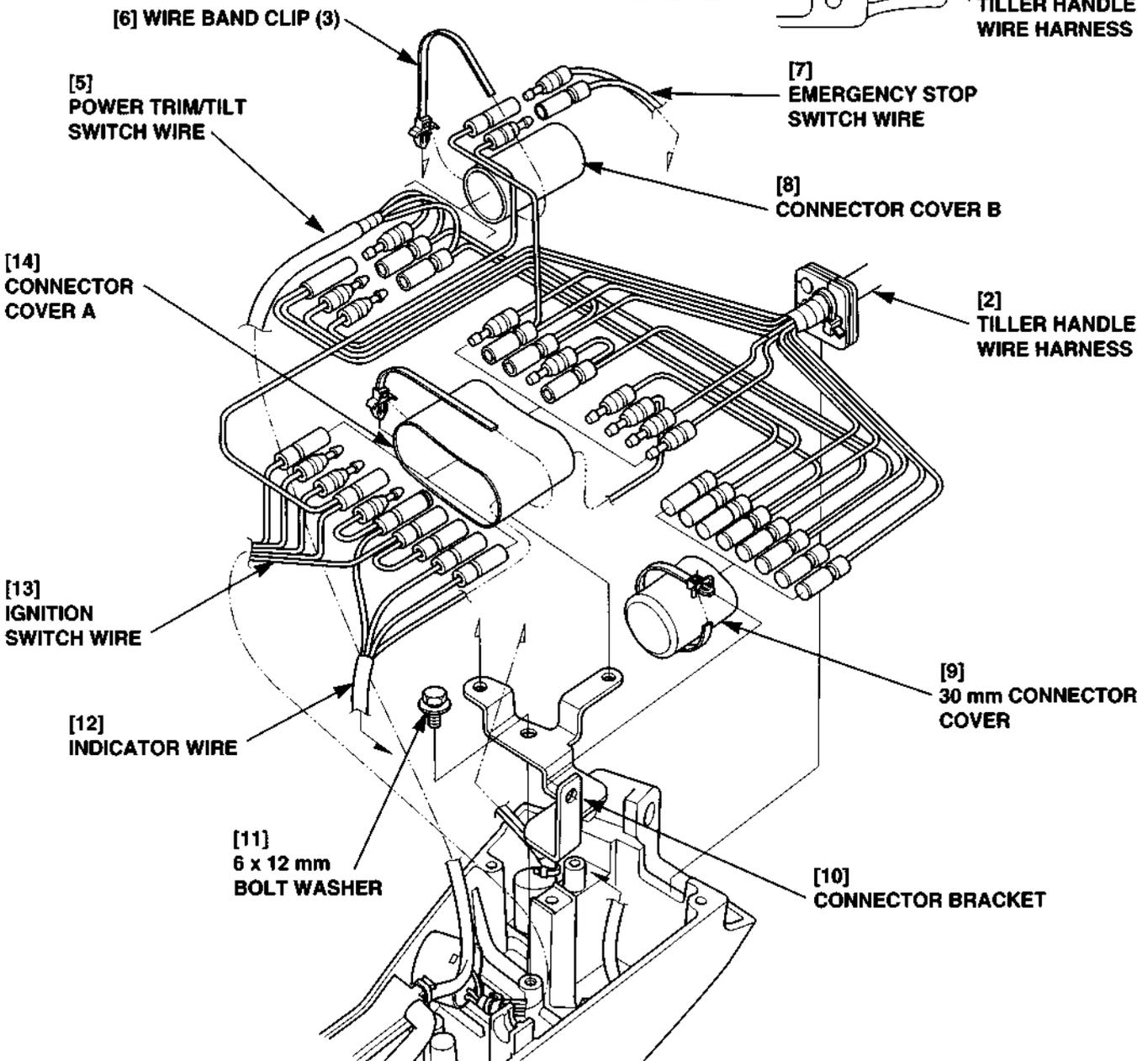
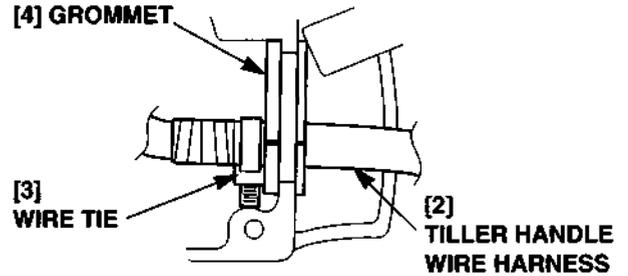
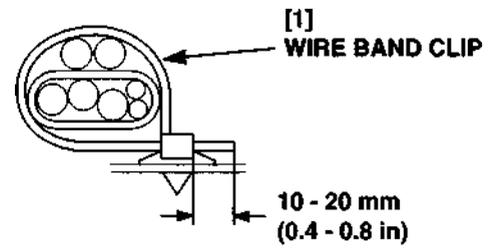
TORQUE: 54 N•m (5.5 kgf•m, 40 lbf•ft)



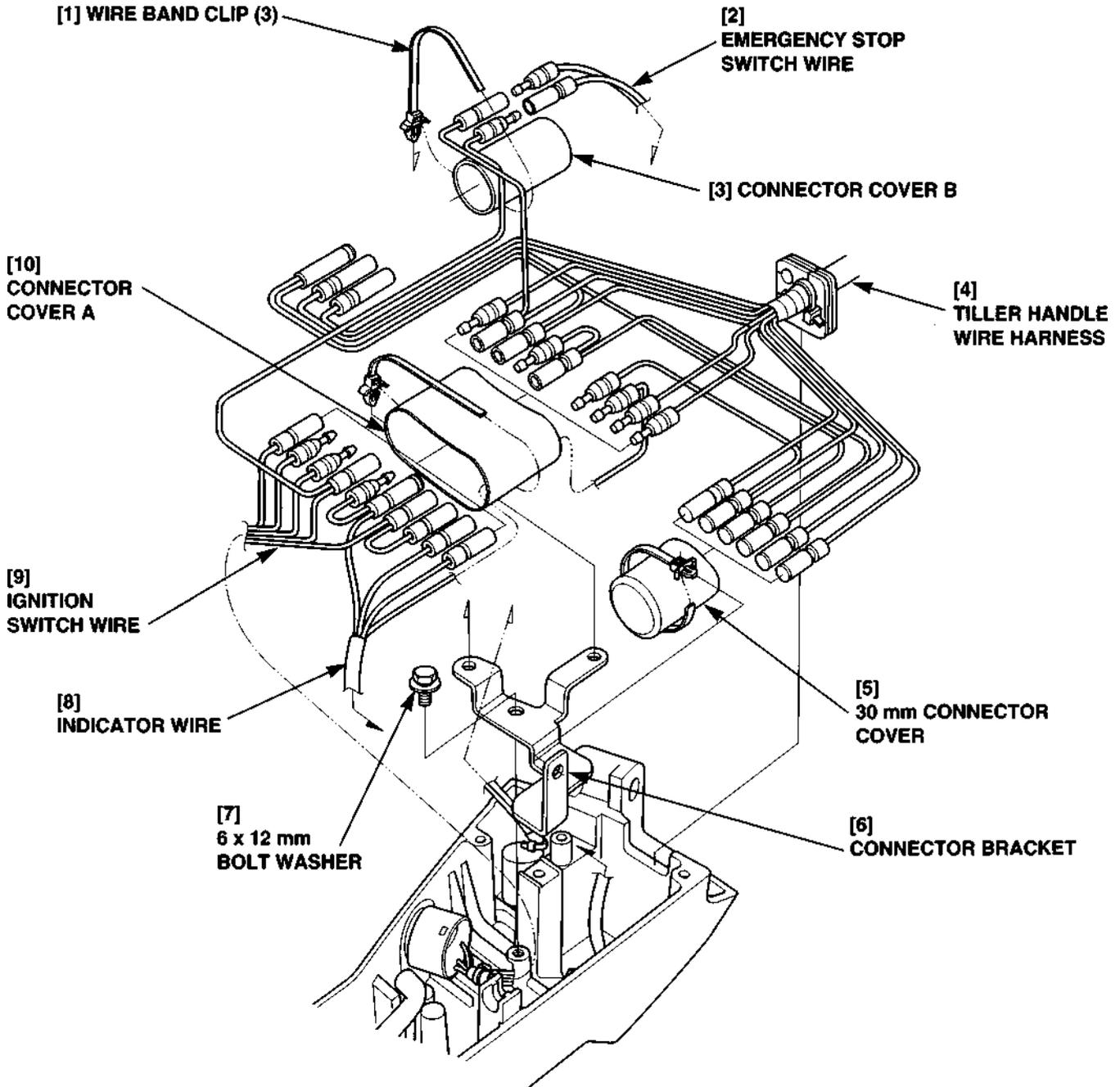
• TILLER HANDLE WIRE HARNESS

- Connect connectors to the wire connectors of the same color, cover the connectors with the connector covers and secure them with the harness band clip.
- Replace the wire band with a new one, if it has been cut. After securing the connectors and wires with a new wire band, cut the end of the wire band so the projected end length is 10 - 20 mm (0.4 - 0.8 in).
- Install the tiller handle wire harness by aligning the wire tie with the grommet as shown

Power Trim/Tilt Type:



Gas Assisted Tilt Type:



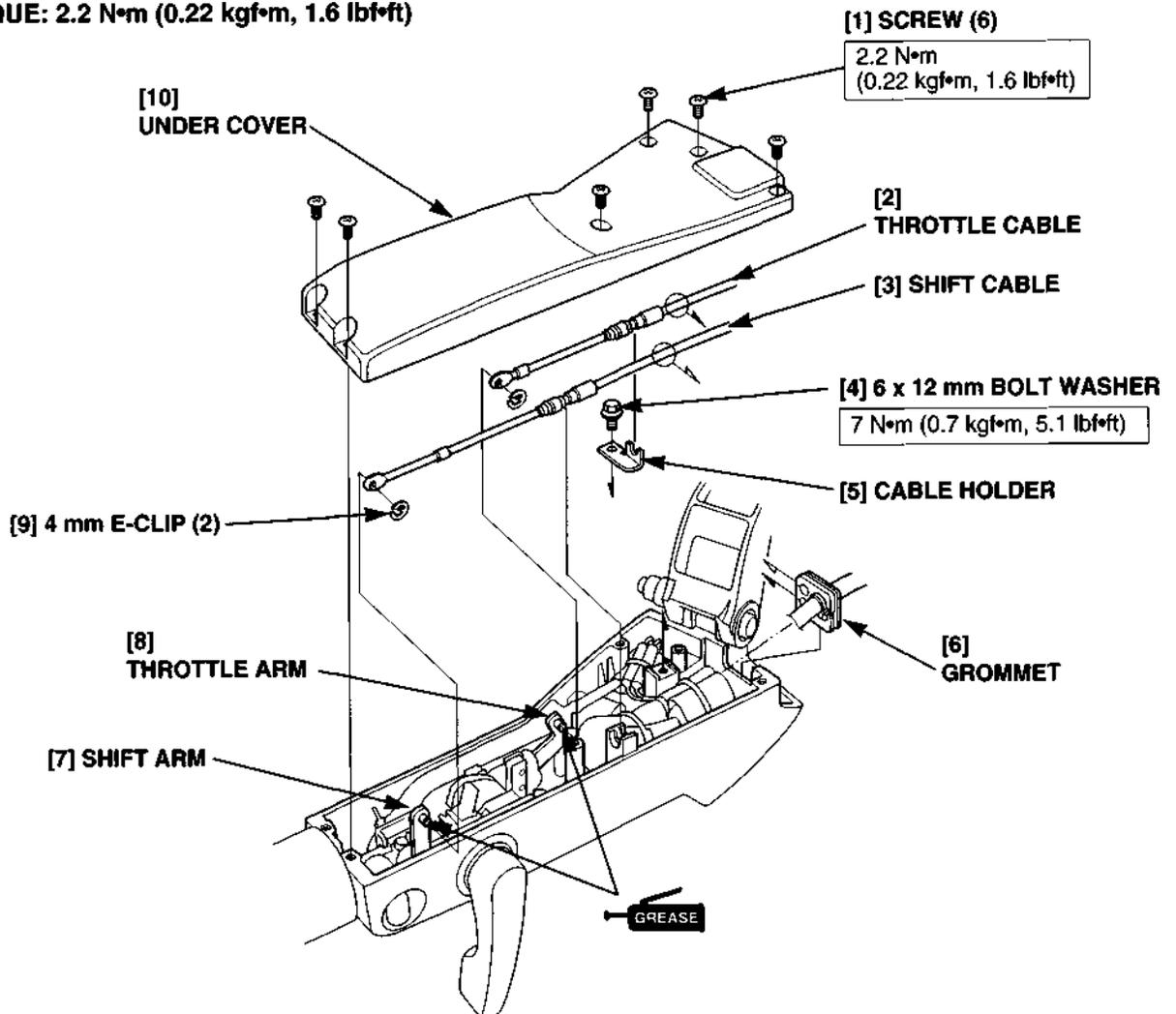
• **CONTROL CABLES, UNDER COVER**

- Install the cable holder as shown noting the installation direction and tighten the 6 x 12 mm bolt washer to the specified torque.

TORQUE: 0.7 N•m (0.7 kg•m, 5.1 lbf•ft)

- Apply grease to the link pins of the throttle arm and shift arm, then connect the throttle cable and shift cable.
- Set the shift cable by aligning the groove of the cable with the cutout of the mounting point.
- Set the throttle cable by aligning the groove with the cutout of the cable holder.
- Route the throttle and shift cable through the grommet (upper hole: shift cable, lower hole: throttle cable) holes and set the grommet in the case correctly.
- Power trim/tilt type only: Check whether the power tilt switch wire does not interfere with the throttle cable.
- Tighten the cover screw to the specified torque.

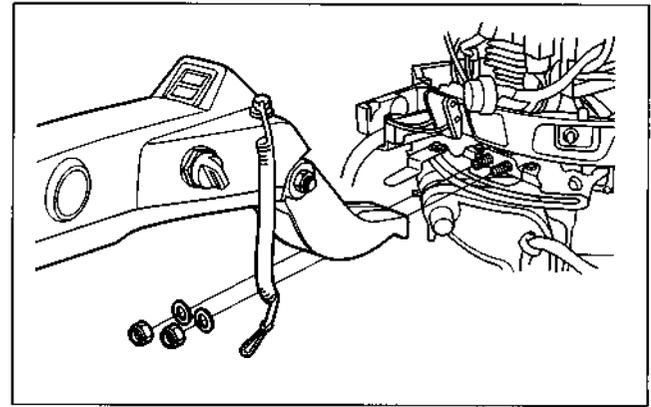
TORQUE: 2.2 N•m (0.22 kg•m, 1.6 lbf•ft)



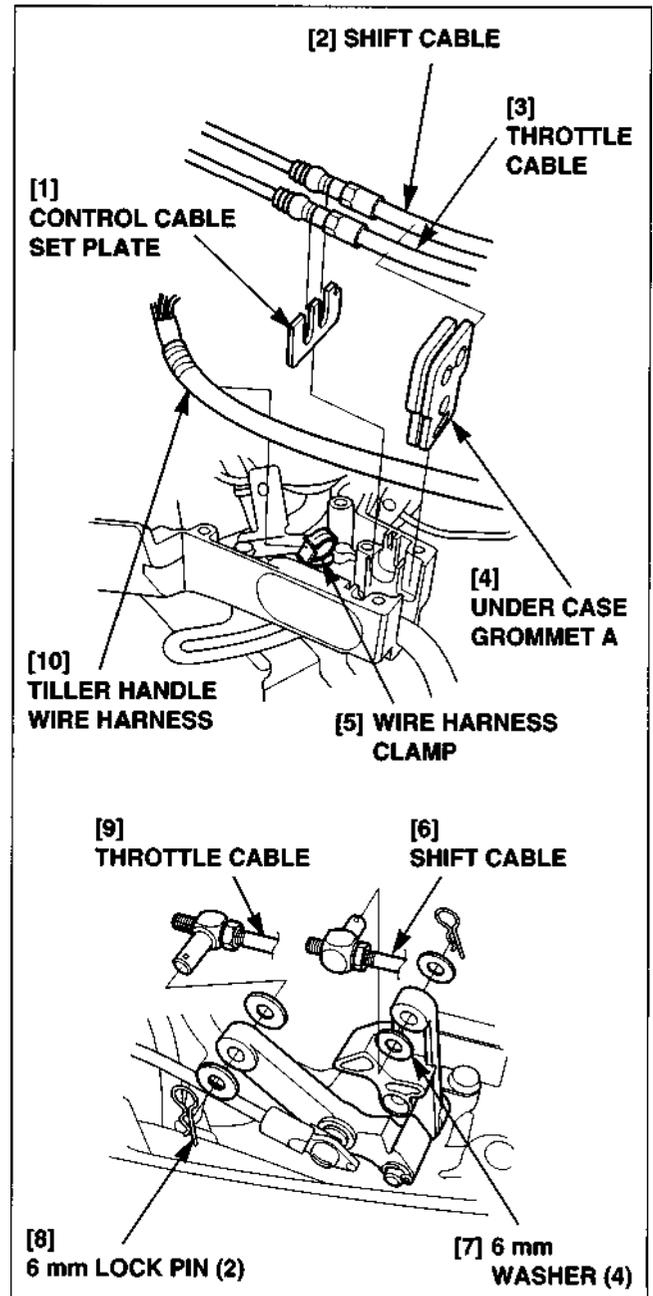
d. INSTALLATION

- 1) Install the long tiller handle assembly to the motor.
- 2) Install the 10 mm washers and tighten the 10 mm self-locking nuts to the specified torque.

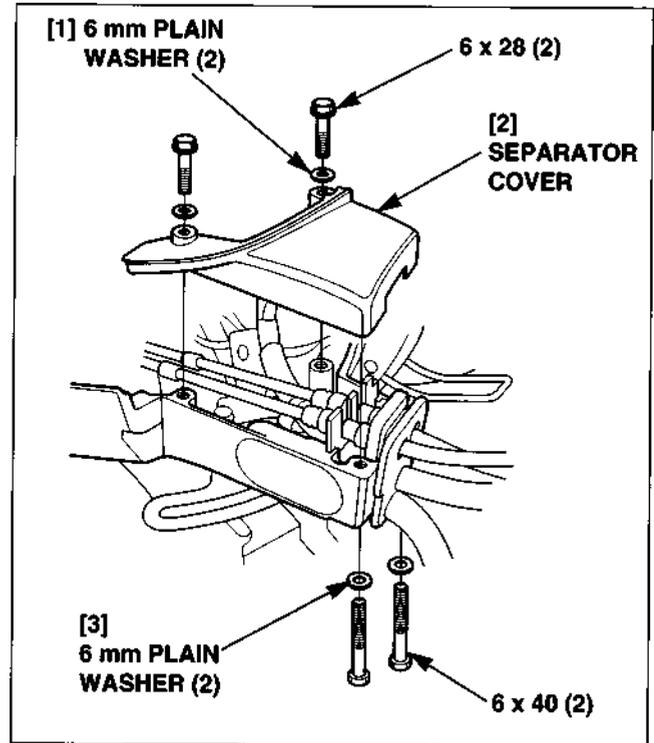
TORQUE: 34 N•m (3.5 kgf•m, 25 lbf•ft)



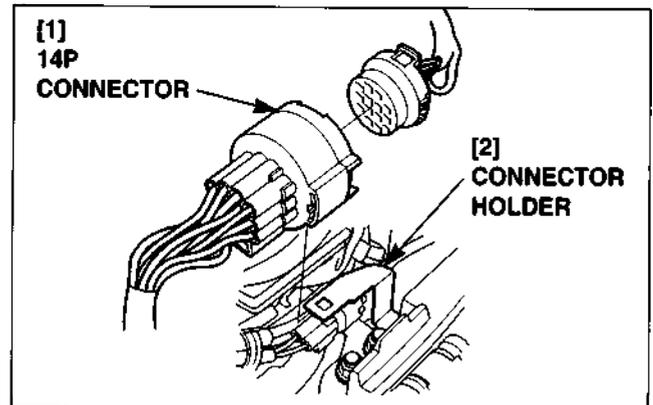
- 3) Pass the long tiller handle wire harness through the under case grommet, and secure it with the wire harness clamp.
- 4) Set the control cable setting plate into the groove of the under case.
- 5) Pass the control cables through the under case grommet and set the control cables by aligning the groove of the control cable with the cutout of the control cable setting plate.
- 6) Adjust the control cables (throttle control cable length: P. 3-6, shift control cable length: P. 3-8).
- 7) Connect the control cables to the shift arm and throttle arm with the 6 mm plain washers and 6 mm lock pins



- 8) Install the separator cover with the two 6 x 28 mm flange bolts and two 6 mm washers and 6 x 40 mm hex. bolts.
- 9) Tighten the two 6 x 28 mm flange bolts and two 6 x 40 mm hex. bolts securely.



- 10) Connect the 14P connector of the long tiller handle wire harness to the main wire harness and set the 14P connector to the connector holder.
- 11) After installation check the throttle operation and gear shift operation.



- 1. CDI UNIT
- 2. POWER COIL

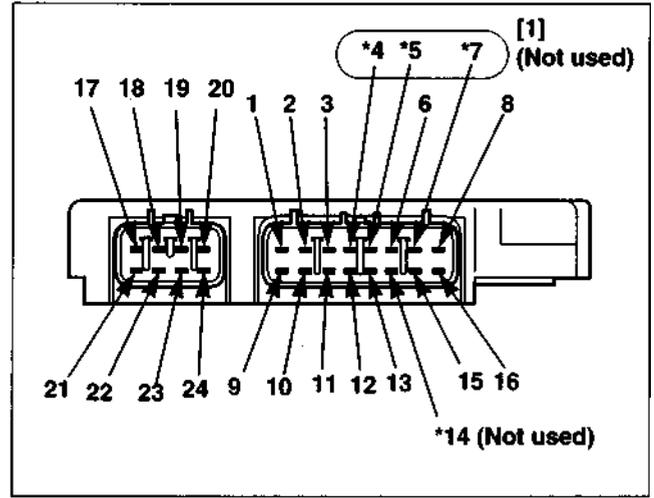
- 3. ECT (Engine Coolant Temperature) SENSOR
- 4. INDICATOR

1. CDI UNIT

a. INSPECTION

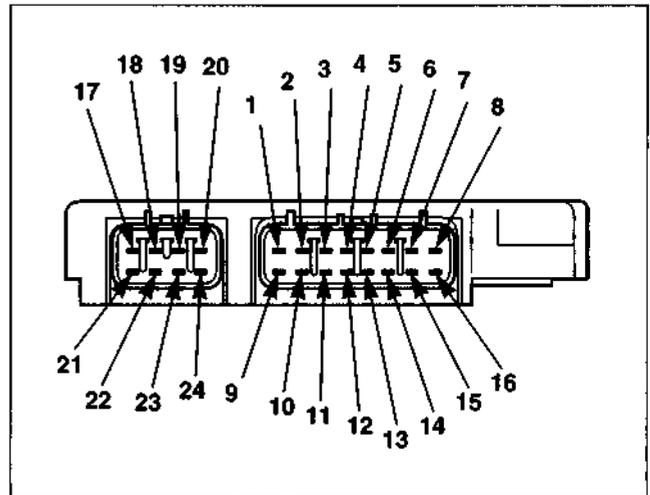
Measure the resistance between the terminals and be sure that the measurements conform to the ranges shown in the table below.

- Use a tester that is equivalent to or higher than the performance specified;
Internal resistance: 20 k Ω /VDC, 9 k Ω /VAC
- Be careful not to touch the metallic part of the tester probe with your body, otherwise correct resistance value cannot be obtained.
- Read the tester manufacturer's operation instructions carefully before operation with a tester. Be sure the tester's battery is fully charged and check the meter before using the tester.
- Use a R x 1 scale of an commercially available multi-meter, and meter shows current flowing from negative (-) to positive (+).



[2] unit: k Ω

		[3] Tester probe (+)											
		1	2	3	*4	*5	6	*7	8	9	10	11	12
[4] Tester probe (-)	1	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	2	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	3	500 ~ ∞	500 ~ ∞	∞	500 ~ ∞	∞	∞	∞	500 ~ ∞	500 ~ ∞	∞	500 ~ ∞	500 ~ ∞
	*4	60 ~ 300	100 ~ 400	11 ~ 45	∞	∞	19 ~ 80	∞	13 ~ 60	6.5 ~ 28	∞	6 ~ 26	7 ~ 30
	*5	∞	∞	100 ~ 400	34 ~ 150	∞	100 ~ 500	∞	100 ~ 400	60 ~ 300	∞	60 ~ 300	70 ~ 300
	6	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	*7	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	8	60 ~ 300	90 ~ 400	15 ~ 60	60 ~ 300	∞	22 ~ 60	∞	∞	9.5 ~ 40	∞	9 ~ 36	18 ~ 80
	9	17 ~ 70	16 ~ 70	2 ~ 8.5	12 ~ 50	∞	5 ~ 20	∞	2.6 ~ 11	∞	∞	0.4 ~ 1.8	0.8 ~ 3.6
	10	36 ~ 150	70 ~ 300	14 ~ 60	50 ~ 200	∞	20 ~ 90	∞	16 ~ 70	8.5 ~ 34	∞	8.5 ~ 34	10 ~ 40
	11	17 ~ 70	15 ~ 60	1.4 ~ 6	11 ~ 50	∞	4.6 ~ 19	∞	2 ~ 8.5	0.4 ~ 1.8	∞	∞	0.8 ~ 3.4
	12	18 ~ 80	30 ~ 150	5.5 ~ 24	24 ~ 100	∞	4 ~ 16	∞	7 ~ 28	3 ~ 13	∞	2.4 ~ 10	∞
	13	16 ~ 70	30 ~ 150	5.5 ~ 24	24 ~ 100	∞	3.6 ~ 15	∞	7 ~ 28	3 ~ 13	∞	2.4 ~ 10	7 ~ 28
	*14	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	15	60 ~ 300	90 ~ 400	15 ~ 60	60 ~ 300	∞	22 ~ 100	∞	17 ~ 70	9.5 ~ 38	∞	9 ~ 36	14 ~ 60
	16	60 ~ 300	90 ~ 400	15 ~ 60	60 ~ 300	∞	22 ~ 100	∞	17 ~ 70	9.5 ~ 38	∞	9 ~ 36	14 ~ 60
	17	20 ~ 150	30 ~ 150	7 ~ 28	22 ~ 90	∞	11 ~ 45	∞	8 ~ 32	4.8 ~ 20	∞	4.4 ~ 17	5 ~ 20
	18	24 ~ 150	26 ~ 150	7 ~ 28	22 ~ 90	∞	11 ~ 45	∞	8 ~ 32	4.8 ~ 20	∞	4.4 ~ 17	5 ~ 20
	19	20 ~ 90	19 ~ 80	3.8 ~ 16	16 ~ 70	∞	7 ~ 28	∞	4.6 ~ 18	2.2 ~ 9.5	∞	1.8 ~ 8	2.4 ~ 10
	20	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	21	24 ~ 150	26 ~ 150	7 ~ 28	22 ~ 100	∞	11 ~ 45	∞	8 ~ 32	4.8 ~ 20	∞	4.4 ~ 18	5 ~ 20
	22	16 ~ 70	15 ~ 60	1.4 ~ 6	11 ~ 50	∞	4.2 ~ 17	∞	2 ~ 8.5	0.4 ~ 1.8	∞	0	0.4 ~ 1.6
	23	16 ~ 70	15 ~ 60	1.4 ~ 6	11 ~ 50	∞	4.2 ~ 17	∞	2 ~ 8.5	0.4 ~ 1.8	∞	0	0.4 ~ 1.6
	24	22 ~ 90	22 ~ 90	5 ~ 20	18 ~ 60	∞	8.5 ~ 34	∞	6 ~ 24	2.8 ~ 12	∞	2.6 ~ 11	3.2 ~ 13



[1] unit: kΩ

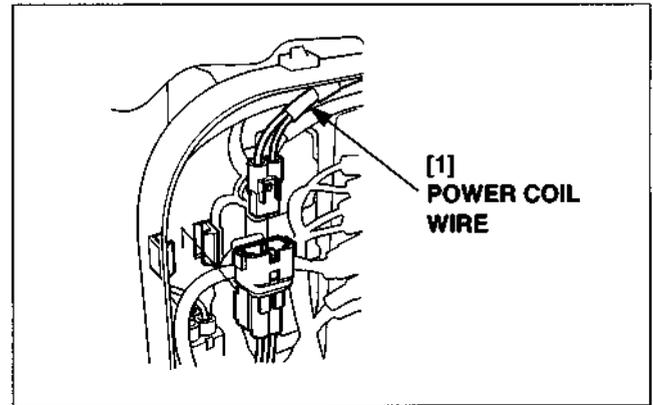
		[2] Tester probe (+)												
		13	*14	15	16	17	18	19	20	21	22	23	24	
[3] Tester probe (-)	1	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	
	2	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	
	3	500 ~ ∞	∞	500 ~ ∞	500 ~ ∞	500 ~ ∞	∞	500 ~ ∞	500 ~ ∞	500 ~ ∞	500 ~ ∞	500 ~ ∞	500 ~ ∞	
	*4	7 ~ 30	∞	13 ~ 60	13 ~ 60	12 ~ 50	12 ~ 50	9 ~ 36	24 ~ 100	12 ~ 60	6 ~ 24	6 ~ 24	10 ~ 45	
	*5	60 ~ 300	∞	100 ~ 400	90 ~ 100	70 ~ 300	70 ~ 300	60 ~ 300	300 ~ ∞	70 ~ 300	60 ~ 300	60 ~ 300	60 ~ 300	
	6	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	
	*7	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	
	8	11 ~ 15	∞	17 ~ 70	17 ~ 70	15 ~ 60	15 ~ 60	12 ~ 50	100 ~ 500	15 ~ 50	9 ~ 36	9 ~ 38	13 ~ 60	
	9	0.8 ~ 3.6	∞	2.6 ~ 11	2.6 ~ 11	4.2 ~ 18	4.2 ~ 18	2.2 ~ 9	8 ~ 32	4.2 ~ 18	0.4 ~ 2	0.4 ~ 2	3 ~ 14	
	10	10 ~ 40	∞	15 ~ 70	15 ~ 70	14 ~ 60	14 ~ 60	11 ~ 45	22 ~ 90	14 ~ 60	8.5 ~ 36	8.5 ~ 36	12 ~ 50	
	11	0.4 ~ 1.6	∞	2 ~ 8	2 ~ 8	3.0 ~ 15	3.8 ~ 16	1.8 ~ 7	5 ~ 34	3.6 ~ 15	0	0	2.4 ~ 10	
	12	3.2 ~ 13	∞	8 ~ 34	7 ~ 28	7.5 ~ 32	7.5 ~ 32	5 ~ 20	6 ~ 32	7.5 ~ 32	2.6 ~ 11	2.6 ~ 11	6.5 ~ 26	
	13		∞	10 ~ 40	6.5 ~ 28	7.5 ~ 32	7.5 ~ 32	5 ~ 22	8 ~ 32	7.5 ~ 32	2.6 ~ 11	2.6 ~ 11	6.5 ~ 26	
	*14	∞		∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	
	15	10 ~ 45	∞		12 ~ 50	15 ~ 60	15 ~ 60	12 ~ 50	28 ~ 150	15 ~ 60	9 ~ 38	9 ~ 38	13 ~ 60	
	16	10 ~ 45	∞		17 ~ 70	15 ~ 60	15 ~ 60	12 ~ 50	28 ~ 150	15 ~ 60	9 ~ 38	9 ~ 38	13 ~ 60	
	17	5.5 ~ 22	∞		7.5 ~ 32	8 ~ 32		3.5 ~ 34	6 ~ 26	10 ~ 45	8.5 ~ 34	4.4 ~ 18	4.4 ~ 18	7 ~ 30
	18	5.5 ~ 22	∞		7.5 ~ 32	8 ~ 32	8 ~ 34		6 ~ 26	10 ~ 45	8.5 ~ 34	4.4 ~ 18	4.4 ~ 18	7 ~ 30
	19	2.4 ~ 10	∞		4.4 ~ 18	4.4 ~ 18	5.5 ~ 24	5.5 ~ 24		6.5 ~ 28	5.5 ~ 24	1.8 ~ 8	1.8 ~ 8	4.6 ~ 19
	20	∞	∞		∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
	21	5 ~ 20	∞		7.5 ~ 32	8 ~ 32	8 ~ 34	8.6 ~ 34	6 ~ 28	10 ~ 45		4.4 ~ 18	4.4 ~ 18	7 ~ 20
	22	0.4 ~ 1.6	∞		2 ~ 8	2 ~ 8	3.6 ~ 15	3.8 ~ 16	1.6 ~ 7	4 ~ 16	3.8 ~ 16		0	2.4 ~ 10
	23	0.4 ~ 1.6	∞		2 ~ 8	2 ~ 8	3.6 ~ 15	3.8 ~ 18	1.6 ~ 7	4 ~ 16	3.8 ~ 16		0	2.4 ~ 10
	24	3.2 ~ 13	∞		5.5 ~ 24	6 ~ 24	6.5 ~ 23	7 ~ 28	4.6 ~ 19	8 ~ 34	7 ~ 30	2.6 ~ 11	2.6 ~ 11	

2. POWER COIL

Disconnect the 2P power coil connector, and measure the resistance between the terminals.

Standard resistance	7.02 - 8.58 Ω
---------------------	----------------------

- See page 6-1 for the power coil replacement.



3. ECT (Engine Coolant Temperature) SENSOR

- The sensor resistance decreases as the coolant temperature increases as shown on the right table.

- 1) Disconnect the 2P connector from the thermo sensor and measure the resistance between the sensor terminals at the room temperature.

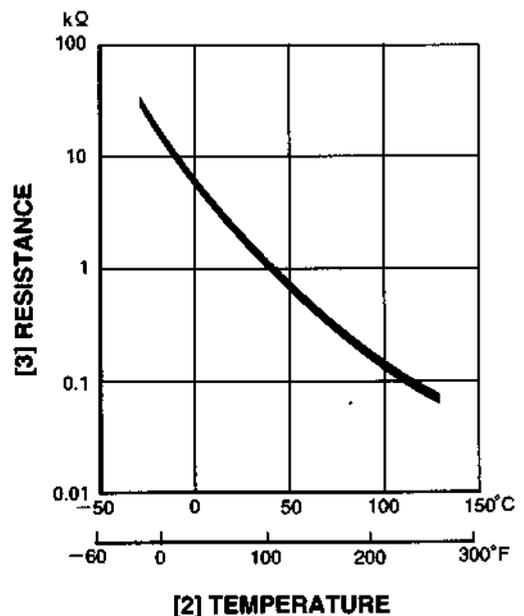
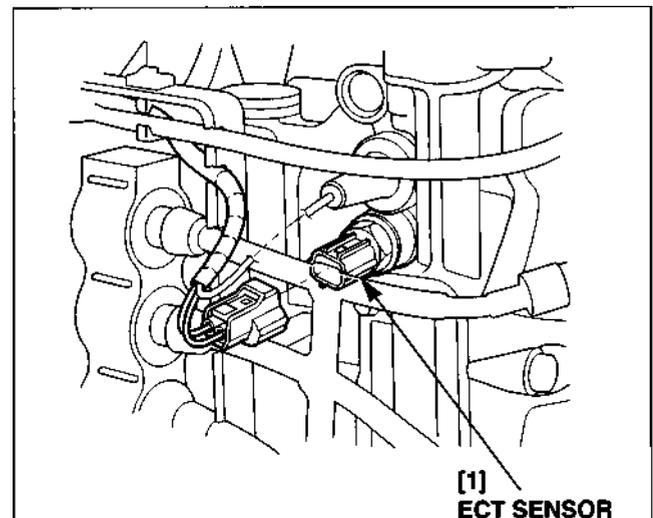
Standard resistance: 1 - 5 k Ω

- 2) Connect the 2P connector and start the engine and warm up the engine to normal operating temperature.

- 3) Stop the engine, and disconnect the 2P connector and measure the resistance.

Standard resistance: 200 - 400 Ω

- ECT sensor installation/removal is almost the same as installation/removal of the sermo switch. (See page 8-2 of the Base Manual.)



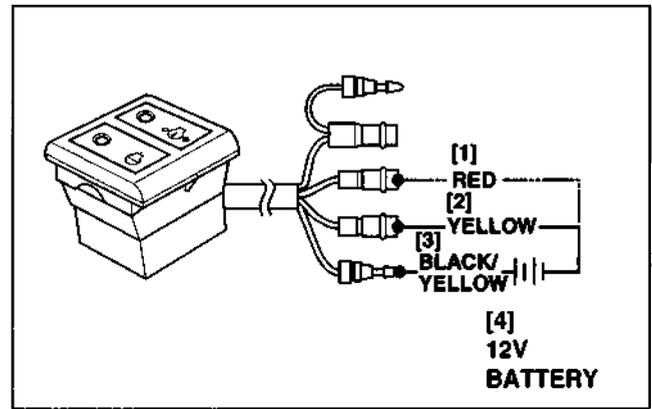
4. INDICATOR

a. INSPECTION

The green indicator should turn on when connecting a 12V battery (+) terminal to the Black/yellow terminal and (-) to the Orange terminal.

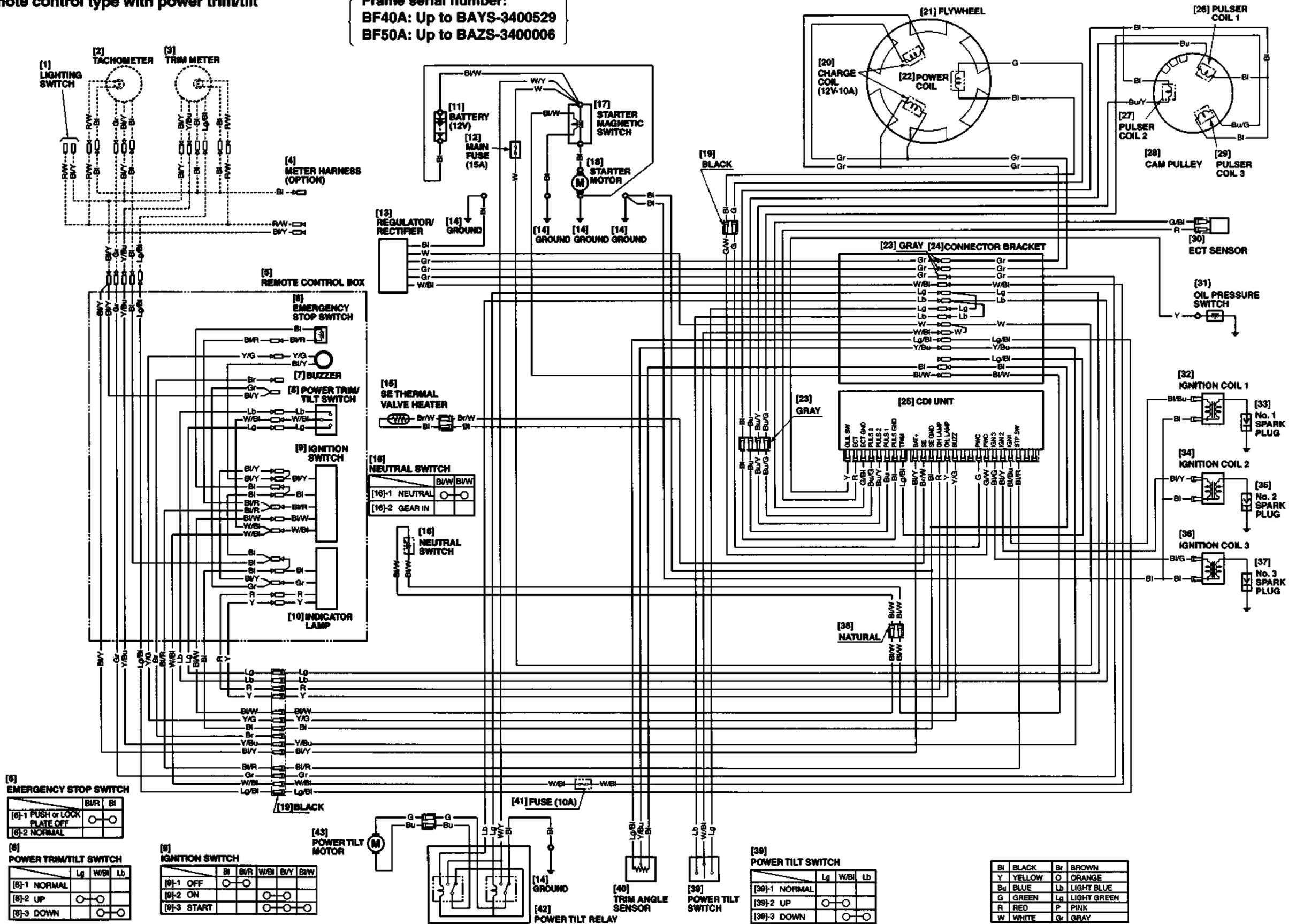
The red indicator should turn on when connecting a 12V battery (+) terminal to the Black/yellow terminal and (-) to the Red terminal.

- Be sure the battery is in good condition before performing the test.



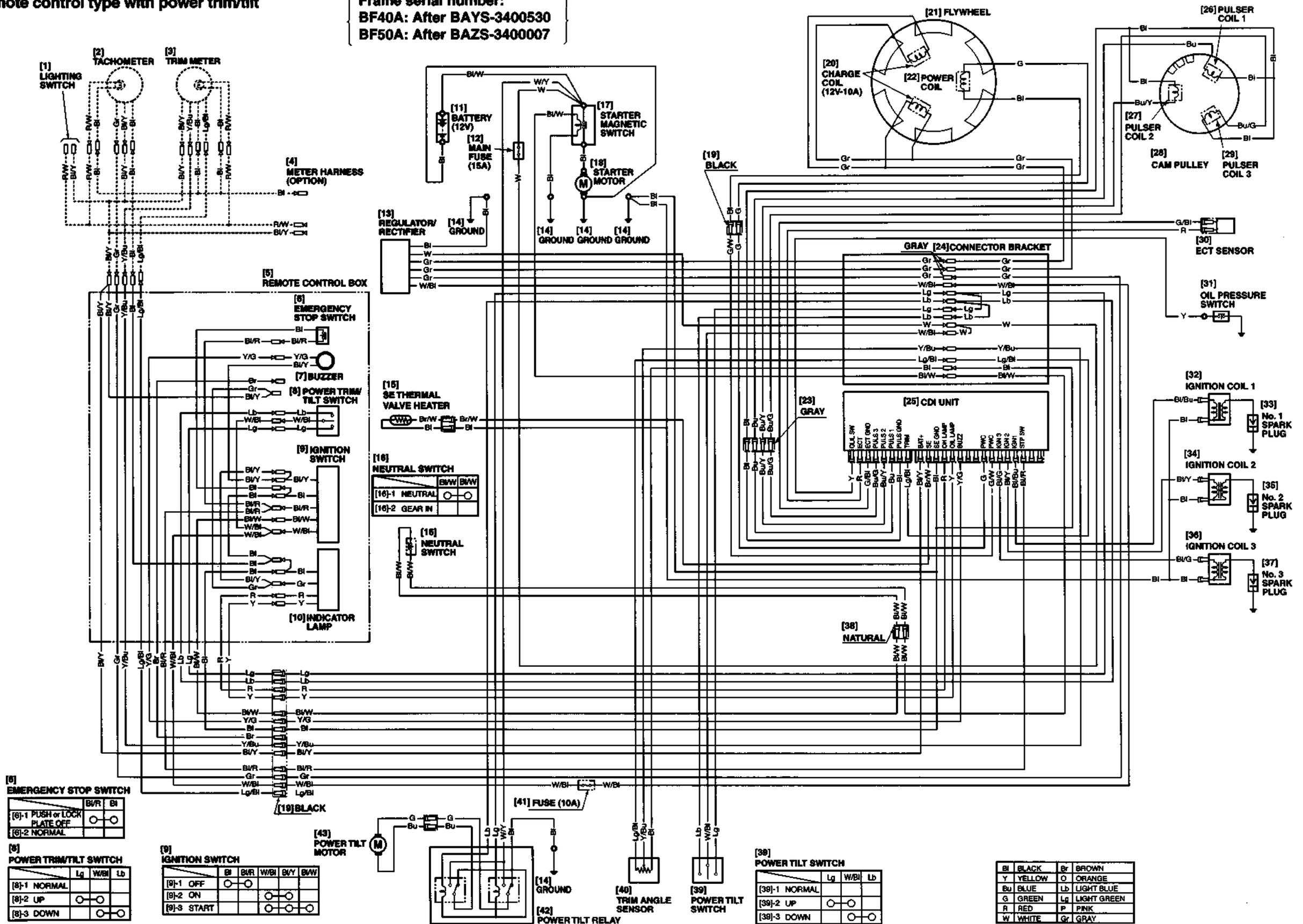
Remote control type with power trim/tilt

Frame serial number:
 BF40A: Up to BAYS-3400529
 BF50A: Up to BAZS-3400006



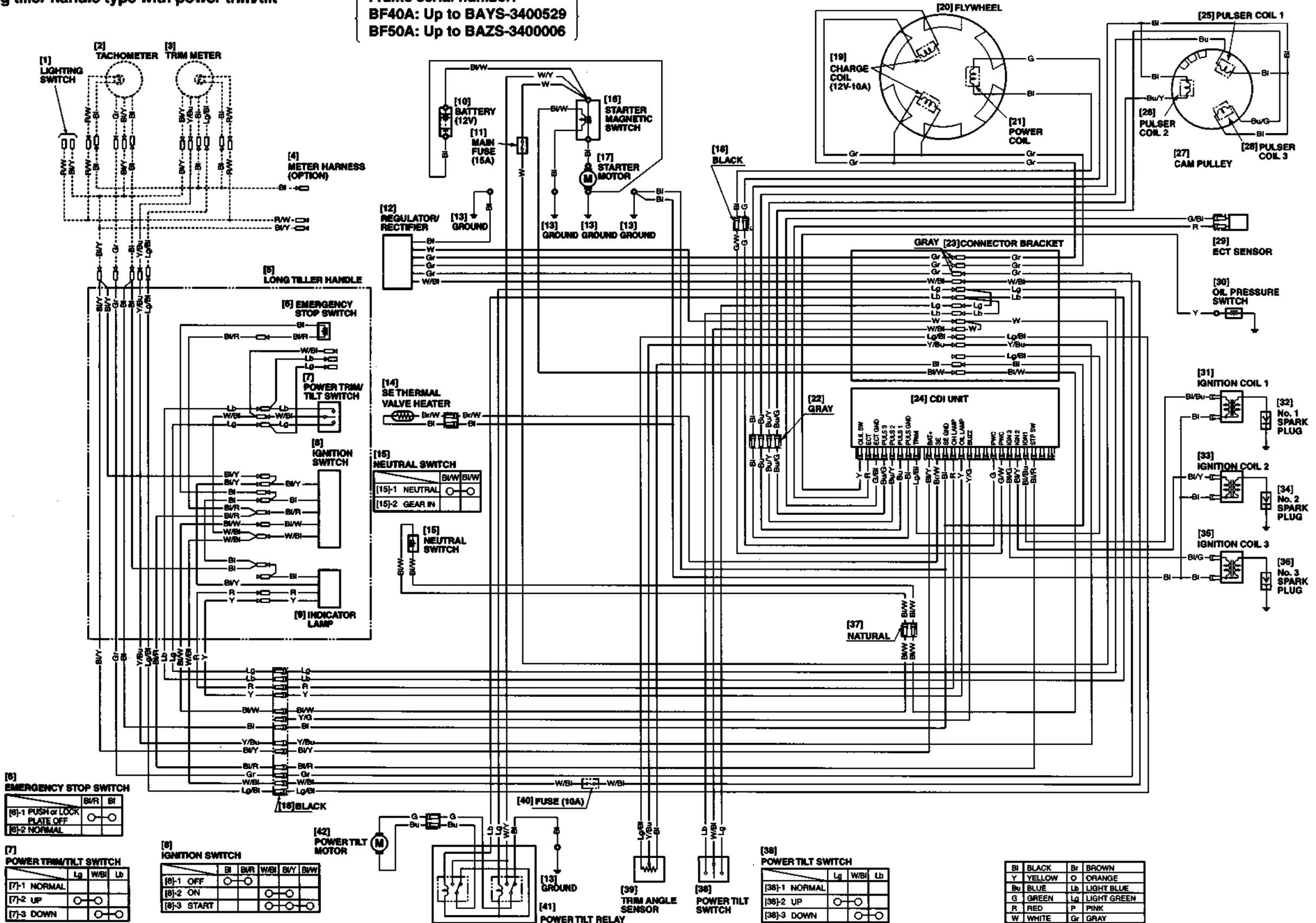
Remote control type with power trim/tilt

Frame serial number:
 BF40A: After BAYS-3400530
 BF50A: After BAZS-3400007



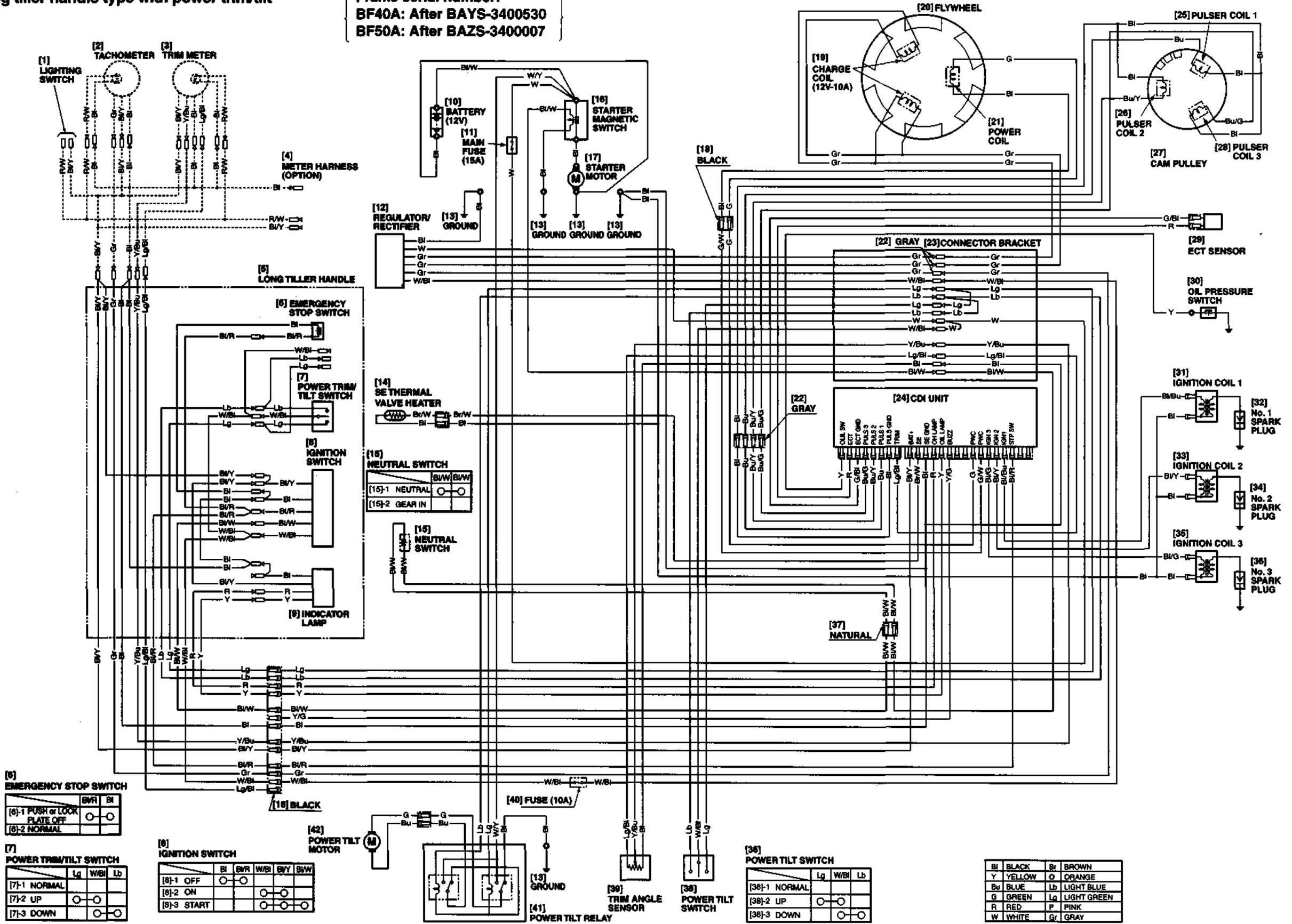
Long tiller handle type with power trim/tilt

Frame serial number:
 BF40A: Up to BAYS-3400529
 BF50A: Up to BAZS-3400006

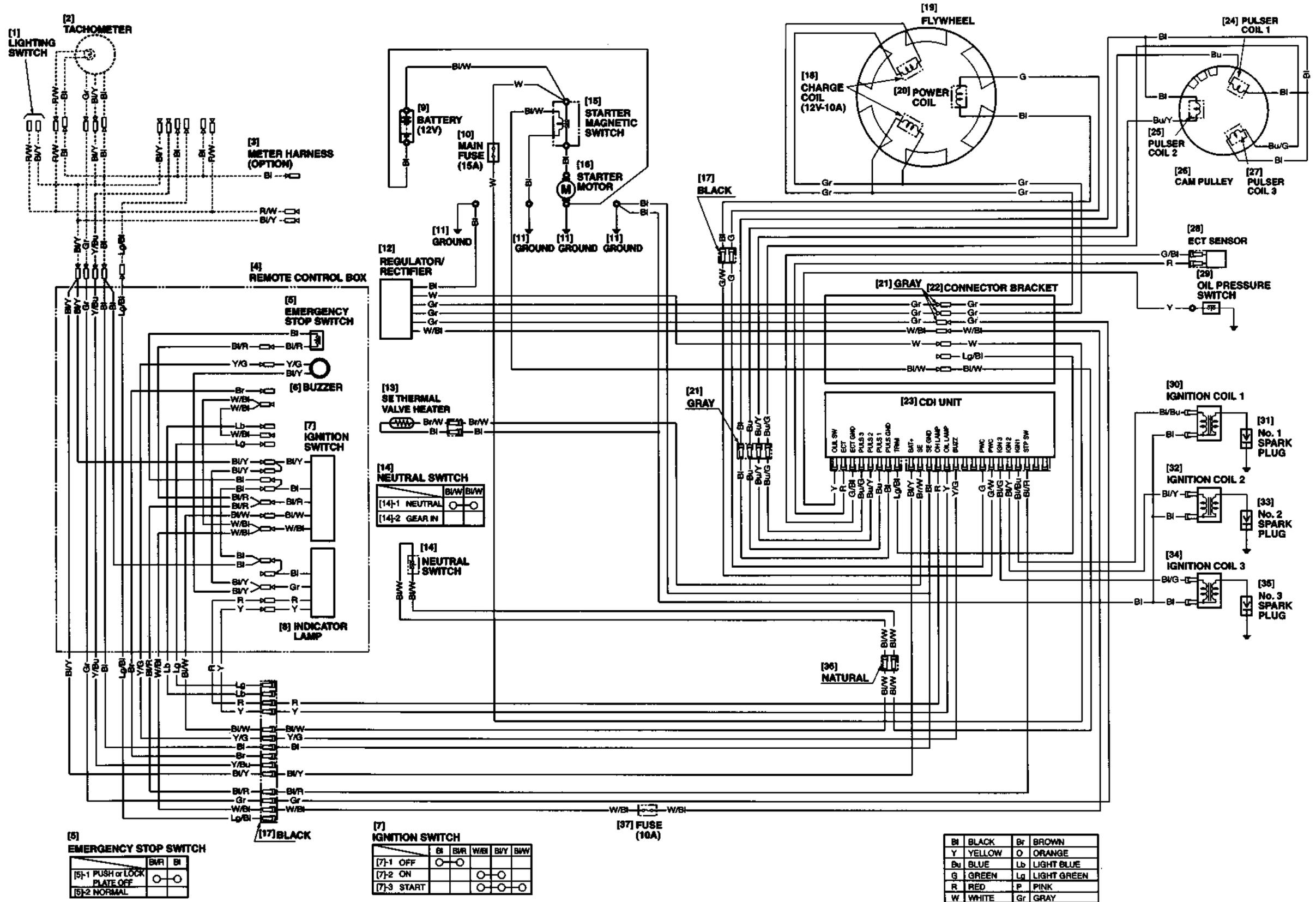


Long tiller handle type with power trim/tilt

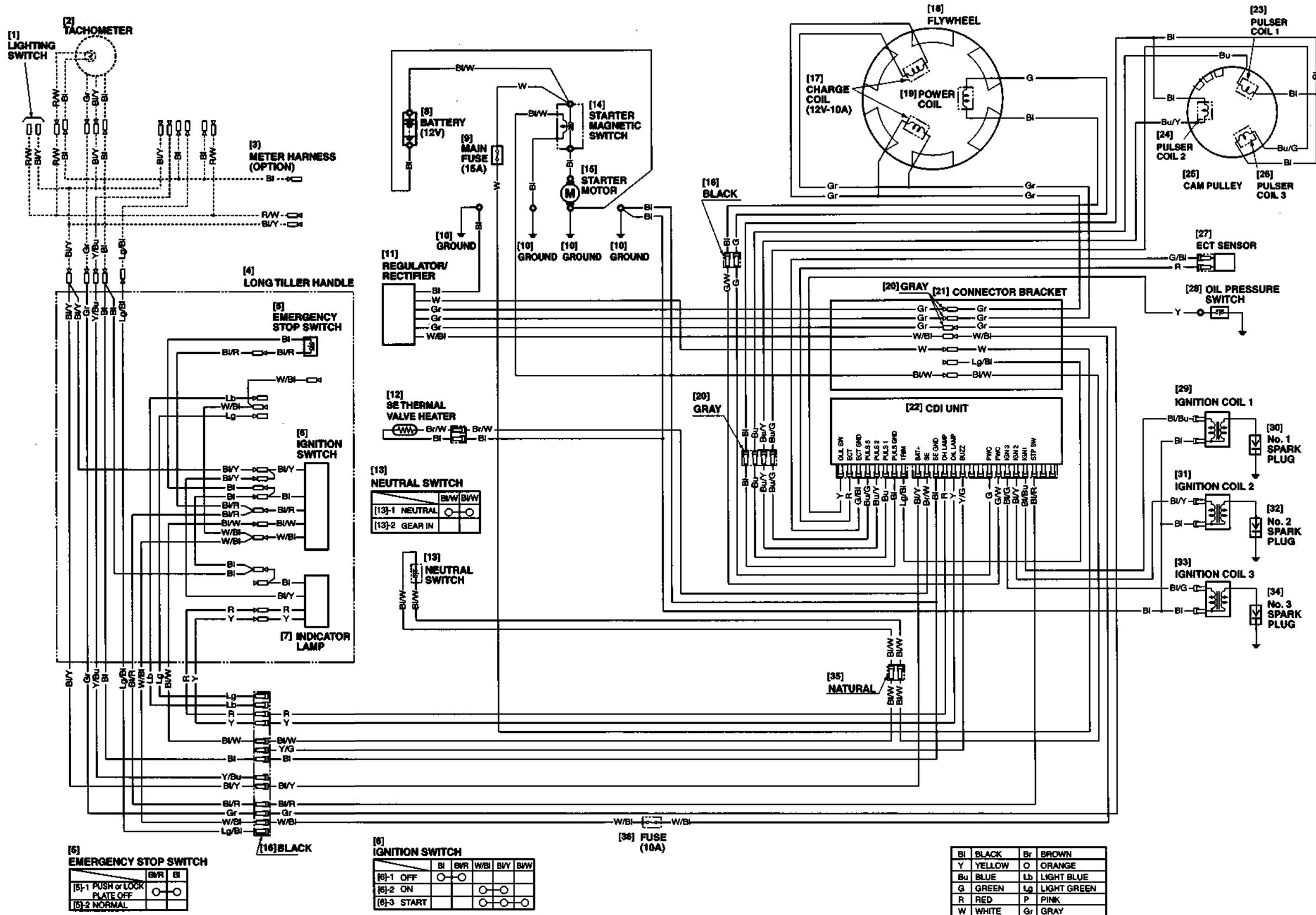
Frame serial number:
 BF40A: After BAYS-3400530
 BF50A: After BAZS-3400007



Remote control type with gas assisted tilt



Long tiller handle type with gas assisted tilt



PREFACE

This manual covers the construction, function and servicing procedures of the Power Trim/Tilt Assembly for Honda BF40A•BF50A Outboard motors.

For service information which is not covered in this supplement, please refer to the base shop manual (Parts number 66ZV300U).

Careful observance of these instructions will result in better, safe service work.

Pay attention to these symbols and their meaning:

⚠ WARNING Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

CAUTION: Indicates a possibility of personal injury or equipment damage if instructions are not followed.

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Service Publication Office



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■ The marked sections contain no changes.
 They are not covered in this manual.

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1. MAINTENANCE STANDARDS

2. TORQUE VALUES

3. SPECIAL TOOLS

4. TROUBLESHOOTING

1. MAINTENANCE STANDARDS

POWER TRIM/TILT

Part	Item	Standard	Service limit
Power trim/tilt	Lower chamber blow pressure	19.3 - 23.0 MPa (197 - 235 kgf/cm ² , 2,802 - 3,342 psi)	—
	Upper chamber blow pressure	27.9 - 34.8 MPa (285 - 355 kgf/cm ² , 4,054 - 5,049 psi)	—
Power trim/tilt motor	Brush length	9.75 mm (0.384 in)	5.5 mm (0.22 in)
	Mica depth	1.8 mm (0.07 in)	1.3 mm (0.05 in)

2. TORQUE VALUES

Item	Thread dia. x pitch	Torque			Note
		N•m	kgf•m	lbf•ft	
• Power trim/tilt					
Upper joint metal	M14 x 1.5	44	4.5	33	(1)
Oil hole cap bolt	3/8-16UNC	1.1	0.11	0.80	
Oil tank socket bolt	M5 x 0.8	4.7	0.48	3.5	
Outer tube	M41 x 1.5	64	6.5	47	(2)
Outer tube guide	M52 x 1.5	88	9.0	65	
Gear pump socket bolt	M5 x 0.8	5.1	0.52	3.8	
Spool valve cap	M22 x 1.0	22	2.2	16	
Manual valve	M12 x 1.75	1.7	0.17	1.2	
2- Way valve	M12 x 1.0	7	0.7	6.1	
Motor screw	1/4-20 UNC	6.4	0.65	4.7	
Yoke screw	M5 x 0.8	2.2	0.22	1.6	

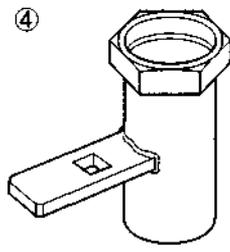
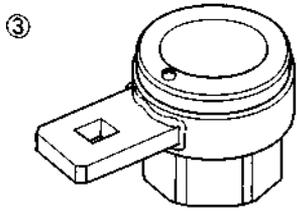
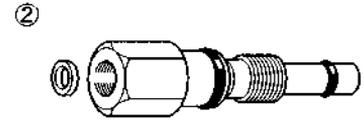
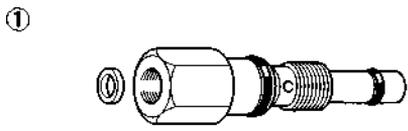
NOTE:

(1): Apply LOCTITE® #271 to the thread (See page 13-28).

(2): Apply LOCTITE® #241 to the thread (See page 13-21).

3. SPECIAL TOOLS

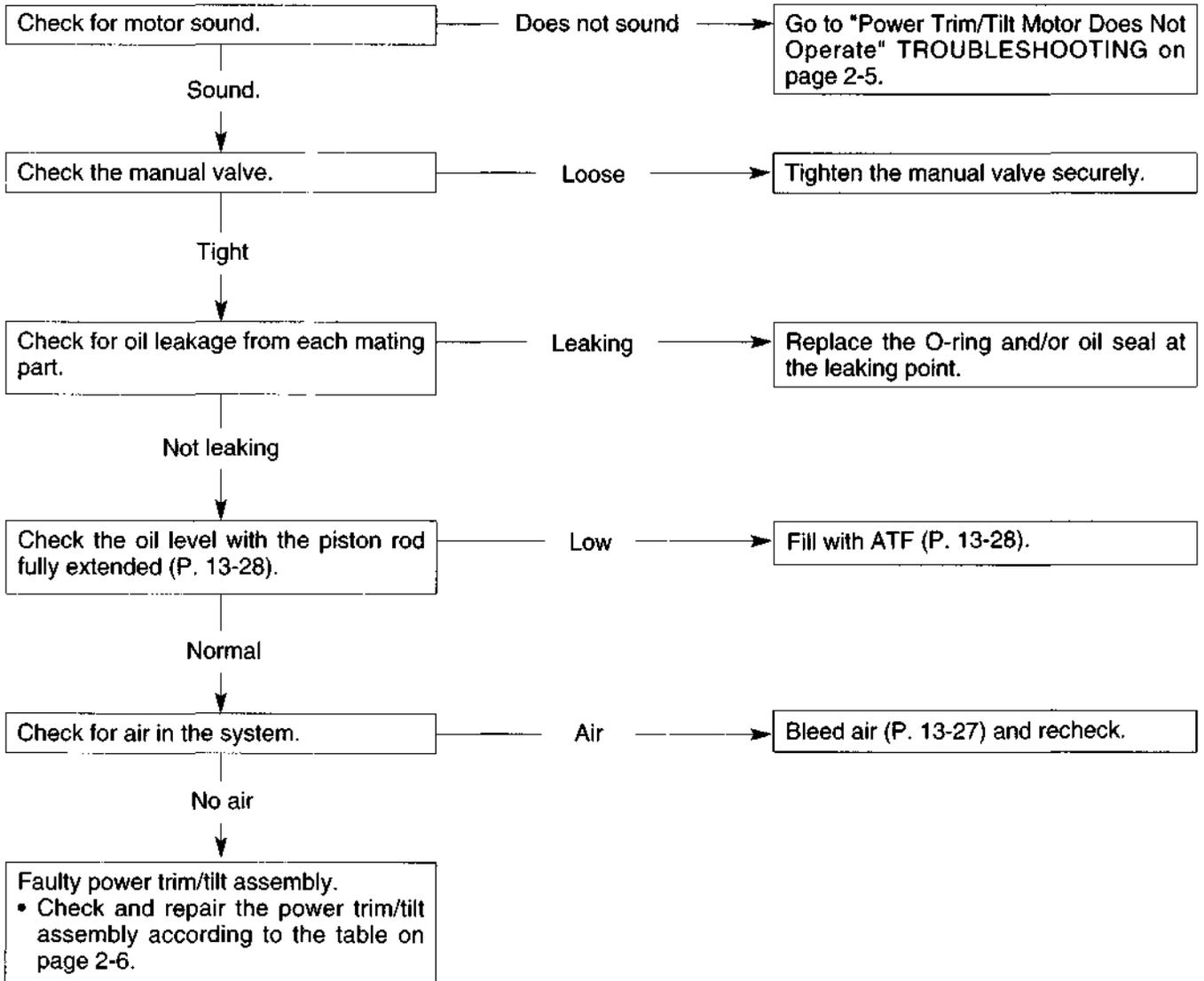
No.	Tool name	Tool number	Application
①	Gauge joint A	070PJ-V150100	Blow pressure inspection
②	Gauge joint B	070PJ-V150200	
③	Lock nut wrench	0709A-ZW40100	Outer tube guide removal/installation
④	Lock nut wrench 30 x 40	07916-9690000	Outer tube removal/installation



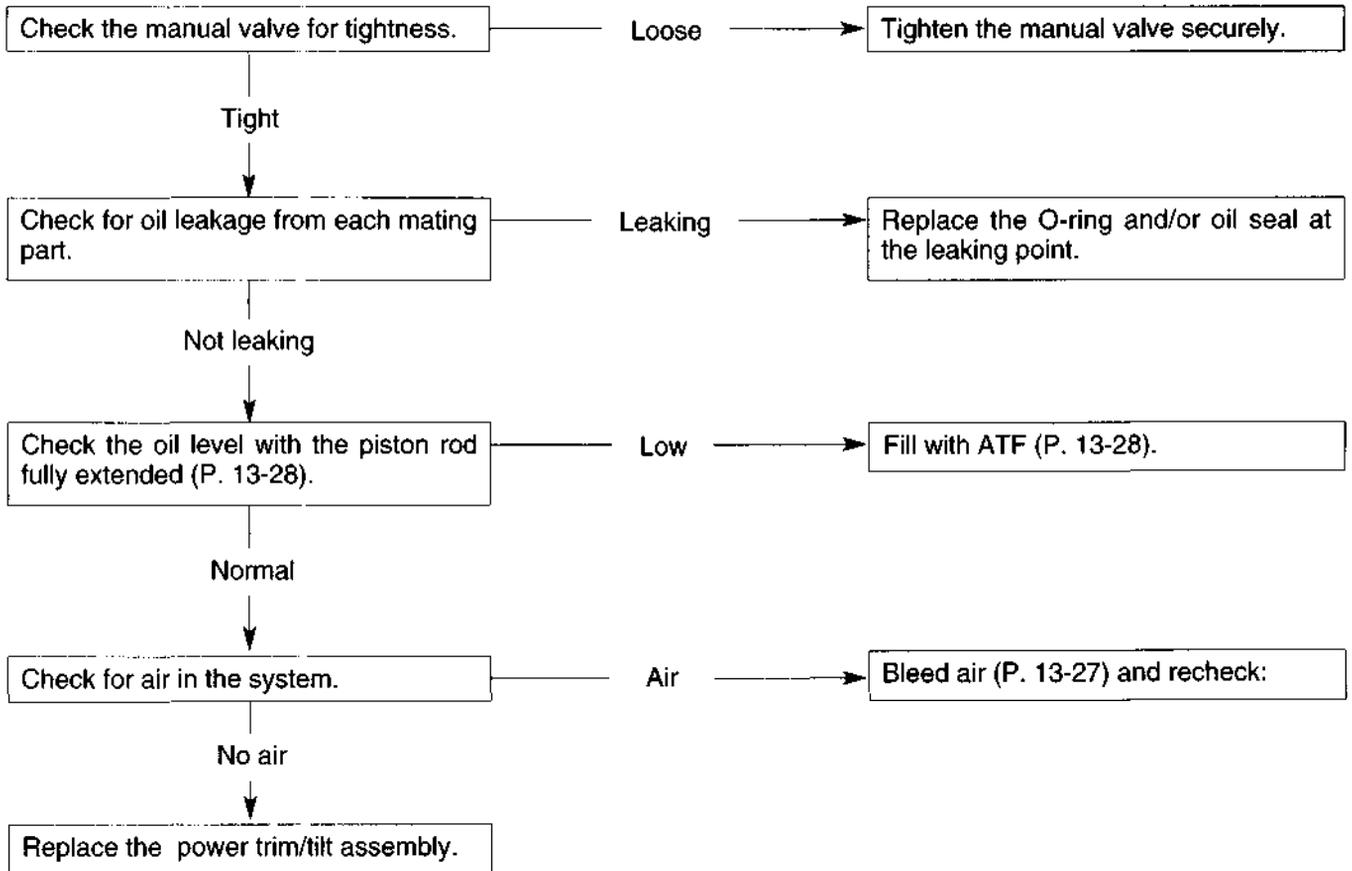
4. TROUBLESHOOTING

a. POWER TRIM/TILT

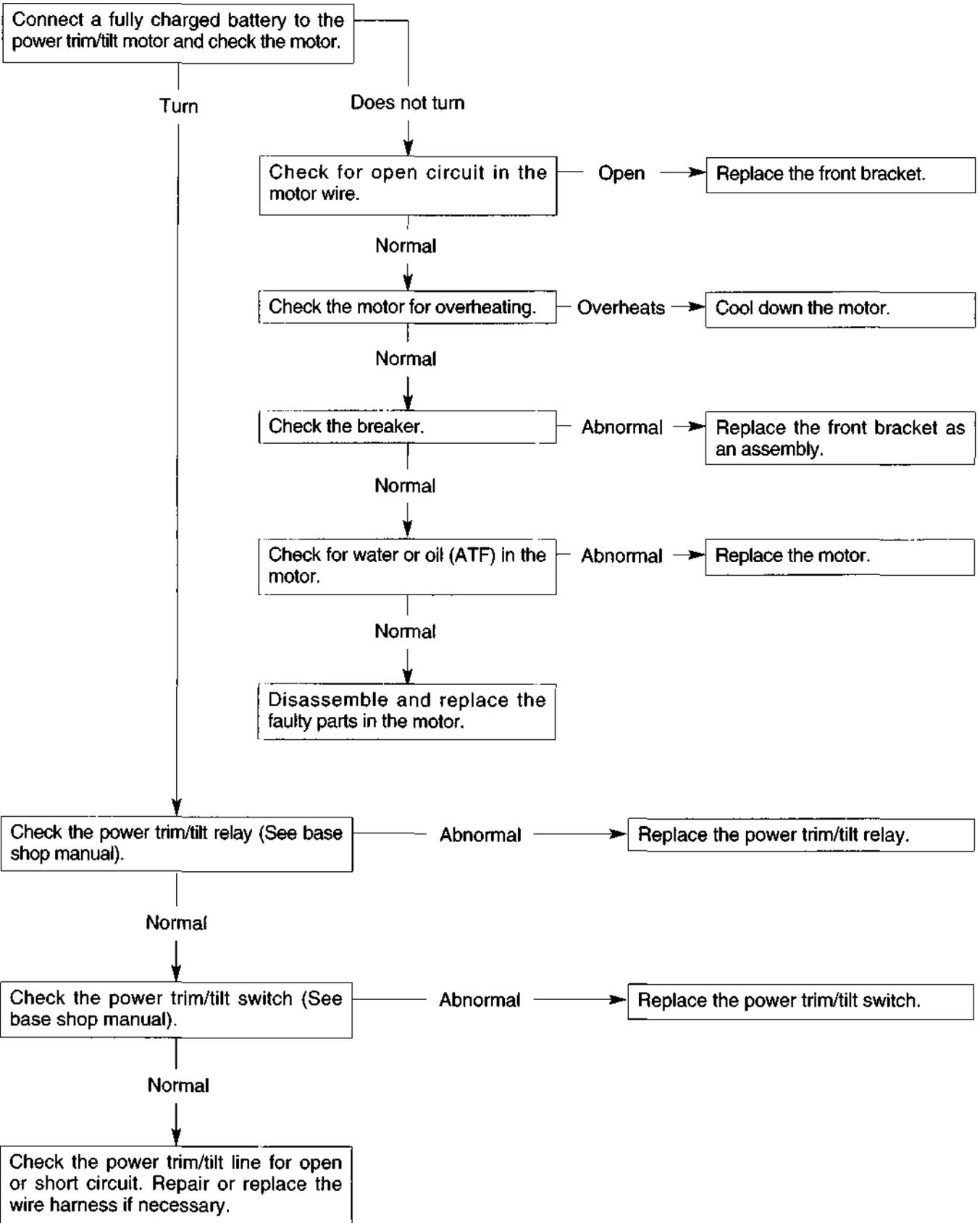
• Power Trim/Tilt Does Not Move



• Power Trim/Tilt Does Not Hold



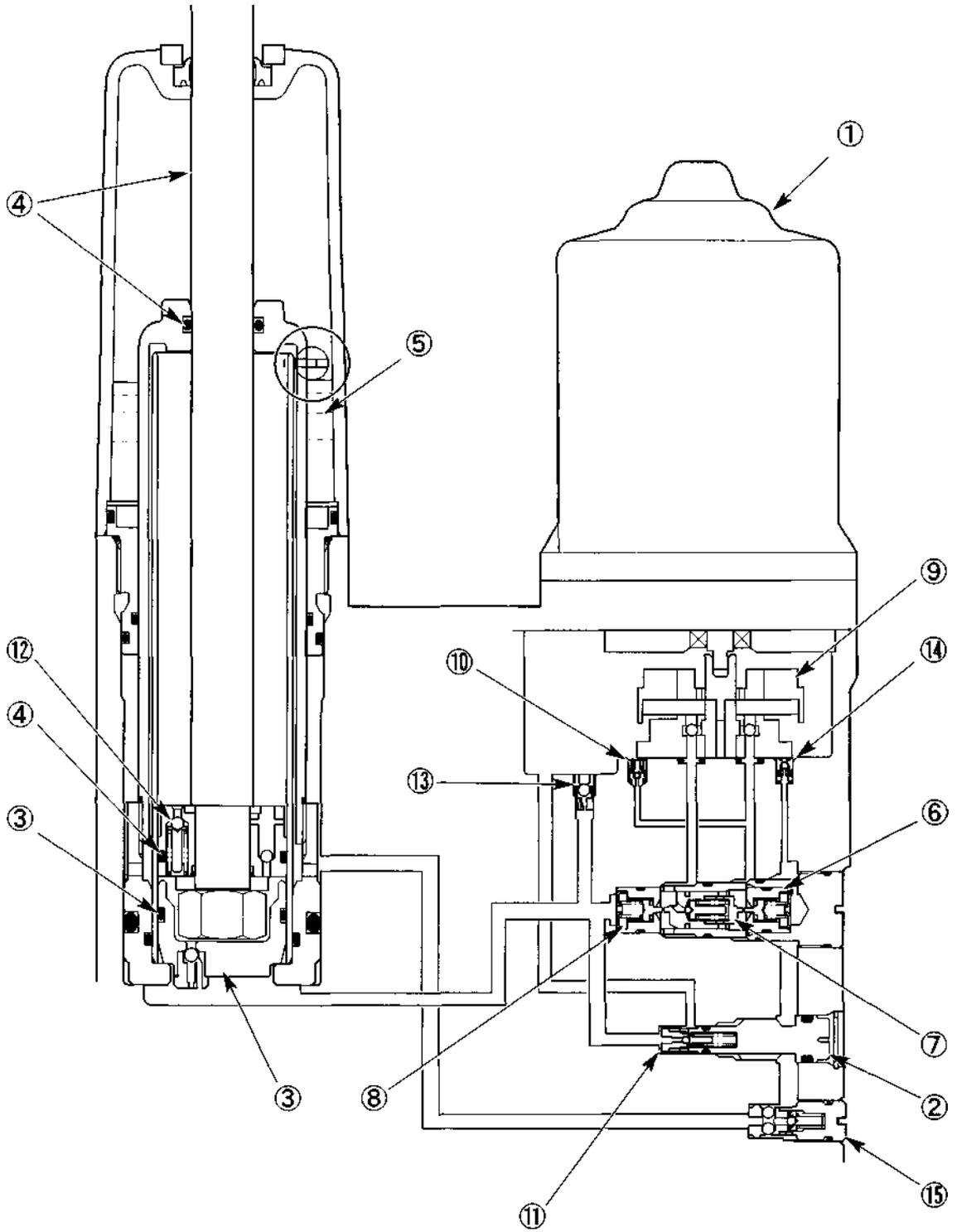
• Power Trim/Tilt Motor Does Not Operate



• Faulty Power Trim/Tilt Assembly Quick Reference Chart

Symptom				Pressure		Check point See page 2-7	Check/repair method
Does not tilt up	Does not tilt down.	Does not hold		Lower chamber blow pressure low or drops	Upper chamber blow pressure low or drops		
		Contracted side	Extended side				
○	○	—	—	○	○	① Motor	Check the motor.
○	○	○	○	○	○	② Manual valve	Check the manual valve for tightening, damage or foreign material. Check the O-ring for damage, replace if necessary. Replace the manual valve if necessary.
○	—	○	—	○	—	③ Free piston, O-ring	Check the O-ring for damage, replace if necessary.
—	○	—	○	—	○	④ Piston rod, O-ring, oil seal	Check the O-ring, oil seal for damage, replace if necessary. Replace the piston rod assembly if necessary.
○	○	—	—	○	○	⑤ Oil (ATF)	Check the oil level and add if necessary.
○	○	—	○	—	○	⑥ Upper chamber check valve	Check the check valve for damage, wear or foreign material. Clean and reassemble the upper chamber check valve properly.
○	○	○	○	○	○	⑦ Spool valve (with built-in upper relief valve)	Check the valve for damage, wear or foreign material. Clean and reassemble the spool valve properly. Do not disassemble the spool valve, either as the upper relief valve is built in the spool valve.
○	○	○	—	○	—	⑧ Lower chamber check valve	Check the check valve for damage, wear or foreign material. Clean and reassemble the lower chamber check valve properly.
○	○	—	—	○	○	⑨ Gear pump	Replace the gear pump assembly.
—	○	—	○	—	○	⑩ Down relief valve	Check the valve for damage, wear or foreign material. Clean and reassemble the down relief valve properly.
○	—	○	—	○	—	⑪ Thermal valve (in the manual valve)	Check the check valve for damage, wear or foreign material. Clean and reassemble the manual valve properly.
—	○	—	○	—	○	⑫ Shock relief valve (in the piston)	Check the relief valve for damage, wear or foreign material. Replace the piston assembly if necessary. Clean and reassemble the piston properly.
○	—	○	—	○	—	⑬ Lower chamber safety valve (with built-in the valve body)	Check the lower chamber safety valve for damage, wear or foreign material. Replace the valve body assembly, if necessary. Clean the valve body and reassemble properly.
—	○	—	—	—	○	⑭ Upper chamber safety valve	Check the upper chamber safety valve for damage, wear or foreign material. Replace the upper chamber safety valve if necessary. Clean and reassemble the upper chamber safety valve properly.
○	○	—	—	—	—	⑮ 2-way valve	Check the 2-way valve for damage, wear or foreign material. Replace the 2-way valve if necessary. Clean and reassemble the 2-way valve properly.

• Check Points



1. POWER TRIM/TILT ASSEMBLY

1. POWER TRIM/TILT ASSEMBLY

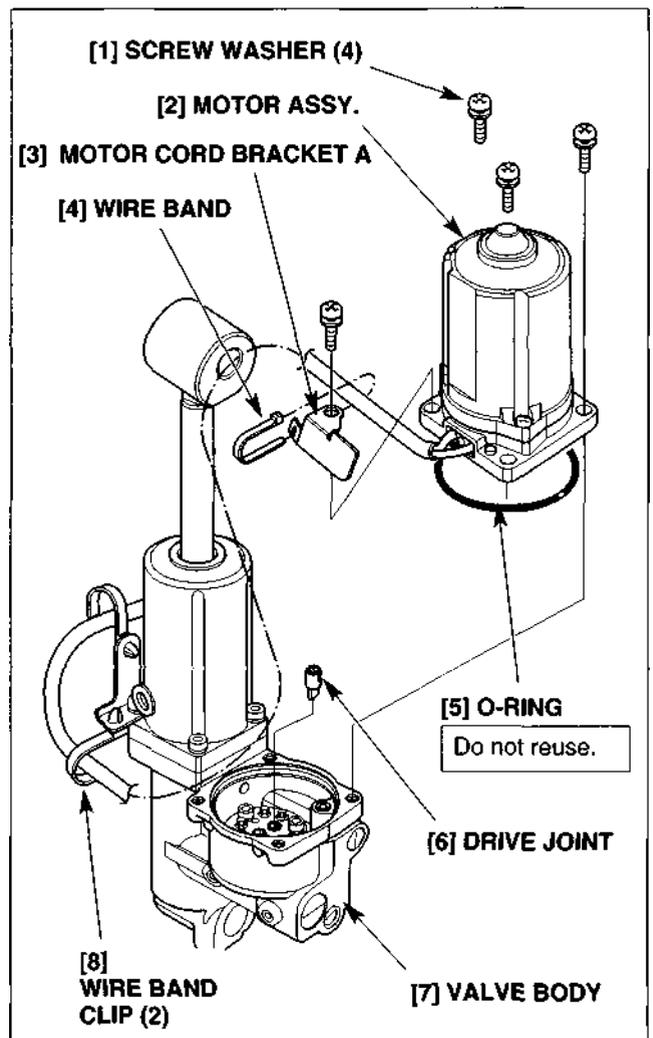
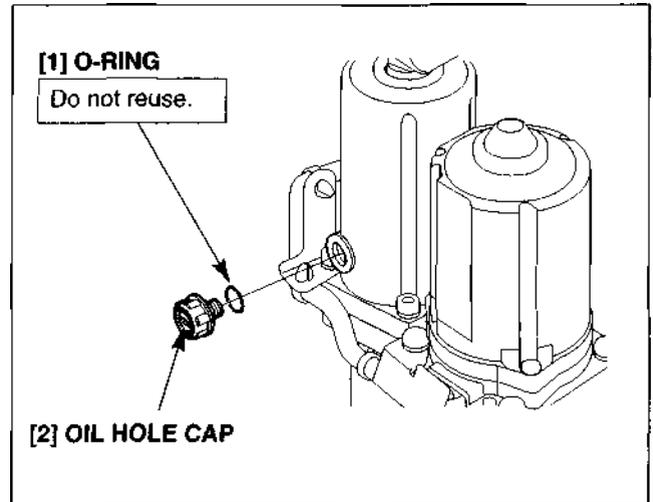
b. DISASSEMBLY

CAUTION:

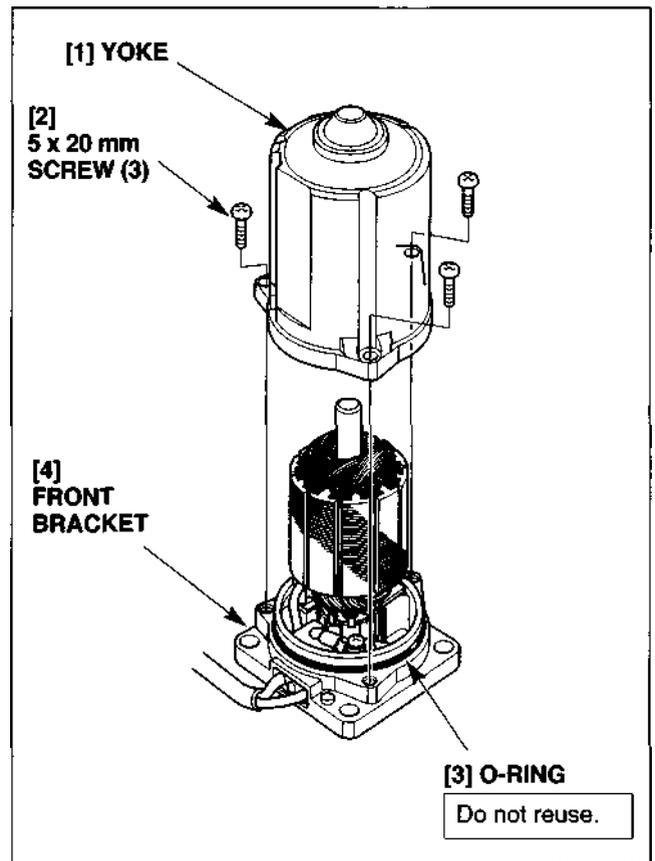
- Do not disassemble the gear pump assembly. If it is faulty, replace it as an assembly.
- Do not use a shop towel, cloth, gloves, etc.
- Do not reuse the drained automatic transmission fluid (ATF).
- Do not hold at the outer tube when holding the power trim/tilt assembly in a vise during operation.
- Clean the removed parts in fresh automatic transmission fluid (ATF), and blow each port of the parts with compressed air. Set the parts neatly in a suitable container with care not to contaminate them with dust and dirt.
- Do not reuse the O-rings oil seals.
- Remove each valve and sleeve with care not to damage the sliding surface of the parts.

• POWER TRIM/TILT MOTOR

- 1) Connect the power trim/tilt motor 2P connector and operate the power trim/tilt motor assembly until the piston rod extends fully.
- 2) Loosen the manual valve fully.
- 3) Remove the oil hole cap and drain ATF in a suitable container through the bolt hole.
- 4) Remove the O-ring from the oil hole cap bolt and discard it. Replace the O-ring with a new one during reassembly.
 - Do not drain ATF by pushing in the piston rod.
- 5) Open the two wire band clips and one wire band, and free the motor wire.
- 6) Remove the four screw washers, and remove wire protector and power trim/tilt motor assembly.
- 7) Drain ATF from the valve body.
- 8) Remove the O-ring from the power trim/tilt motor assembly and discard it.
 - Replace the O-ring with a new one during reassembly.
- 9) Remove the drive joint from the gear pump assembly.

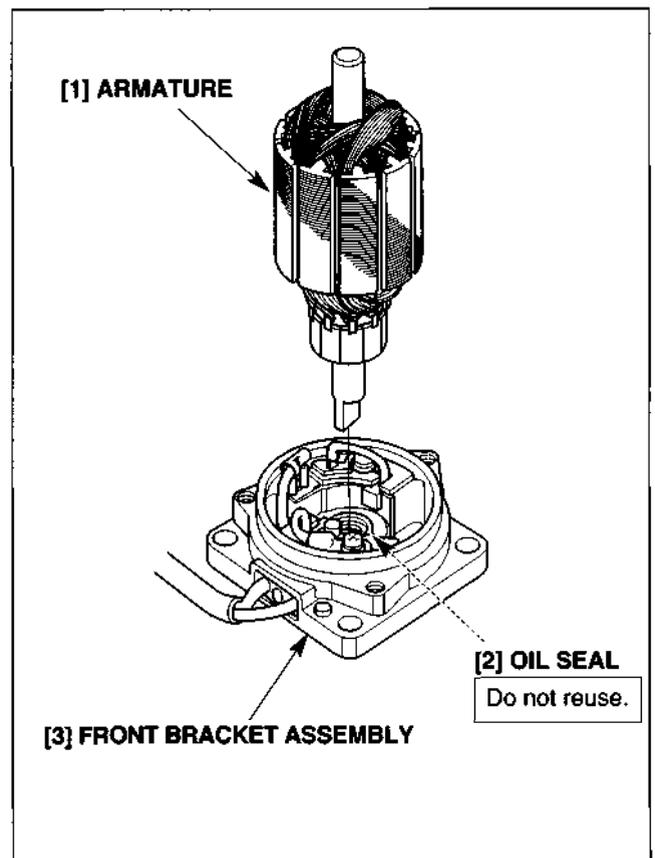


10) Remove the three 5 x 20 mm screws, yoke and O-ring. Discard the O-ring. Replace the O-ring with a new one during reassembly.



11) Remove the armature and brush springs.
 • See page 13-18 for brush inspection and brush replacement.

12) Remove the oil seal if necessary. Discard the oil seal and replace the oil seal with a new one during reassembly.

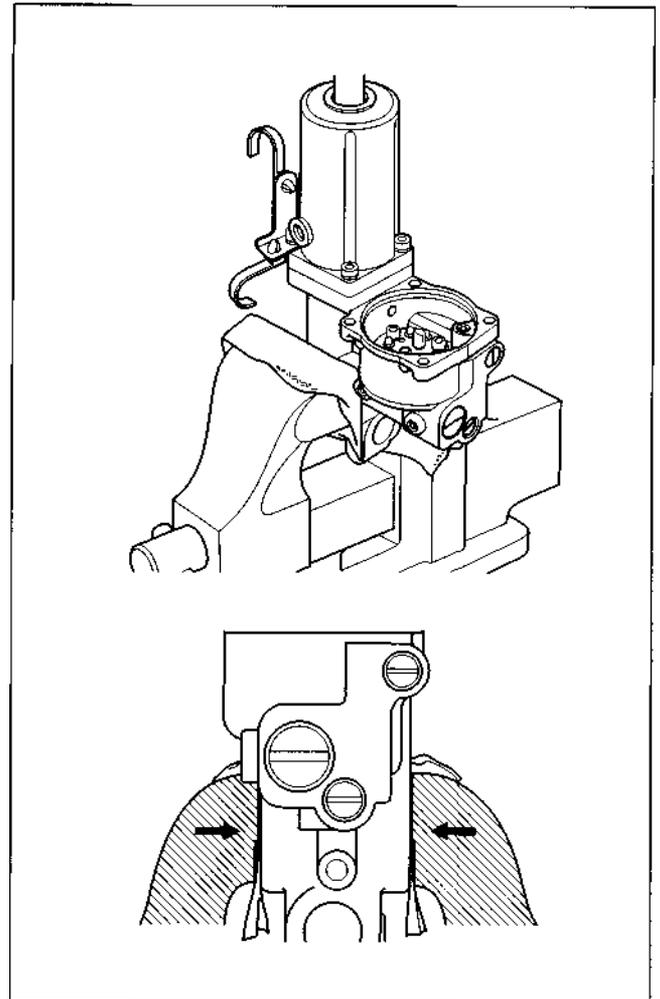


• CYLINDER, PISTON ROD

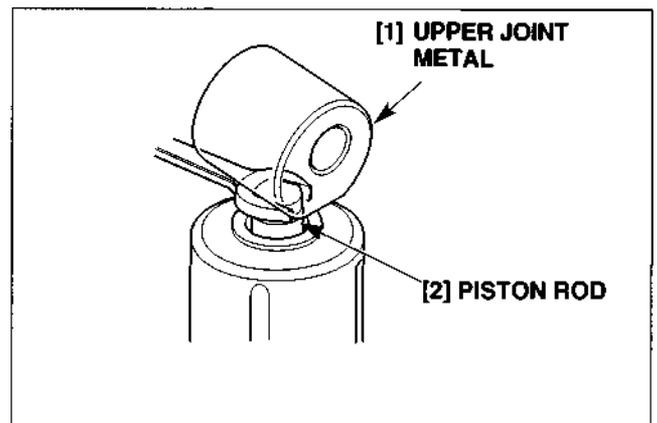
- 1) Hold the valve body in a vise with shop towel or soft jaws as shown.

CAUTION:

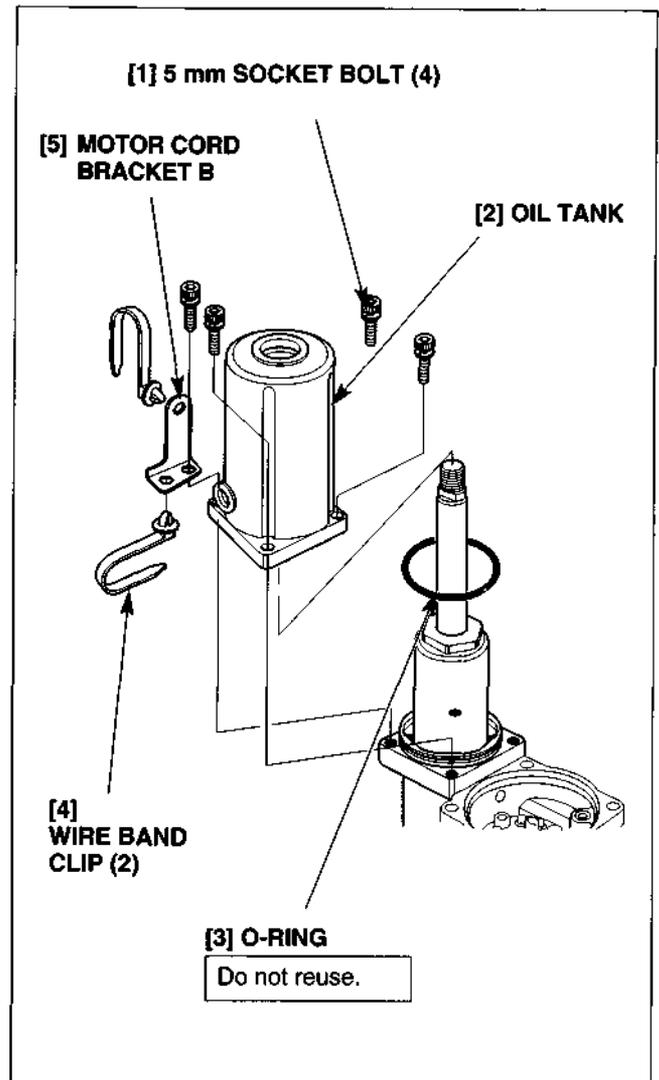
Take care not to tighten the vise too tight as it damages the valve body.



- 2) Hold the piston rod and remove the upper joint metal.
 - Clean of locking agent from the threaded points of the piston rod.



- 3) Remove the four 5 mm socket bolts and remove the oil tank and motor cord bracket B.
- 4) Remove the O-ring from the cylinder Comp.
Discard the O-ring. Replace it with new one during reassembly.

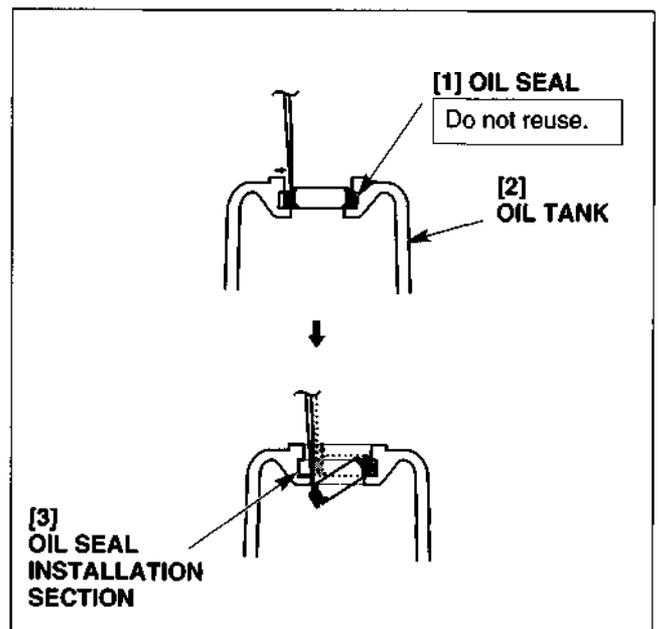


- 5) Remove the oil seal using small screw driver as shown.

Discard the oil seal. Replace it with new one during reassembly.

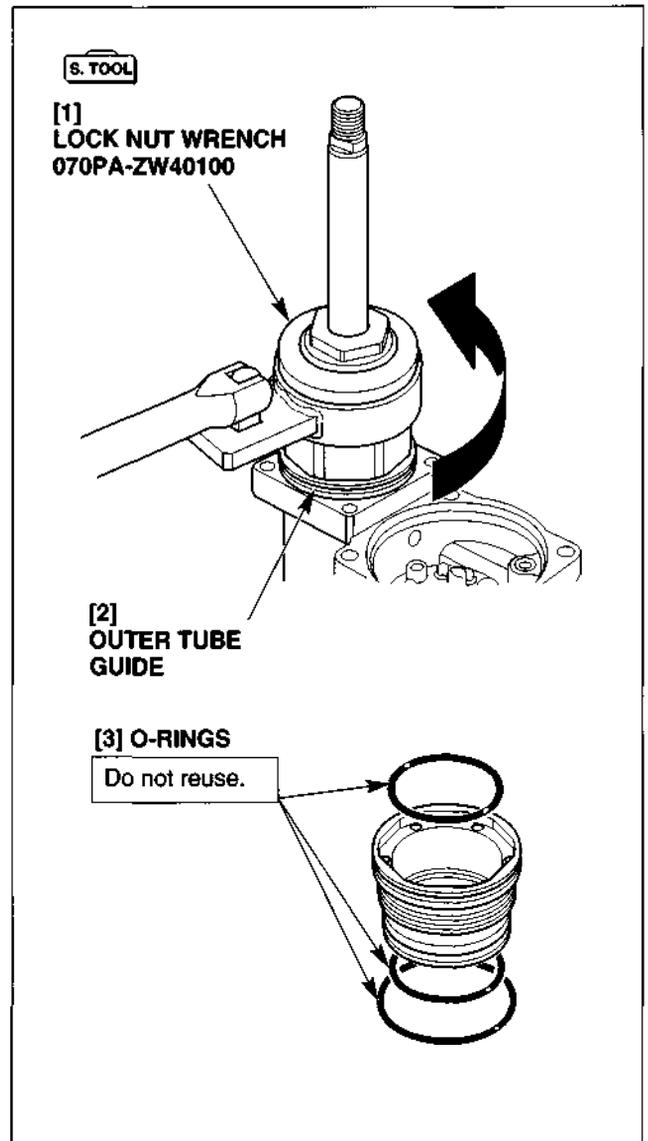
CAUTION:

Take care not to damage the oil seal installation section when removing the oil seal.



- 6) Remove the outer tube guide using the lock nut wrench.

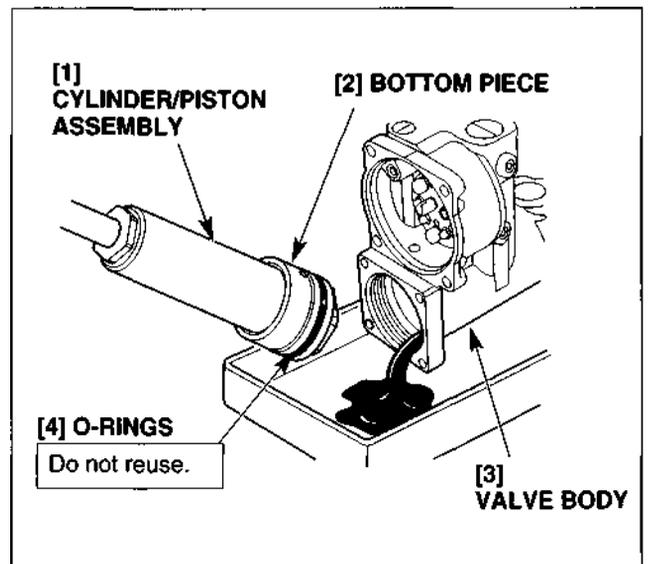
Remove the O-rings from the outer tube guide and discard them. Replace the O-rings with new ones during reassembly.



- 7) Remove the valve body and cylinder assembly from the vise.

- 8) Remove the cylinder/piston assembly from the valve body, and drain ATF from the cylinder assembly and valve body.

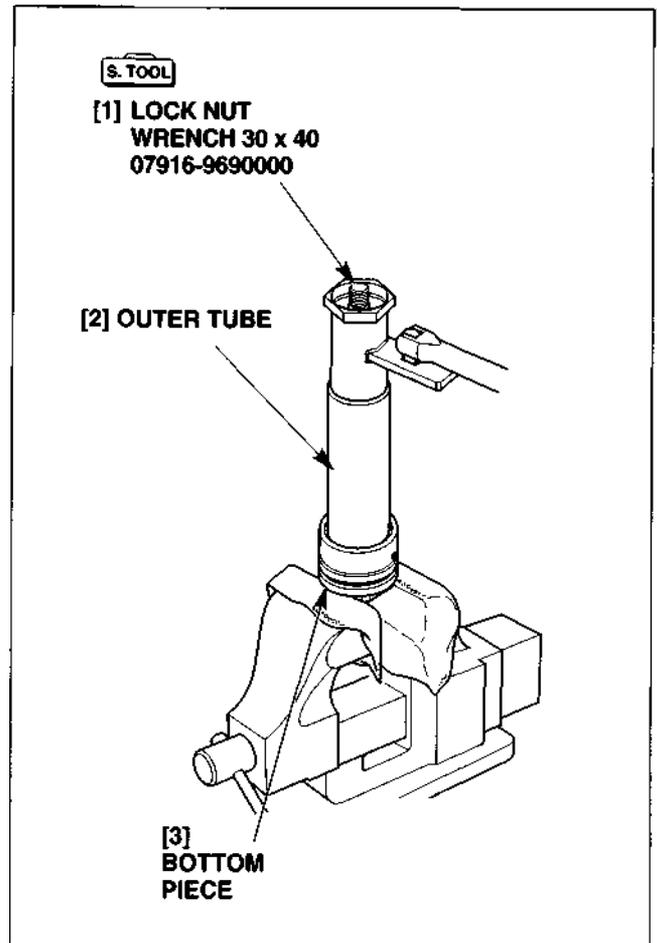
- 9) Remove the O-ring from the bottom piece and discard it. Replace the O-ring with new one during reassembly.



10) Hold the bottom piece in a vise with shop towel or soft jaws as shown and loosen the outer tube using the lock nut wrench, then remove the cylinder/piston assembly from the vise.

CAUTION:

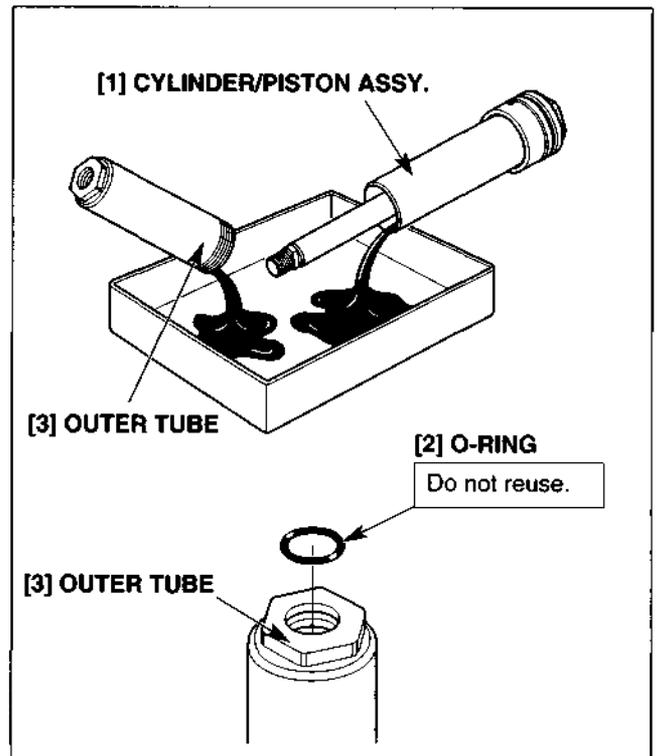
Take care not to tighten the vise too tight as it damages the bottom piece.



11) Remove the outer tube by loosening the outer tube slowly, and drain the residual ATF from the outer tube and cylinder.

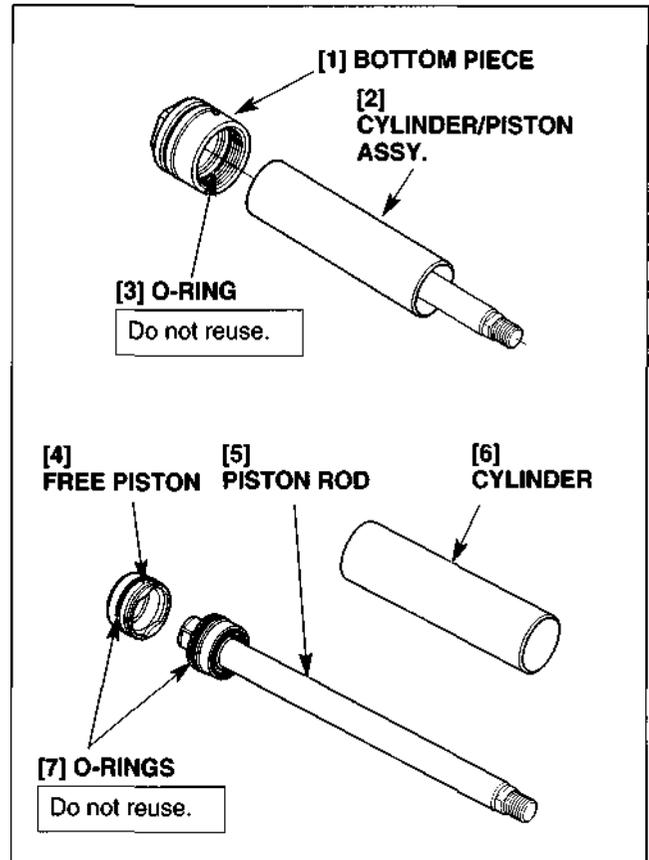
Remove the O-ring from the outer tube using a small screw driver taking care not damage the O-ring installation section, and discard the O-ring. Replace the O-ring with new one during reassembly.

Clean the threads of the outer tube.



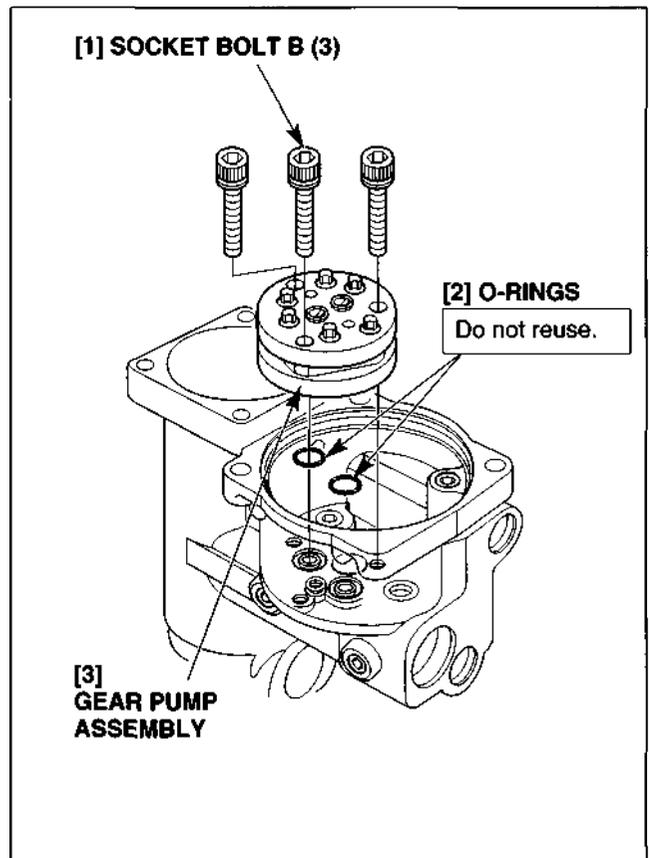
- 12) Remove the bottom piece from the cylinder.
 Remove and discard the O-ring. Replace the O-ring with a new one during reassembly.
 Clean the threads of the bottom piece.

- 14) Remove the piston and free piston from the cylinder.
 Remove and discard the O-rings and discard them.
 Replace the O-rings with new ones during reassembly.



• VALVE BODY

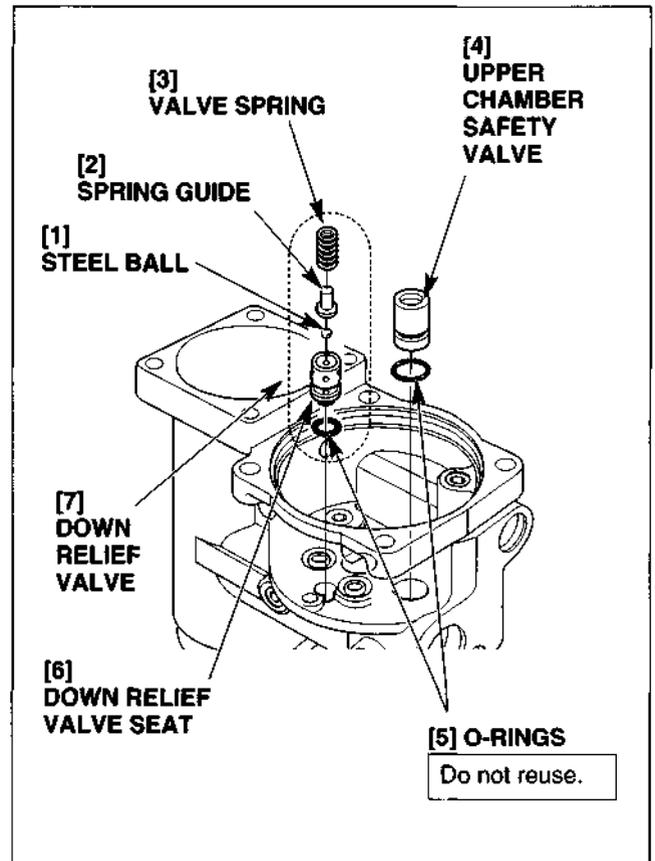
- 1) Remove the socket bolts and gear pump assembly.
 • Do not disassemble the gear pump assembly. If it is faulty, replace it as an assembly.
- 2) Remove the two O-rings from the valve body and discard them. Replace the O-rings with new ones during reassembly.



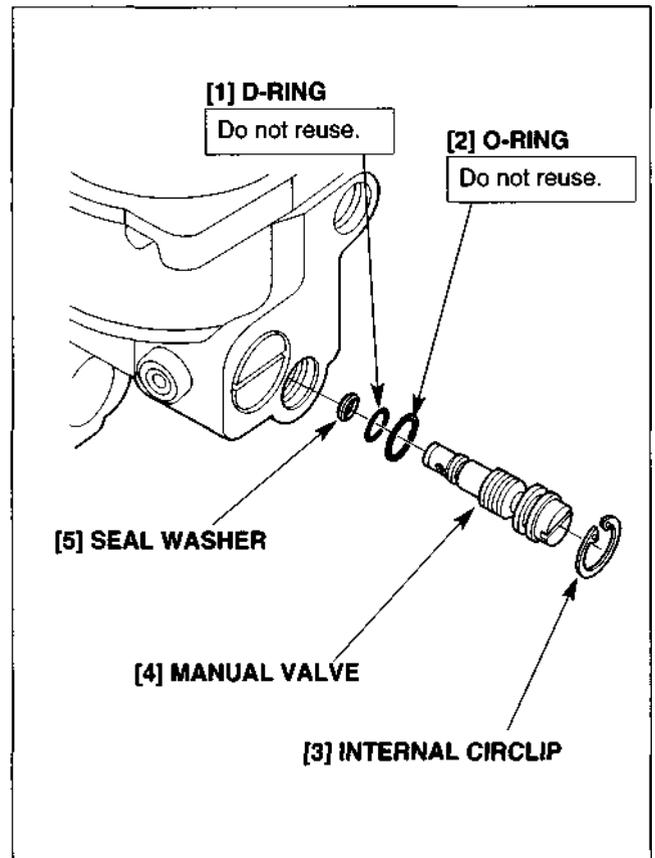
- 3) Remove the down relief valve:
 - valve spring
 - spring guide.
 - steel ball.
 - down relief valve seat.
 - O-ring.

Replace the O-ring with new one during reassembly.

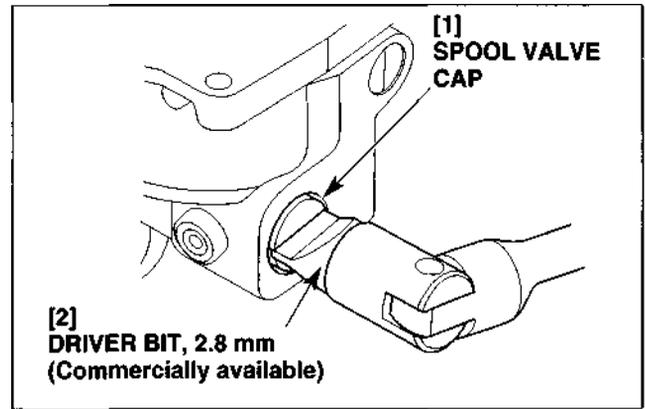
- 4) Remove the upper chamber safety valve.
 Remove O-ring from the upper chamber safety valve and discard it. Replace the O-ring with new one during reassembly.



- 5) Remove the internal circlip, and remove the manual valve and seal washer.
 Remove the D-ring and O-ring, and discard them. Replace with new ones during reassembly.
 Check the sealing washer for damage and wear. Replace it if necessary.

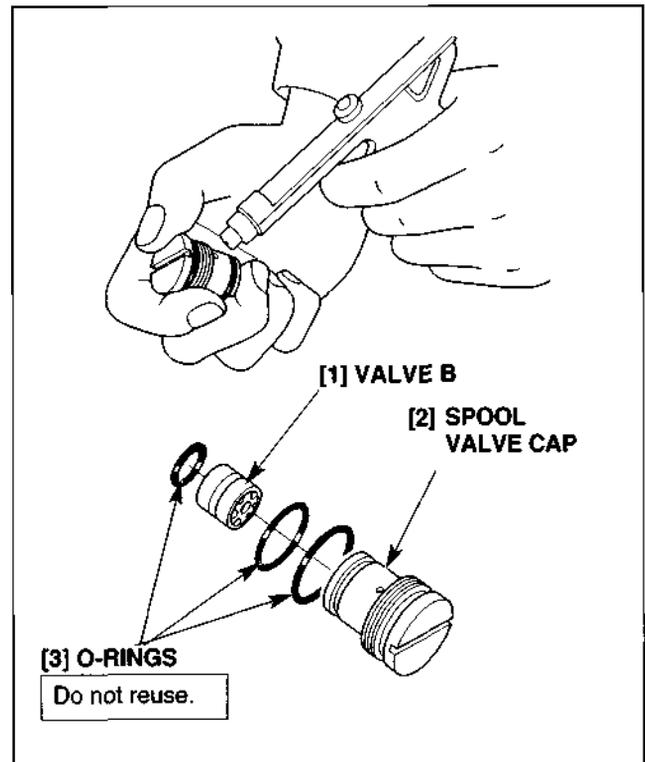


- 6) Remove the spool valve cap using a commercially available 2.8 mm driver bit.

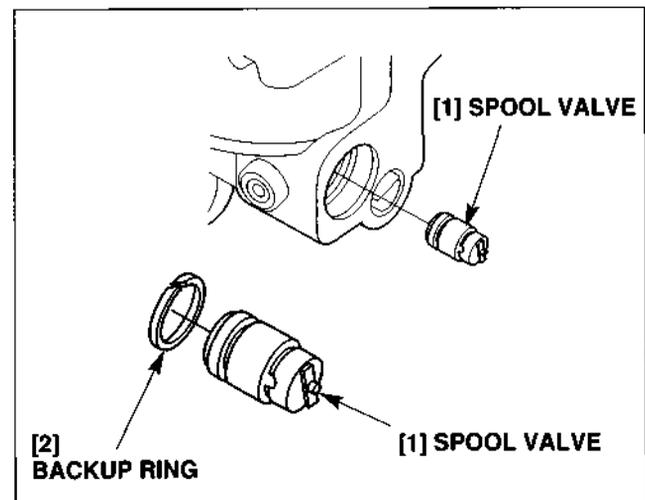


- 7) Apply small squirt of air pressure to the oil hole in the spool valve cap to remove the valve B. Remove the valve B from the spool valve cap.

Remove the O-rings from the spool valve cap and valve B and discard them. Replace the O-rings with the new ones during reassembly.

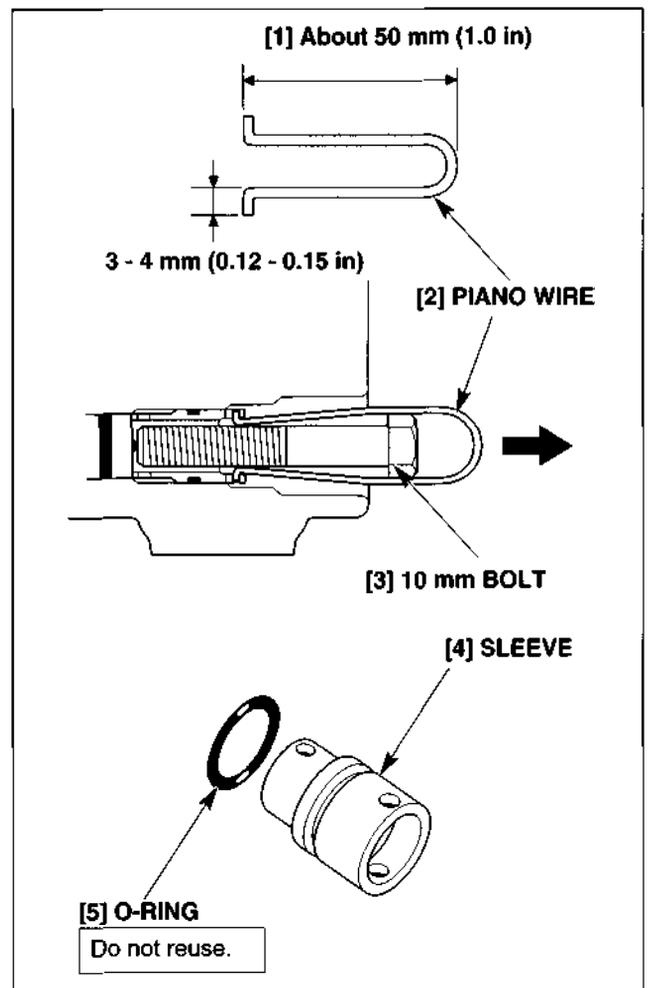


- 8) Remove the spool valve from the valve body.
Check the backup ring on the spool valve for damage and scratches. Replace the backup ring if it is damaged or scratched.



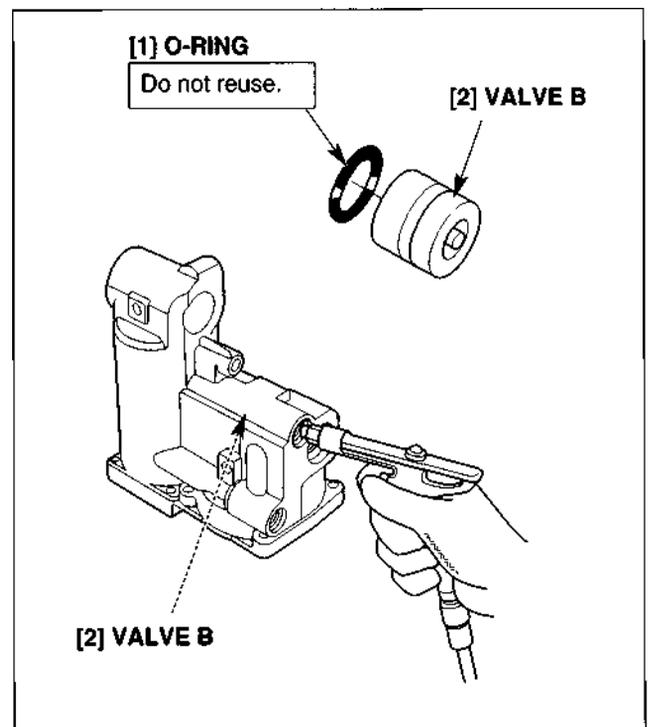
- 9) Prepare a piece of piano wire of 1.5 mm in diameter as shown.
- 7) Set the prepared wire in the holes in both sides of the sleeve as shown, and secure the wire by inserting the 10 mm bolt into the sleeve. Remove the sleeve from the valve body by pulling the wire with care not to damage the valve body.

Remove the O-ring from the sleeve and discard it. Replace the O-ring with a new one during reassembly.



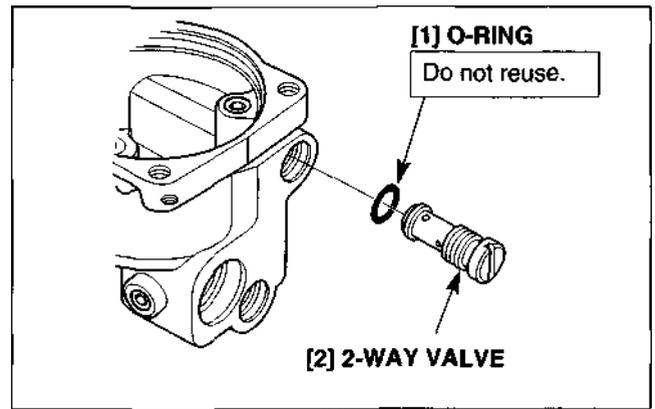
- 8) Set the valve body as shown. Apply small squirt of air pressure to the manual valve installation hole to remove the valve B. Remove the valve B from the valve body.

Remove the O-ring from the valve B. Replace the O-ring with a new one during reassembly.



10) Remove the 2-way valve.

Remove the O-ring from the 2-way valve and discard it. Replace the O-ring with a new one during reassembly.



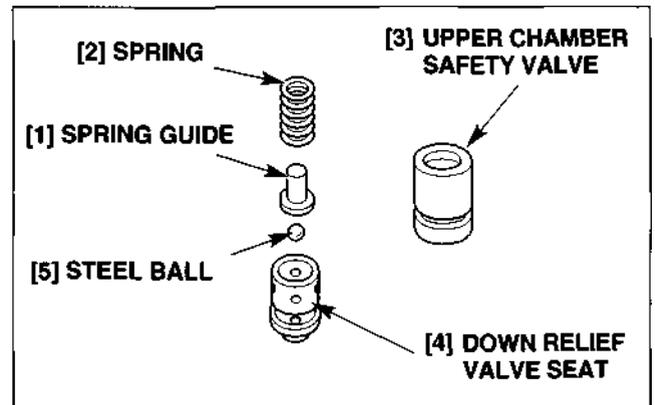
b. INSPECTION

• DOWN RELIEF VALVE

Check the down relief valve seat, spring guide, steel ball and spring for wear and damage. Replace the down relief valve seat, spring guide or spring if damaged or worn.

• UPPER CHAMBER SAFETY VALVE

Check the upper chamber safety valve for wear and damage. Replace the upper chamber safety valve if damaged or worn.

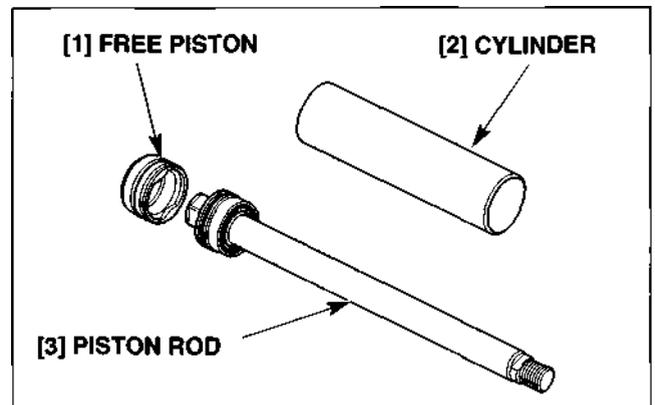


• CYLINDER

Make sure the piston rod is straight and has no damage. Replace the piston rod assembly with a new one if necessary.

• PISTON, FREE PISTON

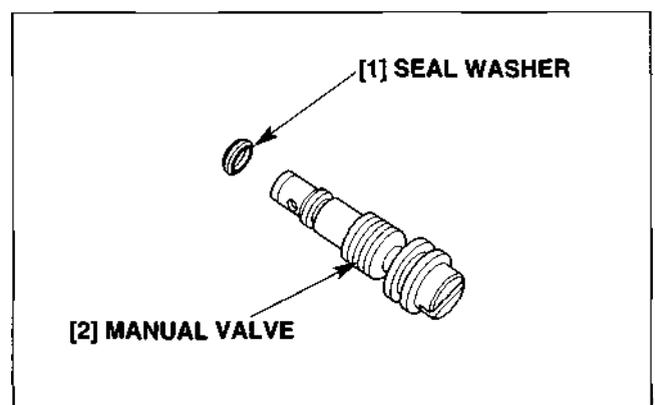
Check the inner and outer surfaces of the cylinder for damage and scratches. Replace the cylinder with a new one if it is damaged or scratched.



• MANUAL VALVE

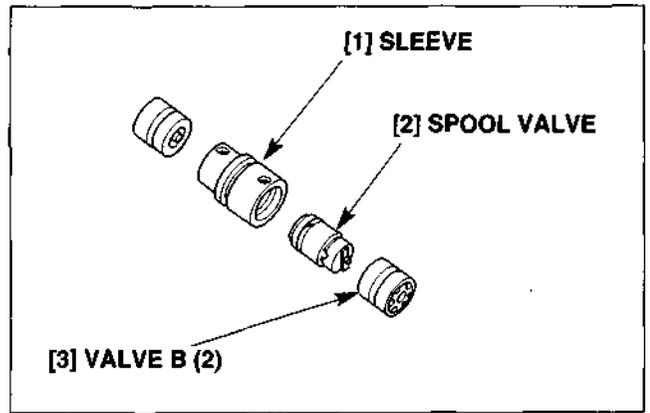
Check the manual valve for damage and scratches. Replace if it is damaged or scratched.

Check the seal washer for damage and deterioration. Replace if it is damaged or deteriorated.



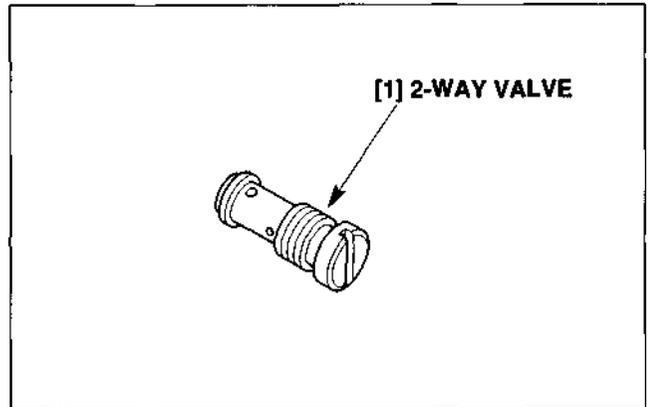
• **SPOOL VALVE, SLEEVE, VALVE B**

Check the sliding surface of the valve B, spool valve, sleeve for damage, scratches and wear. Replace if necessary.



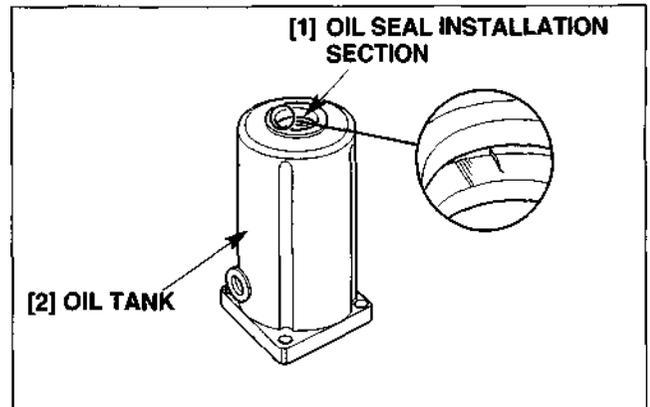
• **2-WAY VALVE**

Check the 2-way valve for damage, scratches and wear. Replace if necessary.



• **OIL TANK**

Visually inspect the oil seal installation section of the oil tank. Replace the oil tank if scratched or damaged.



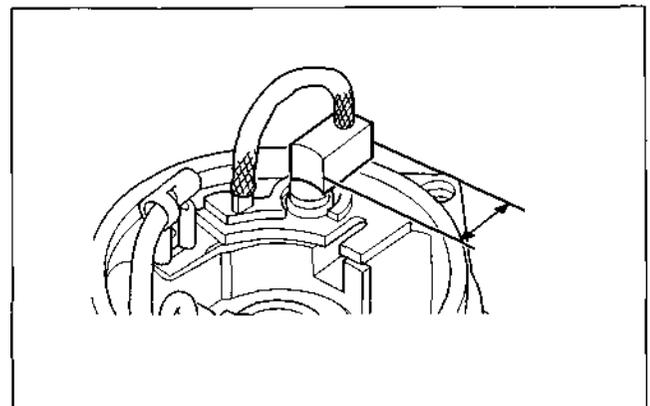
• **POWER TRIM/TILT MOTOR**

• **Brush**

Measure the brush length.

Standard	Service limit
10 mm (0.4 in)	6 mm (0.2 in)

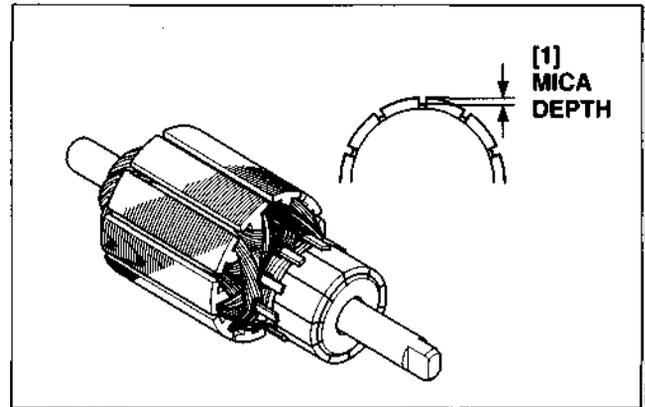
If the brush length is less than the service limit, replace the front bracket assembly.



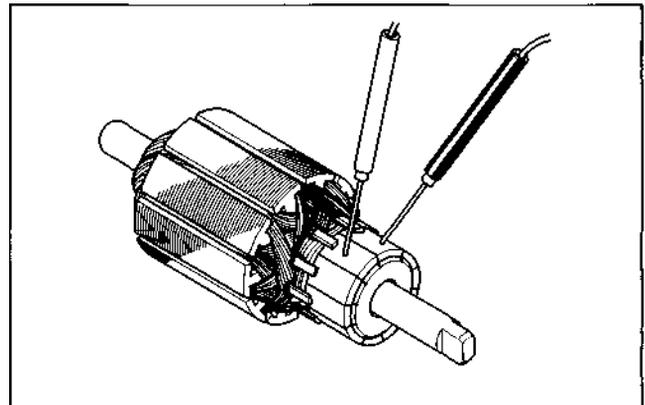
• Armature

- 1) Check the armature for wear and damage. Replace if necessary.
- 2) Visually inspect the commutator surface for dust, rust and other damage. If necessary, wipe it with a clean lint-free cloth or dress with a fine emery cloth.
- 3) Measure the mica depth. If the grooves are clogged, clean the grooves and measure the depth again. If the measurement is less than the service limit, replace the armature.

Service limit	1.3 mm (0.05 in)
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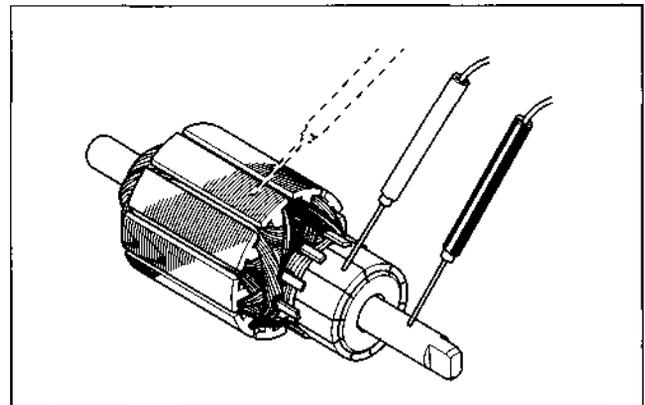


- 4) Check for continuity between each segment. If an open circuit exists between any two segments, replace the armature.



- 5) Check for continuity between the commutator and armature coil core. If continuity exists, replace the armature.

- 6) Check for continuity between the commutator and armature shaft. If there is continuity, replace the armature.



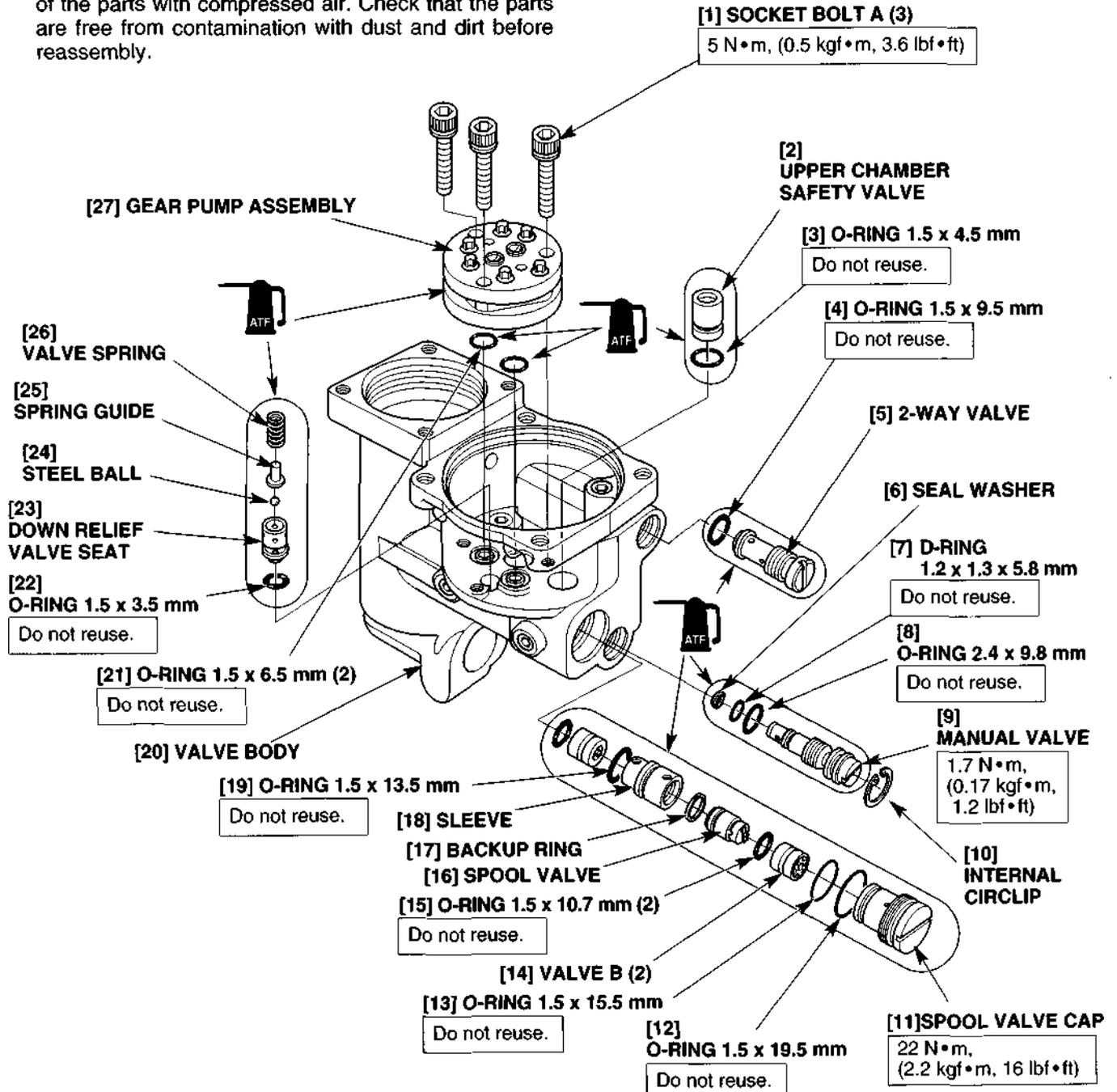
c. ASSEMBLY

• VALVE BODY ASSEMBLY

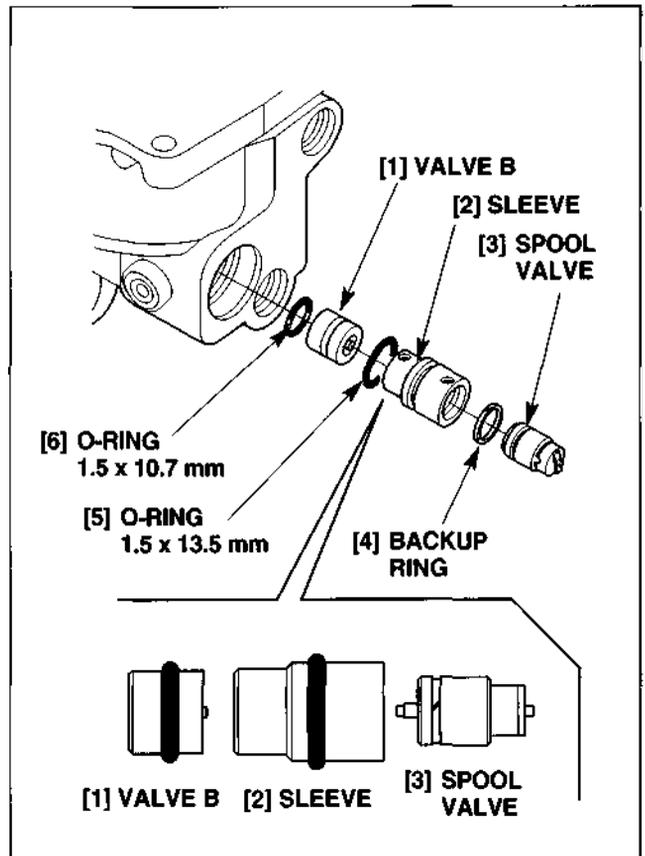
CAUTION:

- Do not reuse the O-ring.
- Do not use a shop towel, cloth, gloves, etc. when reassembly.
- Assemble the parts with care not to let the foreign particles and dirt enter the valve body and gear pump assembly.

1) Clean the parts in the fresh ATF, and blow each part of the parts with compressed air. Check that the parts are free from contamination with dust and dirt before reassembly.

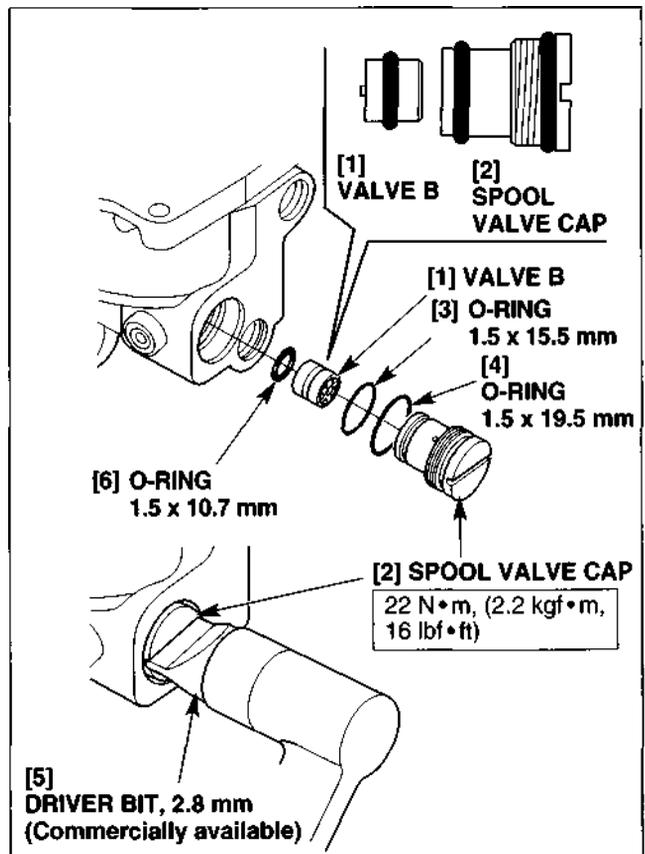


- 2) Apply ATF to a new O-ring, and install it on the valve B.
- 3) Apply ATF to the valve B and install the valve B in the valve body noting the installation direction.
- 4) Apply ATF to a new O-ring, and install it on the sleeve.
- 5) Set the new backup ring on the spool valve and apply ATF to the outer surface of the spool valve.
- 6) Install the spool valve in the sleeve noting the installation direction.
- 7) Apply ATF to the sleeve, and install the sleeve in the valve body noting the installation direction.



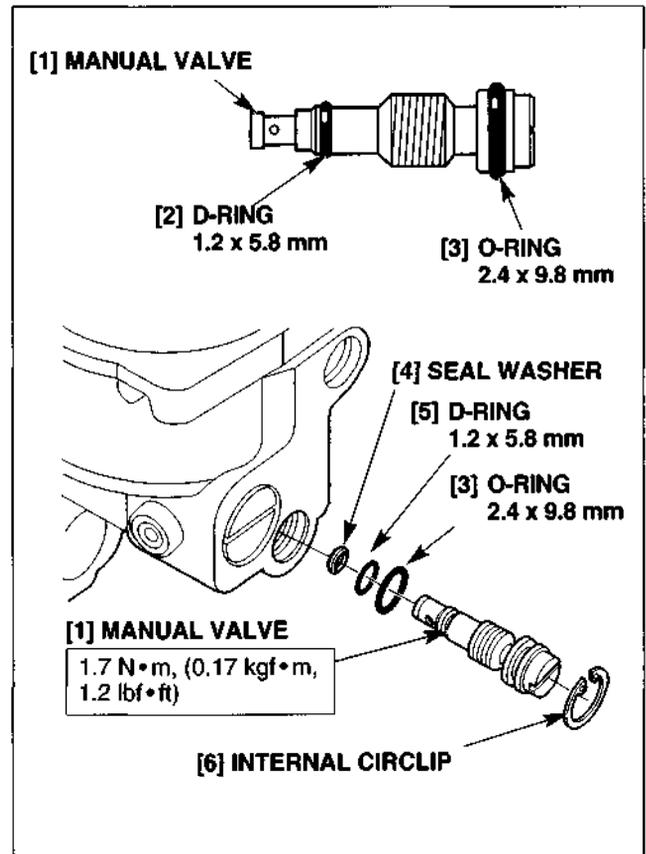
- 8) Apply ATF to a new O-ring, and install it on the valve B.
- 9) Apply ATF to the valve B and install it in the spool valve cap noting the installation direction.
- 10) Apply ATF to the new O-rings, and install the O-rings on the spool valve cap.
- 11) Tighten the spool valve cap to the specified torque using a commercially available 2.8 mm driver bit.

TORQUE: 22 N•m (2.2 kgf•m, 16 lbf•ft)



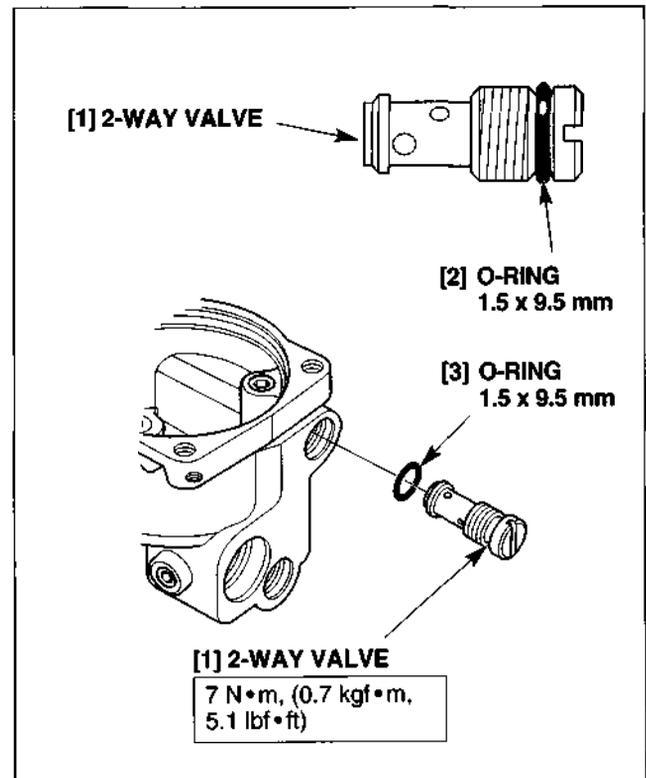
- 12) Apply ATF to the sealing washer, and set it in the valve body at right angles. Be careful not to set it at an inclined angle, which can lead to the collapsed sealing washer.
- 13) Apply ATF to a new D-ring and a new O-ring, and install them on the manual valve.
- 14) Tighten the manual valve to the specified torque, and set the internal circlip in the groove in the valve body securely.

TORQUE: 1.7 N•m (0.17 kgf•m, 1.2 lbf•ft)

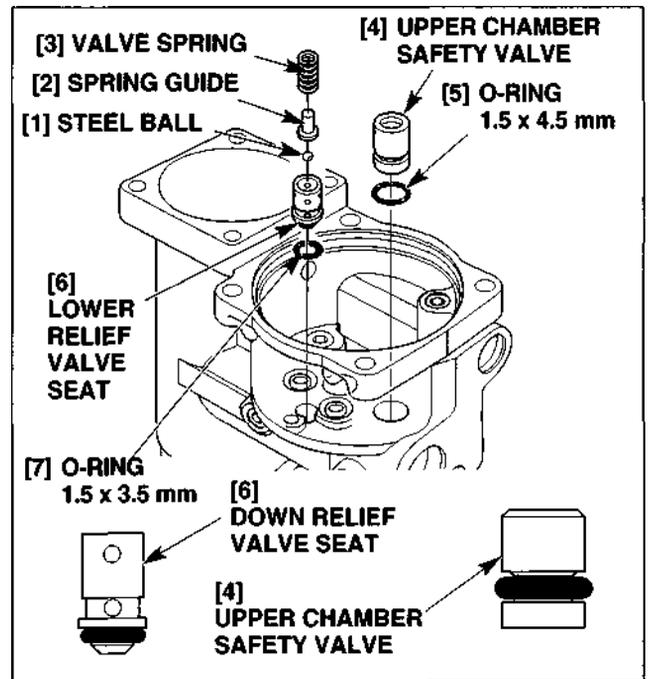


- 15) Apply ATF to new O-ring, and install it on the 2-way valve.
- 16) Install the 2-way valve to the valve body and tighten the 2-way valve to the specified torque.

TORQUE: 7 N•m (0.7 kgf•m, 5.1 lbf•ft)



- 17) Apply ATF to a new O-ring, and install it on the down relief valve seat.
- 18) Apply ATF to the down relief valve seat and install it in the valve body as shown noting the direction.
- 19) Install the steel ball, spring guide and the valve spring in the down relief valve seat.
- 20) Apply ATF to a new O-ring, and install it on the upper chamber safety valve.
- 21) Apply ATF to the upper chamber safety valve and install it in the valve body noting the direction shown.

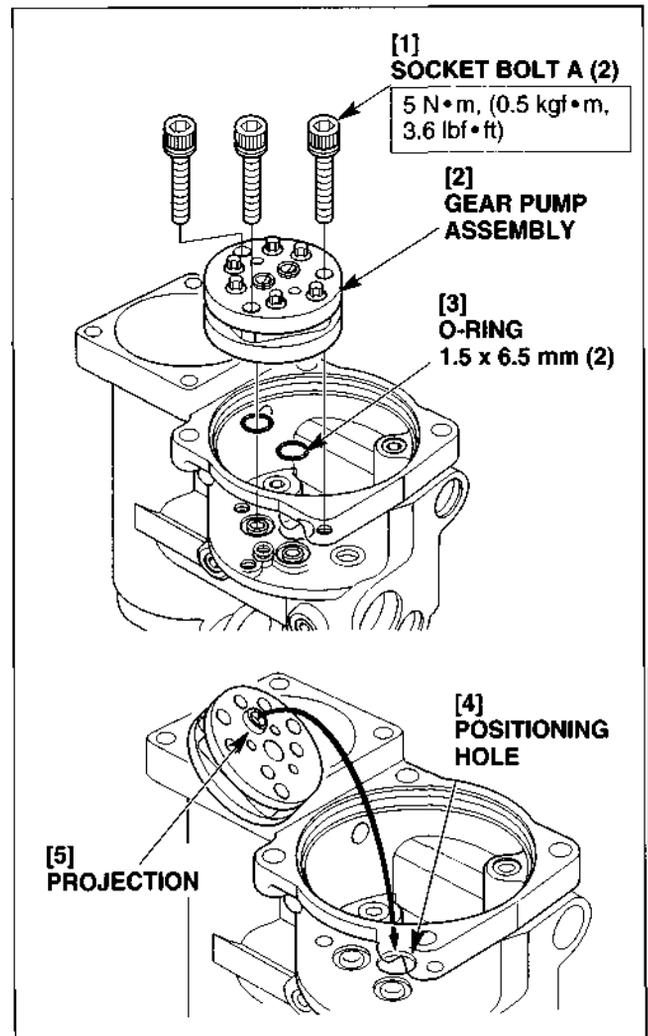


- 22) Apply ATF to the two new O-rings and install the O-rings in the valve body in the positions shown.

- 23) Install the gear pump assembly in the valve body by aligning the projection at the bottom of the gear pump assembly with the positioning hole in the valve body.
 - Take care not to let the O-rings come out of position in the valve body.

- 24) Tighten the socket bolts to the specified torque.

TORQUE: 5 N•m (0.5 kgf•m, 1.3 lbf•ft)

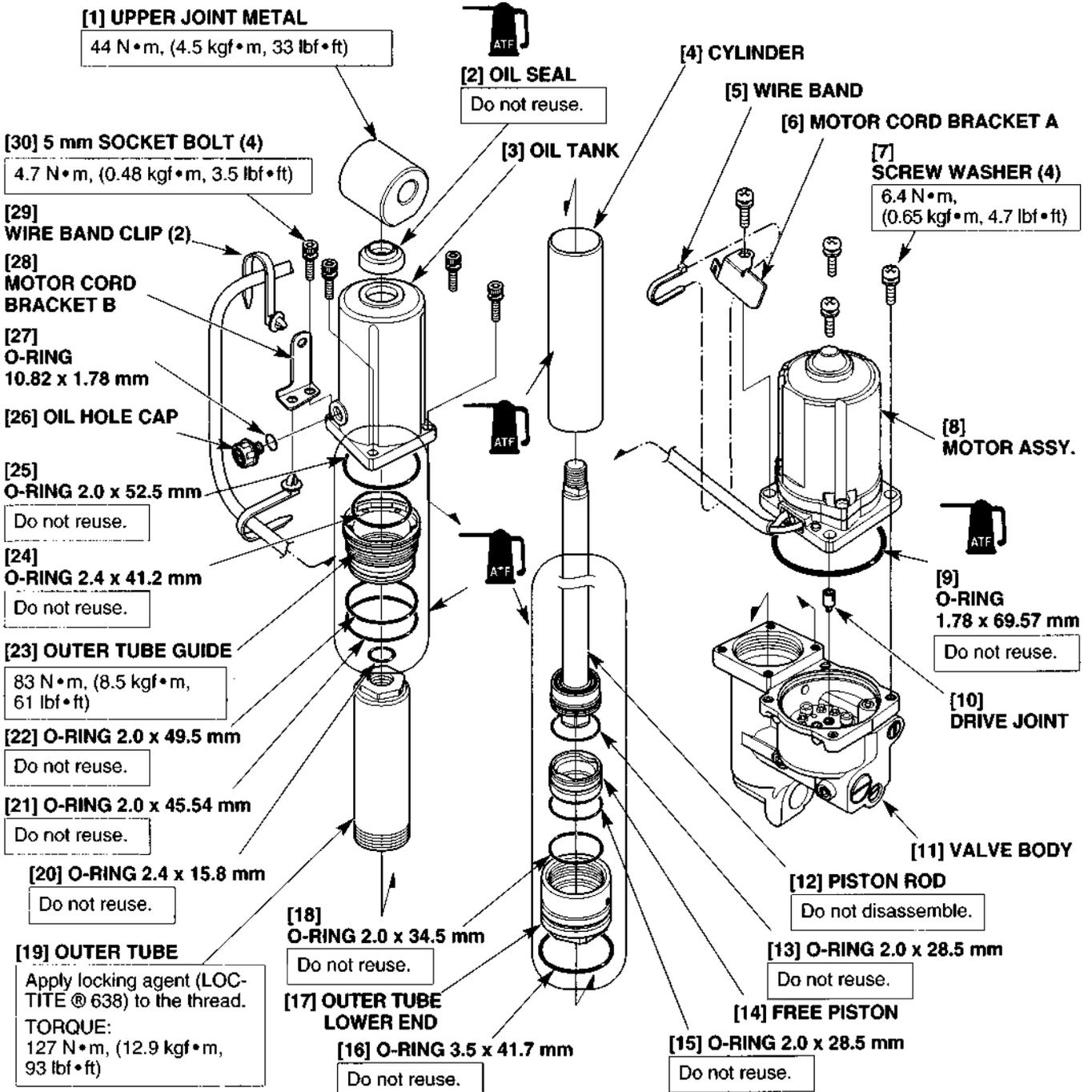


• CYLINDER, PISTON, OIL TANK

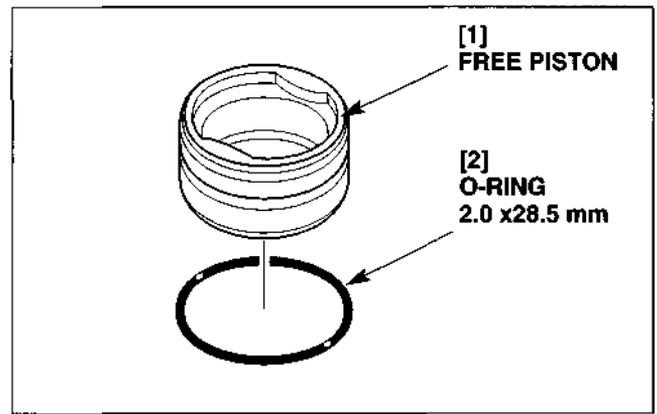
CAUTION:

- Do not reuse the O-ring.
- Do not use a shop towel, cloth, gloves, etc. when reassembly.
- Assemble the parts with care not to let the foreign particles and dirt enter the valve body and gear pump assembly.

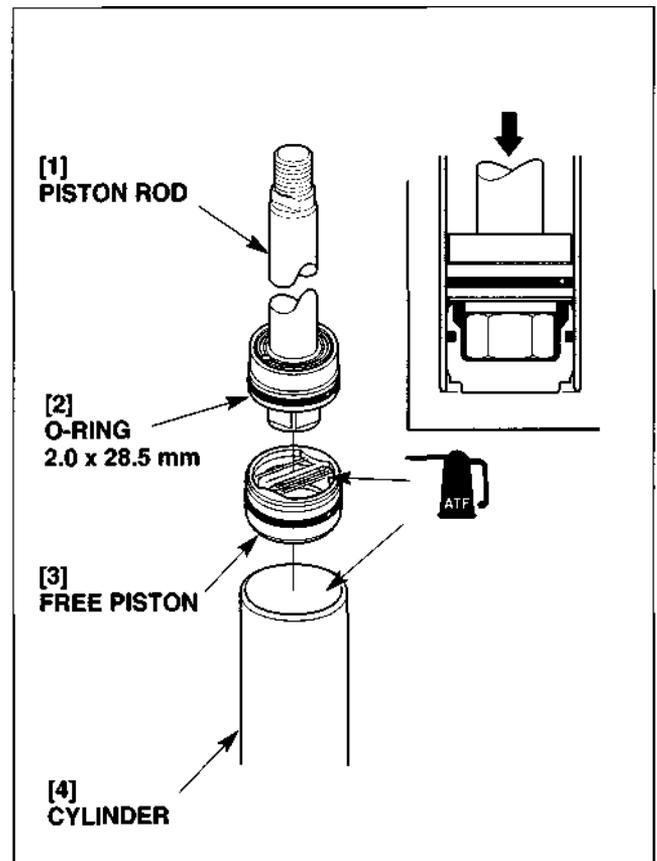
1) Clean the parts in the fresh ATF. Check that the parts are free from contamination with dust and dirt before reassembly.



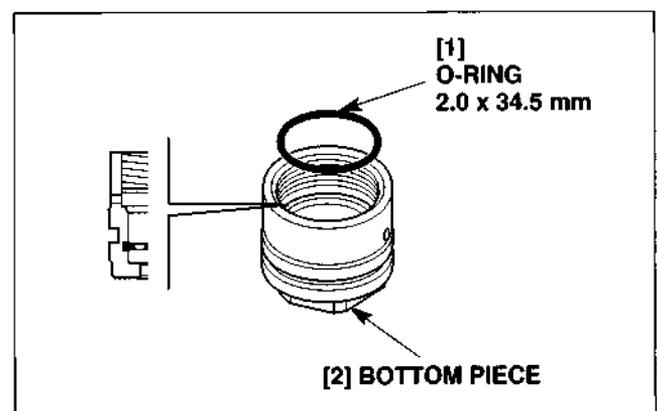
- 2) Apply ATF to a new O-ring, and install it on the free piston.



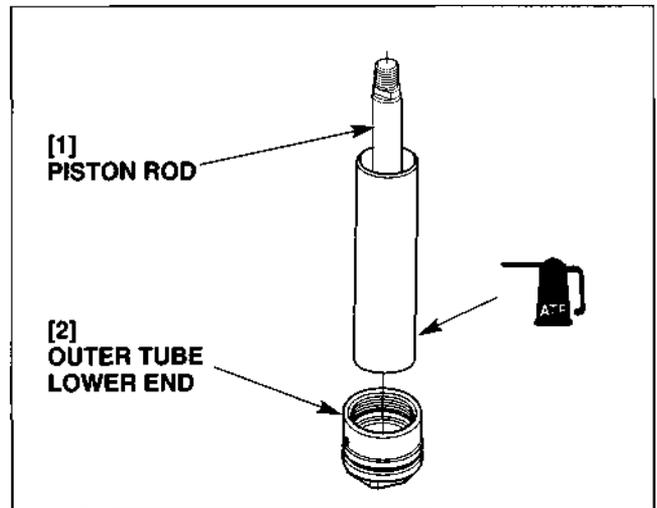
- 3) Apply ATF to a new O-ring and install it on the piston rod.
- 4) Apply ATF to the inner wall of the cylinder.
- 5) Install the free piston in the cylinder taking care not to damage the O-ring, and pour the fresh ATF on the free piston.
- 6) Install the piston rod in the cylinder taking care not to damage the O-ring.
- 7) Push in the piston rod until the free piston end aligns with the bottom end as shown.



- 8) Apply ATF to a new O-ring, and install it in the bottom piece.



- 9) Apply ATF to the lower end of the cylinder and install the cylinder to the bottom piece.

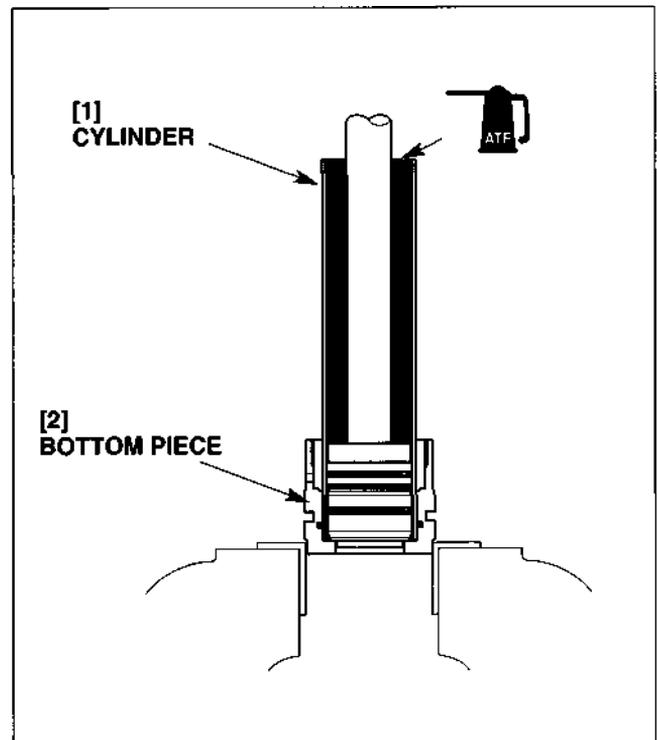


- 10) Set the cylinder/piston assembly vertically on the vise by holding the bottom piece.

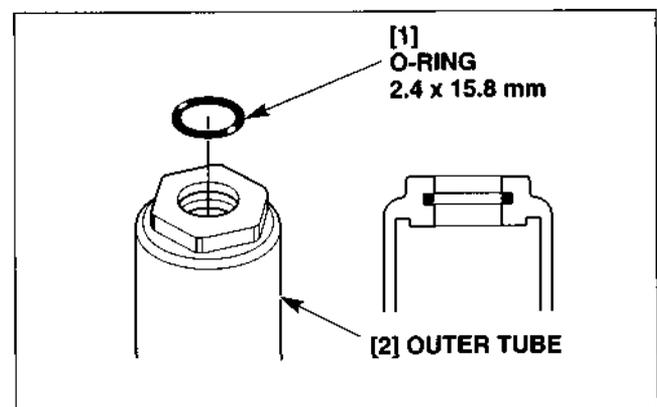
CAUTION:

Take care not to tighten the vise too tight as it damages the bottom piece.

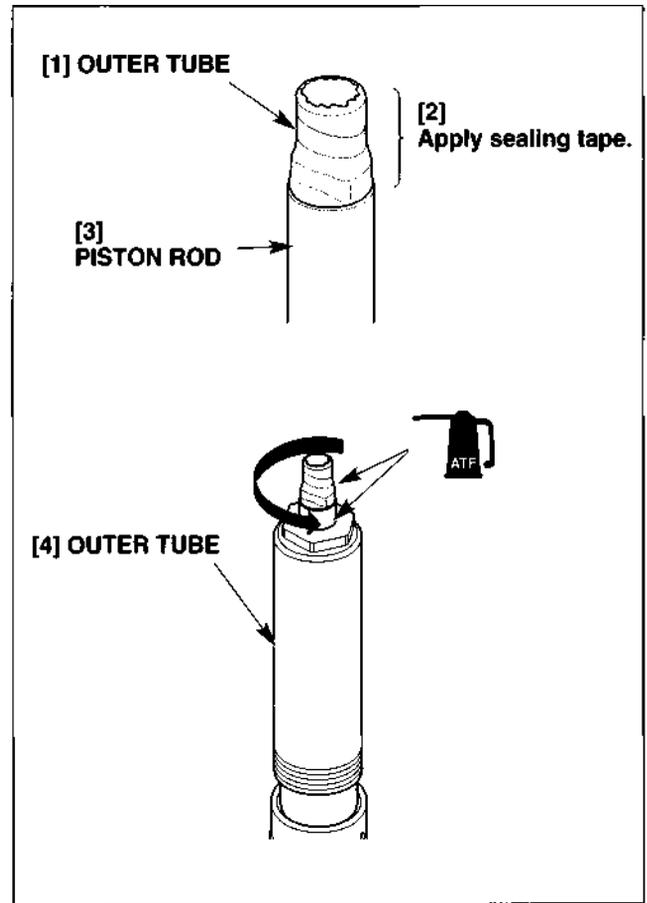
- 11) Pour the fresh ATF into the cylinder up to the top edge of the cylinder.



- 12) Apply ATF to a new O-ring, and install it in the groove in the outer tube taking care not to damage the O-ring.

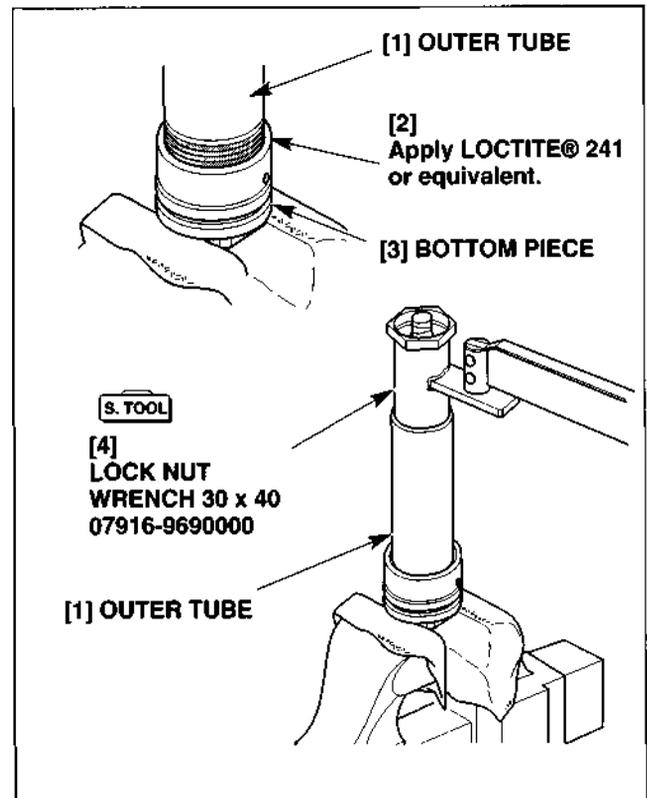


- 13) Attach a thin sealing tape around the threads at the end of the piston rod.
- 14) Apply ATF to the top of the piston rod and O-ring of the outer tube install the outer tub to the piston rod.
 - To install turn the outer tube by hand taking care not to damage the O-ring in the outer tube.



- 15) Tighten the outer tube 2 or 3 turns, then apply LOCTITE® 241 or equivalent to the thread of the outer tube as shown.
- 16) Tighten the outer tube to the specified torque using the 30 mm lock nut wrench.

TORQUE: 64 N•m (6.5 kgf•m, 47 lbf•ft)
- 17) Remove the piston/cylinder assembly from the vise and clean off the residual LOCTITE® from the outer tube.



18) Apply ATF to a new O-ring, and install it on the bottom piece.

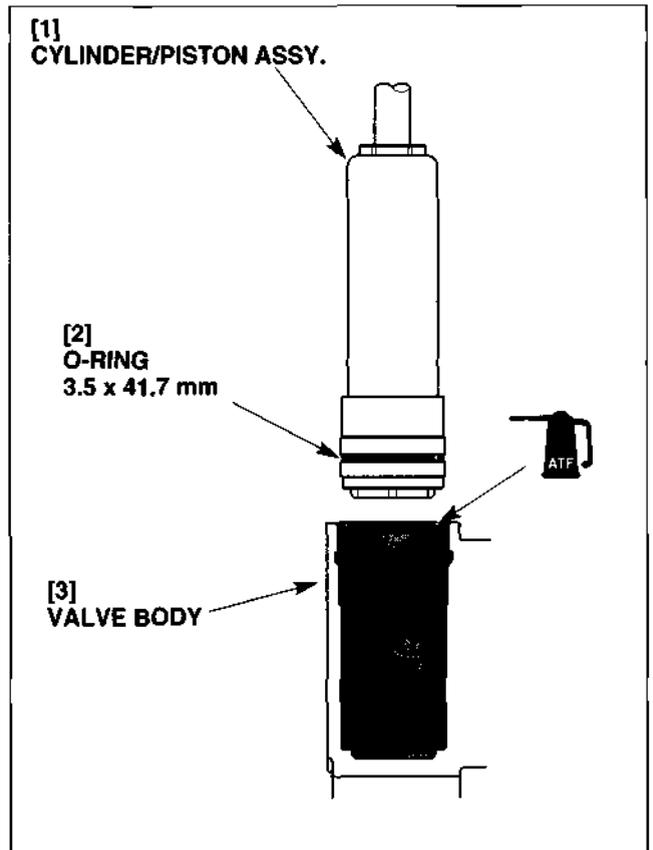
19) Hold the valve body in a vise with shop towel or soft jaws as shown

CAUTION:

Take care not to tighten the vise too tight as it damages the valve body.

20) Loosen the manual valve 3 turns or more and pour the fresh ATF into the cylinder chamber up to the top edge of the valve body.

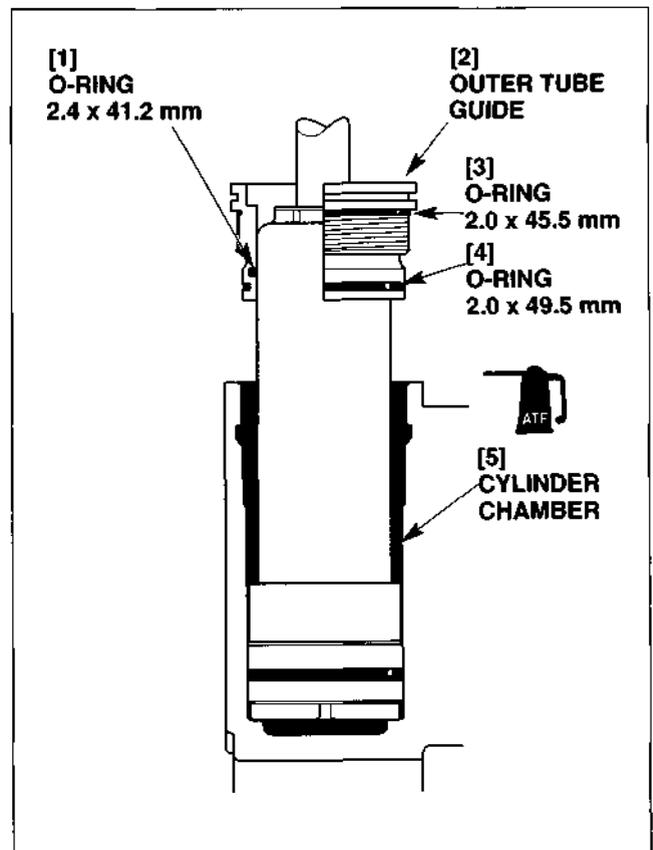
21) Install the cylinder piston assembly to the valve body.



22) Apply ATF to new O-rings and install them on the outer tube guide.

23) Pour the fresh ATF into the cylinder chamber of the valve body up to the top edge of the valve body.

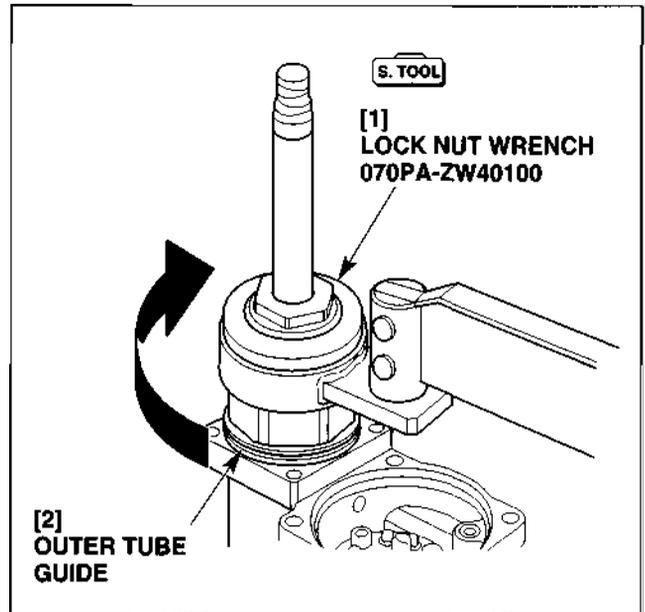
24) Install the outer tube guide loosely.



25) Tighten the outer tube guide to the specified torque using the lock nut wrench.

TORQUE: 88 N•m (9.0 kgf•m, 65 lbf•ft)

26) Tighten the manual valve securely.



27) Apply rubber grease or ATF to a new oil seal. Holding the oil seal with your fingers so that it shapes "U" and install it in the groove in the outer tube taking care not to damage the oil seal.

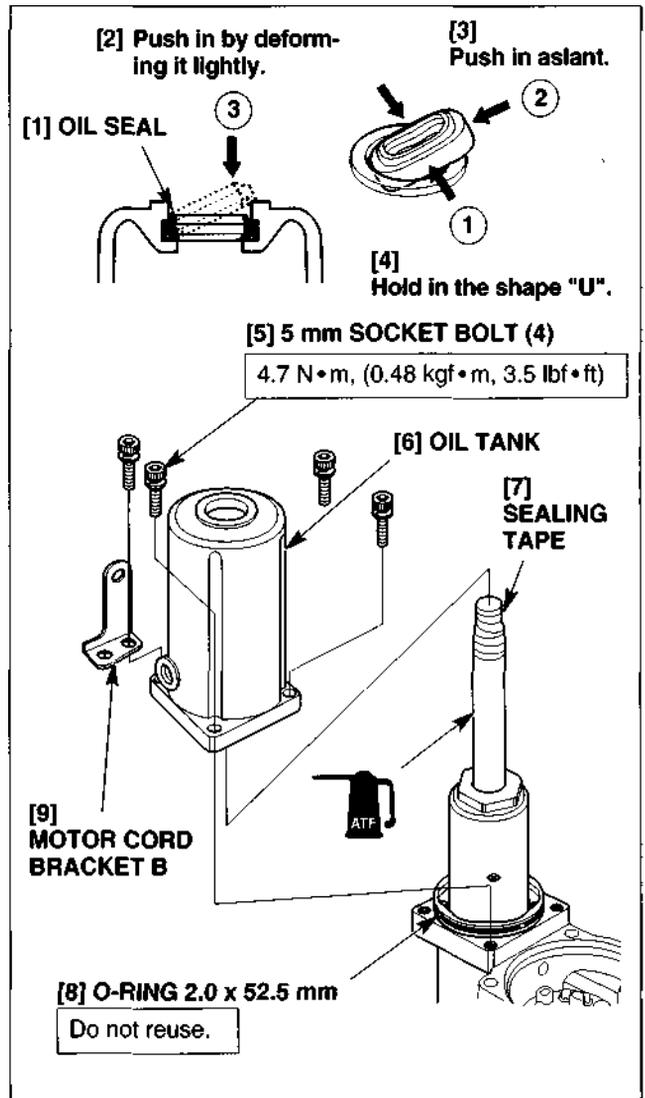
28) Apply ATF to new O-ring and install it on the outer tube guide.

29) Apply ATF to the piston rod and install the oil tank by turning it taking care not to damage the oil seal in the oil tank.

30) Set the oil tank as shown and tighten the four 5 mm socket bolts to the specified torque.

TORQUE: 4.7 N•m (0.48 kgf•m, 3.5 lbf•ft)

31) Remove the sealing tape from the top end of the piston rod.



• POWER TRIM/TILT MOTOR

[1] YOKE

- Make sure there is no metallic part (e.g. washer, etc.) on the magnets before installation.
- After installing the yoke, lightly tap on the outer surface of the yoke with a plastic hammer (for snug fitting of the armature bearing).

[2] 5 mm SCREW (3)

2.2 N•m, (0.22 kgf•m,
1.6 lbf•ft)

[6] ARMATURE

- Remove the burrs at the armature shaft with a fine emery paper before assembly.
- Take care not to damage the oil seal during assembly.

GREASE

[3] O-RING

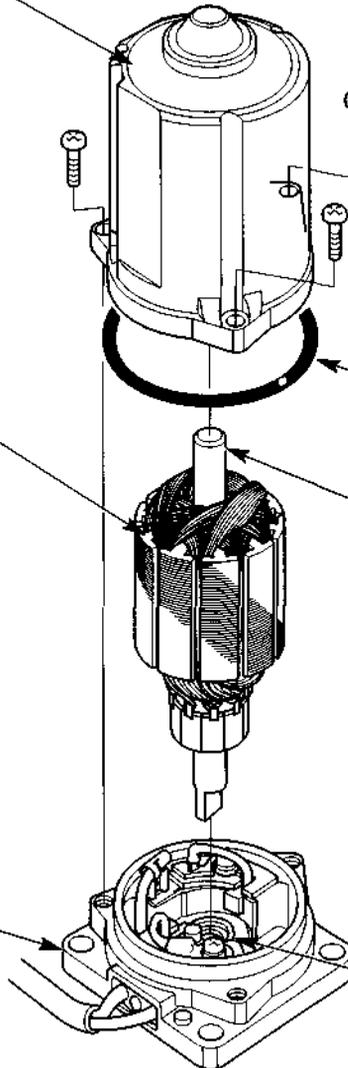
Do not reuse. Replace with a new one.

GREASE

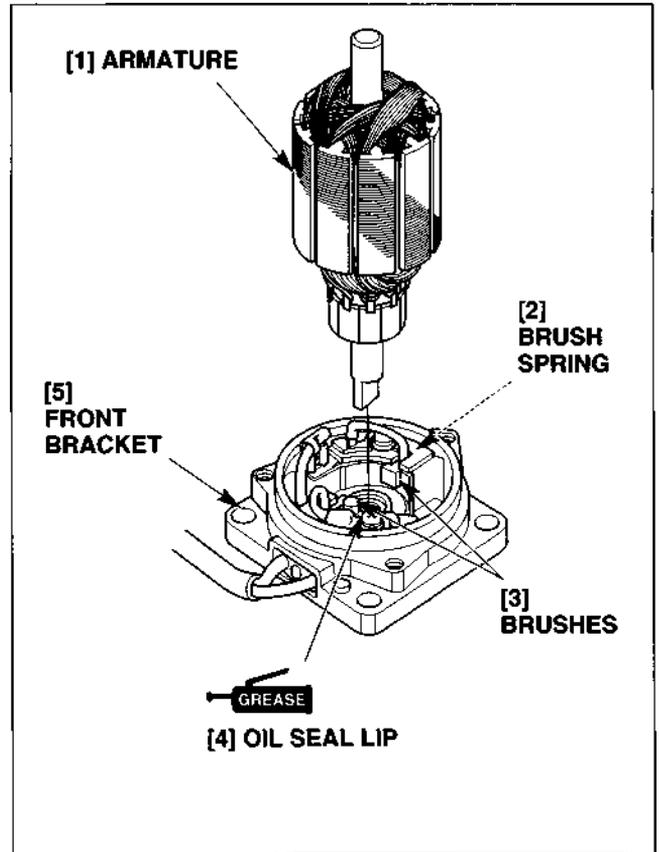
[5] FRONT BRACKET ASSEMBLY

GREASE

[4] OIL SEAL LIP

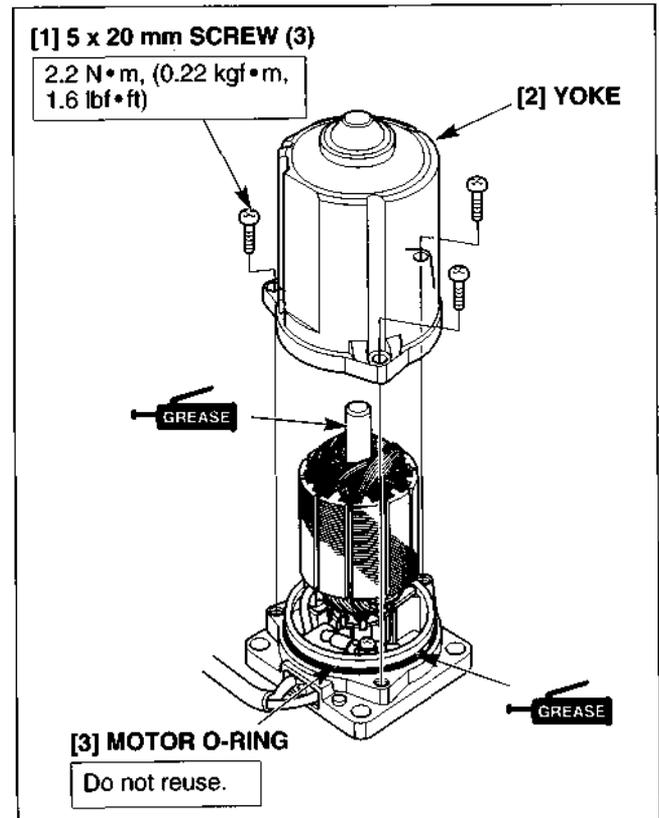


- 1) Apply grease to the oil seal lip.
 - Check the oil seal lip. If the oil seal lip is damaged, replace the front bracket as assembly.
- 2) Expand the brushes and install the armature taking care not to damage the oil seal.
 - Remove the burrs at the armature shaft with a fine emery paper before assembly.
 - Make sure that the brush springs are in place



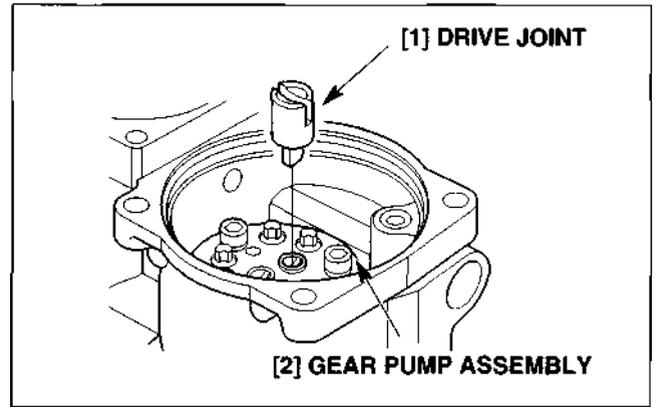
- 3) Apply grease to a new motor O-ring and install it on the front bracket.
- 4) Make sure there is no metallic part (e.g. washer, etc.) on the magnets before installation.
- 5) Apply grease to the yoke side end of the armature shaft. Hold the armature shaft and install the yoke.
- 6) Tighten the three 5 x 20 mm screws to the specified torque.

TORQUE: 2.2 N•m (0.22 kgf•m, 1.6 lbf•ft)
- 7) After assembly, lightly tap on the outer surface of the yoke with a plastic hammer (for snug fitting of the armature bearing).



• **MOTOR INSTALLATION**

1) Install the drive joint in the position of the gear pump assembly as shown.

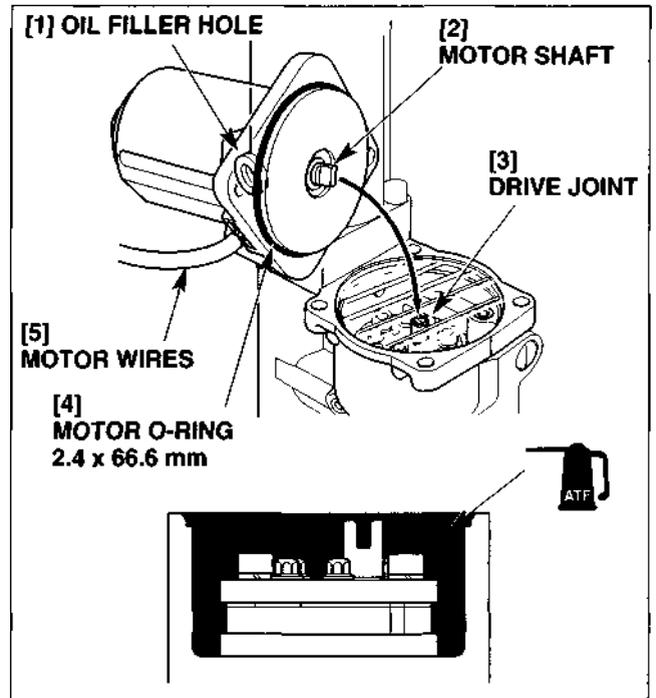


2) Apply ATF to a new O-ring, and install it on the power trim/tilt motor assembly.

3) Fill the gear pump chamber with the fresh ATF up to the upper edge of the chamber. If ATF in the valve body contains air bubbles, remove the air bubbles using an oil bottle or equivalent tool.

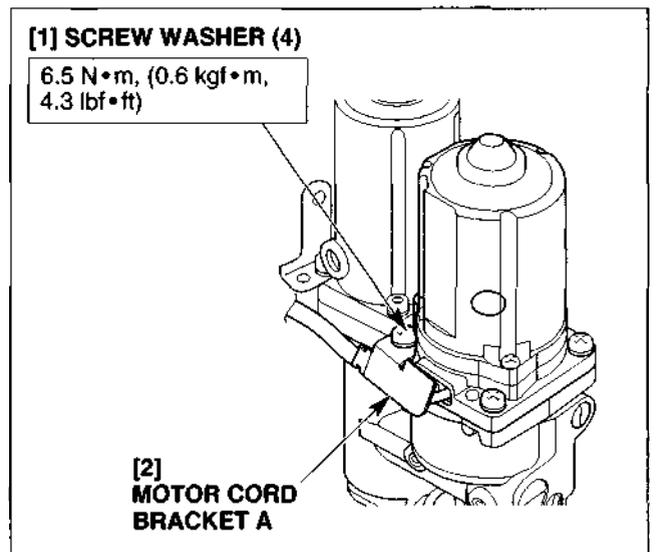
- Do not pour ATF into the valve body gear pump chamber quickly. Pour the fluid slowly.
- Trapped air in the system causes faulty operation. Remove the air bubbles in the fluid completely.

4) Install the power trim/tilt motor assembly on the valve body so that the motor wires is at the oil filler port on the oil tank and align the motor shaft with the groove of the drive joint as shown.

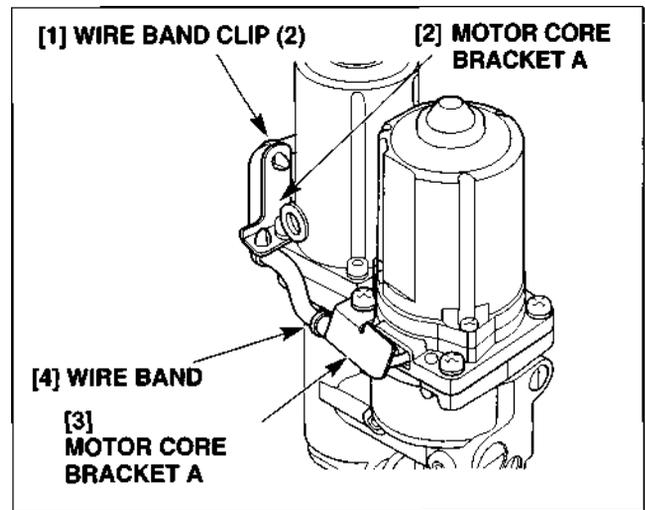


5) Set the motor cord bracket A as shown and tighten the four screw washers to the specified torque.

TORQUE: 6.4 N•m (0.65 kgf•m, 4.7 lbf•ft)

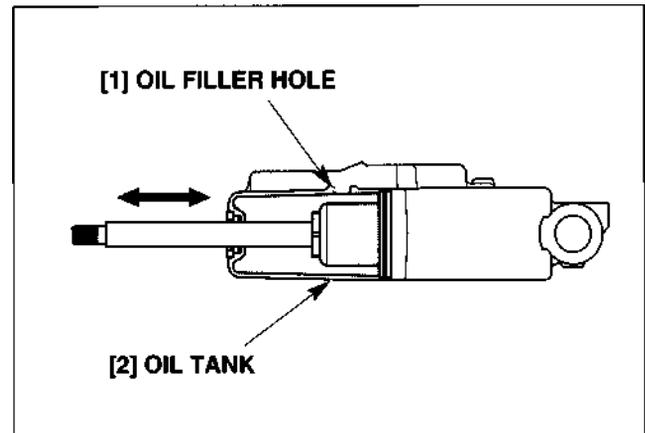


- 6) Clamp the motor wire to the motor cord bracket A with the wire band.
 - After securing the wires with a new wire band , cut the end so projected end length is 3 - 5 mm (0.1 - 0.2 in).
- 7) Set the wire band clips on the clip bracket B, and secure the motor wire with them.
 - After securing the wires with new wire band clip, cut the end so projected end length is 3 - 5 mm (0.1 - 0.2 in).

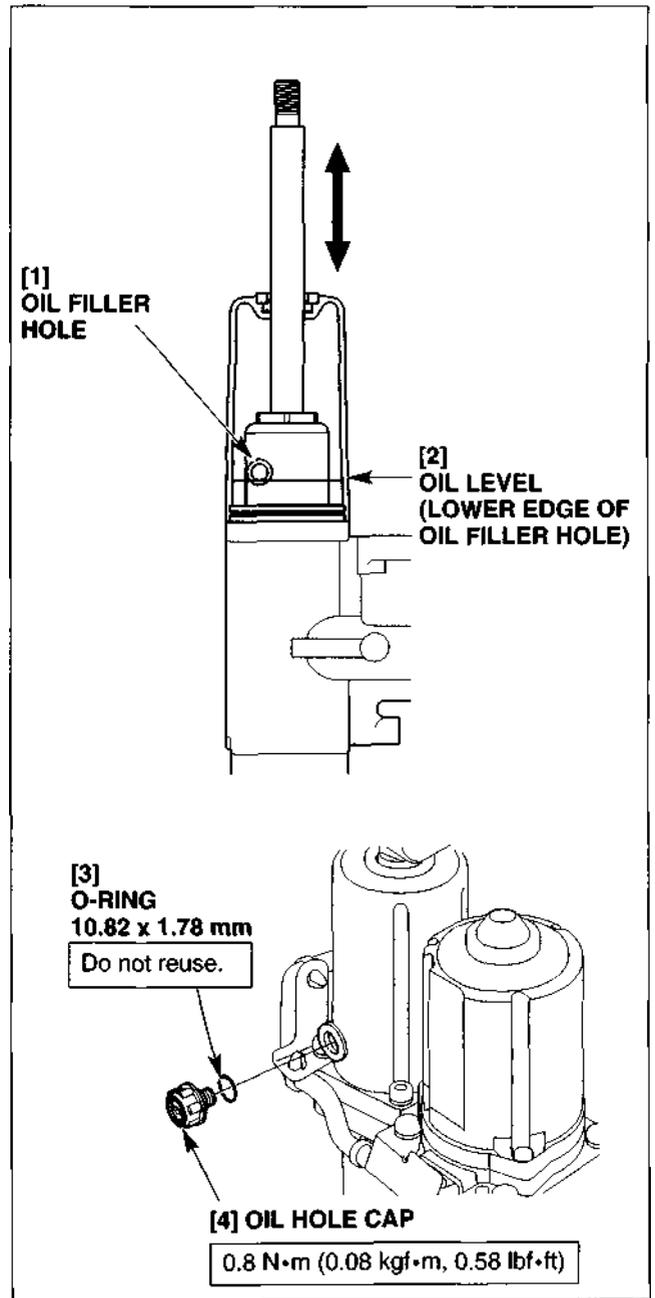


d. AIR BLEEDING

- 1) Lay the power trim/tilt assembly on its side with the oil filler port facing up.
- 2) Connect the battery, power trim/tilt relay and the power trim/tilt switch so that the power trim/tilt assembly functions while it is dismantled from the outboard motor.
- 3) Check that the manual valve is loose. Using a syringe or equivalent tool, pour ATF in the oil tank slowly to fill it up.
- 4) After filling the oil tank, tighten the manual valve securely.
 - Check that the oil hole cap bolt is not installed.
- 5) Push the "UP" side of the power trim/tilt switch to extend the piston rod fully.
 - While extending the piston rod, pour ATF into the oil tank to keep the oil level in the oil tank at full level.
- 6) Push the "DW" side of the power trim/tilt switch to compress the piston rod fully.
 - Do not tighten the oil hole cap bolt this time. Let ATF flow out of the oil filler port.
- 7) Repeat the above steps 5 and 6 three to five times.
 - Repeat this procedure until the piston rod moves smoothly.
- 8) After the piston rod moves smoothly, push the "UP" side of the power trim/tilt switch again to extend the piston rod fully.
 - While extending the piston rod, pour ATF into the oil tank to keep the oil level in the oil tank at full level.



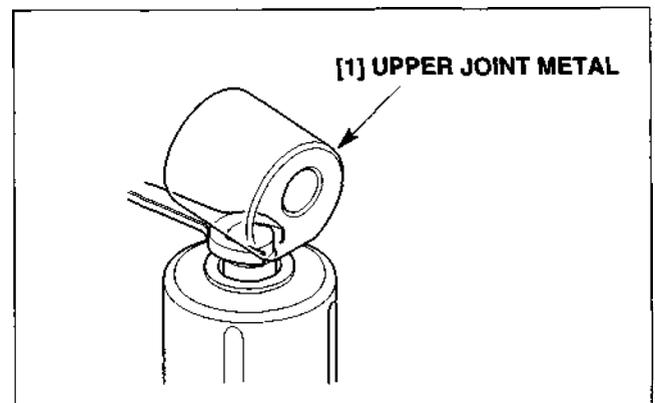
- 9) Hold the power trim/tilt assembly upright and bring the oil level to the lower edge of the oil filler port. Loosely tighten the oil hole cap.
 - 10) Move the piston rod from the fully compressed position to the fully extended position two or three times by operating the power trim/tilt switch.
 - 11) Push the "UP" side of the power trim/tilt switch again to extend the piston rod fully.
 - 12) Remove the oil cap bolt and check the oil level. If the level is low, add ATF with a syringe or equivalent tool until ATF flows out of the oil filler port.
 - 13) Install the new O-ring on the oil cap and tighten the oil cap to the specified torque.
- TORQUE: 0.8 N•m (0.08 kgf•m, 0.58 lbf•ft)**
- 14) Wipe up ATF spilled from the cylinder comp. thoroughly. Operate the power trim/tilt switch and check that the piston rod moves smoothly.
 - 15) Check the blow pressure (P. 13-29).



e. UPPER JOINT METAL INSTALLATION

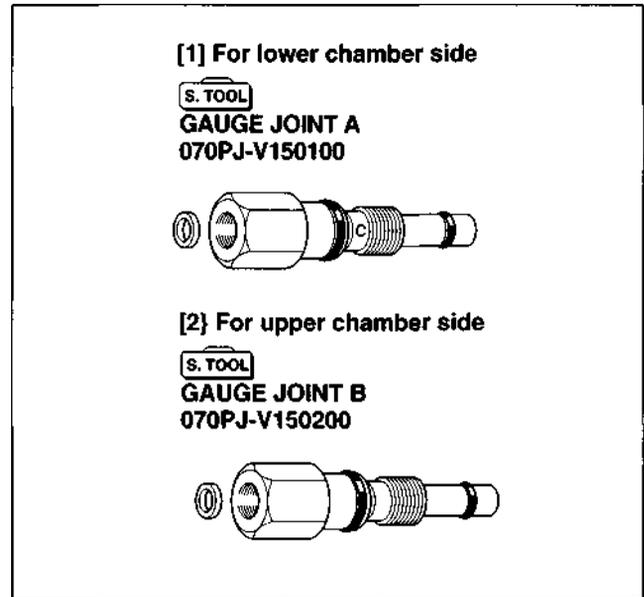
- 1) Apply LOCTITE® 271 or equivalent to the thread of the piston rod.
- 2) Install the upper joint metal against the piston rod.
- 3) Holding the piston rod and tighten the upper joint metal to the specified torque.

TORQUE: 44 N•m (4.5 kgf•m, 33 lbf•ft)



f. BLOW PRESSURE INSPECTION

- After reassembling the power trim/tilt assembly, perform the blow pressure inspection. Install the power trim/tilt assembly after the blow pressure inspection.
- Remove the power trim/tilt assembly if it is mounted.
- Before blow pressure inspection, perform the following:
 - Connect each engine side wire and motor 2P connector so that the power trim/tilt assembly can operate while it is isolated from the outboard motor.
 - Extend the piston rod of the power trim/tilt assembly fully after operating (moving up and down) the piston rod several times.
 - Check ATF level in the power trim/tilt assembly oil tank. It must be at the specified level (P. 13-28).
 - Perform the cylinder upper chamber side and lower chamber side blow pressure inspection using the special tools and commercially available pressure gauge.
 - Use the pressure gauge which measures 40 MPa (400 kgf/cm², 5,600 psi) or above with P/F 1/4 thread.

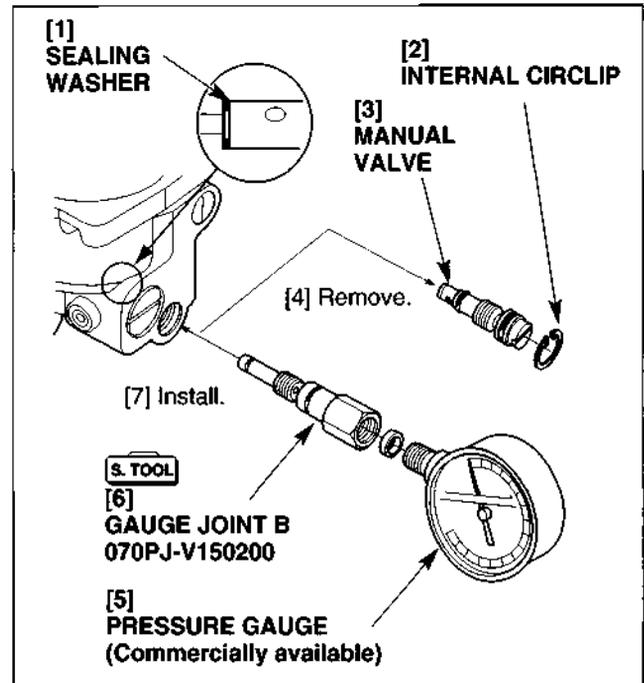


• LOWER CHAMBER SIDE BLOW PRESSURE

- 1) Remove the internal circlip, manual valve and sealing washer from the valve body. Install the special tool (gauge joint body B) and the sealing washer, and tighten the special tool to the specified torque.

TORQUE: 1.7 N•m (0.17 kgf•m, 1.2 lbf•ft)

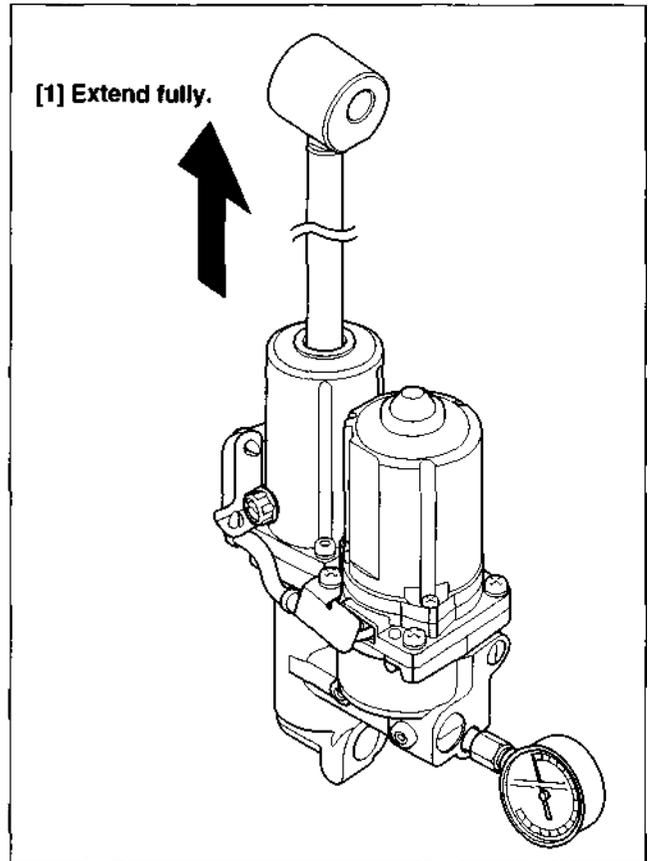
- Be sure to remove the manual valve with the piston rod fully extended, or ATF spurts out.
 - A small amount of ATF flows out after removing the valve. Install the special tool quickly.
 - Install the sealing washer securely not to let it collapse in the valve body.
- 2) Attach a commercially available pressure gauge to the special tool that is set in the valve body.
 - 3) Be sure that ATF level in the oil tank is at the specified level (P. 13-28).



- 3) Push the "DN" side of the power trim/tilt switch and compress the piston rod fully.
- 4) Push the "UP" side of the power trim/tilt switch again. With the piston rod extended fully, measure the lower chamber blow pressure by reading the pressure gauge.

BLOW PRESSURE (Lower chamber side)	19.3 - 23.0 MPa (197 -235 kgf/cm ² , 2,802 - 3,342 psi)
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- If the blow pressure is out of the specified range, check each part of the power trim/tilt assembly for oil leakage.
- If there is no oil leakage but the blow pressure drops below the specified pressure quickly, the power trim/tilt motor assembly can be faulty. Replace the motor assembly with a new one and measure the blow pressure again.
- After measuring the lower chamber blow pressure, measure the upper chamber blow pressure.

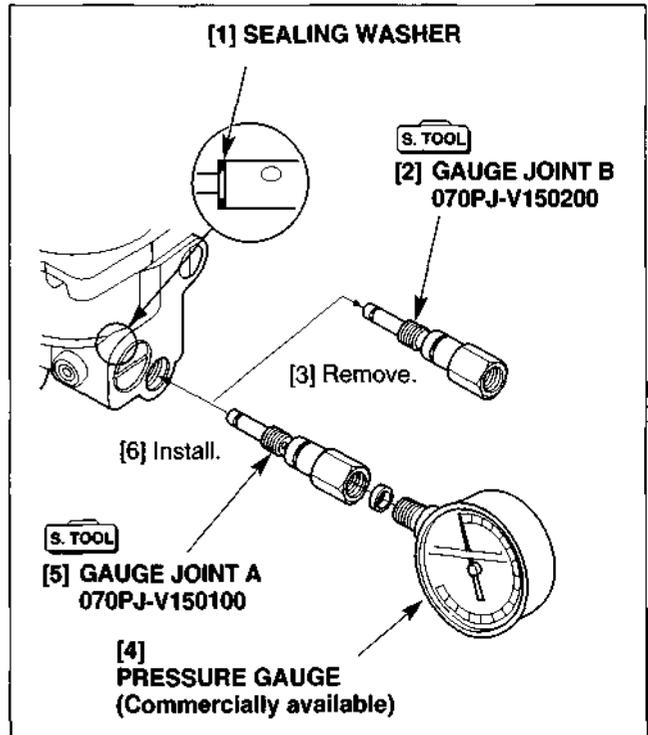


• UPPER CHAMBER BLOW PRESSURE

- 1) Remove the special tool (gauge joint body B) that is for measurement of the lower chamber blow pressure from the valve body. Install the special tool (gauge joint body A) that is for measurement of the upper chamber blow pressure in the valve body. Tighten the special tool to the specified torque.

TORQUE: 1.7 N•m (0.17 kgf•m, 1.2 lbf•ft)

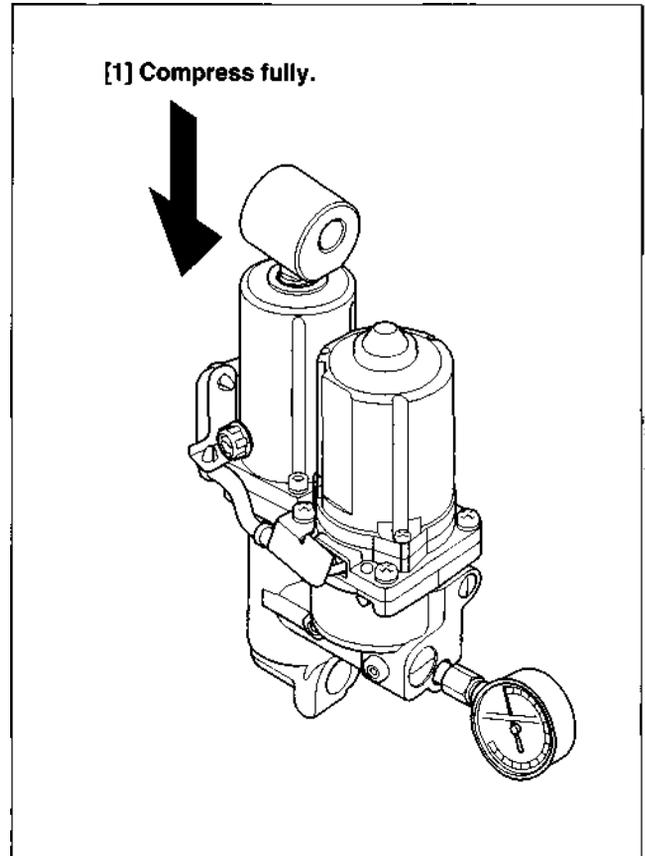
- Be sure to remove the special tool with the piston rod fully extended, or the automatic transmission fluid spurts out.
 - A small amount of ATF flows out after removing the special tool (gauge joint body B). Install the special tool (gauge joint body A) quickly.
 - Install the sealing washer securely not to let it collapse in the valve body.
- 2) Attach a commercially available pressure gauge to the special tool that is set in the valve body.
 - Be sure that ATF level in the oil tank is at the specified level (P. 13-28).



- 3) Push the "DN" side of the power trim/tilt switch and compress the piston rod fully. With the piston rod compressed fully, measure the upper chamber blow pressure by reading the pressure gauge.

BLOW PRESSURE (Upper chamber side)	27.9 - 34.8 MPa (285 - 355 kgf/cm ² , 4,504 - 5,049 psi)
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- If the blow pressure is out of the specified range, check each part of the power trim/tilt assembly for oil leakage.
- If there is no oil leakage but the blow pressure drops below the specified pressure quickly, the power trim/tilt motor assembly can be faulty. Replace the motor assembly with a new one and measure the blow pressure again.



- 4) Push the "UP" side of the power trim/tilt switch and extend the piston rod fully.

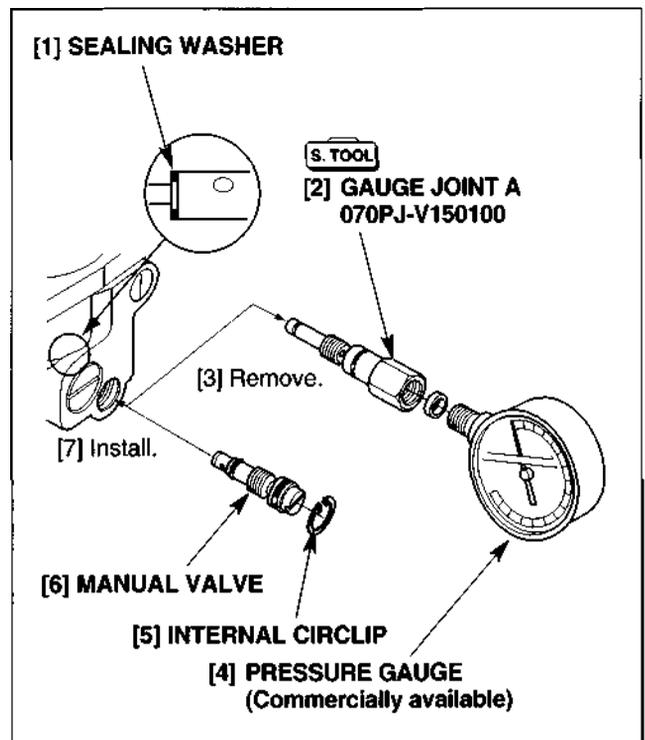
- 5) Remove the special tool and pressure gauge from the valve body. Install the sealing washer, manual valve and the internal circlip in the valve body.

- Be sure to remove the special tool with the piston rod fully extended, or ATF spurts out.
- A small amount of ATF flows out after removing the tool. Install the manual valve quickly.
- Install the sealing washer securely not to let it collapse in the valve body.

- 6) Tighten the manual valve to the specified torque.

TORQUE: 1.7 N•m (0.17 kgf•m, 1.2 lbf•ft)

- 7) With the piston rod fully extended, check whether ATF level is at the edge of the filler port of the oil tank (P. 13-28). If the oil level is low, add ATF up to the edge of the filler port.



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