

**This service manual covers the 1994-2000 Yamaha Timberwolf 4x4 Series.**

**Some models may need supplemental manuals which have blue titles. Use the base manual for everything not contained in the supplement if your model or year requires a supplement.**

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## NOTICE

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

Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

## PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.



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

### WARNING

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

### CAUTION:

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

### NOTE:

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

## HOW TO USE THIS MANUAL

### CONSTRUCTION OF THIS MANUAL

This manual consists of chapters for the main categories of subjects. (See "Illustrated symbols")

- 1st title ① : This is a chapter with its symbol on the upper right of each page.
- 2nd title ② : This title appears on the upper of each page on the left of the chapter symbol. (For the chapter "Periodic inspection and adjustment" the 3rd title appears.)
- 3rd title ③ : This is a final title.

### MANUAL FORMAT

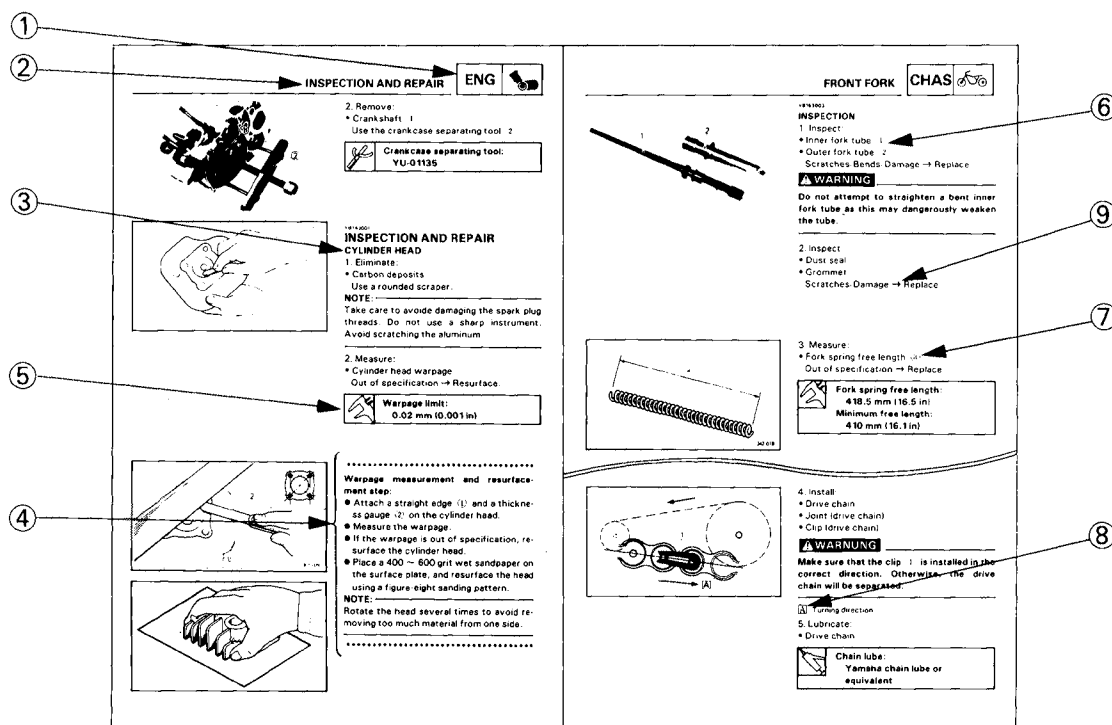
All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspections. A set of particularly important procedure ④ is placed between a line of asterisks "\*" with each procedure preceded by "●".











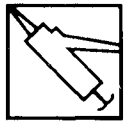



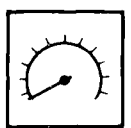
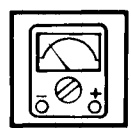







### IMPORTANT FEATURES

- Data and a special tool are framed in a box preceded by a relevant symbol ⑤.
- An encircled numeral ⑥ indicates a part name, and an encircled alphabetical letter data or an alignment mark ⑦, the others being indicated by an alphabetical letter in a box ⑧.
- A condition of a faulty component will precede an arrow symbol and the course of action required the symbol ⑨.

### EXPLODED DIAGRAM

Each chapter provides exploded diagrams before each disassembly section for ease in identifying correct disassembly and assembly procedures.



①	GEN INFO 	②	SPEC 		
③	INSP ADJ 	④	ENG 		
⑤	CARB 	⑥	DRIV 		
⑦	CHAS 	⑧	ELEC 		
⑨	TRBL SHTG 	⑩			
⑪		⑫			
⑬		⑭			
⑮		⑯			
⑰		⑱		⑲	
⑳		㉑		㉒	
㉓		㉔	New		

## ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① to ⑨ are designed as thumb tabs to indicate the chapter's number and content.

- ① General information
- ② Specifications
- ③ Periodic inspection and adjustment
- ④ Engine
- ⑤ Carburetion
- ⑥ Drive train
- ⑦ Chassis
- ⑧ Electrical
- ⑨ Troubleshooting

Illustrated symbols ⑩ to ⑯ are used to identify the specifications appearing in the text.









- ⑩ Filling fluid
- ⑪ Lubricant
- ⑫ Special tool
- ⑬ Tightening
- ⑭ Wear limit, clearance
- ⑮ Engine speed
- ⑯  $\Omega$ , V, A

Illustrated symbols ⑰ to ㉔ in the exploded diagram indicate grade of lubricant and location of lubrication point.

- ⑰ Apply engine oil
- ⑱ Apply gear oil
- ⑲ Apply molybdenum disulfide oil
- ㉑ Apply wheel bearing grease
- ㉒ Apply lightweight lithium-soap base grease
- ㉓ Apply molybdenum disulfide grease
- ㉔ Apply locking agent (LOCTITE®)
- ㉕ Use new one



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**GEN  
INFO 1**



**SPEC 2**



**INSP  
ADJ 3**



**ENG 4**



**CARB 5**



**DRIV 6**



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
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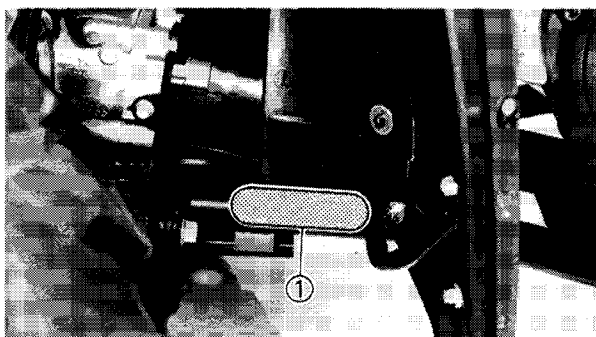
	<b>GEN INFO</b>	<b>1</b>
	<b>SPEC</b>	<b>2</b>
	<b>INSP ADJ</b>	<b>3</b>
	<b>ENG</b>	<b>4</b>
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**MACHINE IDENTIFICATION****GEN  
INFO****GENERAL INFORMATION****MACHINE IDENTIFICATION****VEHICLE IDENTIFICATION NUMBER**

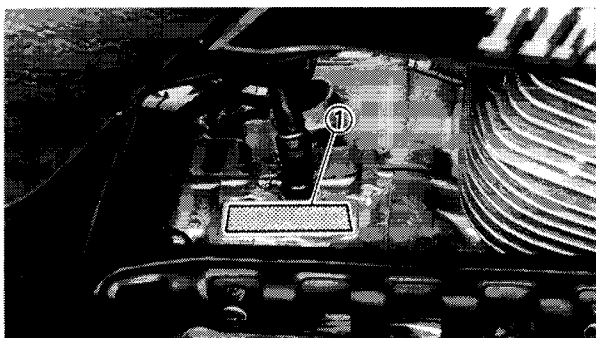
The vehicle identification number ① is stamped into the left side of the frame.

**NOTE:** \_\_\_\_\_

The vehicle identification number is used to identify your machine and may be used to register your machine with the licensing authority in your state.

**Starting serial number:**

**JY44KDA0\*RA000101**

**ENGINE SERIAL NUMBER**

The engine serial number ① is stamped into the right side of the engine.

**NOTE:** \_\_\_\_\_

The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.

**Starting serial number:**

**4KD-000101**

**NOTE:** \_\_\_\_\_

Designs and specifications are subject to change without notice.

**1**

## IMPORTANT INFORMATION

### PREPARATION FOR REMOVAL

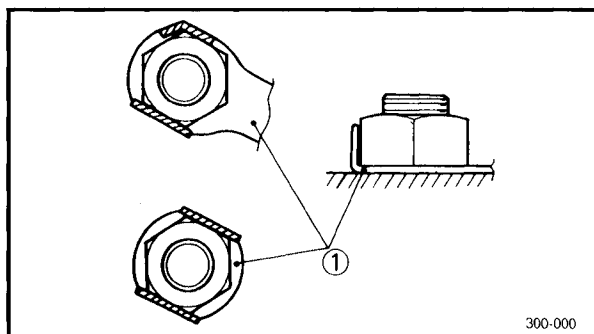
1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment.  
Refer to "CHAPTER 1. GENERAL INFORMATION-SPECIAL TOOLS" section.
3. When disassembling the machine, keep mated parts together. This includes gears, cylinder, piston and other parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.
4. During the machine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled.
5. Keep away from fire.

### ALL REPLACEMENT PARTS

1. We recommend to use Yamaha genuine parts for all replacements. Use oil and/or grease recommended by Yamaha for assembly and adjustment.

### GASKETS, OIL SEALS, AND O-RINGS

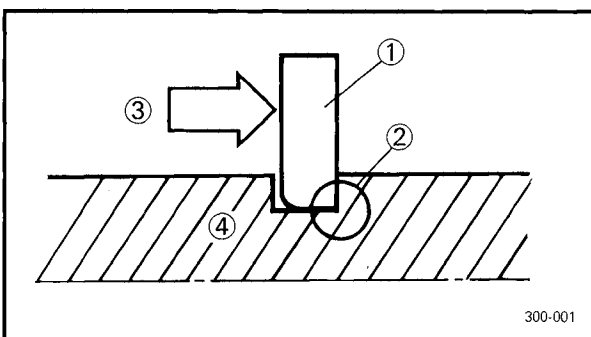
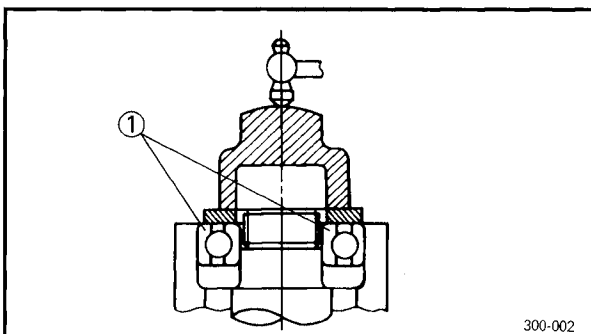
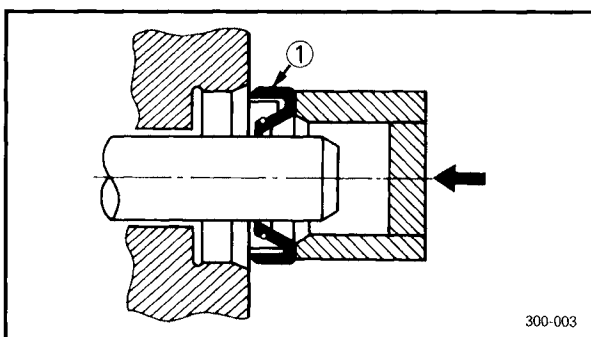
1. All gaskets, seals, and O-rings should be replaced when an engine is overhauled. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



### LOCK WASHER/PLATES AND COTTER PINS

1. All lock washers/plates ① and cotter pins must be replaced when they are removed.  
Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.

## SPECIAL TOOLS



## SPECIAL TOOLS

The proper special tools are necessary for complete and accurate tune-up and assembly.

Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.

The shape and part number used for the special tool differ by country, so two types are provided.

## FOR TUNE UP

## BEARINGS AND OIL SEALS

1. Install the bearing(s) and oil seal(s) with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of light-weight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.

① Oil seal

## CAUTION:

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

① Bearing

## CIRCLIPS

1. All circlips should be inspected carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp edged corner ② is positioned opposite to the thrust ③ it receives. See the sectional view.

④ Shaft

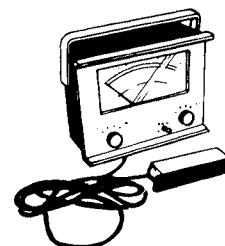
Refer to the list provided to avoid errors when placing an order.

P/N. YM- □□□□, YU-□□□□ For  
YS- □□□□, YK-□□□□ USA,  
ACC-□□□□ CDN

P/N.90890-□□□□ Except  
for USA,  
CDN

1-A

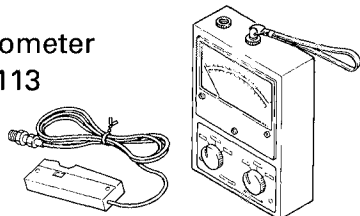
Inductive tachometer  
P/N. YU-08036-A



This tool is needed to measure engine rpm.

**SPECIAL TOOLS****1-B**

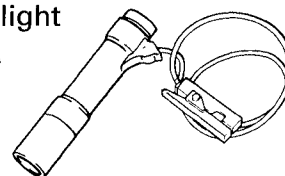
Inductive tachometer  
P/N. 90890-03113



This tool is needed to measure engine rpm.

**2-A**

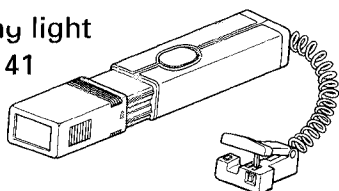
Inductive timing light  
P/N. YM-33277-A



This tool is necessary for checking ignition timing.

**2-B**

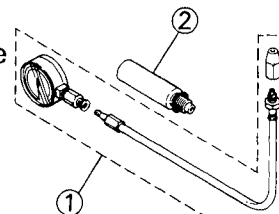
Inductive timing light  
P/N. 90890-03141



This tool is necessary for checking ignition timing.

**3-A**

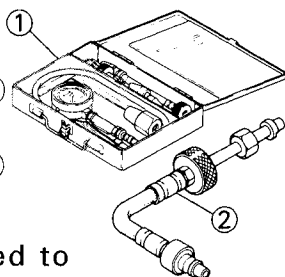
Compression gauge  
P/N. YU-33223- ①  
Adapter (M12)- ②  
P/N. YU-33223-3



This gauge is used to measure the engine compression.

**3-B**

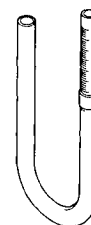
Compression gauge  
P/N. 90890-03081- ①  
Extension  
P/N. 90890-04082- ②



This gauge is used to measure the engine compression.

**4**

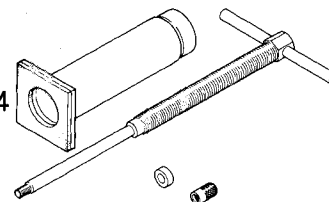
Fuel level gauge  
P/N. YM-01312-A  
P/N. 90890-01312



This gauge is used to measure the fuel level in the float chamber.

**FOR ENGINE SERVICE****1**

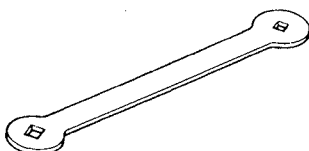
Piston pin puller  
P/N. YU-01304  
P/N. 90890-01304



This tool is used to remove the piston pin.

**2-A**

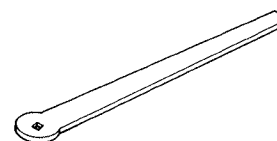
Valve adjusting tool 3 mm (0.12 in)  
P/N. YM-08035



This tool is necessary for adjusting the valve clearance.

**2-B**

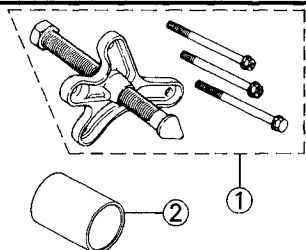
Valve adjusting tool 3 mm (0.12 in)  
P/N. 90890-01311



This tool is necessary for adjusting the valve clearance.

**SPECIAL TOOLS****3-A**

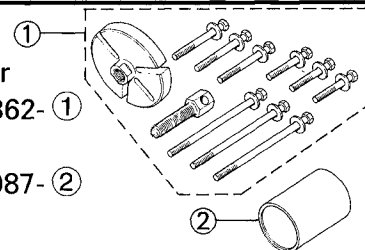
Flywheel puller  
P/N. YU-033270-①  
Attachment  
P/N. YM-33278-②



These tools are used to remove the CDI magneto rotor.

**3-B**

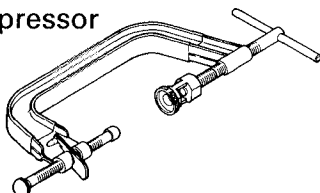
Flywheel puller  
P/N. 90890-01362-①  
Attachment  
P/N. 90890-04087-②



These tools are used to remove the CDI magneto rotor.

**4**

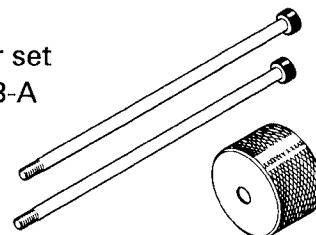
Valve spring compressor  
P/N. YM-04019  
P/N. 90890-04019



This tool is needed to remove and install the valve assemblies.

**5-A**

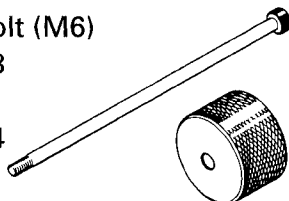
Slide hammer set  
P/N. YU-01083-A



These tools are used when removing the rocker arm shaft.

**5-B**

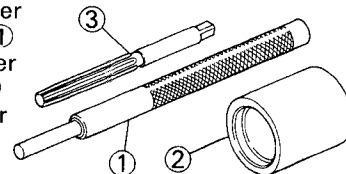
Slide hammer bolt (M6)  
P/N. 90890-01083  
Weight  
P/N. 90890-01084



These tools are used when removing the rocker arm shaft.

**6-A**

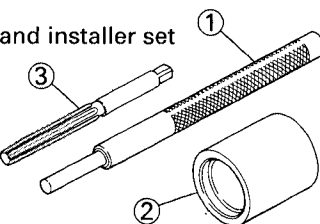
Valve guide remover and installer 6 mm (0.24 in)  
Valve guide remover  
P/N. YM-04064-A-①  
Valve guide installer  
P/N. YM-4065-A-②  
Valve guide reamer  
P/N. YM-04066-③



These tools are used to remove, install and rebore the valve guide.

**6-B**

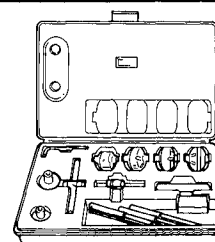
Valve guide remover and installer set  
6 mm (0.24 in)  
Valve guide remover  
P/N. 90890-04064-①  
Valve guide installer  
P/N. 90890-04065-②  
Valve guide reamer  
P/N. 90890-04066-③



These tools are used to remove, install and rebore the valve guide.

**7**

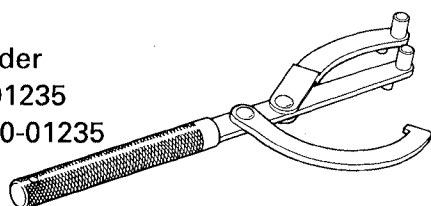
Valve seat cutter  
P/N. YM-91043-B



This tool is used to adjust the valve clearance.

**8**

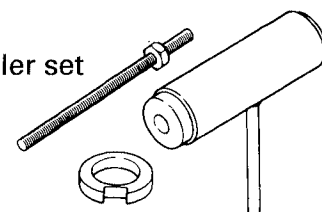
Rotor holder  
P/N. YU-01235  
P/N. 90890-01235



This tool is used to hold the clutch when removing or installing the clutch boss securing nut.

**9-A**

Crankshaft installer set  
P/N. YU-90050

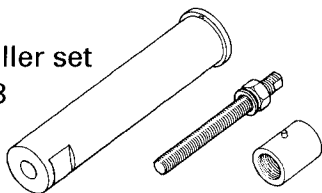


These tools are used to install the crankshaft, buffer boss and oil pump drive gear.

**1**

**SPECIAL TOOLS****GEN  
INFO****9-B**

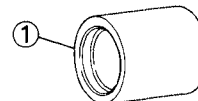
Buffer boss installer set  
P/N. 90890-04088



These tools are used to install the crankshaft, buffer boss and oil pump drive gear.

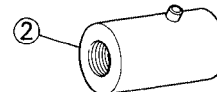
**10**

Pot extension  
P/N. YM-90070-A-①  
P/N. 90890-04060



This tool is used to install the crankshaft.

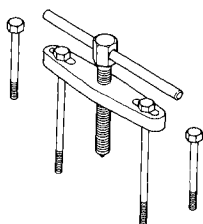
Adapter #11  
P/N. YM-33279-②



Tool is used to install the buffer boss.

**11**

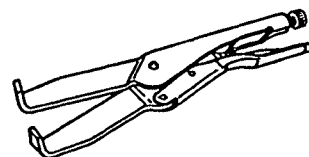
Crankcase separating tool  
P/N. YU-01135-A  
P/N. 90890-01135



These tools are used when removing the crankshaft.

**12**

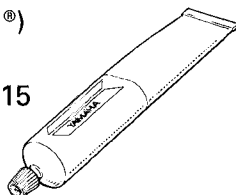
Clutch holder  
P/N. YM-91042



This tool is used to hold the spacer on the crankshaft when removing or installing the crankcase spacer (left).

**13**

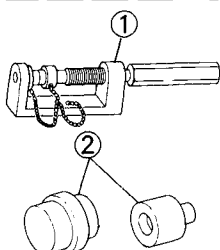
Sealant (Quick Gasket<sup>®</sup>)  
P/N. ACC-11001-15-01  
YAMAHA bond No. 1215  
P/N. 90890-85505



This sealant (bond) is used for crankcase mating surface, etc.

**FOR DRIVE TRAIN SERVICE****1-A**

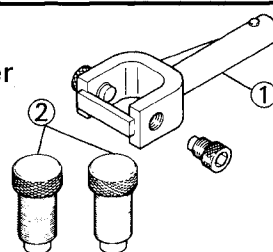
Universal joint holder  
P/N. YM-04062-①  
Attachment  
P/N. YM-33291-②



These tools are used to remove and install the universal joint.

**1-B**

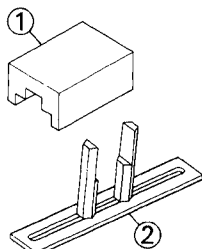
Universal joint holder  
P/N. 90890-04062-①  
Attachment  
P/N. 90890-04096-②



These tools are used to remove and install the universal joint.

**2-A**

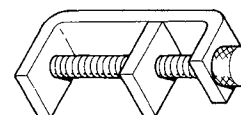
Damper spring compressor (push plate)  
P/N. YM-33286-①  
Middle drive gear holder  
P/N. YM-33222-②



These tools are used to disassemble and reassemble the middle driven gear damper.

**2-B**

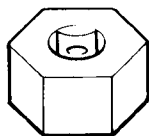
Damper spring compressor (push plate)  
P/N. 90890-04090



These tools are used to disassemble and reassemble the middle driven gear damper.

**SPECIAL TOOLS****GEN  
INFO****1****3**

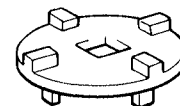
Bearing retainer wrench  
P/N. YM-33289  
P/N. 90890-04104



This tool is used to disassemble and reassemble the middle driven shaft bearing.

**4**

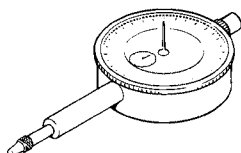
Ring nut wrench  
P/N. YM-1391  
P/N. 90890-01391



This tool is used to remove and install the reverse gear.

**5**

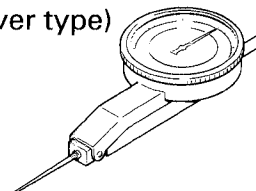
Dial gauge  
P/N. YM-03097  
P/N. 90890-03097



This tool is used to measure the gear lash for the middle gear and final gear.

**6**

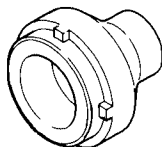
Dial gauge (for lever type)  
P/N. YM-03110



This tool is used to measure the gear lash for the differential gear.

**7**

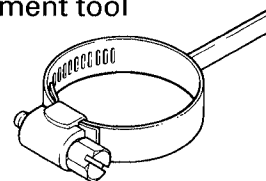
Final drive shaft bearing retainer wrench  
P/N. YM-04050  
P/N. 90890-04050



This tool is used to remove and install the final gear bearing retainer.

**8**

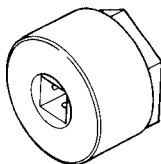
Gear lash measurement tool  
P/N. YM-01230  
P/N. 90890-01230



This tool is used to measure the gear lash.

**FOR CHASSIS SERVICE****2**

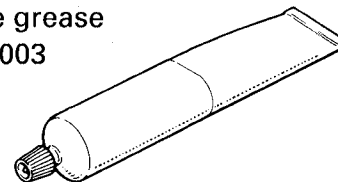
Damper rod holder  
P/N. YM-01327  
P/N. 90890-01327



This tool is used to remove and install the bearing retainer for the steering shaft holder bearing.

**1**

Yamaha brake grease  
P/N. 90793-40003

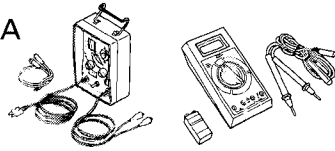


This grease is used for front and rear brake dust seal.

**FOR ELECTRICAL COMPONENTS**

**SPECIAL TOOLS****1-A**

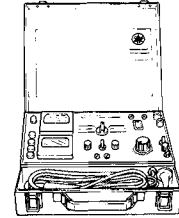
Electro tester  
P/N. YU-33260-A



This instrument is necessary for checking the ignition system components.

**1-B**

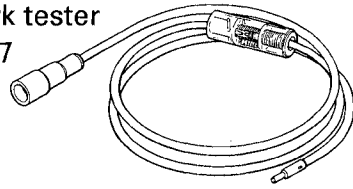
1. Electro tester  
P/N. 90890-03021



This instrument is necessary for checking the ignition system components.

**2-A**

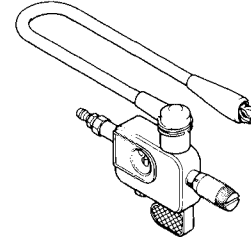
Dynamic spark tester  
P/N. YM-34487



This instrument is necessary for checking the ignition system components.

**2-B**

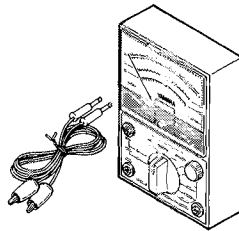
Ignition checker  
P/N. 90890-06754



This instrument is necessary for checking the ignition system components.

**3**

Pocket tester  
P/N. YU-03112  
P/N. 90890-03112



This instrument is invaluable for checking the electrical system.



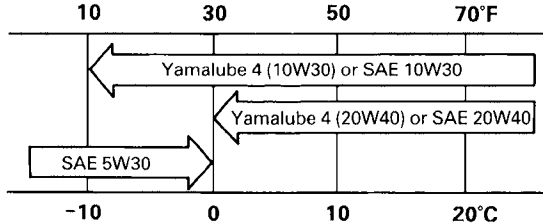
## GENERAL SPECIFICATIONS

SPEC



## SPECIFICATIONS

## GENERAL SPECIFICATIONS

Model	YFB250FWF
Model code:	4KD1
Engine starting number:	4KD-000101
Vehicle identification number:	JY44KDA0*RA000101
Dimensions: Overall length Overall width Overall height Seat height Wheelbase Minimum ground clearance Minimum turning radius	1,755 mm (69.9 in) 1,025 mm (40.4 in) 1,105 mm (43.5 in) 790 mm (31.1 in) 1,120 mm (44.1 in) 167 mm (6.57 in) 3,400 mm (133.9 in)
Basic weight: With oil and full fuel tank	231 kg (509 lb)
Engine: Engine type Cylinder arrangement Displacement Bore×stroke Compression ratio Compression pressure (STD) Starting system Lubrication system:	Air-cooled 4-stroke, SOHC Forward-inclined single cylinder 229.6 cm <sup>3</sup> 71×58 mm (2.80×2.28 in) 8.7 : 1 900 kPa (9 kg/cm <sup>2</sup> , 128 psi) Electric starter Wet sump
Oil type or grade: Engine oil/Transfer gear oil  Final gear oil: Differential gear oil:	Yamalube 4 (10W30) or SAE 10W30 type SE motor oil Yamalube 4 (20W40) or SAE 20W40 type SE motor oil SAE 5W30 type SE motor oil  SAE80API "GL-4" Hypoid Gear Oil SAE80API "GL-4" Hypoid Gear Oil

2

## GENERAL SPECIFICATIONS

SPEC



Model	YFB250FWF
Oil capacity:	
Engine oil	
Periodic oil change	1.5 L (1.3 Imp qt, 1.6 US qt)
With oil filter replacement	1.6 L (1.4 Imp qt, 1.7 US qt)
Total amount	2.2 L (1.9 Imp qt, 2.3 US qt)
Transfer gear case oil	0.25 L (0.22 Imp qt, 0.26 US qt)
Final gear case oil	
Periodic oil change	0.12 L (0.11 Imp qt, 0.13 US qt)
Total amount	0.13 L (0.11 Imp qt, 0.14 US qt)
Differential gear case oil	
Periodic oil change	0.47 L (0.41 Imp qt, 0.50 US qt)
Total amount	0.5 L (0.44 Imp qt, 0.53 US qt)
Air filter:	Wet type element
Fuel:	
Type	Unleaded fuel recommended
Fuel tank capacity	9.2 L (2.02 Imp gal, 2.43 US gal)
Fuel reserve amount	1.6 L (0.35 Imp gal, 0.42 US gal)
Carburetor:	
Type/quantity	VM24SH/1
Manufacturer	MIKUNI
Spark plug:	
Type	D7EA/X22ES-U
Manufacturer	NGK/NIPPONDENSO
Spark plug gap	0.6~0.7 mm (0.024~0.028 in)
Clutch type:	Wet, centrifugal automatic
Transmission:	
Primary reduction system	Helical gear
Primary reduction ratio	73/22 (3.318)
Secondary reduction system	Shaft drive
Secondary reduction ratio	20/17×46/11 (4.919)
Transmission type	Constant mesh 5-speed
Operation	Left foot operation
Gear ratio	
1st	34/12 (2.833)
2nd	34/18 (1.889)
3rd	29/22 (1.318)
4th	26/25 (1.040)
5th	23/28 (0.821)
Reverse gear	73/22×34/12×20/17 (11.061)
Chassis:	
Frame type	Steel tube frame
Caster angle	3°
Trail	15 mm (0.59 in)
Tread (STD)	
rear	770 mm (30.31 in)
Tread (STD)	
front	830 mm (32.68 in)
Toe-in	0~10 mm (0.00~0.39 in)

## GENERAL SPECIFICATIONS

SPEC



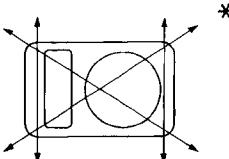
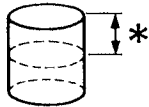
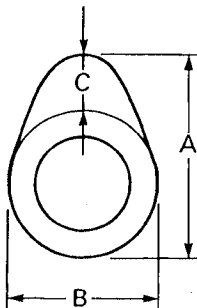
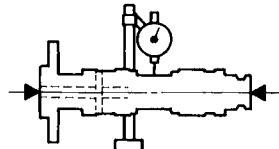
Model		YFB250FWF
Tire:		
Type		Tubeless
Size	front	AT23×8.00-10
	rear	AT23×10.00-10
Manufacturer	front	DUNLOP
	rear	DUNLOP
Type	front	KT401
	rear	KT405
Tire pressure (cold tire):		
	front	25 kPa (0.25 kg/cm <sup>2</sup> , 3.6 psi)
	rear	25 kPa (0.25 kg/cm <sup>2</sup> , 3.6 psi)
Brake:		
Front brake	type	Drum brake
	operation	Right hand operation
Rear brake	type	Drum brake
	operation	Left hand and right foot operation
Suspension:		
Front suspension		Strut
Rear suspension		Swingarm (monocross)
Shock absorber:		
Front shock absorber		Coil spring/Oil damper
Rear shock absorber		Coil spring/Oil damper
Wheel travel:		
Front wheel travel		125 mm (4.9 in)
Rear wheel travel		125 mm (4.9 in)
Electrical:		
Ignition system		C.D.I.
Generator system		A.C. magneto generator
Battery type		GM12CZ-4A-2
Battery capacity		12V 12 AH
Headlight type:		Bulb type
Bulb wattage×quantity:		
Headlight		12V 25 W/25 W
Tail/brake light		12V 7.5 W
Indicator light		
NEUTRAL		12V 3.4 W×1
REVERSE		12V 3.4 W×1

2

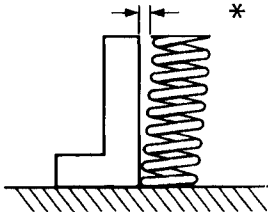




## MAINTENANCE SPECIFICATIONS

## ENGINE

Model	YFB250FWF
Cylinder head: Warp limit 	0.03 mm (0.0012 in) *Lines indicate straightedge measurement.
Cylinder:   Bore size *Measuring point <Wear limit>	 70.97~71.02 mm (2.7941~2.7961 in) 45 mm (1.77 in) <71.1 mm (2.7992 in)>
Camshaft: Drive method Cam cap inside diameter Camshaft outside diameter Shaft-to-cap clearance Cam dimensions Intake  Exhaust  Camshaft runout limit 	Chain drive (Left) 25.000~25.021 mm (0.9843~0.9851 in) 24.96~24.98 mm (0.9827~0.9835 in) 0.020~0.061 mm (0.0008~0.0024 in)  "A" 36.51~36.61 mm (1.437~1.441 in) "B" 30.1~30.2 mm (1.185~1.189 in) "C" 6.41~6.71 mm (0.252~0.264 in) "A" 36.51~36.61 mm (1.437~1.441 in) "B" 30.15~30.25 mm (1.187~1.191 in) "C" 6.41~6.71 mm (0.252~0.264 in)  0.02 mm (0.0008 in)
Cam chain: Cam chain type/No. of links Cam chain adjustment method	DID25SH/104 Automatic
Rocker arm/rocker arm shaft: Bearing inside diameter Shaft outside diameter Arm-to-shaft clearance	12.000~12.018 mm (0.4724~0.4731 in) 11.985~11.991 mm (0.4718~0.4721 in) 0.009~0.037 mm (0.0004~0.0015 in)

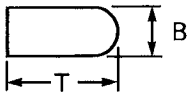
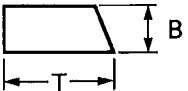
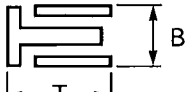
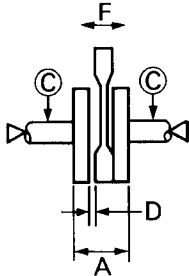


Model		YFB250FWF
Valve spring:		
Inner spring		
Free length	IN	35.5 mm (1.40 in)
	EX	35.5 mm (1.40 in)
Set length (valve closed)	IN	30.5 mm (1.2 in)
	EX	30.5 mm (1.2 in)
Compressed pressure (installed)	IN	8.4~10.2 kg (18.52~22.49 lb)
	EX	8.4~10.2 kg (18.52~22.49 lb)
*Tilt limit	IN	2.5°/1.6 mm (2.5°/0.063 in)
	EX	2.5°/1.6 mm (2.5°/0.063 in)
		
Direction of winding (top view)	IN	Clockwise
	EX	Clockwise
		
Outer spring		
Free length	IN	37.2 mm (1.46 in)
	EX	37.2 mm (1.46 in)
Set length (valve closed)	IN	32 mm (1.3 in)
	EX	32 mm (1.3 in)
Compressed pressure (installed)	IN	16.6~20.4 kg (36.60~44.97 lb)
	EX	16.6~20.4 kg (36.60~44.97 lb)
Tilt limit	IN	2.5°/1.6 mm (2.5°/0.06 in)
	EX	2.5°/1.6 mm (2.5°/0.06 in)
Direction of winding (top view)	IN	Counterclockwise
	EX	Counterclockwise
		



Model		YFB250FWF
Valve, valve seat, valve guide:		
Valve clearance (cold)	IN	0.05~0.09 mm (0.002~0.004 in)
	EX	0.11~0.15 mm (0.004~0.006 in)
Valve dimensions:		
	Head Dia.	Seat Width
	Face Width	Margin Thickness
"A" head diameter	IN	33.9~34.1 mm (1.335~1.343 in)
	EX	28.4~28.6 mm (1.118~1.126 in)
"B" face width	IN	2.26 mm (0.089 in)
	EX	2.26 mm (0.089 in)
"C" seat width	IN	0.9~1.1 mm (0.035~0.043 in)
	EX	0.9~1.1 mm (0.035~0.043 in)
"D" margin thickness	IN	0.8~1.2 mm (0.031~0.047 in)
	EX	0.8~1.2 mm (0.031~0.047 in)
Stem outside diameter	IN	5.975~5.990 mm (0.2352~0.2358 in)
	EX	5.960~5.975 mm (0.2346~0.2352 in)
Guide inside diameter	IN	6.000~6.012 mm (0.2362~0.2367 in)
	EX	6.000~6.012 mm (0.2362~0.2367 in)
Stem-to-guide clearance	IN	0.010~0.037 mm (0.0004~0.0015 in)
	EX	0.025~0.052 mm (0.0010~0.0020 in)
Stem runout limit		0.03 mm (0.0012 in)
Valve seat width	IN	0.9~1.1 mm (0.0354~0.0433 in)
	EX	0.9~1.1 mm (0.0354~0.0433 in)
Piston:		
Piston to cylinder clearance		0.04~0.06 mm (0.0016~0.0024 in)
<Limit>		<0.15 mm (0.0059 in)>
Piston size "D"		70.92~70.97 mm (2.792~2.794 in)
Measuring point "H"		4 mm (0.157 in)
Piston off-set		0.5 mm (0.02 in)
Piston off-set direction		IN side
Piston pin bore inside diameter		16.002~16.013 mm (0.6300~0.6304 in)
Piston pin outside diameter		15.090~15.095 mm (0.5941~0.5943 in)



Model	YFB250FWF
<b>Piston rings:</b> <b>Top ring:</b> Type Dimensions (B×T) End gap (installed) Side clearance (installed) <b>2nd ring:</b> Type Dimensions (B×T) End gap (installed) Side clearance <b>Oil ring:</b> Dimensions (B×T) End gap (installed)	 Barrel 1.2×2.8 mm (0.047×0.110 in) 0.15~0.30 mm (0.006~0.012 in) 0.03~0.07 mm (0.001~0.003 in)  Taper 1.2×2.8 mm (0.047×0.110 in) 0.15~0.30 mm (0.006~0.012 in) 0.02~0.06 mm (0.001~0.002 in)  2.5×2.8 mm (0.098×0.110 in) 0.3~0.9 mm (0.012~0.035 in)
<b>Crankshaft:</b>  Crank width "A" Round limit "C" Big end side clearance "D" Big end radial clearance "E" Small end free play "F"	 55.95~56.00 mm (2.203~2.205 in) 0.06 mm (0.0024 in) 0.35~0.65 mm (0.014~0.026 in) 0.010~0.025 mm (0.0004~0.0010 in) 0.8~1.0 mm (0.0315~0.0394 in)
<b>Balancer:</b> Balancer drive method	Gear
<b>Clutch:</b> Friction plate thickness Quantity Friction plate wear limit Clutch plate thickness Quantity Warp limit Clutch spring free length Quantity Clutch release method Automatic centrifugal clutch: Clutch shoe thickness Clutch shoe spring free length Clutch-in revolution Clutch-stall revolution	2.92~3.08 mm (0.115~0.121 in) 5 pcs 2.8 mm (0.11 in) 1.45~1.75 mm (0.057~0.069 in) 4 pcs 0.2 mm (0.008 in) 35.1 mm (1.38 in) 4 pcs Outer push, cam push  2 mm (0.08 in) 32.47 mm (1.28 in) 1,800~2,100 r/min 3,200~3,600 r/min

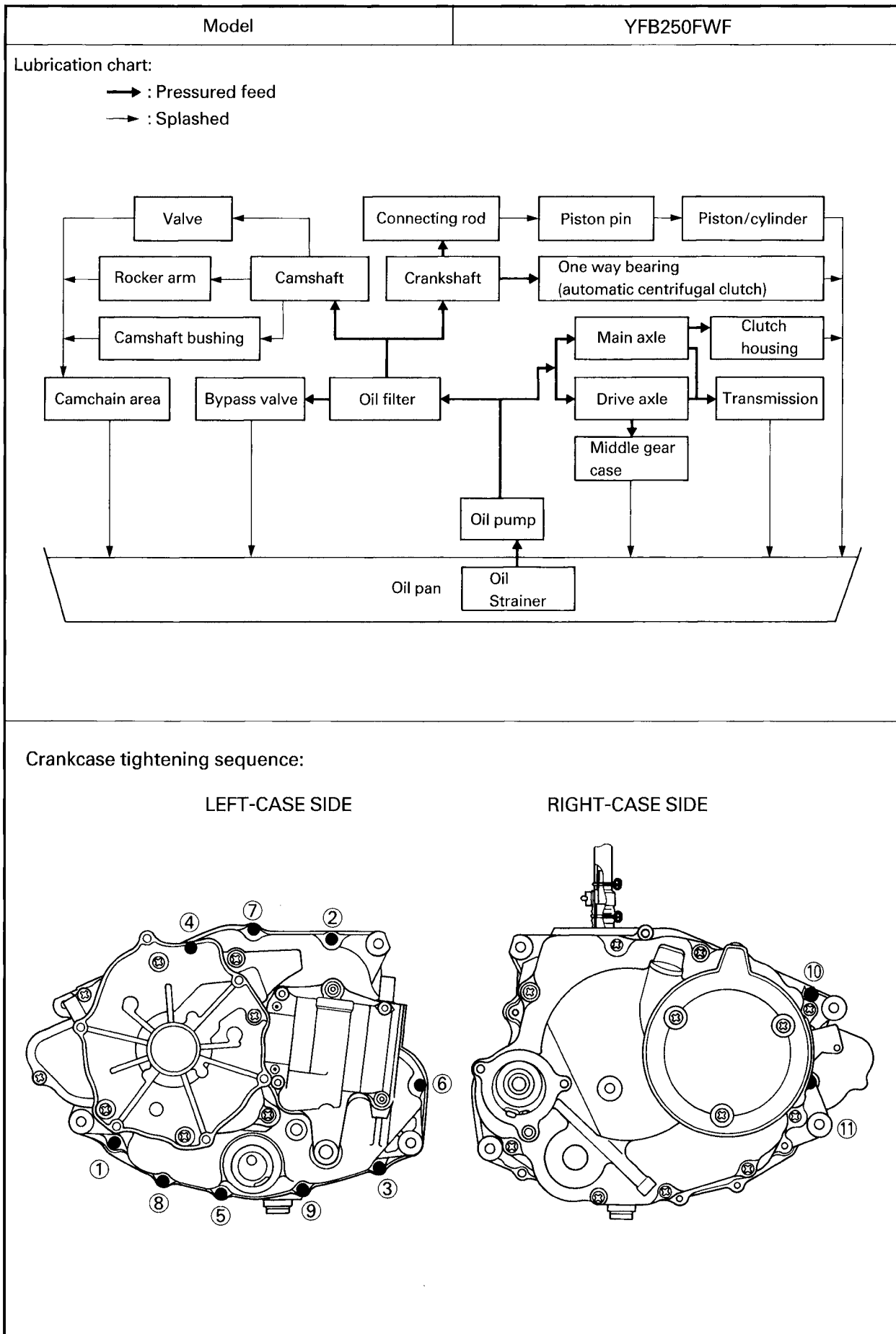
## MAINTENANCE SPECIFICATIONS

SPEC



Model	YFB250FWF
Transmission:	
Main axle deflection limit	0.08 mm (0.003 in)
Drive axle deflection limit	0.08 mm (0.003 in)
Shifter:	
Shifter type	Cam drum and guide bar
Guide bar bending limit	0.8 mm (0.031 in)
Carburetor:	
I.D. mark	4KD 00
Main jet (M.J)	#85
Main air jet (M.A.J)	0.7
Jet needle (J.N)	5L10-4
Needle jet (N.J)	O-4 (#390)
Cutaway (C.A)	3.5
Pilot air jet (P.A.J.1)	#120
Pilot outlet (P.O)	0.7
Pilot jet (P.J)	#20
Bypass 1 (B.P.1)	0.9X3.0
Pilot screw (P.S)	1-1/2
Valve seat size (V.S)	1.8
Starter jet (G.S.1)	#50
Starter jet (G.S.2)	0.9
Float height (F.H)	21~22 mm (0.83~0.87 in)
Fuel level (F.L)	2~4 mm (0.08~0.16 in)
Engine idle speed	1,350~1,450 r/min
Intake vacuum	30.3 kPa (230 mmHg, 9.055 inHg)
Lubrication system:	
Oil filter type	Wire mesh type
Oil pump type	Trochoid type
Tip clearance	0.15 mm (0.006 in)
Side clearance	0.04~0.09 mm (0.002~0.004 in)
Bypass valve setting pressure	80~120 kPa (0.8~1.2 kg/cm <sup>2</sup> , 11.38~17.07 psi)
Oil pressure (hot)	55 kPa (0.55 kg/cm <sup>2</sup> , 7.82 psi) at 7,700 r/min
Pressure check location	ELEMENT COVER
Shaft drive:	
Middle gear backlash (forward)	0.1~0.2 mm (0.004~0.008 in)
Middle gear backlash (reverse)	0.10~0.25 mm (0.004~0.010 in)
Final gear backlash	0.1~0.2 mm (0.004~0.008 in)





## MAINTENANCE SPECIFICATIONS

SPEC



## Tightening Torque

Parts to be tightened	Parts name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Cylinder head (oil gallery plug)	Bolt	M6	1	7	0.7	5.1	Apply oil to the washer
Cylinder head and cylinder	Bolt	M8	4	22	2.2	16	
Cylinder head	Bolt	M8	2	22	2.2	16	
Cam sprocket cover	Screw	M6	2	7	0.7	5.1	Use lock washer
Tappet cover (intake)	Bolt	M6	2	10	1.0	7.2	
Tappet cover (exhaust)	Bolt	M6	3	10	1.0	7.2	
Camshaft bushing retainer	Bolt	M6	2	8	0.8	5.8	
Spark plug	—	M12	1	17.5	1.75	12.5	
Cylinder	Bolt	M6	2	10	1.0	7.2	Use lock washer
Balancer shaft	Nut	M14 × 1.0	1	50	5.0	36	
Rotor	Bolt	M10 × 1.25	1	50	1.0	36	
Valve adjusting nut	Nut	M6	2	14	1.4	10	Tighten cable guide together
Cam sprocket	Bolt	M10	1	60	6.0	4.3	
Cam chain tensioner	Bolt	M6	2	10	1.0	7.2	
Chain guide (intake)	Bolt	M6	2	8	0.8	5.8	
Oil pump	Screw	M6	3	7	0.7	5.1	
Drain plug	Straight screw plug	M14	1	23	2.3	17	
Oil strainer drain plug	Straight screw plug	M35	1	43	4.3	31	
Oil filter cover (drain)	Bolt	M6	1	10	1.0	7.2	
Oil filter cover	Bolt	M6	1	10	1.0	7.2	
Carburetor joint and cylinder head	Bolt	M6	2	12	1.2	8.7	
Carburetor and carburetor joint	Nut	M6	2	8	0.8	5.8	Stake
Carburetor and joint hose	Hose clamp	M4	1	2	0.2	1.4	
Air filter case and joint hose	Hose clamp	M5	2	2	0.2	1.4	
Air filter case and air duct	Hose clamp	M5	2	2	0.2	1.4	
Muffler	Bolt	M8	2	27	2.7	19	
Muffler and exhaust pipe	Bolt	M8	1	20	2.0	1.4	
Exhaust pipe	Bolt	M6	2	10	1.0	7.2	
Crankcase	Screw	M6	11	7	0.7	5.1	
Crankcase spacer (left)	Screw	M6	8	7	0.7	5.1	
Crankcase spacer (right)	Screw	M6	3	7	0.7	5.1	
Bearing retainer (crankcase cover-right)	Screw	M6	3	7	0.7	5.1	Use lock washer
Bearing retainer (crankcase spacer-left)	Screw	M5	3	4	0.4	2.9	
Clutch cover protector	Screw	M6	3	7	0.7	5.1	
Crankcase cover (right)	Screw	M6	9	7	0.7	5.1	
Crankcase cover (left)	Screw	M6	4	10	1.0	7.2	
Clutch carrier assembly	Nut	M22	1	78	7.8	56	
Clutch spring	Screw	M5	4	6	0.6	4.3	
Clutch boss	Nut	M14	1	50	5.0	36	
Shift cam segment	Screw	M6	1	12	1.2	8.7	
Lock nut (Clutch release adjuster)	Nut	M8	1	15	1.5	11	
Starter clutch	Bolt	M8	3	30	3.0	22	Stake
Starter motor	Screw	M6	2	7	0.7	5.1	
Pinion gear (drive axle)	Nut	M16	1	90	9.0	65	Stake
Bearing retainer (drive axle)	Screw	M8	3	25	2.5	18	
Shift pedal	Bolt	M6	1	10	1.0	7.2	Stake
Magneto base	Screw	M6	3	7	0.7	5.1	
Neutral switch	—	M10	1	20	2.0	14	
Reverse switch	—	M12	1	20	2.0	14	

## MAINTENANCE SPECIFICATIONS

SPEC



Parts to be tightened	Parts name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Middle gear case and transfer gear case:							
Bearing retainer (Bearing housing)	Nut	—	1	60	6.0	43	
	Nut	—	1	60	6.0	43	
	Nut	—	1	60	6.0	43	
Bearing housing and transfer gear case	Bolt	M8	4	23	2.3	17	
Middle driven axle and U-joint (rear drive)	Nut	M12	1	60	6.0	43	
Oil filler bolt	Straight screw plug	M14	1	23	2.3	17	
Transfer gear cases	Bolt	M6	5	10	1.0	7.2	
Drain plug	Bolt	M8	1	20	2.0	14	
Middle driven axle and U-joint (front drive)	Nut	M14	1	90	9.0	65	
Drive select lever component:							
Drive select lever assembly	Bolt	M6	2	12	1.2	8.7	
Timing plug	Straight screw plug	M14	1	15	1.5	11	Apply sealant
Locknut (joint rod adjuster)	Nut	M8	2	15	1.5	11	
Lever complete	Bolt	M6	1	11	1.1	8.0	
Final drive gear component:							
Oil filler bolt	Bolt	M14	1	23	2.3	17	
Drain plug	Bolt	M14	1	23	2.3	17	
Bearing housing (ring gear)	Bolt	M10	2	40	4.0	29	
	Bolt	M8	6	23	2.3	17	
Bearing retainer	—	—	1	100	10.0	72	
Differential gear component:							
Differential gear case and frame:							
Front	Bolt	M10	4	52	5.2	37	
Rear	Bolt	M8	2	30	3.0	22	
Drain plug: Front	Straight screw plug	M14	2	23	2.3	17	
Rear	Bolt	M8	1	16	1.6	11	
Oil filler bolt	Straight screw plug	M14	1	23	2.3	17	
Bearing housing	Bolt	M10	2	40	4.0	29	
	Bolt	M8	1	23	2.3	16	
Ring gear stopper	Nut	M8	1	16	1.6	11	
Differential assembly and ring gear	Bolt	M8	6	64	6.4	46	Use lock washer
U-joint and nut	Nut	M14	1	—	—	—	See NOTE Stake

## NOTE:

Starting torque: 0.8~1.3 Nm (0.08~0.13 m · kg, 0.58~0.94 ft · lb)

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## MAINTENANCE SPECIFICATIONS

SPEC



## CHASSIS

Model	YFB250FWF
<b>Front suspension:</b> Shock absorber travel Fork spring free length Spring rate (K1) Stroke (K1) Optional spring	115 mm (4.53 in) 302 mm (11.9 in) 10.0 N/mm (1 kg/mm 56.0 lb/in) 0~115 mm (0.00~4.53 in) No
<b>Rear suspension:</b> Shock absorber travel Spring free length Fitting length Spring rate (K1) Stroke (K1) Optional spring	80 mm (3.15 in) 221 mm (8.70 in) 200.5 mm (7.89 in) 45.0 N/mm (4.5 kg/mm 252.0 lb/in) 0~80 mm (0.00~3.15 in) No
<b>Swingarm:</b> Free play limit	end side 1 mm (0.04 in) 1 mm (0.04 in)
<b>Front wheel:</b> Type Rim size Rim material Rim runout limit	Panel wheel 10×6.0AT Steel radial lateral 2 mm (0.08 in) 2 mm (0.08 in)
<b>Rear wheel:</b> Type Rim size Rim material Rim runout limit	Disc wheel 10×8.0AT Steel radial lateral 2 mm (0.08 in) 2 mm (0.08 in)
<b>Front drum brake:</b> Type Brake drum inside diameter <Limit> Lining thickness <Limit> Shoe spring free length	Leading, trailing 160 mm (6.30 in) <161 mm (6.34 in)> 4 mm (0.16 in) <2 mm (0.08 in)> 71 mm (2.80 in)

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## MAINTENANCE SPECIFICATIONS

SPEC



Model	YFB250FWF
<b>Rear drum brake:</b> Type Brake drum inside diameter <Limit> Lining thickness <Limit> Shoe spring free length	Leading, trailing 160 mm (6.30 in) <161 mm (6.34 in)> 4 mm (0.16 in) <2 mm (0.08 in)> 71 mm (2.80 in)
<b>Brake lever &amp; brake pedal:</b> Brake lever free play (at lever pivot) Brake lever free play (left) (at lever pivot) Brake pedal free play	5~8 mm (0.2~0.3 in) 5~8 mm (0.2~0.3 in) 20~30 mm (0.8~1.2 in)

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## MAINTENANCE SPECIFICATIONS

SPEC



## Tightening Torque

Parts to be tightened	Parts name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Front panel wheel and brake drum	Nut	M10 × 1.25	8	55	5.5	40	
Front brake drum and drive shaft	Nut	M16 × 1.5	2	130	13.0	94	
Front brake cam lever and cam shaft	Bolt	M6 × 1.0	2	9	0.9	6.5	
Front backing plate and steering knuckle	Bolt	M8 × 1.25	4	30	3.0	22	
Steering knuckle and front shock absorber	Nut	M12 × 1.25	4	69	6.9	50	
Front shock absorber and frame	Nut	M35 × 1.5	2	55	5.5	40	
Steering knuckle and tie-rod end	Nut	M10 × 1.25	2	25	2.5	18	
Tie-rod and locknut	Nut	M10 × 1.25	4	30	3.0	22	
Steering shaft and tie-rod end	Nut	M10 × 1.25	2	25	2.5	18	
Steering shaft (lower) and frame	Nut	M12 × 1.25	1	84	8.4	61	
Steering shaft holder and frame	Bolt	M8 × 1.25	2	23	2.3	17	Use lock washer
Steering shaft and upper handlebar holder	Bolt	M8 × 1.25	4	20	2.0	14	
Front lower arm and frame	Nut	M10 × 1.25	4	45	4.5	32	
Front lower arm and steering knuckle	Nut	M10 × 1.25	2	48	4.8	35	
Bearing holder (steering shaft) and frame	—	M42 × 1.0	1	40	4.0	29	
Engine stay and frame (upper)	Bolt	M8 × 1.25	2	30	3.0	22	
Engine mounting (upper)	Nut	M8 × 1.25	1	30	3.0	22	
Engine stay and frame (front)	Nut	M8 × 1.25	2	30	3.0	22	
Engine mounting (front)	Nut	M8 × 1.25	1	30	3.0	22	
Engine mounting (rear-upper)	Nut	M8 × 1.25	1	30	3.0	22	
Engine mounting (rear-lower)	Bolt	M8 × 1.25	1	30	3.0	22	Use spring nut
Front fender and fuel tank cover	Screw	M5	2	2	0.2	1.4	
Front bumper and frame	Bolt	M8 × 1.25	4	30	3.0	22	
Rear fender stay and frame	Bolt	M8 × 1.25	2	16	1.6	11	
Rear fender stay and rear bumper	Bolt	M8 × 1.25	2	16	1.6	11	
Footrest and frame	Bolt	M10 × 1.25	4	55	5.5	40	
Rear panel wheel and wheel hub/brake drum	Nut	M10 × 1.25	8	55	5.5	40	
Rear axle and nut	Nut	M16 × 1.5	2	150	15	110	
Rear brake cam lever and cams shaft	Bolt	M6 × 1.0	1	9	0.9	6.5	
Rear backing plate and swingarm	Bolt	M8 × 1.25	4	28	2.8	20	
Pivot shaft and frame	—	M22 × 1.5	2	6	0.6	4.3	
Pivot shaft and nut	Nut	M22 × 1.5	2	130	13	94	
Swingarm and final drive gear case (front)	Nut	M8 × 1.25	4	35	3.5	25	
Swingarm and final drive gear case (rear)	Bolt	M10 × 1.25	4	47	4.7	34	
Rear shock absorber (upper) and frame	Nut	M12 × 1.25	1	50	5.0	36	
Differential gear case and frame (front)	Bolt	M10 × 1.25	2	52	5.2	37	
Differential gear case and frame (rear)	Bolt	M8 × 1.25	4	30	3.0	22	
Fuel tank and fuel cock	Screw	M6 × 1.0	2	5	0.5	3.6	

## MAINTENANCE SPECIFICATIONS

SPEC



## ELECTRICAL

Model	YFB250FWF
Voltage:	12 V
Ignition system: Ignition timing (B.T.D.C.) Advanced timing (B.T.D.C.) Advancer type	10° at 10 r/min 30° at 6,000 r/min Electrical type
C.D.I.: Magneto model/manufacture Pickup coil resistance/color  Source coil resistance/color C.D.I. unit model/manufacture	4BD/MITSUBISHI 189~231 $\Omega$ at 20°C (68°F)/White/Green—White/ Red 270~330 $\Omega$ at 20°C (68°F)/Brown—Black 4BD/MITSUBISHI
Ignition coil: Model/manufacture Primary winding resistance Secondary winding resistance	F6T535/MITSUBISHI 0.36~0.48 $\Omega$ at 20°C (68°F) 5.44~7.36 k $\Omega$ at 20°C (68°F)
Spark plug cap: Type Resistance	Resin type 5 k $\Omega$
Charging system: Type Nominal output Starter coil resistance/color	A.C. magneto generator 14 V 18 A at 8,000 r/min 0.45~0.55 $\Omega$ at 20°C (68°F)/White—White
Rectifier: Model/manufacture Capacity Withstand voltage	SH535-12/SHINDENGEN 14 A 240 V
Battery: Specific gravity	1.280

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## MAINTENANCE SPECIFICATIONS

SPEC



Model	YFB250FWF
Electric starter system:	
Type	Constant mesh type
Starter motor:	
Model/manufacturer	4BD/MITSUBA
Output	0.4 kW
Armature coil resistance	0.021~0.025 $\Omega$ at 20°C (68°F)
Brush overall length	10.5 mm (0.41 in)
<Limit>	<5 mm (0.20 in)>
Spring force	400~660 g (14.1~23.3 oz)
Commutator diameter	23 mm (0.91 in)
<Wear limit>	<22 mm (0.87 in)>
Mica undercut	1.8 mm (0.07 in)
Starter switch:	
Model/manufacturer	A104-132/HITACHI
Amperage rating	100 A
Coil winding resistance	3.9~4.7 $\Omega$ at 20°C (68°F)
Circuit breaker:	
Type	Fuse
Amperage for individual circuit	
MAIN	30 A×1 pc
Reserve	30 A×1 pc

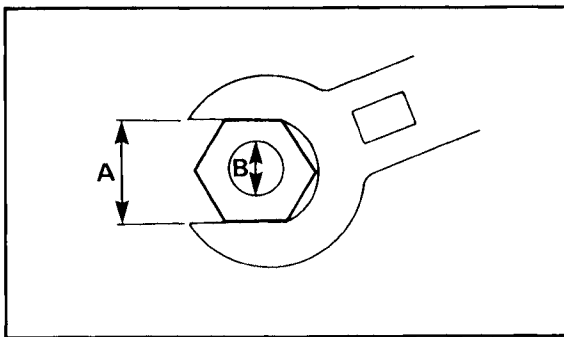
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**GENERAL TORQUE SPECIFICATIONS****SPEC****GENERAL TORQUE SPECIFICATIONS**

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.

A (Nut)	B (Bolt)	General torque specifications		
		Nm	m•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	6.1
22 mm	16 mm	130	13.0	94



A: Distance across flats  
B: Outside thread diameter

**2**

**LUBRICATION POINTS AND LUBRICANT TYPE****SPEC**
**LUBRICATION POINTS AND LUBRICANT TYPE**  
**ENGINE**

Lubrication points (part name)	Lubricant type
Oil seal lips (all)	
O-rings (all)	
Bearings (all)	
Washer (cylinder head bolt)	
Crank pin	
Connecting rod (big end)	
Piston and piston pin	
Piston and piston ring	
Buffer boss	
Valve stem and valve guide	
Oil Seal (valve stem seal)	
Rocker arm shaft and rocker arm	
Cam and bearing (camshaft)	
O-ring (drain plug)	
Push rod	
Primary driven gear and main axle	
Sliding gear (transmission)	
Free movement gear (transmission)	
Shift fork and guide bar	
Shift cam and bearing (shift cam)	
Shift shaft	
Shift ball holder and guide	
Shift shaft and shift pedal	
Crankcase and left crankcase spacer (mating surfaces)	Sealant (Quick Gasket®) Yamaha bond No. 1215

2

**LUBRICATION POINTS AND LUBRICANT TYPE****SPEC****CHASSIS**

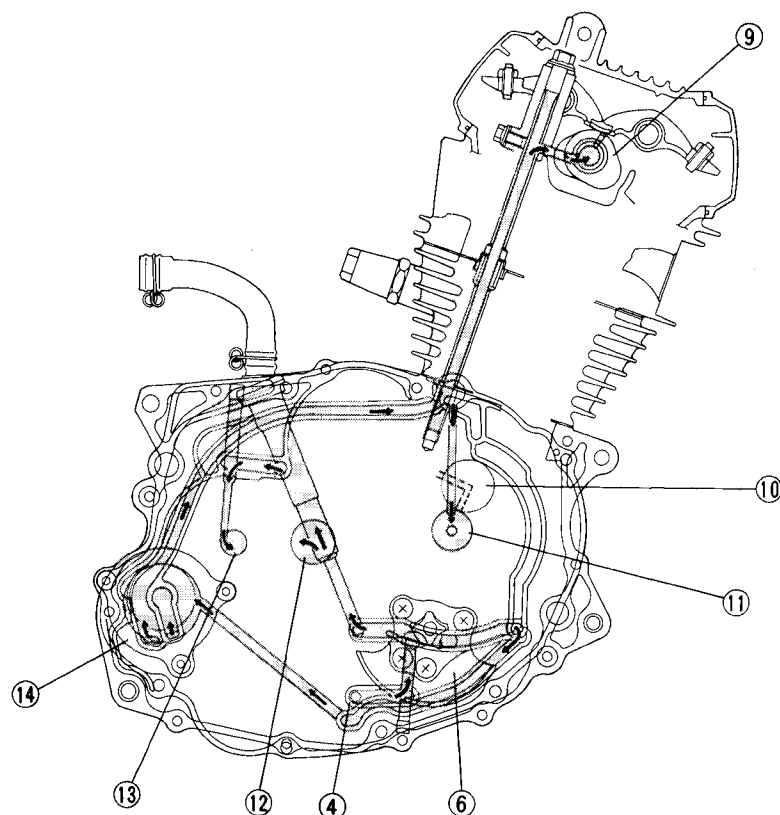
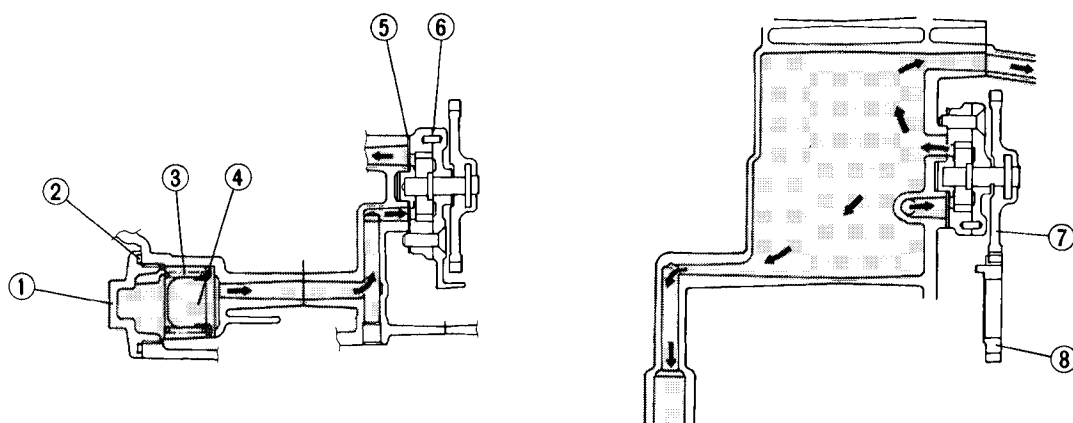
Lubrication points (part name)	Lubricant type
Oil seal lips (all)	
O-rings (all)	
Steering shaft (bushes)	
Backing plates (dust seal lips)	Yamaha brake grease
Wheel bearings	
Throttle cable end (at throttle lever)	
Brake cable ends	
Front lower arms (ball joint)	
Pivot shafts	
Swingarm (bearings)	
Brake lever (pivoting point)	
Throttle lever (pivoting point)	
Brake pedal (pivoting point)	
Front and rear brake cam shaft and pivot pin	
Drive select lever (pivoting point)	
Rear shock absorber (bushes)	
Rear backing plate and swingarm	Sealant (Quick Gasket®) Yamaha bond No. 1215
Front backing plate and steering knuckle	Sealant (Quick Gasket®) Yamaha bond No. 1215
Front and rear backing plates and brake cam brackets	Sealant (Quick Gasket®) Yamaha bond No. 1215
Rear final gear case and swingarm	Sealant (Quick Gasket®) Yamaha bond No. 1215

**2**



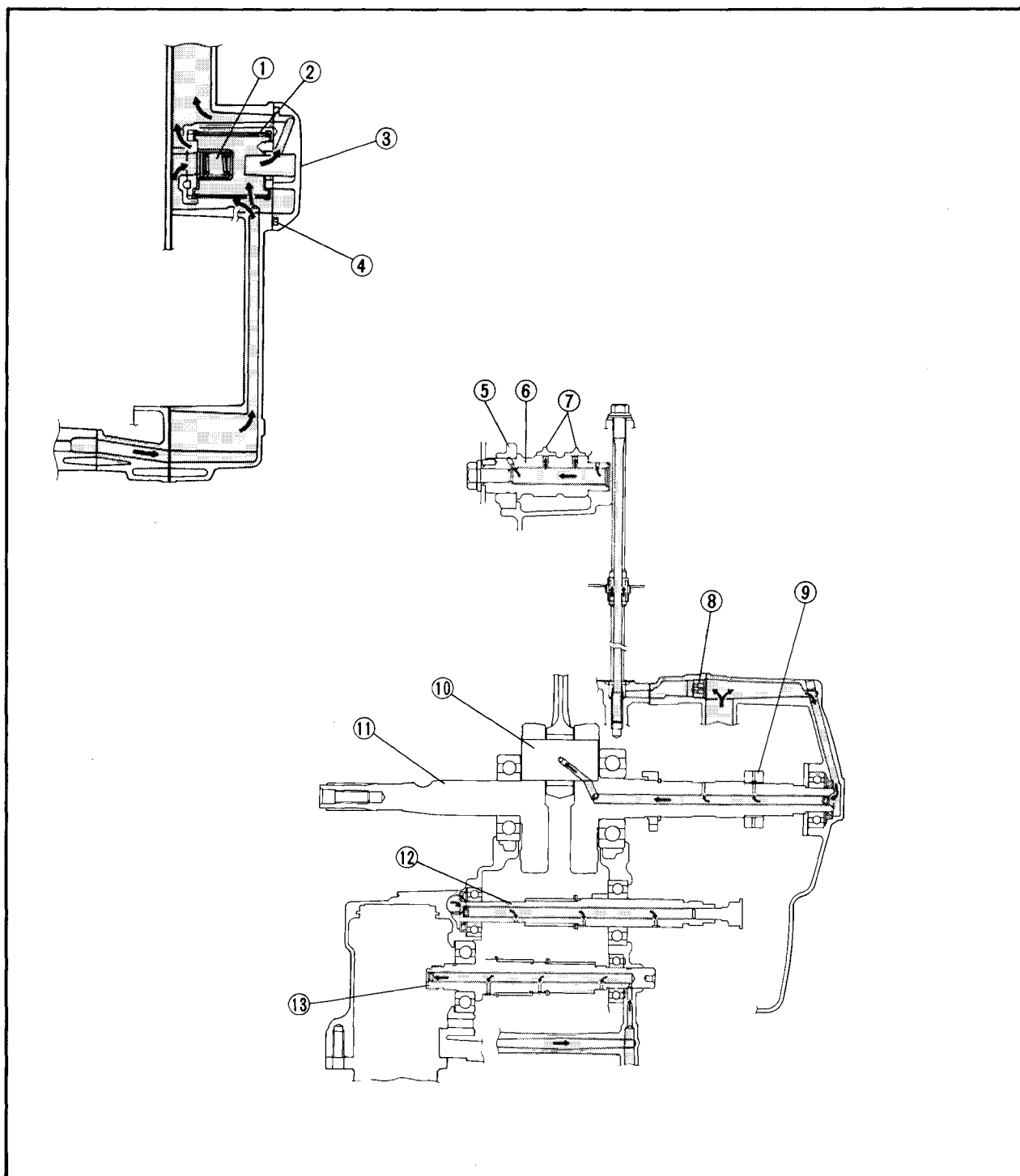
## LUBRICATION DIAGRAMS

- |                        |                       |
|------------------------|-----------------------|
| ① Drain plug           | ⑧ Oil pump drive gear |
| ② O-ring               | ⑨ Camshaft            |
| ③ Compression spring   | ⑩ Crank pin           |
| ④ Oil strainer         | ⑪ Crankshaft          |
| ⑤ Oil pump gasket      | ⑫ Main axle           |
| ⑥ Oil pump assembly    | ⑬ Drive axle          |
| ⑦ Oil pump driven gear | ⑭ Oil filter          |





- |                        |  |
|------------------------|--|
| ① Bypass valve         | ⑨ One way bearing<br>(Automatic centrifugal<br>clutch) |
| ② Oil filter           | ⑩ Crank pin  |
| ③ Oil filter cover     | ⑪ Crankshaft   |
| ④ O-ring               | ⑫ Main axle  |
| ⑤ Collar               | ⑬ Drive axle   |
| ⑥ Camshaft             |  |
| ⑦ Rocker arm           |  |
| ⑧ Check valve assembly |  |

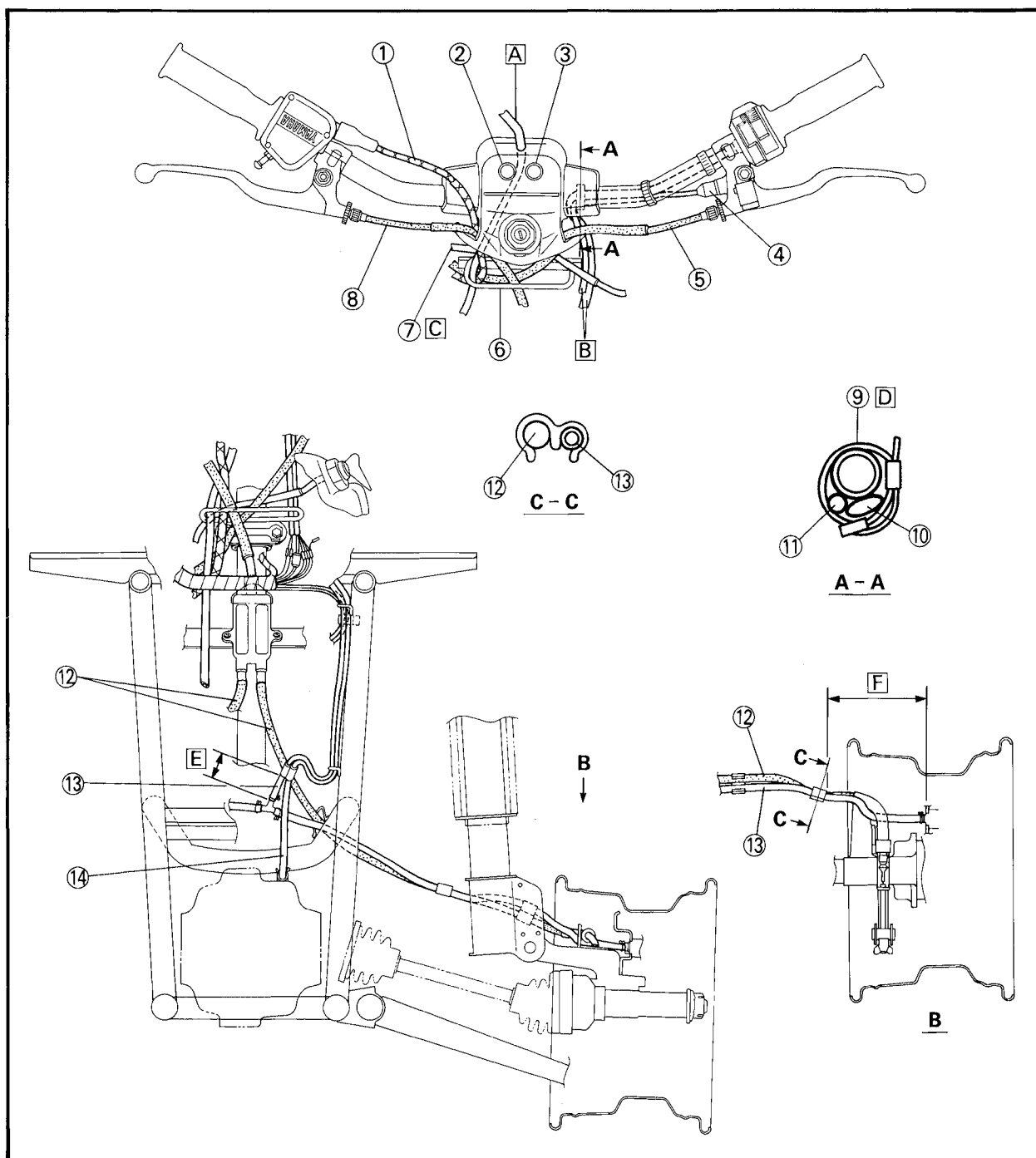


2



## CABLE ROUTING

- ① Throttle cable
  - ② "NEUTRAL" indicator light
  - ③ "REVERSE" indicator light
  - ④ Front brake switch
  - ⑤ Brake cable 1
  - ⑥ Guide
  - ⑦ Starter cable
  - ⑧ Brake cable 4
  - ⑨ Band
  - ⑩ Handlebar switch lead
  - ⑪ Front brake switch lead
  - ⑫ Brake cable 3
  - ⑬ Front brake drum breather hose
  - ⑭ Differential gear case breather hose
- A** Pass the fuel tank breather hose through the handlebar protector hole.
- B** Pass the handlebar switch lead and brake switch lead behind the starter cable. Do not pass the lead in the guide.
- C** Pass the starter cable behind the throttle cable and the brake cable 1 and 4. Do not pass the starter cable through the guide.
- D** Bind the leads together, clamp them underneath the handlebar. The clamping portion should be located under the handlebar.
- E** 15~30 mm (0.59~1.18 in)
- F** This part of the brake drum breather hose should be tight.



# CABLE ROUTING

SPEC

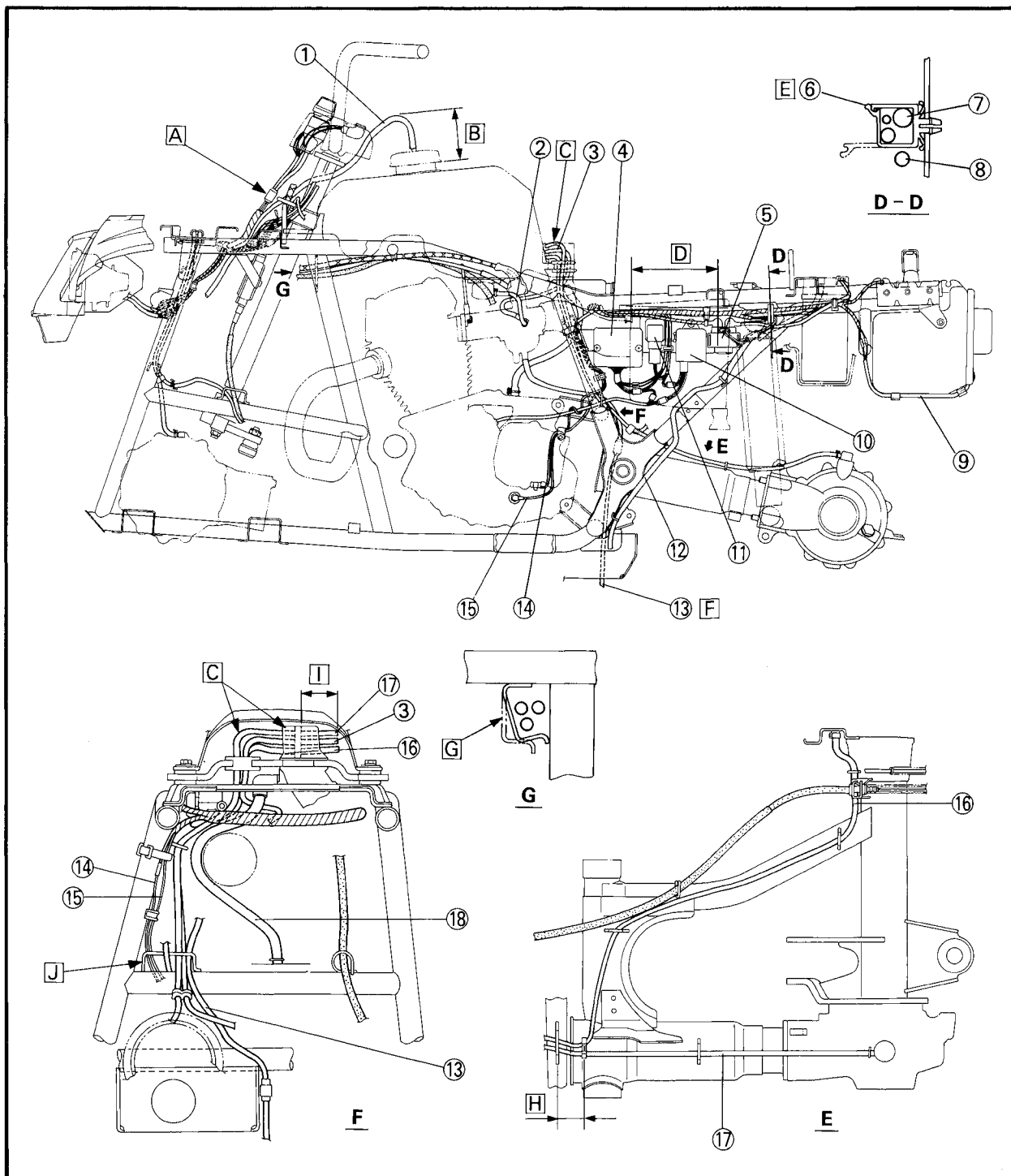


- ① Fuel tank breather hose
- ② Fuel hose
- ③ Carburetor air vent hose
- ④ Rectifier/regulator
- ⑤ Starter relay
- ⑥ Clamp
- ⑦ Wireharness
- ⑧ Battery positive ⊕ lead
- ⑨ Wire sub lead

- ⑩ CDI unit
- ⑪ Starting circuit cut-off relay
- ⑫ Battery breather hose
- ⑬ Carburetor over flow hose
- ⑭ Reverse switch lead
- ⑮ Neutral switch lead
- ⑯ Rear brake drum breather hose

- ⑰ Final gear case breather hose
- ⑱ Crankcase breather hose

- [A] Pass the main switch lead and indicator lights lead in front of the guide.
- [B] 100 mm (3.94 in)



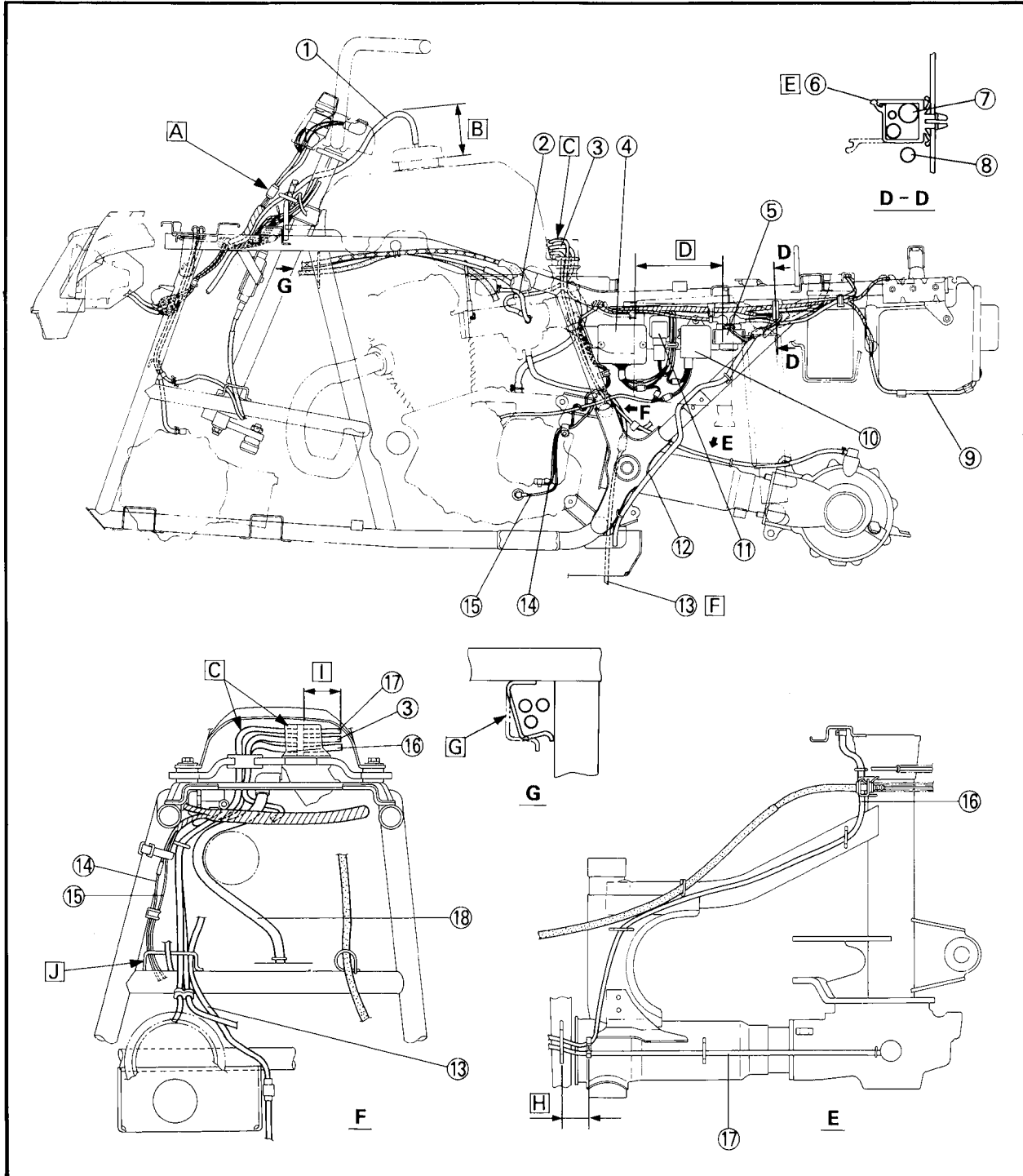
2

## CABLE ROUTING

SPEC



- C** Pass the carburetor air vent hose, rear brake drum breather hose and final gear case breather hose through the rubber grommet hole and connect the hoses to the air duct. Be careful not to squeeze or twist the hose.  
**D** This part of the starter motor lead should be tight.  
**E** Securely set the clamp nail.  
**F** Pass the over flow hose between the swingarm and the engine, then above the frame cross pipe and pull it downward. Make sure the hose is routed so that it will not get obstructed or damaged.  
**G** Bend the clamp till it touch the frame.  
**H** 60~70 mm (2.36~2.76 in)  
**I** 40~50 mm (1.57~1.97 in)  
**J** Pass the both breather hoses, over flow hose, CDI magneto lead through the cable guide of frame.

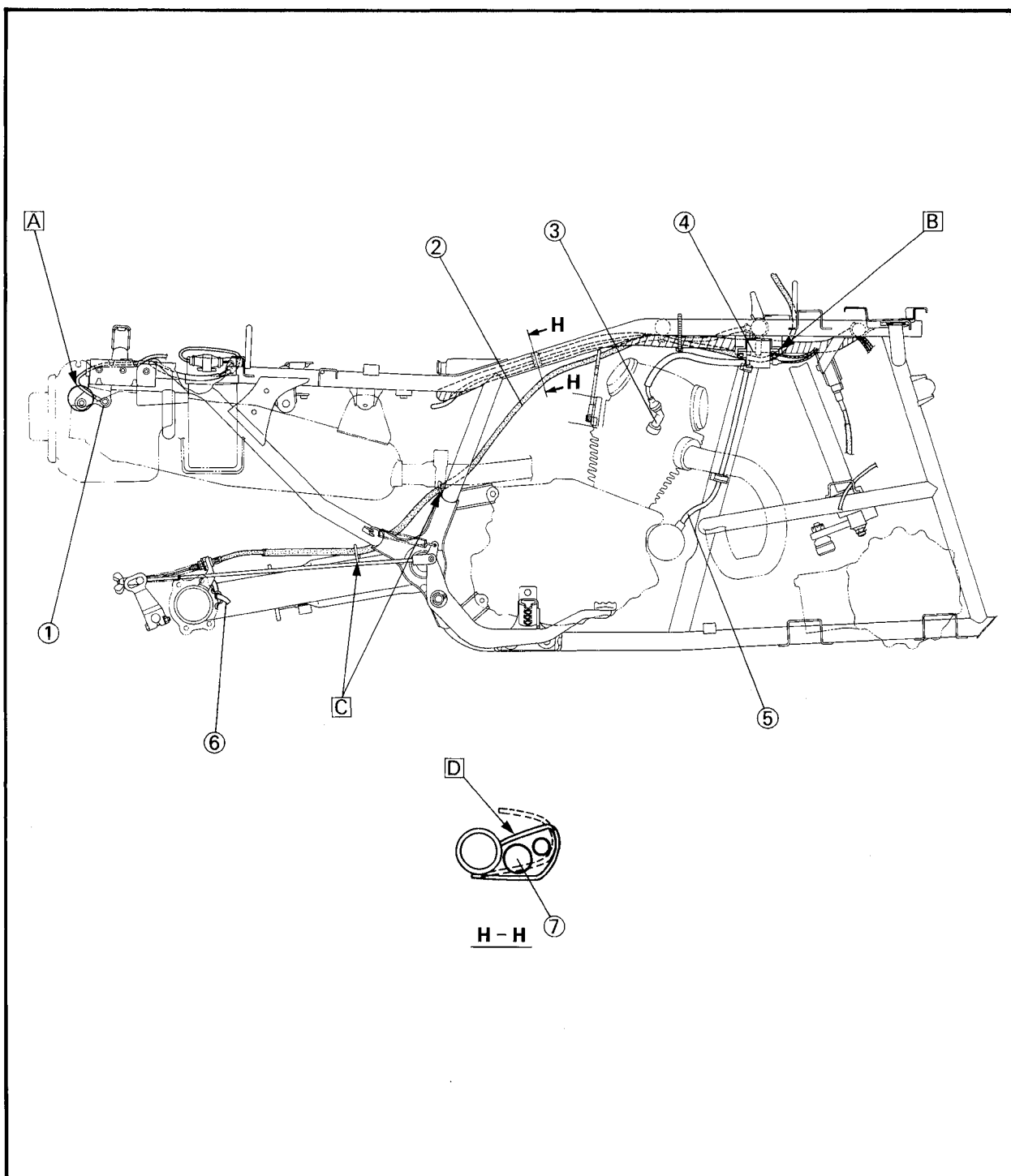




**CABLE ROUTING****SPEC**

- ① Earth bolt
- ② Brake cable 1
- ③ Spark plug cap
- ④ Ignition coil assembly
- ⑤ Starter motor cable
- ⑥ Rear brake drum breather hose
- ⑦ Wireharness

- [A] Do not pinch the battery negative (-) lead with the box mounting bolt.
- [B] Tighten the wireharness ground lead and ignition coil together.
- [C] Pass the brake cable 1 through the cable guide.
- [D] Close the clamp towards the centerline of the pipe as shown in the illustration.

**2**

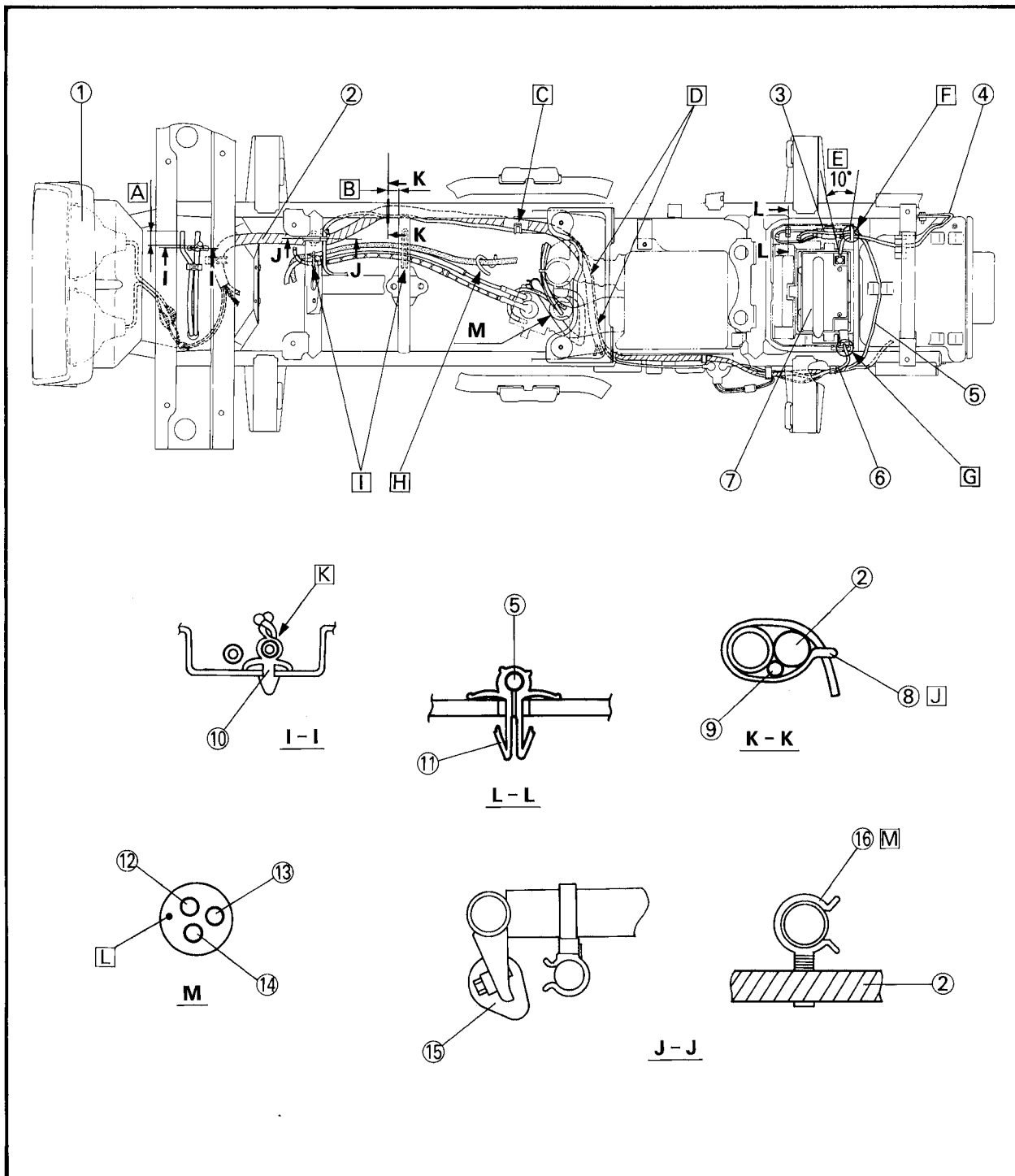
## CABLE ROUTING

SPEC



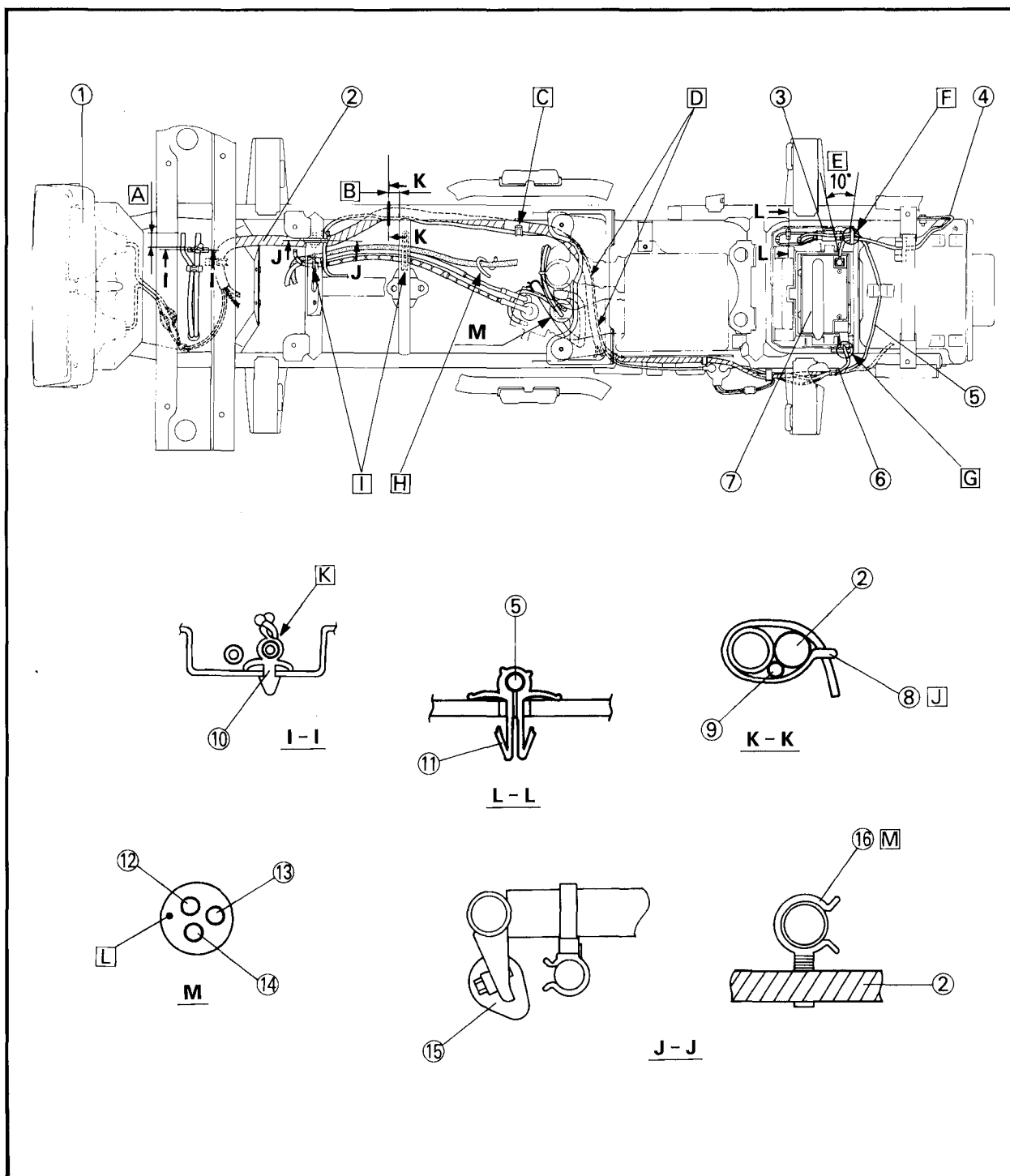
- |                           |                                 |  |
|---------------------------|---------------------------------|--|
| ① Headlight assembly      | ⑩ Clip                          | [A] 30~40 mm (1.18~1.58 in)  |
| ② Wireharness             | ⑪ Clamp                         | [B] 10 mm (0.39 in)  |
| ③ Fuse holder             | ⑫ Rear brake drum breather hose | [C] Align the white tape on the wireharness with the clamp of the frame. |
| ④ Battery negative ⊖ lead | ⑬ Carburetor air vent hose      | [D] Pass the starter motor lead over the duct.                           |
| ⑤ Fuse holder lead        | ⑭ Final gear case breather hose | [E] Refer to the figure when installing the battery negative (-) lead.   |
| ⑥ Battery positive ⊕ lead | ⑮ Ignition coil                 |  |
| ⑦ Battery                 | ⑯ Clamp                         |  |
| ⑧ Clamp                   |                                 |  |
| ⑨ Starter motor cable     |                                 |  |

2



**CABLE ROUTING****SPEC**

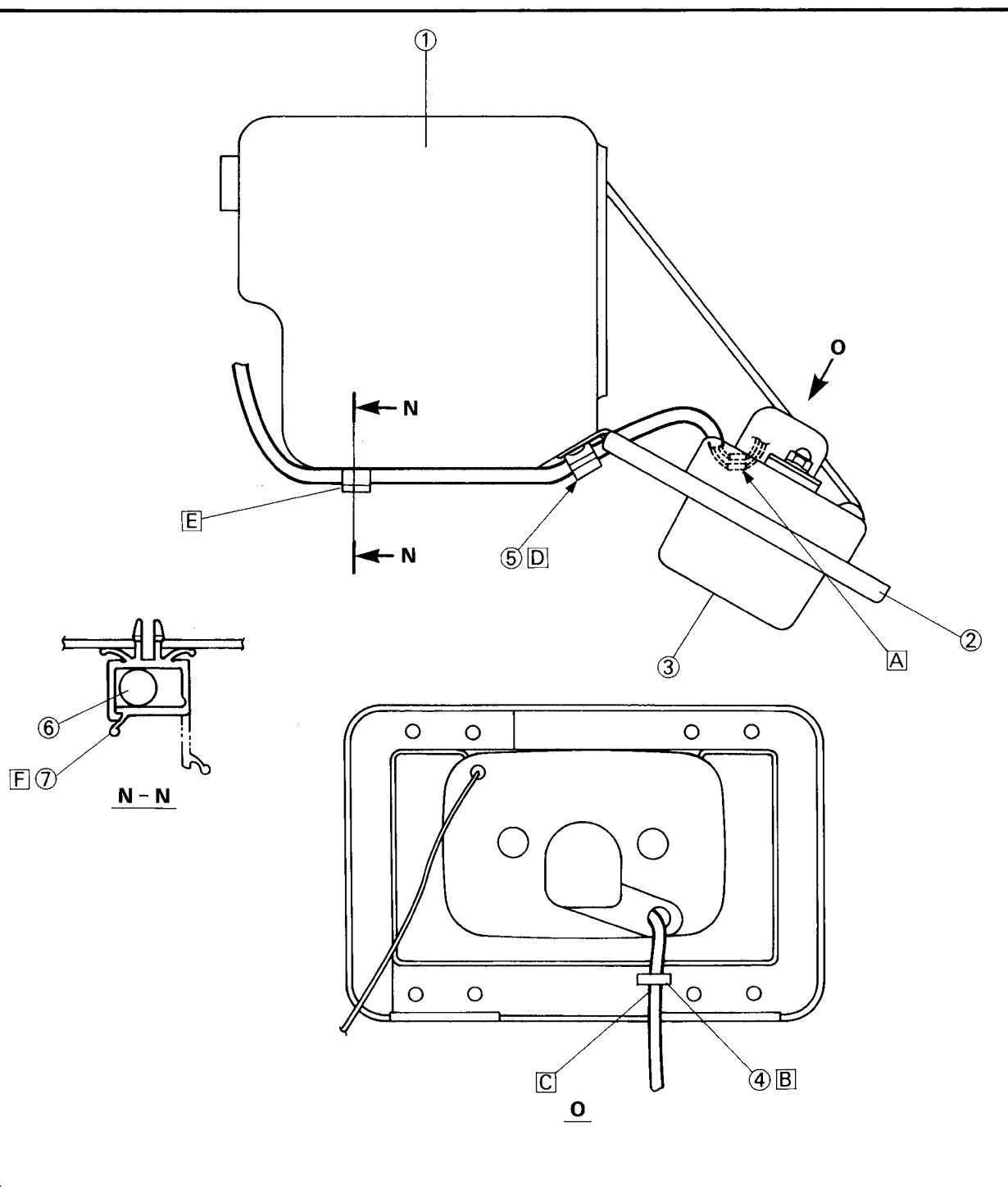
- F** Pass the battery negative (-) lead and fuse holder lead through the rear fender hole.
- G** Pass the battery positive (+) lead through the rear fender hole.
- H** Pass the brake cable 1 through the cable guide.
- I** Pass the throttle cable, starter cable and brake cable 1 through the cable guide.
- J** Bind the wireharness and the leads together, clamp them underneath the frame. The band end should be located under the frame.
- K** After installing the breather hose (either front brake drum breather hose or differential gear case breather hose), securely twist the clip arms.
- L** When installing make sure the mark is facing forward.
- M** Securely install the clamp onto the frame as shown below.

**2**

**CABLE ROUTING****SPEC**

- ① Box complete
- ② Lid
- ③ Taillight unit assembly
- ④ Clamp
- ⑤ Clamp
- ⑥ Wire sub lead
- ⑦ Clamp

- [A] Connect the tail light lead and the wire sub lead on the inside of the box lid.
- [B] Pass the wire sub lead through the clamp.
- [C] Pass the wire sub lead through the lid slit.
- [D] Clamp the wire sub lead.
- [E] Pass the wire sub lead through the clamp.
- [F] Securely install the clamp.

**2**

# INTRODUCTION/ PERIODIC MAINTENANCE/LUBRICATION

**INSP**  
**ADJ**


## PERIODIC INSPECTION AND ADJUSTMENT

### INTRODUCTION

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

### PERIODIC MAINTENANCE/LUBRICATION

Item	Remarks	Initial			Every	
		1 month	3 months	6 months	6 months	1 year
Valve(s)*	Check valve clearance. Adjust if necessary.	○		○	○	○
Spark plug	Check condition. Clean or replace if necessary.	○	○	○	○	○
Air filter	Clean. Replace if necessary.	Every 20 ~ 40 hours (More often in wet or dusty areas.)				
Carburetor*	Check idle speed/starter operation. Adjust if necessary.		○	○	○	○
Fuel line*	Check fuel hose for cracks or damage. Replace if necessary.			○	○	○
Engine oil	Replace (Warm engine before draining).	○		○	○	○
Transfer gear oil						
Engine oil filter	Replace.	○		○		○
Engine oil strainer	Clean.	○		○		○
Final gear oil	Check oil level/oil leakage. Replace every 12 months.	○				○
Differential gear oil						
Brakes*	Check operation. Adjust if necessary.	○	○	○	○	○
Clutch*	Check operation. Adjust if necessary.	○		○	○	○
Wheels*	Check balance/damage/runout. Repair if necessary.	○		○	○	○
Wheel bearing*	Check bearing assembly for looseness/damage. Replace if damaged.	○		○	○	○
Steering system*	Check operation/Replace if damaged. Check toe-in/Adjust if necessary.	○	○	○	○	○
Rubber boots*	Check operation./Replace if damaged.	○				○
Fittings/Fasteners*	Check all chassis fittings and fasteners. Correct if necessary.	○	○	○	○	○
Battery*	Check specific gravity. Check that the breather pipe is working properly. Correct if necessary.	○	○	○	○	○

\* : It is recommended that these items be serviced by a Yamaha dealer or other qualified mechanic. (For USA)

\* : It is recommended that these items be serviced by a Yamaha dealer. (Except for USA)

**3**

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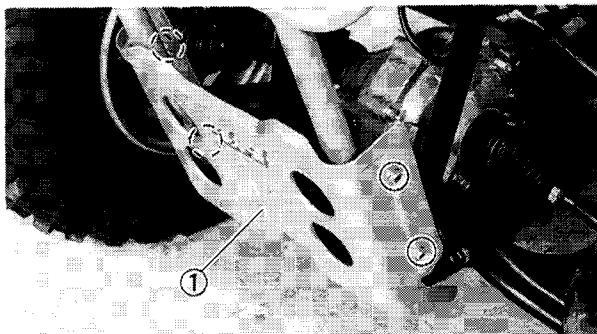


## FENDERS AND FUEL TANK

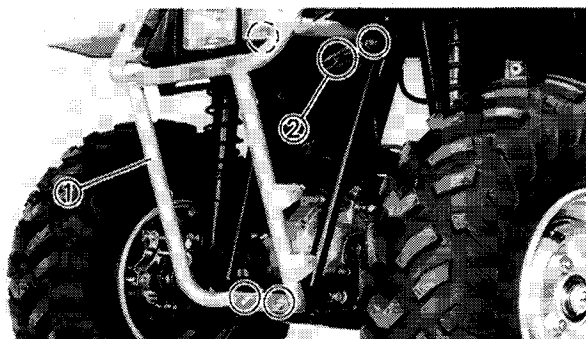
## FRONT FENDER

## Removal

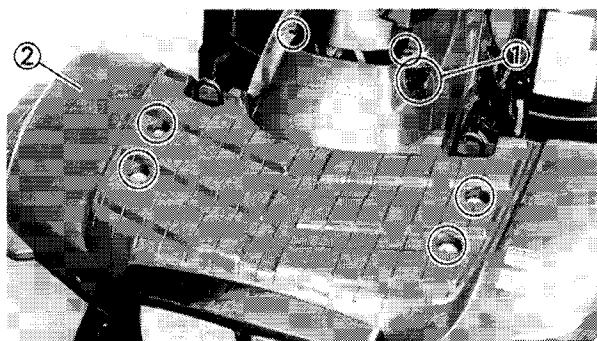
1. Place the machine on a level place.



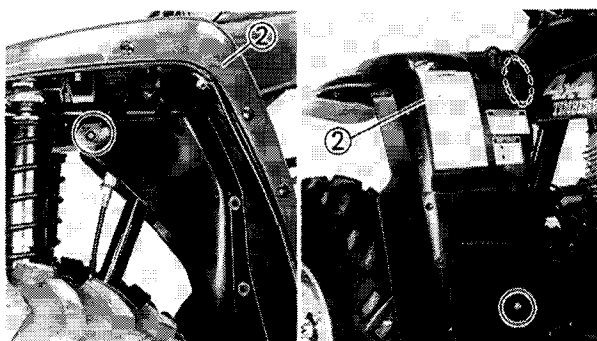
2. Remove:
  - Front guard (1)



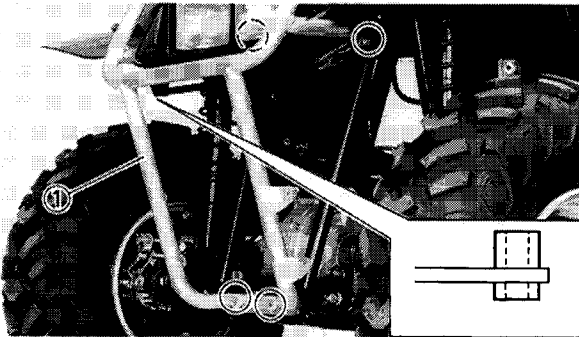
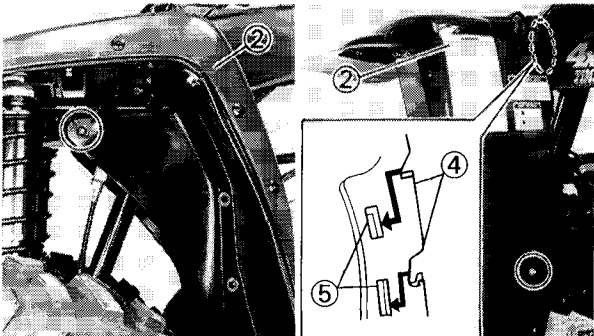
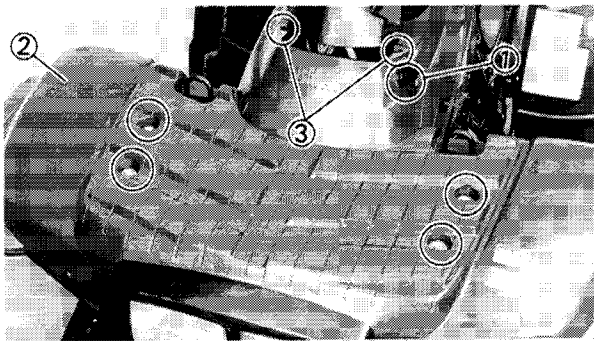
3. Remove:
  - Front bumper (1)
4. Disconnect:
  - Headlight leads (2)



5. Remove:
  - Starter lever (1)
  - Front fender (2)



## SEAT AND REAR FENDER

INSP  
ADJ**Installation**

Reverse the "Removal" procedures.  
Note the following points.

## 1. Install:

- Starter lever ①
- Front fender ②



**Screw ③ (front fender and fuel tank cover):**

**2 Nm (0.2 m•kg, 1.4 ft•lb)**

**NOTE:**

Securely insert the lobes ④ on the front fender into the receptacles ⑤ on the fuel tank cover.

3

## 2. Install:

- Front bumper ①

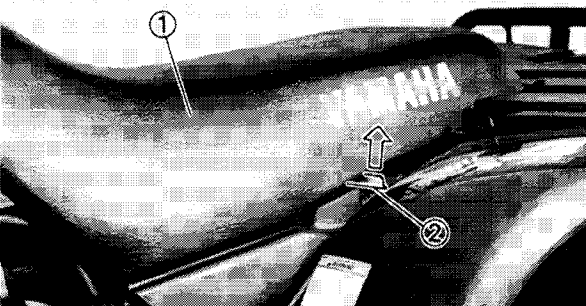


**Bolt (front bumper and frame):**

**30 Nm (3.0 m•kg, 22 ft•lb)**

**SEAT AND REAR FENDER****Removal**

1. Place the machine on a level place.

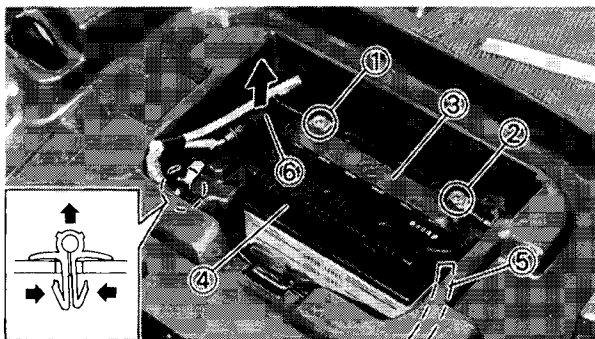


## 2. Remove:

- Seat ①

Pull up the seat lock lever ②, then pull up the seat at the rear.

## SEAT AND REAR FENDER

INSP  
ADJ

## 3. Disconnect:

- Battery leads (negative ① and positive ②)

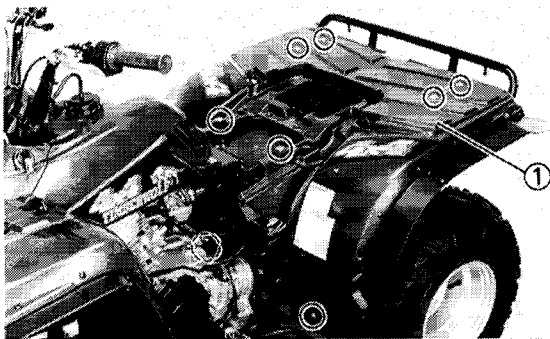
**⚠ WARNING**

Disconnect the negative lead ① first.

## 4. Remove:

- Battery band ③
- Battery ④
- Breather hose ⑤ (battery side)
- Fuse holder ⑥ (from the rear fender)

3



## 5. Remove:

- Rear fender ①

**Installation**

Reverse the removal procedures.

Note the following points.

## 1. Install:

- Fuse holder ①
- Breather hose ② (to the battery)
- Battery ③

**CAUTION:**

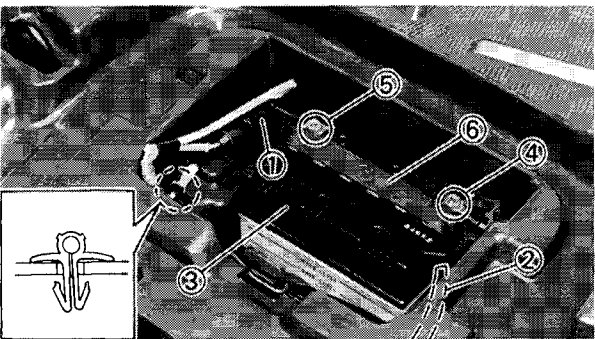
When installing the battery, be sure the breather hose is routed correctly. Refer to the "BATTERY INSPECTION" section.

## 2. Connect:

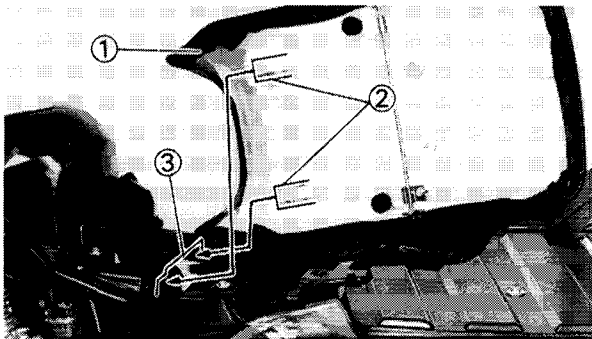
- Battery leads (positive ④ and negative ⑤)
- Battery band ⑥

**⚠ WARNING**

Connect the positive lead ④ first.





**FUEL TANK****INSP  
ADJ**

3. Install:
  - Seat ①

**NOTE:**

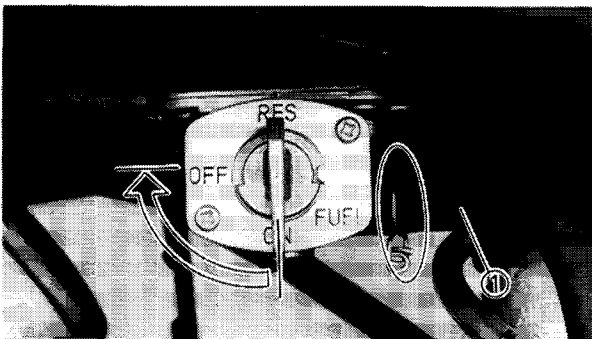
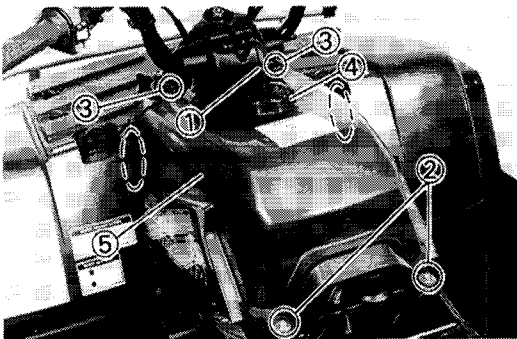
Insert the lobes ② on the seat front into the receptacle ③ on the frame, then push down the seat at the rear.

**FUEL TANK****Removal**

1. Place the machine on a level place.
2. Remove:
  - Seat
 Refer to the "REAR FENDER-Removal" section.
3. Disconnect:
  - Breather hose ① (tank cap side)
4. Remove:
  - Bolt ② (with flange collar)
  - Screw ③
  - Fuel tank cap ④
  - Fuel tank cover ⑤

**NOTE:**

After removing the tank cover, immediately install the tank cap on the fuel tank.



5. Turn the fuel cock lever to "OFF" position.
6. Disconnect:
  - Fuel hose ①

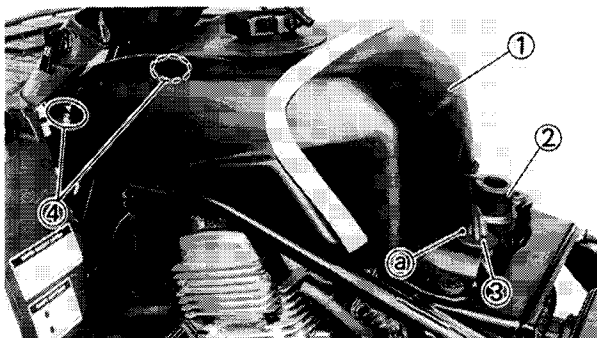
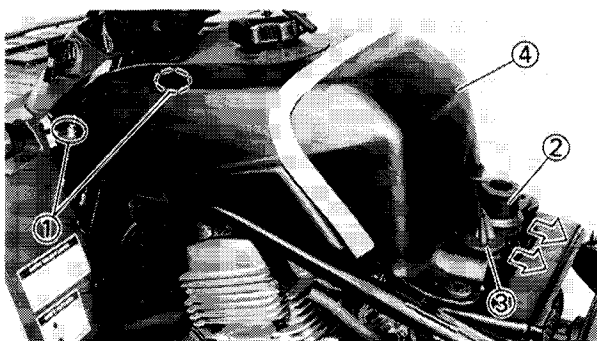
**NOTE:**

Place a rug on the engine to absorb a spilt fuel.

**⚠ WARNING**

- Gasoline is highly flammable.
- Avoid spilling fuel on the hot engine.

**3**

**FUEL TANK****INSP  
ADJ**

7. Remove:
  - Bolt ① (with washer and collar)
8. Disconnect:
  - Air duct ② (with hoses)
  - Grommet ③ (with hoses)
9. Remove:
  - Fuel tank ④

**Installation**

Reverse the removal procedures.  
Note the following points.

1. Install:
  - Fuel tank ①
2. Connect:
  - Air duct ② (with hoses)
  - Grommet ③ (with hoses)

**NOTE:**

When installing the grommet ③, the projection ① should be positioned forward.

3. Install:
  - Bolts ④ (with washers and collars)

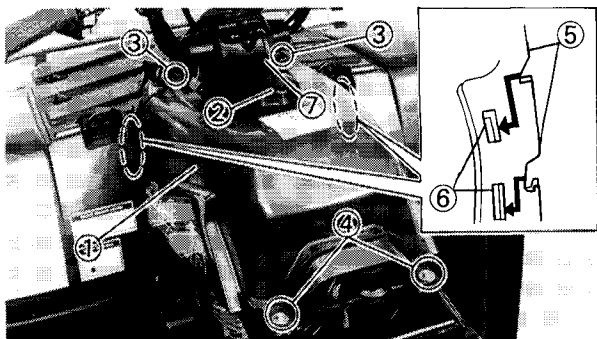


**Bolt (fuel tank and frame):**  
**7 Nm (0.7 m·kg, 5.1 ft·lb)**

4. Install:
  - Fuel tank cover ①
  - Fuel tank cap ②
  - Screws ③
  - Bolts ④ (with flange collars)

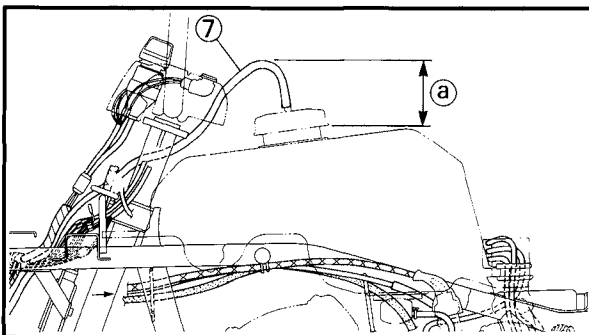


**Screw (fuel tank cover and front fender):**  
**2 Nm (0.2 m·kg, 1.4 ft·lb)**  
**Bolts (fuel tank cover and frame):**  
**7 Nm (0.7 m·kg, 5.1 ft·lb)**

**NOTE:**

Securely insert the lobes ⑤ on the front fender into the receptacles ⑥ on the fuel tank cover.

5. Connect:
  - Breather hose ⑦

**VALVE CLEARANCE ADJUSTMENT****INSP  
ADJ****NOTE:**

When installing the breather hose ⑦, the top of it should be positioned 100 mm (3.94 in) from the bottom of the fuel tank cap as shown by ①.

**6. Install:**

- Seat

Refer to the "REAR FENDER-Installation" section.

**3****ENGINE****VALVE CLEARANCE ADJUSTMENT****NOTE:**

- The valve clearance must be adjusted when the engine is cool to the touch.
- Adjust the valve clearance when the piston is at the Top Dead Center (TDC) on compression stroke.

**1. Place the machine on a level place.****2. Remove:**

- Seat
- Fuel tank

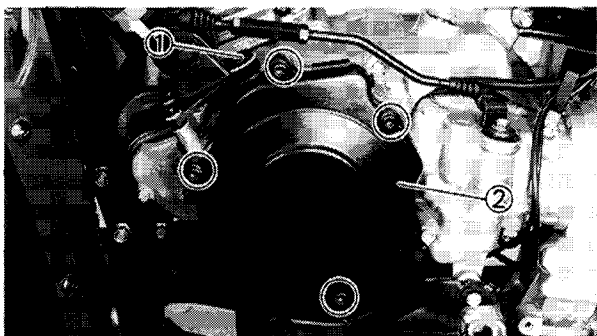
Refer to the "FUEL TANK-Removal" section.

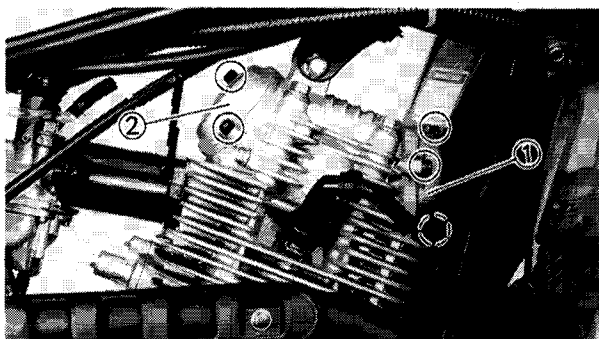
**3. Remove:**

- Timing plug ①
- Crankcase cover (left) ②

**NOTE:**

Do not remove the starter pulley if the recoil starter is equipped.



**VALVE CLEARANCE ADJUSTMENT****INSP  
ADJ****4. Remove:**

- Tappet cover ① (exhaust)
- Tappet cover ② (intake)

**Adjustment****1. Measure:**

- Valve clearance

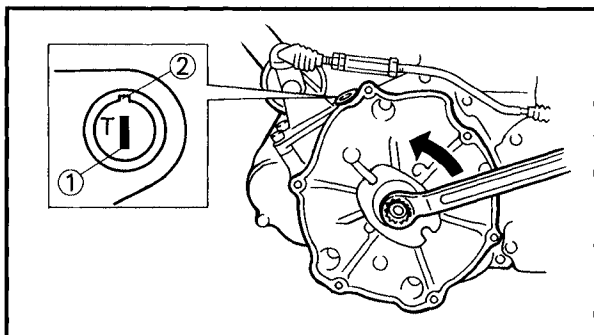
\*\*\*\*\*

**Measurement steps:**

- Turn the crank shaft counterclockwise with the wrench.

**NOTE:**

Turn the starter pulley counterclockwise with the recoil starter if the recoil starter is equipped.



- Align the "T" mark ① on the rotor with the stationary pointer ② on the crankcase cover. When the "T" mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC).

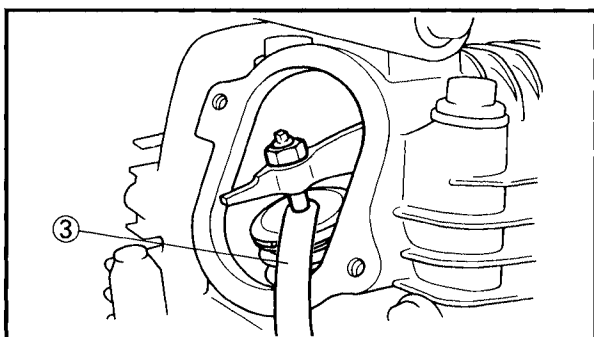
**NOTE:**

TDC on compression stroke check:

- Both rocker arms must have a valve clearance when the rotor match mark ① is aligned with the stationary pointer match mark ②.
- If not, give the crankshaft one counterclockwise turn to meet above condition.

- Measure the valve clearance using a Feeler gauge ③.

Out of specification → Adjust clearance.

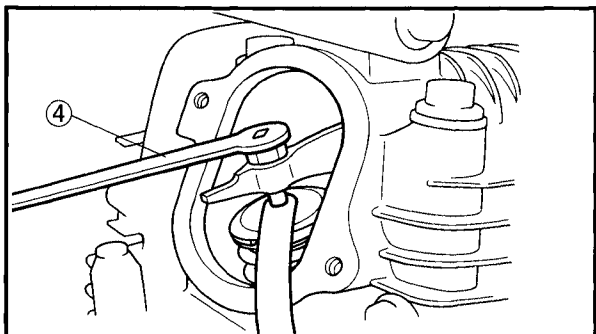
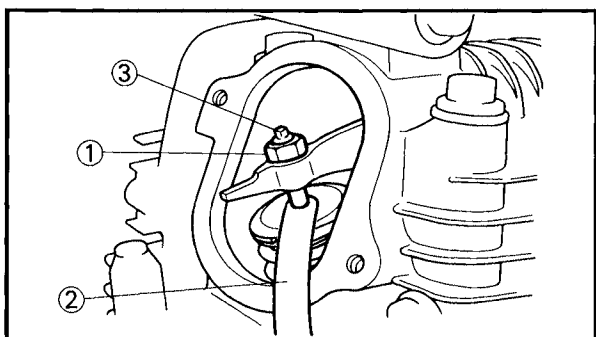
**Intake valve (cold):**

0.05 ~ 0.09 mm (0.002 ~ 0.004 in)

**Exhaust valve (cold):**

0.11 ~ 0.15 mm (0.004 ~ 0.006 in)

\*\*\*\*\*

**VALVE CLEARANCE ADJUSTMENT****INSP  
ADJ**

2. Adjust:
- Valve clearance

\*\*\*\*\*

**Valve clearance adjustment steps:**

- Loosen the locknut ① .
- Insert a Feeler gauge ② between the adjuster end and the valve stem end.
- Turn the adjuster ③ clockwise or counter-clockwise with the Valve adjusting tool ④ until proper clearance is obtained.



**Valve adjusting tool 3 mm (0.12 in):**  
**P/N. YM-08035, 90890-01311**

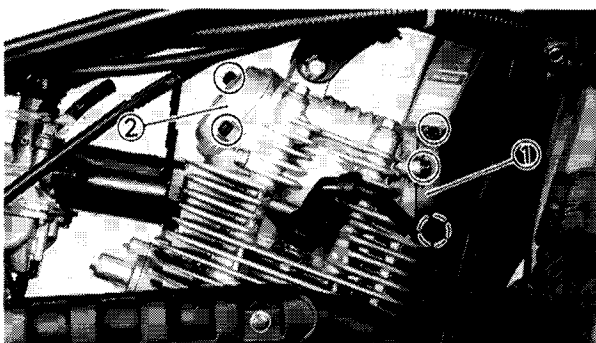
- Hold the adjuster to prevent it from moving and thoroughly tighten the locknut.



**Valve clearance adjusting locknut:**  
**14 Nm (1.4 m•kg, 10 ft•lb)**

- Once again, measure the valve clearance.
- If the clearance is incorrect, repeat above steps until the proper clearance is obtained.

\*\*\*\*\*

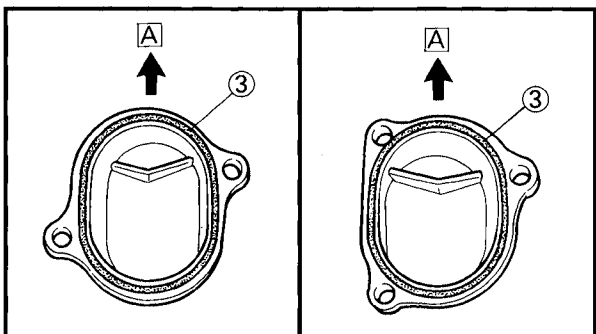
**3****Installation**

Reverse the "Removal" procedure. Note the following points.

1. Install:
- Tappet cover ① (exhaust)
  - Tappet cover ② (intake)

**NOTE:**

- Install the tappet covers with its ridge facing upward **A** .
- Check the O-ring ③ for damage. If damaged, replace.



**Tappet cover:**  
**10 Nm (1.0 m•kg, 7.2 ft•lb)**

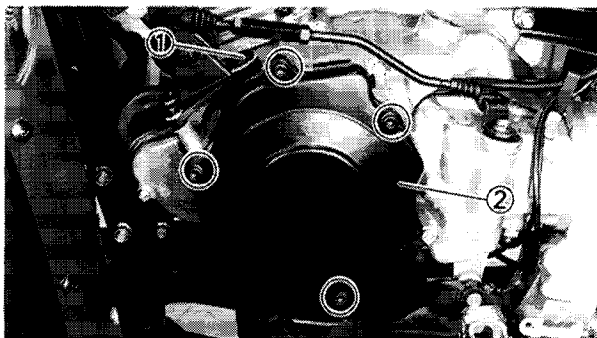
## TIMING CHAIN TENSIONER ADJUSTMENT/ IDLE SPEED ADJUSTMENT

**INSP  
ADJ**


2. Apply:
  - Sealant
 (onto the timing plug thread)



**Sealant (Quick Gasket®):**  
**ACC-11001-05-01**  
**Yamaha bond No. 1215:**  
**90890-85505**



3. Install:
  - Timing plug ①
  - Crankcase cover (left) ②



**Timing plug:**  
**15 Nm (1.5 m•kg, 11 ft•lb)**  
**Bolts (crankcase cover):**  
**10 Nm (1.0 m•kg, 7.2 ft•lb)**

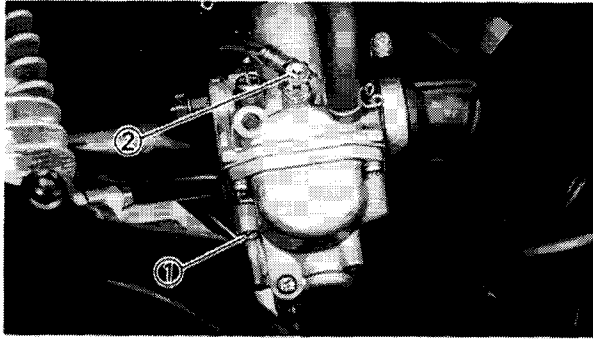
4. Install:
  - Fuel tank
  - Seat
 Refer to the "FUEL TANK-Installation" section.

### TIMING CHAIN TENSIONER ADJUSTMENT

This model has been equipped the automatic timing chain tensioner. No adjustment is necessary.

### IDLE SPEED ADJUSTMENT

1. Place the machine on a level place.
2. Warm up the engine for several minutes.
3. Adjust:
  - Engine idle speed

**THROTTLE CABLE FREE PLAY ADJUSTMENT****INSP  
ADJ**



\*\*\*\*\*

**Adjustment steps:**

- Turn the pilot screw ① clockwise until it is lightly seated.
- Loosen the pilot screw by turning it counterclockwise for the specified number of turns.

**Pilot screw:****1-1/2 counterclockwise turns**

- Turn the throttle stop screw ② until the Idle speed is in the specified range. Use the Inductive tachometer to confirm the engine speed.

<b>Clockwise</b>	<b>Idle speed becomes higher.</b>
<b>Counterclockwise</b>	<b>Idle speed becomes lower.</b>
	<b>Inductive tachometer: P/N. YU-08036-A, 90890-03113</b>
	<b>Engine idle speed: 1,350 ~ 1,450 r/min</b>

**3**

- Turn the pilot screw ① again clockwise or counterclockwise in 1/8-turn increments to achieve the highest speed with just the pilot screw.
- Once again, turn the throttle stop screw ② to attain the specified idle speed.

\*\*\*\*\*

**4. Check:**

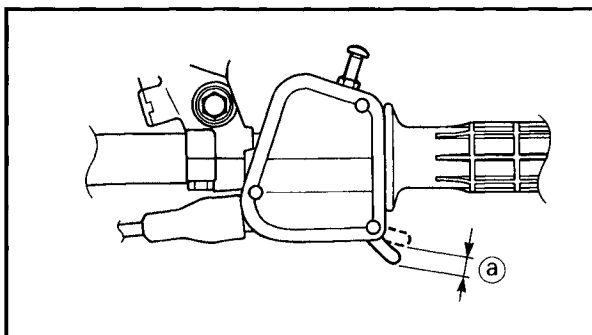
- Throttle cable free play

Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section.

**THROTTLE CABLE FREE PLAY ADJUSTMENT****NOTE:** \_\_\_\_\_

Before adjusting the throttle cable free play, the engine idle speed should be adjusted.

1. Place the machine on a level place.

**THROTTLE CABLE FREE PLAY ADJUSTMENT****INSP  
ADJ****2. Check:**

- Throttle cable free play (a)  
Out of specification → Adjust.



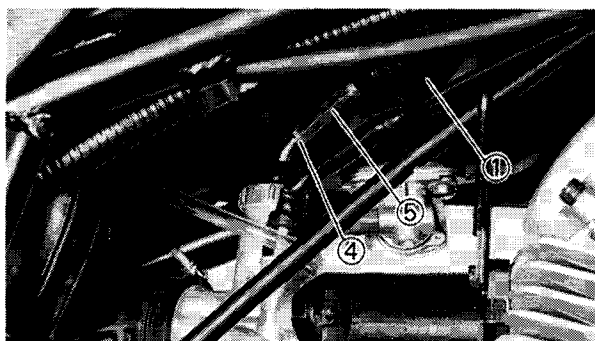
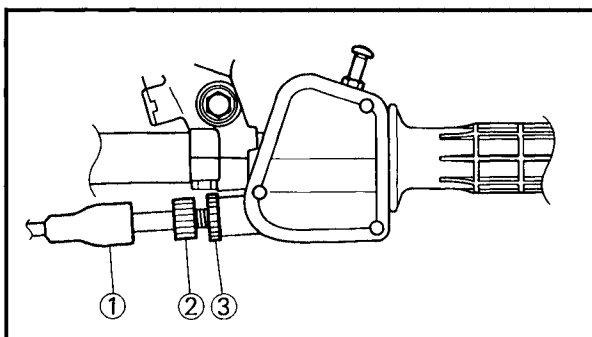
**Throttle cable free play:**  
3 ~ 5 mm (0.12 ~ 0.20 in)

**3. Adjust:**

- Throttle cable free play

**NOTE:**

If the throttle cable free play can not be adjusted on the carburetor side, adjust it on the throttle housing side.



\*\*\*\*\*

**Adjustment steps:**

- Pull back the adjuster covers (1) from the both side (throttle housing and carburetor).
- Make sure that the adjuster (2) and locknut (3) on the throttle housing side are fully tightened.
- Loosen the locknut (4) on the carburetor side.
- Turn the adjuster (5) clockwise or counter-clockwise until the proper free play is obtained.

<b>Clockwise</b>	<b>Free play is increased.</b>
<b>Counterclockwise</b>	<b>Free play is decreased.</b>

- Tighten the locknut (3).
- Reset the adjuster covers.

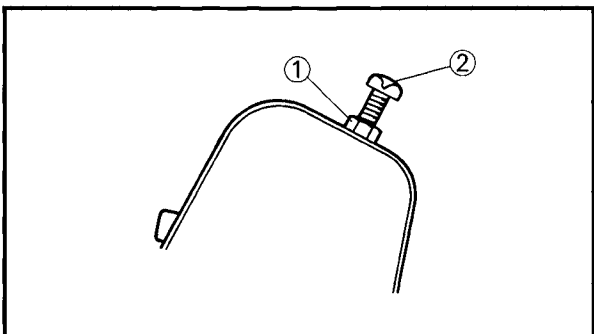
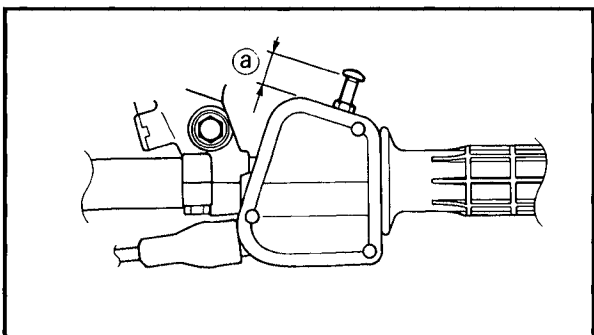
**⚠ WARNING**

**After adjusting the free play, turn the handlebar to right and left, and make sure that the engine idling does not run faster.**

\*\*\*\*\*



## SPEED LIMITER ADJUSTMENT/ SPARK PLUG INSPECTION

**INSP**  
**ADJ**


### SPEED LIMITER ADJUSTMENT

The speed limiter keeps the carburetor throttle from becoming full-open even when the throttle lever is pushed to a maximum. Screwing in the adjuster stops the engine speed from increasing.

1. Adjust:
  - Speed limiter length (a)

\*\*\*\*\*

#### Adjustment steps:

- Loosen the locknut (1).
- Turn the adjuster (2) clockwise or counter-clockwise until the proper length is attained.



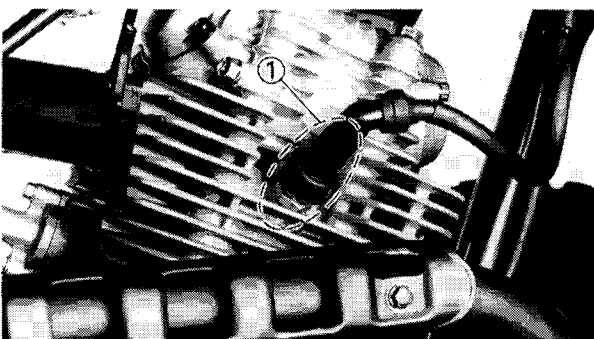
**Speed limiter standard length:**  
12 mm (0.47 in)

- Tighten the locknut.

### ⚠ WARNING

- Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as riding technique improves. Never remove the speed limiter from the outset.
- For proper throttle lever operation do not turn out the adjuster more than 12 mm (0.47 in). Also adjust the throttle lever free play always to 3 ~ 5 mm (0.12 ~ 0.20 in).

\*\*\*\*\*



### SPARK PLUG INSPECTION

1. Place the machine on a level place.
2. Remove:
  - Spark plug (1)

### CAUTION:

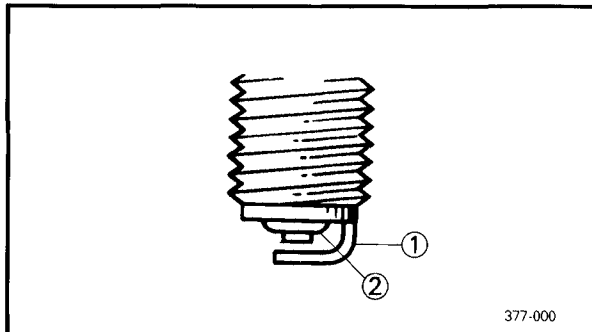
Before completely removing plug, use compressed air to clean the setting areas to prevent dirt particles from falling into the engine.

**3**

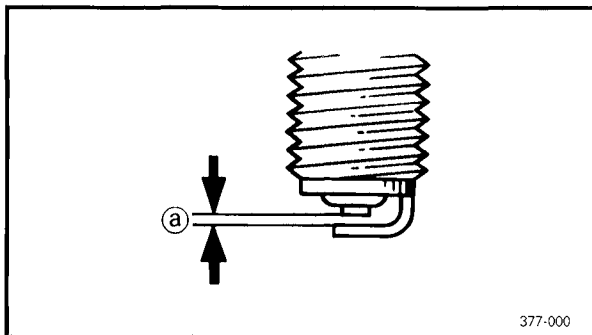
**SPARK PLUG INSPECTION****INSP  
ADJ**

3. Inspect:
- Spark plug type  
Incorrect → Replace.

**Standard spark plug:**  
**D7EA (NGK) or X22ES-U**  
**(NIPPONDENSO)**

**3**

4. Inspect:
- Electrode ①  
Wear/Damage → Replace.
  - Insulator color ②  
Normal condition is a medium to light tan color.  
Distinctly different color → Check the engine condition.



5. Clean:
- Spark plug  
Clean the spark plug with a spark plug cleaner or wire brush.
6. Measure:
- Spark plug gap ①  
Out of specification → Regap.  
Use a wire gauge.



**Spark plug gap:**  
**0.6 ~ 0.7 mm (0.024 ~ 0.028 in)**

7. Tighten:
- Spark plug

**NOTE:**

- Before installing a spark plug, clean the gasket surface and plug surface.
- Finger-tighten the spark plug before torquing to specification.

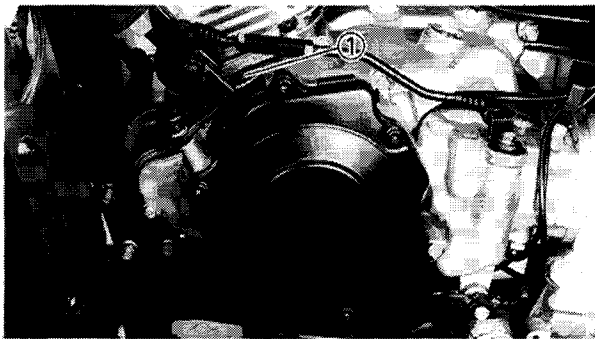


**Spark plug:**  
**17.5 Nm (1.75 m•kg, 12.5 ft•lb)**

**IGNITION TIMING CHECK****INSP  
ADJ****IGNITION TIMING CHECK****NOTE:**

Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Place the machine on a level place.
2. Start the engine and let it warm up for several minutes, then stop the engine.
3. Attach:
  - Inductive tachometer
  - Timing light  
(to spark plug lead)

**Inductive tachometer:****P/N. YU-08036-A, 90890-03113****Timing light:****P/N. YM-33277-A, 90890-03141****3**

4. Check:
  - Ignition timing

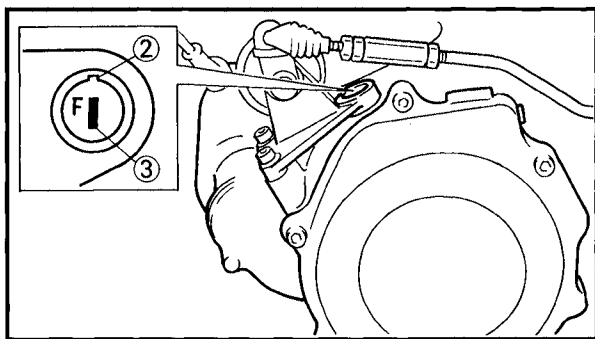
\*\*\*\*\*

**Checking steps:**

- Remove the timing plug ①.
- Start the engine and let it idle at the specified idle speed.

**Idle speed:****1,400 r/min****CAUTION:**

Under extreme conditions, the oil may spurt out when running the engine. Therefore care should be used when running.



- Visually check the stationary pointer ② on the crankcase cover to verify it is within the firing range ③ indicated on the rotor.  
Incorrect → Check the rotor and/or pulser coil assembly (tightness and/or damage).  
Refer to "CHAPTER 8. ELECTRICAL" section further information.

**NOTE:**

Ignition timing is not adjustable.

\*\*\*\*\*

**COMPRESSION PRESSURE MEASUREMENT****INSP  
ADJ**

5. Apply:
  - Sealant  
(onto the timing plug thread)



**Sealant (Quick Gasket®):**  
**ACC-11001-05-01**  
**Yamaha bond No. 1215:**  
**90890-85505**

6. Install:
  - Timing plug



**Timing plug:**  
**15 Nm (1.5 m•kg, 11 ft•lb)**

7. Detach:
  - Timing light
  - Inductive tachometer

**3****COMPRESSION PRESSURE MEASUREMENT****NOTE:**

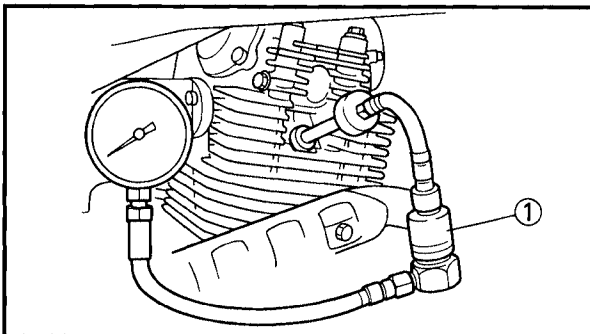
- Insufficient compression pressure will result in performance loss.
- Before measuring the compression pressure, the valve clearance should be adjusted.  
Refer to "VALVE CLEARANCE ADJUSTMENT" section.

1. Place the machine on a level place.
2. Remove:
  - Spark plug
3. Measure:
  - Compression pressure

\*\*\*\*\*

**Measurement steps:**

- Install the Compression gauge ①.



**Compression gauge:**  
**P/N. YU-33223, 90890-03081**  
**Adapter:**  
**P/N. YU-33223-3, 90890-04082**

- Crank over the engine with the electric starter (be sure the battery is fully charged) with the throttle wide-open until the compression reading on the gauge stabilizes.

# ENGINE OIL AND TRANSFER GEAR OIL LEVEL INSPECTION

**INSP**  
**ADJ**


## ⚠ WARNING

When cranking the engine, ground the spark plug lead to prevent sparking.

- Check readings with specified levels (see chart).

### Compression pressure (at sea level):

**Standard : 900 kPa**

(9.0 kg/cm<sup>2</sup>, 128 psi)

**Minimum : 800 kPa**

(8.0 kg/cm<sup>2</sup>, 114 psi)

**Maximum : 1,000 kPa**

(10.0 kg/cm<sup>2</sup>, 142 psi)

- If pressure falls below the minimum level:
  - 1) Squirt a few drops of oil into the affected cylinder.
  - 2) Measure the compression again.

Compression pressure (with oil introduced into cylinder)	
Reading	Diagnosis
Higher than without oil	Worn or damaged pistons
Same as without oil	Defective ring(s), valves, cylinder head gasket or piston is possible.
Above maximum level	Inspect cylinder head, valve surface, or piston crown for carbon deposit.

- Remove the Compression gauge.

\*\*\*\*\*

### 4. Install:

- Spark plug



### Spark plug:

**17.5 Nm (1.75 m•kg, 12.5 ft•lb)**

Refer to "SPARK PLUG INSPECTION" section.

## ENGINE OIL AND TRANSFER GEAR OIL LEVEL INSPECTION

### CAUTION:

- Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.
- Do not allow foreign material to enter the crankcase.

# 3

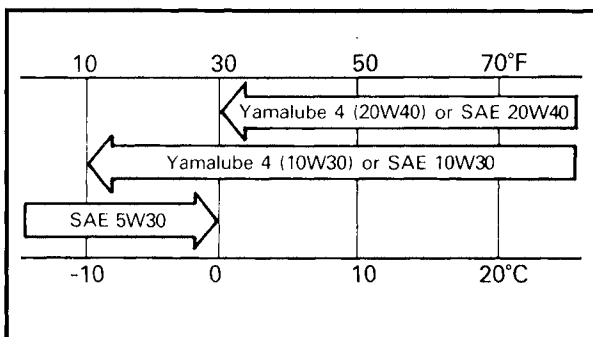
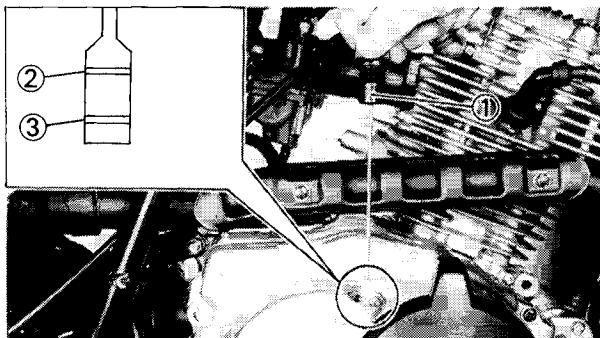
**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****INSP  
ADJ**

1. Place the machine on a level place.
2. Inspect:
  - Engine oil level
 Oil level low → Add sufficient oil

\*\*\*\*\*

**Inspection steps:**

- Warm up the engine for several minutes, and stop it.
- Screw the dipstick ① completely out, and wipe the dipstick clean, then just rest the dipstick in the hole.
- Pull up the dipstick, and inspect the oil level whether or not it is between maximum ② and minimum level ③.
- If the level is lower, add the oil up to the upper level.

**Recommended oil:**

At 0°C (32°F) or higher:

**SAE20W40 type SE motor oil**

At -10°C (14°F) or higher:

**SAE10W30 type SE motor oil**

At 0°C (32°F) or lower:

**SAE5W30 type SE motor oil**

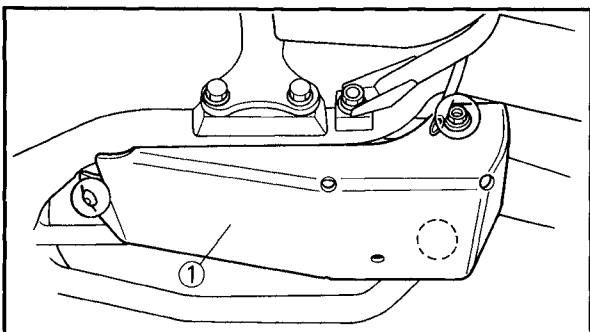
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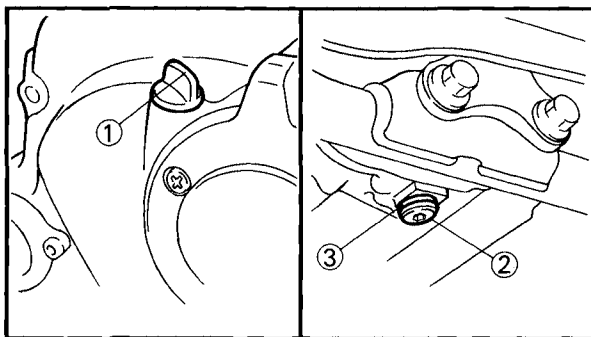
**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****CAUTION:**

- Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.
- Do not allow foreign material to enter the crankcase and transfer gear case.

**Engine oil and transfer gear oil replacement (without oil filter)**

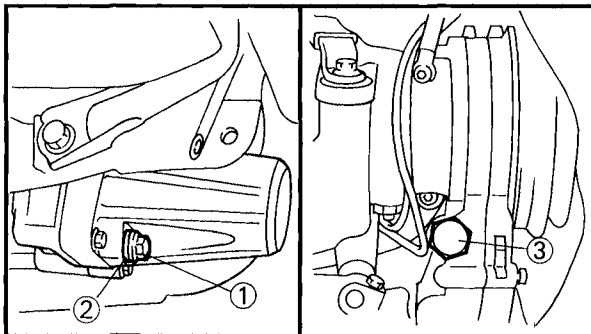
1. Place the machine on a level place.
2. Remove:
  - Transfer gear case guard ①
3. Warm up the engine for several minutes, then stop the engine.
4. Place the receptacle under the engine oil drain plug and transfer gear oil drain plug.



**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****INSP  
ADJ**

5. Remove:
- Dipstick ①
  - Drain plug ② (crankcase)
  - Gasket ③

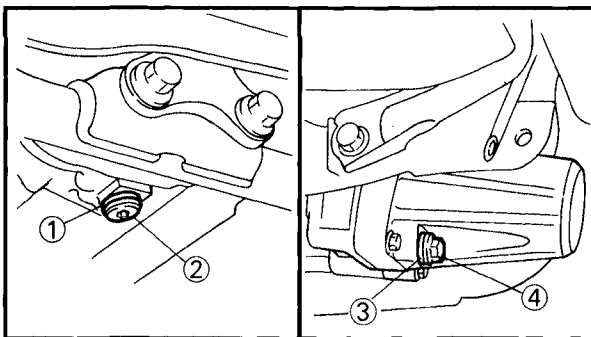
6. Drain:
- Engine oil



7. Remove:
- Drain plug ① (transfer gear case)
  - Gasket ②
  - Oil filler bolt ③

8. Drain:
- Transfer gear oil

9. Inspect:
- Gaskets (drain plugs)  
Damage → Replace.



10. Install:
- Gasket ①
  - Drain plug ② (crankcase)
  - Gasket ③
  - Drain plug ④ (transfer gear case)



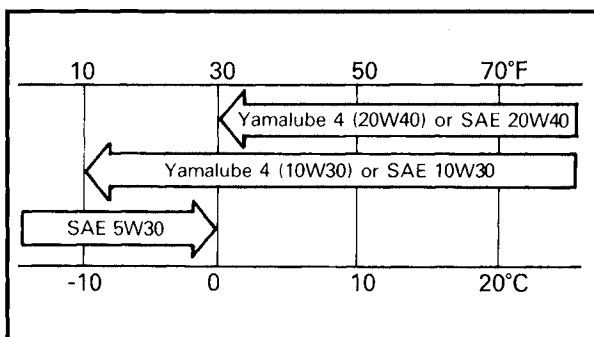
**Drain plug (crankcase):**  
23 Nm (2.3 m•kg, 17 ft•lb)

**Drain plug (transfer gear):**  
20 Nm (2.0 m•kg, 14 ft•lb)

**3**

**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****INSP  
ADJ****11. Fill:**

- Crankcase
- Transfer gear case

**Oil quantity:****Periodic oil change (engine oil):****1.5 L (1.3 Imp qt, 1.6 US qt)****Periodic oil change (transfer gear oil):****0.25 L (0.22 Imp qt, 0.26 US qt)****Periodic oil change****(engine oil and transfer gear oil with oil filter replacement):****1.85 L (1.6 Imp qt, 2.0 US qt)****Total amount:****2.2 L (1.9 Imp qt, 2.3 US qt)****3****Recommended engine oil:****At 0°C (32°F) or higher:****SAE20W40 type SE motor oil****At -10°C (14°F) or higher:****SAE10W30 type SE motor oil****At 0°C (32°F) or lower:****SAE5W30 type SE motor oil****12. Install:**

- Dipstick
- Oil filler bolt (transfer gear case)

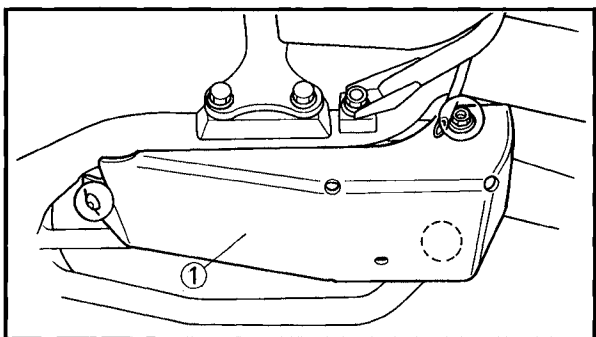
**13. Install:**

- Transfer gear case guard

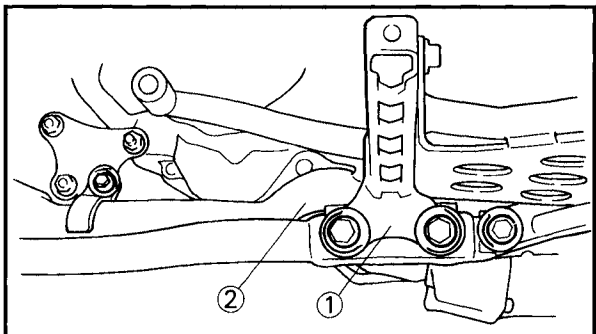
**14. Inspect:**

- Oil level  
Refer to the "ENGINE OIL AND TRANSFER GEAR OIL LEVEL INSPECTION" section.
- Oil pressure  
Refer to the "OIL PRESSURE INSPECTION" section.
- Oil leaks

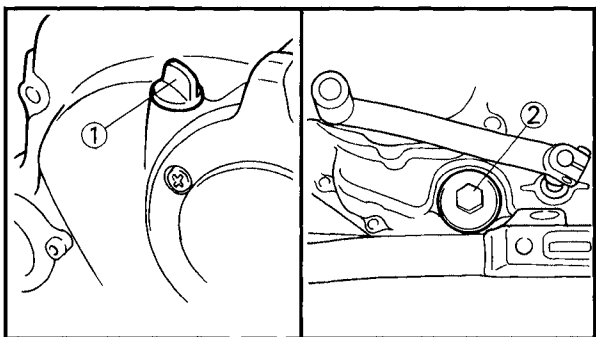


**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****INSP  
ADJ****Engine oil and transfer gear oil replacement (with oil filter)**

1. Place the machine on a level place.
2. Remove:
  - Transfer gear case guard (1)



3. Remove:
  - Footrest (1) (left)
  - Drive shaft cover (2) (rear half)



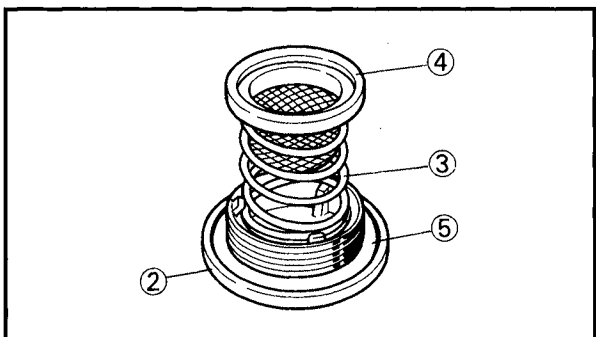
4. Warm up the engine for several minutes and stop it.

5. Place a receptacle under the oil strainer drain plug and transfer gear case drain plug.

6. Remove:
  - Dipstick (1)
  - Oil strainer drain plug (2)

**NOTE:**

When removing the oil strainer drain plug (2), the compression spring (3), oil strainer (4) and O-ring (5) will fall off. Take care not to lose these parts.

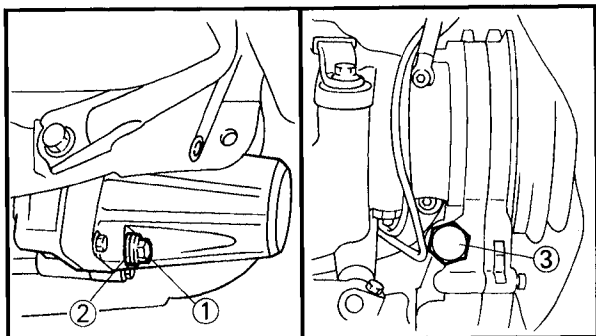


7. Drain:
  - Engine oil

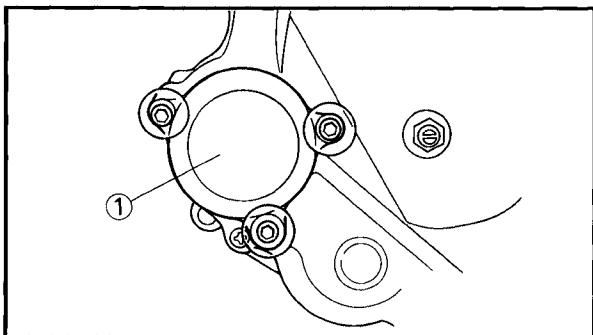
8. Remove:
  - Drain plug (1) (transfer gear oil)
  - Gasket (2)
  - Oil filler bolt (3)

9. Drain:
  - Transfer gear oil

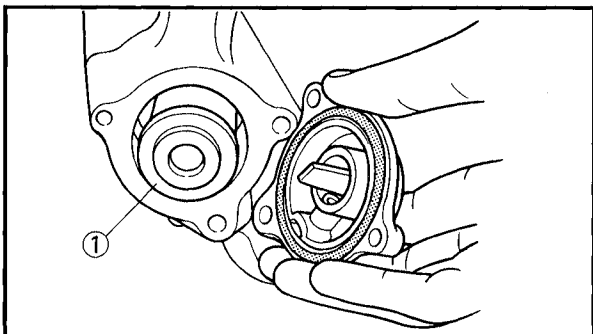
10. Inspect:
  - Gasket (2)
  - Damage → Replace.

**3**

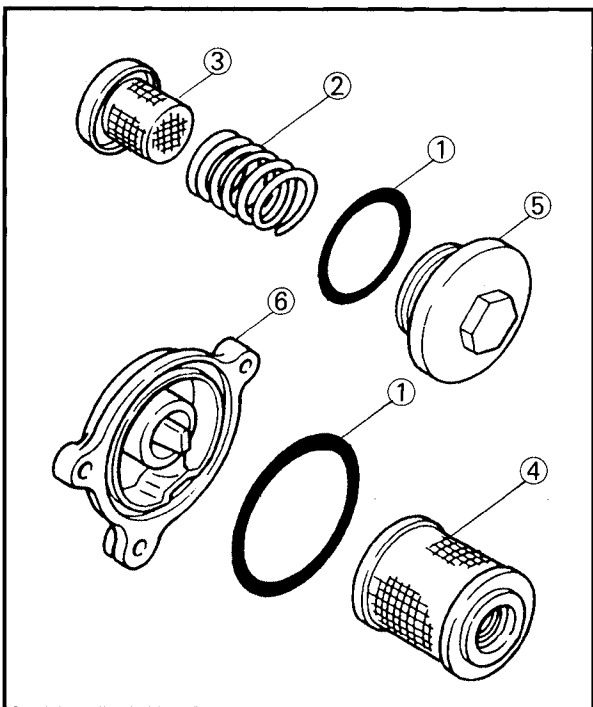
## ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT



11. Remove:
- Oil filter cover ①

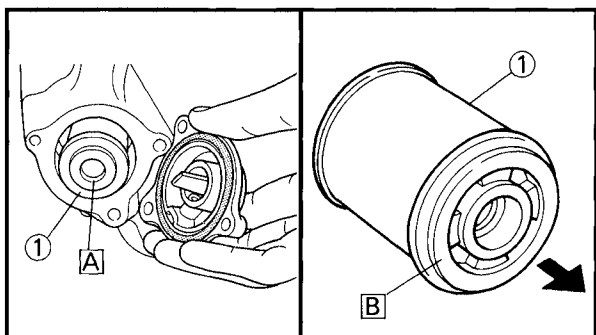


12. Remove:
- Oil filter element ①



13. Inspect:
- O-rings ①
  - Compression spring ②
  - Oil strainer ③
  - Oil filter element ④
- Damage → Replace.
14. Clean:
- Compression spring ②
  - Oil strainer ③
  - Oil filter element ④
  - Drain plug ⑤ (crankcase)
  - Oil filter cover ⑥
- Wash them with a cleaning solvent.
15. Apply:
- Engine oil (light coating)  
(onto the O-rings)

## ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT

INSP  
ADJ

16. Install:

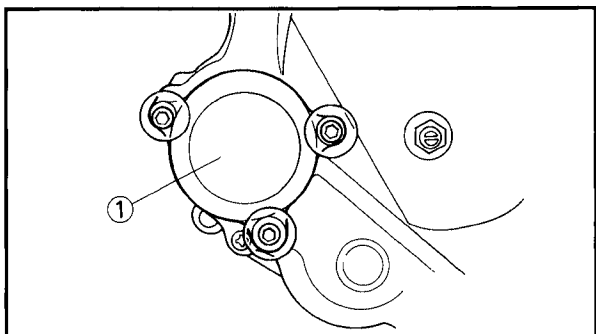
- Oil filter (1)

**CAUTION:**

Install the oil filter as shown.

A Outside

B Inside



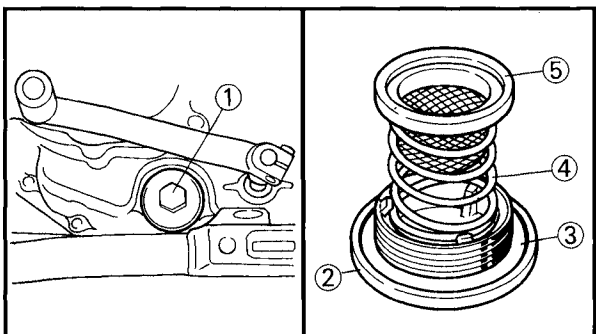
17. Install:

- Oil filter cover (1)

**Bolts (oil filter cover):**

10 Nm (1.0 m•kg, 7.2 ft•lb)

3



18. Install:

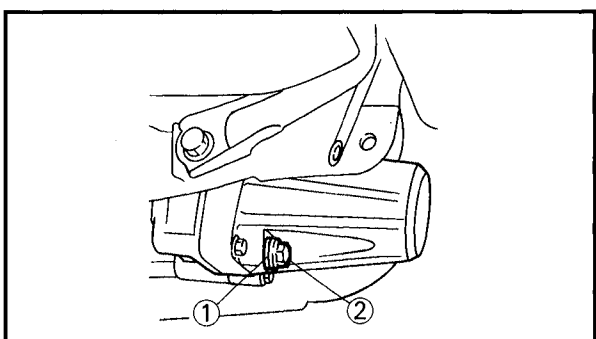
- Oil strainer drain plug (1) (crankcase)

**CAUTION:**

Before reinstalling the drain plug (2), do not forget to fit the O-ring (3), compression spring (4) and oil strainer (5).

**Oil strainer drain plug:**

43 Nm (4.3 m•kg, 31 ft•lb)



19. Install:

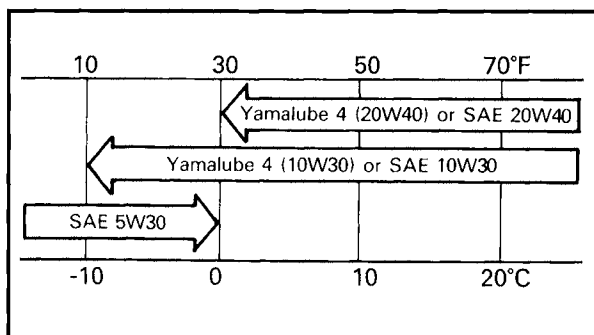
- Gasket (1)
- Drain plug (2) (transfer gear case)

**Drain plug (transfer gear case):**

20 Nm (2.0 m•kg, 14 ft•lb)

**ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT****INSP  
ADJ****20. Fill:**

- Crankcase
- Transfer gear case

**Oil quantity:****Periodic oil change (engine oil):****1.5 L (1.3 Imp qt, 1.6 US qt)****Periodic oil change****(transfer gear oil):****0.25 L (0.22 Imp qt, 0.26 US qt)****Periodic oil change****(engine oil and transfer gear oil  
with oil filter replacement):****1.85 L (1.6 Imp qt, 2.0 US qt)****Total amount:****2.2 L (1.9 Imp qt, 2.3 US qt)****3****Recommended engine oil:****At 0°C (32°F) or higher:****SAE20W40 type SE motor oil****At -10°C (14°F) or higher:****SAE10W30 type SE motor oil****At 0°C (32°F) or lower:****SAE5W30 type SE motor oil****CAUTION:**

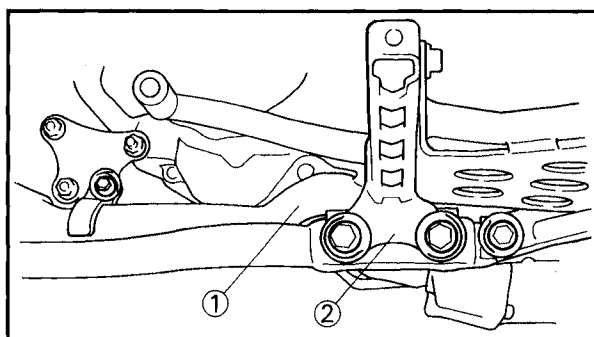
- Do not allow foreign material to enter the crankcase.
- Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.

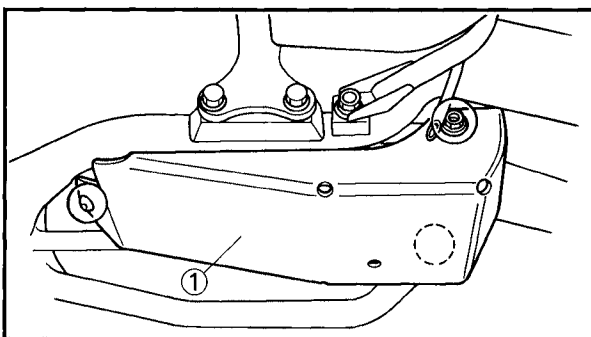
**21. Install:**

- Dipstick
- Oil filler bolt (transfer gear case)

**22. Install:**

- Drive shaft cover ① (rear half)
- Footrest ② (left)

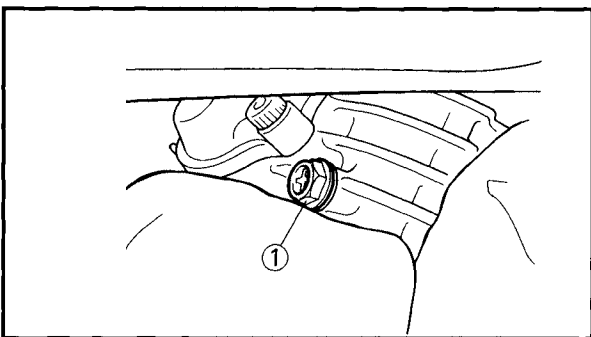
**Bolts (footrest-front):****55 Nm (5.5 m•kg, 40 ft•lb)**

**OIL PRESSURE INSPECTION****INSP**  
**ADJ****23. Install:**

- Transfer gear case guard ①

**24. Inspect:**

- Oil level  
Refer to the "ENGINE OIL AND TRANSFER GEAR OIL LEVEL INSPECTION" section.
- Oil pressure  
Refer to the "OIL PRESSURE INSPECTION" section.
- Oil leaks

**3****OIL PRESSURE INSPECTION****1. Loosen:**

- Oil check bolt ①  
Slightly loosen.

**2. Start the engine and keep it idling for several minutes.****3. Inspect:**

- Oil begins to seep from the check bolt  
Oil flows out → Oil pressure is good.  
No oil comes out → Oil pressure is bad.

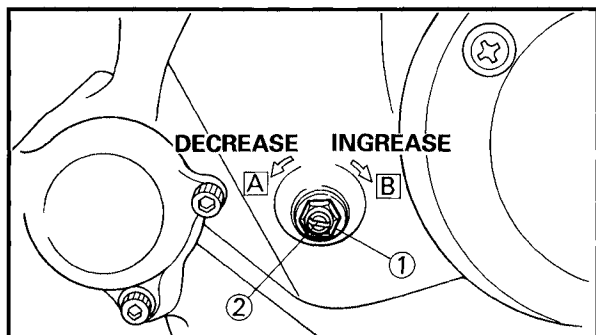
**CAUTION:**

**If no oil comes out after a lapse of one minute, turn off the engine immediately so it will not seize.**

**4. Tighten:**

- Oil check bolt

**Oil check bolt:****7 Nm (0.7 m•kg, 5.1 ft•lb)**

**CLUTCH ADJUSTMENT/  
AIR FILTER CLEANING****INSP  
ADJ****CLUTCH ADJUSTMENT****Release lever free play adjustment**

1. Adjust:
  - Release lever free play

\*\*\*\*\*

**Adjustment steps:**

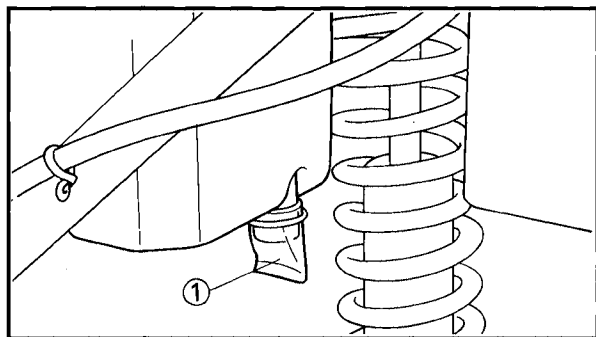
- Loosen the locknut ①.
- Slowly turn the adjuster ② counterclockwise until resistance is felt, then turn back it 1/8 clockwise, hold the adjuster ② in this position and tighten the locknut ①.

**NOTE:** \_\_\_\_\_

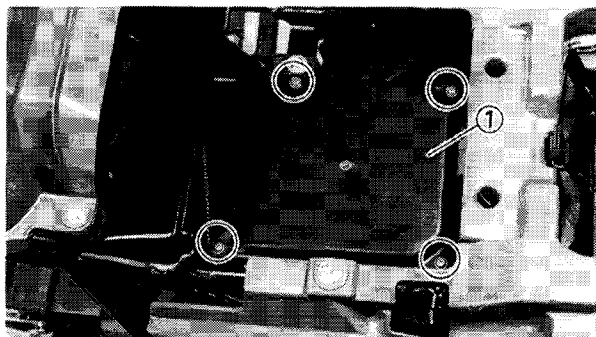
Turn the adjuster counterclockwise ("DECREASE" direction) **A** to decrease the clutch free play and turn it clockwise ("INCREASE" direction) **B** to increase the free play.

**Locknut (adjuster):****15 Nm (1.5 m•kg, 11 ft•lb)**

\*\*\*\*\*

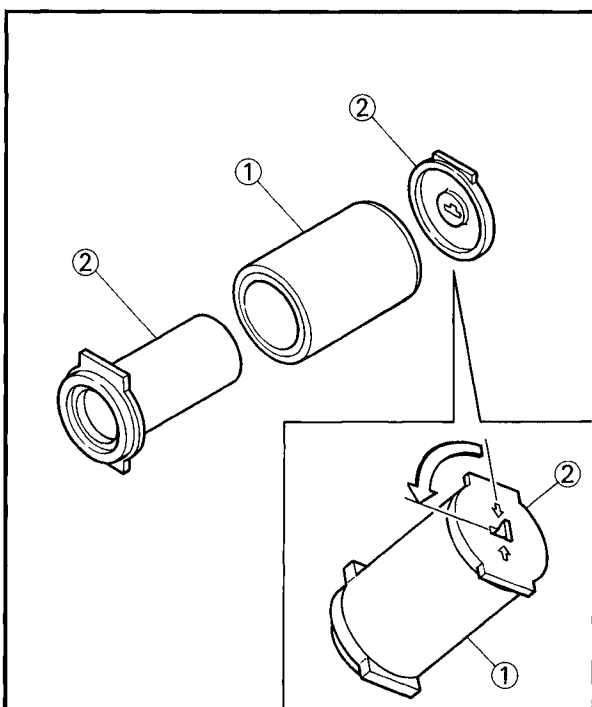
**3****AIR FILTER CLEANING****NOTE:** \_\_\_\_\_

There is check hose ① at the bottom of the air filter case. If dust and/or water collects in this hose, clean the air filter element and air filter case.



1. Remove:
  - Seat  
Refer to "REAR FENDER-Removal" section.
2. Remove:
  - Cover ① (air filter case)
  - Air filter

## AIR FILTER CLEANING

INSP  
ADJ

3. Remove:

- Air filter ①
- Guide ②

**NOTE:**

When removing the air filter, rotate the air filter guide 1/4 turn, and remove the filter.

**CAUTION:**

The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.

4. Inspect:

- Air filter ①
  - Guide ②
- Damage → Replace.

5. Clean:

- Air filter

\*\*\*\*\*

**Cleaning steps:**

- Wash the filter gently, but thoroughly in solvent ①.

**⚠ WARNING**

Never use low flash point solvents such as gasoline to clean the filter. Such solvent may lead to a fire or explosion.

- Squeeze the excess solvent out of the filter and let dry.

**CAUTION:**

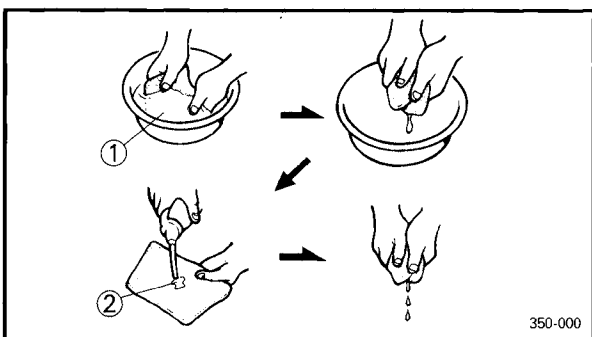
Do not twist the filter when squeezing the filter.

- Apply the SAE 10W30 motor oil ②.
- Squeeze out the excess oil.

**NOTE:**

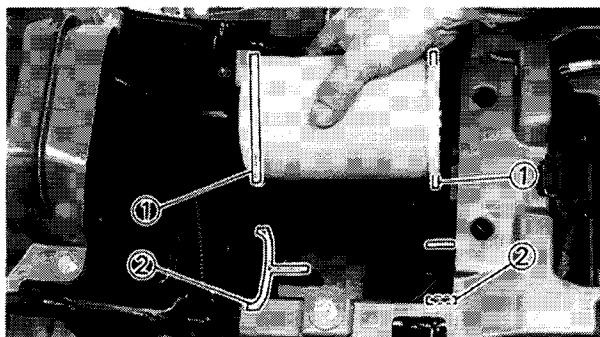
The filter should be wet but not dripping.

\*\*\*\*\*



350-000

3

**FRONT AND REAR BRAKE LINING INSPECTION****INSP  
ADJ**

6. Install:
  - Air filter (to guide)
7. Install:
  - Air filter

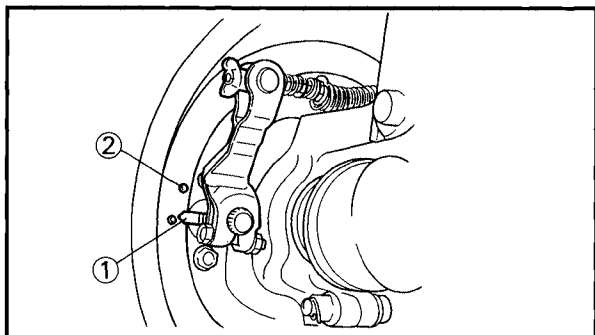
**NOTE:**

- Insert the lobes ① on the filter guide into the receptacles ② on the filter case.
- Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

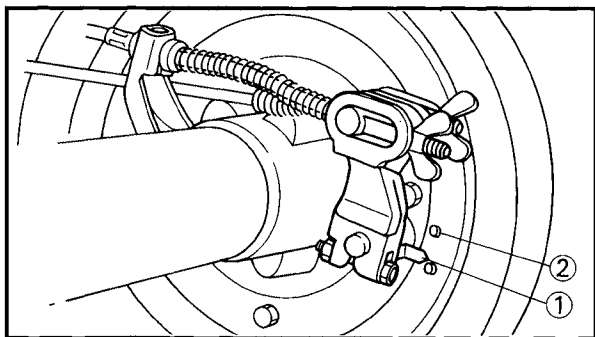
8. Install:
  - Cover (air filter case)
  - Seat
 Refer to "REAR FENDER-Installation" section.

**CHASSIS****FRONT AND REAR BRAKE LINING INSPECTION****Front brake**

1. Apply the front brake.
2. Inspect:
  - Wear indicator ①
 Indicator reaches the wear limit mark ② → Replace brake shoes as a set.  
 Refer to the "FRONT WHEEL AND FRONT BRAKE" section in CHAPTER 7.

**Rear brake**

1. Depress the rear brake pedal.
2. Inspect:
  - Wear indicator ①
 Indicator reaches the wear limit mark ② → Replace brake shoes as a set.  
 Refer to the "REAR WHEELS AND REAR BRAKE" section in CHAPTER 7.

**3**



## FRONT BRAKE ADJUSTMENT

INSP  
ADJ

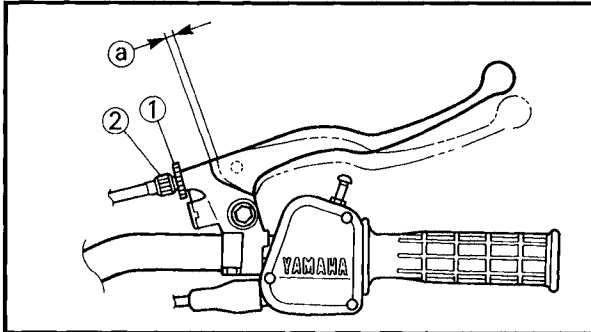
## FRONT BRAKE ADJUSTMENT

## NOTE:

Before adjusting the front brake, the front brake linings should be inspected.

## CAUTION:

Proper lever free play is essential to avoid excessive brake drag.



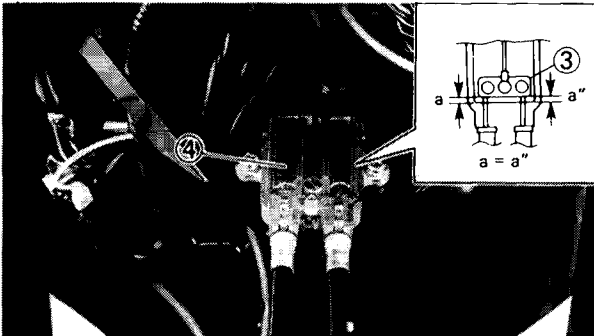
## 1. Check:

- Front brake lever free play (a)  
Out of specification → Adjust.



**Front brake lever free play:**  
5 ~ 8 mm (0.20 ~ 0.31 in)  
at lever pivot

3



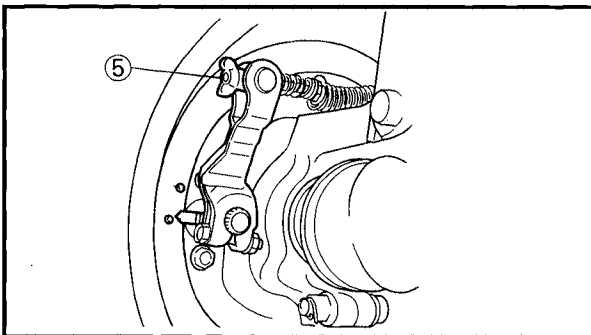
## 2. Adjust:

- Front brake lever free play

\*\*\*\*\*

## Adjustment steps:

- Loosen the locknut (1) and turn the adjuster (2) clockwise to release the tension in the front brake cable.
- Visually check the cable joint (3) in the equalizer (4) to verify it is horizontal.
- If not horizontal, turn both adjuster (5) (front hub — left and right) until the cable joint (3) is horizontal.
- Make sure that the both brakes (left and right) have some slight drag by lifting the front wheels off the ground, then spin the wheels.
- Turn the adjuster (2) clockwise or counter-clockwise until proper free play is obtained.



Clockwise	Free play is increased.
Counterclockwise	Free play is decreased.

- Tighten the locknut.

\*\*\*\*\*

# REAR BRAKE LEVER AND PEDAL ADJUSTMENT

**INSP**  
**ADJ**


## REAR BRAKE LEVER AND PEDAL ADJUSTMENT

**NOTE:** \_\_\_\_\_

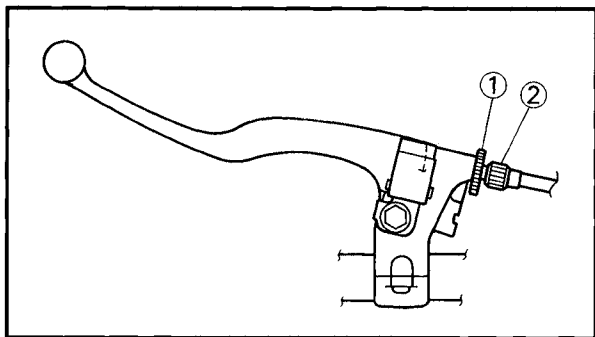
Before adjusting the rear brake, the rear brake shoe lining should be inspected.

**CAUTION:** \_\_\_\_\_

**Proper lever and pedal free play is essential to avoid excessive brake drag.**

**! WARNING** \_\_\_\_\_

**Always adjust both the brake pedal and the brake lever whenever adjusting the rear brake.**

**3**


1. Place the machine on a level place.
2. Adjust:

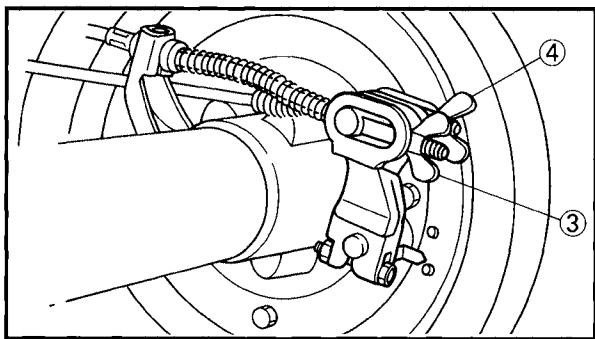
- Brake lever free play
- Brake pedal free play

\*\*\*\*\*

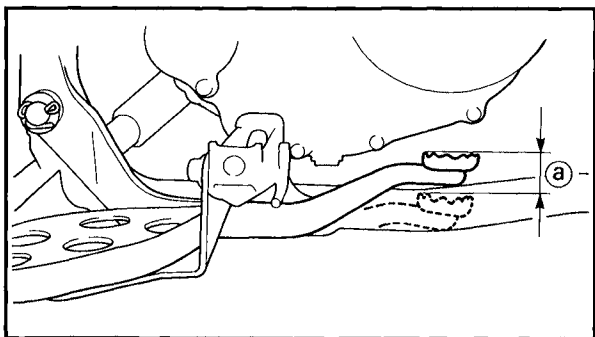
### Adjustment steps:

**NOTE:** \_\_\_\_\_

Before adjusting the free play, pump the brake pedal 2 to 3 times.



- Fully loosen the locknut ① (handlebar) and fully turn in the brake lever adjuster ②.
- Fully loosen brake cable adjuster ③ and brake rod adjuster ④.



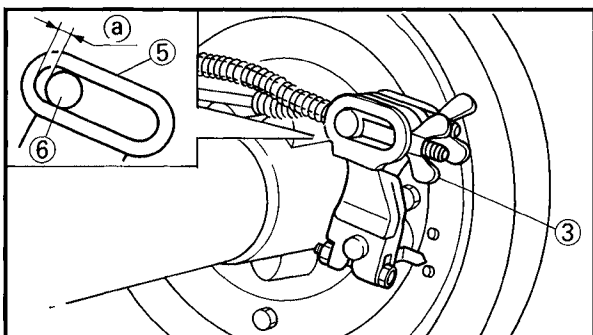
- Tighten the brake pedal adjuster ④ until proper free play is attained.



**Free play ① (brake pedal):**  
**20 ~ 30 mm (0.8 ~ 1.2 in)**

- Turn the brake lever cable adjuster ③ clockwise until the gap ① is within the specified limits.

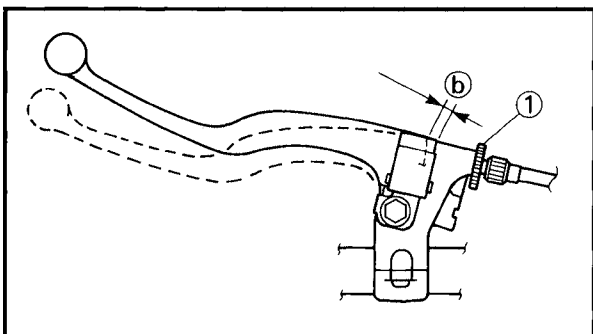
## DRIVE SELECT LEVER POSITION ADJUSTMENT

**INSP  
ADJ**

**Gap (a):**
**0 ~ 1 mm (0 ~ 0.04 in)**

⑤ Brake cam lever

⑥ Pin

- Turn out the brake lever cable adjuster ② (handlebar) until proper free play is attained.

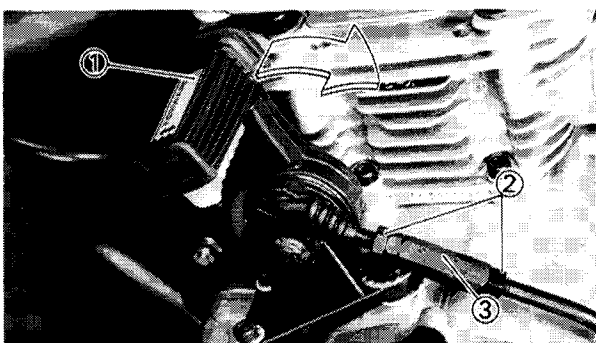

**Free play (b) (brake lever):**
**5 ~ 8 mm (0.2 ~ 0.3 in) at lever pivot**

- Tighten the locknut ① (handlebar).
- Inspect brake lever and brake pedal free play.  
If out of specification, perform adjustment steps again.

### **⚠ WARNING**

After this adjustment is performed, block the rear of the machine off the ground, and spin the rear wheels to ensure there is no brake drag. If any brake drag is noticed, perform the above steps again.

\*\*\*\*\*



## DRIVE SELECT LEVER POSITION ADJUSTMENT

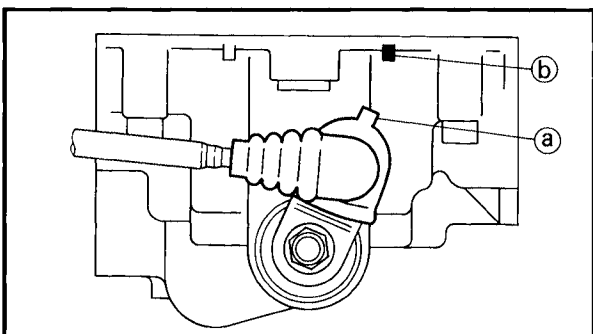
1. Adjust:

- Drive select lever position

\*\*\*\*\*

### **Adjustment steps:**

- Place the machine on a level place.
- Shift the transmission in first gear, and move the select lever ① to reverse position.
- Loosen the locknuts ②.
- Turn the select lever adjuster ③ in or out until projection (a) on the rubber boot aligns with match mark (b) on the crankcase cover.
- Tighten the locknuts ②.


**Locknut (select lever adjuster):**
**15 Nm (1.5 m·kg, 11 ft·lb)**
**3**

**FINAL DRIVE GEAR OIL LEVEL INSPECTION****INSP  
ADJ****NOTE:** \_\_\_\_\_

After adjusting the drive select lever, be sure the reverse indicator light comes on when the drive select lever is in reverse position.

\*\*\*\*\*

**FINAL DRIVE GEAR OIL LEVEL INSPECTION****1. Inspect:**

- Final drive gear oil level
- Oil level low > Add sufficient oil.

**NOTE:** \_\_\_\_\_

The engine should be cool (at atmospheric temperature).

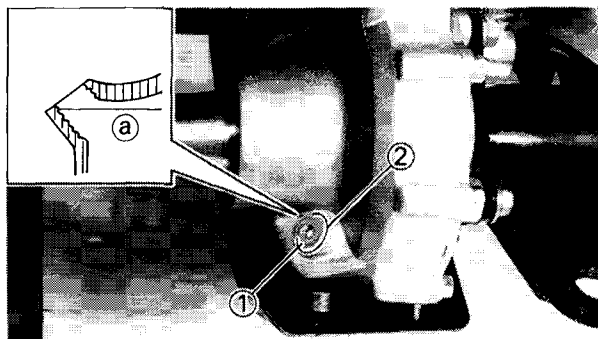
\*\*\*\*\*

**Inspection steps:**

- Place the machine on a level place.
- Place an oil pan under the final drive gear case.
- Remove the filler bolt ① and gasket ②.
- Visually check the oil level. Correct oil level ① should be at the lower brim of the hole.
- If the oil level is low, add the recommended oil up to the specified level. Refer to "FINAL DRIVE GEAR OIL REPLACEMENT" section.
- Inspect the gasket for damage. If damaged, replace it
- Install the gasket and filler bolt.

**NOTE:** \_\_\_\_\_

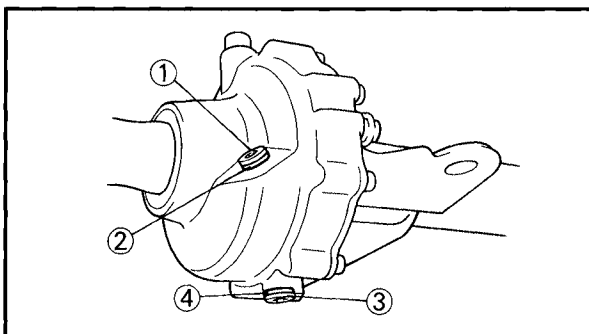
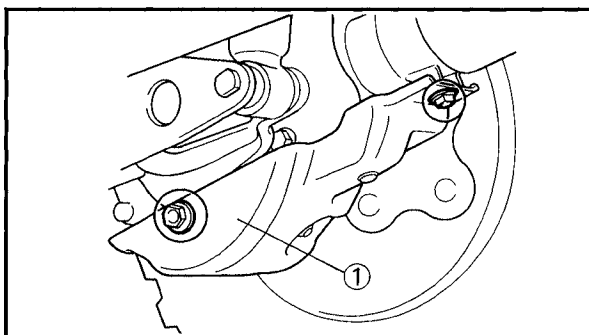
- Before installing the filler bolt, do not forget to fit the gasket.
- After installing the filler bolt, inspect the oil leaks.



**Filler bolt (final drive gear case):**  
**23 Nm (2.3 m•kg, 17 ft•lb)**

\*\*\*\*\*

**3**

**FINAL DRIVE GEAR OIL REPLACEMENT****INSP  
ADJ****FINAL DRIVE GEAR OIL REPLACEMENT**

1. Place the machine on a level place.
2. Remove:
  - Final gear case guard ①
3. Place a receptacle under the final drive gear case.
4. Remove:
  - Filler bolt ① (final drive gear case)
  - Gasket ②
  - Drain plug ③ (gear case)
  - Gasket ④
5. Drain the final drive gear oil.
6. Inspect:
  - Gasket ② (filler bolt)
  - Gasket ④ (drain plug)
 Damage → Replace.
7. Install:
  - Gasket (drain plug)
  - Drain plug (final drive gear case)



**Drain plug (final drive gear case):**  
**23 Nm (2.3 m•kg, 17 ft•lb)**

8. Fill:
  - Final drive gear case

**CAUTION:**

**Do not allow foreign material to enter the final drive gear case.**



**Periodic oil change:**  
**0.12 L (0.10 Imp qt, 0.13 US qt)**  
**Total amount:**  
**0.13 L (0.11 Imp qt, 0.14 US qt)**  
**Recommended oil:**  
**SAE 80 API "GL-4"**  
**Hypoid gear oil**

9. Install:
  - Gasket (filler bolt)
  - Filler bolt (final drive gear case)

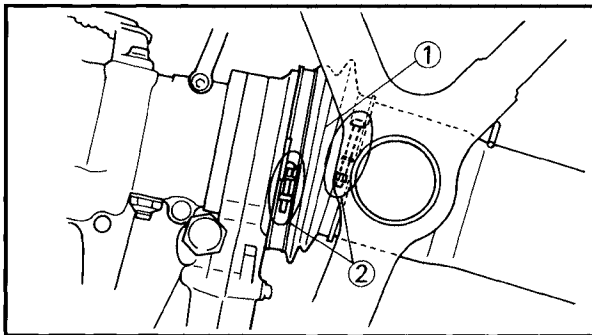
**NOTE:**

After filling the oil, inspect the oil leaks.



**Oil filler bolt (final drive gear case):**  
**23 Nm (2.3 m•kg, 17 ft•lb)**

**3**



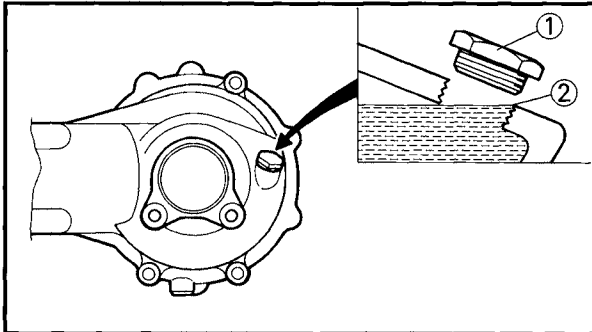
### DRIVE SHAFT DUST BOOT INSPECTION

1. Inspect:

- Dust boot ①  
Wear/Damage → Replace.

- Clamp ②  
Loose → Tighten.

Refer to the "REAR SHOCK ABSORBER AND SWINGARM" section in the CHAPTER 7.



### DIFFERENTIAL GEAR OIL LEVEL INSPECTION

1. Place the machine on a level place.

2. Oil filler bolt ①

3. Inspect:

- Oil level  
Oil level should be up to bottom brim ② of hole  
Oil level low → Add oil to proper level.



**Periodic oil change:**

0.47 L (0.41 Imp qt, 0.50 US qt)

**Total amount:**

0.5 L (0.44 Imp qt, 0.53 US qt)

**Recommended oil:**

SAE80 API "GL-4"

Hypoid gear oil

### CAUTION:

Take care not allow foreign material to enter the final gear case.

4. Install:

- Oil filler bolt (differential gear case)



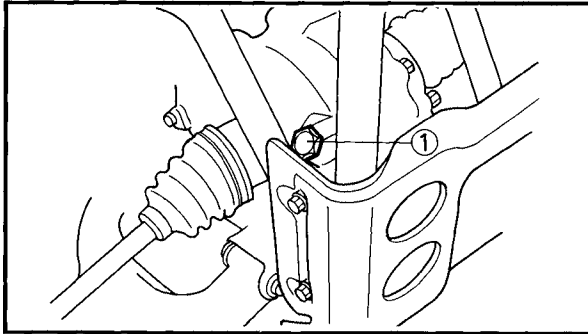
**Oil filler bolt (differential gear case):**

23 Nm (2.3 m•kg, 17 ft•lb)

### DIFFERENTIAL GEAR OIL REPLACEMENT

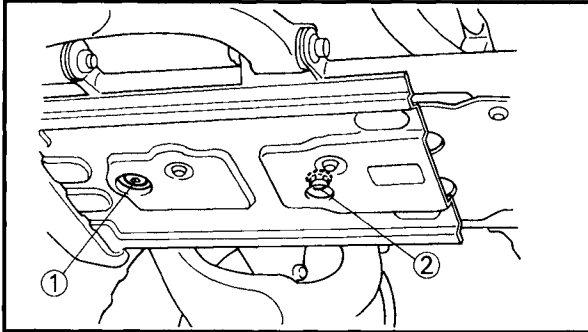
1. Place the machine on a level place.

2. Place a receptacle under the differential gear case.

**DIFFERENTIAL GEAR OIL REPLACEMENT****INSP**  
**ADJ**

3. Remove:

- Oil filler bolt ①



4. Remove:

- Drain plug ① (front)
- Drain plug ② (rear)
- Gaskets (drain plugs)

5. Drain:

- Differential gear oil

6. Inspect:

- Gaskets (drain plugs)
- Damage → Replace.

7. Install:

- Gaskets (drain plugs)
- Drain plug (front)
- Drain plug (rear)

**3****Drain plug (rear):****16 Nm (1.6 m•kg, 11 ft•lb)****Drain plug (front):****23 Nm (2.3 m•kg, 17 ft•lb)**

8. Fill:

- Differential gear case

**Periodic oil change:****0.47 L (0.41 Imp qt, 0.50 US qt)****Total amount:****0.5 L (0.44 Imp qt, 0.53 US qt)****Recommended oil:****SAE80 API "GL-4"****Hypoid gear oil****CAUTION:**

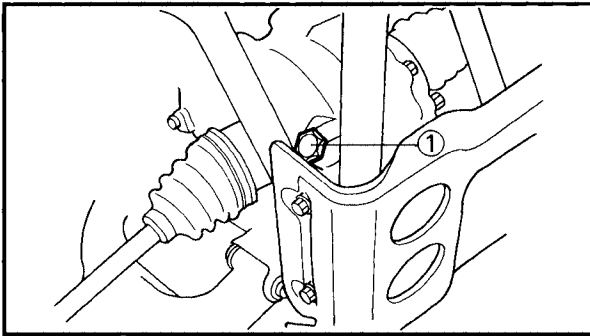
**Take care not allow foreign material to enter the differential gear case.**

9. Inspect:

- Oil level

Refer to the "DIFFERENTIAL GEAR OIL LEVEL INSPECTION" section.

# CONSTANT VELOCITY JOINT DUST BOOT INSPECTION/ STEERING SYSTEM INSPECTION

**INSP**  
**ADJ**


## 10. Install:

- Oil filler bolt ① (differential gear case)



**Oil filler bolt (differential gear case):**  
**23 Nm (2.3 m•kg, 17 ft•lb)**

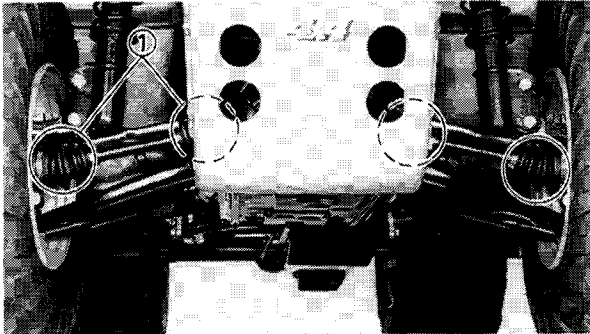
## CONSTANT VELOCITY JOINT DUST BOOT INSPECTION

### 1. Inspect

- Dust boots ①

Damage → Replace.

Refer to the "DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINT" section in the CHAPTER 6.

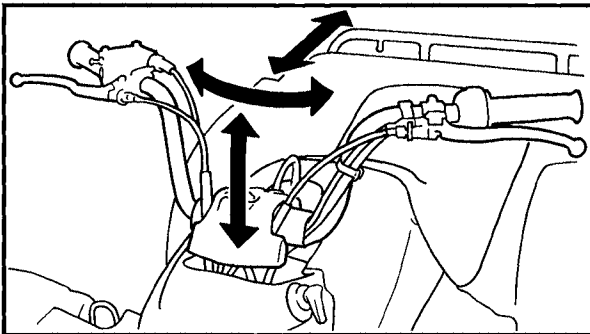


## STEERING SYSTEM INSPECTION

### 1. Place the machine on a level place.

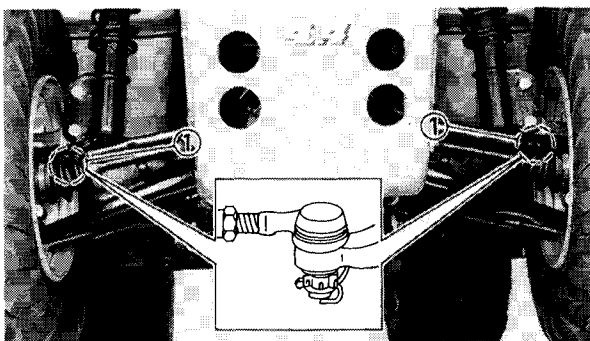
### 2. Check:

- Steering shaft bushings and bearings  
Move the handlebar up and down, and/or back and forth,  
Excessive play → Replace the steering shaft bushings and or bearings.  
Refer to the "STEERING SYSTEM" section in the CHAPTER 7.



### 3. Check:

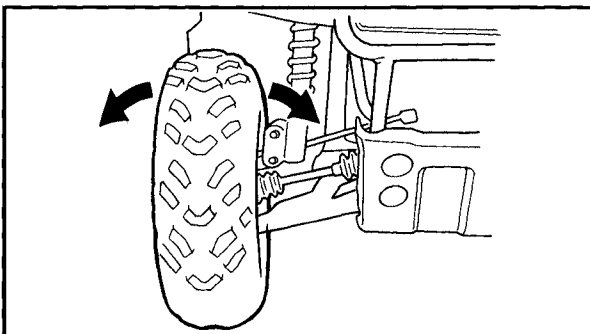
- Tie-rod ends  
Turn the handlebar to the left and/or right until it stops completely, then slightly move the handlebar from left to right.  
Tie-rod end ① has any vertical play → Replace the tie-rod end(s).  
Refer to the "STEERING SYSTEM" section in the CHAPTER 7.



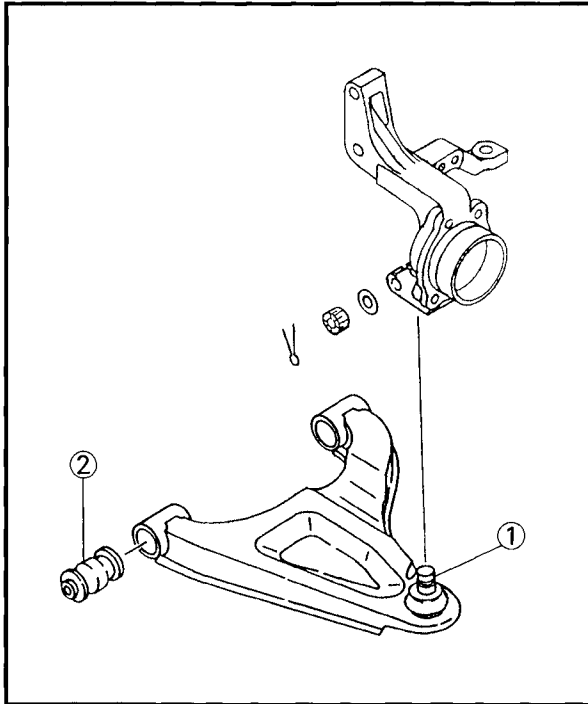
### 4. Raise the front end of the machine so that there is no weight on the front wheels.

### 5. Check:

- Knuckles and/or wheel bearings  
Move the wheels laterally back and forth.  
Excessive free play → Replace the following parts.

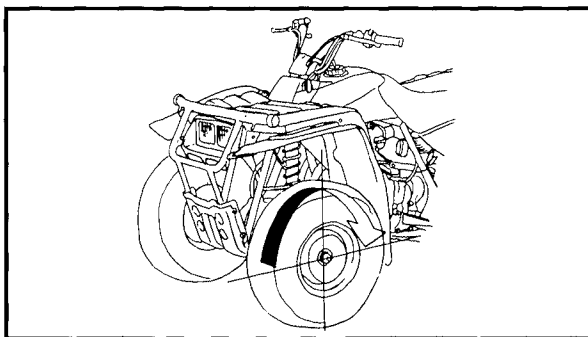
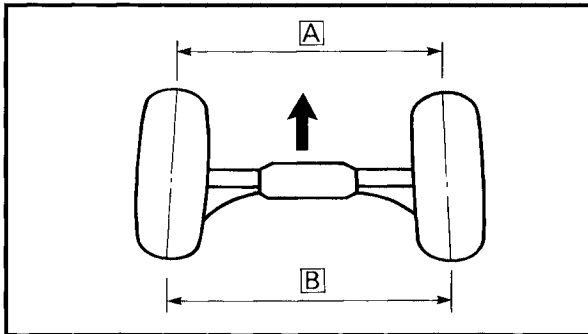




**TOE-IN ADJUSTMENT****INSP  
ADJ**

- 1) Wheel bearings
- 2) Stud boll(s) ① (lower arm)
- 3) Bushings ② (lower arm)

Refer to the "STEERING SYSTEM" section in the CHAPTER 7.

**3****TOE-IN ADJUSTMENT**

1. Place the machine on a level place.
2. Measure:
  - Toe-in
 Out of specification → Adjust.

\*\*\*\*\*

**Toe-in measurement steps:**

- Mark both front tire tread centers.
- Raise the front end of the machine so that there is no weight on the front tires.
- Fix the handlebar straight ahead.
- Measure the width **A** Between the marks.
- Rotate the front tires 180 degrees until the mark come exactly opposite.
- Measure the width **B** between the marks.
- Calculate the toe-in using the formula given below.

$$\text{Toe-in} = \mathbf{B} - \mathbf{A}$$

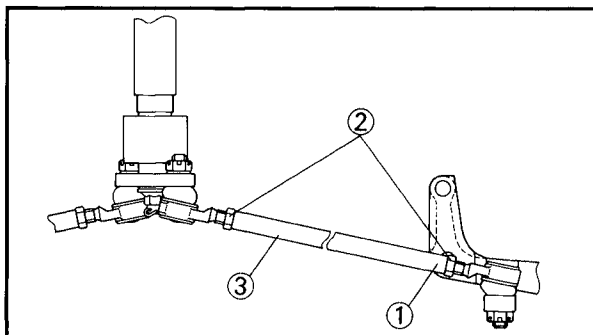


**Toe-in:**  
0 ~ 10 mm (0 ~ 0.39 in)

- If the toe-in is incorrect, adjust the toe-in.

\*\*\*\*\*

# FRONT AND REAR SHOCK ABSORBERS INSPECTION

**INSP**  
**ADJ**


3. Adjust:
- Toe-in

\*\*\*\*\*

## Adjustment steps:

- Place a confirmation marks ① on the both tie-rods end.
- Loosen the rod end locknuts ② of both tie-rods.
- The same number of turns should be given to both tie-rods ③ right and left until the specified toe-in is obtained, so that the lengths of the rods will be kept the same.
- Tighten the rod end locknuts ② of both tie-rods.



**Locknut (tie-rod end):**  
**30 Nm (3.0 m·kg, 22 ft·lb)**

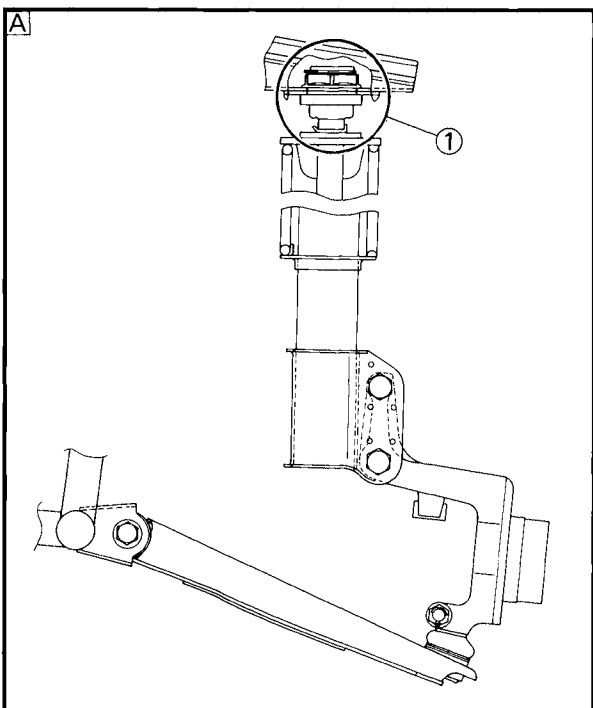
## ⚠ WARNING

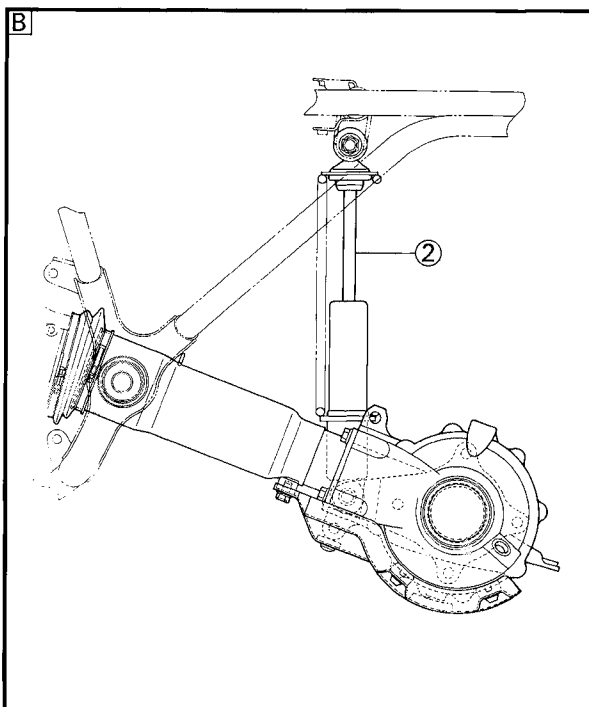
- Be sure that both tie-rods (left and right) are turned by the same amount. If not, the machine will go right or left even though the handlebar is positioned straight and it may lead to mishandling and accident.
- After setting the toe-in to specification, run the machine slowly for some distance with the hands lightly on the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.

\*\*\*\*\*

## FRONT AND REAR SHOCK ABSORBERS INSPECTION

1. Place the machine on a level place.
  2. Check:
    - Ball joint complete ① (front)  
Cracks/Damage → Replace the shock absorber assembly.
    - Damper rod ② (rear)  
Scratch/Damage → Replace the shock absorber assembly.
    - Oil leaks  
Excessive oil leaks → Replace the shock absorber assembly.
- Refer to the "FRONT SHOCK ABSORBER AND LOWER ARM" section or "REAR SHOCK ABSORBER AND SWINGARM" section in the CHAPTER 7.


**3**

**REAR SHOCK ABSORBER ADJUSTMENT****INSP  
ADJ****3. Check:**• **Operation**

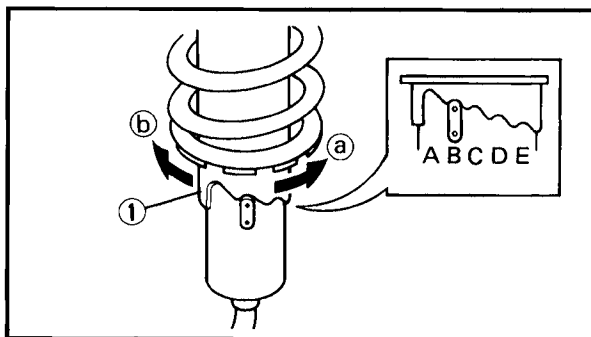
Pump the shock absorbers up and down for several times.

Unsmooth operation → Replace the shock absorber assembly.

Refer to the "FRONT SHOCK ABSORBER AND LOWER ARM" section or "REAR SHOCK ABSORBER AND SWINGARM" section in the CHAPTER 7.

**A** Front shock absorber

**B** Rear shock absorber

**3****REAR SHOCK ABSORBER ADJUSTMENT****1. Adjust:**• **Spring preload**

Turn the adjuster ① to increase or decrease the spring preload.

**NOTE:**

The spring preload of the rear shock absorber can be adjusted to suit rider's preference, weight, and the course conditions.

**Rear shock absorber preload**

Preload	Softer ① ←	Standard	Stiffer ② →
Position	A	B	C, D, E

**TIRE INSPECTION****INSP  
ADJ****TIRE INSPECTION****⚠ WARNING**

This model is equipped with low pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

- **TIRE CHARACTERISTICS**

- 1) Tire characteristics influence the handling of ATV's. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your machine's handling characteristics and are therefore not recommended.

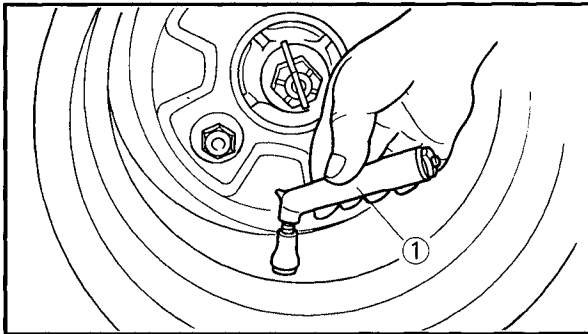
	Manufacturer	Size	Type
Front	DUNLOP	AT23 × 8-10	KT401
Rear	DUNLOP	AT23 × 10-10	KT405

- **TIRE PRESSURE**

- 1) Recommended tire pressure  
Front 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)  
Rear 25 kPa (0.25 kgf/cm<sup>2</sup>, 3.6 psi)
- 2) Tire pressure below the minimum specified could cause the tire to dislodge from the rim under severe riding conditions.  
The following are minimums:  
Front 22 kPa (0.22 kgf/cm<sup>2</sup>, 3.2 psi)  
Rear 22 kPa (0.22 kgf/cm<sup>2</sup>, 3.2 psi)
- 3) Use no more than  
Front 250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)  
Rear 250 kPa (2.5 kgf/cm<sup>2</sup>, 36 psi)  
When seating the tire beads. Higher pressures may cause the tire to burst. Inflate the tires very slowly and carefully. Fast inflation could cause the tire to burst.

- **MAXIMUM LOADING LIMIT**

- 1) Vehicle load limits:  
For USA: 200 kg (441 lb)\*  
Except for USA: 165 kg (364 lb)  
\*Total weight of cargo, rider, and accessories, and trailer hitch vertical load.

**TIRE INSPECTION****INSP  
ADJ**

## 1. Measure:

- Tire pressure (cold tire pressure)  
Out of specification → Adjust.

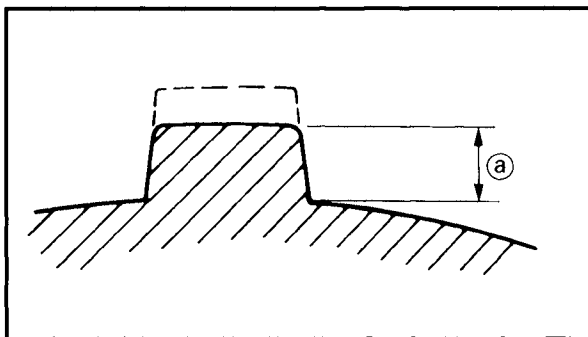
**NOTE:**

- The Low-pressure tire gauge ① is included in the standard equipment.
- If dust or the like is stuck to this gauge, it does not provide correct readings. Therefore, make two measurements on the tire pressure and get the second reading.

**⚠ WARNING**

Uneven or improper tire pressure may adversely affect the handling of this machine and may cause loss of control.

- Maintain proper tire pressures.
- Set tire pressures when the tires are cold.
- Tire pressures must be equal in both front tires and equal in both rear tires.

**3**

Cold tire pressure	Front	Rear
<b>Standard</b>	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)	25 kPa (0.25 kgf/cm <sup>2</sup> , 3.6 psi)
<b>Minimum</b>	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)	22 kPa (0.22 kgf/cm <sup>2</sup> , 3.2 psi)
<b>Maximum</b>	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)	28 kPa (0.28 kgf/cm <sup>2</sup> , 4.0 psi)

## 2. Inspect:

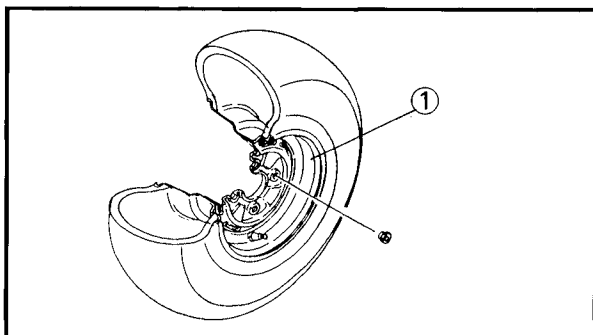
- Tire surfaces  
Wear/Damage → Replace.

**⚠ WARNING**

It is dangerous to ride with a wornout tire. When a tire wear is out of specification, replace the tire immediately.



**Tire wear limit ②:**  
front and rear: 3.0 mm (0.12 in)

**WHEEL INSPECTION/BATTERY INSPECTION****INSP  
ADJ****WHEEL INSPECTION**

1. Inspect:
  - Wheels ①
 Cracks/Bends/Damage → Replace.

**NOTE:**

Always balance the wheel when a tire or wheel has been changed or replaced.

**⚠ WARNING**

Never attempt even small repairs to the wheel.

**ELECTRICAL  
BATTERY INSPECTION****⚠ WARNING**

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

Always follow these preventive measures:

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

Antidote (EXTERNAL):

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

Antidote (INTERNAL):

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

Batteries also generate explosive hydrogen gas. You should always follow these preventive measures:

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

**KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**

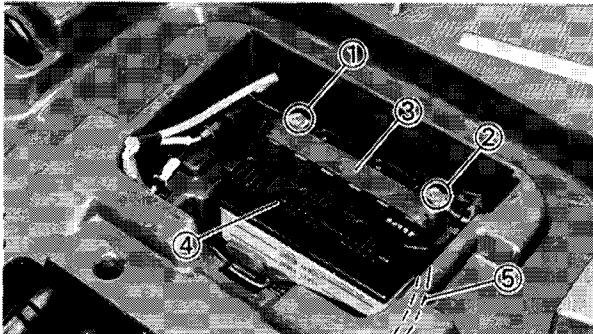


**BATTERY INSPECTION****INSP  
ADJ**

## 1. Remove:

- Seat

Refer to the "REAR FENDER-Removal" section.



## 2. Disconnect:

- Battery leads (negative ① and positive ②)
- Battery band ③

**⚠ WARNING**

**Disconnect the negative lead ① first.**

**3**

## 3. Remove:

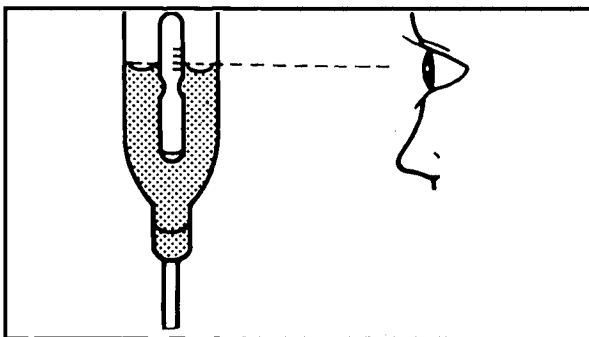
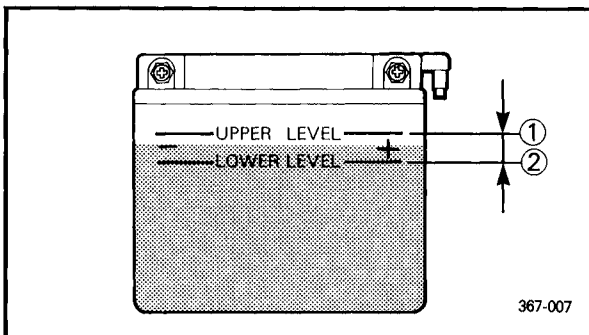
- Battery ④
- Breather hose ⑤ (battery side)

## 4. Inspect:

- Battery fluid level  
Battery fluid level low → Fill.  
Fluid level should be between upper level ① and lower level ② marks.

**CAUTION:**

**Refill with distilled water only; tap water contains minerals harmful to a battery.**



## 5. Inspect:

- Battery fluid specific gravity  
Out of specification → Charge.

**Charging current: 1.2 amps/10 hrs**  
**Specific gravity: 1.280 at 20°C (68°F)**

\*\*\*\*\*

**Replace the battery if:**

- Battery voltage will not rise to a specific value or bubbles fail to rise even after many hours of charging.
- Sulfation of one or more cells occurs, as indicated by the plates turning white, or an accumulation of material exists in the bottom of the cell.

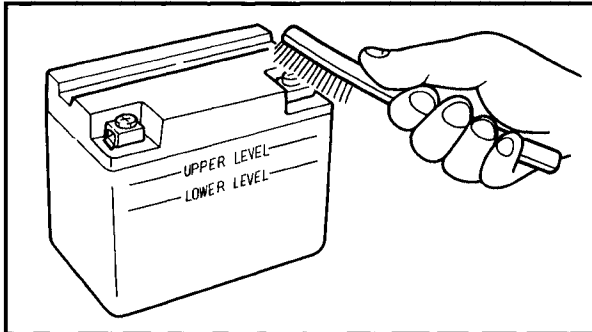
**BATTERY INSPECTION****INSP**  
**ADJ**

- Specific gravity readings after a long, slow charge indicate one cell to be lower than the rest.
- Warpage or buckling of plates or insulators is evident.

\*\*\*\*\*

**CAUTION:**

**Always charge a new battery before using it to ensure maximum performance.**



## 6. Inspect:

- Battery terminal  
Dirty terminal → Clean with wire brush.  
Poor connection → Correct.

**NOTE:**

After cleaning the terminals, apply grease lightly to the terminals.

## 7. Inspect:

- Breather hose  
Obstruction → Remove.  
Damage → Replace.

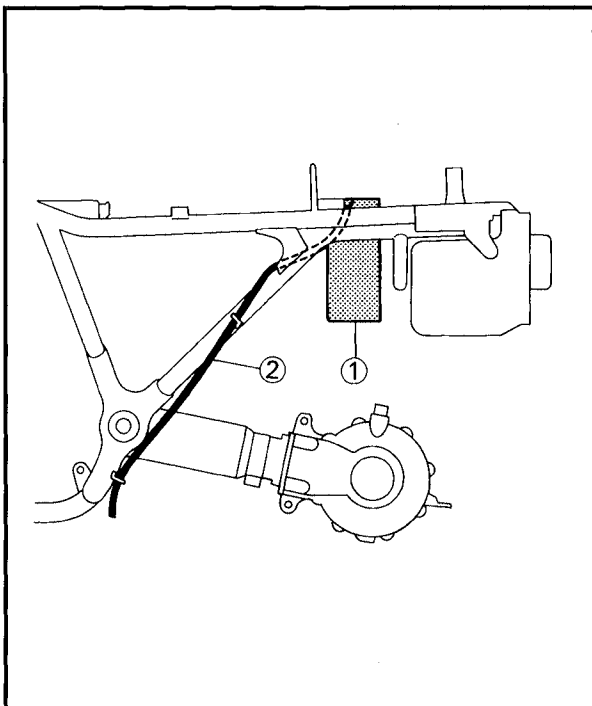
## 8. Install:

- Battery ①
- Breather hose ②

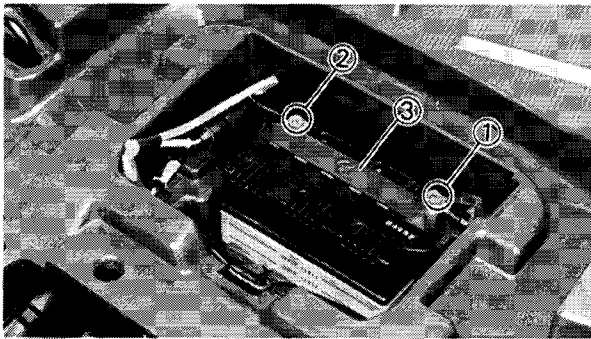
Refer to the "CABLE ROUTING" section in the CHAPTER 2.

**CAUTION:**

**When installing the battery, be sure the breather hose is routed correctly. If the breather hose touches the frame or exits in such a way as to cause battery electrolyte or gas to exit onto the frame, structural and cosmetic damage to the machine can occur.**





**FUSE INSPECTION****INSP  
ADJ**

## 9. Connect:

- Battery leads (positive ① and negative ②)
- Battery band ③

**⚠ WARNING**

Connect the positive lead ① first.

## 10. Install:

- Seat

Refer to the "REAR FENDER-Installation" section.

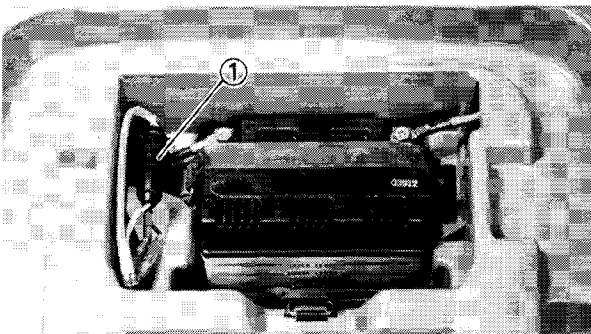
**3****FUSE INSPECTION****CAUTION:**

Don't forget to turn off the main switch when checking or replacing the fuse. Otherwise, it may cause accidental shortcircuiting.

**⚠ WARNING**

Do not use fuses of a higher amperage rating than those recommended. Substitution of a fuse of improper rating can cause extensive electrical system damage and possible fire.

Description	Amperage	Quantity
Main	30A	1
Spare	30A	1



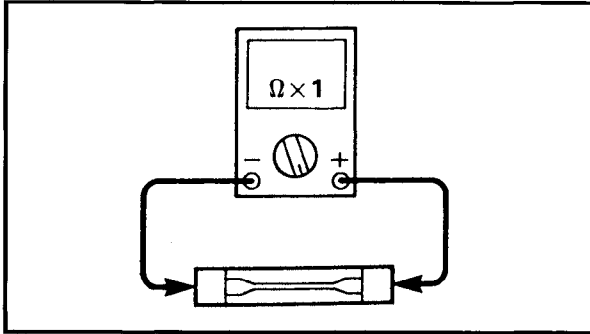
## 1. Remove:

- Seat

Refer to the "REAR FENDER-Removal" section.

## 2. Remove:

- Fuse holder ①
- Fuse

**HEADLIGHT BEAM ADJUSTMENT****INSP  
ADJ****3. Inspect:**

- Fuse

\*\*\*\*\*

**Inspection steps:**

- Connect the Pocket tester to the fuse and check it for continuity.

**NOTE:**

Set the tester selector to "Ω × 1" position.

**Pocket tester:****P/N. YU-03112, 90890-03112**

- If the tester is indicated at ∞. The fuse is blown, replace it.

\*\*\*\*\*

**4. Replace:**

- Blown fuse

\*\*\*\*\*

**Blown fuse replacement steps:**

- Turn off ignition and the circuit.
- Install a new fuse of proper amperage.
- Turn on the switches and see if the electrical device operates.
- Fuse interrupts the circuit again → Check electrical system.

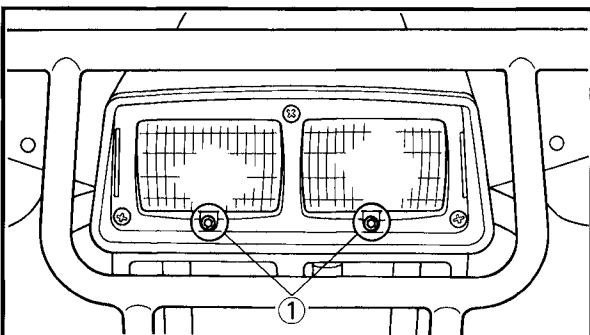
Refer to the "CHAPTER 8. ELECTRICAL" for further information.

\*\*\*\*\*

**5. Install:**

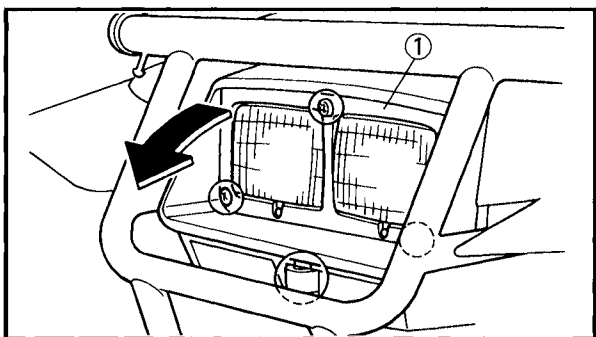
- Fuse holder
- Seat

Refer to the "REAR FENDER-Installation" section.

**HEADLIGHT BEAM ADJUSTMENT****1. Adjust:**

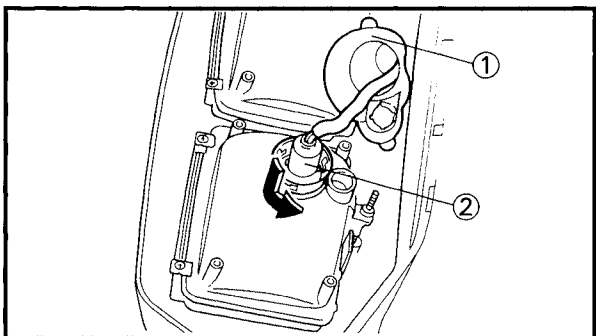
- Headlight beam (vertically)

Vertical adjustment	
Higher	Turn the adjusting screw ① clockwise.
Lower	Turn the adjusting screw ① counterclockwise.

**HEADLIGHT BULB REPLACEMENT****INSP  
ADJ****HEADLIGHT BULB REPLACEMENT**

1. Remove:

- Headlight cover ① (with headlight units)



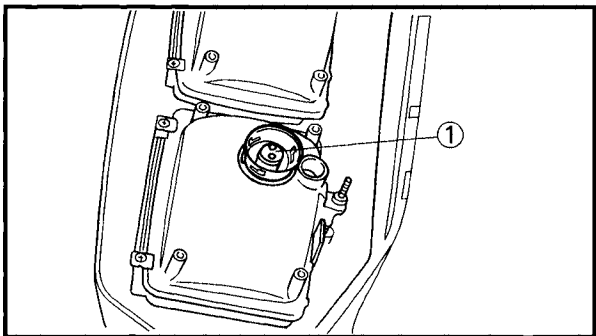
2. Pull back the bulb cover ①.

3. Disconnect:

- Bulb holder ②

**NOTE:**

While pushing the bulb holder ②, turn it counterclockwise.

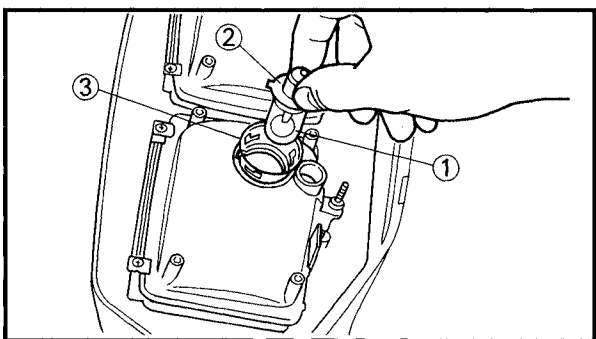


4. Remove:

- Bulb ①

**⚠ WARNING**

Keep flammable products or your hands away from the bulb while it is on, it will be hot. Do not touch the bulb until it cools down.



5. Install:

- Bulb ① (new)

**NOTE:**

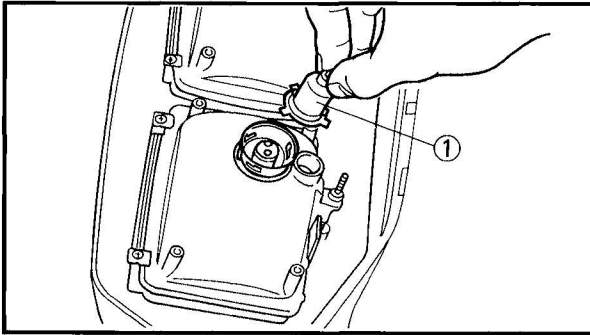
Make sure the projection ② on the bulb is meshed with the slot ③ on the light case.

**CAUTION:**

Avoid touching glass part of bulb. Also keep it free from oil otherwise, transparency of glass, bulb life and illuminous flux will be adversely affected. If oil gets on bulb, clean it with a cloth moistened thoroughly with alcohol or lacquer thinner.

**3**

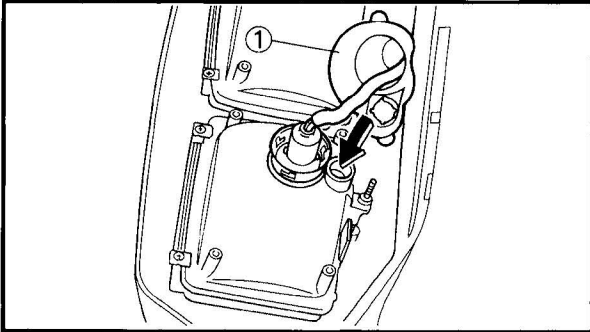
## HEADLIGHT BULB REPLACEMENT



6. Connent:
- Bulb holder ①

**NOTE:**

Make sure the projections on the bulb holder are meshed with the slots on the light case.



7. Set the bulb cover ① to the bulb holder.

8. Install:
- Headlight cover (with headlight unit)

9. Adjust:
- Headlight beam  
Refer to the "HEADLIGHT BEAM ADJUSTMENT" section.

**3**





## ENGINE OVERHAUL

### ENGINE REMOVAL

#### NOTE:

- It is not necessary to remove the engine in order to remove the following components:
  - \* Cylinder head
  - \* Cylinder
  - \* Piston
  - \* Primary and secondary clutches
  - \* Oil pump
  - \* Shift shaft
  - \* CDI Magneto
- It is necessary to remove the rear wheel drive assembly in order to remove the engine assembly.

#### PREPARATION FOR REMOVAL

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to the "SPECIAL TOOLS" section in the CHAPTER 1.

#### NOTE:

When disassembling the engine, keep mated parts together. This includes gears, cylinder, piston and other parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.

3. During engine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled in the engine.
4. Place the machine on a level place.

#### FRONT FENDER AND REAR FENDER

1. Remove:
  - Front fender
  - Seat
  - Rear fender
  - Fuel tank

Refer to the "FENDERS AND FUEL TANK" section in the CHAPTER 3.

**ENGINE REMOVAL****ENG****ENGINE OIL AND TRANSFER GEAR OIL**

## 1. Drain:

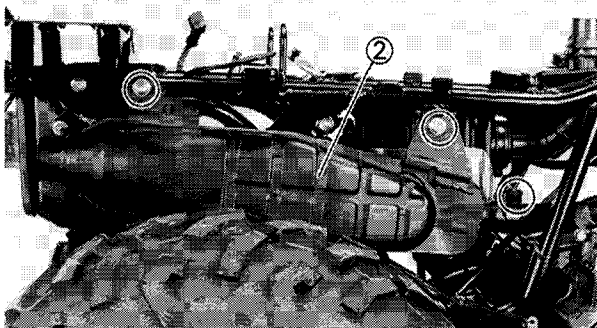
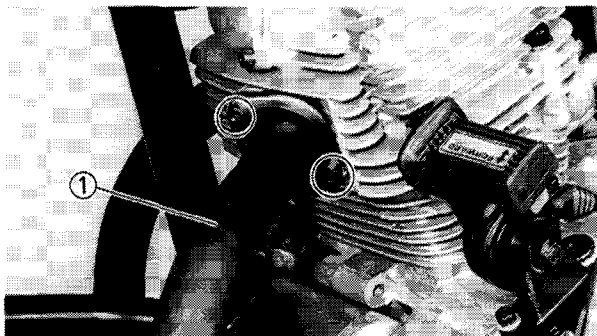
- Engine oil
- Transfer gear oil

Refer to the "ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT" section in the CHAPTER 3.

**EXHAUST PIPE AND MUFFLER**

## 1. Remove:

- Exhaust pipe ①
- Muffler ②

**CARBURETOR**

## 1. Drain:

- Fuel (float chamber)

**NOTE:**

Place a rag under the over flow hose to absorb a spilt fuel.

**⚠ WARNING**

Gasoline is highly flammable. Avoid spilling fuel on the hot engine.

## 2. Loosen:

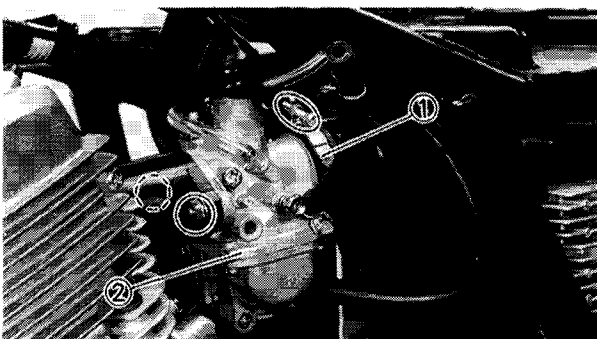
- Clamp ①

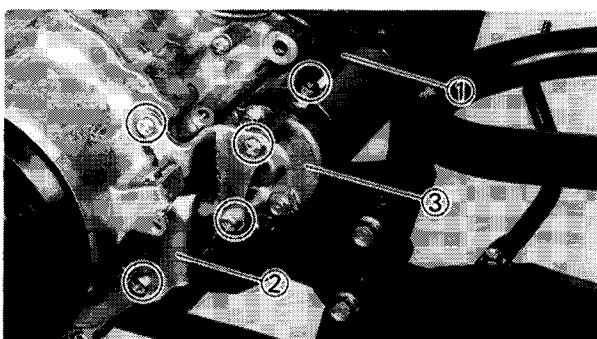
## 3. Remove:

- Carburetor ②

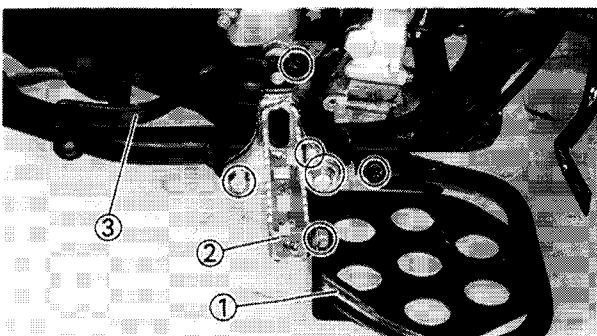
**NOTE:**

Cover the carburetor with a clean rag to prevent dirt or foreign material from entering the carburetor.

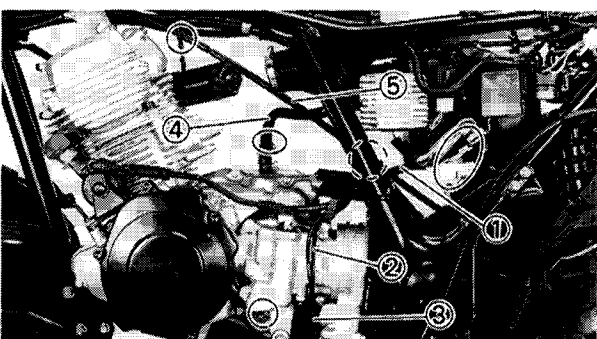


**ENGINE REMOVAL****ENG****STARTER MOTOR**

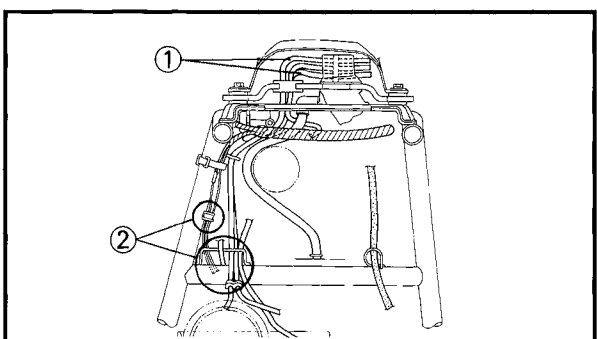
1. Disconnect:
  - Starter motor lead ①
2. Remove:
  - Starter motor bracket ②
  - Starter motor ③

**FOOTREST (LEFT)**

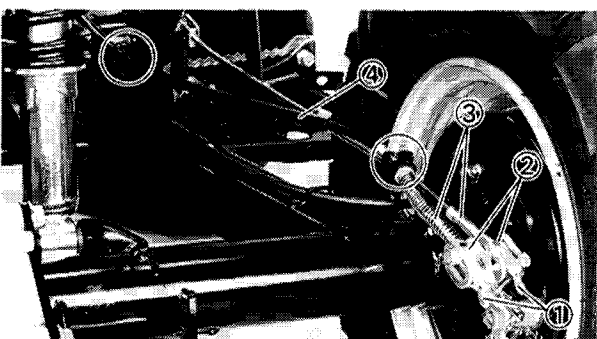
1. Remove:
  - Footrest guard ① (left)
  - Footrest ② (left)
  - Shift pedal ③

**WIRINGS AND HOSES**

1. Disconnect:
  - Spark plug lead
  - CDI magneto leads ①
  - "REVERSE" switch lead ②
  - "NEUTRAL" switch lead ③
  - Breather hose ④ (crankcase)
  - Brake cable ⑤ (from cable guide)

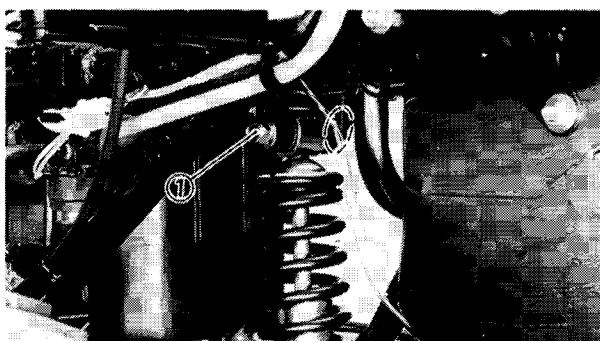
**REAR WHEEL DRIVE ASSEMBLY AND SWINGARM**

1. Disconnect:
  - Breather hose ① (final gear case and rear brake drum)  
(from the cable guides ② of main frame)
2. Remove:
  - Adjusters ① (parking brake cable and brake rod)
  - Pins ②
  - Springs ③
3. Disconnect:
  - Brake cable ④  
(from brake cable bracket and cable guide)

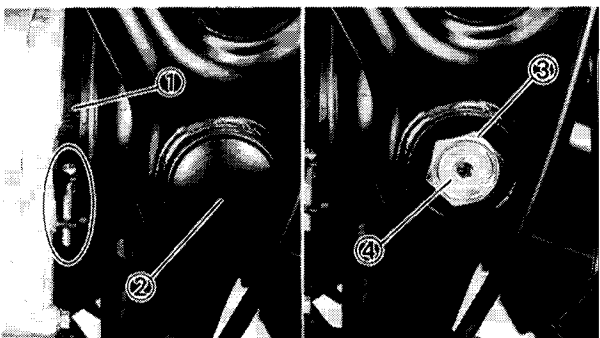
**4**

## ENGINE REMOVAL

ENG



4. Block the front wheels, and elevate the rear wheels by placing the suitable stand under the frame.
5. Remove:
  - Bolt ① (rear shock absorber-top)

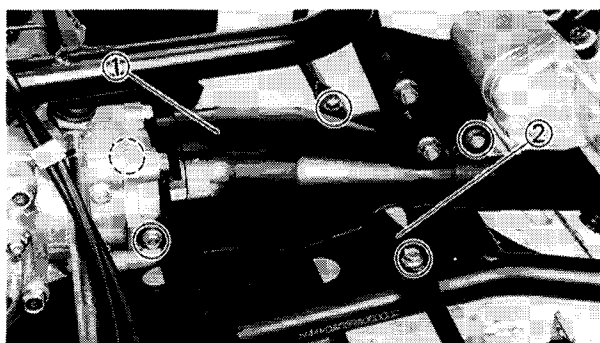
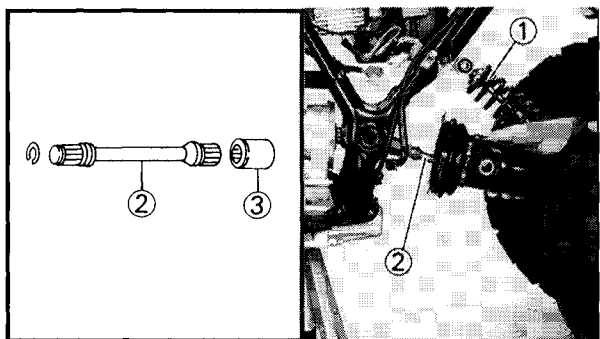


6. Loosen:
  - Clamp ① (rubber boot)
7. Remove:
  - Pivot shaft caps ②
  - Locknuts ③ (pivot shaft)
  - Pivot shafts ④ (swingarm)

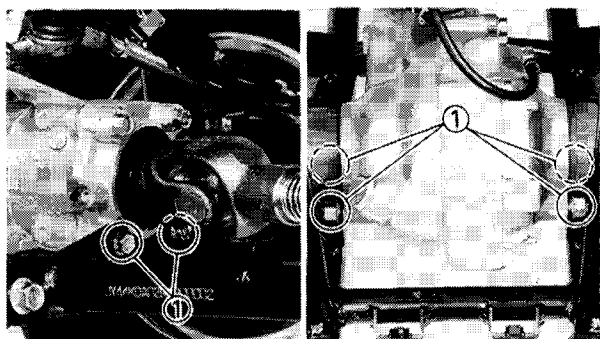
8. Remove:
  - Rear wheel drive assembly and swingarm

**CAUTION:**

- When removing the swingarm, hold the shock absorber ① so that it may not fall over.
- When the swingarm is disconnected from the rubber boot, the drive shaft ② and coupling gear ③ may fall off. Be careful not to lose these parts.

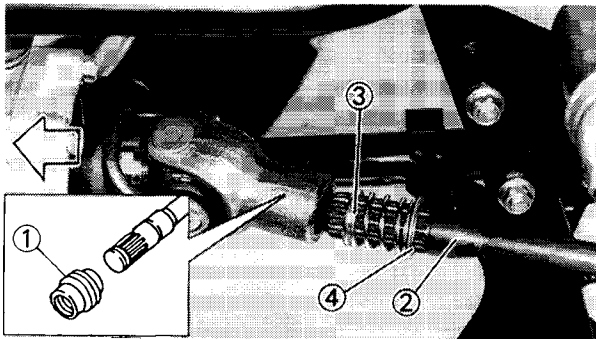
**FRONT DRIVE SHAFT**

1. Remove:
  - Drive shaft protector ① (front half)
  - Front fender stay ②



2. Remove:
  - Differential gear case mounting bolts ①

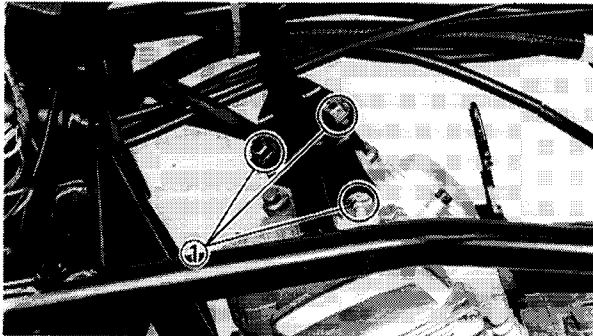


**ENGINE REMOVAL****ENG****3. Remove:**

- Boot ① (For Oceania)
- Front drive shaft ②
- Spring ③
- Spring seat ④

**NOTE:**

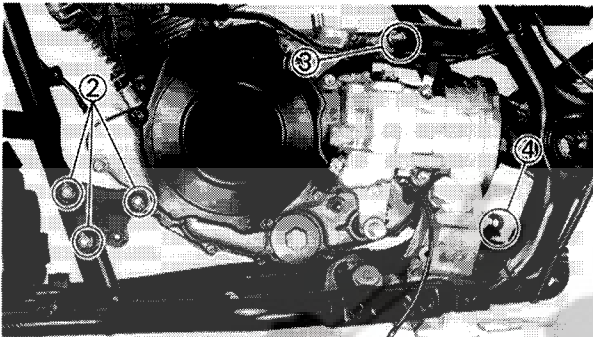
Lift up the differential gear case and move it forward to remove the drive shaft.

**ENGINE REMOVAL****1. Remove:**

- Bolts ① (engine mounting-top)
- Bolt ② (engine mounting-front)
- Bolt ③ (engine mounting-rear upper)
- Bolt ④ (engine mounting-rear lower)

**2. Remove:**

- Engine assembly  
(to the left side)

**4**

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## ENGINE DISASSEMBLY

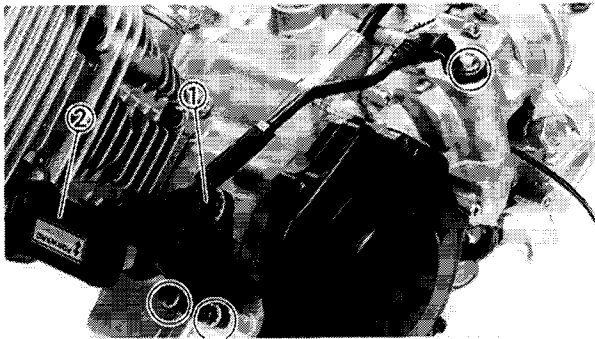
### CYLINDER HEAD ASSEMBLY, CYLINDER AND PISTON

#### NOTE:

With the engine mounted cylinder head assembly, cylinder and piston can be maintained by removing the following parts.

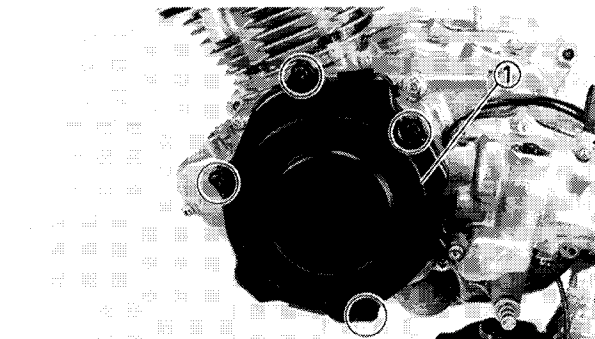
- Fuel tank
- Exhaust pipe
- Carburetor
- Engine stay (top)

# 4



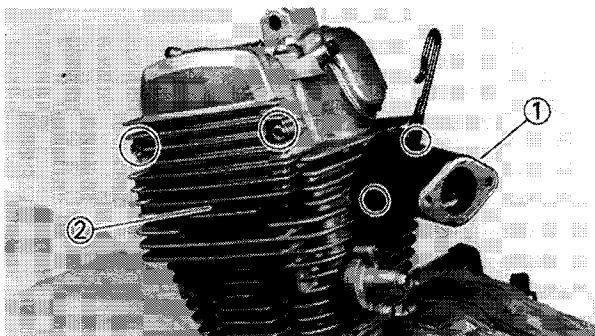
#### 1. Remove:

- Timing plug ①
- Drive select lever assembly ②
- Washers



#### 2. Remove:

- Crankcase cover ① (left)

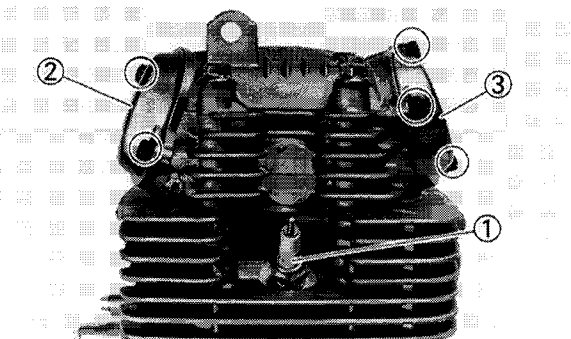


#### 3. Remove:

- Carburetor joint ①
- Cam sprocket cover ②

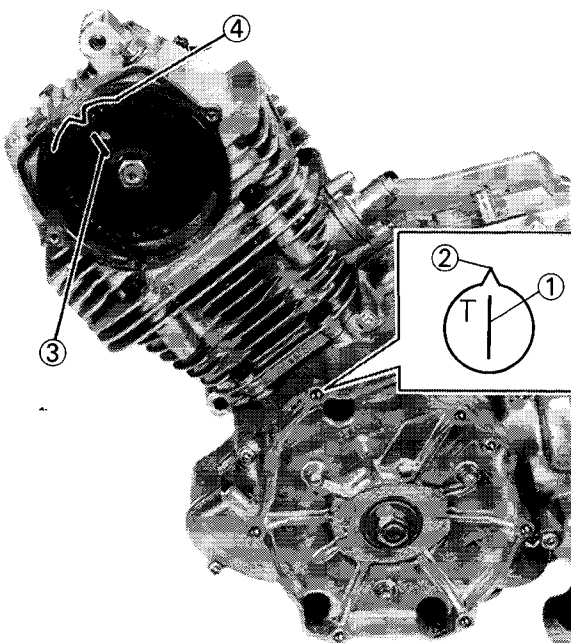
## ENGINE DISASSEMBLY

ENG



## 4. Remove:

- Spark plug ①
- Tappet cover ② (intake)
- Tappet cover ③ (exhaust)



## 5. Align:

- "T" mark on the rotor

With the stationary pointer on the crankcase cover.

\*\*\*\*\*

**TDC alignment steps:**

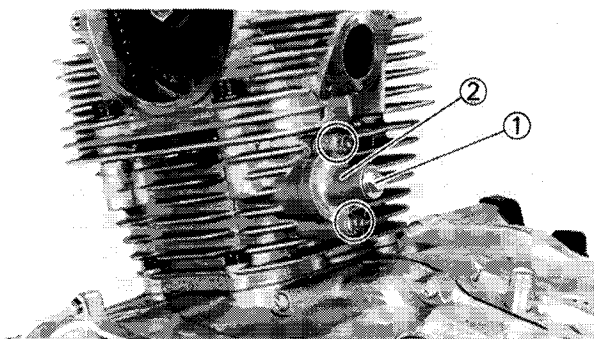
- Turn the crankshaft counterclockwise with wrench.
- Align the "T" mark ① on the rotor with the stationary pointer ② on the crankcase spacer. When the "T" mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC).

**NOTE:**

TDC on compression stroke check:

- Both rocker arms must have a valve clearance when the cam sprocket match mark ③ is aligned with the cylinder head match mark ④.
- If not, give the crankshaft one counterclockwise turn to meet above condition.

\*\*\*\*\*



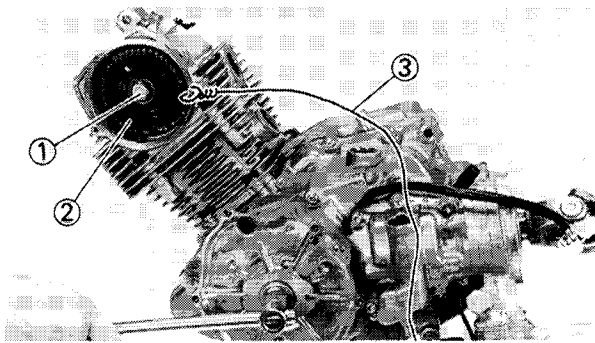
## 6. Loosen:

- Cap bolt ① (chain tensioner)

## 7. Remove:

- Chain tensioner ②
- Gasket

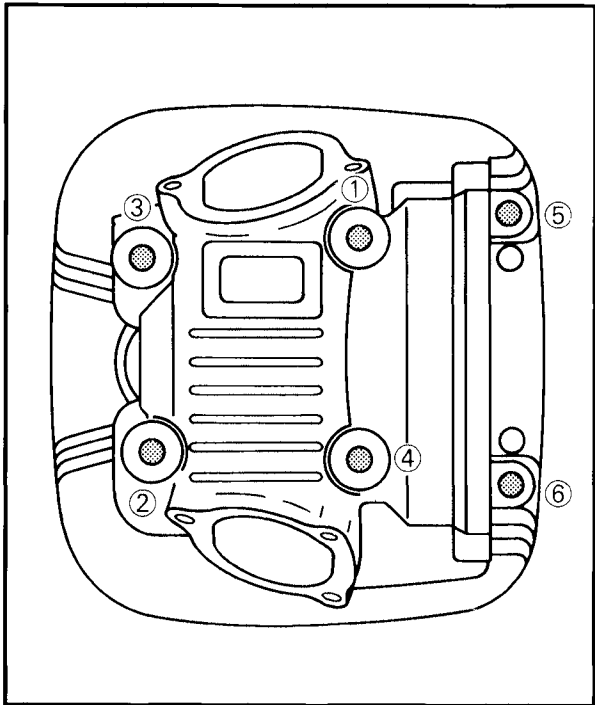
4

**ENGINE DISASSEMBLY****ENG****8. Remove:**

- Bolt ①
- Cam sprocket ②

**NOTE:**

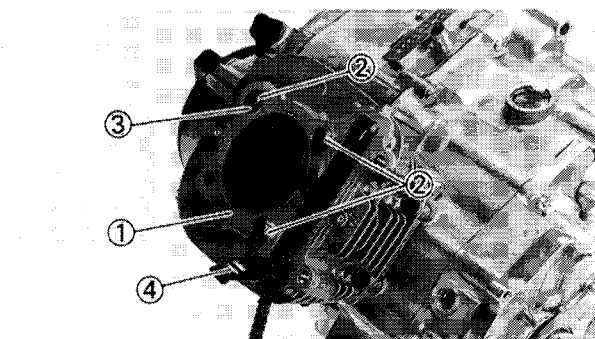
- Fasten a safety wire ③ to the timing chain to prevent it from falling into the crankcase.
- When removing the cam sprocket, it is not necessary to separate the timing chain.

**4****9. Remove:**

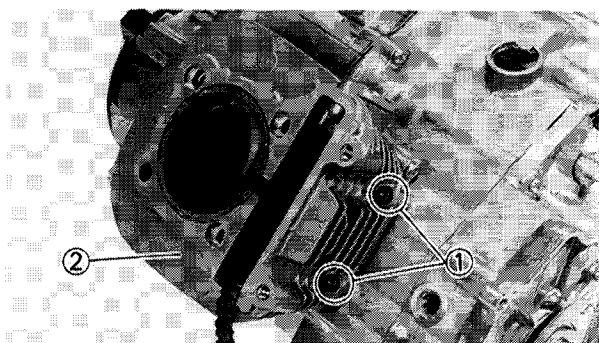
- Bolts
- Cylinder head

**NOTE:**

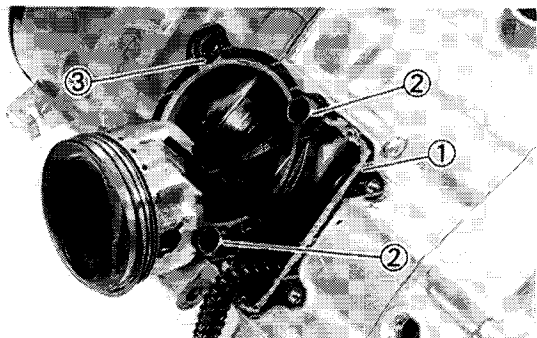
- Loosen the bolts 1/4 turn each and remove them after all are loosened.
- Loosen the bolts starting with the highest numbered one.
- The embossed numbers in the cylinder head designate the tightening sequence.

**10. Remove:**

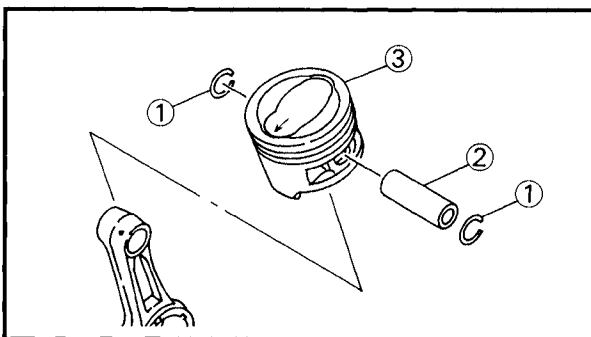
- Gasket ① (cylinder head)
- Dowel pins ②
- Oil seal ③
- Chain guide ④ (exhaust side)

**ENGINE DISASSEMBLY****ENG****11. Remove:**

- Bolts ① (cylinder)
- Cylinder ②

**12. Remove:**

- Gasket ① (cylinder)
- Dowel pins ②
- O-ring ③
- O-ring (cylinder skirt)

**13. Remove:**

- Piston pin clip ①
- Piston pin ②
- Piston ③

**NOTE:**

- When removing the piston pin clip, cover the crankcase with a clean rag so you will not accidentally drop the clip into the crankcase.
- Before removing the piston pin, deburr the clip groove and pin hole area.  
If the piston pin groove is deburred and piston pin is still difficult to remove, use Piston pin puller.

**Piston pin puller:****P/N. YU-01304, 90890-01304****CAUTION:**

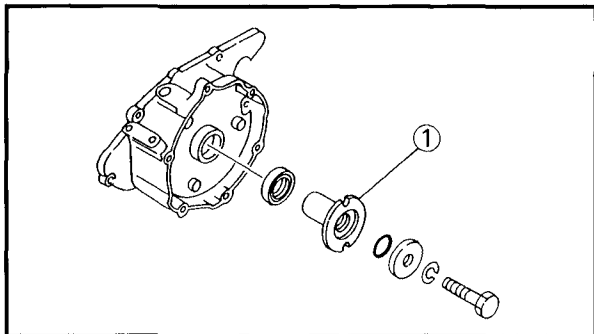
**Do not use a hammer to drive the piston pin out.**

**4**

**ENGINE DISASSEMBLY****ENG****CDI MAGNETO****NOTE:**

With the engine mounted, the CDI magneto can be maintained by removing the following parts:

- Drive select lever assembly
- Crankcase cover (left)

**4**

## 1. Remove:

- Spacer ①

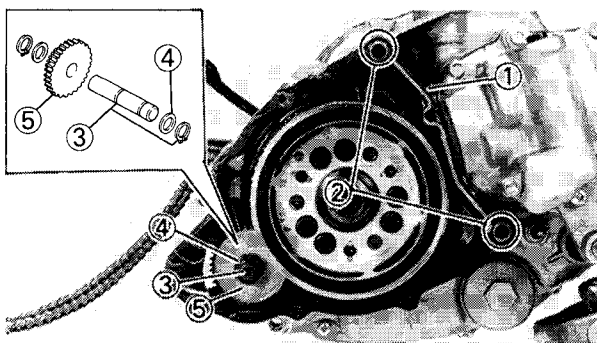
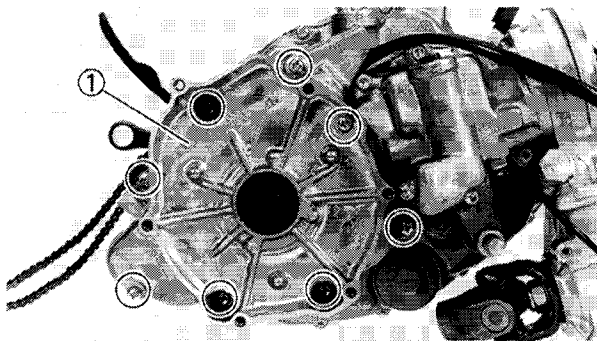
**NOTE:**

Hold the spacer by the Clutch holder to loosen the bolt on the spacer.

**Clutch holder:****P/N. YM-91042**

## 2. Remove:

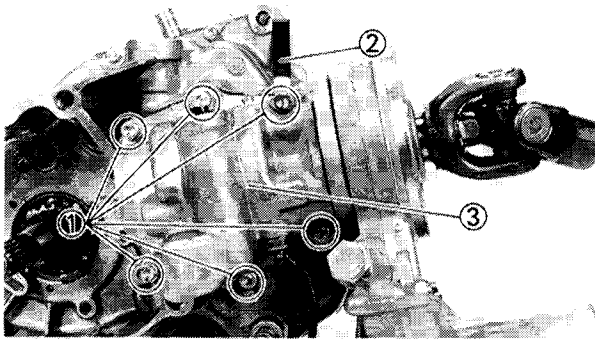
- Crankcase spacer ① (left)



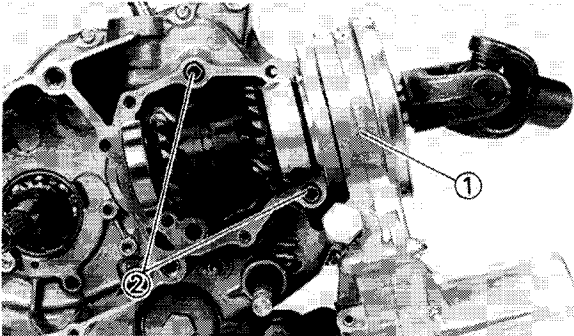
## 3. Remove:

- Gasket ①
- Dowel pins ②
- Shaft ③
- Washer ④
- Starter idle gear ⑤



**ENGINE DISASSEMBLY****ENG****2. Remove:**

- Bolts ① (middle gear case cover)
- Clamp ②
- Middle gear case cover ③

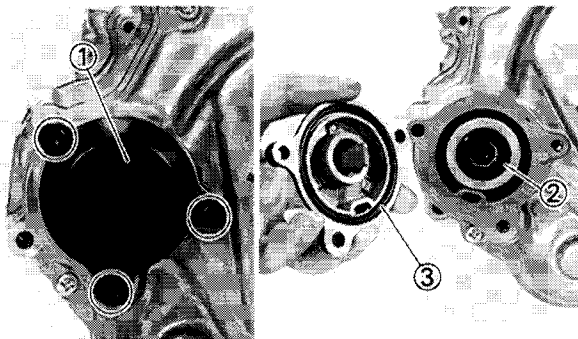
**3. Remove:**

- Middle driven shaft assembly/transfer gear assembly ①
- Dowel pins ②

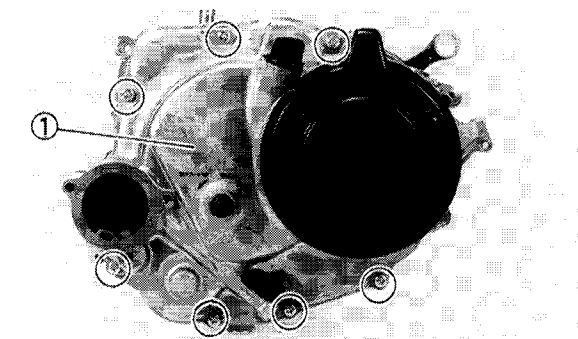
**4****PRIMARY AND SECONDARY CLUTCHES****NOTE:**

With the engine mounted, the primary and secondary clutches can be maintained by removing the following parts:

- Starter motor
- Crankcase cover (right)

**1. Remove:**

- Oil filter cover ①
- Oil filter ②
- O-ring ③

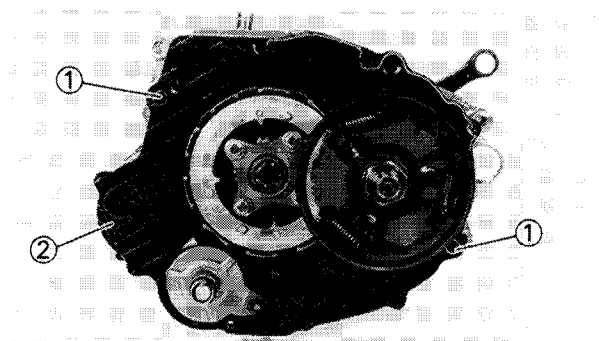
**2. Remove:**

- Crankcase cover ① (right)



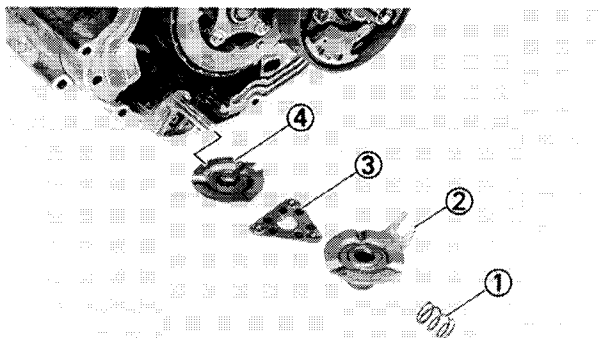
## ENGINE DISASSEMBLY

ENG



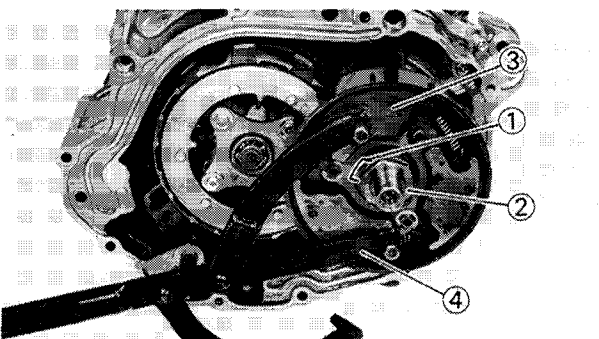
## 3. Remove:

- Dowel pins ①
- Gasket ②



## 4. Remove:

- Spring ① (clutch release lever)
- Shift guide #1 ②
- Ball holder ③
- Shift guide #2 ④



## 5. Straighten:

- Lock washer tab ①

## 6. Remove:

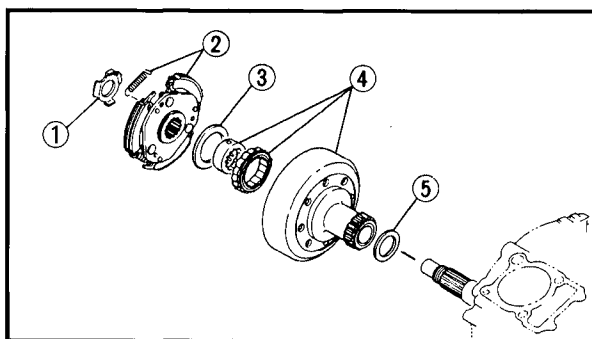
- Nut ② (primary clutch)

**NOTE:**

Hold the clutch carrier ③ by the Rotor holder ④ to loosen the nut.

**Rotor holder:**

P/N. YU-01235, 90890-01235

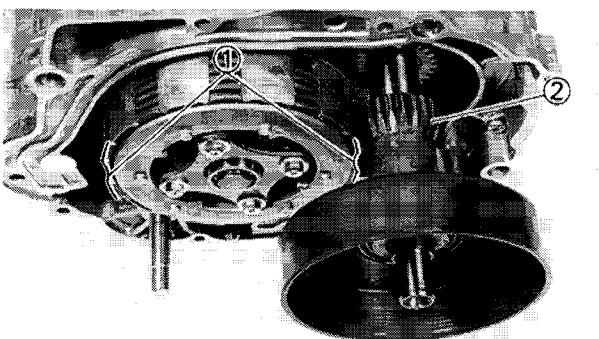


## 7. Remove:

- Lock washer ①
- Clutch carrier assembly ②
- Washer ③
- Clutch housing ④ (primary)
- Washer ⑤

**NOTE:**

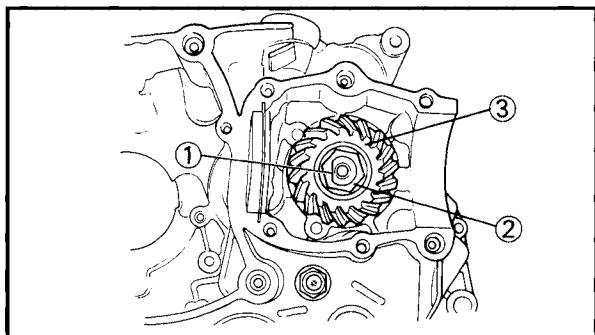
The secondary clutch housing has two grooves ① permitting the primary drive gear ② to clear the secondary clutch. Align one of these grooves with the primary drive gear before removing the primary clutch assembly.



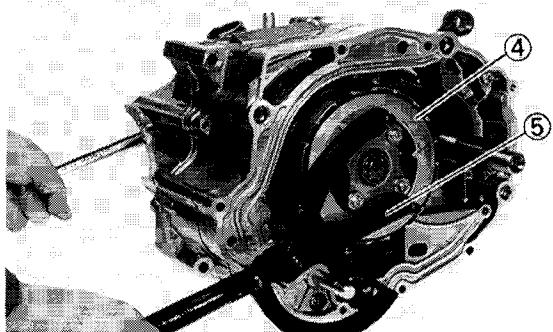
4

## ENGINE DISASSEMBLY

ENG



8. Flatten:
  - Nut tab ① (drive pinion gear)
9. Remove:
  - Nut ② (drive pinion gear)
  - Drive pinion gear ③

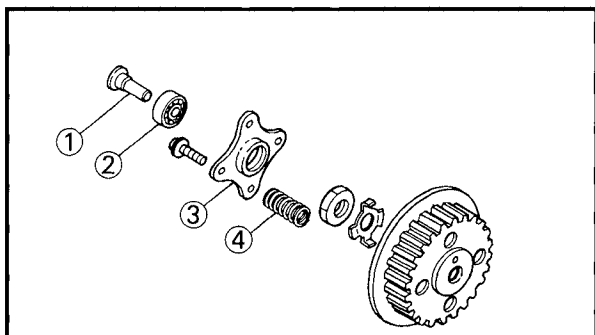
**NOTE:**

- Hold the clutch boss ④ on the secondary clutch by the Rotor holder ⑤ to loosen the nut (driven pinion gear)

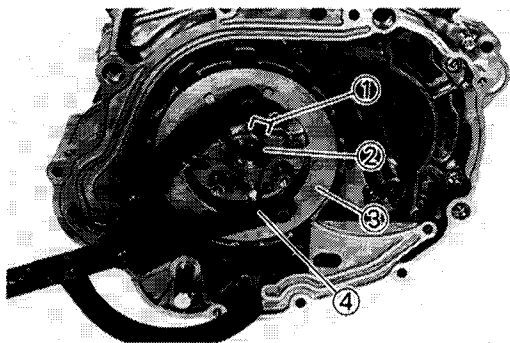
**Rotor holder:****P/N. YU-01235, 90890-01235**

- Put the transmission in the 1st gear, and carry out the operation.

4



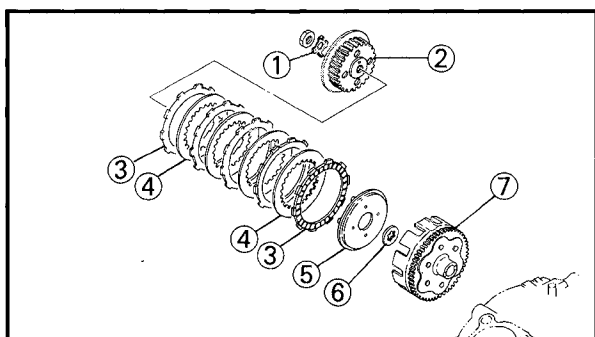
10. Remove:
  - Push rod ①
  - Bearing ②
  - Bearing holder ③
  - Clutch springs ④



11. Straighten:
  - Lock washer tab ① (clutch boss)
12. Remove:
  - Nut ② (clutch boss)

**NOTE:**

Hold the clutch boss ③ by the Rotor holder ④ to loosen the nut.

**Rotor holder:****P/N. YU-01235, 90890-01235**

13. Remove:
  - Lock washer ①
  - Clutch boss ②
  - Friction plates ③
  - Clutch plates ④
  - Pressure plate ⑤
  - Washer ⑥
  - Clutch housing ⑦



## OIL PUMP AND SHIFTER

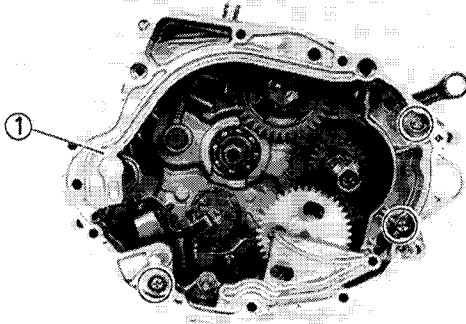
## NOTE:

With the engine mounted, the oil pump assembly can be maintained by removing the following parts:

- Starter motor
- Crankcase cover (right)
- Primary and secondary clutches
- Crankcase spacer (right)

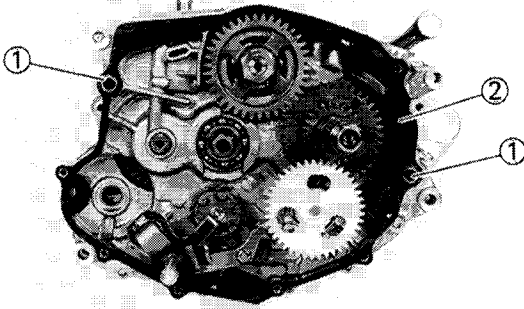
## 1. Remove:

- Crankcase spacer ① (right)



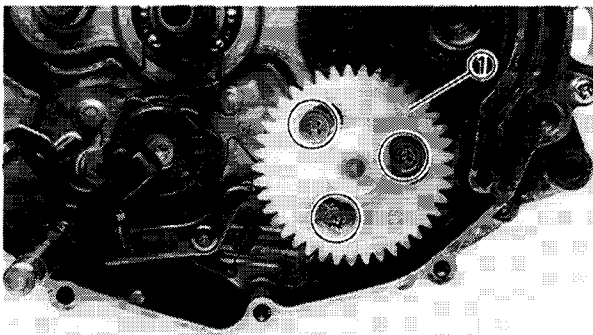
## 2. Remove:

- Dowel pins ①
- Gasket ②



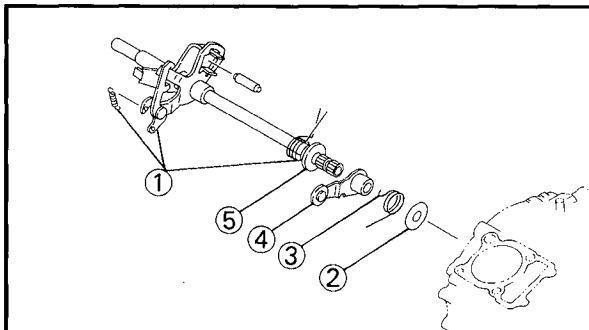
## 3. Remove:

- Oil pump assembly ①
- Gasket



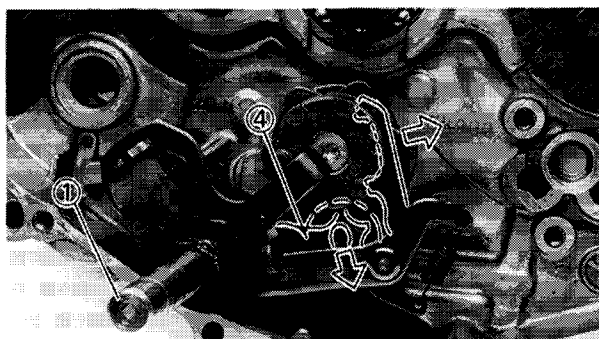
## 4. Remove:

- Shift lever assembly ①
- Washer ②
- Return spring ③
- Stopper lever ④
- Washer ⑤

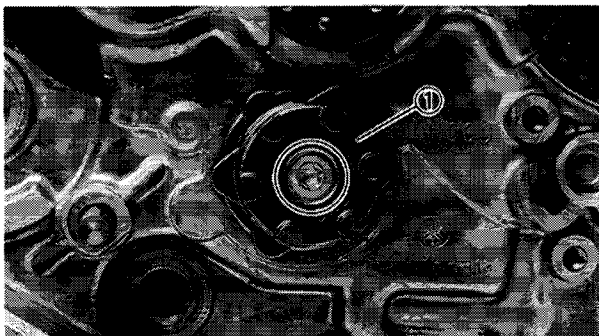


## ENGINE DISASSEMBLY

ENG

**NOTE:**

Push the shift pawl and the stopper lever to the arrow direction and remove them from the shift cam segment.



## 5. Remove:

- Segment ① (shift cam)

Use the torx wrench to remove.

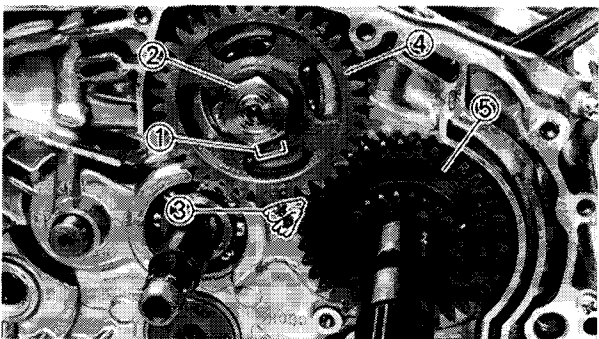
**NOTE:**

When removing the segment, the dowel pin will fall off. Take care not to lose the pin.

**BALANCER DRIVEN GEAR****NOTE:**

With the engine mounted, the balancer driven gear can be maintained by removing the following parts:

- Starter motor
- Crankcase cover (right)
- Primary and secondary clutches
- Crankcase spacer (right)
- Oil pump assembly



## 1. Straighten:

- Lock washer tab ① (driven gear)

## 2. Remove:

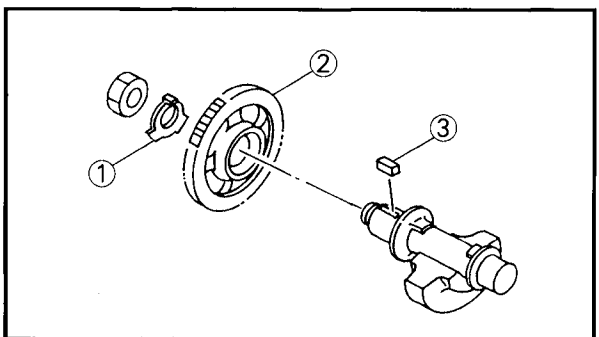
- Nut ② (driven gear)

**NOTE:**

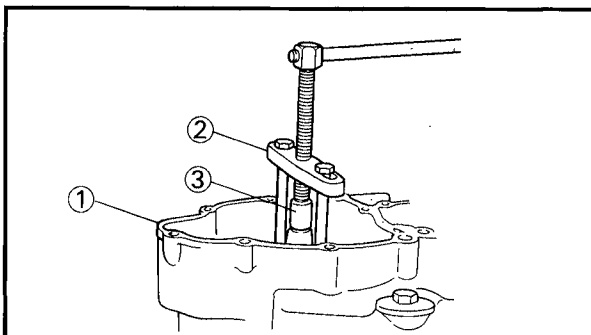
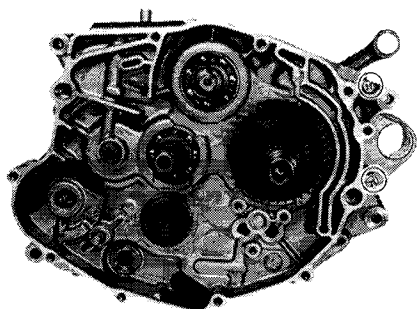
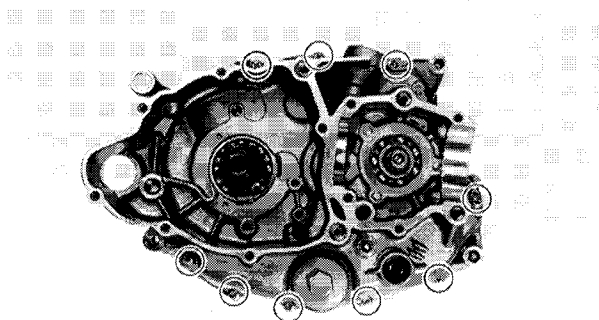
Place a folded rag ③ between the teeth of the driven gear ④ and drive gear ⑤ to lock them.

## 3. Remove:

- Lock washer ①
- Balancer gear ② (driven)
- Straight key ③



4

**ENGINE DISASSEMBLY****ENG****CRANKCASE (LEFT)****1. Remove:**

- Screws (crankcase)

**NOTE:**

Working in a crisscross pattern, loosen all screws 1/4 turn each. Remove them after all are loosened.

**2. Remove:**

- Crankcase ① (left)
- Dowel pins

\*\*\*\*\*

**Removal steps:**

- Attach the Crankcase separating tool ② and Attachment ③ to the left side crankcase.

**Crankcase separating tool:**

P/N. YU-01135-A, 90890-01135

**Attachment:**

P/N. YM-33278, 90890-04087

**NOTE:**

Fully tighten the tool holding bolts, but make sure the tool body is parallel with the case. If necessary, one screw may be backed out slightly to level tool body.

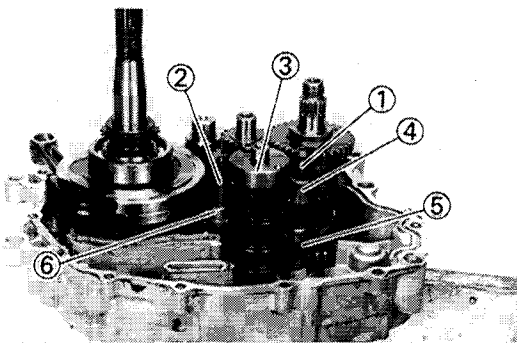
- As pressure is applied, alternately tap on the front engine mounting boss, transmission shafts and balancer shaft.

**4**

**CAUTION:**

- Use soft hammer to tap on the case half.
- Tap only on reinforced portions of case.
- Do not tap on gasket mating surface.
- Work slowly and carefully.
- Make sure the case halves separate evenly.  
If one end "hangs up", take pressure off the push screw, realign, and start over. If the cases do not separate, check for a remaining case screw or fitting. Do not force.

4

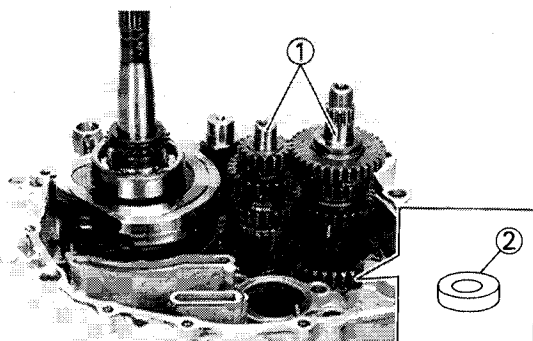
**TRANSMISSION, BALANCER SHAFT AND CRANKSHAFT**

## 1. Remove:

- Guide bar #1 ① (long)
- Guide bar #2 ② (short)
- Shift cam ③
- Shift fork #3 ④
- Shift fork #2 ⑤
- Shift fork #1 ⑥

**NOTE:**

Note the position of each part. Pay particular attention to the location and direction of shift forks.

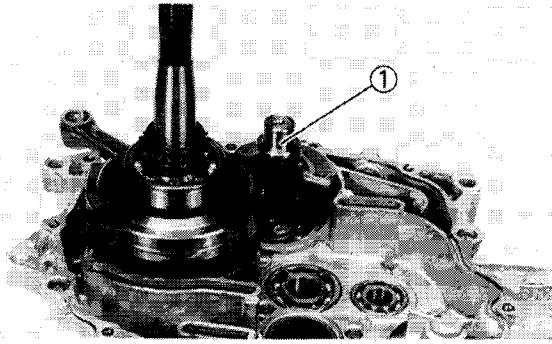


## 2. Remove:

- Transmission assembly ① (main axle and middle drive axle)
- Washer ② (middle drive axle)

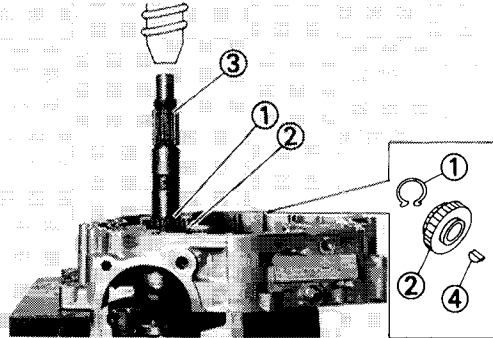
## ENGINE DISASSEMBLY

ENG



## 3. Remove:

- Balancer shaft (1)



## 4. Remove:

- Circlip (1)

## 5. Remove:

- Balancer drive gear (2)
- Crankshaft (3)  
(from right crankcase)
- Woodruff key (4)

**NOTE:**

Use a hydraulic press to remove the balancer drive gear (2) from the crankshaft.

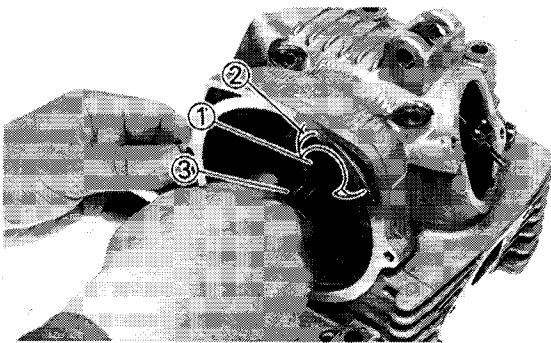
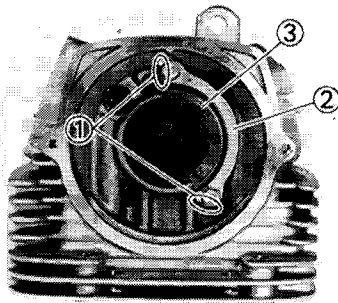
**CYLINDER HEAD**

## 1. Straighten:

- Lock washer tabs (1)

## 2. Remove:

- Lock washer (2)
- Retainer (3) (camshaft bushing)



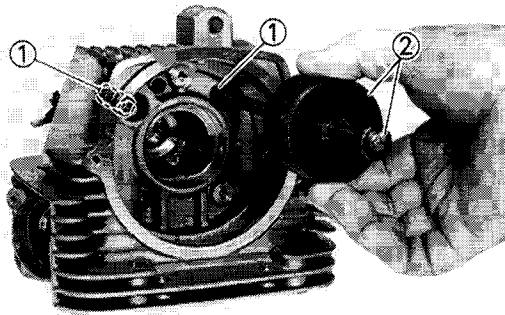
## 3. Remove:

- Camshaft (1)
- Camshaft bushing (2)

**NOTE:**

Screw in a suitable length of 10 mm bolt (3) into the thread hole on the camshaft, and pull out the camshaft.

4

**ENGINE DISASSEMBLY****ENG****4. Remove:**

- Rocker arm shafts ①
- Rocker arms (intake and exhaust)

**NOTE:**

Attach the Slide hammer set ② to the rocker arm shaft, and then slide out them.

**Slide hammer set:**

P/N. YU-01083-A

**Slide hammer bolt:**

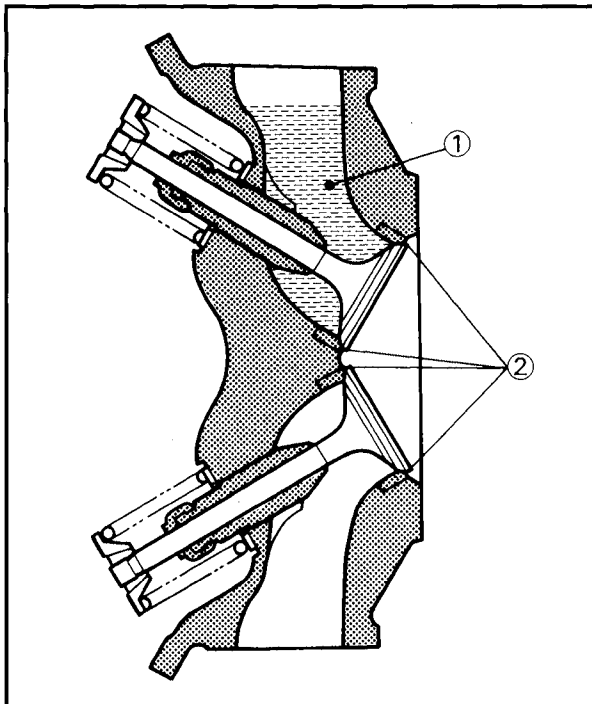
P/N. 90890-01083

**Weight:**

P/N. 90890-01084

**4****VALVE****NOTE:**

Before removing the internal parts (valve, valve spring, valve seat etc.) of the cylinder head, the valve sealing should be checked.

**1. Check:**

- Valve sealing

Leakage at valve seat → Inspect the valve face, valve seat and valve seat width.

Refer to "INSPECTION AND REPAIR-VALVE SEAT".

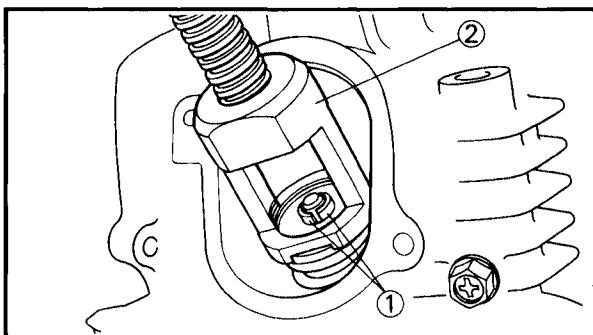
\*\*\*\*\*

**Valve seat checking steps:**

- Pour a clean solvent ① into the intake and exhaust ports.
- Check the valve sealing.  
There should be no leakage at the valve seat ②.

\*\*\*\*\*



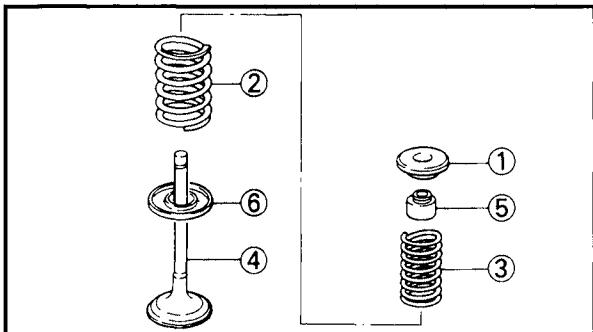
**ENGINE DISASSEMBLY****ENG**

2. Remove:

- Valve cotters ①

**NOTE:**

Remove the valve cotters while compressing the valve spring with the Valve spring compressor ②.

**Valve spring compressor:****P/N. YM-04019, 90890-04019**

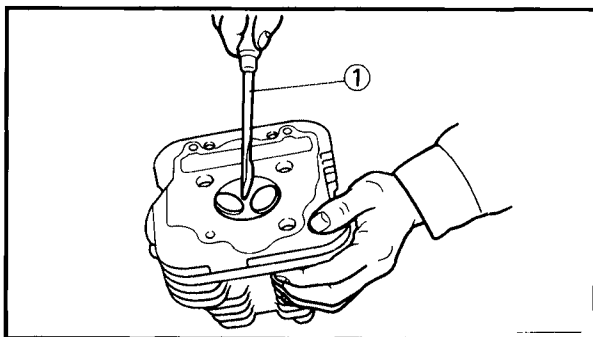
3. Remove:

- Valve spring seat ① (upper)
- Valve spring ② (outer)
- Valve spring ③ (inner)
- Valve ④
- Valve stem seal ⑤
- Valve spring seat ⑥ (lower)

**NOTE:**

Identify each part position very carefully so that it can be reinstalled in its original place.

**4**



YB243001

## INSPECTION AND REPAIR CYLINDER HEAD

### 1. Eliminate:

- Carbon deposit  
(from combustion chamber)  
Use rounded scraper ①.

### NOTE:

Do not use a sharp instrument and avoid damaging or scratching:

- Spark plug thread
- Valve seat

### 2. Inspect:

- Cylinder head  
Scratches/Damage → Replace.

### 3. Measure:

- Warpage  
Out of specification → Resurface.



**Cylinder head warpage:**  
**Less than 0.03 mm (0.0012 in)**

### 4. Resurface:

- Cylinder head

\*\*\*\*\*

### Resurfacement steps:

- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

### NOTE:

Rotate the head several times to avoid removing too much material from one side.

\*\*\*\*\*



YB243002

**VALVE SEAT**

## 1. Eliminate:

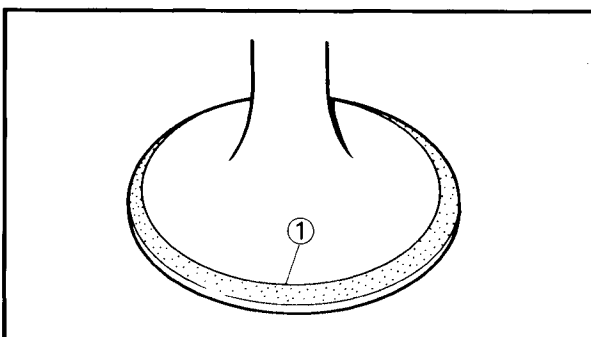
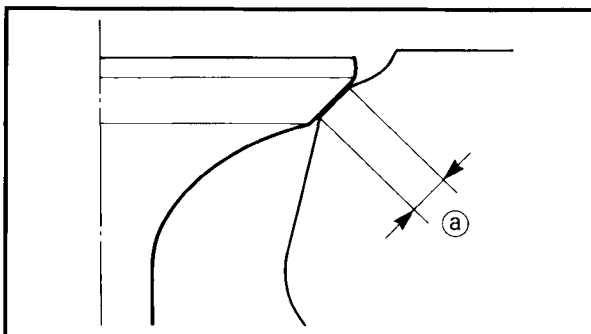
- Carbon deposit  
(from valve face and valve seat)

## 2. Inspect:

- Valve seat  
Pitting/Wear → Reface the valve seat.

## 3. Measure:

- Valve seat width (a)  
Out of specification → Reface the valve seat.

**Valve seat width:****Intake:**

0.9 ~ 1.1 mm (0.035 ~ 0.043 in)

**Exhaust:**

0.9 ~ 1.1 mm (0.035 ~ 0.043 in)

\*\*\*\*\*

**Measurement steps:**

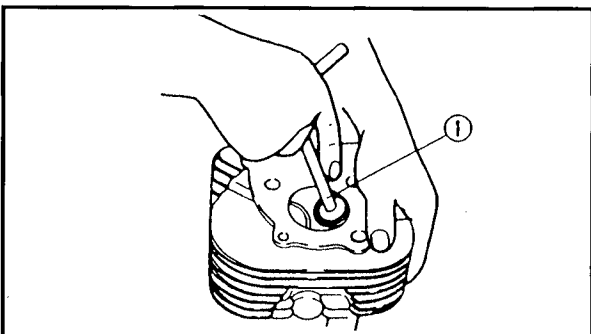
- Apply the Mechanic's bluing dye (Dykem) (1) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Wherever the valve seat and valve face made contact, bluing will have been removed.
- If the valve seat width is too wide, too narrow, or seat has not centered, the valve seat must be refaced.

\*\*\*\*\*

## 4. Reface:

- Valve seat

Use a 30°, 45° and 60° valve seat cotter  
(1).

**Valve seat cotter:**

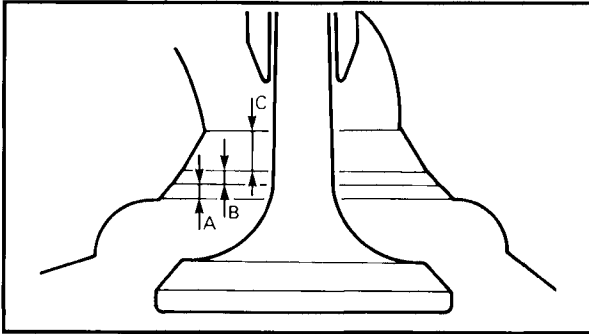
P/N. YM-91043

**CAUTION:**

When twisting cutter, keep an even downward pressure (4 ~ 5 kg) to prevent chatter marks.

## INSPECTION AND REPAIR

ENG



Cut section as follows

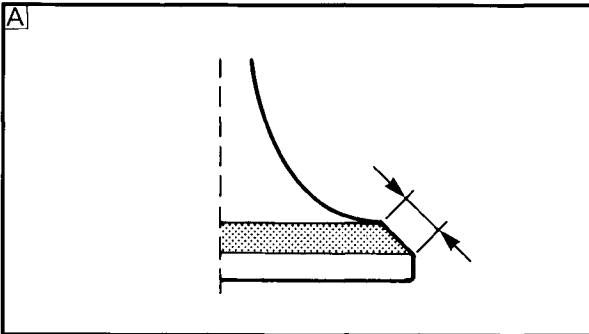
Section	Cutter
A	30°
B	45°
C	60°

\*\*\*\*\*

## Refacing steps:

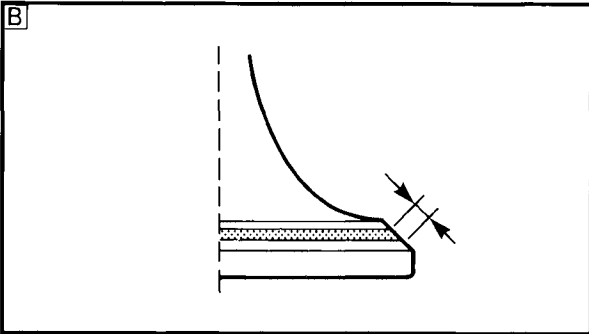
- A** Valve seat is centered on valve face but it is too wide.

Valve seat cutter set		Desired result
Use lightly	30° cutter 60° cutter	To reduce valve seat width to 1.0 mm (0.039 in).



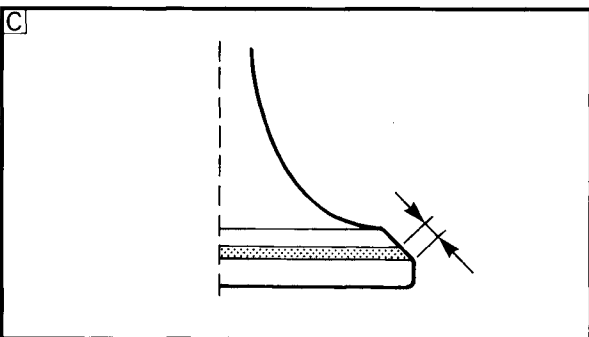
- B** Valve seat is in the middle of the face but it is too narrow.

Valve seat cutter set		Desired result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in).



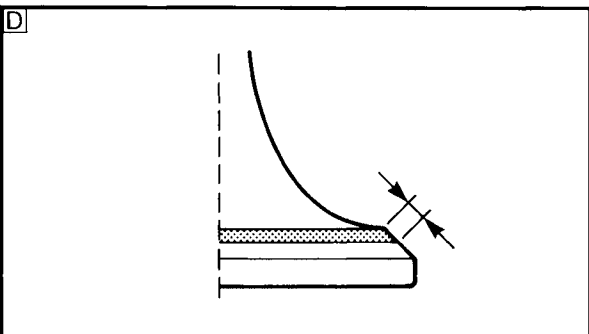
- C** Valve seat is too narrow and it is near valve margin.

Valve seat cutter set		Desired result
Use	First: 30° cutter Second: 45° cutter	To center the seat and to achieve its width of 1.0 mm (0.039 in).



- D** Valve seat is too narrow and it is located near the bottom edge of the valve face.

Valve seat cutter set		Desired result
Use	First: 60° cutter Second: 45° cutter	To center the seat and increase its width.



\*\*\*\*\*

4



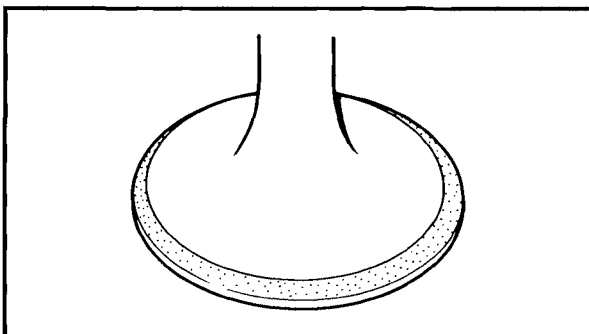
## 5. Lap:

- Valve face
- Valve seat

**NOTE:** \_\_\_\_\_

After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.

\_\_\_\_\_



\*\*\*\*\*

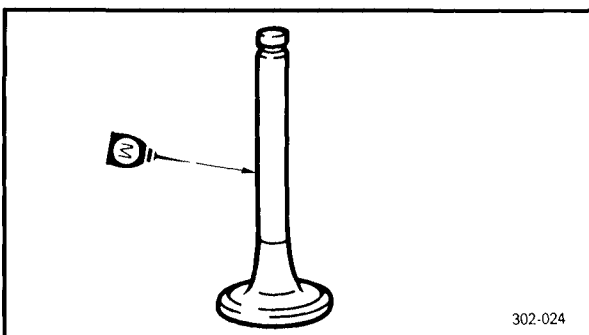
**Lapping steps:**

- Apply a coarse lapping compound to the valve face.

**CAUTION:** \_\_\_\_\_

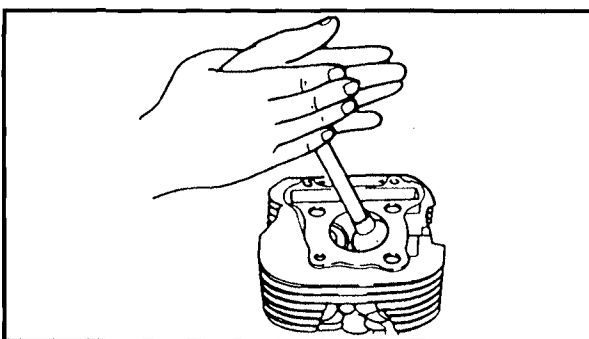
Be sure no compound enters the gap between the valve stem and guide.

\_\_\_\_\_



- Apply a molybdenum disulfide oil to the valve stem.
- Install the valve into the cylinder head.
- Turn the valve until the valve face and valve seat are evenly polished, then clean off all compound.

4

**NOTE:** \_\_\_\_\_

To obtain the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

\_\_\_\_\_

- Apply fine lapping compound to the valve face and repeat the above steps.

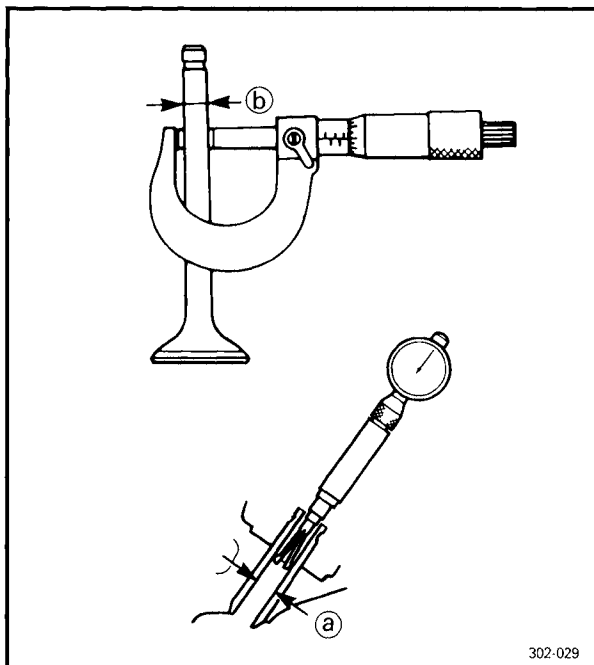
**NOTE:** \_\_\_\_\_

Be sure to clean off all compound from the valve face and valve seat after every lapping operation.

\_\_\_\_\_



4



302-029

- Apply a Mechanic's bluing dye (Dykem) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width again.  
If the valve seat width out of specification, reface and lap the valve seat.

\*\*\*\*\*

YB243003

**VALVE AND VALVE GUIDE**

## 1. Measure:

- Stem-to-guide clearance

$$\text{Stem-to-guide clearance} = \text{Valve guide inside diameter } \textcircled{a} - \text{Valve stem diameter } \textcircled{b}$$

Out of specification → Replace valve guide.

**Stem-to-guide clearance:****Intake:**

0.010 ~ 0.037 mm  
(0.0004 ~ 0.0015 in)  
<Limit : 0.08 mm (0.0031 in)>

**Exhaust:**

0.025 ~ 0.052 mm  
(0.0010 ~ 0.0020 in)  
<Limit : 0.10 mm (0.0039 in)>

## 2. Replace:

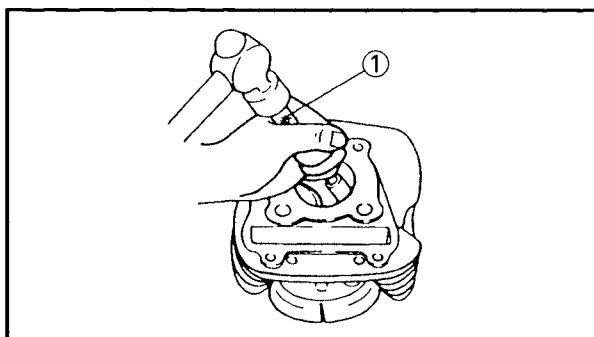
- Valve guide

\*\*\*\*\*

**Replacement steps:****NOTE:**

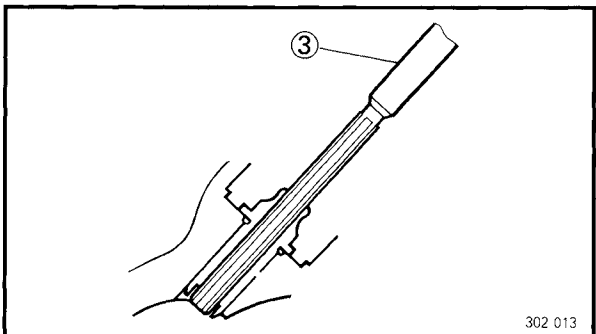
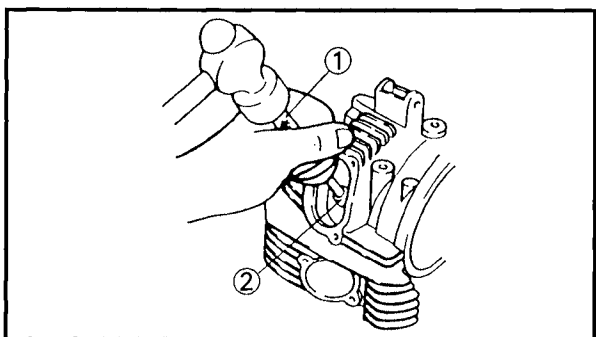
Heat the cylinder head in an oven to 100°C (212°F) to ease guide removal and installation and to maintain correct interference fit.

- Remove the valve guide using the valve guide remover ①.



## INSPECTION AND REPAIR

ENG



- Install the valve guide (new) using the valve guide installer ② and valve guide remover ①.
- After installing the valve guide, bore the valve guide using the valve guide reamer ③ to obtain proper stem-to-guide clearance.



**Valve guide remover 6 mm  
(0.24 in):**

**P/N. YM-04064-A, 90890-04064**

**Valve guide reamer 6 mm  
(0.24 in):**

**P/N. YM-04066, 90890-04066**

**Valve guide installer 6 mm  
(0.24 in):**

**P/N. YM-04064-A, 90890-04065**

\*\*\*\*\*

**NOTE:**

Reface the valve seat after replacing the valve guide.

4

## 3. Eliminate:

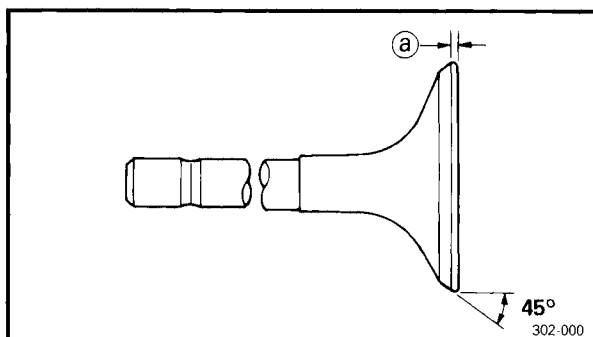
- Carbon deposit  
(from valve face)

## 4. Inspect:

- Valve face  
Pitting/Wear → Grind the face.
- Valve stem end  
Mushroom shape or diameter larger than rest of stem → Replace.

## 5. Measure:

- Margin thickness (a)  
Out of specification → Replace.

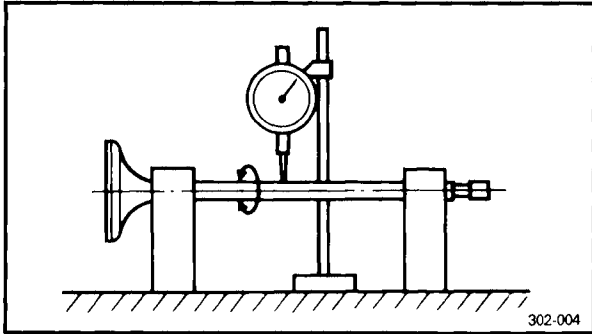


**Margin thickness:**

**0.8 ~ 1.2 mm (0.031 ~ 0.047 in)**

## INSPECTION AND REPAIR

ENG



## 6. Measure:

- Runout (valve stem)

Out of specification → Replace.

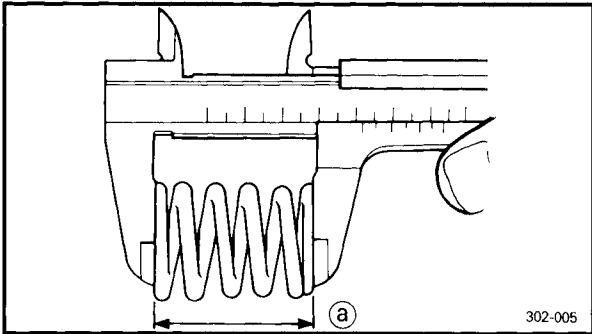
**Runout:**

Less than 0.03 mm (0.0012 in)

**NOTE:**

- Always replace the guide if the valve is replaced.
- Always replace the oil seal if the valve is removed.

4



YB243004

**VALVE SPRING**

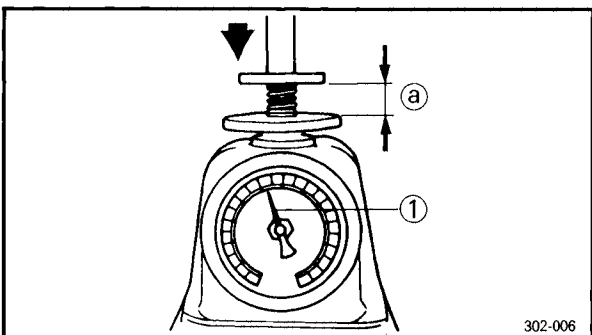
## 1. Measure:

- Free length (a) (valve spring)

Out of specification → Replace.

**Free length (valve spring):**

	Inner spring	Outer spring
Intake	35.5 mm (1.40 in)	37.2 mm (1.46 in)
Exhaust	35.5 mm (1.40 in)	37.2 mm (1.46 in)



## 2. Measure:

- Compressed force (valve spring) ①

Out of specification → Replace.

① Installed length

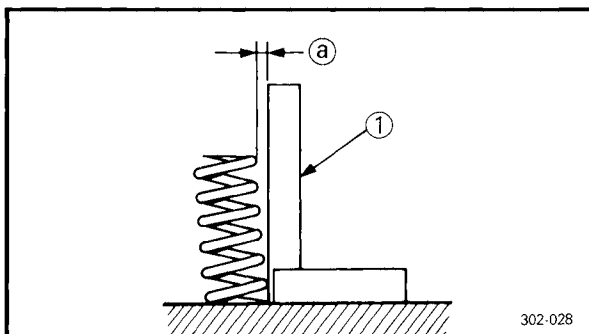


## INSPECTION AND REPAIR

ENG

**Compressed force:**

	Inner spring at 30.5 mm (1.20 in)	Outer spring at 32.0 mm (1.26 in)
<b>Intake</b>	8.4 ~ 10.2 kg (18.52 ~ 22.49 lb)	16.6 ~ 20.4 kg (36.60 ~ 44.97 lb)
<b>Exhaust</b>	8.4 ~ 10.2 kg (18.52 ~ 22.49 lb)	16.6 ~ 20.4 kg (36.60 ~ 44.97 lb)



## 3. Measure:

- Spring tilt (a)

Out of specification → Replace.

**Spring tilt:****Intake:**

Less than 1.6 mm (0.063 in)

**Exhaust:**

Less than 1.6 mm (0.063 in)

YB243005

**CAMSHAFT**

## 1. Inspect:

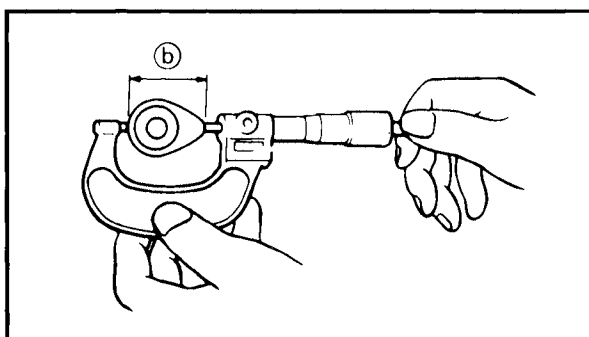
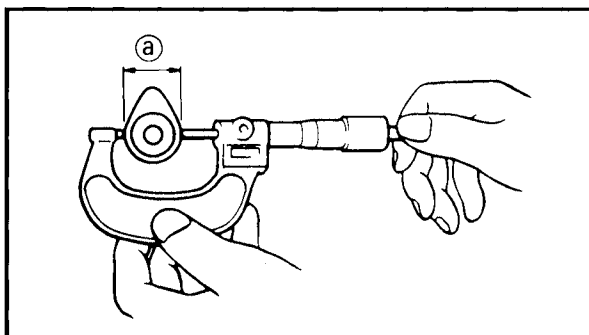
- Cam lobes

Pitting/Scratches/Blue discoloration → Replace.

## 2. Measure:

- Cam lobes length (a) and (b)

Out of specification → Replace.

**Cam lobe  
length (a):****Cam lobe  
length (b):**

<b>Intake</b>	30.1 ~ 30.2 mm (1.185 ~ 1.189 in)	36.51 ~ 36.61 mm (1.437 ~ 1.441 in)
<b>Exhaust</b>	30.15 ~ 30.25 mm (1.187 ~ 1.191 in)	36.51 ~ 36.61 mm (1.437 ~ 1.441 in)

## 3. Measure:

- Runout (camshaft)

Out of specification → Replace.

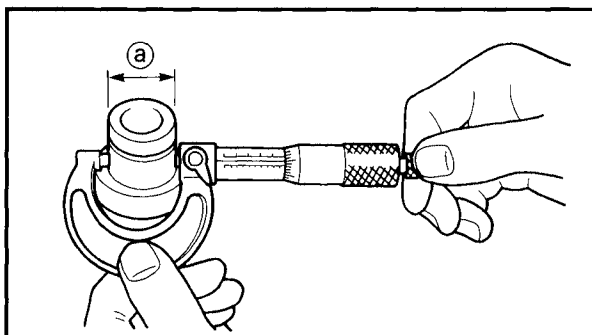
**Runout (camshaft):**

Less than 0.02 mm (0.0008 in)

4

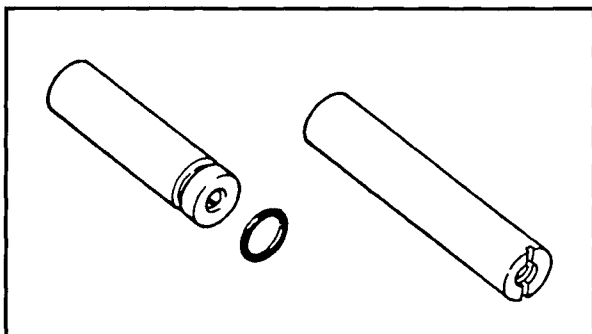
## INSPECTION AND REPAIR

ENG



## 4. Measure:

- Bearing diameter (a) (camshaft)  
Out of specification → Replace camshaft.  
Within specification → Replace cap (collar).

**Bearing diameter (camshaft):****24.960 ~ 24.980 mm****(0.9827 ~ 0.9835 in)****ROCKER ARM AND ROCKER ARM SHAFT**

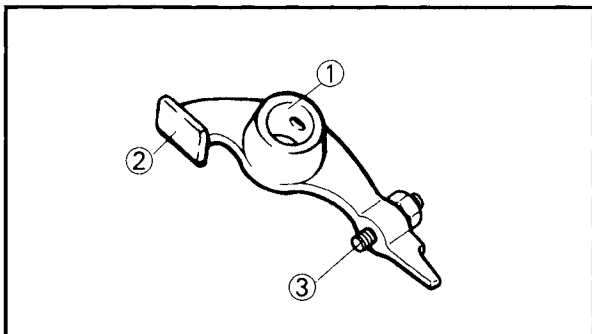
## 1. Inspect:

- Rocker arm shaft  
Blue discoloration/Grooves → Replace, then inspect lubrication system.

## 2. Inspect:

- Rocker arm shaft hole (1)
- Cam lobe contact surface (2)
- Adjuster surface (3)

Wear/Pitting/Scratches/Blue discoloration  
→ Replace, then inspect lubrication system.



## 3. Measure:

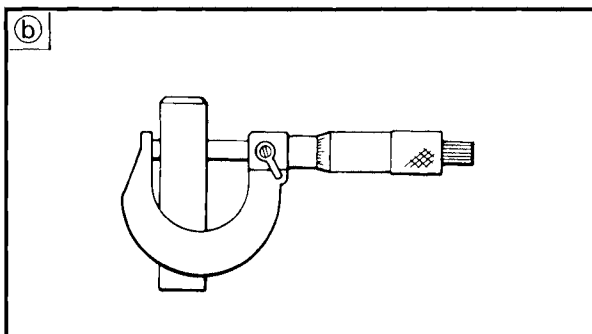
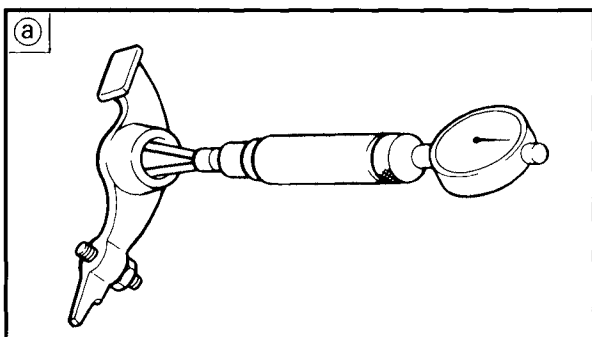
- Arm-to-shaft clearance.

Arm-to-shaft clearance =

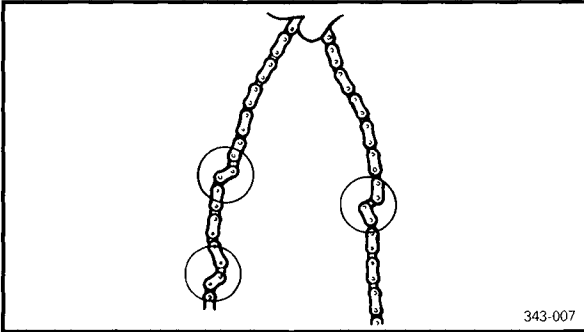
Rocker arm inside diameter (a) —

Rocker arm shaft outside diameter (b)

Out of specification → Replace as a set.

**Arm-to-shaft clearance:****0.009 ~ 0.037 mm****(0.0004 ~ 0.0015 in)**

4

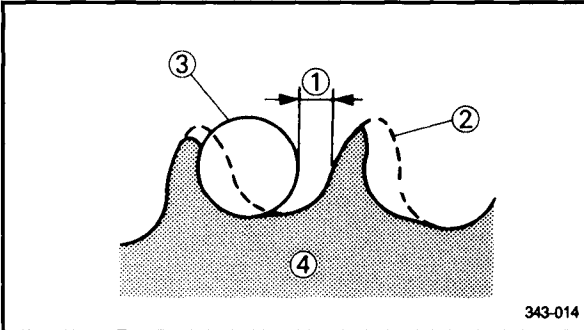


YB243007

### TIMING CHAIN, SPROCKET, CHAIN GUIDE AND TENSIONER

#### 1. Inspect:

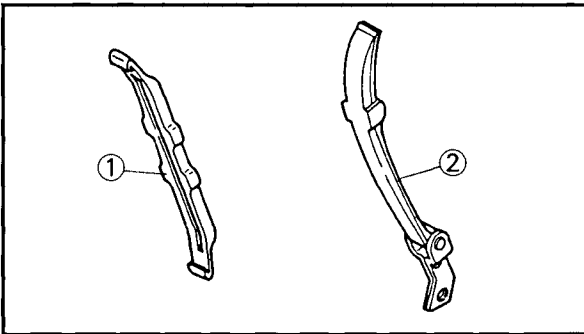
- Timing chain  
Stiff/Cracks → Replace timing chain and sprocket as a set.



#### 2. Inspect:

- Cam sprocket  
Wear/Damage → Replace cam sprocket and timing chain as a set.

- ① 1/4 tooth
- ② Correct
- ③ Roller
- ④ Sprocket



#### 3. Inspect:

- Chain guide ① (exhaust side)
- Chain guide ② (intake side)
- Wear/Damage → Replace.

4

#### 4. Check:

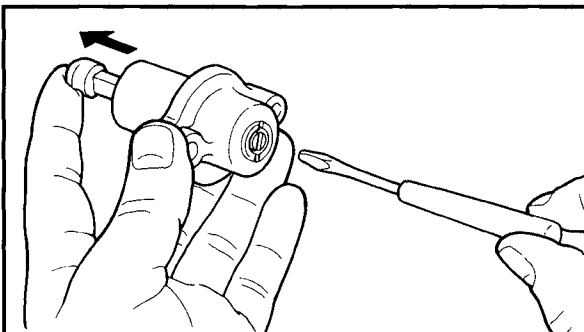
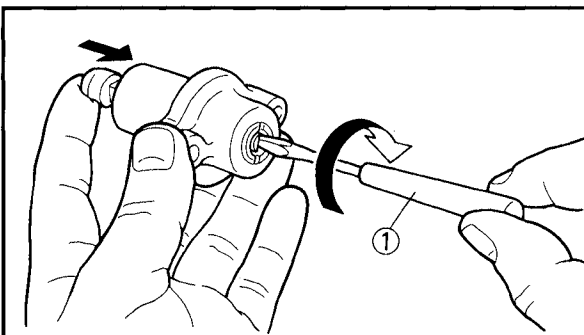
- Timing chain tensioner play

\*\*\*\*\*

#### Checking steps:

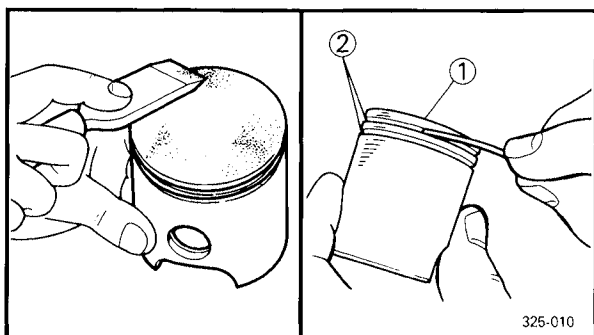
- While pressing the tensioner rod lightly with fingers, use a thin screwdriver ① and wind the tensioner rod up fully clockwise.
- When releasing the screwdriver by pressing lightly with fingers, make sure that the tensioner rod will come out smoothly.
- If not, replace the tensioner assembly.

\*\*\*\*\*



## INSPECTION AND REPAIR

ENG



YB243008

**CYLINDER AND PISTON**

## 1. Eliminate:

- Carbon deposits  
(from the piston crown and ring grooves.)

## 2. Inspect:

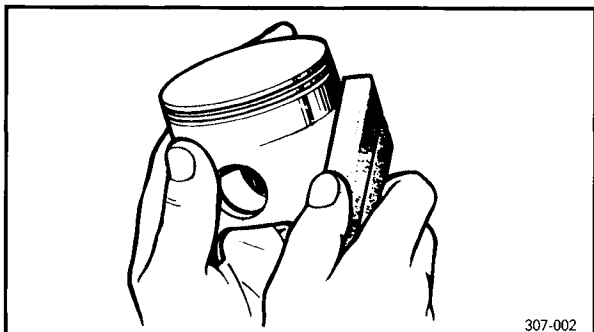
- Piston wall  
Wear/Scratches/Damage → Replace.

## 3. Eliminate:

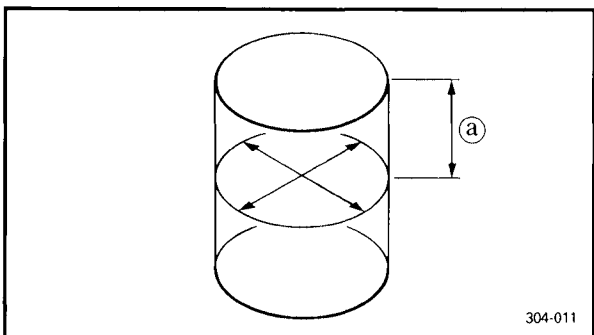
- Score marks and lacquer deposits  
(from the side of the piston.)  
Use a 600 ~ 800 grit wet sandpaper.

**NOTE:**

Sand in a crisscross pattern. Do not sand excessively.



4



## 4. Inspect:

- Cylinder wall  
Wear/Scratches → Rebore or replace.

## 5. Measure:

- Piston-to-cylinder clearance

\*\*\*\*\*

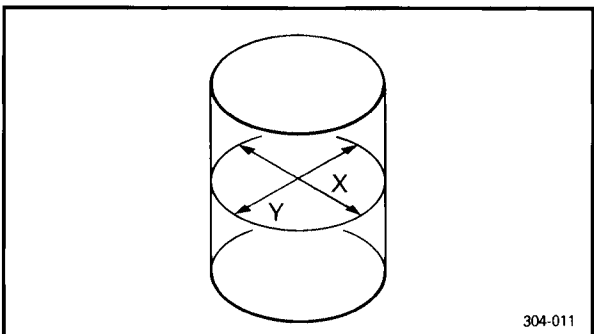
**Measurement steps:****First steps**

- Measure the cylinder bore "C" with a cylinder bore gauge.

Ⓐ 45 mm (1.77 in) from the cylinder top

**NOTE:**

Measure the cylinder bore "C" in parallel to and at right angles to the crankshaft. Then, find the average of the measurements.

**Cylinder bore "C":**

70.97 ~ 71.02 mm

(2.794 ~ 2.796 in)

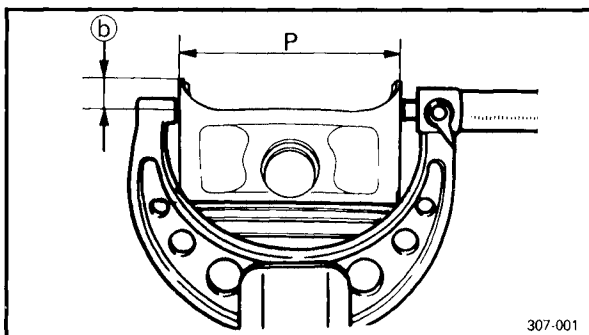
<Limit: 71.10 mm (2.799 in)>

$$C = (X+Y)/2$$

- If out of the specification, rebore or replace the cylinder, and the piston and piston rings as a set.

## INSPECTION AND REPAIR

ENG

**2nd steps**

- Measure the piston skirt diameter "P" with a micrometer.

ⓑ 4.0 mm (0.16 in) from the piston bottom edge

**Piston skirt diameter "P":**

<b>Standard</b>	<b>70.92 ~ 70.97 mm (2.792 ~ 2.794 in)</b>
<b>Oversize 2</b>	<b>71.50 mm (2.815 in)</b>
<b>Oversize 4</b>	<b>72.00 mm (2.846 in)</b>

- If out of the specification, replace the piston and piston ring as a set.

**3rd steps**

- Find the piston-to-cylinder clearance with following formula.

$$\text{Piston-to-cylinder clearance} = \text{Cylinder bore "C"} - \text{Piston skirt diameter "P"}$$

**Piston-to-cylinder clearance:**

**0.04 ~ 0.06 mm  
(0.0016 ~ 0.0026 in)  
<Limit: 0.15 mm (0.0059 in)>**

- If out of the specification, rebore or replace the cylinder, and replace the piston and piston ring as a set.

\*\*\*\*\*

YB243009

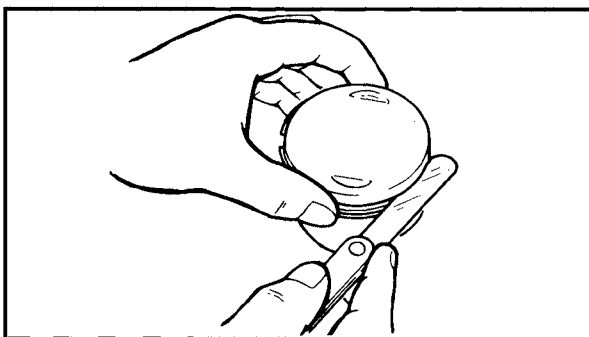
**PISTON RING****1. Measure:**

- Side clearance

Out of specification → Replace piston and piston ring as a set.

**NOTE:**

Clean carbon from piston ring grooves and rings before measuring side clearance.

**Side clearance:****Top ring:**

**0.03 ~ 0.07 mm (0.001 ~ 0.003 in)  
<Limit: 0.12 mm (0.005 in)>**

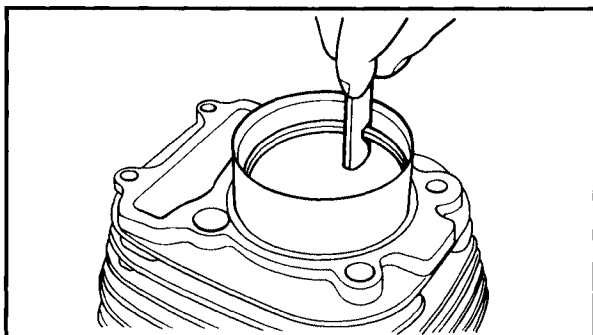
**2nd ring:**

**0.02 ~ 0.06 mm (0.001 ~ 0.002 in)  
<Limit: 0.12 mm (0.005 in)>**

4

## INSPECTION AND REPAIR

ENG



2. Position:
  - Piston ring  
(into the cylinder)

**NOTE:**

Push the ring with the piston crown so that the ring will be at a right angle to cylinder bore.

3. Measure:
  - End gap  
Out of specification → Replace.

**NOTE:**

You cannot measure end gap on expander spacer of oil control ring. If oil control ring rails show excessive gap, replace all three rings.

4

**End gap:****Top ring:**

0.15 ~ 0.30 mm (0.006 ~ 0.012 in)

&lt;Limit: 0.4 mm (0.016 in)&gt;

**2nd ring:**

0.15 ~ 0.30 mm (0.006 ~ 0.012 in)

&lt;Limit: 0.4 mm (0.016 in)&gt;

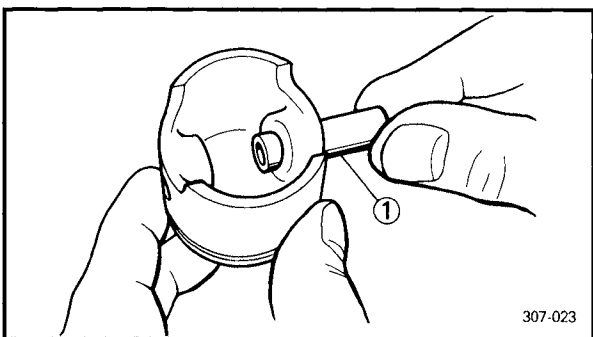
**Oil ring:**

0.30 ~ 0.90 mm (0.012 ~ 0.035 in)

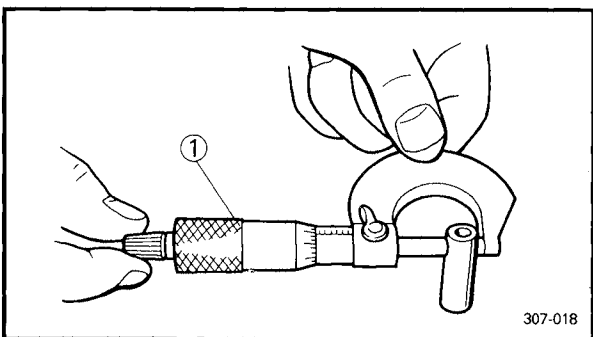
YB243010

**PISTON PIN**

1. Inspect:
  - Piston pin ①  
Blue discoloration/groove → Replace,  
then inspect lubrication system.



307-023



307-018

2. Measure:
  - Piston-pin outside diameter  
Out of specification → Replace.

**Outside diameter (piston pin):**

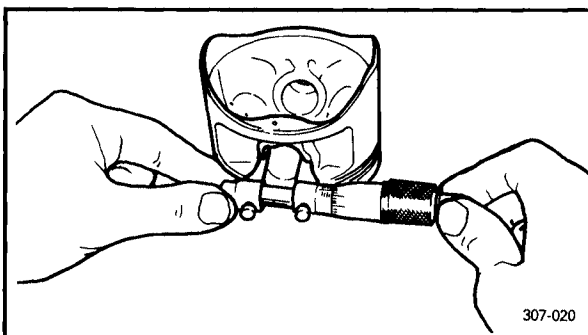
15.090 ~ 15.095 mm

(0.5941 ~ 0.5943 in)

① Micrometer

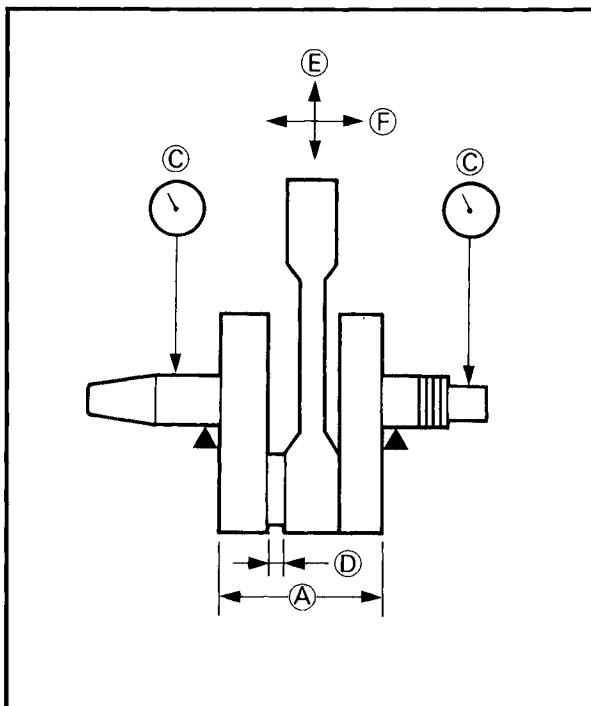
## INSPECTION AND REPAIR

ENG



## 3. Measure:

- Piston-pin bore inside diameter  
Out of specification → Replace.

**Piston pin bore inside diameter:****16.002 ~ 16.013 mm****(0.6300 ~ 0.6304 in)**

## CRANKSHAFT

## 1. Measure:

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

**Crank width:****55.95 ~ 56.00 mm****(2.203 ~ 2.205 in)**

- Runout (C)

Out of specification → Replace crankshaft and/or bearing.

**Runout limit:****0.06 mm (0.0024 in)**

- Big end side clearance (D)

Out of specification → Replace big end bearing, crank pin and/or connecting rod.

**Big end side clearance:****0.35 ~ 0.65 mm (0.014 ~ 0.026 in)**

- Big end radial clearance (E)

Out of specification → Replace or repair.

**Big end radial clearance:****0.010 ~ 0.025 mm****(0.0004 ~ 0.0010 in)**

- Small end free play (F)

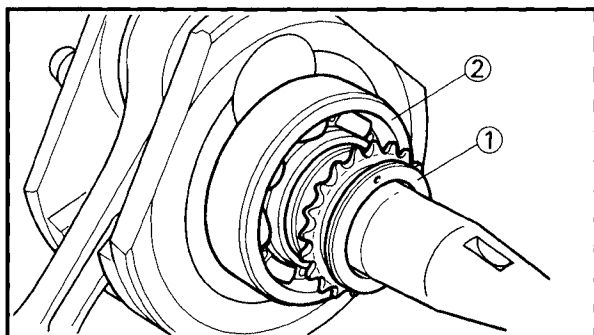
Out of specification → Replace connecting rod.

**Small end free play:****0.8 ~ 1.0 mm****(0.0315 ~ 0.0394 in)**

4

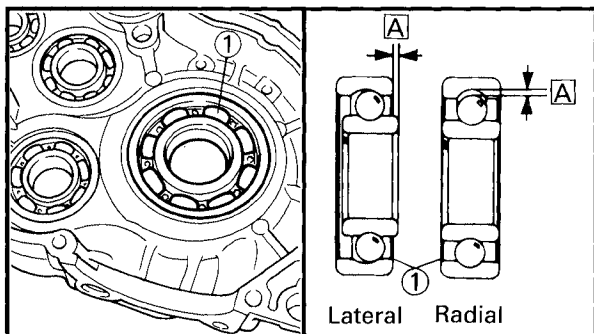
## INSPECTION AND REPAIR

ENG



## 2. Inspect:

- Crankshaft sprocket ①  
Wear/Damage → Replace crankshaft.
- Crank bearing ②(left)  
Abnormal noise/Turn roughly/Free play  
→ Replace crankshaft.



## 3. Inspect:

- Crank bearing ①(right)  
Abnormal noise/Turn roughly/Free play  
→ Replace.

**A** Free play

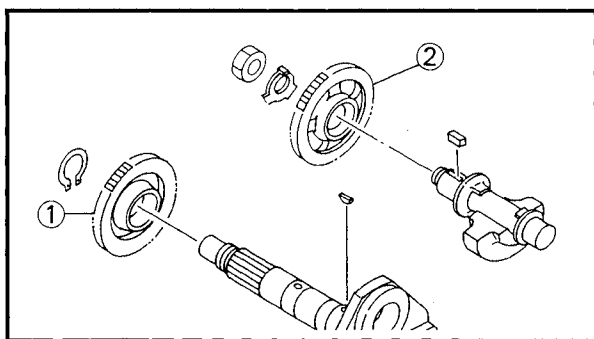
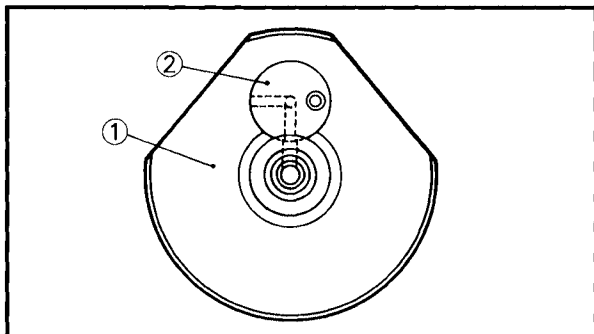
\*\*\*\*\*

**Crankshaft reassembling point:**

The crankshaft ① and the crank pin ② oil passages must be properly interconnected with a tolerance of less than 1 mm (0.04 in).

\*\*\*\*\*

4

**BALANCER DRIVE GEAR AND DRIVEN GEARS**

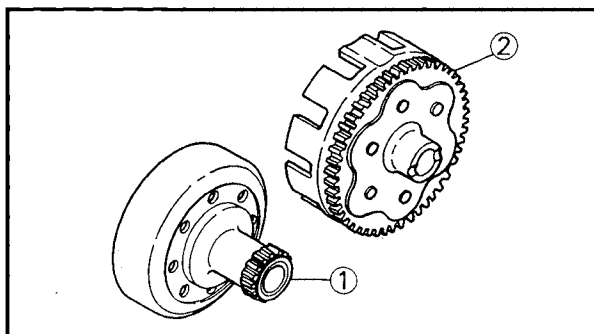
## 1. Inspect:

- Balancer drive gear teeth ①
- Balancer driven gear teeth ②  
Wear/Damage → Replace both gears.

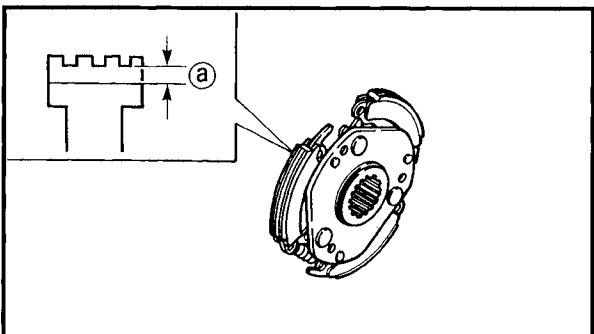
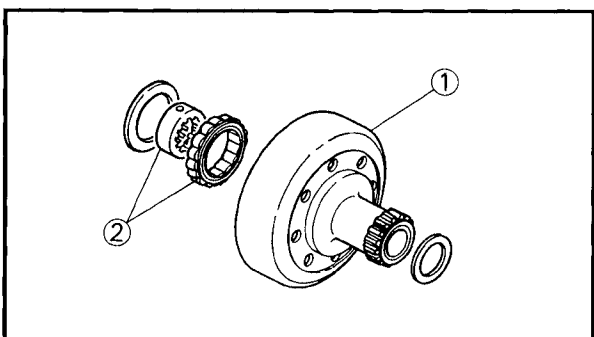
**PRIMARY GEARS**

## 1. Inspect:

- Drive gear ①
- Driven gear ②  
Scratches/Wear/Damage → Replace.  
Excessive noises during operation → Replace both gears.





**INSPECTION AND REPAIR****ENG****PRIMARY CLUTCH****Clutch housing**

## 1. Inspect:

- Clutch housing ①  
Heat damage/Wear/Damage → Replace.
- One way clutch assembly ②  
Chafing/Wear/Damage → Replace.

**NOTE:**

- Replace the one way clutch assembly and clutch housing as a set.
- One way bearing must be installed with flag side facing inward.

**Clutch carrier**

## 1. Inspect:

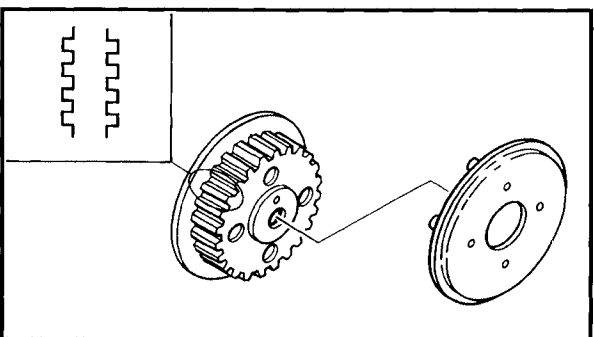
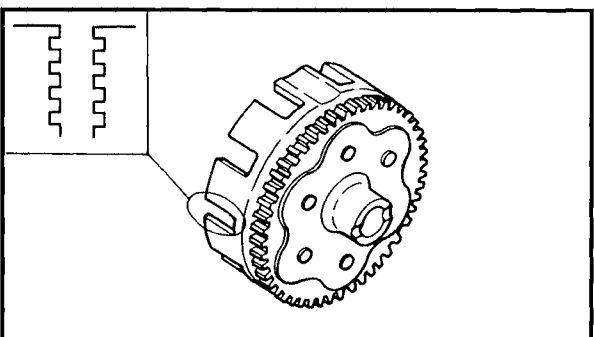
- Clutch shoe  
Heat damage → Replace.

## 2. Measure:

- Clutch shoe thickness  
Out of specification → Replace.



**Clutch shoe wear limit ①:**  
**1.5 mm (0.06 in)**

**4****SECONDARY CLUTCH****Clutch housing**

## 1. Inspect:

- Clutch housing dogs  
Cracks/Pitting (edges)/Moderate → Deburr.  
Severe → Replace clutch housing.

**NOTE:**

Pitting on friction plate dogs of clutch housing will cause erratic operation.

**Clutch boss and pressure plate**

## 1. Inspect:

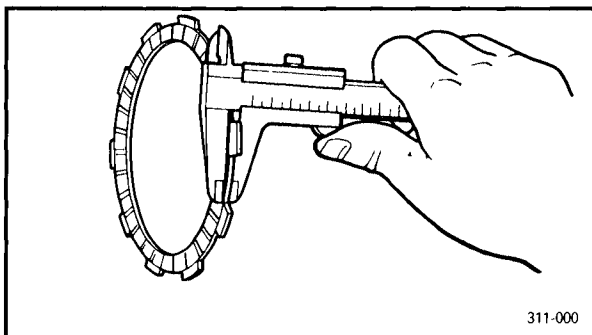
- Clutch boss splines
- Pressure plate  
Scoring/Wear/Damage → Replace clutch boss assembly and/or pressure plate.

**NOTE:**

Scoring on the clutch plate splines will cause erratic operation.

## INSPECTION AND REPAIR

ENG



311-000

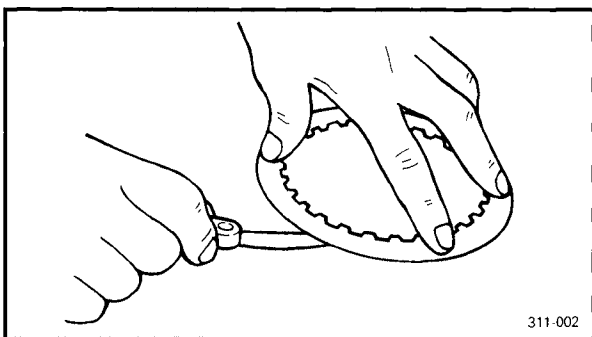
**Friction plates**

1. Inspect:
  - Friction plate  
Damage/Wear → Replace friction plates as a set.
2. Measure:
  - Friction plate thickness  
Measure at all four points.  
Out of specification → Replace friction plates as a set.



**Wear limit:**  
**2.8 mm (0.110 in)**

4



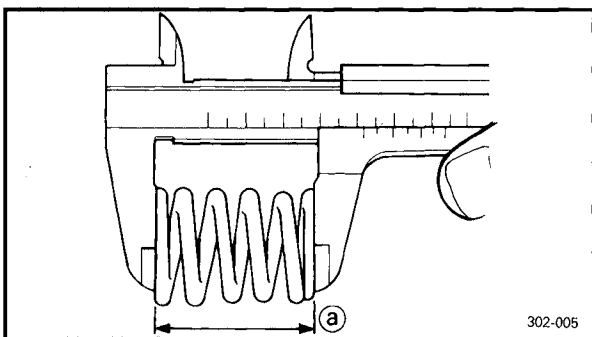
311-002

**Clutch plates**

1. Measure:
  - Clutch plate warpage  
Use surface plate and feeler gauge.  
Out of specification → Replace.



**Warp limit:**  
**0.2 mm (0.008 in)**



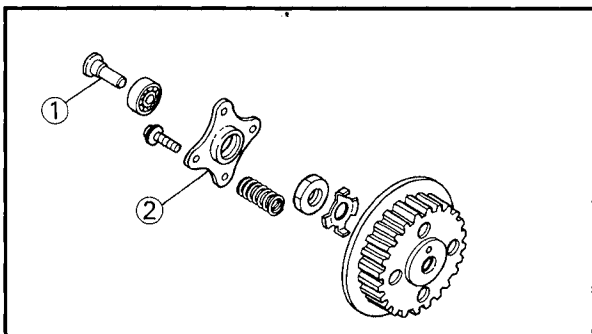
302-005

**Clutch spring**

1. Measure:
  - Clutch spring free length (a)  
Out of specification → Replace spring as a set.



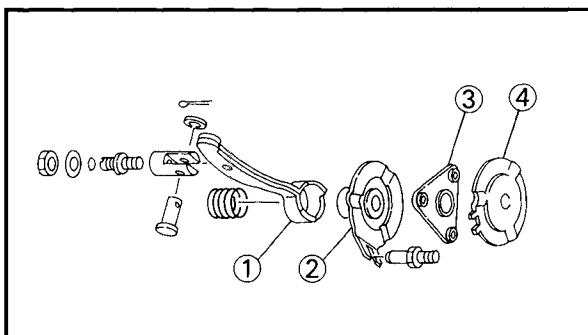
**Minimum length:**  
**32.9 mm (1.30 in)**

**Push rod**

1. Inspect:
  - Push rod ①
  - Clutch spring plate ②  
Bends/Crack/Damage → Replace.

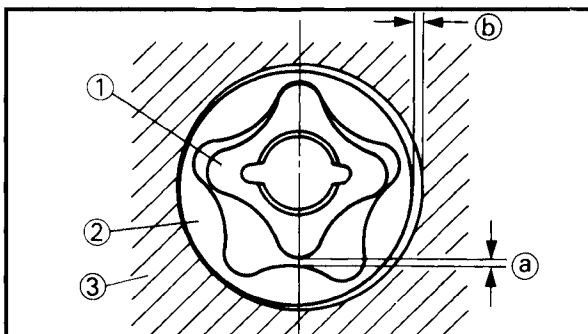
## INSPECTION AND REPAIR

ENG

**Shift arm and shift guide**

## 1. Inspect:

- Release lever ①
- Shift guide #2 ②
- Ball holder ③
- Shift guide #1 ④

**OIL PUMP**

## 1. Measure:

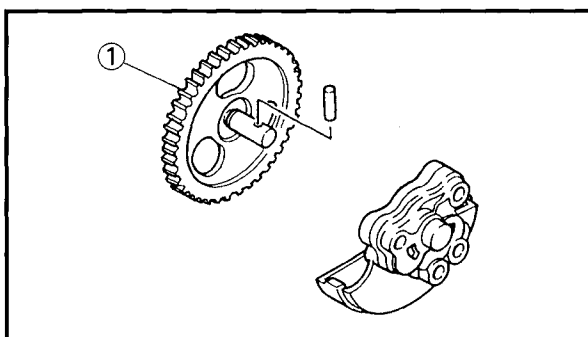
- Tip clearance **a**  
(between inner rotor ① and outer rotor ②)
- Side clearance **b**  
(between outer rotor ② and pump housing ③)

Out of specifications → Replace oil pump.



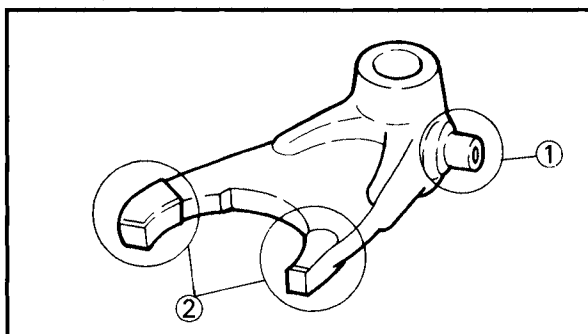
**Tip clearance limit:**  
0.20 mm (0.008 in)  
**Side clearance limit:**  
0.09 mm (0.004 in)

4



## 2. Inspect:

- Oil pump driven gear ①  
Wear/Cracks/Damage → Replace.



YB243015

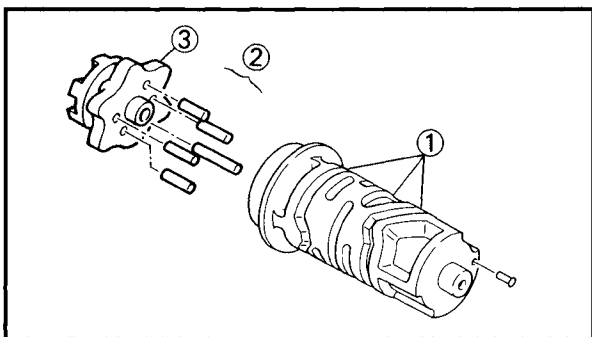
**TRANSMISSION AND SHIFTER**

## 1. Inspect:

- Shift fork cam follower ①
- Shift fork pawl ②  
Scoring/Bends/Wear → Replace.

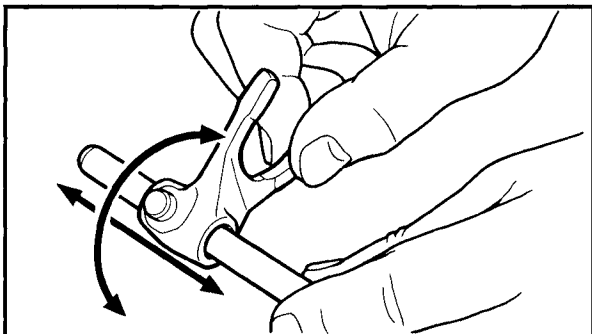
## INSPECTION AND REPAIR

ENG



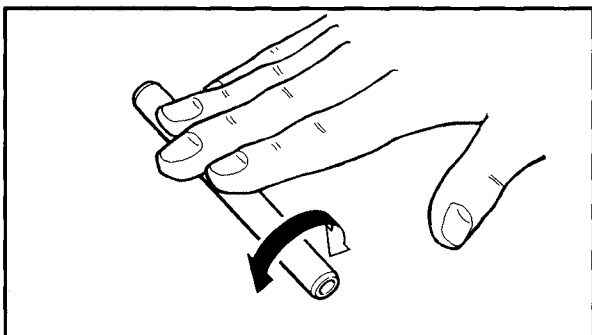
## 2. Inspect:

- Shift cam groove ①
  - Dowel pin ②
  - Shift cam segment ③
- Wear/Damage → Replace.



## 3. Check:

- Shift fork movement
- Unsmooth operation → Replace shift fork and/or guide bar.

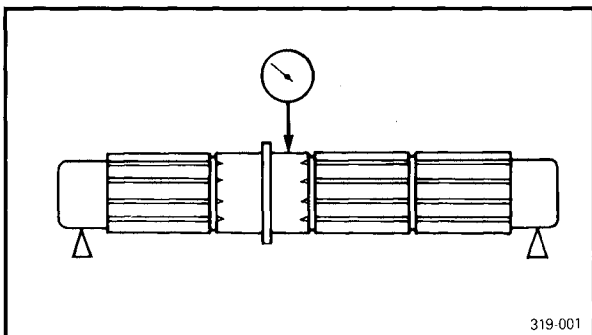


## 4. Check:

- Guide bar
- Roll the guide bar on a flat surface.  
Bends → Replace.

**⚠ WARNING**

**Do not attempt to straighten a bent guide bar.**



## 5. Measure:

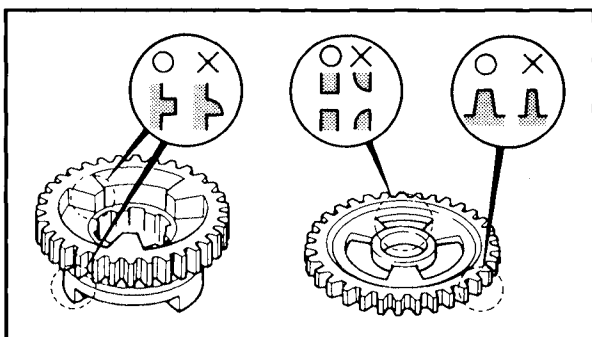
- Runout (middle drive axle and main axle)
- Out of specification → Replace.

**Runout:**

**Less than 0.08 mm (0.003 in)**

**⚠ WARNING**

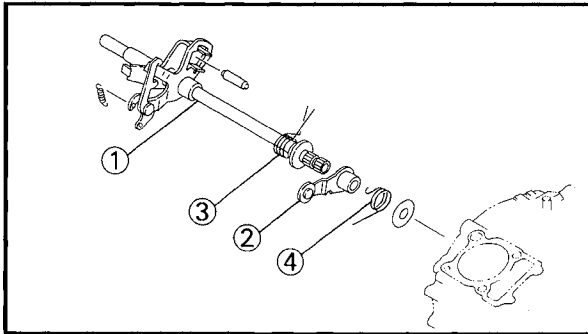
**Do not attempt to straighten a bent axle.**



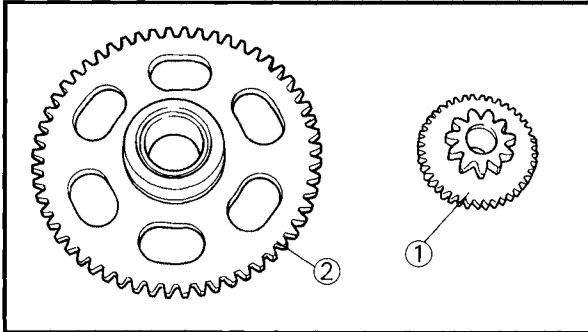
## 6. Inspect:

- Gear teeth
- Blue discoloration/Pitting/Wear → Replace.
- Mated dogs
- Rounded edges/Cracks/Missing portions → Replace.

4

**INSPECTION AND REPAIR****ENG****7. Inspect:**

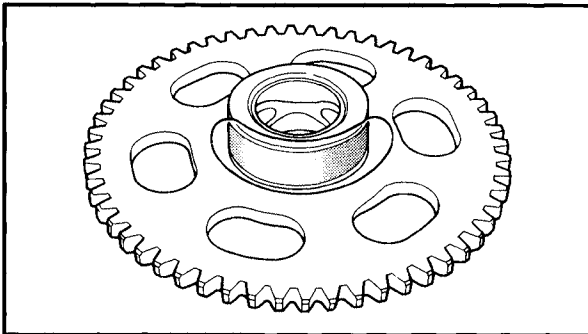
- Shift shaft ①
- Stopper lever ②  
Damage/Bends/Wear → Replace.
- Torsion spring ③
- Return spring ④  
Cracks/Damage → Replace.



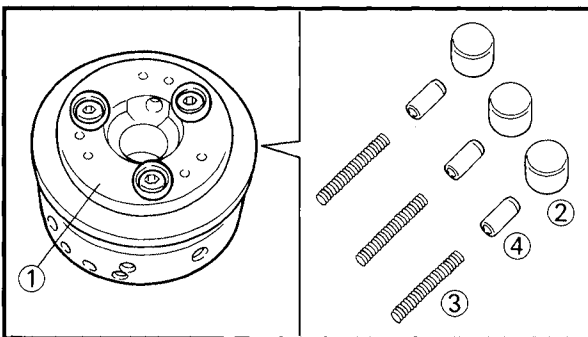
YB243012

**ELECTRIC STARTER DRIVE****1. Inspect:**

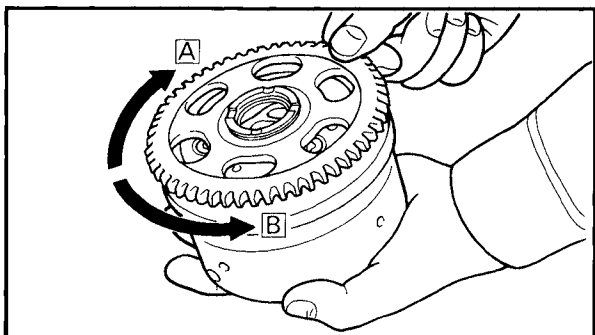
- Starter idle gear teeth ①
- Starter wheel gear teeth ②  
Burrs/Chips/Roughness/Wear → Replace.

**2. Inspect:**

- Starter wheel gear  
(contacting surfaces)  
Pitting/Wear/Damage → Replace.

**4****3. Inspect:**

- Starter clutch assembly ①
- Dowel pin ②
- Compression spring ③
- Spring cap ④  
Wear/Damage → Replace.



4. Check:
- Starter clutch operation

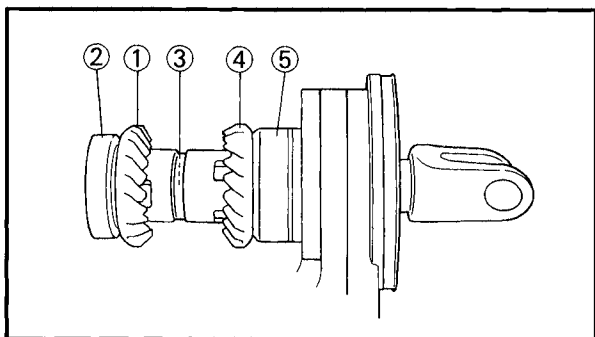
\*\*\*\*\*

#### Checking steps:

- Install the starter wheel gear to the starter clutch, and hold the starter clutch.
- When turning the starter wheel gear clockwise **A**, the starter clutch and the wheel gear should be engaged.  
If not, the starter clutch is faulty. Replace it.
- When turning the starter wheel gear counterclockwise **B**, the starter clutch gear should turn freely.  
If not, the starter clutch is faulty. Replace it.

\*\*\*\*\*

4



#### MIDDLE GEAR

1. Inspect :
- Middle driven pinion gear ①
  - Bearing ②
  - Middle driven shaft ③
  - Reverse gear ④
  - Bearing housing ⑤
- Damage/Wear → Replace.
2. Check:
- Bearing movement
- Turns roughly → Replace.

#### NOTE:

When the driven pinion gear, reverse gear, middle driven shaft and/or bearing housing are replaced, be sure to adjust the middle gear shim(s).

Refer to the "MIDDLE GEARS AND TRANSFER GEARS-MIDDLE GEAR SHIM SELECTION" section in the CHAPTER 6.

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**INSPECTION AND REPAIR**

---

**ENG**

YB243018

**CRANKCASE**

1. Thoroughly wash the case halves with mild solvent.
2. Clean all the gasket mating surface and crankcase mating surface thoroughly.
3. Inspect:
  - Crankcase  
Cracks/Damage → Replace.
  - Oil delivery passages  
Clog → Blow out with compressed air.

YB243019

**BEARING AND OIL SEAL**

1. Inspect:
  - Bearings  
Clean and lubricate, then rotate inner race with finger.  
Roughness → Replace.

**CAUTION:**

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

---

2. Inspect:
  - Oil seals  
Damage/Wear → Replace.

**CIRCLIPS AND WASHERS**

1. Inspect:
  - Circlips
  - Washers  
Damage/Looseness/Bends → Replace.

**4**







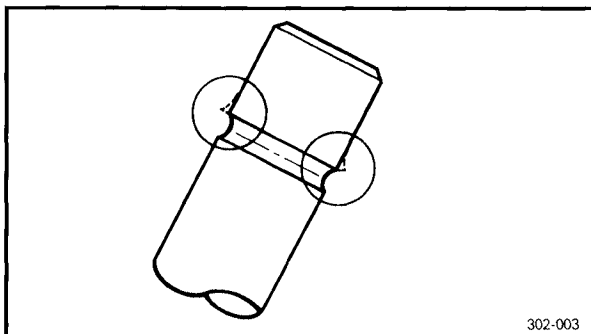
YB244000

## ENGINE ASSEMBLY AND ADJUSTMENT

### **⚠ WARNING**

For engine reassembly, replace the following parts with new ones.

- O-ring
- Gasket
- Oil seal
- Copper washer
- Lock washer
- Circlip



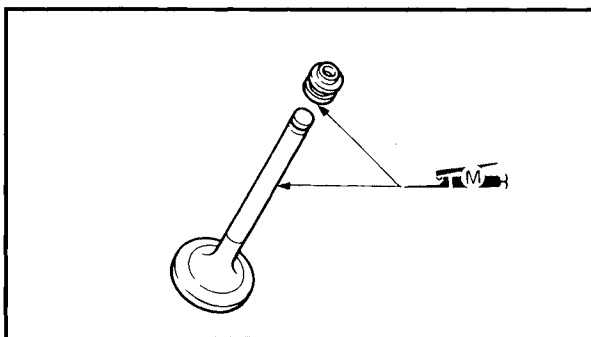
YB344002

### VALVES

#### 1. Deburr:

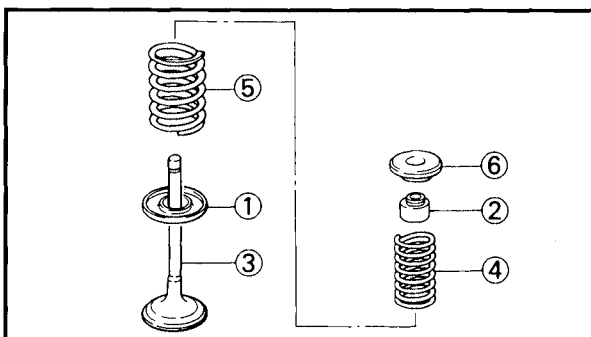
- Valve stem end

Use an oil stone to smooth the stem end.



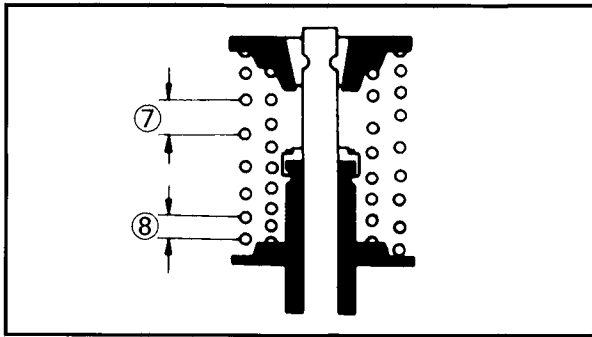
#### 2. Apply:

- Molybdenum disulfide oil  
(onto valve stem and oil seal)



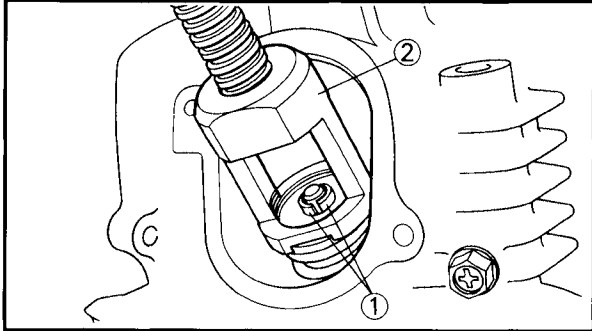
#### 3. Install:

- Valve spring seat ①
- Valve stem seal ②
- Valve ③
- Valve spring (inner) ④
- Valve spring (outer) ⑤
- Valve retainer ⑥

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****NOTE:**

Install the valve spring with larger pitch ⑦ facing upward.

⑧ Smaller pitch



## 4. Install:

- Valve cotters ①

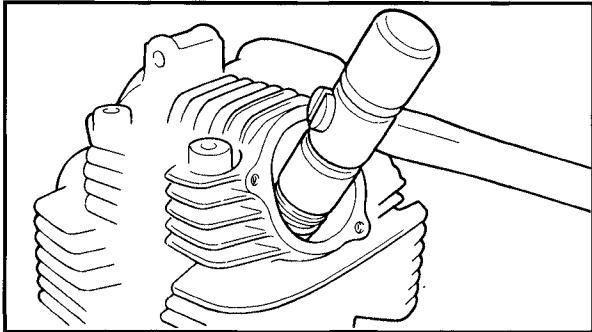
**NOTE:**

Install the valve cotters while compressing the valve spring with the Valve spring compressor ②.



**Valve spring compressor:**

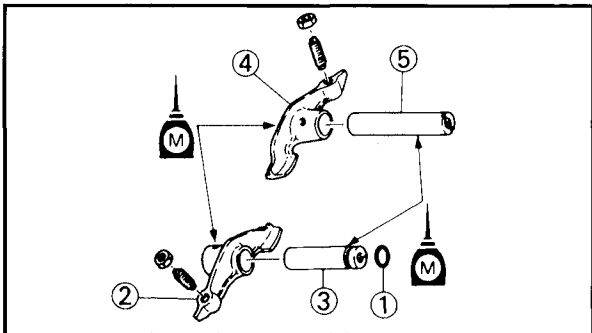
**P/N. YM-04019, 90890-04019**



5. Secure the valve cotter on to the valve stem by tapping it lightly with a soft hammer.

**NOTE:**

Do not hit so much as to damage the valve.

**ROCKER ARM**

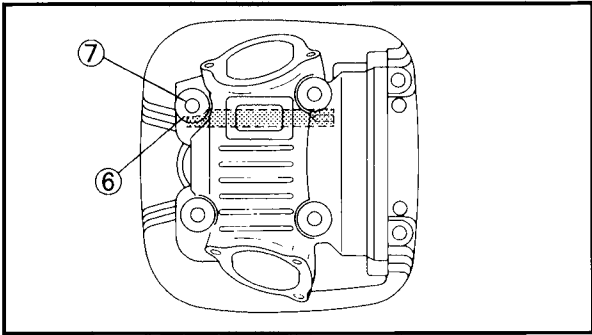
## 1. Lubricate:

- Molybdenum disulfide oil  
(to the rocker arm, rocker arm shaft and O-ring)

## 2. Install:

- O-ring ①
- Rocker arm ②
- Rocker arm shaft ③ (exhaust)
- Rocker arm ④
- Rocker arm shaft ⑤ (intake)

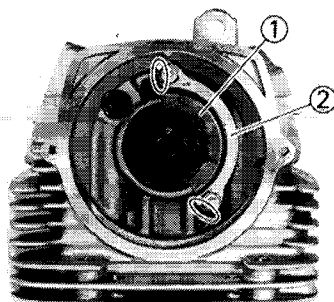
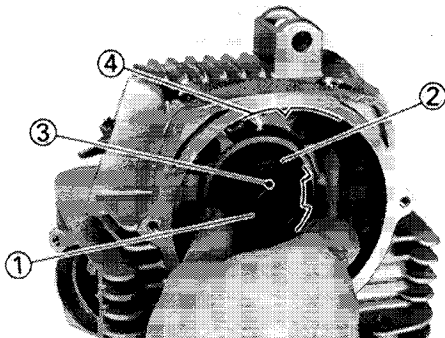
**4**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****NOTE:**

Align the slit ⑥ on the rocker arm shaft (intake) with the cylinder head bolt hole ⑦ and install the rocker arm shaft.

**CAUTION:**

Do not confuse the installation direction of rocker arm shaft. Be sure to install the threaded part facing outward.



## 3. Lubricate:

- 4-stroke engine oil  
(to the camshaft, collar and pin)

## 4. Install:

- Camshaft ①
- Camshaft bushing ②

**NOTE:**

Align the camshaft pin ③ with the match mark ④ on the cylinder head and install the pin.

## 5. Install:

- Retainer ① (camshaft bushing)
- Lock washer ②



**Bolts (camshaft bushing refainer):**  
8 Nm (0.8 m•kg, 5.8 ft•lb)

**⚠ WARNING**

Always use a new lock washer.

6. Bend the lock washer tab along the bolt flats.

**4**

## ENGINE ASSEMBLY AND ADJUSTMENT

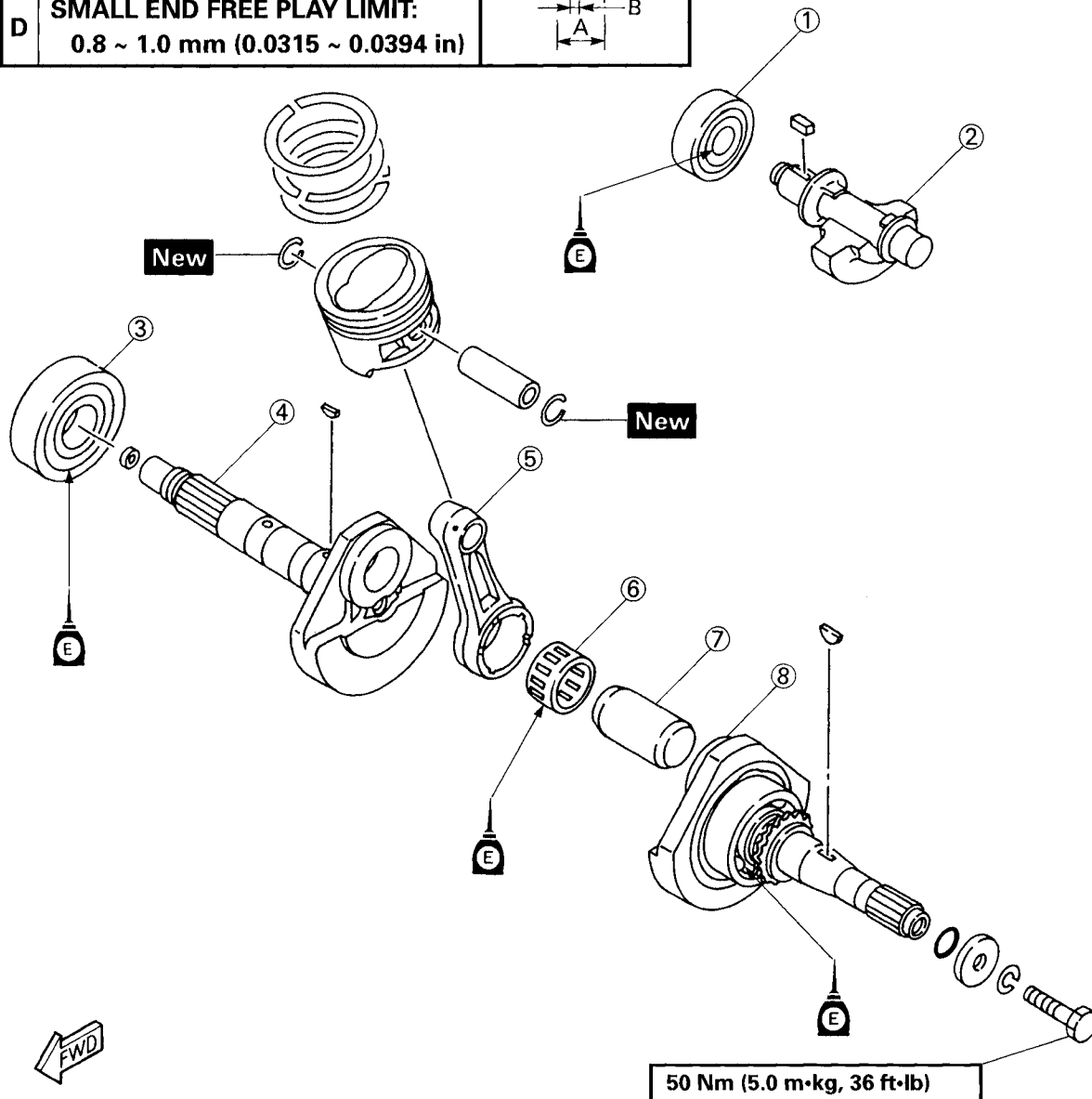
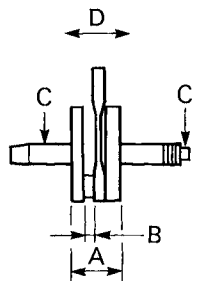
ENG



## CRANKSHAFT AND BALANCER SHAFT

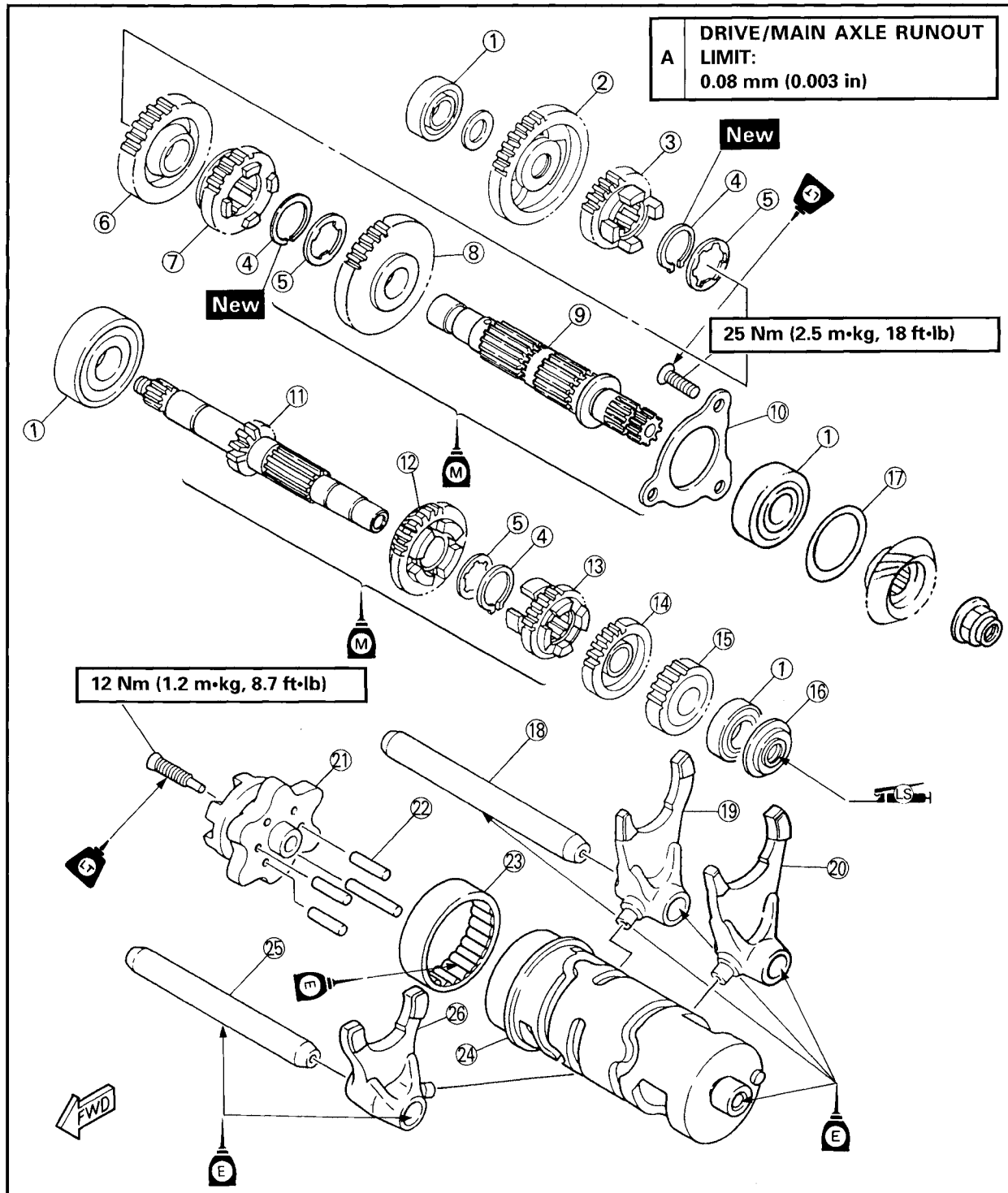
- ① Bearing
- ② Balancer
- ③ Bearing
- ④ Crank (right)
- ⑤ Connecting rod
- ⑥ Big end bearing
- ⑦ Crank pin
- ⑧ Crank (left)

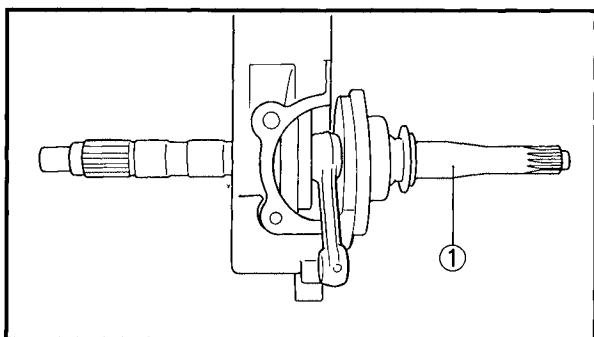
<b>A</b>	<b>CRANK WIDTH:</b> 55.95 ~ 56.00 mm (2.203 ~ 2.205 in)
<b>B</b>	<b>BIG END SIDE CLEARANCE:</b> 0.35 ~ 0.65 mm (0.014 ~ 0.026 in)
<b>C</b>	<b>RUNOUT LIMIT:</b> 0.06 mm (0.0024 in)
<b>D</b>	<b>SMALL END FREE PLAY LIMIT:</b> 0.8 ~ 1.0 mm (0.0315 ~ 0.0394 in)



**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****TRANSMISSION AND SHIFTER**

- |                  |                       |                        |
|------------------|-----------------------|------------------------|
| ① Bearing        | ⑩ Bearing retainer    | ⑲ Shift fork #2        |
| ② 1st wheel gear | ⑪ Main axle           | ⑳ Shift fork #3        |
| ③ 5th wheel gear | ⑫ 5th pinion gear     | ㉑ Shift cam segment    |
| ④ Circlip        | ⑬ 3rd pinion gear     | ㉒ Pin                  |
| ⑤ Washer         | ⑭ 4th pinion gear     | ㉓ Bearing              |
| ⑥ 3rd wheel gear | ⑮ 2nd pinion gear     | ㉔ Shift cam            |
| ⑦ 4th wheel gear | ⑯ Oil seal            | ㉕ Guide bar #2 (short) |
| ⑧ 2nd wheel gear | ⑰ Shim                | ㉖ Shift fork #1        |
| ⑨ Drive axle     | ⑱ Guide bar #1 (long) |                        |

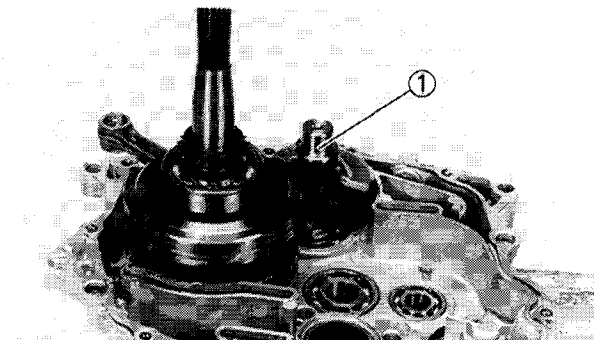


**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****CRANKSHAFT, BALANCER SHAFT AND TRANSMISSION****1. Install:**

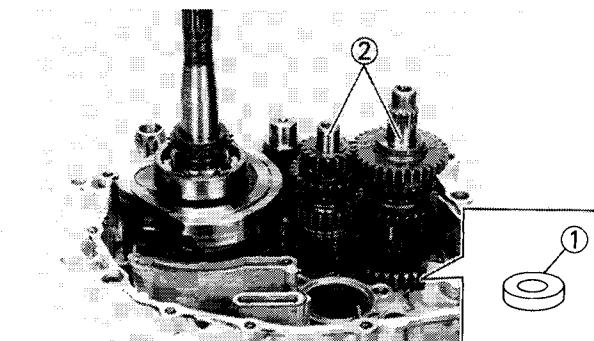
- Crankshaft ①  
(to the right crankcase)

**NOTE:**

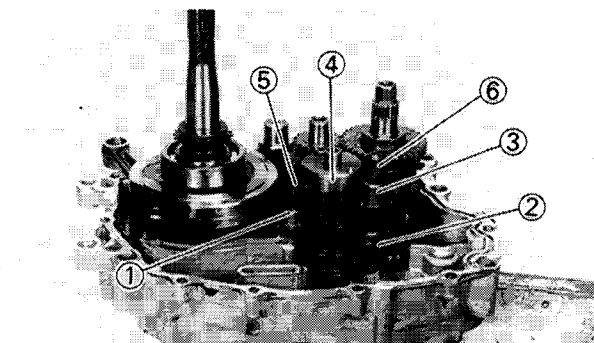
Hold the connecting rod at top dead center with one hand while installing the crankshaft.

**2. Install:**

- Balancer shaft ①

**3. Install:**

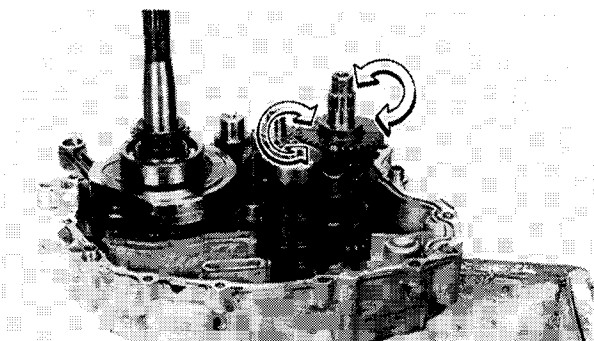
- Washer ① (middle drive shaft)
- Transmission assembly ② (main axle and middle drive axle)

**4. Install:**

- Shift fork #1 ①
- Shift fork #2 ②
- Shift fork #3 ③
- Shift cam ④
- Guide bar #2 ⑤ (short)
- Guide bar #1 ⑥ (long)

**NOTE:**

Each shift fork is identified by a number cast on its side.

**5. Check:**

- Transmission and shifter operation  
Unsmooth operation → Repair.

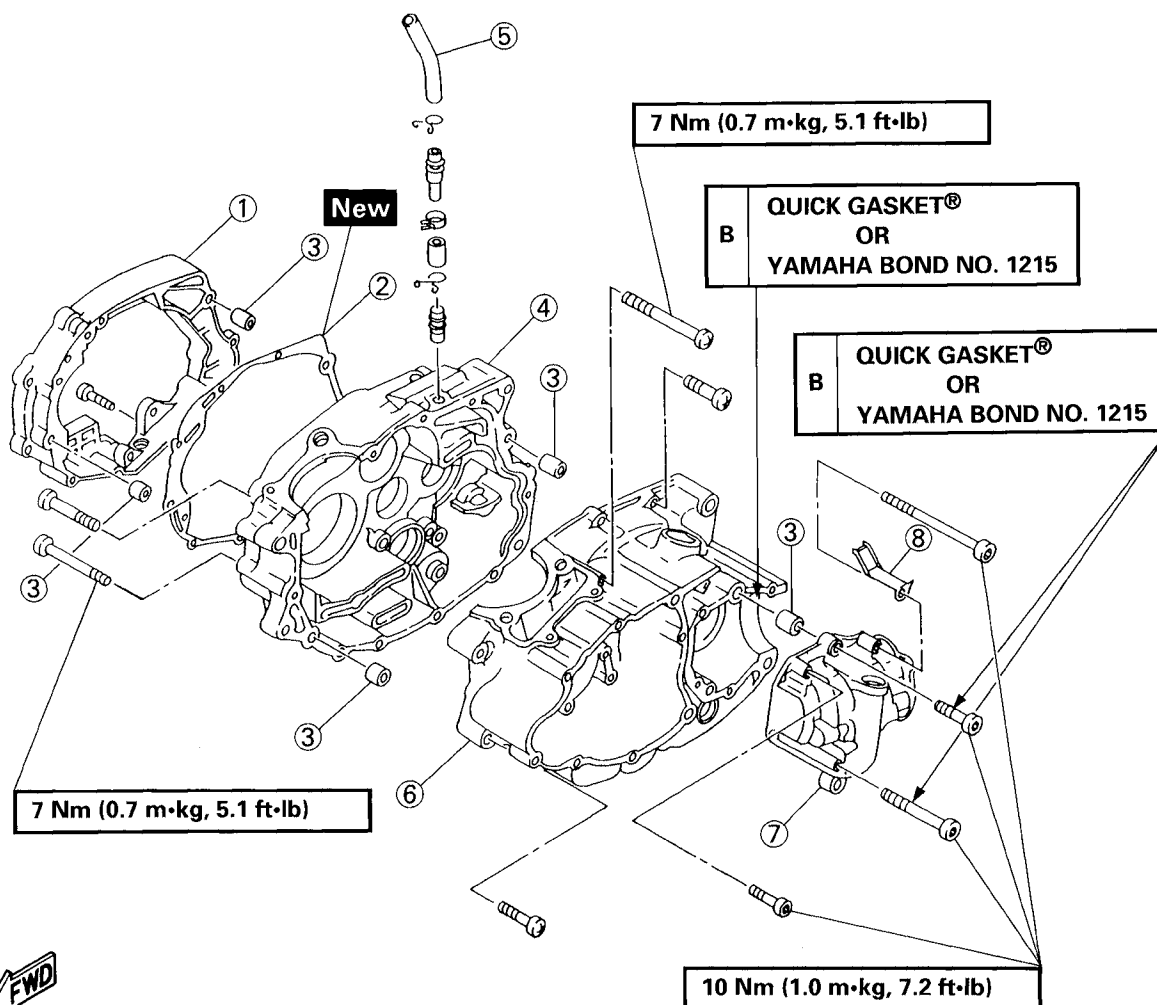
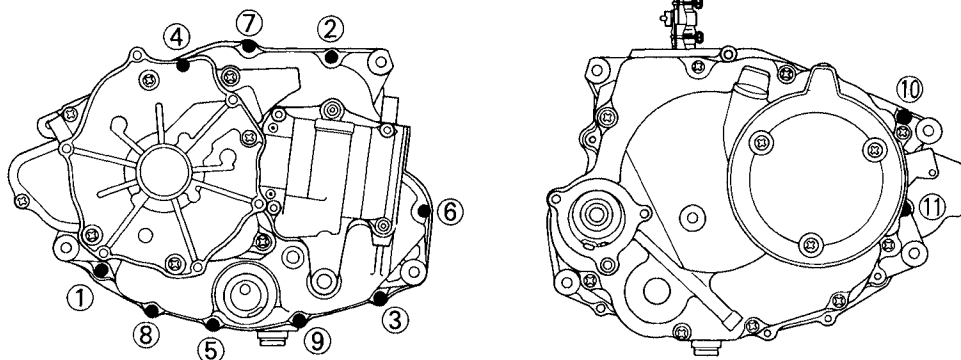
**NOTE:**

- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, be sure that the transmission is in neutral and that the gears turn freely.

**4**

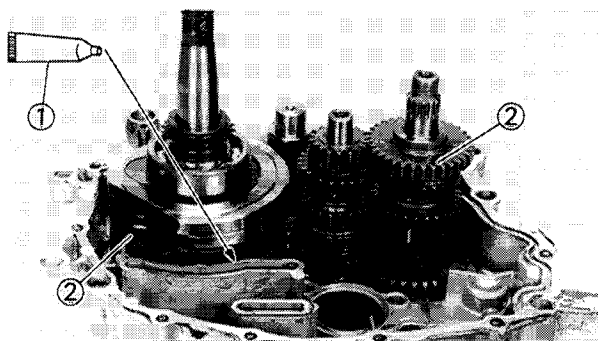
**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****CRANKCASE**

- |                            |                           |
|----------------------------|---------------------------|
| ① Crankcase spacer (right) | ⑤ Crankcase breather hose |
| ② Gasket                   | ⑥ Crankcase (left)        |
| ③ Dowel pin                | ⑦ Middle gear case cover  |
| ④ Crankcase (right)        | ⑧ Clamp                   |

**A TIGHTENING SEQUENCE:****4**

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



## CRANKCASE (LEFT)

1. Apply:
  - Sealant (1)
 (to matching surfaces of both case halves)



**Sealant (Quick Gasket®):**  
**ACC-11001-01**  
**Yamaha bond No. 1215:**  
**90890-85505**

2. Install:
  - Dowel pins (2)
3. Fit the left crankcase onto the right case.  
 Tap lightly on the case with a soft hammer.

**CAUTION:**

**Before installing and torquing the crankcase holding screws, be sure to check whether the transmission is functioning properly by manually rotating the shift cam either way.**

4. Tighten:
  - Screws (crankcase)

**NOTE:**

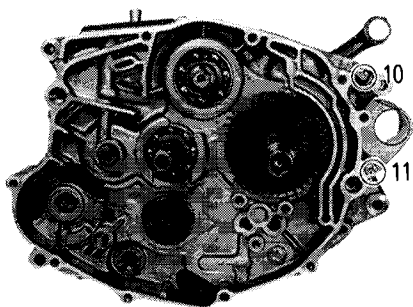
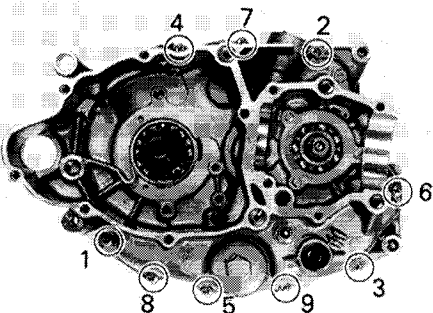
- Apply sealant onto the thread of the No. 7 screw.
- Tighten the screws starting with the lowest numbered one.



**Sealant (Quick Gasket®)**  
**ACC-11001-01**  
**Yamaha bond No. 1215:**  
**90890-85505**



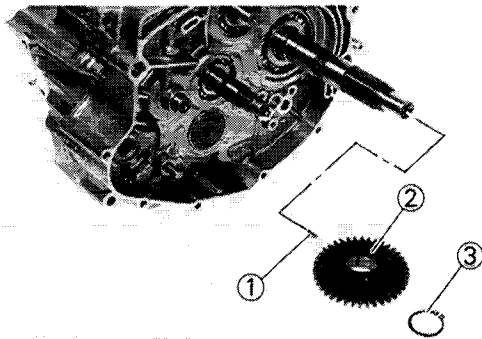
**Screws (crankcase):**  
**7 Nm (0.7 m•kg, 5.1 ft•lb)**



5. Apply:
  - 4-stroke engine oil
 To the crank pin, bearing and oil delivery hole.
6. Check:
  - Crankshaft and transmission operation
 Unsmooth operation → Repair.

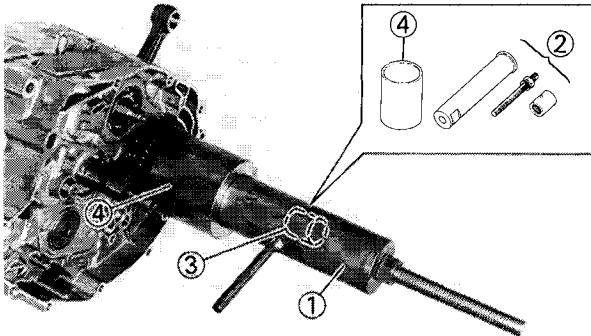
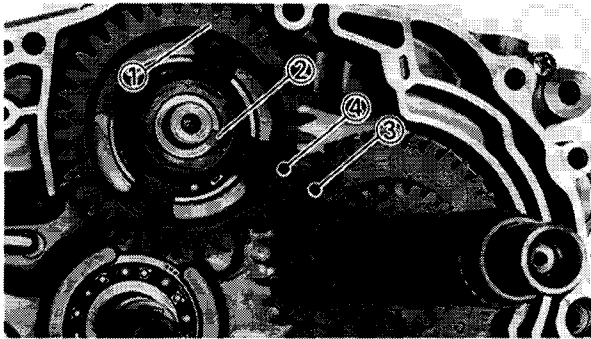
4



**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****BALANCER DRIVEN AND DRIVE GEARS**

## 1. Install:

- Woodruff key ①
- Balancer drive gear ②
- Circlip ③

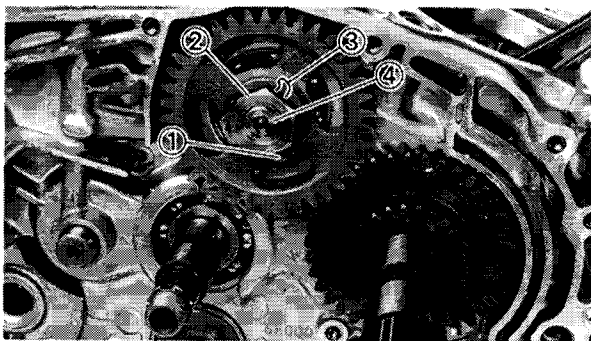
**Crankshaft installer set ①:****P/N. YU-90050****Buffer boss installer set ②:****P/N. 90890-04088****Adapter #11 ③:****P/N. YM-33279****Spacer ④ (crankshaft):****P/N. YM-90070-A, 90890-04060**

## 2. Install:

- Balancer driven gear ①
- Straight key ②

**NOTE:**

Align the drive gear mark ③ with the driven gear mark ④.



## 3. Install:

- Lock washer ①
- Nut ② (driven gear)

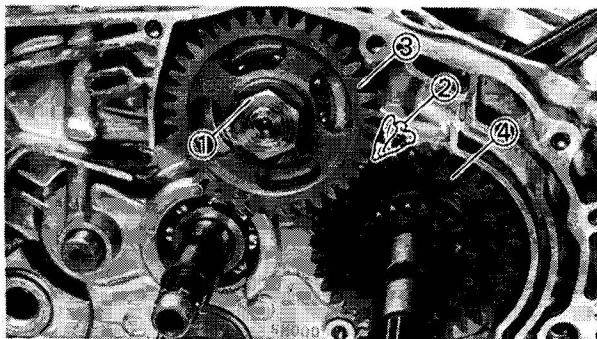
**⚠ WARNING**

**Always use a new lock washer.**

**NOTE:**

Install the lock washer tab ③ into the key way of the balancer shaft ④.

**4**



4. Tighten:
- Nut ① (driven gear)



**Nut (balancer driven gear):**  
**50 Nm (5.0 m•kg, 36 ft•lb)**

**NOTE:**

Place a folded rag ② between the teeth of the driven gear ③ and drive gear ④ to lock them.

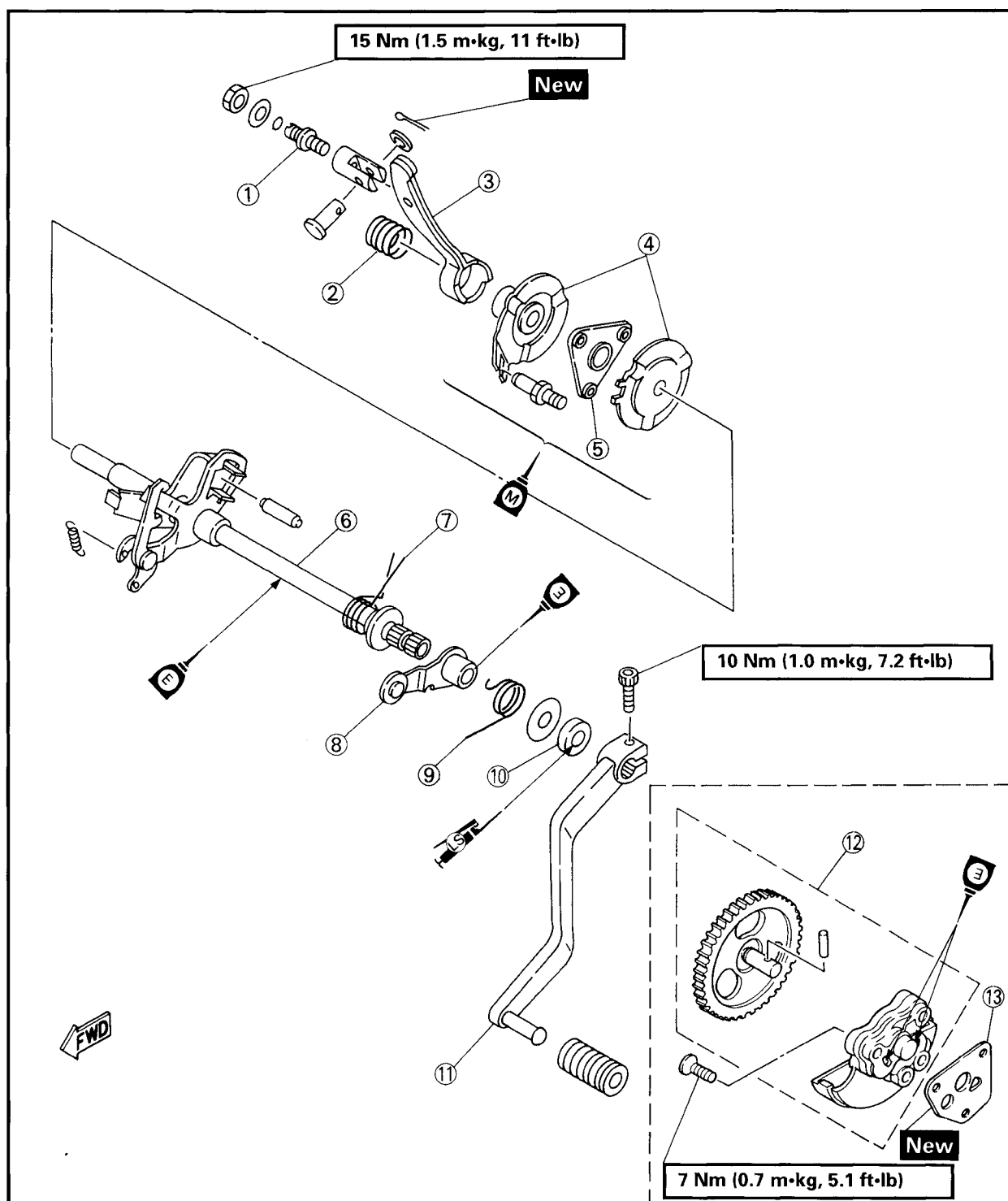
5. Bend the lock washer tab.

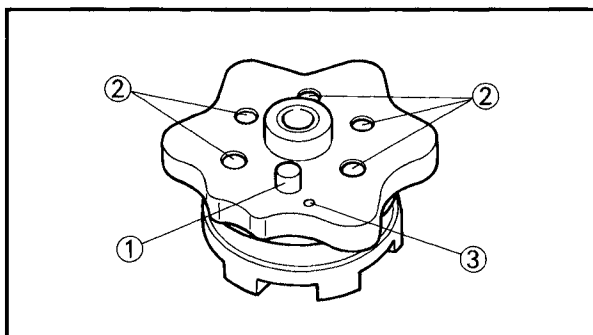
4



**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****SHIFT SHAFT AND OIL PUMP**

- |                  |                     |
|------------------|---------------------|
| ① Adjuster       | ⑩ Oil seal          |
| ② Spring         | ⑪ Shift pedal       |
| ③ Release lever  | ⑫ Oil pump assembly |
| ④ Shift guides   | ⑬ Gasket            |
| ⑤ Ball holder    |                     |
| ⑥ Shift shaft    |                     |
| ⑦ Torsion spring |                     |
| ⑧ Stopper lever  |                     |
| ⑨ Return spring  |                     |

**4**

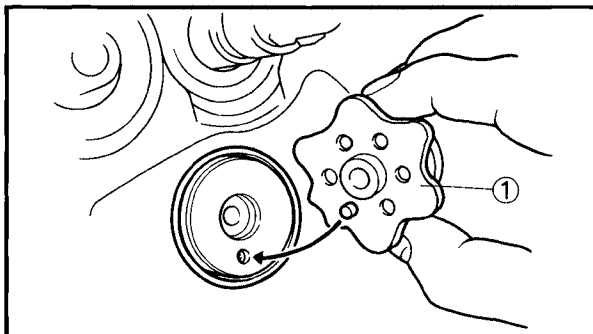
**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****SHIFTER AND OIL PUMP**

## 1. Install:

- Pin ① (long)  
(to shift cam segment)
- Pin ② (short)  
(to shift cam segment)

**NOTE:**

Install the pin ① (long) to the match mark ③ position.

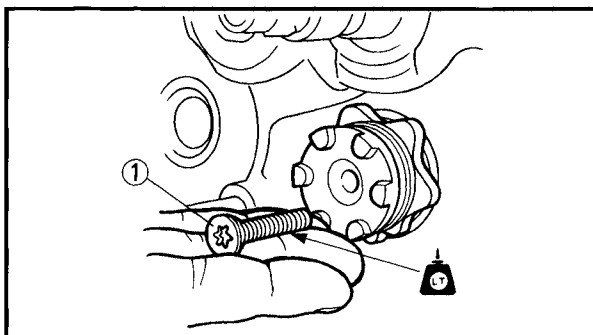


## 2. Install:

- Shift cam segment ①

**NOTE:**

Align the hole of the shift cam with the pin (long) of the segment.



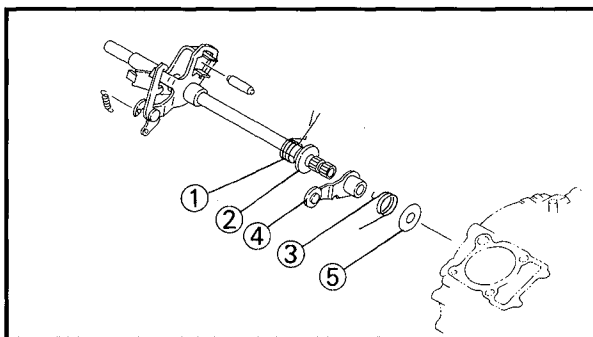
## 3. Tighten:

- Screw ① (segment)

**Screw (segment):**

**12 Nm (1.2 m•kg, 8.7 ft•lb)**

**Use LOCTITE®**



## 4. Install:

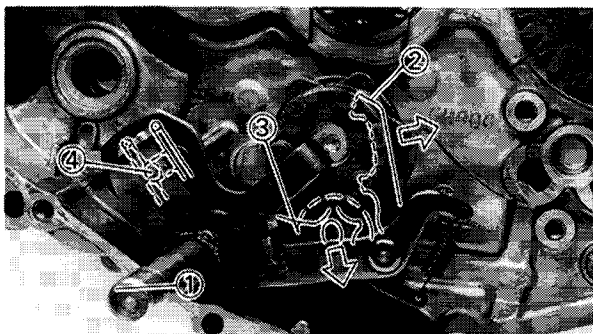
- Torsion spring ① (to shift shaft)
- Washer ②
- Return spring ③ (to stopper lever ④)
- Stopper lever ④
- Washer ⑤

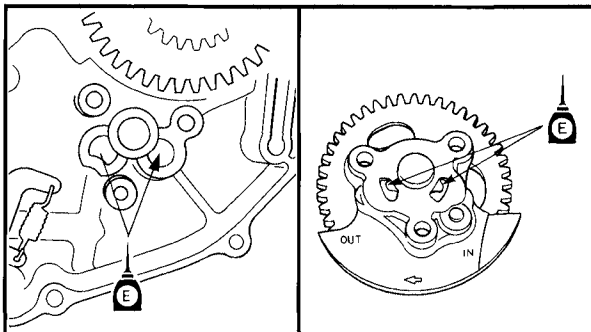
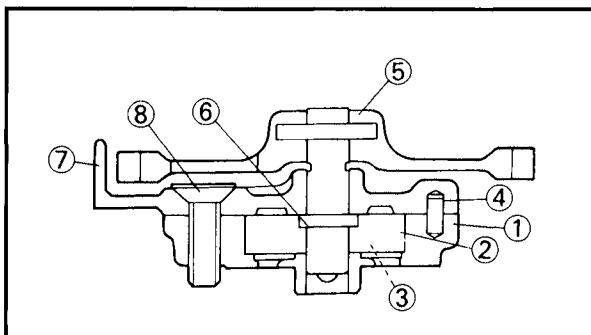
## 5. Install:

- Shift shaft ①

**NOTE:**

- Before installing the shift shaft, apply the grease to the oil seal lip (crankcase-left).
- Push the shift pawl ② and the stopper lever ③ to the arrow direction and install them to the segment.
- Be sure the stoper shaft ④ is placed between the spring hooks.



**ENGINE ASSEMBLY AND ADJUSTMENT****ENG**

## 6. Apply:

- 4-stroke engine oil  
(to the oil pump inner parts)

## 7. Install:

- Rotor housing ①
- Outer rotor ②
- Inner rotor ③
- Dowel pins ④
- Oil pump driven gear ⑤
- Dowel pin ⑥
- Oil pump cover ⑦
- Screw ⑧

**Screw (oil pump):****7 Nm (0.7 m•kg, 5.1 ft•lb)**

## 8. Apply:

- 4-stroke engine oil  
(to the oil passages in the crankcase)

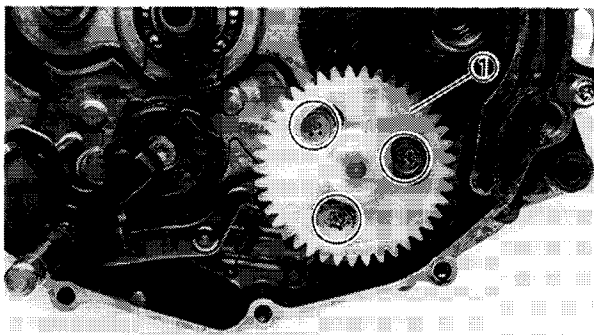
**CAUTION:**

**Apply a liberal amount of 4-stroke engine oil to the oil pump passages in the crankcase, or the engine may be damaged.**

**4**

## 9. Apply:

- 4-stroke engine oil  
(to the oil passages in the oil pump)

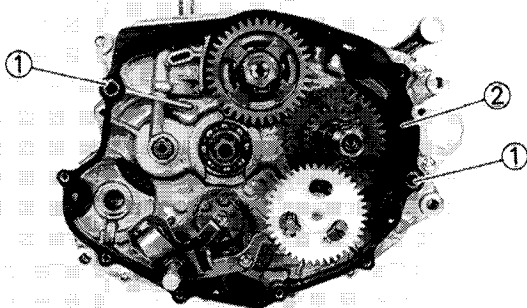


## 10. Install:

- Gasket
- Oil pump assembly ①

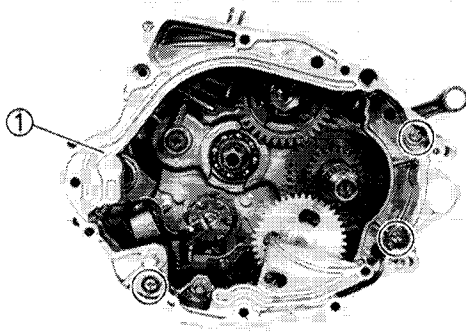
**Oil pump:****7 Nm (0.7 m•kg, 5.1 ft•lb)****⚠ WARNING**

**Always use a new gasket.**



## 11. Install:

- Dowel pins ①
- Gasket ② (new)

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG**

12. Install:

- Crankcase spacer ① (right)

**Crankcase spacer (right):****7 Nm (0.7 m•kg, 5.1 ft•lb)****⚠ WARNING****Always use a new gasket.****4**

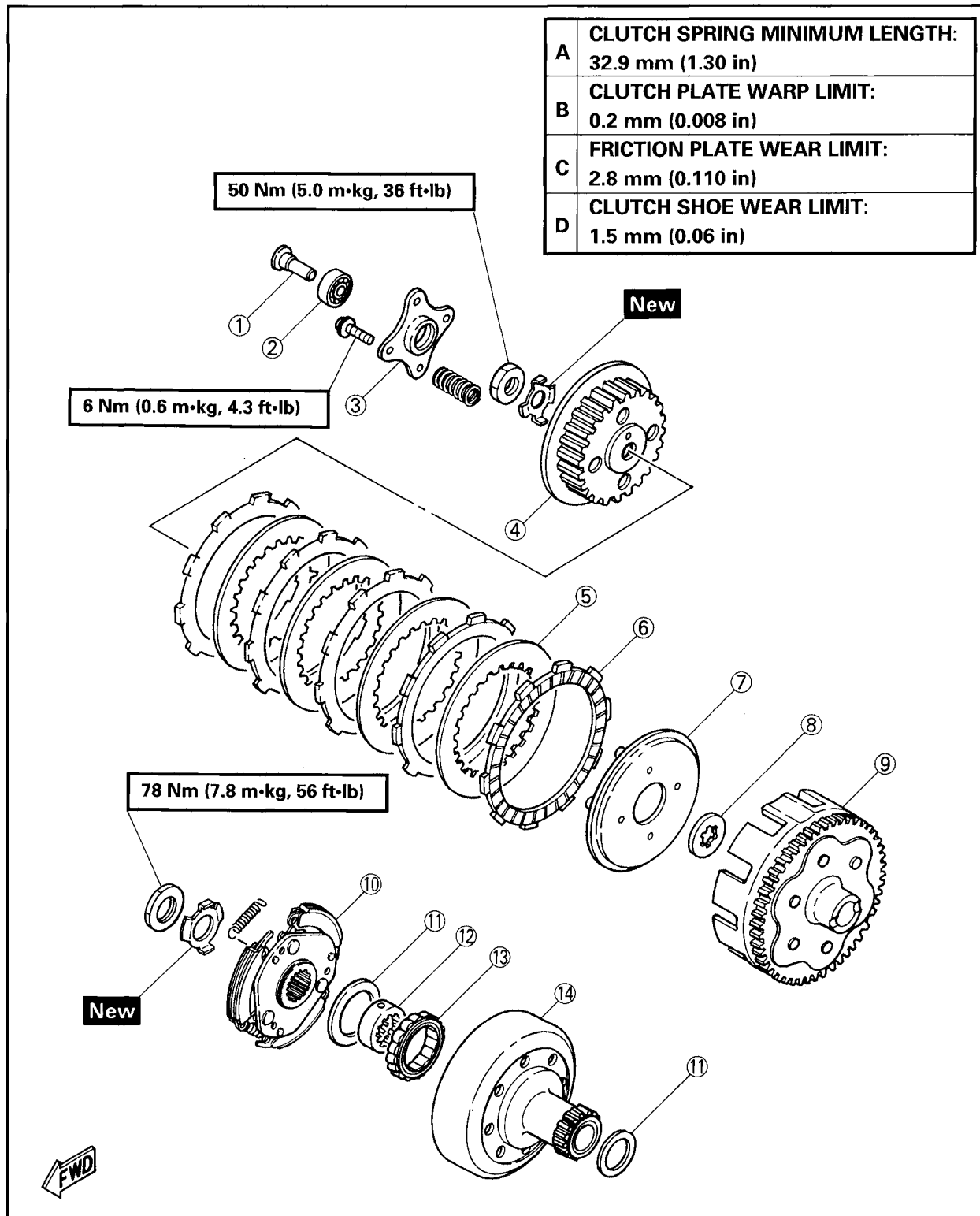
## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



## CLUTCH

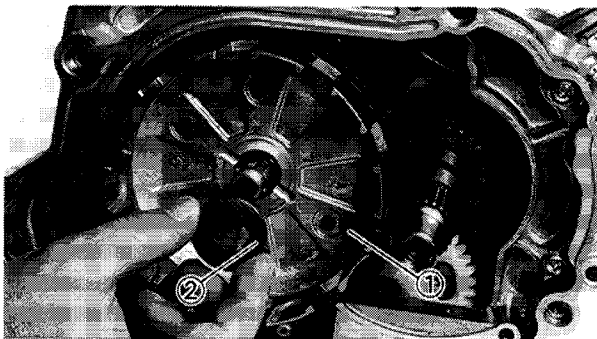
- |                  |                              |
|------------------|------------------------------|
| ① Push rod       | ⑧ Washer                     |
| ② Bearing        | ⑨ Clutch housing (secondary) |
| ③ Bearing holder | ⑩ Clutch carrier assembly    |
| ④ Clutch boss    | ⑪ Washer                     |
| ⑤ Clutch plate   | ⑫ Inner collar               |
| ⑥ Friction plate | ⑬ One way bearing            |
| ⑦ Pressure plate | ⑭ Clutch housing (primary)   |



4

## ENGINE ASSEMBLY AND ADJUSTMENT

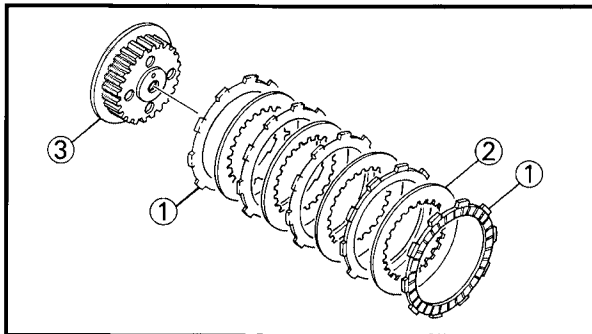
ENG



## PRIMARY AND SECONDARY CLUTCHES

## 1. Install:

- Clutch housing ① (secondary)
- Washer ②



## 2. Install:

- Friction plates ①
- Clutch plates ②
- (to clutch boss ③)

**NOTE:**

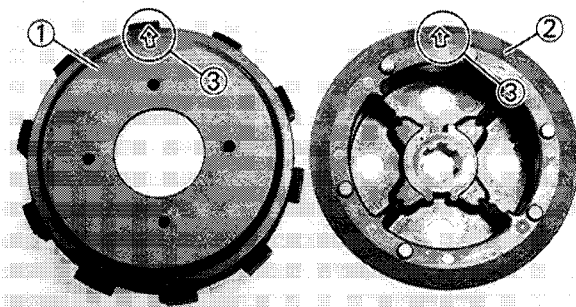
Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.

## 3. Install:

- Clutch boss ①
- (to pressure plate assembly ②)

**NOTE:**

Align the arrow marks ③ on the clutch boss with the pressure plate.



## 4. Install:

- Secondary clutch assembly ①
- (to main axle ②)
- Lock washer ③
- Nut ④ (clutch boss)

**⚠ WARNING**

Always use a new lock washer.

**NOTE:**

Make sure that the tabs of the lock washer engages the indentations in the clutch boss.

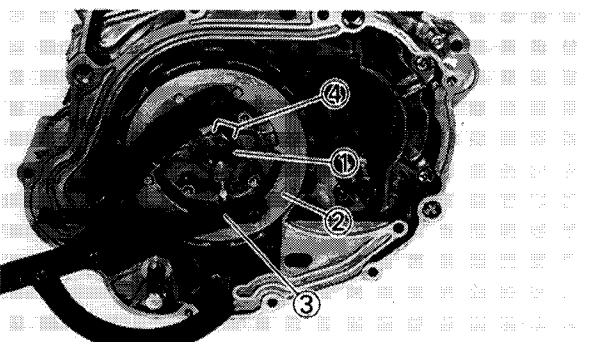
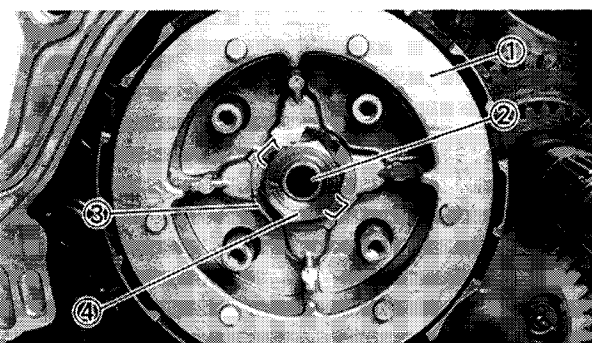
## 5. Tighten:

- Nut ① (clutch boss)



**Nut (clutch boss):**

**50 Nm (5.0 m•kg, 36 ft•lb)**



4



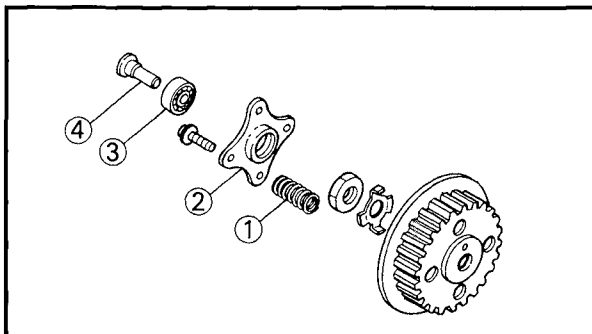
**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****NOTE:**

Hold the clutch boss ② by the Rotor holder ③ to tighten the nut.

**Rotor holder:**

P/N. YU-01235, 90890-01235

6. Bend the lock washer tab ④ .

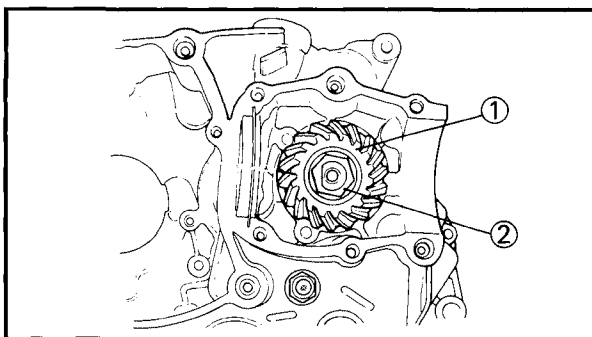


7. Install:

- Clutch springs ①
- Bearing holder ②
- Bearing ③
- Push rod ④

**Bolts (clutch spring):**

6 Nm (0.6 m·kg, 4.3 ft·lb)



8. Install:

- Drive pinion gear ①
- Nut ② (drive pinion gear)

**⚠ WARNING**

Always use a new drive pinion gear nut.

9. Tighten:

- Nut ② (drive pinion gear)

**Nut (drive pinion gear):**

90 Nm (9.0 m·kg, 65 ft·lb)

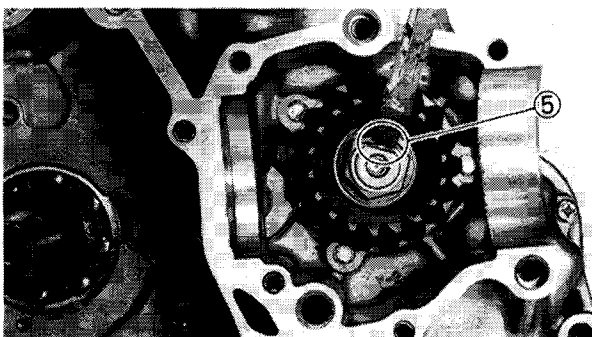
**NOTE:**

Hold the clutch boss ③ on the secondary clutch by the Rotor holder ④ to tighten the nut.

**Rotor holder:**

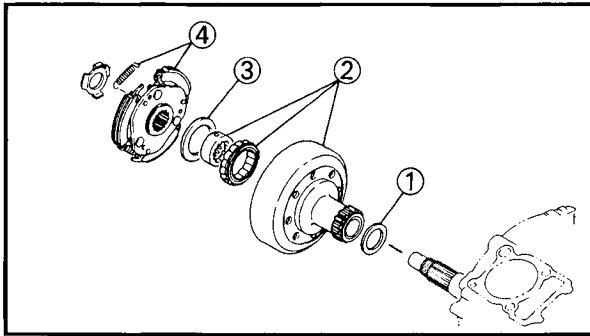
P/N. YU-01235, 90890-01235

10. Lock the threads ⑤ with drift punch.

**4**

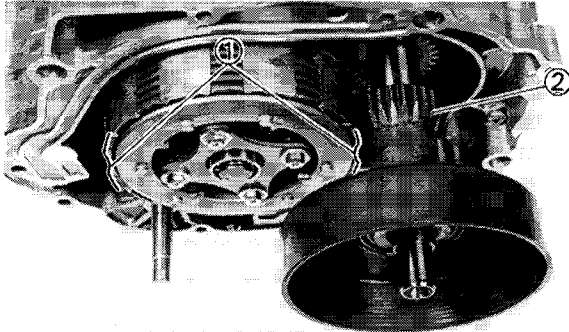
## ENGINE ASSEMBLY AND ADJUSTMENT

ENG

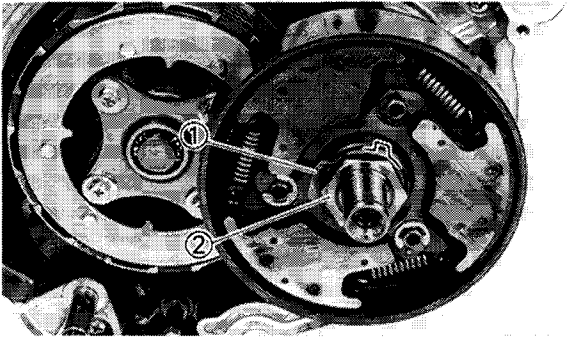


11. Install:

- Washer ①
- Clutch housing ② (primary)
- Washer ③
- Clutch carrier assembly ④

**NOTE:**

The secondary clutch housing has two grooves ① permitting the primary drive gear ② to clear the secondary clutch. Align one of these grooves with the primary drive gear before installing the primary clutch housing.



12. Install:

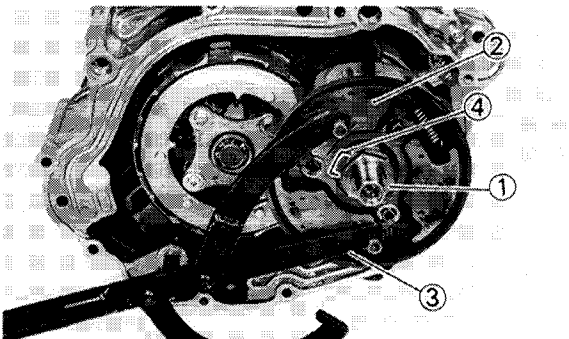
- Lock washer ①
- Nut ② (primary clutch)

**⚠ WARNING**

**Always use a new lock washer.**

**NOTE:**

Make sure that the tabs of the lock washer engages the indentations on the clutch carrier.



13. Tighten:

- Nut ① (primary clutch)



**Nut (primary clutch):**  
78 Nm (7.8 m•kg, 56 ft•lb)

**NOTE:**

Hold the clutch carrier ② by the Rotor holder ③ to tighten the nut.



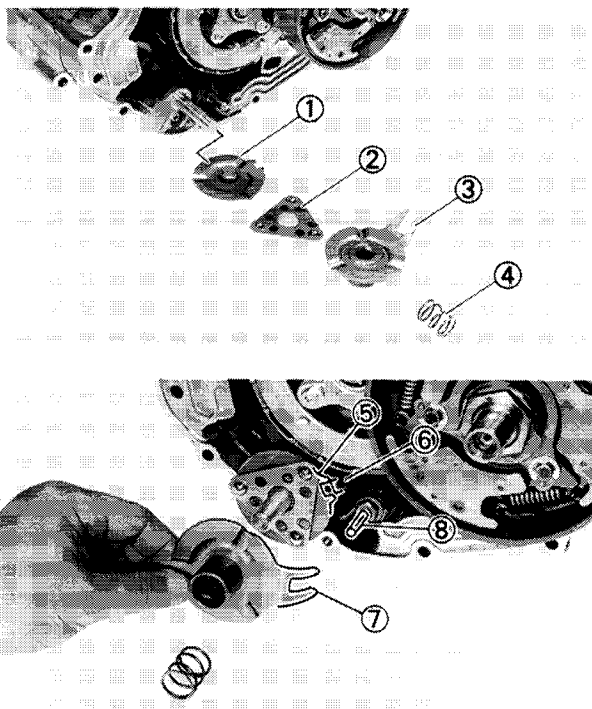
**Rotor holder:**  
P/N. YU-01235, 90890-01235

14. Bend the lock washer tab ④.

4

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG

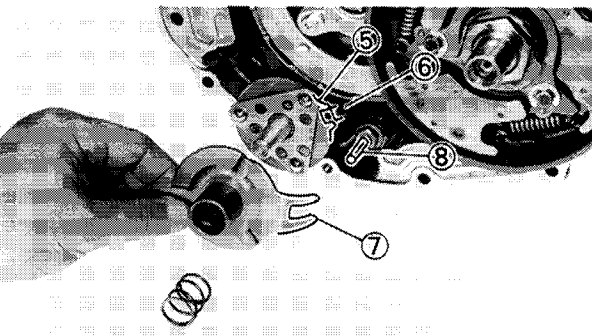


15. Install:

- Shift guide #2 ①
- Ball holder ②
- Shift guide #1 ③
- Spring ④ (clutch release lever)

**NOTE:**

- The slot ⑤ in the shift guide #2 must engage with the shift shaft projection ⑥.
- The slot ⑦ in the shift guide #1 must engage with the stopper shaft ⑧.

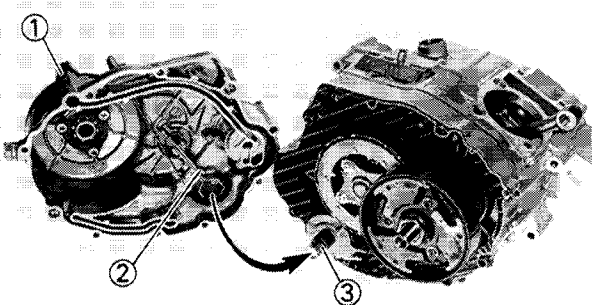
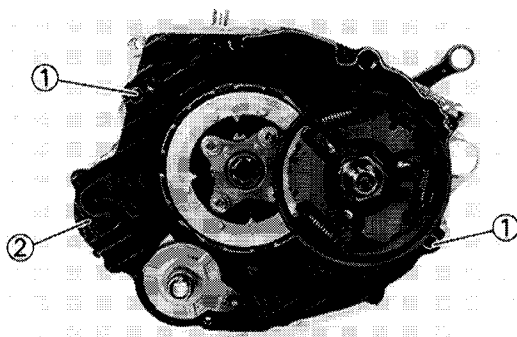


16. Install:

- Dowel pins ① (crankcase cover)
- Gasket ②

**⚠ WARNING**

Always use a new gasket.

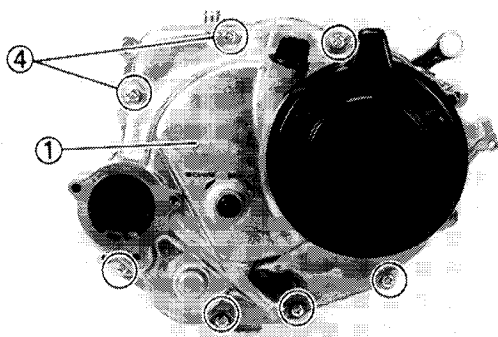


17. Install:

- Crankcase cover ① (right)

**NOTE:**

- Engage the clutch release lever ② with the shift guide #1 ③.
- Apply sealant onto the thread of screws ④.
- Tighten the screws in stage, using a criss-cross pattern.

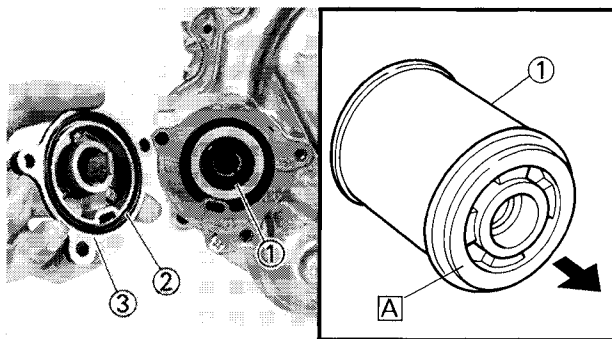


**Sealant (Quick Gasket®):**  
ACC-11001-01  
Yamaha bond No. 1215:  
90890-85505



**Screws (crankcase cover):**  
7 Nm (0.7 m•kg, 5.1 ft•lb)

4

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG**

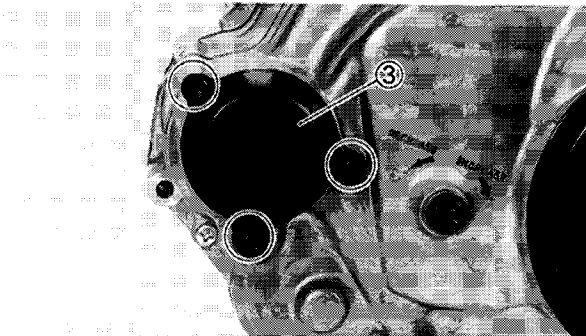
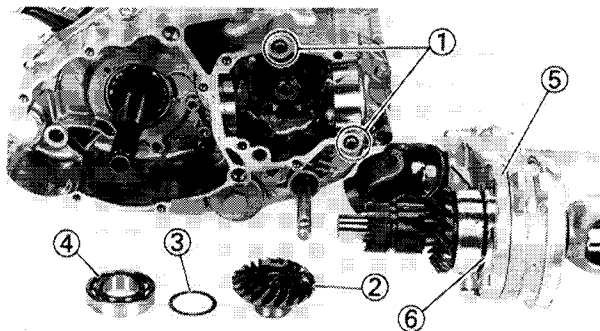
18. Install:

- Oil filter ①
- O-ring ②
- Oil filter cover ③

**CAUTION:**

Install the oil filter as shown.

A Inside

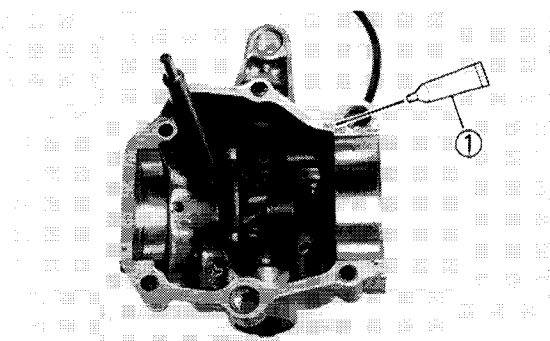
**Bolts (oil filter cover):****10 Nm (1.0 m•kg, 7.2 ft•lb)****4****MIDDLE DRIVEN SHAFT**

1. Install:

- Dowel pins ①
- Driven pinion gear ② (to middle driven shaft)
- Shims ③
- Bearing ④
- Middle driven shaft assembly/transfer gear assembly ⑤

**NOTE:**

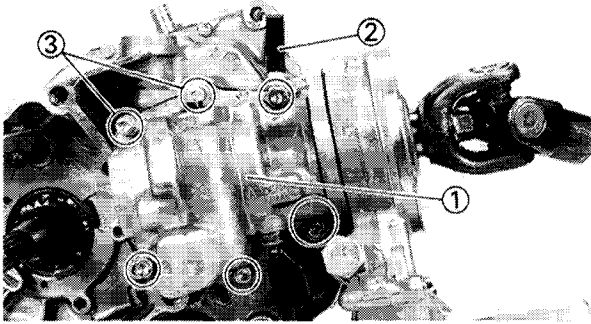
Apply the lithium soap base grease to the O-ring ⑥.



2. Apply:

- Sealant ①  
(to matching surface of middle shaft case cover)

**Sealant (Quick Gasket®):****P/N. ACC-11001-01****Yamaha Bond No. 1215:****P/N. 90890-85505**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****3. Install:**

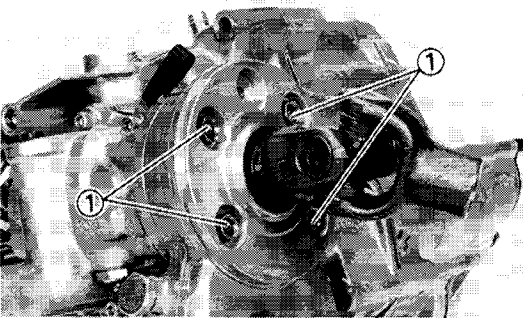
- Middle gear case cover ①
- Clamp ②
- Bolts

**NOTE:**

Apply sealant onto the thread of the bolts ③.

**Sealant (Quick Gasket®):****P/N. ACC-11001-01****Yamaha Bond No. 1215:****P/N. 90890-85505****Bolts (middle shaft case cover):****10 Nm (1.0 m•kg, 7.2 ft•lb)****NOTE:**

Before installing the middle gear case cover onto the crankcase, shift the gear into "FORWARD".

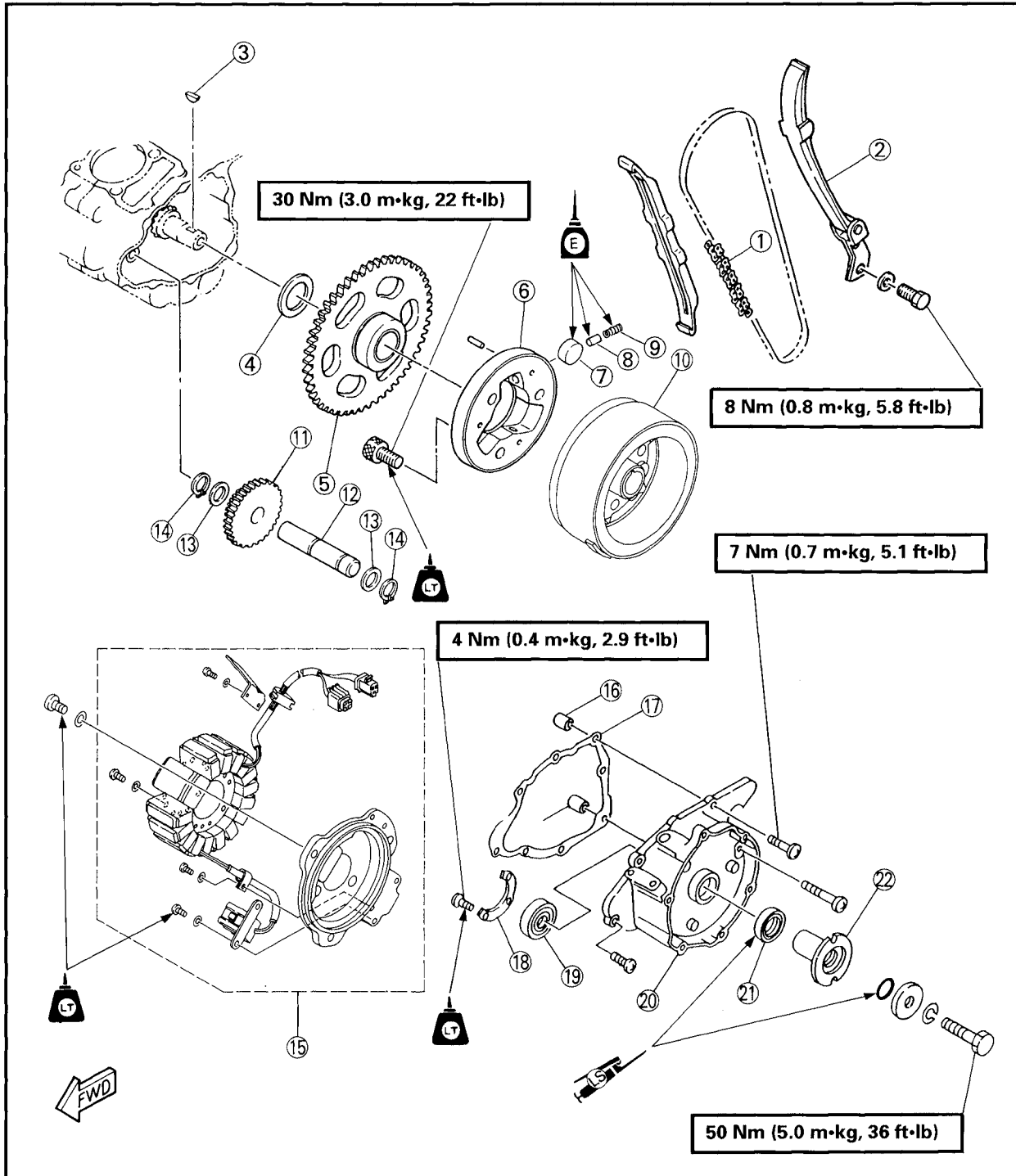
**4****4. Install:**

- Bolts ①

**Bolt:****23 Nm (2.3 m•kg, 17 ft•lb)**

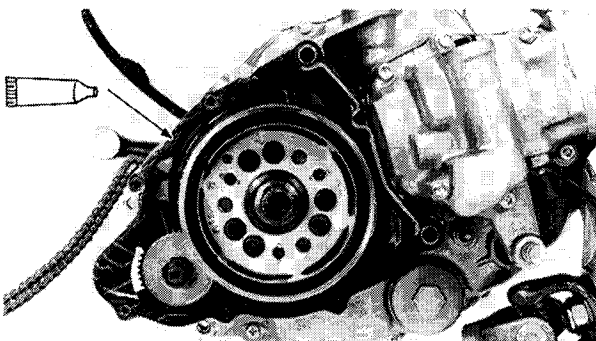
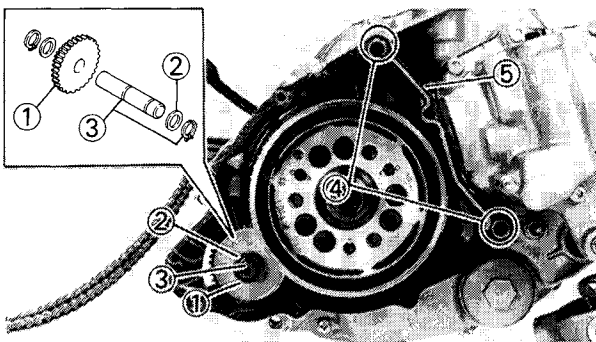
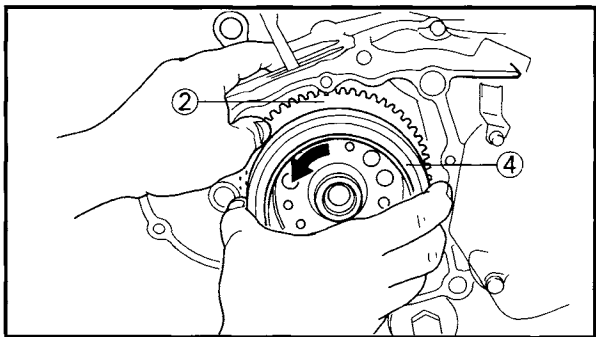
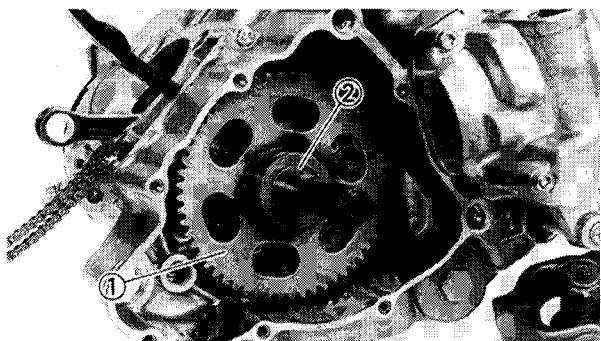
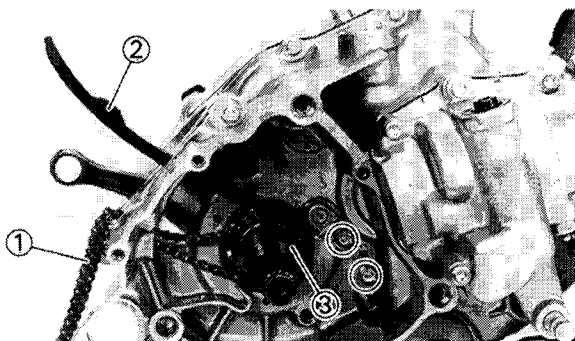
**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****CDI MAGNETO**

- |                               |                           |            |
|-------------------------------|---------------------------|------------|
| ① Timing chain                | ⑪ Starter idle gear       | ⑳ Oil seal |
| ② Timing chain guide (intake) | ⑫ Shaft                   | ㉑ Spacer   |
| ③ Woodruff key                | ⑬ Washer                  |            |
| ④ Washer                      | ⑭ Circlip                 |            |
| ⑤ Starter driven gear         | ⑮ Stator assembly         |            |
| ⑥ Starter clutch              | ⑯ Dowel pin               |            |
| ⑦ Dowel pin                   | ⑰ Gasket                  |            |
| ⑧ Starter clutch spring cap   | ⑱ Bearing retainer        |            |
| ⑨ Compression spring          | ㉒ Bearing                 |            |
| ⑩ CDI magneto                 | ㉓ Crankcase spacer (left) |            |



## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



## CDI MAGNETO

## 1. Install:

- Timing chain ①
- Chain guide ② (intake side)
- Washer ③ (starter wheel gear)



## Chain guide (intake):

8 Nm (0.8 m·kg, 5.8 ft·lb)

## NOTE:

Fasten a safety wire to the timing chain to prevent it from falling into the crankcase.

## 2. Install:

- Starter wheel gear ①
- Woodruff key ②
- CDI magneto rotor ③

## NOTE:

- Clean the tapered portions of the crankshaft and CDI magneto rotor.
- When installing the CDI magneto rotor, make sure the key is properly seated in the key way of the crankshaft, and install the CDI magneto rotor ③ to the crankshaft, then while holding the starter wheel gear ②, set the CDI magneto rotor to the wheel gear, turn it counterclockwise.

4

## 3. Install:

- Starter idle gear ①
- Washer ②
- Shaft ③
- Dowel pins ④
- Gasket ⑤

**WARNING**

Always use a new gasket.

## 4. Apply:

- Sealant  
(to mating surface of left crankcase and crankcase spacer)

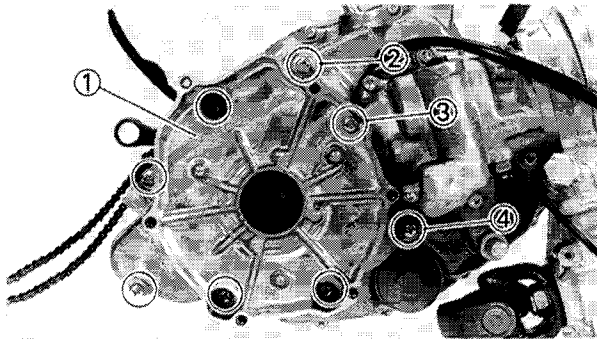


## Sealant (Quick Gasket®):

P/N. ACC-11001-01

Yamaha Bond No. 1215:

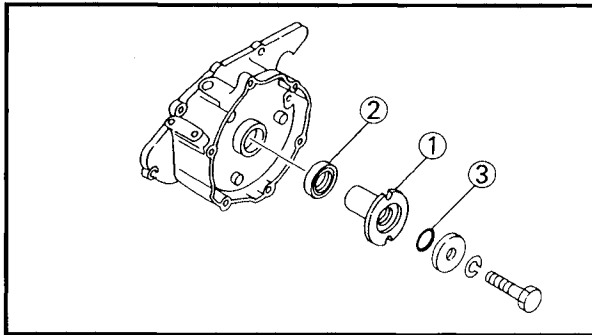
P/N. 90890-85505

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****5. Install:**

- Crankcase spacer ① (left)
- Screws

**NOTE:**

Apply sealant to the thread of screws ②, ③ and ④.

**Sealant (Quick Gasket®):****ACC-11001-01****Yamaha bond No. 1215:****90890-85505****Screws (crankcase spacer):****7 Nm (0.7 m•kg, 5.1 ft•lb)****4****6. Install:**

- Spacer ①

**Bolt (spacer):****50 Nm (5.0 m•kg, 36 ft•lb)****NOTE:**

- Before installing the spacer or starter pulley, apply the lithium soap base grease to the oil seal lip ② and O-ring ③.
- Hold the spacer by the Clutch holder to tighten the bolt.

**Clutch holder:****P/N. YM-91042**

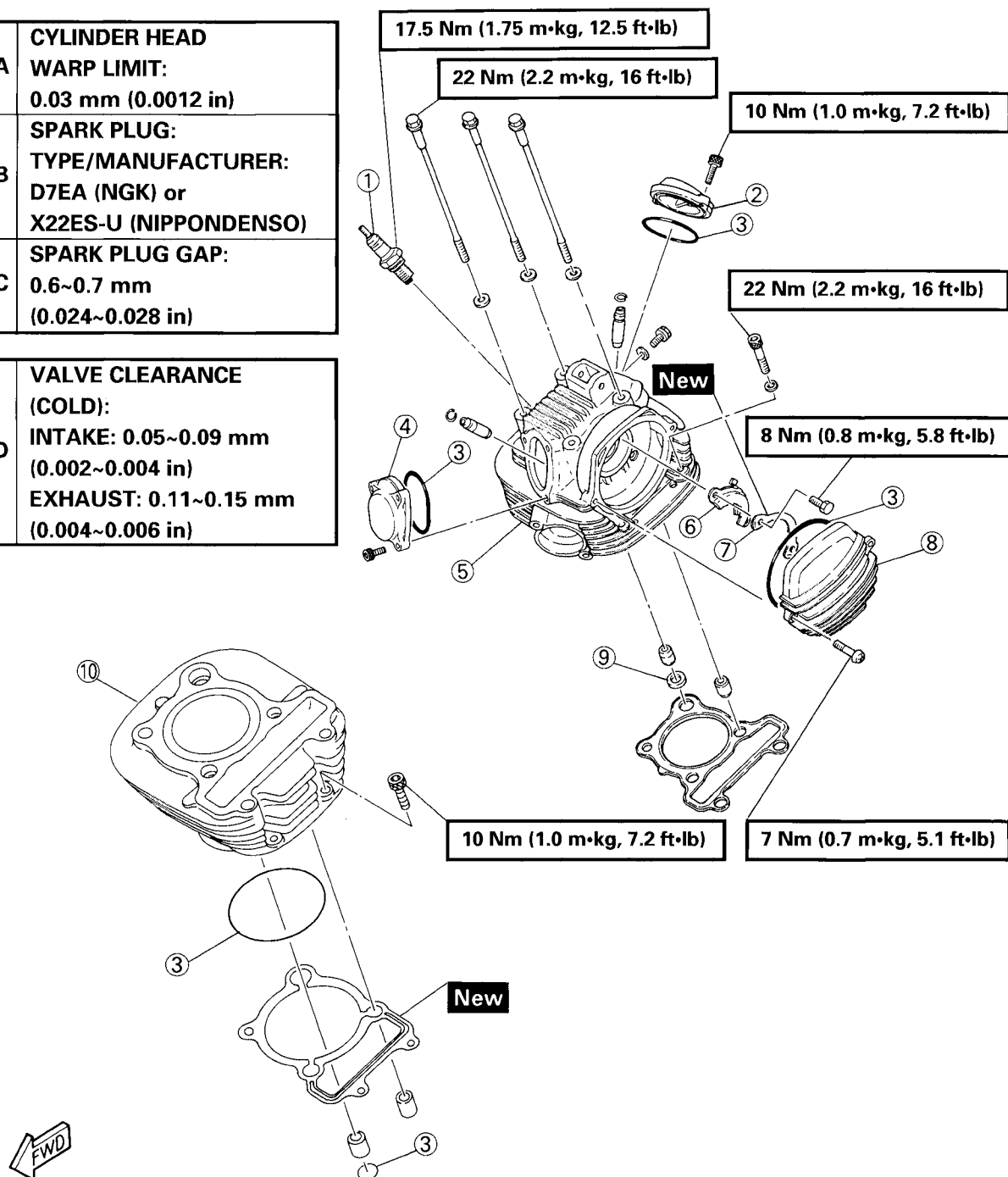


**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****CYLINDER AND CYLINDER HEAD ASSEMBLY**

- ① Spark plug
- ② Tappet cover (intake)
- ③ O-ring
- ④ Tappet cover (exhaust)
- ⑤ Cylinder head
- ⑥ Bearing retainer
- ⑦ Lock washer
- ⑧ Cam sprocket cover
- ⑨ Oil seal
- ⑩ Cylinder

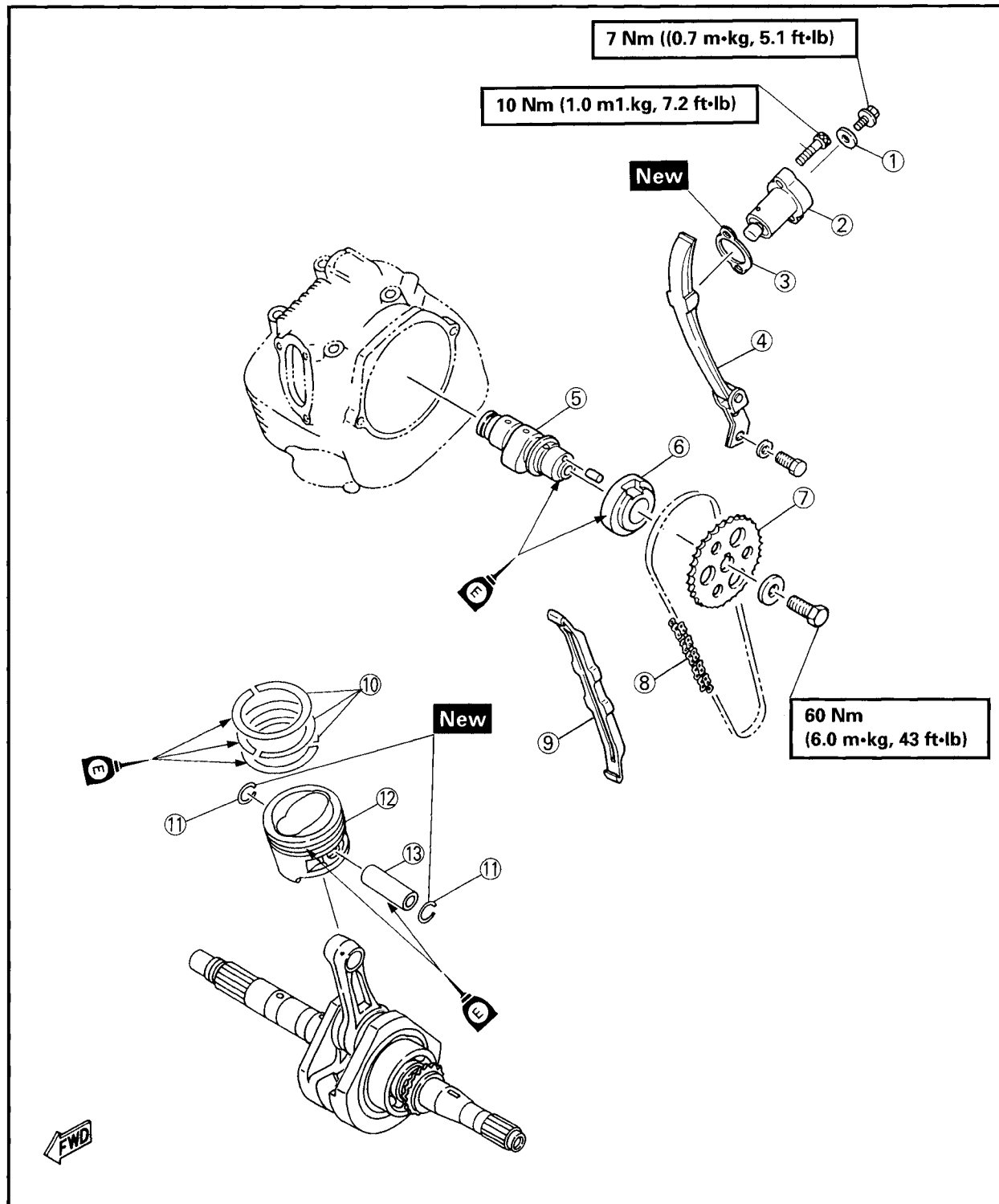
<b>A</b>	<b>CYLINDER HEAD WARP LIMIT: 0.03 mm (0.0012 in)</b>
<b>B</b>	<b>SPARK PLUG: TYPE/MANUFACTURER: D7EA (NGK) or X22ES-U (NIPPONDENSO)</b>
<b>C</b>	<b>SPARK PLUG GAP: 0.6~0.7 mm (0.024~0.028 in)</b>

<b>D</b>	<b>VALVE CLEARANCE (COLD): INTAKE: 0.05~0.09 mm (0.002~0.004 in) EXHAUST: 0.11~0.15 mm (0.004~0.006 in)</b>
----------	---

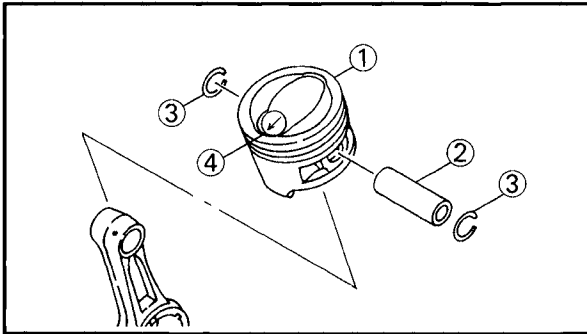
**4**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****PISTON, CAMSHAFT AND TIMING CHAIN**

- |                               |                                |
|-------------------------------|--------------------------------|
| ① Gasket                      | ⑧ Timing chain                 |
| ② Timing chain tensioner      | ⑨ Timing chain guide (exhaust) |
| ③ Gasket                      | ⑩ Piston ring                  |
| ④ Timing chain guide (intake) | ⑪ Piston pin clip              |
| ⑤ Camshaft                    | ⑫ Piston                       |
| ⑥ Camshaft bushing            | ⑬ Piston pin                   |
| ⑦ Cam sprocket                |                                |



# ENGINE ASSEMBLY AND ADJUSTMENT

**ENG**


## CYLINDER HEAD ASSEMBLY, CYLINDER AND PISTON

### 1. Install:

- Piston ①
- Piston pin ②
- Piston pin clips ③

### NOTE:

- The arrow ④ on the piston must point to the front of the engine.
- When installing the piston pin clip, cover the crankcase with a clean rag so you will not accidentally drop the pin clip and material into the crankcase.

### ⚠ WARNING

Always use a new piston pin clip.

### 2. Apply:

- 4-stroke engine oil

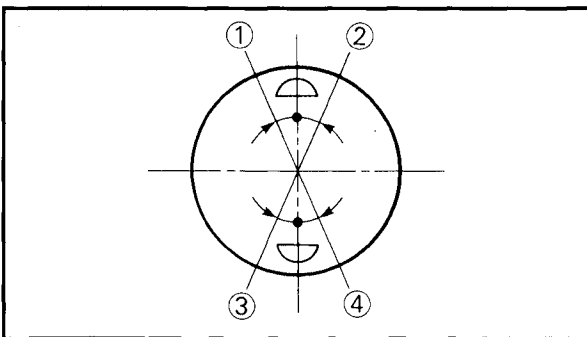
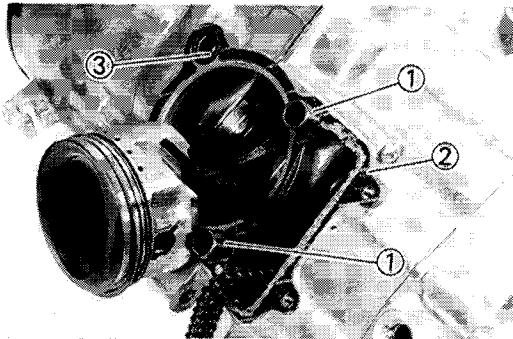
To the piston pin, piston ring grooves and piston skirt areas.

### 3. Install:

- Dowel pins ①
- Gasket ② (cylinder)
- O-ring ③
- O-ring (to cylinder skirt)

### ⚠ WARNING

Always use a new gasket.



### 4. Offset the piston ring end gaps as shown.

### NOTE:

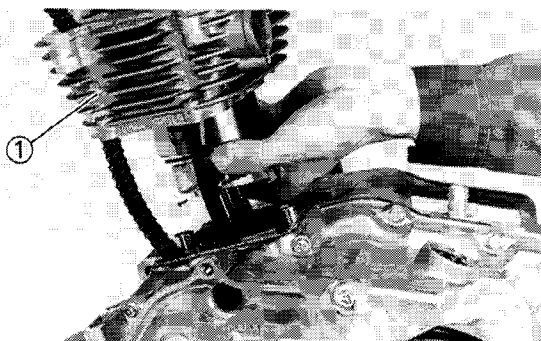
- Be sure to check the manufacturer's marks or numbers stamped on the rings are on the top side of the rings.
- Before installing the cylinder, apply a liberal coating of 4-stroke engine oil to the piston rings.

- ① Top ring end
- ② Oil ring end (lower)
- ③ Oil ring end (upper)
- ④ 2nd ring end

**4**

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



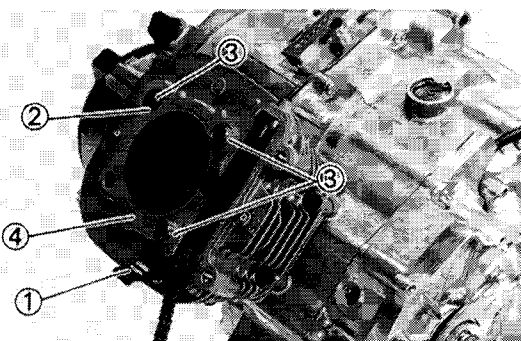
## 5. Install:

- Cylinder ①
- Bolts (cylinder)

## NOTE:

- Install the cylinder with one hand while compressing the piston rings with the other hand.
- Pass the timing chain through the chain cavity.
- In this step, temporarily tighten the cylinder securing bolts.

4



## 6. Install:

- Chain guide ① (exhaust)
- Oil seal ②
- Dowel pins ③
- Gasket ④ (cylinder head)

**⚠ WARNING**

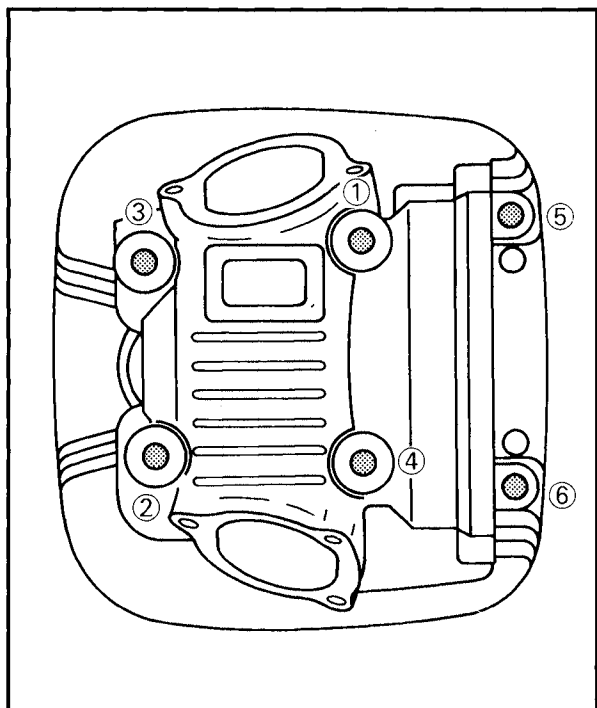
Always use a new gasket.

## 7. Install:

- Cylinder head assembly
- Bolts (cylinder head)

## NOTE:

- Apply the 4-stroke engine oil onto the washers.
- Tighten the bolts starting with the lowest numbered one.
- The embossed numbers in the cylinder head designate the tightening sequence.



## 8. Tighten:

- Bolts ① ~ ④ (cylinder head)
- Bolts ⑤, ⑥ (cylinder head and cylinder)
- Bolts (cylinder)

**Bolt (cylinder head):**

22 Nm (2.2 m•kg, 16 ft•lb)

**Bolt (cylinder head and cylinder):**

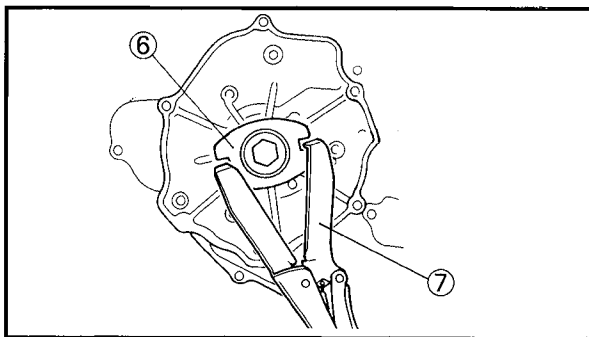
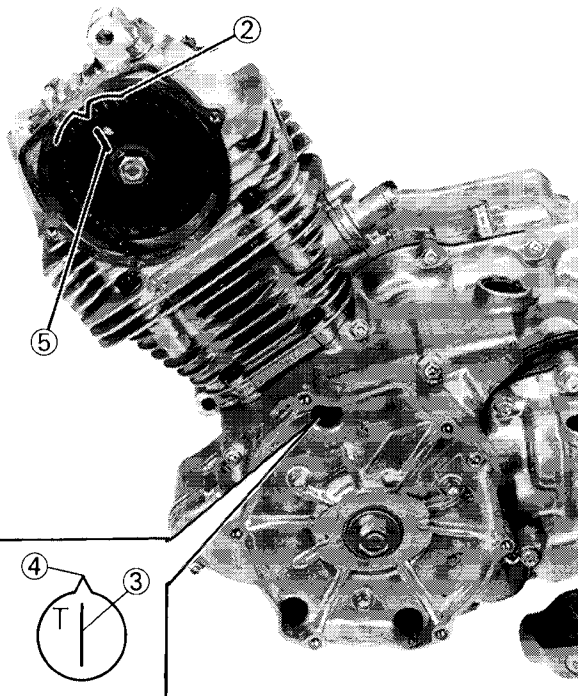
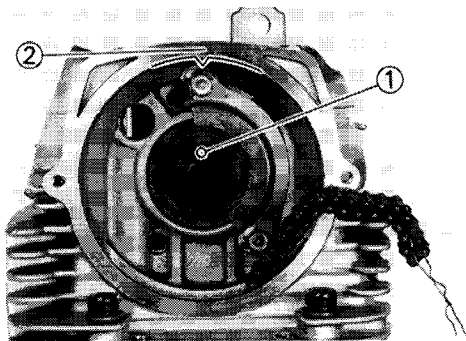
22 Nm (2.2 m•kg, 16 ft•lb)

**Bolt (cylinder):**

10 Nm (1.0 m•kg, 7.2 ft•lb)

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



## 9. Install:

- Cam sprocket

\*\*\*\*\*

**Cam sprocket installing steps:**

- Rotate the camshaft to align the camshaft pin ① with the cylinder head match mark ②.
- Turn the crankshaft counterclockwise until the TDC mark ③ is aligned with the stationary pointer ④ on the crankcase spacer.
- Place the timing chain onto the cam sprocket.
- Install the cam sprocket onto the camshaft, and finger tighten the sprocket bolt.

**NOTE:**

- When installing the cam sprocket, keep the timing chain as tense as possible on the exhaust side.
- Align the match mark ⑤ on the cam sprocket with the stationary pointer ② on the cylinder head.

- Insert your finger into the timing chain tensioner hole, and push the timing chain damper inward.
- While pushing the timing chain damper, be sure cam sprocket match mark ⑤ align the cylinder head match mark ②.
- If marks are aligned, tighten the cam sprocket bolt.

**Bolt (cam sprocket):****60 Nm (6.0 m·kg, 43 ft·lb)****NOTE:**

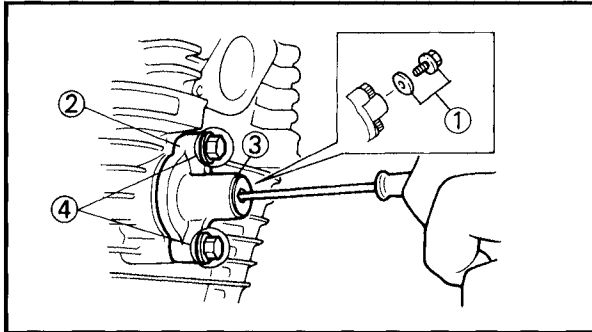
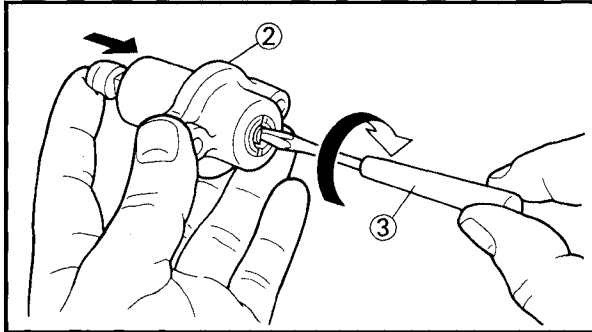
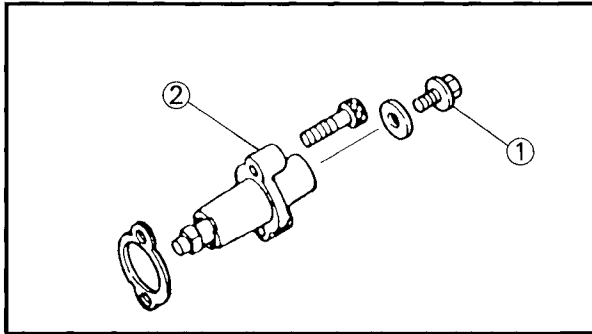
Hold the spacer ⑥ by the Clutch holder ⑦ to tighten the bolt of the cam sprocket.

**Clutch holder:****P/N. YM-91042**

- If marks do not align, change the meshing position of sprocket and chain.
- Remove a safety wire from the timing chain.

\*\*\*\*\*

4

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****10. Install:**

- Timing chain tensioner assembly

\*\*\*\*\*

**Installation steps:**

- Remove the chain tensioner cap ① from the chain tensioner assembly ②.
- Insert a small screwdriver ③ into the tensioner body slit. While pressing the tensioner rod, rotate the screwdriver clockwise until it stops turning.
- While holding the screwdriver in this position, and install the tensioner assembly ② (with the gasket) onto the cylinder, then temporarily tighten the tensioner assembly holding bolts ④.

**⚠ WARNING****Always use a new gasket.**

- Remove the screwdriver from the tensioner body, and torque the tensioner assembly holding bolts.


**Bolt (cam chain tensioner assembly):**  
**10 Nm (1.0 m•kg, 7.2 ft•lb)**

- Install the tensioner cap ① with the gasket.

**⚠ WARNING****Always use a new gasket.**
**Cam chain tensioner cap:**  
**7 Nm (0.7 m•kg, 5.1 ft•lb)**

\*\*\*\*\*

**11. Adjust:**

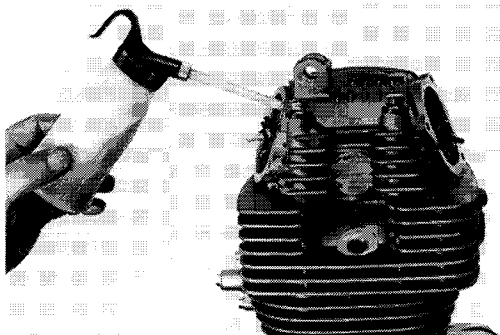
- Valve clearance

Refer to the "VALVE CLEARANCE ADJUSTMENT" section in the CHAPTER 3.


**Intake valve (cold):**  
**0.05 ~ 0.09 mm (0.002 ~ 0.004 in)**  
**Exhaust valve (cold):**  
**0.11 ~ 0.15 mm (0.004 ~ 0.006 in)**

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



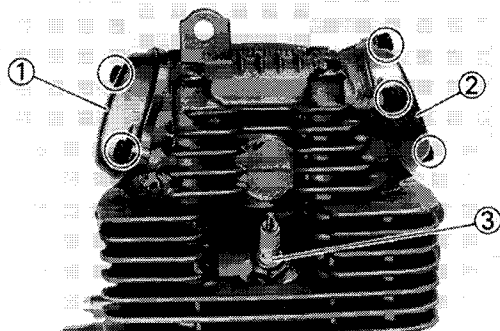
## 12. Apply:

- 4-stroke engine oil  
(to the camshaft upper side)



## Oil quantity:

0.05 L (0.044 Imp qt, 0.053 US qt)

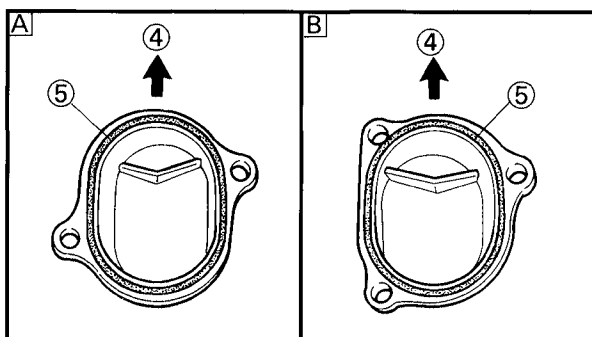


## 13. Install:

- Tappet cover ① (intake)
- Tappet cover ② (exhaust)
- Spark plug ③

## NOTE:

- Install the tappet covers with its ridge facing upward ④.
- Check the O-ring ⑤ for damage. If damaged, replace.



A Intake side

B Exhaust side

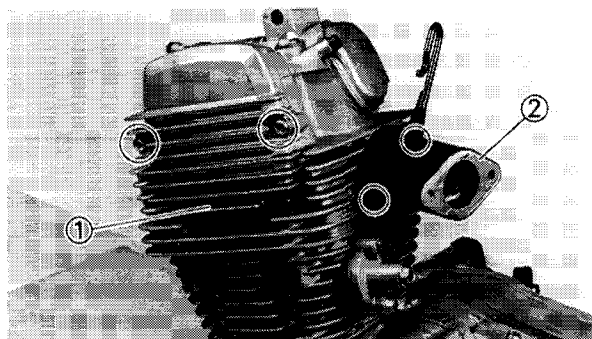


## Bolt (tappet cover):

10 Nm (1.0 m•kg, 7.2 ft•lb)

## Spark plug:

17.5 Nm (17.5 m•kg, 12.5 ft•lb)



## 14. Install:

- Cam sprocket cover ①
- Carburetor joint ②



## Screw (cam sprocket cover):

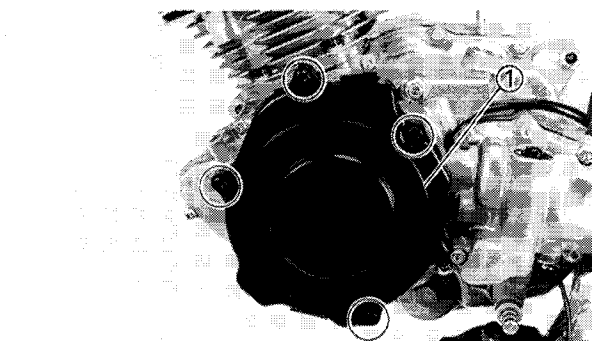
7 Nm (0.7 m•kg, 5.1 ft•lb)

## Bolt (carburetor joint):

12 Nm (1.2 m•kg, 8.7 ft•lb)

## NOTE:

Inspect the O-ring of the carburetor joint. If damaged, replace it.



## 15. Install:

- Crankcase cover ① (left)



## Screws (crankcase cover):

10 Nm (1.0 m•kg, 7.2 ft•lb)

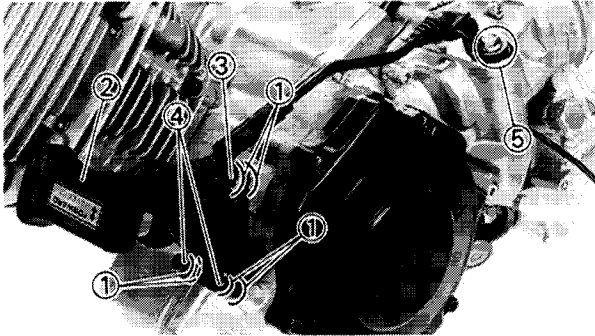
4

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG**

16. Apply:

- Sealant

(onto thread of timing plug)

**Selant (Quick Gasket®):****P/N. ACC-11001-01****Yamaha Bond No. 1215:****P/N. 90890-85505**

17. Install:

- Washers ①
- Drive select lever assembly ②
- Timing plug ③

**NOTE:**

Before installing the drive select lever assembly, do not forget to fit the washers.

**Bolts ④ (drive select lever assembly):****12 Nm (1.2 m•kg, 8.7 ft•lb)****Bolts ⑤ (drive select lever assembly):****11 Nm (1.1 m•kg, 8.0 ft•lb)****Timing plug:****15 Nm (1.5 m•kg, 11 ft•lb)****4**

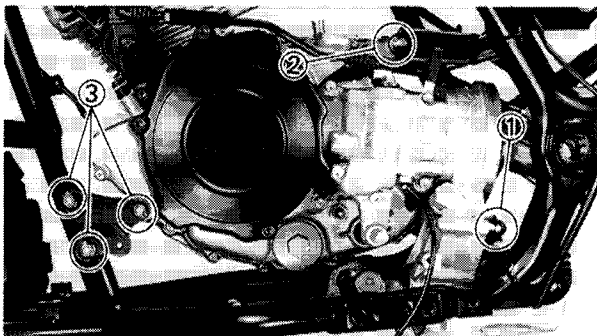


**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****REMounting ENGINE**

Reverse the "ENGINE REMOVAL" procedure.  
Note the following points.

**⚠ WARNING**

**Securely support the machine so there is no danger of it falling over.**

**1. Install:**

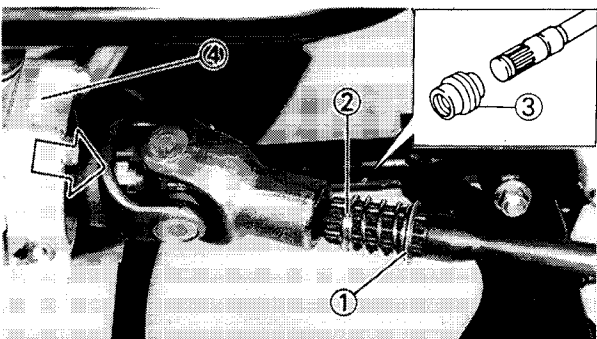
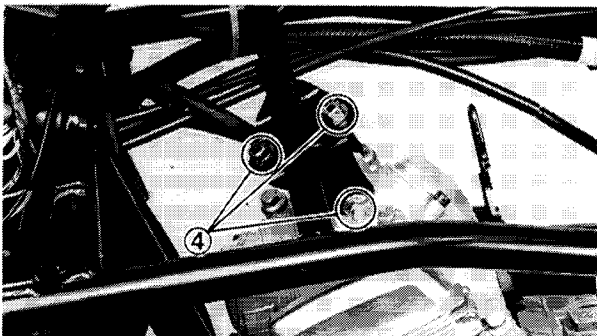
- Engine assembly  
(from the left side)

**2. Install:**

- Bolt ① (engine mounting-rear lower)
- Bolt ② (engine mounting-rear upper)
- Bolt ③ (engine mounting-front)
- Bolts ④ (engine mounting-top)

**NOTE:**

- All mounting bolts should be installed from the right of the machine.
- Temporary tighten the nuts and bolt, do not torque them at this point.

**3. Install:**

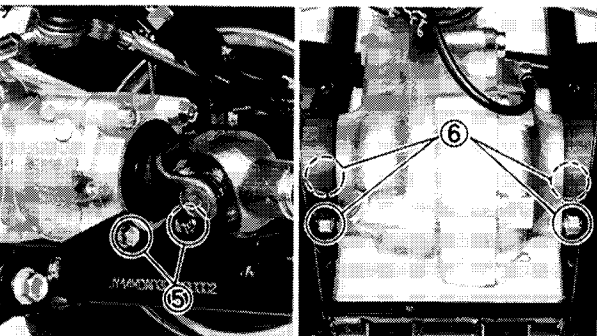
- Front drive shaft

\*\*\*\*\*

**Front drive shaft installation steps:**

- Apply lithium soap base grease onto the front drive shaft splines.
- Connect the front drive shaft to the universal joint of transfer gear side.
- Install the spring seat ①, spring ② and boot ③ (for Oceania) to the drive shaft.
- Lift up the differential gear case ④ and slide it to connect its universal joint to the drive shaft.
- Set the differential gear case on its position by temporarily tightening the bolts ⑤ and ⑥.

\*\*\*\*\*

**4**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****4. Check:**

- Front drive shaft operation

\*\*\*\*\*

**Front drive shaft operation checking steps:**

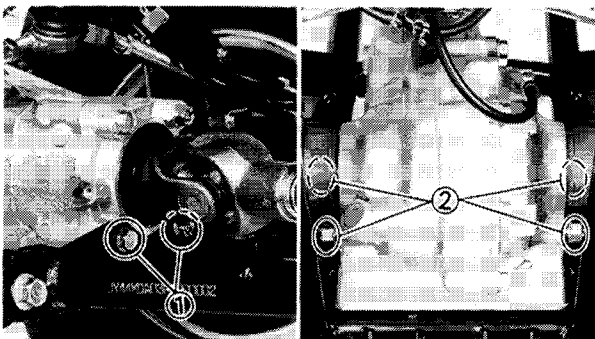
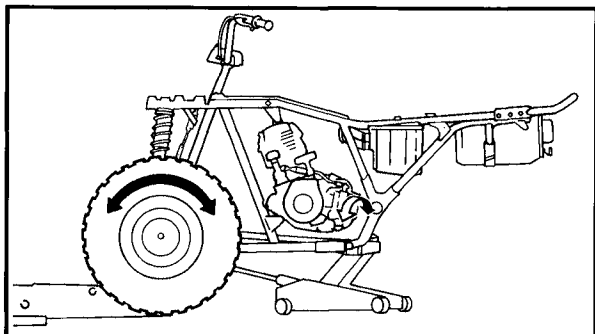
- Make sure that the machine is off the ground at the rear.
- Lift the front of the machine off the ground, too.

**⚠ WARNING**

**Securely support the machine so there is no danger of it falling over.**

- Turn the front wheels back and forth.
- Check the front drive shaft operation. If the operation is unsmooth, reinstall the front drive shaft properly.

\*\*\*\*\*

**5. Tighten:**

- Bolts ① (differential gear case-rear)
- Bolts ② (differential gear case-front)



**Bolts ① (differential gear case-rear):**  
30 Nm (3.0 m•kg, 22 ft•lb)

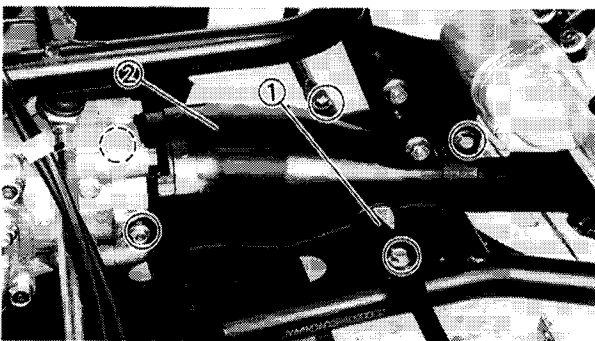
**Bolts ② (differential gear case-front):**  
52 Nm (5.2 m•kg, 37 ft•lb)

**6. Install:**

- Front fender stay ①
- Drive shaft protector ② (front half)



**Bolts (front fender stay):**  
9 Nm (0.9 m•kg, 6.5 ft•lb)

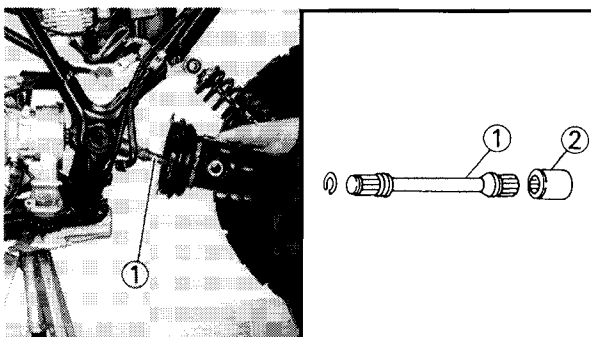
**7. Lubricate:**

- Bearings (swingarm pivots)
- Oil seals (swingarm pivots)
- Callars (swingarm pivots)  
(to inner groove)
- Pivot shafts
- Rear drive shaft splines
- Coupling gear splines



**Lithium soap base grease**

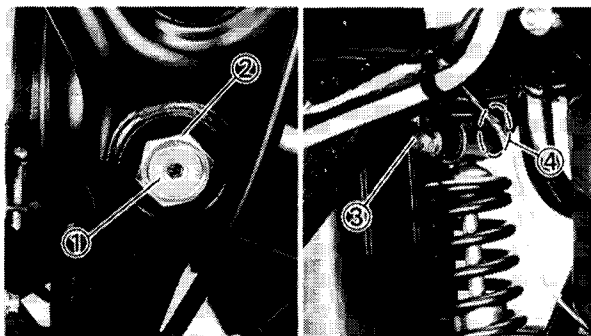
**4**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****8. Install:**

- Rear wheel drive assembly and swingarm

**NOTE:**

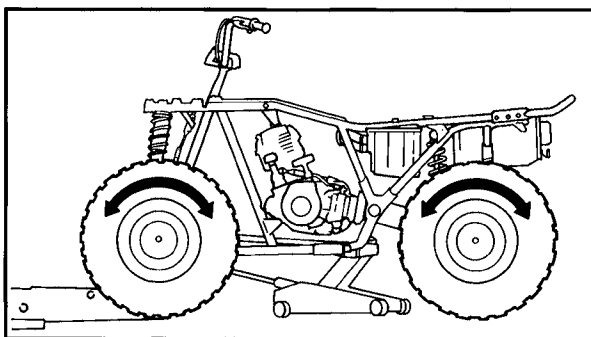
- Before installing the swingarm, do not forget to fit the rear drive shaft ① and coupling gear ②.
- Insert the rear drive shaft into the universal joint properly.

**9. Install:**

- Pivot shafts ①
- Locknuts ② (swingarm)
- Bolt ③ (rear shock absorber)
- Nut ④ (rear shock absorber)

**NOTE:**

Temporarily tighten the pivot shafts, locknuts and bolt (shock absorber) do not torque them at this point.

**10. Check:**

- Rear drive shaft operation

\*\*\*\*\*

**Rear drive shaft operation checking steps:**

- Make sure that the machine is off the ground at the rear.
- Place the suitable block under the swingarm.
- Lift the front of the machine off the ground, too.

**⚠ WARNING**

**Securely support the machine so there is no danger of it falling over.**

- Turn the front wheel back and forth.
- Check the rear axle operation. If the operation is unsmooth, reinstall the swingarm properly.

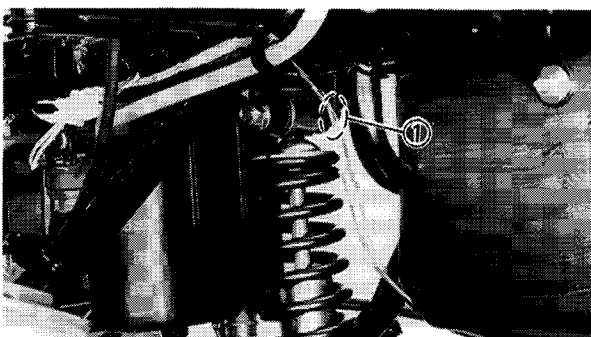
\*\*\*\*\*

**11. Tighten:**

- Nut ① (rear shock absorber)

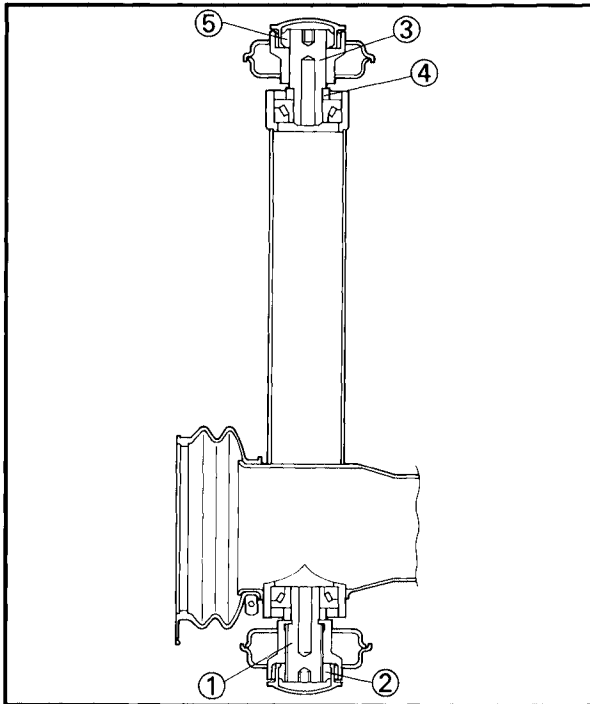


**Nut (rear shock absorber):**  
**50 Nm (5.0 m•kg, 36 ft•lb)**

**4**

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



## 12. Tighten:

- Pivot shafts
- Locknuts (pivot shaft)

\*\*\*\*\*

**Pivot shaft tightening steps:**

- Tighten the pivot shaft ① (left) to specification.

**Pivot shaft (left):****6 Nm (0.6 m•kg, 4.3 ft•lb)**

- Tighten the locknut (left) ② to specification.

**Locknut (left):****130 Nm (13.0 m•kg, 94 ft•lb)**

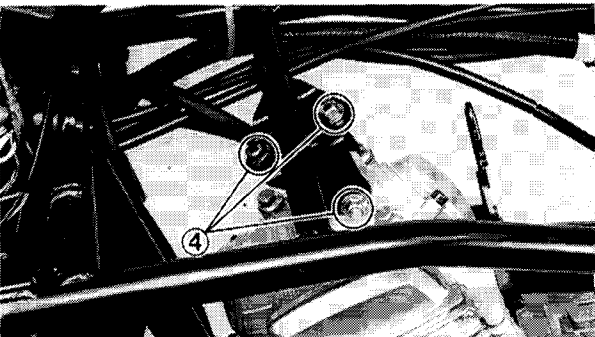
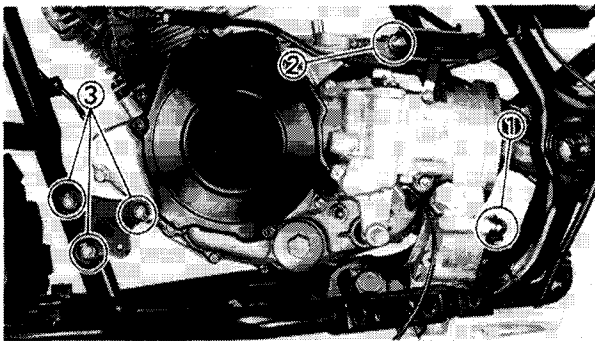
- Tighten the pivot shaft ③ (right) until it contacts the collar ④, then torque to specification.

**Pivot shaft (right):****6 Nm (0.6 m•kg, 4.3 ft•lb)**

- Tighten the locknut ⑤ (right) to specification.

**Locknut (right):****130 Nm (13.0 m•kg, 94 ft•lb)**

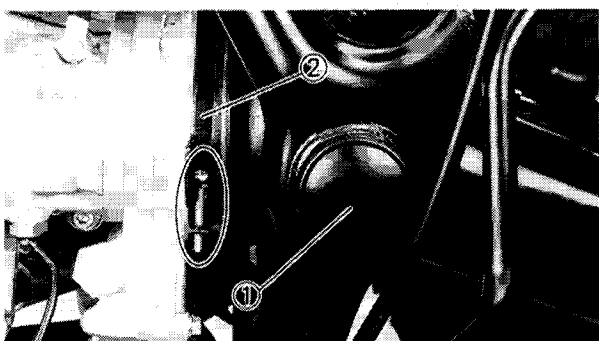
\*\*\*\*\*



## 13. Tighten:

- Bolt ① (engine mounting-rear lower)
- Nut ② (engine mounting-rear upper)
- Nuts ③ (engine mounting-front)
- Nuts ④ (engine mounting-top)

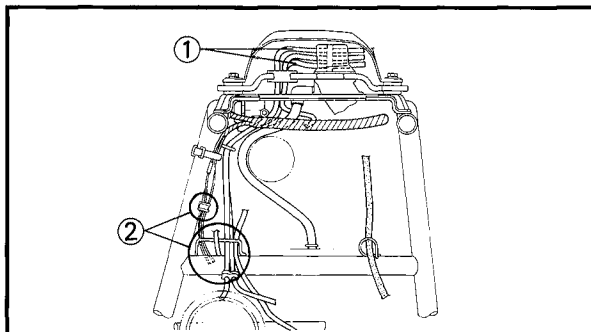
**Bolt (engine mounting-rear lower):****30 Nm (3.0 m•kg, 22 ft•lb)****Nut (engine mounting-rear upper):****30 Nm (3.0 m•kg, 22 ft•lb)****Nuts (engine mounting-front):****30 Nm (3.0 m•kg, 22 ft•lb)****Nuts (engine mounting-top):****30 Nm (3.0 m•kg, 22 ft•lb)**

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG****14. Install:**

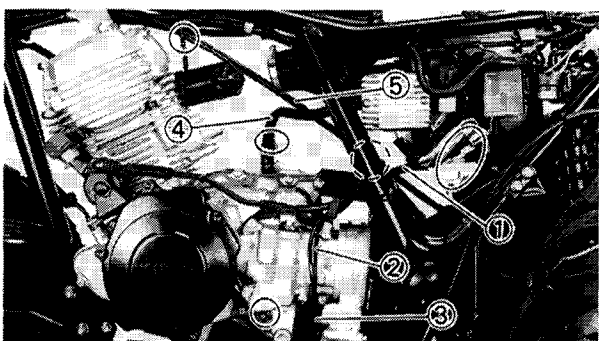
- Pivot shaft caps ①

**15. Tighten:**

- Clamp ② (rubber boot)

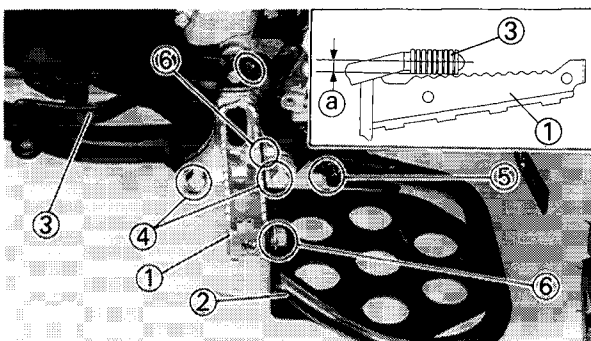
**16. Connect:**

- Breather hose ① (final gear housing and rear brake drum)  
(to the cable guides ② of main frame)  
Refer to the "CABLE ROUTING" section in the CHAPTER 2.

**17. Connect:**

- Spark plug lead ①
- CDI magneto leads ②
- "REVERSE" switch lead ③
- "NEUTRAL" switch lead ④
- Breather hose ⑤ (crankcase)
- Brake cable ⑥ (to cable guide)

Refer to the "CABLE ROUTING" section in the CHAPTER 2.

**18. Install:**

- Footrest ① (left)
- Footrest guard ② (left)
- Shift pedal ③

**NOTE:**

The center of the shift pedal ③ should be positioned 10 mm (0.39 in) above the top of the footrest ①.

a 10 mm (0.39 in)

**Bolts ④ (footrest-front):**

55 Nm (5.5 m•kg, 40 ft•lb)

**Bolt ⑤ (footrest guard-frame):**

23 Nm (2.3 m•kg, 17 ft•lb)

**Bolts ⑥ (footrest guard-footrest):**

30 Nm (3.0 m•kg, 22 ft•lb)

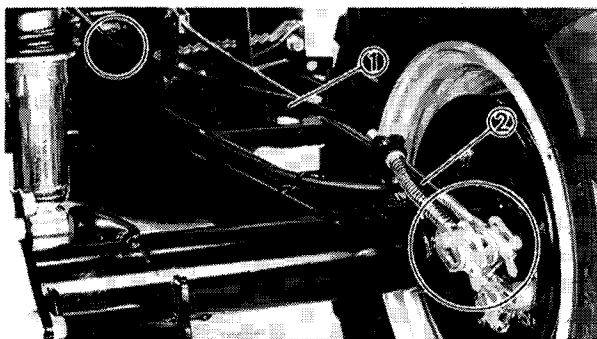
**Bolt (shift pedal):**

10 Nm (1.0 m•kg, 7.2 ft•lb)

**4**

## ENGINE ASSEMBLY AND ADJUSTMENT

ENG



19. Connect:

- Brake cable ① (rear)
- Brake pedal rod ②

20. Adjust:

- Rear brake

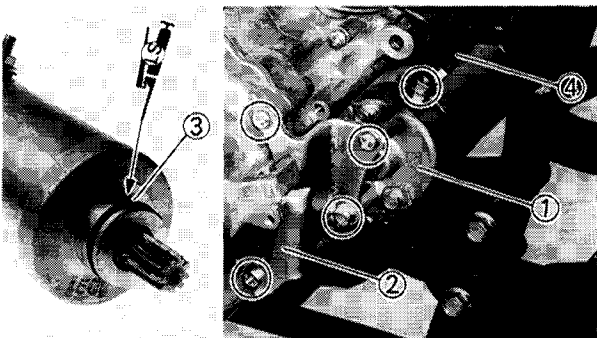
Refer to the "REAR BRAKE LEVER AND PEDAL ADJUSTMENT" section in the CHAPTER 3.

21. Install:

- Starter motor ①
- Bracket ② (starter motor)

**NOTE:**

Before installing the starter motor, apply the grease to the o-ring ③.

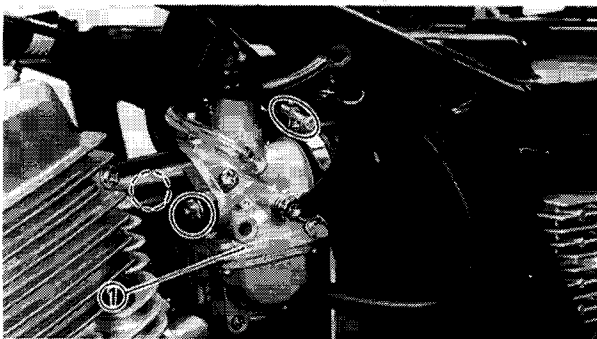
**Bracket (starter motor):****7 Nm (0.7 m•kg, 5.1 ft•lb)**

22. Connect:

- Starter motor lead ④

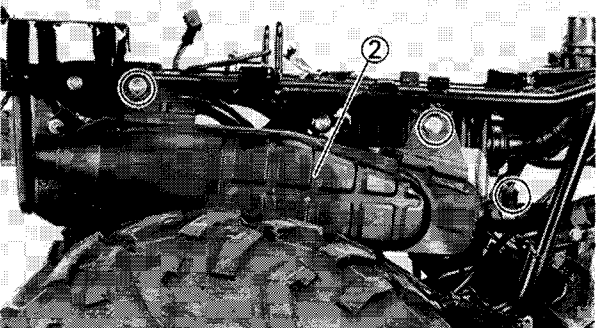
23. Install:

- Carburetor ①

**Nut (carburetor and carburetor joint):****8 Nm (0.8 m•kg, 5.8 ft•lb)****Hose clamp (carburetor and joint hose):****2 Nm (0.2 m•kg, 1.4 ft•lb)**

24. Install:

- Exhaust pipe ①
- Muffler ②

**Bolt (muffler):****27 Nm (2.7 m•kg, 19 ft•lb)****Bolt (muffler and exhaust pipe):****20 Nm (2.0 m•kg, 14 ft•lb)****Bolt (exhaust pipe):****10 Nm (1.0 m•kg, 7.2 ft•lb)**

4

**ENGINE ASSEMBLY AND ADJUSTMENT****ENG**

## 25. Fill:

- Crankcase
- Transfer gear case

**Total amount:****2.2 L (1.9 Imp qt, 2.3 US qt)**

Refer to the "ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT" section in the CHAPTER 3.

## 26. Adjust:

- Release lever free play (clutch)

Refer to the "CLUTCH ADJUSTMENT" section in the CHAPTER 3.

## 27. Adjust:

- Drive select lever position

Refer to the "DRIVE SELECT LEVER POSITION ADJUSTMENT" section in the CHAPTER 3.

## 28. Install:

- Fuel tank
- Rear fender
- Seat
- Front fender

Refer to the "FENDERS AND FUEL TANK" section in the CHAPTER 3.

## 29. Inspect:

- Oil leakage

## 30. Check:

- "NEUTRAL" indicator light operation
- "REVERSE" indicator light operation

Poor operation → Repair.

**4**



4



## CARBURETOR

CARB



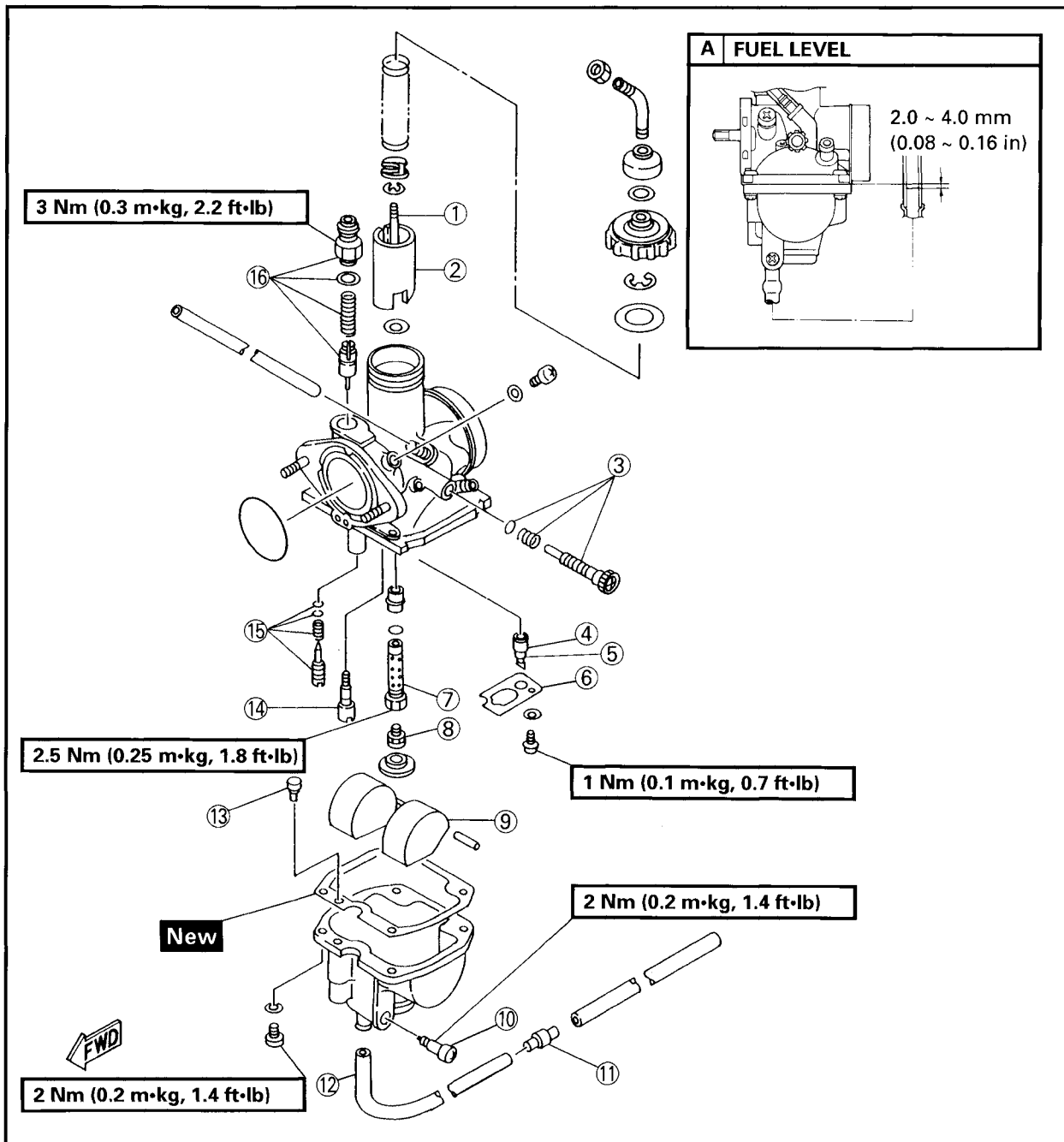
## CARBURETION

## CARBURETOR

- |                           |                       |
|---------------------------|-----------------------|
| ① Jet needle              | ⑨ Float               |
| ② Throttle valve          | ⑩ Drain screw         |
| ③ Throttle stop screw set | ⑪ Oneway valve        |
| ④ Valve seat              | ⑫ Overflow hose       |
| ⑤ Needle valve            | ⑬ Starter jet         |
| ⑥ Baffle plate            | ⑭ Pilot jet           |
| ⑦ Needle jet              | ⑮ Pilot screw set     |
| ⑧ Main jet                | ⑯ Starter plunger set |

## SPECIFICATIONS

Main Jet	(M.J.)	#85
Main Air Jet	(M.A.J.)	ø0.7
Jet Needle	(J.N.)	5L10-4
Needle Jet	(N.J.)	O-4 (#390)
Pilot Jet	(P.J.)	#20
Pilot Screw	(P.S.)	1 and 1/2 turns out
Float Height	(F.H.)	21.0 ~ 22.0 mm (0.83 ~ 0.87 in)
Fuel Level		2.0 ~ 4.0 mm (0.08 ~ 0.16 in)
Engine Idling Speed		1,350 ~ 1,450 r/min



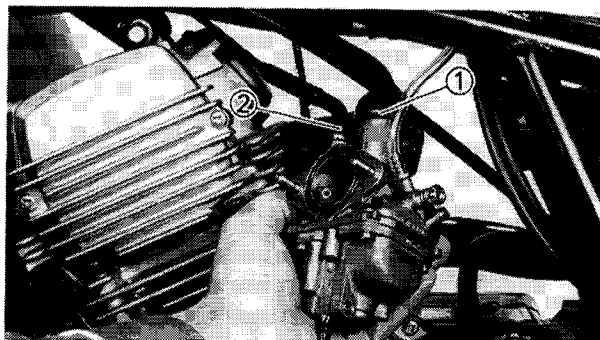
5

**REMOVAL**

## 1. Remove:

- Seat
- Fuel tank cover
- Fuel tank

Refer to the "FENDERS AND FUEL TANK-FUEL TANK" section in the CHAPTER 3.



## 2. Remove:

- Carburetor

Refer to the "ENGINE REMOVAL-CARBURETOR" section in the CHAPTER 4.

## 3. Disconnect:

- Throttle valve assembly ①
- Starter plunger assembly ②  
(from carburetor)

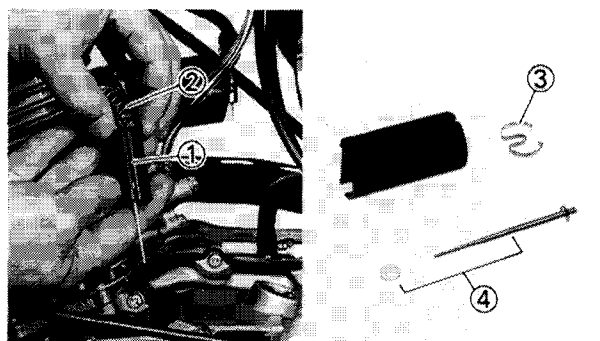
**DISASSEMBLY**

**NOTE:** \_\_\_\_\_

The following parts can be cleaned and inspected without disassembly.

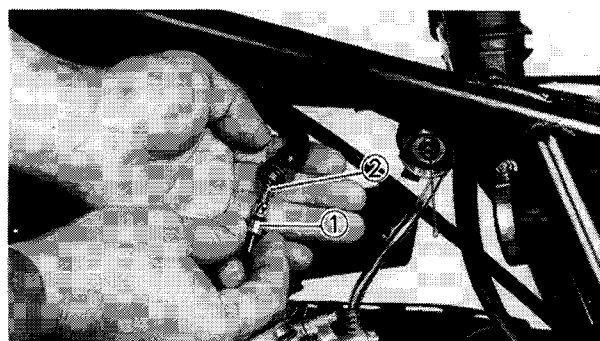
- Throttle stop screw set
- Pilot screw set

**5**



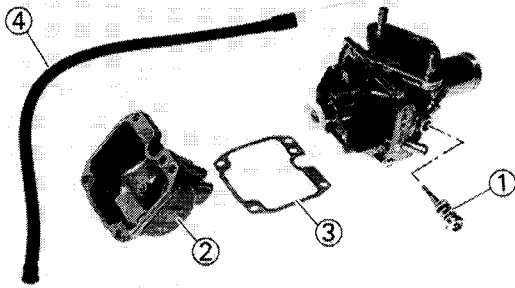
## 1. Remove:

- Throttle valve ①
- Spring ②
- Stopper ③ (jet needle)
- Jet needle set ④

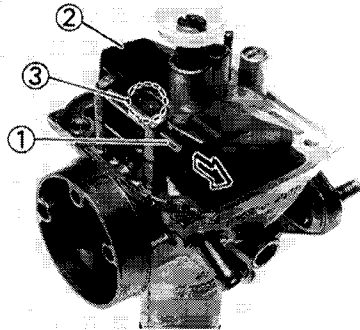


## 2. Remove:

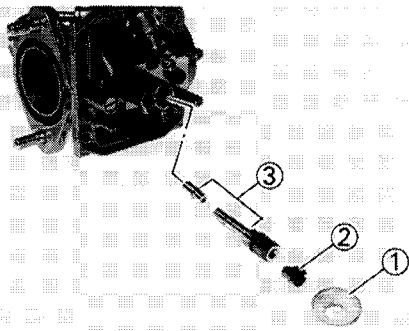
- Starter plunger ①
- Spring ②

**CARBURETOR****CARB****3. Remove:**

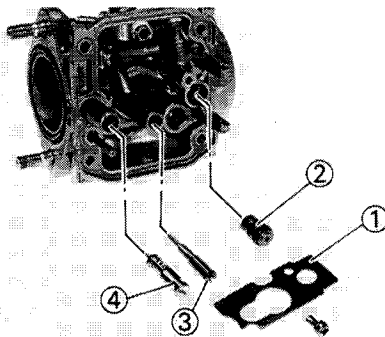
- Throttle stop screw set ①
- Float chamber body ②
- Gasket ③ (float chamber body)
- Overflow hose ④ (float chamber)

**4. Remove:**

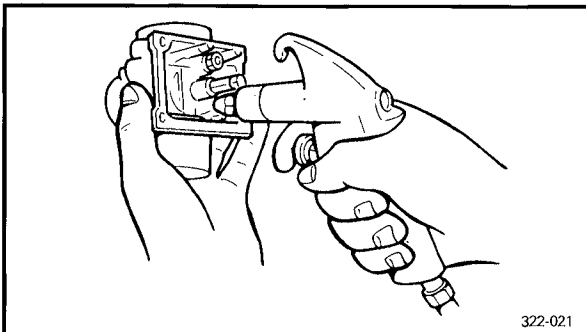
- Float pin ①
- Float ②
- (with needle valve ③)

**5. Remove:**

- Main jet ring ①
- Main jet ②
- Needle jet set ③

**6. Remove:**

- Baffle plate ①
- Valve seat ②
- Pilot jet ③
- Pilot screw set ④



322-021

**INSPECTION****1. Inspect:**

- Carburetor body
- Float chamber body
- Fuel passage
- Cracks/Damage → Replace.
- Clog → Clean.

**NOTE:**

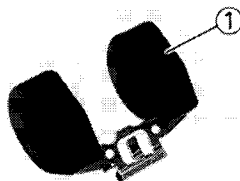
- Use a petroleum based solvent for cleaning.
- Blow out all passages and jets with compressed air.

**5**

**CARBURETOR****CARB****2. Inspect:**

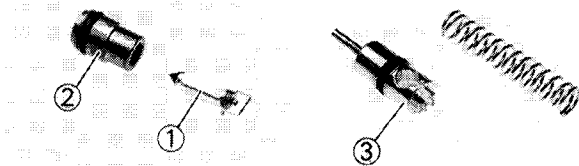
- Float ①

Wear/Damage → Replace.

**3. Inspect:**

- Needle valve ①
- Valve seat ②
- Starter plunger ③

Wear/Damage → Replace.

**4. Inspect:**

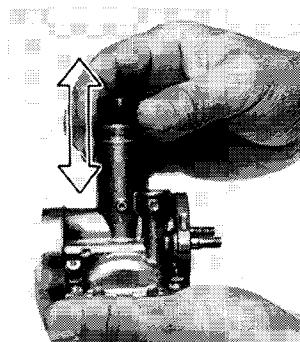
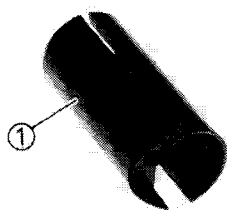
- Throttle valve ①

Wear/Scratches/Damage → Replace.

**5. Check:**

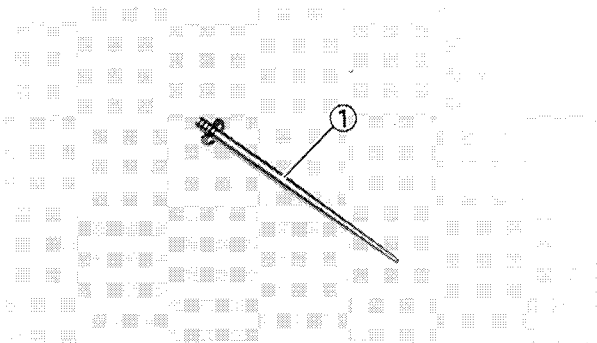
- Free movement
- Stick → Replace.

Insert the throttle valve into the carburetor body, and check for free movement.

**6. Inspect:**

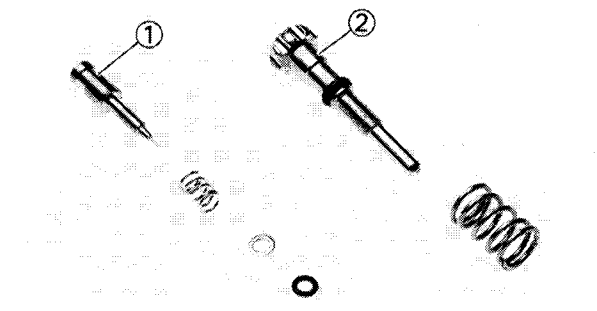
- Jet needle ①

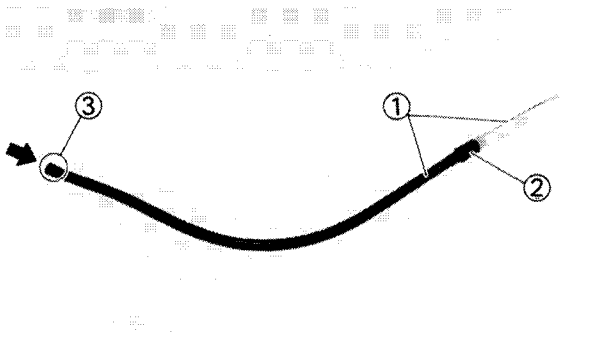
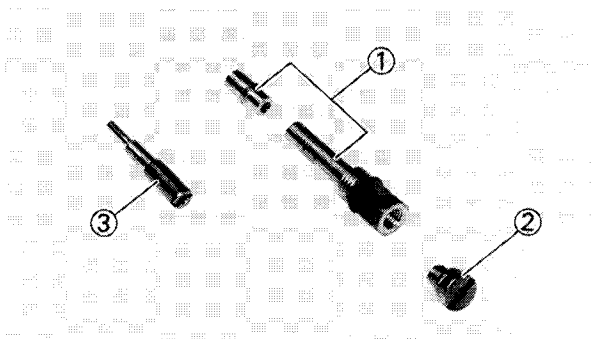
Bends/Wear/Damage → Replace.

**7. Inspect:**

- Pilot screw ①
- Throttle stop screw ②

Wear/Damage → Replace.



**CARBURETOR****CARB****8. Inspect:**

- Needle jet set ①
  - Main jet ②
  - Pilot jet ③
- Wear/Damage → Replace.  
Clog → Clean.

**NOTE:**

Blow out the jets with compressed air.

**9. Inspect:**

- Overflow hoses ①/Oneway valve ②
- Clog/Damage → Replace.

**NOTE:**

Blow into the smaller end ③ of the overflow hose (with the oneway valve).

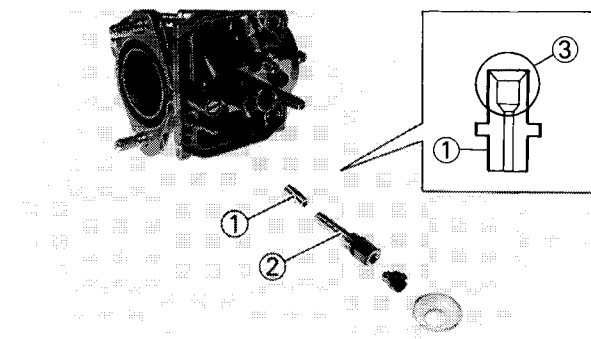
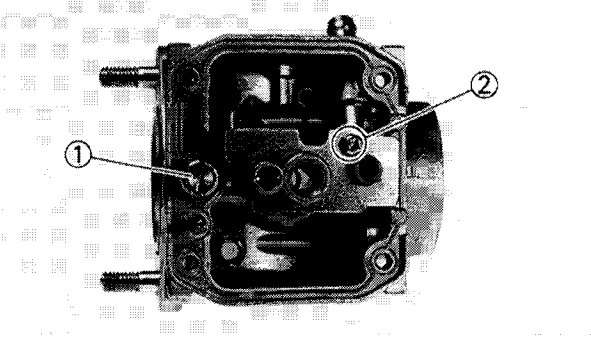
Air should pass freely through the valve in this direction only.

**ASSEMBLY**

Reverse the "DISASSEMBLY" procedure.  
Note the following points.

**CAUTION:**

- Before reassembling, wash all parts in clean gasoline.
- Always use new gasket.

**1. Adjust:**

- Pilot screw ①

**Pilot screw:**

1 and 1/2 turns out

**2. Tighten:**

- Screw ② (baffle plate)

**Screw (baffle plate):**

1 Nm (0.1 m•kg, 0.7 ft•lb)

**3. Install:**

- Needle jet #1 ①
- Needle jet #2 ②

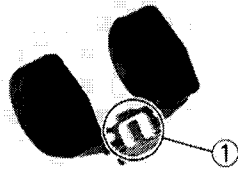
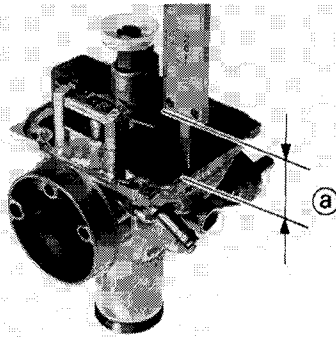
**NOTE:**

Be sure to install the indented end ③ of the needle jet #1 ① in the carburetor.

**Needle Jet:**

2.5 Nm (0.25 m•kg, 1.8 ft•lb)

**5**

**CARBURETOR****CARB****4. Measure:**

- Float height ①

Out of specification → Adjust.

\*\*\*\*\*

**Float height measurement and adjustment steps:**

- Hold the carburetor in an upside down position.
- Measure the carburetor between the mating surface of the float chamber body (gasket removed) and top of the float using a gauge.



**Float height:**

21.0 ~ 22.0 mm (0.83 ~ 0.87 in)

**NOTE:**

The float arm should be resting on the needle valve, but not compressing the needle valve.

- If the float height is not within specification, inspect the valve seat and needle valve.
- If either is worn, replace them both.
- If both are fine, adjust the float height by bending the float tang ① on the float.
- Recheck the float height.

\*\*\*\*\*

**5. Install:**

- Drain screw ①
- Float chamber body ②

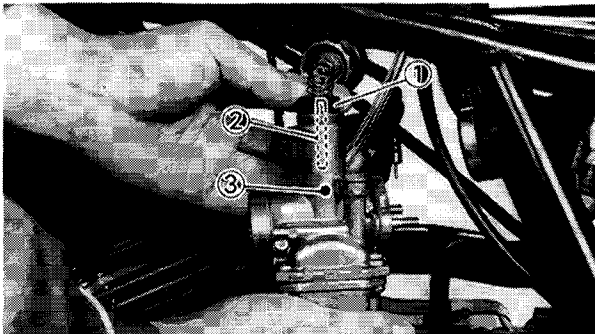
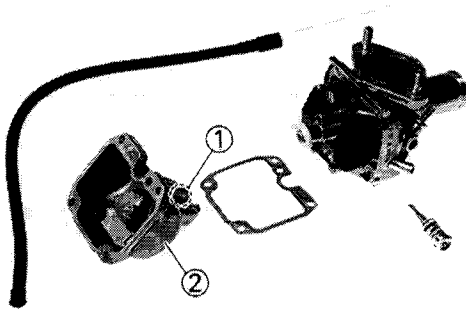


**Drain screw:**

2 Nm (0.2 m•kg, 1.4 ft•lb)

**Float chamber body:**

2 Nm (0.2 m•kg, 1.4 ft•lb)

**INSTALLATION**

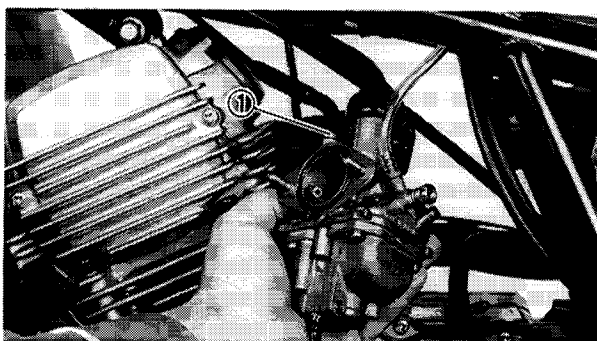
Reverse the "REMOVAL" procedures. Note the following points.

**1. Install:**

- Throttle valve ①

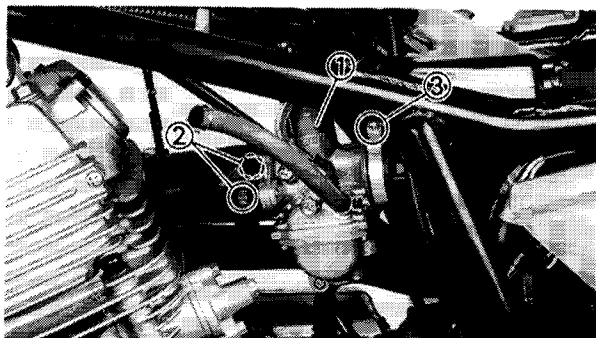
**NOTE:**

Align the groove ② of the throttle valve with the projection ③ of the carburetor body.

**CARBURETOR****CARB**

## 2. Install:

- Starter plunger ①

**Starter plunger:****3 Nm (0.3 m·kg, 2.2 ft·lb)**

## 3. Install:

- Carburetor ①

**Nut ② (carburetor and carburetor joint):****8 Nm (0.8 m·kg, 5.8 ft·lb)****Hose clamp ③ (carburetor and joint hose):****2 Nm (0.2 m·kg, 1.4 ft·lb)****CAUTION:**

**Make sure the carburetor overflow hose is routed correctly.**

**Refer to the "CABLE ROUTING" section in the CHAPTER 2.**

## 4. Check:

- Throttle cable operation  
Unsmooth operation → Repair.

## 5. Adjust:

- Idle speed

**Engine idle speed:****1,350 ~ 1,450 r/min**

Refer to the "IDLE SPEED ADJUSTMENT" section in the CHAPTER 3.

## 6. Adjust:

- Throttle cable free play

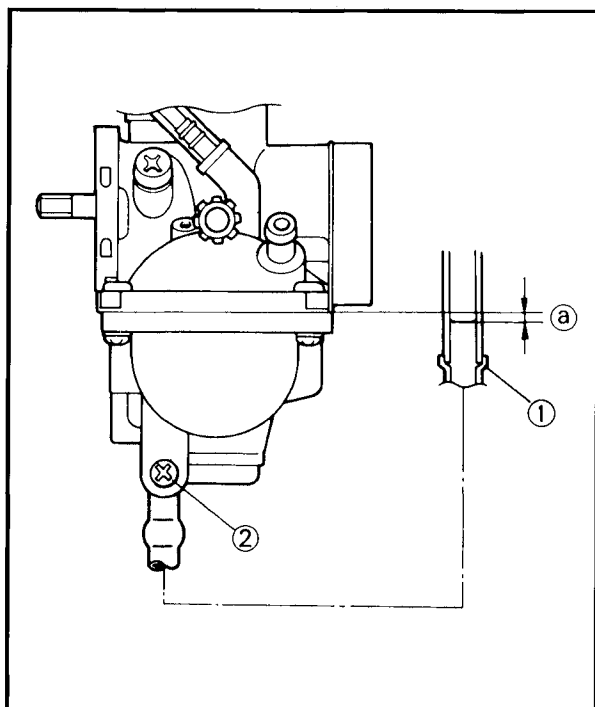
**Throttle cable free play:****3 ~ 5 mm (0.12 ~ 0.20 in)**

Refer to the "THROTTLE CABLE FREE PLAY ADJUSTMENT" section in the CHAPTER 3.

## 7. Install:

- Fuel tank
- Seat

Refer to the "FENDERS AND FUEL TANK" section in the CHAPTER 3.

**CARBURETOR****CARB****FUEL LEVEL ADJUSTMENT****NOTE:**

Before adjusting the fuel level, the float height should be adjusted.

**1. Measure:**

- Fuel level (a)

Out of specification → Adjust.

\*\*\*\*\*

**Fuel level measurement and adjustment steps:**

- Place the machine on a level place.
- Attach the Fuel level gauge (1) to the float chamber body nozzle.

**Fuel level gauge:**

P/N. YM-01312-A, 90890-01312

- Loosen the drain screw (2) and start the engine.
- Place tube vertically next to the center of the mating line of the carburetor body and float chamber body.
- Measure the fuel level (a) with gauge.

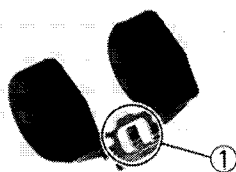
**Fuel level:**

2.0 ~ 4.0 mm (0.08 ~ 0.16 in)

Below the carburetor body edge

- If the fuel level is incorrect, adjust the fuel level.
- Remove the carburetor.
- Inspect the valve seat and needle valve.
- If both are fine, adjust the float height by bending the float tang (1) on the float.
- Recheck the fuel level.

\*\*\*\*\*


**5**





## DRIVE TRAIN

### TROUBLESHOOTING

The following conditions may indicate damage shaft drive components:

Symptoms	Possible causes
1. A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (this must not be confused with engine surging or transmission characteristics.)	A. Bearing damage.
	B. Improper gear lash.
	C. Gear tooth damage.
2. A "rolling rumble" noticeable at low speed; a high-pitched whine; a "clunk" from a shaft drive component or area.	D. Broken drive shaft.
	E. Broken gear teeth.
3. A locked-up condition of the shaft drive train mechanism, no power transmitted from engine to front and/or rear wheels.	F. Seizure due to lack of lubrication.
	G. Small foreign object lodged between moving parts.

#### NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal machine operating noise. If there is reason to believe these components are damaged, remove the components for specific inspection.

#### Inspection notes

1. Investigate any unusual noises:

\*\*\*\*\*

#### The following "noises" may indicate a mechanical defect:

- A "rolling rumble" noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.  
Diagnosis: Possible wheel bearing damage.
- A "whining" noise that varies with acceleration and deceleration.  
Diagnosis: Possible incorrect reassembly, too-little gear lash.

**CAUTION:**

**Too-little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage.**

- A slight “thunk” evident at low speed operation. This noise must be distinguished from normal machine operation.  
Diagnosis: Possible broken gear teeth.

**! WARNING**

**Stop riding immediately if broken gear teeth are suspected. This condition could result in a locking-up of the shaft drive assembly, causing loss of control of the machine and possible injury to the rider.**

\*\*\*\*\*

## 2. Inspect:

- Drained oil  
Drain plug shows large amount of metal.  
Particles → Check bearing for seizure.

**NOTE:**

A small amount of metal particles in the oil is normal.

## 3. Inspect:

- Oil leakage

\*\*\*\*\*

**Oil leakage inspection steps:**

- Clean the entire machine thoroughly, then dry it.
- Apply a leak-localizing compound or dry powder spray to the shaft drive.
- Road test the machine for the distance necessary to locate the leak.

Leakage → Inspect component housing, gasket, and/or seal for damage.

Damage → Replace component.

**NOTE:**

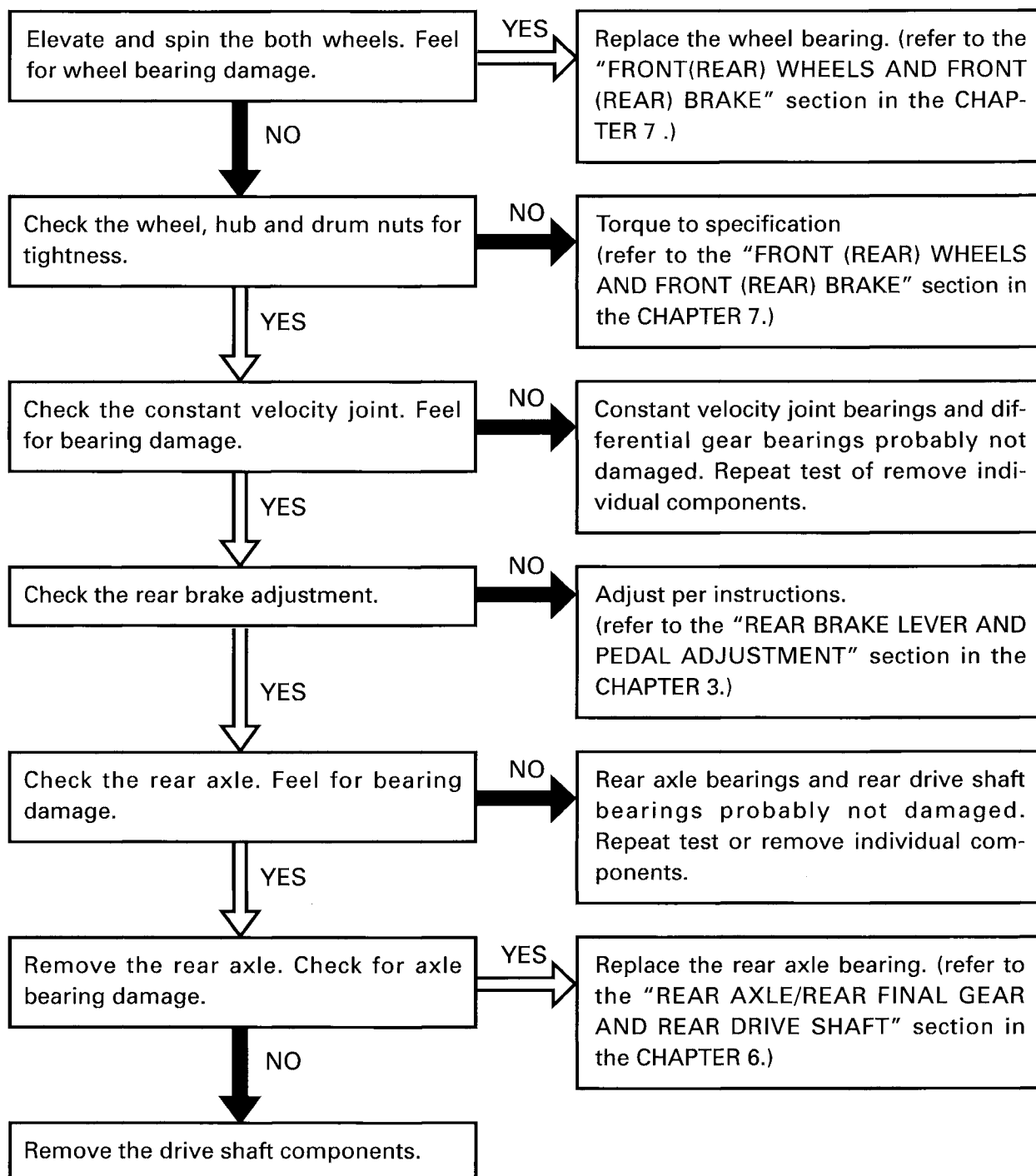
- An apparent oil leak on a new or nearly new machine may be the result of a rust-preventative coating or excessive seal lubrication.
- Always clean the machine and recheck the suspected location of an apparent leakage.

\*\*\*\*\*



### Troubleshooting Chart

When basic condition "a" and "b" above exist, check the following points:



# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

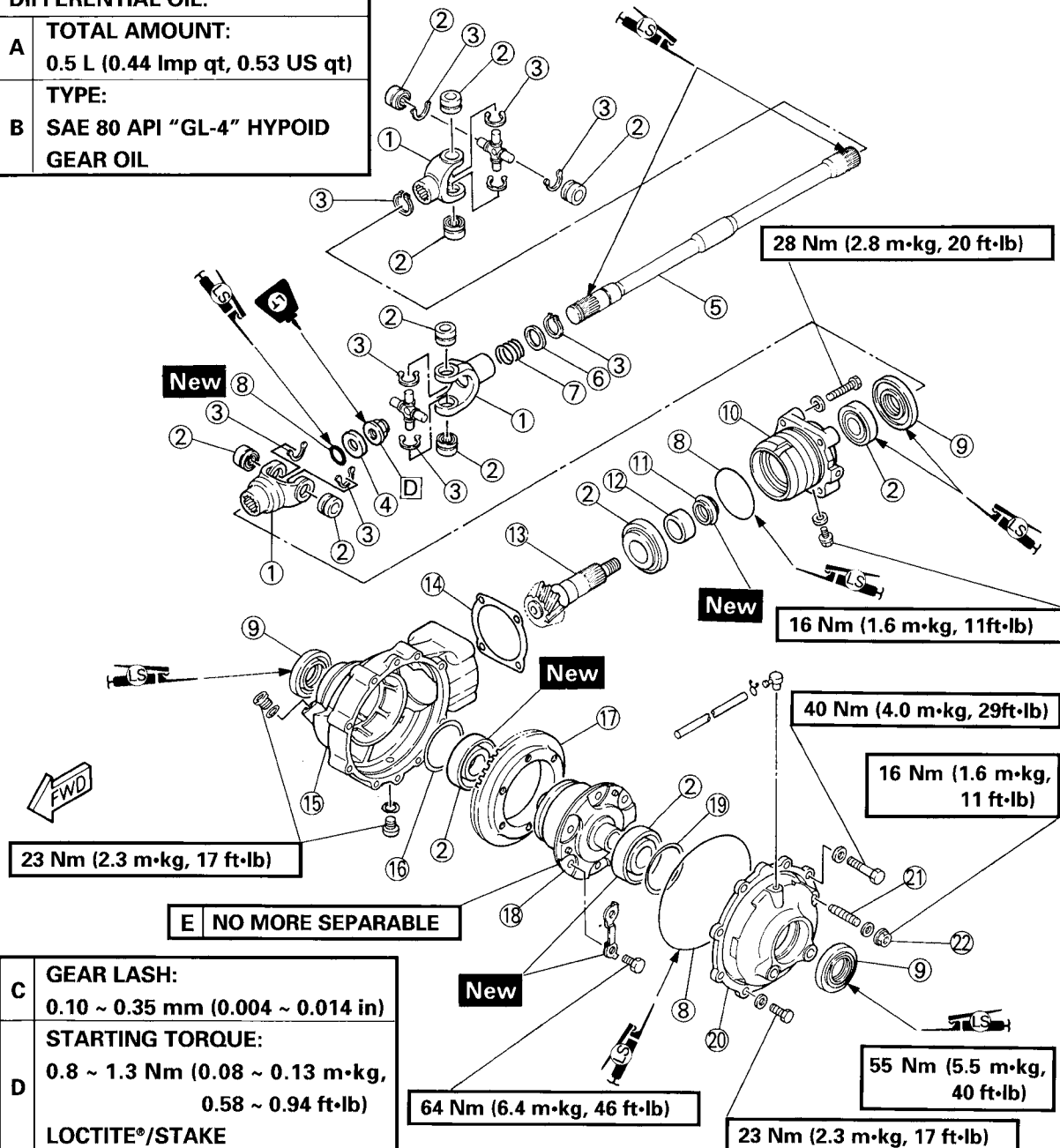
**DRIV**


## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

- |                     |                                      |                                |
|---------------------|--------------------------------------|--------------------------------|
| ① Universal joint   | ⑨ Oil seal                           | ①⑦ Ring gear                   |
| ② Bearing           | ⑩ Bearing housing (front drive gear) | ①⑧ Differential gear assembly  |
| ③ Circlip           | ⑪ Collapsible collar                 | ①⑨ Ring gear shim              |
| ④ Plane washer      | ⑫ Spacer                             | ②⑦ Bearing housing (ring gear) |
| ⑤ Front drive shaft | ⑬ Drive pinion gear                  | ②① Ring gear stopper           |
| ⑥ Spring seat       | ⑭ Drive pinion gear shim             | ②② Locknut                     |
| ⑦ Spring            | ⑮ Differential gear case             |                                |
| ⑧ O-ring            | ⑯ Thrust washer                      |                                |

### DIFFERENTIAL OIL:

- |          |   |
|----------|---|
| <b>A</b> | <b>TOTAL AMOUNT:</b><br>0.5 L (0.44 Imp qt, 0.53 US qt) |
| <b>B</b> | <b>TYPE:</b><br>SAE 80 API "GL-4" HYPOID<br>GEAR OIL    |

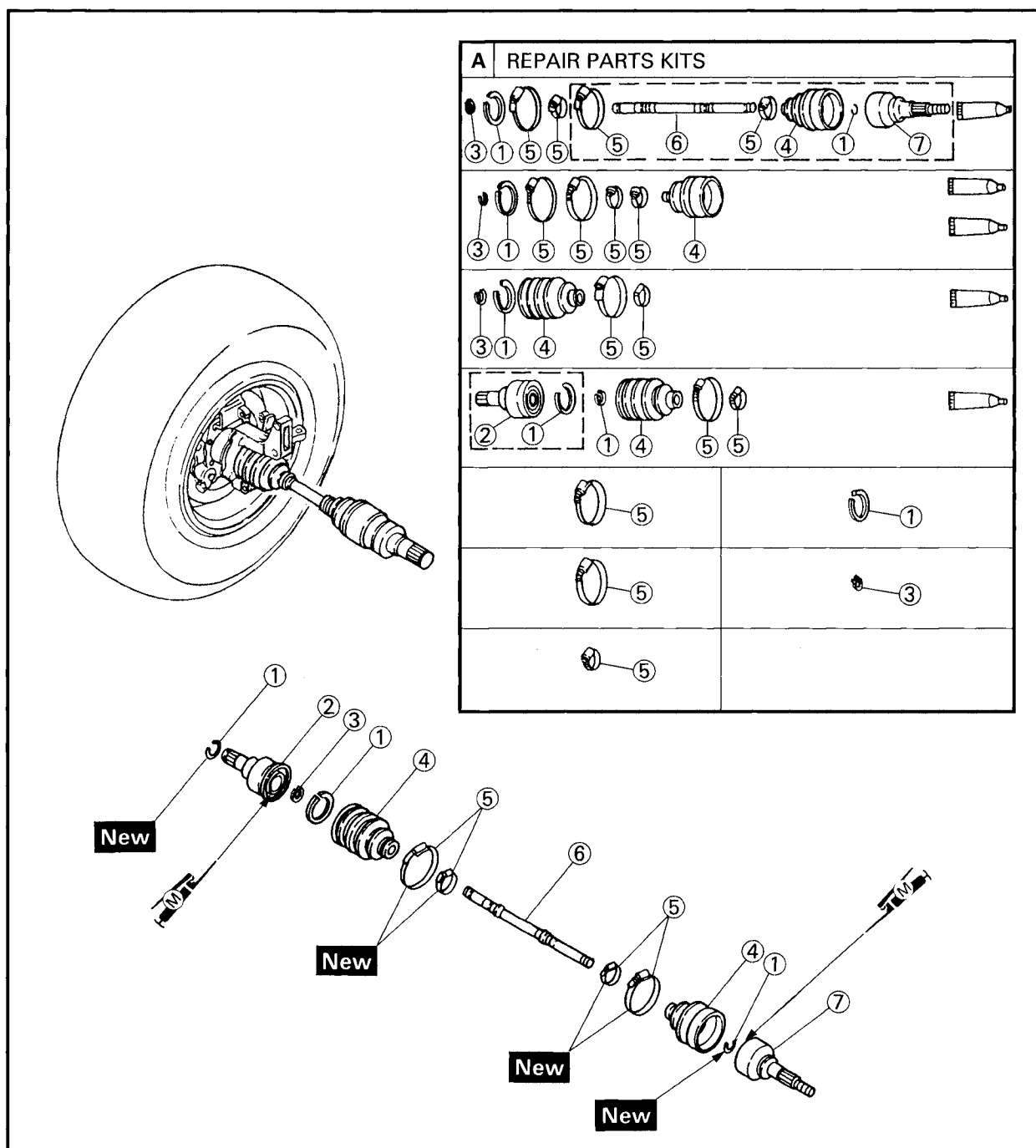

**6**

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



- ① Circlip
- ② Double off-set joint
- ③ Snap ring
- ④ Dust boot
- ⑤ Boot band
- ⑥ Joint shaft
- ⑦ Ball joint



6

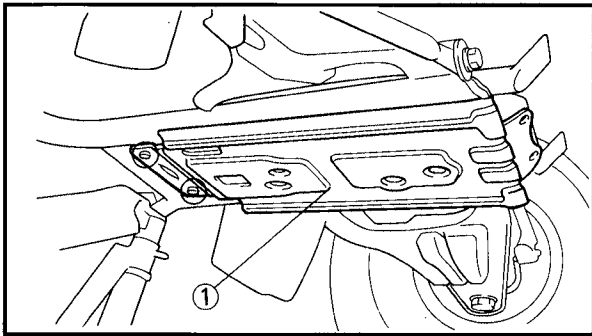
## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV

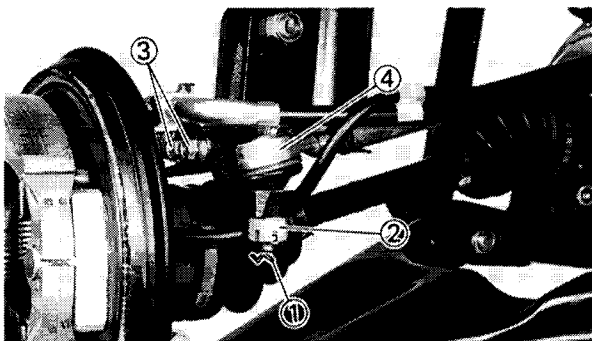


### REMOVAL

1. Place the machine on a level place.
2. Apply the parking brake.
3. Remove:
  - Front bumper  
Refer to the "FENDERS AND FUEL TANK" section in the CHAPTER 3.
4. Drain:
  - Differential gear oil  
Refer to the "DIFFERENTIAL GEAR OIL REPLACEMENT" section in the CHAPTER 3.



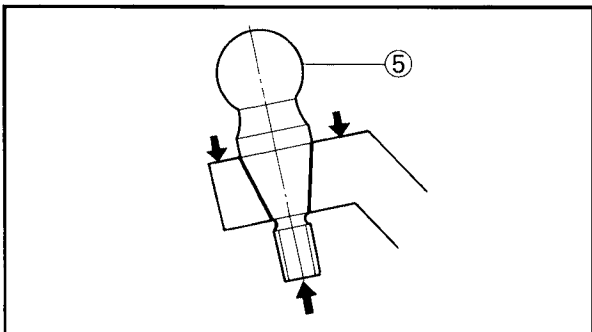
5. Remove:
  - Differential gear case guard ①
6. Block the rear wheels, and elevate the front wheels by placing the suitable stand under the frame.



7. Remove:
  - Front wheels
  - Front brake drums  
Refer to the "FRONT WHEELS AND FRONT BRAKE-REMOVAL" section in the CHAPTER 7.

8. Remove:
  - Cotter pin ①
  - Nut ②
  - Bolts ③

9. Disconnect:
  - Tie-rod end ④  
(from steering knuckle)



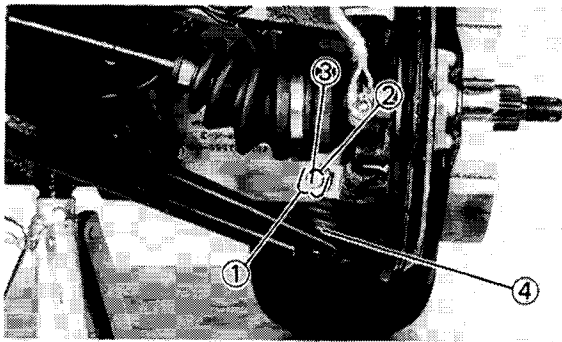
### NOTE: \_\_\_\_\_

Use the General bearing puller to separate the ball joint ⑤ (tie-rod end) and steering knuckle.

\_\_\_\_\_

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV

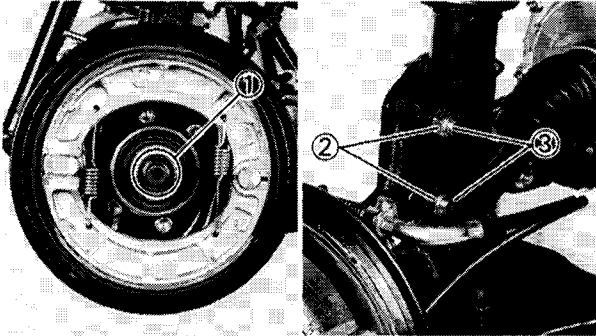


10. Remove:

- Cotter pin ①
- Nut ②
- Shaft bolt ③

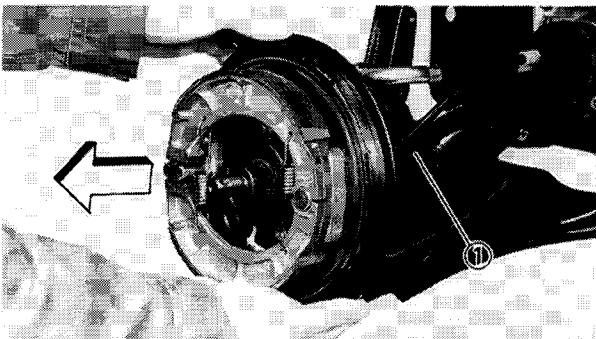
11. Disconnect:

- Lower arm ④  
(from steering knuckle)



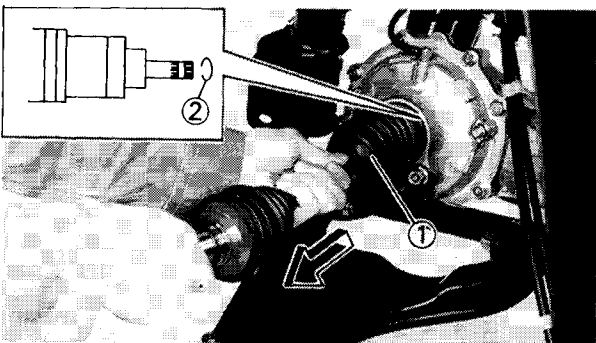
12. Remove:

- O-ring ①
- Nut ② (front shock absorber-rear)
- Bolt ③



13. Remove:

- Steering knuckle ① (with backing plate)

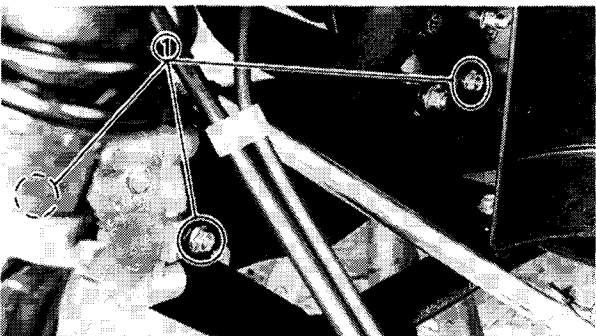


14. Remove:

- Constant velocity joints ①
- Circlips ② (double off-set joint)

## NOTE:

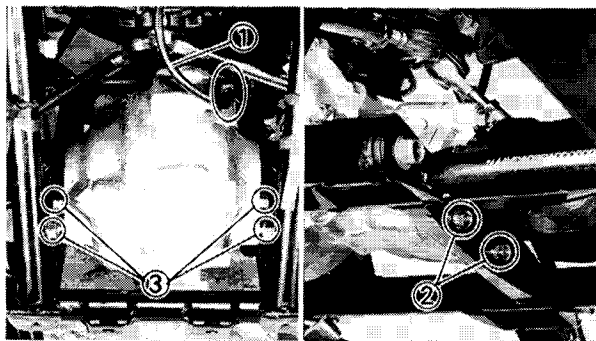
Before remove the constant velocity joint, band the front shock absorbers on the frame not to damage the joint.



15. Remove:

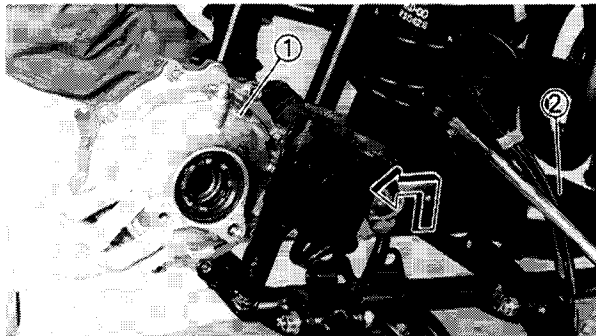
- Bolts ① (drive shaft cover-front half)

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


16. Disconnect
- Breather hose ①

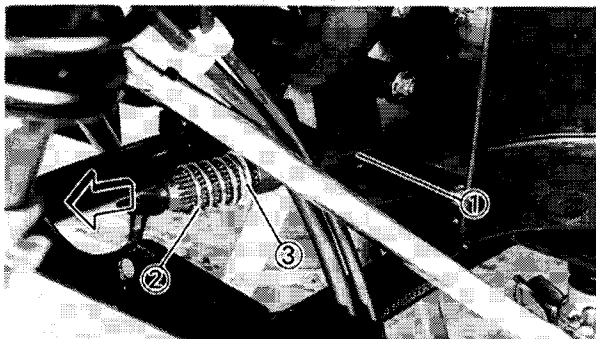
17. Remove:
- Bolts ② (differential gear case-rear)
  - Bolts ③ (differential gear case-front)



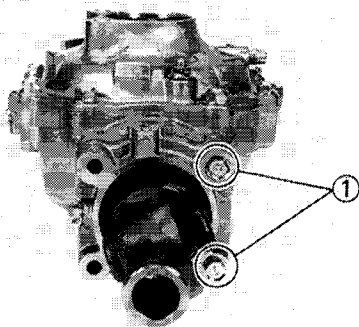
18. Remove:
- Differential gear case ①
  - Drive shaft cover ② (front half)

## NOTE:

Lift up the differential gear case and move it forward to remove from the drive shaft.



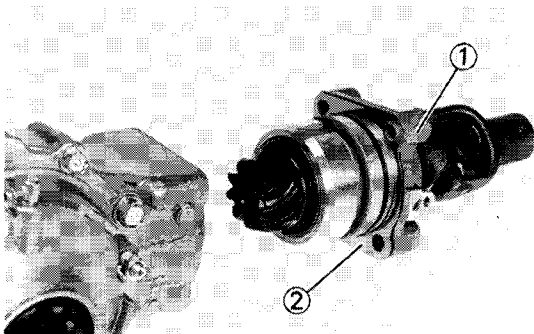
19. Remove:
- Front drive shaft ①
  - Spring ②
  - Spring seat ③

**6**


## DISASSEMBLY

### Differential gear

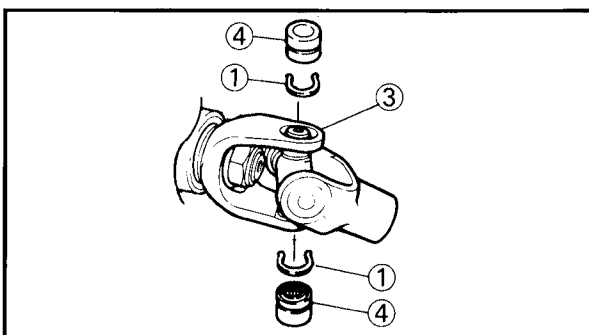
1. Remove:
- Bolts (bearing housing-drive pinion gear) ①



2. Remove:
- Drive pinion gear assembly with bearing housing ①
  - Shim(s) ②



# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


## 3. Remove:

- Universal joint

\*\*\*\*\*

## Universal joint removal steps:

- Remove the circlips (1).
- Place the universal joint in a press.
- With a suitable diameter pipe (2) beneath the yoke (3), press the bearing (4) into the pipe as shown.

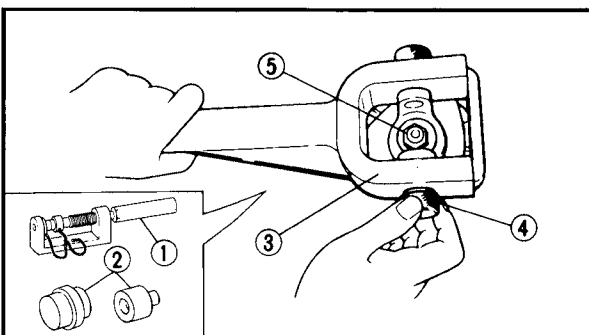
## NOTE:

It may be necessary to lightly tap the yoke with a punch.

- Repeat the steps for the opposite bearing.
- Remove the yoke.

## NOTE:

It may be necessary to lightly tap the yoke with a punch.



## 4. Attach:

- Universal joint holder
- Attachment  
(to the universal joint yoke)



## Universal joint holder:

P/N. YM-04062- (1), 90890-04062

(3)

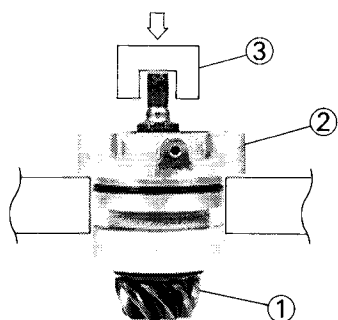
## Attachment:

P/N. YM-33291- (2), 90890-04096

(4)

## 5. Remove:

- Nut (5)
- Washer
- O-ring
- Yoke



## 6. Remove:

- Drive pinion gear assembly (1)  
(from the bearing housing (2))

\*\*\*\*\*

## Drive pinion gear assembly removal steps:

- Clean the outside of the drive pinion gear shaft.
- Place the drive pinion gear assembly with bearing housing onto a hydraulic press.

## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**

**CAUTION:**

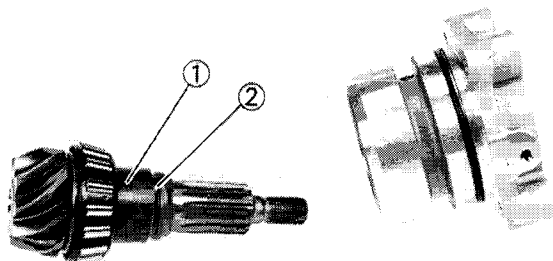
- Never directly press the shaft end with a hydraulic press, this will result in damage to the shaft thread.
- Install the suitable socket ③ on the shaft end to protect the thread from damage.

- Press the shaft end, and remove the drive pinion gear assembly from the bearing housing.

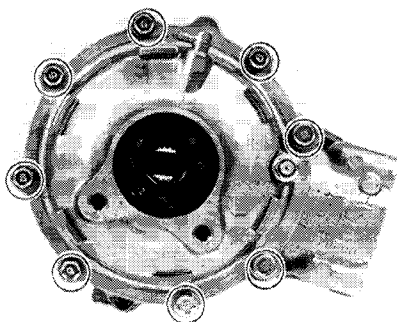
\*\*\*\*\*

**7. Remove:**

- Collapsible collar ①
- Spacer ②


**8. Remove:**

- 8 mm bolts (bearing housing-ring gear)
- 10 mm bolts (bearing housing-ring gear)


**NOTE:**

Working in a crisscross pattern, loosen the bolt 1/4 turn each. Remove then after all loosened.

**9. Remove:**

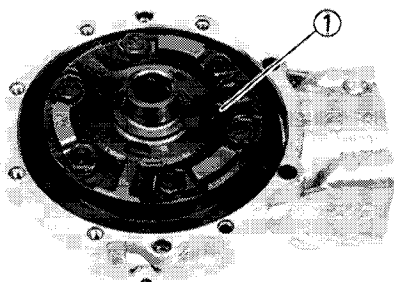
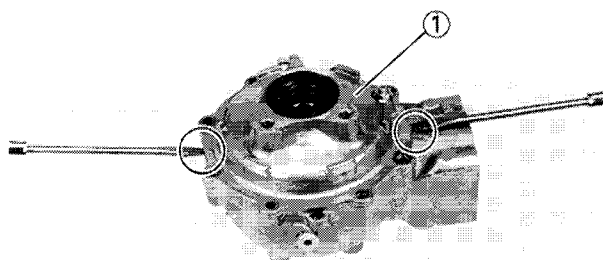
- Bearing housing ① (ring gear)

**NOTE:**

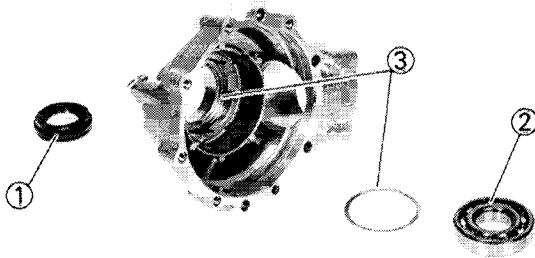
Slots for separating the differential gear case and the bearing housing are provided. Prizing the slots with flat head screwdrivers, remove the bearing housing from the case.

**10. Remove:**

- Differential gear assembly ①


**6**

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

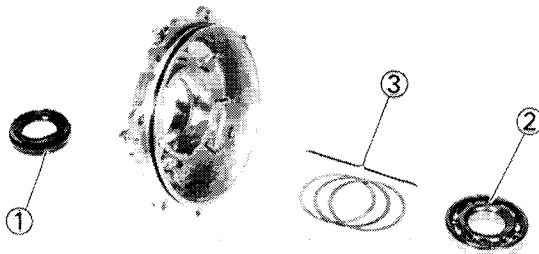
**DRIV**


## 11. Remove:

- Oil seal ① (differential gear case)
- Bearing ②
- Thrust washer(s) ③

### CAUTION:

Differential gear case bearing removal should be performed only if bearing replacement or differential gear shims adjustment is necessary. Do not reuse bearing after removal.

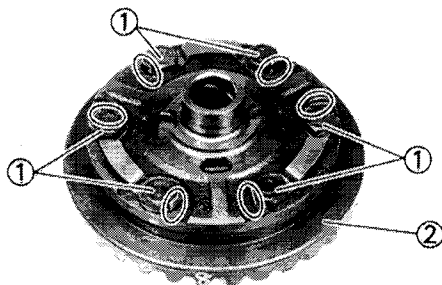


## 12. Remove:

- Oil seal ① (bearing housing)
- Bearing ②
- Ring gear shim(s) ③

### CAUTION:

Bearing housing bearing removal should be performed only if bearing replacement or differential gear shims adjustment is necessary. Do not reuse bearing after removal.



## 13. Straighten:

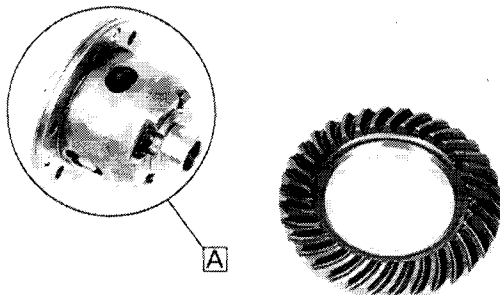
- Lock washer tabs

## 14. Remove:

- Bolts ①
- Lock washer
- Ring gear ②

### CAUTION:

The differential gears are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.

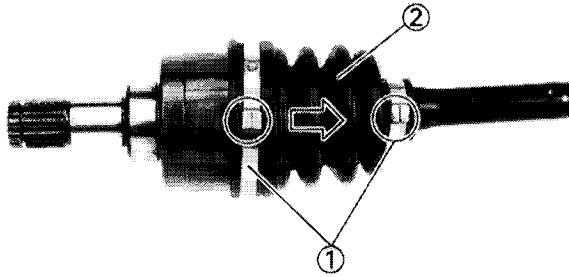


**A** Not to be disassembled.

**6**

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



## Constant velocity joint

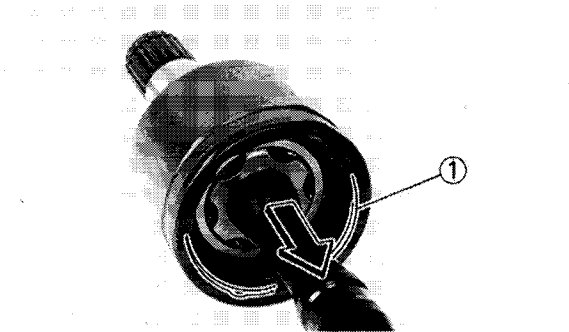
### 1. Remove:

- Bands ① (double off-set joint)

**NOTE:** \_\_\_\_\_

After removing the bands, slide the dust boot ② (double off-set joint) to the ball joint side.

\_\_\_\_\_



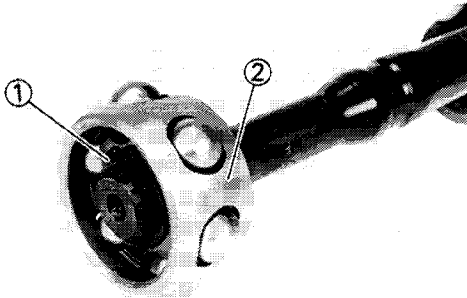
### 2. Remove:

- Snap ring ①

**NOTE:** \_\_\_\_\_

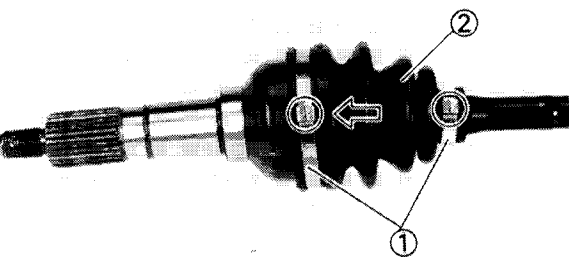
After removing the circlip, pull out the shaft with bearing.

\_\_\_\_\_



### 3. Remove:

- Circlip ①
- Ball bearing ②
- Dust boot (double off-set joint)

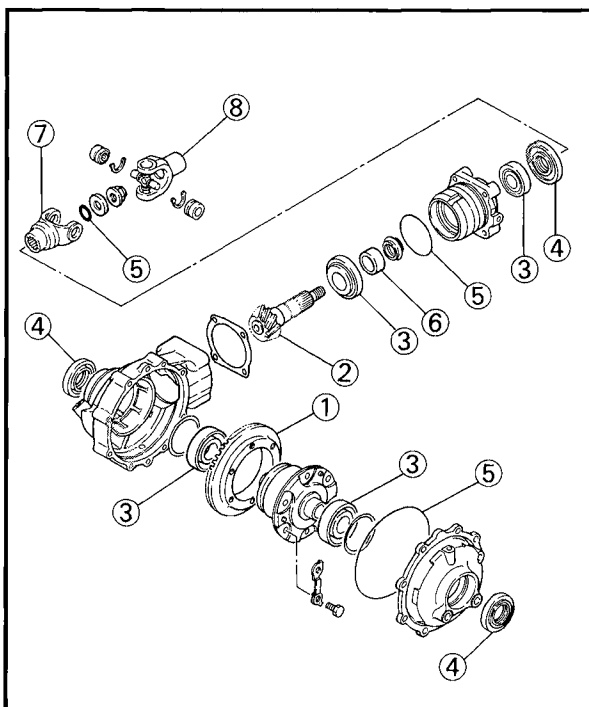


### 4. Remove:

- Bands ① (ball joint)
- Dust boot ② (ball joint)  
(from the ball joint assembly)

6

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


## INSPECTION

### Differential gear

#### 1. Inspect:

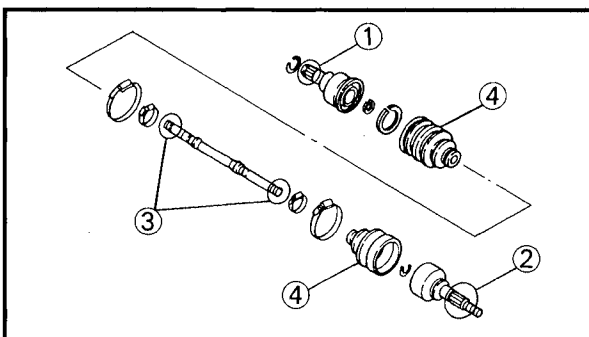
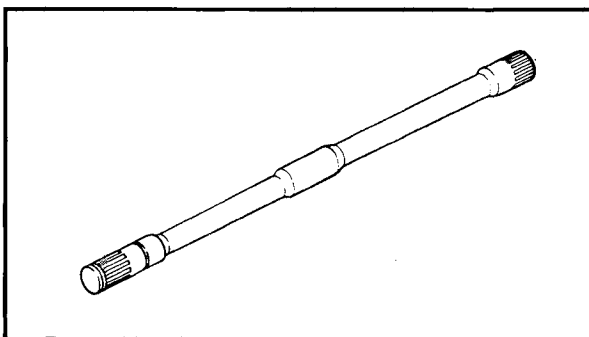
- Gear teeth (ring gear ① and drive pinion gear ②)  
Pitting/Galling/Wear → Replace drive pinion gear and ring gear as a set.
- Bearing ③  
Pitting/Damage → Replace.
- Oil seal ④
- O-ring ⑤
- Spacer ⑥  
Damage → Replace.
- Splines (drive pinion gear ②, yoke ⑦ and universal joint ⑧)  
Wear/Damage → Replace.

#### 2. Inspect:

- Front drive shaft  
Bends → Replace.

### **⚠ WARNING**

**Do not attempt to straighten a bent shaft; this may dangerously weaken the shaft.**



### Constant velocity joint

#### 1. Inspect:

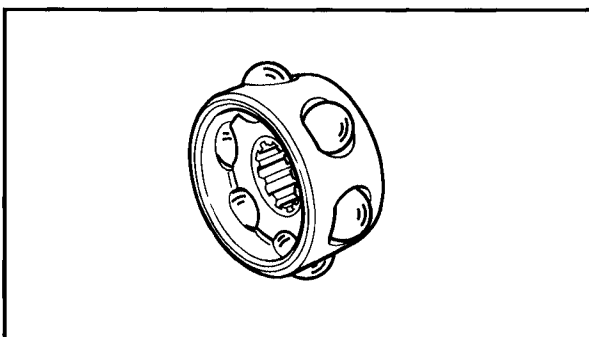
- Double off-set joint spline ①
- Ball joint spline ②
- Shaft spline ③  
Wear/Damage → Replace.

#### 2. Inspect:

- Dust boots ④  
Cracks/Damage → Replace.

### **CAUTION:**

**Always use new boot band.**



#### 3. Inspect:

- Balls and ball races
- Inner surface of double off-set joint  
Pitting/Damage/Wear → Replace.

**6**

## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**

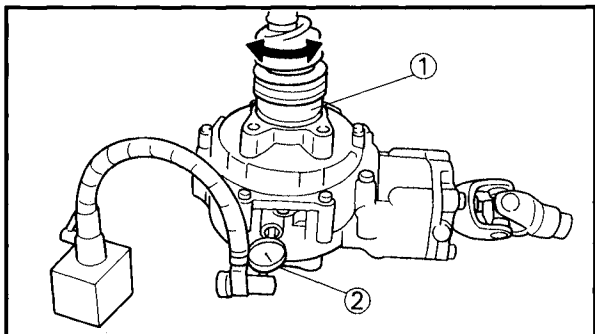

### MEASUREMENT AND ADJUSTMENT

#### Differential gear gear lash measurement

1. Remove:
  - Differential gear case assembly  
Refer to the "REMOVAL" section.
2. Install:
  - Constant velocity joint ①  
Into the joint hole.

**NOTE:** \_\_\_\_\_

When installing the joint, do not fit the circlip to the joint.



3. Attach:
  - Dial gauge ② (for lever type)



**Dial gauge (for lever type):**  
**P/N. YM-03110**

4. Measure:
  - Gear lash  
Gently rotate the constant velocity joint from engagement to engagement.  
Over specified limit → Adjust.

**NOTE:** \_\_\_\_\_

- When rotating the joint, do not turn the universal joint.
- Measure the gear lash at 4 positions. Rotate the ring gear 90° each time.

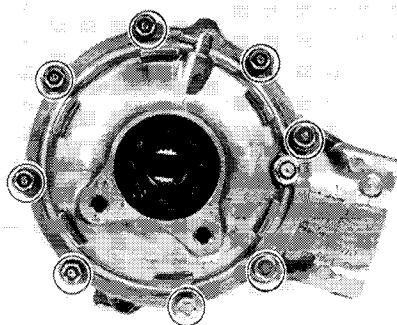


**Differential gear gear lash:**  
**0.10 ~ 0.35 mm (0.004 ~ 0.14 in)**

#### Differential gear gear lash adjustment

1. Remove:
  - Differential gear case assembly  
Refer to the "REMOVAL" section.
2. Remove:
  - Drive pinion gear assembly with bearing housing  
Refer to the "DISASSEMBLY" section.

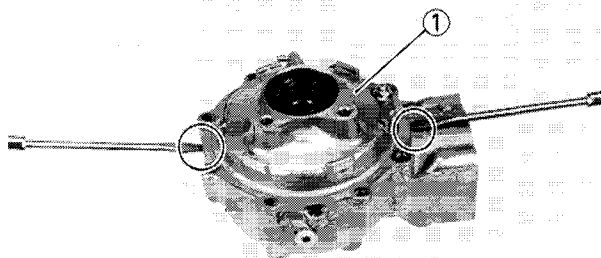
## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**

**3. Remove:**

- 8 mm bolts (bearing housing-ring gear)
- 10 mm bolts (bearing housing-ring gear)

**NOTE:**

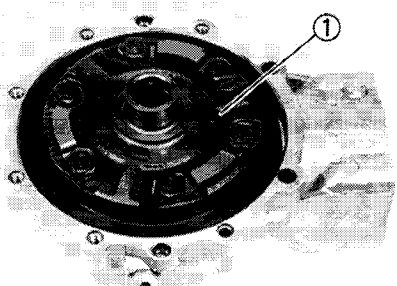
Working in a crisscross pattern, loosen the bolt 1/4 turn each. Remove then after all loosened.


**4. Remove:**

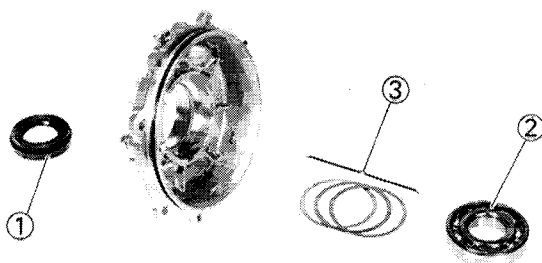
- Bearing housing ① (ring gear)

**NOTE:**

Slots for separating the differential gear case and the bearing housing are provided. Prizing the slots with flat head screwdrivers, remove the bearing housing from the case.


**5. Remove:**

- Differential gear assembly ①


**6. Remove:**

- Oil seal ① (bearing housing)
- Bearing ②
- Ring gear shim(s) ③

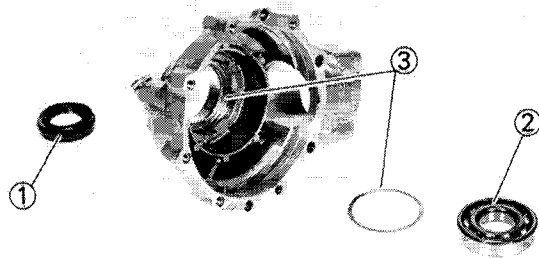
**CAUTION:**

Bearing housing bearing removal should be performed only if bearing replacement bearing replacement or differential gear shims adjustment is necessary. Do not reuse bearings or races after removal.

**6**

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



## 7. Remove:

- Oil seal ① (differential gear case)
- Bearing ②
- Thrust washer(s) ③

## CAUTION:

Differential gear case bearing removal should be performed only if bearing replacement or differential gear shims adjustment is necessary. Do not reuse bearings or races after removal.

## 8. Adjust:

- Gear lash

\*\*\*\*\*

## Gear lash adjustment steps:

- Select the suitable shims(s) and thrust washer(s) by the following chart.

Too-little gear lash →

Reduce shim thickness.

Too-large gear lash →

Increase shim thickness.

## To add or reduce ring gear shim thickness

Increase by more than  
0.1 mm (0.004 in)

Reduce by more than  
0.1 mm (0.004 in)

Reduce thrust washer  
thickness by 0.1 mm  
(0.004 in) for every 0.1  
mm of ring gear shim  
increase.

Reverse  
procedure



## Ring gear shim/thrust washer

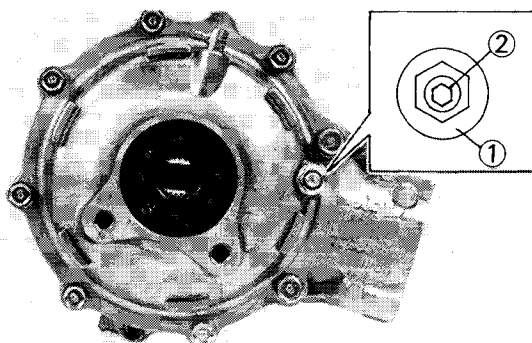
Thickness (mm)

0.15	0.20	0.30
0.40	0.50	

\*\*\*\*\*



## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


### Ring gear stopper clearance adjustment

#### 1. Adjust:

- Clearance (ring gear stopper)

\*\*\*\*\*

### Ring gear stopper clearance adjustment steps:

- Loosen the locknut ①.
- Finger tighten the adjuster ② until resistance is felt.

### **CAUTION:**

**Do not over tighten the adjuster; finger tight is sufficient.**

- Turn back it 1/2 rotation.
- Tighten the locknut.



**Locknut (ring gear stopper):**  
**16 Nm (1.6 m•kg, 11 ft•lb)**

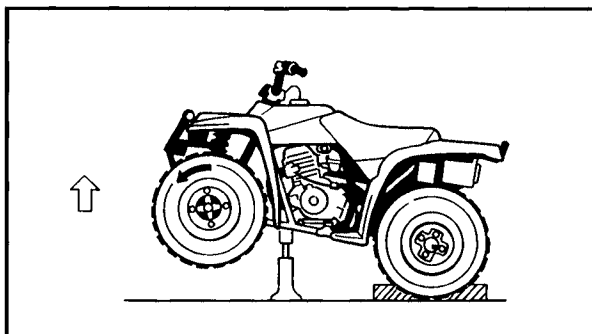
\*\*\*\*\*

### DIFFERENTIAL GEAR OPERATION CHECK

1. Block the rear wheels, and elevate the front wheels by placing a suitable stand under the frame.
2. Remove the cotter pin from the axle nut (right or left).
3. Measure the starting torque of the front wheel (i.e., differential gear preload) with the torque wrench.

### **NOTE:**

- Repeat this step several times to obtain an average figure.
- During this test, the other front wheel will turn in the opposite direction.


**6**

## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



**Front wheel starting torque:  
(differential gear preload):**

**New unit:**

40 ~ 80 Nm (4.0 ~ 8.0 m•kg,  
29 ~ 58 ft•lb)

**Minimum:**

10 Nm (1.0 m•kg, 7.2 ft•lb)

4. Out of the above specification, replace the differential gear assembly.
5. Within the above specification, install the cotter pin and wheel cap.

### **⚠ WARNING**

**Always use a new cotter pin.**

### **ASSEMBLY**

#### **Constant velocity joint**

Reverse the "DISASSEMBLY" procedures.  
Note the following points.

1. Apply:
  - Molybdenum disulfide grease  
Into the ball joint assembly.

#### **NOTE:**

Molybdenum disulfide grease is included in the repair kit.

2. Install:

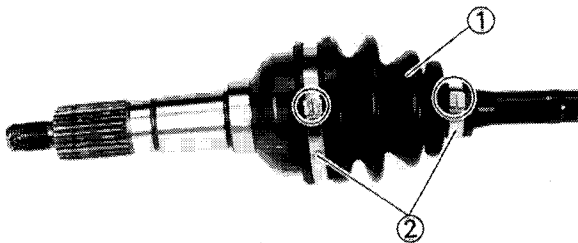
- Dust boot ① (ball joint)
- Bands ②

#### **NOTE:**

After installing the bands, bend the band ends securely.

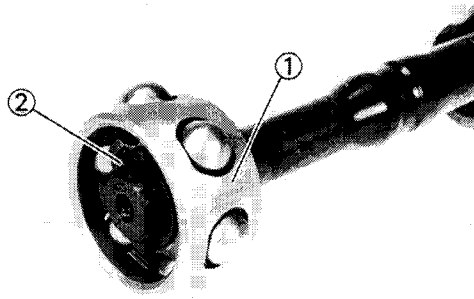
### **CAUTION:**

**Always use new bands.**



6

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


## 3. Install:

- Dust boot (double off-set joint)  
Insert the shaft into the boot.
- Ball bearing ①
- Snap ring ②

## 4. Lubricate:

- Ball bearing

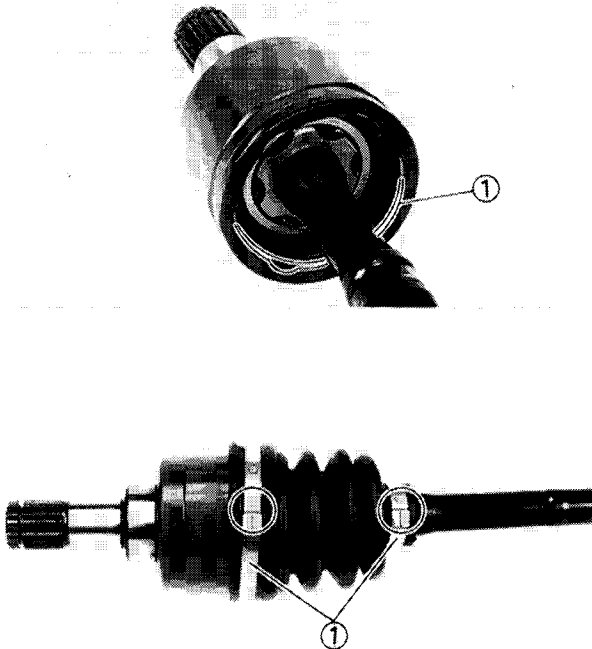

**Molybdenum disulfide grease**

## 5. Install:

- Ball bearing with shaft
- Circlip ①  
(to the double off-set joint)

## NOTE:

- Before installing the ball bearing, liberally apply the molybdenum disulfide grease into the double off-set joint.
- Cover the double off-set joint with the dust boot.



## 6. Install:

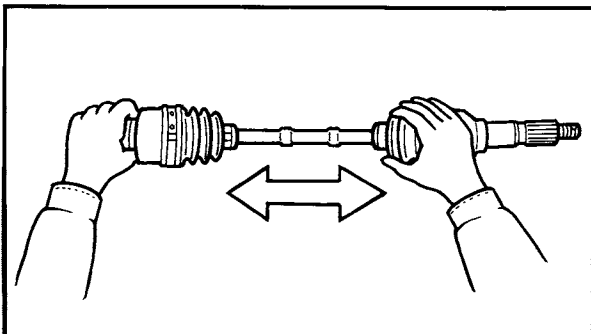
- Bands ① (double off-set joint boot)

## NOTE:

After installing the bands, bend the band ends securely.

## CAUTION:

**Always use the new bands.**



## 7. Check:

- Free play (thrust movement)  
Excessive play → Replace joint assembly.  
Move the shaft back and forth.

**6**

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



## Differential gear

Reverse the "DISASSEMBLY" procedures.  
Note the following points.

1. Lubricate:
  - Bearings
  - Oil seals
  - O-rings



**Lithium soap base grease**

2. Install:
  - Ring gear ①
  - Lock washers ②



**Ring gear:**  
**64 Nm (6.4 m•kg, 46 ft•lb)**

3. Bend:
  - Lock washer tab  
(along the bolt flats)

## ⚠ WARNING

**Always use new lock washers.**

4. Install:
  - Ring gear shim(s) ①
  - Bearing ②
  - Oil seal ③

## ⚠ WARNING

**Always use a new bearing.**

5. Install:
  - Thrust washer(s) ①
  - Bearing ②
  - Oil seal ③

Differential gear assembly with ring gear ④

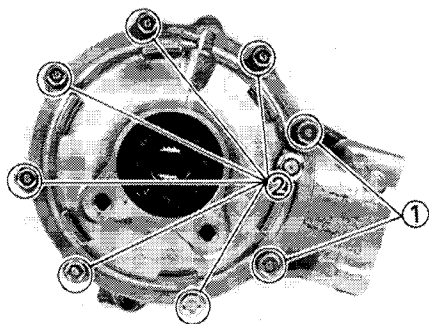
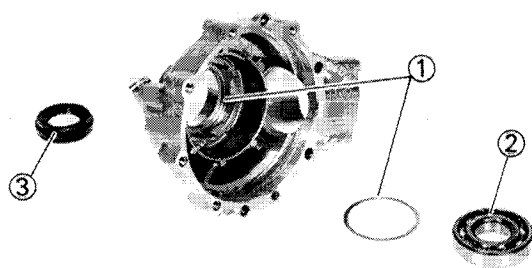
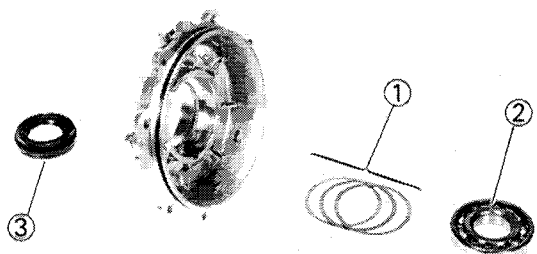
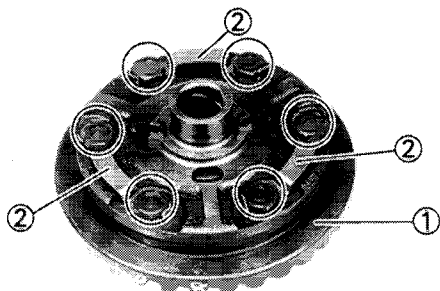
## ⚠ WARNING

**Always use a new bearing.**

6. Tighten:
  - 10 mm bolts ① (bearing housing-ring gear)
  - 8 mm bolts ② (bearing housing-ring gear)

## NOTE:

Tighten the bolts in stage, using a crisscross pattern.



# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


## 10 mm Bolts

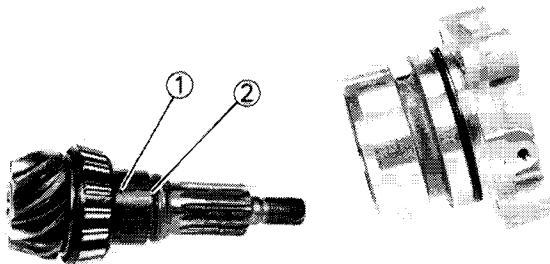
(bearing housing-ring gear):

40 Nm (4.0 m•kg, 29 ft•lb)

## 8 mm Bolts

(bearing housing-ring gear):

23 Nm (2.3 m•kg, 17 ft•lb)



## 7. Install:

- Spacer ①
- Collapsible collar ②  
(to the drive pinion gear shaft)

## ⚠ WARNING

**Always use a new collapsible collar.**

## 8. Install:

- Drive pinion gear assembly  
(to the bearing housing)

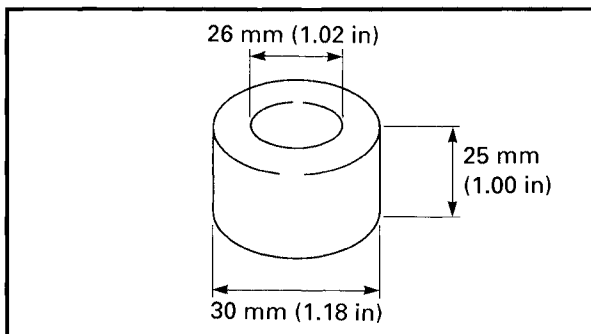
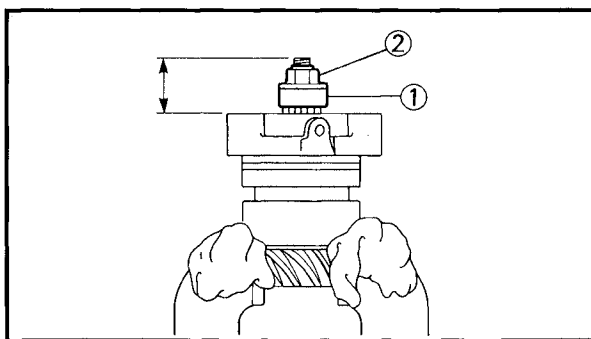
\*\*\*\*\*

## Drive pinion gear assembly installation steps:

- Clean the outside of the drive pinion gear shaft.
- Insert the drive pinion gear assembly into the bearing housing.
- Clamp the drive pinion gear in a vise with soft jaws.

## CAUTION:

**Do not clamp the bearing inner race. Clamp the front drive gear with care at this point.**



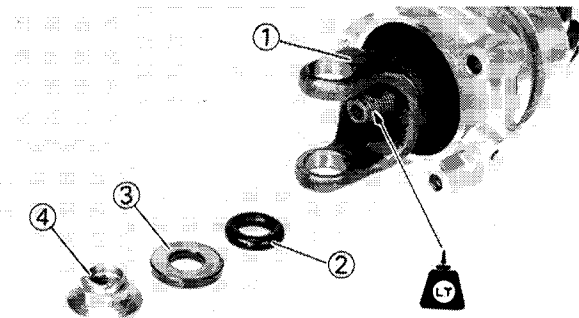
- Install the hand-made tool ① and nut (drive pinion gear) ②.
- Tighten the nut until the drive pinion gear shaft end and bearing housing end are 40 mm (1.57 in) apart.
- Remove the nut (drive gear) and tool from the drive pinion gear assembly.

\*\*\*\*\*

# 6

# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



## 9. Install:

- Yoke ①
- O-ring ②
- Washer ③
- Nut ④ (drive pinion gear)

## ⚠ WARNING

Always use a new O-ring and nut.

## NOTE:

Before installing the nut (drive pinion gear), apply LOCTITE® to the thread of front drive gear shaft.

\*\*\*\*\*

## Nut (drive pinion gear) tightening steps:

- Clean the outside of the bearing housing.
- Clamp the bearing housing in a vise with soft jaws.

## CAUTION:

Do not clamp the bearing inner race. Clamp the bearing housing with care at this point.

- Attach the universal joint holder ① and attachment ② on the universal joint.



## Universal joint holder ①:

P/N. YM-04062, 90890-04062

## Attachment ②:

P/N. YM-33291, 90890-04096

- Carefully tighten the nut (drive pinion gear), little by little.
- Remove the aforementioned special tools.
- Measure the starting torque of the drive pinion gear with the small size torque wrench ③.



## Front drive gear starting torque:

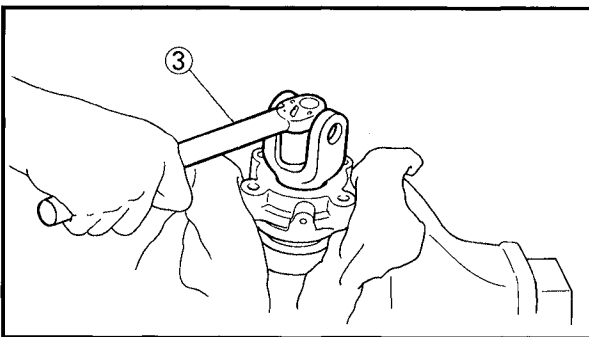
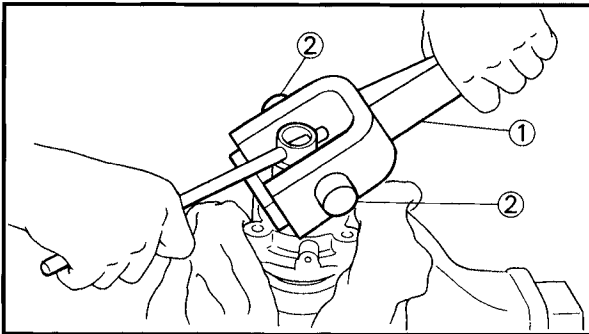
0.8 ~ 1.3 Nm (0.08 ~ 0.13 m•kg,  
0.60 ~ 0.94 ft•lb)

- Repeat tightening steps to establish the standard starting torque for the drive pinion gear.

## NOTE:

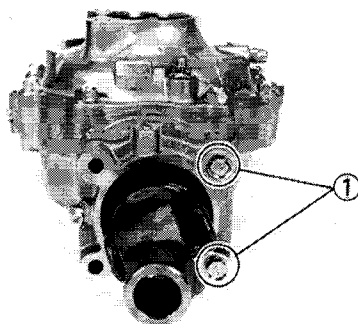
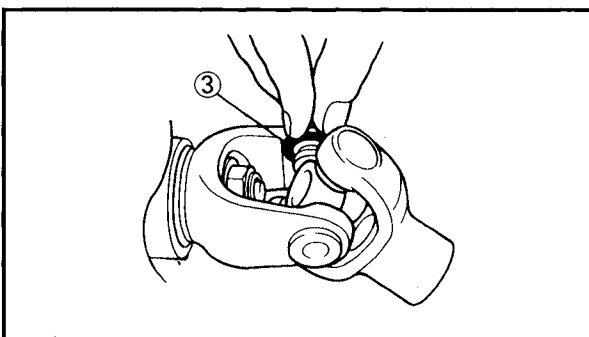
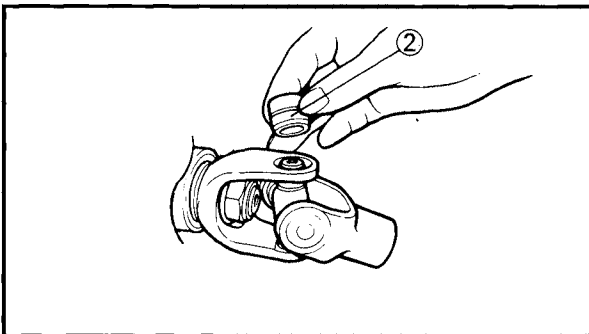
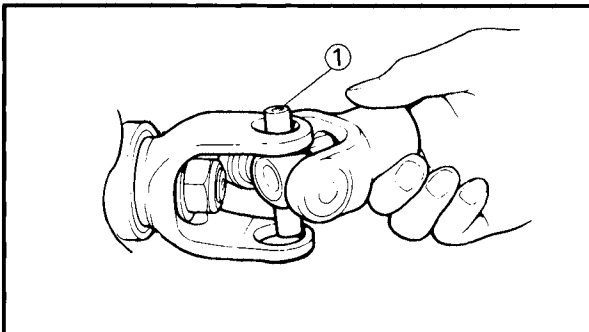
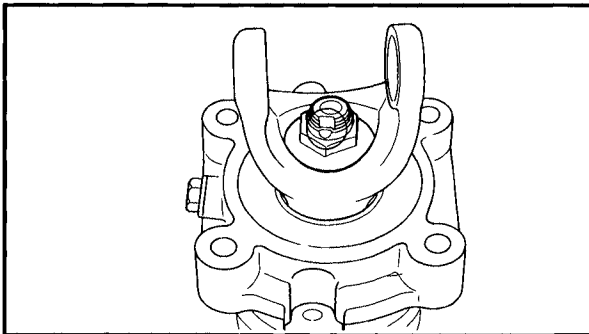
Starting torque is the amount of force required to make the shaft begin to turn against the drag of the bearing and oil seal.

# 6



# DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

DRIV



## CAUTION:

Never exceed the standard starting torque. Be sure to tighten the nut (drive pinion gear) slowly, carefully checking and measurements each time. Exceeding the standard starting torque may depress the collapsible collar, requiring reassembly. Then you must replace the collapsible collar and repeat the tightening steps to obtain the standard starting torque.

- Stake the nut head with a center punch to lock.

\*\*\*\*\*

## 10. Install:

- Universal joint

\*\*\*\*\*

## Universal joint installation steps:

- Install the universal joint (1) into the yoke.
- Apply the wheel bearing grease to the bearings.
- Install the bearing (2) onto the yoke.

## CAUTION:

Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.

- Press each bearing into the yoke using a suitable socket.

## NOTE:

Bearing must be inserted far enough into yoke so that circlip can be installed.

- Install the circlips (3) into the groove of each bearing.

\*\*\*\*\*

## 11. Install:

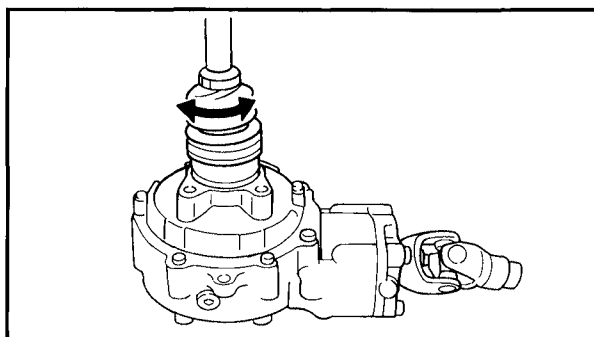
- Bolts (1) (bearing housing-upper)



**Bolts (bearing housing-upper):**  
28 Nm (2.8 m•kg, 20 ft•lb)

6

## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**


### 12. Check:

- Differential gear operation  
Unsmooth operation → Replace differential gear assembly.  
Insert the double off-set joint into the differential gear, and turn the gear back and forth.

### 13. Check:

- Gear lash  
Out of specification → Adjust.  
Refer to the "MEASUREMENT AND ADJUSTMENT" section.

## INSTALLATION

Reverse the "REMOVAL" procedures. Note the following points.

### 1. Lubricate:

- Drive shaft splines


**Lithium soap base grease**

### 2. Install:

- Front drive shaft ①
- Spring seat ②
- Spring ③

### NOTE:

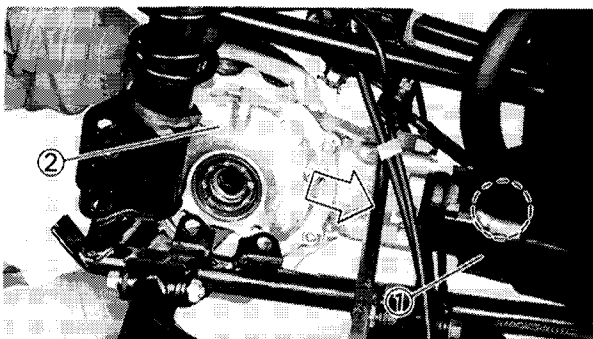
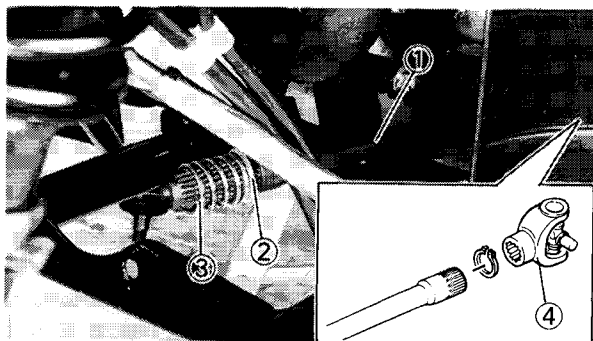
Insert the drive shaft into the universal joint ④ properly.

### 3. Install:

- Drive shaft cover ① (front half)
- Differential gear case ②

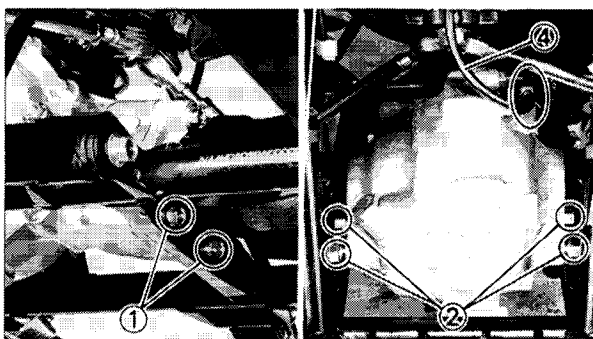
### NOTE:

Connect the differential gear case universal joint to the front drive shaft properly.

**6**




## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

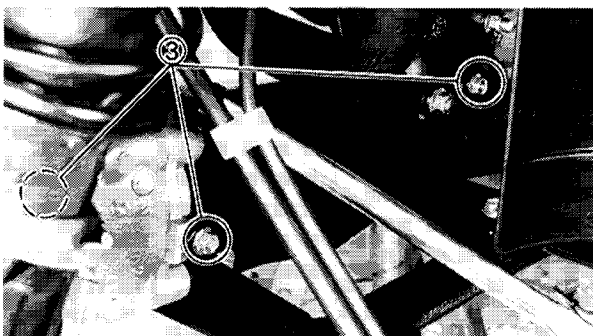
**DRIV**


### 4. Install:

- Bolts ① (differential gear case-rear)
- Bolts ② (differential gear case-front)
- Bolts ③ (drive shaft cover-front half)

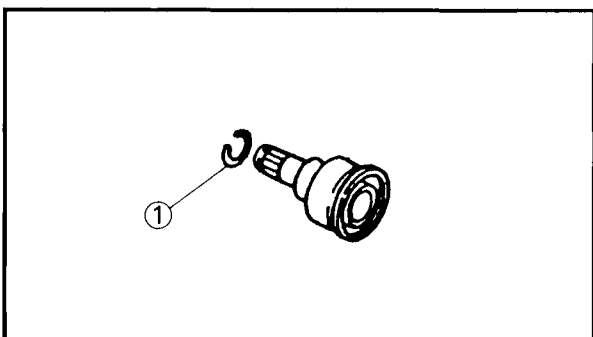
### NOTE:

In this step, temporarily install the bolts ①, ② and ③.



### 5. Connect:

- Breather hose ④



### 6. Install:

- Circlip ① (double off-set joint)

### ⚠ WARNING

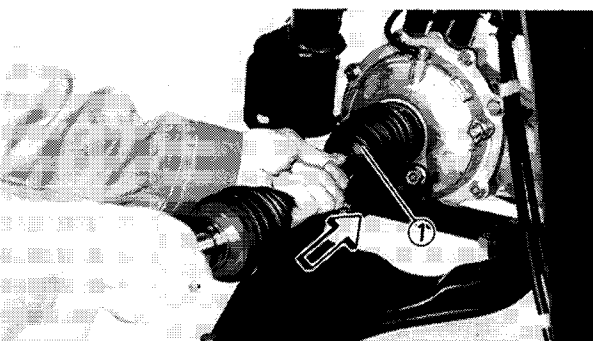
Always use a new circlip.

### 7. Lubricate:

- Constant velocity joint splines

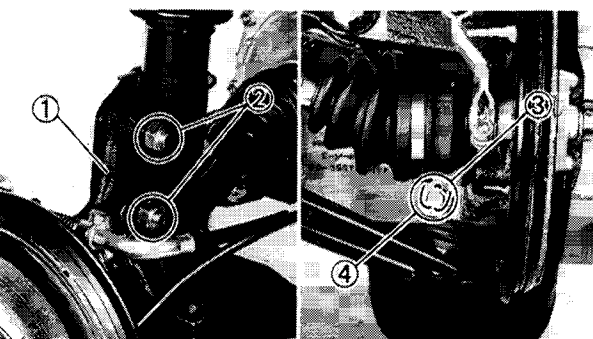


**Lithium soap base grease**



### 8. Install:

- Constant velocity joints ①

**6**


### 9. Install:

- Steering knuckle ①



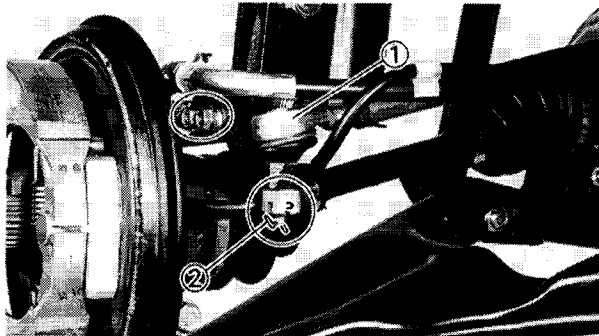
**Nuts ② (steering knuckle and front shock absorber):**

**69 Nm (6.9 m•kg, 50 ft•lb)**

**Nut ③ (steering knuckle and lower arm):**

**48 Nm (4.8 m•kg, 35 ft•lb)**

## DIFFERENTIAL GEAR AND CONSTANT VELOCITY JOINTS

**DRIV**

10. Install:

- Cotter pin ④

### **⚠ WARNING**

**Always use a new cotter pin.**

11. Connect:

- Tie-rod end ①  
(to steering knuckle)



**Nut (tie-rod end):**  
**25 Nm (2.5 m•kg, 18 ft•lb)**

12. Install:

- Cotter pin ②

### **⚠ WARNING**

**Always use a new cotter pin.**

13. Install:

- Front brake drum
- Front wheels

Refer to the "FRONT WHEELS AND  
FRONT BRAKE-INSTALLATION" section  
in the CHAPTER 7.

14. Check:

- Front drive shaft operation

\*\*\*\*\*

### **Front drive shaft operation checking steps:**

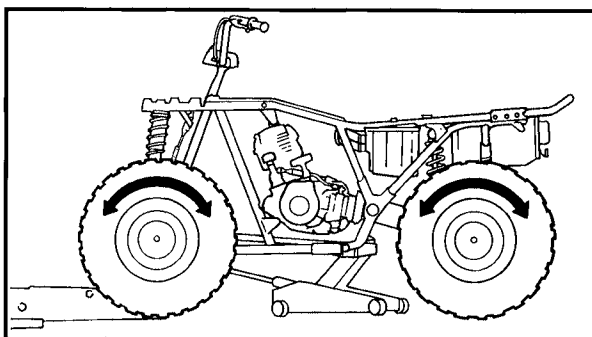
- Make sure that the machine is off the ground at the front.
- Place the suitable block under the swingarm.
- Lift the rear of the machine off the ground, too.

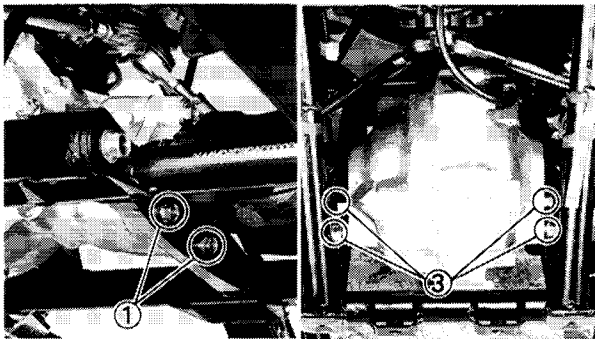
### **⚠ WARNING**

**Securely support the machine so there is no  
danger of it falling over.**

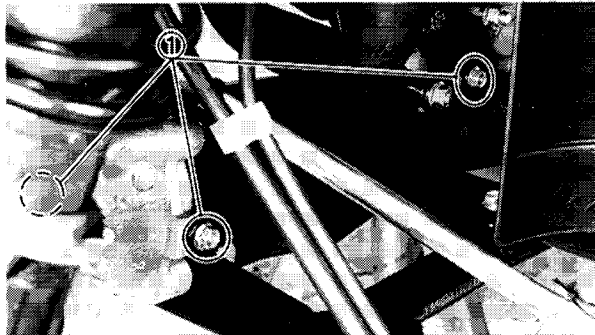
- Turn the rear wheels back and forth.
- Check the front drive shaft operation. If the operation is unsmooth, reinstall the front drive shaft properly.

\*\*\*\*\*



**DIFFERENTIAL GEAR AND  
CONSTANT VELOCITY JOINTS****DRIV****15. Tighten:**

- Bolts ① (differential gear case-rear)
- Bolts ② (differential gear case-front)
- Bolts ③ (drive shaft cover-front half)

**Bolts (differential gear case-rear):****30 Nm (3.0 m•kg, 22 ft•lb)****Bolts (differential gear case-front):****52 Nm (5.2 m•kg, 37 ft•lb)****16. Fill:**

- Differential gear case

Refer to the "DIFFERENTIAL GEAR OIL REPLACEMENT" section in the CHAPTER 3.

**17. Install:**

- Front bumper

Refer to the "FENDERS AND FUEL TANK" section in the CHAPTER 3.

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## MIDDLE GEARS AND TRANSFER GEARS

DRIV



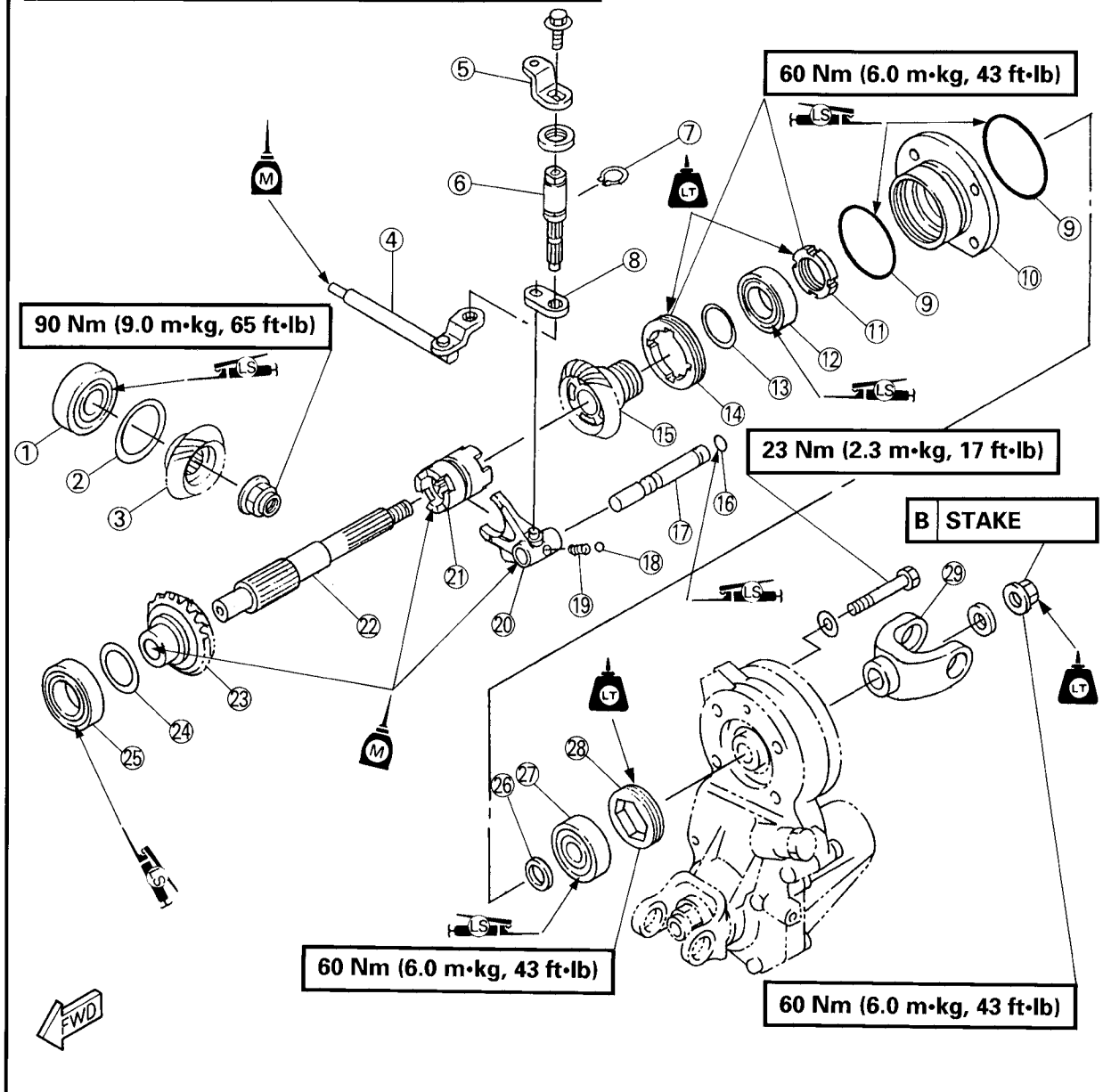
## MIDDLE GEARS AND TRANSFER GEARS

## MIDDLE GEARS

- |                     |                             |   |
|---------------------|-----------------------------|---|
| ① Bearing           | ⑪ Reverse gear securing nut | ⑳ Dog clutch                                |
| ② Shims             | ⑫ Bearing                   | ㉑ Middle driven shaft (for rear final gear) |
| ③ Drive pinion gear | ⑬ Shims                     | ㉒ Driven pinion gear                        |
| ④ Stopper shaft     | ⑭ Bearing retainer 2        | ㉓ Shims                                     |
| ⑤ Lever             | ⑮ Reverse gear              | ㉔ Bearing                                   |
| ⑥ Shift lever shaft | ⑯ O-ring                    | ㉕ Shims                                     |
| ⑦ Circlip           | ⑰ Shift fork guide bar      | ㉖ Bearing                                   |
| ⑧ Shift lever       | ⑱ Ball                      | ㉗ Bearing retainer 1                        |
| ⑨ O-ring            | ㉘ Spring                    | ㉙ Universal joint yoke                      |
| ⑩ Bearing housing   | ㉚ Shift fork                |   |

## MIDDLE GEARLASH:

- A**
- FORWARD : 0.1~0.2 mm (0.004~0.008 in)**
- REVERSE : 0.10~0.25 mm (0.004~0.010 in)**

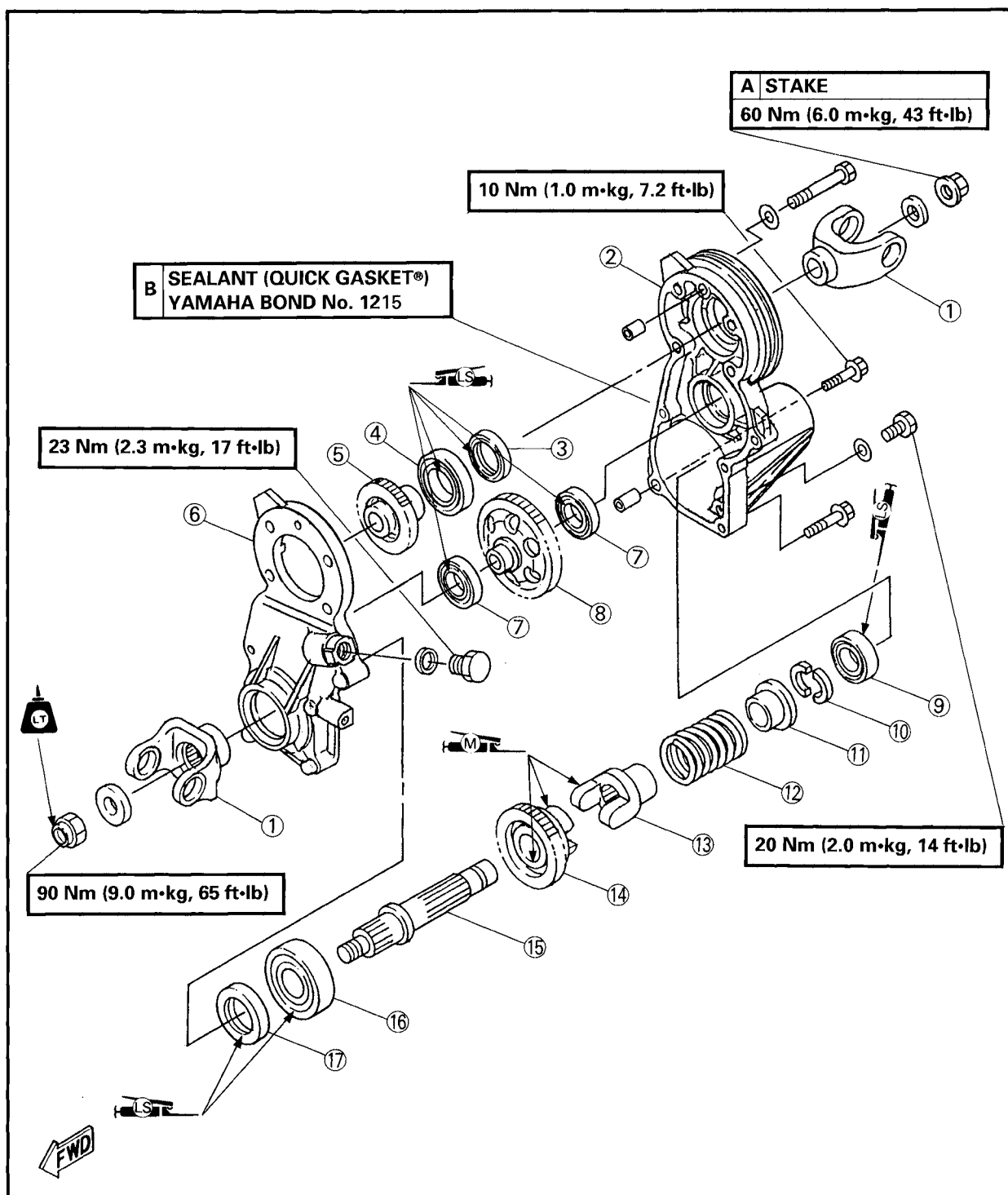


# MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


## TRANSFER GEARS

- |                              |  |
|------------------------------|--|
| ① Universal joint yoke       | ⑩ Retainers                                      |
| ② Transfer gear case (rear)  | ⑪ Holder   |
| ③ Oil seal                   | ⑫ Damper spring                                  |
| ④ Bearing                    | ⑬ Damper cam                                     |
| ⑤ Transfer drive gear (23T)  | ⑭ Transfer driven gear (26T)                     |
| ⑥ Transfer gear case (front) | ⑮ Middle driven shaft<br>(for differential gear) |
| ⑦ Bearing                    | ⑯ Bearing  |
| ⑧ Idler gear (32T)           | ⑰ Oil seal                                       |
| ⑨ Bearing                    |  |

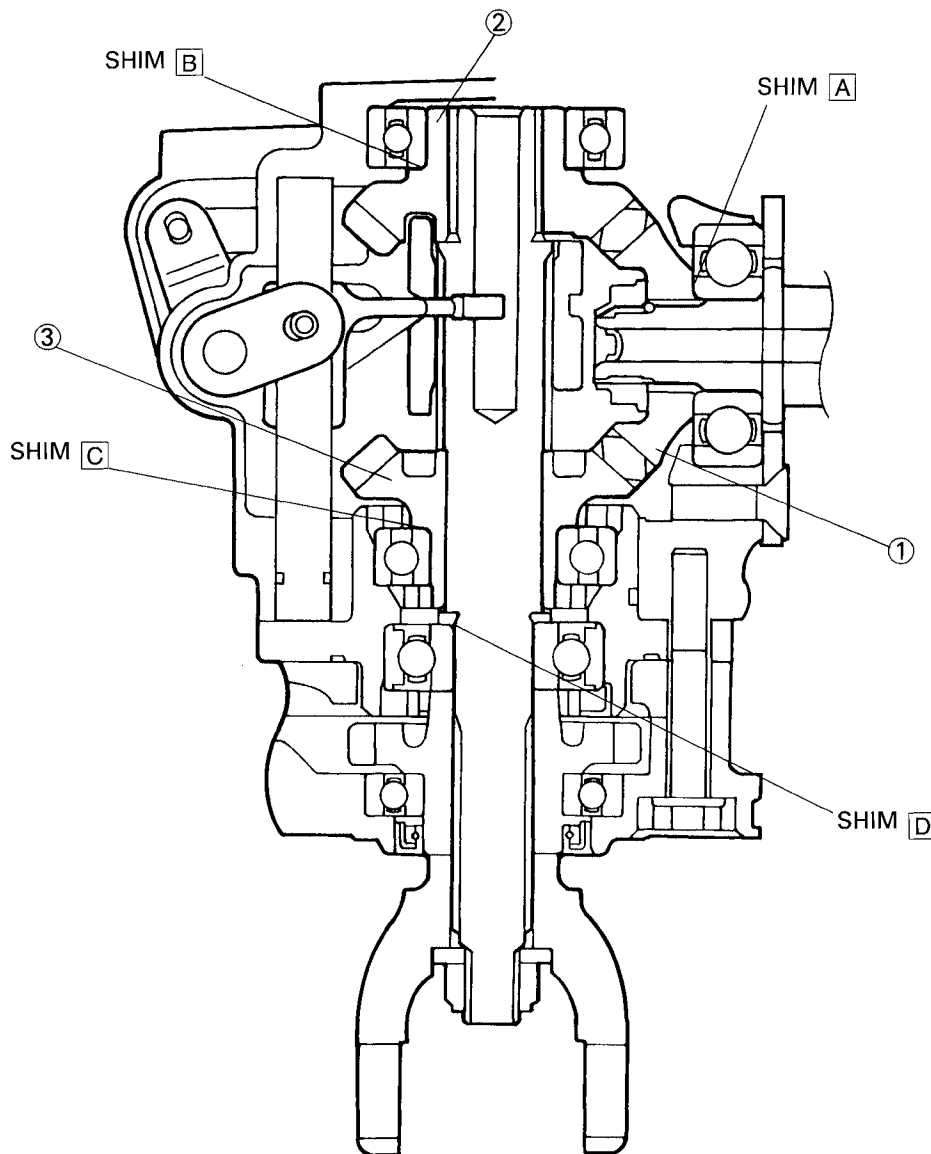


**MIDDLE GEARS AND TRANSFER GEARS****DRIV****MIDDLE GEAR SHIMS**

When the crankcase assembly and/or the middle gear comp., etc. are replaced, be sure to adjust the middle gear shim(s).

Refer to the "MIDDLE GEAR SHIM SELECTION and MIDDLE GEAR LASH ADJUSTMENT" section.

- ① Drive pinion gear
- ② Driven pinion gear (forward gear)
- ③ Reverse gear
- A Drive pinion gear shim
- B Driven pinion gear shim
- C Reverse gear shim
- D Middle driven shaft shim



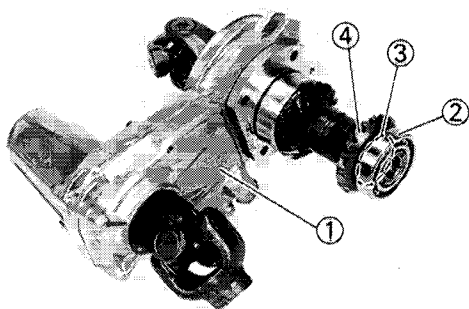
**MIDDLE GEARS AND TRANSFER GEARS****DRIV****REMOVAL****NOTE:**

It is necessary to remove the rear wheel drive assembly and engine assembly in order to service the middle gears and transfer gears, refer to the CHAPTER 4 "ENGINE OVERHAUL" section.

## 1. Remove:

- Engine assembly

Refer to the "ENGINE REMOVAL" section in the CHAPTER 4.

**DISASSEMBLY****Middle driven shaft and transfer gear assembly**

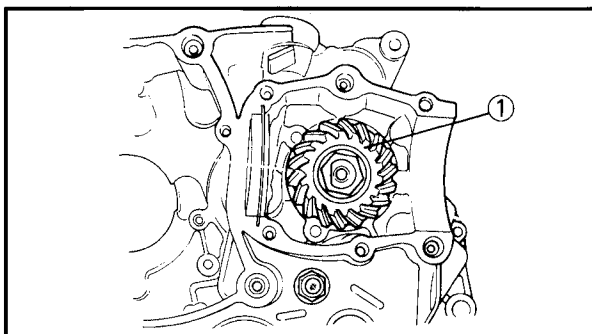
## 1. Remove:

- Cylinder head
- Cylinder and piston
- CDI magneto (for rear final gear)
- Middle driven shaft (for rear final gear) and transfer gear assembly ①

Refer to the "ENGINE DISASSEMBLY" section in the CHAPTER 4.

## 2. Remove:

- Bearing ②
- Shim(s) ③
- Reverse gear ④

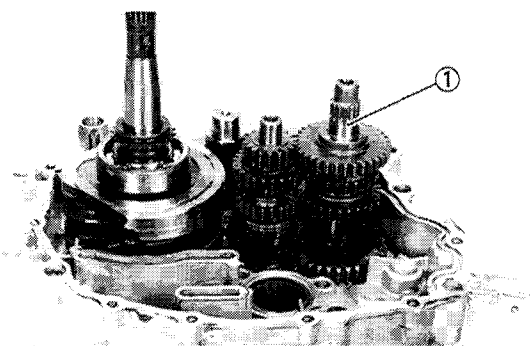
**6****Middle drive pinion gear and middle drive axle**

## 1. Remove:

- Primary clutch
- Middle drive pinion gear ①

Refer to the "ENGINE DISASSEMBLY" section in the CHAPTER 4.

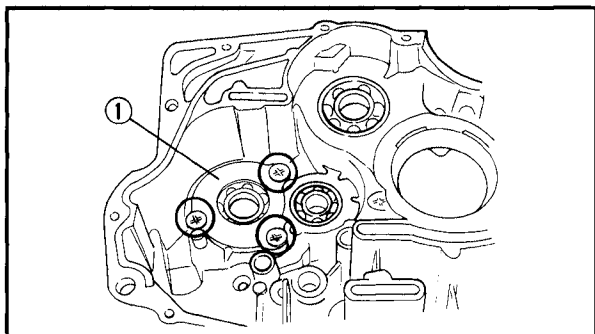
## MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


### 2. Remove:

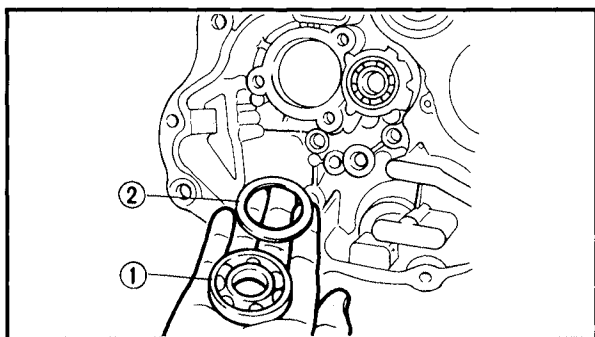
- Secondary clutch
- Balancer driven gear
- Crankcase (left)
- Middle drive axle (1)

Refer to the "ENGINE DISASSEMBLY" section in the CHAPTER 4.



### 3. Remove:

- Bearing retainers (1)
- Use a #40 Torx driver.



### 4. Remove:

- Bearing (1)
- Shim (2)

### Middle driven shaft (for rear final gear)

#### 1. Remove:

- Universal joint

\*\*\*\*\*

#### Universal joint removal steps:

- Remove the circlips (1).
- Place the universal joint in a press.
- With a suitable diameter pipe (2) beneath the yoke (3), press the bearing (4) into the pipe as shown.

**NOTE:** \_\_\_\_\_

It may be necessary to lightly tap the yoke with a punch.

\_\_\_\_\_

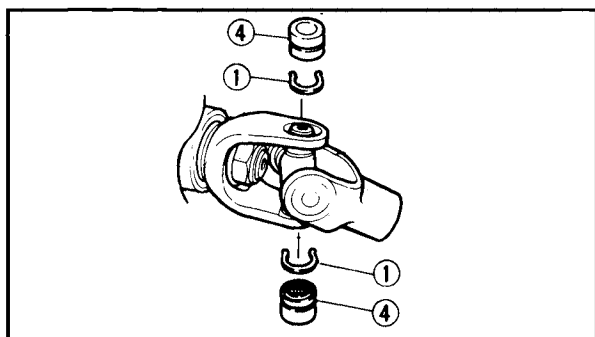
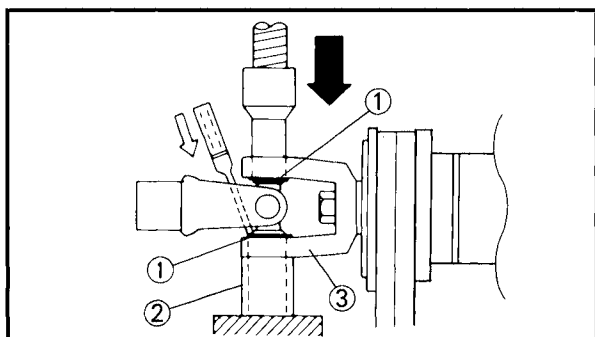
- Repeat the steps for the opposite bearing.
- Remove the yoke.

**NOTE:** \_\_\_\_\_

It may be necessary to lightly tap the yoke with a punch.

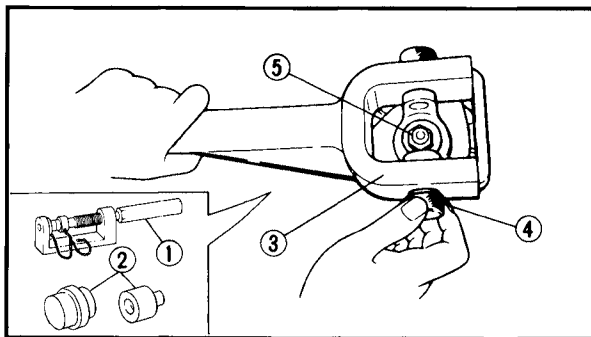
\_\_\_\_\_

\*\*\*\*\*

**6**




# MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


## 2. Attach:

- Universal joint holder
- Attachment  
(to the universal joint yoke)



### Universal joint holder:

P/N: YM-04062- ①, 90890-04062

③

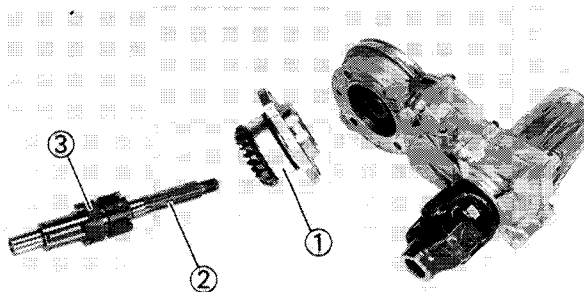
### Attachment:

P/N: YM-33291- ②, 90890-04096

④

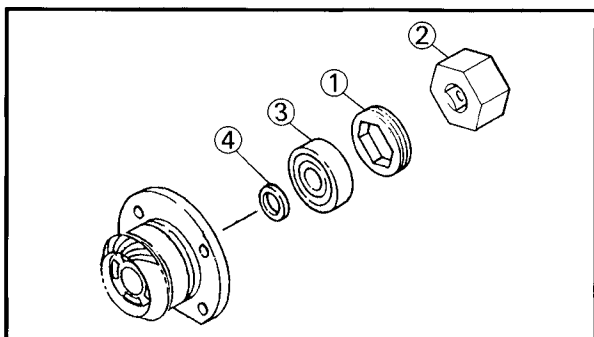
## 3. Remove:

- Nut ⑤
- Washer
- Yoke



## 4. Remove:

- Bearing housing ①
- Middle driven shaft ②
- Dog clutch ③



## 5. Remove:

- Bearing retainer ①

### NOTE:

Use the Bearing retainer wrench ② to remove the bearing retainer ①.



**Bearing retainer wrench 32mm  
(1.26 in)**

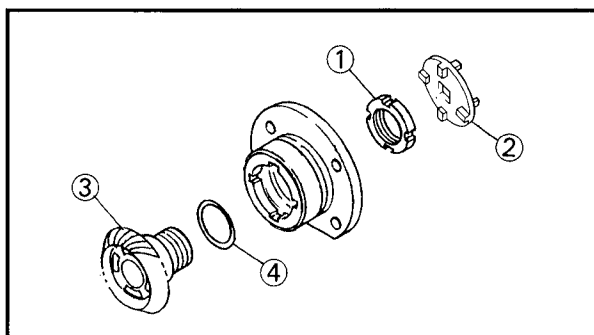
P/N: YM-33289, 90890-04104

## 6. Remove:

- Bearing ③
- Shim(s) ④

# 6

# MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


7. Remove:

- Reverse gear securing nut ①

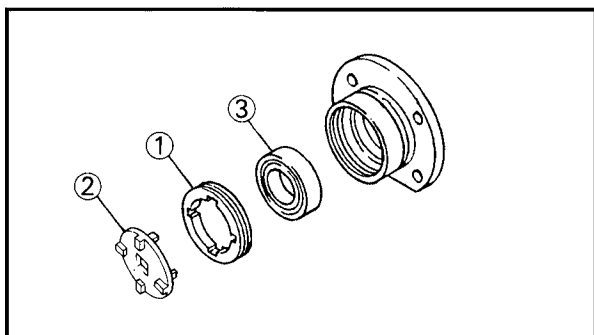
**NOTE:**

The reverse gear securing nut ① has left-hand threads; turn the nut clockwise by using the Ring nut wrench ② to loosen it.


**Ring nut wrench:**
**P/N. YM-1391, 90890-01391**

8. Remove:

- Reverse gear ③
- Shim(s) ④



9. Remove:

- Bearing retainer ①

**NOTE:**

- Use the Ring nut wrench ② to remove the bearing retainer ①.


**Ring nut wrench:**
**P/N. YM-1391, 90890-01391**

10. Remove:

- Bearing ③

**Shift lever**

1. Remove:

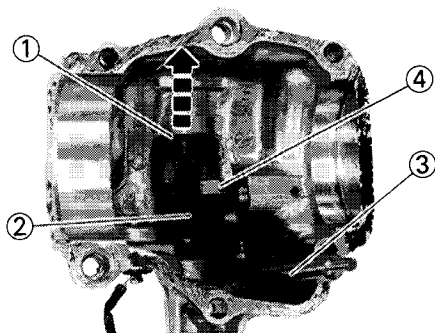
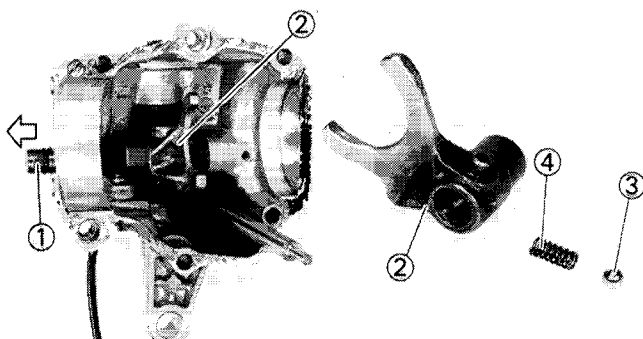
- Shift fork guide bar ①
- Shift fork ②
- Ball ③
- Spring ④

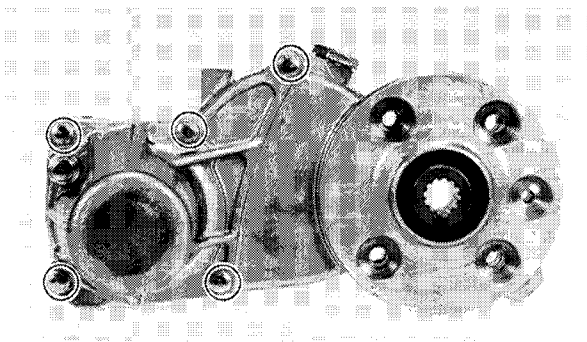
**NOTE:**

When removing the shift fork guide bar ①, the ball ③ will fall off. Take care not lose it.

2. Remove:

- Circlip ①
- Shift lever shaft ②
- Stopper shaft ③
- Shift lever ④

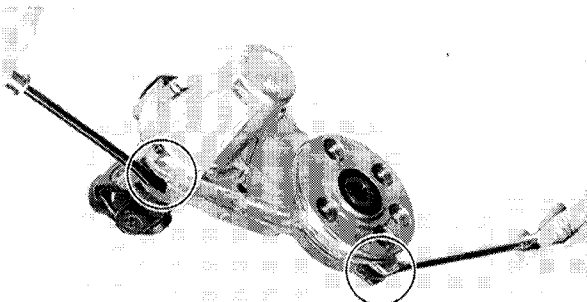
**6**


**MIDDLE GEARS AND TRANSFER GEARS****DRIV****Middle driven shaft (for differential gear)**

1. Remove:
  - Bolts (transfer gear case-rear)

**NOTE:**

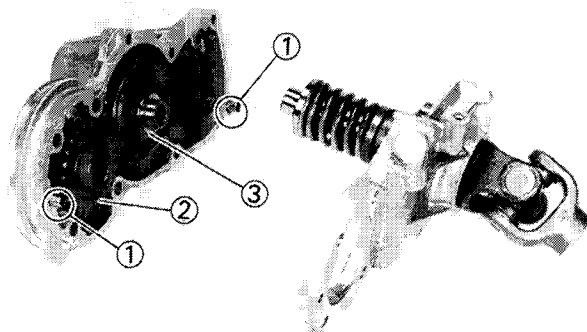
Working in a crisscross pattern, loosen bolt 1/4 turn each. Remove them after all loosened.



2. Remove:
  - Transfer gear case (rear)

**NOTE:**

- For this removal, tabs on the transfer gear case can be used as shown.
- When removing the transfer gear case, the dowel pins may fall off. Take care not to lose these parts.



3. Remove:
  - Dowel pins ①
  - Transfer drive gear ②
  - Idle gear ③

4. Remove:
  - Universal joint (for differential gear)

\*\*\*\*\*

**Universal joint removal steps:**

- Remove the circlips ①.
- Place the universal joint in a press.
- With a suitable diameter pipe ② beneath the yoke ③, press the bearing into the pipe as shown.

**NOTE:**

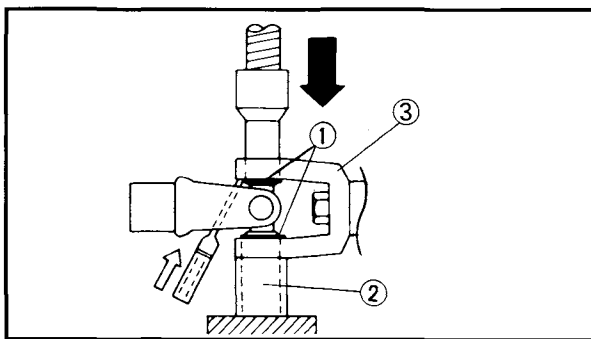
It may be necessary to lightly tap the yoke with a punch.

- Repeat the steps for the opposite bearing.
- Remove the yoke.

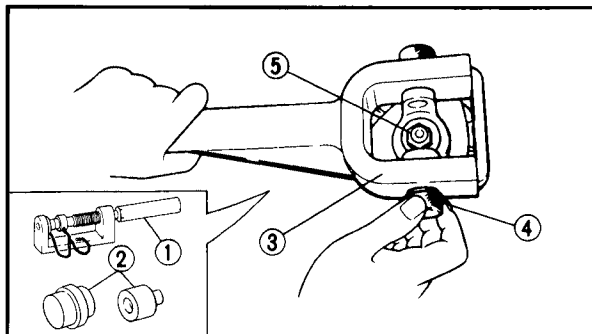
**NOTE:**

It may be necessary to lightly tap the yoke with a punch.

\*\*\*\*\*

**6**

## MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


### 5. Attach:

- Universal joint holder
- Attachment  
(to the universal joint yoke)



### Universal joint holder:

P/N. YM-04062 ①, 90890-04062

③

### Attachment:

P/N. YM-33291 ②, 90890-04096

④

### 6. Remove:

- Nut ⑤ (middle driven shaft-front differential gear)
- Washer
- Yoke

### 7. Remove:

- Middle driven shaft assembly ① (for differential gear)

\*\*\*\*\*

### Middle driven shaft assembly (for differential gear) removal steps:

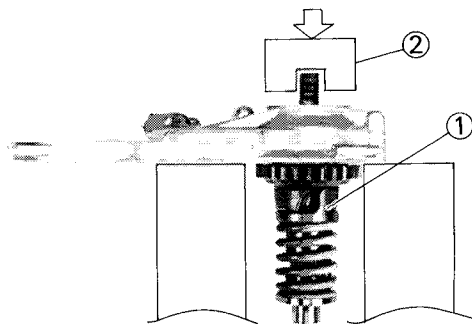
- Clean the outside of the middle driven shaft.
- Place the middle driven shaft assembly with transfer gear case (rear) onto the Hydraulic press.

### CAUTION:

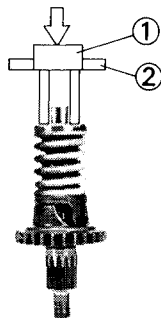
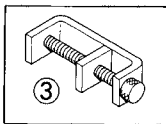
- Never directly press the shaft end with a hydraulic press, this will result in damage to the shaft thread.
- Install the suitable socket ② on the shaft end to protect the thread from damage.

- Press the shaft end, and remove the middle driven shaft assembly.

\*\*\*\*\*


**6**

## MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


### 8. Attach:

- Damper spring compressor
- Middle drive gear holder  
(onto the holder of transfer driven gear)



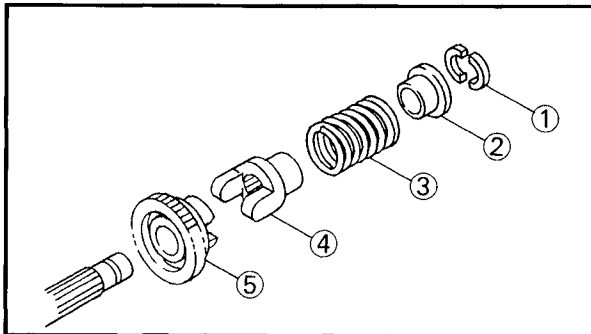
### Damper spring compressor:

P/N. YM-33286 ①, 90890-04090

③

### Middle drive gear holder:

P/N. YM-33222 ②



### 9. Position:

- Middle driven shaft assembly  
(onto a Hydraulic press)

### 10. Compress the damper spring on the holder.

### 11. Remove:

- Retainers ①
- Holder ②
- Damper spring ③
- Damper cam ④
- Transfer driven gear ⑤

## INSPECTION

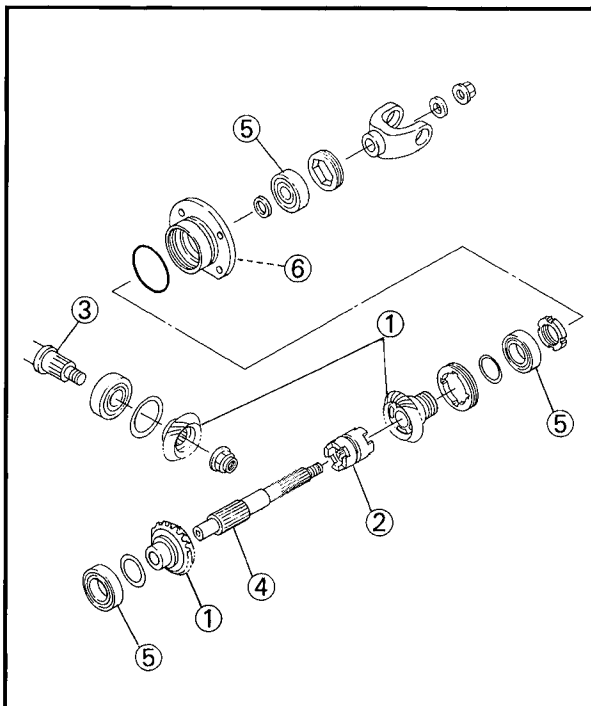
### Middle drive axle and middle driven shaft (for rear final gear)

#### 1. Inspect:

- Gear teeth ① (middle gear comp.)  
Pitting/Galling/Wear → Replace.
- Dog clutch ②  
Wear/Cracks/Damage → Replace.
- Middle drive shaft ③
- Middle driven shaft ④ (for rear final gear)  
Bends/Damage → Replace.

#### NOTE:

When the middle gear and/or middle driven shaft are replaced, be sure to adjust the middle gear shim(s), refer to the "MIDDLE GEAR SHIM SELECTION" section.

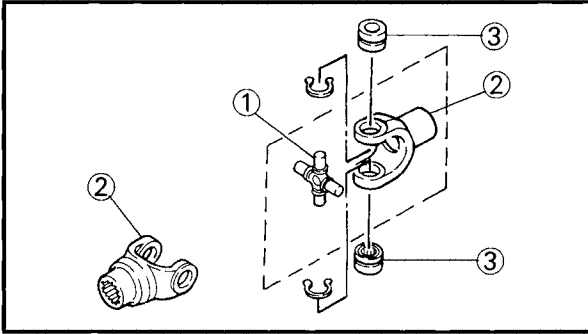


#### 2. Inspect:

- Bearings ⑤  
Pitting/Damage → Replace.
- Oil seal ⑥  
Wear/Damage → Replace.

# 6

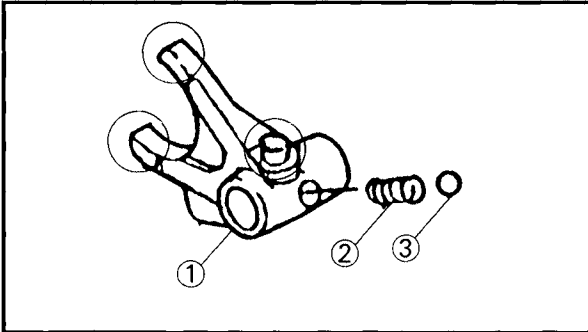
## MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


### 3. Check:

- Universal joint ①
- Yoke ②
- Bearings ③

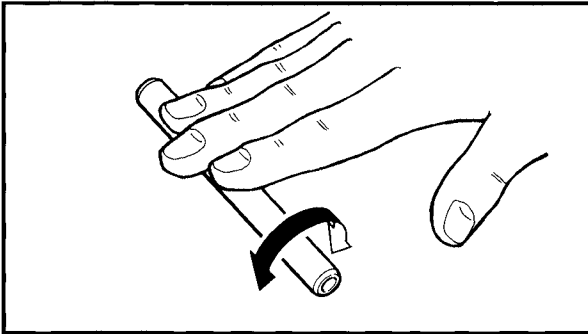
Wear/Cracks/Damage → Replace.



### Shift lever

#### 1. Inspect:

- Shift fork ①  
Wear/Chafing/Bends/Damage → Replace.
- Spring ②  
Wear/Damage → Replace.
- Ball (stopper) ③  
Wear/Damage/Scratches → Replace.

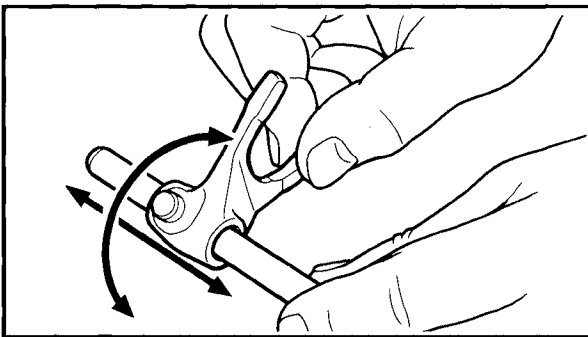


#### 2. Inspect:

- Guide bar  
Bends → Replace.  
Roll the guide bar on a flat surface.

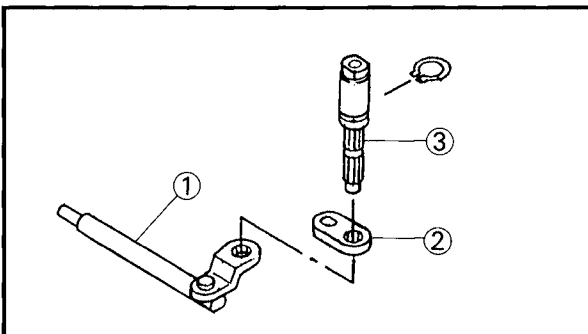
### **⚠ WARNING**

**Do not attempt to straighten a bent guide bar.**

**6**


### 3. Check:

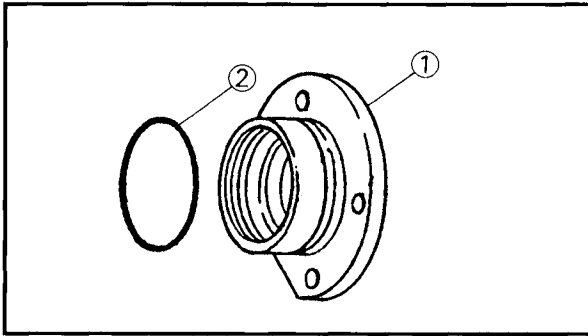
- Shift fork movement  
Unsmooth operation → Replace fork and/or guide bar.



#### 4. Inspect:

- Stopper shaft ①
- Shift lever ②
- Shift lever shaft ③  
Bends/Cracks/Damage → Replace.

## MIDDLE GEARS AND TRANSFER GEARS

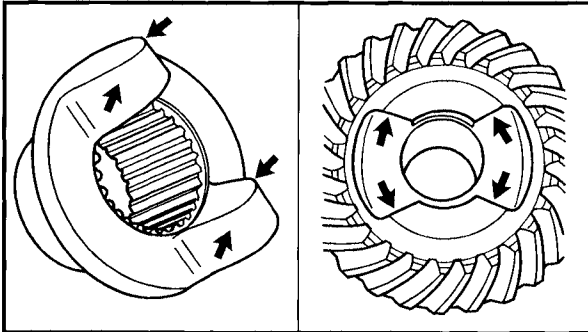
**DRIV**


### 5. Inspect:

- Bearing housing (1)  
Cracks/Damage → Replace bearing housing assembly.
- O-ring (2)  
Wear/Damage → Replace.

### NOTE:

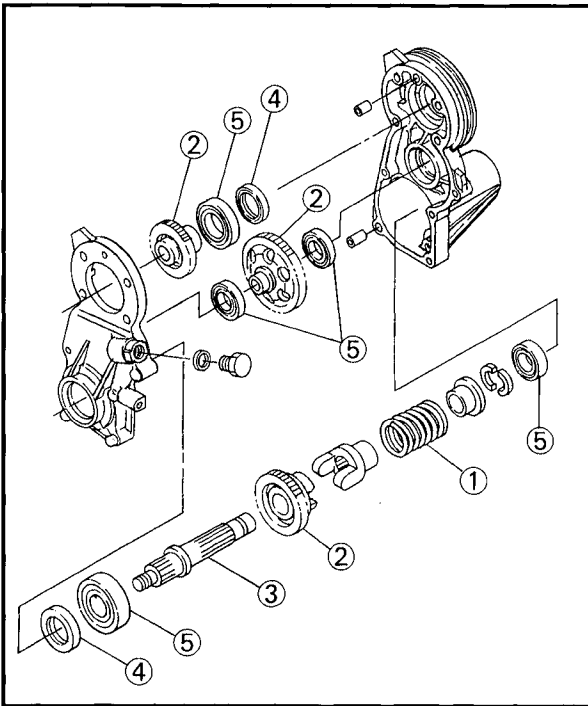
When the bearing housing assembly is replaced, be sure to adjust the middle gear shim(s), refer to the "MIDDLE GEAR SHIM SELECTION" section.



### Middle driven shaft (for differential gear)

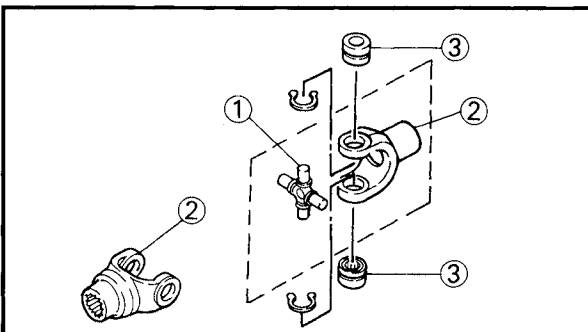
#### 1. Inspect:

- Damper cam surfaces  
Wear/Scratches → Replace damper and middle driven gear as a set.



#### 2. Inspect:

- Damper spring (1)  
Damage/Cracks → Replace.
- Gear teeth (2) (transfer gear comp.)  
Pitting/Galling/Wear → Replace transfer gear as a set.
- Middle driven shaft (3) (for rear final gear)  
Bends/Damage → Replace.
- Oil seals (4)  
Damage → Replace.
- Bearings (5)  
Pitting/Damage → Replace.



#### 3. Check:

- Universal joint (1)
- Yoke (2)
- Bearings (3)  
Wear/Cracks/Damage → Replace.

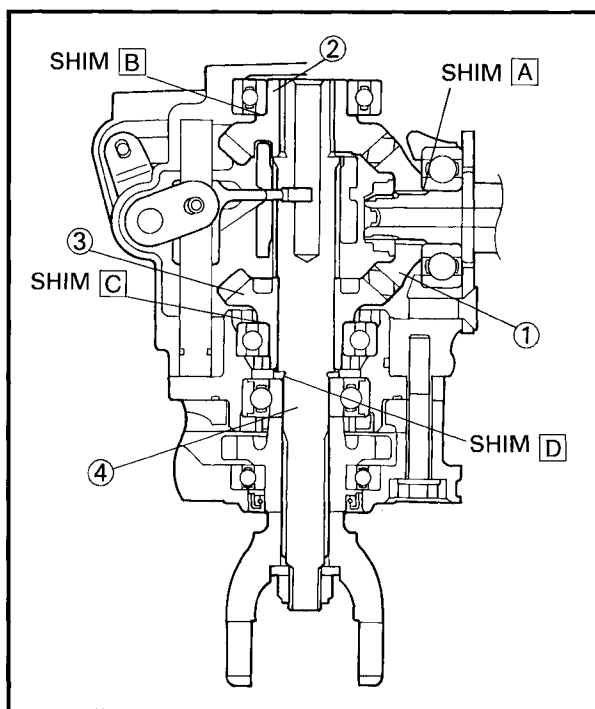
**MIDDLE GEARS AND TRANSFER GEARS****DRIV****MIDDLE GEAR SHIM SELECTION**

Install the crankcase, middle gears and middle driven shaft by using shim(s) with their respective thickness(es) calculated from the numbers specified on the following parts.

- Crankcase
- Drive pinion gear
- Driven pinion gear
- Reverse gear
- Bearing housing
- Middle driven shaft (for rear final gear)

Be sure to adjust the middle gear shim(s), when the following parts replaced.

- Crankcase
- Drive pinion gear
- Driven pinion gear
- Reverse gear
- Bearing housing
- Middle driven shaft (for rear final gear)

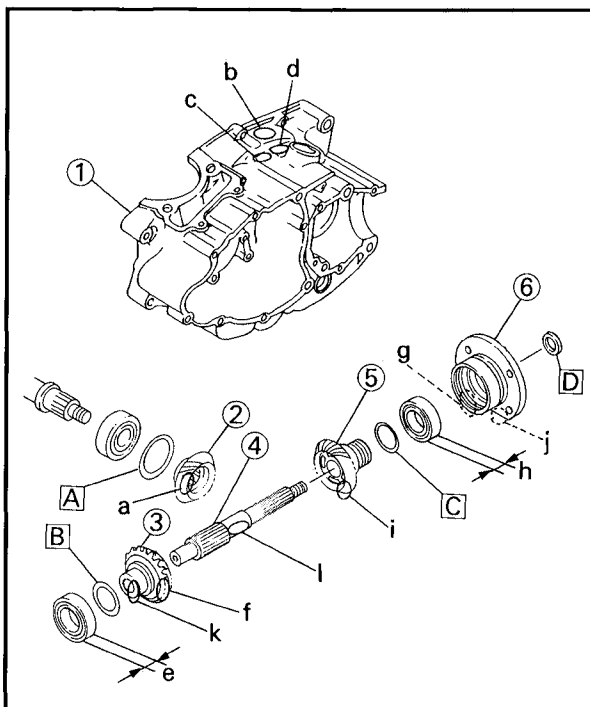
**Shim location**

- A** = Drive pinion gear shim  
**B** = Driven pinion gear shim  
**C** = Reverse gear shim  
**D** = Middle driven shaft shim

- ① Drive pinion gear  
 ② Driven pinion gear  
 ③ Reverse gear  
 ④ Middle driven shaft (for rear final gear)



# MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


Replaced parts	Adjustment shim			
Crankcase	A	B	C	D
Drive pinion gear	A			
Driven pinion gear		B		D
Reverse gear			C	D
Bearing housing			C	D
Middle driven shaft				D

**A** = a - b

**B** = c - d - e - f

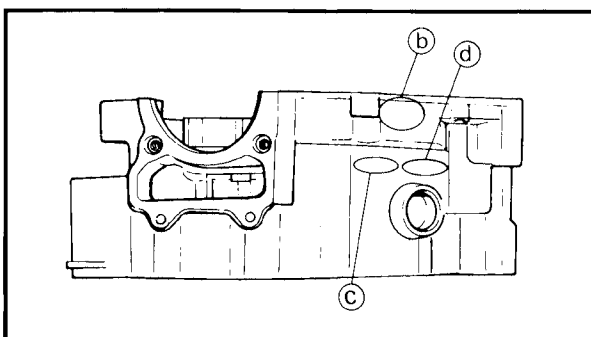
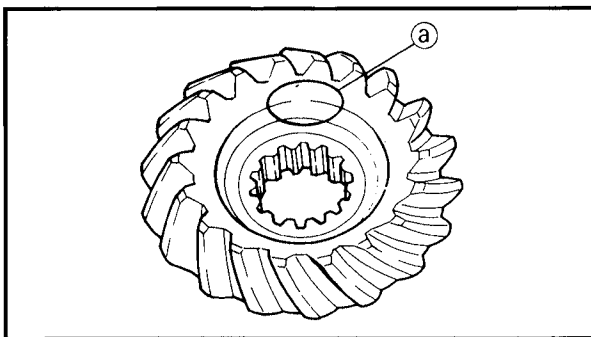
**C** = d - g - h - i

**D** = j + c - e - **B** - k - l - 0.25

- ① Crankcase (left)
- ② Drive pinion gear
- ③ Driven pinion gear
- ④ Middle driven shaft (for rear final gear)
- ⑤ Reverse gear
- ⑥ Bearing housing

**NOTE:**

- The gear back lash should be:  
0.1 mm~0.2 mm forward  
0.1 mm~0.25 mm rear
- Adjust the middle driven shaft in order to obtain the following thrust free play.  
0.1 mm~0.4 mm



\*\*\*\*\*

**Middle gear shims selection steps:**
**Shim selection **A****

- When the crankcase and/or the drive pinion gear are replaced, be sure to adjust the drive pinion gear shim **A**.
- To find drive pinion gear shim thickness "A" use following formula:

**Drive pinion gear shim thickness:**

$$\mathbf{A} = \textcircled{a} - \textcircled{b}$$

- ① = The stamped number on the drive pinion gear is either added to or subtracted from "42".
- ② = The stamped number on the crankcase is added to or subtracted from "41".

**NOTE:**

All stamped numbers are in hundredths of a mm.

**6**


## MIDDLE GEARS AND TRANSFER GEARS

DRIV



Example:

- 1) If the drive pinion gear is stamped "+02"  
..... (a) =  $42 + 0.02 = 42.02$
- 2) If the crankcase is stamped "45"  
..... (b) is =  $41 + 0.45 = 41.45$
- 3) Therefore, shim thickness (A) is,  
(A) =  $42.02 - 41.45 = 0.57$  mm
- 4) Shim sizes are supplied in the following thickness:

	<b>Drive pinion gear shim</b>	
<b>Thickness (mm)</b>	<b>0.15</b>	<b>0.40</b>
	<b>0.20</b>	<b>0.50</b>
	<b>0.30</b>	

Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

<b>Hundredths</b>	<b>Round value</b>
<b>0, 1, 2</b>	<b>0</b>
<b>3, 4, 5, 6, 7</b>	<b>5</b>
<b>8, 9</b>	<b>10</b>

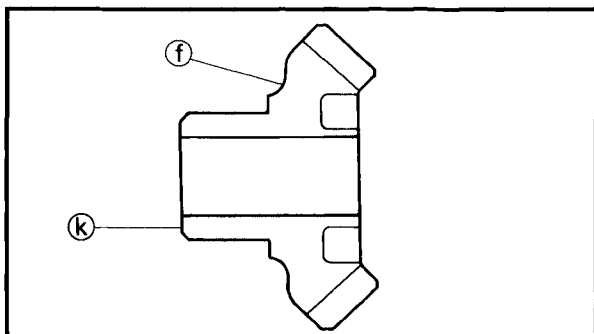
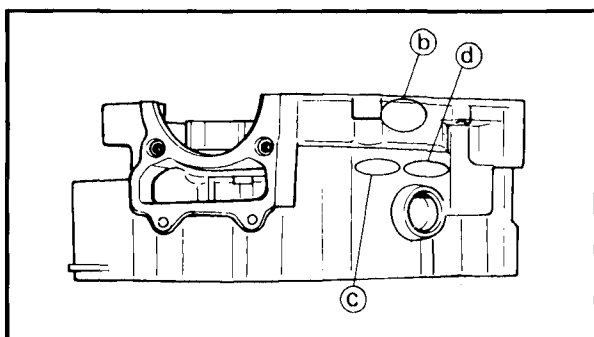
In the example above, the calculated shim thickness is 0.57 mm. The chart instructs you, however, to round off the 7 to 5, then shim thickness is 0.55 mm.

**Shim selection (B)**

- When the crankcase and/or the driven pinion gear are replaced, be sure to adjust the driven pinion gear shim (B).
- To find driven pinion gear shim thickness "B" use following formula:

**Drive pinion gear shim thickness:**

$$(B) = (C) - (d) - (e) - (f)$$

**MIDDLE GEARS AND TRANSFER GEARS****DRIV**

- © = The stamped number on the crankcase is added to or subtracted from "110".  
 d = The stamped number on the crankcase is subtracted from "59".  
 e = Bearing (driven pinion gear) thickness (considered constant) "13.00 mm".  
 f = The stamped number on the driven pinion gear is added to or subtracted from "37.5".

Example:

- 1) If the drive pinion gear is stamped "45"  
..... © =  $110 + 0.45 = 110.45$
- 2) If the crank case is stamped "-02"  
..... d =  $59 - 0.02 = 58.98$
- 3) If the driven pinion gear is stamped "+02"  
..... f =  $37.5 + 0.02 = 37.52$
- 4) Therefore, shim thickness B is,  
B =  $110.45 - 58.98 - 13.00 - 37.52 = 0.95$  mm
- 5) Shim sizes are supplied in following thickness:

Thickness (mm)	Drive pinion gear shim	
	0.15	0.40
	0.20	0.50
	0.30	

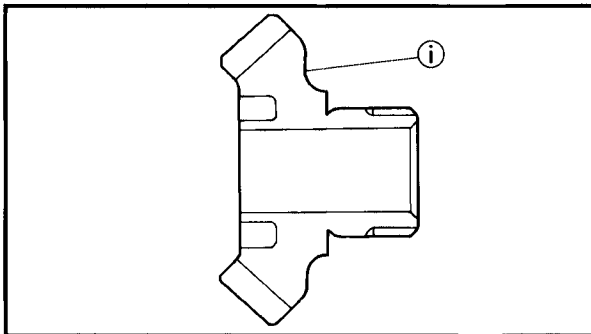
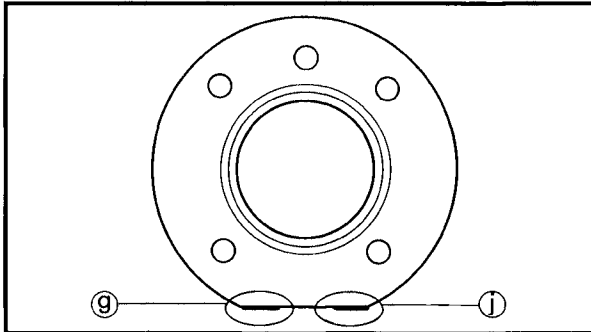
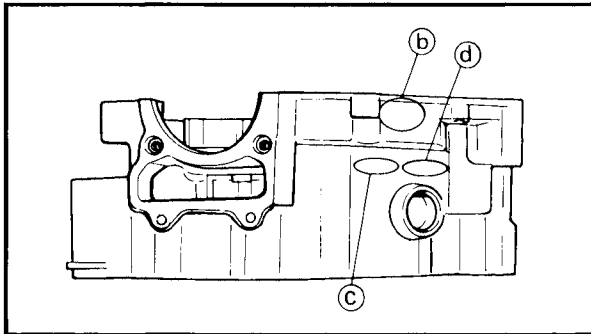
Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

Hundredths	Round value
0, 1	0
2, 3	3
4, 5, 6	5
7, 8	8
9	10

In the example above, the calculated shim thickness is 0.95 mm. The chart instructs you, however, to round off the 5 to 5, then shim thickness is 0.95 mm.

## MIDDLE GEARS AND TRANSFER GEARS

DRIV

Shim selection  $\text{C}$ 

- When the crankcase, reverse gear and/or bearing housing are replaced, be sure to adjust the reverse gear shim  $\text{C}$ .
- To find reverse gear shim thickness "C" use following formula:


**Drive pinion gear shim thickness:**

$$\text{C} = \text{d} - \text{g} - \text{h} - \text{i}$$

- $\text{d}$  = The stamped number on the crankcase is subtracted from "59".
- $\text{g}$  = The stamped number on the bearing housing is subtracted from "7.5".
- $\text{h}$  = Bearing (reverse gear) thickness (considered constant) "12.00 mm".
- $\text{i}$  = The stamped number on the reverse gear is added to or subtracted from "39".

## Example:

- 1) If the crank case is stamped "-02".  
.....  $\text{d} = 59 - 0.02 = 58.98$
- 2) If the bearing, housing is stamped "-01".  
.....  $\text{g} = 7.5 - 0.01 = 7.49$
- 3) If the reverse gear is stamped "-02".  
.....  $\text{i} = 39 - 0.02 = 38.98$
- 4) Therefore, shim thickness  $\text{C}$  is,  
 $\text{C} = 58.98 - 7.49 - 12.00 - 38.98 = 0.51$  mm
- 5) Shim sizes are supplied in following thickness:

	Reverse gear shim	
	0.15	0.40
Thickness (mm)	0.20	0.50
	0.30	

Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

Hundredths	Round value
0, 1	0
2, 3	3
4, 5, 6	5
7, 8	8
9	10

In the example above, the calculated shim thickness is 0.51 mm. The chart instructs you, however, to round off the 1 to 0, then shim thickness is 0.50 mm.

## MIDDLE GEARS AND TRANSFER GEARS

DRIV

**Shim selection**  $\boxed{D}$ 

- When the crankcase, driven pinion gear, reverse gear, bearing housing and/or middle driven shaft (for rear final gear) are replaced, be sure to adjust the middle driven shaft shim  $\boxed{D}$ .
- To find reverse gear shim thickness "D" use following formula:

**Drive pinion gear shim thickness:**

$$\boxed{D} = \boxed{J} - \boxed{C} - \boxed{e} - \boxed{B} - \boxed{k} - \boxed{I} - 0.25$$

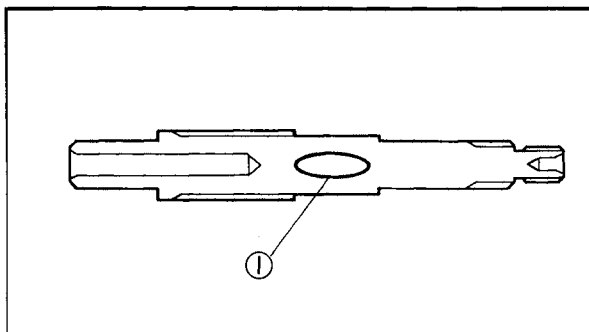
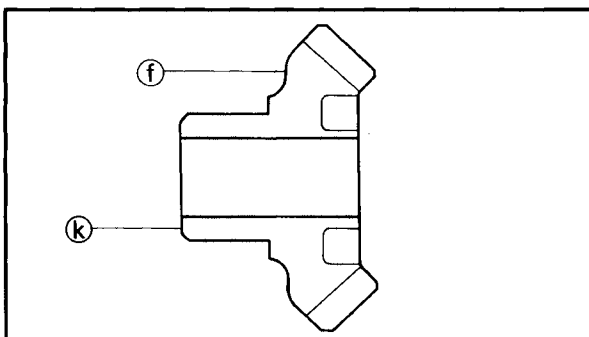
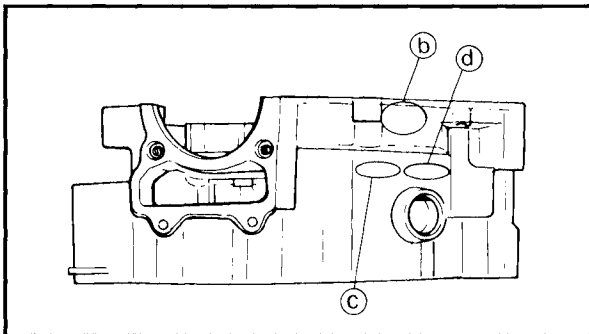
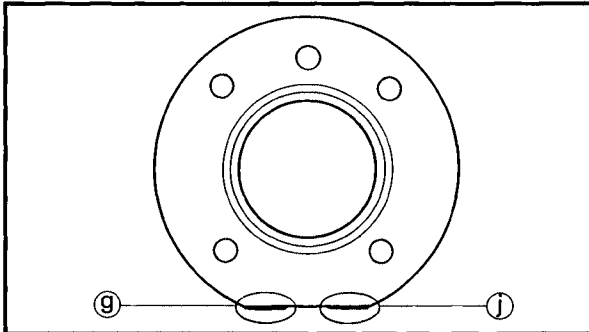
- $\boxed{J}$  = The stamped number on the bearing housing is subtracted from "1".
- $\boxed{C}$  = The stamped number on the crankcase is added to from "110".
- $\boxed{e}$  = Bearing (driven pinion gear) width "13.00".
- $\boxed{k}$  = The stamped number on the driven pinion gear (forward gear) is subtracted from "14.5".
- $\boxed{I}$  = The stamped number on the middle driven shaft is either added to or subtracted from "80.5".

**Example:**

- If the bearing housing is stamped "-03".  
.....  $\boxed{J} = 1 - 0.03 = 0.97$
- If the crankcase is stamped "45"  
.....  $\boxed{C} = 110 + 0.45 = 110.45$
- If the pinion gear is stamped "-02"  
.....  $\boxed{k} = 14.5 - 0.02 = 14.48$
- If the middle drive shaft is stamped "03"  
.....  $\boxed{I} = 80.5 + 0.03 = 80.53$
- Therefore, shim thickness  $\boxed{D}$  is,  
$$\boxed{D} = 0.97 + 110.45 - 13.00 - 0.95 - 14.48 - 80.53 - 0.25 = 2.21 \text{ mm}$$
- Shim sizes are supplied in following thickness:

	Middle driven gear shim	
Thickness (mm)	1.0	1.1
	1.2	1.3
	1.4	1.5
	1.6	1.7
	1.8	1.9

Because shims can only be selected in 0.10 mm increments, round off hundredths digit and select appropriate shim(s).



6

**MIDDLE GEARS AND TRANSFER GEARS**

Because shims can only be selected in 0.10 mm increments, round off hundredths digit and select appropriate shim(s).

Hundredths	Round value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

If the example above, the calculated shim thickness 2.21 mm. The chart instructs you, however, to round off the 1 to 0, then shim thickness is 2.20 mm.

\*\*\*\*\*

**MIDDLE GEAR LASH ADJUSTMENT****NOTE:**

When measuring middle gear backlash, tighten all securing bolts (middle gear case cover and bearing housing) with specified torque.

**1. Drain:**

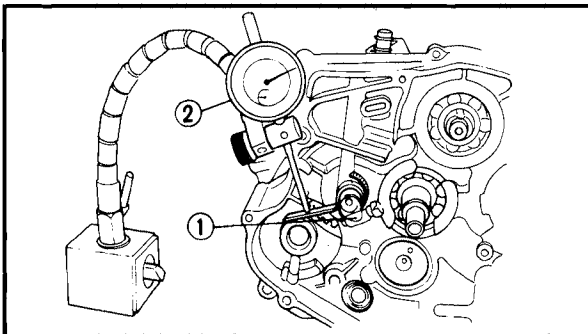
- Engine oil and transfer gear oil  
Refer to the "ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT" section in the CHAPTER 3.

**2. Remove:**

- Starter motor
- Crankcase cover (right)
- Primary and secondary clutches  
Refer to the "ENGINE DISASSEMBLY" section in the CHAPTER 4.

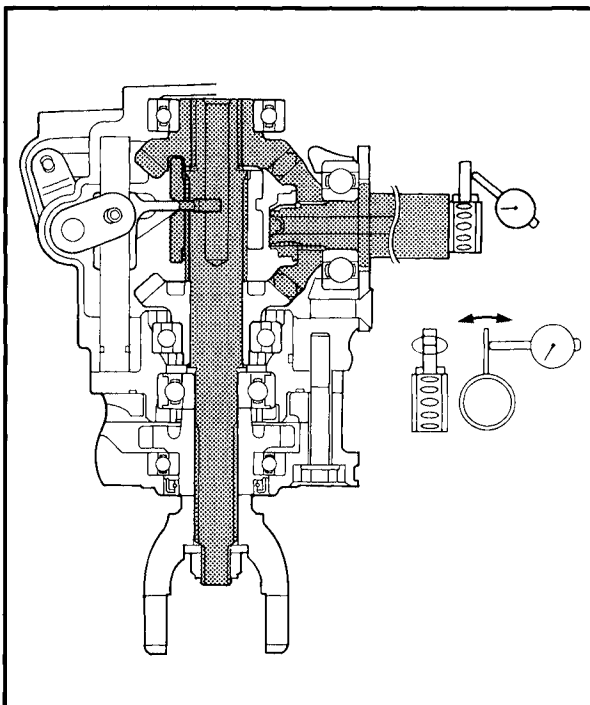
**3. Attach:**

- Gear lash measurement tool ①
- Dial gauge ②  
(to the middle drive axle end)



**Gear lash measurement tool:**  
P/N. YM-01231, 90890-01231  
**Dial gauge:**  
P/N. YM-03097, 90890-03097

## MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


### 4. Shift:

- Drive select lever  
In "FORWARD" position.

### 5. Measure:

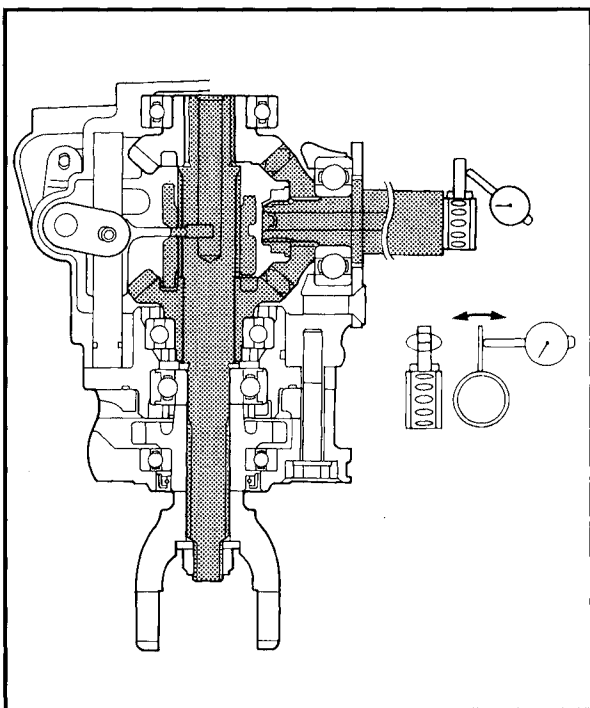
- Gear lash  
Over specified limit → Repair.  
Gently rotate the middle drive axle from engagement to engagement.



**Middle driven gear lash:**  
(using measurement tool):  
**0.1~0.2 mm (0.004~0.008 in)**

### NOTE:

Measure the gear lash at 4 positions. Rotate the shaft 90° each time.



### 6. Shift:

- Drive select lever  
In "REVERSE" position.

### 7. Repeat the step 4.

Over specified limit → Repair.



**Reverse gear lash:**  
**0.1~0.25 mm (0.004~0.010 in)**

### 8. Install:

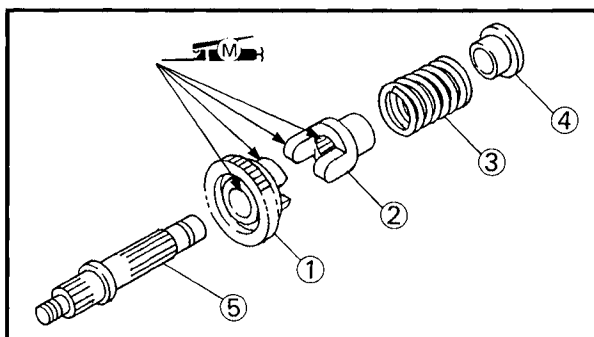
- Secondary and primary clutches
- Crankcase cover (right)
- Starter motor  
Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.

### 9. Fill:

- Crankcase
- Transfer gear case  
Refer to the "ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT" section in the CHAPTER 3.

## MIDDLE GEARS AND TRANSFER GEARS

DRIV



## ASSEMBLY

## Middle driven shaft (for differential gear)

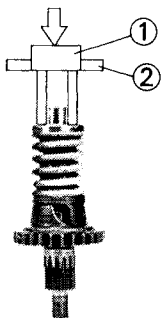
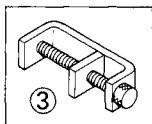
1. Lubricate:
  - Damper cam
  - Transfer driven gear

**Molybdenum disulfide grease**

- Oil seals
- Bearings

**Lithium soap base grease**

2. Install:
  - Transfer driven gear ①
  - Damper cam ②
  - Damper spring ③
  - Holder ④
 (to the middle driven shaft ⑤)



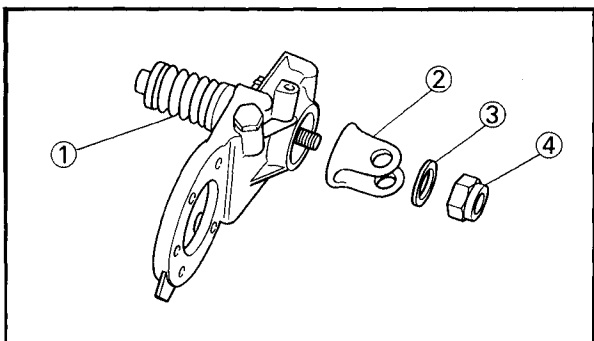
3. Attach:
  - Damper spring compressor
  - Middle drive gear holder
 (onto the holder of transfer driven gear)

**Damper spring compressor:****P/N. YM-33286 ① 90890-04090**

③

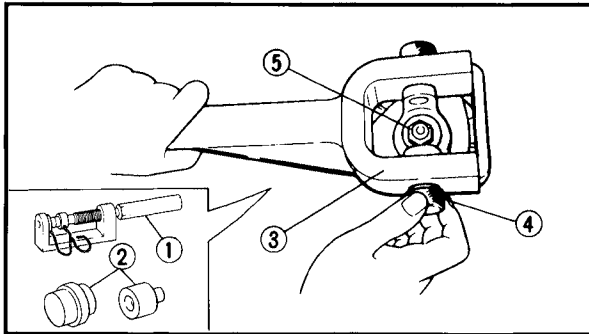
**Middle drive gear holder:****P/N. YM-33222 ②**

4. Position:
  - Middle driven shaft assembly
 (onto a Hydraulic press)
5. Compress the damper spring on the holder.
6. Install:
  - Retainers
 (into the middle driven shaft groove)



7. Install:
  - Middle driven shaft assembly ①
 (to the transfer gear case)
  - Yoke ②
  - Washer ③
  - Nut ④ (middle driven shaft-for differential gear)
 (to the middle driven shaft)



**MIDDLE GEARS AND TRANSFER GEARS****DRIV****8. Attach:**

- Universal joint holder
- Attachment  
(onto the universal joint yoke)

**Universal joint holder:****P/N. YM-04062 ① 90890-04062****③****Attachment:****P/N. YM-33291 ②, 90890-04096****④****9. Tighten:**

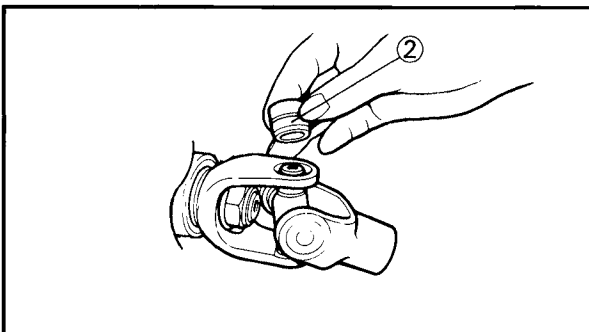
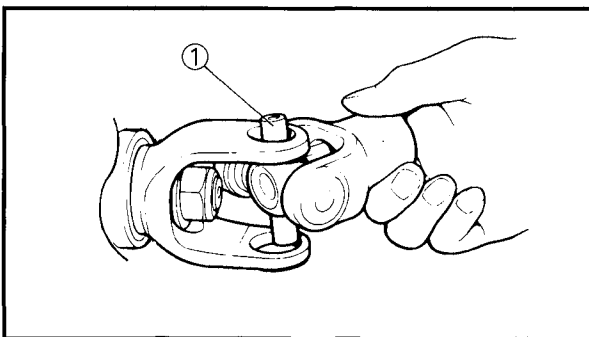
- Nut ⑤ (middle driven shaft-for differential gear)

**NOTE:**

Tighten the nut ⑤ carefully little by little till the middle driven shaft seats the bearing on the case. Then tighten the nut to the specified torque.

**Nut (middle driven shaft - for differential gear):****90Nm (9.0 m•kg, 65 ft•lb)****Use LOCTITE®****10. Install:**

- Universal joint (for differential gear)



\*\*\*\*\*

**Installation steps:**

- Install the universal joint ① into the yoke.
- Apply the wheel bearing grease to the bearings ②.
- Install the bearing onto the yoke.

**CAUTION:**

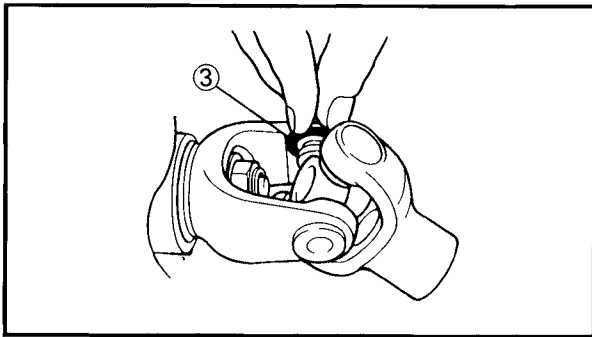
**Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.**

- Press each bearing into the yoke using a suitable socket.

**NOTE:**

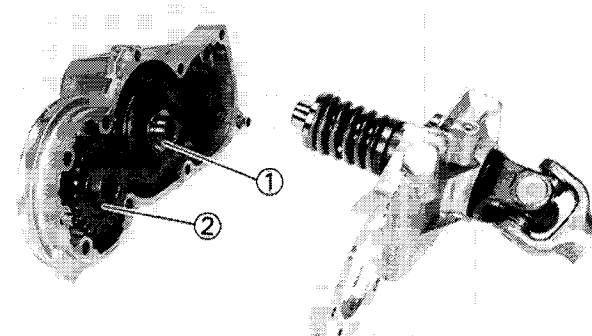
Bearing must be inserted far enough into yoke so that circlip can be installed.

**6**

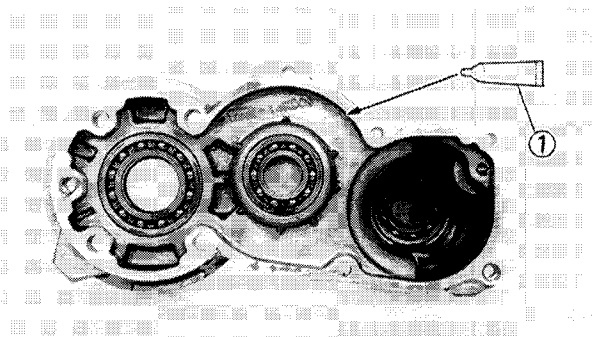
**MIDDLE GEAR S AND TRANSFER GEARS****DRIV**

- Install the circlips (3) into the groove of each bearing.

\*\*\*\*\*



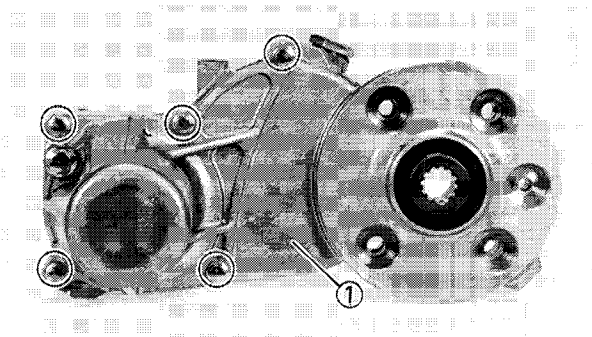
11. Install:
- Idle gear (1)
  - Transfer drive gear (2)



12. Apply:
- Sealant (1)  
(onto mating surfaces of both case halves)



**Sealant (Quick Gasket®):**  
**P/N. ACC-11001-01**  
**Yamaha Bond No. 1215:**  
**P/N. 90890-85505**



13. Install:
- Dowel pins
  - Transfer gear case (1) (rear)

14. Tighten:
- Bolts (transfer gear case)



**6mm Bolts (transfer gear case):**  
**10 Nm (1.0 m•kg, 7.2 ft•lb)**

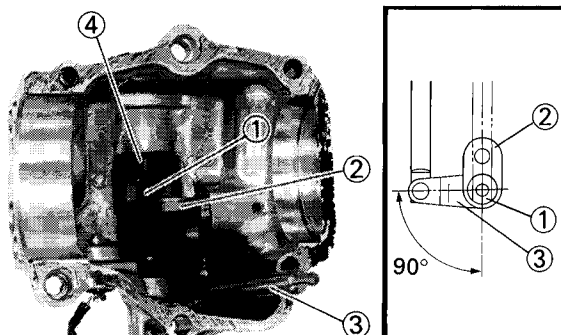
**NOTE:** \_\_\_\_\_

Tighten the bolts using a crisscross pattern.

\_\_\_\_\_

**6**

# MIDDLE GEARS AND TRANSFER GEARS

**DRIV**


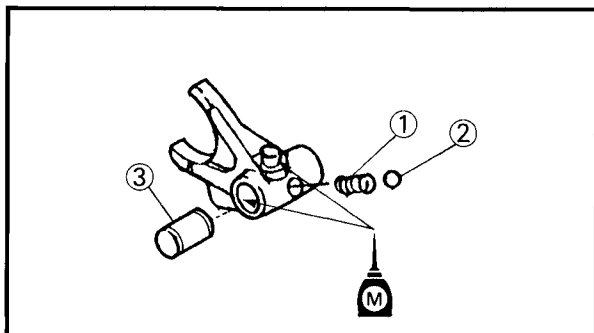
## Shift lever

### 1. Install:

- Shift lever shaft ①
- Shift lever ②
- Stopper shaft ③
- Circlip ④

### NOTE:

Install the shift lever ② and stopper shaft ③ to the shift lever shaft ① as shown.



### 2. Install:

- Spring ① (to shift fork)
- Ball ②

### NOTE:

When installing the shift fork onto the shift fork guide bar, place a dowel pin ③ (used for a crankcase cover) to hold the ball and spring in place.

### 3. Lubricate:

- Shift fork inner surface
- Dowel pin (shift fork)


**Molybdenum disulfide oil**

### 4. Install:

- Shift fork guide bar ① (with O-ring ②)
- Shift fork ③

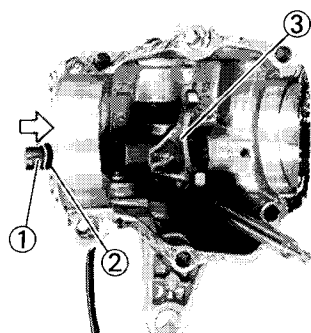
### NOTE:

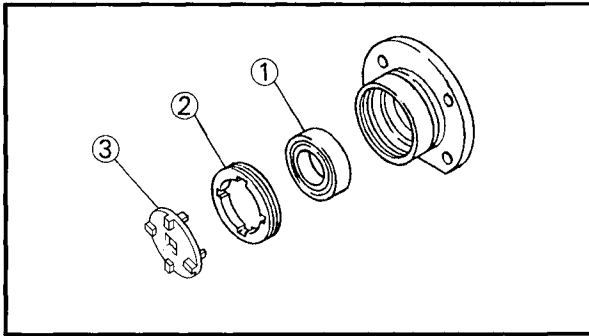
- Remove the dowel pin from the shift fork.
- Make sure that the shift fork performs smoothly.

## Middle driven shaft (for rear final gear)

### 1. Lubricate:

- Oil seals
- O-rings

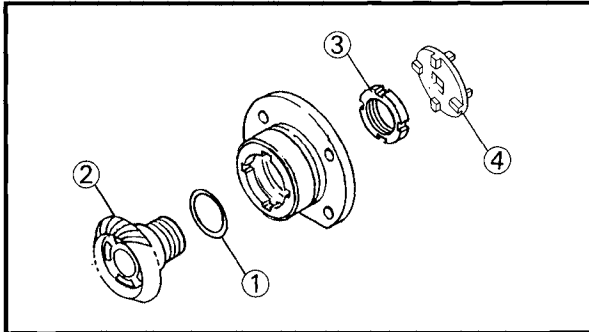

**Lithium soap base grease**

**6**

**MIDDLE GEARS AND TRANSFER GEARS****DRIV****2. Install:**

- Bearing (1) (to bearing housing)
- Bearing retainer (2)

**NOTE:**

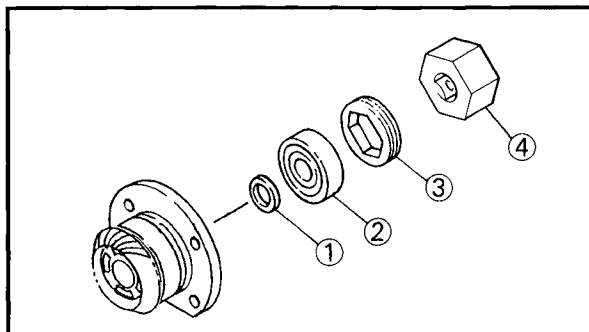
- Use the Ring nut wrench (3) to install the bearing retainer (2).

**Ring nut wrench:****P/N: YM-1391, 90890-01391****Bearing retainer:****60 Nm (6.0 m•kg, 43 ft•lb)****Use LOCTITE®****3. Install:**

- Shim(s) (1)
- Reverse gear (2)
- Reverse gear securing nut (3)

**NOTE:**

The reverse gear securing nut has left-hand threads, turn the nut counter clock wise by using the Ring nut wrench (4) to tighten it.

**Ring nut wrench:****P/N: YM-1391, 90890-01391****Reverse gear securing nut:  
(LEFT-HAND-THREADS)****60 Nm (6.0 m•kg, 43 ft•lb)****Use LOCTITE®****4. Install:**

- Shim(s) (1)
- Bearing (2)
- Bearing retainer (3)

**NOTE:**

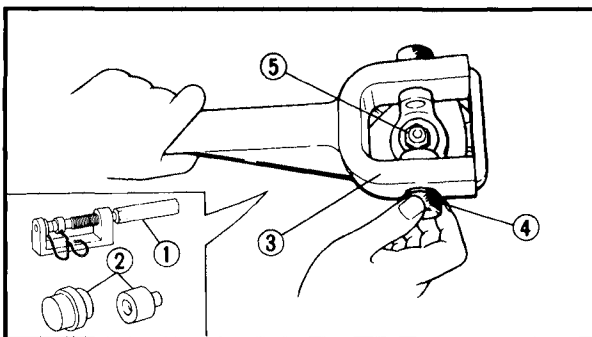
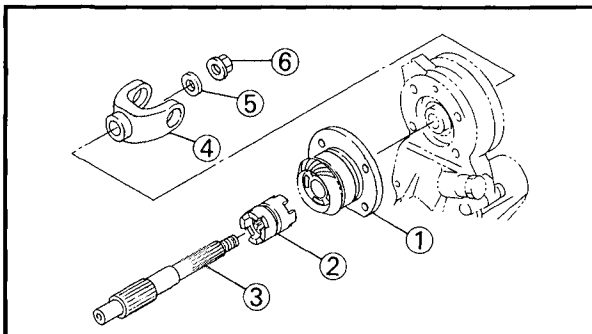
Use the Bearing retainer wrench (4) to install the bearing retainer (3).

**MIDDLE GEARS AND TRANSFER GEARS****DRIV**

**Bearing retainer wrench:**  
P/N. YM-33289, 90890-04104



**Bearing retainer:**  
60 Nm (6.0 m•kg, 43 ft•lb)  
Use LOCTITE®

**5. Install:**

- Bearing housing ①
- Dog clutch ②
- Middle driven shaft ③ (for rear final gear)
- Yoke ④
- Washer ⑤
- Nut ⑥

**NOTE:**

Before install the nut ⑥, apply LOCTITE® to the thread of middle driven shaft ③.

**6. Attach:**

- Universal joint holder
- Attachment  
(to the universal joint yoke)



**Universal joint holder:**  
P/N. YM-04062 ① 90890-04062  
③

**Attachment:**  
P/N. YM-33291 ②, 90890-04096  
④

**7. Tighten:**

- Nut ⑤ (middle driven shaft-for rear final gear)

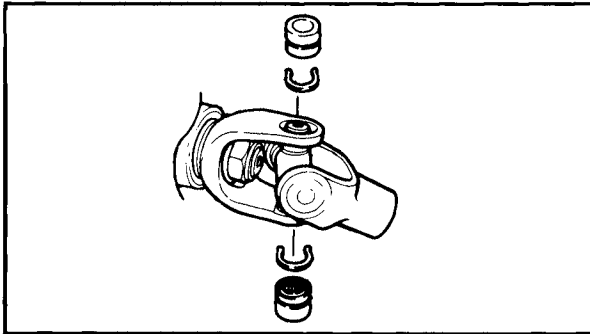


**Nut (middle driven shaft - for rear final gear):**  
60 Nm (6.0 m•kg, 43 ft•lb)  
Use LOCTITE®

**NOTE:**

Stake the nut head with a center punch to lock.

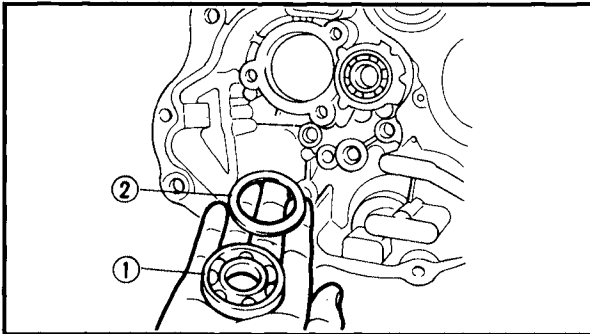
**6**

**MIDDLE GEARS AND TRANSFER GEARS****DRIV**

8. Install:

- Universal joint

Refer to the "Middle driven shaft (for differential gear)" section.

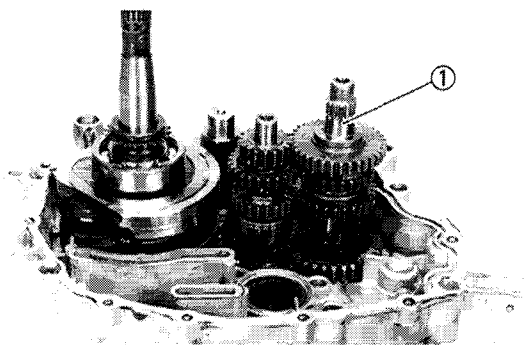
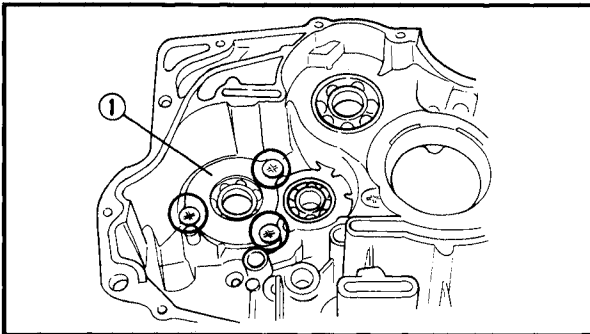
**INSTALLATION****Middle drive pinion gear and middle drive axle**

1. Install:

- Bearing ①
- Shim ②

2. Install:

- Bearing retainers ①
- Use a #40 Torx Driver.

**Bearing retainers:****25 Nm (2.5 m•kg, 18 ft•lb)****Use LOCTITE®**

3. Install:

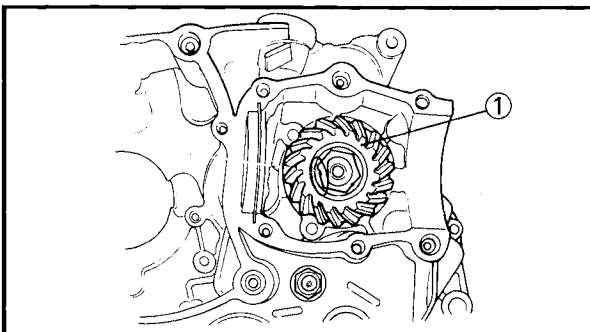
- Middle drive axle ①
- Crankcase (left)
- Balancer driven gear
- Secondary clutch

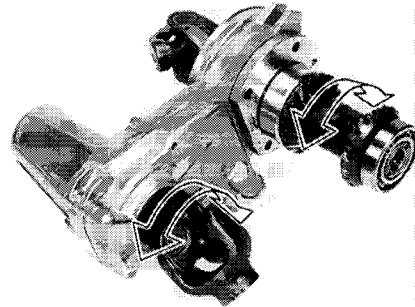
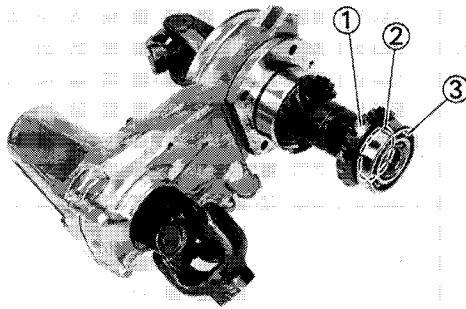
Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.

4. Install:

- Middle drive pinion gear ①
- Primary clutch

Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.



**MIDDLE GEARS AND TRANSFER GEARS****DRIV****Middle driven shaft and transfer gear assembly**

1. Install:
  - Reverse gear ①
  - Shim(s) ②
  - Bearing ③
2. Check:
  - Transfer gears operation
  - Unsmooth operation → Repair.
3. Install:
  - Middle driven shaft assembly and transfer gear assembly
  - Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.
4. Check:
  - Middle gear lash
  - Refer to the "MIDDLE GEAR LASH ADJUSTMENT" section
5. Install:
  - CDI magneto
  - Piston and cylinder
  - Cylinder head
  - Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.
6. Install:
  - Engine assembly
  - Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT-REMOUNTING ENGINE" section in the CHAPTER 4.
7. Fill:
  - Engine oil
  - Transfer gear oil
  - Refer to the "ENGINE OIL AND TRANSFER GEAR OIL REPLACEMENT" section in the CHAPTER 3.



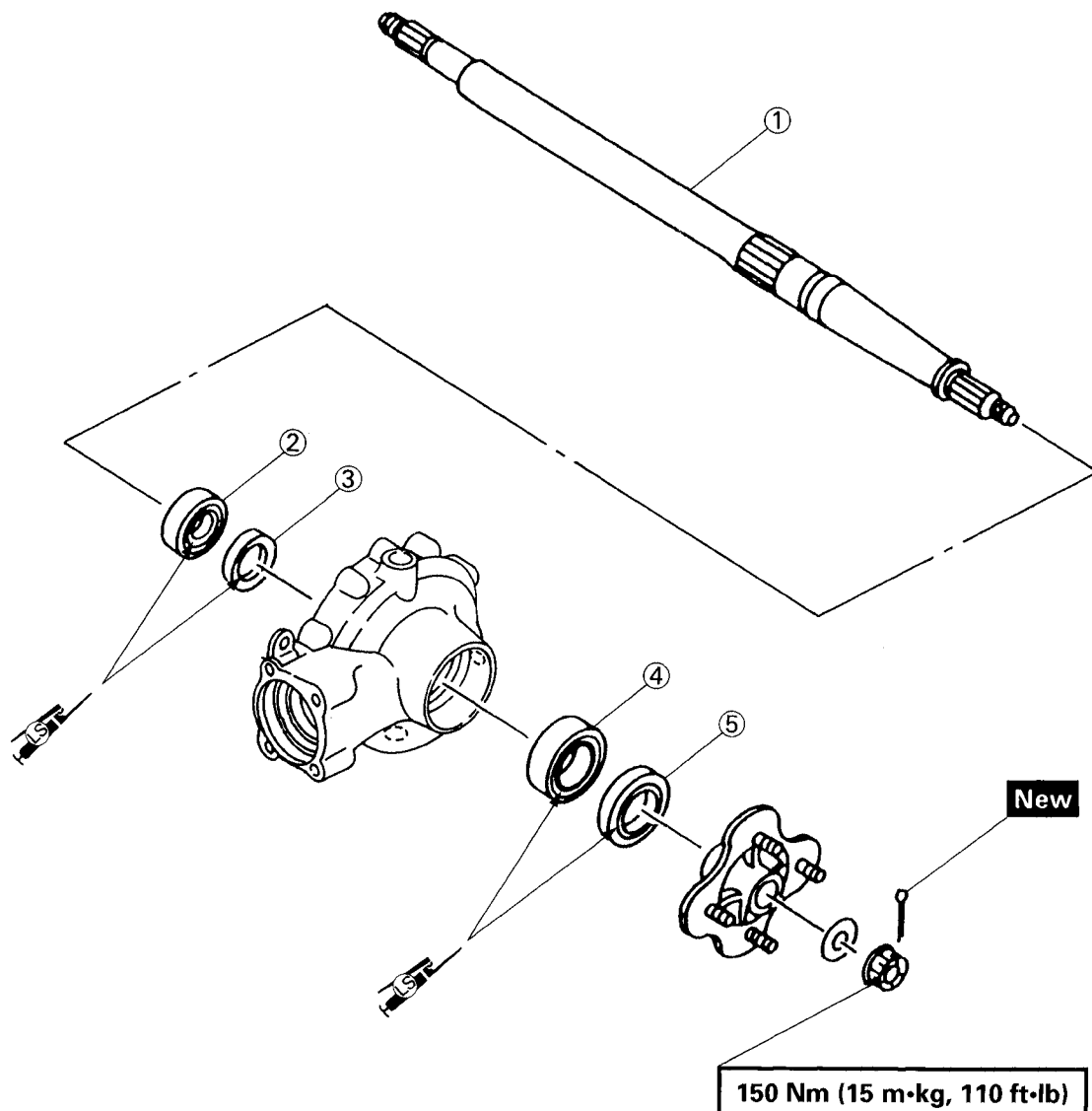
## REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT

## REAR AXLE

- ① Rear axle
- ② Oil seal
- ③ Bearing
- ④ Bearing
- ⑤ Oil seal

A

REAR AXLE RUNOUT LIMIT:  
1.5 mm (0.06 in)



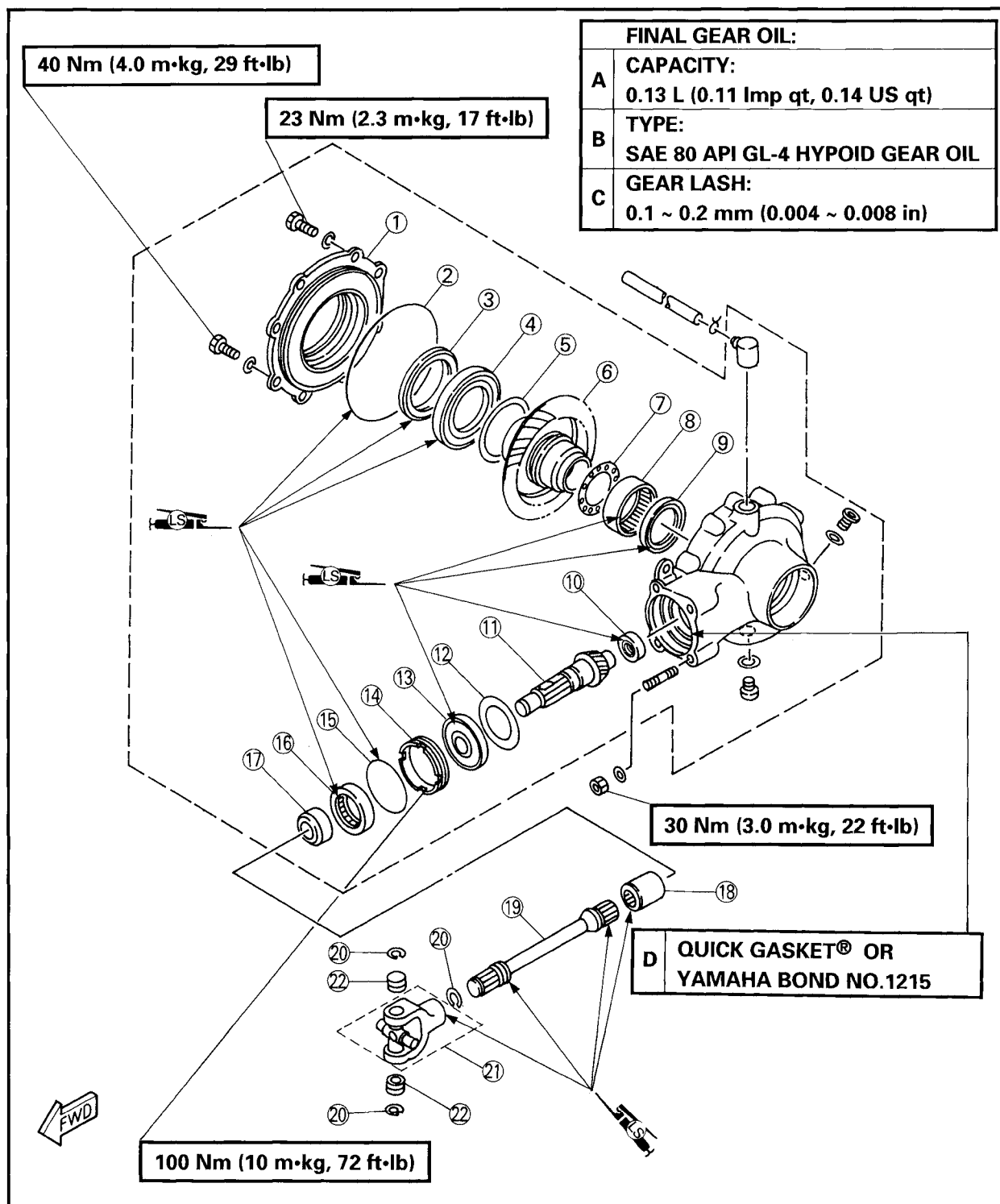


# **REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT**

**DRIV**


## **REAR FINAL GEAR AND DRIVE SHAFT**

- |                   |                         |                            |
|-------------------|-------------------------|----------------------------|
| ① Bearing housing | ⑨ Oil seal              | ⑰ Collar                   |
| ② O-ring          | ⑩ Bearing               | ⑱ Coupling gear            |
| ③ Oil seal        | ⑪ Drive pinion gear     | ⑲ Drive shaft              |
| ④ Bearing         | ⑫ Final drive gear shim | ⑳ Circlip                  |
| ⑤ Ring gear shim  | ⑬ Bearing               | ㉑ Universal joint assembly |
| ⑥ Ring gear       | ⑭ Bearing retainer      | ㉒ Bearing                  |
| ⑦ Thrust washer   | ⑮ O-ring                |                            |
| ⑧ Bearing         | ⑯ Oil seal              |                            |


**6**

# REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT

DRIV



## REMOVAL

### **⚠ WARNING**

Securely support the machine so there is no danger of it falling over.

#### 1. Drain:

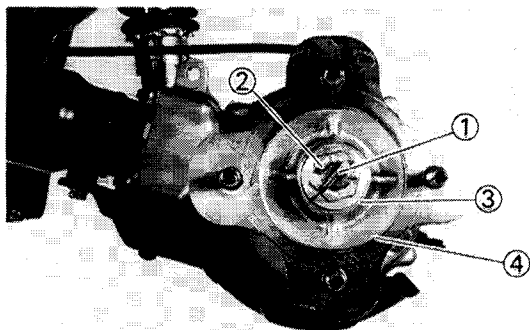
- Final gear oil

Refer to the "FINAL GEAR OIL REPLACEMENT" section in the CHAPTER 3.

#### 2. Remove:

- Rear wheels

Refer to the "REAR WHEELS AND REAR BRAKE-REMOVAL" section in the CHAPTER 7.



#### 3. Remove:

- Cotter pin ①
- Axle nut ②
- Washer ③
- Wheel hub ④

#### NOTE:

Apply parking brake to loosen the axle nut ②

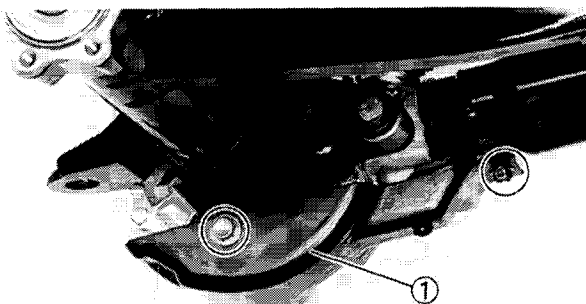
#### 4. Remove:

- Rear brake drum
- Backing plate

Refer to the "REAR WHEELS AND REAR BRAKE-REMOVAL" section in the CHAPTER 7.

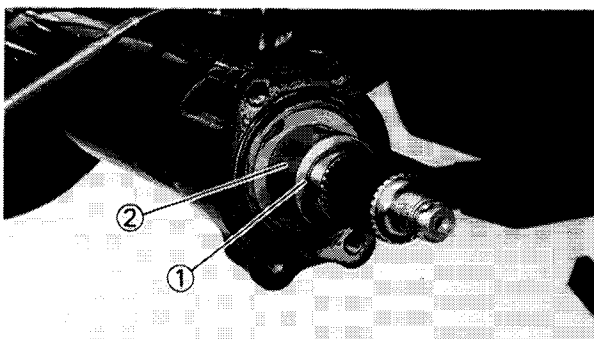
#### 5. Remove:

- Final gear case guard ①

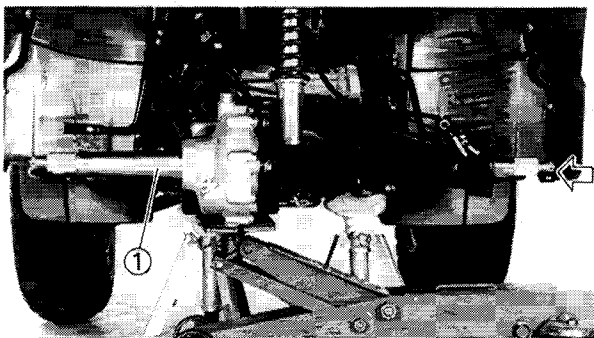


# REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT

DRIV



6. Remove:
  - O-ring ①
  - Spacer collar ②



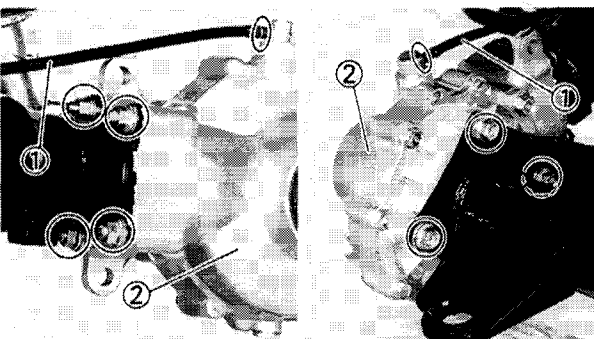
7. Remove:
  - Rear axle ①

**NOTE:** \_\_\_\_\_

When removing the rear axle from the swingarm and final gear case, use a soft hammer.

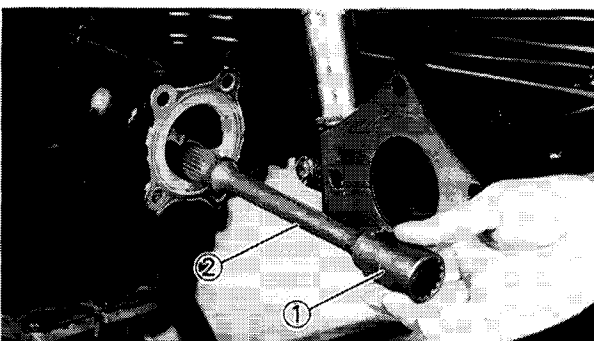
**CAUTION:** \_\_\_\_\_

Never directly tap the axle end with a hammer, this will result in damage to the axle thread and spline.



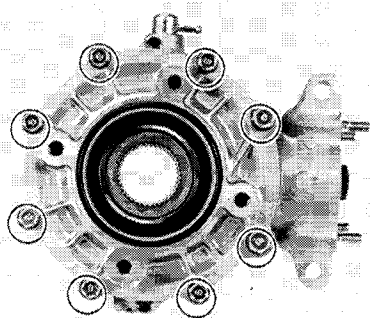
8. Disconnect:
  - Breather hose ①

9. Remove:
  - Final gear case ②



10. Remove:
  - Coupling gear ①
  - Rear drive shaft ②

6



### DISASSEMBLY

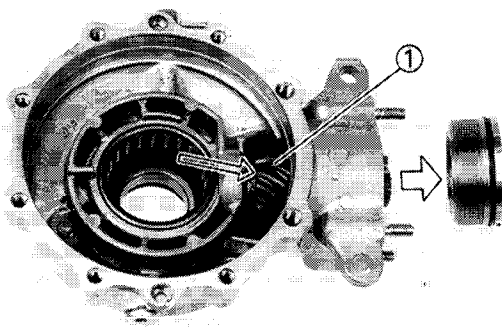
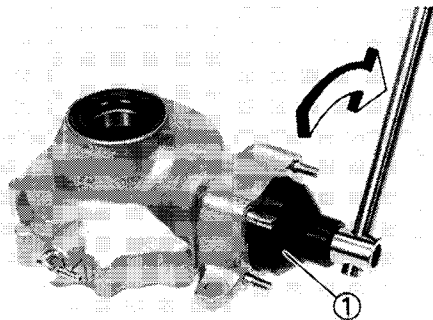
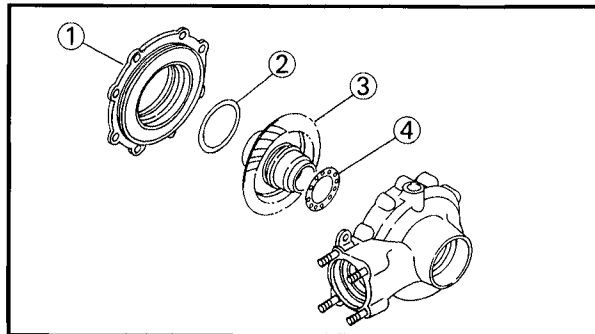
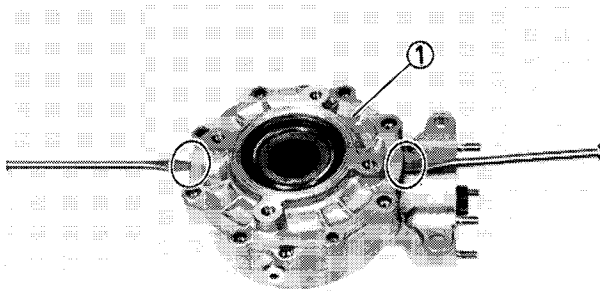
1. Remove:
  - Bolts

**NOTE:** \_\_\_\_\_

Working in a crisscross pattern, loosen bolt 1/4 turn each. Remove them after all loosened.

# REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT

DRIV



### 2. Remove:

- Bearing housing ①
- Shim(s) ②
- Ring gear ③
- Thrust washer(s) ④

### NOTE:

Slots for separating the final gear case and the bearing housing are provided. Prizing the slots with flat head screwdrivers, remove the bearing housing from the case.

### 3. Remove:

- Bearing retainer

### NOTE:

Final drive shaft bearing retainer has left-hand threads. Turn the retainer clockwise by using the Bearing retainer wrench ① to remove it.



**Bearing retainer wrench;**  
P/N. YM-04050, 90890-04050

### 4. Remove:

- Drive pinion gear assembly ①

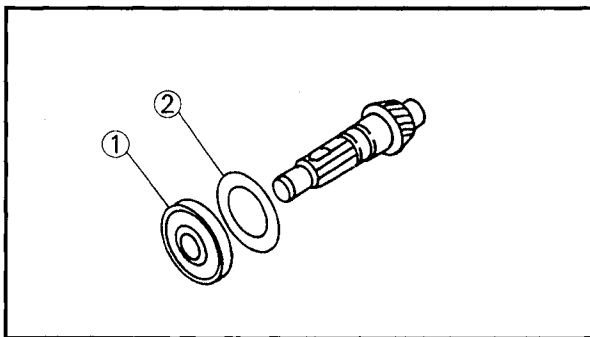
### NOTE:

Tap lightly on the final drive pinion gear end with a soft hammer.

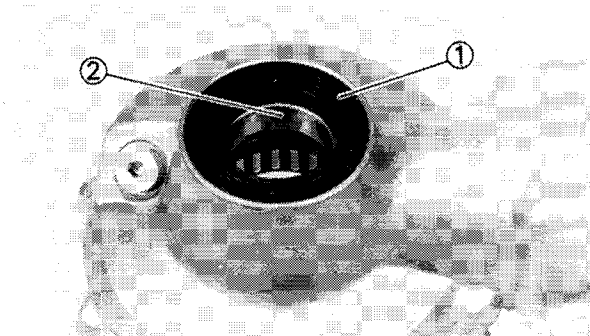
### CAUTION:

Final drive pinion gear removal should be performed only if bearing replacement is necessary. Do not reuse bearings or races after removal.

# **REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT**

**DRIV**


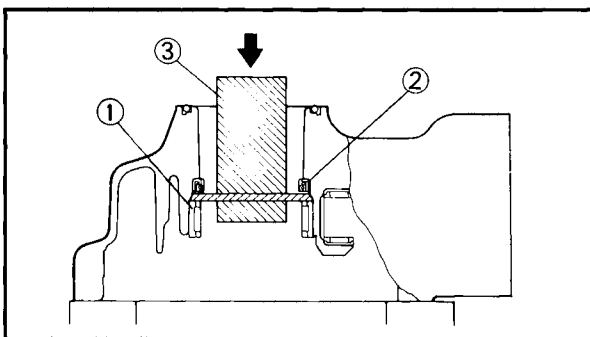
5. Remove:
- Bearing ①
  - Shim(s) ②



6. Remove:
- Oil seal ①
  - Bearing ②

**NOTE:** \_\_\_\_\_

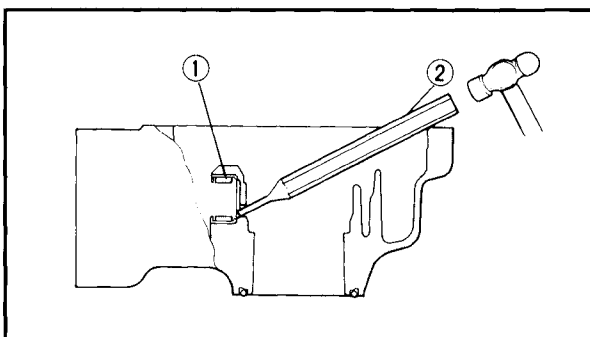
Use General bearing puller to remove the bearing ②.



7. Remove:
- Roller bearing ① (ring gear)
  - Oil seal ②

**NOTE:** \_\_\_\_\_

When removing the roller bearing ①, use a suitable press tool ③ and an appropriate support for the main housing.



8. Remove:
- Roller bearing ① (drive pinion gear)

\*\*\*\*\*

## **Drive pinion gear roller bearing removal steps:**

- Heat the main housing only to 150°C (302°F).
- Remove the roller bearing outer race with an appropriately shaped punch ②.
- Remove the inner race from the final drive shaft.

**NOTE:** \_\_\_\_\_

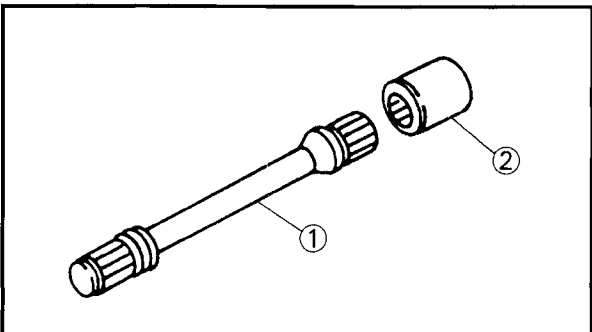
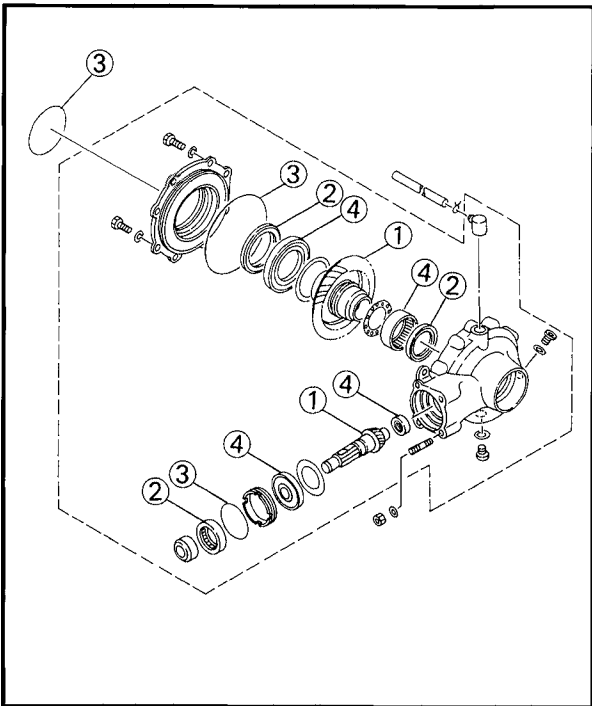
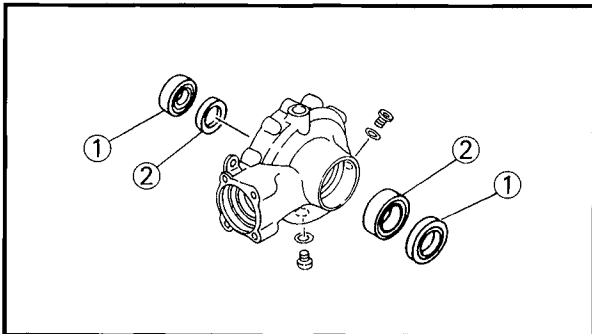
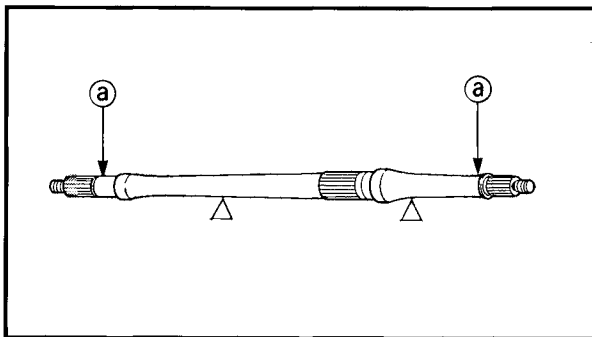
The removal of the drive pinion gear roller bearing is difficult seldom necessary.

\*\*\*\*\*

**6**

# REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT

DRIV



### INSPECTION

#### 1. Inspect:

- Rear axle runout (a)  
Out of specification → Replace.

### ⚠ WARNING

**Do not attempt to straighten a bent axle.**



**Rear axle runout limit:  
1.5 mm (0.06 in)**

#### 2. Inspect:

- Oil seals (1)  
Damage → Replace.

#### 3. Check:

- Bearings (2)  
Bearings allow play in the final gear housing and rear hub or rear axle turns roughly → Replace.

#### 4. Inspect:

- Gear teeth (1)  
Pitting/Galling/Wear → Replaced drive pinion gear and ring gear as a set.
- Oil seal (2)
- O-ring (3)  
Damage → Replace.

#### 5. Inspect:

- Bearings (4)  
Damage → Replace.

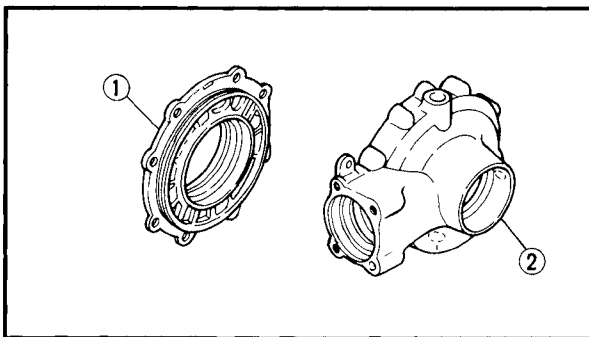
### NOTE:

- Reuse of roller bearing OK, but Yamaha recommends installation of new bearing.  
Do not reuse the oil seal.
- When the final drive pinion gear and/or ring gear are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear, refer to the "FINAL DRIVE PINION GEAR AND RING GEAR SHIM SELECTION" section.

#### 6. Inspect:

- Drive shaft (1) (splines)
- Coupling gear (2) (splines)  
Wear/Damage → Replace.

# **REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT**

**DRIV**

**7. Inspect:**

- Final gear case ①
- Bearing housing ② (ring gear)  
Cracks/Damage → Replace.

**NOTE:**

When the final gear case and/or ring gear bearing housing are replaced, be sure to adjust the shim of the final drive pinion gear and/or ring gear, refer to "FINAL DRIVE PINION GEAR AND RING GEAR SHIM SELECTION" section.

## **FINAL DRIVE PINION GEAR AND RING GEAR SHIM SELECTION**

When the final drive pinion gear, ring gear, final gear case and/or ring gear bearing housing are replaced, be sure to adjust the positions for the final drive pinion gear and ring gear by the shim(s).

**Final drive pinion gear shim(s) selection**
**1. Select:**

- Final drive pinion gear shim(s) ①

\*\*\*\*\*

**Shim selection steps:**

- To find final drive pinion gear shim thickness "A", use the following formula.

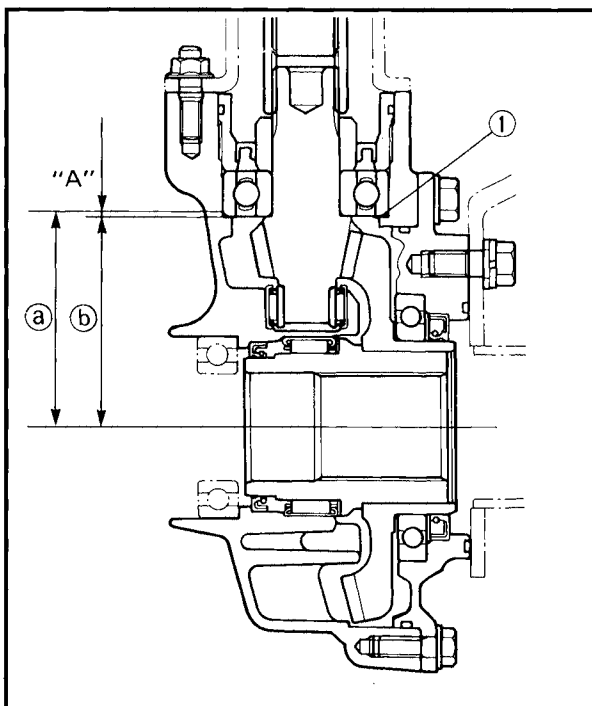
**Final drive pinion gear shim thickness:**

$$"A" = \textcircled{a} - \textcircled{b}$$

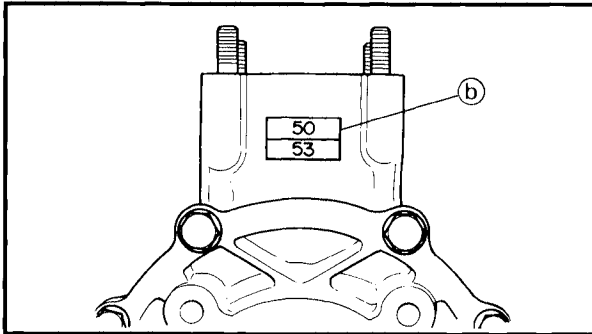
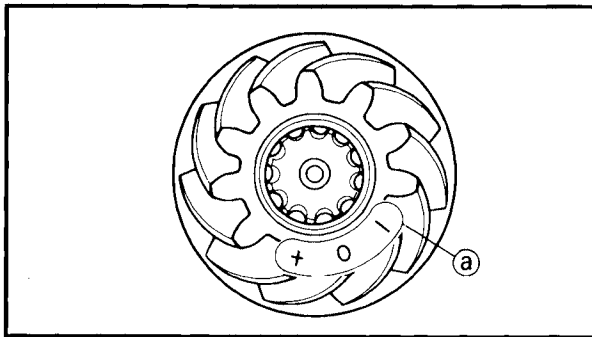
- ① = a numeral (usually a decimal number) on the final drive pinion gear is either added to or subtracted from "79".
- ② = a numeral (usually a decimal number) on the final gear case is either added to or subtracted from "78".

**NOTE:**

All stamped numbers are in hundredths of a mm.



# **REAR AXLE/REAR FINAL GEAR AND REAR DRIVE SHAFT**

**DRIV**

**Example:**

- 1) If the "+01" is stamped on the final drive pinion gear,  

$$a = 79 + 0.01 = 79.01$$
- 2) If the "50" is stamped on the final gear case,  

$$b = 78 + 0.50 = 78.50$$
- 3) Therefore, "A" is,  

$$A = 79.01 - 78.50 = 0.51$$
- 4) Round off hundredths digit and select appropriate shim(s).

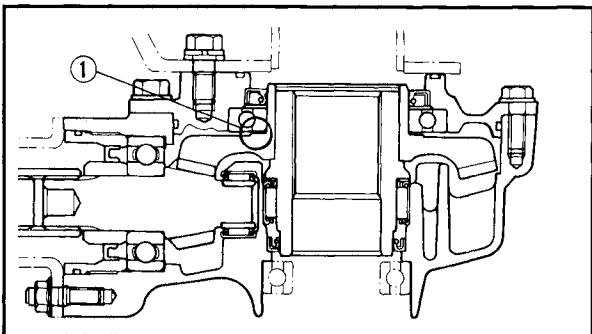
In the example above, the calculated number is 0.51. The chart instructs you to round off 1 to 0 at the hundredth place. Thus, the shim thickness is 0.50 mm.

Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shim sizes are supplied in the following thickness.

Thickness (mm)	Final drive pinion gear shim	
	0.15	0.50
	0.30	0.60
	0.40	

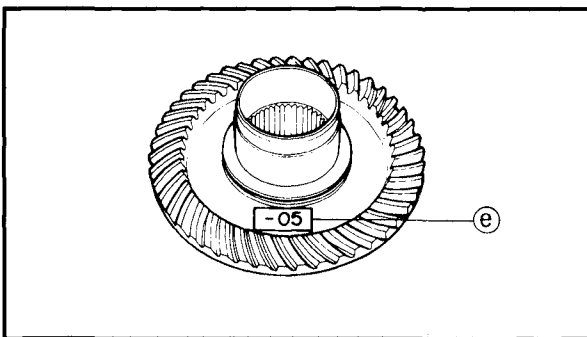
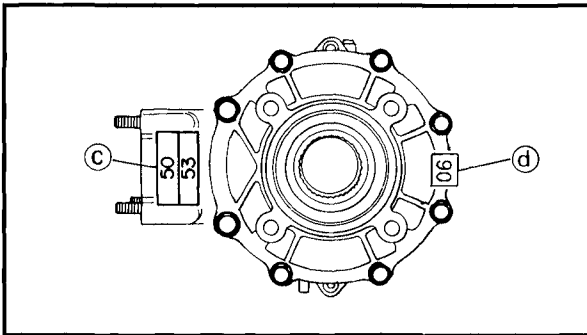
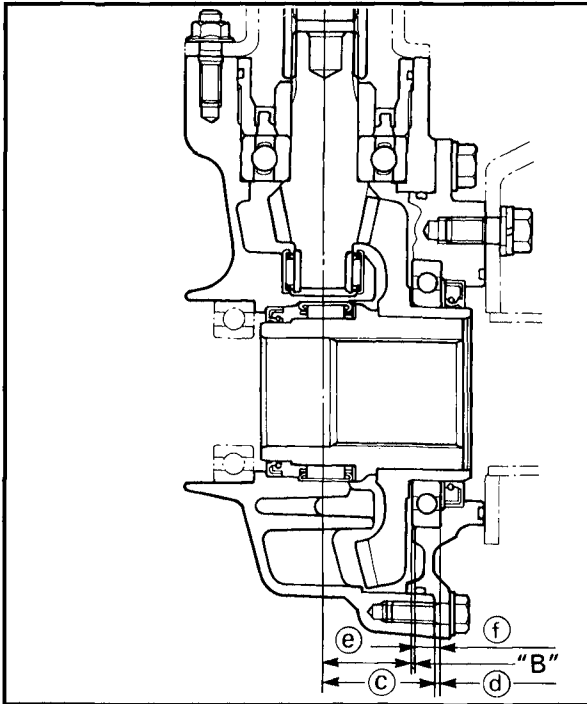
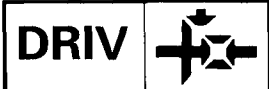
\*\*\*\*\*

**6**

**Ring gear shim(s) selection**

1. Select:
  - Ring gear shim(s) ①



# **REAR AXLE/ REAR FINAL GEAR AND DRIVE SHAFT**



\*\*\*\*\*

## **Shim selection steps:**

- To find ring gear shim thickness "B", use the following formula.

### **Ring gear shim thickness:**

$$"B" = (c) + (d) - ((e) + (f))$$

- (c) = a numeral (usually a decimal number) on the final gear case is either added to or subtracted from "42".
- (d) = a numeral (usually a decimal number) on outside of ring gear bearing housing and added to "2".
- (e) = a numeral (usually a decimal number) on inside of ring gear either added to or subtracted from "33".
- (f) = bearing thickness (considered constant) "11.00 mm".

### **Example:**

- 1) If the "53" is stamped on the final gear case,  
 $(c) = 42 + 0.53 = 42.53$
- 2) If the "06" is stamped on the ring gear bearing housing,  
 $(d) = 2 + 0.06 = 2.06 \text{ mm}$
- 3) If the "-05" is stamped on the ring gear,  
 $(e) = 33 - 0.05 = 32.95 \text{ mm}$
- 4) (c) = is 11.00.
- 5) Therefore, "B" is,  
 $"B" = 42.53 + 2.06 - (32.95 + 11.00)$   
 $= 44.58 - 43.95 = 0.64$
- 6) Round off hundredths digit and select appropriate shim(s).  
 In the example above, the calculated number is 0.64. The chart instructs you to round off the 4 to 5 at the hundredth place.  
 Thus, the shim thickness is 0.65 mm.

Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shim sizes are supplied in the following thickness.

Ring gear shim		
Thickness (mm)	0.25	0.40
	0.30	0.50

\*\*\*\*\*

**6**

**REAR AXLE/ REAR FINAL GEAR  
AND DRIVE SHAFT****DRIV****ASSEMBLY**

Reverse the "DISASSEMBLY" procedures.  
Note the following points.

## 1. Lubricate:

- Oil seals
- Bearings
- O-rings

**Lithium soap base grease**

## 2. Install:

- Roller bearing (drive pinion gear)

\*\*\*\*\*

**Installation steps:**

- Heat the main housing only to 150°C (302°F)
- Install the roller bearing outer race by using the proper adapter.
- Install the inner race onto the drive shaft.

\*\*\*\*\*

## 3. Install:

- Oil seal ①
- Roller bearing ② (outer race)

**NOTE:**

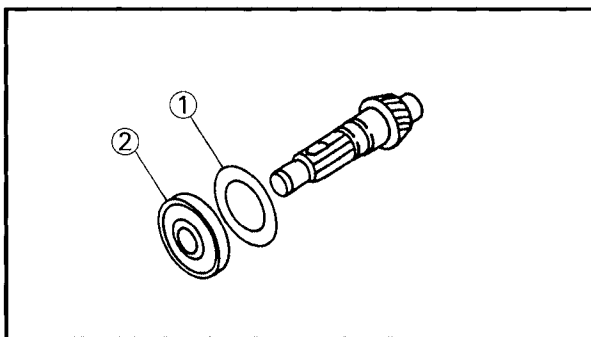
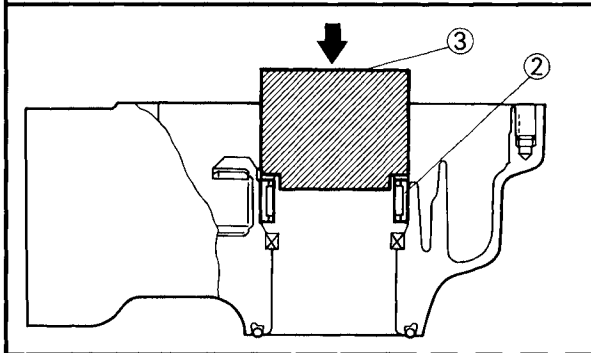
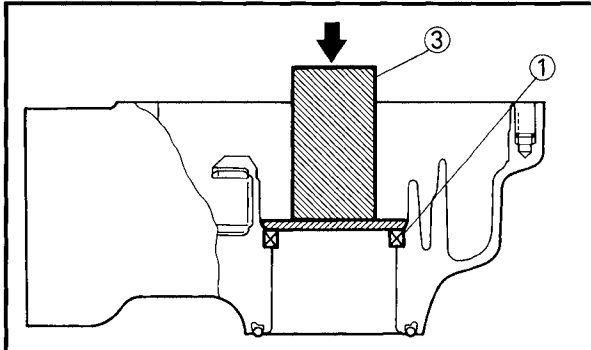
Use a suitable press tool ③ and a press to install the above components into the main housing.

**⚠ WARNING**

**Always use a new oil seal.**

## 4. Install:

- Shim(s) ① (proper size as calculated)
- Bearing ② (to drive pinion gear)

**6**




**REAR AXLE/ REAR FINAL GEAR  
AND DRIVE SHAFT****DRIV****7. Select:**

- Ring gear thrust washer


\*\*\*\*\*

**Thrust washer selection steps:**

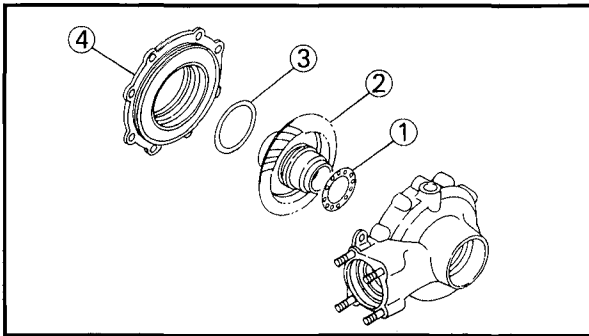
- Select the suitable thrust washer by the following chart.

	Thrust washer		
	1.2	1.7	2.0
Thickness (mm)	1.4	1.8	2.1
	1.6	1.9	

- Repeat measurement steps until the ring gear thrust clearance is within the specified limits.

	Ring gear thrust clearance:
	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)

\*\*\*\*\*

**8. Install:**

- Thrust washer ①
- Ring gear ②
- Shim(s) ③ (proper size as calculated)
- Bearing housing ④

**NOTE:** \_\_\_\_\_

Before installing the ring gear, apply the grease to the oil seal lips.


- Before installing the bearing housing, apply the grease to the O-ring.

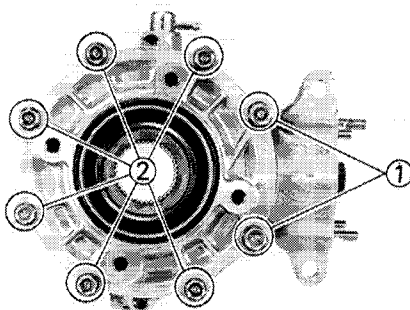
**9. Install:**

- 10 mm bolts ① (bearing housing)
- 8 mm bolts ② (bearing housing)

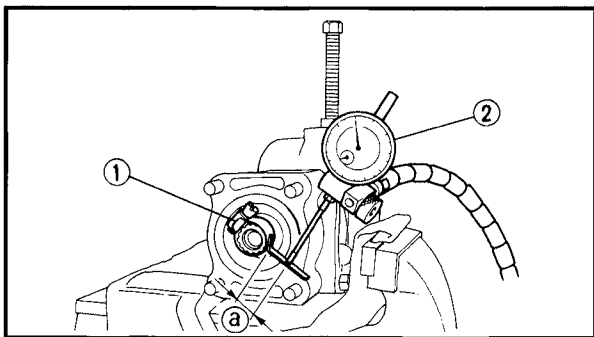
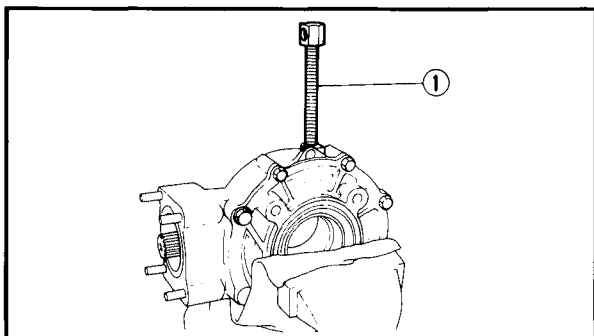
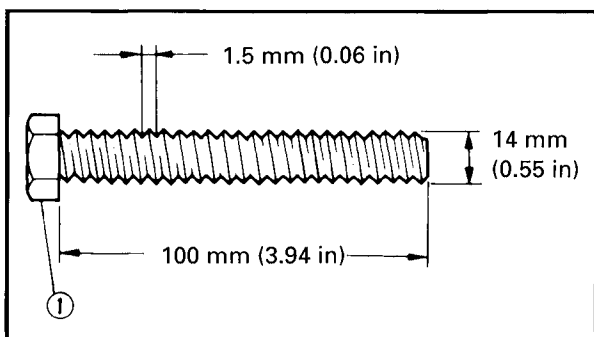
**NOTE:** \_\_\_\_\_

Tighten the bolts in stage, using a crisscross pattern.

	10 mm Bolts (bearing housing):
	40 Nm (4.0 m•kg, 29 ft•lb)
	8 mm Bolts (bearing housing):
	23 Nm (2.3 m•kg, 17 ft•lb)

**6**

# **REAR AXLE/ REAR FINAL GEAR AND DRIVE SHAFT**

**DRIV**


## **FINAL GEAR GEAR LASH MEASUREMENT AND ADJUSTMENT**

### **Final gear gear lash measurement**

1. Secure the gear case in a vise or other support.
2. Remove:
  - Drain plug
  - Gasket
3. Install:
  - A bolt of the specified size ①  
Into the drain plug hole.

### **CAUTION:**

**Finger tighten the bolt until it holds the ring gear.**

**Otherwise, the ring gear will be damage.**

4. Attach:
  - Gear lash measurement tool ①
  - Dial gauge ②



**Gear lash measurement tool:**  
P/N. YM-01231, 90890-01231  
**Dial gauge:**  
P/N. YU-03097, 90890-03097

① Measuring point

5. Measure:
  - Gear lash

### **NOTE:**

Gently rotate the gear coupling from engagement to engagement.

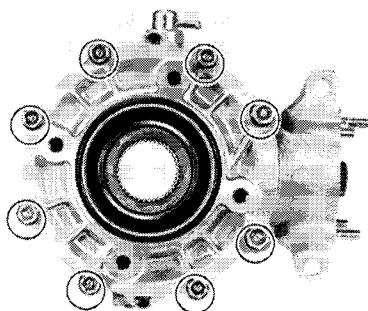
If the measured value in step 5 is different than that of the calculated value for shim size (refer to the "FINAL DRIVE PINION GEAR AND RING GEAR SHIM SELECTION-Final drive pinion gear shim(s) slection" section), repeat the following steps using the measured value in step 5.



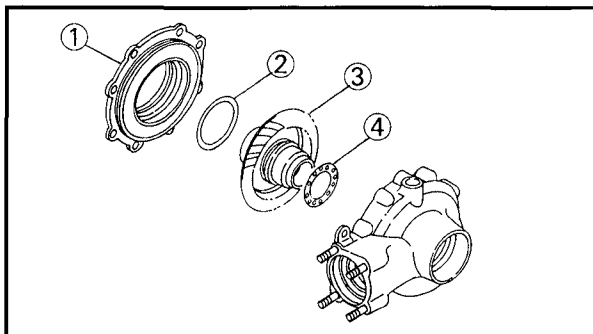
**Final gear gear lash:**  
0.1 ~ 0.2 mm (0.004 ~ 0.008 in)

### **NOTE:**

Measure the gear lash at 4 positions rotate the shaft 90° each time.

**REAR AXLE/ REAR FINAL GEAR  
AND DRIVE SHAFT****DRIV****Final gear lash adjustment**

1. Remove:
  - 8 mm bolts (bearing housing)
  - 10 mm bolts (bearing housing)



2. Remove:
  - Bearing housing ①
  - Shim(s) ②
  - Ring gear ③
  - Thrust washer ④

3. Adjust:
  - Gear lash

\*\*\*\*\*

**Gear lash adjustment steps:**

- Select the suitable shims and thrust washer by the following chart.

**Too-little gear lash →**  
**Reduce shim thickness.**  
**Too-large gear lash →**  
**Increase shim thickness.**

**To add or reduce ring gear shim  
thickness**

Increase by more than 0.1 mm (0.004 in)	Reduce by more than 0.1 mm (0.004 in)
--	--

**Reduce thrust washer  
thickness by 0.1 mm  
(0.004 in) for every 0.1  
mm of ring gear shim  
increase.**

**Reverse  
procedure**

**Ring gear shim**

Thickness (mm)	0.25	0.30	0.35
	0.40	0.45	0.50

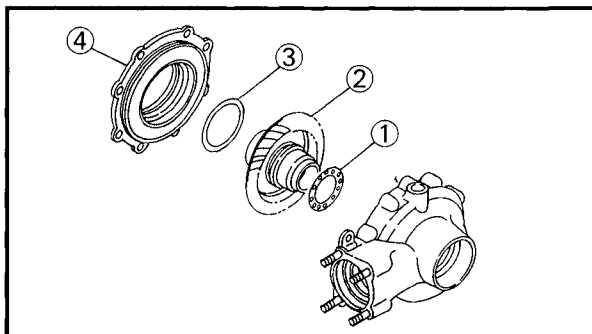
# **REAR AXLE/ REAR FINAL GEAR AND DRIVE SHAFT**

**DRIV**

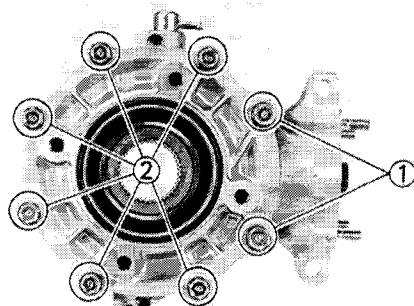
**Thrust washer**

	1.2	1.7	2.0
Thickness (mm)	1.4	1.8	2.1
	1.6	1.9	

\*\*\*\*\*


**4. Install:**

- Thrust washer ①
- Ring gear ②
- Shim(s) ③
- Bearing housing ④


**5. Install:**

- 10 mm bolts ① (bearing housing)
- 8 mm bolts ② (bearing housing)



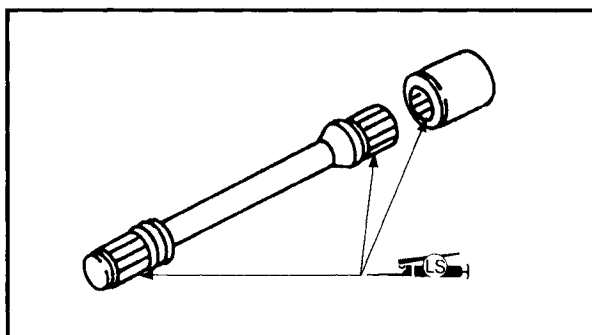
**10 mm Bolts (bearing housing):**  
40 Nm (4.0 m•kg, 29 ft•lb)  
**8 mm Bolts (bearing housing):**  
23 Nm (2.3 m•kg, 17 ft•lb)

**6. Measure:**

- Gear lash
- If the gear lash is incorrect → Repeat.



**Final gear lash:**  
0.1 ~ 0.2 mm (0.004 ~ 0.008 in)

**6**

**INSTALLATION**

Reverse the "REMOVAL" procedures. Note the following points.

**1. Lubricate:**

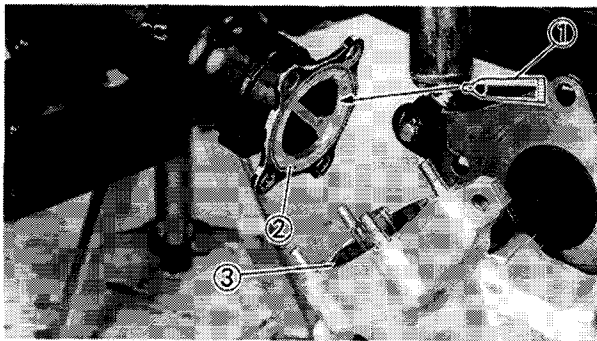
- Drive shaft (splines)
- Coupling gear (splines)



**Lithium soap base grease**

# REAR AXLE/ REAR FINAL GEAR AND DRIVE SHAFT

# DRIV



### 2. Apply:

- Sealant (1)  
(to matching surfaces of swingarm (2)  
and final gear case (3))

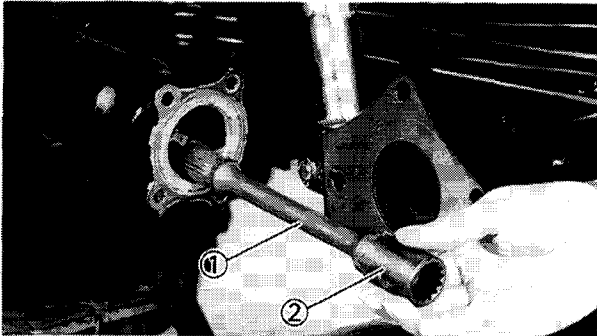


**Sealant (Quick Gasket®):**

**P/N. ACC-11001-05-01**

**Yamaha Bond No. 1215:**

**P/N. 90890-85505**

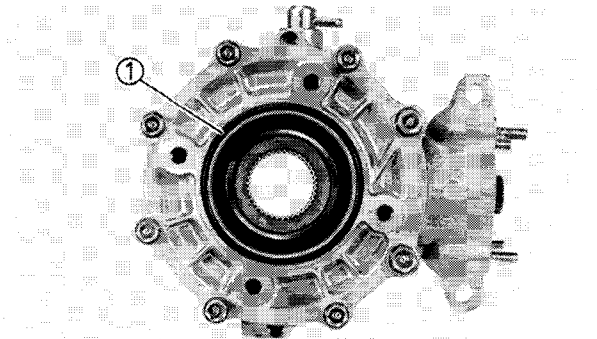


### 3 Install:

- Drive shaft (1)
- Coupling gear (2)

### NOTE:

Connect the drive shaft to the universal joint properly.



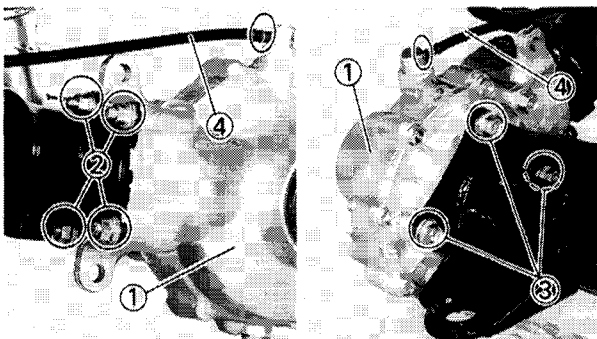
### 4. Lubricate:

- O-ring (1)
- Oil seal
- Bearing



**Lithium soap base grease**

# 6



### 5. Install:

- Final gear case unit (1)
- Nuts (2)
- Bolts (3)
- Breather hose (4)

### 6. Tighten:

- Nuts (2)
- Bolts (3)



**Nuts (2) (bearing housing-swingarm):**

**35 Nm (3.5 m·kg, 25 ft·lb)**

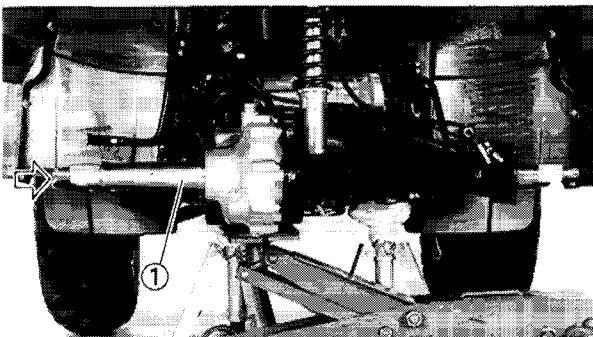
**Bolts (3) (gear housing-swingarm):**

**47 Nm (4.7 m·kg, 34 ft·lb)**



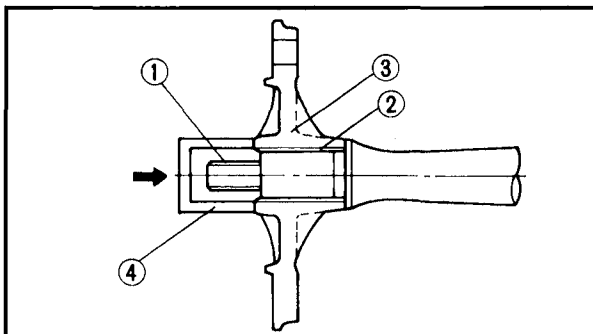
# REAR AXLE/ REAR FINAL GEAR AND DRIVE SHAFT

# DRIV



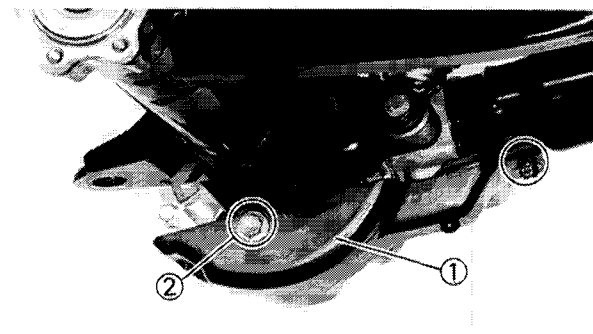
### 7. Install:

- Rear axle ①  
Tap the LEFT END axle while checking the ring gear engagement.



### CAUTION:

- Never directly tap the axle end with a hammer, this will result in damage to the axle thread ① and spline ②.
- Install the wheel hub ③ and suitable socket ④ on the axle end to protect the thread and spline from damage.



### 8. Install:

- Final gear case guard ①

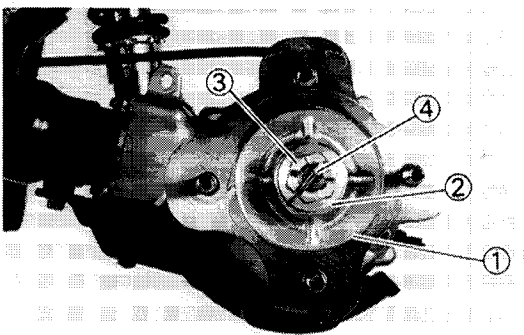


**Bolt ② (final gear case guard-rear):**  
47 Nm (4.7 m•kg, 34 ft•lb)

### 9. Install:

- Backing plate
- Rear brake drum  
Refer to the "REAR WHEELS AND REAR BRAKE-INSTALLATION" section in the CHAPTER 7.

# 6



### 10. Install:

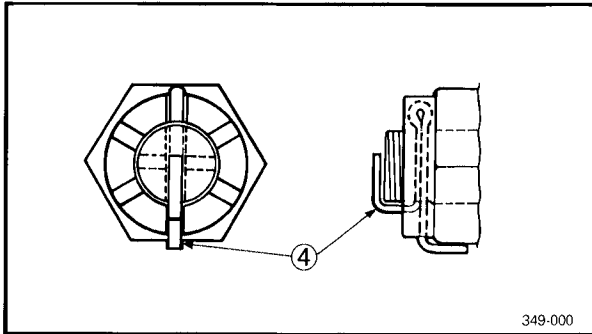
- Wheel hub ①
- Washer ②
- Axle nut ③

### NOTE:

Apply parking brake to tighten the axle nut ③.



**Axle Nut (rear wheel hub):**  
150 Nm (15 m•kg, 110 ft•lb)

**REAR AXLE/ REAR FINAL GEAR  
AND DRIVE SHAFT**

11. Install:

- Cotter pin ④

**NOTE:**

Do not loosen the axle nut after torque tightening. If the axle nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the axle nut.

**⚠ WARNING**

**Always use a new cotter pin.**

12. Install:

- Rear wheels

Refer to the "REAR WHEELS AND REAR BRAKE-INSTALLATION" section in the CHAPTER 7.

13. Fill:

- Final gear case

Refer to the "FINAL GEAR OIL REPLACEMENT" section in the CHAPTER 3.

## FRONT WHEELS AND FRONT BRAKE

CHAS

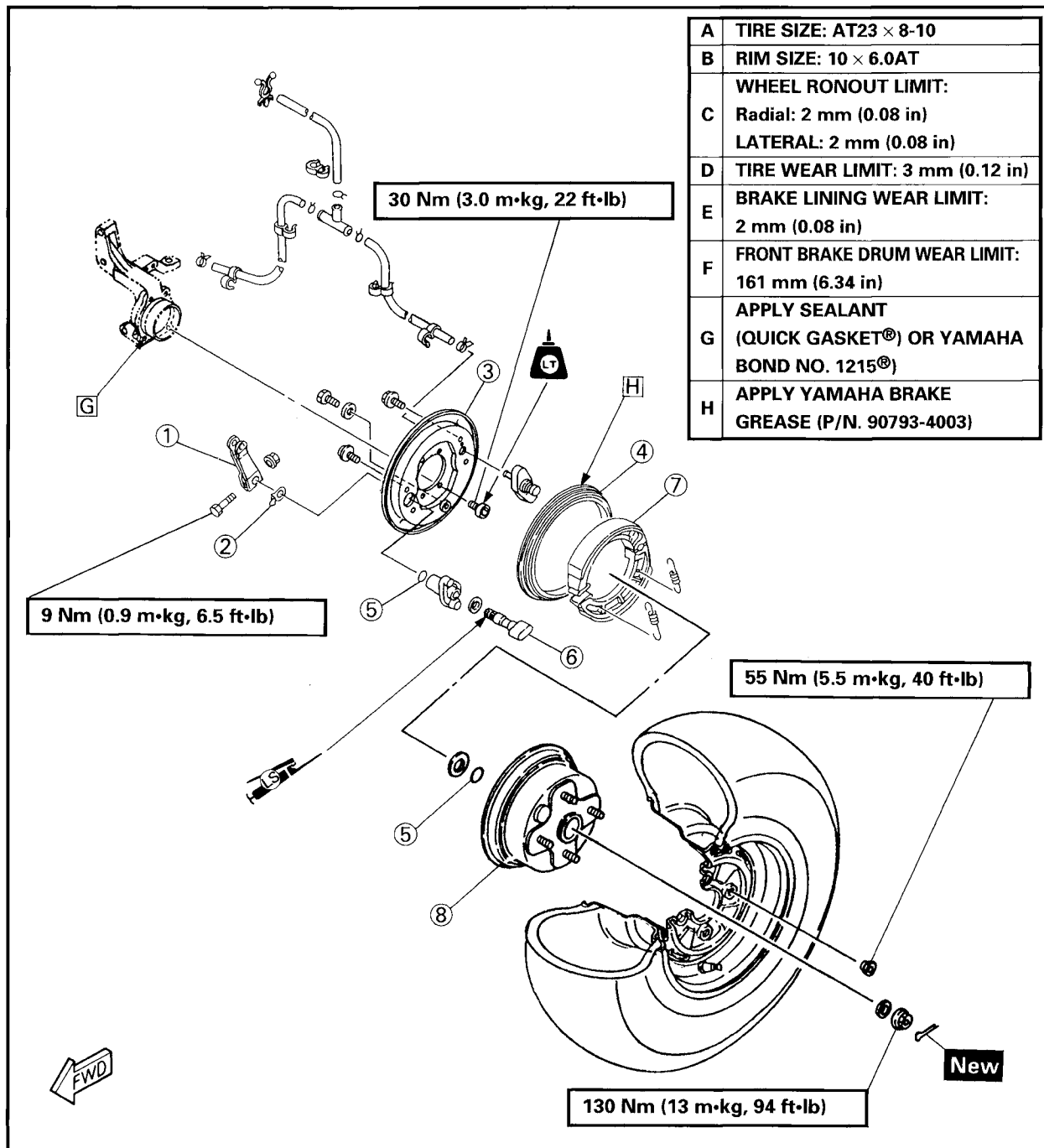


## CHASSIS

## FRONT WHEELS AND FRONT BRAKE

- ① Cam lever
- ② Wear indicator plate
- ③ Backing plate
- ④ Oil seal
- ⑤ O-ring
- ⑥ Camshaft
- ⑦ Brake shoe complete
- ⑧ Front brake drum

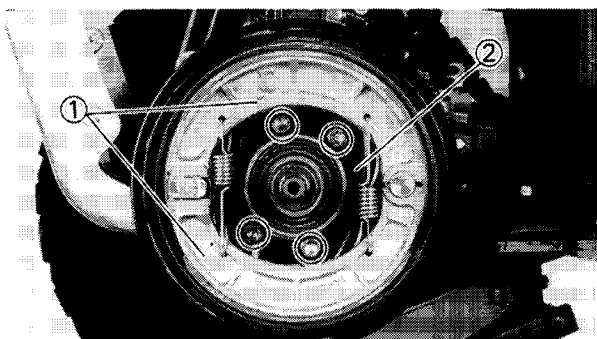
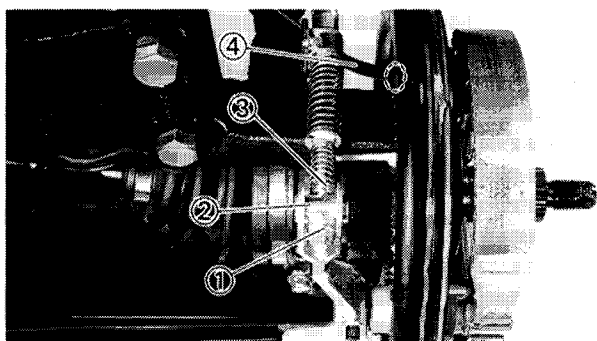
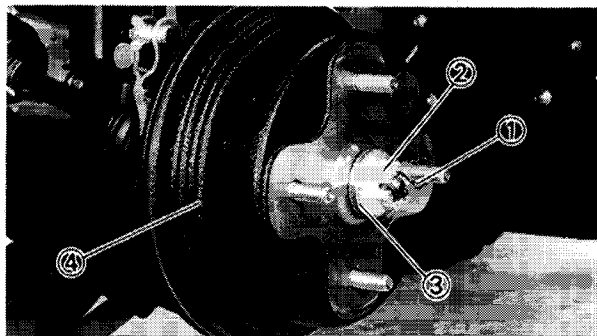
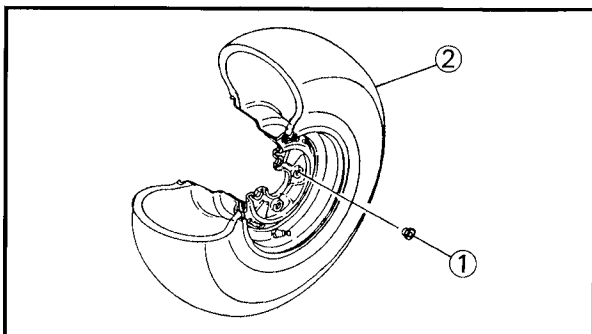
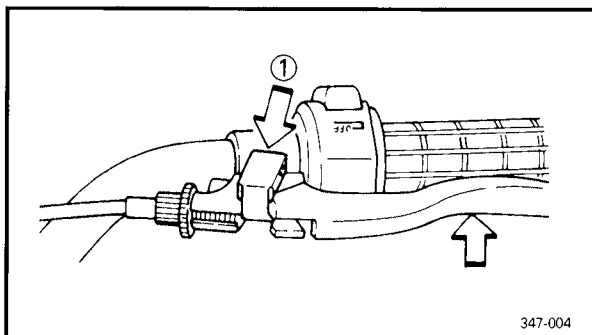
TIRE AIR PRESSURE		
Cold tire pressure	Front	Rear
Standard	25 kPa (0.25 kg/cm <sup>2</sup> , 3.6 psi)	25 kPa (0.25 kg/cm <sup>2</sup> , 3.6 psi)
Minimum	22 kPa (0.22 kg/cm <sup>2</sup> , 3.2 psi)	22 kPa (0.22 kg/cm <sup>2</sup> , 3.2 psi)
Maximum	28 kPa (0.28 kg/cm <sup>2</sup> , 4.0 psi)	28 kPa (0.28 kg/cm <sup>2</sup> , 4.0 psi)



7

# FRONT WHEELS AND FRONT BRAKE

CHAS



## REMOVAL

1. Place the machine on a level place.
2. Loosen:
  - Nuts (front wheel)
 Apply the parking brake ①.
3. Elevate the front wheels by placing the suitable stand under the frame.

## ⚠ WARNING

**Securely support the machine there is no danger of falling over.**

4. Remove:
  - Nuts ① (front wheel)
  - Front wheel ②

5. Remove:
  - Cotter pin ①
  - Axle nut ②
  - Plain washer ③
  - Brake drum ④

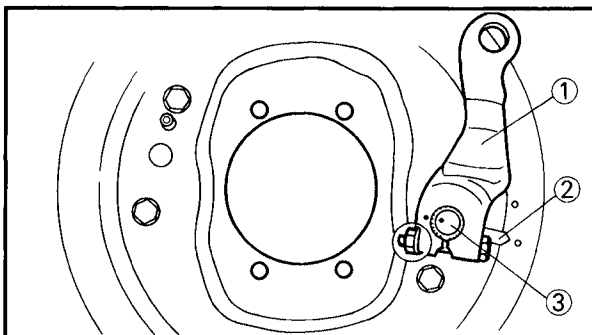
6. Remove:
  - Adjuster ①
  - Pin ②
  - Spring ③

7. Disconnect:
  - Brake cable
  - Breather hose ④

8. Remove:
  - Brake shoes ①
  - Backing plate ②

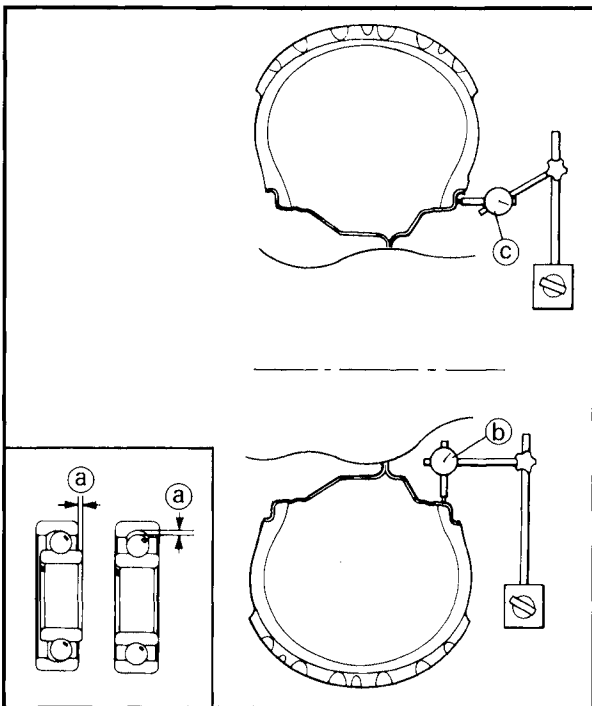
## FRONT WHEELS AND FRONT BRAKE

CHAS



9. Remove:

- Camshaft lever ①
- Wear indicator plate ②
- Camshaft ③



### INSPECTION

1. Inspect:

- Wheel

Refer to the "WHEEL INSPECTION" section in the CHAPTER 3.

2. Measure:

- Wheel runout

Over specified limit → Replace wheel or check bearing play (a) .



**Rim runout limits:**

**Radial (b) : 2.0 mm (0.08 in)**

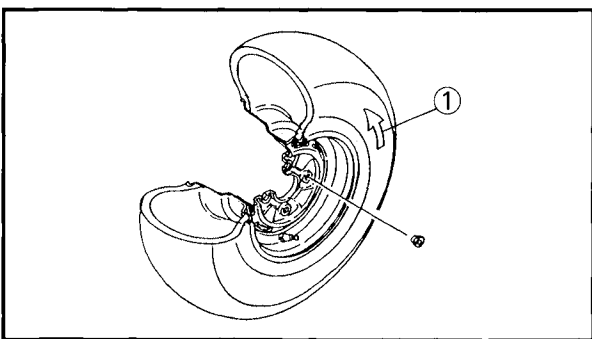
**Lateral (c) : 2.0 mm (0.08 in)**

3. Inspect:

- Tire surfaces

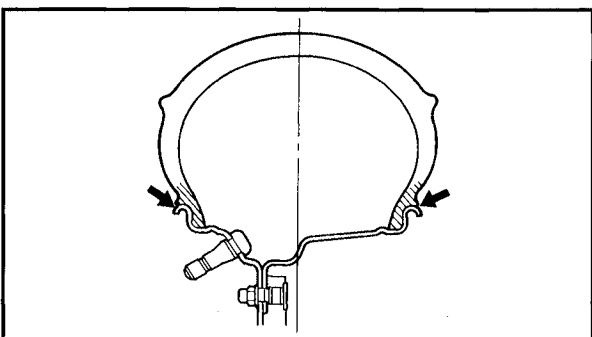
Wear/Damage → Replace.

Refer to the "TIRE INSPECTION" section in the CHAPTER 3.



### NOTE:

Install the tire with the "DRIVE" mark ① to the rotating direction.



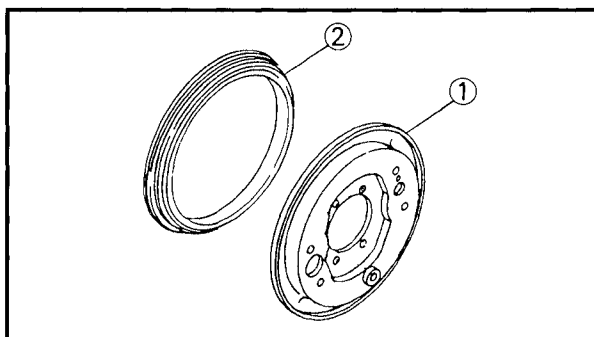
### ⚠ WARNING

After replacing the tire, ride conservatively to allow the tire to be properly seated in the rim.

Failure to do so may cause an accident resulting in machine damage and possible operator injury.

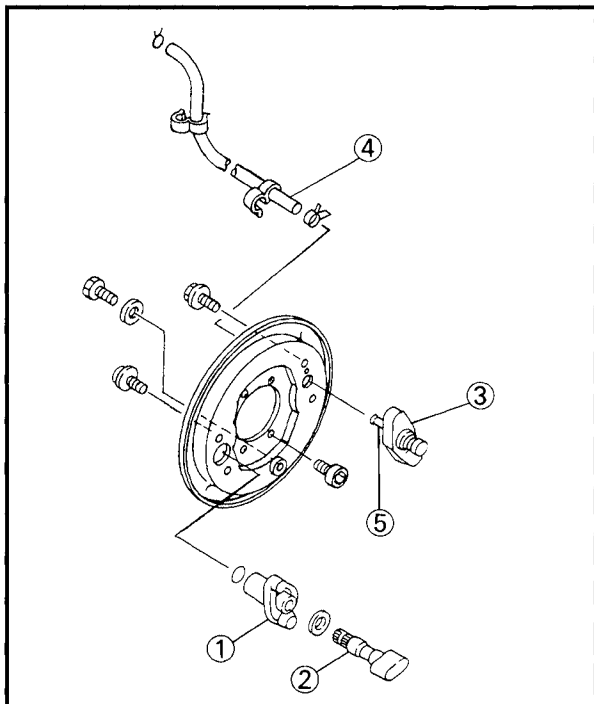
## FRONT WHEELS AND FRONT BRAKE

CHAS



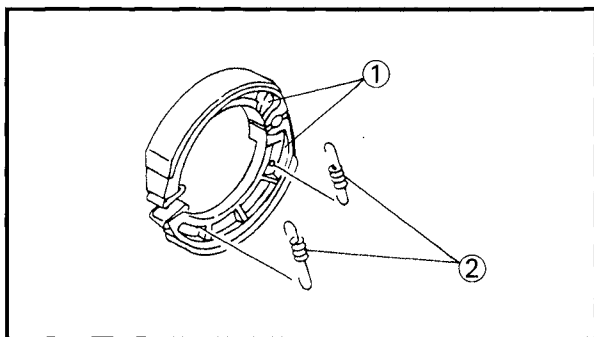
## 4. Inspect:

- Backing plate ①  
Cracks/Bends/Damage → Replace.
- Dust seal ②  
Wear/Damage → Replace.



## 5. Inspect:

- Bracket ① (camshaft)
  - Camshaft ②
  - Bracket ③ (brake shoe)  
Wear/Scratches/Damage → Replace.
  - Breather hose ④  
Obstruction → Remove.  
Damage → Replace.
6. Clean and blow out the breather hole ⑤ of the brake shoe bracket with compressed air.

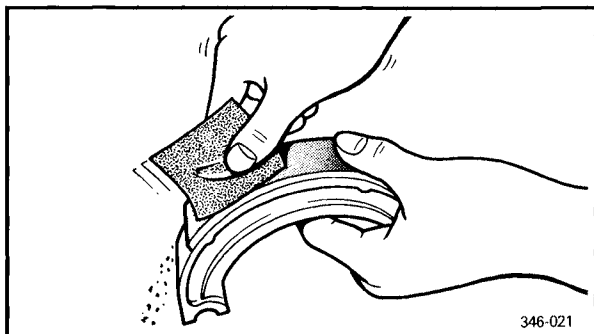


## 7. Inspect:

- Brake shoe ①
- Brake shoe spring ②  
Cracks/Damage → Replace as a set.

**NOTE:**

When replacing the brake shoes, replace the brake shoe springs at the same time.



## 8. Inspect:

- Brake shoe lining surface  
Glazed areas → Remove.  
Use a coarse sand paper.

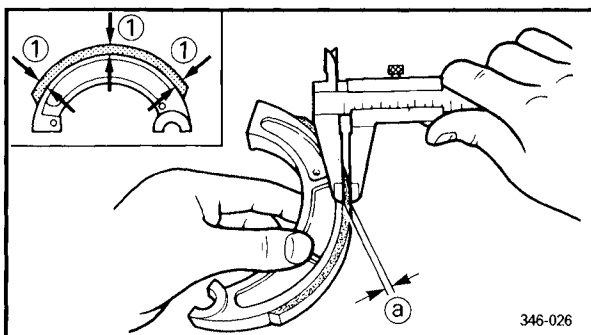
**NOTE:**

After using the sand paper, clean of the polished particles with cloth.

346-021

## FRONT WHEELS AND FRONT BRAKE

CHAS



9. Measure:

- Brake shoe lining thickness (a)  
Out of specification → Replace.

① Measuring points

**NOTE:** \_\_\_\_\_

Replace the brake shoes as a set if either is found to be worn to the wear limit.

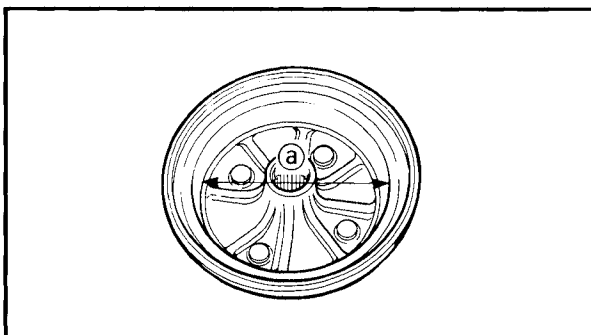


**Brake lining thickness:**

**4.0 mm (0.16 in)**

**<Wear limit>:**

**2.0 mm (0.08 in)**



10. Measure:

- Brake drum inside diameter (a)  
Out of specification → Replace.

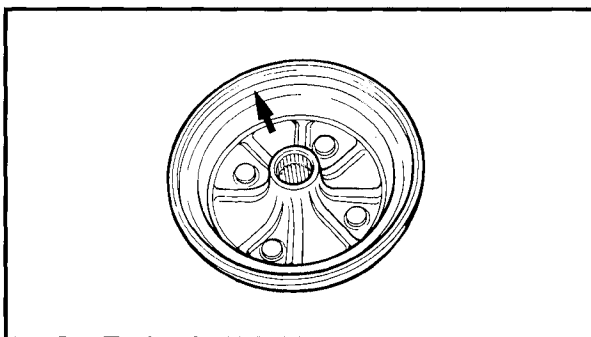


**Front brake drum inside diameter:**

**160 mm (6.30 in)**

**<Wear limit>:**

**161 mm (6.34 in)**



11. Inspect:

- Brake drum inner surface  
Oil/Scratches → Remove.

Oil	Use a rag soaked in lacquer thinner or solvent.
Scratches	Use an emery cloth (lightly and evenly polishing)

### INSTALLATION

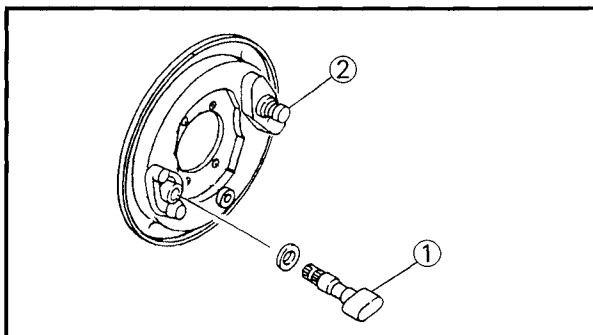
Reverse the "REMOVAL" procedure.

Note the following points.

**7**

## FRONT WHEELS AND FRONT BRAKE

CHAS



## 1. Lubricate:

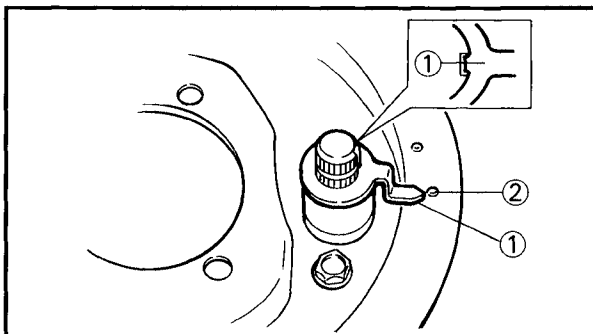
- Camshaft ①
- Pivot pin ②



Lithium soap base grease

**CAUTION:**

Install the camshaft and the pivot pin with lightly greased. Wipe off the excess grease.

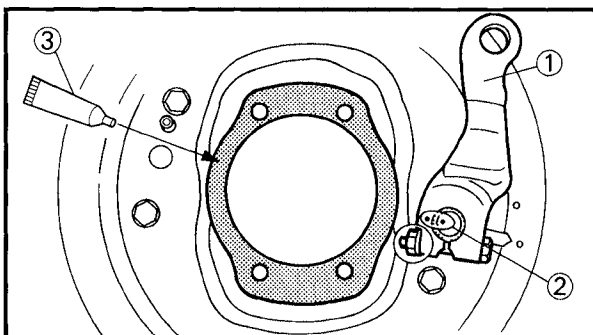


## 2. Install:

- Wear indicator plate ①

**NOTE:**

When installing the wear indicator plate, fit the projection to the camshaft groove and align the pointer to the wear indicator ②.



## 3. Install:

- Camshaft lever ①



**Bolt (camshaft lever):**  
9 Nm (0.9 m•kg, 6.5 ft•lb)

**NOTE:**

When installing the camshaft lever, align the punch mark ② on the camshaft lever and camshaft.

## 4. Apply:

- Sealant ③

(onto mating surfaces of steering knuckle)



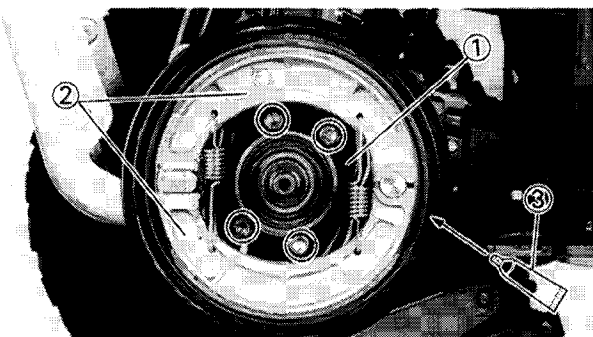
**Sealant (Quick Gasket®):**  
P/N. ACC-11001-01  
**Yamaha bond No 1215:**  
P/N. 90890-85505

## 5. Install:

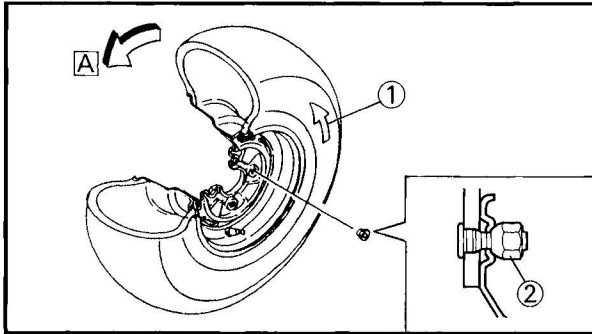
- Backing plate ①
- Brake shoes ②



**Bolts (brake shoe plate):**  
30 Nm (3.0 m•kg, 22 ft•lb)  
Use LOCTITE®





**FRONT WHEELS AND FRONT BRAKE****CHAS****9. Install:**

- Front wheel

**Nuts (front wheel):****55 Nm (5.5 in·kg, 40 ft·lb)****NOTE:**

Arrow mark ① on the tire must point toward the rotating direction **A** of the wheel.

**⚠ WARNING**

Install the nuts ② with its tapered side facing the wheel panel.

**10. Adjust:**

- Front brake cable free play  
Refer to the "FRONT BRAKE ADJUSTMENT" section in the CHAPTER 3.

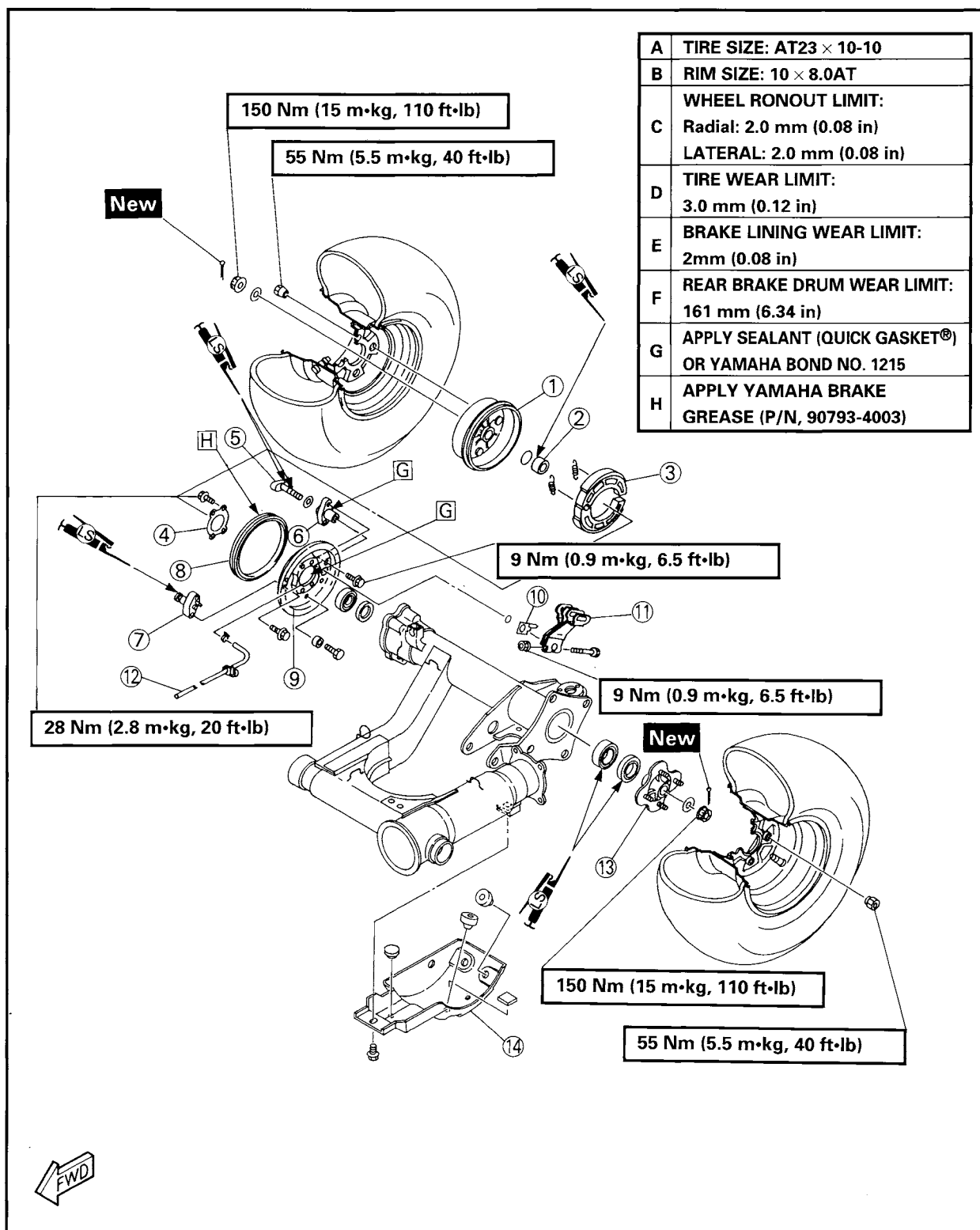
**Front brake free play:****5.0 ~ 8.0 mm (0.20 ~ 0.31 in) at lever pivot****7**



## REAR WHEELS AND REAR BRAKE

### REAR WHEELS AND REAR BRAKE

- |                       |                      |                         |
|-----------------------|----------------------|-------------------------|
| ① Brake drum          | ⑦ Brake shoe brakcet | ⑬ Wheel hub             |
| ② Spacer collar       | ⑧ Dust seal          | ⑭ Final gear case guard |
| ③ Brake shoe complete | ⑨ Backing plate      |                         |
| ④ Plate               | ⑩ Wear indicator     |                         |
| ⑤ Camshaft            | ⑪ Cam lever          |                         |
| ⑥ Camshaft brakcet    | ⑫ Breather hose      |                         |



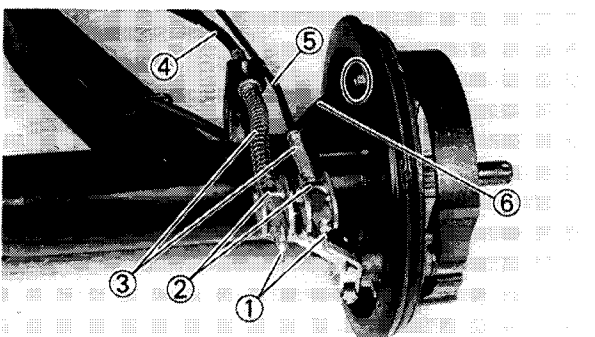
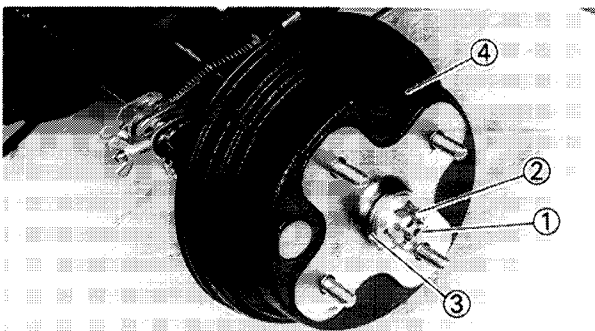
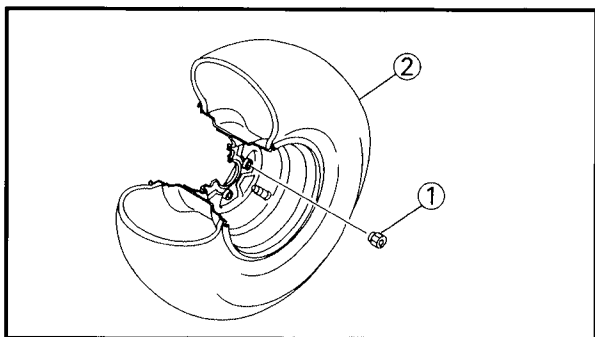
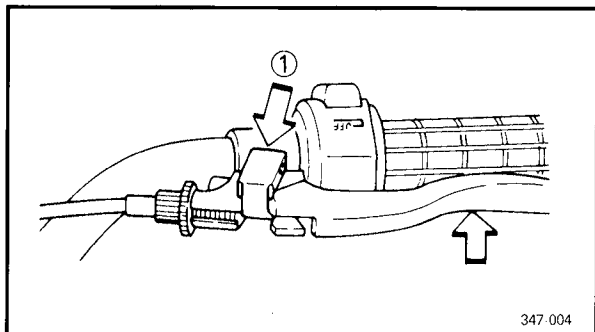
## REAR WHEELS AND REAR BRAKE

CHAS



### REMOVAL

1. Place the machine on a level place.



2. Loosen:
  - Nuts (rear wheel)
 Apply the parking brake ①.
3. Block the front wheels, and elevate the rear wheels by placing the suitable stand under the frame.

### **⚠ WARNING**

**Securely support the machine there is no danger of falling over.**

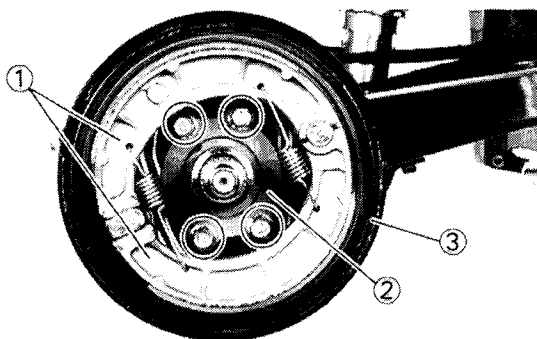
4. Remove:
  - Nuts ① (rear wheel)
  - Rear wheel ②

5. Remove:
  - Cotter pin ①
  - Axle nut ②
  - Plain washer ③
6. Release the parking brake.
7. Remove:
  - Brake drum ④

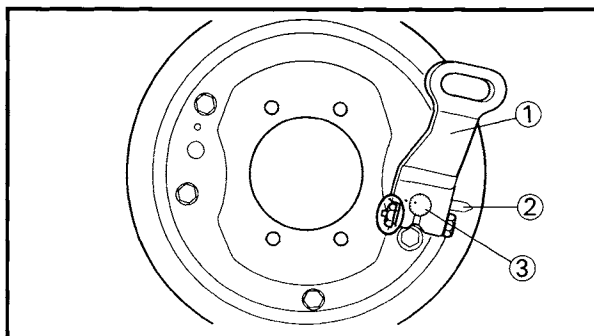
8. Remove:
  - Adjusters ① (brake lever and brake pedal)
  - Pins ②
  - Springs ③
9. Disconnect:
  - Brake cable ④ (from camshaft lever)
  - Brake pedal rod ⑤
  - Breather hose ⑥



## REAR WHEELS AND REAR BRAKE



10. Remove:
- Brake shoes ①
  - Plate ②
  - Backing plate ③

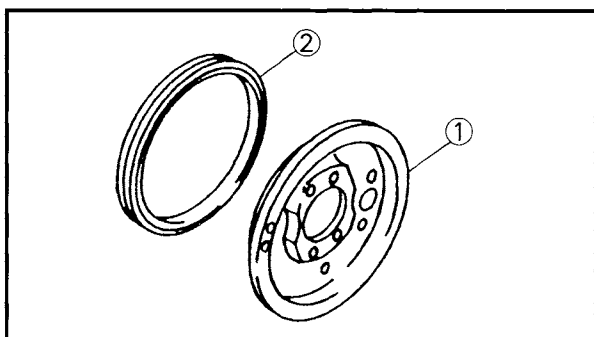


11. Remove:
- Camshaft lever ①
  - Wear indicator plate ②
  - Camshaft ③
  - Washer

### INSPECTION

1. Inspect:
- Wheel
- Refer to the "WHEEL INSPECTION" section in the CHAPTER 3.

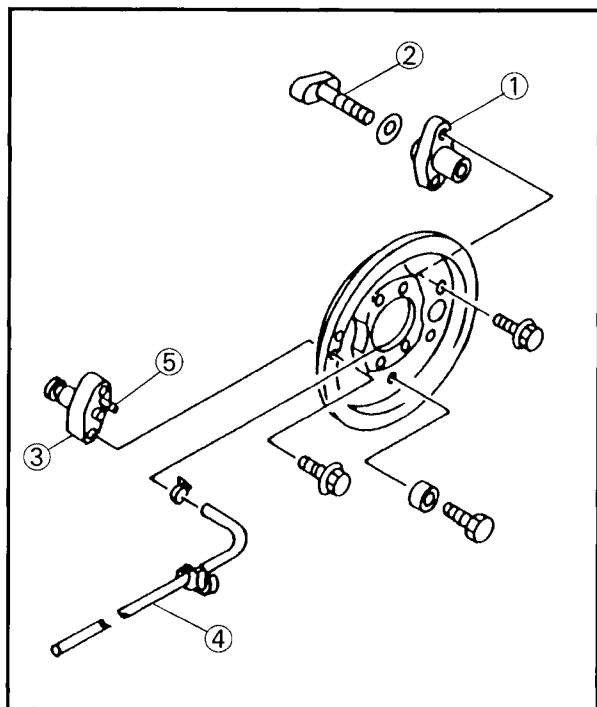
2. Measure:
- Wheel runout
  - Tire surfaces
- Refer to the "FRONT WHEEL AND FRONT BRAKE-INSPECTION" section



3. Inspect:
- Backing plate ①  
Cracks/Bends/Damage → Replace.
  - Dust seal ②  
Wear/Damage → Replace.

# REAR WHEELS AND REAR BRAKE

CHAS



## 4. Inspect:

- Bracket ① (camshaft)
- Camshaft ②
- Bracket ③ (brake shoe)  
Wear/Scratches/Damage → Replace.
- Breather hose ④  
Obstruction → Remove.  
Damage → Replace.

## 5. Clean and blow out the breather hole ⑤ of the brake shoe bracket with compressed air.

## 6. Inspect:

- Brake shoe linings

## 7. Measure:

- Brake lining thickness  
Refer to the "FRONT WHEEL AND FRONT BRAKE-INSPECTION" section.



### Brake lining thickness:

4.0 mm (0.16 in)

### <Wear limit>:

2.0 mm (0.8 in)

## 8. Inspect:

- Shoe springs  
Refer to the "FRONT WHEEL AND FRONT BRAKE-INSPECTION" section.

## 9. Measure:

- Brake drum inside diameter ①  
Out of specification → Replace.

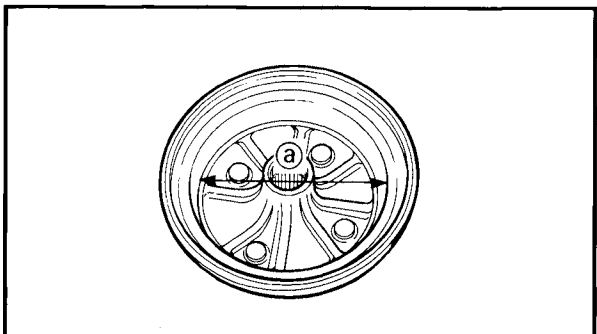


### Rear brake drum inside diameter:

160 mm (6.30 in)

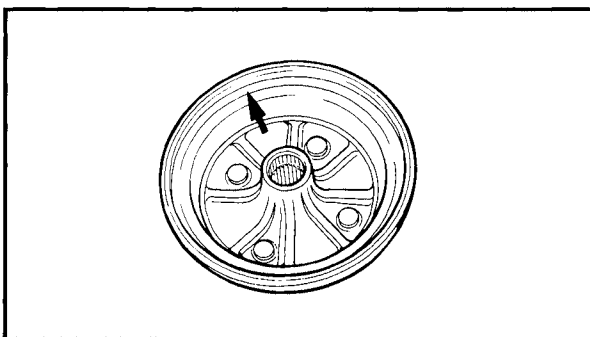
### <Wear limit>:

161 mm (6.34 in)



## REAR WHEELS AND REAR BRAKE

CHAS



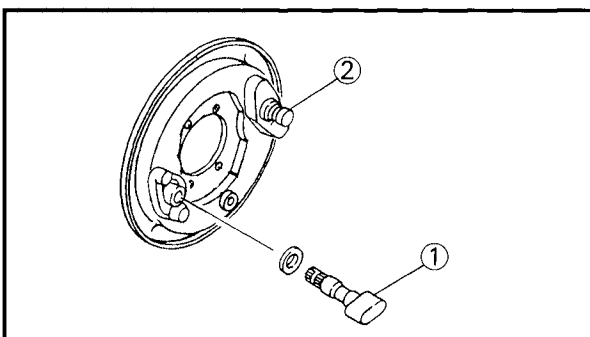
### 10. Inspect:

- Brake drum inner surface
- Oil/Scratches → Remove.

Oil	Use a rag soaked in lacquer thinner or solvent.
Scratches	Use a emery cloth (lightly and evenly polishing)

### INSTALLATION

Reverse the "REMOVAL" procedure.  
Note the following points.



### 1. Lubricate:

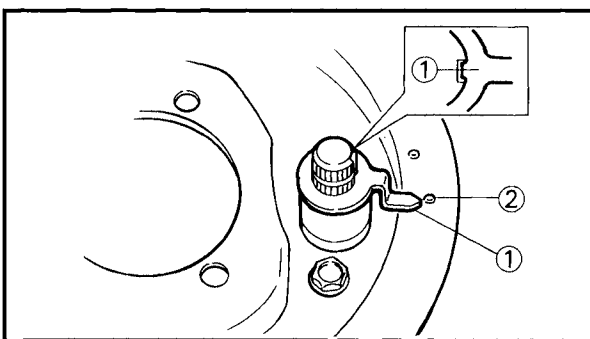
- Camshaft ①
- Pivot pin ②



**Lithium soap base grease**

### CAUTION:

Install the camshaft and the pivot pin with lightly greased. Wipe off the excess grease.

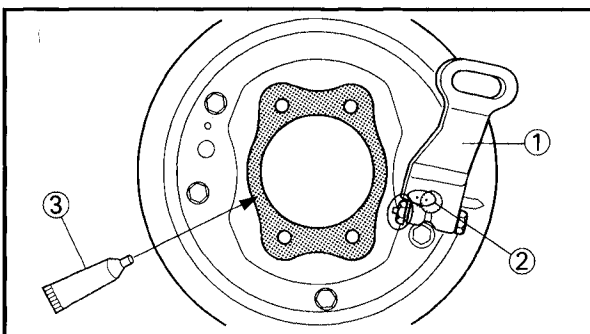


### 2. Install:

- Wear indicator plate ①

### NOTE:

When installing the wear indicator plate, fit the projection to the camshaft groove and align the pointer to the wear indicator ②.



### 3. Install:

- Camshaft lever ①

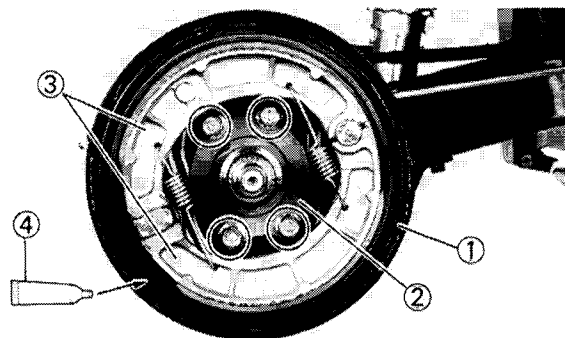


**Bolt (camshaft lever):**  
**9 Nm (0.9 m•kg, 6.5 ft•lb)**

### NOTE:

When installing the camshaft lever, align the punch mark ② on the camshaft lever and camshaft.

**7**

**REAR WHEELS AND REAR BRAKE****CHAS**

## 4. Apply:

- Sealant ③

(onto mating surfaces of swingarm)

**Sealant (Quick Gasket®):****P/N. ACC-11001-01****Yamaha bond No 1215:****P/N. 90890-85505**

## 5. Install:

- Backing plate ①
- Plate ②
- Brake shoes ③

**Bolts (Backing plate):****28 Nm (2.8 m•kg, 20 ft•lb)**

## 6. Check:

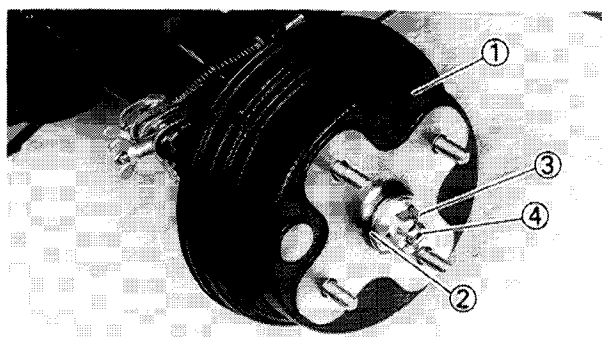
- Camshaft operation
- Unsmooth operation → Repair.

## 7. Apply:

- Yamaha brake grease ④
- (to the dust seal lip)

**Yamaha brake grease:****P/N. 90793-40003****! WARNING**

**Do not apply grease to the brake shoe linings.**

**7**

## 8. Install:

- Brake drum ①
- Washer ②
- Axle nut ③

## 9. Apply the parking brake.

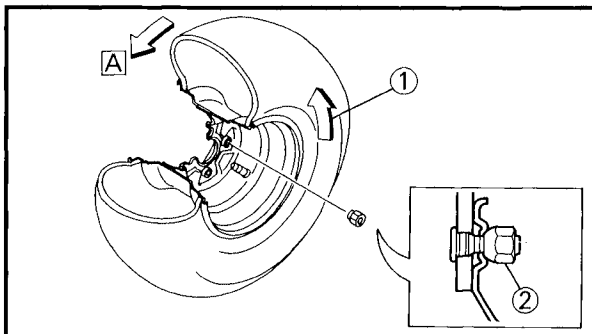
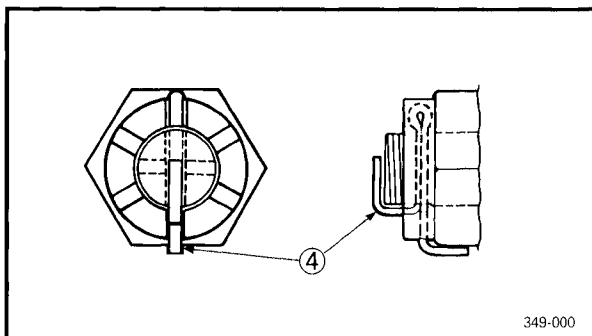
## 10. Tighten:

- Axle nut

**Axle nut (wheel hub):****150 Nm (15 m•kg, 110 ft•lb)**

## REAR WHEELS AND REAR BRAKE

CHAS



### 11. Install

- Cotter pin ④

#### NOTE:

Do not loosen the axle nut after torque tightening. If the axle nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the axle nut.

### ⚠ WARNING

Always use a new cotter pin.

### 12. Install:

- Rear wheel



#### Nut (Rear wheel):

55 Nm (5.5 m·kg, 40 ft·lb)

#### NOTE:

Arrow mark ① on the tire must point toward the rotating direction **A** of the wheel.

### ⚠ WARNING

Install the nuts ② with its tapered side facing the wheel.

### 13. Adjust:

- Rear brake pedal free play
- Rear brake cable free play

Refer to the "REAR BRAKE AND PEDAL ADJUSTMENT" section in the CHAPTER 3.



#### Rear brake pedal free play:

20 ~ 30 mm (0.78 ~ 1.18 in)

#### Rear brake lever free play:

5.0 ~ 8.0 mm (0.2 ~ 0.31 in) at lever pivot

# 7



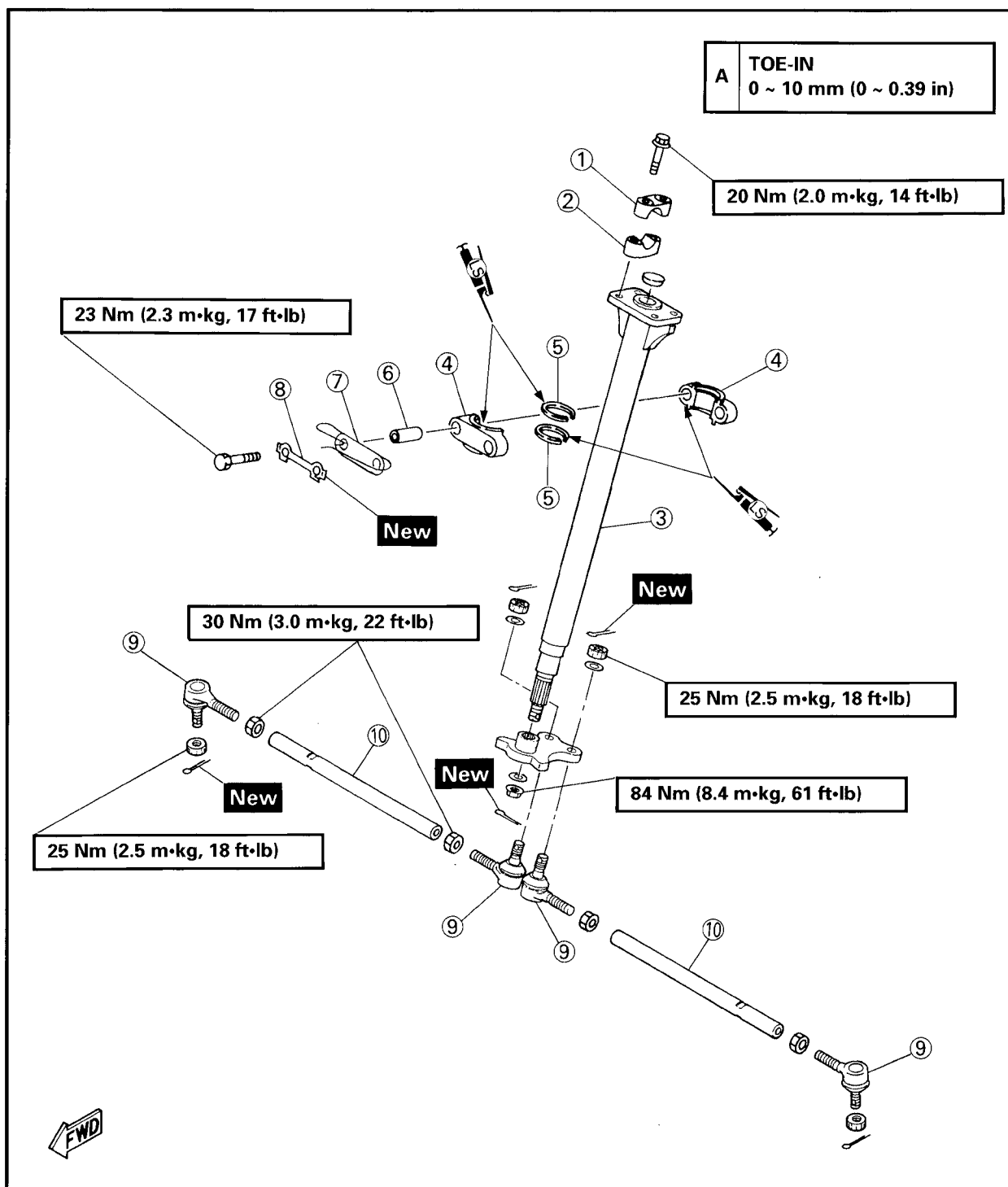
## STEERING SYSTEM

CHAS



## STEERING SYSTEM

- ① Handlebar holder (upper)
- ② Handlebar holder (lower)
- ③ Steering shaft
- ④ Steering bearing
- ⑤ Oil seal
- ⑥ Collar
- ⑦ Cable guide
- ⑧ Lock washer
- ⑨ Rod end
- ⑩ Tie-rod

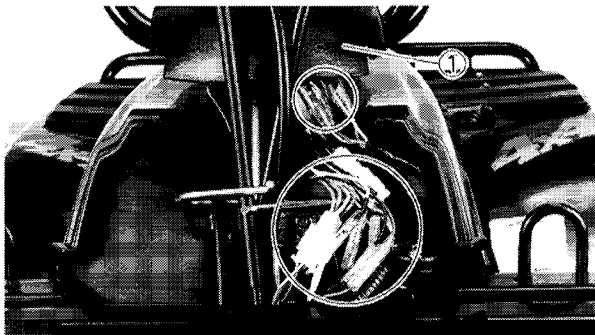


**REMOVAL****Handlebar**

## 1. Remove:

- Front bumper
- Front fender

Refer to the "FENDERS AND FUEL TANK-FRONT FENDER" section in CHAPTER 3.

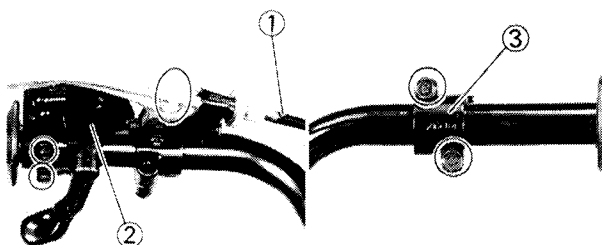


## 2. Disconnect:

- Main switch leads
- "NEUTRAL" indicator light leads
- "REVERSE" indicator light leads
- Handlebar switch (left) leads
- Brake switch lead.

## 3. Remove:

- Handle protector ①

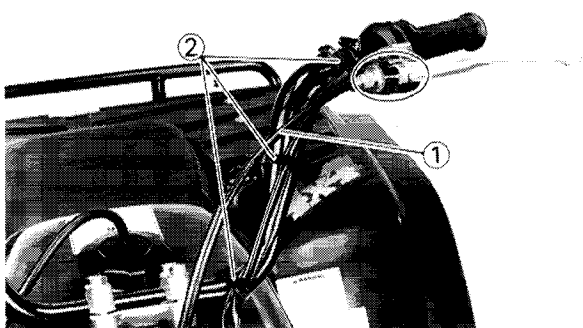


## 4. Disconnect:

- Front brake cable ①

## 5. Remove:

- Throttle lever assembly ②
- Brake lever holder ③ (front brake)

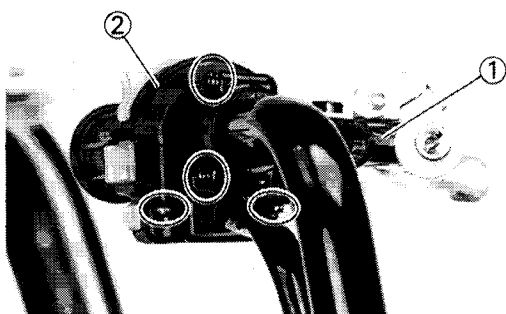


## 6. Disconnect:

- Brake cable ① (parking)

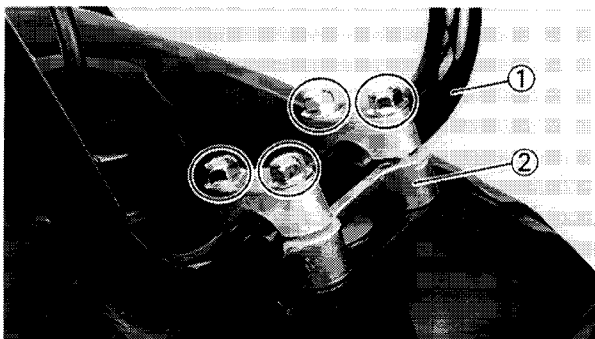
## 7. Remove:

- Bands ②

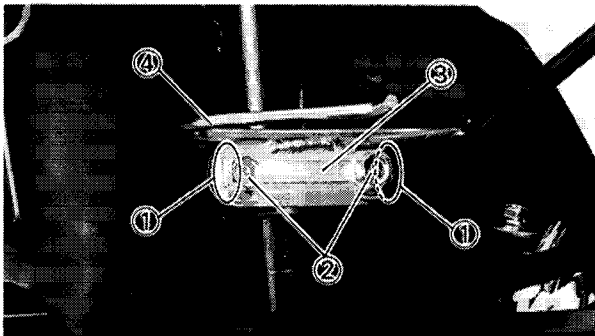


## 8. Remove:

- Brake lever holder ① (parking)
- Handlebar switch ②

**STEERING SYSTEM****CHAS****9. Remove:**

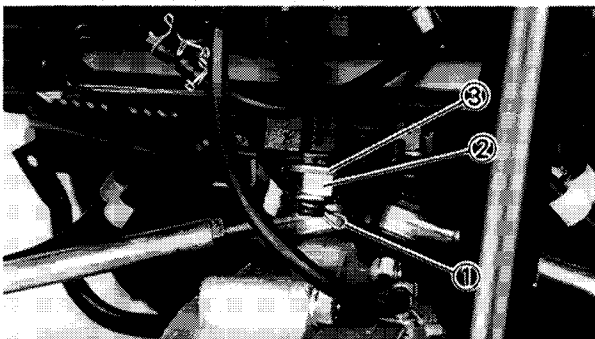
- Handlebar ①
- Handlebar holder ② (lower)

**Steering shaft****1. Straighten:**

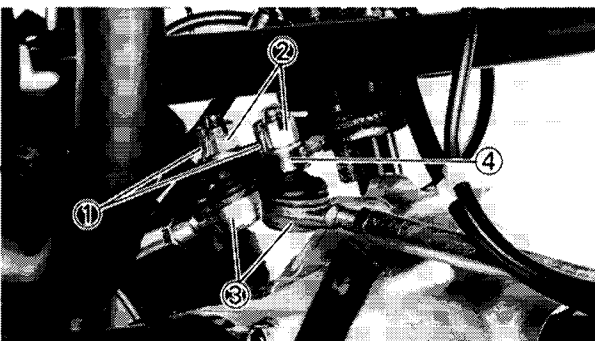
- Lock washer tabs ①

**2. Remove:**

- Bolts ②
- Lock washer ③
- Cable guide ④

**3. Remove:**

- Clip ① (steering shaft)
- Nut ②
- Washer ③

**4. Remove:**

- Cotter pins ①
- Nuts ②

**5. Disconnect:**

- Tie-rod ends ③ (from pit man arm ④)

**NOTE:**

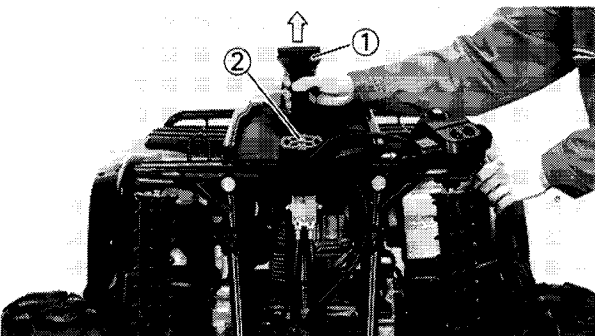
When disconnecting the tie-rod ends from the pit man arm, use a General bearing puller.

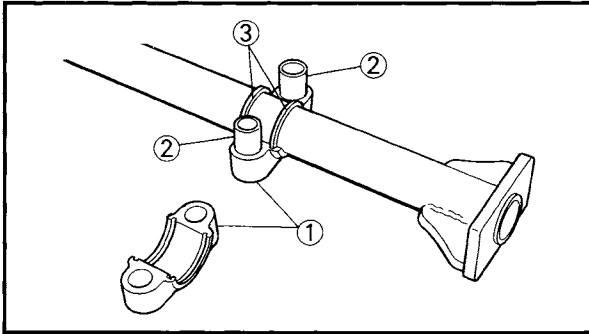
**6. Remove:**

- Pit man arm ④

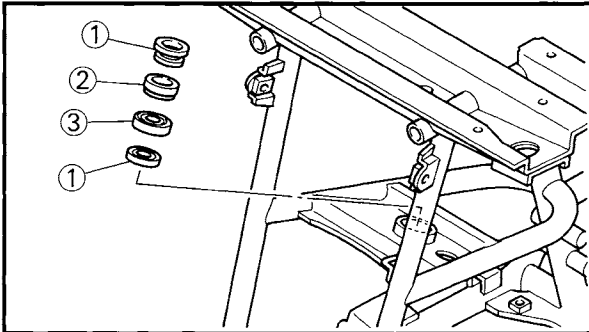
**7. Remove:**

- Steering shaft ① (with steering bearings ② )  
(from upside)

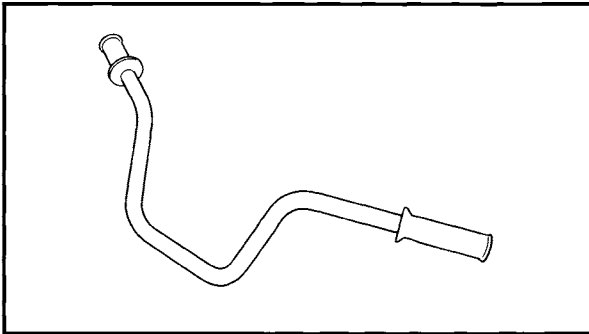


**STEERING SYSTEM****CHAS****8. Remove:**

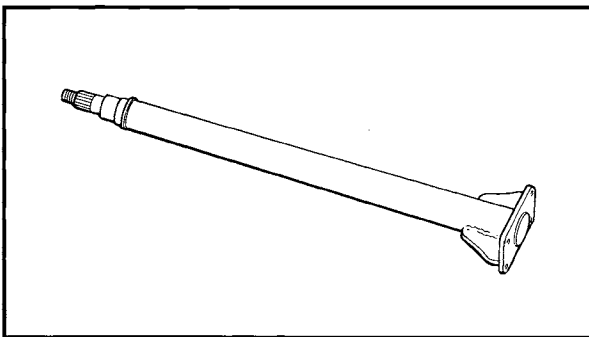
- Steering bearings ①
- Collars ②
- Oil seals ③

**9. Remove:**

- Oil seals ①
- Bearing retainer ②  
Use the damper rod holder.
- Bearing ③

**Damper rod holder:****P/N YM-01327, 90890-01327****INSPECTION****1. Inspect:**

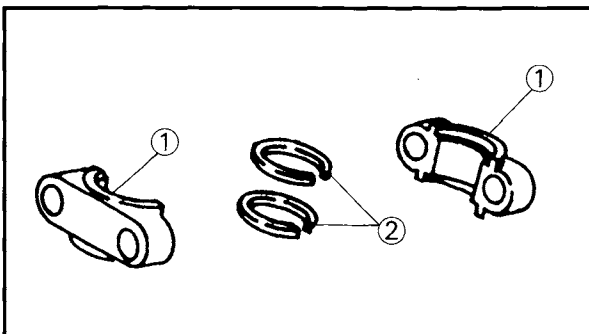
- Handlebar  
Cracks/Bends/Damage → Replace.

**2. Inspect:**

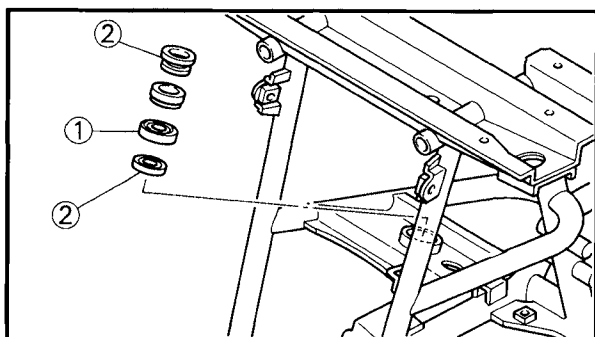
- Steering shaft  
Bends/Damage → Replace.

**⚠ WARNING**

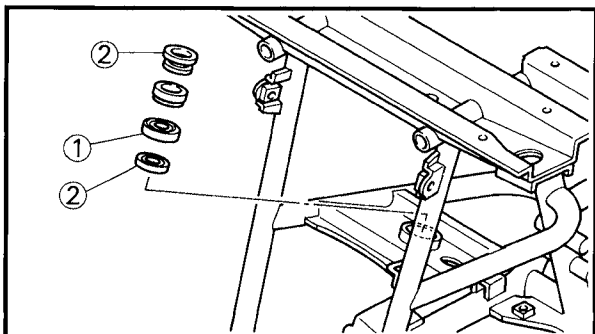
**Do not attempt to straighten a bent shaft; this may dangerously weaken the shaft.**

**3. Inspect:**

- Steering bearings ①
- Oil seals ②  
Wear/Damage → Replace.

**STEERING SYSTEM****CHAS****4. Inspect:**

- Bearing ① (steering shaft lower)
  - Oil seals ②
- Wear/Damage → Replace.

**INSTALLATION**

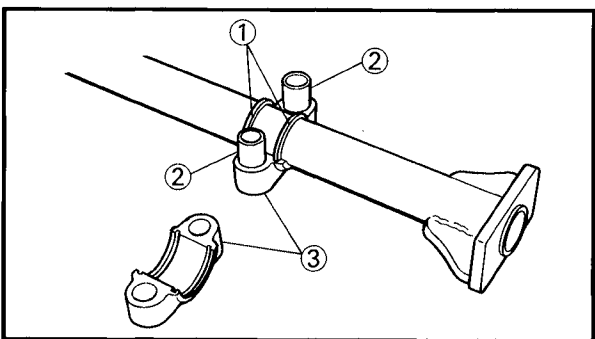
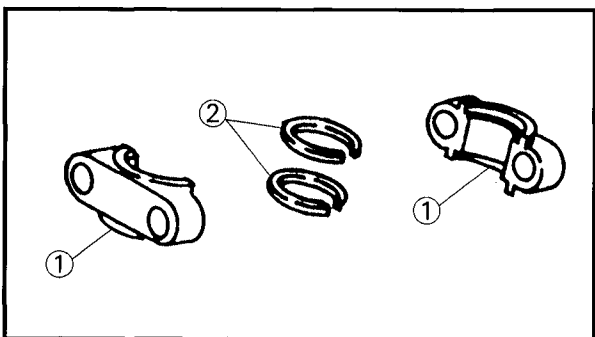
Reverse the "REMOVAL" procedures.  
Note the following points.

**Steering shaft****1. Lubricate:**

- Bearing ① (steering shaft lower)
- Oil seals ②

**Lithium soap base grease****2. Lubricate:**

- Steering bearings ①
- Oil seals ②

**Lithium soap base grease****3. Install:**

- Oil seals ① (to steering shaft)
- Collars ②
- Steering bearings ③

**NOTE:**

Make sure to set the oil seals on the grooves of the steering bearings.

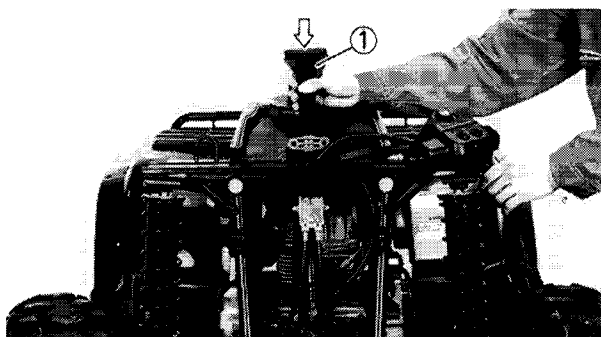
**4. Install:**

- Steering shaft ①

**WARNING**

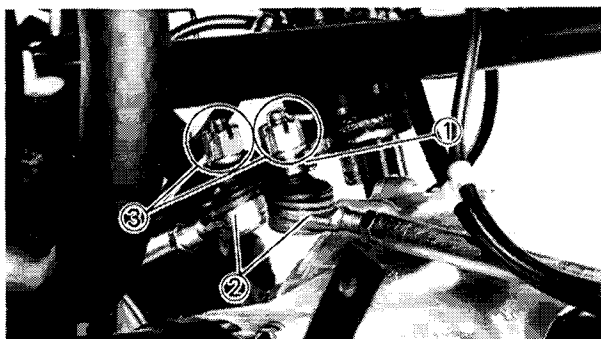
Make sure the brake cables and leads are properly routed, and are not damaged or twisted.

Refer to the "CABLE ROUTING" section in the CHAPTER 3.



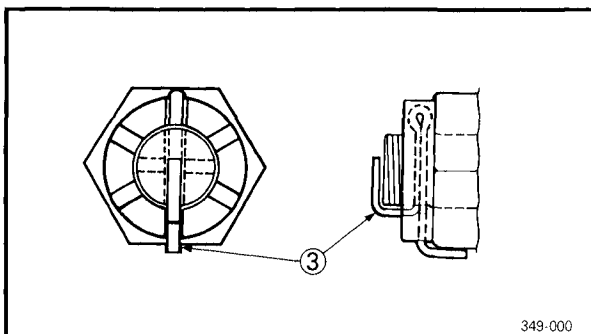
## STEERING SYSTEM

CHAS



## 5. Install:

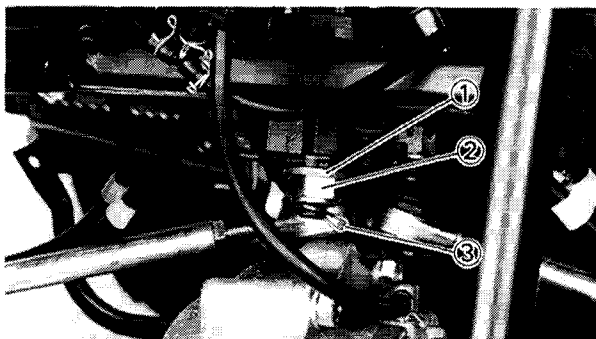
- Pit man arm ①
- Tie-rod ends ②
- Cotter pins ③

**Nuts (tie-rod):****25 Nm (2.5 m•kg, 18 ft•lb)****NOTE:**

Do not loosen the nut after torque tightening. If the nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the nut.

**⚠ WARNING**

Always use new cotter pins.

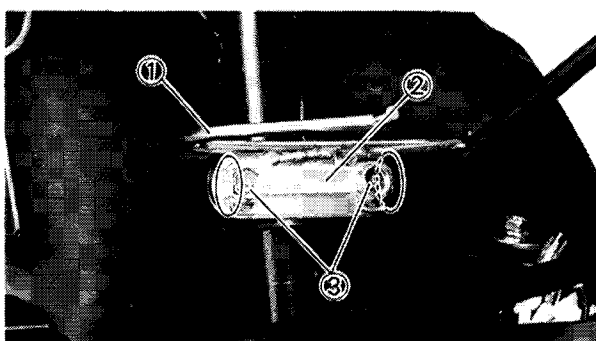


## 6. Install:

- Washer ①
- Nut ②
- Clip ③

**Nut (steering shaft):****84 Nm (8.4 m•kg, 61 ft•lb)****NOTE:**

Before installing the nut ②, apply lithium soap base grease onto the steering shaft end thread.



## 7. Install:

- Cable guide ①
- Lock washer ②
- Bolts ③

**Bolt (bearing holder):****23 Nm (2.3 m•kg, 17 ft•lb)****⚠ WARNING**

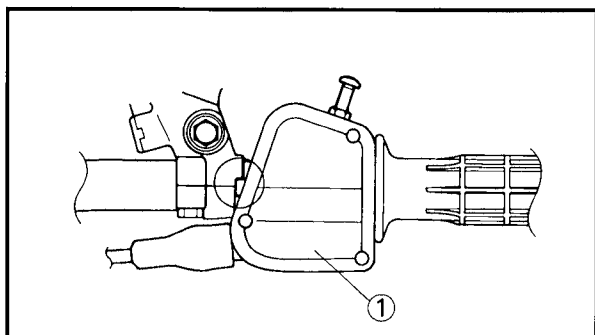
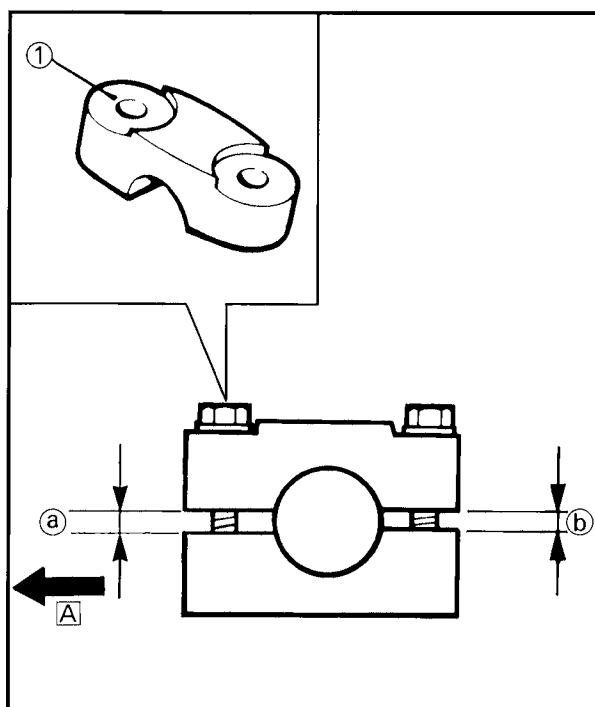
Always use a new lock washer.

10. Bend the lock washer tabs.

7

## STEERING SYSTEM

CHAS

**Handlebar**

## 1. Install:

- Handlebar holder (lower)
- Handlebar
- Handlebar holders (upper)

**NOTE:**

- The upper handlebar holder should be installed with the punched mark ① forward **A**.
- Gap **a** and **b** should be equal.



**Handlebar holder (upper):**  
20 Nm (2.0 m·kg, 14 ft·lb)

## 2. Install:

- Throttle lever assembly ①

**NOTE:**

Fit the throttle housing projection onto the indent on the front brake lever holder.

**⚠ WARNING**

Proper cable and lead routing is essential to assure safe machine operation. Refer to the "CABLE ROUTING" section in the CHAPTER 2.

## 3. Adjust:

- Brake cable free play  
Refer to the "FRONT BRAKE ADJUSTMENT" and "REAR BRAKE LEVER AND PEDAL ADJUSTMENT" section in the CHAPTER 3.

## 4. Adjust:

- Toe-in  
Refer to the "TOE-IN ADJUSTMENT" section in CHAPTER 3.

## 5. Install:

- Front fender
- Front bumper  
Refer to the "FENDERS AND FUEL TANK—FRONT FENDER" section in CHAPTER 3.



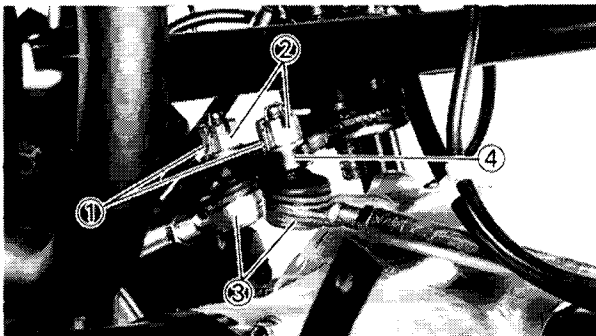
## STEERING KNUCKLES AND TIE-RODS

### REMOVAL

#### 1. Remove:

- Front wheels
- Front brake drums
- Backing plate

Refer to the "FRONT WHEELS AND FRONT BRAKE" section.



#### 2. Remove:

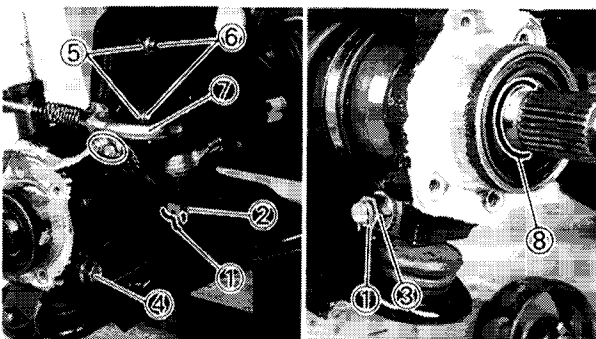
- Cotter pins ①
- Nuts ② (tie-rod ends)

#### 3. Disconnect:

- Tie-rod ③ (from pit man arm ④)

### NOTE:

When disconnecting the tie-rod ends from the pit man arm, use a General bearing puller.



#### 4. Remove:

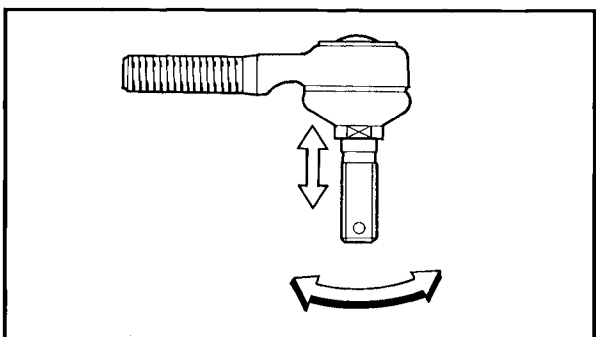
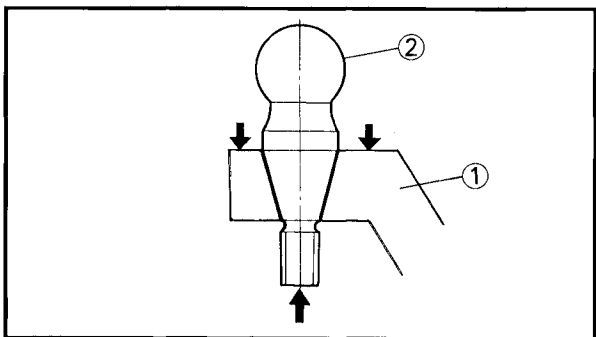
- Cotter pins ①
- Nut ② (tie-rod end)
- Nuts ③ (steering knuckle)
- Bolt ④ (knuckle arm)
- Nuts ⑤ (shock absorber)
- Bolts ⑥ (shock absorber)
- Brake cable holder ⑦
- O-ring ⑧

#### 5. Remove:

- Steering knuckle ①

### NOTE:

Use the General bearing puller to separate the ball joint ② and steering knuckle.

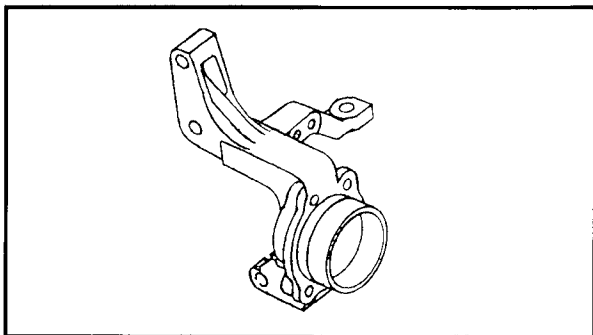


### INSPECTION

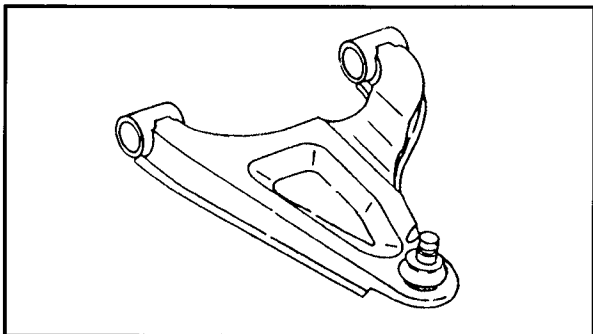
#### 1. Check:

- Tie-rod free play and movement  
Tie-rod is exists free play → Replace tie-rod end.  
Tie-rod is turns roughly → Replace tie-rod end.



**STEERING KNUCKLES AND TIE-RODS****CHAS****2. Inspect:**

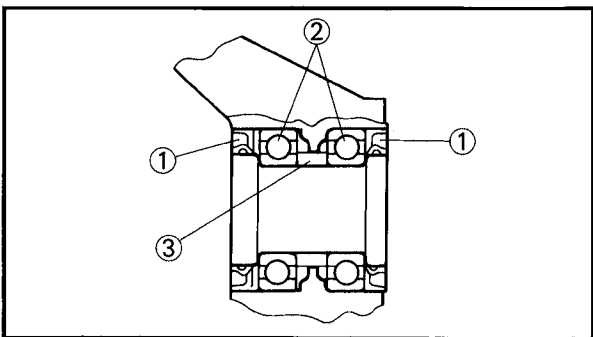
- Steering knuckle  
Damage/Pitting → Replace.

**3. Inspect:**

- Ball joints  
Damage/Pitting → Replace front arms.  
Ball joint is exists free play → Replace front arms.  
Ball joint turns roughly → Replace front arms.

**4. Inspect:**

- Wheel bearings  
Bearings allow play in the wheel hubs or wheel turns roughly → Replace.
- Oil seals  
Damage → Replace.



\*\*\*\*\*

**Wheel bearing replacement steps:**

- Clean the outside of the steering knuckle.
- Remove the oil seals ①.
- Drive out the bearings ②.

**⚠ WARNING**

**Eye protection is recommended when using striking tools.**

- Remove the spacer ③.
- Apply the lithium base grease to the bearings and oil seals.
- Install the spacer to the steering knuckle.
- Install the new bearings.

**NOTE:**

Install the outside bearing first.

**STEERING KNUCKLES AND TIE-RODS****CHAS****CAUTION:**

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

- Install the new oil seals.

**NOTE:**

When installing the oil seals, sealed side of oil seal comes outside.

\*\*\*\*\*

**INSTALLATION**

When installing the tie-rod, reverse the "REMOVAL" procedure. Note the following points.

## 1. Lubricate:

- Bearings (steering knuckle)
- Oil seal lips (steering knuckle)
- O-ring (drive shaft end)
- Oil seal (drive shaft end)



**Lithium soap base grease**

## 2. Adjust:

- Tie-rod assembly length

\*\*\*\*\*

**Tie-rod assembly length adjustment steps:**

- Loosen the lock nuts.
- Adjust tie-rod assembly length (a) by turning both tie-rod ends.

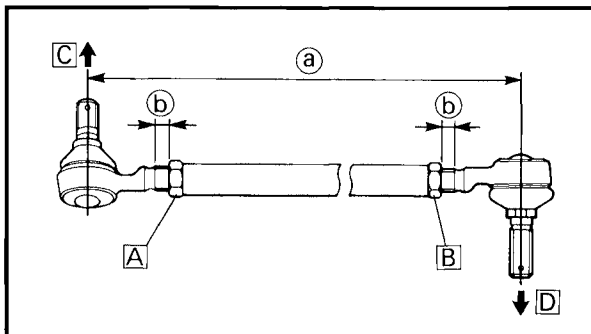


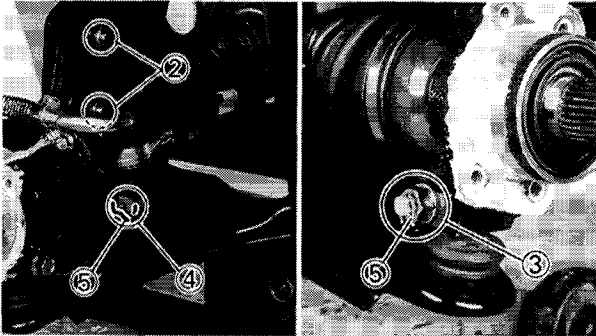
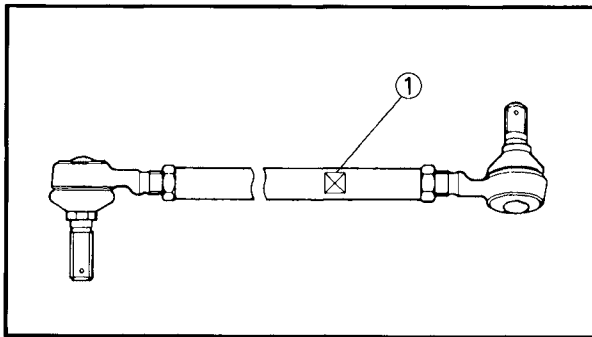
**Tie-rod assembly length (a):**  
**344 mm (13.5 in)**

- A** Right-hand-threads
- B** Left-hand-threads
- C** To steering shaft
- D** To knuckle

**NOTE:**

The threads (b) on both tie-rod ends must be of the same length.



**STEERING KNUCKLES AND TIE-RODS****CHAS**

- Tighten the locknuts.



**Locknut (tie-rod):**  
**30 Nm (3.0 m·kg, 22 ft·lb)**

\*\*\*\*\*

**3. Install:**

- Tie-rod
- Steering knuckle

**NOTE:**

- Be sure to position the tie-rod so that its indentation ① side is connected to the knuckle arm.
- Before installing the bolt ③, apply lithium soap base grease onto the bolt thread.



**Nut ② (steering knuckle and shock absorber):**

**69 Nm (6.9 m·kg, 50 ft·lb)**

**Nut ③ (steering knuckle and lower arm):**

**48 Nm (4.8 m·kg, 35 ft·lb)**

**Nut ④ (steering knuckle and tie-rod):**

**25 Nm (2.5 m·kg, 18 ft·lb)**

**4. Install:**

- Cotter pins ⑤

**⚠ WARNING**

**Always use new cotter pins.**

**5. Install:**

- Backing plate
- Front brake drum
- Front wheel

Refer to the "FRONT WHEELS AND FRONT BRAKE-INSTALLATION" section.

**6. Adjust:**

- Toe-in

Refer to the "TOE-IN ADJUSTMENT" section in the CHAPTER 3.

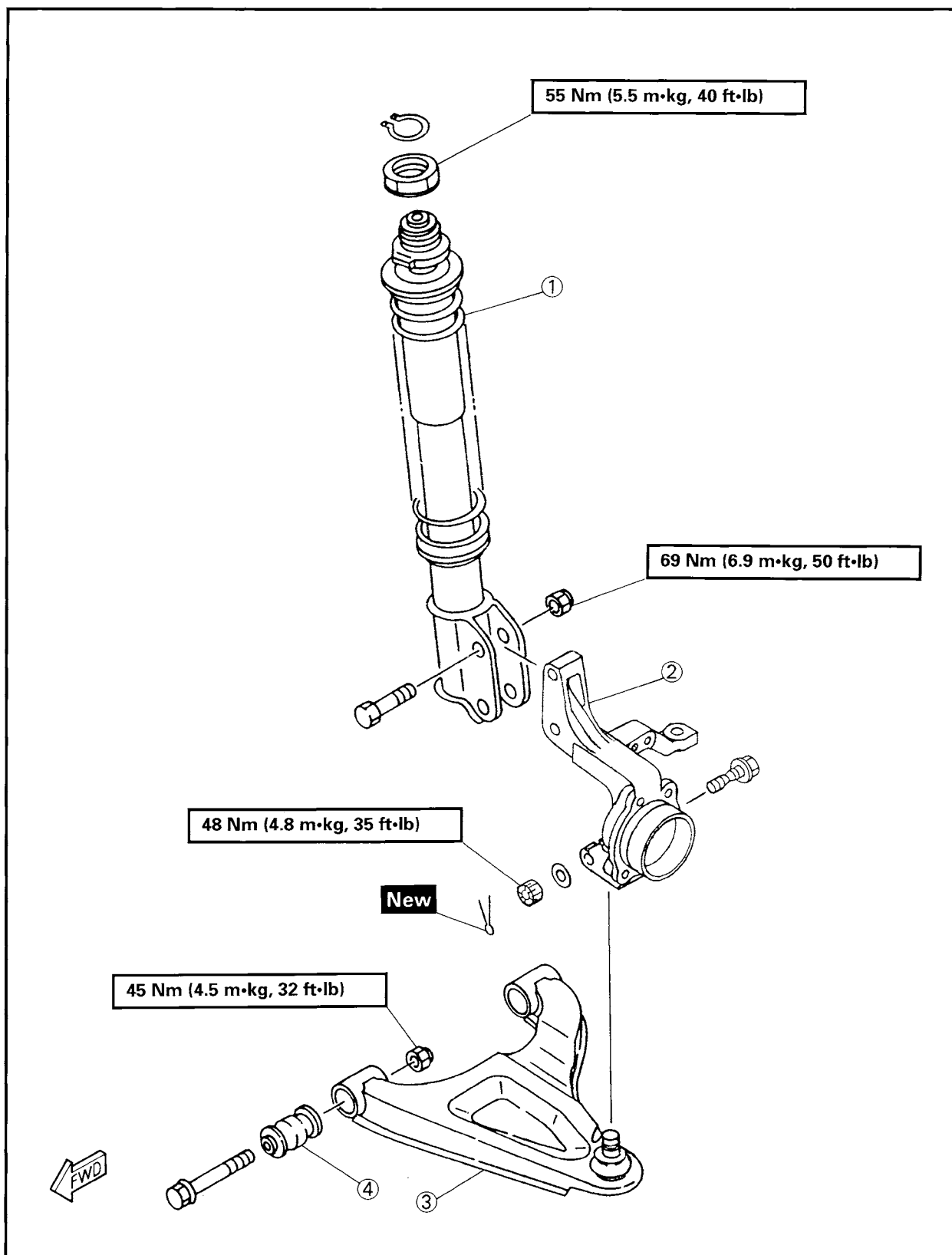
## FRONT SHOCK ABSORBER AND LOWER ARM

CHAS



## FRONT SHOCK ABSORBER AND LOWER ARM

- ① Front shock absorber
- ② Steering knuckle
- ③ Lower arm
- ④ Bushing



7

# FRONT SHOCK ABSORBER AND LOWER ARM

CHAS



## REMOVAL

### 1. Remove:

- Front bumper
- Front fender

Refer to the "FENDERS AND FUEL TANK-FRONT FENDER" section in the CHAPTER 3.

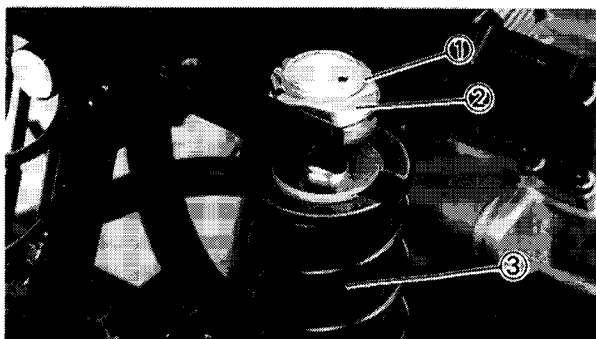
- Front wheel
- Brake drum
- Backing plate

Refer to the "FRONT WHEELS AND FRONT BRAKE-REMOVAL" section.

### 2. Remove:

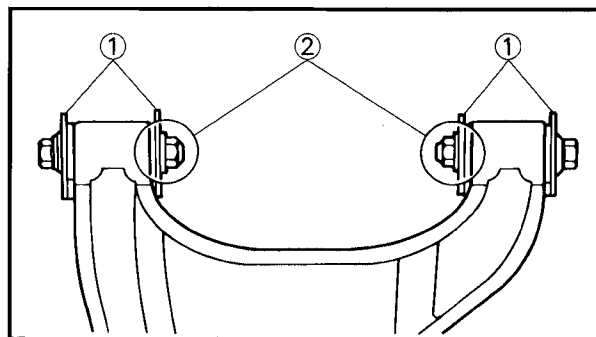
- Steering knuckle

Refer to the "STEERING KNUCKLES AND TIE-RODS" section.



### 3. Remove:

- Circlip ①
- Nut ②
- Front shock absorber ③



### 4. Inspect:

- Lower arms free play

\*\*\*\*\*

### Inspection steps:

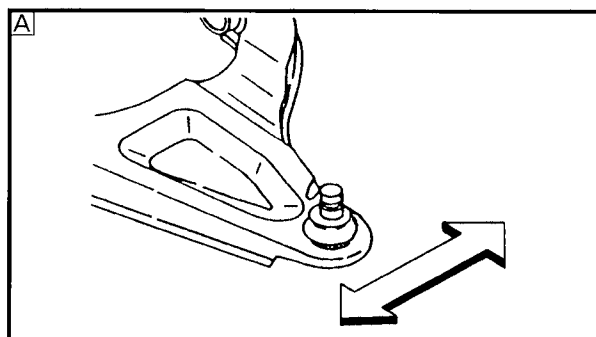
- Inspect the lower arm brackets ① of the frame.  
If bent, cracked or damaged, repair or replace the frame.
- Check the tightening torque of the lower arm securing nuts ②.



### Nut (lower arm):

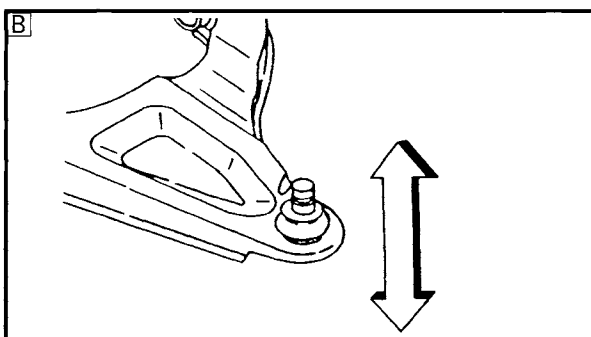
45 Nm (4.5 m•kg, 32 ft•lb)

- Check the lower arm side play [A] by moving it from side to side. If side play noticeable, replace the bushings or lower arm as a set.





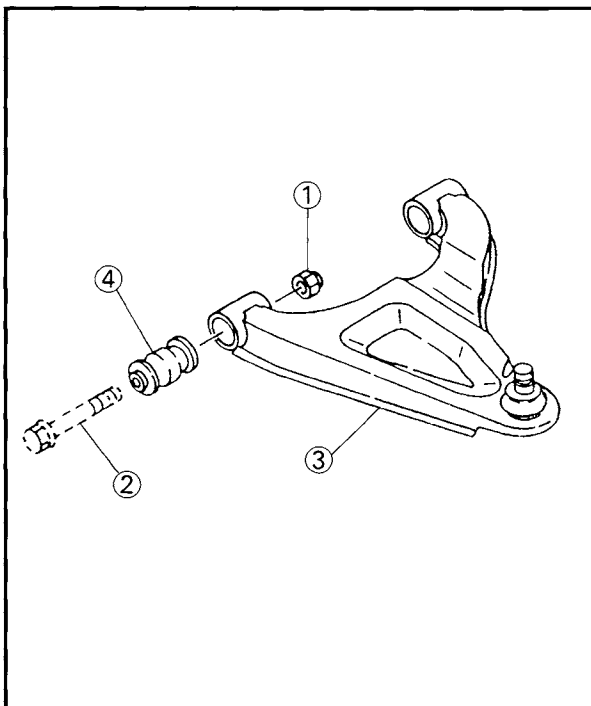
## FRONT SHOCK ABSORBER AND LOWER ARM



- Check the lower arm vertical movement **B** by moving it up and down.

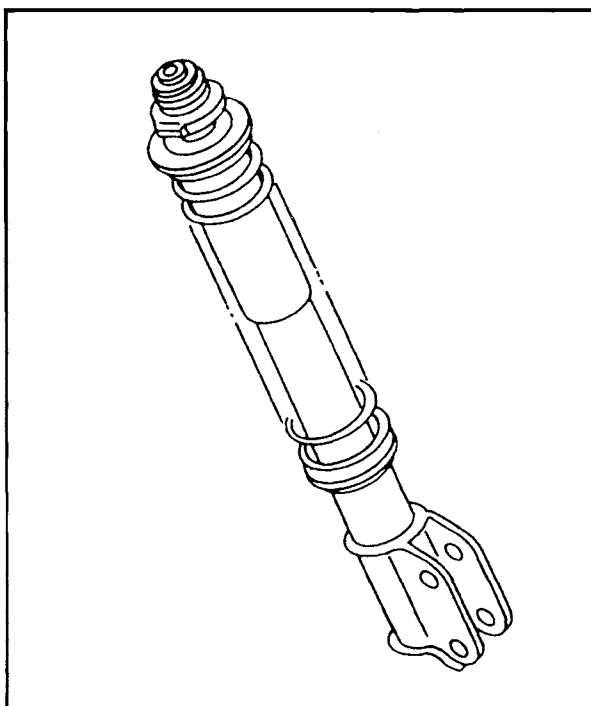
If vertical movement is tight, binding or rough, replace the bushings or lower arm as a set.

\*\*\*\*\*



### 5. Remove:

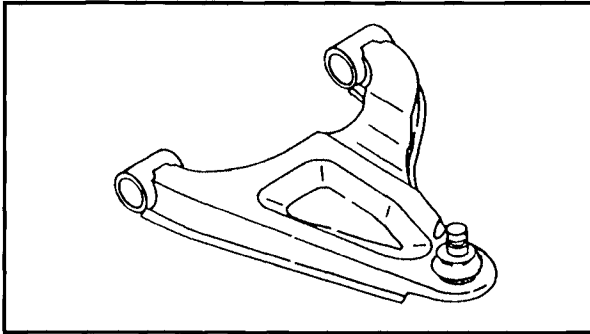
- Nuts ①
- Bolts ②
- Lower arm ③
- Bushings ④



### INSPECTION

#### 1. Inspect:

- Shock absorber  
Oil leaks → Replace the shock absorber assembly.
- Ball joint  
Cracks/Damage → Replace the shock absorber assembly.
- Spring  
Fatigue/Damage → Replace the shock absorber assembly.  
Move the spring up and down.

**FRONT SHOCK ABSORBER AND LOWER ARM****CHAS**

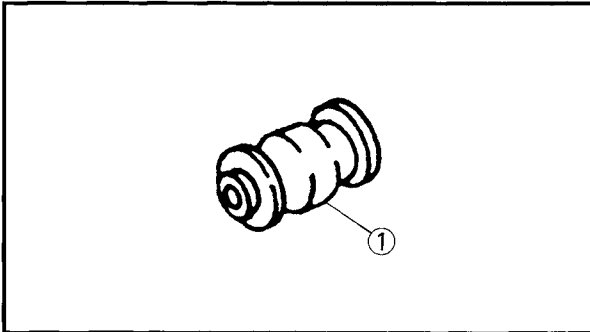
## 2. Inspect:

- Lower arm

Cracks/Bends/Damage → Replace.

**⚠ WARNING**

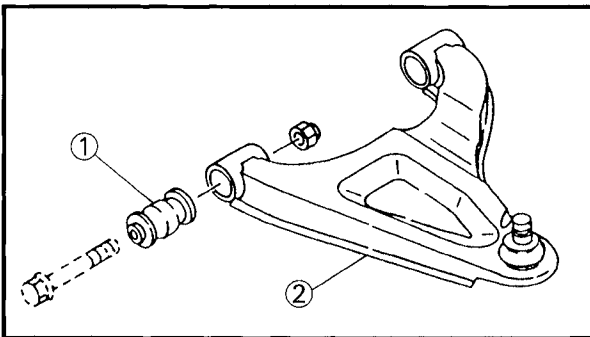
**Do not attempt to straighten a bent arm; this may dangerously weaken the arm.**



## 3. Inspect:

- Bushings ①

Wear/Damage → Replace as a set.

**INSTALLATION**

Reverse the "REMOVAL" procedures.

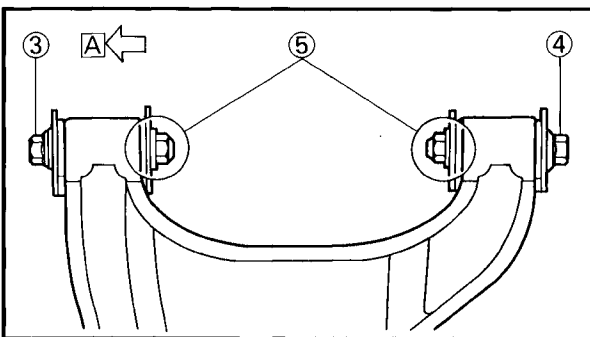
Note the following points.

## 1. Install:

- Bushings ①
- Lower arm ②

**NOTE:**

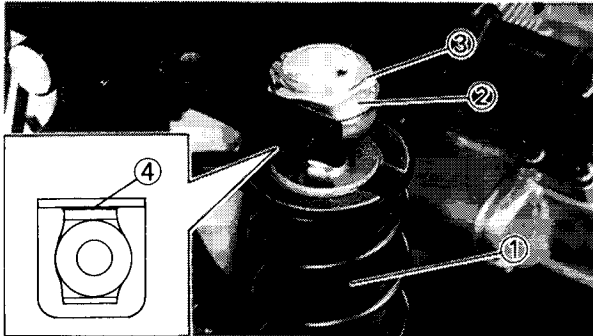
- Be sure to position the front arm securing bolts (front ③ and rear ④) so that the bolt heads will face outward.
- In this point, temporarily tighten the nuts ⑤.



A Forward

# FRONT SHOCK ABSORBER AND LOWER ARM

CHAS



## 3. Install:

- Front shock absorber ①
- Nut ②
- Circlip ③

## NOTE:

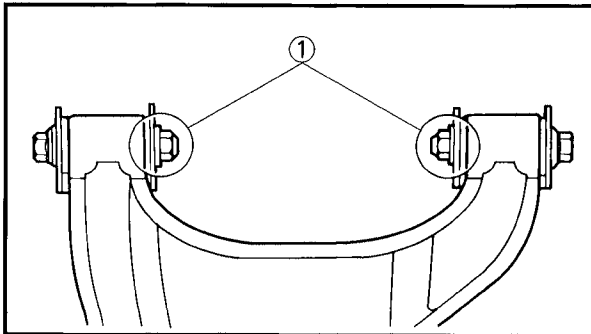
Make sure the flat sides ④ of the ball joint are firmly held by the frame before tightening the nut ②.



**Nut (front shock absorber):**  
55 Nm (5.5 m•kg, 50 ft•lb)

## 4. Install:

- Steering knuckle  
Refer to the "STEERING KNUCKLES AND TIE-RODS-INSTALLATION" section.



## 5. Tighten:

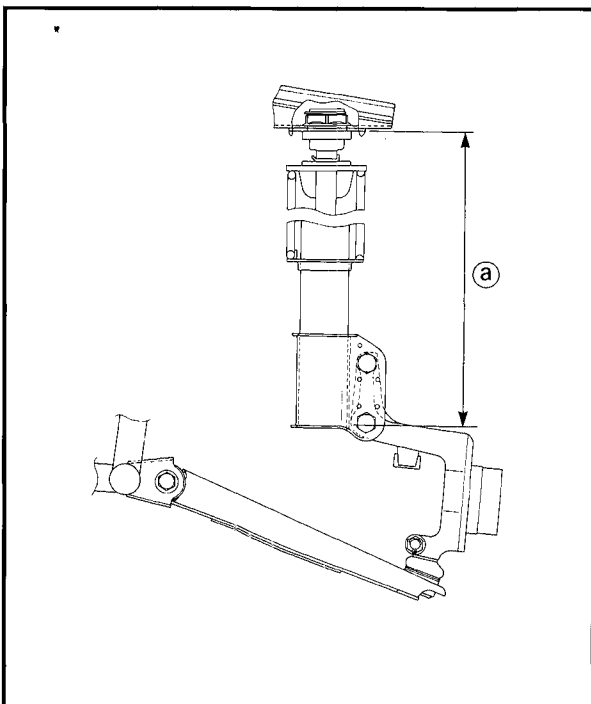
- Nuts ① (lower arm)

## NOTE:

Hold the lower arm and front shock absorber so that the length ② between the frame and shock absorber lower securing bolt (lower) center is 372 mm (146.5 in), and tighten the nuts ①.



**Nuts (lower arm):**  
45 Nm (4.5 m•kg, 32 ft•lb)



## 6. Install:

- Backing plate
- Brake drum
- Front wheel

Refer to the "FRONT WHEELS AND FRONT BRAKE-INSTALLATION" section.



## FRONT SHOCK ABSORBER AND LOWER ARM

---

**CHAS**



7. Adjust:

- Toe-in

Refer to the "TOE-IN ADJUSTMENT" section in the CHAPTER 3.

8. Install:

- Front fender
- Front bumper

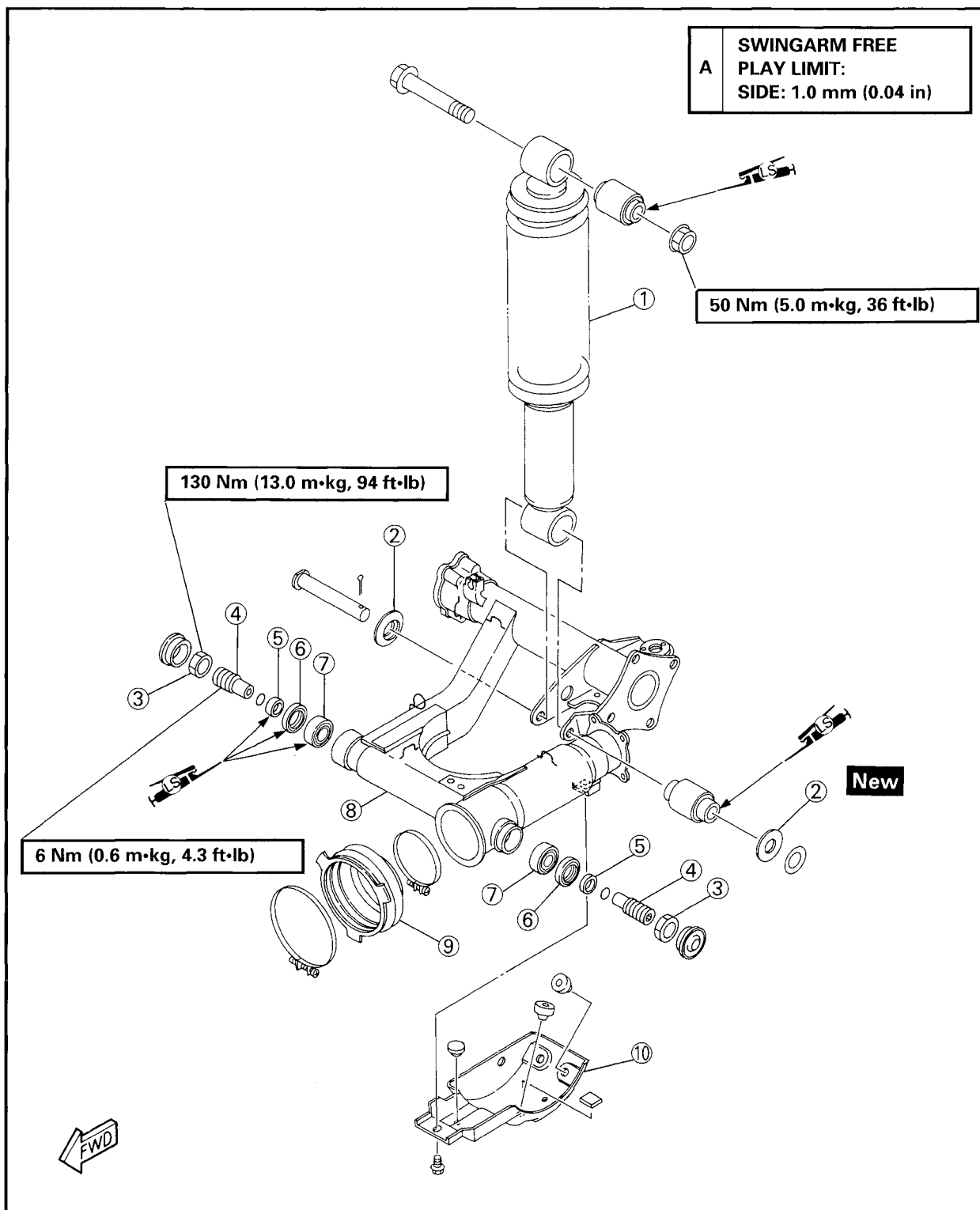
Refer to the "FENDERS AND FUEL TANK-INSTALLATION" section in the CHAPTER 3.

# **REAR SHOCK ABSORBER AND SWINGARM**

**CHAS**

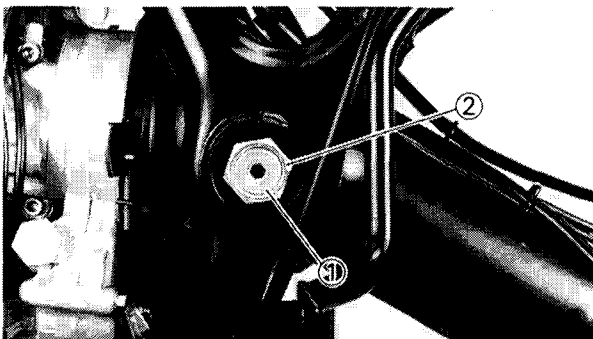

## **REAR SHOCK ABSORBER AND SWINGARM**

- |                        |                         |
|------------------------|-------------------------|
| ① Rear shock absorber  | ⑧ Swingarm              |
| ② Thrust cover         | ⑨ Rubber boot           |
| ③ Locknut              | ⑩ Final gear case guard |
| ④ Pivot shaft          |                         |
| ⑤ Collar               |                         |
| ⑥ Oil seal             |                         |
| ⑦ Taper roller bearing |                         |


**7**

# REAR SHOCK ABSORBER AND SWINGARM

CHAS



## 6. Remove:

- Caps (pivot shaft)

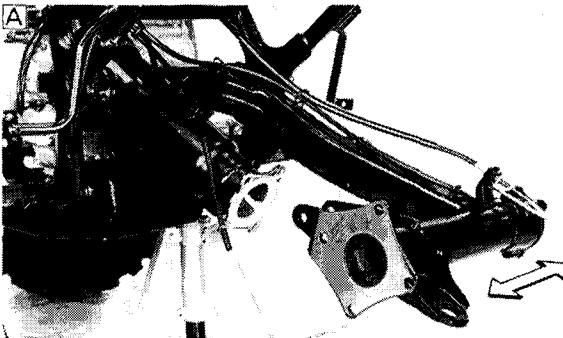
## 7. Check:

- Swingarm free play

\*\*\*\*\*

## Free play checking steps:

- Check the tightening torque of the pivot shafts ① (swingarm) and locknuts ② (pivot shaft).



## Pivot Shaft (swingarm):

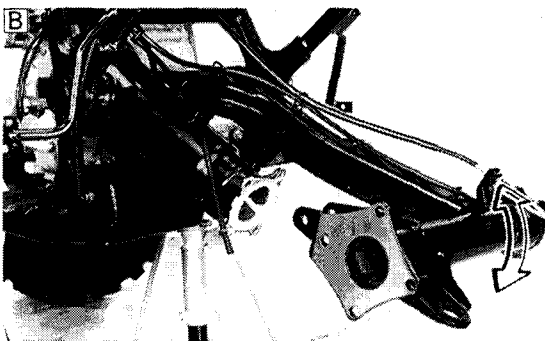
6 Nm (0.6 m•kg, 4.3 ft•lb)

## Locknut (pivot shaft):

130 Nm (13 m•kg, 94 ft•lb)

- Check the swingarm side play **A** by moving it from side to side.

If side play noticeable, check the spacer collar, bearing and frame pivot.



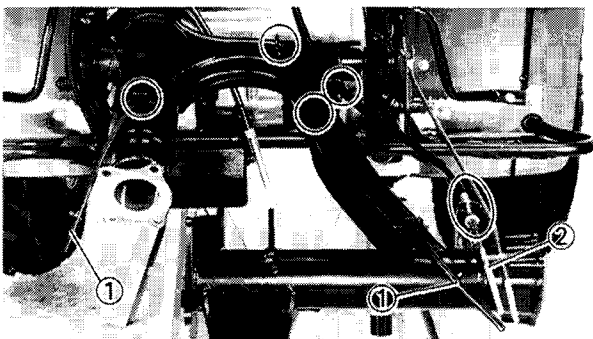
## Free play limit:

1.0 mm (0.04 in)

- Check the swingarm vertical movement **B** by moving it up and down.

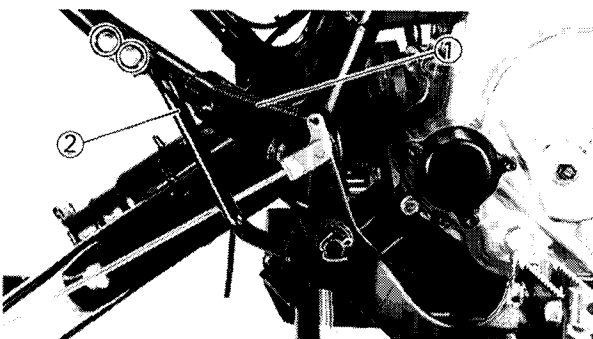
If vertical movement is tight, binding or rough, check the spacer collar, bearing and frame pivot.

\*\*\*\*\*



## 8. Remove:

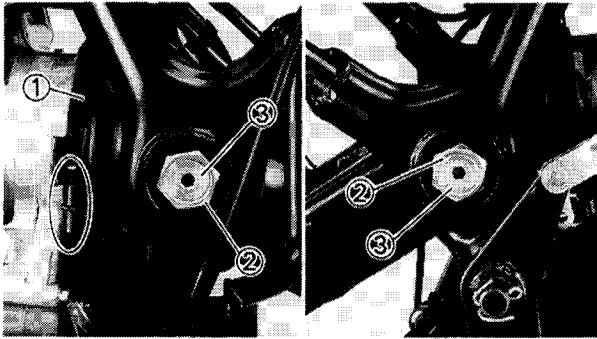
- Breather hoses ① (from swingarm)
- Brake cable ② (from swingarm)



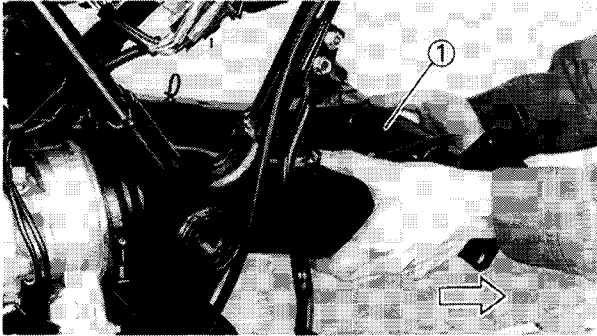
## 9. Remove:

- Return spring ① (brake pedal)
- Rear fender stay ② (right)

7

**REAR SHOCK ABSORBER AND SWINGARM****CHAS**

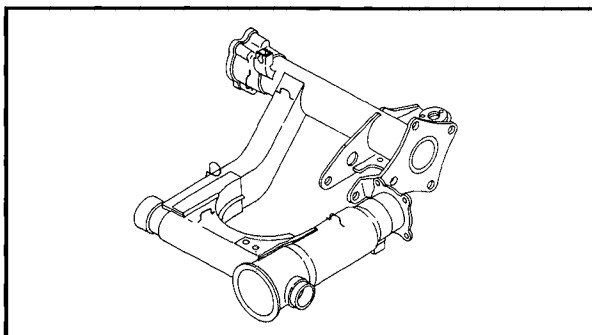
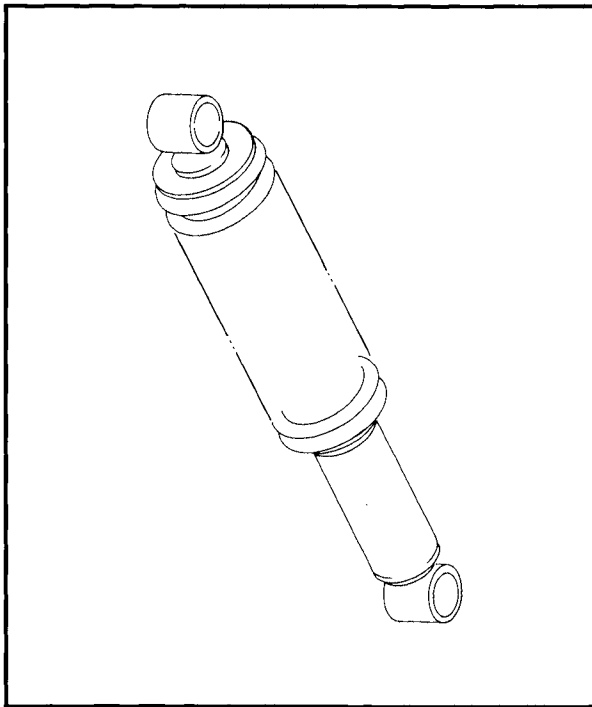
10. Loosen:
  - Clamp ① (rubber boot)
11. Remove:
  - Locknuts ② (pivot shaft)
  - Pivot shafts ③ (swingarm)



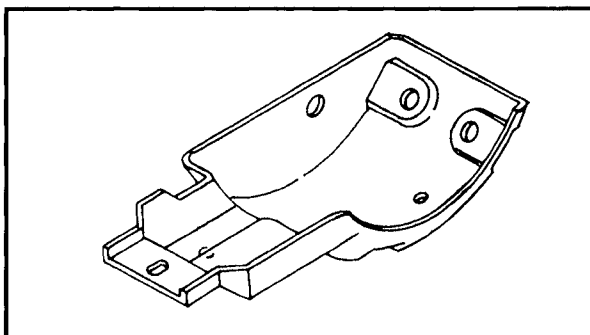
12. Remove:
  - Swingarm ①

**INSPECTION**

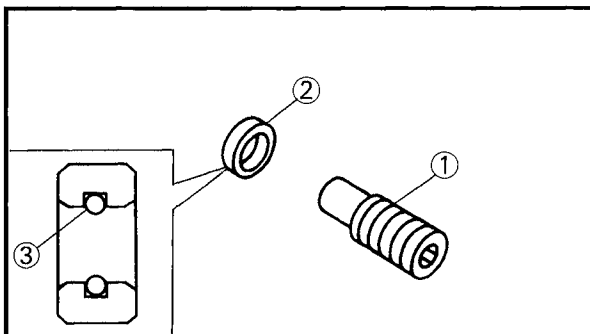
1. Inspect:
  - Shock absorber
    - Oil leaks → Replace the shock absorber assembly.
  - Shock absorber rod
    - Bends/Damage → Replace the shock absorber assembly.
  - Spring
    - Fatigue/Damage → Replace the shock absorber assembly.
    - Move the spring up and down.



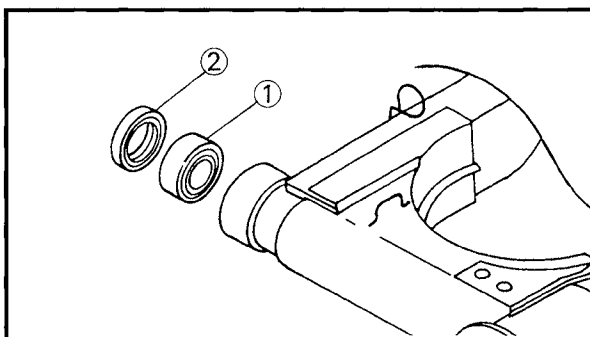
2. Inspect:
  - Swingarm
    - Cracks/Bends/Damage → Replace.

**REAR SHOCK ABSORBER AND SWINGARM****CHAS****3. Inspect:**

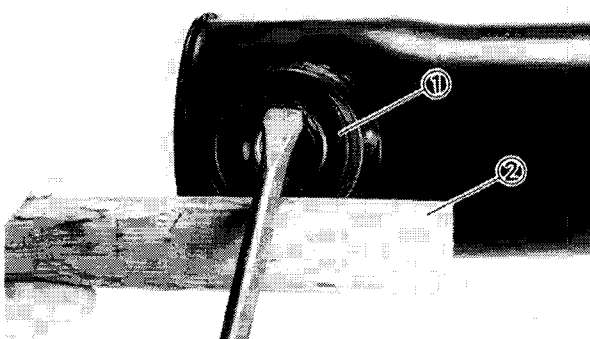
- Final gear case guard
- Cracks/Bends/Damage → Replace.

**4. Inspect:**

- Pivot shaft ① (swingarm)
- Spacer collar ②
- O-ring ①
- Wear/Damage → Replace.

**5. Inspect:**

- Bearings ① (swingarm)
- Bearings allow play in the swingarm or bearing turns roughly → Replace.
- Oil seals ②
- Wear/Damage → Replace.



\*\*\*\*\*

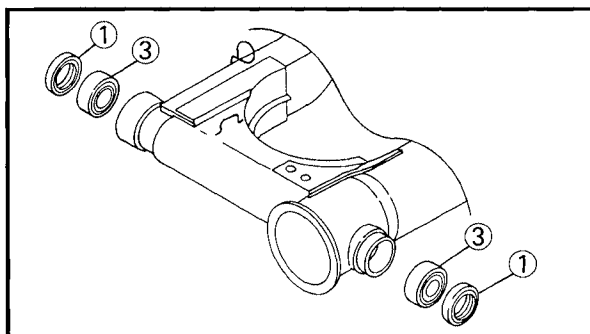
**Swingarm bearing and oil seal replacement steps:**

- Clean the area around the bearings on the swingarm.
- Remove the oil seals ① use a flat-head screw driver.

**NOTE:** \_\_\_\_\_

Place a wood block ② on the outer edge to protect this edge.

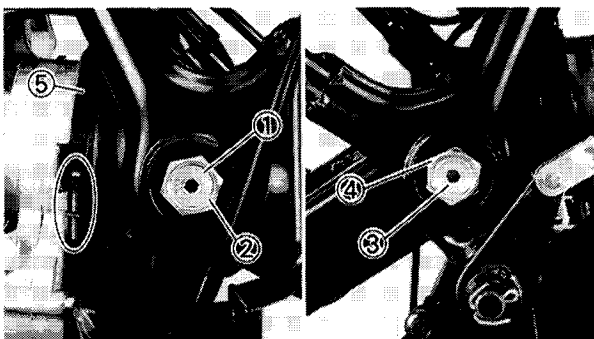
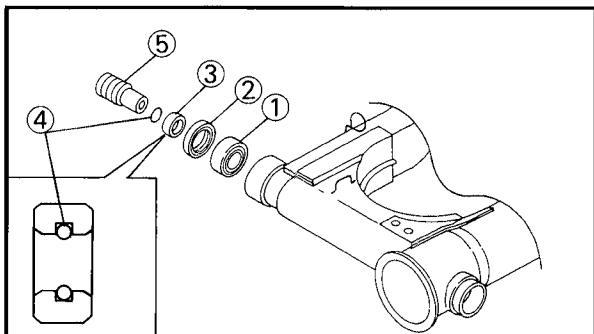
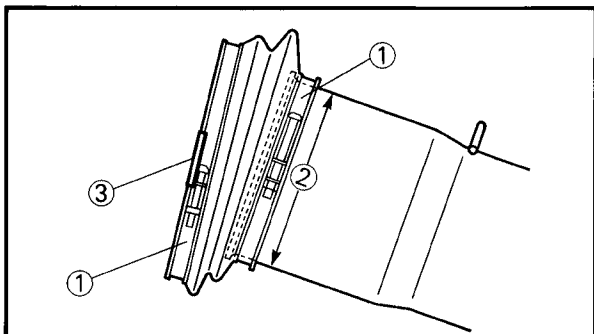
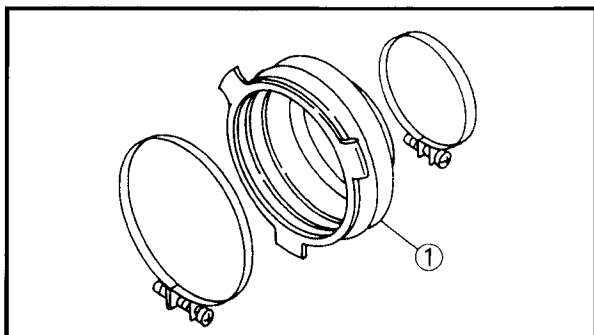
\_\_\_\_\_



- Remove the bearings ③ using a general bearing puller.
- Install the new bearings and oil seal by reversing the previous steps.

\*\*\*\*\*

**7**

**REAR SHOCK ABSORBER AND SWINGARM****CHAS****6. Inspect:**

- Rubber boot ①
- Damage → Replace.

\*\*\*\*\*

**Swingarm rubber boot replacement steps:**

- Remove the clamps ①.
- Remove the damaged rubber boot.
- Clean the swingarm front end outer surface.
- Apply adhesive for rubber to the swingarm end ②.
- Install the new rubber boot.

**NOTE:**

Be sure to position the rubber boot so that the tang ③ face the left side.

- Install the clamps.

\*\*\*\*\*

**INSTALLATION**

Reverse the "REMOVAL" procedures.

Note the following points.

**1. Lubricate:**

- Bearings ①
- Oil seals ②
- Collars ③
- O-rings ④ (collar)
- Pivot shafts ⑤

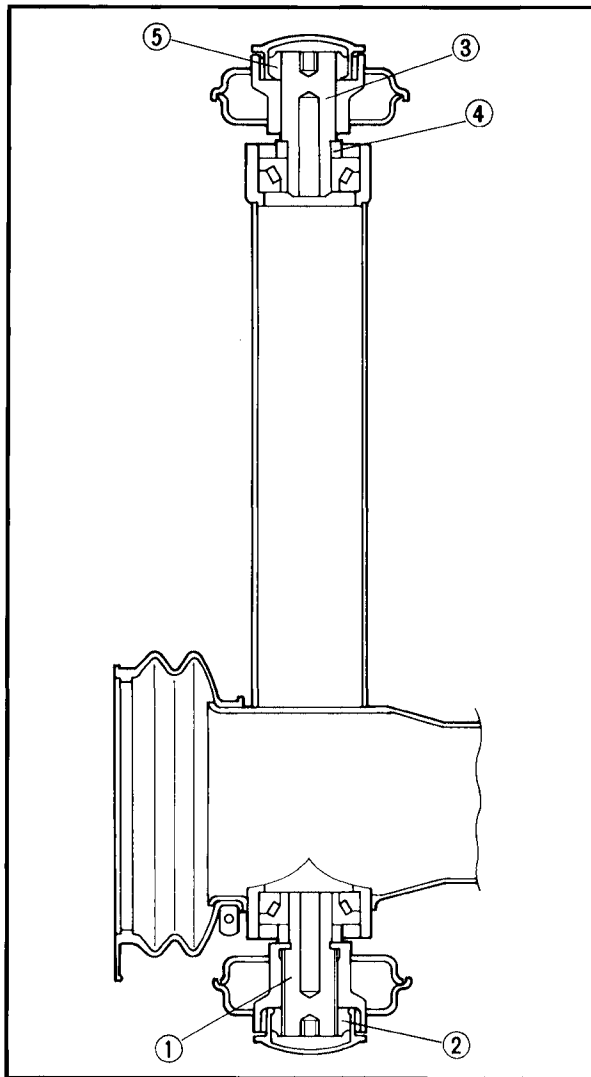
**Lithium soap base grease****2. Install:**

- Swingarm
- Pivot shafts (swingarm)

**3. Tighten:**

- Pivot shaft ① (left)
- Locknut ②
- Pivot shaft ③ (right)
- Locknut ④
- Clamp ⑤ (rubber boot)

# **REAR SHOCK ABSORBER AND SWINGARM**

**CHAS**


\*\*\*\*\*

## **Pivot shaft tightening steps:**

- Tighten the pivot shaft ① (left) to specification.



### **Pivot shaft (left):**

**6 Nm (0.6 m•kg, 4.3 ft•lb)**

- Tighten the locknut (left) ② to specification.



### **Locknut (left):**

**130 Nm (13.0 m•kg, 94 ft•lb)**

- Tighten the pivot shaft ③ (right) until it contacts the collar ④, then torque to specification.



### **Pivot shaft (right):**

**6 Nm (0.6 m•kg, 4.3 ft•lb)**

- Tighten the locknut ⑤ (right) to specification.



### **Locknut (right):**

**130 Nm (13.0 m•kg, 94 ft•lb)**

\*\*\*\*\*

## **4. Inspect:**

- Swingarm free play  
Refer to the step 7. in the "REMOVAL" section.

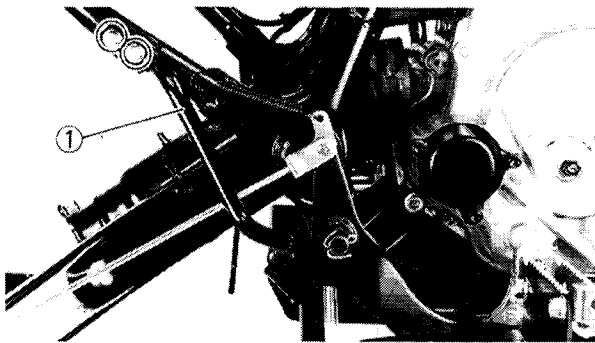
## **5. Install:**

- Rear fender stay ①

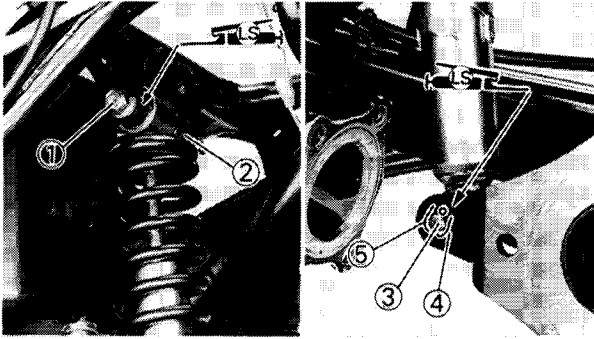


### **Bolts (fender stay):**

**9 Nm (0.9 m•kg, 6.5 ft•lb)**



**7**

**REAR SHOCK ABSORBER AND SWINGARM****CHAS****6. Lubricate:**

- Bushings (shock absorber-upper and lower)

**Lithium soap base grease****7. Install:**

- Bolt ① (shock absorber-upper)
- Nut ②
- Pin ③
- Washer ④
- Cotter pin ⑤

**NOTE:**

The bolt ① supports the top of shock absorber should be installed from the left and the pin ③ supports the bottom of shock absorber from the right.

**⚠ WARNING**

**Always use a new cotter pin.**



**Nut (shock absorber-upper):**  
**50 Nm (5.0 m•kg, 36 ft•lb)**

**8. Install:**

- Final gear case unit
- Rear axle
- Final gear case guard

Refer to the "REAR AXLE/REAR FINAL GEAR AND DRIVE SHAFT-ASSEMBLY-INSTALLATION" section in the CHAPTER 6.

**9. Install:**

- Baking plate
- Brake drum
- Rear wheels

Refer to the "REAR WHEELS AND REAR BRAKE-INSTALLATION" section.



## REAR SHOCK ABSORBER AND SWINGARM

---

CHAS



10. Install:

- Rear bumper
- Rear fender
- Seat

Refer to the "FENDERS AND FUEL TANK-REAR FENDER" section in the CHAPTER 3.

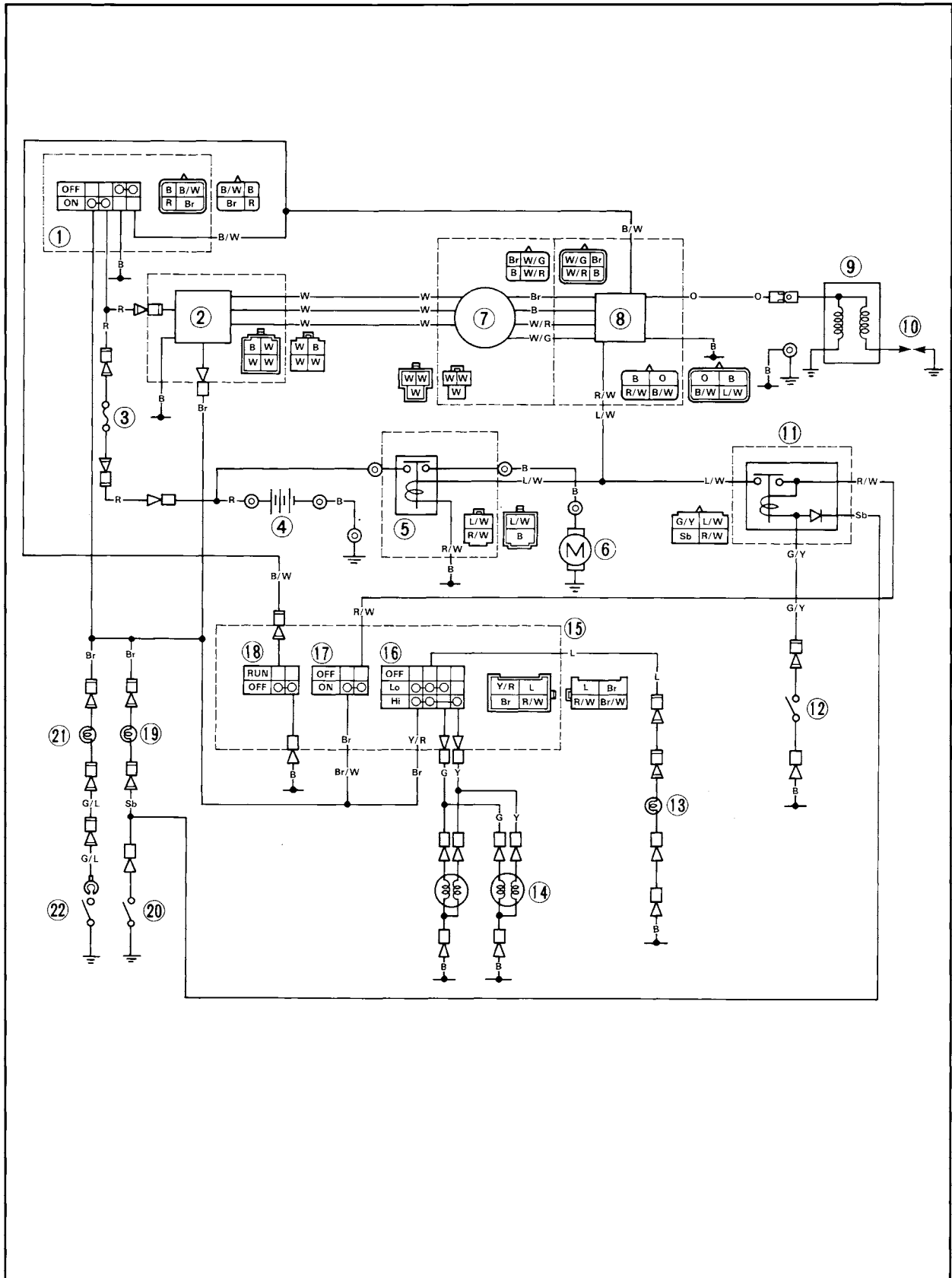
## CIRCUIT DIAGRAM

ELEC



## ELECTRICAL

## YFB250FW (F) '94 CIRCUIT DIAGRAM



**CIRCUIT DIAGRAM****ELEC**

- |                                  |                             |
|----------------------------------|-----------------------------|
| ① Main switch                    | ⑫ Brake switch              |
| ② Rectifier/Regulator            | ⑬ Taillight                 |
| ③ Fuse                           | ⑭ Headlight                 |
| ④ Battery                        | ⑮ Handlebar switch          |
| ⑤ Starter relay                  | ⑯ "LIGHTS" (dimmer) switch  |
| ⑥ Starter motor                  | ⑰ "START" switch            |
| ⑦ CDI magneto                    | ⑱ "ENGINE STOP" switch      |
| ⑧ CDI unit                       | ⑲ "NEUTRAL" indicator light |
| ⑨ Ignition coil                  | ⑳ Neutral switch            |
| ⑩ Spark plug                     | ㉑ "REVERSE" indicator light |
| ⑪ Starting circuit cut-off relay | ㉒ Reverse switch            |

**NOTE:**

- "START" switch is closed while the button (switch) is pushed.
- Brake switch is closed while the brake lever is pulled.
- Neutral switch is closed while the transmission is in neutral.
- Reverse switch is closed while the dirve select lever is in reverse.

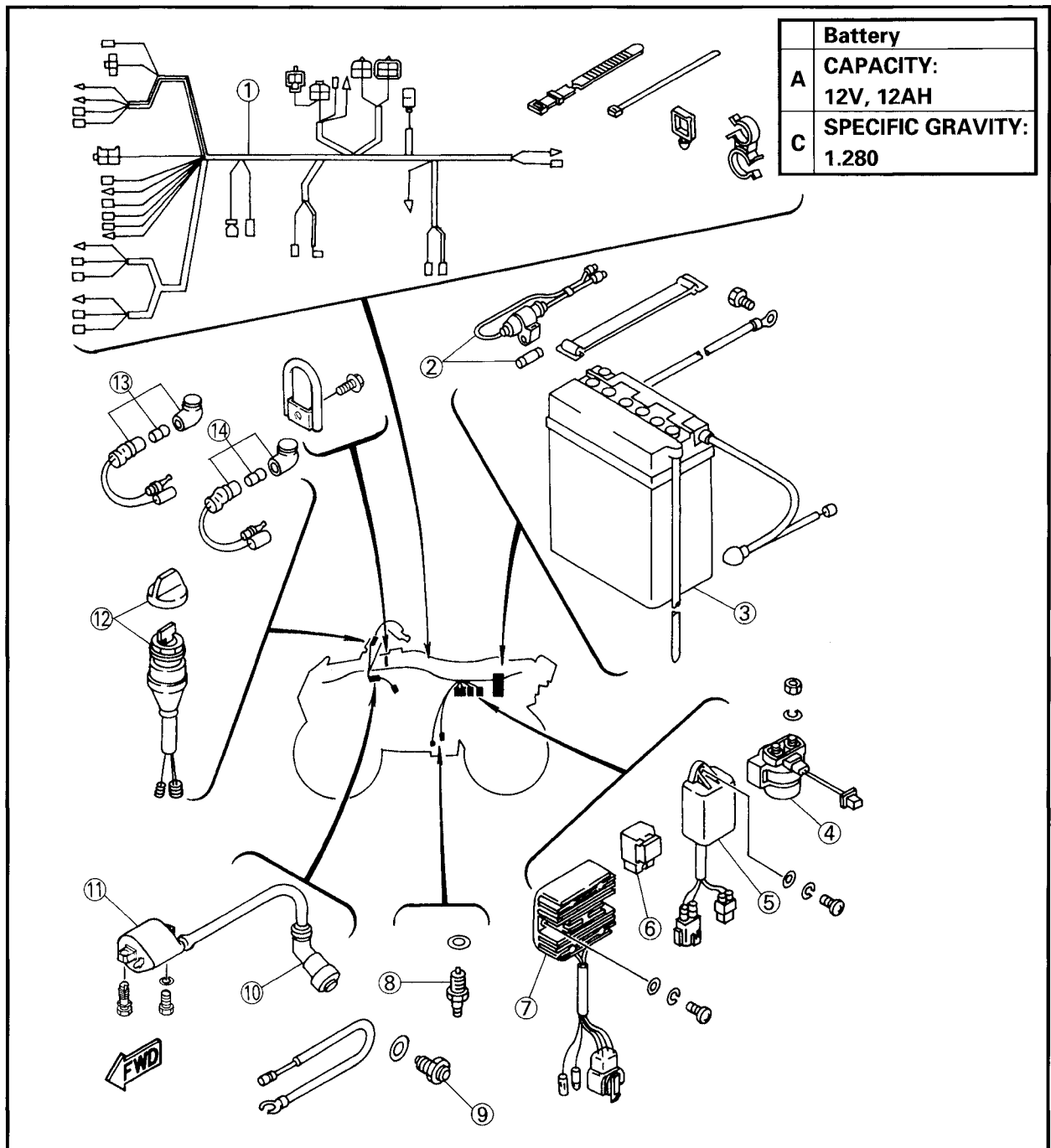
**COLOR CODE**

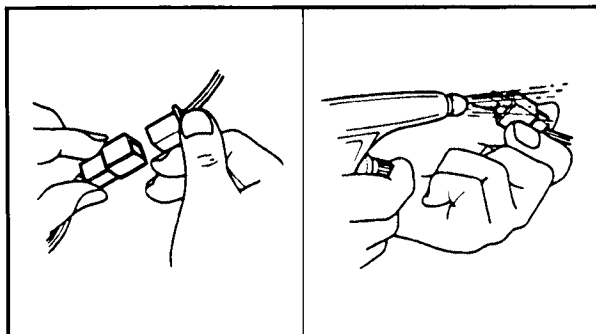
B	Black	B/W	Black/White
Br	Brown	G/L	Green/Blue
G	Green	G/Y	Green/Yellow
L	Blue	L/W	Blue/White
O	Orange	R/W	Red/White
R	Red	W/G	White/Green
Sb	Sky blue	W/R	White/Red
W	White	Y/R	Yellow/Red
Y	Yellow	Br/W	Brown/White

**ELECTRICAL COMPONENTS****ELEC****ELECTRICAL COMPONENTS**

- |                                  |                             |
|----------------------------------|-----------------------------|
| ① Wireharness                    | ⑧ Reverse switch            |
| ② Fuse                           | ⑨ Neutral switch            |
| ③ Battery                        | ⑩ Plug cap                  |
| ④ Starter relay                  | ⑪ Ignition coil             |
| ⑤ CDI unit                       | ⑫ Main switch               |
| ⑥ Starting circuit cut-off relay | ⑬ "NEUTRAL" indicator light |
| ⑦ Rectifier/Regulator            | ⑭ "REVERSE" indicator light |

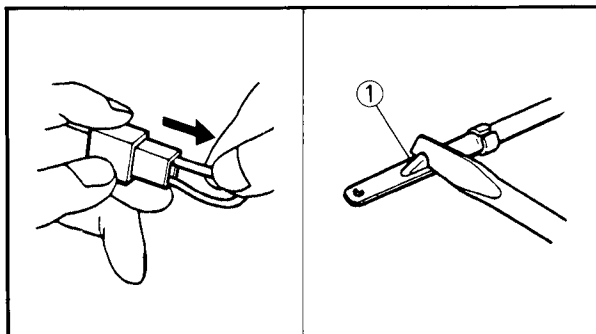
SPECIFICATIONS	RESISTANCE:
IGNITION COIL:	
PRIMARY	0.36~0.48 $\Omega$
SECONDARY	5.44~7.36 k $\Omega$
PICK-UP COIL	189~231 $\Omega$
SOURCE COIL	270~330 $\Omega$
STATOR COIL	0.45~0.55 $\Omega$



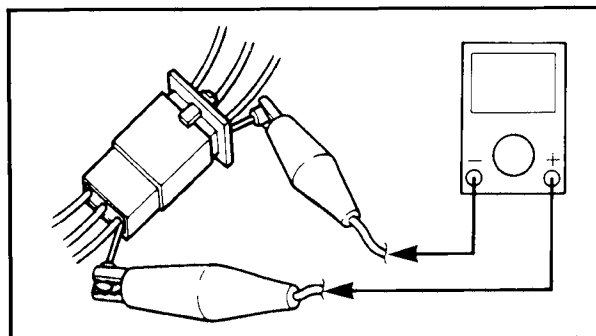
**CHECKING OF CONNECTIONS****ELEC****CHECKING OF CONNECTIONS**

Dealing with stains, rust, moisture, etc. on the connector.

1. Disconnect:
  - Connector
2. Dry each terminal by an air blower.



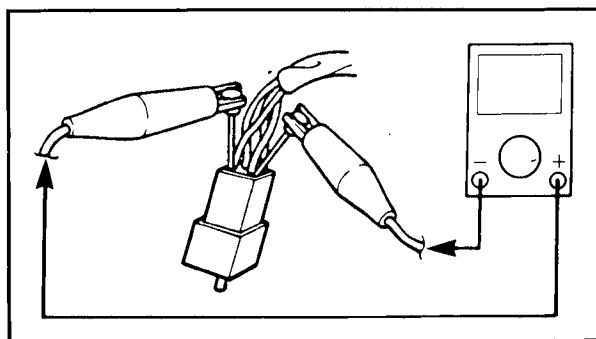
3. Connect and disconnect the connector two or three times.
4. Pull the lead to check that it will not come off.
5. If the terminal comes off, bend up the pin ① and reinsert the terminal into connector.



6. Connect:
  - Connector
7. Check for continuity by a tester.

**NOTE:** \_\_\_\_\_

- If there is no continuity, clean the terminals.
- Be sure to perform the above steps 1 to 7 when checking the wireharness.
- When replacing the CDI unit, be sure to check its connector.
- For a field remedy, use a contact revitalizer available on the market.
- Use the tester on the connector as shown.

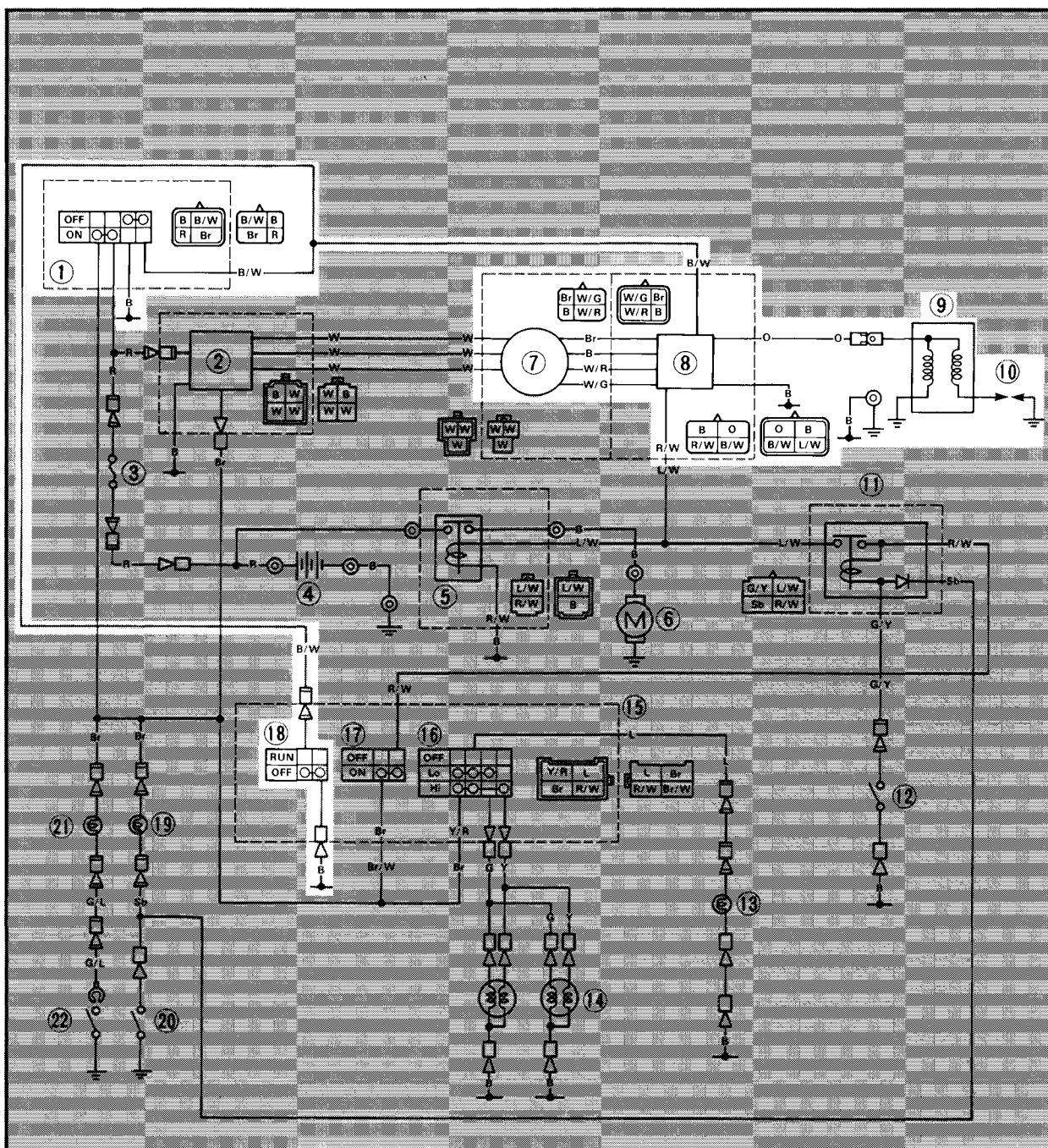


## IGNITION SYSTEM

ELEC



# IGNITION SYSTEM CIRCUIT DIAGRAM



- ① Main switch
- ⑦ CDI magneto
- ⑧ CDI unit
- ⑨ Ignition coil
- ⑩ Spark plug
- ⑱ "ENGINE STOP" switch

8

## IGNITION SYSTEM

ELEC



## TROUBLESHOOTING

**IF IGNITION SYSTEM SHOULD BECOME INOPERATIVE  
(NO SPARK OR INTERMITTENT SPARK)**

**Procedure**

Check;

- |                              |  |
|------------------------------|--|
| 1. Spark plug                | 6. "ENGINE STOP" switch                |
| 2. Ignition spark gap        | 7. Source coil resistance              |
| 3. Spark plug cap resistance | 8. Pickup coil resistance              |
| 4. Ignition coil resistance  | 9. Wiring connection (ignition system) |
| 5. Main switch               |  |

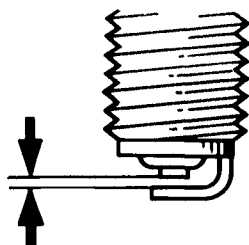
**NOTE:**

- Remove the following parts before troubleshooting.
 

1) Seat	4) Fuse holder
2) Fuel tank	5) Rear fender
3) Battery	
- Use the following special tools in this troubleshooting.

**Pocket tester:****P/N. YU-03112, 90890-03112****Dynamic spark tester/Ignition checker:****P/N. YM-34487, 90890-06754****1. Spark plug**

- Check the spark plug type condition and gap.  
Refer to the "SPARK PLUG INSPECTION" section in the CHAPTER 3.

**Standard spark plug:****D7EA (NGK) or X22ES-U (NIPPON-DENSO)****Spark plug gap:****0.6~0.7 mm (0.024~0.028 in)**

INCORRECT

INCORRECT

Repair or replace spark plug.



CORRECT

\*

## IGNITION SYSTEM

ELEC

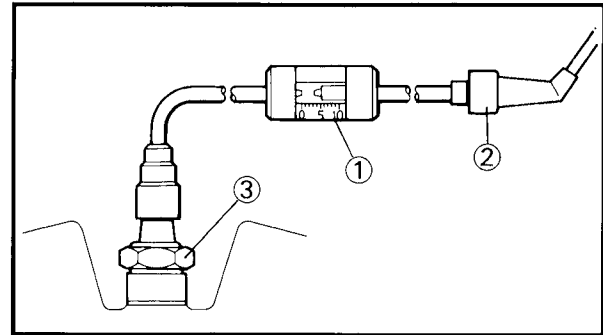


## 2. Ignition spark gap

- Securely connect the battery leads (positive and negative) to a fully charged battery.
- Disconnect the spark plug cap from the spark plug.
- Connect the Dynamic spark tester ① between the spark plug ② and spark plug cap ③, and set the specified spark gap.
- Turn the main switch to "ON" and "ENGINE STOP" switch to "RUN" then, shift the gear in neutral.
- Start the engine.
- Check the ignition spark condition.



**Minimum spark gap:**  
6 mm (0.24 in)



MEETS SPECIFICATION

Ignition circuit is good.

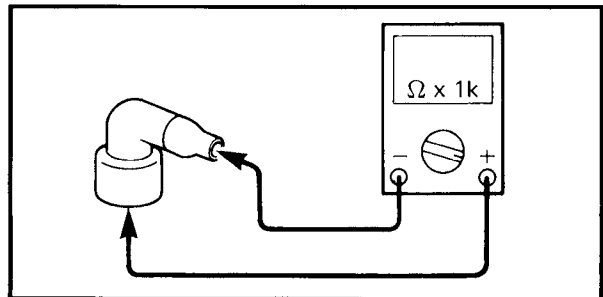
OUT OF SPECIFICATION

## 3. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the Pocket tester ( $\Omega \times 1k$ ) to the spark plug cap.
- Check the spark plug cap for specified resistance.



**Spark plug cap resistance:**  
5 k $\Omega$  at 20°C (68°F)



OUT OF SPECIFICATION

Spark plug cap is faulty, replace it.

MEETS SPECIFICATION

## 4. Ignition coil resistance

- Disconnect the ignition coil lead (Orange) from the wireharness.
- Connect the Pocket tester to the ignition coil.

**Primary coil [A]: ( $\Omega \times 1$ )**

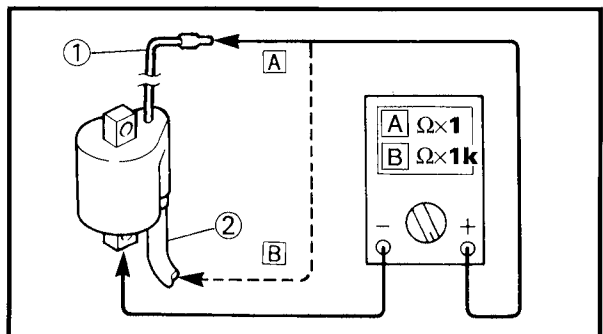
Tester (+)lead → Terminal ①

Tester (-)lead → Ignition coil base

**Secondary coil [B]: ( $\Omega \times 1k$ )**

Tester (+)lead → Spark plug lead ②

Tester (-)lead → Ignition coil base





## IGNITION SYSTEM

ELEC



- Measure the primary and secondary coil resistances.

Primary coil resistance **A** :0.36~0.48  $\Omega$  at 20°C (68°F)Secondary coil resistance **B** :5.44~7.36 k $\Omega$  at 20°C (68°F)

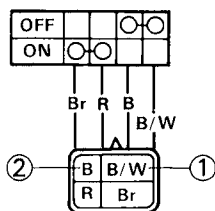
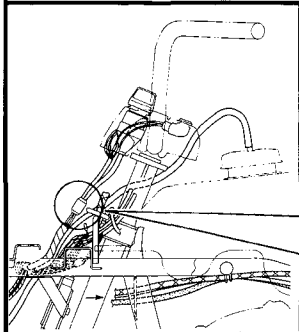
OUT OF SPECIFICATION

Ignition coil is faulty, replace it.

MEETS BOTH  
SPECIFICATIONS

## 5. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Black/White ① and Black ②".



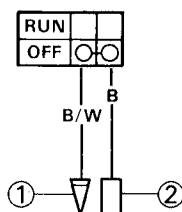
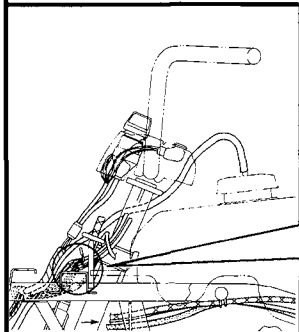
INCORRECT

Main switch is faulty, replace it.

CORRECT

## 6. "ENGINE STOP" switch

- Disconnect the "ENGINE STOP" switch coupler from the wireharness.
- Check the switch component for the continuity between "Black/White ① and Black ②".



INCORRECT

Handlebar switch is faulty, replace it.

CORRECT

\*

## IGNITION SYSTEM

ELEC



## 7. Source coil resistance

- Disconnect the CDI magneto coupler from the wireharness.
- Connect the Pocket tester ( $\Omega \times 100$ ) to the source coil.

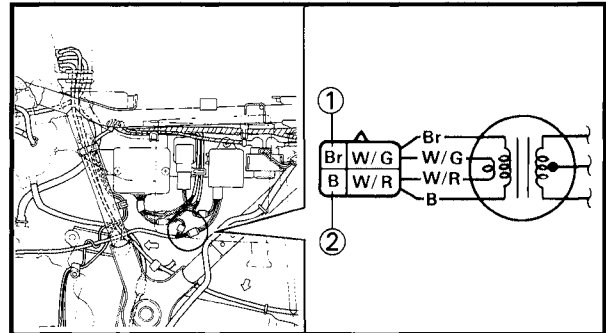
Tester (+) lead → Brown ① terminal

Tester (-) lead → Black ② terminal

- Measure the source coil resistance.



**Source coil resistance:**  
270~330  $\Omega$  at 20°C (68°F)



OUT OF SPECIFICATION

Source coil is faulty, replace it.

## 8. Pickup coil resistance

- Disconnect the CDI magneto coupler from the wireharness.
- Connect the Pocket tester ( $\Omega \times 100$ ) to the pickup coil.

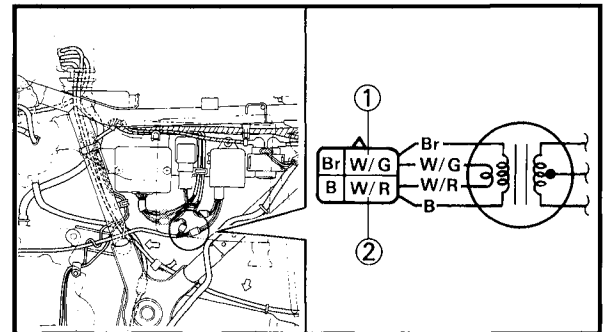
Tester (+) lead → White/Green ① terminal

Tester (-) lead → White/Red ② terminal

- Measure the pickup coil resistance.



**Pickup coil resistance:**  
189~231  $\Omega$  at 20°C (68°F)



OUT OF SPECIFICATION

Pickup coil is faulty, replace it.

## 9. Wiring connection

- Check the entire ignition system for connections.
- Refer to the "WIRING DIAGRAM" section.

CORRECT

CDI unit is faulty, Replace it.

POOR CONNECTION

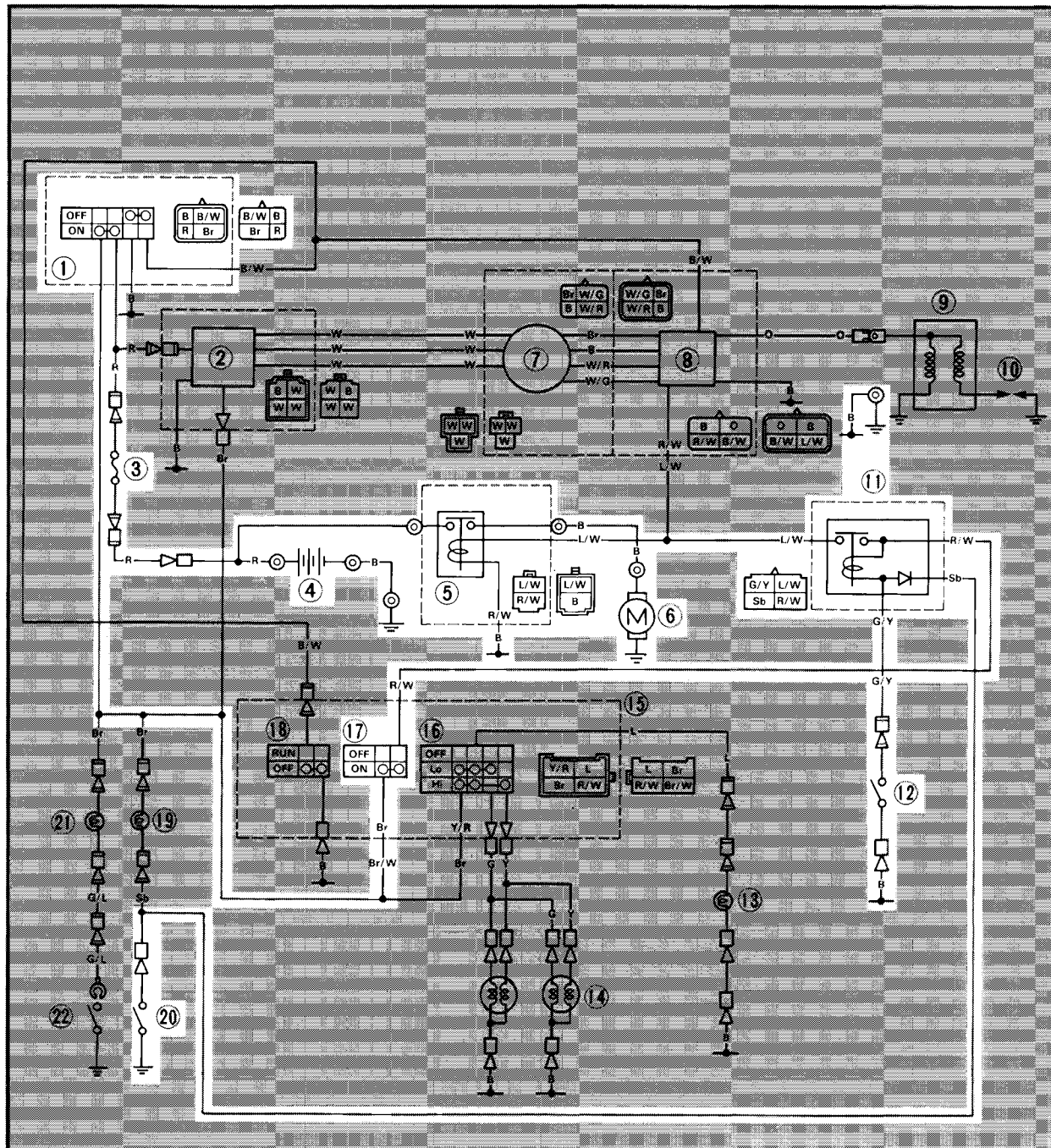
Correct.

## ELECTRIC STARTING SYSTEM

ELEC



# ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM



- |                 |                                  |
|-----------------|----------------------------------|
| ① Main switch   | ⑪ Starting circuit cut-off relay |
| ③ Fuse          | ⑫ Brake switch                   |
| ④ Battery       | ⑬ "START" switch                 |
| ⑤ Starter relay | ⑭ Neutral switch                 |
| ⑥ Starter motor |                                  |

**ELECTRIC STARTING SYSTEM****ELEC****TROUBLESHOOTING****STARTER MOTOR DOES NOT OPERATE****Procedure**

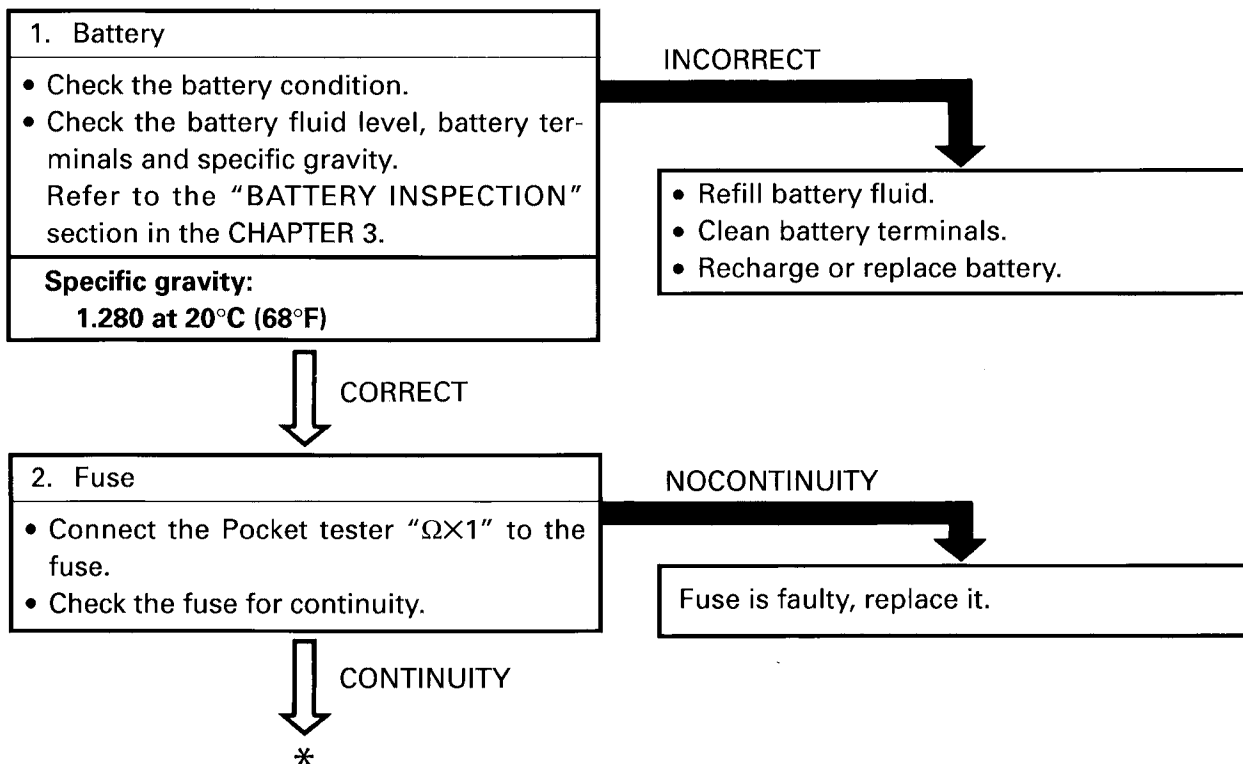
Check;

- |                                   |   |
|-----------------------------------|---|
| 1. Battery                        | 6. Main switch                          |
| 2. Fuse                           | 7. "START" switch                       |
| 3. Starter motor                  | 8. Neutral switch                       |
| 4. Starter relay                  | 9. Brake switch                         |
| 5. Starting circuit cut-off relay | 10. Wiring connection (starting system) |

**NOTE:**

- Remove the following parts before troubleshooting.
 

1) Seat	4) Fuse holder
2) Fuel tank	5) Rear fender
3) Battery	
- Use the following special tool in this troubleshooting.

**Pocket tester:****P/N. YU-03112, 90890-03112**

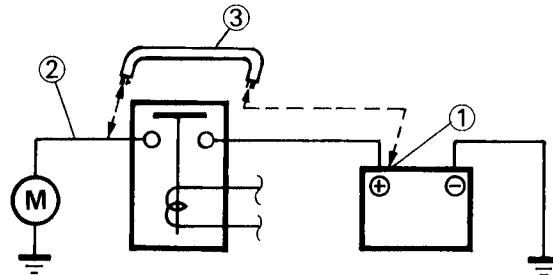
## ELECTRIC STARTING SYSTEM

ELEC



## 3. Starter motor

- Securely connect the battery leads (positive and negative) to the battery.
- Connect the battery positive terminal ① and starter motor cable ② using the jumper lead ③ \*.
- Check the starter motor for operation.



\*

**⚠ WARNING**

- A wire for the jumper lead must have the equivalent capacity as that of the battery lead or more, otherwise it may cause the jumper lead to be burned.
- This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

DOES NOT MOVES

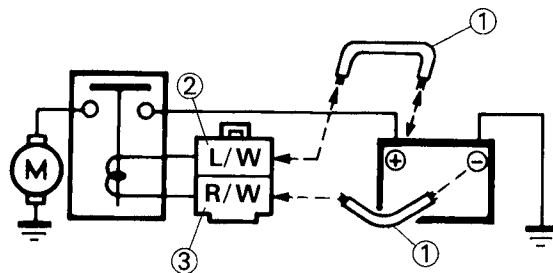
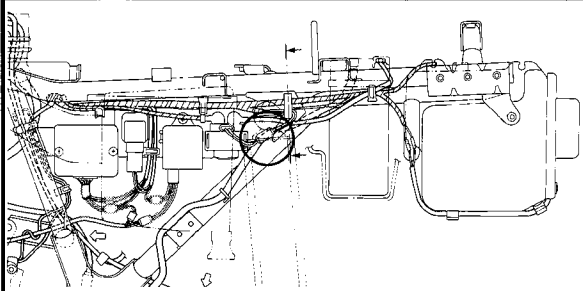
Repair or replace starter motor.

MOVES

## 4. Starter relay

- Disconnect the starter relay coupler from the wireharness.
- Connect the battery (12V) to the starter relay terminals, using the jumper leads ① \*.

Battery (+) lead → Blue/white ② terminal  
 Battery (-) lead → Red/White ③ terminal



- Check the starter motor for operation.

\*

**⚠ WARNING**

- A wire for the jumper lead must have the equivalent capacity as that of the battery lead or more, otherwise it may cause the jumper lead to be burned.
- This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

DOES NOT MOVES

Starter relay is faulty, replace it.

MOVES

\*

## ELECTRIC STARTING SYSTEM

ELEC



## 5. Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wireharness.
- Connect the Pocket tester ( $\Omega \times 1$ ) and battery (12V) to the relay terminals.

**Tester (+) lead** → Red/White ① terminal  
**Tester (-) lead** → Blue/White ② terminal

**A Battery (+) lead** → Red/White ① terminal  
**Battery (-) lead** → Sky blue ③ terminal

**B Battery (+) lead** → Red/White ① terminal  
**Battery (-) lead** → Green/Yellow ④ terminal



Good condition

Bad condition

Battery Connected

○

○

×

×

Battery Disconnected

×

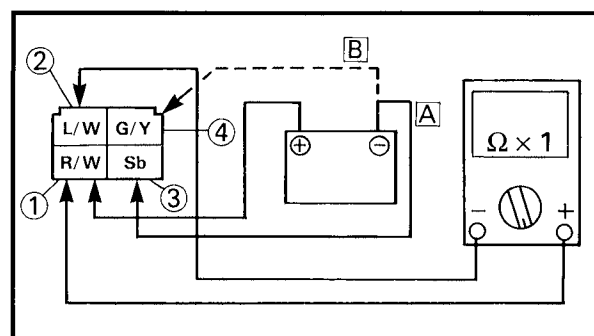
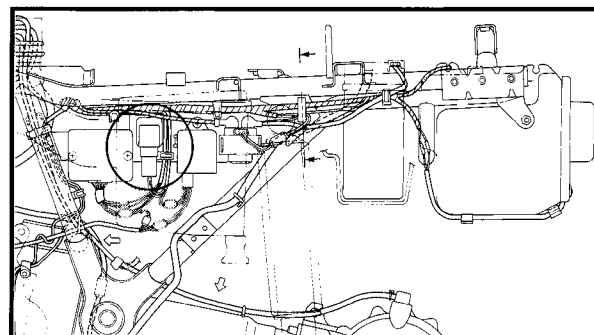
○

×

○

○: Continuity    ×: Nocontinuity

- Check the relay for continuity.



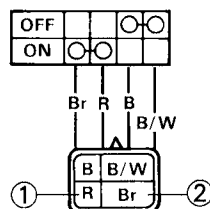
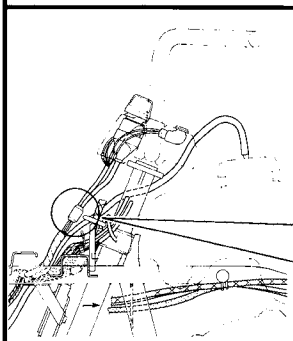
BAD CONDITION

Starting circuit cut-off relay is faulty, replace it.

GOOD CONDITION

## 6. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②".



INCORRECT

Main switch is faulty, replace it.

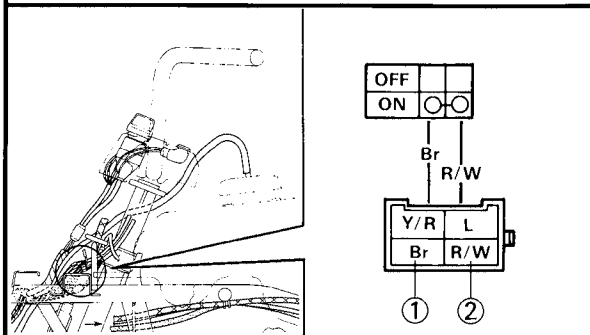
CORRECT

\*

8

**ELECTRIC STARTING SYSTEM****ELEC****7. "Start" switch**

- Disconnect the "handlebar" switch coupler from the wireharness.
- Check the switch component for the continuity between "Brown ① and Red/White ②."



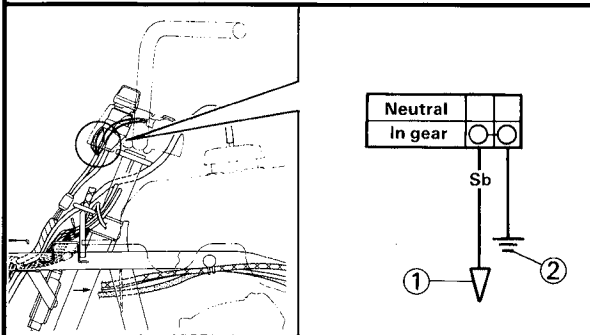
INCORRECT

Handlebar switch is faulty, replace it.

CORRECT

**8. Neutral switch**

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for the continuity between "Sky blue ① and Ground ②".



INCORRECT

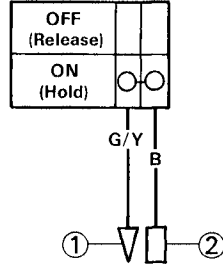
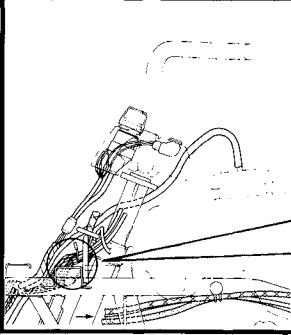
Neutral switch is faulty, replace it.

CORRECT



**ELECTRIC STARTING SYSTEM****ELEC****9. Brake switch**

- Disconnect the brake switch leads from the wireharness.
- Check the switch component for the continuity between "Green/Yellow ① and Black ②".

**INCORRECT**

Brake switch is faulty, replace it.

**CORRECT****10. Wiring connection**

- Check the entire electrical starting system for connections. Refer to the "WIRING DIAGRAM" section.

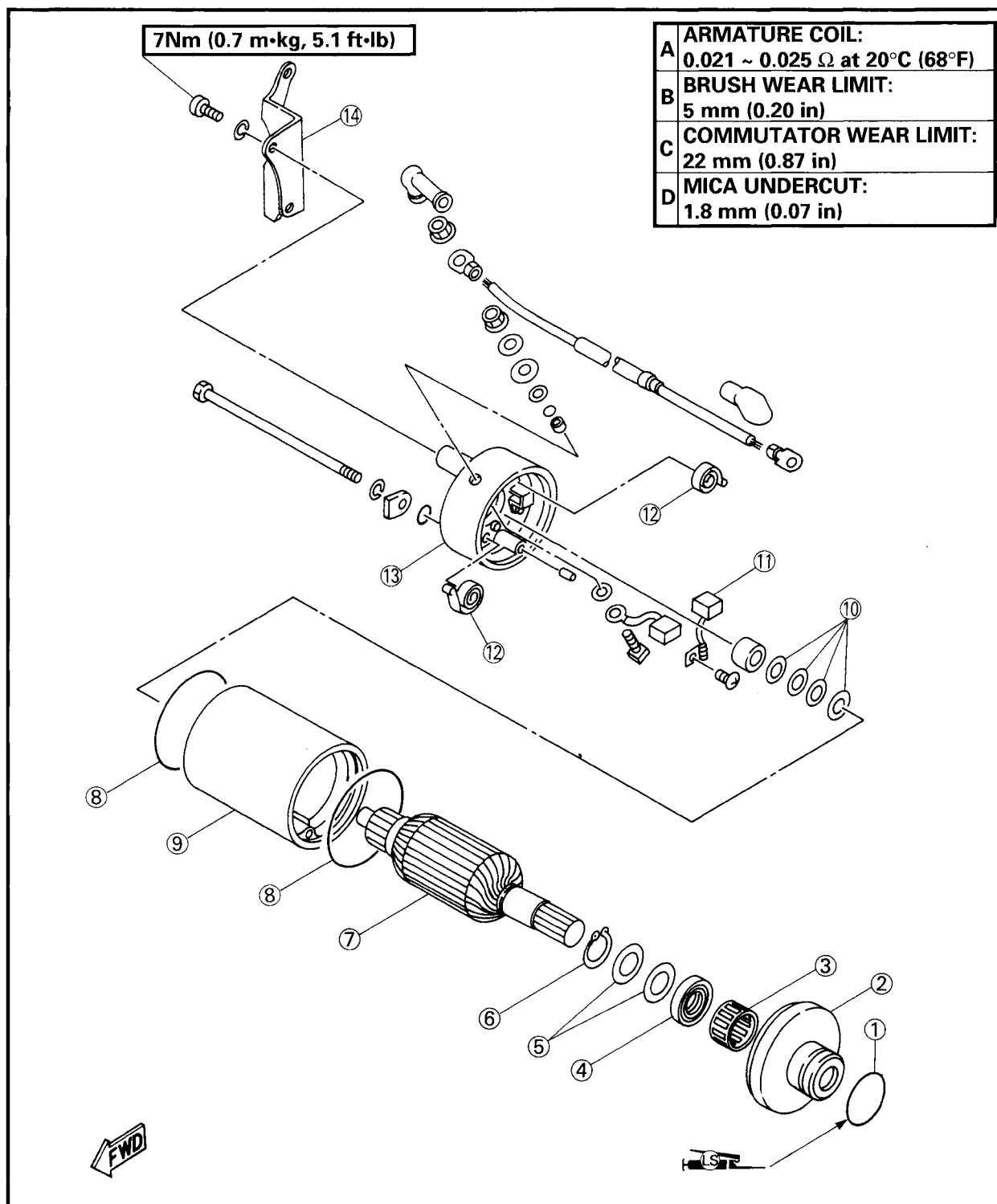
**POOR CONNECTION**

Correct.



**ELECTRIC STARTING SYSTEM****ELEC****STARTER MOTOR**

- |                 |                |
|-----------------|----------------|
| ① O-ring        | ⑧ O-ring       |
| ② Front bracket | ⑨ Yoke         |
| ③ Bearing       | ⑩ Shim         |
| ④ Oil seal      | ⑪ Brush        |
| ⑤ Shim          | ⑫ Brush spring |
| ⑥ Circlip       | ⑬ Rear bracket |
| ⑦ Armature      | ⑭ Bracket      |

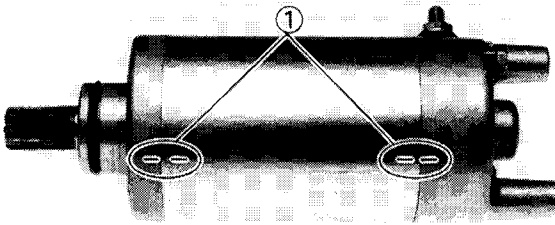


**Removal**

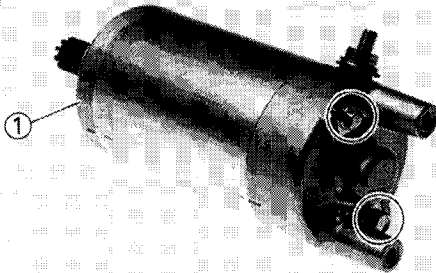
1. Disconnect:
  - Battery negative lead  
Refer to the "BATTERY INSPECTION" section in the CHAPTER 3.
2. Remove:
  - Starter motor  
Refer to "ENGINE REMOVAL" section in the CHAPTER 4.

**Disassembly**

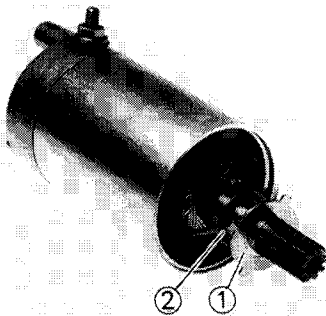
1. Put identifying marks ① on the brackets for reassembly as shown.



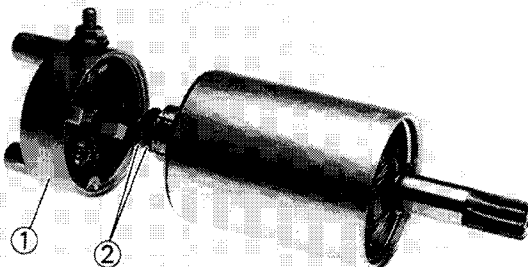
2. Remove:
  - Front bracket ①

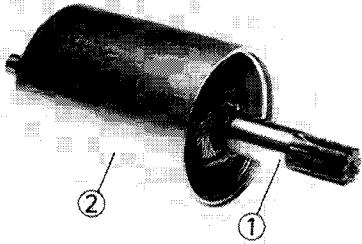


3. Remove:
  - Washer ①
  - Shim ②

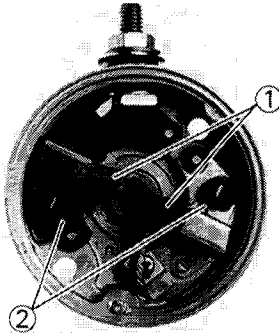


4. Remove:
  - Rear bracket ①
  - Shim ②

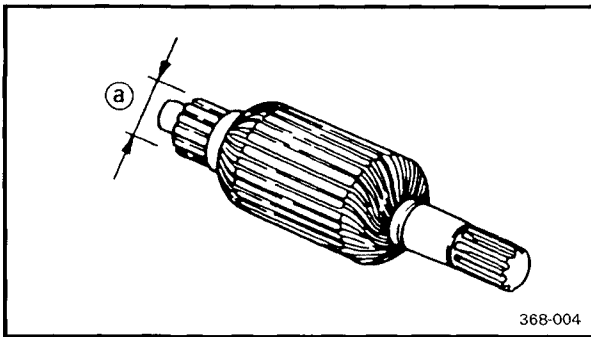


**ELECTRIC STARTING SYSTEM****ELEC****5. Remove:**

- Armature assembly ①
- Yoke ②

**6. Remove:**

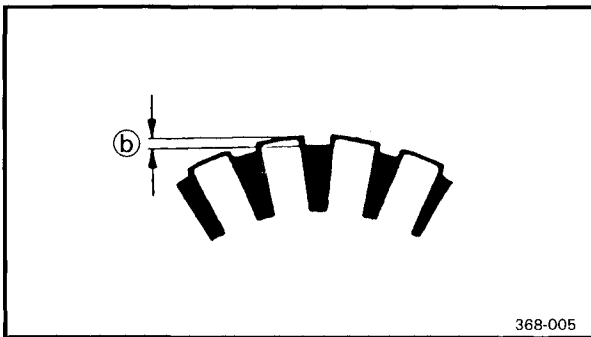
- Brush ①
- Brush spring ②

**Inspection and Repair****1. Inspect:**

- Commutator  
Dirty → Clean it with #600 grit sandpaper.

**2. Measure:**

- Commutator diameter ①  
Out of specification → Replace starter motor.



**Commutator wear limit:**  
**22 mm (0.87 in)**

**3. Measure:**

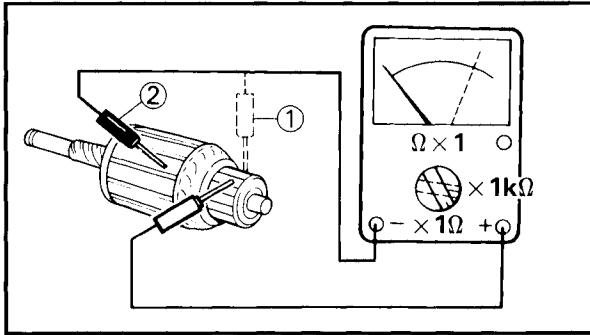
- Mica undercut ②  
Out of specification → Scrape the mica to proper value use a hacksaw blade can be ground to fit.



**Mica undercut:**  
**1.8 mm (0.07 in)**

**NOTE:**

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.

**ELECTRIC STARTING SYSTEM****ELEC****4. Inspect:**

- Armature coil (insulation/continuity)  
Defects → Replace starter motor.

\*\*\*\*\*

**Inspecting steps:**

- Connect the Pocket tester for continuity check ① and insulation check ②.

**Pocket tester:****P/N. YU-03112, 90890-03112**

- Measure the armature resistances.

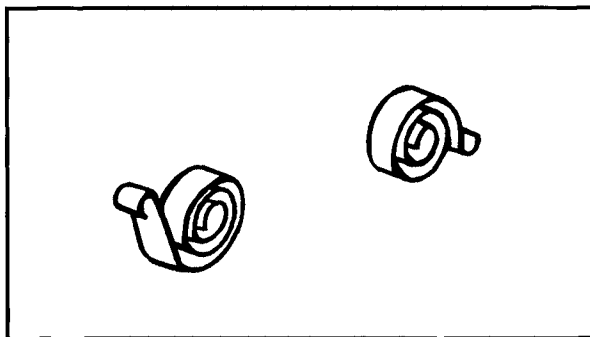
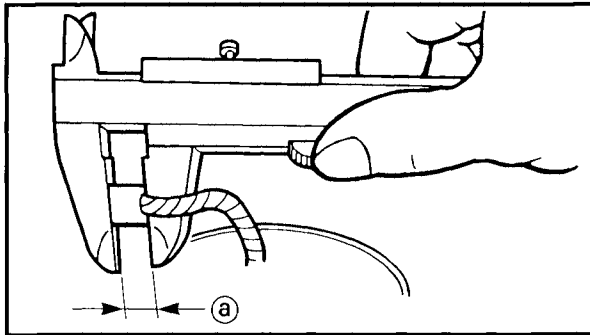
**Armature coil resistance:****Continuity check ①:****0.021 ~ 0.025Ω at 20°C (68°F)****Insulation check ②:****More than 1MΩ at 20°C (68°F)**

- If the resistance is incorrect, replace the starter motor.

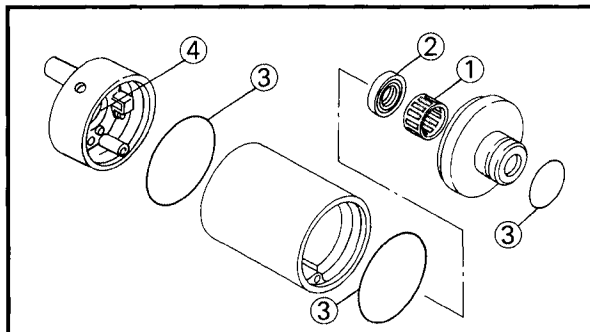
\*\*\*\*\*

**5. Measure:**

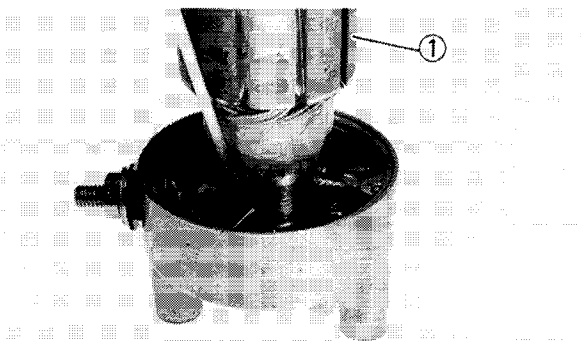
- Brush length (a)  
Out of specification → Replace as a set.

**Brush length limit:****5 mm (0.20 in)****6. Measure:**

- Brush spring pressure  
Fatigue/Out of specification → Replace as a set.

**Brush spring pressure:****400 ~ 660 g (14.1 ~ 23.3 oz)****7. Inspect:**

- Bearing ①
  - Oil seal ②
  - O-rings ③
  - Bush ④
- Wear/Damage → Replace.

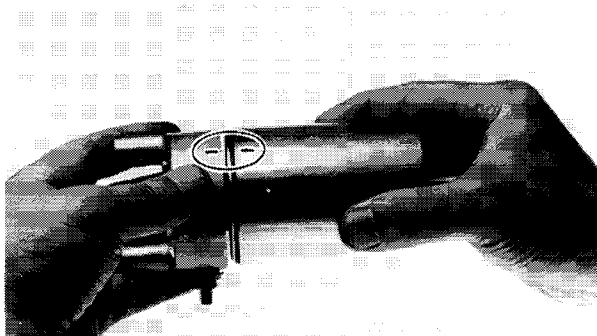
**ELECTRIC STARTING SYSTEM****ELEC****Assembly**

Reverse the "Removal" procedure.  
Note the following points.

1. Install:
  - Armature ①

**NOTE**

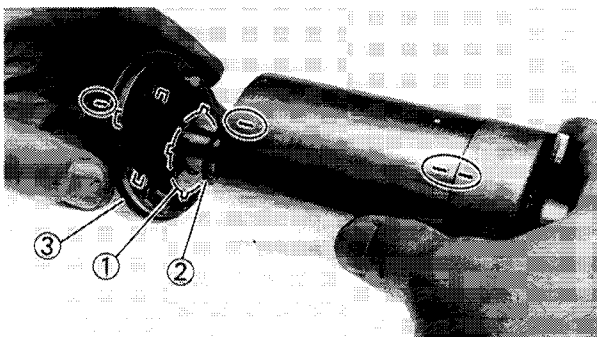
When installing the armature, press the brush with thin screwdriver, etc. to avoid damage to the brush and install.



2. Install:
  - Yoke

**NOTE:**

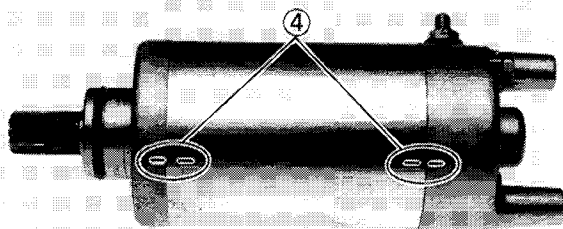
- When installing the yoke, hold the armature in place to avoid it from being pulled out of the rear bracket.
- Align the match mark on the yoke with the match mark on the rear bracket.



3. Install:
  - Washer ①
  - Shim ②
  - Front bracket ③

**NOTE:**

- Align the projection of the washer ① with the slot of the front bracket ③ and install.
- Align the match marks ④ on the yoke with the match marks on the brackets.

**Bolt:**

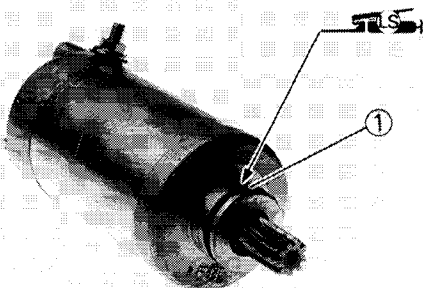
**5 Nm (0.5 m·kg, 3.6 ft·lb)**

**Installation**

1. Apply:
  - Lithium soap base grease

**NOTE:**

Apply a lightly grease to the O-ring ①.



2. Install:
  - Starter motor

Refer to the "ENGINE ASSEMBLY AND ADJUSTMENT" section in the CHAPTER 4.

**Bolt (starter motor):**

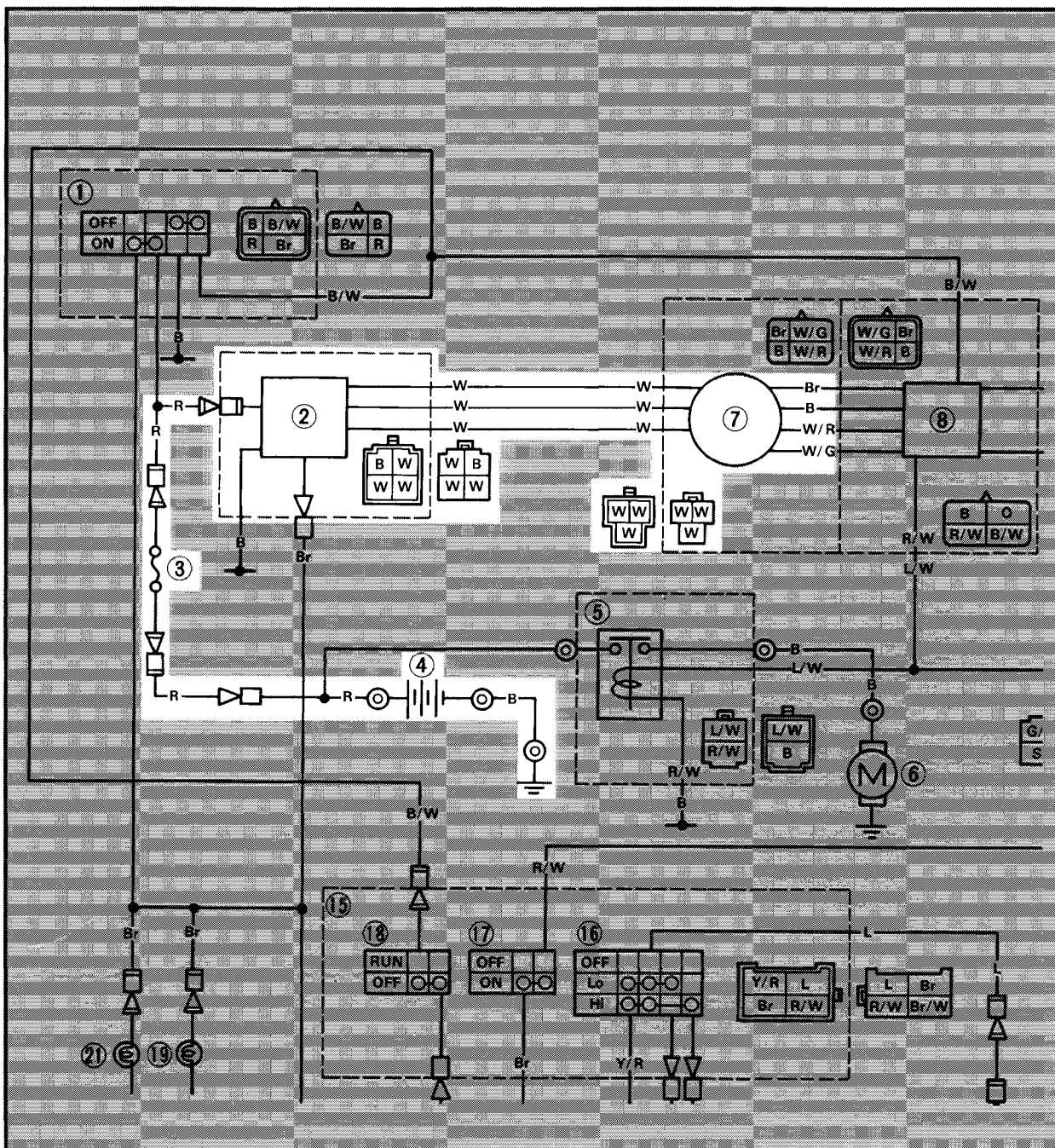
**7 Nm (0.7 m·kg, 5.1 ft·lb)**

## CHARGING SYSTEM

ELEC



# CHARGING SYSTEM CIRCUIT DIAGRAM



- ② Rectifier/Regulator
- ③ Fuse
- ④ Battery
- ⑤ CDI magneto

**CHARGING SYSTEM****ELEC****TROUBLESHOOTING****THE BATTERY IS NOT CHARGED****Procedure**

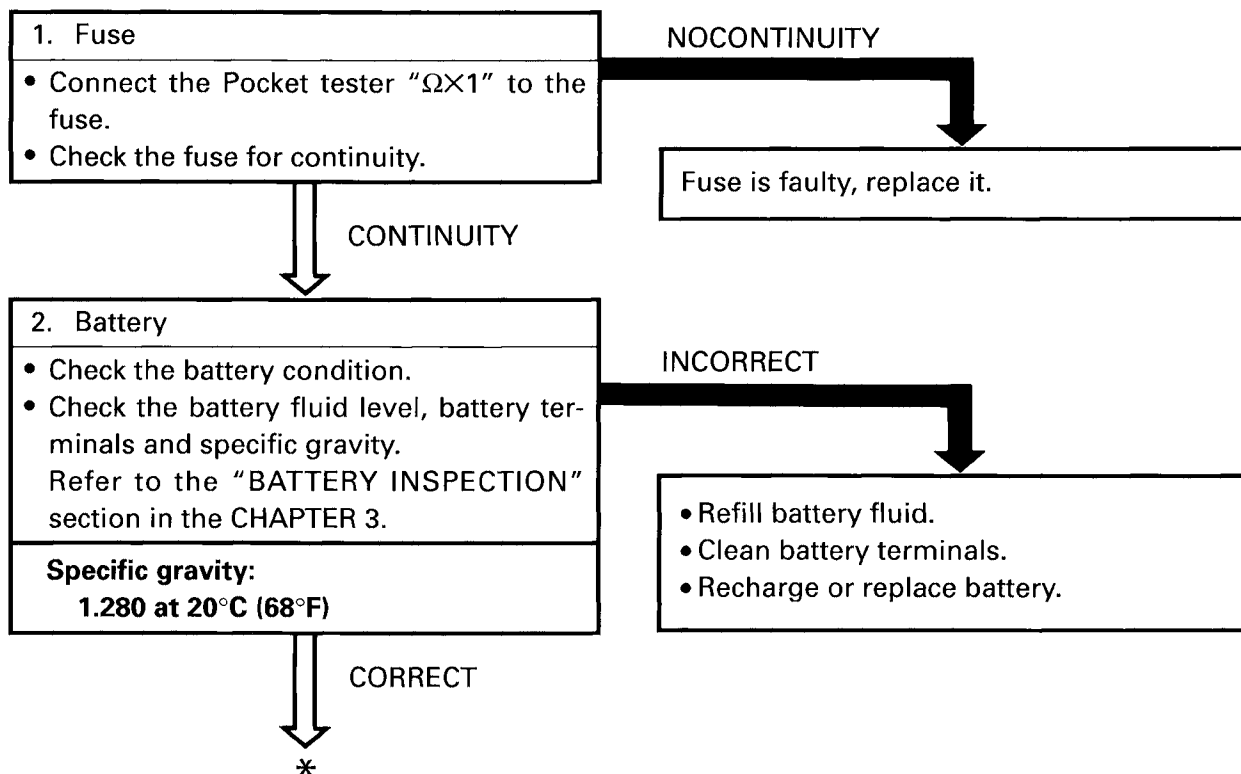
Check;

- |                     |                           |
|---------------------|---------------------------|
| 1. Fuse             | 4. Stator coil resistance |
| 2. Battery          | 5. Wiring connection      |
| 3. Charging voltage | (charging system)         |

**NOTE:**

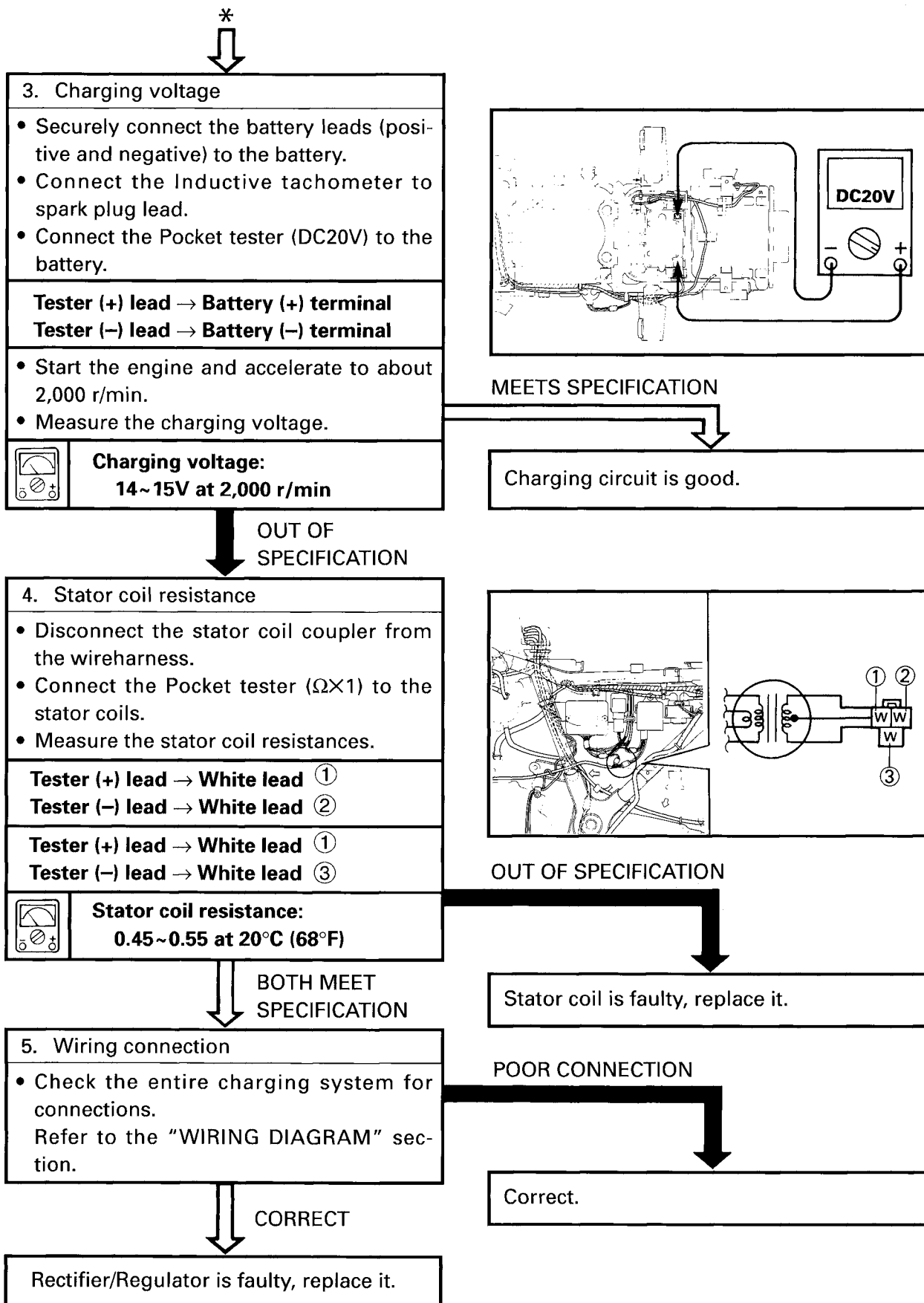
- Remove the following parts before troubleshooting.
 

1) Seat	3) Rear fender
2) Battery	
- Use the following special tools in this troubleshooting.

**Pocket tester:****P/N. YU-03112, 90890-03112****Inductive tachometer:****P/N. YU-08036, 90890-03113**

## CHARGING SYSTEM

ELEC



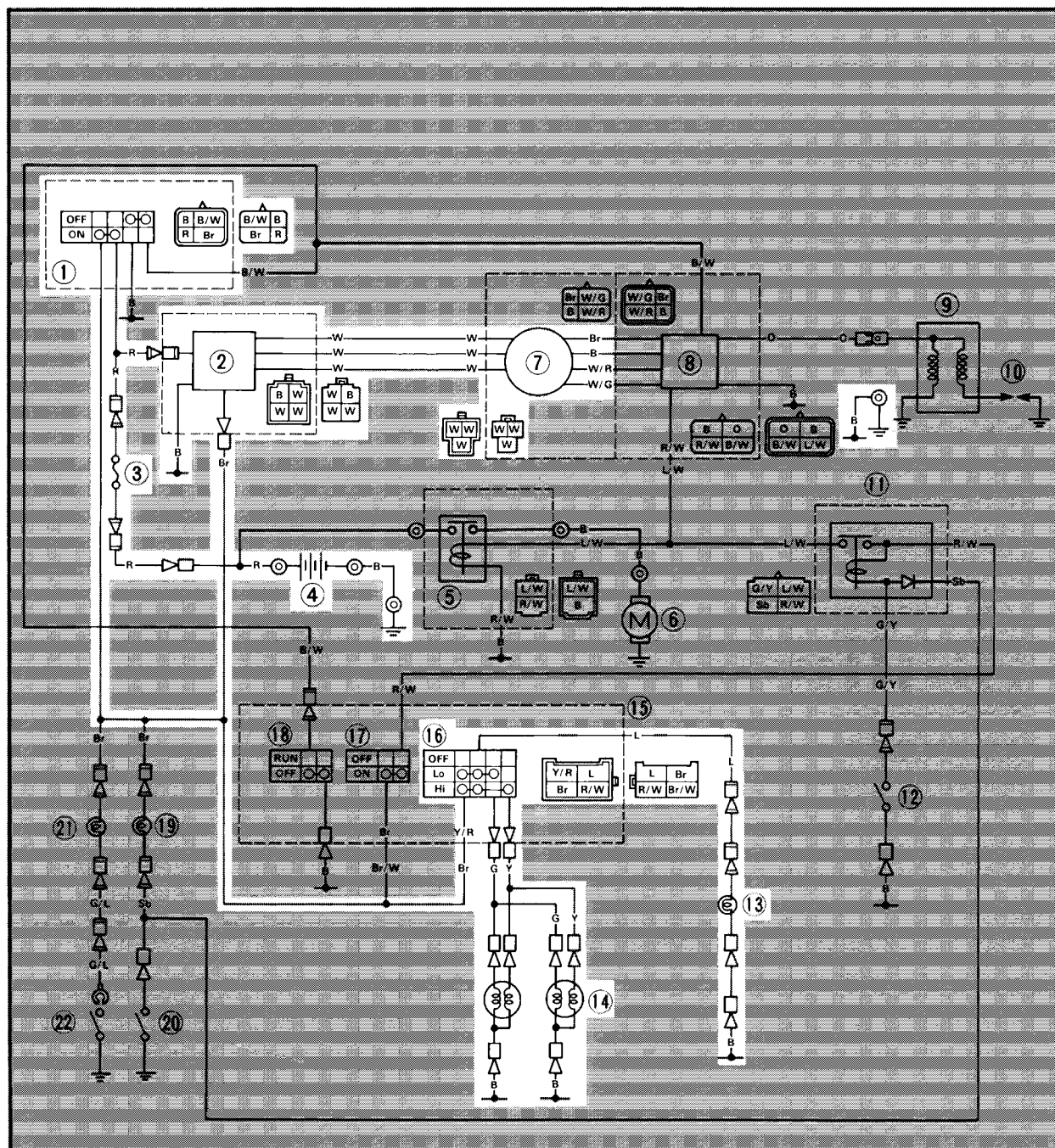


## LIGHTING SYSTEM

ELEC



# LIGHTING SYSTEM CIRCUIT DIAGRAM



- ① Main switch
- ② Rectifier/Regulator
- ③ Fuse
- ④ Battery
- ⑦ CDI magneto
- ⑬ Taillight
- ⑭ Headlight
- ⑯ "LIGHTS" (dimmer) switch



## TROUBLESHOOTING

## HEADLIGHT, TAILLIGHT DO NOT COME ON

## Procedure

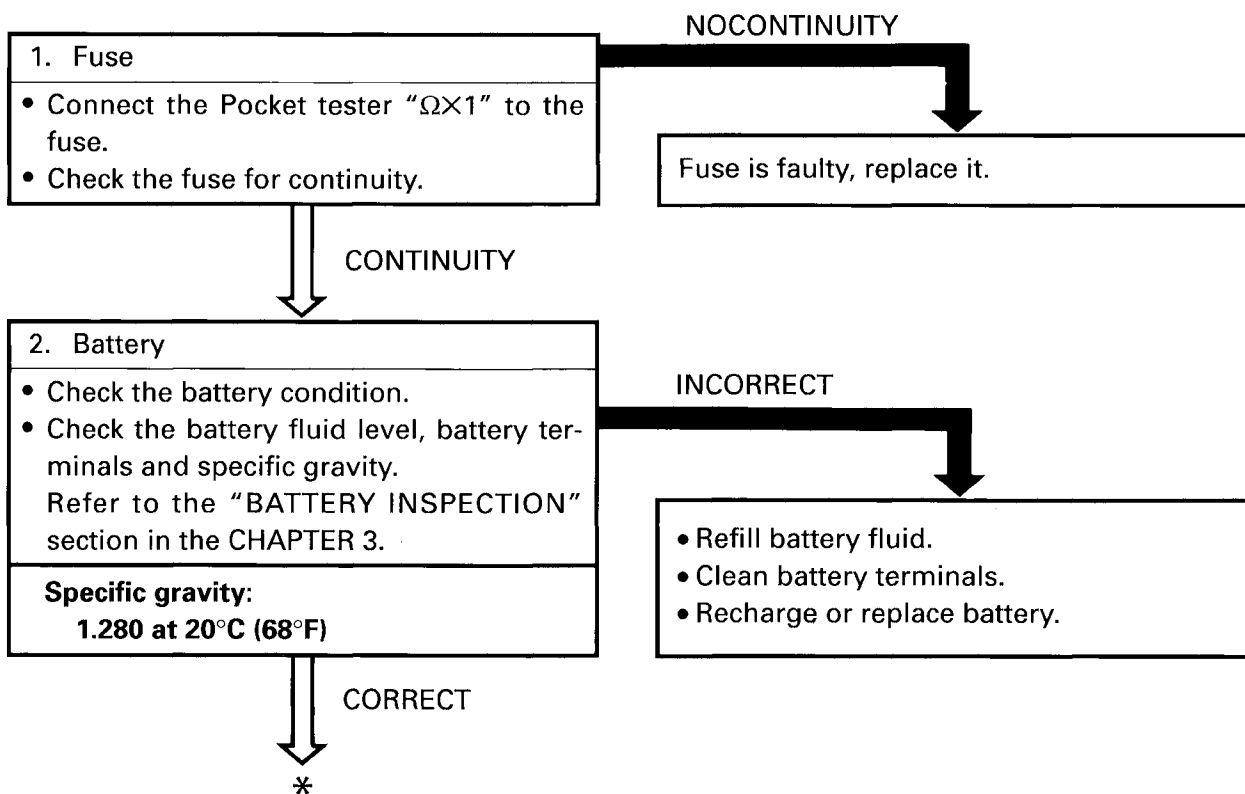
Check;

- |                |  |
|----------------|--|
| 1. Fuse        | 4. "LIGHTS" (dimmer) switch            |
| 2. Battery     | 5. Wiring connection (lighting system) |
| 3. Main switch |  |

## NOTE:

- Remove the following parts before troubleshooting.
 

1) Seat	3) Battery
2) Fuel tank	4) Rear fender
- Use the following special tools in this troubleshooting.

**Pocket tester:****P/N. YU-03112, 90890-03112**

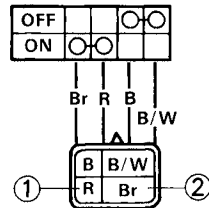
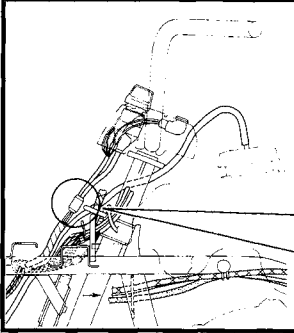
## LIGHTING SYSTEM

ELEC



## 3. Main switch

- Disconnect the main switch coupler from the wireharness.
- Check the switch component for the continuity between "Red ① and Brown ②".



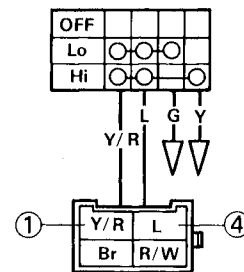
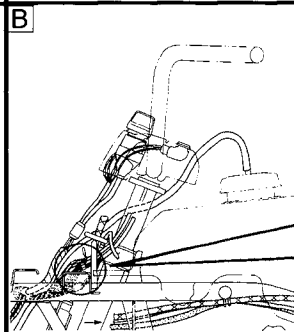
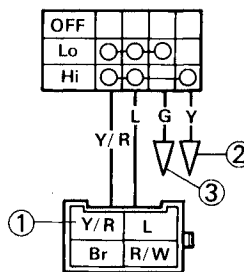
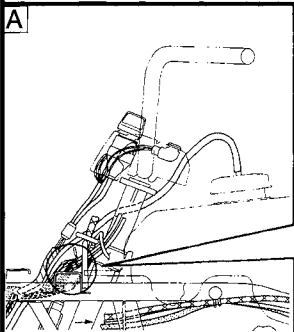
INCORRECT

Main switch is faulty, replace it.

CORRECT

## 4. "LIGHTS" switch

- Disconnect the handlebar switch coupler and headlight leads from the wireharness.
- Check the switch component for the continuity between "Yellow/Red ① and Yellow ②", "Yellow/Red ① and Green ③" and, "Yellow/Red ① and Blue ④".



INCORRECT

Handlebar switch is faulty, replace it.

POOR CONNECTION

Correct.

CORRECT

## 5. Wiring connection

- Check entire lighting system for connections. Refer to the "WIRING DIAGRAM" section

CORRECT

Go to the "LIGHTING SYSTEM CHECK" section.

8

**LIGHTING SYSTEM****ELEC****LIGHTING SYSTEM CHECK**

1. Headlights do not come on.

**1. Bulb and bulb socket**

- Check the bulb and bulb socket for continuity.

NO CONTINUITY

Bulb and/or bulb socket are faulty, replace.

CONTINUITY

**2. Lighting voltage**

- Disconnect the headlight leads from the wireharness.
- Connect the Pocket tester (DC20V) to the headlight leads.

**Head light (1):**

Tester (+) lead → Green lead ①

Tester (-) lead → Black lead ②

**Head light (2):**

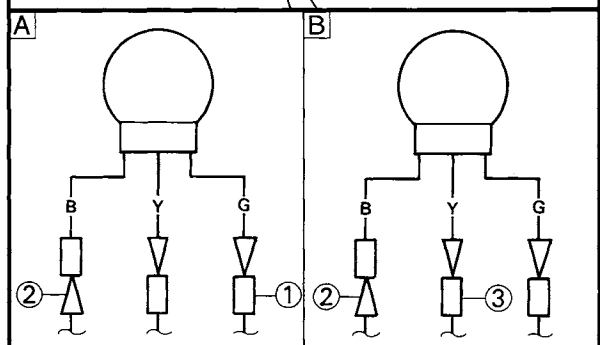
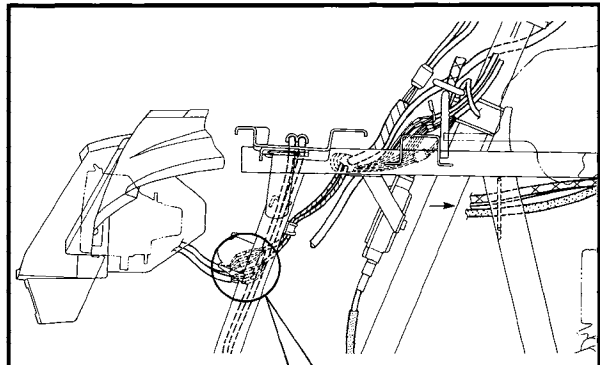
Tester (+) lead → Yellow lead ③

Tester (-) lead → Black lead ②

**A** When "LIGHTS" (dimmer) switch is "LO" position.

**B** When "LIGHTS" (dimmer) switch is "HI" position.

- Turn the main switch to "ON".
- Turn the "LIGHTS" (dimmer) switch to "LO" or "HI" position.
- Check for voltage (12V) on the "Green" and "Yellow" leads at bulb socket connectors.



OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

BOTH MEET  
SPECIFICATION (12V)

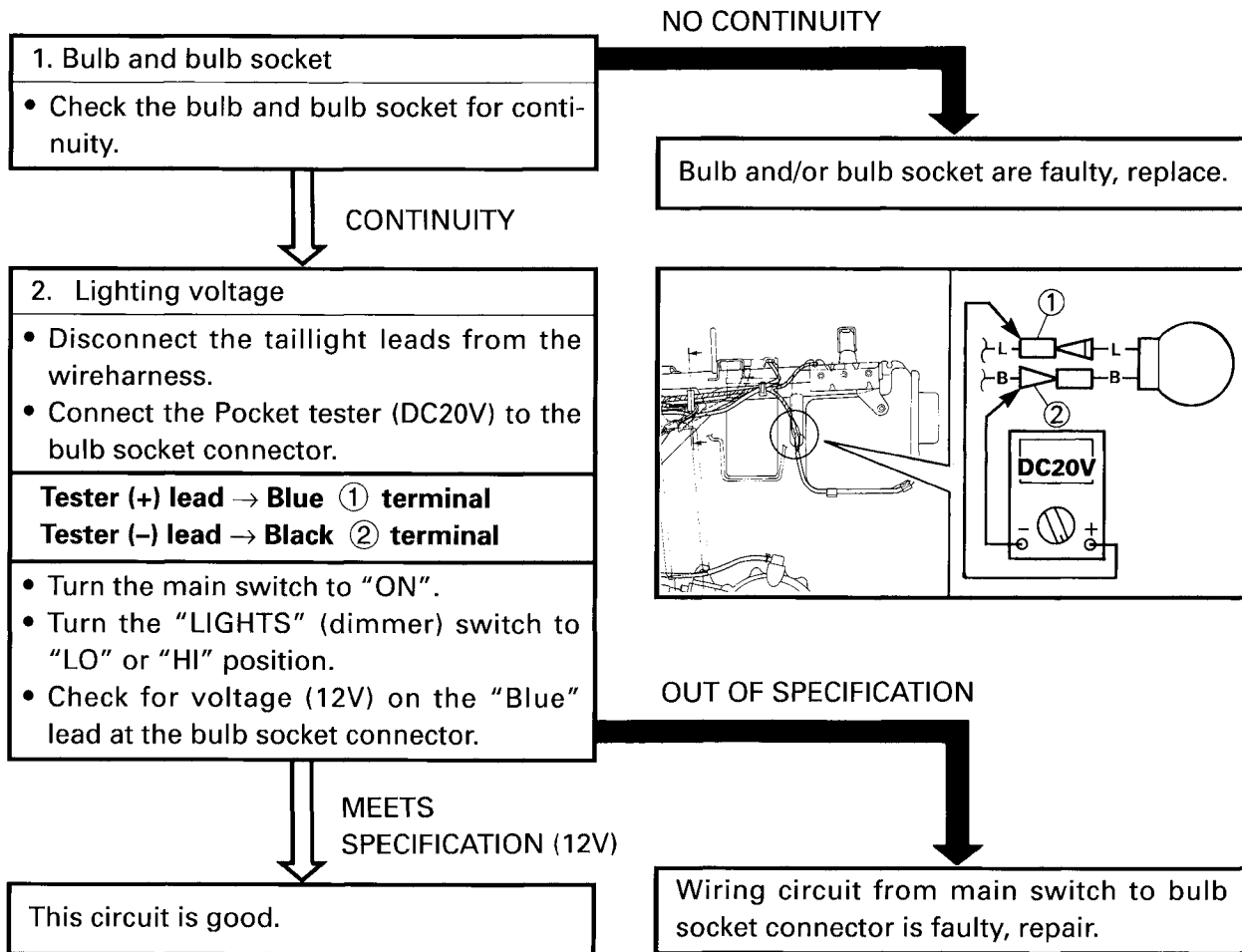
This circuit is good.

## LIGHTING SYSTEM

ELEC



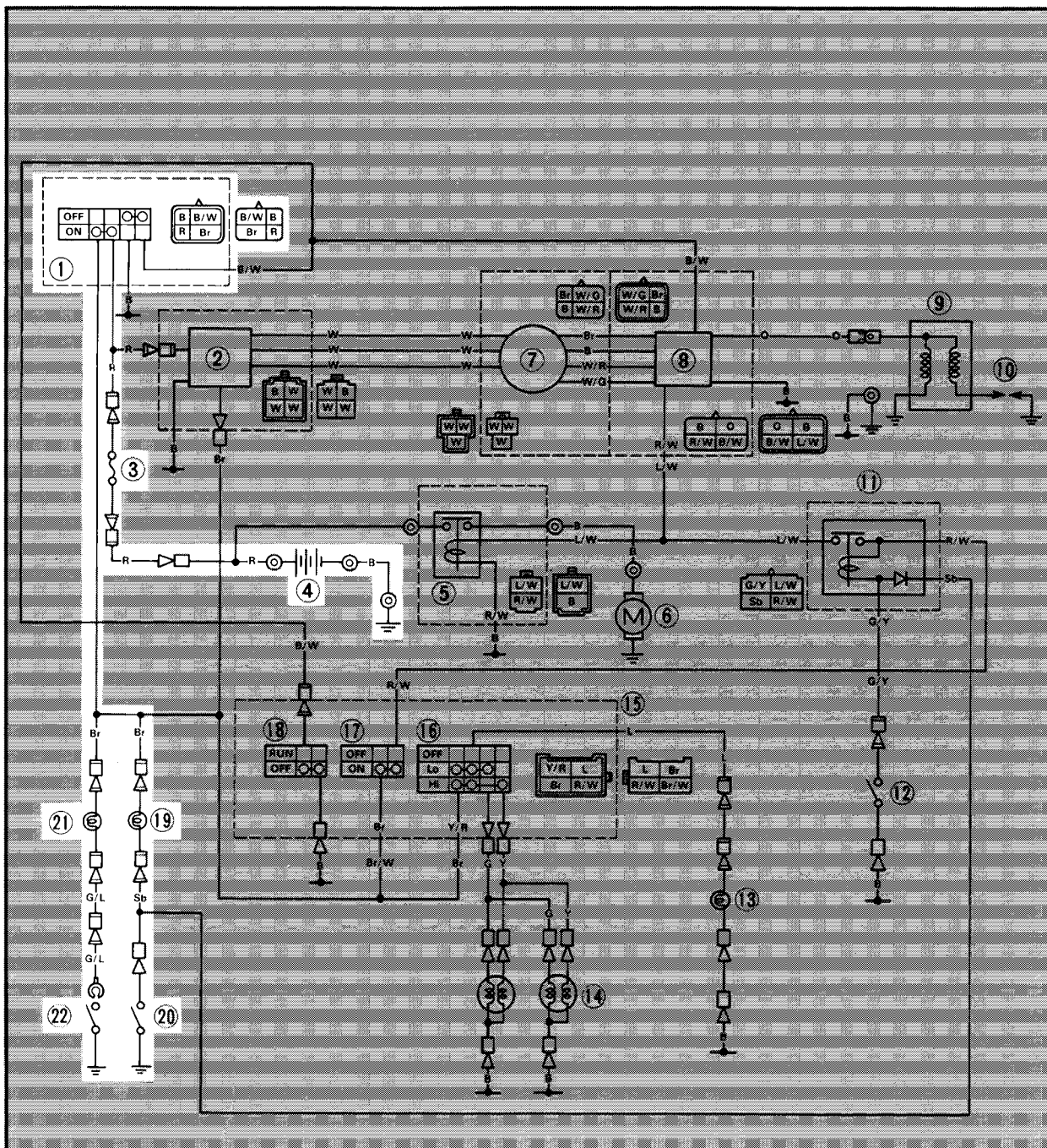
2. Taillight does not come on.





# SIGNAL SYSTEM

## CIRCUIT DIAGRAM



- ① Main switch
- ③ Fuse
- ④ Battery
- ①⑨ "NEUTRAL" indicator light
- ②⑩ Neutral switch
- ②① "REVERSE" indicator light
- ②② Reverse switch



## TROUBLESHOOTING

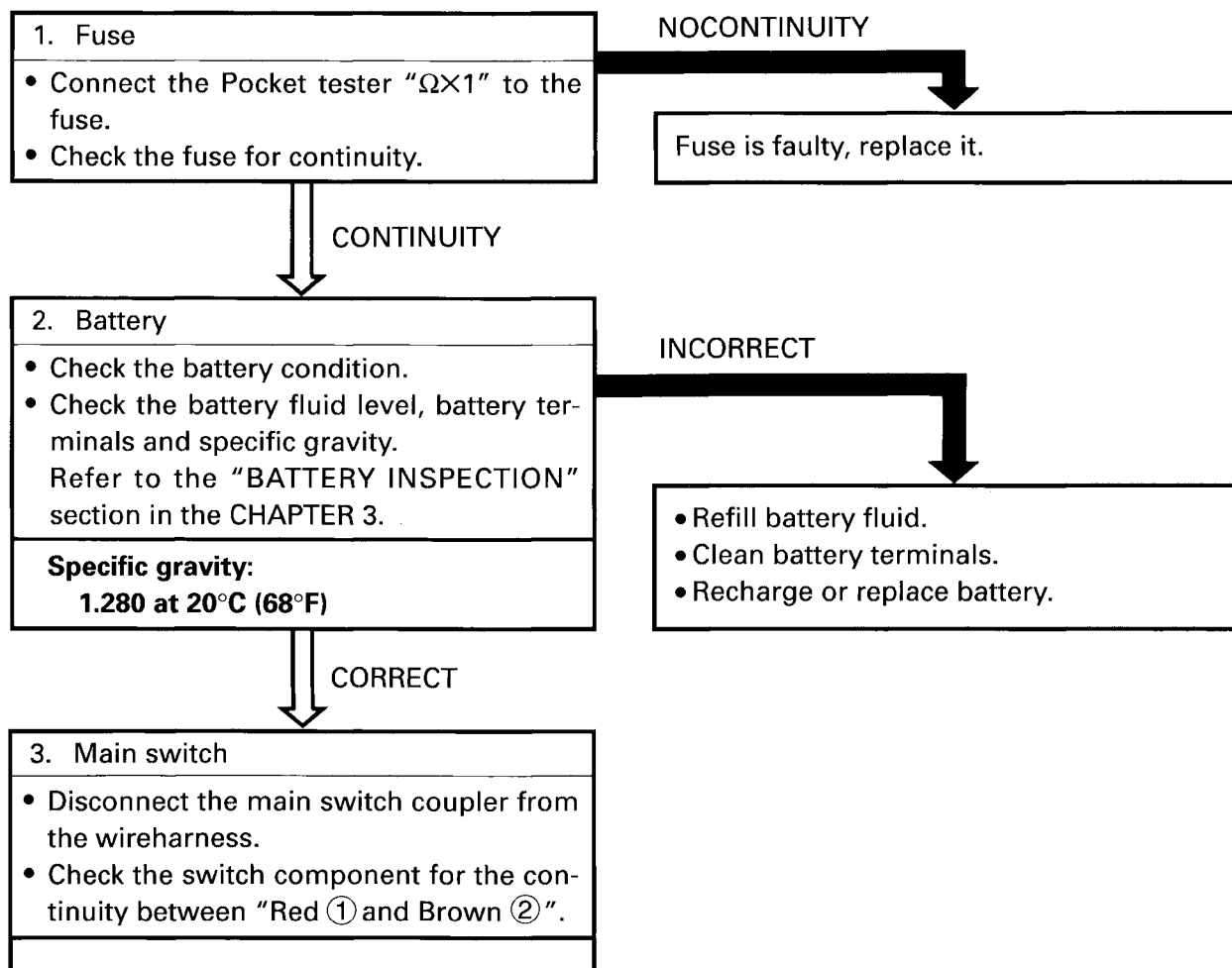
**"NEUTRAL" AND "REVERSE" INDICATOR LIGHT DO NOT COME ON****Procedure**

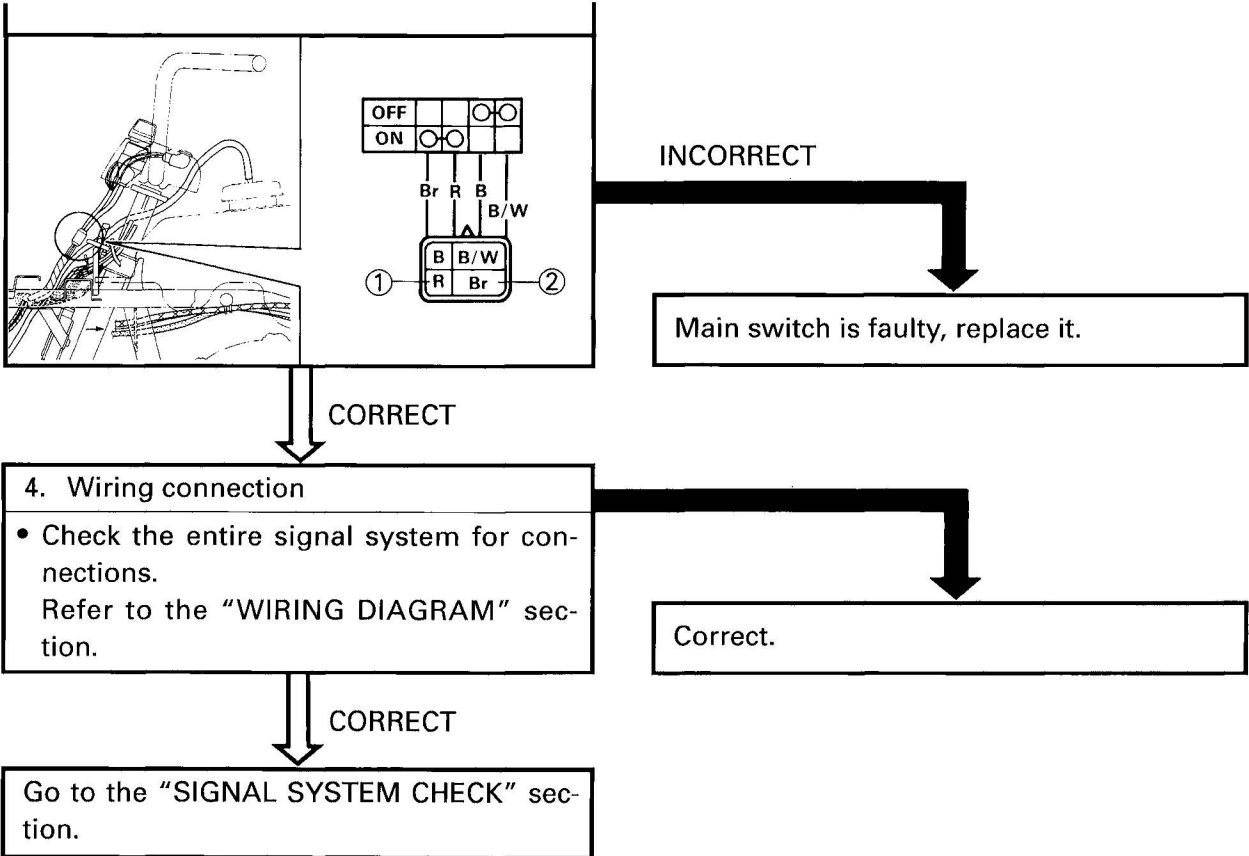
Check;

- |            |                                      |
|------------|--------------------------------------|
| 1. Fuse    | 4. Main switch                       |
| 2. Battery | 5. Wiring connection (signal system) |

**NOTE:**

- Remove the following parts before troubleshooting.
  - 1) Seat
  - 2) Fuel tank
- Use the following special tools in this troubleshooting.

**Pocket tester:****P/N. YU-03112, 90890-03112**





**SIGNAL SYSTEM****ELEC****SIGNAL SYSTEM CHECK****"NEUTRAL" INDICATOR LIGHT DOES NOT COME ON****1. Bulb and bulb socket**

- Check the bulb and bulb socket for continuity.

**NOTE:**

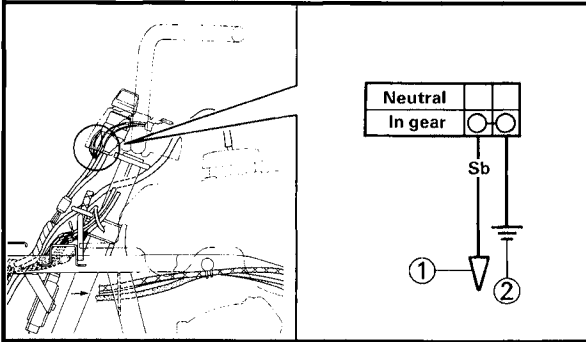
Remove the handlebar cover.

**NOCONTINUITY****CONTINUITY**

Bulb and/or bulb socket are faulty, replace.

**2. Neutral switch**

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for continuity between "Sky blue ① and Ground ②".



Neutral switch is faulty, replace it.

**CORRECT****3. Wiring connection**

- Check the entire signal system for connections. Refer to the "WIRING DIAGRAM" section.

**POOR CONNECTION**

Correct.

**SIGNAL SYSTEM****ELEC****"REVERSE" INDICATOR LIGHT DOES NOT COME ON****1. Bulb and bulb socket**

- Check the bulb and bulb socket for continuity.

**NOTE:**

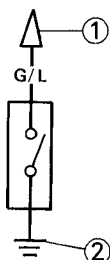
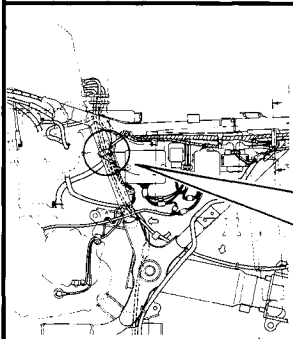
Remove the handlebar cover.

**NOCONTINUITY**

Bulb and/or bulb socket are faulty, replace.

**CONTINUITY****2. Reverse switch**

- Disconnect the neutral switch lead from the wireharness.
- Check the switch component for continuity between "Green/Blue ① and Ground ②".



Reverse switch is faulty, replace it.

**CORRECT****3. Wiring connection**

- Check the entire signal system for connections. Refer to the "WIRING DIAGRAM" section.

**POOR CONNECTION**

Correct.

**TROUBLESHOOTING****NOTE:**

The following troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

**STARTING FAILURE/HARD STARTING****FUEL SYSTEM****Fuel tank**

- Empty
- Clogged fuel filter
- Clogged fuel breather hose
- Deteriorated fuel/fuel containing water or foreign material

**Fuel cock**

- Clogged fuel hose

**Air cleaner**

- Clogged air filter

**Carburetor**

- Deteriorated fuel, fuel containing water or foreign material
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Groove-worn needle valve
- Improperly sealed valve seat
- Improperly adjusted fuel level
- Improperly set pilot jet
- Clogged starter jet
- Starter plunger malfunction

**ELECTRICAL SYSTEM****Spark plug**

- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

**Ignition coil**

- Broken or shorted primary/secondary coil
- Faulty spark plug lead
- Broken body

**CDI unit system**

- Faulty CDI unit
- Faulty source coil
- Faulty pick-up coil
- Broken woodruff key

**Switches and wiring**

- Faulty main switch
- Faulty "START" switch
- Faulty "ENGINE STOP" switch
- Faulty "NEUTRAL" switch
- Faulty "REVERSE" switch
- Faulty brake switch
- Broken or shorted wiring

**Starter motor**

- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit out-off relay
- Faulty starter clutch

## POOR IDLE SPEED PERFORMANCE/POOR MEDIUM AND HIGH SPEED PERFORMANCE

**TRBL  
SHTG**
**?**

### COMPRESSION SYSTEM

#### Cylinder and cylinder head

- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Broken cylinder gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring

#### Piston and piston rings

- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

#### Crankcase and crankshaft

- Improperly seated crankcase
- Seized crankshaft

## POOR IDLE SPEED PERFORMANCE

### Carburetor

- Improperly returned starter plunger
- Clogged or loose pilot jet
- Clogged pilot air jet
- Improperly adjusted idle speed (Throttle stop screw)
- Improper throttle cable play
- Flooded carburetor

### Air cleaner

- Clogged air filter

### Electrical system

- Faulty battery
- Faulty spark plug
- Faulty CDI unit
- Faulty pickup coil
- Faulty ignition coil

### Valve train

- Improperly adjusted valve clearance

## POOR MEDIUM AND HIGH SPEED PERFORMANCE

### POOR MEDIUM AND HIGH SPEED PERFORMANCE

Refer to "STARTING FAILURE/HARD STARTING" and "POOR IDLE SPEED PERFORMANCE-Valve train" section.

### Carburetor

- Improper jet needle clip position
- Improperly adjusted fuel level
- Clogged or loose main jet

### Air cleaner

- Clogged air filter

**FAULTY DRIVE TRAIN**

The following conditions may indicate damage drive train components:

Symptoms	Possible causes
1. A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)  2. A "rolling rumble" noticeable at low speed; a high-pitched whine; a "clank" from a drive train component or area.  3. A locked-up condition of the drive train mechanism, no power transmitted from engine to front and/or rear wheels.	A. Bearing damage.  B. Improper gear lash.  C. Gear tooth damage.  D. Broken drive shaft.  E. Broken gear teeth.  F. Seizure due to lack of lubrication.  G. Small foreign object lodged between moving parts.

**NOTE:**

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal machine operating noise. If there is reason to believe these components are damaged, remove the components for specific inspection.

**FAULTY GEAR SHIFTING/CLUTCH SLIPPING/Dragging****FAULTY GEAR SHIFTING****HARD SHIFTING**

Refer to the "CLUTCH SLIPPING/Dragging-CLUTCH Dragging" Section.

**SHIFT PEDAL DOES NOT MOVE****Shift shaft**

- Bent shift shaft

**Shift cam and shift fork**

- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

**Transmission**

- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

**Shift guide**

- Broken shift guide

**JUMP-OUT GEAR****Shift shaft**

- Improperly adjusted shift lever position
- Improperly returned stopper lever

**Shift cam**

- Improper thrust play
- Worn shift cam groove

**Shift fork**

- Worn shift fork

**Transmission**

- Worn gear dog

**CLUTCH SLIPPING/Dragging****CLUTCH SLIPPING****Clutch**

- Improperly adjusted clutch release lever free play
- Loose clutch spring (primary and/or secondary)
- Fatigued clutch spring (primary and/or secondary)
- Worn friction plate
- Worn clutch plate
- Worn clutch shoe (primary)

**Engine oil**

- Low oil level
- Improper quality (low viscosity)
- Deterioration

## OVERHEATING/FAULTY BRAKE/ SHOCK ABSORBER MALFUNCTION

TRBL SHTG	?
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### CLUTCH DRAGGING

#### Clutch

- Improperly adjusted clutch release lever free play
- Improper engagement of release lever and push rod
- Warped clutch plate
- Swollen friction plate
- Broken clutch boss

#### Engine oil

- High oil level
- Improper quality (high viscosity)
- Deterioration

### OVERHEATING

#### OVERHEATING

#### Ignition system

- Improper spark plug gap
- Improper spark plug heat range
- Faulty CDI unit

#### Compression system

- Heavy carbon build-up

#### Fuel system

- Improper carburetor main jet (improper setting)
- Improperly adjusted fuel height
- Clogged air cleaner element

#### Engine oil

- Incorrect oil level
- Improper oil viscosity
- Inferior oil quality

#### Brake

- Dragging brake

### FAULTY BRAKE

#### POOR BRAKING EFFECT

#### Drum brake

- Worn brake shoe
- Worn or rusty brake drum
- Improperly adjusted brake free play
- Improper brake cam lever position
- Improper brake shoe position
- Fatigued/Damaged return spring
- Oily or greasy brake shoe
- Oily or greasy brake drum
- Broken brake cable

### SHOCK ABSORBER MALFUNCTION

#### MALFUNCTION

- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring

**INSTABLE HANDLING/FAULTY LIGHTING SYSTEM****INSTABLE HANDLING****INSTABLE HANDLING****Handlebars**

- Improperly installed or bent

**Steering**

- Incorrect toe-in
- Bent steering shaft
- Improperly installed steering shaft
- Damaged bearing or bearing race
- Bent tie-rods
- Deformed steering knuckles

**Tires**

- Uneven tire pressures on both sides
- Incorrect tire pressure
- Unevenly worn tires

**Wheels**

- Deformed wheel
- Loose bearing
- Bent or loose wheel axle
- Excessive wheel run-out

**Frame**

- Twisted
- Damaged frame
- Improperly installed bearing race

**Swingarm**

- Worn bearing or bush
- Bent or damaged

**FAULTY LIGHTING SYSTEM****HEADLIGHT DARK**

- Improper bulb
- Too many electric accessories
- Hard charging (broken charging coil and/or faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- Poor contacts (main or "LIGHTS" (dimmer) switch)
- Bulb life expired

**BULB BURNT OUT**

- Improper bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded
- Faulty main and/or "LIGHTS" (dimmer) switch
- Bulb life expired



**YAMAHA MOTOR CO.,LTD.**