

# **XVS1100(L)** '99 5el1-Ae1

# **SERVICE MANUAL**

EB000000

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# NOTICE

This manual was produced by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha motorcycles has a basic understanding of the mechanical ideas and the procedures of motorcycle repair. Repairs attempted by anyone without this knowledge are likely to render the motorcycle unsafe and unfit for use.

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

NO	TE:

Designs and specifications are subject to change without notice.

### **IMPORTANT INFORMATION**

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

	The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!
	Failure to follow WARNING instructions could result in severe injury or death to the motorcycle operator, a bystander or a person inspecting or repairing the motorcycle.
CAUTION:	A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.
NOTE:	A NOTE provides key information to make procedures easier or clearer.

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# HOW TO USE THIS MANUAL

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

1st title (1): This is the title of the chapter with its symbol in the upper right corner of each page.

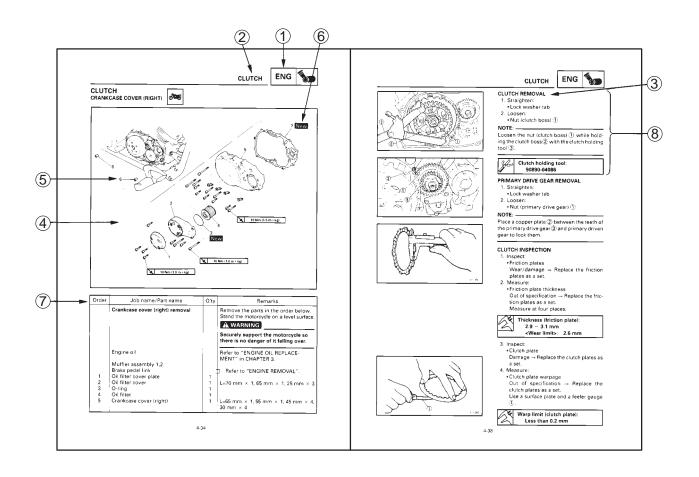
2nd title 2: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper right corner of the page.

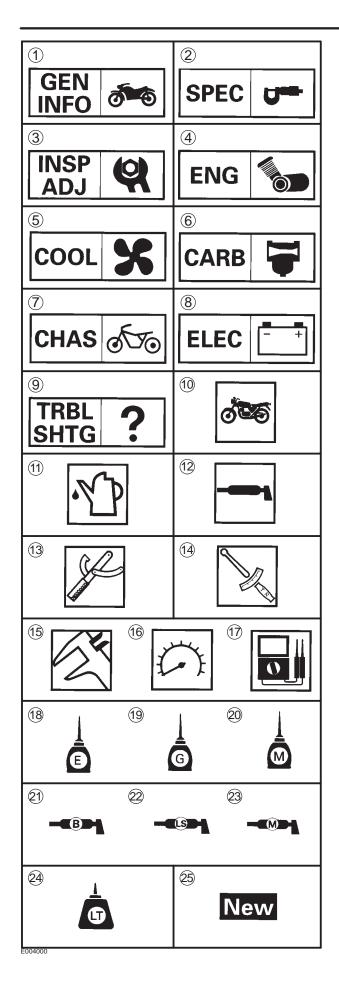
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

### EXPLODED DIAGRAMS

To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

- 1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.
- 2. Numbers (5) are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
- 3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks
  ⑥. The meanings of the symbol marks are given on the next page.
- 4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- 5. For jobs requiring more information, the step-by-step format supplements (8) are given in addition to the exploded diagram and the job instruction chart.





# ILLUSTRATED SYMBOLS

Illustrated symbols 1 to 9 are printed on the top right of each page and indicate the subject of each chapter.

- 1 General information
- ② Specifications
- ③ Periodic inspections and adjustments
- (4) Engine
- (5) Cooling system
- 6 Carburetion
- (7) Chassis
- 8 Electrical
- (9) Troubleshooting

Illustrated symbols 10 to 17 are used to identify the specifications appearing in the text.

- 10 Can be serviced with engine mounted
- 1 Filling fluid
- 12 Lubricant
- (13) Special tool
- 14 Torque
- 15 Wear limit, clearance
- 16 Engine speed
- (17) Ω, V, A

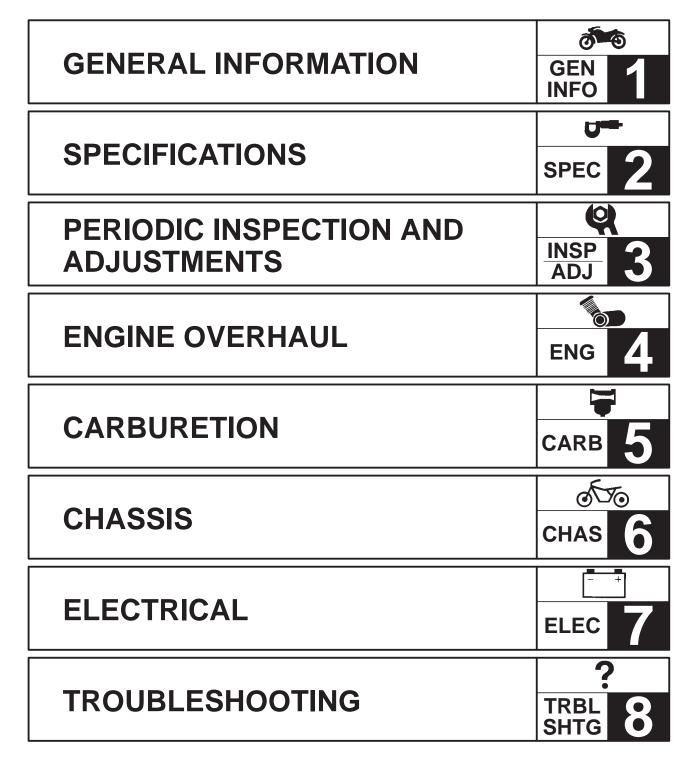
Illustrated symbols 18 to 23 in the exploded diagrams indicate the types of lubricants and lubrication points.

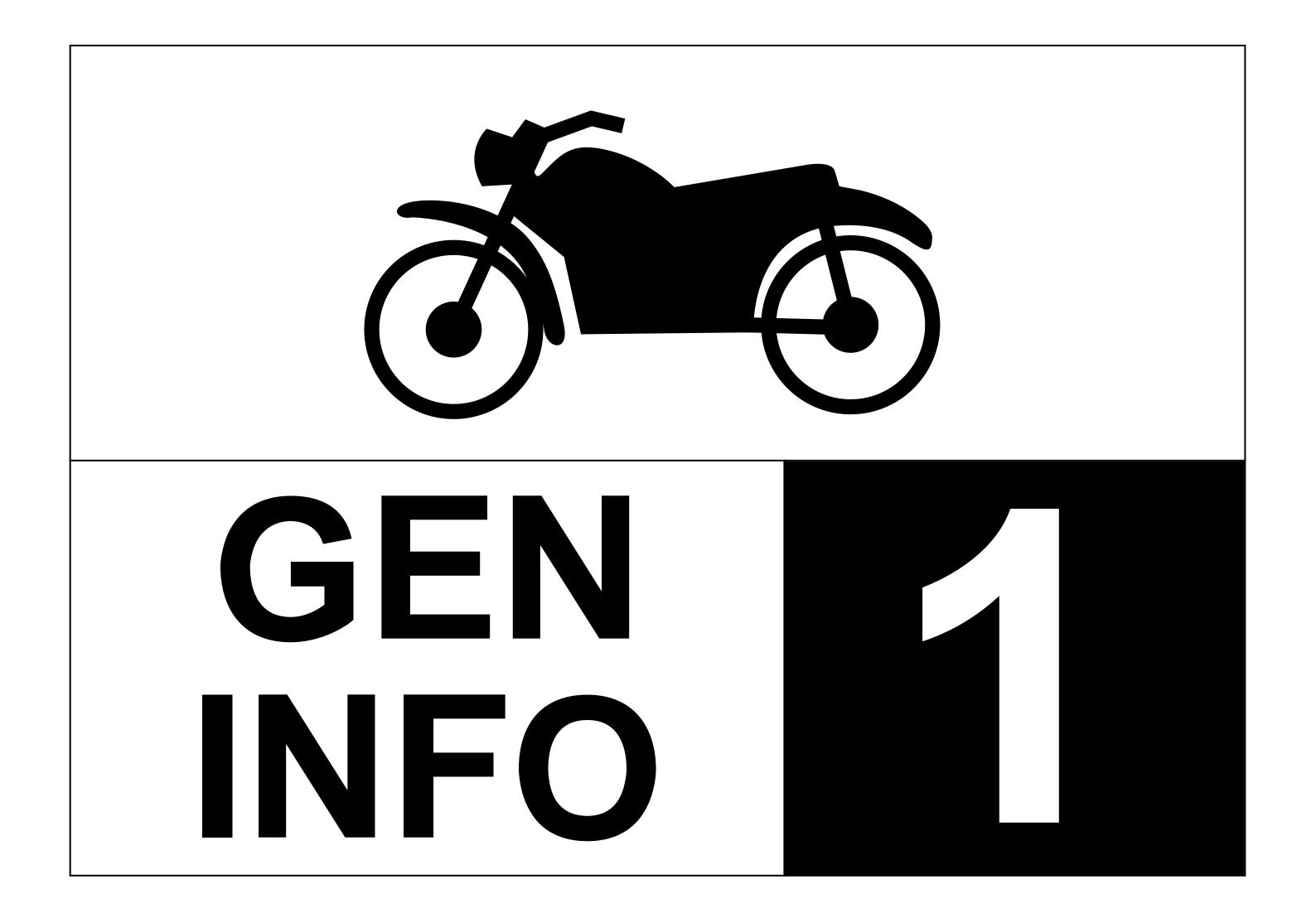
- (18) Apply engine oil
- (19) Apply gear oil
- 20 Apply molybdenum disulfide oil
- 21 Apply wheel bearing grease
- 22 Apply lightweight lithium-soap base grease
- 23 Apply molybdenum disulfide grease

Illustrated symbols 24 to 25 in the exploded diagrams indicate where to apply locking agent 24 and when to install new parts 25.

- 24 Apply locking agent (LOCTITE°)
- 25 Replace

# **CHAPTER TITLES**





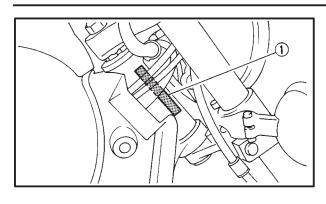


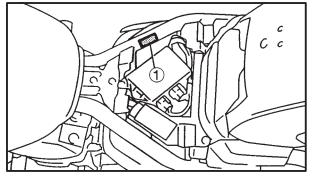
# CHAPTER 1. GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION 1-	1
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### MOTORCYCLE IDENTIFICATION







# GENERAL INFORMATION MOTORCYCLE IDENTIFICATION

#### VEHICLE IDENTIFICATION NUMBER

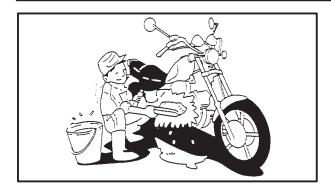
The vehicle identification number ① is stamped into the right side of the steering head.

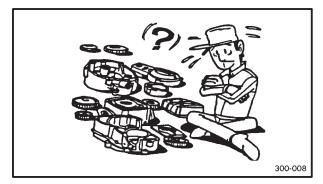
### MODEL LABEL

The model label 1 is affixed to the frame. This information will be needed to order spare parts.

### **IMPORTANT INFORMATION**







### IMPORTANT INFORMATION PREPARATION FOR REMOVAL PROCE-DURES

- 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.
- 3. When disassembling the machine, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.
- 4. During machine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
- 5. Keep all parts away from any source of fire.



### EB101010

### **REPLACEMENT PARTS**

 Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

EB101020

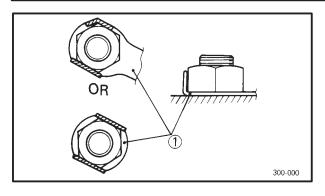
#### GASKETS, OIL SEALS AND O-RINGS

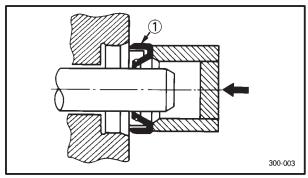
- 1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
- 2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.

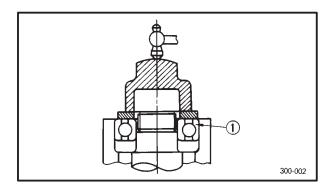


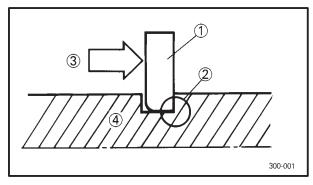
EB101030











# LOCK WASHERS/PLATES AND COTTER PINS

Replace all lock washers/plates ① and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.

### EB101040

### **BEARINGS AND OIL SEALS**

- Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.
- 1 Oil seal

### **CAUTION:**

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

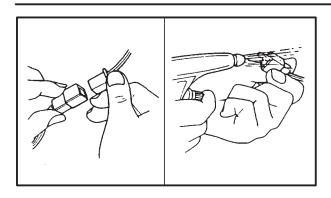
1) Bearing

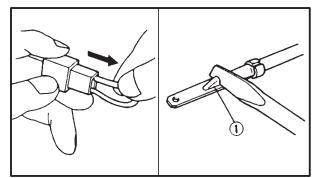
# EB101050

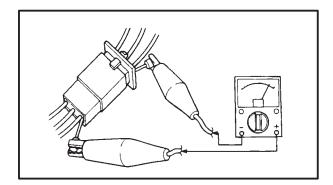
- Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharpedged corner ② is positioned opposite the thrust ③ it receives. See sectional view.
- (4) Shaft

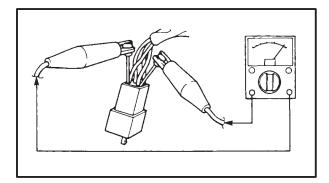
### **CHECKING OF CONNECTIONS**











#### 

Check the connectors for stains, rust, moisture, etc.

- 1. Disconnect:
  - °Connector
- 2. Check:
- °Connector

Moisture  $\rightarrow$  Dry each terminal with an air blower.

Stains/rust  $\rightarrow$  Connect and disconnect the terminals several times.

- 3. Check:
  - ° Connector leads

Looseness  $\rightarrow$  Bend up the pin 1 and connect the terminals.

4. Connect:

° Connector terminals

#### NOTE: -

The two terminals "click" together.

5. Check:

°Continuity (using a pocket tester)

### NOTE: -

- ° If there is no continuity, clean the terminals.
- <sup>o</sup>When checking the wire harness be sure to perform steps 1 to 3.
- °As a quick remedy, use a contact revitalizer available at most part stores.
- °Check the connector with a pocket tester as shown.



# SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.

When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name/How to use	Illustration	
Weight 90890-01084 Bolt	Slide hammer bolt/weight These tools are used to remove the rocker	0	
90890-01085	arm shaft.		
90890-01135	Crankcase separating tool		
	This tool is used to remove the crankshaft.		
90890-01229	Coupling gear/Middle shaft tool		
	This tool is needed when removing or installing the final pinion shaft nut.		
Final gear backlash band 90890-01230	Final gear backlash band	ALLELING CILLING	
Middle gear backlash band 90890-01231	This tool is needed when measuring final gear /middle gear backlash.		
Installer pot 90890-01274 Bolt 90890-01275	Crankshaft installer pot/bolt/adapter/spacer		
Adaptor 90890-04130 Spacer 90890-04060			
	These tools are used to install the crankshaft.		
90890-01304	Piston pin puller		
	This tool is used to remove the piston pin.	6 6	
90890-01312	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.		



Tool No.	Tool name/How to use	Illustration
T-handle 90890-01326 Holder 90890-01460	T-handle/damper rod holder These tools are needed to loosen and tighten	
Puller 90890-01362 Adapter 90890-04131	the damper rod holding bolt. Flywheel puller/adapter These tools are needed to remove the rotor.	
Weight 90890-01367 Adapter 90890-01381	Fork seal driver weight/adapter These tools are needed when installing the slide metal, oil seal and dust seal into the fork.	
Ring nut wrench 90890-01403 Exhaust nut wrench 90890-01268	Ring nut wrench/ehaust and steering nut wrench This tool is needed to loosen and tighten the steering stem ring nut.	
90890-01701	Sheave holder This tool is needed to hold the rotor when re- moving or installing the rotor bolt.	
90890-03081	Compression gauge set These tools are needed to measure engine compression.	
90890-03094	Vacuum gauge This gauge is needed for carburetor synchro- nization.	
90890-03112	Pocket tester This instrument is needed for checking the electrical system.	Star Star
90890-03113	Engine tachometer This tool is needed for observing engine r/min.	



Tool No.	Tool name/How to use	Illustration
90890-03141	Timing light This tool is necessary for checking ignition timing.	
90890-04014	Valve guide remover & installer This tool is needed to remove and install the valve guide.	
90890-04019	Valve spring compressor This tool is needed to remove and install the valve assemblies.	and the second
Adapter 90890-01277 Shock puller 90890-01290 Weight 90890-01291	Crankshaft installer bolt adapter/armature shock puller/weight These tools are needed when removing the final pinion shaft.	
90890-04137	Bearing retainer wrench This tool is needed when removing or instal- ling the middle drive shaft assembly.	
Wrench 90890-04138 Holder 90890-04055	Middle drive shaft nut wrench/Middle drive shaft holder These tools are needed when removing or installing the middle drive shaft bearing.	
90890-04062	Universal joint holder This tool is needed when removing or instal- ling the driven pinion gear nut.	
90890-04077	Bearing retainer wrench This tool is needed when removing or instal- ling the final drive pinion gear assembly.	
90890-04086	Clutch holding tool This tool is needed to hold the clutch when re- moving or installing the clutch boss nut.	



Tool No.	Tool name/How to use	Illustration
90890-04090	Damper spring compressor This tool is needed when removing or instal- ling the damper spring.	
90890-06754	Dynamic spark tester Ignition checker This instrument is necessary for checking the ignition system components.	a company of the second s
90890-85505	Yamaha bond No.1215 This sealant (bond) is used on crankcase mat- ing surfaces, etc.	



# SPEC U

# CHAPTER 2. SPECIFICATIONS

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# **GENERAL SPECIFICATIONS**



## **SPECIFICATIONS**

### **GENERAL SPECIFICATIONS**

Item	Standard
Model code:	XVS1100: 5EL1 (For Europe) 5EL2 (For D, A, FIN) 5EL3 (For Australia)
Dimensions: Overall length Overall width Overall height Seat height Wheelbase Minimum ground clearance Minimum turning radius	2,405 mm 895 mm 1,095 mm 690 mm 1,640 mm 145 mm 3,200 mm
Basic weight: With oil and a full fuel tank	274 kg (5EL2 : 275kg)
Engine: Engine type Cylinder arrangement Displacement Bore × stroke Compression ratio Compression pressure (STD) Starting system	Air cooled 4-stroke, SOHC V-type 2-cylinder 1.063 L 95 × 75mm 8.3 : 1 1,000 kPa (10 kg/cm <sup>2</sup> , 10 bar) at 400 r/min Electric starter
Lubrication system:	Wet sump
Oil type or grade: Engine oil Temp. °C -20 -10 0 10 20 30 40 10W/30 10W/40 20W/40 20W/50	API standard: "SE" or higher grade ACEA standard: G4 or G5
Final gear oil:	SAE80API "GL-4" Hypoid Gear Oil
Oil quantity: Engine oil Periodic oil change With oil filter replacement Total amount Final gear case oil Total amount	3.0 L 3.1 L 3.6 L 0.2 L
Air filter:	Dry type element
Fuel: Type Fuel tank capacity Fuel reserve amount	Regular unleaded gasoline 17 L 4.5 L

# **GENERAL SPECIFICATIONS**



Item		Standard
Carburetor:		
Type/quantity		BSR37/2
Manufacturer		MIKUNI
Spark plug:		BPR7ES/W22EPR-U
Type Manufacturer		NGK/DENSO
Spark plug gap		$0.7 \sim 0.8 \text{ mm}$
Clutch type:		Wet, multiple-disc
Transmission:		
Primary reduction system	<b>`</b>	Spur gear
Primary reduction ratio	I	78/47 (1.660)
Secondary reduction sys	tom	Shaft drive
Secondary reduction ratio		$44/47 \times 19/18 \times 32/11$ (2.875)
Transmission type	0	Constant mesh 5-speed
Operation		Left foot operation
Gear ratio	1st	40/17 (2.353)
	2nd	40/24 (1.667)
	3rd	36/28 (1.286)
	4th	32/31 (1.032)
	5th	29/34 (0.853)
Chassis:		
Frame type		Double cradle
Caster angle		33°
Trail		136 mm
Tire:		
Туре		With tube
Size	front	110/90-18 61S
	rear	170/80-15M/C 77S
Manufacturer	front	BRIDGESTONE/DUNLOP
	rear	BRIDGESTONE/DUNLOP
Туре	front	EXEDRA L309/K555F
	rear	EXEDRA G546/K555
Maximum load-except mot	orcycle:	201 kg (5EL2 : 200kg)
Tire pressure (cold tire):		
$0 \sim 90 \text{ kg} (0 \sim 198 \text{ lb})$		
	front	200 kPa (2.00 kg/cm <sup>2</sup> )
	rear	225 kPa (2.25 kg/cm <sup>2</sup> )
90 kg (198 lb) $\sim$ Maximu		
	front	225 kPa (2.25 kg/cm <sup>2</sup> )
	rear	250 kPa (2.50 kg/cm <sup>2</sup> )
		* Load is the total weight of the cargo, rider, passenger and accessories.
Brake:		หลวอยามุยา สาน สมมัยวอบเเออ.
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Right foot operation
	5201011	

# **GENERAL SPECIFICATIONS**



Item	Standard
Suspension:	
Front suspension	Telescopic fork
Rear suspension	Swingarm (link suspension)
Shock absorber:	
Front shock absorber	Coil spring/Oil damper
Rear shock absorber	Coil spring/Gas-oil damper
Wheel travel:	
Front wheel travel	140 mm
Rear wheel travel	113 mm
Electrical:	
Ignition system	T.C.I. (digital)
Generator system	A.C. magneto
Battery type	GT14B-4
Battery capacity	12 V 12 AH
Headlight type:	Quartz bulb (halogen)
Bulb wattage $\times$ quantity:	
Headlight	12 V 60 W/55 W × 1
Auxiliary light	12 V 4 W × 1
Tail/brake light	12 V 5 W/21 W × 1
Turn signal	12 V 21 W × 4
Licence light	12 V 5 W × 1
Meter light	14 V 1.4 W × 2
Neutral indicator light	12 V 1.7 W × 1
High beam indicator light	12 V 1.7 W × 1
Turn indicator light	12 V 1.7 W × 1
Oil level caution light	12 V 1.7 W × 1
Engine warning light	12 V 1.7 W × 1



### MAINTENANCE SPECIFICATIONS ENGINE

Item	Standard	Limit
Cylinder head: Warp limit <b>*</b>	•••	0.03 mm
Cylinder: Bore size Measuring point*	95.00 ~ 95.01 mm 40 mm	95.1 mm
Camshaft: Drive method Cam cap inside diameter Camshaft outside diameter Shaft-to-cap clearance Cam dimensions	Chain drive (left & right) 25.000 ~ 25.021 mm 24.96 ~ 24.98 mm 0.020 ~ 0.061 mm	••••
Intake "A" "B" Exhaust "A" "B" "C"	39.112 ~ 39.212 mm #1: 32.093 ~ 32.193 mm #2: 32.127 ~ 32.227 mm 7.162 mm 39.145 ~ 39.245 mm 32.200 ~ 32.300 mm 7.195 mm	39.012 mm #1: 31.993 mm #2: 32.027 mm 7.012 mm 39.045 mm 32.100 mm 7.045 mm
Camshaft runout limit	•••	0.03 mm



ltem		Standard	Limit
Timing chain:			
Timing chain type/No. of	linke	SILENT CHAIN/98L	
Timing chain adjustment		Automatic	•••
Rocker arm/rocker arm sha			
Bearing inside diameter	ait.	14.000 mm ~ 14.018 mm	14.036 mm
Shaft outside diameter		$13.985 \text{ mm} \sim 13.991 \text{ mm}$	13.95 mm
Arm-to-shaft clearance		$0.009 \text{ mm} \sim 0.033 \text{ mm}$	0.086 mm
Valve, valve seat, valve gui	de.		
Valve clearance (cold)	IN	0.07 ~ 0.12 mm	•••
valve elearance (cela)	EX	$0.12 \sim 0.17 \text{ mm}$	•••
Valve dimensions:			I
11	1		
			⇒ <u>+</u> "D"
	F		T
Head Dia	Face width	Seat Width Margin	Thickness
"A" head diameter	IN	47.0 ~ 47.2 mm	•••
	EX	39.0 ~ 39.2 mm	•••
"B" face width	IN	2.1 mm	•••
	EX	2.1 mm	•••
"C" seat width	IN	1.2 ~ 1.4 mm	1.8 mm
	EX	1.2 ~ 1.4 mm	1.8 mm
"D" margin thickness	IN	1.1 ~ 1.5 mm	0.8 mm
	EX	1.1 ~ 1.5 mm	0.8 mm
Stem outside diameter		7.975 ~ 7.990 mm	•••
Guide inside diameter	EX IN	7.960 ~ 7.975 mm 8.000 ~ 8.012 mm	•••
	EX	$8.000 \sim 8.012 \text{ mm}$ $8.000 \sim 8.012 \text{ mm}$	•••
Stem-to-guide clearance	IN	$0.010 \sim 0.037 \text{ mm}$	0.08 mm
Stem-to-guide cleardifice	EX	$0.010 \sim 0.037$ mm $0.025 \sim 0.052$ mm	0.08 mm
		0.020 0.002 mm	0.10 mm



Item		Standard	Limit
Stem runout limit		•••	0.03 mm
	= J		
Valve seat width	IN EX	1.2 ~ 1.4 mm 1.2 ~ 1.4 mm	2.0 mm 2.0 mm
Valve spring: Free length Set length (valve closed) Compressed pressure (installed) Tilt limit *	IN EX IN EX IN EX	44.6 mm 44.6 mm 40 mm 160.7 N (16.4 kg) 160.7 N (16.4 kg) •••	43.5 mm 43.5 mm ••• ••• 2.5°/1.9mm 2.5°/1.9mm
(top view)	IN EX	Clockwise Clockwise	•••
Piston: Piston to cylinder clearance Piston size "D"		0.025 ~ 0.050 mm 94.960 ~ 94.975 mm	0.15 mm
Measuring point "H" Piston off-set		5 mm 0 mm	•••



14		1 1 2 1
Item	Standard	Limit
Piston pin bore inside diameter	22.004 ~ 22.015 mm	•••
Piston pin outside diameter	21.991 ~ 22.000 mm	•••
Piston rings:		
Top ring:		
Tura a	Disia	
Type Dimensions (P, x, T)	Plain $1.5 \times 3.8 \text{ mm}$	•••
Dimensions (B $\times$ T) End gap (installed)	0.3 ~ 0.5 mm	0.8 mm
Side clearance (installed)	$0.04 \sim 0.08 \text{ mm}$	0.1 mm
2nd ring:		0.1 11111
В		
Туре	Taper	•••
Dimensions (B $\times$ T)	1.2 × 3.8 mm	•••
End gap (installed)	0.30 ~ 0.45 mm	0.8 mm
Side clearance	0.03 ~ 0.07 mm	0.1 mm
Oil ring:		
Oil ring:		
[=e]		
Dimensions (B $ imes$ T)	2.5 imes3.4 mm	•••
End gap (installed)	$0.2 \sim 0.7 \text{ mm}$	•••
Connecting rod:		
Oil clearance	0.044 ~ 0.073 mm	•••
Color code (corresponding size)	(1)Blue (2) Black (3) Brown (4) Green (5) Yellow	•••
Crankshaft:		
പ്രത്തിന് പ		
$ \qquad \qquad$		
A		
Crank width "A"	101.95 ~ 102.00 mm	•••
Runout limit "C"	•••	0.02 mm
Big end side clearance "D"	0.320 ~ 0.474 mm	•••

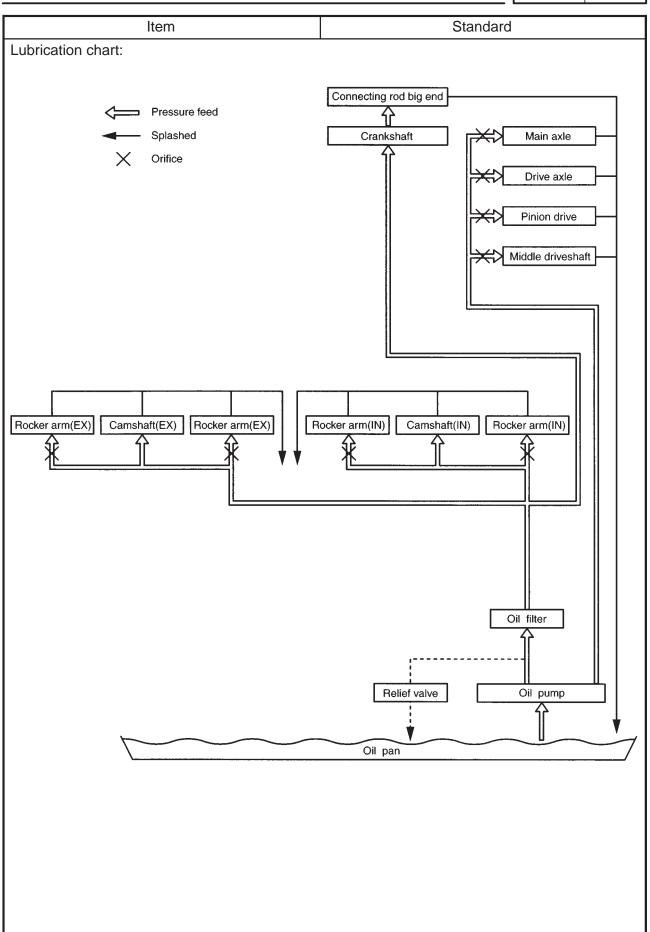


Item		Standard	Limit
Clutch:			
Friction plate thickness		2.9 ~ 3.1 mm	2.8 mm
Quantity		8	•••
Clutch plate thickness		2.5 ~ 2.7 mm	0.1 mm
Quantity		1	•••
Clutch plate thickness		1.9 ~ 2.1 mm	0.1 mm
Quantity		7	
Clutch spring free length		7.2 mm	6.5 mm
Quantity		1	•••
Clutch housing thrust clear	anco	0.05 ~ 0.40 mm	
Clutch housing radial clear		$0.03 \sim 0.40$ mm $0.010 \sim 0.044$ mm	
Clutch release method	ance		
		Inner push, screw push	
Push rod bending limit		•••	0.5 mm
Transmission:			
Main axle deflection limit		•••	0.08 mm
Drive axle deflection limit		•••	0.08 mm
Shifter:			
Shifter type		Guide bar	•••
Carburetor:			
I. D. mark		5EL1 00	•••
Main jet	(M.J)	#1: #110, #2: #112.5	•••
Main air jet	(M.O) (M.A.J)	#55	
Jet needle	(J.N)	#1: 5DL39-53-3/5, #2: 5DL40-53-3/5	
Needle jet	(N.J)	P-0M	•••
Pilot air jet	(P.A.J.1)	#63.8	
Fliot all jet	(P.A.J.1) (P.A.J.2)	#145	
Pilot outlet	```	1.0	
	(P.O)	#17.5	
Pilot jet	(P.J)		•••
Bypass 1	(B.P.1)	0.8	•••
Bypass 2	(B.P.2)	0.8	
Bypass 3	(B.P.3)	0.8	•••
Pilot screw	(P.S)	3	•••
Valve seat size	(V.S)	1.2	•••
Starter jet	(G.S.1)	#42.5	•••
Starter jet	(G.S.2)	0.8	•••
Throttle valve size	(Th.V)	#125	•••
Fuel level	(F.L)	4~5 mm	•••
Engine idle speed		950 ~ 1,050 r/min	•••
Intake vacuum		34.7 ~ 37.3 kPa (260 ~ 280 mmHg)	•••
Engine oil temperature		75 ~ 85°C	•••
Fuel pump:			
Туре		Electrical type	•••
Model/manufacturer		UC-Z6M/MITSUBISHI	•••
Consumption amperage	<max></max>	0.8 A	•••
Output pressure		12 kPa (0.12 kg/cm <sup>2</sup> )	•••



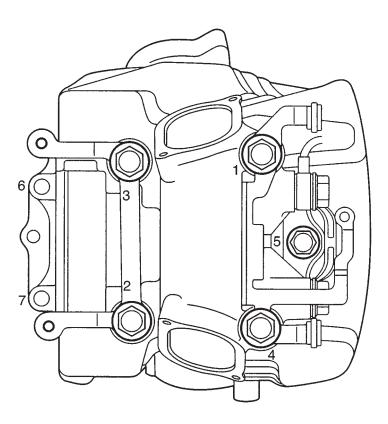
ltem	Standard	Limit
Lubrication system:		
Oil filter type	Paper type	•••
Oil pump type	Trochoid type	•••
Tip clearance "A" or "B"	0.03 ~ 0.09 mm	0.15 mm
Side clearance	0.03 ~ 0.08 mm	0.15 mm
Relief valve operating pressure	450 $\sim$ 550 kPa (4.5 $\sim$ 5.5 kg/cm <sup>2</sup> )	•••
Shaft drive:		
Middle gear backlash	0.1 ~ 0.2 mm	•••
Final gear backlash	$0.1 \sim 0.2 \text{ mm}$	•••



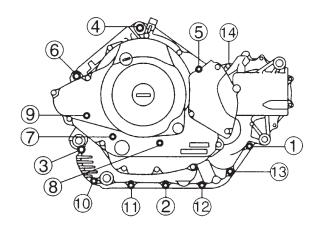




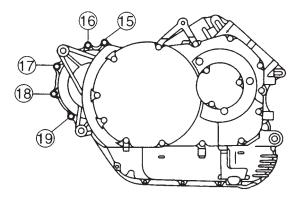
### Cylinder head tightening sequence:



Crankcase tightening sequence:



Left crankcase



Right crankcase



# Tightening torques

Part to be tightened	Part name	Thread	Q'ty	Tight tore	ening que	Remarks
		size		Nm	m•kg	
Cylinder head	Nut	M12	8	50	5.0	
Cylinder head	Nut	M10	2	35	3.5	
Plate	Bolt	M8	2	20	2.0	
Cylinder head cover	Screw	M6	4	4	0.4	
Cylinder head (exhaust pipe)	Stud bolt	M8	4	12.5	1.25	
Rocker arm shaft	Union bolt	M16	2	37.5	3.75	
Camshaft sprocket cover	Bolt	M6	4	10	1.0	
Tappet cover	Bolt	M6	8	10	1.0	
Rocker arm shaft (oil passage)	Bolt	M16	4	38	3.8	
Stopper plate (camshaft)	Bolt	M8	4	20	2.0	Use lock washer
Spark plug	—	M14	2	20	2.0	
Cylinder	Bolt	M6	2	10	1.0	
Lower cylinder head cover	Bolt	M6	6	10	1.0	
Upper cylinder head cover	Screw	M6	8	5	0.5	
Connecting rod	Nut	M9	4	48	4.8	
Rotor	Nut	M16		175	17.5	
Valve adjusting locknut	Nut	M8	4	27	2.7	
Camshaft sprocket	Bolt	M10	2	55	5.5	
Timing chain tensioner	Bolt	M6	4	10	1.0	
Timing chain tentioner cap	Bolt	M6	2	8	0.8	
Timing chain guide	Bolt	M6	4	10	1.0	
Oil pump	Bolt	M6	3 3	10 10	1.0 1.0	
Oil strainer cover Oil filter cover	Bolt Bolt	M6 M6	5 5	10	1.0	
Oil pump gear	Bolt	M6	1	10	1.0	
Oil pump cap	Bolt	M6	1	10	1.2	
Oil deliuery pipe (cylinder head)	Union bolt	M16	2	20	2.0	
(crankcase)	Union bolt	M10	1	20	2.0	
Drain bolt		M14	1	43	4.3	
Carburetor cover	Bolt	M5	2	7	0.7	
Air filter case stay	Bolt	M6	2	10	1.0	
Air filter case assembly	Bolt	M5	3	2	0.2	
Exhaust pipe joint and cylinder head	Nut	M8	4	20	2.0	
Exhaust pipe joint and muffler	Bolt	M8	2	20	2.0	
assembly						
Muffler	Bolt	M10	2	25	2.5	
Crankcase (cylinder)	Stud bolt	M12	8	24	2.4	
Crankcase (cylinder)	Stud bolt	M10	2	20	2.0	
Crankcase	Bolt	M10	3	38.5	3.85	
Crankcase	Bolt	M6	10	10	1.0	
Bearing retainer (middle drive pinion	Bolt	M8	3	25	2.5	
gear)						
Crankcase cover (left)	Bolt	M6	13	10	1.0	
Crankcase cover (right)	Bolt	M6	11	10	1.0	
Clamp	Bolt	M6	1	10	1.0	
One-way clutch	Bolt	M6	8	12	1.2	- 0
Primary drive gear	Nut	M20	1	110	11.0	Use lock washer

SPEC U

Part to be tightened	Part name	Thread size	Q'ty		ening que	Remarks
		3120		Nm	m•kg	
Clutch spring	Bolt	M6	6	8	0.8	
Clutch adjuster	Nut	M8	1	12	1.2	
Clutch boss	Nut	M20	1	70	7.0	Use lock washer
Push lever axle	Screw	M8	1	12	1.2	
Middle drive pinion gear	Nut	M44	1	110	11.0	Stake
Bearing retainer (middle driven shaft)	Nut	M88	1	110	11.0	Stake
Yoke (middle driven shaft)	Nut	M14	1	—	—	Stake
Bearing housing (middle drive shaft)	Bolt	M8	4	25	2.5	
Shift lever stopper	Bolt	M8	1	22	2.2	0
						Use lock washer
Guide bar stopper	Screw	M6	2	7	0.7	-6
Shift dram segment	Screw	M5	1	4	0.4	
Shift arm	Bolt	M6	1	10	1.0	
Shift pedal adjuster	Nut	M6	2	10	1.0	1 of 2 has LH
						thread
Stator coil	Screw	M6	3	10	1.0	-6
Pickup coil	Screw	M5	2	7	0.7	-6
Starter motor	Bolt	M6	2	10	1.0	
Neutral switch	—	M10	1	20	2.0	
Ignition coil	Screw	M5	4	2.5	0.25	
Speed sensor	Bolt	M6	1	7	0.7	



### CHASSIS

ltem		Standard	Limit
Steering system:			
Steering bearing type		Angular bearing	•••
Front suspension:			
Front fork travel		140 mm	•••
Fork spring free length		356.9 mm	350 mm
Fitting length		319.4 mm	•••
Collar length		183 mm	•••
Spring rate	(K1)	8.8 N/mm (0.9 kg/mm)	•••
	(K2)	12.7 N/mm (1.3 kg/mm)	•••
Stroke	(K1)	0 ~ 77.5 mm	•••
	(K2)	77.5 ~ 140 mm	•••
Optional spring		No	•••
Oil capacity		0.464 L	•••
Oil level		108 mm	•••
Oil grade		Fork oil 10W or equivalent	•••
Rear suspension:			
Shock absorber travel		113 mm	•••
Spring free length		179.5 mm	•••
Fitting length		163 mm	•••
Spring rate	(K1)	117.7 N/mm (12 kg/mm)	•••
Stroke	(K1)	0 ~ 50 mm	•••
Optional spring		No	•••
Swingarm:			
Free play limit	end	•••	0 mm
Front wheel:			
Туре		Spoke wheel	•••
Rim size		18 × 2.15	•••
Rim material		Steel	•••
Rim runout limit	radial	•••	1.0 mm
	lateral	•••	0.5 mm
Rear wheel:			
Туре		Spoke wheel	•••
Rim size		15M/C × MT4.50	•••
Rim material		Steel	•••
Rim runout limit	radial	•••	1.0 mm
	lateral	•••	0.5 mm



ltom Ctondord Limit			
Item	Standard	Limit	
Front brake:			
Туре	Dual disc	•••	
Disc outside diameter $\times$ thickness	$298 \times 5 \text{ mm}$	4.5 mm	
Disc deflection limit	•••	0.15 mm	
Pad thickness inner	6.2 mm	0.8 mm	
Pad thickness outer	6.2 mm	0.8 mm	
×			
Master cylinder inside diameter	14.0 mm	•••	
Caliper cylinder inside diameter	25.4 mm	•••	
Caliper cylinder inside diameter	30.1 mm	•••	
Brake fluid type	DOT 4	•••	
Rear brake:			
Туре	Single disc	•••	
Disc outside diameter $\times$ thickeness	282 × 6 mm	5.5 mm	
Disc deflection limit	•••	0.15 mm	
Pad thickness inner	5.55 mm	0.5 mm	
outer	5.55 mm	0.5 mm	
Master cylinder inside diameter	12.7 mm	•••	
Caliper cylinder inside dimeter	42.9 mm	•••	
Brake fluid type	DOT 4		
Brake lever & brake pedal:			
Brake lever free play (at lever end)	5 ~ 8 mm	•••	
Brake pedal position	81.8 mm	•••	
Brake pedal free play	0 mm	•••	
Clutch lever free play (at lever end)	$5 \sim 10 \text{ mm}$	•••	
Throttle grip free play	$4 \sim 6 \text{ mm}$		



# Tightening torques

Part to be tightened	Thread size	Tighte tore	•	Remarks
		Nm	m∙kg	
Upper bracket and inner tube Lower bracket and inner tube Upper bracket and steering shaft Ring nut (steering shaft) Handlebar holder (lower) and upper bracket Handlebar holder (lower) and handlebar	M8 M10 M22 — M12 M8	20 30 110 18 32 28	2.0 3.0 11.0 1.8 3.2 2.8	See NOTE
holder (upper) Master cylinder (front brake) Union bolt (brake hose) Brake hose holder and lower bracket Brake hose joint and brake pipe Brake hose joint and brake hose holder Front fender and outer tube Headlight stay and lower bracket Headlight stay and headlight Front flasher light and lower bracket	M6 M10 M6 M10 M6 M8 M6 M6 M6 M6	10 30 10 19 10 10 7 8 7	1.0 3.0 1.0 1.9 1.0 1.0 0.7 0.8 0.7	
Engine mounting: Frame and stay (front - upper) Frame and stay (front - lower) Stay and engine (front - upper) Stay and engine (front - lower) Frame and engine (rear - upper) Frame and engine (rear - lower) Down tube and frame Ignition coil and stay	M10 M10 M12 M10 M10 M10 M10 M5	48 48 74 48 48 48 48 48 48 48	4.8 4.8 7.4 4.8 4.8 4.8 4.8 4.8 0.4	
Muffler stay and frame Rear shock absorber and relay arm Rear shock absorber and frame Pivot shaft and swingarm Relay arm and frame Connecting arm and relay arm Connecting arm and swingarm Final gear case and swingarm	M8 M10 M10 M16 M10 M12 M12 M10	30 48 40 90 48 48 48 90	3.0 4.8 4.0 9.0 4.8 4.8 4.8 9.0	
Swingarm end and holder Fuel tank and fuel cock Fuel tank bracket and frame Rider's seat Passenger seat Fuel tank and top cover Licence bracket and rear fender stay	M8 M6 M8 M6 M6 M5 M6 M5	23 7 23 7 7 4 7	2.3 0.7 2.3 0.7 0.7 0.7 0.4 0.7	
Rear fender and rear fender stay Rear fender and tail/brake light Rear fender stay and rear flasher light Frame and rear fender Side cover (left) Battery cover Side cover (right) Starter relay and leads	M5 M6 M12 M8 M6 M6 M6 M6	4 6 7 26 7 7 7 7	0.4 0.6 0.7 2.6 0.7 0.7 0.7 0.7	



	Thread		ening	
Part to be tightened	size	tore	que	Remarks
	SIZE	Nm	m•kg	
Passenger footrest and frame	M8	26	2.6	
Sidestand bracket and frame	M10	64	6.4	
Sidestand and sidestand bracket	M10	56	5.6	
Sidestand switch	M5	4	0.4	
Brake pedal/footrest and frame	M6	7	0.7	
Rear brake master cylinder and master cylinder	M8	23	2.3	
bracket				
Master cylinder bracket and down tube	M8	23	2.3	
Footrest and frame	M10	64	6.4	
Front wheel axle	M16	59	5.9	
Front wheel axle pinch bolt	M8	20	2.0	
Brake caliper	M10	40	4.0	
Brake disc and front wheel	M8	23	2.3	-0
Caliper bleed screw	M7	6	0.6	-
Rear wheel axle nut	M16	107	10.7	
Rear brake caliper and caliper bracket	M10	40	4.0	
Caliper bracket and swingarm	M10	40	4.0	
Brake hose union bolt	M10	30	3.0	
Caliper bleed screw	M8	6	0.6	
Clutch hub and damper	M10	62	6.2	
Final gear case stud bolt	M10	18	1.8	- 0
Final gear case stud bolt	M8	9	0.9	
Bearing housing (final gear case)	M8	23	2.3	
Bearing housing (final gear case)	M10	40	4.0	-6
Drive pinion	M14	130	13.0	
Bearing retainer (final drive pinion gear)	M65	115	11.5	LH thread
Oil filter bolt (final gear)	M14	23	2.3	
Oil drain bolt (final gear)	M14	23	2.3	
Housing cover	M10	42	4.2	

NOTE: \_

First, tighten the ring nut approximately 52 Nm (5.2 m•kg) by using the torque wrench, then loosen the ring nut completely.
 Retighten the ring nut to specification.



### ELECTRICAL

Item	Standard	Limit
Voltage:	12 V	•••
Ignition system: Ignition timing (B.T.D.C.) Advancer type	10° at 1,000 r/min Digital type	•••
T.C.I.: Pickup coil resistance/color T.C.I. unit model/manufacturer	189 ~ 231 Ω at 20°C/Gray – Black J4T101/MITSUBISHI	•••
Ignition coil: Model/manufacturer Primary winding resistance Secondary winding resistance	F6T507/MITSUBISHI 3.57 ~ 4.83 Ω at 20°C 10.7 ~ 14.5 kΩ at 20°C	•••
Spark plug cap: Type Resistance	Resin type 10 kΩ	•••
Charging system: Type Model/manufacturer Nominal output Stator coil resistance/color	A.C. magneto F4T654/MITSUBISHI 14 V 350 W at 5,000 r/min 0.36 $\sim$ 0.44 $\Omega$ at 20°C/White – White	•••
Voltage regulator: Type Model/manufacturer No load regulated voltage	Semi-conductor, short-circuit type SH650D-11/SHINDENGEN 14.1 ~ 14.9 V	•••
Rectifier: Model/manufacturer Capacity Withstand voltage	SH650D-11/SHINDENGEN 18 A 200 V	•••
Battery: Specific gravity	1.320	•••
Electric starter system: Type Starter motor:	Constant mesh type	•••
Model/manufacturer Output Armature coil resistance	SM-13/MITSUBA 0.6 kW 0.026 ~ 0.034 Ω at 20°C	•••
Brush overall length Brush spring pressure Commutator diameter	12.5 mm 7.65 ~ 10.01 N (780 ~ 1021 g) 28 mm	5 mm ••• 27 mm
Mica undercut Starter relay: Model/manufacturer	0.7 mm MS5F-421/JIDECO	•••
Amperage rating	180 A	•••

## MAINTENANCE SPECIFICATIONS

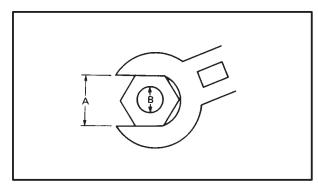


Item	Standard	Limit
Horn:		
Туре	Plane type	•••
Quantity	1	•••
Model/manufacturer	YF-12/NIKKO	•••
Maximum amperage	3 A	•••
Flasher relay:		
Туре	Full transistor type	•••
Model/manufacturer	FE246BH/DENSO	•••
Self cancelling device	No	•••
Flasher frequency	75 $\sim$ 95 cycle/min	•••
Wattage	21 W × 2 + 3.4W	•••
Oil level gauge:		
Model/manufacturer	5EL/DENSO	•••
Starting circuit cut-off relay		
Model/manufacturer	G8R-30Y-B/OMRON	•••
Fuel pump relay:		
Model/manufacturer	G8R-30Y-B/OMRON	•••
Circuit breaker:		
Туре	Fuse	•••
Amperage for individual circuit		
MAIN	30 A × 1	•••
HEAD LIGHT	15 A × 1	•••
SIGNALS	10 A × 1	•••
IGNITION	10 A × 1	•••
BACK UP	5 A × 1	•••
Carburetor heater	15 A × 1	•••
Reserve	30 A × 1	•••
Reserve	15 A × 1	•••
Reserve	10 A × 1	•••
Reserve	5 A × 1	•••



## 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 provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion, in progressive stages, until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.



- A: Distance between flats
- B: Outside thread diameter

A	B	Genera specifi	l torque cations
(nut)	(Bolt)	Nm	m∙kg
10 mm	6 mm	6	0,6
12 mm	8 mm	15	1,5
14 mm	10 mm	30	3,0
17 mm	12 mm	55	5,5
19 mm	14 mm	85	8,5
22 mm	16 mm	130	13,0

## CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS. Use this table to convert METRIC unit data to

IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMP
** mm	Х	0.03937	=	** in
2 mm	х	0.03937	=	0.08 in

#### CONVERSION TABLE

	METRIC TO IMP					
	Known	Multiplier	Result			
Torque	Torque m•kg f m•kg f cm•kg cm•kg f cm•kg f		ft•lb in•lb ft•lb in•lb			
Weight	kg g	2.205 0.03527	lb oz			
Distance	km/hr km m m cm mm	0.6214 0.6214 3.281 1.094 0.3937 0.03937	mph mi ft yd in in			
Volume/ Capacity	cc (cm <sup>3</sup> ) cc (cm <sup>3</sup> ) It (liter) It (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu∙in qt (IMP liq.) gal (IMP liq.)			
Miscella- neous	kg/mm kg/cm <sup>2</sup> Centigrade	55.997 14.2234 9/5 (°C) + 32	lb/in psi (lb/in <sup>2</sup> ) Fahrenheit (°F)			



## LUBRICATION POINTS AND LUBRICANT TYPES ENGINE

Lubrication point	Symbol
Oil seal lips	
O-ring	
Bearing	0
Connecting rod bolt/nut	
Connecting rod small end and big end	0
Crankshaft pin	(3
Crankshaft journal/big end	
Piston surface	0
Piston pin	
Camshaft cam lobe/journal	0
Rocker arm shaft	
Valve stem (IN, EX)	
Valve stem end (IN, EX)	
Timing chain drive gear shafts/sprokets	
Oil pump rotor (inner/outer), housing	
Idle gear surface	
Starter idle gear	
Starter idle gear shaft	
Starter oneway cam	
Middle drive gear	
Primary driven gear	
Push rod 1, 2	8
Transmission gear (wheel/pinion)	(3
Shift cam	
Shift fork/guide bar	
Shift shaft assembly	
Push rod ball	
Push lever assembly	

## LUBRICATION POINTS AND LUBRICANT TYPES

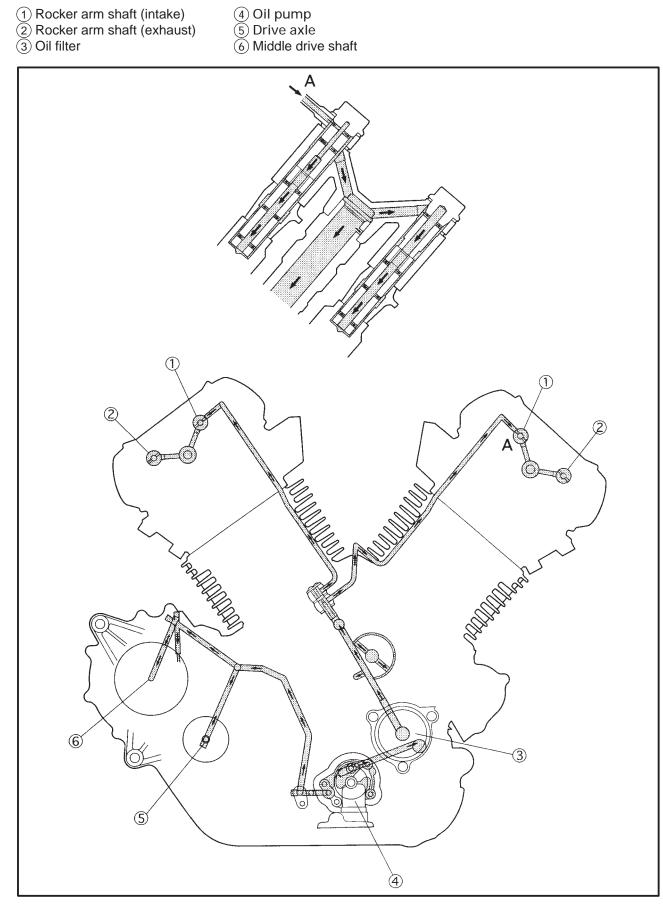


## EB203010

Lubrication point	Symbol
Steering head pipe (upper/lower), bearing	
Steering head pipe, bearing cover lip	
Steering head pipe, oil seal lip	
Front wheel oil seal lip (right/left)	
Rear wheel oil seal lip	
Clutch hub fitting area	
Rear brake pedal shaft	
Shift pedal shaft	
Sidestand bolt, sidestand sliding surface	
Tube guide (throttle grip) inner surface	
Brake lever pivot bolt, contact surface	
Clutch lever pivot bolt, contact surface	
Rear shock absorber (lower) oil seal lip	
Swingarm pivot bearing inner surface	
Swingarm pivot oil seal lip	
Relay arm bearing, collar and oil seal	
Drive shaft spline	
Drive shaft dust cover	



## LUBRICATION DIAGRAMS

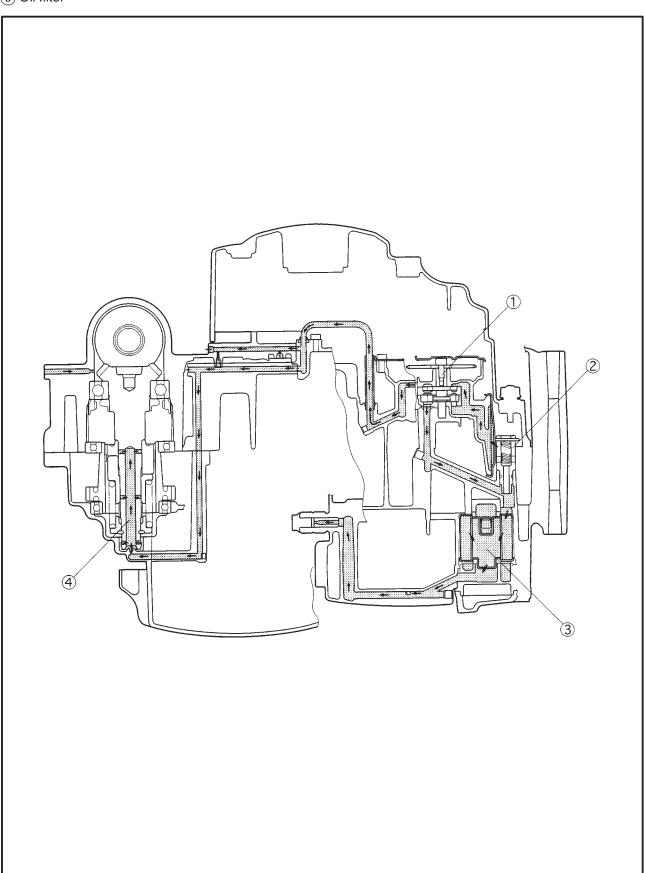


## LUBRICATION DIAGRAMS



Oil pump
 Releaf valve
 Oil filter

(4) Middle drive shaft

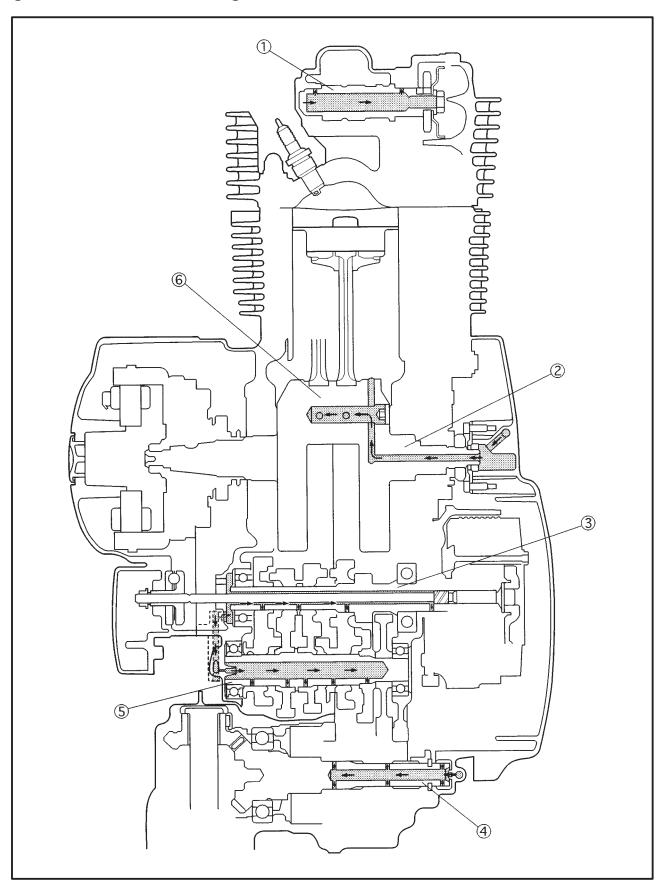


## LUBRICATION DIAGRAMS



Camshaft
 Crankshaft
 Main axle

- (4) Middle drive shaft
  (5) Drive axle
  (6) Connecting rod big end

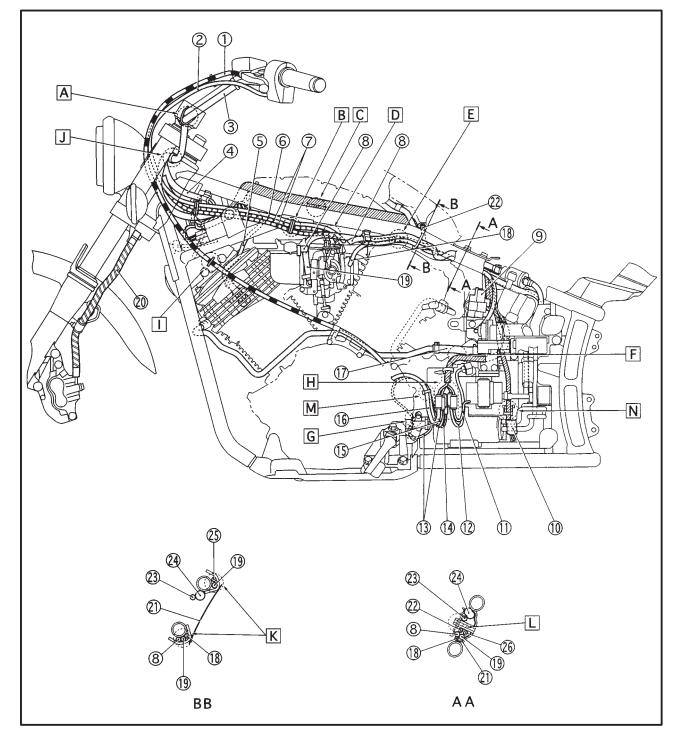




- 1 Clutch cable
- 2 Starter cable
- (3) Handlebar switch lead (left)
- (4) Handlebar switch lead (right)
- 5 High tension code
- 6 Starter cable
- 7 Throttle cable
- (8) Fuel hose (fuel cock-fuel filter)
- 9 Fuse box

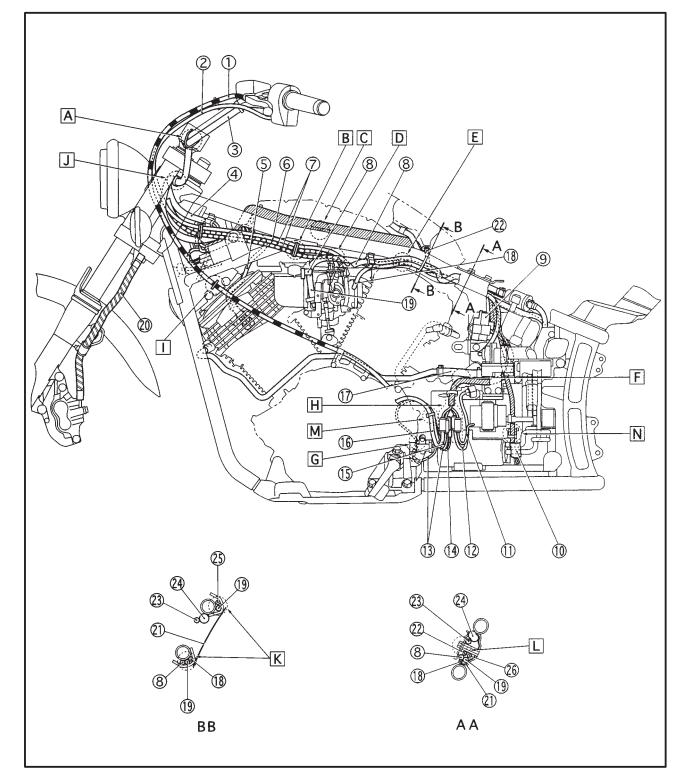
- 10 Alarm connector
- 1 Fuel pump lead
- 12 Speed sensor lead
- (13) Sidestand switch lead
- 14 Neutral switch lead
- 15 Pickup coil lead
- (16) AC magneto lead
- (17) Ventilation hose
- (18) Sensing hose (AIS-carburetor joint)

- (19) Fuel hose (carburetor-fuel pump)
- 20 Brake hose
- (21) Heat protector
- 22 Fuel breather hose (fuel tankroll over valve) (for California)
- 23 Speedometer lead
- 24 Wireharness
- Purge hose (carburetor-solenoid valve) (for California)





- 26 Purge hose (carburetor-solenoid B Position the throttle cable and valve) (for California)
- A Fasten the handlebar switch leads (left and right) to the handlebar with plastic locking tie.
- starter cable as shown, and clamp them with holder.
- C Clamp the wire harness with the hook of frame side.
- D When installing the pipe of throttle cables, press it inside.
- E Connect the sensing hose (carburetor joint-AIS side) with a nozzle.
- F Push the wire harness inside of the tool box plate.
- G Route the sidestand lead inside of engine cover.
- H Position the all connectors inside of the connector cover.
- I Route the clutch cable through the cable guide.

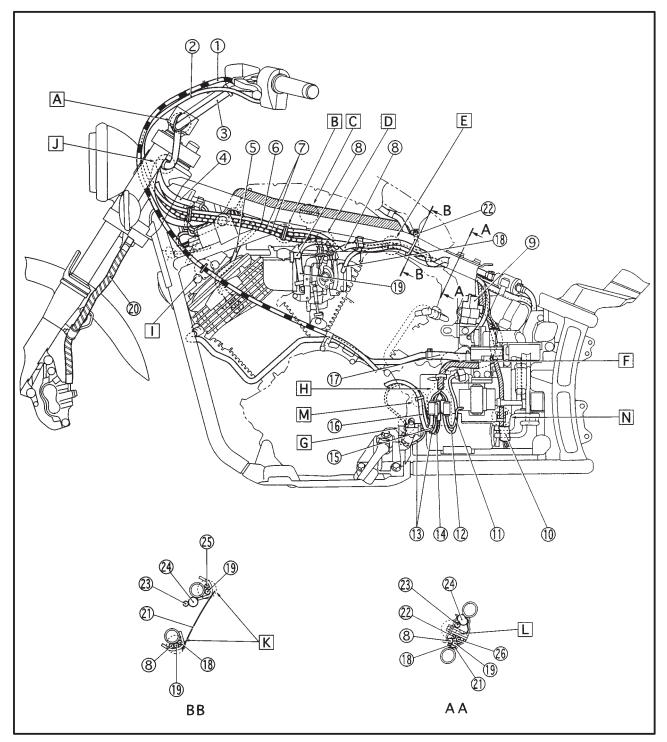




J Fasten the handlebar switch leads (left and right) under the handle crown with a plastic band. Set the band at four notches,

and install it no slacking.

- K Route the each hoses through the frame guide and do not pinch it.
- When installing the fitting plate, do not pinch the each hoses and wire harness.
- M Fasten the AC magneto lead and sidestand switch lead with a plastic locking tie.
- N Fasten the alarm lead with a plastic band on the lid.

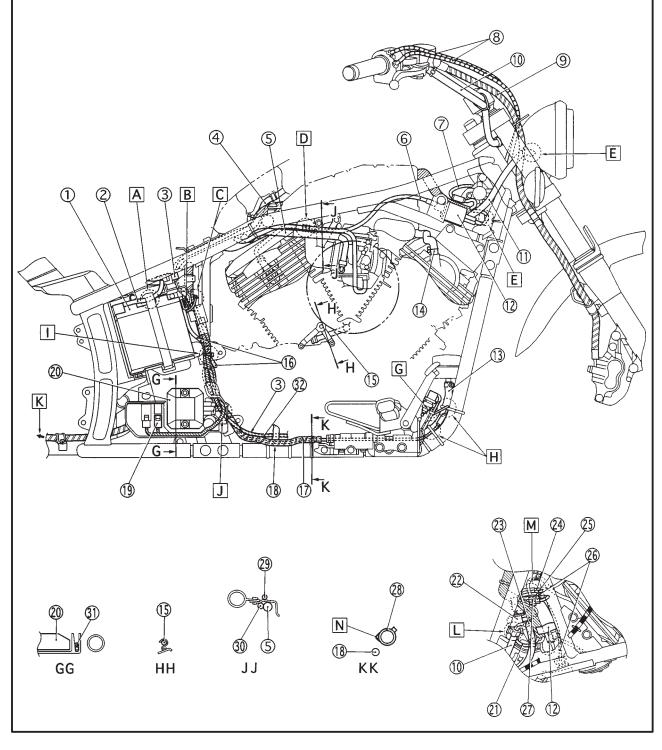




- (1) Battery
- 2 Battery positive (+) lead
- (3) Starter motor positive (+) lead
- (4) Speedometer lead
- (5) Fuel hose (carburetor-fuel pump) (16) Battery negative (-) lead
- (6) High tension code
- (7) Main switch lead
- (8) Throttle cable
- (9) Brake hose
- (10) Handlebar switch lead (right)
- (11) Headlight lead

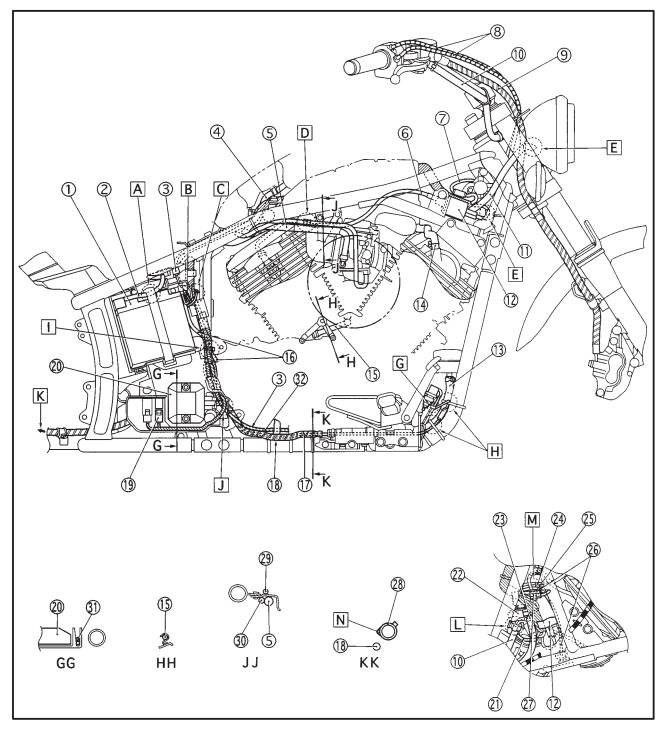
- (12) Ignition coil
- (13) Master cylinder reservoir hose
- (14) Breather hose
- (15) Air filter drain hose
- (17) Rear brake switch lead
- (18) Rear brake hose
- (19) Carburetor heater connector
- 20 Rectifier/regulator
- (21) Main switch lead
- 22 Flasher relay

- 23 Handlebar switch lead (left)
- 24 Throttle position sensor lead
- 25 Carburetor heater lead
- 26 Thermo switch lead
- 27) Starting circuit cutoff relay
- 28 Down tube
- (29) High tension code
- 30 Purge hose (carburetorsolenoid valve) (for California)
- (31) Carburetor heater lead
- (32) Oil level switch lead



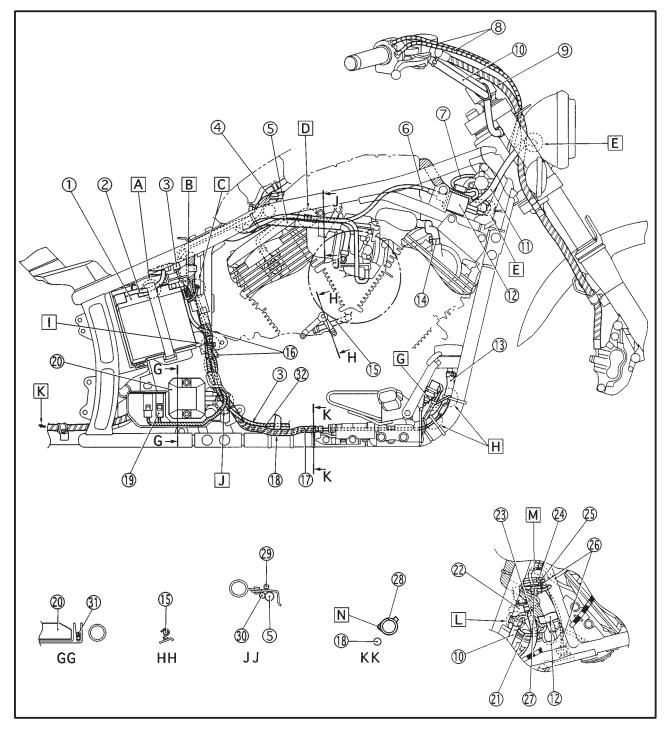
- A Clamp the battery positive (+) lead to the battery with battery band.
- Connect the battery negative
   (-) lead connector and push it into the space between battery box and battery.
- C Route the rectifier/regulator lead, wire harness and starter motor positive (+) lead through the outside of frame bracket and fasten them to the frame with a plastic locking tie.
- Connect the purge hose (carburetor side-solenoid valve side) with joint. (for California)
- E Route the front turn signal light lead and headlight lead through the rear of headlight body hole.
- F Connect the ignition coil lead at red tape to the right side.
- G Fasten the rear brake switch lead to the brake switch bracket with a plastic locking tie.

- H Fasten the rear brake switch lead and master cylinder reservoir hose to the down tube with a plastic locking tie.
- Fasten the wire harness, starter motor positive (+) lead and battery negative (-) lead to the frame with a plastic locking tie.
- Route the rectifier/regulator lead and carburetor heater lead through inside of battery box hole to outside it and connect them.





- K To rear brake caliper
- L Clamp the handlebar switch lead (right) and main switch lead to the frame with a holder.
- M Arrange the throttle position sensor connector, carburetor heater connector and thermo switch connector between the starting circuit cutoff relay and high tension code.
- N Fasten the rear brake switch to the down tube with a plastic locking tie.

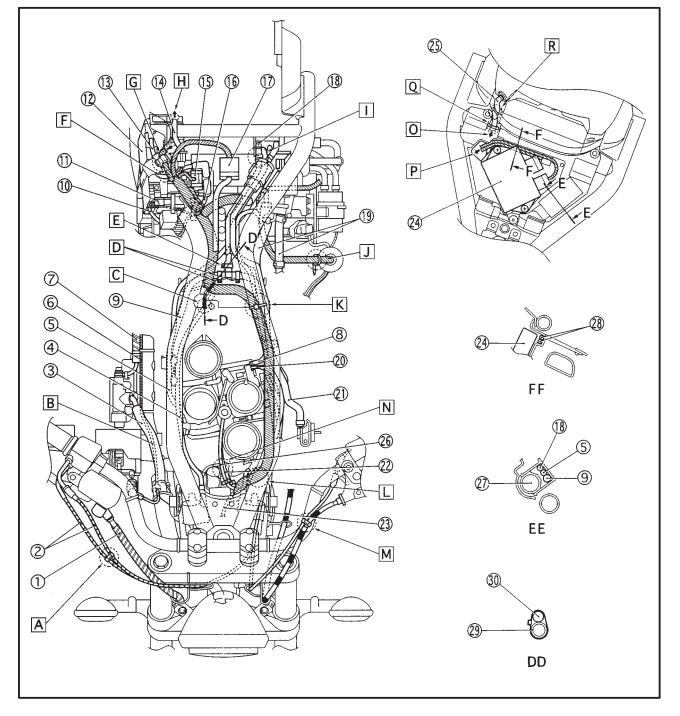




- (1) Brake hose
- (2) Throttle cable
- $\overline{(3)}$  Master cylinder reservoir hose
- (4) High tension code
- (5) Purge hose (carburetor-solenoid (14) Taillight lead valve) (for California)
- (6) Rear brake switch lead
- (7) Brake hose
- (8) Sensing hose (AIS-carburetor joint)
- (9) Fuel hose (carburetor-fuel pump)
- (10) Battery negative (-) lead

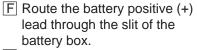
- (11) Battery negative (-) lead connector
- (12) Battery
- (13) Battery positive (+) lead
- (15) Starter relay
- (16) Starter motor positive (+) lead
- (17) Speedometer lead connector
- (18) Fuel tank breather hose
  - (fuel tank-roll over valve) (for California)
- (19) Ventilation hose

- 20 Starter cable
- (21) Fuel hose (fuel cock-fuel filter)
- (22) Carburetor heater lead
- 23 Thermo switch lead
- (24) Igniter unit
- 25 Taillight lead
- (26) Throttle position sensor lead
- (27) Fuel filter
- 28 Igniter unit lead
  - 29 Frame
  - 30 Wire harness
- A Clamp the throttle cables with the holder.

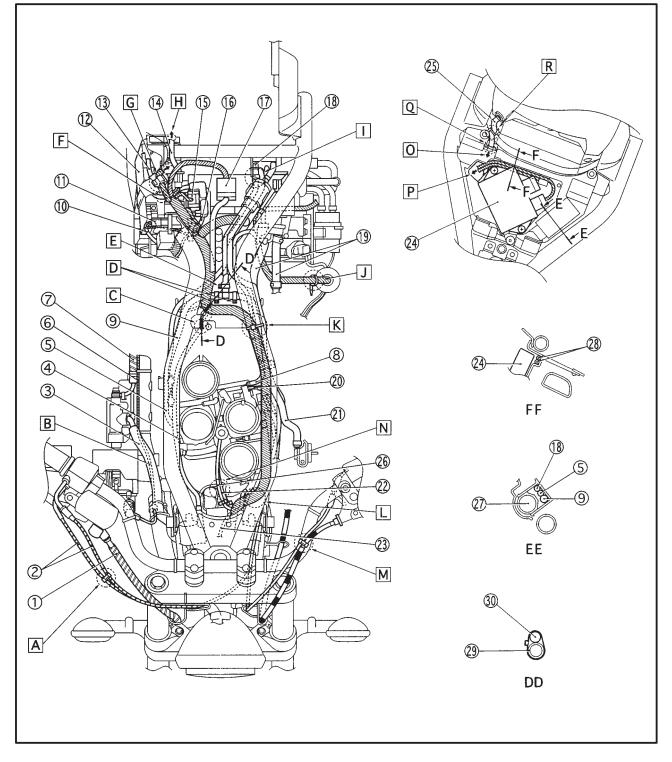




- B Route the rear brake switch lead under the master cylinder reservoir hose.
- C Position the band end of right side bracket.
- D Position the steel band end to forward.
- E Position the steel band end to right side.



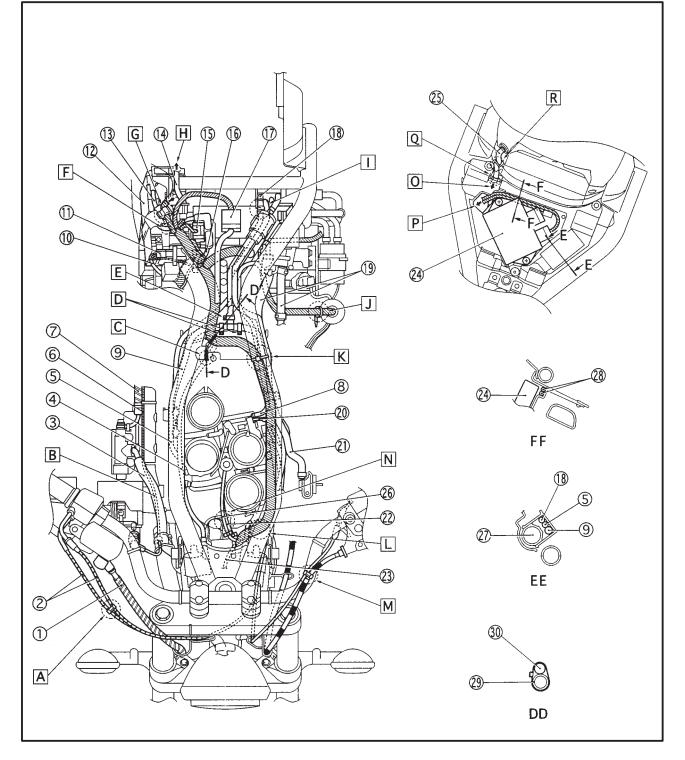
- G Clamp the igniter unit lead to the frame with a holder.
- H To the rear fender.
- Route the fuel tank breather hose under the fuel filter and connect it (fuel tank side-roll over valve side) with a joint. Position the end of clip outside.
- J Fasten the wire harness with a band on the tool box plate.
- K Fasten the wire harness to the frame with a plastic locking tie. Position the locking tie front of the solder.





- L Route wire harness outside of the guide on the frame.
- M Clamp the clutch cable and starter cable with a holder. Position the end of holder down side.
- N Route the throttle position sensor lead and carburetor heater lead left side of the tappet cover.
- O To the wire harness.

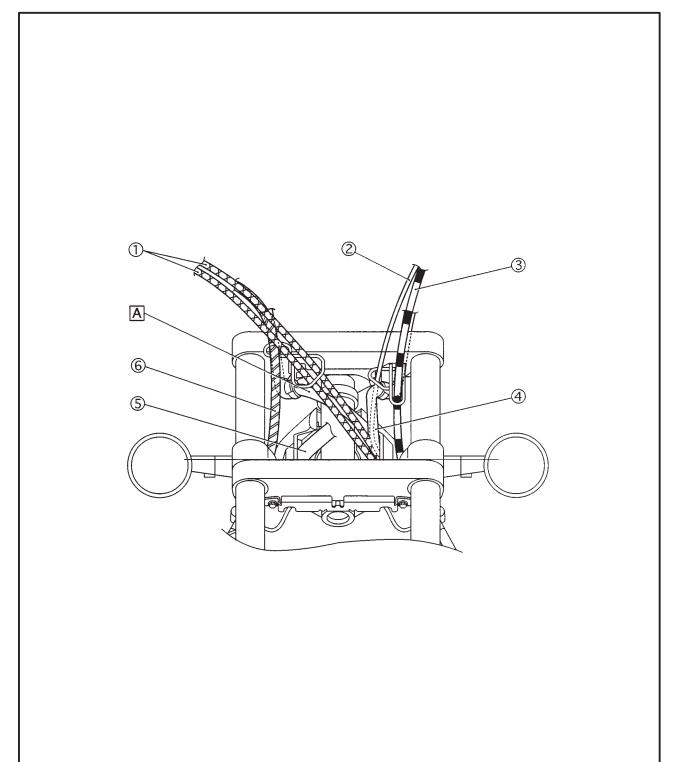
- P Route the igniter lead through the igniter plate hole to the wire harness.
- Q Clamp the taillight lead with mud guard clamp.
- R Clamp the taillight lead with a holder on the mud guard.

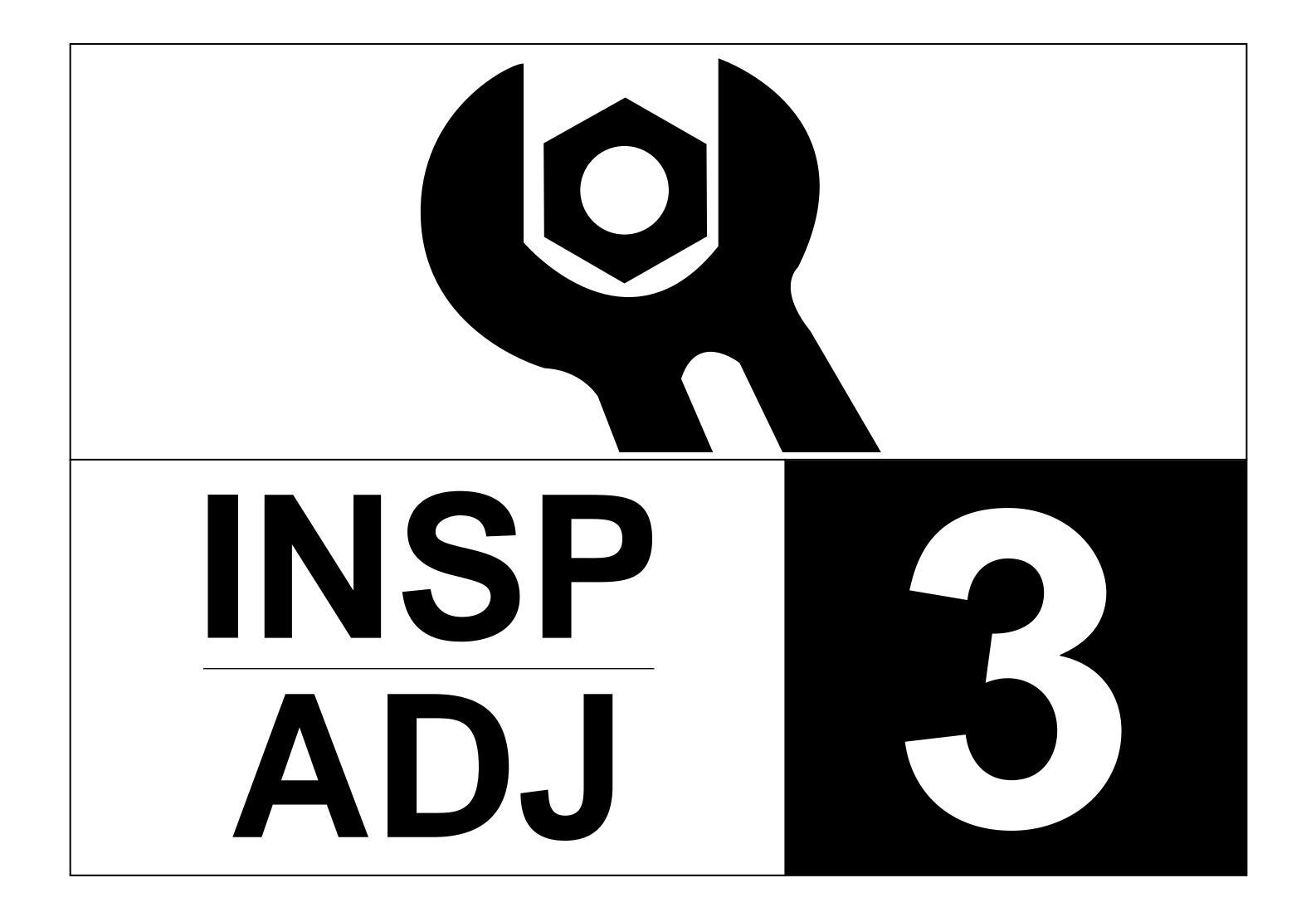




- Throttle cable
   Starter cable
   Clutch cable
   Handlebar switch lead (left)
   Headlight lead
- 6 Brake hose

A Route the handlebar switch lead (right) rear side of the throttle cable.







## **CHAPTER 3**

### PERIODIC INSPECTIONS AND ADJUSTMENTS

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EB300000

# PERIODIC INSPECTIONS AND ADJUSTMENTS

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 to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

## PERIODIC MAINTENANCE/LUBRICATION INTERVALS

					EVERY	
NC	). 	ITEM	CHECKS AND MAINTENANCE JOBS	Initial (1,000 km)	6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
1	*	Fuel line (manual cock)	<ul> <li>° Check fuel hoses for cracks or damage.</li> <li>° Replace if necessary.</li> </ul>			$\checkmark$
2	*	Fuel filter	<ul> <li>° Check condition.</li> <li>° Replace if necessary.</li> </ul>			$\checkmark$
3		Spark plugs	<ul> <li>° Check condition.</li> <li>° Clean, regap or replace if necessary.</li> </ul>	$\checkmark$		
4	*	Valves (arm SOHC)	<ul> <li>° Check valve clearance.</li> <li>° Adjust if necessary.</li> </ul>	$\checkmark$		
5		Air filter	° Clean or replace if necessary.			$\checkmark$
6		Clutch	<ul> <li>° Check operation.</li> <li>° Adjust or replace cable.</li> </ul>	$\checkmark$		$\checkmark$
7	*	Front brake (disc)	<ul> <li>° Check operation, fluid level and vehicle for fluid leakage. (See NOTE.)</li> <li>° Correct accordingly.</li> <li>° Repalce brake pads if necessary.</li> </ul>	V	V	
8	*	Rear brake (disc)	<ul> <li>° Check operation, fluid level and vehicle for fluid leakage.</li> <li>(See NOTE.)</li> <li>° Correct accordingly.</li> <li>° Replace brake pads if necessary.</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$
9	*	Wheels (spoke)	<ul> <li><sup>°</sup> Check balance, runout, spoke tightness and for damage.</li> <li><sup>°</sup> Tighten spokes and rebalance, replace if necessary.</li> </ul>		$\checkmark$	$\checkmark$
10	*	Tires (EUR)	<ul> <li>° Check tread depth and for damage.</li> <li>° Replace if necessary.</li> <li>° Check air pressure.</li> <li>° Correct if necessary.</li> </ul>		V	
11	*	Wheel bearings	<ul> <li><sup>°</sup> Check bearing for looseness or damage.</li> <li><sup>°</sup> Replace if necessary.</li> </ul>		$\checkmark$	$\checkmark$
12	*	Swingarm (no nipple)	<ul> <li><sup>°</sup> Check swingarm pivoting point for play.</li> <li><sup>°</sup> Correct if necessary.</li> <li><sup>°</sup> Lubricate with molybdenum disulfide grease every 24,000 km or 24 months (whichever comes first).</li> </ul>		V	
13	*	Steering bearings	<ul> <li><sup>o</sup> Check bearing play and steering for roughness.</li> <li><sup>o</sup> Correct accordingly.</li> <li><sup>o</sup> Lubricate with lithium soap base grease every 24,000 km or 24 months (whichever comes first).</li> </ul>		V	
14	*	Chassis fasteners	<ul> <li><sup>°</sup> Make sure that all nuts, bolts and screws are properly tightened.</li> <li>√</li> <li><sup>°</sup> Tighten if necessary.</li> </ul>		V	
15		Sidestand	<ul> <li>° Check operation.</li> <li>° Lubricate and repair if necessary.</li> </ul>			
16	*	Sidestand switch	<ul> <li>° Check operation.</li> <li>° Replace if necessary.</li> </ul>		$\checkmark$	

PERIODIC MAINTENANCE/LUBRICATION INTERVALS



					EVERY	
N	D.	ITEM	CHECKS AND MAINTENANCE JOBS	Initial (1,000 km)	6,000 km or 6 months (whichever comes first)	12,000 km or 12 months (whichever comes first)
17	*	Front fork	<ul> <li><sup>°</sup> Check operation and for oil leakage.</li> <li><sup>°</sup> Correct accordingly.</li> </ul>			$\checkmark$
18	*	Rear shock absorber assembly	<ul> <li><sup>°</sup> Check operation and shock absorber for oil leakage.</li> <li><sup>°</sup> Replace shock absorber assembly if necessary.</li> </ul>			$\checkmark$
19	*	Carburetors (multi)	<ul> <li><sup>°</sup> Check engine idling speed, synchronization and starter operation.</li> <li><sup>°</sup> Adjust if necessary.</li> </ul>		$\checkmark$	
20		Engine oil	<ul> <li><sup>°</sup> Check oil level and vehicle for oil leakage.</li> <li><sup>°</sup> Correct if necessary.</li> <li><sup>°</sup> Change. (Warm engine before draining.)</li> </ul>	$\checkmark$	$\checkmark$	
21	*	Engine oil filter element	° Replace. √			V
22		Final gear oil	<ul> <li><sup>°</sup> Check oil level and vehicle for oil leakage.</li> <li><sup>°</sup> Change oil at initial 1,000 km and thereafter every 24,000 km or 24 months (whichever comes first).</li> </ul>	$\checkmark$	$\checkmark$	$\checkmark$

\* Since these items require special tools, data and technical skills, they should be serviced by a Yamaha dealer.

#### NOTE: -

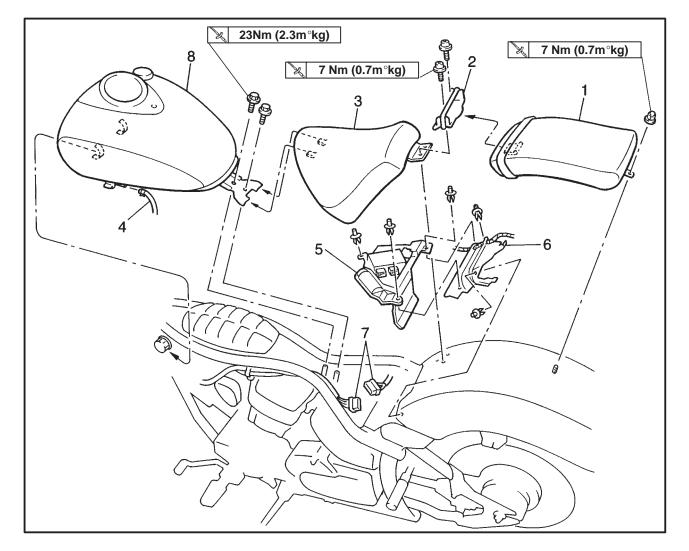
°The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

- °Hydraulic brake system
- When disassembling the master cylinder or caliper cylinder, always replace the brake fluid. Check the brake fluid level regularly and fill as required.
- Replace the oil seals on the inner parts of the master cylinder and caliper cylinder every two years.
- Replace the brake hoses every four years or if cracked or damaged.



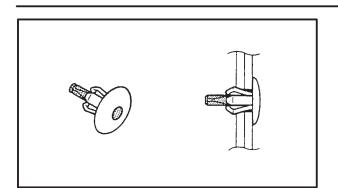
FUEL TANK AND SEATS

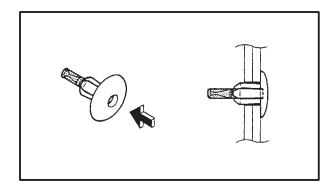
## FUEL TANK AND SEATS

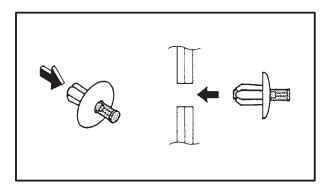


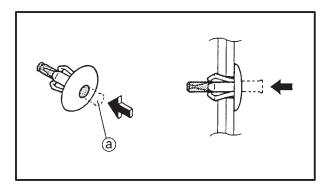
Order	Job name/Part name	Q'ty	Remarks
	Fuel tank and seats removal		Remove the parts in the order below.
1	Passenger seat	1	
2	Seat bracket	1	
3	Rider's seat	1	
4	Fuel hose	1	NOTE:
			Set the fuel cock to "OFF" before dis- connecting the fuel hose.
5	Ignitor plate	1	
6	Mud guard	1	
	Meter lead couper	1	
8	Fuel tank assembly	1	
			For installation, reverse the removal procedure.











#### REMOVAL

1. Remove:

FUEL TANK AND SEATS

° Ignitor plate

### NOTE: ----

To remove the quick fastener, push its center in with a screwdriver, then pull the fastener out.

#### INSTALLATION

1. Install:

° Ignitor plate

#### NOTE: -

To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the cowling and push the pin (a) in with a screwdriver. Make sure that the pin is flush with the fastener's head.



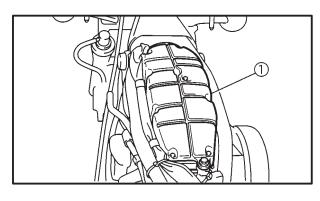
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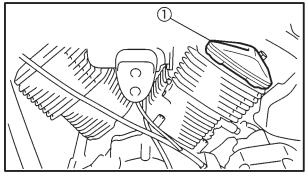
#### ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

#### NOTE: -

- ° Valve clearance adjustment should be made on a cold engine, at room temperature.
- ° When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.
- 1. Remove:
  - °rider's seat
  - ° fuel tank
  - Refer to "FUEL TANK AND SEATS".
- 2. Disconnect:
  - ° spark plug caps
- 3. Remove:
- °spark plugs
- 4. Remove: °air intake box ①

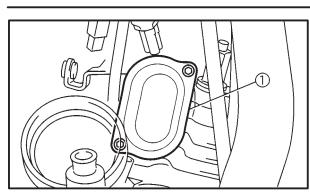


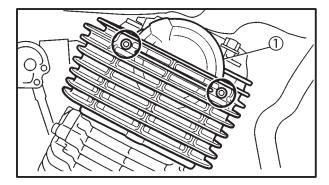


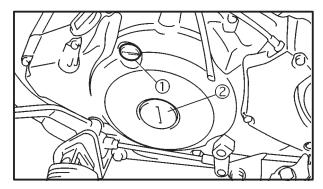
- 5. Remove:
  - ° cylinder head cover (rear cylinder) ① ° cylinder head cover (front cylinder)

## ADJUSTING THE VALVE CLEARANCE









- 6. Remove:
  - ° tappet covers ①

- 7. Remove:
  - ° camshaft sprocket cover (rear cylinder) ① ° camshaft sprocket cover (front cylinder)

8. Remove: °timing plug ① °straight plug ②

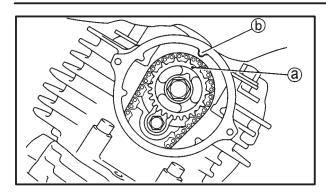
 Measure: <sup>°</sup>valve clearance Out of specification → Adjust.

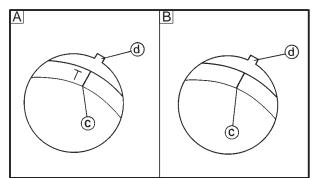


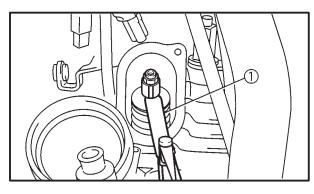
Valve clearance (cold): Intake valve:  $0.07 \times 0.12 \text{ mm}$ Exhaust valve:  $0.12 \times 0.17 \text{ mm}$ 

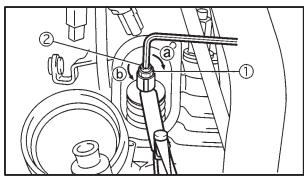
## ADJUSTING THE VALVE CLEARANCE











- Turn the grankabaft counterclockwise
- a. Turn the crankshaft counterclockwise.
- b. When the piston is at TDC on the compression stroke, align either the camshaft sprocket plate hole ⓐ with the stationary pointer ⓑ on the cylinder head. When the camshaft sprocket plate hole or camshaft sprocket punch mark is aligned with the stationary pointer, the piston is at top dead center (TDC).
- c. Align the TDC mark ⓒ on the generator rotor with the stationary pointer ⓓ on the crank-case.
- A Rear cylinder ("TI" mark)
- B Front cylinder ("I" mark)

- d. Measure the valve clearance with a thickness gauge 1.
- e. Turn the crankshaft crockwise 290°, and then measure the front cylinder.
- \*\*\*\*\*
- 10. Adjust
- ° valve clearance
- \*\*\*\*\*
- a. Loosen the locknut  $\bigcirc$ .
- b. Insert a thickness gauge between the end of the adjusting screw and the valve tip.
- c. Turn the adjusting screw (2) in direction (a) or
  (b) until the specified valve clearance is obtained.

Direction (a)	Valve clearance is decreased.
Direction (b)	Valve clearance is increased.

d. Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.

#### ADJUSTING THE VALVE CLEARANCE/ SYNCHRONIZING THE CARBURETORS



## Locknut:

27 Nm (2.7 m°kg)

- e. Measure the valve clearance again.
- f. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

#### 

11. Install:

°all removed parts

#### NOTE: -

Install all removed parts in the reverse order of their disassembly. Note the following points.

° camshaft sprocket covers

X	10	Nm	(1.0	m°kg)
· 🗞			···•	

10 Nm (1.0 m°kg)

°spark plugs

° tappet covers

🎉 20 Nm (2.0 m°kg)

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#### SYNCHRONIZING THE CARBURETORS NOTE: \_\_\_\_\_

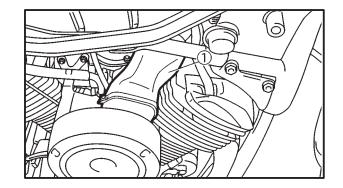
Prior to synchronizing the carburetors, the valve clearance and the engine idling speed should be properly adjusted and the ignition timing should be checked.

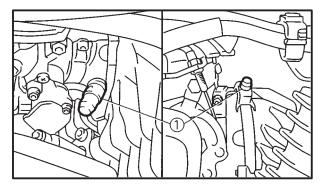
1. Stand the motorcycle on a level surface.

#### NOTE: .

Place the motorcycle on a suitable stand.

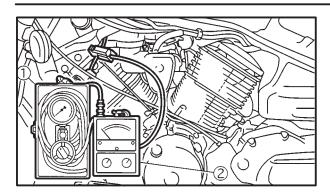
- 2. Remove:
  - ° rider's seat
  - ° fuel tank
  - Refer to "FUEL TANK AND SEATS".
- 3. Remove:
  - °air duct 1
- 4. Remove:
  - ° vacuum plugs (1)





## SYNCHRONIZING THE CARBURETORS





5. Install:

°vacuum gauge ①

°engine tachometer 2

(to the spark plug lead of cyl. #2)

#### Vacuum gauge: 90890-03094 Engine tachometer: 90890-03113

- 6. Start the engine and let it warm up for several minutes.
- 7. Check:
  - ° engine idling speed Out of specification → Adjust. Refer to "ADJUSTING THE ENGINE IDLING SPEED".

#### 8. Adjust:

- °Carburetor synchronization

Engine idling speed: 950  $\times$  1,050 r/min

- a. Synchronize carburetor #1 to carburetor #2 by turning the synchronizing screw ① in either direction until both gauges read the same.
- b. Rev the engine two or three times, each time for less than a second, and check the synchronization again.

Vacuum pressure at idle speed: 34.7  $\times$  37.3 kPa (260  $\times$  280 mmHg)

#### NOTE: -

The difference between the two carburetors should not exceed 1.33 kPa (10 mmHg).

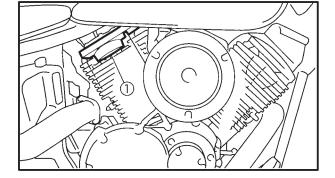
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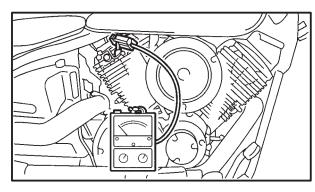
- 9. Check:
- °engine idling speed
  - Out of specification  $\rightarrow$  Adjust.
- 10. Stop the engine and remove the measuring equipment.
- 11. Adjust:
  - $^\circ\ensuremath{\text{throttle}}$  cable free play

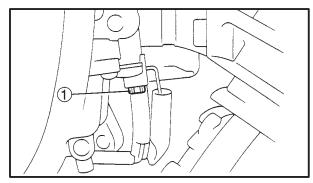
Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

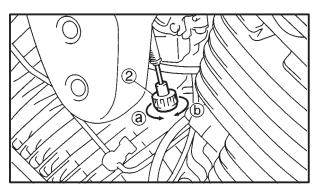
#### SYNCHRONIZING THE CARBURETORS/ ADJUSTING THE ENGINE IDLING SPEED













Throttle cable free play (at the flange of the throttle grip)  $4 \times 6$  mm

- 12. Install:
  - °vacuum plugs
  - °air duct
  - ° fuel tank
- °seat

## ADJUSTING THE ENGINE IDLING SPEED

#### NOTE: -

Prior to adjusting the engine idling speed, the carburetor synchronization should be adjusted properly, the air filter should be clean, and the engine should have adequate compression.

- 1. Start the engine and let it warm up for several minutes.
- 2. Remove:
  - ° cylinder head cover 1
- Install: <sup>o</sup>engine tachometer (to the spark plug lead of cyl. #1)

#### Engine tachometer: 90890-03113

4. Check:

° engine idling speed Out of specification  $\rightarrow$  Adjust.

- 5. Adjust:
  - ° engine idling speed
- \*\*\*\*
- a. Turn the pilot screw 1 in until it is lightly seated.
- b. Turn the pilot screw out the specified number of turns.

## Pilot screw 3 turns out

c. Turn the throttle stop screw (2) in direction (a) or (b) until the specified engine idling speed is obtained.

Direction	Engine idling speed is increased.
Direction	Engine idling speed is decreased.

.....

#### ADJUSTING THE ENGINE IDLING SPEED/ ADJUSTING THE THROTTLE CABLE FREE PLAY



 Adjust:
 <sup>o</sup> throttle cable free play Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".



Throttle cable free play (at the flange of the throttle grip)  $4 \times 6$  mm

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## ADJUSTING THE THROTTLE CABLE FREE PLAY

#### NOTE: -

Prior to adjusting the throttle cable free play, the engine idling speed should be adjusted.

- 1. Check:
  - ° throttle cable free play (a) Out of specification  $\rightarrow$  Adjust.



Throttle cable free play (at the flange of the throttle grip)  $4 \times 6 \text{ mm}$ 

- 2. Remove:
  - °rider's seat
  - ° fuel tank
  - Refer to "FUEL TANK AND SEATS".
- 3. Adjust: °throttle cable free play

## NOTE: \_\_\_\_\_

When the motorcycle is accelerating, the accelerator cable 1 is pulled.

#### Carburetor side

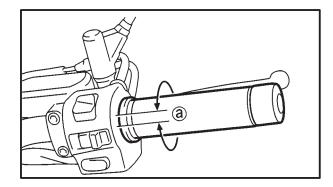
- a. Loosen the locknut 2 on the accelerator cable.
- b. Turn the adjusting nut ③ in direction ⓐ or ⓑ until the specified throttle cable free play is obtained.

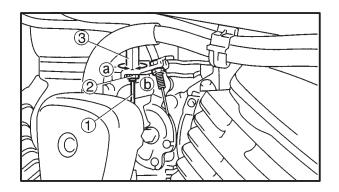
Direction	Throttle cable free play is decreased.
Direction	Throttle cable free play is increased.

c. Tighten the locknuts.

#### NOTE: -

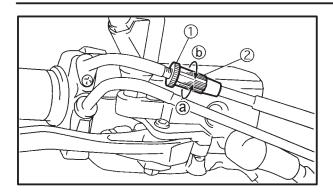
If the specified throttle cable free play cannot be obtained on the carburetor side of the cable, use the adjusting nut on the handlebar side.





#### ADJUSTING THE THROTTLE CABLE FREE PLAY/ CHECKING THE SPARK PLUGS





#### Handlebar side

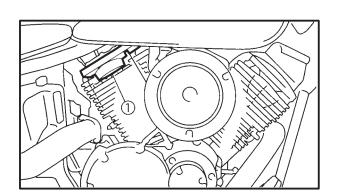
- a. Loosen the locknut ①.
- b. Turn the adjusting nut ② in direction ③ or ⓑ until the specified throttle cable free play is obtained.

Direction	Throttle cable free play is increased.
Direction	Throttle cable free play is decreased.

c. Tighten the locknut.

### A WARNING

After adjusting the throttle cable free play, turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.



#### EAS00059

#### CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

- 1. Remove:
  - ° cylinder head covers 1
- 2. Disconnect:
  - °spark plug cap
- Remove: <sup>o</sup> spark plug

#### **CAUTION:**

Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

4. Check:

° spark plug type Incorrect  $\rightarrow$  Change.

#### Spark plug type (manufacturer) BPR7ES (NGK) W22EPR-U (DENSO)

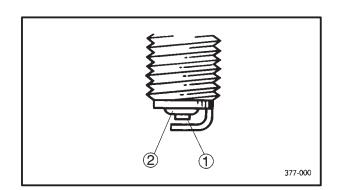
5. Check:

° electrode (1) Damage/wear  $\rightarrow$  Replace the spark plug. ° insulator (2)

Abnormal color  $\rightarrow$  Replace the spark plug. Normal color is a medium-to-light tan color.

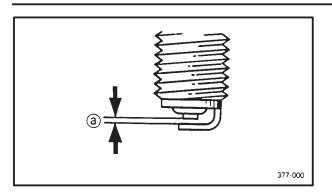
6. Clean:

°spark plug (with a spark plug cleaner or wire brush)



### CHECKING THE SPARK PLUGS/ CHECKING THE IGNITION TIMING





7. Measure:

° spark plug gap ⓐ (with a wire gauge) Out of specification → Regap.

Spark plug gap 0.7 × 0.8 mm

#### 8. Install:

° spark plug 🗽 20 Nm (2.0 m°kg)

#### NOTE: -

Before installing the spark plug, clean the spark plug and gasket surface.

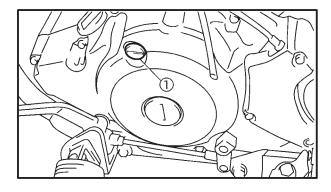
- 9. Connect:
  - ° spark plug cap

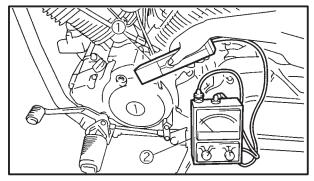
EAS00064

## CHECKING THE IGNITION TIMING

#### NOTE: \_

Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure that all connections are tight and free of corrosion.





1. Remove: °timing plug ①

2. Install:
°timing light 1
°engine tachometer 2
(to the spark plug lead of cyl. #1)

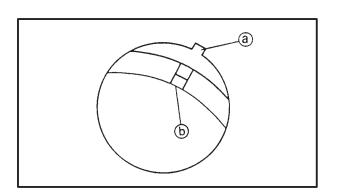
 Timing light: 90890-03141
 Engine tachometer: 90890-03113

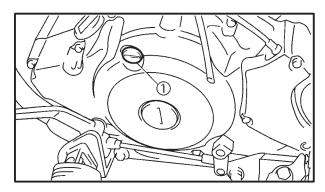
#### CHECKING THE IGNITION TIMING/ MEASURING THE COMPRESSION PRESSURE



- 3. Check: °ignition timing
- \*\*\*\*
- a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

Engine idling speed: 950  $\times$  1,050 r/min





b. Check that the stationary pointer ⓐ is within the firing range ⓑ on the generator rotor. Incorrect firing range → Check the ignition system.

#### NOTE: .

The ignition timing is not adjustable.

4. Install: °timing plug ①

#### EAS00065

#### MEASURING THE COMPRESSION PRES-SURE

The following procedure applies to all of the cylinders.

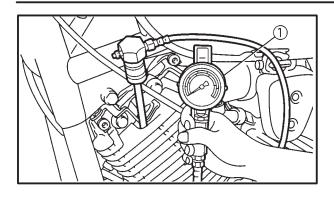
#### NOTE: -

Insufficient compression pressure will result in a loss of performance.

- 1. Check:
  - $^\circ$  valve clearance Out of specification  $\rightarrow$  Adjust. Refer to "ADJUSTING THE VALVE CLEAR-ANCE".
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Disconnect:
  - ° spark plug cap
- Remove: <sup>o</sup> spark plug



### MEASURING THE COMPRESSION PRESSURE



#### CAUTION:

Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.

5. Install:

° compression gauge ①



6. Measure:

 $^\circ$  compression pressure Above the maximum pressure  $\rightarrow$  Inspect the cylinder head, valve surfaces, and piston crown for carbon deposits.

Below the minimum pressure  $\rightarrow$  Squirt a few drops of oil into the affected cylinder and measure again.

°Refer to the following table.

Compression pressure (with oil applied in the cylinder)		
Reading	Diagnosis	
Higher than without oil	Piston wear or damage → Repair.	
Same as without oil	Piston ring(-s), valves, cylinder head gasket or piston possibly defective $\rightarrow$ Repair.	

	Compression pressure (at sea level)
$\sim$	,
	Standard:
	1,000 kPa (10 kg/cm <sup>2</sup> , 10 bar)
	Minimum:
	900 kPa (9 kg/cm <sup>2</sup> , 9 bar)
	Maximum:
	1,100 kPa (11 kg/cm <sup>2</sup> , 11 bar)

- a. Turn the main switch to "ON".
- b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilized.

## 

To prevent sparking, ground all spark plug leads before cranking the engine.

#### NOTE: ·

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm<sup>2</sup>, 1 bar).

#### CHECKING THE ENGINE OIL LEVEL

1. Stand the motorcycle on a level surface.

#### NOTE: \_

EAS00069

7. Install:

° spark plug

° spark plug cap

8. Connect:

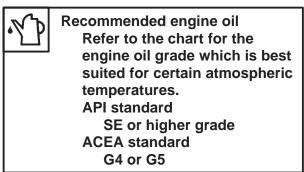
<sup>°</sup>Place the motorcycle on a suitable stand. <sup>°</sup>Make sure that the motorcycle is upright.

- 2. Let the engine idle for a few minutes.
- 3. Check:

° engine oil level

The engine oil level should be between the minimum level marks (a) and maximum level marks (b).

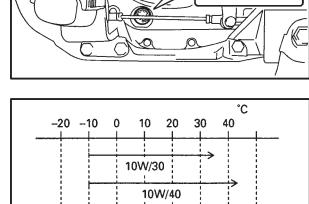
Below the minimum level mark  $\rightarrow$  Add the recommended engine oil to the proper level.



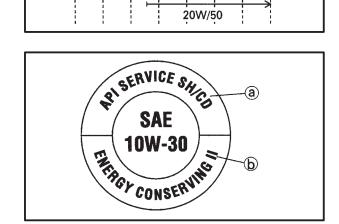
## CAUTION:

° Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD (a) or higher and do not use oils labeled "ENERGY CONSERV-ING II" (b) or higher.

<sup>°</sup>Do not allow foreign materials to enter the crankcase.



20W/40





20 Nm (2.0 m°kg)

 $\mathbb{X}$ 

## CHECKING THE ENGINE OIL LEVEL/ CHANGING THE ENGINE OIL



- 4. Start the engine, warm it up for several minutes, and then turn it off.
- 5. Check the engine oil level again.

#### NOTE:

Before checking the engine oil level, wait a few minutes until the oil has settled.

# CHANGING THE ENGINE OIL

- 1. Start the engine, warm it up for several minutes, and then turn it off.
- 2. Place a container under the engine oil drain bolt.
- 3. Remove:
  - $\degree$ engine oil filler cap (1)
  - °o-ring
  - °engine oil drain bolt 2
- °gašket 4. Drain:
- <sup>4</sup>. Drain: °engine oil
- (completely from the crankcase)
- 5. If the oil filter element is also to be replaced, perform the following procedure.

\*

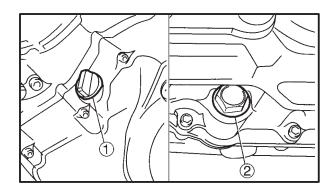
## 

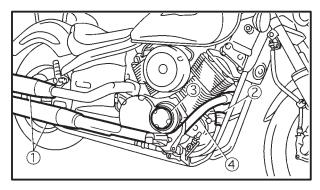
# Oil filter element replacement should be made cold exhaust pipe and muffler, at room temperature.

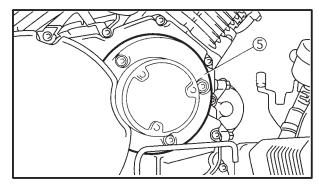
- a. Remove the muffler ①, rear brake reservoir tank ②, element cover ③ and exhaust pipe (front cylinder) ④.
- b. Remove the oil filter element cover plate (5), element cover (6) and oil filter element (7).
- c. Check the O-ring (8) and replace it if it is cracked or damaged.
- d. Install the new oil filter element and the element cover.

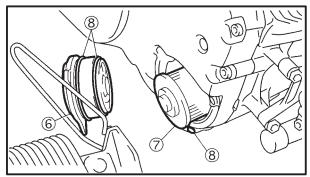
## Oil filter element cover bolt 10 Nm (1.0 m°kg)

- e. Install the exhaust pipe (front cylinder), element cover plate, rear brake reservoir tank and muffler.
- Refer to "ENGINE" in chapter 4.
- 6. Check:
- °engine oil drain bolt gasket
   Damage → Replace.
- 7. Install:
  - °gasket
- ° ĕngine oil drain bolt 🔀 43 Nm (4.3 m°kg)
- 8. Fill: °crankcase (with the specified amount of the recommended engine oil)











- Quantity Total amount 3.6 L Without oil filter element replacement 3.0 L With oil filter element replacement 3.1 L
- 9. Install:
- °o-ring
- ° engine oil filter cap
- 10. Start the engine, warm it up for several minutes, and then turn it off.
- 11. Check:
- °engine
  - (for engine oil leaks)
- 12. Check:
- ° engine oil level
  - Refer to "CHECKING THE ENGINE OIL LEVEL".

## 

# ADJUSTING THE CLUTCH CABLE FREE PLAY

- 1. Check: ° clutch cable free play (a)
  - Out of specification  $\rightarrow$  Adjust.



- 2. Adjust:
- ° clutch cable free play

# Handlebar side

- a. Loosen the locknut (1).
- b. Turn the adjusting screw (2) in direction (b) or
   (c) until the specified clutch cable free play is obtained.

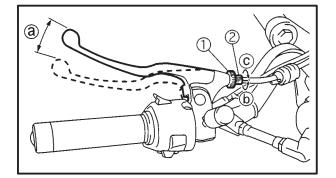
Direction (b)	Clutch cable free play is increased.
Direction©	Clutch cable free play is decreased.

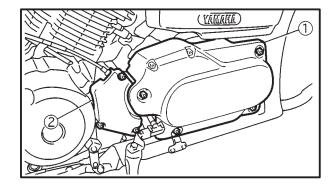
c. Tighten the locknut.

#### NOTE: -

If the specified clutch cable free play cannot be obtained as described above, perform the mechanism adjustment procedure described below.

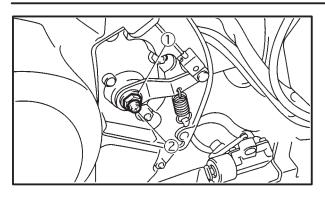
- 3. Remove:
- ° left side cover ①
- ° clutch adjusting cover 2

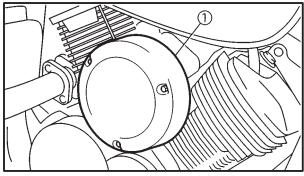


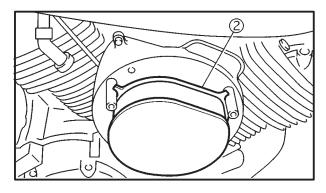


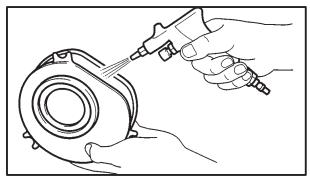
## ADJUSTING THE CLUTCH CABLE FREE PLAY/ CLEANING THE AIR FILTER ELEMENT

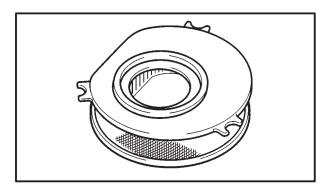












- 4. Adjust: °clutch mechanism
- •••••

## Engine side

- a. Loosen the locknut ①.
- b. Turn in the adjusting screw 2 until it is lightly seated.
- c. Turn the adjusting screw out 1/4 of a turn.
- d. Tighten the locknut.
- e. Check the clutch cable free play again and ajust it if necessary.

#### **CLEANING THE AIR FILTER ELEMENT**

- 1. Remove:
  - ° air filter case cover  $\bigcirc$ ° air filter element  $\bigcirc$

2. Clean:

 ° air filter element
 Apply compressed air to the outer surface of the air filter element.

- 3. Check:
  - °air filter element
  - Damage  $\rightarrow$  Replace.
- 4. Install:
  - ° air filter element ° air filter case cover
- 3-19

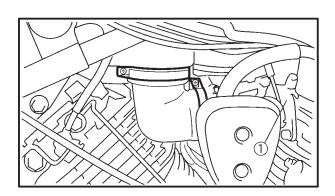


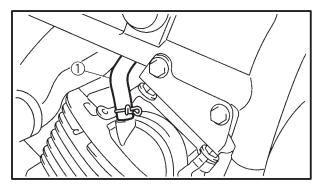
## **CAUTION:**

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect the carburetor turning, leading to poor engine performance and possible overheating.

#### NOTE: \_

When installing the air filter element into the air filter case cover, be sure their sealing surfaces are aligned to prevent any air leaks.





## EAS00094

# CHECKING THE CARBURETOR JOINT AND INTAKE MANIFOLD

- 1. Check:
  - ° carburetor joint ① Cracks/damage  $\rightarrow$  Replace. Refer to "CARBURETOR" in chapter 6.

#### EAS00098

#### CHECKING THE BREATHER HOSE

- 1. Remove:
  - ° cylinder head cover
- Check:
   °cylinder head breather hose ①
   Cracks/damage → Replace.
   Loose connection → Connect properly.

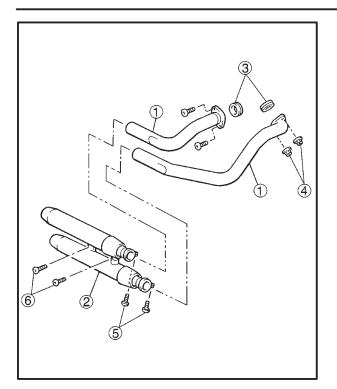
## CAUTION:

Make sure that the cylinder head breather hose is routed correctly.

## **CHECKING THE EXHAUST SYSTEM**

EAS00100

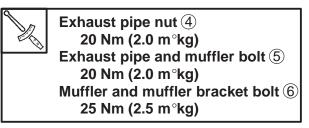




### CHECKING THE EXHAUST SYSTEM

The following procedure applies to all of the exhaust pipes, mufflers and gaskets.

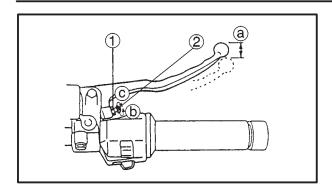
- 1. Check:
  - $^\circ \text{exhaust}$  pipes (1)
  - ° muffler (2)
  - Cracks/damage  $\rightarrow$  Replace.
  - ° gaskets ③
  - Exhaust gas leaks  $\rightarrow$  Replace.
- 2. Check:
  - ° tightening torque



## ADJUSTING THE FRONT BRAKE

EAS00108





## CHASSIS

## ADJUSTING THE FRONT BRAKE

- 1. Check:
  - ° brake lever free play (a) Out of specification  $\rightarrow$  Adjust.

Brake lever free play (at the end of the brake lever)  $5 \times 8 \text{ mm}$ 

- 2. Adjust:
  - °brake lever free play
- ••••••••••••••••••••••
- a. Loosen the locknut 1.
- b. Turn the adjusting bolt ② in direction ⓑ or ⓒ until the specified brake lever free play is obtained.

Direction $\bigcirc \rightarrow$ Brake lever free play is increased.	
$\begin{array}{c} \text{Direction} \ \textcircled{C} \rightarrow \ \text{Brake lever free play is} \\ \text{decreased.} \end{array}$	

c. Tighten the locknut.

## A WARNING

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, inspect and, if necessary, bleed the brake system.

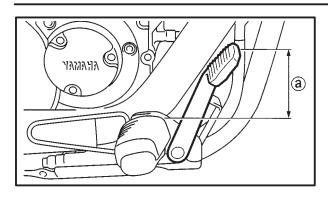
#### **CAUTION:**

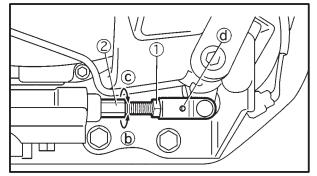
After adjusting the brake lever free play, make sure that there is no brake drag.

## ADJUSTING THE REAR BRAKE

EAS00110



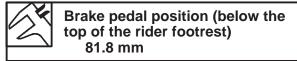




## ADJUSTING THE REAR BRAKE

1. Check:

° brake pedal position (distance ⓐ from the top of the rider footrest to the top of the brake pedal) Out of specification  $\rightarrow$  Adjust.



2. Adjust:

- ° brake pedal position
- \*\*\*\*\*
- a. Loosen the locknut ①.
- b. Turn the adjusting bolt ② in direction ⓑ or ⓒ until the specified brake pedal position is obtained.

Direction (b)  $\rightarrow$  Brake pedal is raised.

 $\textbf{Direction} \ \textcircled{C} \rightarrow \textbf{Brake pedal is lowered.}$ 

## A WARNING

After adjusting the brake pedal position, check that the end of the adjusting bolt (2) is visible through the hole (d).

c. Tighten the locknut ① to specification.

Lo

Locknut 16 Nm (1.6 m°kg)

## A WARNING

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance and could result in loss of control and possibly an accident. Therefore, inspect and, if necessary, bleed the brake system.

## **CAUTION:**

After adjusting the brake pedal position, make sure that there is no brake drag.

#### 

3. Adjust:

<sup>°</sup>rear brake light switch Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH".



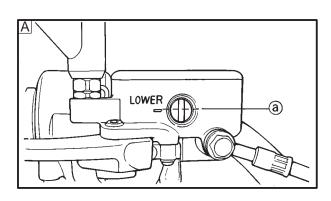
#### CHECKING THE BRAKE FLUID LEVEL

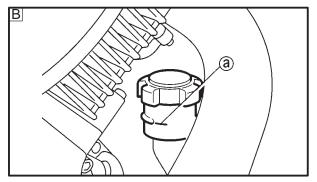
1. Stand the motorcycle on a level surface.

#### NOTE: -

EAS00115

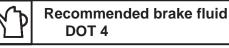
- °Place the motorcycle on a suitable stand.
- $^\circ\mbox{Make}$  sure that the motorcycle is upright.





2. Check;

° brake fluid level Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level.



A Front brake

B Rear brake

- <sup>o</sup> Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- <sup>o</sup> Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- <sup>o</sup>When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

## CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

#### NOTE: \_\_

In order to ensure a correct reading of the brake fluid level, make sure that the top of the reservoir is horizontal.



# ADJUSTING THE REAR BRAKE LIGHT SWITCH

#### NOTE: ·

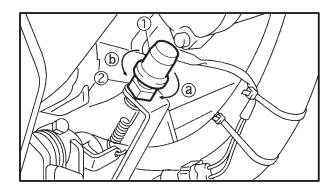
EAS00128

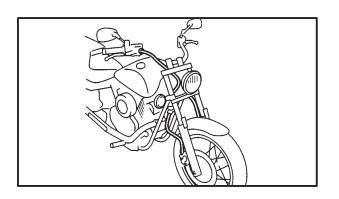
The rear brake light switch is operated by movement of the brake pedal.

The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.

- 1. Check:
- ° rear brake light operation timing Incorrect  $\rightarrow$  Adjust.
- 2. Adjust: °rear brake light operation timing
- a. Hold the main body ① of the rear brake light switch so that it does not rotate and turn the adjusting nut ② in direction ③ or ⑤ until the rear brake light comes on at the proper time.

Direction $(a) \rightarrow$ Brake light comes on
sooner.
Direction $(b) \rightarrow$ Brake light comes on
later.





EAS00131

## CHECKING THE BRAKE HOSES

The following procedure applies to all of the brake hoses and clamps.

- 1. Check:
  - ° brake hose

 $Cracks/damage/wear \rightarrow Replace.$ 

- Check:
   °brake hose clamp
   Loose connection → Tighten.
- 3. Hold the motorcycle upright and apply the brake.
- 4. Check:

° brake hose

Activate the brake several times.

Brake fluid leakage  $\rightarrow$  Replace the damaged hose.

Refer to "FRONT AND REAR BRAKES" in chapter 7.



BLEEDING THE HYDRAULIC BRAKE SYS-TEM

# 

Bleed the hydraulic brake system whenever: <sup>°</sup> the system was disassembled,

- °a brake hose was loosened or removed,
- ° the brake fluid level is very low,
- ° brake operation is faulty.

#### NOTE: \_

EAS00134

- <sup>o</sup>Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- <sup>o</sup>When bleeding the hydraulic brake system, make sure that there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- <sup>o</sup> If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.
- 1. Stand the motorcycle on alevel surface.

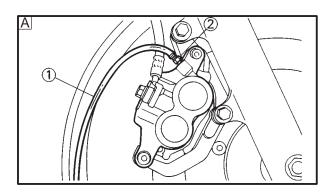
#### NOTE:

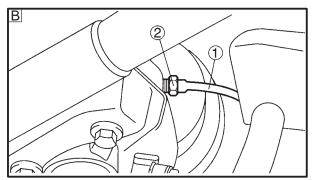
° Place the motorcycle on a suitable stand. ° Make sure that the motorcycle is upright.

2. Bleed:

°hydraulic brake system

- a. Add the recommended brake fluid to the proper level.
- b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
- c. Connect a clear plastic hose ① tightly to the bleed screw ②.
- A: FrontB: Rear
- d. Place the other end of the hose into a container.
- e. Slowly apply the brake several times.
- f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
- g. Loosen the bleed screw. This will release the tension and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.





## BLEEDING THE HYDRAULIC BRAKE SYSTEM/ ADJUSTING THE SHIFT PEDAL



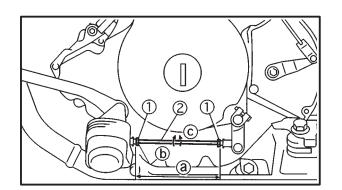
- h. Tighten the bleed screw and then release the brake lever or brake pedal.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- j. Tighten the bleed screw to specification.

#### Bleed screw 6 Nm (0.6 m°kg)

k. Fill the reservoir to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL".

## A WARNING

After bleeding the hydraulic brake system, check the brake operation.



#### EAS00137

#### ADJUSTING THE SHIFT PEDAL

#### NOTE: -

The shift pedal position is determined by the adjusting bolt length (a).

- 1. Measure:
- ° adjusting the length (a) Incorrect  $\rightarrow$  Adjust.

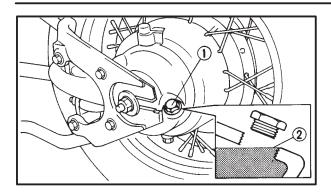


- 2. Adjust:
  - °adjusting bolt length (a)
- a. Loosen both locknuts ①
- b. Turn the adjusting bolt ② in direction ⓑ or ⓒ to obtain the correct shift pedal position.

Direction $\textcircled{b} \rightarrow$ shift pedal is raised.
Direction $\widehat{\mathbb{C}} \to$ shift pedal is lowered.

## CHECKING THE FINAL DRIVE OIL LEVEL/ CHANGING THE FINAL DRIVE OIL





#### \_ \_\_\_\_

CHECKING THE FINAL DRIVE OIL LEVEL

1. Stand the motorcycle on a level surface.

#### NOTE: -

EAS00144

<sup>°</sup> Place the motorcycle on a suitable stand. <sup>°</sup> Make sure that the motorcycle is upright.

- 2. Remove:
  - °final drive housing oil filler bolt ①
- 3. Check:
  - °final drive oil level

The final drive oil level should be to the bottom brim 2 of the filler hole.

Below the bottom brim  $\rightarrow$  Add the recommended final drive oil to the proper level.



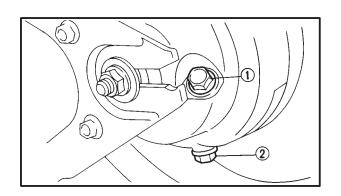
Recommended final drive oil SAE 80 hypoid gear oil graded "GL-4", "GL-5" or "GL-6" or

multi-purpose SAE 80W90 hypoid gear oil

4. Install:

° final drive housing oil filler bolt

🍾 23 Nm (2.3 m°kg)



EAS00145

#### **CHANGING THE FINAL DRIVE OIL**

- 1. Place a container under the final drive housing.
- 2. Remove:
  - °final drive housing oil filler bolt ①
  - ° final drive housing oil drain bolt ② Completely drain the final drive housing of its oil.
- 3. Check:
  - ° final drive housing oil drain bolt gasket Damage  $\rightarrow$  Replace.
- 4. Install:

° final drive housing oil drain bolt

🔌 23 Nm (2.3 m°kg)

- 5. Fill:
  - ° final drive housing

(with the specified amount of the recommended final drive oil)

## CHANGING THE FINAL DRIVE OIL/ CHECKING AND ADJUSTING THE STEERING HEAD



## Quantity 0.2 L

Refer to "CHECKING THE FINAL DRIVE OIL LEVEL".

#### EAS00146

# CHECKING AND ADJUSTING THE STEER-ING HEAD

1. Stand the motorcycle on a level surface.

## A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

#### NOTE: \_\_\_\_\_

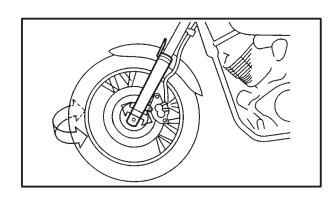
Place the motorcycle on a suitable stand so that the front wheel is elevated.

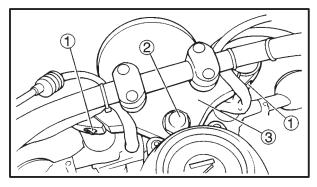
2. Check:

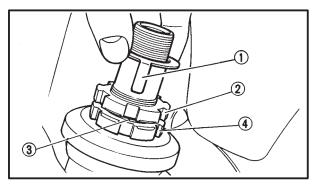
° steering head
 Grasp the bottom of the front fork legs and gently rock the front fork.
 Looseness or binding → Adjust the steering head.

- 3. Remove:
  - ° upper bracket pinch bolt 1
  - ° steering stem nut 2
  - ° upper bracket ③

- 4. Adjust:
- ° steering head
- a. Remove the lock washr ①, the upper ring nut
  ②, and the rubber washer ③.

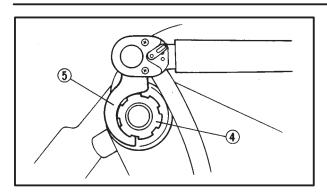






## CHECKING AND ADJUSTING THE STEERING HEAD

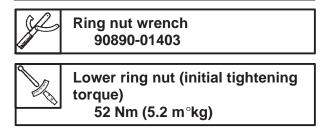




b. Loosen the lower ring nut ④ and then tighten it to specification with a ring nut wrench ⑤.

#### NOTE: -

Set the torque wrench at a right angle to the ring nut wrench.



c. Loosen the lower ring nut (4) completely, then tighten it to specification.

## 

#### Do not overtighten the lower ring nut.



Lower ring nut (final tightening torque) 18 Nm (1.8 m°kg)

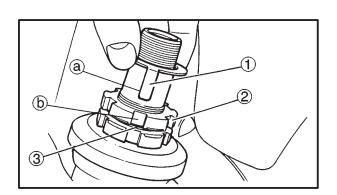
- d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and inspect the upper and lower bearings.
  - Refer to "STEERING HEAD AND HAN-DLEBAR" in chapter 7.
- e. Install the rubber washer ③.
- f. Install the upper ring nut (2).
- g. Finger tighten the upper ring nut ②, then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned.
- h. Install the lock washer ①.

#### NOTE: -

Make sure that the lock washer tabs (a) sit correctly in the ring nut slots (b).

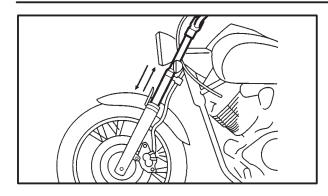
#### 

- 5. Install:
  - ° upper bracket
  - ° steering stem nut 🔀 110 Nm (11.0 m°kg)
  - ° upper bracket pinch bolt 🔀 20 Nm (2.0 m°kg)



## CHECKING THE FRONT FORK/ ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY





EAS00149 CHECKING THE FRONT FORK

1. Stand the motorcycle on a level surface.

## A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

- 2. Check:
  - °inner tube
    - Damage/scratches  $\rightarrow$  Replace.
  - ° oil seal
  - Oil leakage  $\rightarrow$  Replace.
- 3. Hold the motorcycle upright and apply the front brake.
- 4. Check:
  - °operation

Push down hard on the handlebar several times and check if the front fork rebounds smoothly.

Unsmooth operation  $\rightarrow$  Repair. Refer to "FRONT FORK" in chapter 7.

EAS00159

ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

## 

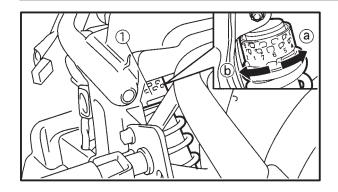
Securely support the motorcycle so that there is no danger of it falling over.

## CAUTION:

Never go beyond the maximum or minimum adjustment positions.

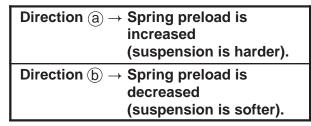
1. Adjust: °spring preload ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY/ CHECKING THE TIRES





#### Ring nut wrench 1HX-28135-00

- •••••
- a. Turn the adjusting knob ① in direction ③ or ⑤.



Adjusting position Standard: 3 Minimum: 1 (soft) Maximum: 7 (hard)

## EB304174

#### CHECKING THE TIRES

The following procedure applies to both of the tires.

- 1. Measure:
  - ° tire pressure Out of specification  $\rightarrow$  Regulate.

# 

- <sup>°</sup>The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
- <sup>o</sup> The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
- <sup>o</sup> Operation of an overloaded motorcycle could cause tire damage, an accident or an injury.

NEVER OVERLOAD THE MOTORCYCLE.



**CHECKING THE TIRES** 

Basic weight: (with oil and full fuel tank)	274 kg	
Maximum load*:	201 kg	
Cold tire pressure:	Front	Rear
Up to 90 kg load*	200 kPa (2.00 kgf/cm <sup>2</sup> )	225 kPa (2.25 kgf/cm <sup>2</sup> )
90 kg × maximum load*	225 kPa (2.25 kgf/cm <sup>2</sup> )	250 kPa (2.50 kgf/cm <sup>2</sup> )
High speed riding	225 kPa (2.25 kgf/cm <sup>2</sup> )	250 kPa (2,50 kgf/cm <sup>2</sup> )

\*: total of cargo, rider, passenger and accessories

## 

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

Check:
 °tire surfaces
 Damage/wear → Replace the tire.

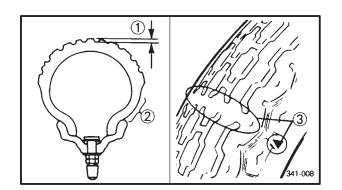


Minimum tire tread depth 1.6 mm

- 1 Tire tread depth
- 2 Side wall
- ③ Wear indicator

## 

- <sup>°</sup> Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- ° When using a tube tire, be sure to install the correct tube.
- ° Always replace a new tube tire and a new tube as a set.
- ° To avoid pinching the tube, make sure that the wheel rim band and tube are centered in the wheel groove.



## **CHECKING THE TIRES**



<sup>o</sup> Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.

Tube wheel	Tubeless wheel
Tube tire only	Tube or tubeless tire

<sup>o</sup> After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. Then front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this motorcycle.

Front tire:

Manufactur- er	Туре	Size
BRIDGE- STONE	110/90-18 61S	EXEDRA L309
DUNLOP	110/90-18 61S	K555F

**Rear tire:** 

Manufactur- er	Туре	Size
BRIDGE- STONE	170/80-15 M/C 77S	EXEDRA G546
DUNLOP	170/80-15 M/C 77S	K555

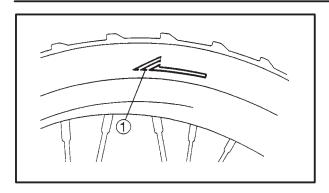
## 

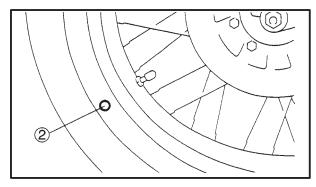
<sup>o</sup>New tires have a relatively low grip on the road surface until they have been slightly worn.

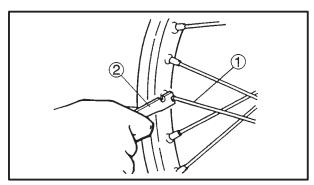
Therefor, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

## CHECKING THE TIRES/ CHECKING AND TIGHTENING THE SPOKES









## NOTE: -

- For tires with a direction of rotation mark (1):
- ° Install the tire with the mark pointing in the direction of wheel rotation.
- $^\circ \text{Align}$  the mark 2 with the value installation point.

### EAS00169

CHECKING AND TIGHTENING THE SPOKES

The following procedure applies to all of the spokes.

- 1. Check:
  - ° spoke (1) Bends/damage  $\rightarrow$  Replace. Loose  $\rightarrow$  Tighten.

Tap the spokes with a screwdriver.

#### NOTE: -

A tight spoke will emit a clear, ringing tone; a loose spoke will sound flat.

2. Tighten:

° spoke 🔀 3 Nm (0.3 m°kg) (with a spoke wrench 2)

#### NOTE: -

Be sure to tighten the spokes before and after break-in.

CHECKING AND LUBRICATING THE CABLES/ LUBRICATING THE LEVERS AND PEDALS/LUBRICATING THE SIDESTAND/LUBRICATING THE REAR SUSPENSION



# CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the cable sheaths and cables.

## A WARNING

Damaged cable sheaths may causes the cable to corrode and interfere with its movement. Replace damaged cable sheaths and cables as soon as possible.

1. Check:

EAS00170

° cable sheath

 $\mathsf{Damage} \to \mathsf{Replace}.$ 

2. Check:

° cable operation

Unsmooth operation  $\rightarrow$  Lubricate.



Recommended lubricant Engine oil or a suitable cable lubricant

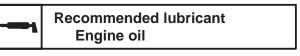
#### NOTE: \_

Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubing device.

EAS00171

#### LUBRICATING THE LEVERS AND PEDALS

Lubricate the pivoting point and metal-to-metal moving parts of the levers and pedals.



EAS00172

#### LUBRICATING THE SIDESTAND

Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.



Recommended lubricant Engine oil

EAS00174

#### LUBRICATING THE REAR SUSPENSION

Lubricate the pivoting point and metal-to-metal moving parts of the rear suspension.



#### EB305020 ELECTRICAL SYSTEM CHECKING AND CHARGING THE BATTERY

## A WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid.

Therefore, always follow these preventive measures:

- <sup>o</sup> Wear protective eye gear when handling or working near batteries.
- °Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- <sup>o</sup> DO NOT SMOKE when charging or handling batteries.
- KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.
- ° Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

First aid in case of bodily contact:

External

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

Internal

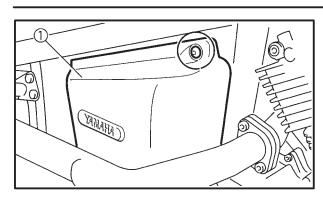
Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

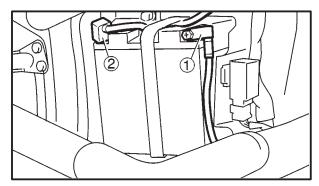
## CAUTION:

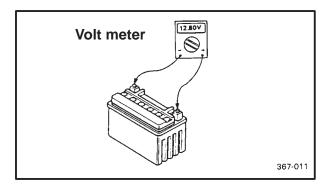
- <sup>o</sup> This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- <sup>°</sup> Charging time, charging amperage and charging voltage for a MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

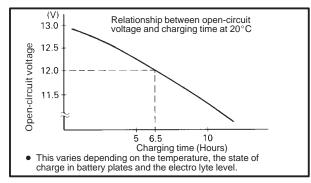
## CHECKING AND CHARGING THE BATTERY











#### NOTE: -

Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

- 1. Remove:
- battery cover ①
- 2. Disconnect:
  - battery leads (from the battery terminals)

#### **CAUTION:**

First, disconnect the negative lead (1), then the positive lead (2).

- 3. Remove:
- battery
- 4. Check:
  - battery charge
- Connect a pocket tester to the battery terminals.

Tester positive lead → battery positive terminal Tester negative lead → battery negative terminal

#### NOTE: -

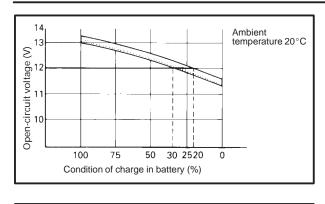
- The charge state of a MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.
- b. Check the charge of the battery, as shown in the charts and the following example.

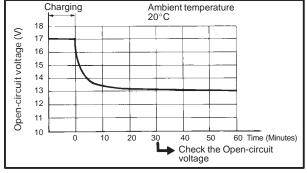
## Example

- c. Open-circuit voltage = 12.0 V
- d. Charging time = 6.5 hours
- e. Charge of the battery =  $20 \times 30 \%$
- \*\*\*\*\*
- Charge:
   battery

(refer to the appropriate charging method illustration)







## 

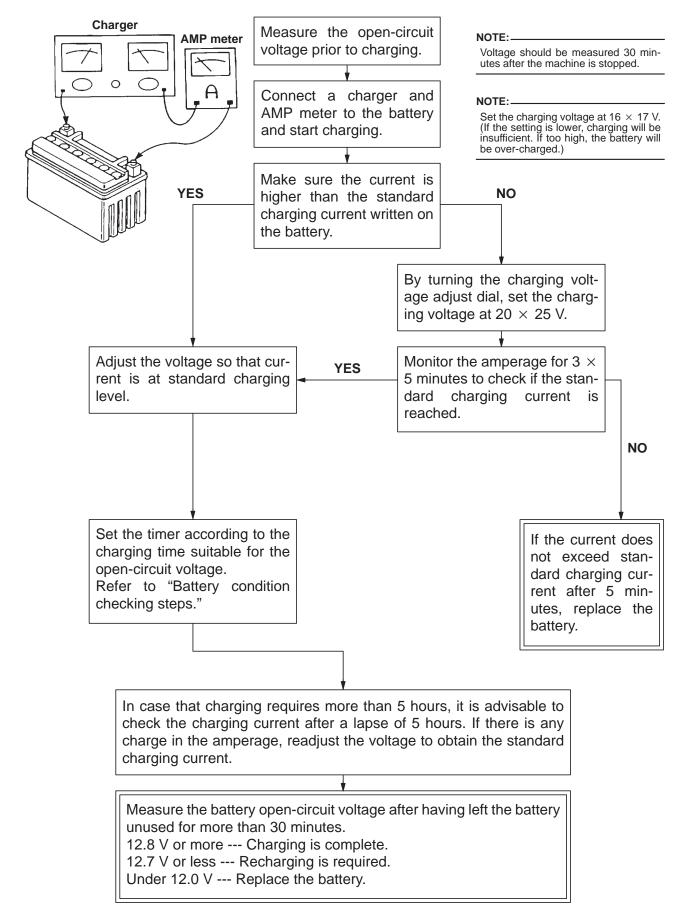
Do not quick charge a battery.

## **CAUTION:**

- <sup>o</sup>Make sure that the battery breather hose and battery vent are free of obstructions.
- <sup>o</sup>Never remove the MF battery sealing caps.
- <sup>o</sup> Do not use a high-rate battery charger. They force a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- <sup>o</sup> If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- <sup>o</sup> When charging a battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle, disconnect the negative lead from the battery terminal.)
- <sup>o</sup> To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- <sup>o</sup>Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- <sup>o</sup> Make sure that the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- <sup>o</sup> If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- <sup>o</sup> As shown in the following illustration, the open-circuit voltage of a MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.



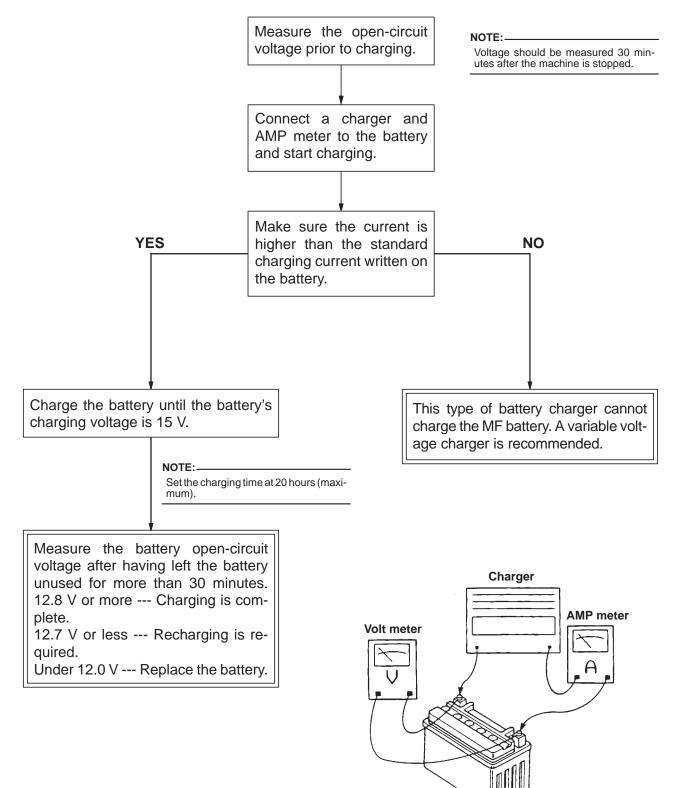
#### Charging method using a variable-current (voltage) type charger





## **CHECKING AND CHARGING THE BATTERY**

#### Charging method using a constant-voltage type charger



#### Charging method using a constant-current type charger

This type of battery charger cannot charge the MF battery.

## CHECKING AND CHARGING THE BATTERY



- 6. Check:
  °battery breather hose and battery vent Obstruction → Clean.
  Damage → Replace.
- 7. Install:
- ° battery

## **CAUTION:**

- <sup>o</sup>When inspecting the battery, make sure that the battery breather hose is properly attached and routed correctly. If the battery breather hose is positioned so as to allow electrolyte or hydrogen gas from the battery to contact the frame, the motorcycle and its finish may be damaged.
- <sup>o</sup> Make sure that the battery breather hose is properly routed away from the drive chain and from below the swingarm.
- 8. Connect:
  - battery leads (to the battery terminals)

## **CAUTION:**

First, connect the positive lead (1), then the negative lead (2).

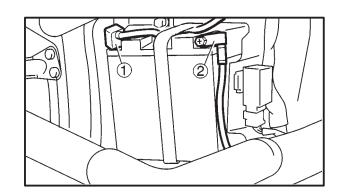
- 9. Check:
  - ° battery terminals Dirt  $\rightarrow$  Clean with a wire brush.
  - Loose connection  $\rightarrow$  Connect properly.
- 10. Lubricate:
  - ° battery terminals



#### Recommended lubricant Dielectric grease

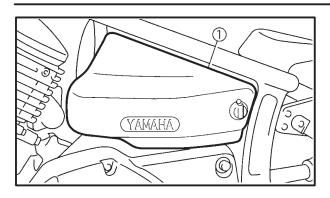
11. Install:

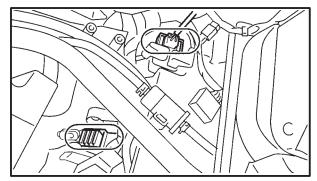
° battery cover

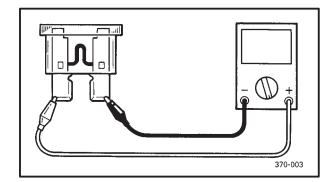




## **CHECKING THE FUSES**







# CHECKING THE FUSES

The following procedure applies to all of the fuses.

#### CAUTION:

To avoid a short circuit, always turn the main switch to "OFF" when checking or replacing a fuse.

- 1. Remove:
  - ° rider's seat
  - ° ignitor plate
  - Refer to "FUEL TANK AND SEATS".
  - $^{\circ}$  tool box cover (1)
- 2. Check:
  - °fuse
- \*\*\*\*
- a. Connect the pocket tester to the fuse and check it for continuity.

#### NOTE: -

Set the pocket tester selector to " $\Omega \times 1$ ".

Pocket tester 90890-03112

b. If the pocket tester indicates " $\infty$ ", replace the fuse.

- 3. Replace:
- ° blown fuse
- a. Turn off the ignition.
- b. Install a new fuse of the correct amperage rating.
- c. Turn on the switches to verify if the electrical circuit is operational.
- d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Quantity
Main	30A	1
Headlight	15A	1
Carburetor heater	15A	1
Signals	10A	1
Ignition	10A	1
Back up	5A	1
Reserve	30A	1
Reserve	15A	1
Reserve	10A	1
Reserve	5A	1

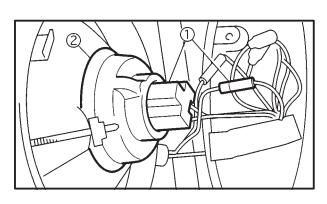
## CHECKING THE FUSES/ REPLACING THE HEADLIGHT BULB

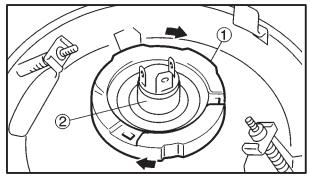


## A WARNING

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

- 4. Install:
  - ° tool box cover
  - ° ignitor plate
  - °rider's seat





#### EAS00182

#### **REPLACING THE HEADLIGHT BULB**

- 1. Disconnect:
- $^{\circ}$  connectors (1)
- 2. Remove
  - ° headlight bulb cover 2
- 3. Remove:
- ° headlight bulb holder 1
- 4. Remove:
  - ° headlight bulb 2

## 

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

5. Install:

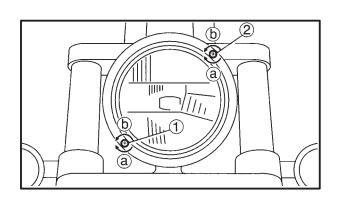
° headlight bulb (New) Secure the new headlight bulb with the headlight bulb holder.



### CAUTION:

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

- 5. Install:
  - ° headlight bulb holder
- 6. Install:
  - ° headlight bulb cover
- 7. Connect:
- °leads



#### EAS00184

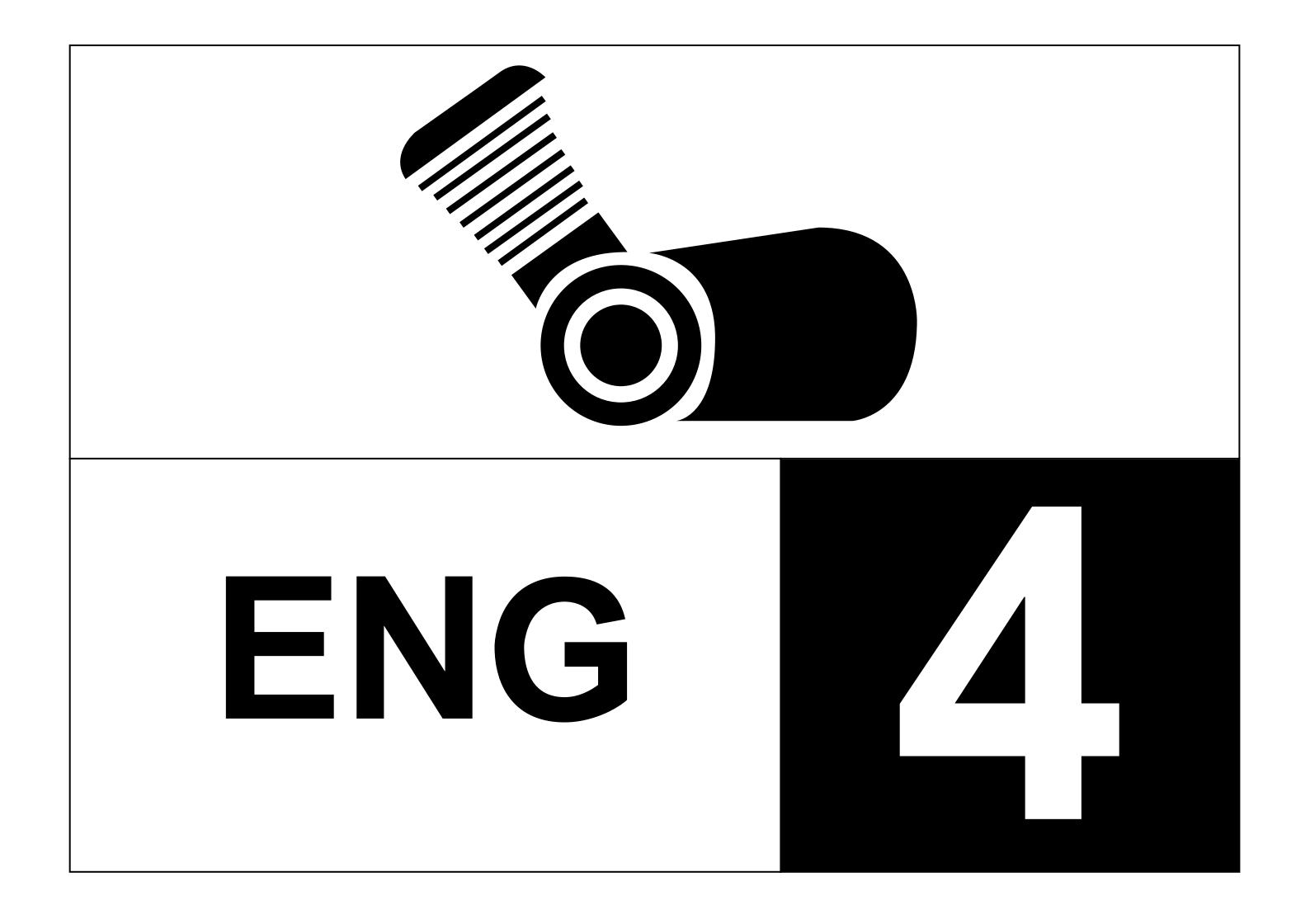
#### ADJUSTING THE HEADLIGHT BEAM

- 1. Adjust:
- ° headlight beam (vertically)
- a. Turn the adjusting screw ① in direction ③ or ⑤.

Direction (a)  $\rightarrow$  Headlight beam is raised. Direction (b)  $\rightarrow$  Headlight beam is lowered.

- 2. Adjust:
  - ° headlight beam (horizontally)
- a. Turn the adjusting knob (2) in direction (a) or
   (b).

Direction $(a) \rightarrow$ Headlight beam moves to
the right.
Direction $(b) \rightarrow$ Headlight beam moves to
the left.





# CHAPTER 4 ENGINE

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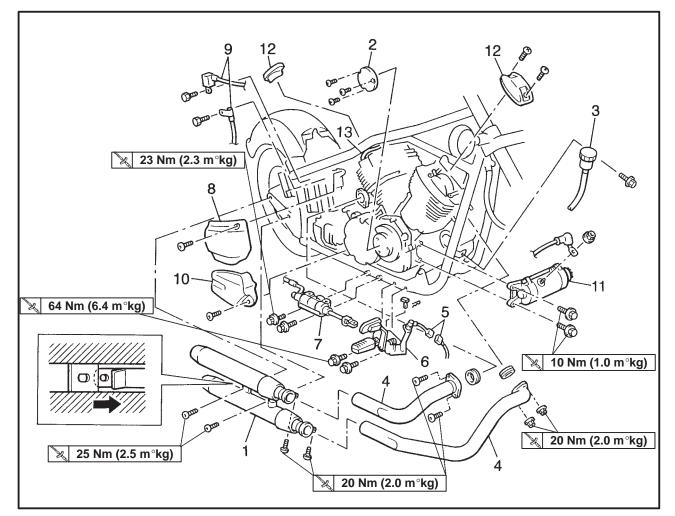
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**ENGINE REMOVAL** 



# ENGINE

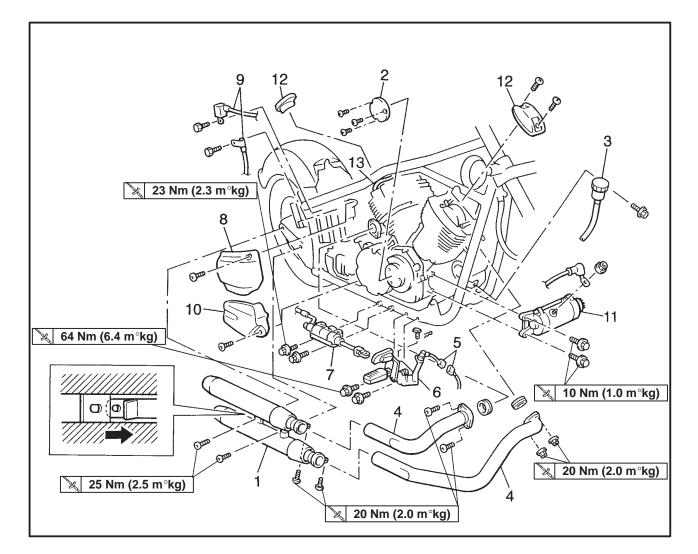
## **ENGINE REMOVAL** MUFFLERS, BRAKE PEDAL AND SIDE COVER



Order	Job name/Part name	Q'ty	Remarks
	Removing the muffler, brake pedal and side cover		Remove the parts in the order listed.
			Stand the motorcycle on a level surface.
			Securely support the motorcycle so there is no danger of it falling over.
	Fuel tank		Refer & "FUEL TANK AND SEATS" in Chapter 3.
	Air filter case assembly Carburetor assembly	-	Refer to "CARBURETOR" in Chapter 5.
1	Muffler assembly	1	
2	Cover (emblem)	1	
3	Reservoir tank	1	
4	Exhaust pipes	2	
5	Rear brake switch lead	1	Disconnect
6	Footrest/brake pedal	1/1	

**ENGINE REMOVAL** 



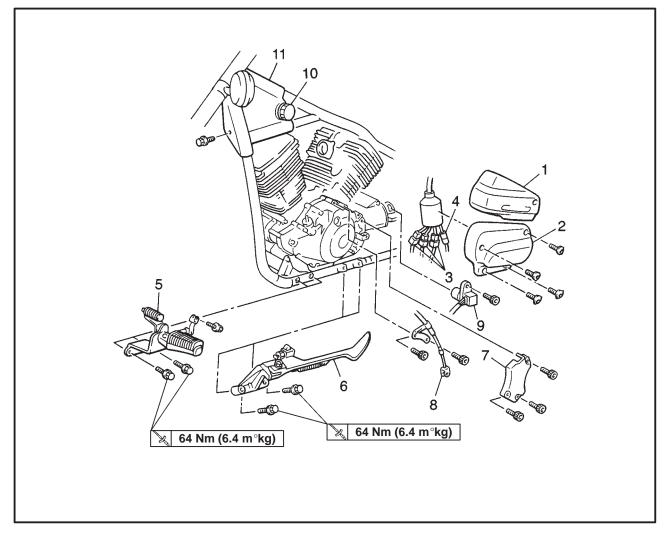


Order	Job name/Part name	Q'ty	Remarks
7	Rear brake master cylinder/bracket	1/1	
8	Battery cover	1	
9	Battery leads	2	Disconnect
			NOTE:
			First, disconnect the negative lead, then disconnect the positive lead.
10 11 12 13	Right side cover Starter motor Cylinder head covers Spark plug caps	1 1 4 4	Disconnect
			For installation, reverse the removal procedure

ENGINE REMOVAL



## LEADS, SHIFT PEDL AND CLUTCH CABLE

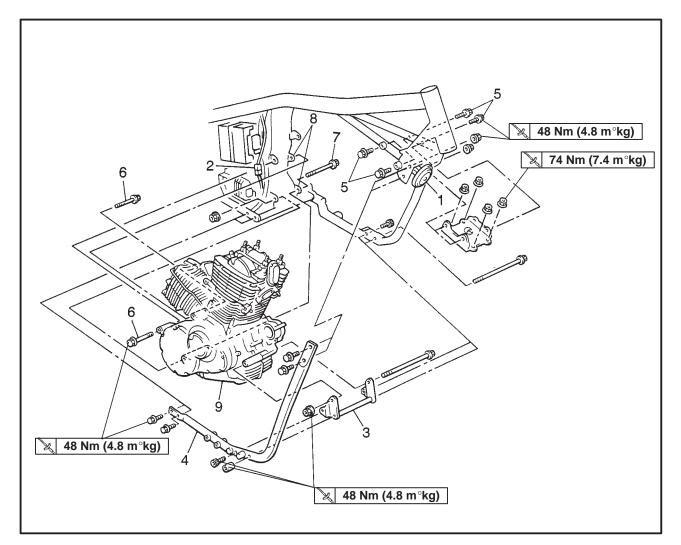


Order	Job name/Part name	Q'ty	Remarks
	Removing the leads, shift pedal and		Remove the parts in the order listed.
	clutch cable		
1	Tool box cover	1	
2	Left side cover	1	
3	AC magneto lead/pickup lead/side	1/1/1	Disconnect
	stand switch lead/speed sensor lead		
4	Neutral switch lead	1	Disconnect
5	Footrest/shift pedal	1/1	Refer to "INSTALLING THE ENGINE".
6	Sidestand	1	
7	Clutch adjusting cover	1	
8	Clutch cable	1	Disconnect
9	Speed sensor	1	
10	Fuel tank fitting knobs	2	
11	Steering head side covers	2	
			For installation, reverse the removal procedure.

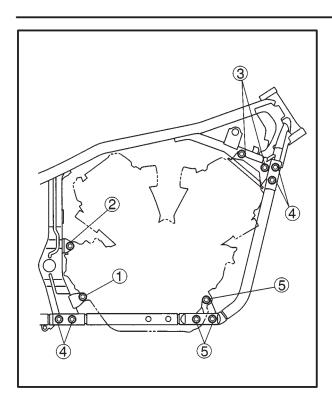
**ENGINE REMOVAL** 

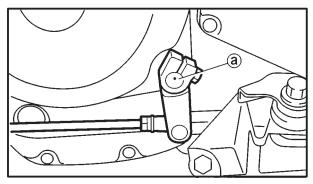


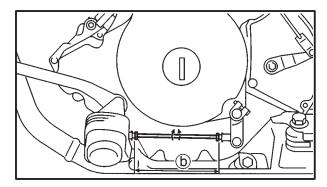
# **ENGINE MOUNTING BOLTS**



Order	Job name/Part name	Q'ty	Remarks
	Engine mounting bolt removal Left crankcase cover Tool box		Remove the parts in the order below. Place a suitable stand under the frame and engine. Refer to "GENERATOR AND STARTER CLUTCH" Refer to "REAR SHOCK ABSORBER AND SWINGARM" in Chapter 6.
1 2 3 4 5 6 7 8 9	Horn Engine ground lead connector Engine stay (front-lower) Down tube Engine bracket bolts Engine mount bolts (rear upper) Engine mount bolt (rear lower) Engine stays (rear upper/lower) Engine assembly	1 1 - 1 2 1 1/1 1 -	Refer to "INSTALLING THE ENGINE".
			For installation, reverse the removal procedure.







ENGINE



# **INSTALLING THE ENGINE**

EAS00192

1. Tighten the bolts in the following order.

Bolt ①:
48 Nm (4.8 m°kg)
Bolt ②:
48 Nm (4.8 m°kg)
Bolt ③:
48 Nm (4.8 m°kg)
Bolt ④:
48 Nm (4.8 m°kg)
Bolt 5:
48 Nm (4.8 m°kg)

- 2. Install:
  - ° shift arm ①

# NOTE: \_

- °Align the punch mark (a) in the shift shaft with the slot in the shift arm.
- °Adjust the adjusting bolt length (b).

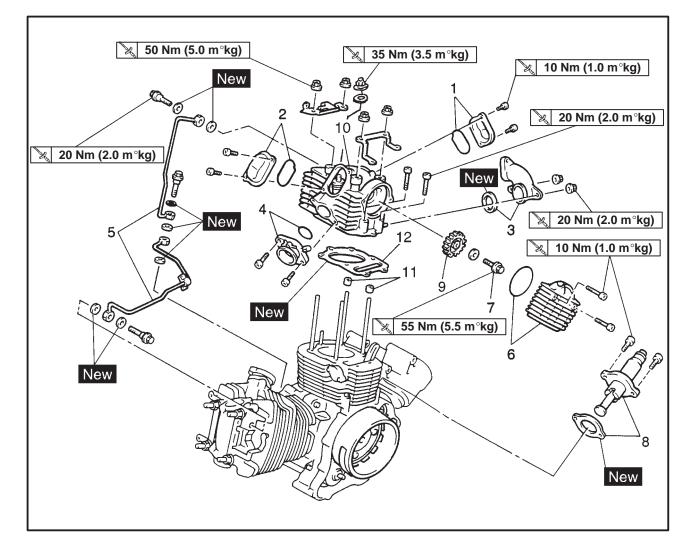
Refer to "ADJUSTING THE SHIFT PEDAL" in chapter 3.

Shift arm bolt 10Nm (1.0m°kg)

Adjusting bolt length 114.7mm

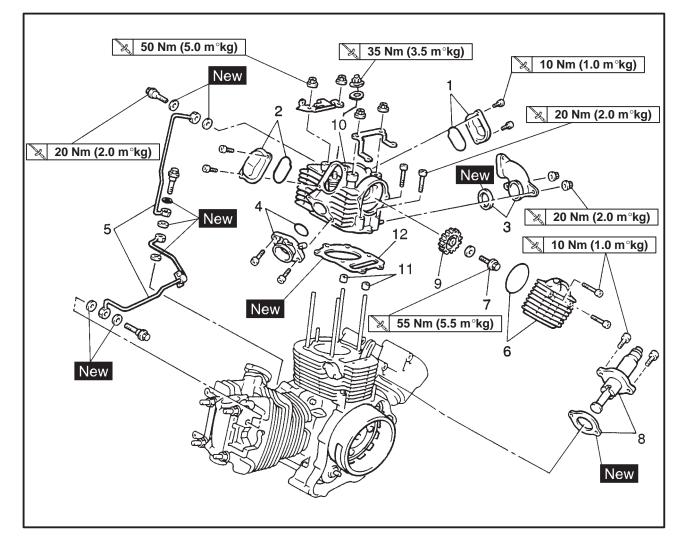


# CYLINDER HEADS REAR CYLINDER HEAD



Order	Job name/Part name	Q'ty	Remarks
	<b>Cylinder head removal</b> Engine assembly Left crankcase cover		Remove the parts in the order listed. Refer to "ENGINE REMOVAL". Refer to "GENERATOR AND STARTER CLUTCH".
1	Tappet cover (exhaust)/O-ring	1/1	
2	Tappet cover (intake)/O-ring	1/1	
3	Exhaust pipe joint/gasket	1/1	
4	Carburetor joint/O-ring	1/1	
5	Oil delivery pipes	2	
6	Camshaft sprocket cover/O-ring	1/1 <sub>-</sub>	Refer to "INSTALLING THE CYLINDER
7	Camshaft sprocket bolt	1 -	HEADS".

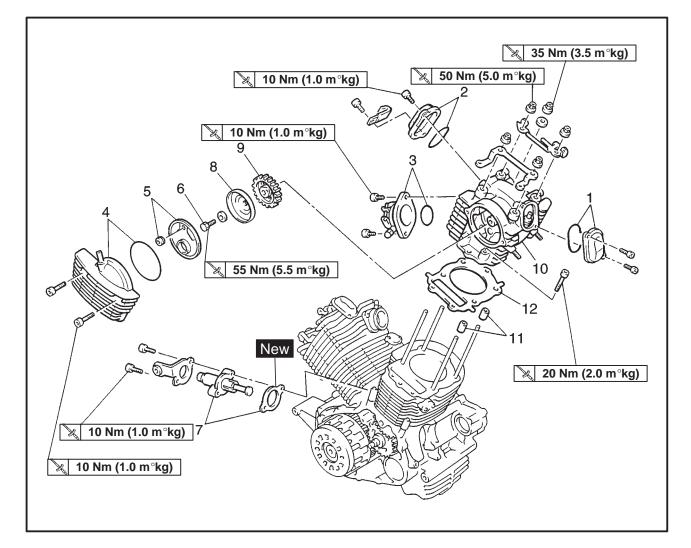




Order	Job name/Part name	Q'ty	Remarks
8 9 10 11 12	Timing chain tensioner/gasket Camshaft sprocket Cylinder head Dowel pins Cylinder head gasket	2 -	Refer to "REMOVING/INSTALLING THE CYLINDER HEADS". Refer to "INSTALLING THE CYLINDER HEADS". For installation, reverse the removal procedure.

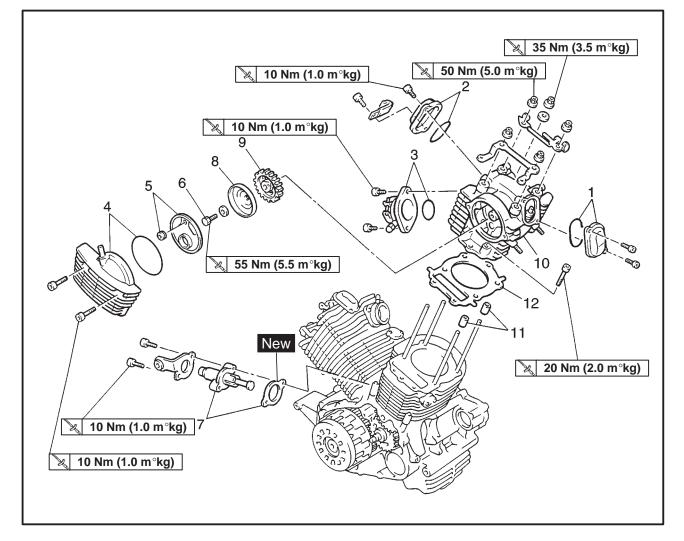


# FRONT CYLINDER HEAD



Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6	Cylinder head removal Engine assembly Oil delivery pipes Right crankcase cover Tappet cover (exhaust)/O-ring Tappet cover (intake)/O-ring Carburetor joint/O-ring Camshaft sprocket cover/O-ring Baffle plate/O-ring Camshaft sprocket bolt	1/1 1/1 1/1 1/1 - 1/1 1 -	Remove the parts in the order listed. Refer to "ENGINE REMOVAL". Refer to "REAR CYLINDER HEAD". Refer to "CLUTCH".





Order	Job name/Part name	Q'ty	Remarks
7	Timing chain tensioner/gasket		Refer to "REMOVING/INSTALLING
8	Camshaft sprocket plate		THE CYLINDER HEADS".
9	Camshaft sprocket		Refer to "INSTALLING THE CYLINDER
10	Cylinder head		HEADS".
11	Dowel pins		For installationreverse the removal
12	Cylinder head gasket		procedure.

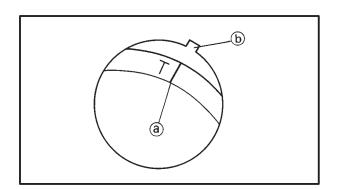


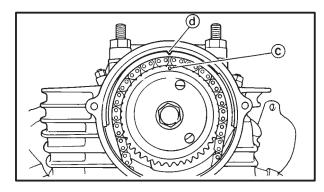
# REMOVING THE CYLINDER HEADS Rear cylinder head

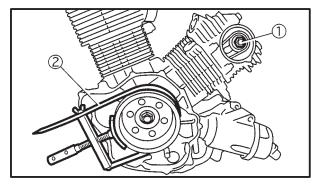
1. Remove:

EAS00226

- ° camshaft sprocket cover
- ° tappet covers







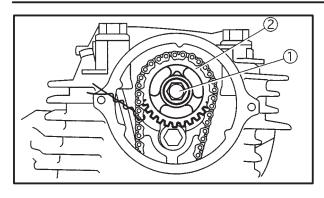
- 2. Align:
  - ° "T" mark (a) (with the stationary pointer (b))
- a. Temporarily install the left crankcase cover without the pickup coil and stator coil.
- b. Turn the crankshaft clockwise.
- c. Align the "T" mark (a) with the stationary pointer (b) on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
- d. Check that the rear piston is at TDC in the compression stroke.
- e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
- f. When to "T" mark is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.
- 3. Loosen:

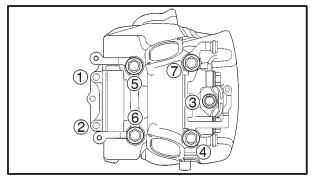
° bolt (camshaft sprocket) 1

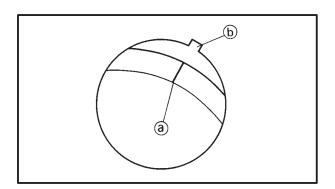
### NOTE: -

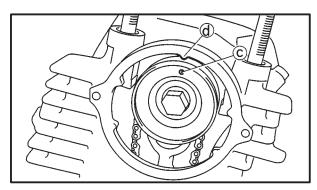
Use the sheave holder 2 to hold the rotor.

Sheave holder: 90890-01701











- 4. Remove:
  - ° timing chain tensioner ° gasket
- 5. Remove:
  - ° bolt (camshaft sprocket) 1
  - °camshaft sprocket 2

# NOTE: -

To prevent the timing chain from falling into the crankcase fasten a wire to it.

6. Remove: °cylinder head

# NOTE: \_

- °Loosen the bolts and nuts in the proper sequence.
- <sup>°</sup>Follow the numerical order shown in the illustration. Loosen each bolt 1/4 of a turn at a time until all of the bolts are loose.

# Front cylinder head

# NOTE: \_

When removing the front cylinder head, repeat the rear cylinder head removal procedures. However, note the following points.

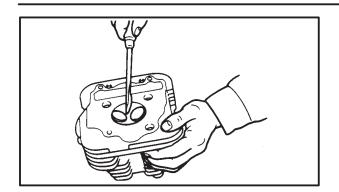
- 1. Align:
  - °"l" mark

(with the stationary pointer)

# Removal steps:

- °Turn the crankshaft clockwise 290°.
- Align the "I" mark (a) with the stationary pointer
  (b) on the crankcase cover (left) when the front piston is at TDC on the compression stroke.
- •When the "I" mark is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.
- <sup>o</sup>The front piston is at TDC on the compression stroke when there is clearance at both of the rocker arms.





### EAS00228 CHECKING THE CYLINDER HEADS

The following procedure applies to all of the cylinder heads.

1. Eliminate:

**CYLINDER HEADS** 

° combustion chamber carbon deposits (with a rounded scraper)

# NOTE: \_\_\_\_

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

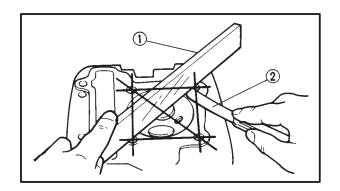
° spark plug threads

° valve seats

- 2. Check:
  - ° cylinder head Damage/scratches  $\rightarrow$  Replace.
- 3. Measure:

° cylinder head warpage Out of specification → Resurface the cylinder head.

> Cylinder head warpage Less than 0.03 mm



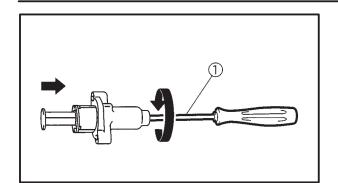
## \*\*\*\*\*

- a. Place a straightedge ① and a thickness gauge ② across the cylinder head.
- b. Measure the warpage.
- c. If the limited is exceeded, resurface the cylinder head as follows.
- d. Place 400 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

### NOTE: \_\_

To ensure an even surface, rotate the cylinder head several times.





# CHECKING THE TIMING CHAIN TENSIONER

1. Check:

EB401430

°timing chain tensioner
 Cracks/damage/rough movement → Replace.

a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.

## NOTE:

While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver 1 until it stops.

- b. Remove the screwdriver and slowly release the timing chain tensioner rod.
- c. Make sure that the timing chain tensioner rod comes out of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

## EAS00234

# INSTALLING THE CYLINDER HEADS Rear cylinder head

 Install: <sup>o</sup>dowel pins <sup>o</sup>gasket

# NOTE: -

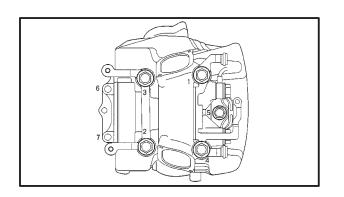
The "5EL" mark on the gasket must face up side of the cylinder.

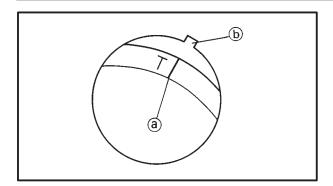
2. Install:

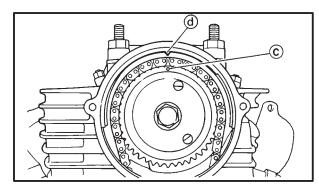
°nuts (cylinder head) (M12: 1 – 4)		
🔀 50 Nm (5.0 m°kg)		
°cap nut (cylinder head) (M10: 5)		
🔀 35 Nm (3.5 m°kg)		
°bolts (cylinder head) (M8: 6 − 7)		
🔀 20 Nm (2.0 m°kg)		

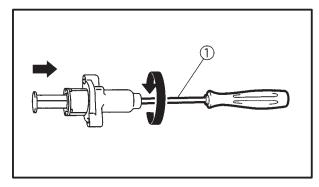
# NOTE: -

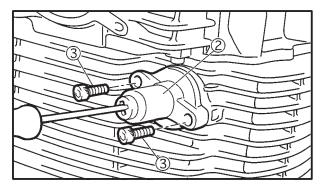
- °Tighten the bolts and nuts in the proper sequence.
- <sup>°</sup>Follow the numerical order shown in the illustration. Tighten the bolts and nuts in two stages.













 Install: <sup>o</sup> camshaft sprocket

# 

- a. Temporarily install the rotor nut and left crankcase cover without the pickup coil and stator coil.
- b. Turn the crankshaft clockwise.
- c. Align the "T" mark ⓐ with the stationary pointer ⓑ on the crankcase cover (left).
- d. Install the camshaft sprocket with the timing mark ⓒ facing out.
- e. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
- f. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.
- g. While pushing the timing chain guide, be sure that the timing mark ⓒ and the stationary pointer ⓓ are properly aligned at TDC.
- 4. Install:

° timing chain tensioner

- a. Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
- b. While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver 1 until it stops.
- c. With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner ②, and gasket.

Then, tighten the timing chain tensioner bolts (3) to the specified torque.

# A WARNING

# Always use a new gasket.

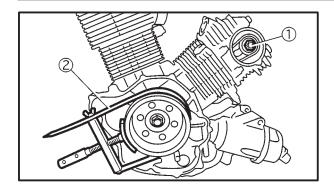
# NOTE: -

The "UP" mark on the timing chain tensioner should face up.



Timing chain tensioner bolt 10 Nm (1.0 m°kg)





d. Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

# Cap bolt 8 Nm (0.8 m°kg)

5. Install:

° bolt (camshaft sprocket) ①

🎉 55 Nm (5.5 m°kg)

# NOTE: -

- ° Be sure the projection on the camshaft sprocket plate is aligned with the hole in the sprocket.
- $^{\circ}$  Use the sheave holder 2 to hold the rotor.

Sheave holder: 90890-01701

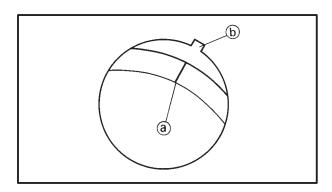
- 6. Check:
  - °alignment marks
  - If the marks do not align  $\rightarrow$  Adjust.
- 7. Measure:
  - ° valve clearance Out of specification  $\rightarrow$  Adjust. Refer to "ADJUSTING THE VALVE CLEAR-ANCE" in CHAPTER 3.

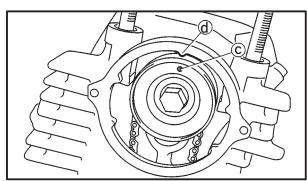
# Front cylinder head

# NOTE: \_

When installing the front cylinder head, repeat the rear cylinder head installation procedure. However, note the following points.

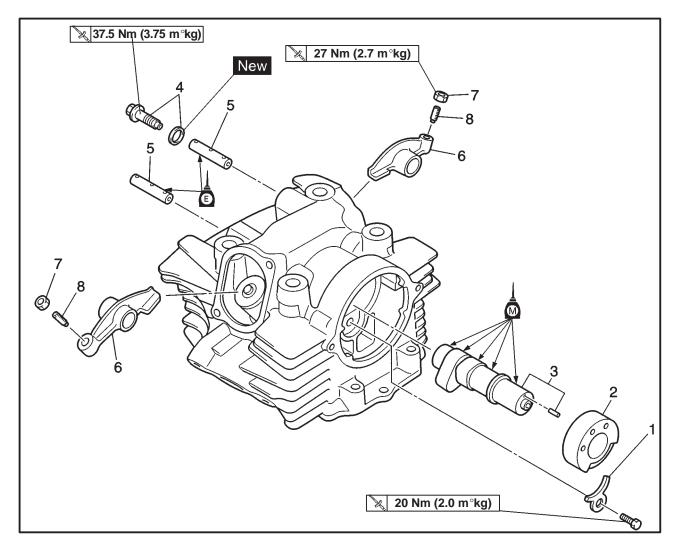
- 1. Install:
- ° camshaft sprocket
- \*\*\*\*
- a. Turn the crankshaft clockwise 290°.
- b. Align the "I" mark (a) with the stationary pointer (b) on the crankcase cover (left).
- c. Install the camshaft sprocket with the timing mark C facing out.
- d. Turn the camshaft just enough to remove any slack from the intake side of the timing chain.
- e. Insert your finger into the hole and timing chain tensioner hole and push the timing chain guide inward.
- f. While pushing the timing chain guide, be sure that the timing mark ⓒ and the stationary pointer ⓓ are properly aligned at TDC.







# **ROCKER ARMS AND CAMSHAFT**

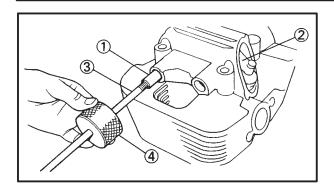


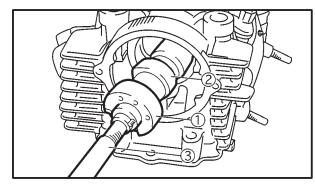
Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6 7 8	Removing the rocker arm and camshaft Cylinder heads Stopper plate Camshaft bushing Camshaft/dowel pin Union bolt/gasket Rocker arm shafts Rocker arms Locknuts Valve adjusters	1/1	Remove the parts in the order listed. Refer to "CYLINDER HEAD". Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT". Refer to "REMOVING/INSTALLING THE ROCKER ARM AND CAMSHAFT".

# **ROCKER ARMS AND CAMSHAFT**

EAS00202







# REMOVING THE ROCKER ARMS AND CAM-SHAFT

- 1. Remove:
  - ° rocker arm shafts (intake and exhaust) (1) ° rocker arms (2)

### NOTE: -

Use a slide hammer 3 and weight 4 to remove the rocker arm shafts.



- 2. Remove:
  - ° camshaft bushing ① ° camshaft ②

# NOTE: ----

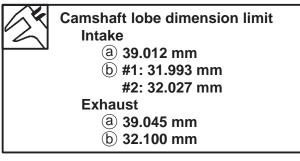
Screw a 10 mm bolt 3 into the threaded end of the camshaft and pull out the camshaft.

# EAS00205

# CHECKING THE CAMSHAFTS

- 1. Check:
  - ° camshaft bushings
  - $\mathsf{Damage/wear} \to \mathsf{Replace}.$
- 2. Check:
  - ° camshaft lobes Blue discoloration/pitting/scratches → Replace the camshaft.
- 3. Measure:

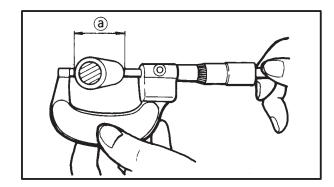
° camshaft lobe dimensions (a) and (b) Out of specification  $\rightarrow$  Replace the camshaft.

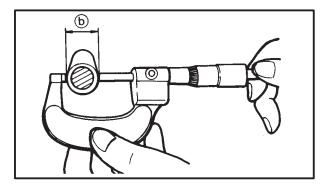


4. Check:

° camshaft oil passage

Obstruction  $\rightarrow$  Blow out with compressed air.

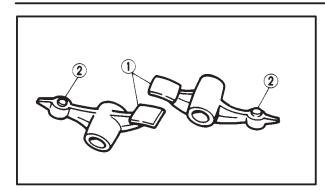


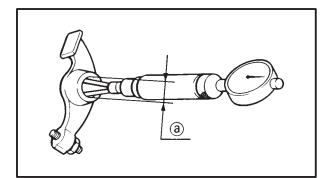


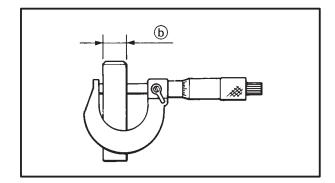
# **ROCKER ARMS AND CAMSHAFTS**

EB401410









# CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

- 1. Check:
  - ° rocker arm
  - Damage/wear  $\rightarrow$  Replace.
  - $^{\circ}$ rocker arm lobe (1)
  - $^{\circ}$  valve adjuster (2)

Excessive wear  $\rightarrow$  Replace.

- 2. Check:
  - °rocker arm shaft

Blue discoloration/excessive wear/pitting/scratches  $\rightarrow$  Replace or check the lubrication system.

- 3. Measure:
  - ° rocker arm inside diameter (a) Out of specification  $\rightarrow$  Replace.



Rocker arm inside diameter 14.036 mm

4. Measure:

° rocker arm shaft outside diameter (b) Out of specification  $\rightarrow$  Replace.



Rocker arm shaft outside diameter 13.95 mm

5. Calculate:

°rocker-arm-to-rocker-arm-shaft clearance

### NOTE: -

Calculate the clearance by subtracting the rocker er arm shaft outside diameter from the rocker arm inside diameter.

Above 0.086 mm  $\rightarrow$  Replace the defective part(-s).



Rocker-arm-to-rocker-arm-shaft clearance  $0.009 \times 0.033 \text{ mm}$ 

<Limit> : 0.086 mm



EAS00220

# **INSTALLING THE CAMSHAFT AND ROCK-ER ARMS**

1. Lubricate:

° camshaft



2. Install:

 $^{\circ}$  camshaft (1)

° camshaft bushing 2

# NOTE: -

- $^{\circ}$  The dowel pin (a) on the end of the camshaft must align with the timing mark (b) on the cylinder head.
- °Make sure that the No.1 camshaft ③ is installed in the rear cylinder head and the No.2 camshaft ④ is installed in the front cylinder head.

- 3. Install:
  - ° stopper plate ①

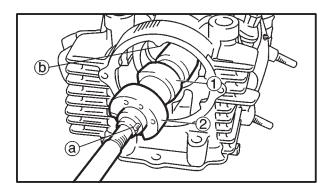


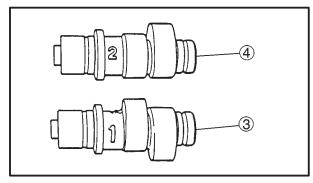
Stopper plate bolt 2 20 Nm (2.0 m°kg)

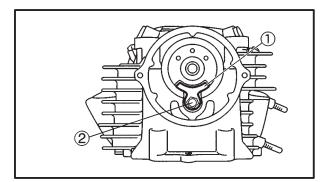
4. Lubricate:

° rocker arm shafts









# ROCKER ARMS AND CAMSHAFTS

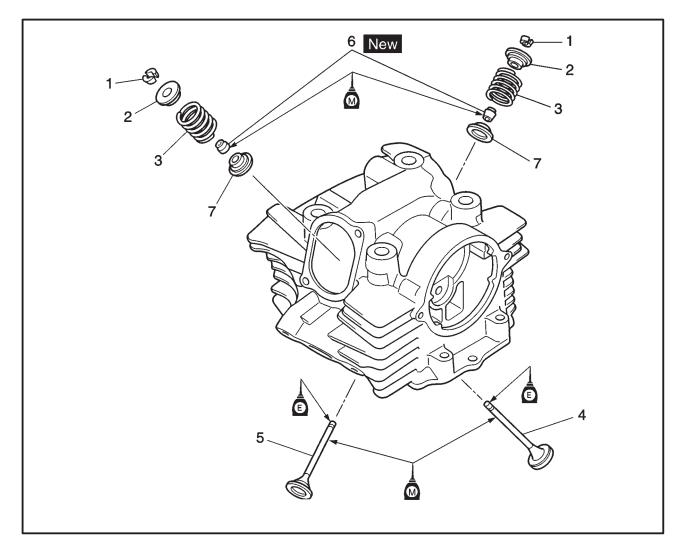


- 5. Install:
  - °rocker arms
  - ° rocker arm shafts

# NOTE: ----

Make sure that the rocker arm shafts is completely pushed into the cylinder head.



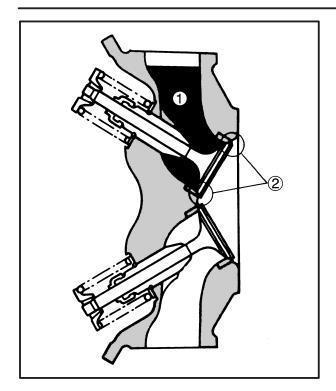


Order	Job name/Part name	Q'ty	Remarks
	Removing the valves and valve springs.		Remove the parts in the order listed.
	Cylinder heads		Refer to "CYLINDER HEADS".
	Rocker arms and camshafts		Refer to "ROCKER ARMS AND CAMSHAFT".
1	Valve cotters	4	Refer to "REMOVING/INSTALLING THE VALVES".
2	Valve spring retainers	2 -	
3	Valve springs	2	
4	Valve (intake)	1	
5	Valve (exhaust)	1	Refer to "INSTALLING THE VALVES".
6	Valve stem seals	2	
7	Valve spring seats	2 -	
			For installation, reverse the removal procedure.



EAS00237





# **REMOVING THE VALVES**

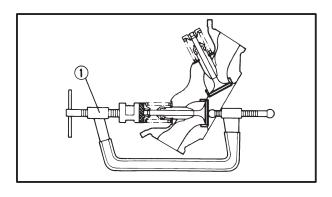
The following procedure applies to all of the valves and related components.

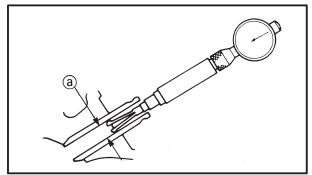
# NOTE: \_

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure that the valves properly seal.

### 1. Check:

- ° valve sealing Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS".
- a. Pour a clean solvent ① into the intake and exhaust ports.
- b. Check that the valves properly seal. There should be no leakage at the valve seat
  (2).





- 2. Remove:
  - ° valve cotters

### NOTE: -

Remove the valve cotters by compressing the valve spring with the valve spring compressor 1.



#### EAS00239

# CHECKING THE VALVES AND VALVE GUIDES The following procedure applies to all of the

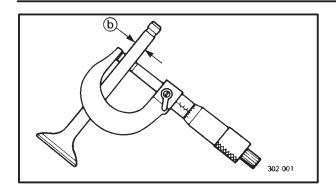
valve and valve guides.

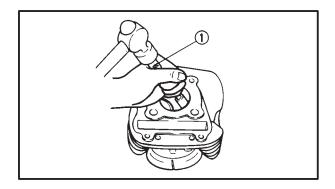
1. Measure:

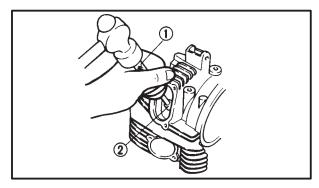
°valve-stem-to-valve-guide clearance

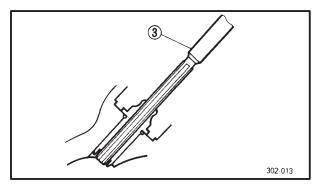
Valve-stem-to-valve-guide clearance = Valve guide inside diameter (a) – Valve stem diameter (b)



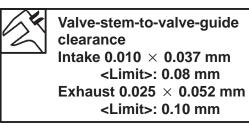








Out of specification  $\rightarrow$  Replace the valve guide.



## 2. Replace.

° valve guide

### NOTE: \_

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to  $100^{\circ}C$  ( $212^{\circ}K$ ) in an oven.

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

### NOTE: -

After replacing the valve guide, reface the valve seat.

Valve guide remover and installer (8 mm) 90890-04014

. . . . . . . . . . . . . . . . . .

- 3. Eliminate:
  - ° carbon deposits
    - (from the valve face and valve seat)

# 4. Check:

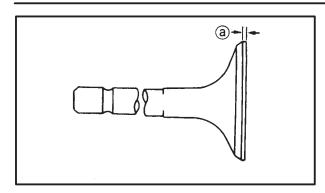
°valve face

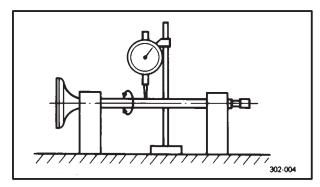
Pitting/wear  $\rightarrow$  Grind the valve face.

° valve stem end

Mushroom shape or diameter larger than the body of the valve stem  $\rightarrow$  Replace the valve.







5. Measure:
 °valve margin thickness ⓐ
 Out of specification → Replace the valve.



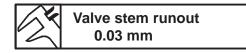
# Valve margin thickness limit 0.8 mm

6. Measure:

°valve stem runout Out of specification  $\rightarrow$  Replace the valve.

NOTE: -

- <sup>°</sup>When installing a new valve, always replace the valve guide.
- ° If the valve is removed or replaced, always replace the valve stem seal.



# EAS00240

# **CHECKING THE VALVE SEATS**

The following procedure applies to all of the valves and valve seats.

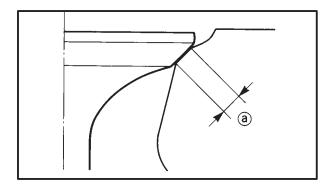
- 1. Eliminate:
  - ° carbon deposits
  - (from the valve face and valve seat)
- 2. Check: °valve seat
  - $\label{eq:Pitting} \mbox{wear} \rightarrow \mbox{Replace the cylinder head}.$
- 3. Measure:
  - ° valve seat width (a)

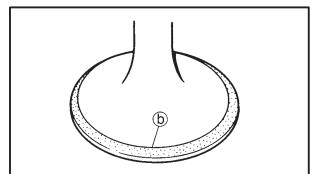
Out of specification  $\rightarrow$  Replace the cylinder head.

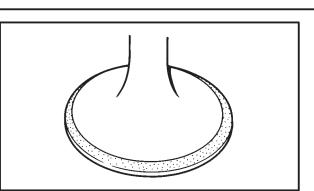
Valve seat width limit Intake: 1.8 mm Exhaust: 1.8 mm

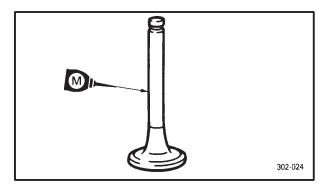
# \*\*\*\*

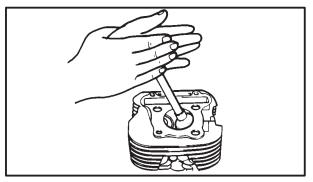
- a. Apply Mechanic's blueing dye (Dykem) (b) onto the valve face.
- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- d. Measure the valve seat width. Where the valve seat and valve face contacted one another, the blueing will have been removed.











- 4. Lap:
  - °valve face
  - ° valve seat

# NOTE: -

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

ENG

 $\bigcirc$ 

### 

a. Apply a coarse lapping compound to the valve face.

# CAUTION:

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

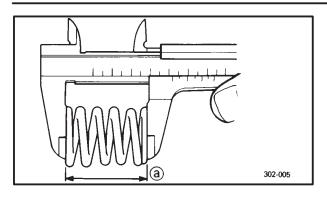
- b. Apply molybdenum disulfide oil onto the valve stem.
- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

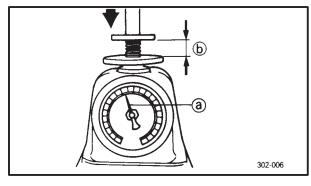
### NOTE: \_

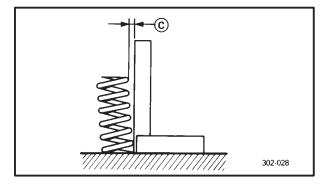
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hand.

- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic's blueing dye (Dykem) onto the valve face.
- h. Install the valve into the cylinder head.
- i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- j. Measure the valve seat width again. If the valve seat width is out of specification, reface and lap the valve seat.







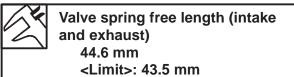


# CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

1. Measure:

- ° valve spring free length (a)
- Out of specification  $\rightarrow$  Replace the valve spring.



- 2. Measure:
- ° compressed spring force (a) Out of specification  $\rightarrow$  Replace the valve spring.

(b) Installed length



Compressed spring force Intake and exhaust spring 160.7 N (16.4 kg) at 40 mm

- 3. Measure:
  - ° valve spring tilt ©

Out of specification  $\rightarrow$  Replace the valve spring.

Spring tilt limit Intake and exhaust valve spring 2.5°/1.9 mm

#### EAS00245 INSTALLING THE VALVES

The following procedure applies to all of the valves and related components.

- 1. Deburr:
  - ° valve stem end (with an oil stone)
- 2. Lubricate:
  - ° valve stem
  - °oil seal New

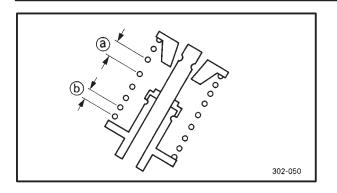
(with the recommended lubricant)

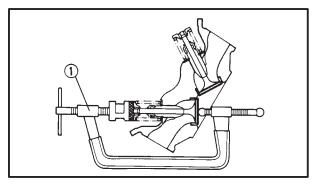
# Recommended lubricant Molybdenum disulfide oil

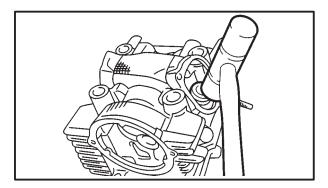
3. Install:

- °valve
- ° lower spring seat
- °oil seal New
- °valve spring
- °upper spring seat

(into the cylinder head)









# NOTE: \_

Install the value spring with the larger pitch a facing up.

(b) Smaller pitch

- 4. Install:
- °valve cotters

# NOTE: \_

Install the value cotters by compressing the value spring with the value spring compressor 1.



Valve spring compressor 90890-04019

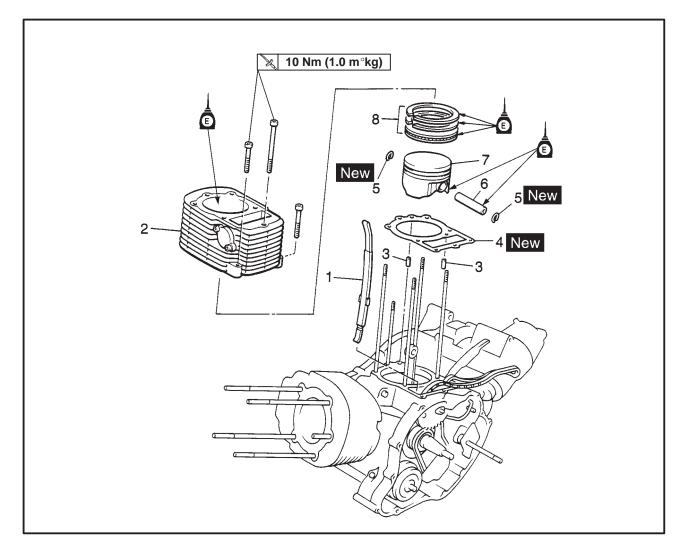
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

**CAUTION:** 

Hitting the valve tip with excessive force could damage the valve.



# **CYLINDERS AND PISTONS**

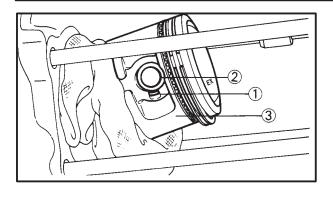


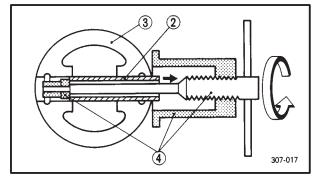
Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6 7 8	Removing the cylinders and pistons Cylinder heads Timing chain guide Cylinder Dowel pins Cylinder gasket Piston pin clips Piston pin Piston Piston ring set	1 2 1 - 2 - 1 1 1 1 -	Remove the parts in the order listed. Refer to "CYLINDER HEADS". The "5EL" mark should face towards the cylinder head. Refer to "INSTALLING THE PISTONS AND CYLINDERS". Refer to "REMOVING/INSTALLING THE CYLINDERS AND PISTONS". For installation, reverse the removal procedure.



EAS00254







# **REMOVING THE PISTONS**

The following procedure applies to all of the pistons.

1. Remove:

- ° piston pin clip  $\bigcirc$
- ° piston pin (2)
- ° piston ③

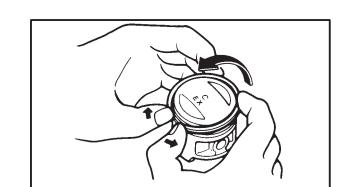
# **CAUTION:**

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

## NOTE: \_\_\_\_

- <sup>o</sup> Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- ° For reference during installation, put an identification mark on each piston crown.
- <sup>o</sup> Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller ④.

Piston pin puller 90890-01304



- 2. Remove:
  - °top ring
  - °2nd ring

°oil ring

## NOTE: -

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

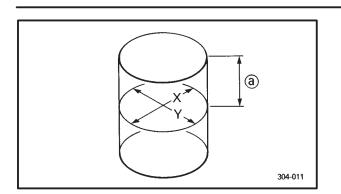
# EB404405

# CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

- 1. Check:
  - °piston wall
  - ° cylinder wall

Vertical scratches  $\rightarrow$  Rebore or replace the cylinder, and replace the piston and piston rings as a set.





- 2. Measure: °piston-to-cylinder clearance
- a. Measure cylinder bore "C" with the cylinder bore gauge.
- (a) 40 mm from the top of the cylinder

### NOTE: -

**CYLINDER AND PISTONS** 

Measure cylinder bore "C" by taking side-toside and front-to-back measurements of the cylinder. Then, find the average of the measurements.

J.	Standard	Wear limit			
Cylinder bore C:	95.00 × 95.01 mm	95.1 mm			
$C = \frac{X + Y}{2}$					

- b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- c. Measure piston skirt diameter "P" with the micrometer.
- (b) 5 mm from the bottom edge of the piston.

	Piston size P
Standard	94.960 $ imes$ 94.975 mm

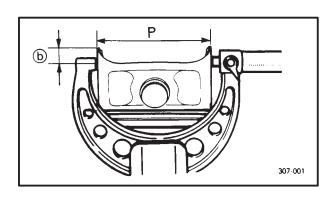
- d. If out of specification, replace the piston and piston rings as a set.
- e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance = Cylinder bore "C" – Piston skirt diameter "P"



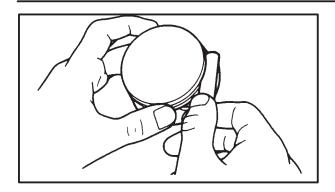
Piston-to-cylinder clearance  $0.025 \times 0.050 \text{ mm}$  <Limit>: 0.15 mm

f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.









# **CHECKING THE PISTON RINGS**

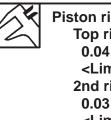
### 1. Measure:

EB404410

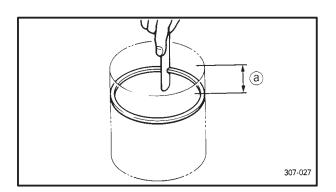
° piston ring side clearance Out of specification  $\rightarrow$  Replace the piston and piston rings as a set.

### NOTE: -

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



Piston ring side clearance Top ring 0.04 imes 0.08 mm <Limit>: 0.1 mm 2nd ring  $0.03 \times 0.07 \text{ mm}$ <Limit>: 0.1 mm



2. Install: ° piston ring (into the cylinder)

### NOTE: -

Using the piston crown pash the ring into the cylinder so that the ring will be at a right angle to the cylinder bore.

- (a) 40 mm from the top of the cylinder
- 3. Measure:
  - ° piston ring end gap

Out of specification  $\rightarrow$  Replace the piston ring.

### NOTE:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

	Piston ring end gap	
14	Top ring	
	0.3 $ imes$ 0.5 mm	
	<limit>: 0.8 mm</limit>	
	2nd ring	
	0.3 $ imes$ 0.45 mm	
	<limit>: 0.8 mm</limit>	
	Oil ring	
	0.2 × 0.7 mm	

EAS00266



# **CHECKING THE PISTON PINS**

The following procedure applies to all of the piston pins.

1. CHECK:

° piston pin

Blue discoloration/grooves  $\rightarrow$  Replace, then inspect the lubrication system.

2. Measure:

° piston pin outside diameter (a) Out of specification  $\rightarrow$  Replace the piston pin.



# Piston pin outside diameter 21.991 $\times$ 22.000 mm

3. Measure:

° piston pin bore inside diameter (b) Out of specification  $\rightarrow$  Replace the piston



Piston pin bore inside diameter 22.004  $\times$  22.015 mm

4. Calculate:

° piston-pin-to-piston clearance Out of specification  $\rightarrow$  Replace the piston pin.

Piston-pin-to-piston clearance = Piston pin bore size (b) – Piston pin outside diameter (a)



Piston-pin-to-piston clearance 0.004  $\times$  0.024 mm

### EB404701

INSTALLING THE PISTONS AND CYLINDERS

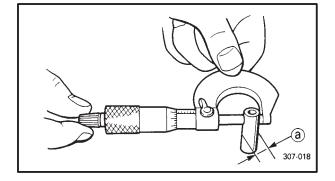
The following procedure applies to all of the pistons and cylinders.

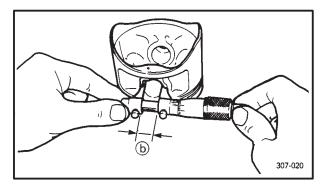
1. Install:

- °oil ring expander
- ° lower oil ring rail
- ° upper oil ring rail
- °2nd ring
- ° top ring

# NOTE: -

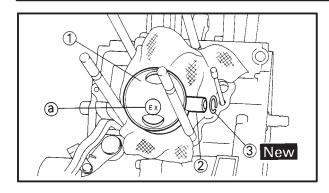
Be sure to install the piston rings so that the manufacuturer's marks or numbers face up.





# **CYLINDERS AND PISTONS**

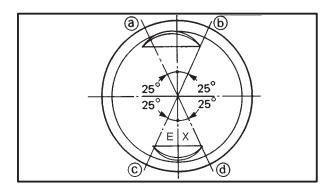


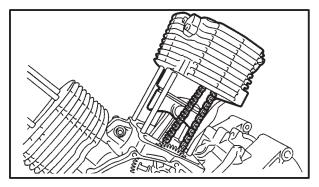


- 2. Install:
  - ° piston (1)
  - ° piston pin ②
  - ° piston pin clip (New) ③

# NOTE: -

- °Apply engine oil onto the piston pin.
- <sup>o</sup> Make sure that the "EX" mark (a) on the piston faces towards the exhaust side of the engine.
- <sup>°</sup>Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.
- 3. Install:
  - °gasket (New)
- ° dowel pins
- 4. Lubricate:
  - °piston
  - ° piston rings
  - °cylinder
    - (with the recommended lubricant)





# Recommended lubricant Engine oil

- 5. Offset:
  - ° piston ring end gaps
- (a) Top ring
- (b) Lower oil ring rail
- © Upper oil ring rail
- (d) 2nd ring
- 6. Install:

°cylinder

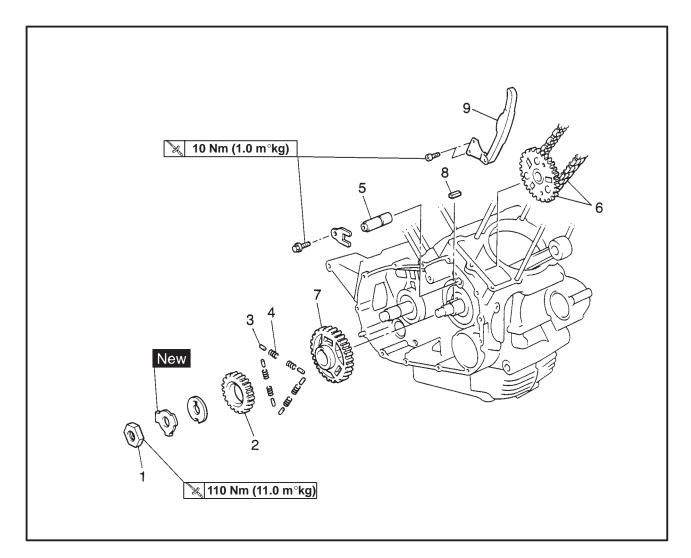
- NOTE: \_
- °While compressing the piston rings with one hand, install the cylinder with the other hand.
- ° Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

# , Cylinder bolt

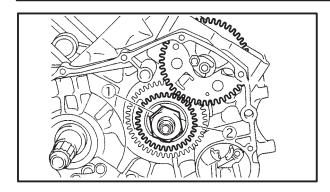
10 Nm (1.0 m°kg)

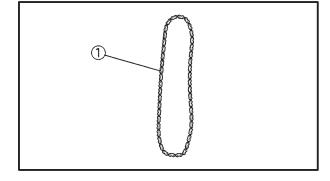


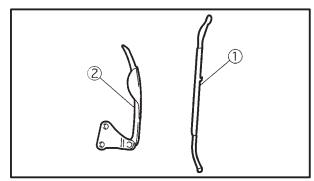




Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6 7 8 9	Removing the timing gears Cylinder heads Cylinders Clutch assembly Primary drive gear nut Timing drive gear Dowel pins Springs Timing chain drive gear shaft Timing chain drive gear sprocket/ Timing chain Primary drive gear Straight key Timing chain guide	1 - 1 6 - 1 - 1/1 1 1 1 -	Remove the parts in the order listed. Refer to "CYLINDER HEAD". Refer to "CYLINDERS AND PISTONS". Refer to "CLUTCH". Refer to "REMOVING/INSTALLING THE TIMING DRIVE GEARS". Refer to "INSTALLING THE TIMING DRIVE GEARS". For installation, reverse the removal procedure.









# REMOVING THE TIMING DRIVE GEAR Front cylinder

- 1. Straighten the lock washer tab.
- 2. Remove:

° primary drive gear nut ①

# NOTE: -

While holding the generator rotor with the sheave holder, loosen the primary drive gear nut.

- 3. Remove:
  - ° timing drive gear (2)
  - °dowel pins
- °springs

# NOTE: \_

When removing the timing drive gear, the dowel pins and springs are scatter and dropping down. Do not missing them.

# Rear cylinder

# NOTE: \_

When removing the rear cylinder timing gear, repeat the front cylinder timing gear removal procedure. However, note the following points.

- 1. Remove:
  - ° rotor assembly
  - ° dowel pins
- °springs
- ° timing drive gear
- Refer to "GENERATOR AND STARTER CLUTCH".

EB401422

# CHECKING THE TIMING CHAINS, CAMSHAFT SPROCKETS, AND TIMING CHAIN GUIDES

The following procedure applies to all of the timing chains, camshaft sprockets, and timing chain guides.

- 1. Check:
  - ° timing chain ①

Damage/sitffness  $\rightarrow$  Replace the timing chain and its respective camshaft sprockets as a set.

2. Check:

° camshaft sprocket

Damage/wear  $\rightarrow$  Replace the respective camshaft sprockets and the respective timing chain as a set.

- 3. Check:
  - ° timing chain guide (exhaust side) ①
  - ° timing chain guide (intake side) 2
  - °Damage/wear  $\rightarrow$  Replace the defective part(-s).



# CHECKING THE PRIMARY DRIVE

1. Check:

EAS00292

- ° primary drive gear
- <sup>o</sup> primary driven gear
   Damage/wear → Replace the primary drive and primary driven gears as a set.
   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.
- 2. Check:
  - ° primary-drive-gear-to-primary-driven-gear free play

Free play exists  $\rightarrow$  Replace the primary drive and primary driven gears as a set.

# INSTALLING THE TIMING DRIVE GEARS

 Install: <sup>o</sup>timing chain (onto the timing chain drive gear sprocket)

NOTE: -

To prevent the timing chain from falling into the crankcase, fasten it with a wire.

- 2. Install:
  - ° timing chain drive gear sprocket ° timing chain drive gear shaft

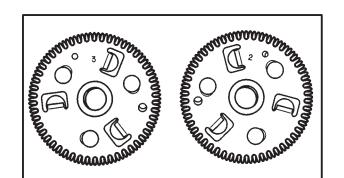
### NOTE: -

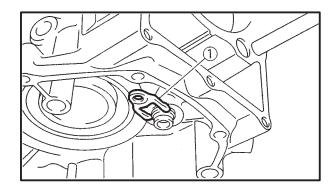
Make sure that the "2" mark on the timing chain drive gear sprocket is installed in the rear cylinder and the "3" mark on the timing chain drive gear sprocket is installed in the front cylinder.

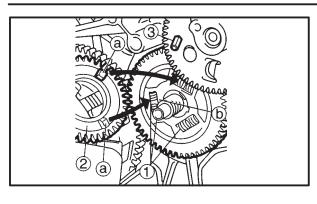
- 3. Install:
- ° stopper plate ① ° stopper plate bolt 🗽 10 Nm (1.0 m°kg)

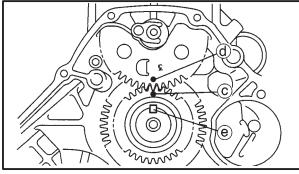
# NOTE: -

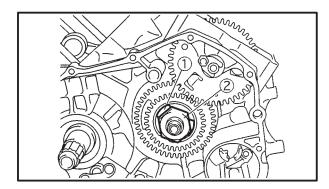
Turn the timing chain drive gear shaft so that the stopper plate fits correctly into the slot and then fasten the stopper plate with the bolt.













# Front cylinder

- 1. Install:
  - (Front cylinder)
  - ° springs ① ° dowel pins
  - ° timing drive gear 2

# NOTE: -

- ° Insert the suitable pin (3) into the hole of timing chain drive gear sprocket and match the gear teeth.
- °Push the projections ⓐ on the timing drive gear into the spaces ⓑ.
- <sup>o</sup>Align the punch mark <sup>©</sup> on the timing drive gear, the punch mark <sup>(D)</sup> on the timing chain drive gear sprocket and the key posision <sup>(E)</sup> as shown.
- 2. Install:
  - ° claw washer
  - °lock washer ① New
  - ° primary drive gear nut 2

🔌 110 Nm (11.0 m°kg)

# NOTE: -

While holding the generator retor with the sheave holder, tighten the primary drive gear nut.

3. Bend the lock washer tab along a flat side of the nut.

# **Rear cylinder**

# NOTE: -

When installing the rear cylinder timing gear, repeat the front cylinder timing gear installation procedure. However, note the following points.

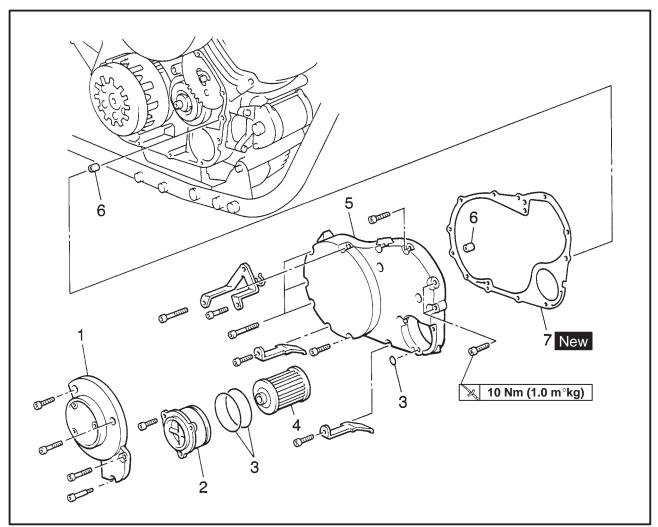
- 1. Install:
  - °springs
  - ° dowel pins
  - ° timing drive gear
  - ° rotor assembly
  - Refer to "GENERATOR AND STARTER CLUTCH".

CLUTCH



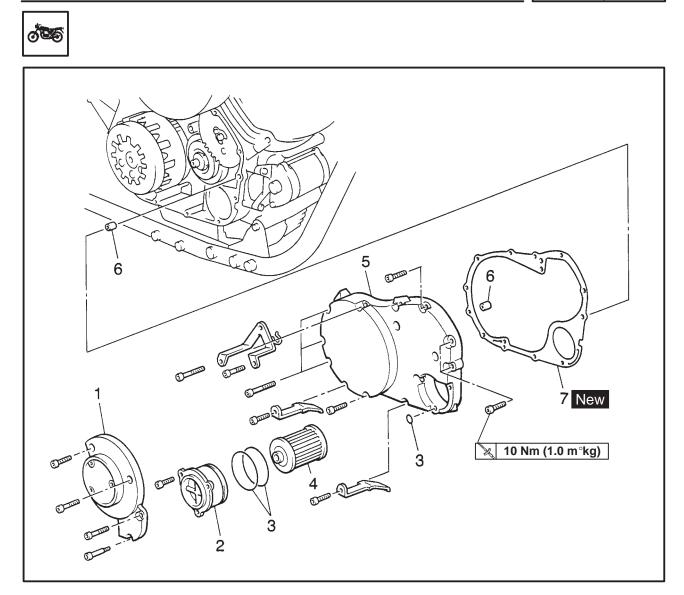
# CLUTCH RIGHT CRANKCASE COVER





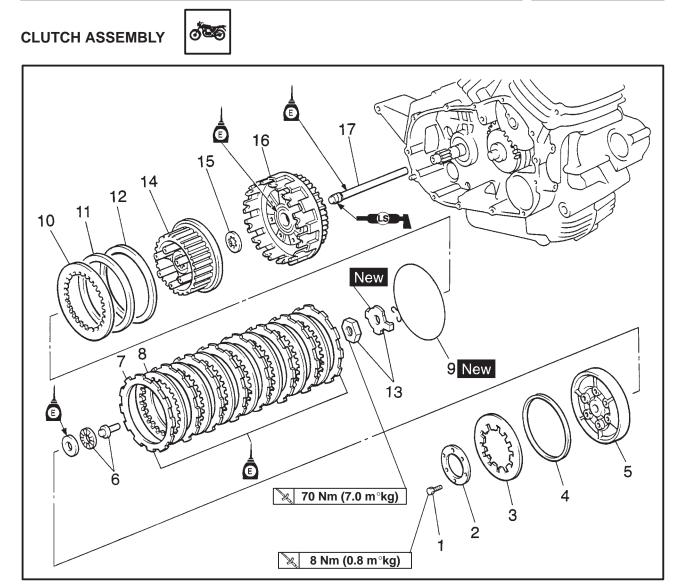
Order	Job name/Part name	Q'ty	Remarks
	Removing the right clutch cover		Remove the parts in the order listed. Stand the motorcycle on a level surface.
			Securely support the motorcycle so there is no danger of it falling over.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Muffler assembly Exhaust pipes Brake pedal/Footrest Rear brake master cylinder/bracket	-	Refer to "ENGINE REMOVAL".
1	Oil filter cover plate	1	
23	Oil filter cover O-rings	1	
4	Oil filter	1	
5	Right crankcase cover	1	





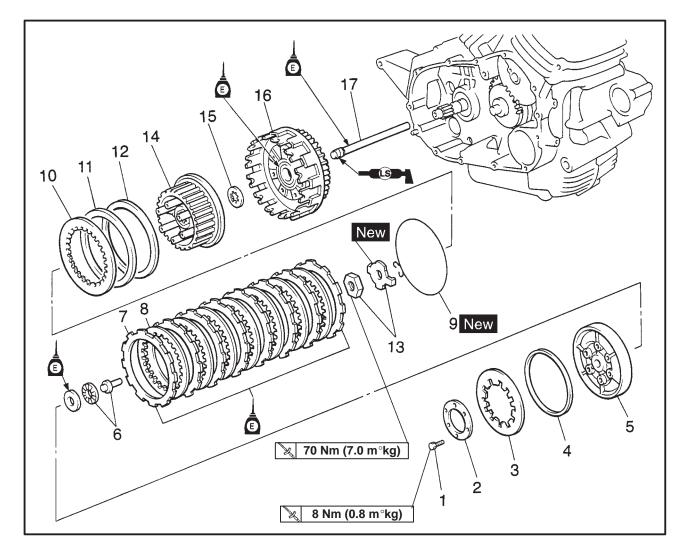
Order	Job name/Part name	Q'ty	Remarks
6	Dowel pins	2	For installation, reverse the removal procedure.
7	Crankcase cover gasket	1	





Order	Job name/Part name	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order listed.
1	Clutch spring bolts	6 -	
2	Clutch spring plate	1	
3	Clutch spring	1	
4	Clutch spring seat	1	
5	Clutch pressure plate	1	Refer to "INSTALLING THE CLUTCH".
6	Bearing/shart clutch push rod	1/1	
7	Friction plates	6	
8	Clutch plates	5 -	
9	Wire circlip	1 -	
10	Clutch plate	1	
11	Damper	1	Refer to "REMOVING/INSTALLING
12	Clutch damper plate	1	THE CLUTCH."
13	Nut/lock washer	1/1	
14	Clutch boss	1 -	

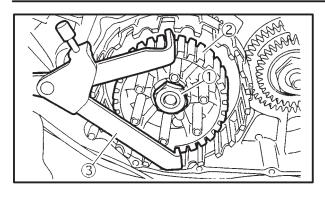


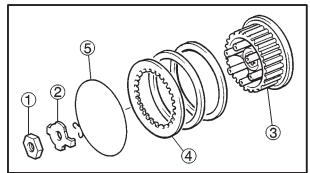


Order	Job name/Part name	Q'ty	Remarks
15	Thrust washer	1	For installation, reverse the removal procedure.
16	Clutch housing	1	
17	Long clutch push rod	1	









## **REMOVING THE CLUTCH**

- 1. Straighten the lock washer tab.
- 2. Loosen:
- ° clutch boss nut 1

#### NOTE: -

EAS00278

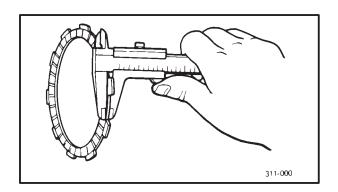
While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

# Clutch holding tool 90890-04086

- 3. Remove:
  - ° clutch boss nut ①
  - ° lock washer 2
  - $^{\circ}$  clutch boss (3)

## NOTE: \_

There is a built-in damper between the clutch boss 3 and the clutch plate 4. It is not necessary to remove the wire circlip 5 and disassemble the built-in damper unless there is serious clutch chattering.



## EAS00281

## CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

- 1. Check:
  - ° friction plate

Damage/wear  $\rightarrow$  Replace the friction plates as a set.

- 2. Measure:
  - ° friction plate thickness

Out of specification  $\rightarrow$  Replace the friction plates as a set.

## NOTE: -

Measure the friction plate at four places.



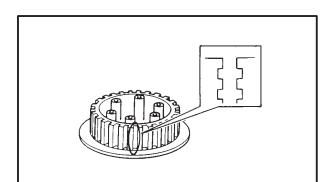
Friction plate thickness 2.9 × 3.1 mm <Limit>: 2.8 mm

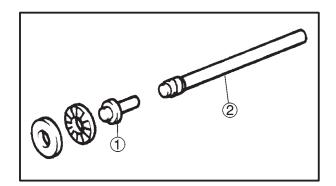


**CLUTCH** 

## CHECKING THE PRESSURE PLATE

- 1. Check:
  - ° pressure plate
  - $Cracks/damage \rightarrow Replace.$
  - °bearing
  - Damage/wear  $\rightarrow$  Replace.





## EAS00285

## **CHECKING THE CLUTCH BOSS**

- 1. Check:
  - $^{\circ}$  clutch boss splines Damage/pitting/wear  $\rightarrow$  Replace the clutch boss.

## NOTE: -

Pitting on the clutch boss splines will cause erratic clutch operation.

# 

## CHECKING THE CLUTCH PUSH RODS

- 1. Check:
  - ° short clutch push rod (1)° long clutch push rod (2)Cracks/damage/wear  $\rightarrow$  Replace the defective part(-s).
- 2. Measure:

° long clutch push rod bending limit Out of specification  $\rightarrow$  Replace the long clutch push rod.



Long clutch push rod bending limit 0.5 mm



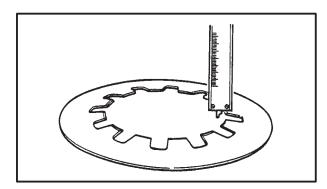
# CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

- 1. Check:
  - ° clutch plate

 $\label{eq:def-Damage} \ensuremath{\mathsf{Damage}} \to \ensuremath{\mathsf{Replace}}\xspace \ensuremath{\mathsf{the}}\xspace \ensuremath{\mathsf{clutch}}\xspace \ensuremath{\mathsf{pamage}}\xspace \ensuremath{\mathsf{space}}\xspace \ensuremath{\mathsf{space}}\x$ 

The second secon



2. Measure:

° clutch plate warpage (with a surface plate and thickness gauge (1))

Out of specification  $\rightarrow$  Replace the clutch plates as a set.



Clutch plate warpage limit Less than 0.1 mm

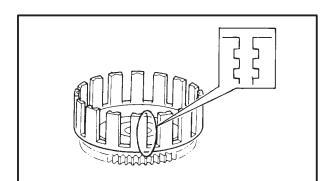
## EAS00283

# CHECKING THE CLUTCH SPRING AND CLUTCH SPRING SEAT PLATE

- Check:
   °clutch spring plate
   Damage → Replace.
- 2. Check:
  - ° clutch spring plate seat Damage  $\rightarrow$  Replace.
- 3. Measure:
  - $^\circ$  clutch spring free height Out of specificatrion  $\rightarrow$  Replace the clutch spring



Clutch spring free height 7.2 mm <Limit>: 6.5 mm



# 

## CHECKING THE CLUTCH HOUSING

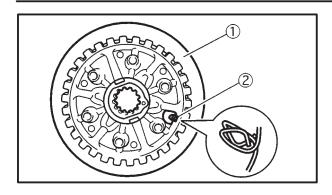
- 1. Check:
  - $^{\circ}$  clutch housing dogs

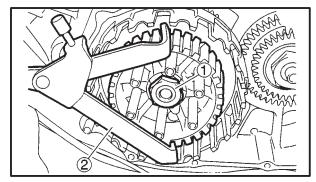
Damage/pitting/wear  $\rightarrow$  Deburr the clutch housing dogs or replace the clutch housing.

NOTE: \_

Pitting on the clutch housing dogs will cause erratic clutch operation.







## **INSTALLING THE CLUTCH**

**CLUTCH** 

1. Install:

EAS00295

 $^{\circ}$  clutch housing (1)

## NOTE: \_\_

- $^\circ$  If the wire circlip (2) has been removed, carefully install a new one as shown.
- 2. Tighten:
  - °lock washer New
  - ° clutch boss  $\overline{\text{nut}(1)}$
- 🎉 70 Nm (7.0 m°kg)

## NOTE: .

While holding the clutch boss with the clutch holding tool 2 , tighten the clutch boss nut.



- 3. Bend the lock washer tab along a flat side of the nut.
- 4. Lubricate:
  - $^{\circ}$  long clutch push rod
  - ° short clutch push rod
  - (with the recommended lubricant)



- 5. Lubricate:
  - <sup>o</sup> friction plates
     <sup>o</sup> clutch plates
     (with the recommended lubricant)



Recommended lubricant Engine oil

- 6. Install:
  - ° friction plates
  - ° clutch plates
  - ° long clutch push rod
  - $^\circ {\rm short}$  clutch push rod
  - °bearing
  - °washer



## NOTE: -

Make sure that the semicircular slot (a) in the friction plate is aligned with the mark (b) on the clutch housing.

CLUTCH

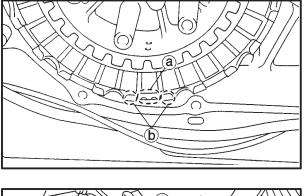
- 7. Install:
  - ° clutch pressure plate
  - ° clutch spring plate seat
  - ° clutch spring ①
  - ° clutch spring plate 2
  - ° clutch spring bolts (3)

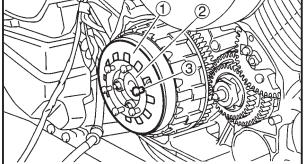
## NOTE: \_

Tighten the clutch spring bolts in stages and in a crisscross pattern.



Clutch spring bolt 8 Nm (0.8 m°kg)

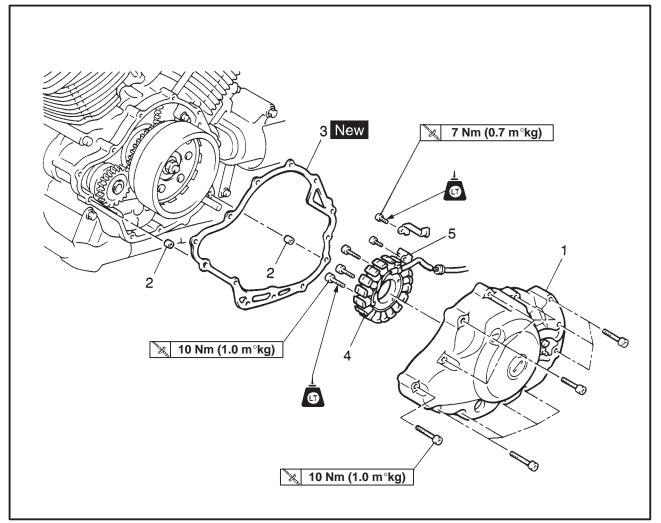






## GENERATOR AND STARTER CLUTCH STATOR COIL AND PICKUP COIL





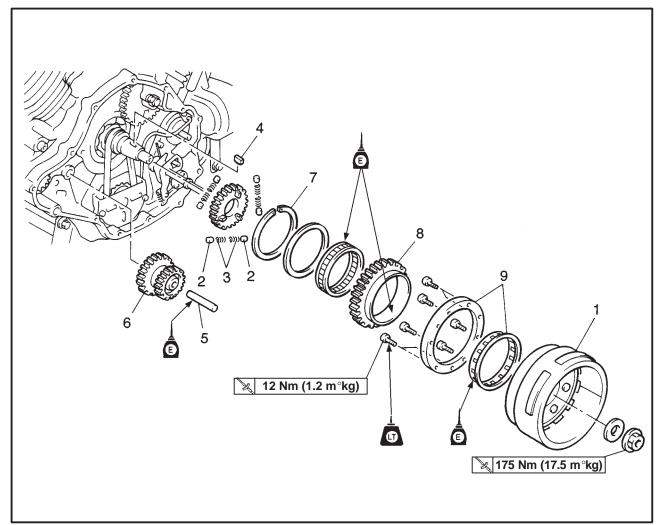
Order	Job name/Part name	Q'ty	Remarks
	Removing the startor coil Engine oil		Remove the parts in the order listed Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Left side cover AC magneto lead/pickup lead/ sidestand switch lead Footrest/shift pedal Sidestand Clutch adjusting cover/clutch cable	-	Refer to "ENGINE REMOVAL".
1	Left crankcase cover	1	
2 3	Dowel pins Gasket	2	
4	Stator coil		
5	Pickup coil	1	
			For installation, reverse the removal procedure.

# GENERATOR AND STARTER CLUTCH



## GENERATOR AND STARTER CLUTCH





Order	Job name/Part name	Q'ty	Remarks
1	Removing the generator and starter clutch.	1 -	Remove the parts in the order listed
2 3 4 5 6 7 8 9	Dowel pins Springs Woodruff key Shaft Starter idler gear Circlip Starter clutch drive gear Starter clutch assembly	6 6 1 - 1 1 1 - 1 -	Refer to "REMOVING/INSTALLING THE GENERATOR." Refer to "INSTALLING THE GENERATOR." For installation, reverse the removal procedure.

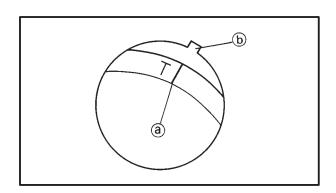


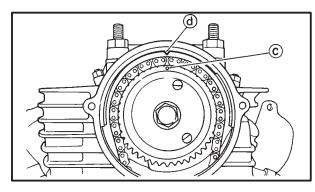
## **REMOVING THE GENERATOR**

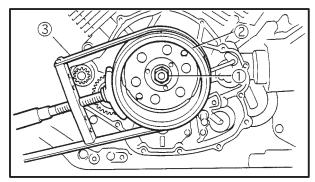
1. Remove:

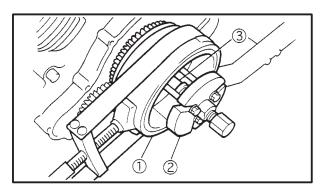
EAS00347

- ° camshaft sprocket cover
- °tappet covers
- Refer to "REAR CYLINDER HEAD."









- 2. Align:
- $^{\circ}$  "T" mark (a) (with the stationary pointer (b))
- •••••
- a. Temporarily install the AC magneto cover without the pickup coil and stator coil.
- b. Turn the crankshaft clockwise.
- c. Align the "T" mark ⓐ with the stationary pointerⓑ on the crankcase cover (left) when the rear piston is at TDC on the compression stroke.
- d. Check that the rear piston is at TDC in the compression stroke.
- e. The rear piston is at TDC on the compression stroke when there is clearance at both of the rocker arms. If there is no clearance then turn the crankshaft clockwise one full turn.
- f. When the "T" mark is aligned with the stationary pointer the punch mark ⓒ on the camshaft sprocket should be aligned with the stationary pointer ⓓ on the cylinder head.
- \*\*\*\*\*\*
- 3. Remove:
  - ° generator rotor nut ① ° washer

## NOTE:

- °While holding the generator rotor ② with the sheave holder ③, loosen the generator rotor nut.
- ° Do not allow the sheave holder to touch the projection on the generator rotor.

# Sheave holder 90890-01701

- 4. Remove:
  - ° generator rotor ①
  - (with the flywheel puller set (2) and adapter (3))
  - $^\circ \text{woodruff}$  key



## NOTE: -

- <sup>°</sup>Remove the rotor by pushing back the rotor, the flywheel puller 2 and the adapter 3.
- ° Install the flywheel puller bolts and tighten the center bolt, making sure that the tool body stays parallel to the rotor. If necessary, one holding bolt may be backed out slightly for realignment of the tool.
- °When rotor is removed, the dowel pins and springs are scatter and dropping down. Do not missing them.

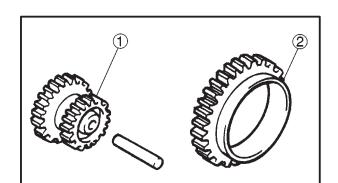


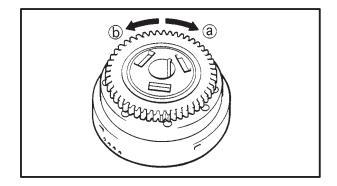
90890-01701 Flywheel puller: 90890-01362 90890-04131

#### EAS00349

#### CHECKING THE STARTER CLUTCH

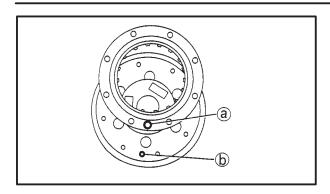
- 1. Check:
  - ° starter clutch idle gear (1)° starter clutch drive gear (2)Burrs/chips/roughness/wear Replace the defective part(-s).
- 2. Check:
  - ° starter clutch operation
- a. When turning the starter clutch drive gear counter clockwise (b), the starter clutch and the starter clutch drive gear should engage. If the starter clutch drive gear and starter clutch do not engage, the starter clutch is faulty and must be replaced.
- b. When turning the starter clutch drive gear clockwise (a), it should turn freely. If the starter clutch drive gear does not turn freely, the starter clutch is faulty and must be replaced.
- . . . . . . . . . . . . . . . .

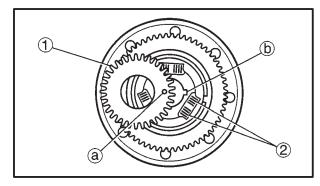


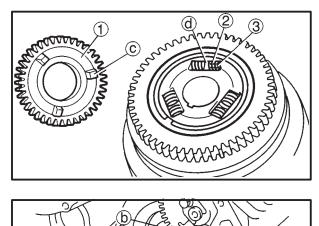


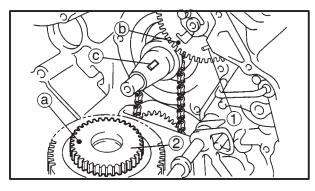
# **GENERATOR AND STARTER CLUTCH**

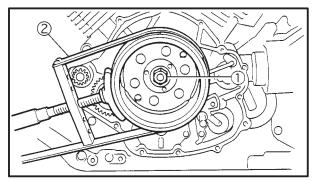












#### **INSTALLING THE GENERATOR**

1. Install:

° starter clutch assembly

## NOTE: -

Align the hole (a) on the starter clutch housing with the hole (b) on the rotor.



#### 2. Install:

timing drive gear 1
springs 2
dowel pins 3

#### NOTE: -

- °Align the punch mark (a) on the timing drive gear with the key slide (b).
- °Push the projections  $\bigcirc$  on the timing drive gear into the space  $\bigcirc$ .

#### 3. Install:

° rotor assembly

#### NOTE: -

- ° Insert the suitable pin ① into the hole of timing chain drive gear sprocket and match the gear teeth.
- <sup>o</sup> Align the punch mark (a) on the timing drive gear (2) the punch mark (b) on the timing chain drive gear sprocket and the key position (C) as shown.
- ° When installing the rotor, make sure the woodruff key is properly seated in the key way of the crankshaft.
- 4. Tighten:

NOTE: -

° nut (rotor) ①

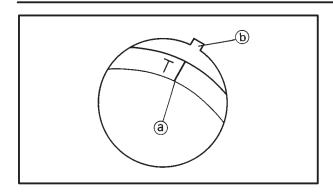
# ) **175 Nm (17.5 m°kg)**

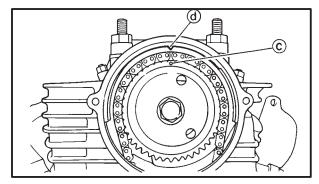
Tighten the rotor nut (1) while holding the magneto rotor with a sheave holder (2).



# **GENERATOR AND STARTER CLUTCH**







- 4. Check:
  - °TDC on the compression stroke If the marks do not align  $\rightarrow$  Adjust.

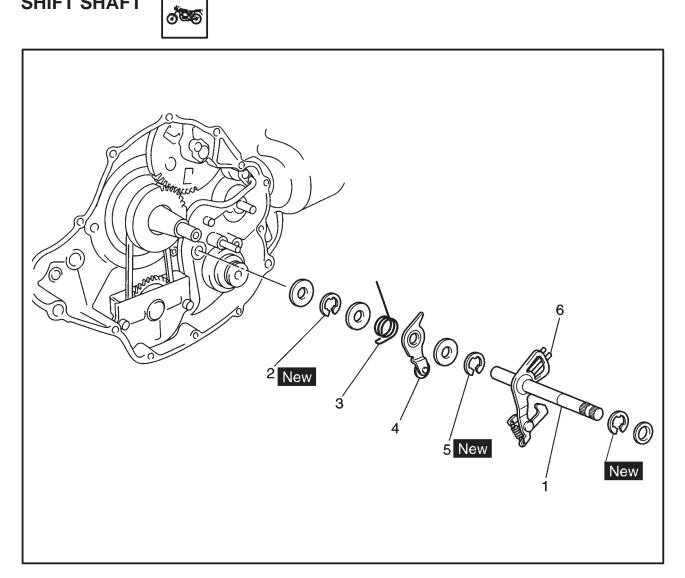
# a. Align the "T" mark (a) with the stationary

- pointer (b) on the left crankcase cover.
- b. When the "T" mark is aligned with the stationary pointer, the punch mark © on the camshaft sprocket should be aligned with the stationary pointer (d) on the cylinder head.

SHIFT SHAFT

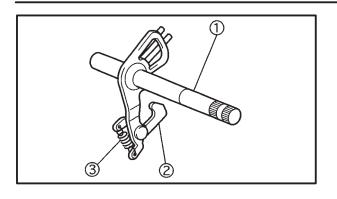


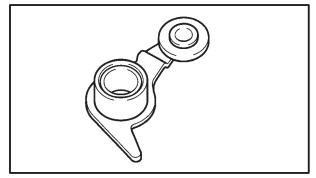


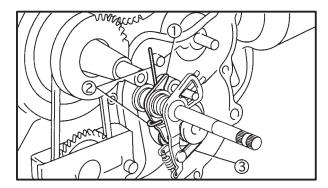


Order	Job name/Part name	Q'ty	Remarks
	Removing the shift shaft and stopper lever.		Remove the parts in the order listed.
	Engine oil		Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.
	Left crankcase cover Rotor assembly	-	Refer to "GENERATOR AND STARTER CLUTCH".
1	Shift shaft	1 -	-
2	Circlip	1	
3	Torsion spring (stopper lever)	1	Refer to "INSTALLING THE SHIFT
4	Stopper lever	1	SHAFT".
5	Circlip	1	
6	Torsion spring (shift shaft)	1 -	
			For installation, reverse the removal procedure.









## EAS00328

SHIFT SHAFT

## CHECKING THE SHIFT SHAFT

- 1. Check:
  - $^{\circ}$  shift shaft 1
  - $^{\circ}$  shift lever (2)
  - Bends/damage/wear  $\rightarrow$  Replace.
  - ° shift lever spring ③
  - Damage/wear  $\rightarrow$  Replace.

#### EB408410

## CHECKING THE STOPPER LEVER

- 1. Check:
  - ° stopper lever

Bends/damage  $\rightarrow$  Replace.

Roller turns roughly  $\rightarrow$  Replace the stopper lever.

## EAS00331

## **INSTALLING THE SHIFT SHAFT**

1. Install:

° stopper lever ① ° stopper lever spring ②

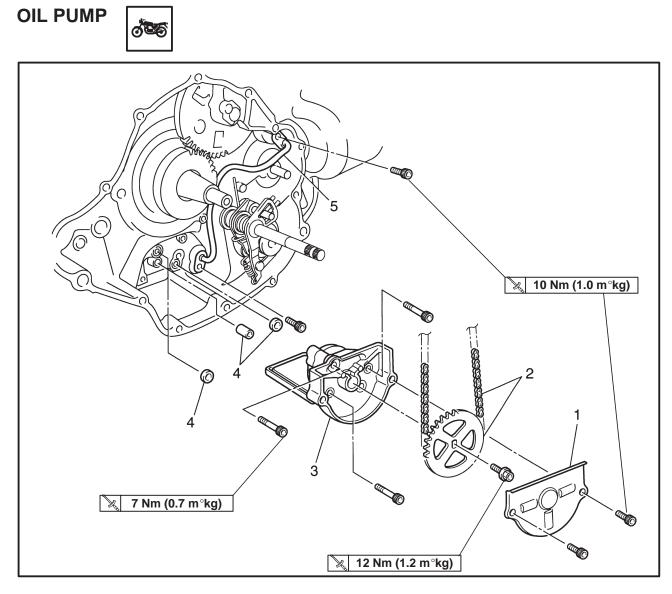
°shift shaft lever ③

## NOTE: \_

- ° Hook the ends of the stopper lever spring onto the stopper lever and the crankcase boss.
- ° Mesh the stopper lever with the shift drum segment assembly.



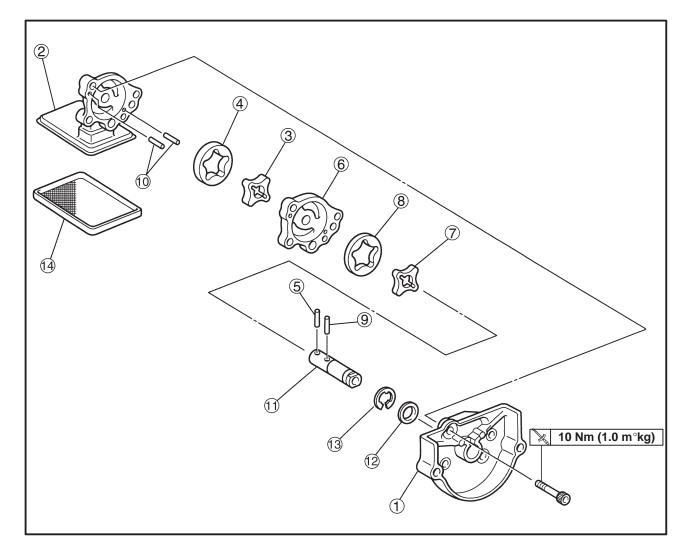




Order	Job name/Part name	Q'ty	Remarks
	Removing the oil pump Rotor assembly		Remove the parts in the order listed. Refer to "GENERATOR AND STARTER CLUTCH".
	Crankcase cover (right)		Refer to " CLUTCH".
1	Driven gear cover	1	
2	Driven gear (oil pump)/Oil pump drive	1/1	
	chain		
3	Oil pump assembly	1	
4	O-rings/dowel pin	2/1	
5	Oil delivery pipe	1	
			For installation, reverse the removal procedure.

OIL PUMP





Order	Job name/Part name	Q'ty	Remarks
123456789911234	Disassembling the oil pump Oil pump cover Oil pump body Oil pump rotor (inner) Oil pump rotor (outer) Pin Oil pump body Oil pump rotor (inner) Oil pump rotor (outer) Pin Dowel pins Oil pump shaft Washer Circlip Oil strainer	1 1 - 1 - 1 - 1 - 1 - 2 1 1 1 1	Disassembly the parts in the order listed.          Refer to "ASSEMBLING THE OIL         PUMP".         Refer to "ASSEMBLING THE OIL         PUMP".         For assembly, reverse the disassembly procedure.



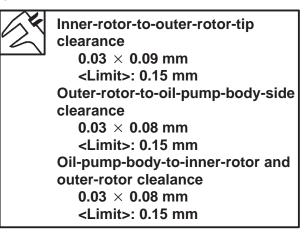


## CHECKING THE OIL PUMP

## 1. Check:

EAS00364

- °oil pump driven gear
- ° oil pump body
- ° oil pump driven gear cover
- Cracks/damage/wear  $\rightarrow$  Replace the defective part(-s).
- 2. Measure:
  - ° inner-rotor-to-outer-rotor-tip clearance (a)
  - ° outer-rotor-to-oil-pump-body-side clearance b
  - $^\circ$ oil-pump-body-to-inner-rotor-and-outer-rotor clearance C
  - Out of specification  $\rightarrow$  Replace the oil pump.
- 1 Inner rotor
- (2) Outer rotor
- ③ Oil pump body



## EAS00367

## CHECKING THE OIL DELIVERY PIPES

The following procedure applies to all of the oil delivery pipes.

- 1. Check:
  - ° oil delivery pipes ①
  - Damage  $\rightarrow$  Replace.

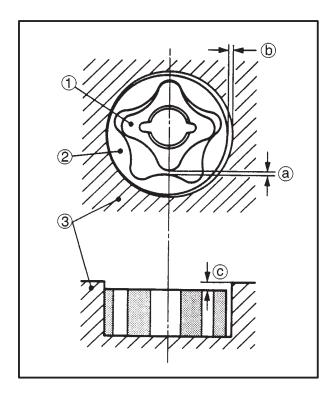
Obstruction  $\rightarrow$  Wash and blow out with compressed air.

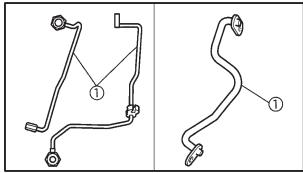
## EAS00368

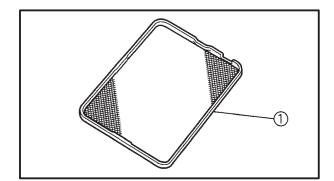
## CHECKING THE OIL STRAINER

- 1. Check:
  - °oil strainer (1)
  - Damage  $\rightarrow$  Replace.

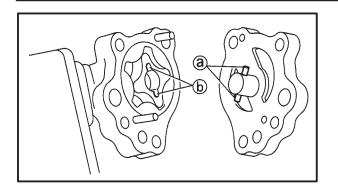
 $\label{eq:contaminants} \mbox{--} Clean \mbox{ with engine oil.}$ 











# ASSEMBLING THE OIL PUMP

**OIL PUMP** 

1. Assemble:

°oil pump

🔀 10 Nm (1.0 m°kg)

## CAUTION:

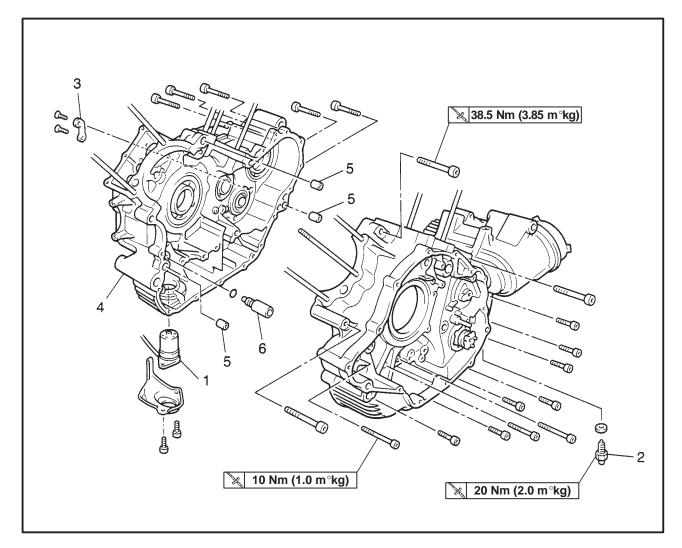
After tightening the bolts, make sure that the oil pump turns smoothly.

#### NOTE: \_\_\_\_

Align the pin a with the slots b on the inner rotor.

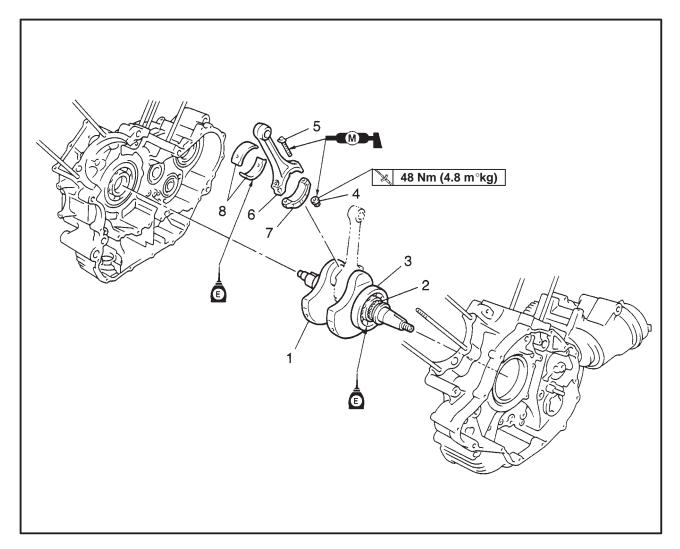


## CRANKSHAFT AND CONNECTING RODS CRANKCASE



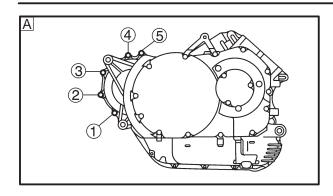
Order	Job name/Part name	Q'ty	Remarks
1 2 3 4	Removing the crankshaft assembly Engine assembly Cylinder head Cylinder and piston Clutch assembly AC magneto and starter clutch Shift shaft Oil pump assembly Oil level gauge Neutral switch Shift shaft stopper plate Crankcase (right)	1 1 1 1	Remove the parts in the order listed. Refer to "ENGINE REMOVAL". Refer to "CYLINDER HEADS". Refer to "CYLINDERS AND PISTONS". Refer to "CLUTCH". Refer to "GENERATOR AND STARTER CLUTCH". Refer to "SHIFT SHAFT". Refer to "SHIFT SHAFT". Refer to "OIL PUMP". Refer to "OIL PUMP".
5 6	Dowel pins Relief valve	3 1	THE CRANKCASE". For installation, reverse the removal procedure.

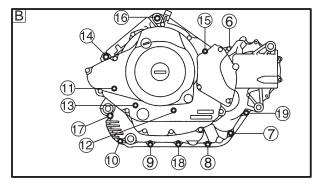


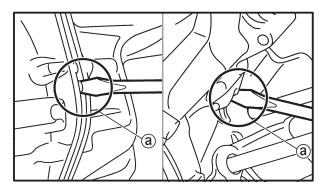


Order	Job name/Part name	Q'ty	Remarks
	Removing the crankshaft and connecting rod		Remove the parts in the order listed.
1	Crankshaft assembly	1	Refer to "REMOVING/INSTALLING THE CRANKSHAFT".
2	Oil pump drive sprocket	1	
3	Bearing	1	
4	Nuts (connecting rod caps)	4 -	
5	Connecting rod bolts	4	Refer to "INSTALLING THE
6	Connecting rods	2 -	CRANKSHAFT".
7	Connecting rod caps	2 -	Refer to "REMOVING THE CONNECTING
8	Plain bearings	4 -	RODS/INSTALLING THE CRANKSHAFT". For installation, reverse the removal procedure.









#### DISASSEMBLING THE CRANKCASE

- 1. Remove:
  - ° crankcase bolts

#### NOTE: \_\_\_\_

EAS00386

- °Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.
- <sup>o</sup>Loosen the bolts in decreasing numerical order (refer to the numbers in the illustration.)
- A Right crankcase
- B Left crankcase

2. Remove:

° right crankcase

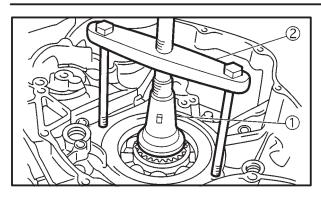
#### NOTE: -

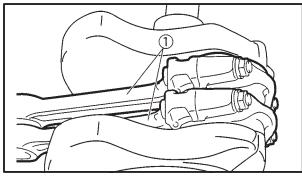
For this removal, slits a in the crankcase can be use as shown.

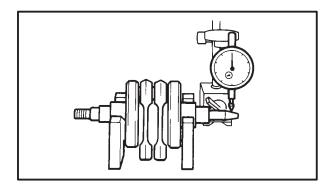
## CAUTION:

Use a soft hammer to tap on one side of the crankcase. Tap only on reinforced portions of the crankcase. Do not tap on the crankcase mating surfaces. Work slowly and carefully. Make sure that the crankcase halves separate evenly.









#### **REMOVING THE CRANKSHAFT**

1. Remove:

° crankshaft assembly ①

## NOTE: \_\_

EB412111

- <sup>°</sup>Remove the crankshaft assembly with the crankcase separating tool ②.
- <sup>o</sup>Make sure that the crankcase separating tool is centered over the crankshaft assembly.



#### EB412121

## **REMOVING THE CONNECTING RODS**

- 1. Remove:
  - $^{\circ}$  connecting rods (1)
  - ° big end bearings

#### NOTE: -

Identify the position of each big end bearing so that it can be reinstalled in its original place.

#### EB413404

## CHECKING THE CRANKSHAFT AND CON-NECTING RODS

- 1. Measure:
  - ° crankshaft runout

Out of specification  $\rightarrow$  Replace the crank-shaft.



#### Crankshaft runout Less than 0.02 mm

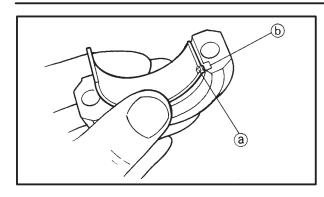
- 2. Check:
  - ° crankshaft journal surfaces
  - ° crankshaft pin surfaces
  - ° bearing surfaces
  - Scratches/wear  $\rightarrow$  Replace the crankshaft.
- 3. Measure:
  - ° crankshaft-pin-to-big-end-bearing clearance

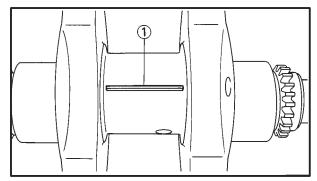
Out of specification  $\rightarrow$  Replace the big end bearings.

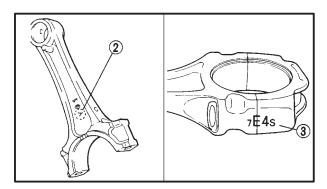
Crankshaft-pin-to-big-end-bearing clearance 0.044  $\times$  0.073 mm

The following procedure applies to all of the connecting rods.









## CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

- a. Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
- b. Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

## NOTE: -

Align the projections (a) on the big end bearings with the notches (b) in the connecting rod and connecting rod cap.

- c. Put a piece of  $\mathsf{Plastigauge}^{\texttt{B}}(1)$  on the crankshaft pin.
- d. Assemble the connecting rod halves.

## NOTE: ·

- <sup>°</sup> Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- ° Apply molybdenum disulfide grease onto the bolts, threads, and nut seats.
- <sup>o</sup> Make sure that the "Y" mark (2) on the connecting rod faces towards the left side of the crankshaft.
- <sup>o</sup> Make sure that the characters ③ on both the connecting rod and connecting rod cap are aligned.
- e. Tighten the connecting rod nuts.

## **CAUTION:**

- <sup>o</sup>When tightening the connecting rod nuts, be sure to use an F-type torque wrench.
- <sup>°</sup> Without pausing, tighten the connecting rod nuts to the specified torque. Apply continuous torque between 4.3 and 4.8 m°kg. Once you reach 4.3 m°kg, DO NOT STOP TIGHTENING until the specified torque is reached.

If the tightening is interrupted between 4.3 and 4.8 m°kg, loosen the connecting rod nut to less than 4.3 m°kg and start again.



Refer to "INSTALLING THE CONNECTING RODS".

## Connecting rod nut 48 Nm (4.8 m°kg)

f. Remove the connecting rod and big end bearings.

Refer to "REMOVING THE CONNECTING RODS".

- g. Measure the compressed Plastigauge<sup>®</sup> width ① on each crankshaft pin.
   If the clearance is out of specification, select replacement big end bearings.

#### 4. Select:

° big end bearings (P<sub>1</sub>,P<sub>2</sub>)

#### NOTE: \_

<sup>o</sup> The numbers ① stamped into the crankshaft web and the numbers ② on the connecting rods are used to determine the replacement big end bearing sizes.

°"P<sub>1</sub>,P<sub>2</sub>" refer to the bearings shown in the crankshaft illustration.

For example, if the connecting rod " $P_1$ " and the crankshaft web " $P_1$ " numbers are "4" and "1" respectively, then the bearing size for " $P_1$ " is:

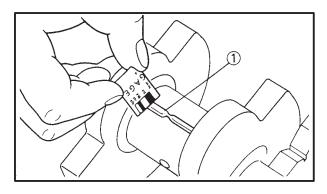
Bearing size for "P<sub>1</sub>": "P<sub>1</sub>" (connecting rod) – "P<sub>1</sub>" (crankshaft web) = 4 – 1 = 3 (brown)

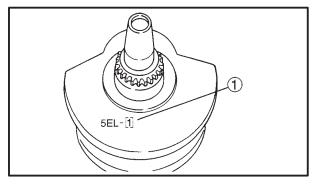
Rear cylinder lower bearing/Front cylinder upper and lower bearing.

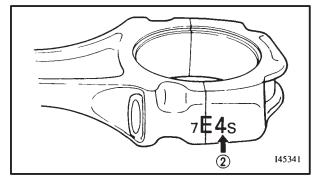
BEARING COLOR CODE		
1	blue	
2	black	
3	brown	
4	green	
5	yellow	

Rear cylinder upper bearing

BEARING COLOR CODE		
1	black	
2	DIACK	
3	brown	
4	aroon	
5	green	









#### EB412440 CHECKING THE BEARINGS AND OIL SEALS

- 1. Check:
  - <sup>°</sup> bearings
     Clean and lubricate the bearings, then rotate the inner race with your finger
     Rough movement → Replace.
- 2. Check:
- ° oil seals Damage/wear  $\rightarrow$  Replace.

## INSTALLING THE CRANKSHAFT

## 3. Install:

 $^\circ \, {\rm connecting} \, {\rm rod} \, {\rm bearings} \, {\rm (1)}$ 

## NOTE: -

- °Align the projection (a) of the bearings with the notches (b) in the connecting rod cap.
- ° Install each bearing in its original place.
- 4. Install:

 $^{\circ}$  connecting rods (1)

NOTE: -

- °The stamped "Y" mark (a) on the connecting rods should face towards the left side of the crankcase.
- ° Install each connecting rod in its original place.
- 5. Install:

 $^\circ \text{connecting rod cap} \, \textcircled{1}$ 

## NOTE: -

Be sure that the characters (a) on the side of the cap and connecting rod are aligned.

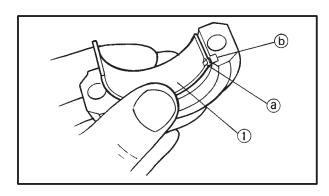
6. Tighten:

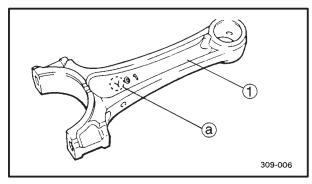
°nuts (connecting rod cap)

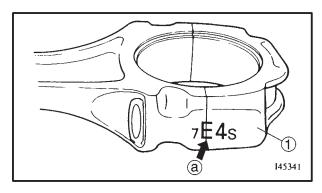
濲 48 Nm (4.8 m°kg)

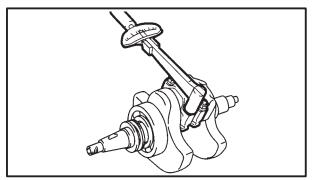
## NOTE: -

Apply molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.





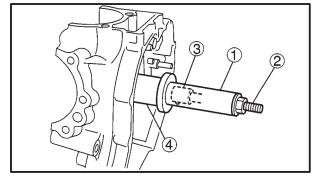


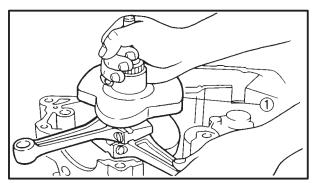




## CAUTION:

- <sup>°</sup>When tightening the nuts be sure to use an F-type torque wrench.
- <sup>o</sup> Without pausing tighten to full torque specification. Apply continuous torque between 4.3 and 4.8 m<sup>o</sup>kg. Once you reach 4.3 m<sup>o</sup>kg DO NOT STOP TIGHTENING until final torque is reached. If the tightening is interrupted between 4.3 and 4.8 m<sup>o</sup>kg, loosen the nut to less than 4.3 m<sup>o</sup>kg and start again.



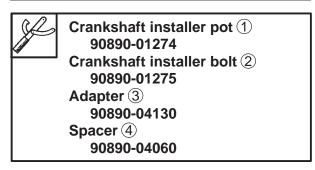


## 7. Install:

° crankshaft installing tool

#### NOTE: -

Attach the spacer to the bearing inner race.



8. Install:

° crankshaft (1)

## NOTE: -

Align the left connecting rod with the rear cylinder sleeve hole.

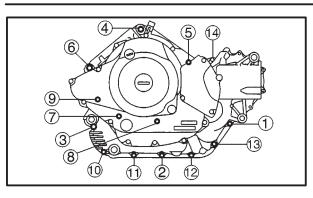
## ASSEMBLING THE CRANKCASE

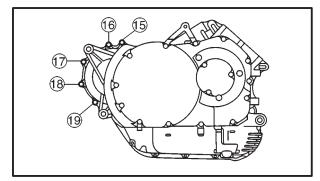
- 1. Apply:
- ° engine oil
  - (onto the main journal bearings)
- °sealant
  - (onto the crankcase mating surfaces)



Yamaha Bond No. 1215: 90890-85505







Tighten:
 °crankcase bolts
 (follow the proper tightening sequence)

## NOTE: -

The numbers embossed on the crankcase indicate the crankcase tightening sequence.

$$\begin{array}{c} (4) \sim (6) \ (M10) \\ (1) \sim (3), \ (7) \sim (19) \ (M6) \\ \hline \end{array}$$

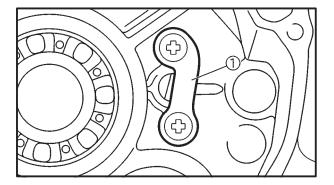
#### NOTE: -

<sup>°</sup>Lubricate the bolt threads with engine oil.

° Tighten the bolts in increasing numerical order.

M6 $ imes$ 30 mm	$(1) \sim (3), (10) \sim (14), (17) \sim (19)$
M6 × 30 mm (Chromium plated bolt)	(15),(16)
M6 $\times$ 55 mm	8
M6 $\times$ 80 mm	7,9
M10 × 60 mm	5
M10 $ imes$ 70 mm	(4)
M10 $ imes$ 100 mm	6

(19): with engine ground lead



3. Install:

° shift shaft stopper plate ①

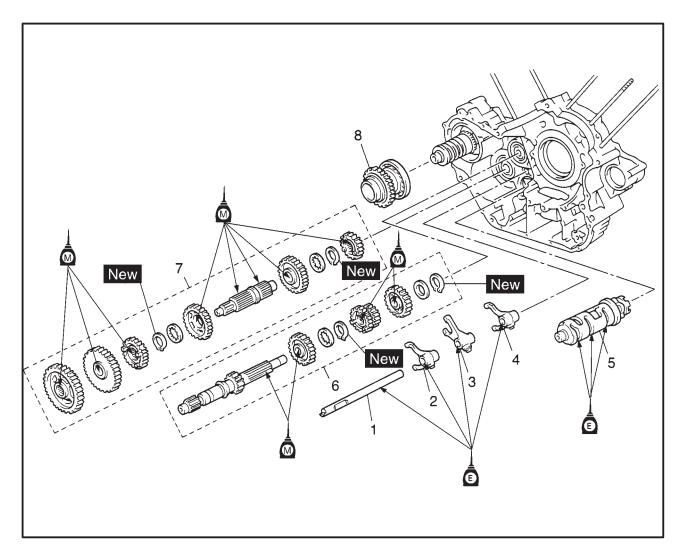
## NOTE: -

Install the shift shaft stopper plate as shown.

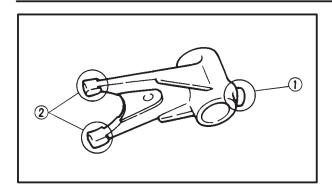


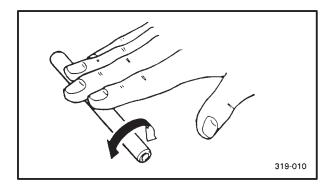


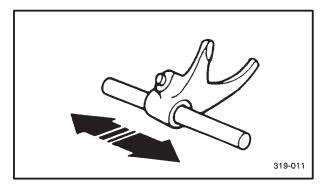
# TRANSMISSION

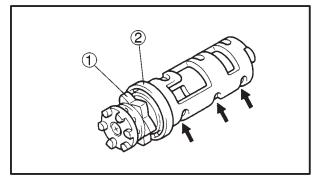


Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6 7 8	Transmission removal Crankcase separation Guide bar Shift fork 1 "R" Shift fork 2 "C" Shift fork 3 "L" Shift drum Main axle assembly Drive axle assembly Middle driven gear	1 - 1 1 1 1 1 1 1 -	Remove the parts in the order listed. Refer to "CRANKSHAFT". Refer to "INSTALLING THE TRANSMISSION". For installation, reverse the removal procedure.









## TRANSMISSION



#### EAS00421 CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks and related components.

- 1. Check:
  - ° shift fork cam follower ①
  - ° shift fork pawl (2) Bends/damage/scoring/wear  $\rightarrow$  Replace the shift fork.
- 2. Check:
  - ° shift fork guide bar Roll the shift fork guide bar on a flat surface. Bends  $\rightarrow$  Replace.

# A WARNING

Do not attempt to straighten a bent shift fork guide bar.

3. Check:

° shift fork movement

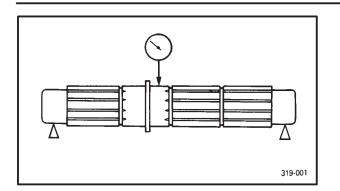
 (on the shift fork guide bar)
 Rough movement → Replace the shift forks
 and shift fork guide bar as a set.

## EAS00422

## CHECKING THE SHIFT DRUM ASSEMBLY

- 1. Check:
  - ° shift drum grooves Damage/scratches/wear → Replace the shift drum.
  - ° shift drum segment ①
  - Damage/wear  $\rightarrow$  Replace.
  - ° shift drum bearing 2
  - Damage/pitting  $\rightarrow$  Replace.





## CHECKING THE TRANSMISSION

TRANSMISSION

1. Measure:

EAS00424

°main axle runout
 (with a centering device and dial gauge)
 Out of specification → Replace the main axle.

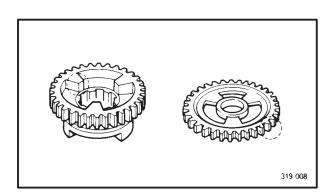


2. Measure:

° drive axle runout (with a centering device and dial gauge) Out of specification  $\rightarrow$  Replace the drive axle.



Drive axle runout limit 0.08 mm

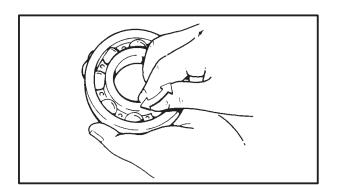


3. Check:

° transmission gears Blue discoloration/pitting/wear  $\rightarrow$  Replace the defective gear(-s).

° transmission gear dogs Cracks/damage/rounded edges  $\rightarrow$  Replace the defective gear(-s).

- 4. Check:
   °transmission gear movement Rough movement → Replace the defective part(-s).
- 5. Check:
   °washers
   Damage/bends/looseness → Replace.



- 6. Check:
  - ° bearings Un smooth  $\rightarrow$  Replace.

## TRANSMISSION



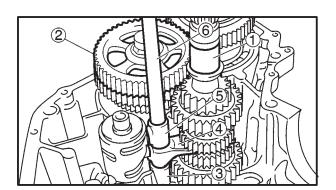
#### EAS00430 INSTALLING THE TRANSMISSION

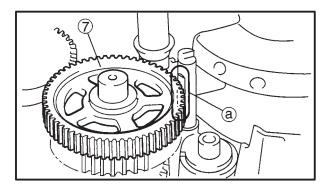
1. Install:

° shift drum assembly

#### NOTE: \_\_\_\_

Turn the shift drum assembly to the neutral position.





- 2. Install:
  - $^\circ\text{main}$  axle assembly (1)
  - $^{\circ}$ drive axle assembly 2
  - ° shift fork "L" (3)
  - ° shift fork "C"  $\underbrace{4}$
  - ° shift fork "R" (5)
  - $^\circ {\rm shift}$  fork guide bars (6)

#### NOTE: -

- <sup>o</sup> The embossed marks on the shift forks should face towards the right side of the engine and be in the following sequence:
- "R", "C", "L".
- ° When installing the middle drive gear T, align the slit (a) on the guide bar with the middle drive gear.

## A WARNING

Always use new circlips.

3. Check:

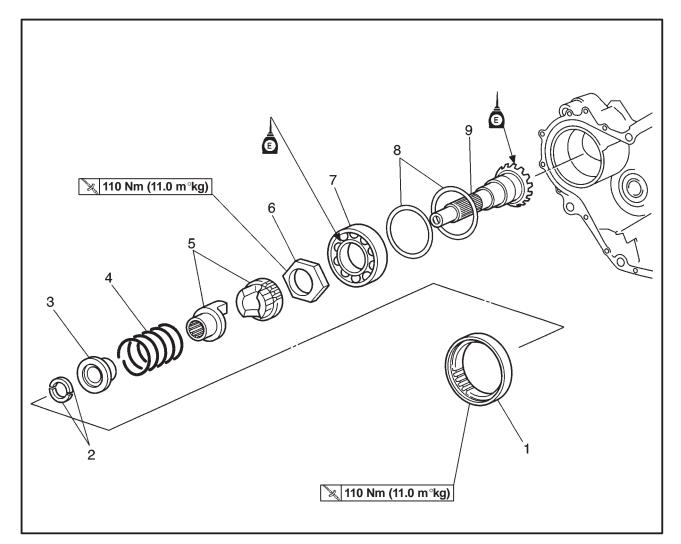
° transmission Rough movement  $\rightarrow$  Repair.

#### NOTE: -

Oil each gear, shaft, and bearing thoroughly.



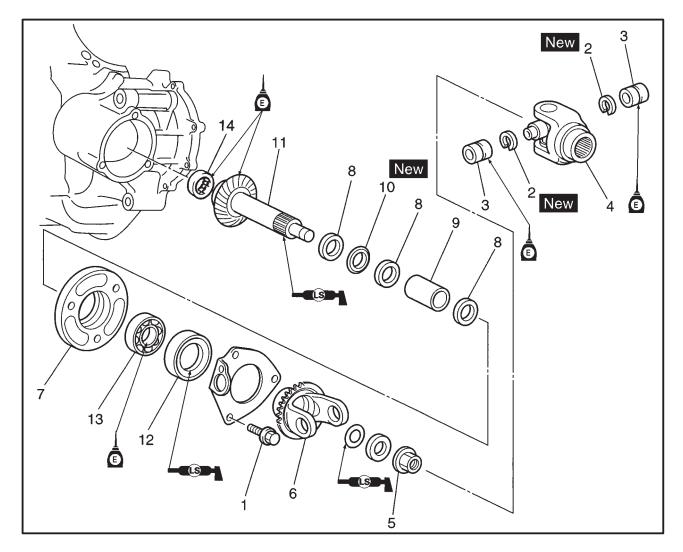
## MIDDLE GEAR MIDDLE DRIVE PINION GEAR



Order	Job name/Part name	Q'ty	Remarks
	Removing the middle drive pinion gear		Remove the parts in the order listed.
	Sepalate the crankcase		Refer to "CRANKSHAFT AND CONNECTING ROD."
1	Bearing retainer	1	Refer to "REMOVING THE MIDDLE DRIVE SHAFT ASSEMBLY/INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
2	Spring retainers	2 -	
3	Spring seat	1	
4	Damper spring	1	Refer to "DISASSEMBLING/
5	Damper cams	2	
6	Nut	1	SHAFT ASSEMBLY".
7	Bearing	1 -	
8	Shim(s)	1	
9	Middle drive pinion shaft	1	
			For installation, reverse the removal procedure.

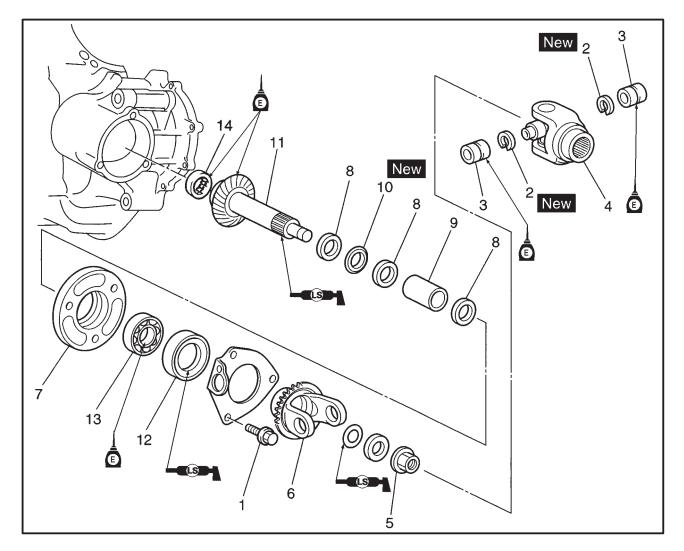


## MIDDLE DRIVEN PINION GEAR

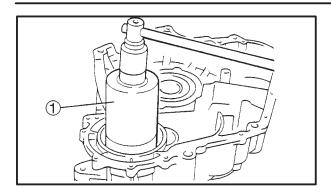


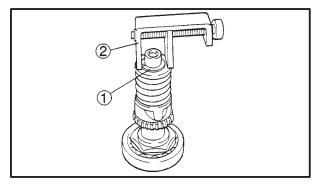
Order	Job name/Part name	Q'ty	Remarks
	Removing the middle driven pinion gear.		Remove the parts in the order listed.
1 2 3 4	Bolts Circlips Bearings Driven yoke	3 - 2 2 1 -	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/ INSTALLING THE UNIVERSAL JOINT".
5	Nut	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY/INSTALING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
6	Drive yoke	1	Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
7 8 9	Bearing housing/O-ring Washers Collar	1/1 3 1	

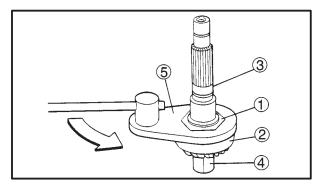




Order	Job name/Part name	Q'ty	Remarks
10 11	Collapsible collar Middle driven shaft	1 - 1 -	Refer to "INSTALLING THE MIDDLE GEAR ASSEMBLY AND ADJUSTING THE BACKLASH".
12 13 14	Oil seal Bearing Bearing	1 -	Refer to "ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY". For installation, reverse the removal procedure.









## **REMOVING THE MIDDLE DRIVE SHAFT AS-**SEMBLY

- 1. Remove:
- ° bearing retainer
- ° middle drive shaft assembly
- a. Straighten the thread on the bearing retainer.
- b. Attach the bearing retainer wrench ①.



c. Remove the bearing retainer and middle drive shaft assembly. . . . . . . . . . .

## DISASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

1. Remove:

° spring retainers ①

## NOTE: \_

While compressing the spring with a damper spring compressor (2), remove the spring retainers.



## Damper spring compressor 90890-04090

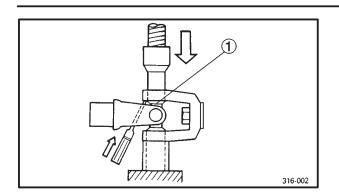
- 2. Straighten the thread on the middle drive shaft nut.
- 3. Remove:
  - ° middle drive shaft nut ①
  - ° bearing (2)
  - ° middle drive shaft ③
- a. Attach the middle drive shaft holder (4) onto the middle drive shaft as shown.

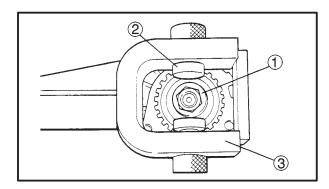
Middle drive shaft holder 90890-04055

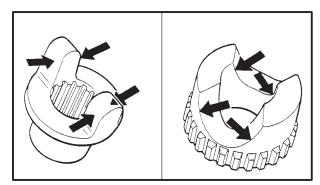
- b. Secure the middle drive shaft holder in a vice.
- c. Loosen the middle drive shaft nut with the middle drive shaft nut wrench (5).

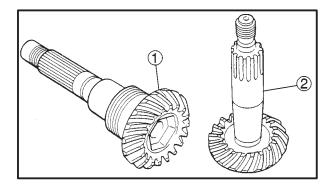


d. Remove the middle drive shaft nut and bearing. 











### REMOVING THE MIDDLE DRIVEN SHAFT ASSEMBLY

### 1. Remove:

- ° universal joint
- •••••
- a. Remove the circlips 1.
- b. Place the universal joint in a press.
- c. With a pipe of the proper diameter positioned beneath the universal joint driven yoke as shown, press the bearing into the pipe.

### NOTE: -

It may be necessary to lightly tap the universal joint driven yoke.

- d. Repeat the above steps to remove the opposite side's bearing.
- e. Separate the universal joint yokes.
- 2. Loosen:

 $^{\circ}$  middle driven shaft nut (1)

### NOTE: \_

While holding the universal joint driven yoke 2 with the universal joint holder 3, loosen the middle driven shaft nut.



### EAS00438

### CHECKING THE MIDDLE DRIVE SHAFT AS-SEMBLY

- 1. Check:
  - ° damper cam surface Scratches/wear  $\rightarrow$  Replace the damper cam.
- Check:
   °spring Cracks/damage → Replace.

### CHECKING THE MIDDLE DRIVEN SHAFT ASSEMBLY

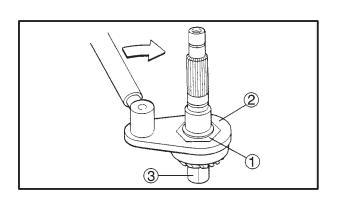
- 1. Check:
  - ° middle drive gear ①
  - ° middle driven gear 2
  - Galling/pitting/wear  $\rightarrow$  Replace the middle driven shaft assembly.
- 2. Check: °bearings

Damage/pitting  $\rightarrow$  Replace the middle drive shaft bearing housing assembly.

MIDDLE GEAR ENG



- 3. Check:
  - °O-ring
  - °oil seal
    - Damage  $\rightarrow$  Replace the defective part(-s).
- 4. Check:
  - $^\circ$  universal joint movement Rough movement  $\rightarrow$  Replace the universal joint.



### ASSEMBLING THE MIDDLE DRIVE SHAFT ASSEMBLY

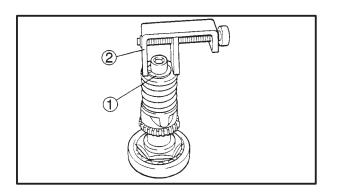
- 1. Tighten:
  - ° middle drive shaft nut ①

🔌 110 Nm (11.0 m°kg)

### NOTE: -

- ° Set the torque wrench at a right angle to the middle drive shaft nut wrench ②.
- <sup>°</sup>Lock the threads on the middle drive shaft nut by staking them with a center punch.





- 2. Install:
  - $^{\circ}$  spring retainers (1)

NOTE: -

While compress the spring with the damper spring compressor 2, and then install the spring retainers.



Damper spring compressor 90890-04090



### ASSEMBLING THE MIDDLE DRIVEN SHAFT ASSEMBLY

### NOTE: -

The following points are critical when assembling the middle gears:

- <sup>o</sup> The collapsible collar must be replaced whenever the middle driven shaft assembly is removed from the middle driven shaft bearing housing.
- <sup>o</sup>When performing this procedure for the first time, be sure to have at least one extra collapsible collar on hand.
- 1. Install:
  - ° bearing outer race
  - (into the middle driven shaft bearing housing)

### 

Do not press the bearing outer race. During installation, always press the bearing inner race carefully.

 Install: <sup>°</sup>middle driven shaft nut

NOTE: -

Finger tighten the middle driven shaft mut.

### INSTALLING THE MIDDLE GEAR AS-SEMBLY AND ADJUSTING THE BACKLASH NOTE: \_\_\_\_\_

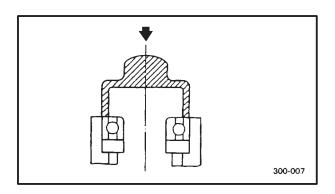
When installing the middle gear assembly, be sure to replace the following parts:

- collapsible collar

- 1. Install:

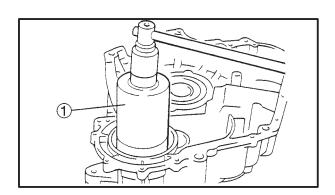
 $^{\circ}$  middle driven shaft assembly (1)

🎉 25 Nm (2.5 m°kg)





- 2. Install:
  - ° shim
  - ° middle drive shaft assembly



3. Install: °bearing retainer

#### 

#### Install steps:

°Attach the bearing retainer wrench (1).



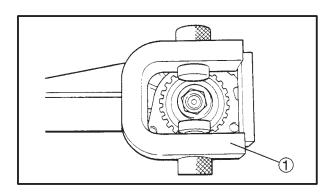
Bearing retainer wrench: 90890-04137

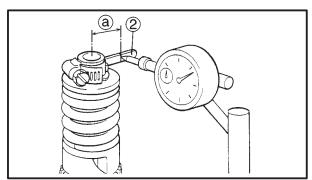
°Tighten the bearing retainer.



Bearing retainer: 110 Nm (11.0 m°kg)

°Lock the threads on the bearing retainer by staking them with a center punch.





4. Adjust:

° middle gear backlash

Middle gear backlash:  $0.1 \times 0.2 \text{ mm}$ 

a. Install the universal joint holder ① and middle gear backlash band ② as shown.



- b. Make sure that the dial gauge plunger on the middle gear backlash band as shown.
  (a) Dial-gauge-plunger contact point: 68.2 mm
- c. Remove the middle driven pinion gear nut and apply the LOCKTITE<sup>®</sup> on it.
- d. Reinstall the middle driven pinion gear nut.
- e. While measure the middle gear backlash, tighten the middle driven pinion gear nut until specific backlash.



### CAUTION:

Do not over tighten the middle driven pinion gear nut. If over tighten the middle driven pinion gear nut, replace the collapsible collar and adjust the backlash.

f. Stake the middle driven pinion gear shaft thread.

### 

#### **INSTALLING THE UNIVERSAL JOINT** 4. Install:

° universal joint driven yoke/cross joint① (into the universal joint drive yoke)

### CAUTION:

Do not hammer the universal joint drive yoke or the collapsible collar may be distorted. This will result in a change in the standard spinning torque, requiring replacement of the collapsible collar and reassembly of the middle driven shaft assembly.

- 2. Install:
  - ° bearings ② (onto the universal joint driven yoke/cross joint)

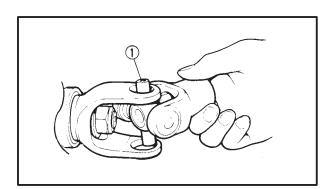
### **CAUTION:**

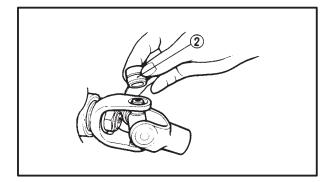
The needles can easily fall out of their races, so check each bearing carefully. Slide the universal joint driven yoke assembly back and forth on the bearings. If a needle is out of place, the yoke will not go all the way onto the bearings.

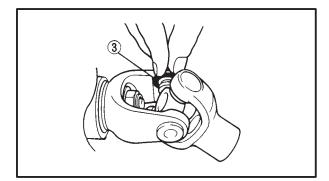
Press each bearing into the universal joint driven yoke assembly with a socket of the proper size.

### NOTE: -

The bearings must be inserted far enough into the universal joint driven yoke assembly so that circlips 3 can be installed.









#### EAS00452 ALIGNING THE MIDDLE GEAR

#### NOTE: \_

Aligning the middle gear is necessary when any of the following parts are replaced: ° Crankcase

- ° Middle drive shaft
- 1. Select:

° middle drive gear shim(-s) (1)

### NOTE: -

Select the middle drive gear shim(-s) (1) by calculating the middle drive gear shim thickness and then measuring the middle gear backlash.

- a. Position the middle drive gear with the appropriate shim(-s) (1) that has had its respective thickness calculated from information marked on the crankcase and the end of the middle drive gear.
- b. To find middle drive gear shim thickness "A", use the following formula.

Middle drive gear shim thickness "**A**" = ⓐ – ⓒ

(a) ="43.00"

(b) =a numeral on the upper crankcase near the main bearing selection numbers and which is added to the nominal size "42" Example:

(a) is 43.00

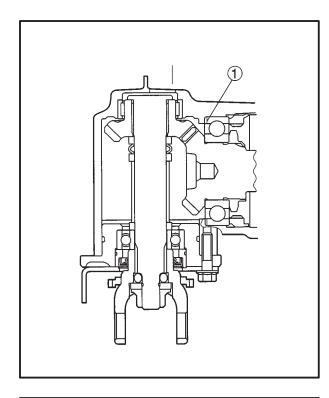
If the upper crankcase is marked "46" (b) © is 42.46 (i.e., 42.00 + 0.46 = 42.46)

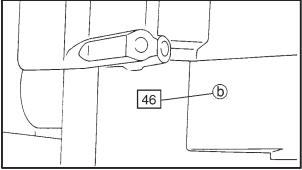
"A" = 43.00 - 42.46 = 0.54

Round off to the hundredths digit and select the appropriate shim(-s).

### NOTE: -

In the above example, the calculated number is 0.54. The chart instructs you to round off the 4 to 5. Thus, the shim thickness is 0.55 mm.





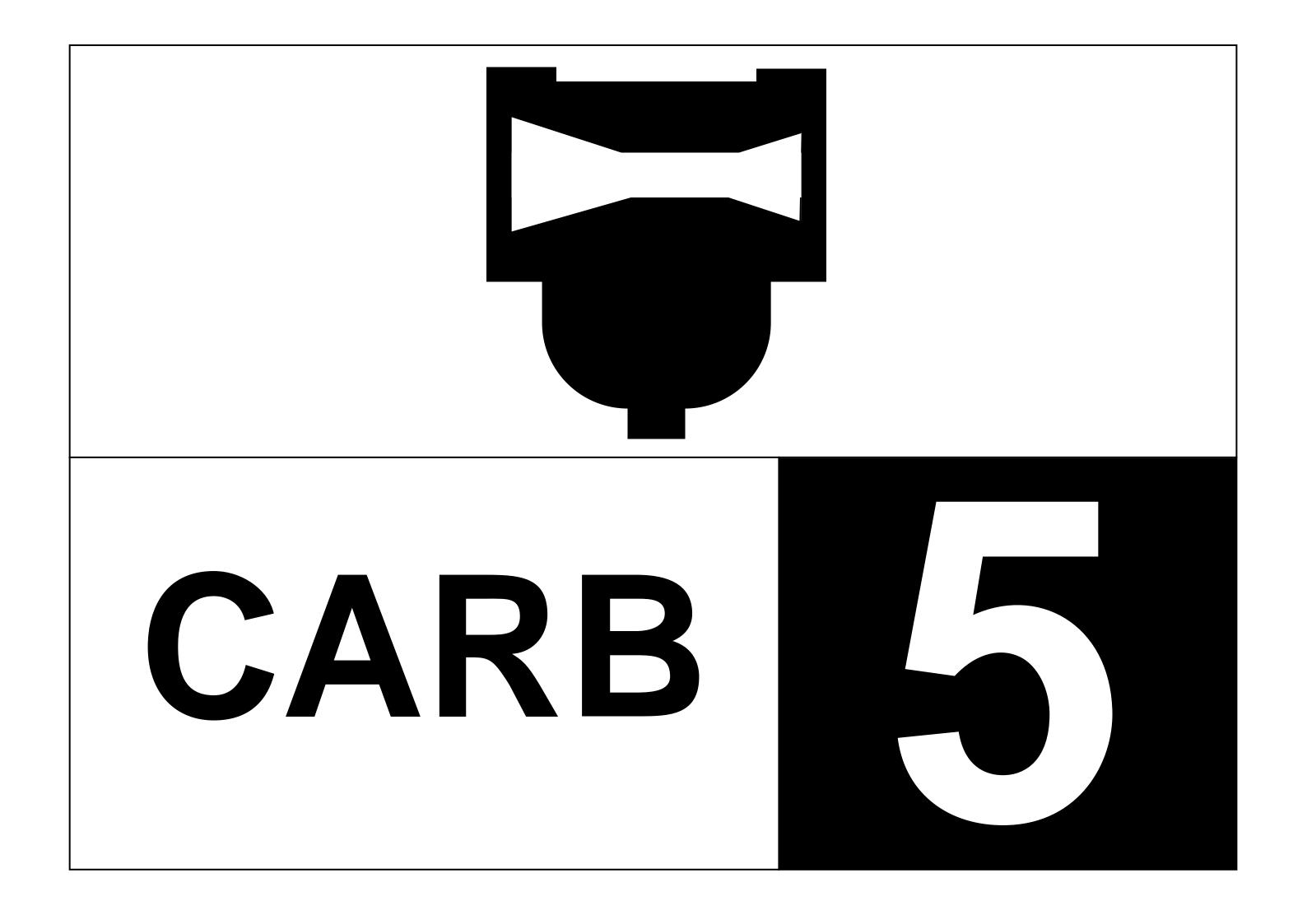


Hundredths	Rounded value
0, 1, 2	0
3, 4, 5, 6,	5
7, 8, 9	10

Shims are supplied in the following thickness.

Middle drive	Middle drive pinion gear shim:		
Thickness (mm)	0.10, 0.15, 0.20		

\*\*\*\*\*





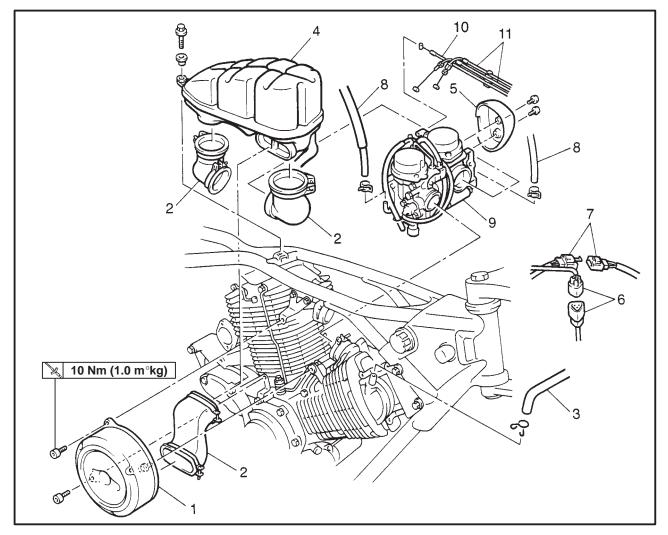
### CHAPTER 5 CARBURETION

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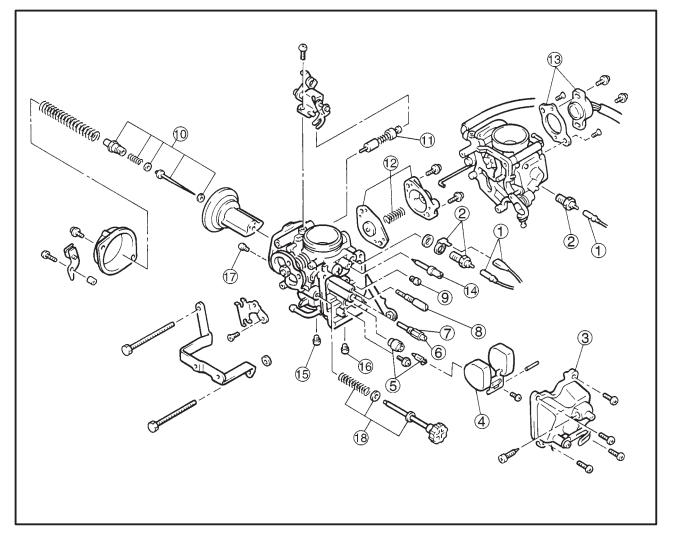
## CARBURETION

### CARBURETOR



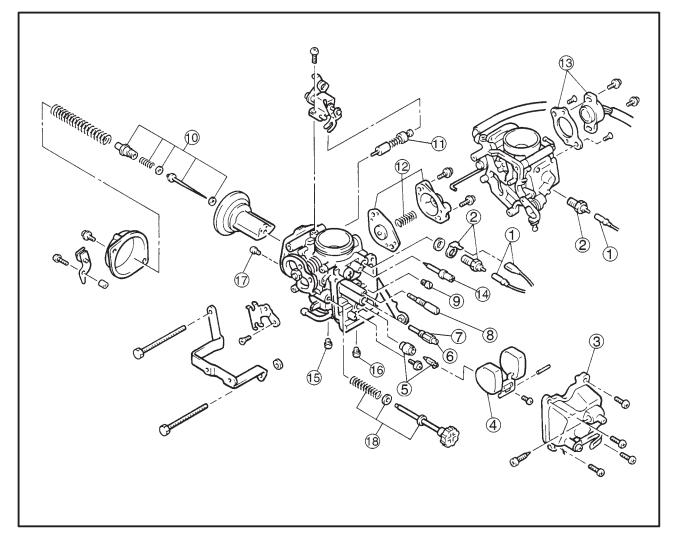
Removing the carburetors Fuel tankRemove the parts in the order listed. Refer to "FUEL TANK AND SEATS" in CHAPTER 3.1Air filter case assembly Air ducts1 3 33Cylinder head breather hose 4 51 1 14Air chamber 61 Throttle position sensor lead	Order	Job name/Part name	Q'ty	Remarks
7       Carburetor heater lead       1       Disconnect         8       Fuel hoses       2       Disconnect         9       Carburetor assembly       1       1         10       Starter cable       1       1         11       Throttle cables       2       After removing the carburetor assemble remove the starter cable and throttle cables.         For installation, reverse the removal procedure.       For installation, reverse the removal procedure.	1 2 3 4 5 6 7 8 9 10	Removing the carburetors Fuel tank Air filter case assembly Air ducts Cylinder head breather hose Air chamber Cover Throttle position sensor lead Carburetor heater lead Fuel hoses Carburetor assembly Starter cable	1 3 1 1 1 1 2 1 1	Remove the parts in the order listed. Refer to "FUEL TANK AND SEATS" in CHAPTER 3. Disconnect Disconnect Disconnect Disconnect <b>NOTE:</b> After removing the carburetor assembly, remove the starter cable and throttle cables. For installation, reverse the removal





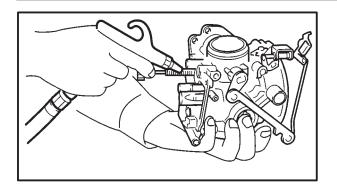
Order	Job name/Part name	Q'ty	Remarks
12345678911	Disassembling the carburetor. Carburetor heater leads Carburetor heaters Float chamber/gasket Float Needle valve set Main jet Jet holder Pilot jet Starter jet Jet needle set Starter plunger set	2 2 1 1 1 1 1 1 1 1 1 1 1	Disassemble the parts in the order listed. 12V 30W Refer to "CARBURETOR ASSEMBLY".





Order	Job name/Part name	Q'ty	Remarks
12	Diaphragm set	1	Refer to "ASSEMBLING THE CARBURE TORS".
13	Throttle position sensor	1	Refer to "CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR (TPS)".
14	Pilot screw	1	
15	Main air jet	1	
16	Pilot air jet 1	1	
(17)	Pilot air jet 2	1	
18	Throttle stop screw set	1	
			For assembly, reverse the disassembly procedure.





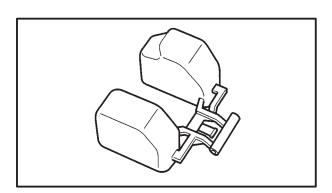
# CHECKING THE CARBURETORS

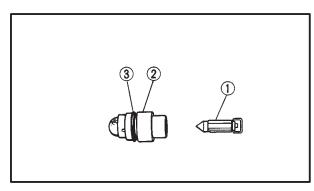
The following procedure applies to all of the carburetors.

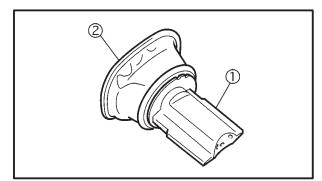
- 1. Check:
  - ° carburetor body

**CARBURETORS** 

- ° float chamber
- ° jet housing
  - Cracks/damage  $\rightarrow$  Replace.
- 2. Check:
  - ° fuel passages
  - Obstruction  $\rightarrow$  Clean.
- a. Wash the carburetor in a petroleumbased solvent. Do not use any caustic-carburetor-cleaning solution.
- b. Blow out all of the passages and jets with compressed air.







- Check:
   °float chamber body Dirt → Clean.
- Check: <sup>o</sup>float chamber rubber gasket
  - Cracks/damage/wear  $\rightarrow$  Replace.
- 5. Check:
  - °float Damage  $\rightarrow$  Replace.
- 6. Check:
  - ° needle valve ①
  - ° needle valve seat 2
  - °O-ring ③

Damage/obstruction/wear  $\rightarrow$  Replace the needle valve, needle valve seat and O-ring as a set.

7. Check:

° piston valve ① Damage/scratches/wear  $\rightarrow$  Replace. ° rubber diaphragm ② Cracks/tears  $\rightarrow$  Replace.



- 8. Check:
  - ° vacuum chamber cover 1
  - ° piston valve spring 2

- ° plastic cap ③
- °O-ring ④
- ° spring (5)
- Cracks/damage  $\rightarrow$  Replace.
- 9. Check:
  - $^{\circ}$  jet needle ①
  - ° needle jet 2
  - ° main jet ③
  - °pilot screw ④
  - ° pilot jet (5)
  - ° main air jet 6
  - ° starter jet  $\bigcirc$ Bends/damage/wear  $\rightarrow$  Replace. Obstruction  $\rightarrow$  Clean. Blow out the jets with compressed air.
- 10. Check:

° piston valve movement
 Insert the piston valve into the carburetor
 body and move it up and down.
 Tightness → Replace the piston valve.

- 11. Check.
  - ° fuel feed pipes

°hose joint

 $Cracks/damage \rightarrow Replace.$ 

 $Obstruction \rightarrow Clean.$ 

Blow out the pipes with compressed air.

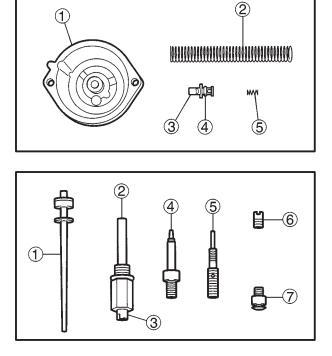
12. Check:

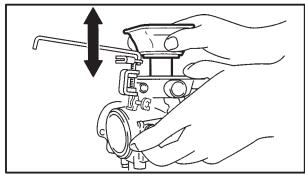
- ° fuel feed hoses
- ° fuel hoses

 $Cracks/damage/wear \rightarrow Replace.$ 

Obstruction  $\rightarrow$  Clean.

Blow out the hoses with compressed air.









# ASSEMBLING THE CARBURETORS

The following procedure applies to both of the carburetors.

### **CAUTION:**

<sup>°</sup>Before assembling the carburetors, wash all of the parts in a petroleum-based solvent.

### ° Always use a new gasket.

- 1. Install:
  - ° coasting enricher diaphragm
  - ° coasting enricher spring
  - ° coasting enricher cover

### NOTE: -

- ° Align the holes (a) on the coasting enricher diaphragm with the projections (b) in the carburetor body.
- $^{\circ}$ When installing the coasting enricher, position the throttle connecting arm (1) as shown.
- 2. Install:
- ° connecting bolts

### NOTE: -

After installing the connecting bolts, check that the throttle cable lever and starter plunger link operate smoothly.

EB600051

### INSTALLING THE CARBURETORS

- 1. Adjust:
  - <sup>°</sup> carburetor synchronization Refer to "SYNCHRONIZING THE CARBU-RETORS" in chapter 3.
- 2. Adjust:
  - ° engine idling speed



Refer to "ADJUSTING THE ENGINE IDLING SPEED" in chapter 3.

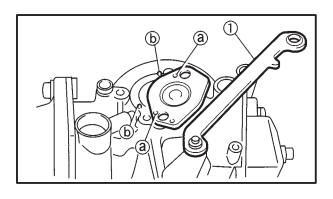
3. Adjust:

° throttle cable free play

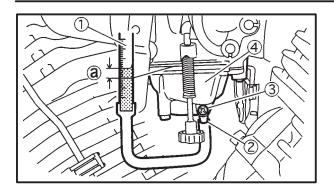


Throttle cable free play (at the flange of the throttle grip)  $4 \times 6$  mm

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.







# MEASURING AND ADJUSTING THE FUEL LEVEL

 Measure: <sup>°</sup>fuel level ⓐ Out of specification → Adjust.

CARBURETOR

EB600063



### 

- a. Stand the motorcycle on a level surface.
- b. Place the motorcycle on a suitable stand to ensure that the motorcycle is standing straight up.
- c. Install the fuel level gauge ① to the fuel drain pipe ②.

Fuel level gauge 90890-01312

- d. Loosen the fuel drain screw  $\Im$ .
- e. Hold the fuel level gauge vertically next to the upper face of the float chamber ④.
- f. Measure the fuel level (a).

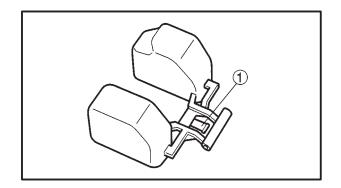
### NOTE: -

Fuel level readings should be equal on both sides of the carburetor assembly.

### 

### 2. Adjust:

- a. Remove the carburetor assembly.
- b. Check the needle valve seat and needle valve.
- c. If either is worn, replace them as a set.
- d. If both are fine, adjust the float level by slightly bending the float tang ①.
- e. Install the carburetor assembly.
- f. Measure the fuel level again.
- g. Repeat steps (a) to (f) until the fuel level is within specification.
- \*



<sup>°</sup> fuel level



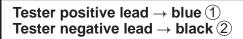
# CHECKING AND ADJUSTING THE THROTTLE POSITION SENSOR

#### NOTE: -

- ° Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.
- 1. Inspect:

° throttle position sensor

- a. Disconnect the throttle position sensor coupler.
- b. Connect the pocket tester ( $\Omega \times 1k$ ) to the throttle position sensor.



c. Check the throttle position sensor resistance "R1".

Out of specification  $\rightarrow$  Replace the throttle position sensor.



Throttle position sensor resistance "R1"  $4 \sim 6 \ k\Omega \ at \ 20^{\circ}C \ (68^{\circ}F)$ (blue – black)

d. Connect the pocket tester ( $\Omega \times$  1k) to the throttle position sensor.

Tester positive lead  $\rightarrow$  yellow (3) Tester negative lead  $\rightarrow$  black (2)

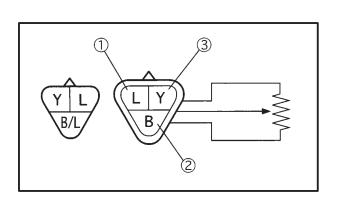
e. While slowly opening the throttle, check that the throttle position sensor resistance "R2" is within the specified range.

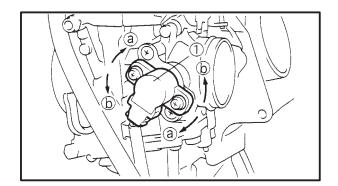
Out of specification  $\rightarrow$  Replace the throttle position sensor.



Throttle position sensor resistance "R2"  $0.56 \sim 0.84 \text{ k}\Omega$  to  $3.01 \sim$  $4.51 \text{ k}\Omega$  at 20°C (68°F) (yellow – black)

- 2. Adjust:
- ° throttle position sensor angle
- \*\*\*\*
- a. Loosen the throttle position sensor screws  $\widehat{(1)}$ .
- b. Turn the throttle position sensor in direction
  (a) or (b) until the specified closed-throttle resistance is indicated on the pocket tester.









Closed-throttle resistance 0.56  $\times$  0.84 k $\Omega$  at 20°C (yellow – black)

c. Tighten the throttle position sensor screws.

NOTE: -

Remove the pocket tester leads and connect the throttle position sensor coupler.

\*\*\*\*

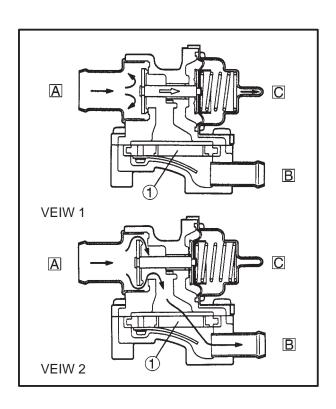


### AIR INDUCTION SYSTEM (AIS) AIR INDUTION

This system burns the unburned exhaust gases by injecting fresh air (secondary air) at the exhaust port. This is to reduce the output of the hydrocarbons.

When there is negative pressure around the exhaust port, the reed valve opens and the secondary air flows into the exhaust port.

The required temperature for burning the unburned exhaust gases is approximately  $600^{\circ}$  to  $700^{\circ}$ C.



### AIR CUT-OFF VALVE

The air cut-off valve is operated by intake gas pressure through the diaphragm. Normally, this valve is opened in order to allow fresh air to flow into the exhaust port.

When the throttle is rapidly closed, negative pressure is generated and the valve closes in order to prevent after-burning.

VIEW 1. (NO FLOW)

When decelerating (the throttle closes), the valve will close.

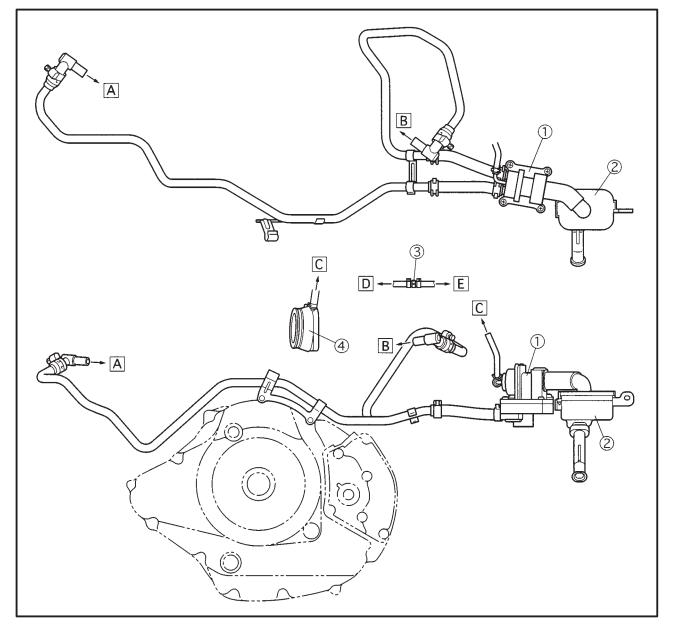
VIEW 2. (FLOW)

During normal operation the valve is open.

- A From the air filter
- B To the cylinder heads
- C To the carburetor joint
- 1 Reed valve

**AIR INDUCTION SYSTEM (AIS)** 





- ① Reed valve
- Air filter
- 3 Orifice
- (4) Carburetor joint (near cylinder)
- A To the front cylinder head
- B To the rear cylinder head
- C To the orifice
- D To the carburetor joint (rear cylinder)
- E To the AIS valve

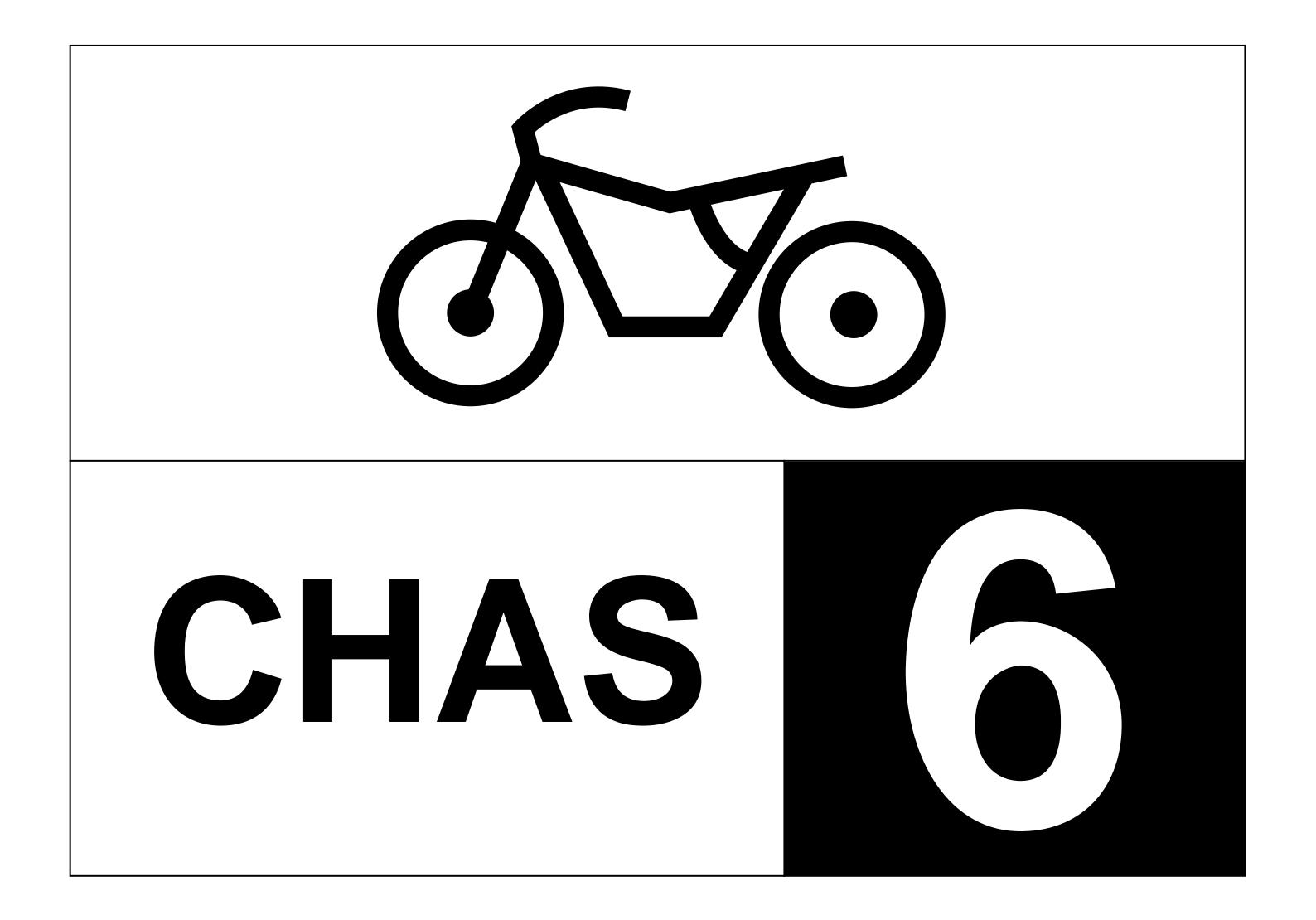
### AIR INDUCTION SYSTEM INSPECTION

- 1. Inspect:
  - °hose connections
  - Poor connections  $\rightarrow$  Properly connect.
- °hoses
- ° reed valves
- ° air cut-off valve
- ° air filter
- Cracks/damage  $\rightarrow$  Replace. Clogged  $\rightarrow$  Clean.

### NOTE: \_\_\_\_

The orifice ③ should be installed with the arrow mark facing the AIS valve side.



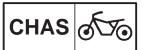


### CHAPTER 6 CHASSIS

CHAS 5

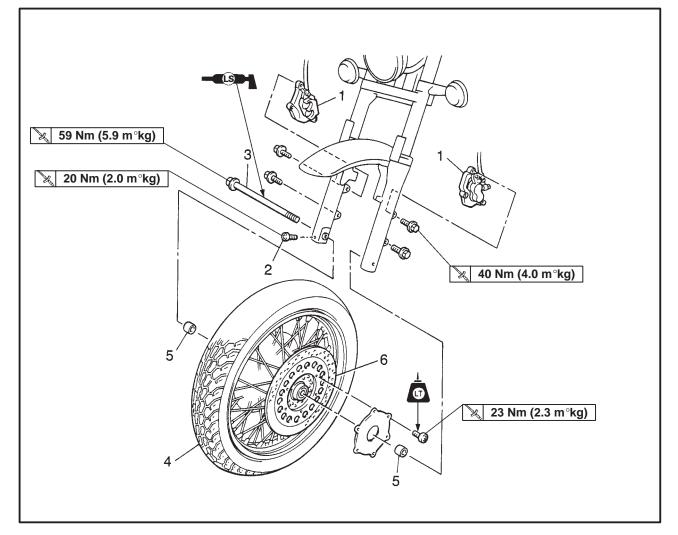
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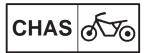
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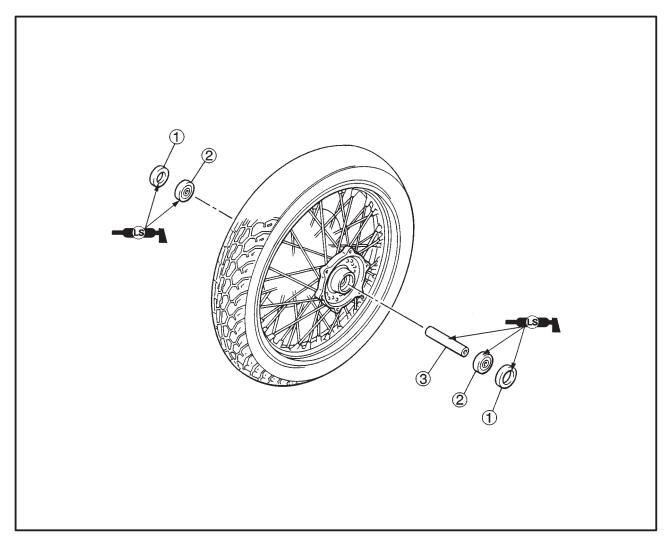
# FRONT WHEEL AND BRAKE DISCS



Order	Job name/Part name	Q'ty	Remarks
	Removing the front wheel and brake discs		Remove the parts in the order listed. Stand the motorcycle on a level surface.
			Securely support the motorcycle so there is no danger of it falling over.
1 2 3 4 5 6	Brake calipers Front wheel axle pinch bolt Front wheel axle Front wheel assembly Collars Brake discs	2 - 1 1 - 2 - 2 -	Refer to "REMOVING/INSTALLING THE FRONT WHEEL". Refer to "INSTALLING THE FRONT WHEEL". For installation, reverse the removal procedure.

### FRONT WHEEL AND BRAKE DISCS





Order	Job name/Part name	Q'ty	Remarks
1 2 3	<b>Disassembling the front wheel</b> Oil seals Bearings Collar	2 2 1	Disassemble the parts in the order listed. For assembly, reverse the disassembly procedure.



# REMOVING THE FRONT WHEEL

1. Stand the motorcycle on a level surface.

### A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

#### NOTE: -

Place the motorcycle on a suitable stand so that the front wheel is elevated.

2. Remove:

°brake calipers ① (left and right)

#### NOTE: -

Do not squeeze the brake lever when removing the brake calipers.

- 3. Loosen:
  - ° pinch bolt (front wheel axle) (1) ° front wheel axle (2)
- 4. Elevate:
  - ° front wheel

### NOTE: \_

Place the motorcycle on a suitable stand so that the front wheel is elevated.

### EAS00526

#### CHECKING THE FRONT WHEEL

- 1. Check:
  - ° wheel axle Roll the wheel axle on a flat surface. Bends  $\rightarrow$  Replace.

### **WARNING**

### Do not attempt to straighten a bent wheel axle.

- 2. Check:
- °tire
- ° front wheel
- Damage/wear  $\rightarrow$  Replace.

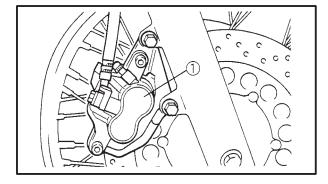
Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.

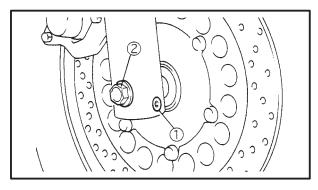
3. Check:

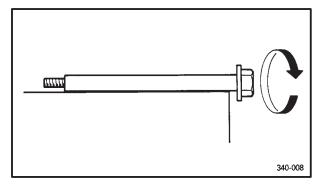
° spokes Bends/damage  $\rightarrow$  Replace.

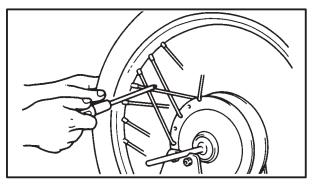
Loose  $\rightarrow$  Tighten.

Tap the spokes with a screwdriver.











#### NOTE: -

A tight spoke will emit a clear, ringing tone, a loose spoke will sound flat.

- 4. Tighten:
- °spokes

🍡 3 Nm (0.3m°kg)

**NOTE:** \_\_\_\_\_\_ After tightening the spokes, measure the front wheel runout.

- 5. Measure:
  - ° front wheel radial runout 1
  - ° front wheel lateral runout 2Over the specified limits  $\rightarrow$  Replace.



Front wheel radial runout limit 1.0 mm Front wheel lateral runout limit 0.5 mm

- 6. Check:
  - ° collars Damage/wear  $\rightarrow$  Replace.

### 

New tires have a relatively low grip on the road surface until they have been slightly worn.

Therefore, approximately 100 km should be traveled at normal speed before any highspeed riding is done.

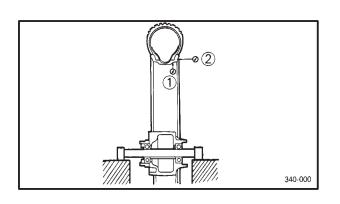
7. Check

° wheel bearings

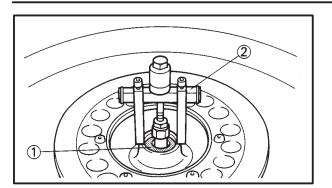
Front wheel turns roughly or is loose  $\rightarrow$  Replace the wheel bearings.

°oil seals

- Damage/wear  $\rightarrow$  Replace.
- 8. Replace:
  - ° wheel bearings (New)
  - $^{\circ}\text{oil}$  seals (New)



### FRONT WHEEL AND BRAKE DISCS



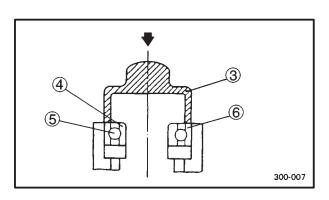


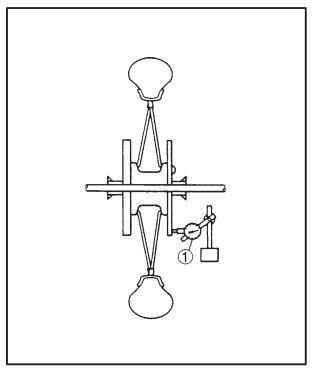
- a. Clean the outside of the front wheel hub.
- b. Remove the oil seals 1 with a flat-head screwdriver.

### NOTE: -

To prevent damaging the wheel, place a rag between the screwdriver and the wheel surface.

- c. Remove the wheel bearings with a general bearing puller ②.
- d. Install the new wheel bearings and oil seals in the reverse order of disassembly.





### CAUTION:

Do not contact the wheel bearing center race 4 or balls 5. Contact should be made only with the outer race 6.

### NOTE: \_

Use a socket ③ that matches the diameter of the wheel bearing outer race and oil seal.

#### 

#### EAS00531

### CHECKING THE BRAKE DISCS

The following procedure applies to all of the brake discs.

- 1. Check: °brake disc
  - Damage/galling  $\rightarrow$  Replace.
- 2. Measure:

° brake disc deflection 1

Out of specification  $\rightarrow$  Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit (maximum) Front: 0.15 mm Rear: 0.15 mm

- a. Place the motorcycle on a suitable stand so that the wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.





- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 2 3 mm below the edge of the brake disc.

- Measure:
   °brake disc thickness ①
   Measure the brake disc thickness at a few different locations.
   Out of specification → Replace.



Brake disc thickness limit (minimum) Front: 4.5 mm Rear: 5.5 mm

#### 4. Adjust:

- ° brake disc deflection
- a. Remove the brake disc.
- b. Rotate the brake disc by one bolt hole.
- c. Install the brake disc.

#### NOTE: -

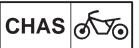
Tighten the brake disc bolts in stages and in a crisscross pattern.



Brake disc bolt 23 Nm (2.3 m°kg) LOCTITE<sup>®</sup>

- d. Measure the brake disc deflection.
- e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
- f. If the brake disc deflection cannot be brought within specification, replace the brake disc.
- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

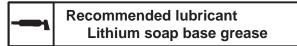
EAS00544



### **INSTALLING THE FRONT WHEEL**

The following procedure applies to both brake discs.

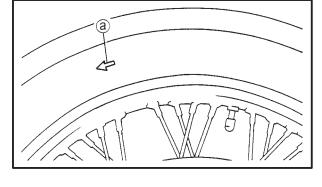
- 1. Lubricate:
- ° wheel axle
- ° oil seallips

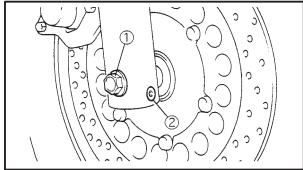


- 2. Install:
- ° front wheel assembly

#### NOTE: -

The arrow mark (a) on the tire must point in the direction of the wheel.





### 3. Tighten: ° wheel axle 1 59 Nm (5.9 m°kg) ° wheel axle pinch bolt 2 20 Nm (2.0 m°kg)

### **CAUTION:**

Before tightening the wheel axle nut, push down hard on the handlebar several times and check if the front fork rebounds smoothly.

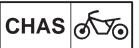
4. Install:

° brake caliper

🔌 40 Nm (4.0 m°kg)

**A** WARNING

Make sure that the brake hose is routed properly.



# ADJUSTING THE FRONT WHEEL STATIC BALANCE

#### NOTE: ·

EAS00549

- ° After replacing the tire, wheel or both, the front wheel static balance shourd be adjusted.
- ° Adjust the front wheel static balance with the brake discs installed.
- 1. Remove:

° balancing weight (-s)

### NOTE: -

Place the front wheel on a suitable balancing stand.

- 2. Find:
  - ° front wheel's heavy spot
- a. Spin the front wheel.
- b. When the front wheel stops, put an "X1" mark at the bottom of the wheel.
- c. Turn the front wheel 90° so that the " $X_1$ " mark is positioned as shown.
- d. Release the front wheel.
- e. When the wheel stops, put an "X<sub>2</sub>" mark at the bottom of the wheel.
- f. Repeat steps (b) through (d) several times until all the marks come to rest at the same spot.
- g. The spot where all the marks come to rest is the front wheel's heavy spot "X".
- 3. Adjust:

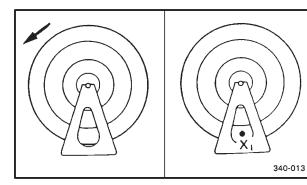
° front wheel static balance

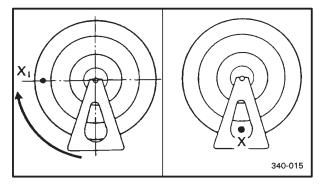
- a. Install a balancing weight ① onto the rimexactly opposite the heavy spot "X".

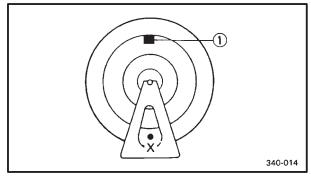
NOTE: -

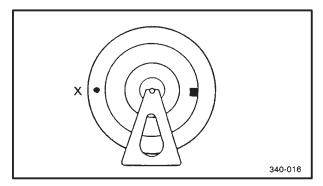
Start with the lightest weight.

- b. Turn the front wheel 90° so that the heavy spot is positioned as shown.
- c. If the heavy spot does not stay in that position, install a heavier weight.
- d. Repeat steps (b) and (c) until the front wheel is balanced.
- \*\*\*\*



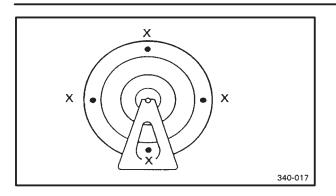






### FRONT WHEEL AND BRAKE DISCS

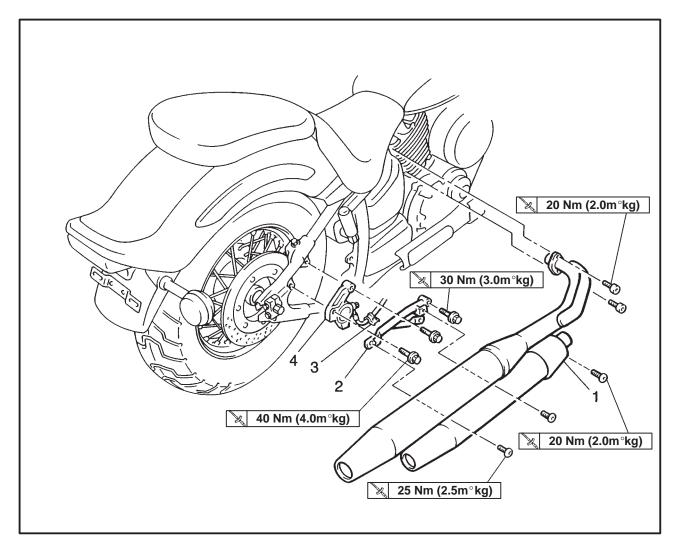




- 4. Check: ° front wheel static balance
- \*\*\*\*
- a. Turn the front wheel and make sure that it stays at each position shown.
- b. If the front wheel does not remain stationary at all of the positions, rebalance it.



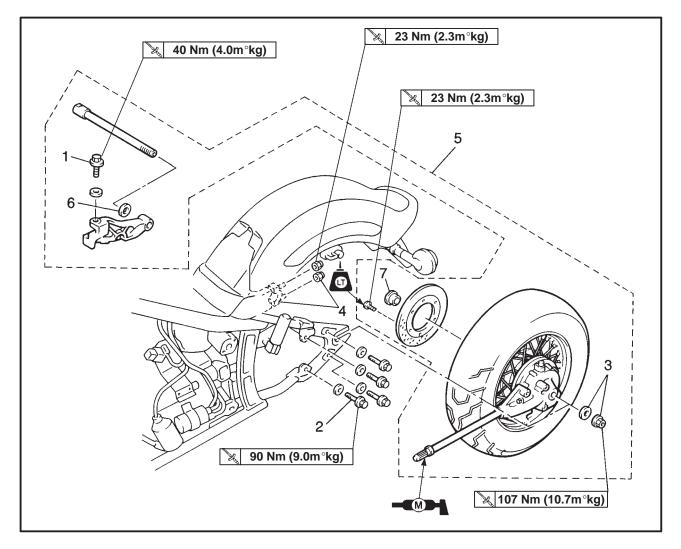
### REAR WHEEL AND BRAKE DISC MUFFLER AND BRAKE CALIPER



Order	Job name/Part name	Q'ty	Remarks
	Removing the muffler and brake caliper		Remove the parts in the order listed.
1	Muffler	1	
2	Muffler stay	1	
3	Brake hose holder	1	
4	Brake caliper	1	Refer to "REMOVING THE REAR WHEEL". For installation, reverse the removal procedure.

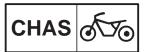


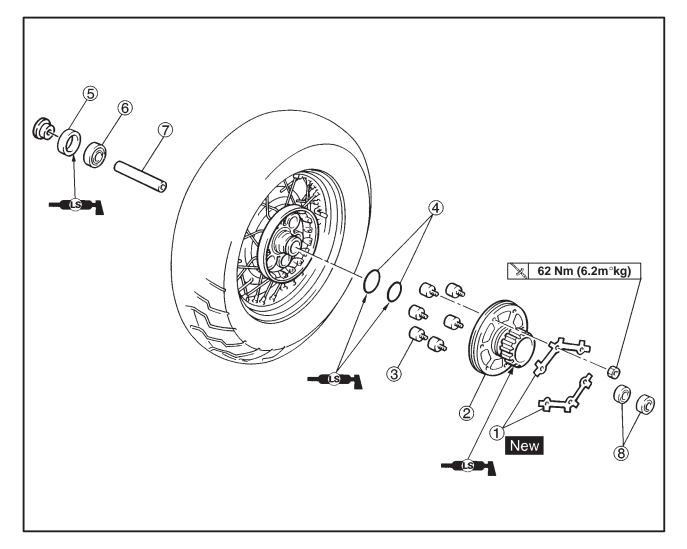
### **REAR WHEEL**



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear wheel		Remove the parts in the order listed. WARNING Securely support the motorcycle so there is no danger of it falling over.
1 2 3 4 5 6 7	Final gear oil Fuel tank and seats Rear fender assembly Brake caliper bracket bolt Bolts Rear axle nut/washer Rear axle end nuts/axle holder Rear wheel assembly Washer Collar	1 4 1/1- 2/1 1 - 1	Drain Refer to "FINAL GEAR OIL REPLACE- MENT" in CHAPTER 3. Refer to "FUEL TANK AND SEATS" in CHAPTER 3. Loosen Refer to "REMOVING/INSTAL- LING THE REAR WHEEL". For installation, reverse the removal procedure.

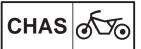
### REAR WHEEL AND BRAKE DISC





Order	Job name/Part name	Q'ty	Remarks
12345678	Rear wheel disassembly Disassembling the rear wheel Lock washers Clutch hub Dampers O-rings Oil seal Bearing Spacer Bearing	2 1 6 2 1 1 1	Remove the parts in the order listed. For assembly, reverse the disassembly procedure.

EAS00562



### **REMOVING THE REAR WHEEL**

1. Stand the motorcycle on a level surface.

### A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

#### NOTE: -

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

- 2. Remove:
  - ° rear gear case fitting bolts
- 3. Remove: <sup>°</sup>brake caliper ① <sup>°</sup>brake caliper bracket bolt

#### NOTE: -

Do not depress the brake pedai when removing the brake caliper.

- 4. Remove:
  - ° wheel axle nut
  - °washer
- 5. Remove:
  - $^{\circ}$  rear axle end nut  $^{\circ}$
- 6. Remove:
  - $^{\circ}$  rear axle holder 3
- 7. Remove:
  - ° rear wheel
- EAS00566

### CHECKING THE REAR WHEEL

- 1. Check:
  - $^{\circ} \text{wheel}$  axle
  - ° rear wheel
  - ° wheel bearings
  - $^{\circ} \text{oil seals}$

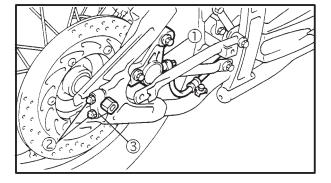
Refer to "FRONT WHEEL AND BRAKE DISCS".

- 2. Check:
  - °tire
    - Damage/wear  $\rightarrow$  Replace.

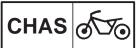
Refer to "CHECKING THE TIRES" and "CHECKING THE WHEELS" in chapter 3.

- 3. Check: °spokes Refer to "FRONT WHEEL AND BRAKE DISCS".
- 4. Measure:
  - ° rear wheel radial runout
  - ° rear wheel lateral runout

Refer to "FRONT WHEEL AND BRAKE DISCS".



EAS00567



### CHECKING THE REAR WHEEL DRIVE HUB

- 1. Check:
  - ° rear wheel drive hub
  - Cracks/damage  $\rightarrow$  Replace.
  - ° rear wheel drive hub dampers
  - Damage/wear  $\rightarrow$  Replace.

EAS00572

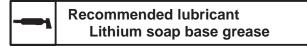
#### **INSTALLING THE REAR WHEEL**

1. Lubricate:

° drive shaft splines

Recommended lubricant Molydenum disulfide grease

- 2. Lubricate:
  - ° wheel axle
  - ° wheel bearings
  - °oil seal lips



### 2. Install:

- ° rear wheel assembly
- \*\*\*\*
- a. Install the rear wheel assembly ① with the rear brake caliper bracket ② and hold the bracket to keep the specified position.
- b. After installation of the rear axle shaft ③, slide the wheel assembly to forward direction.
- c. To make sure the caliper bracket mounts on the swingarm and then, fix the holder of swingarm temporally.

#### NOTE: -

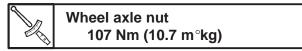
The holder should installed with the punch mark (a) facing upper.

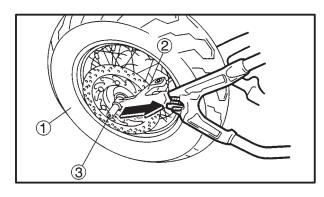
d. Tighten the rear gear housing bolts, with specified tightening torque.

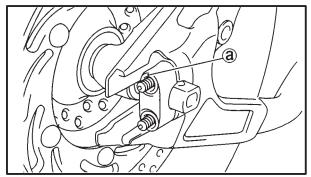


Rear gear housing bolt 90 Nm (9.0 m°kg)

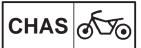
e. Tighten the nut of rear axle shaft with specified torque.







### **REAR WHEEL AND BRAKE DISC**



f. Tighten the rear axle holder with specified torque.



Rear axle end nut 23 Nm (2.3 m°kg)

g. Tighten the rear brake caliper bracket bolt with specified tightening torque.

### Brake caliper bracket bolt 40 Nm (4.0 m°kg)

h. Install the rear brake caliper on the bracket and tighten the bolts with specified tightening torque.

> Brake caliper bolt 40 Nm (4.0 m°kg)

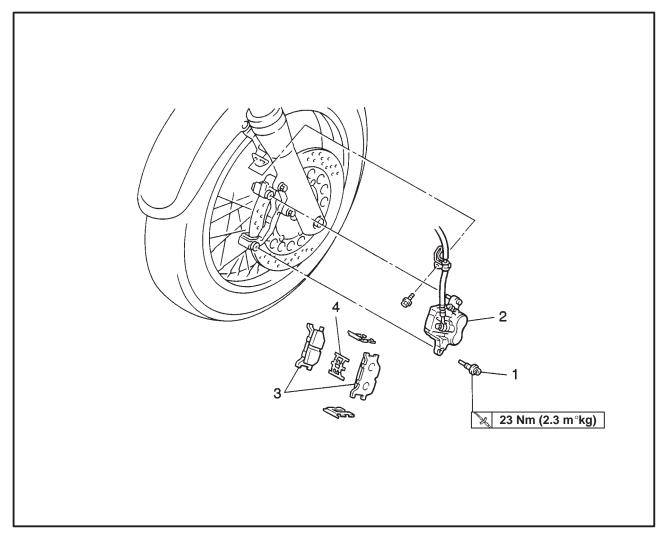
ADJUSTING THE REAR WHEEL STATIC BALANCE

#### NOTE: -

- <sup>o</sup> After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- <sup>°</sup>Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.
- 1. Adjust:
  - <sup>°</sup> rear wheel static balance Refer to "FRONT WHEEL AND BRAKE CISCS".



### FRONT AND REAR BRAKES FRONT BRAKE PADS

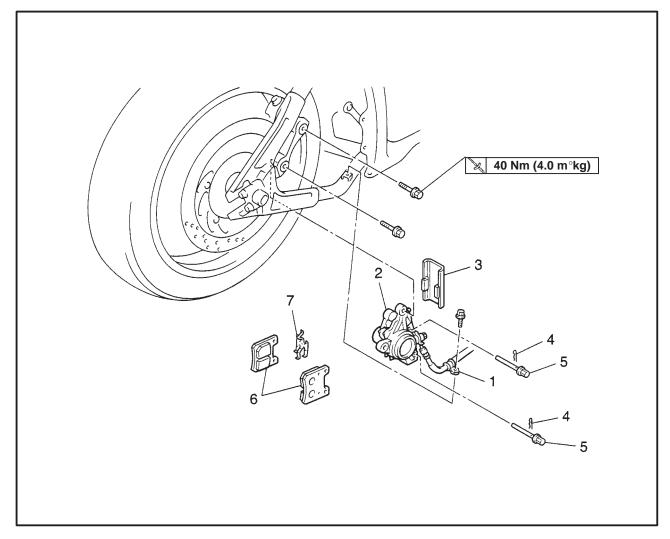


Order	Job name/Part name	Q'ty	Remarks
1 2 3 4	<b>Removing the front brake pads</b> Retaining bolt Brake caliper Brake pads Pad spring	1 - 1 2 1 -	Remove the parts in the order listed. Refer to "REPLACING THE FRONT BRAKE PADS". For installation, reverse the removal procedure.



EAS00578

### **REAR BRAKE PADS**



Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 7 6	Removing the rear brake pads Muffler Muffler stay Brake hose holder Caliper Cover Clips Pad pins Pad spring Brake pads	- - 1 - 1 2 2 1 2 -	Remove the parts in the order listed. Refer to "REAR WHEEL AND BRAKE DISC". Refer to "REPLACING THE REAR BRAKE PADS". For installation, reverse the removal procedure.



EAS00579

### **CAUTION:**

Disc brake components rarely require disassembly.

Therefore, always follow these preventive measures:

- <sup>o</sup> Never disassemble brake components unless absolutely necessary.
- <sup>o</sup> If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- <sup>o</sup>Never use solvents on internal brake components.
- <sup>o</sup>Use only clean or new brake fluid for cleaning brake components.
- <sup>o</sup> Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt fluid immediately.
- <sup>o</sup> Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- First aid for brake fluid entering the eyes: ° Flush with water for 15 minutes and get im-

mediate medical attention.

EAS00582

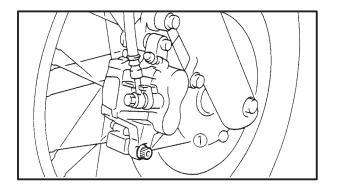
#### **REPLACING THE FRONT BRAKE PADS**

The following procedure applies to both brake calipers.

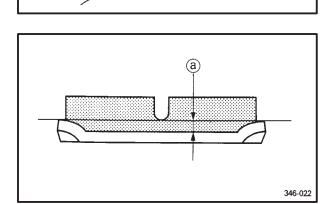
#### NOTE: -

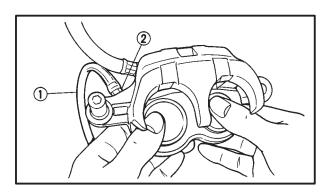
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

- 1. Remove:
- ° brake hose holder ° retaining bolt ①



# 2. Re °bra (al





2. Remove: °brake pads ①

FRONT AND REAR BRAKES

(along with the brake pad shims)

CHAS of

3. Measure:

° brake pad wear limit (a) Out of specification  $\rightarrow$  Replace the brake pads as a set.

Brake pad wear limit 0.8 mm

- 4. Install:
  - ° brake pad shims
  - (onto the brake pads)
  - ° brake pads
  - ° brake pad spring

### NOTE: -

Always install new brake pads, brake pad shims, and a brake pad spring as a set.

- a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
- b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
- c. Tighten the bleed screw.

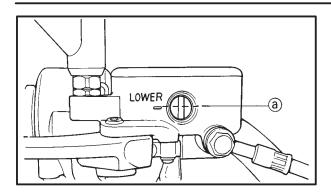
Bleed screw 6 Nm (0.6 m°kg)

- d. Install new brake pad shims onto the new brake pads.
- e. Install new brake pads and a new brake pad spring.
- 5. Install:
  - $^\circ {\rm brake}$  caliper
  - ° retaining bolt

🍾 23 Nm (2.3 m°kg)







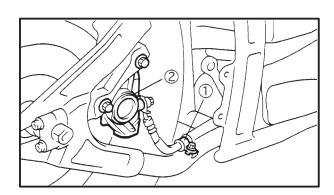
6. Check:

° brake fluid level Below the minimum lever mark ⓐ → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 7. Check:
  - ° brake lever operation

Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.



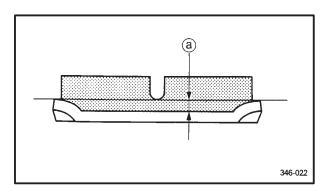
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### REPLACING THE REAR BRAKE PADS NOTE: \_\_\_\_\_

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

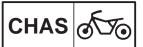
- 1. Remove:
  - ° brake hose holder (1) ° brake caliper (2)
- 2. Remove:
  - ° brake pad cover
  - ° brake pad clips
  - ° brake pad pins
  - ° brake pad spring
- Remove:
   °brake pads

   (along with the brake pad shims)



4. Measure:
 °brake pad wear limit ⓐ
 Out of specification → Replace the brake pads as a set.

Brake pad wear limit 0.5 mm



- 5. Install:
  - ° brake pad shims
  - (onto the brake pads)
- ° brake pads
- ° brake pad spring

#### NOTE: -

Always install new brake pads, brake pad shims, and a brake pad spring as a set.

#### \*\*\*\*

- a. Connect a clear plastic hose ① tightly to the bleed screw ②. Put the other end of the hose into an open container.
- b. Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
- c. Tighten the bleed screw.



Bleed screw 6 Nm (0.6 m°kg)

- d. Install new brake pad shims onto the new brake pads.
- e. Install new brake pads and a new brake pad spring.

#### NOTE: -

The longer tangs (a) on the brake pad spring must point in the direction of disc rotation.

#### 

- 6. Install:
  - ° brake pad pins
  - ° brake pad clips
  - ° brake pad cover
  - ° brake caliper
- 7. Check:

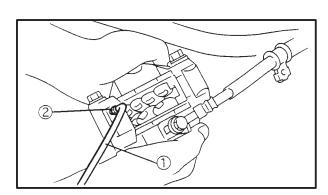
° brake fluid level Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

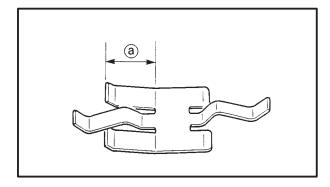
🔌 40 Nm (4.0 m°kg)

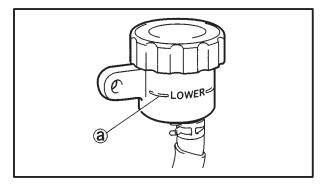
- 8. Check:
- ° brake pedal operation

Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

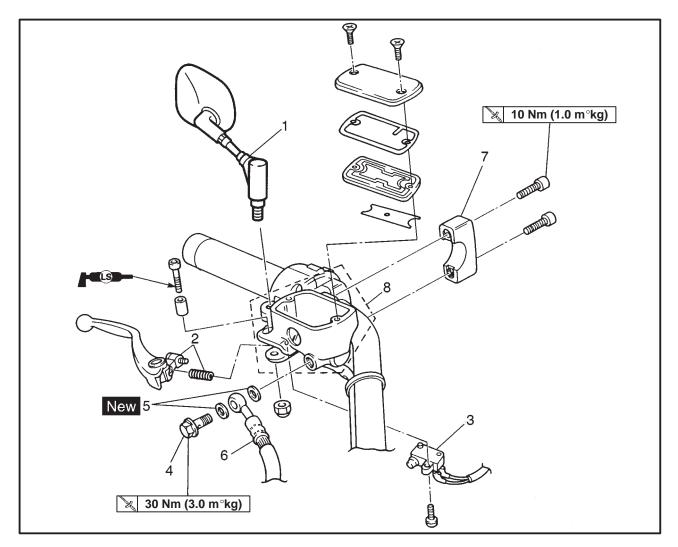




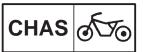


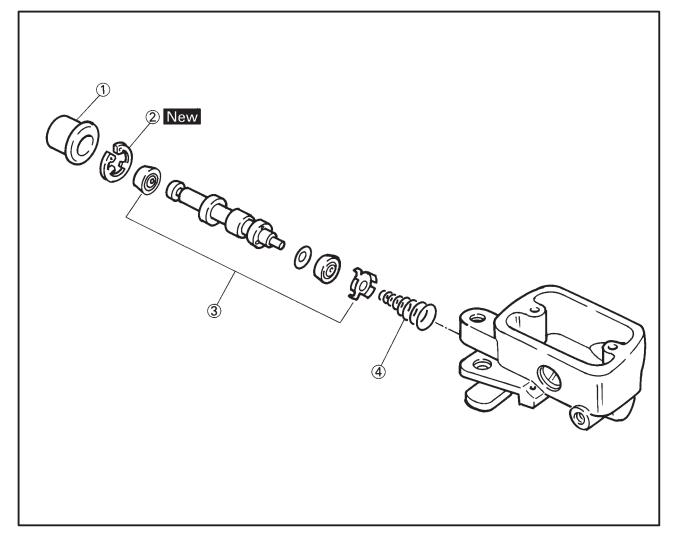


### FRONT BRAKE MASTER CYLINDER



Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6 7 8	Removing the front brake master cylinder. Brake fluid Rear view mirror (right) Brake lever/compression spring Front brake switch Union bolt Copper washers Brake hose Master cylinder bracket Master cylinder	1 1/1 1 - 2 1 - 1 - 1 -	Remove the parts in the order listed. Drain Refer to "REMOVING/INSTALLING THE FRONT BRAKE MASTER CYLINDER". Reter to "INSTALLING THE FRONT BRAKE MASTER CYLINDER". For installation, reverse the removal procedure.



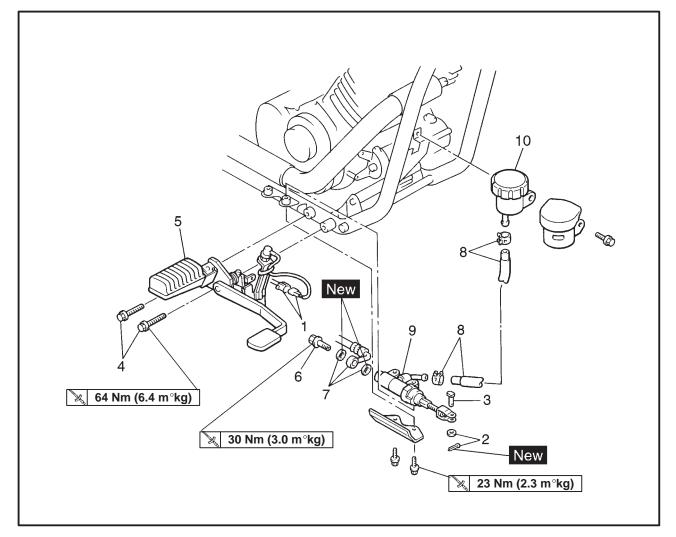


Order Job name/Part name Q'ty Remarks	
Disassembling the front brake master cylinder       Remove the parts in the order line         ①       Dust boot       1         ②       Circlip       1         ③       Master cylinder cup       1         ④       Spring       1         For assembly, reverse the disast procedure.       For assembly, reverse the disast procedure.	

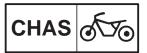


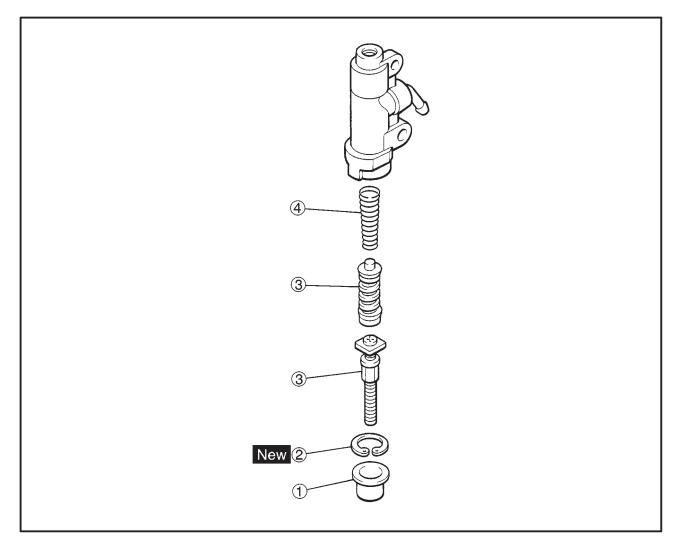
EAS00586

### **REAR BRAKE MASTER CYLINDER**



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain
1	Brake switch connector	1	Disconnect
2	Cotter pin/washer	1/1	
3	Pin	1	
4	Bolts	2	
5	Brake pedal assembly	1	
6	Union bolt	1 _	Refer to "REMOVING/INSTALLING THE
7	Copper washers/brake hose	2/1 -	$^{\downarrow}$ REAR BRAKE MASTER CYLINDER".
8	Clips/reservoir hose	2/1	
9	Master cylinder assembly	1	
10	Reservoir tank	1	
			For installation, reverse removal procedure.

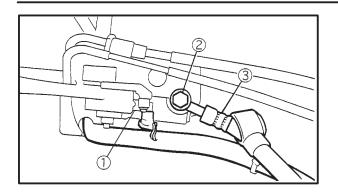




Order	Job name/Part name	Q'ty	Remarks
1 2 3 4	Disassembling the rear brake master cylinder Master cylinder boot Circlip Master cylinder cup Spring	1 1 1	Disassembly the parts in the order listed. For assembly, reverse the disassembly procedure.

EAS00588





# REMOVING THE FRONT BRAKE MASTER CYLINDER

#### NOTE: -

Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

- 1. Remove:
  - ° rear view mirror (right)
  - ° brake lever/compression spring
- °brake switch ①
- 2. Remove:
  - °union bolt 2
  - ° copper washers
  - ° brake hose ③

### NOTE: -

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

3. Remove:

° master cylinder bracket ° master cylinder

#### EAS00589

# REMOVING THE REAR BRAKE MASTER CYLINDER

#### NOTE: -

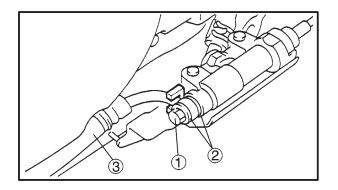
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

- 1. Remove:
  - ° brake switch connector
  - ° cotter pin/washer
  - °pin
  - ° bolt/brake pedal assembly
- 2. Remove:
  - $^{\circ}$  union bolt (1)
  - $^{\circ}$  copper washers (2)
  - ° brake hose ③

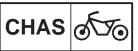
### NOTE: -

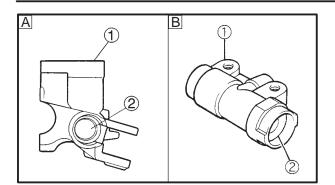
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

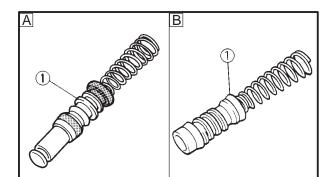
- 3. Remove:
  - ° clips/reservoir hose
  - ° master cylinder assembly

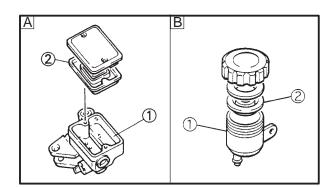


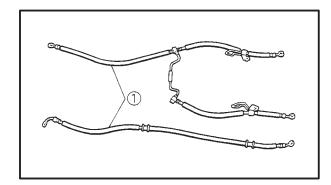
EAS00592









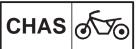


# CHECKING THE FRONT AND REAR BRAKE MASTER CYLINDERS

The following procedure applies to the both of the brake master cylinders.

- 1. Check:
- °brake master cylinder ①
  Damage/scratches/wear → Replace.
  °brake fluid delivery passages ②
  (brake master cylinder body)
  Obstruction → Blow out with compressed air.
- A Front
- B Rear
- 2. Check:
  - ° brake master cylinder kit (1) Damage/scratches/wear  $\rightarrow$  Replace.
- A Front
- **B** Rear
- 3. Check:
  °brake fluid reservoir ①
  Cracks/damage → Replace.
  °brake fluid reservoir diaphragm ②
  - Cracks/damage  $\rightarrow$  Replace.
- A Front
- B Rear
- 4. Check:
   °brake hoses ①
   Cracks/damage/wear → Replace.

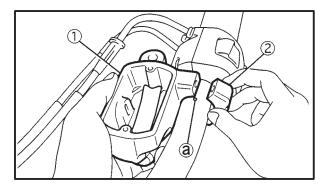
EAS00598

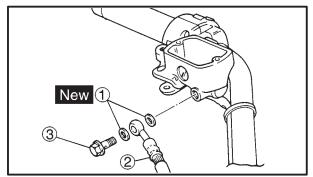


# INSTALLING THE FRONT BRAKE MASTER CYLINDER

# 

- <sup>o</sup> Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- <sup>o</sup>Never use solvents on internal brake components.





### Recommended brake fluid DOT 4

- 1. Install:
- ° brake master cylinder ①
- ° brake master cylinder bracket 2

🔌 10 Nm (1.0 m°kg)

#### NOTE: -

- <sup>o</sup> Install the brake master cylinder bracket with the "UP" mark facing up.
- ° Align the end of the brake master cylinder holder with the punch mark (a) on the handlebar.
- ° First, tighten the upper bolt, then the lower bolt.

2. Install:

° copper washers (New) ①

° brake hose 2 ° union bolt 3

🔀 30 Nm (3.0 m°kg)

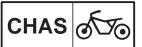
# A WARNING

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

### NOTE: \_

- °While holding the brake hose, tighten the union bolt as shown.
- <sup>o</sup> Turn the handlebar to the left and to the right to make sure that the brake hose does not touch other parts (e. g., wire harness, cables, leads). Correct if necessary.
- 3. Fill:
  - <sup>o</sup> brake master cylinder reservoir (with the specified amount of the recommended brake fluid)

### Recommended brake fluid DOT 4



# A WARNING

- <sup>o</sup>Use only the designated brake fluid. Other brake fluids may cause the rubber
- seals to deteriorate, causing leakage and poor brake performance.
- <sup>o</sup> Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- <sup>o</sup>When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

### CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

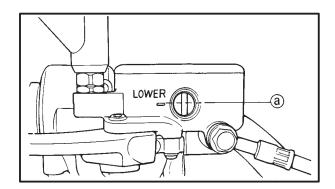
4. Bleed:

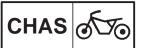
<sup>°</sup>brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

- 5. Check:
  - ° brake fluid level
     Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
- 6. Check:

° brake lever operation Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.





#### EASODG10 INSTALLING THE REAR BRAKE MASTER CYLINDER

- 1. Install:
- ° copper washers (New) ° brake hose

Union bolt 30 Nm (3.0 m°kg)

# 

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

# CAUTION:

When installing the brake hose onto the brake master cylinder make sure that the brake pipe touches the projections (a) as shown.

- 2. Fill:
  - <sup>o</sup>brake fluid reservoir (to the maximum level mark)



Recommended brake fluid DOT 4

# 

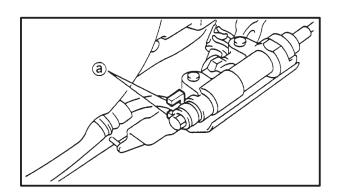
- <sup>o</sup> Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- <sup>o</sup> Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- <sup>o</sup>When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

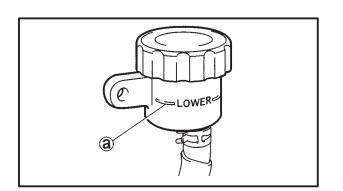
# CAUTION:

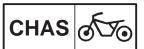
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

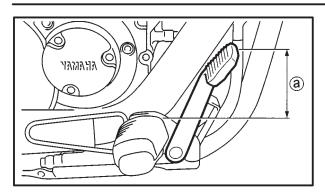
- 3. Bleed:
  - <sup>°</sup> brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
- 4. Check:

° brake fluid level Below the minimum level mark (a)  $\rightarrow$  Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

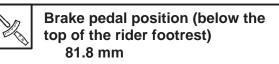








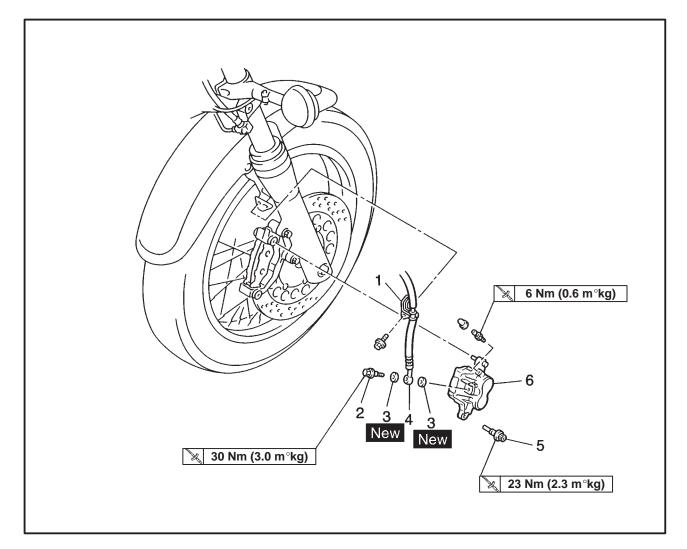
 Adjust:
 °brake pedal position (a) Refer to "ADJUSTING THE REAR BRAKE" in chapter 3.



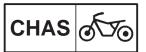
- 6. Adjust:
  - <sup>°</sup> rear brake light operation timing Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" in chapter 3.

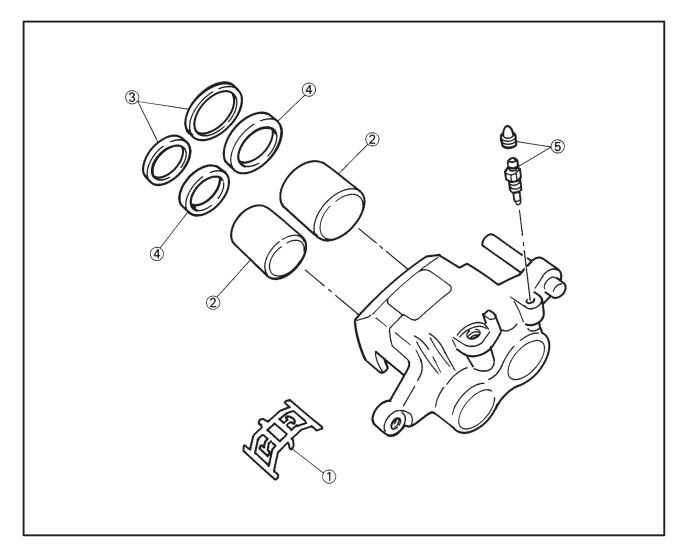


### FRONT BRAKE CALIPERS



Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5 6	Removing the front brake calipers Brake fluid Brake hose holder Union bolt Copper washers Brake hose Retaining bolt Brake caliper assembly	1 1 - 2 1 - 1 1	Remove the parts in the order listed. Drain Refer to "REMOVING/INSTALLING THE FRONT BRAKE CALIPERS". For installation, reverse the removal procedure.



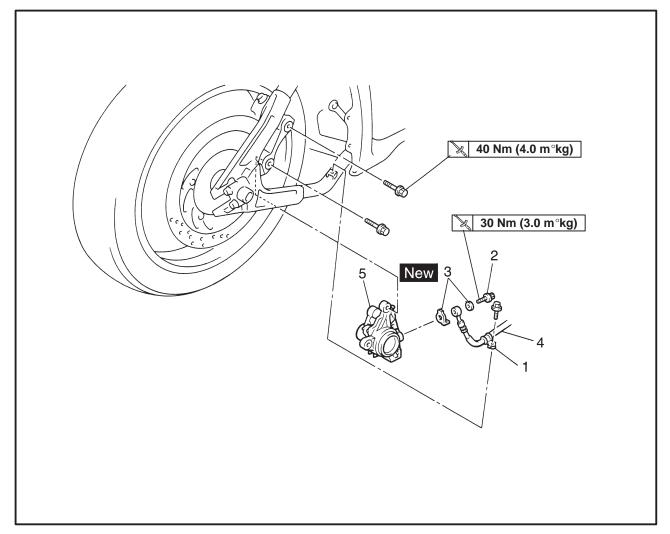


Order	Job name/Part name	Q'ty	Remarks
12345	Disassembling the front brake calipers Pad spring Brake caliper pistons Dust seals Caliper piston seals Bleed screw	1 2 - 2 - 1	Remove the parts in the order listed.          Refer to "REMOVING THE FRONT         BRAKE CALIPERS".         For assembly, reverse the disassembly         procedure.

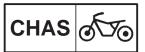


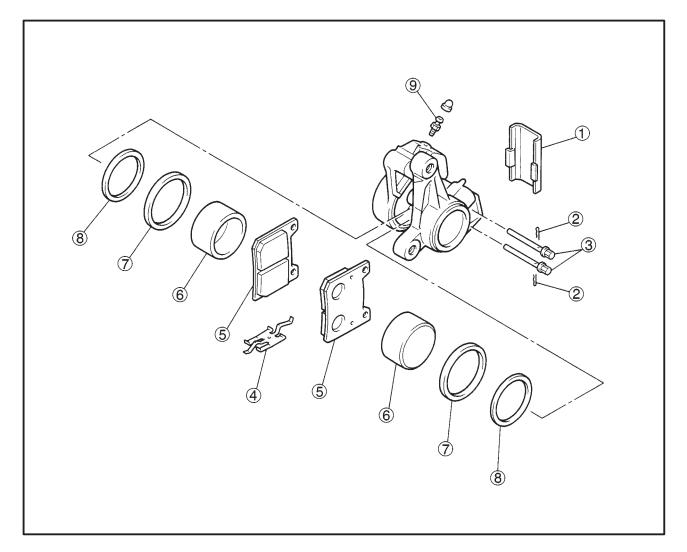
ESA00616

### **REAR BRAKE CALIPER**



Order	Job name/Part name	Q'ty	Remarks
1 2 3 4 5	Removing the rear brake caliper Muffler Muffler stay Brake fluid Brake hose holder Union bolt Copper washers Brake hose Caliper ass'y	- - 1 - 2 1 - 1	Remove the parts in the order listed. Refer to "REAR WHEEL AND BRAKE DISC". Drain Refer to "REMOVING/INSTALLING THE REAR BRAKE CALIPER". For installation, reverse the removal procedure.





Order	Job name/Part name	Q'ty	Remarks
123456789	Disassembling the rear brake caliper Cover Clips Pad pins Pad spring Brake pads Caliper pistons Dust seals Piston seals Bleed screw	1 2 1 2 2 - 2 1	Disassembly the parts in the order listed. Refer to "DISASSEMBLING THE REAR BRAKE CALIPER". For assembly, reverse the disassembly procedure.

EAS00624



### **REMOVING THE FRONT BRAKE CALIPERS**

The following procedure applies to both of the brake calipers.

### NOTE: \_

Before removing either brake caliper, drain the brake fluid from the entire brake system.

- 1. Remove:
  - ° brake hose holder
  - ° union bolt (1)
  - ° copper washers (2)
- ° brake hose

NOTE: -

Put the end of the brake hose into a container and pump out the brake fluid carefully.

- 2. Remove:
  - °brake caliper pistons ①
  - $^\circ\text{brake}$  caliper piston seals (2)
- a. Blow compressed air into the brake hose
- joint opening to force out the pistons from the brake caliper.

# A WARNING

- ° Cover the brake caliper piston with a rag. Be carful not to get injured when the piston is expelled from the brake caliper cylinder.
- <sup>°</sup>Never try to pry out the brake caliper pistons.

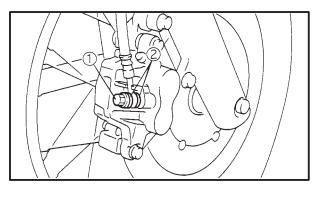
b. Remove the brake caliper piston seals.

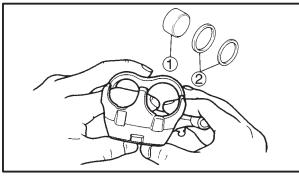
EAS00628

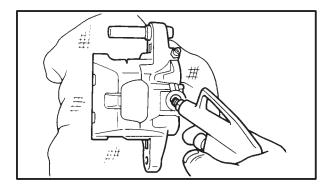
**REMOVING THE REAR BRAKE CALIPER** 

#### NOTE: -

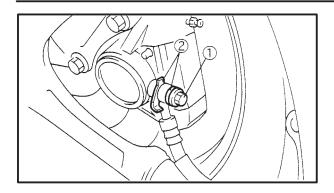
Before removing the brake caliper, drain the brake fluid from the entire brake system.

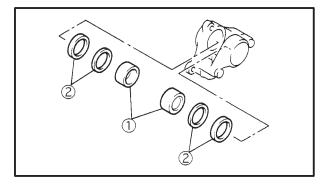


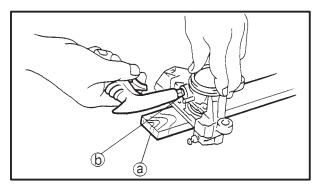












- 1. Remove:
  - °union bolt ①
  - ° copper wachers 2
  - ° brake hose

### NOTE: -

Put the end of the brake hose into a container and pump out the brake fluid carefully.

- 2. Remove:
  - ° brake caliper pistons ①
  - ° brake caliper pistons seals (2)

- a. Secure the right side brake caliper piston with a piece of wood (a).
- b. Blow compressed air into the brake hose joint opening (b) to force out the left side piston from the brake caliper.

### A WARNING

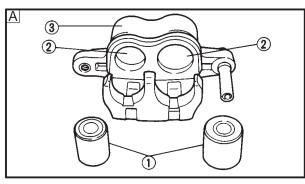
- <sup>°</sup>Never try to pry out the brake caliper pistons.
- <sup>°</sup> Do not loosen the bolts.
- c. Remove the brake caliper piston seals.
- d. Repeat the previous steps to force out the right side piston from the brake caliper.

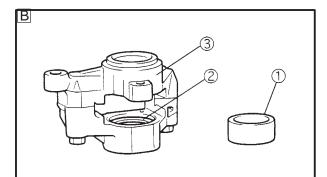
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EAS00633

# CHECKING THE FRONT AND REAR BRAKE CALIPERS

Recommended brake component replacement schedule:		
Brake pads	If necessary	
Piston seals	Every two years	
Brake hoses	Every two years	
Brake fluid	Every two years and whenever the brake is disassembled.	







- Check:

   <sup>o</sup> brake caliper pistons ①
   Rust/scratches/wear → Replace the brake caliper piston assembly.
  - ° brake caliper cylinders 2
  - Scratches/wear  $\rightarrow$  Replace the brake caliper.
  - ° brake calipers ③
  - Cracks/damage  $\rightarrow$  Replace.
  - °brake fluid delivery passages
  - (brake caliper body)

 $Obstruction \rightarrow Blow \ out \ with \ compressed \ air.$ 

# A WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

A Front

B Rear

2. Check:

° brake caliper brackets Cracks/damage  $\rightarrow$  Replace.

EAS00638

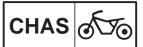
### INSTALLING THE FRONT BRAKE CAL-IPERS

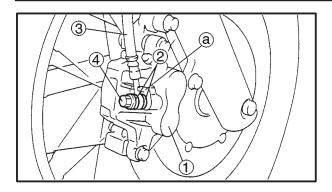
The following procedure applies to both of the brake calipers.

# 

- <sup>o</sup> Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- <sup>o</sup> Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- <sup>°</sup>Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

Recommended brake fluid DOT 4





- 1. Install:
  - $^{\circ}$ brake caliper (1)
  - (temporarily)
  - ° copper washers (New) 2
  - ° brake hose ③ ° union bolt ④
- 🔌 30 Nm (3.0 m°kg)

## **WARNING**

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

### CAUTION:

When installing the brake hose onto the brake caliper  $\bigcirc$ , make sure that the brake pipe touches the projection (a) on the brake caliper.

- 2. Install:
  - ° brake caliper retaining bolt

23 Nm (2.3 m°kg)

- °brake hose holder Refer to "FRONT BRAKE PADS".
- 3. Fill:
  - <sup>o</sup> brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



Recommended brake fluid DOT 4

# 

- <sup>o</sup> Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- <sup>o</sup> Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- <sup>o</sup>When refilling, be careful that water does not enter the reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.



### CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 4. Bleed:
  - °brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
- 5. Check:

<sup>°</sup> brake fluid level
 Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level.
 Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 6. Check:
  - ° brake lever operation Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

LOWER

EAS00642

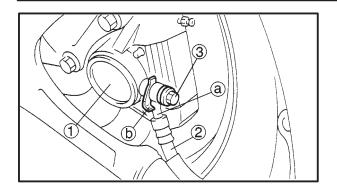
INSTALLING THE REAR BRAKE CALIPER

### 

- <sup>o</sup> Before installaiton, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- <sup>°</sup> Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- <sup>o</sup> Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

Recommended brake fluid DOT 4





- 1. Install: ° brake caliper (1) (temporarily) ° copper washers New
  - ° brake hose (2)
  - $^{\circ}$  union bolt (3)

🔌 30 Nm (3.0 m°kg)

40 Nm (4.0 m°kg)

### 

Proper brake hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".

### CAUTION:

When installing the brake hose onto the brake caliper (1), make sure that the brake pipe (a) touches the projection (b) on the copper washer.

- 2. Install:
  - ° brake caliper
  - ° brake hose holder

Refer to "REAR BRAKE PADS".

- 3. Fill:
  - ° brake fluid reservoir (with the specified amount of the recommended brake fluid)

**Recommended brake fluid** DOT 4

### 

- <sup>o</sup>Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- <sup>o</sup> Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a farmful chemical reaction, leading to poor brake performance.
- <sup>o</sup>When refilling, be careful that water does not enter the brake fluid reservoir. Water will signicantly lower the boiling point of the brake fluid and could cause vapor lock.



### **CAUTION:**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 4. Bleed:
  - ° brake system

#### NOTE: -

- ° Place the motorcycle on a suitable stand.
- <sup>o</sup>Make sure that the motorcycle is upright.

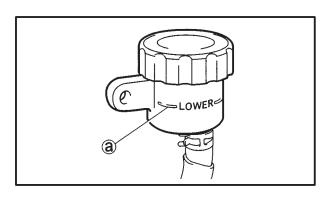
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

5. Check:

° brake fluid level Below the minimum level mark ⓐ → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

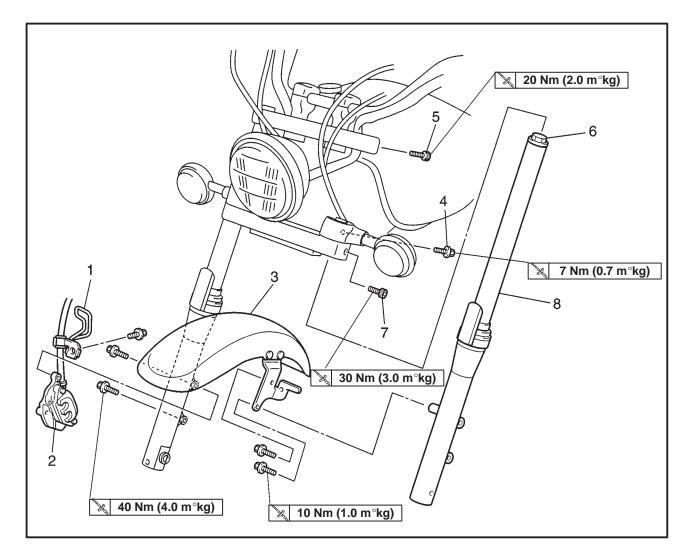
- 6. Check:
  - $^{\circ}$  brake pedal operation Soft or spongy feeling  $\rightarrow$  bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

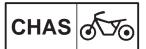


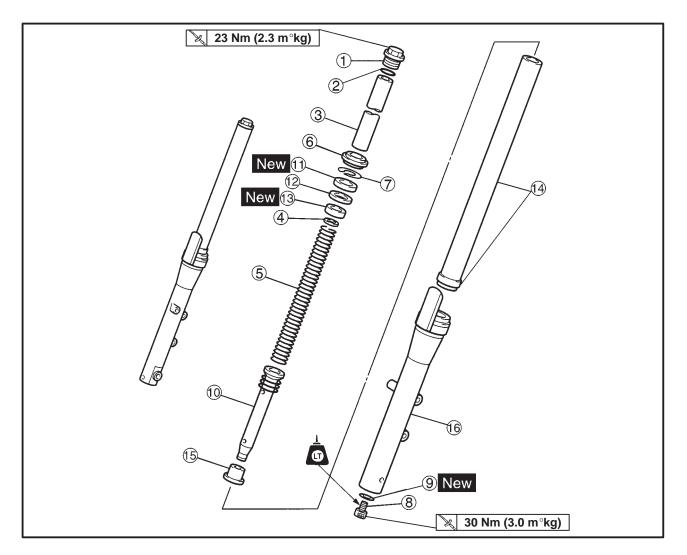


# **FRONT FORK**

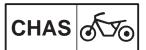


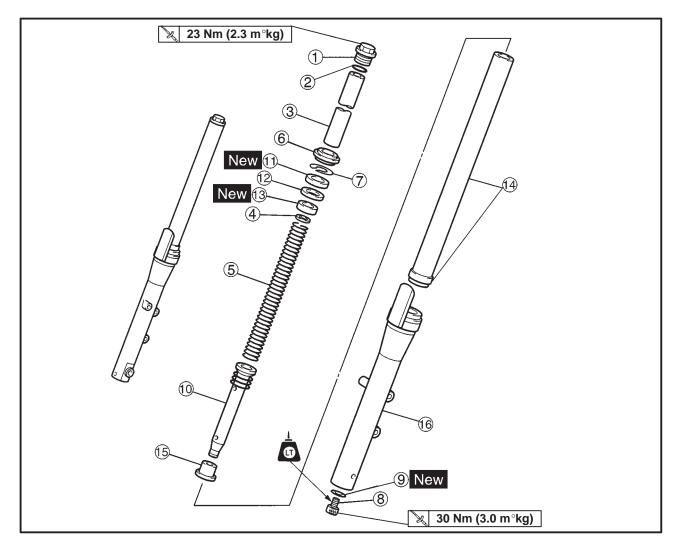
Order	Job name/Part name	Q'ty	Remarks
	Removing the front fork Front wheel		Remove the parts in the order listed. Refer to "FRONT WHEEL AND BRAKE DISCS".
1 2 3 4 5 6 7 8	Brake hose holders Brake caliper assembly Front fender Turn signal light bolts Upper bracket bolts Cap bolts Lower bracket bolts Front fork legs	2 2 1 2 2 2 2 2 2 2	Refer to "REMOVING/INSTALLING THE FRONT FORK LEGS". For installation, reverse the removal procedure.





Order	Job name/Part name	Q'ty	Remarks
12345678921	Disassembling the front fork Cap bolt O-ring Spacer Spring seat Fork spring Dust seal Oil seal clip Damper rod bolt Copper washer Damper rod/rebound spring Oil seal	1 - 1 1 1 1 1 1 1/1 1 -	Disassemble the parts in the order listed. Refer to "DISASSEMBLING/ASSEM- BLING THE FRONT FORK LEGS".





Order	Job name/Part name	Q'ty	Remarks
(2) (13) (14) (15) (16)	Seal spacer Outer tube bushing Inner tube/inner tube bushing Oil lock piece Outer tube	1 - 1 1/1 1 1 -	Refer to "DISASSEMBLING/ASSEM- BLING THE FRONT FORK LEGS". For assembly, reverse the disassembly procedure.



### **REMOVING THE FRONT FORK LEGS**

The following procedure applies to both of the front fork legs.

1. Stand the motorcycle on a level surface.

# A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

#### NOTE: -

EAS00649

Place the motorcycle on a suitable stand so that the front wheel is elevated.

2. Loosen:

- ° upper bracket pinch bolt 1° cap bolt 2
- °turn signal light bolt ③
- ° lower bracket pinch bolt ④

# A WARNING

Before loosening the upper and lower bracket pinch bolts, support the front fork leg.

3. Remove:

° front fork leg

EAS00653

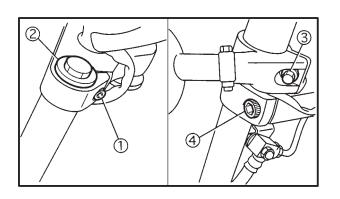
DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

- 1. Remove:
  - ° cap bolt
  - °O-ring
  - ° spacer
  - ° spring seat ° fork spring
- 2. Drain
- ° fork oil
- 3. Remove:
  - ° dust seal (1)
  - ° oil seal clip 2
  - (with a flat-head screwdriver)

### **CAUTION:**

Do not scratch the inner tube.







### NOTE: \_\_

- ° Do not remove the front fork leg protector from the outer tube.
- ° If the front fork leg protector must be removed, always install a new one.
- 4. Remove:
- ° damper rod bolt ° copper washer

### NOTE: \_

While holding the damper rod with the T-handle 1 and damper rod holder 2, loosen the damper rod bolt 3.

T-handle 90890-01326 Damper rod holder 90890-01460

- 6. Remove:
- ° inner tube
- •••••
- a. Hold the front fork leg horizontally.
- b. Slowly push A the inner tube into the outer tube and just before it bottoms out, pull B the inner tube back quickly.
- c. Repeat this step until the inner tube separates from the outer tube.

### EAS00657

CHECKING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

- 1. Check:
  - $^{\circ}$  inner tube ①
  - °outer tube 2

Bends/damage/scratches  $\rightarrow$  Replace.

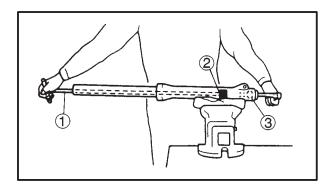
# 

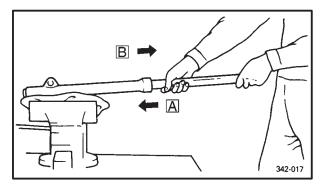
Do not attempt to straighten a bent inner tube as this may dangerously weaken it.

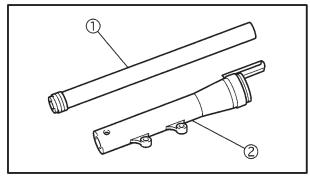
2. Measure:

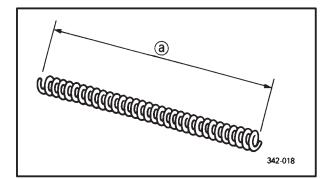
° spring free length (a) Over the specified limit  $\rightarrow$  Replace.

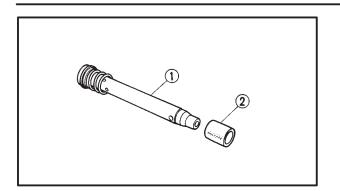
Spring free length limit 350 mm

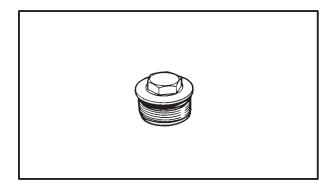












3. Check:

°damper rod ①

Damage/wear  $\rightarrow$  Replace.

Obstruction  $\rightarrow$  Blow out all of the oil pas-

- sages with compressed air.
- ° oil lock piece ②

 $\mathsf{Damage} \to \mathsf{Replace}.$ 

### **CAUTION:**

When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.

- 4. Check:
  - ° cap bolt
  - °O-ring

front fork legs.

Damage/wear  $\rightarrow$  Replace.

EAS00659

**ASSEMBLING THE FRONT FORK LEGS** The following procedure applies to both of the

# 

- ° Make sure that the oil levels both front fork legs are equal.
- <sup>o</sup>Uneven oil levels can result in poor handling and a loss of stability.

### NOTE: -

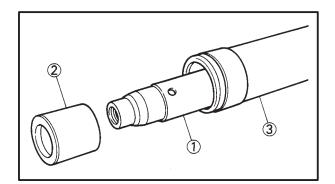
- ° When assembling the front fork leg, be sure to replace the following parts:
- -inner tube bushing
- -outer tube bushing
- -oil seal
- -dust seal
- <sup>°</sup>Before assembling the front fork leg, make sure that all of the components are clean.
- 1. Install:
- ° damper rod ① ° oil lock piece ②

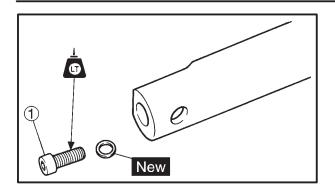
# A WARNING

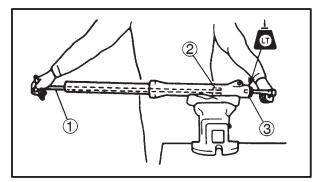
Always use new copper washers.

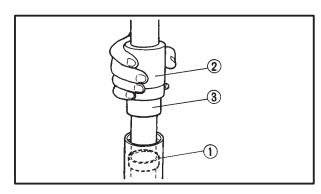
### **CAUTION:**

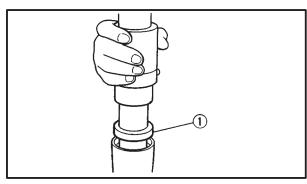
Allow the damper rod to slide slowly down the inner tube ③ until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

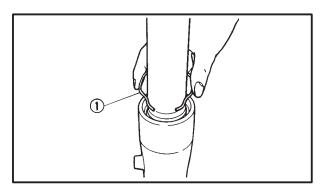




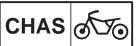






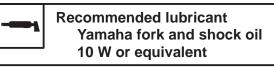


# **FRONT FORK**



2. Lubricate:

° inner tube's outer surface



# 3. Tighten:

NOTE: -

° damper rod bolt ①

bolt 1 30 Nm (3.0 m°kg)

While holding the damper rod with the T-handle 1 and damper rod holder 2, tighten the damper rod bolt 3.

T-handle 90890-01326 Damper rod holder 90890-01460

4. Install:

- $^\circ {\rm outer}$  tube bushing (1)
- ° seal spacer

(with the fork seal driver weight 2 and adapter 3)

Fork seal driver weight 90890-01367 Adapter 90890-01381

- 5. Install:
  - ° oil seal ①

(with the fork seal driver weight and adapter)

# CAUTION:

Make sure that the numbered side of the oil seal faces up.

### NOTE: \_\_\_\_

- ° Before installing the oil seal, apply lithium soap base grease onto its lips.
- 6. Install:

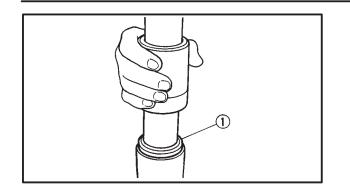
° oil seal clip ①

# NOTE: -

Adjust the oil seal clip so that it fits into the outer tube groove.





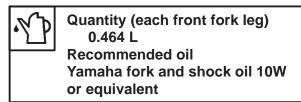


7. Install:

°dust seal ① (with the fork seal driver weight)

- 8. Fill:

 <sup>o</sup> front fork leg (with the specified amount of the recommended fork oil)



# CAUTION:

- <sup>°</sup> Be sure to use the recommended fork oil. Other oils may have an adverse effect on front fork performance.
- <sup>o</sup>When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.
- 9. After filling the front fork leg, slowly stroke the inner tube up and down (at least ten times) to distribute the fork oil.

### NOTE: -

Be sure to stroke the inner tube slowly because the fork oil may spurt out.

- 10. Measure:
- ° front fork leg oil level (a) Out of specification  $\rightarrow$  Correct.

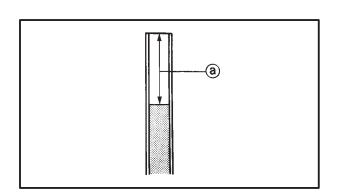


Front fork leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring) 108 mm

### NOTE: \_

Hold the fork in an upright position.

- 11. Install:
  - ° fork spring
  - ° spring seat
  - °spacer
  - °O-ring
  - ° cap bolt





### NOTE: \_\_\_\_

- ° Install the fork spring with its smaller pitch upword.
- <sup>°</sup>Before installing the cap bolt, apply grease to the O-ring.
- ° Temporarily tighten the cap bolt.

### EAS00662

### **INSTALLING THE FRONT FORK LEGS**

The fllowing procedure applies to both of the front fork legs.

- 1. Install:
  - ° front fork leg

Temporarily tighten the upper and lower bracket pinch bolts.

### NOTE: -

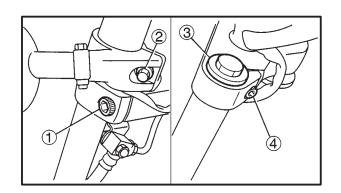
Make sure that the inner fork tube is flush with the top of the upper bracket.

2. Tighten:

° lower bracket pinch b	
	🔌 30 Nm (3.0 m°kg)
° front turn signal light	bolt 2
0 0	🔌 7 Nm (0.7 m°kg)
° cap bolt ③	🍾 23 Nm (2.3 m°kg)
° upper bracket pinch	bolt ④
	🔌 20 Nm (2.0m °kg)

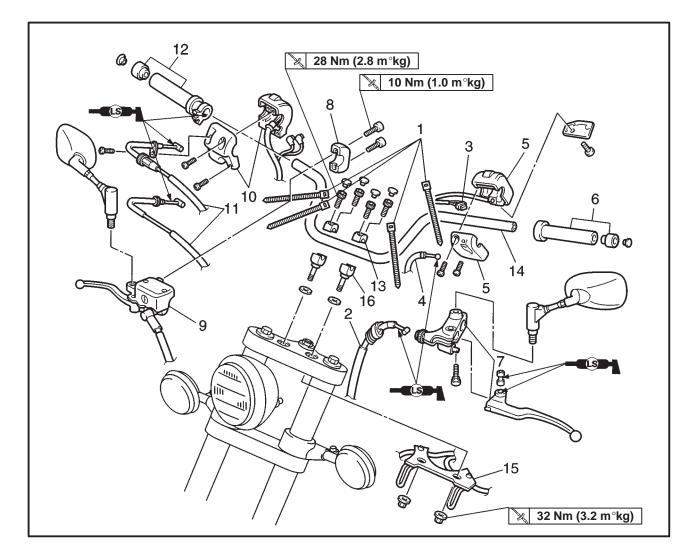
# A WARNING

Make sure that the brake hoses are routed properly.



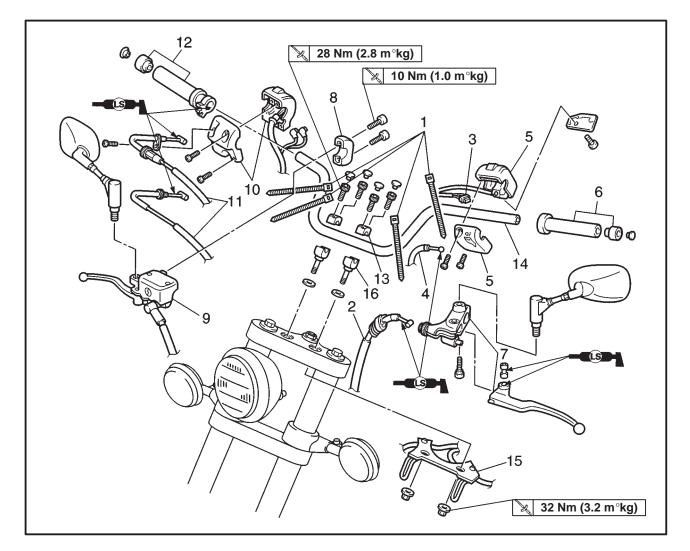


# HANDLEBAR



Order	Job name/Part name	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed. Stand the motorcycle on a level surface. WARNING Securely support the motorcycle so that there is no danger of it falling over.
1 2 3 4 5 6 7 8 9 10 11	Plastic locking ties Clutch cable Clutch switch lead Starter cable Handlebar switch (left) Grip (left) Clutch lever assembly Master cylinder bracket Master cylinder assembly Handlebar switch (right) Throttle cables	4 1 1 1 1 1 1 1 1 2	Refer to "INSTALLING THE HANDLEBAR". Refer to "REMOVING THE HANDLEBAR". Refer to "INSTALLING THE HANDLEBAR".





Order	Job name/Part name	Q'ty	Remarks
12 13 14 15 16	Throttle grip assembly Handlebar holders (upper) Handlebar Cable guide Handlebar holders (lower)	1 - 2 1 1 - 2	Refer to "INSTALLING THE HANDLEBAR". For installation, reverse the removal procedure.



### EAS00666 REMOVING THE HANDLEBAR

1. Stand the motorcycle on a level surface.

# A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

2. Remove: °handlebar grip (left) ①

NOTE: \_

Blow compressed air between the handlebar and the handlebar grip, and gradually push the grip off the handlebar.

### EAS00668

### **CHECKING THE HANDLEBAR**

1. Stand the motorcycle on a level surface.

#### 

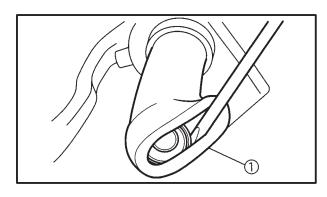
Securely support the motorcycle so that there is no danger of it falling over.

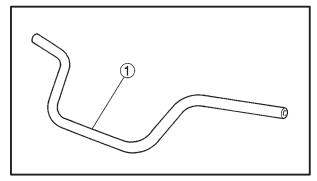
- 2. Check:
- ° handlebar (1) Bends/cracks/damage  $\rightarrow$  Replace.

# A WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

- 3. Install:
  - ° handlebar grip







- a. Apply a light coat of rubber adhesive onto the left end of the handlebar.
- b. Slide the handlebar grip over the left end of the handlebar.
- c. Wipe off any excess rubber adhesive with a clean rag.

# 

Do not touch the handlebar grip until the rubber adhesive has fully dried.

EAS00670

**INSTALLING THE HANDLEBAR** 

1. Stand the motorcycle on a level surface.

# 

Securely support the motorcycle so that there is no danger of it falling over.

- 2. Install:
  - °handlebar
  - ° upper handlebar holders

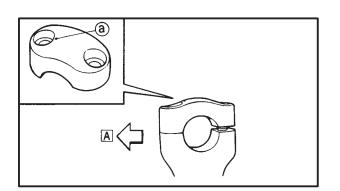
🔀 28 Nm (2.8 m°kg)

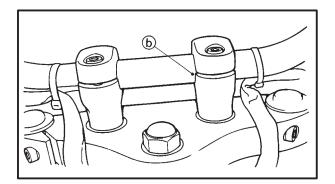
# CAUTION:

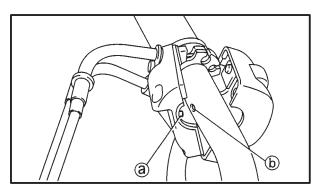
<sup>o</sup> First, tighten the bolts on the front side of the handlebar holder, then on the rear side.
<sup>o</sup> Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.

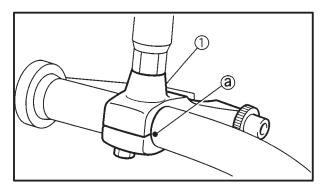
### NOTE: -

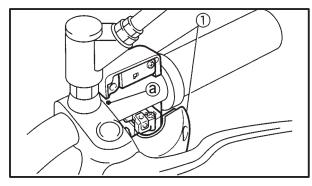
°The upper handlebar holders should be installed with the punch mark (a) facing forward  $\boxed{A}$ .













- <sup>o</sup> Align the match marks (b) on the handlebar with the upper surface of the lower handlebar holders.
- 3. Install:
  - ° throttle grip
  - ° throttle cable

# 

Make sure that the pin (a) on the throttle cable housing is aligned with the hole (b) in the handlebar.

- 4. Install:
  - ° master cylinder Refer to "FRONT AND REAR BRAKES".
- 5. Install:

° clutch lever holder (1)

### NOTE: -

Align the slit in the clutch lever holder with the punch mark (a) in the handlebar.

6. Install:

° left handlebar switch ①

# NOTE: \_

Aligh the matching surface on the handlebar switches with the punch mark a on the handlebar.

- 7. Install:
- ° clutch cable
- 8. Connect:
- ° clutch switch coupler

### NOTE: \_

Apply a thin coat of lithium soap base grease onto the end of the clutch cable.

CHAS of 50

- HANDLEBAR
- 9. Adjust:

<sup>°</sup> clutch cable free play Refer to "ADJUSTING THE CLUTCH CABLE FREE PLAY" in chapter 3.



Clutch cable free play (at the end of the clutch lever)  $5 \times 10 \text{ mm}$ 

10. Adjust:

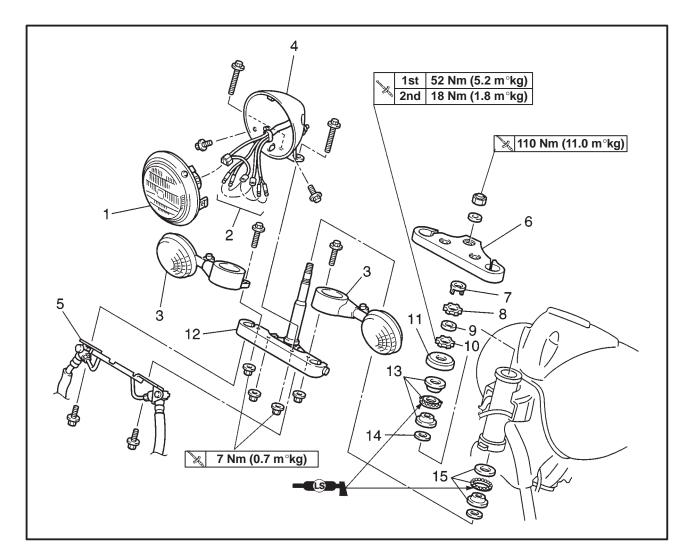
<sup>o</sup> throttle cable free play Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.



Throttle cable free play (at the flange of the throttle grip)  $4 \times 6 \text{ mm}$ 

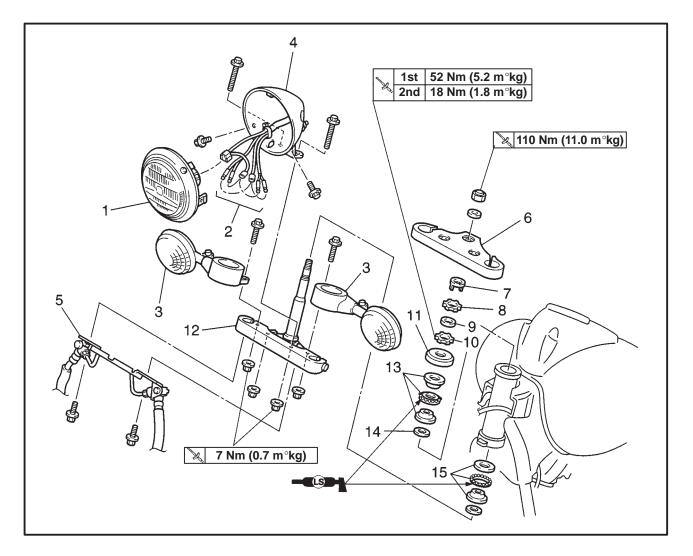


# **STEERING HEAD**



Order	Job name/Part name	Q'ty	Remarks
	Removing the lower bracket		Remove the parts in the order listed. Stand the motorcycle on a level surface.
			Securely support the motorcycle so that there is no danger of it falling over.
	Front fork legs Handlebar		Refer to "FRONT FORK". Refer to "HANDLEBAR".
1	Headlight lens unit Leads (in the headlight body)	1	Disconnect
3	Front turn signal light (left/right)	1/1	Disconnect
4	Headlight body	1	
5	Brake hose joint holder	1	
6	Upper bracket	1	
7 8	Lock washer Upper ring nut	1	





Order	Job name/Part name	Q'ty	Remarks
9 10 11 12 13 14 15	Rubber washer Lower ring nut Bearing cover Lower bracket Bearing (upper) Rubber seal Bearing (lower)	1 1 - 1 1 1 1	Refer to "REMOVING THE LOWER BRACKET/INSTALLING THE STEERING HEAD". For installaiton, reverse the removal procedure.



EAS00677

**REMOVING THE LOWER BRACKET** 

1. Stand the motorcycle on a level surface.

# A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

- 2. Remove:
  - ° upper ring nut 1
  - ° lower ring nut 2

# NOTE: .

Hold the lower ring nut with the exhaust and steering nut wrench, then remove the upper ring nut with the ring nut wrench.



# 

Securely support the lower bracket so that there is no danger of it falling.

EAS00681

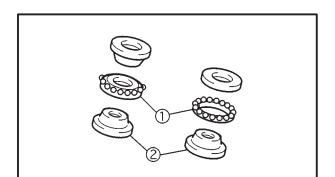
**CHECKING THE STEERING HEAD** 

1. Wash:

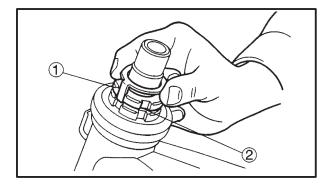
°bearings

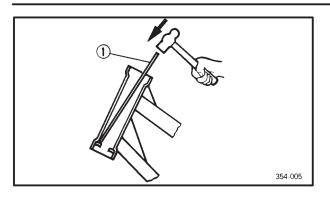
°bearing races

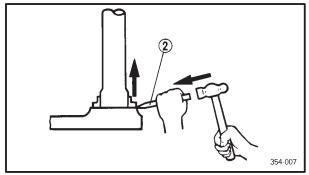
Recommended cleaning solvent Kerosine

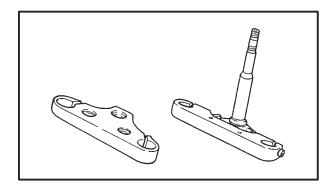


- 2. Check
  - ° bearings ① ° bearing races ②
  - Damage/pitting  $\rightarrow$  Replace.
- 3. Replace:
- °bearings
- ° bearing races











- a. Remove the bearing reces from the steering head pipe with a long rod ① and hammer.
- b. Remove the bearing race from the lower bracket with a floor chisel (2) and hammer.
- c. Install a new rubber seal and new bearing reces.

# **CAUTION:**

If the bearing race is not installed properly, the steering head pipe could be damaged.

### NOTE: \_\_\_\_

- °Always replace the bearings and bearing races as a set.
- <sup>°</sup>Whenever the steering head is disassembled, replace the rubber seal.
- 4. Check:
  - ° upper bracket
  - ° lower bracket (along with the steering stem) Bends/cracks/damage  $\rightarrow$  Replace.

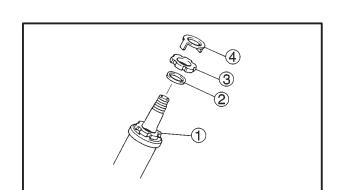
EAS00683

### **INSTALLING THE STEERING HEAD**

- 1. Lubricate:
  - ° upper bearing
  - ° lower bearing
  - ° bearing races

----1

- Recommended lubricant Lithium soap base grease
- 2. Install:
  - °Lower ring nut  $\underbrace{1}$
  - ° rubber washer 2
  - ° upper ring nut 3
  - ° lock washer ④
  - Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" in chapter 3.
- 3. Install:
- ° upper bracket
- ° steering stem nut





# NOTE: \_\_\_\_

Temporarily tighten the steering stem nut.

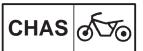
4. Install:

° front fork legs Refer to "FRONT FORK"

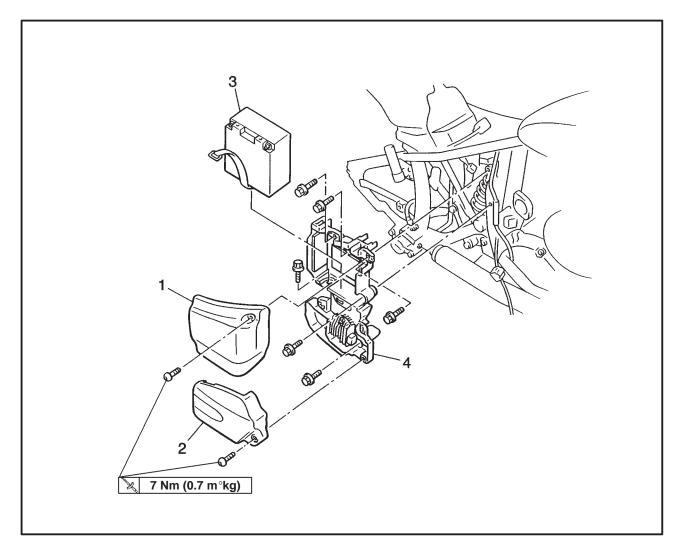
# NOTE: -

Temporarily tighten the upper and lower bracket pinch bolts.

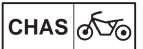
# REAR SHOCK ABSORBER AND SWINGARM



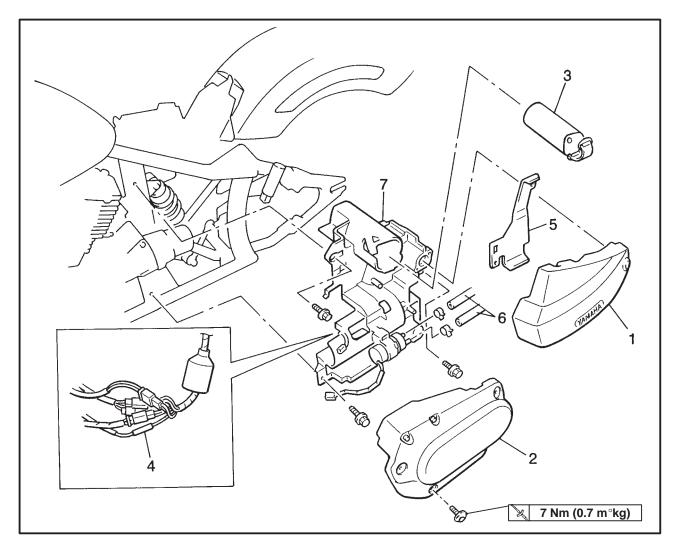
# REAR SHOCK ABSORBER AND SWINGARM RIGHT SIDE COVER AND BATTERY BOX



Order	Job name/Part name	Q'ty	Remarks
	Removing the right side cover and battery box. Seats Muffler assembly		Remove the parts in the order listed. Stand the motorcycle on a level surface. Refer to "FUEL TANK AND SEATS" in CHAPTER 3. Refer to "REAR WHEEL AND BRAKE DISC".
1 2 3 4	Battery cover Right side cover Battery Battery box	1 1 1	Refer to "REMOVING/INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY". For installation, reverse the removal procedure.



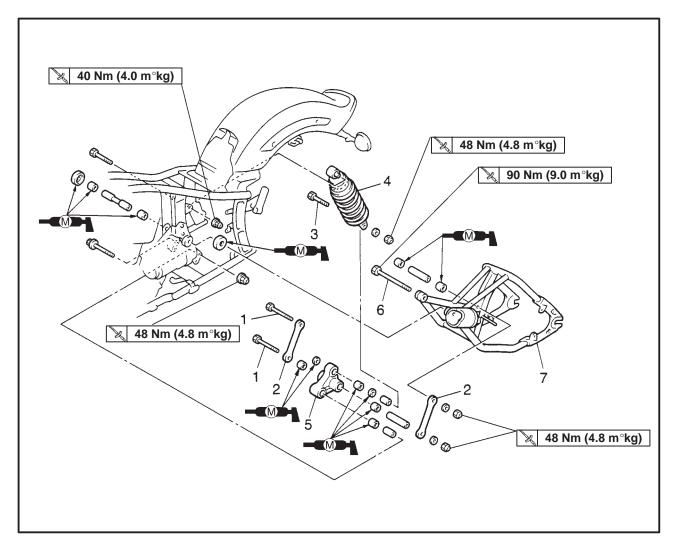
## LEFT SIDE COVER AND TOOL BOX



Order	Job name/Part name	Q'ty	Remarks
	Removing the left side cover and tool box		Remove the parts in order listed.
1	Tool box cover	1	
2	Left side cover	1	
3	Owner's tool kit	1	
4	Connector's	-	Disconnect
5	Fuel hose holder	1	
6	Fuel hoses	2	Disconnect
7	Tool box	1	
			For installation, reverse the removal procedure.



# REAR SHOCK ABSORBER AND SWINGARM



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear shock absorber and swingarm		Remove the parts in order listed.
	Rear wheel		Refer to "REAR WHEEL AND BRAKE DISC".
1	Connecting arm bolts	2 -	
2	Connecting arms	2	Refer to "REMOVING/INSTALLING THE
3	Rear shock absorber lower bolt	1	REAR SHOCK ABSORBER ASSEMBLY".
4	Rear shock absorber	1 =	
5	Relay arm	1	Refer to "REMOVING/INSTALLING THE
6	Pivot shaft	1	SWINGARM".
7	Swingarm	1 -	
			For installation, reverse the removal procedure.



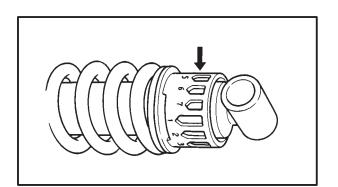
HANDLING THE REAR SHOCK ABSORBER AND GAS CYLINDER

# 

EAS00687

This rear shock absorber and gas cylinder contain highly compressed nitrogen gas. Before handling the rear shock absorber or gas cylinder, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber and gas cylinder.

- <sup>o</sup> Do not tamper or attempt to open the rear shock absorber or gas cylinder.
- <sup>o</sup> Do not subject the rear shock absorber or gas cylinder to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- <sup>o</sup> Do not deform or damage the rear shock absorber or gas cylinder in any way. If the rear shock absorber, gas cylinder or both are damaged, damping performance will suffer.



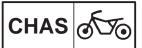
EAS00689

# DISPOSING OF A REAR SHOCK ABSORBER AND GAS CYLINDER

- a. Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, drill a  $2 \times 3$  mm hole through the gas cylinder at a point 15 20 mm from its end as shown.

# A WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.



### REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the motorcycle on a level surface.

# A WARNING

Securely support the motorcycle so that there is no danger of it falling over.

### NOTE: \_\_\_\_

EAS00694

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

 Disconnect:
 °battery leads (from the battery terminals)

# CAUTION:

First, disconnect the negative lead (1), then the positive lead (2).

3. Remove:

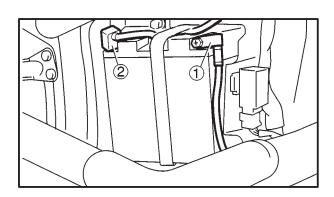
° connecting arm bolt(swingarm side) ① ° rear shock absorber assembly lower bolt

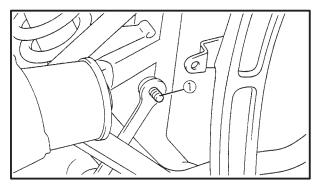
### NOTE: -

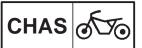
While removing the connecting arm bolt (swingarm side), hold the swingarm so that it does not drop down.

### 4. Remove:

- ° rear shock absorber upper bolt
- ° rear shock absorber







# **REMOVING THE SWINGARM**

1. Stand the motorcycle on a level surface.

# A WARNING

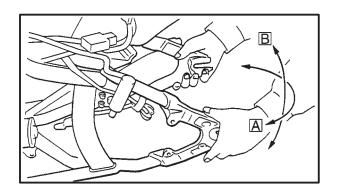
Securely support the motorcycle so that there is no danger of it falling over.

### NOTE: -

EAS00702

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

- 2. Remove:
  - ° rear shock absorber

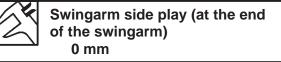


- 3. Check:
  - °swingarm side play
  - °swingarm vertical movement
- a. Check the tightening torque of the swingarm pivot bolts and locknut.



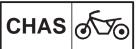
### Locknut 90 Nm (9.0 m°kg)

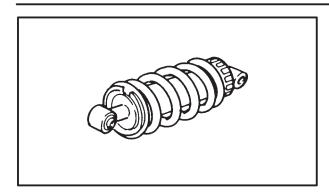
- b. Check the swingarm side play A by moving the swingarm from side to side.
- c. If the swingarm side play is out of specification, check the spacers and bearings.

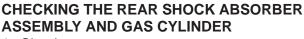


d. Check the swingarm vertical movement B by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the spacers and bearings.

# **REAR SHOCK ABSORBER AND SWINGARM**







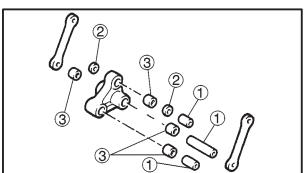
1. Check:

EAS00696

- ° rear shock absorber rod Bends/damage  $\rightarrow$  Replace the rear shock absorber assembly.
- ° rear shock absorber
- Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- °spring
- Damage/wear  $\rightarrow$  Replace the rear shock absorber assembly.
- ° gas cylinder
- Damage/gas leaks  $\rightarrow$  Replace.
- ° bushings
- Damage/wear  $\rightarrow$  Replace.
- ° dust seals
- Damage/wear  $\rightarrow$  Replace.
- ° bolts Bends/damage/wear  $\rightarrow$  Replace.
- EAS00708

## **CHECKING THE SWINGARM**

- 1. Check:
  - ° swingarm Bends/cracks/damage  $\rightarrow$  Replace.
- 2. Check: ° pivot shaft Damage/wear  $\rightarrow$  Replace.



- 3. Check:
  - $^{\circ}$  collars (1)
  - ° oilseals (2)
  - ° bearings ③
  - Damage/wear  $\rightarrow$  Replace.

6-69



# EAS00698

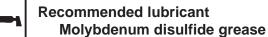
# INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Install:
  - °swingarm

Refer to "INSTALLING THE SWINGARM".

- 2. Lubricate:
  - °spacers

° bearings



3. Install:

° rear shock absorber assembly

Rear shock absorber assembly upper nut 40 Nm (4.0 m°kg) Rear shock absorber assembly lower nut 48 Nm (4.8 m°kg) Relay-arm-to-frame-nut 48 Nm (4.8 m°kg)

### NOTE: \_

- °When installing the rear shock absorber assembly, lift up the swingarm.
- ° Install the connecting arm front bolt from the right.
- 4. Connect:
  - battery leads
     (to the battery terminals)

# **CAUTION:**

First, connect the positive lead (1), then the negative lead (2).

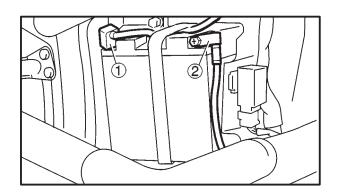
EAS00712

### INSTALLING THE SWINGARM

- 1. Lubricate:
- °bearings
- ° spacers

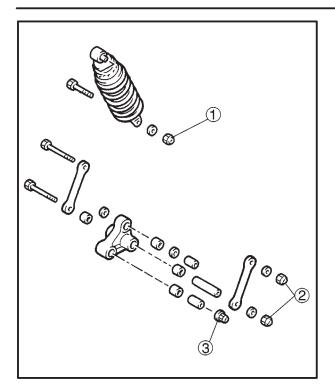
°oil seals

Recommended lubricant Molybdenum disulfide grease

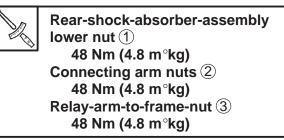


# REAR SHOCK ABSORBER AND SWINGARM





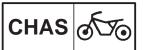
- 2. Install:
- ° relay arm
- ° left connecting arm
- ° right connecting arm



3. Install:

- ° rear shock absorber Reter to "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY".
- 4. Install:
- ° rear wheel

Refer to "REAR WHEEL AND BRAKE DISC".



# SHAFT DRIVE

# TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

Α	Symptoms	В	Possible causes
2.	A pronounced hesitation or jerky movement during acceleration, deceleration, or sus- tained speeds. (not to be confused with engine surging or transmissionrelated movements.) A rolling "rumble" noticeable at low speeds, a high-pitched whine, or a "clunk" from a shaft drive component or vicinity of the shaft drive. The shaft drive is locked up or no power is transmitted from the engine to the rear wheel	B. C. D. E. F. G.	Bearing damage Improper gear lash Damaged gear teeth Broken drive shaft Broken gear teeth Seizure due to lack of lubrication Small foreign objects lodged between moving parts

### NOTE: ----

Causes A, B and C may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal operating noises. If there is reason to believe these components are damaged, remove them for individual inspection.



### **Inspection notes**

1. Investigate any unusual noises.

The following noises may indicate a mechanical defect:

- A rolling "rumble" during coasting, acceleration, or deceleration, (increases with the rear wheel speed, but does not increase with higher engine or transmission speeds).
   Diagnosis: Possible wheel bearing damage.
- b. A whining noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly or too little gear lash.

# 

Insufficient gear lash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

 c. A slight "clunk" evident at low speed operation. (not to be confused with normal motorcycle operation)
 Diagnosis: Possible broken gear teeth

# 

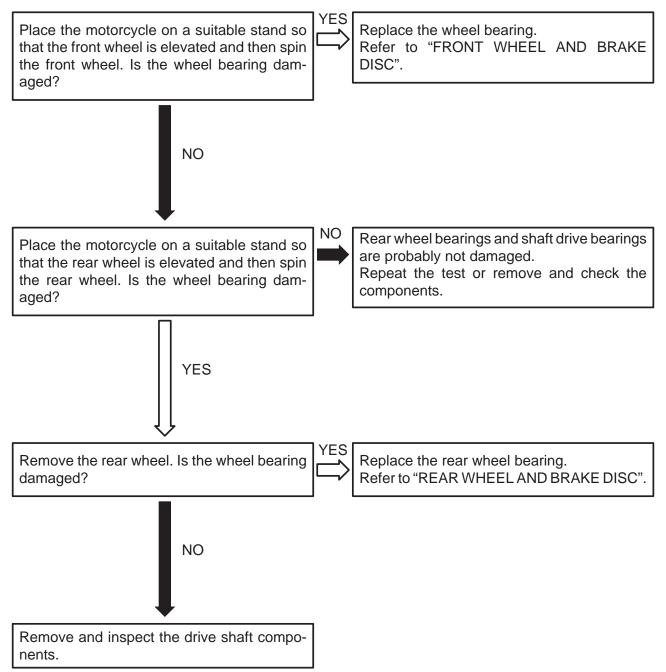
Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

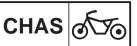


### EAS00716

### **Troubleshooting chart**

When causes A and B shown in the chart at the beginning of the "TROUBLESHOOTING" section exist, check the following points:





### EAS00717

# CHECKING THE FINAL DRIVE OIL FOR CONTAMINATION AND INSPECTING THE SHAFT DRIVE FOR LEAKS

- 1. Drain:
  - ° final drive oil
  - (from the final drive housing)
  - Refer to "CHARGING THE FINAL DRIVE OIL" in chapter 3.
- 2. Check:
  - ° final drive oil

Large amount of metal particles  $\rightarrow$  Check for bearing seizure.

### NOTE: \_

A small amount of metal particles in the final drive oil is normal.

- 3. Check:
- °shaft drive housing (for oil leaks)

### \*\*\*\*

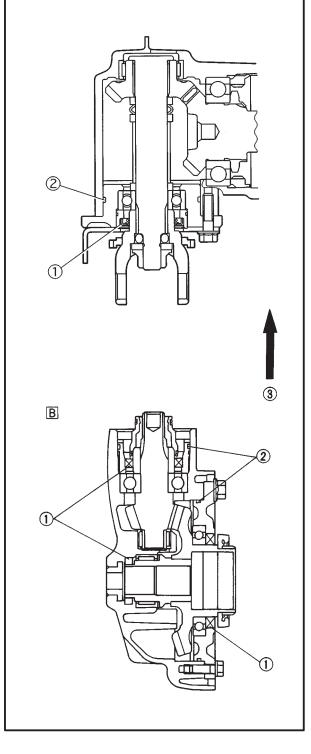
- a. Thoroughly clean the entire motorcycle and then completely dry it.
- b. Apply a leak-locating compound or dry powder spray to the shaft drive.
- c. Test ride the motorcycle long enough to locate a leak.

Oil leak  $\rightarrow$  Repair or replace the faulty part(-s).

- 1 Oil seal
- (2) O-ring
- (3) Forward

# NOTE: -

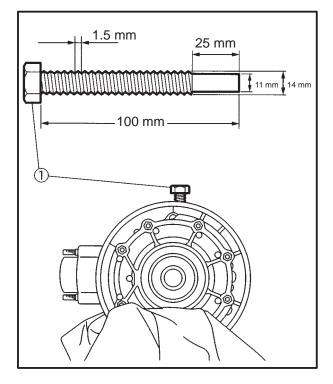
- ° What may appear to be an oil leak on a new or fairly new motorcycle, may result from the application of a rust preventive coating or excessive seal lubrication.
- ° Always clean the motorcycle and recheck the area where the leak is thought to originate from.

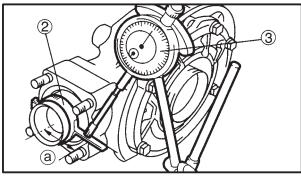




# 

- MEASURING THE RING GEAR BACKLASH
- 1. Secure the final drive assembly in a vise.
- 2. Remove:
  - ° final drive oil drain bolt
- 3. Drain:
  - ° final drive oil (from the final drive assembly)





4. Measure:
 °ring gear backlash
 Out of specification → Adjust.

 $\begin{array}{c} \textbf{Fing gear backlash}\\ \textbf{0.1}\times\textbf{0.2} \text{ mm} \end{array}$ 

- a. Install a bolt ① of the specified size, into the final drive oil filler hole.
- b. Finger tighten the bolt until it stops the ring gear from moving.

### NOTE: -

Do not overtighten the bolt.

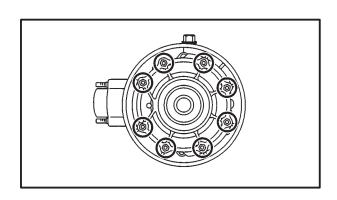
c. Install the final gear backlash band 2 and dial gauge 3

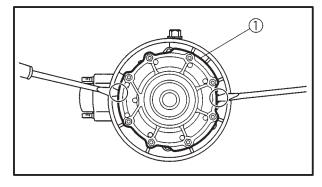


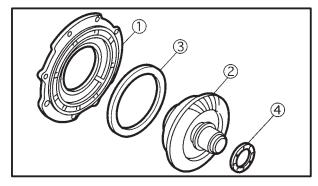
- (a) Dial-gauge-plunger contact point: 54.5 mm
- d. Gently rotate the gear coupling from engagement to engagement.
- e. Record the reading on the dial gauge.
- f. Remove the dial gauge, special tool, and bolt.



- g. Rotate the final drive pinion gear 90°.
- h. Reinstall the bolt, special tool, and dial gauge.
- i. Repeat steps (d) to (h) three more times (for a total of four measurements).
- j. If any of the readings are over specification, adjust the ring gear backlash.







### EAS00720

# ADJUSTING THE RING GEAR BACKLASH

- 1. Remove:
  - ° ring gear bearing housing nuts
  - ° ring gear bearing housing bolts

### NOTE: -

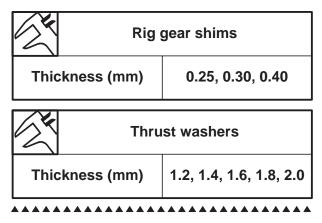
Working in a crisscross pattern, loosen each nut 1/4 of a turn. After all of the nuts are fully loosened, remove them and the bolts.

- 2. Remove:
  - $^{\circ}$  ring gear bearing housing (1)
  - ° ring gear ②
  - ° thrust washer ③
  - $^{\circ}$  ring gear shim(-s) ④
- 3. Adjust:
  - ° ring gear backlash
- a. Use the following chart to select the suitable shim(-s) and thrust washer.

Thinner shim	Ring gear backlash is increased.
Thicker shim	Ring gear backlash is decreased.

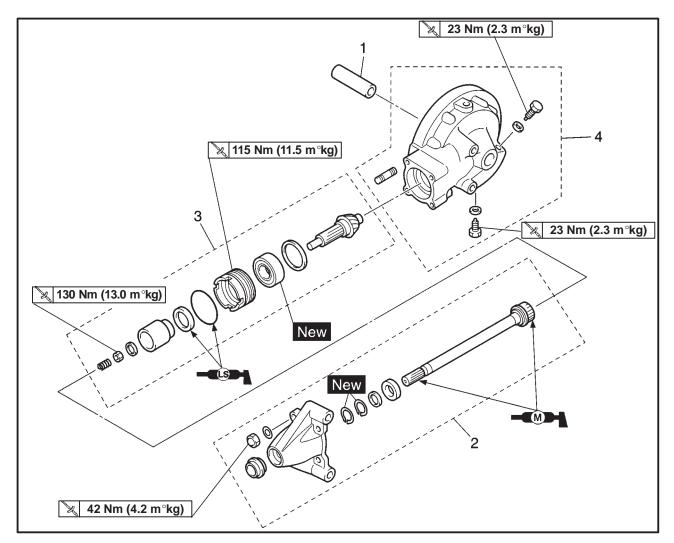


- b. If it is necessary to increase the ring gear backlash by more than 0.2 mm, reduce the thrust washer thickness by 0.2 mm for every 0.2 mm increase of ring gear shim thickness.
- c. If it is necessary to reduce the ring gear backlash by more than 0.2 mm, increase the thrust washer thickness by 0.2 mm for every 0.2 mm decrease of ring gear shim thickness.

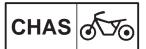




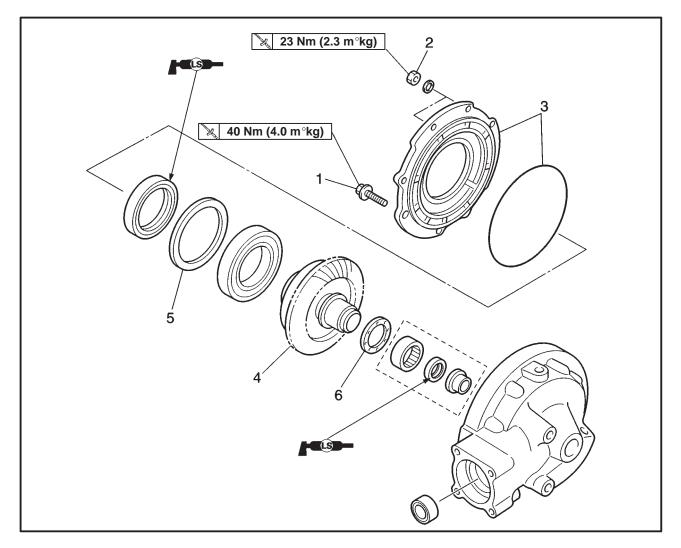
# FINAL DRIVE ASSEMBLY AND DRIVE SHAFT



Order	Job name/Part name	Q'ty	Remarks
	Removing the final drive assembly and drive shaft.		Remove the parts in the order listed. Stand the motorcycle on a level surface.
			Securely support the motorcycle so there is no danger of it falling over.
	Rear wheel assembly		Refer to "REAR WHEEL AND BRAKE DISC".
1	Collar	1	
2	Drive shaft assembly	1	
3	Final drive pinion gear assembly	1	Refer to "DISASSEMBLING THE FINAL DRIVE ASSEMBLY/ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR".
4	Final gear assembly	1	For installation, reverse the removal procedure.



# **FINAL GEAR**



Order	Job name/Part name	Q'ty	Remarks
1	<b>Disassembling the final gear.</b> Bolts (bearing housing)	2	Disassemble the parts in the order listed.
2	Nuts (bearing housing)	6	Working in a crisscross pattern, loosen each bolt and nut 1/4 of a turn. After all the bolts and nuts are loosened, remove them.
3 4 5 6	Bearing housing/O-ring Ring gear Shim (s) Thrust washer	1/1 1 1 1	For assembly, reverse the disassembly procedure.

CHAS 650

# EAS00724

DISASSEMBLING THE FINAL DRIVE AS-SEMBLY

- 1. Remove:
  - ° ring gear bearing housing nuts ° ring gear bearing housing bolts

### NOTE: -

Working in a crisscross pattern, loosen each bolts and nuts 1/4 of a turn. After all of the bolts and nuts are fully loosened, and remove them.

- 2. Remove:
  - ° self-locking nut
  - ° gear coupling (with the special tool ①)



# Coupling gear/middle shaft tool 90890-01229

- 3. Remove:
- bearing retainer (2)(with the special tool (3))

# **CAUTION:**

The bearing retainer has left-hand threads. To loosen the bearing retainer, turn it clockwise.

- 4. Remove:
  - final drive pinion gear (with the special tools)

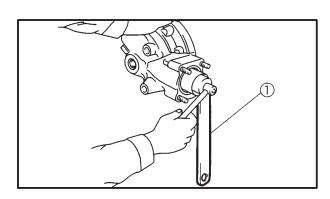


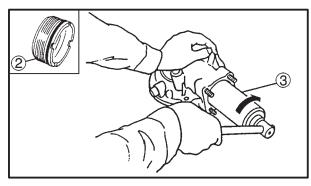
# A WARNING

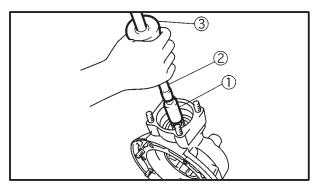
Always use new bearings.

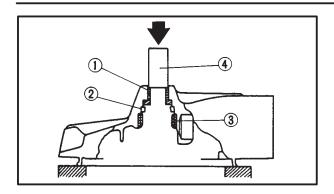
# CAUTION:

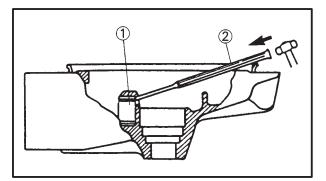
The final drive pinion gear should only be removed if ring gear replacement is necessary.

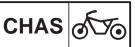












# REMOVING AND INSTALLING THE RING GEAR BEARINGS

1. Remove:

EAS06725

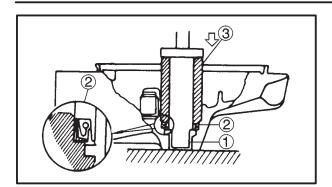
- $^{\circ}$  collar (1)
- $^{\circ}$ oil seal (2)
- $^{\circ}$  bearing ③
- (with an appropriate press tool 4 and an appropriate support for the final drive housing)
- 2. Check:
  - °bearing
  - $\mathsf{Damage} \to \mathsf{Replace}.$
- 3. Remove:
  - °bearing ①
- a Heat the final gear case to approximately
- a. Heat the final gear case to approximately 150 °C (302 °F).
- b. Remove the bearing outer races with an appropriately shaped punch (2).
- c. Remove the inner race from the final drive pinion gear.

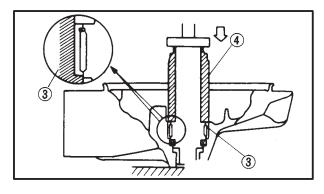
### NOTE: -

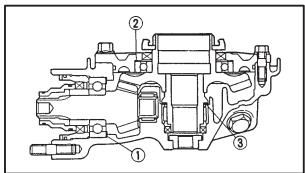
The removal of the final drive pinion gear bearing is a difficult procedure and is rarely necessary.

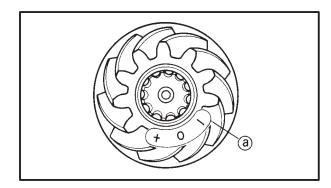
### 

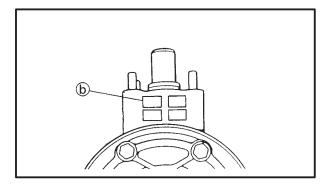
- 4. Install:
  - ° bearing (New)
- a. Heat the final gear case to approximately 150°C (302°F).
- b. Install the bearing outer races with a socket or appropriate tool that matches the diameter of the races.
- c. Install the inner race onto the final drive pinion gear.

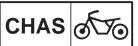












- 5. Install:
  - $^{\circ}$  collar (1) °oil seal 2 New
  - ° bearing
  - (with an appropriate press tool (3) and press)

# NOTE: -

The bearing can be reused, but Yamaha recommends installing a new one.

# EAS00726

# ALIGNING THE FINAL DRIVE PINION GEAR AND RING GEAR

### NOTE: \_

Aligning the final drive pinion gear and ring gear is necessary when any of the following parts are replaced:

° Final drive housing

° Any bearing

- 1. Select:
  - ° final drive pinion gear shim(-s) ① ° ring gear shim(-s) 2
- a. Position the final drive pinion gear and the ring gear with shims (1) and (2). Calculate the respective thicknesses from information marked on the final drive housing and the drive pinion gear.
- (1) Final drive pinion gear shim
- (2) Ring gear shim
- (3) Thrust washer
- b. To find final drive pinion gear shim thickness "A" use the following formula:

Final drive pinion gear shim thickness A = (84 + @/100) - b



### Where:

a = a numeral (positive or negative) on the ring gear, to be divided by 100 and added to "84"

b = a numeral on the final drive housing.

# Example:

If the final drive pinion gear is marked "+ 01" and the final drive housing is marked "83.50":

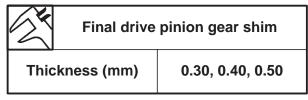
$$A = (84 + 1/100) - (83.50)$$

$$= (84 + 0.01) - (83.50)$$
  
= 84.01 - 83.50

= 0.51

Therefore, the calculated final drive pinion gear shim thickness is 0.51 mm.

Shim sizes are supplied in the following thicknesses.



Since the final drive pinion gear shims are only available in 0.10 mm increments, round off to the hundredths digit.

Hundredths	Rounded value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

In the example above, the calculated final drive pinion gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm final drive pinion gear shim.

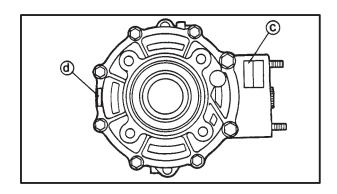
c. To find ring gear shim thickness "B", use the following formula:

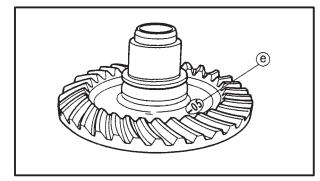


### Where:

- $\bigcirc$  = a numeral on the final drive housing.
- $(\mathbf{d})$  = a numeral usually on the outside of the ring gear bearing housing.

(e) = a numeral (positive or negative) on the inside of the ring gear, to be divided by 100 and added to "35.40".





SHAFT DRIVE



(f) = the ring gear bearing thickness constant



## Example:

If the final drive housing is marked "45.51" the ring gear bearing housing is marked "3.35" the ring gear is marked "-05", and "f" is 13.00:

B = 45.51 + 3.35 - [(35.40 - 5/100) + 13]= 45.51 + 3.35 - [(35.40 - 0.05) + 13] - 48.86 - [35.35 + 13]

$$= 48.86 - [35.35 + 13]$$
  
= 48.86 - 48.35

Therefore, the calculated ring gear shim thickness is 0.51 mm.

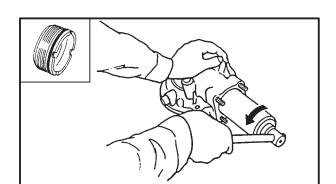
Shim sizes are supplied in the following thickness.



Since the ring gear shims are only available in 0.10 mm increments, round off the hundredths digit.

Hundredths	Rounded value
0, 1, 2, 3, 4	0
5, 6, 7, 8, 9	10

In the example above, the calculated final gear shim thickness is 0.51 mm. The chart instructs you to round off the 1 to 0. Thus, you should use a 0.50 mm ring gear shim.



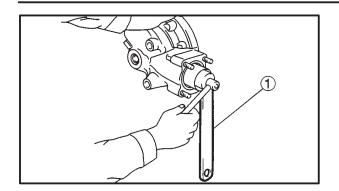
- 2. Install:
  - ° shim(s) (as calculated)
  - ° final drive pinion gear
  - <sup>o</sup>bearing retainer [x] 115Nm (11.5 m <sup>o</sup>kg) (with the bearing retainer wrench)

## CAUTION:

The bearing retainer has left-hand threads. To tighten the bearing retainer, turn it counterclockwise.







## **Bearing retainer wrench** 90890-04077

3. Install:

° gear coupling

° self-locking nut

🔌 130 Nm (13.0 m°kg) (with the special tool (1))

Coupling gear/middle shaft tool 90890-01229

## **CAUTION:**

Apply LOCTITE<sup>®</sup> to the self-locking nut.

4. Install:

° ring gear bearing housing (along with the ring gear, but without the thrust washer)

5. Adjust:

° ring gear backlash Refer to "MEASURING THE RING GEAR BACKLASH" and "ADJUSTING THE RING GEAR BACKLASH".

- 6. Measure:
  - <sup>o</sup>ring-gear-to-thrust-washer clearance
- \*\*\*
- a. Remove the ring gear bearing housing (along with the ring gear).
- b. Place four pieces of Plastigauge<sup>®</sup> between the original thrust washer and the ring gear.
- c. Install the ring gear bearing housing and tighten the bolts, and nuts to specification.

Ring gear bearing housing bolt (M10) 40 Nm (4.0 m°kg) Ring gear bearing housing nut (M8) 23 Nm (2.3 m°kg)

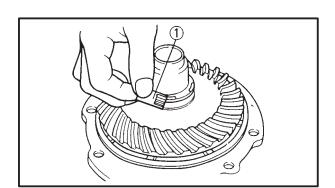
## NOTE: -

Do not turn the final drive pinion gear and ring gear while measuring the ring-gear-to-thrustwasher clearance with Plastigauge<sup>®</sup>.

- d. Remove the ring gear bearing housing.
- e. Measure the width of the flattened Plasti $gauge^{\mathbb{B}}$  (1).

**Ring-gear-to-thrust-washer** clearance 0.2 mm

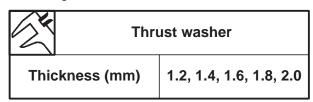
f. If the ring-gear-to-thrust-washer clearance is within specification, install the ring gear bearing housing (along with the ring gear).



## SHAFT DRIVE



- g. If the ring-gear-to-thrust-washer clearance is out of specification, select the correct thrust washer as follows.
- h. Select the suitable thrust washer from the following chart.



i. Repeat the measurement steps until the ring-gear-to-thrust-washer clearance is within the specified limits.



## EAS00727

## CHECKING THE DRIVE SHAFT

- 1. Check:
  - ° drive shaft splines Damage/wear  $\rightarrow$  Replace the drive shaft.

#### EAS00728

#### **INSTALLING THE DRIVE SHAFT**

1. Lubricate:

° drive shaft splines

Recommended lubricant Molybdenum disulfide grease

- 2. Apply:
- ° sealant

(onto both final drive housing mating surfaces)



- 3. Install:
  - ° drive shaft
    - (to the final drive pinion gear)

SHAFT DRIVE

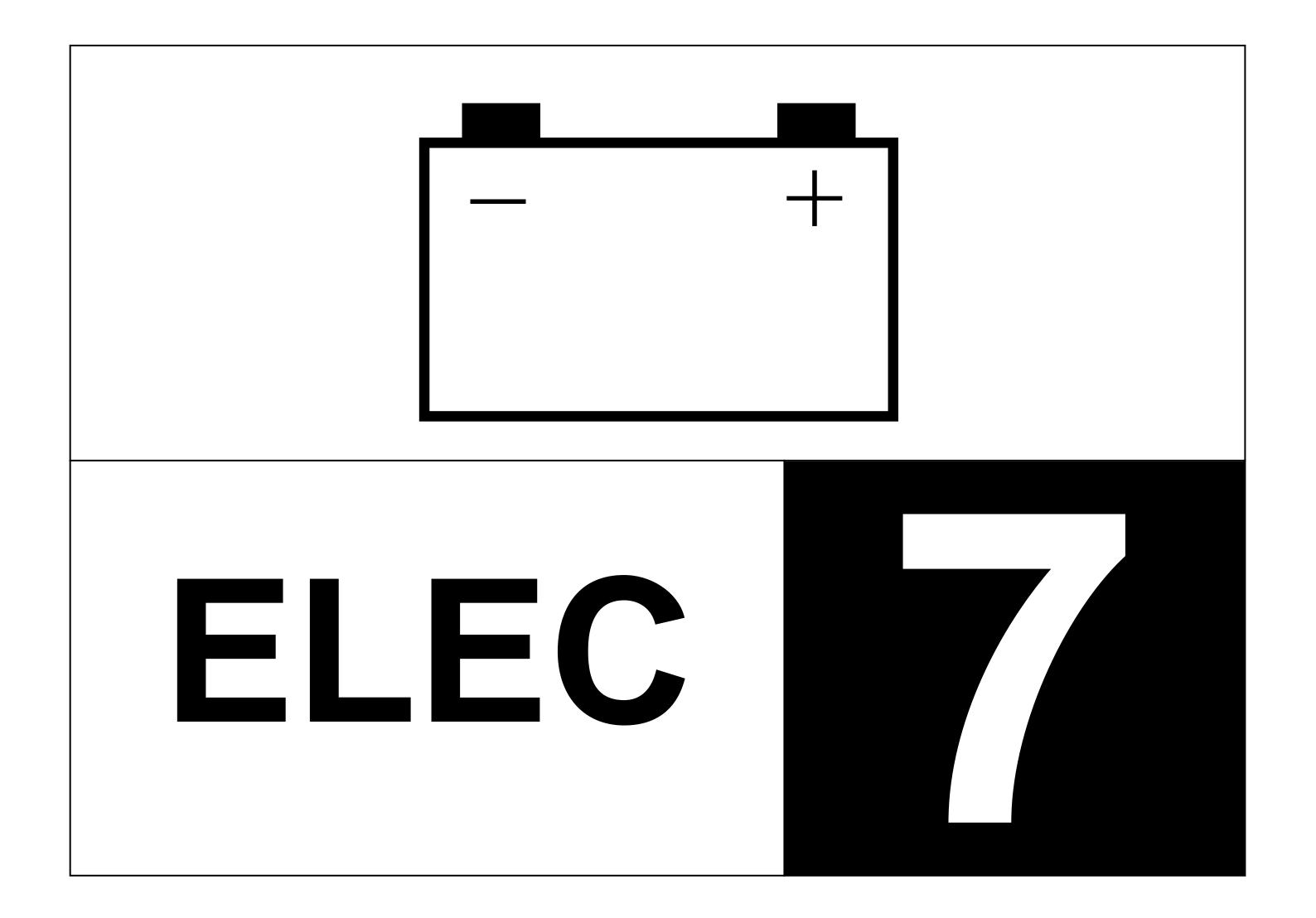


4. Tighten:

° final bearing housing nuts

🍾 42 Nm (4.3 m°kg)

 Install: <sup>°</sup>rear wheel assembly Refer to "REAR WHEEL AND BRAKE DISC".



## CHAPTER 7 ELECTRICAL

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# ELEC -+

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## **ELECTRICAL COMPONENTS**



EB800000

## **ELECTRICAL**

## **ELECTRICAL COMPONENTS**

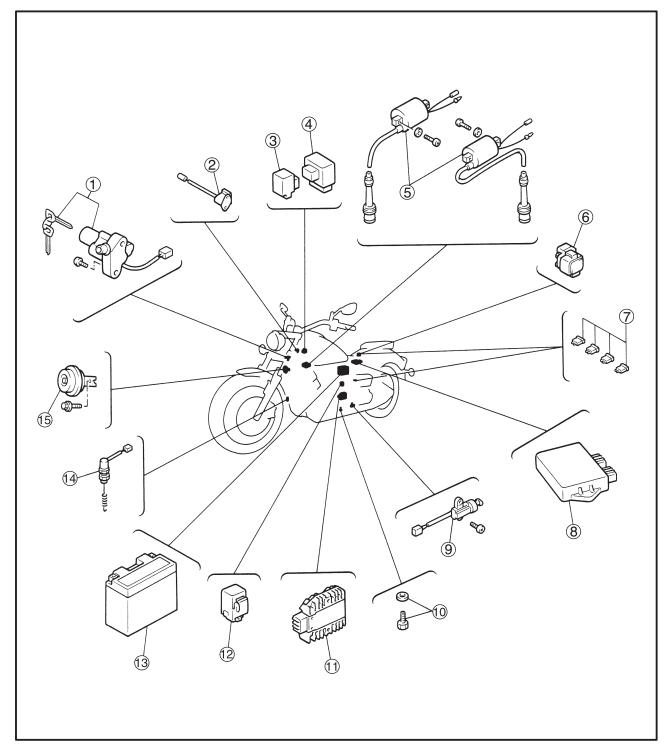
- (1) Main switch
- 2 Thermo switch
  3 Flasher relay
- $(\underline{4})$  Starting circuit cut off relay
- 5 Ignition coil 6 Starter relay
- (1) Rectifier/regulator
  (1) Oil lamp relay
- 13 Battery
- (14) Rear brake switch

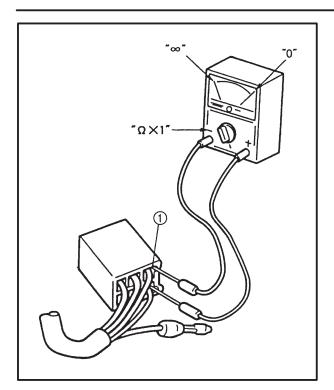
(9) Side stand switch

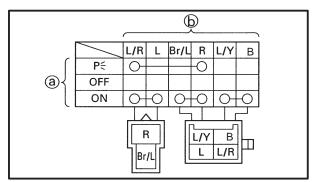
(10) Neutral switch

- (7) Fuse
- 8 Igniter unit

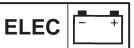
15 Horn







**SWITCHES** 



#### EASOUTO SWITCHES CHECKING SWITCH

## CHECKING SWITCH CONTINUITY

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

## **CAUTION:**

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

Pocket tester 90890-03112

## NOTE: -

 $^\circ\text{Before}$  checking for continuity, set the pocket tester to "0" and to the " $\Omega\,\times\,$  1" range.

<sup>o</sup>When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions (a) are shown in the far left column and the switch lead colors (b) are shown in the top row in the switch illustration.

## NOTE: -

"O——O" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

# The example illustration on the left shows that:

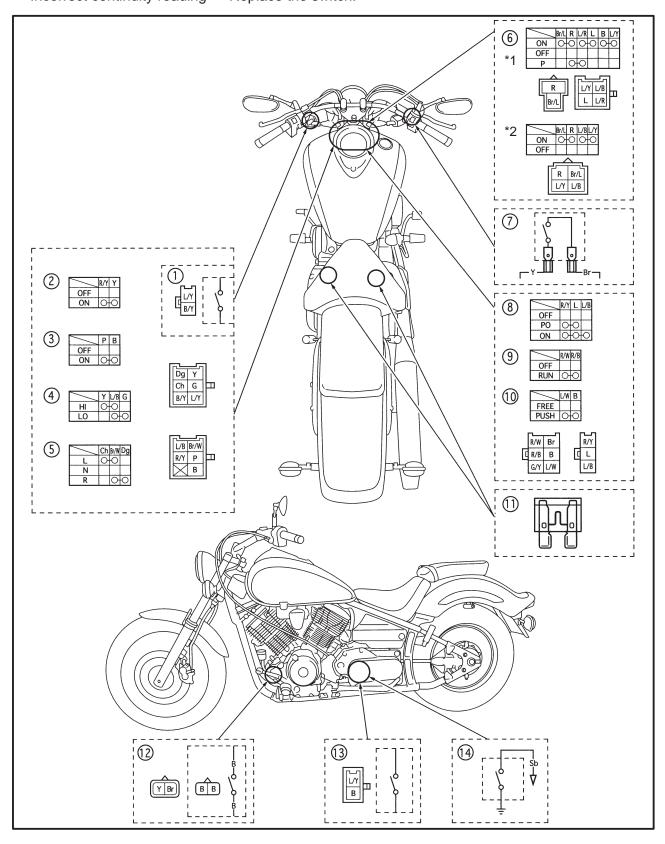
There is continuity between blue/red and red when the switch is set to " $P \in$ ".

There is continuity between blue/red and blue, between brown/blue and red, and between blue/yellow and black when the switch is set to "ON".



#### EAS00731 **CHECKING THE SWITCHES**

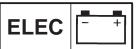
Check each switch for damage or wear, proper connections, and also for continuity between the termi-nals. Refer to "CHECKING SWITCH CONTINUITY". Damage/wear → Repair or replace the switch. Improperly connected → Properly connect. Incorrect continuity reading → Replace the switch.



## **CECKING THE SWITCHES**



- Clutch switch
   Pass switch
- (3) Horn switch
- 4 Dimmer switch
  5 Turn switch
- 6 Main switch
- 7 Front brake switch8 Lights switch (for Europe)
- (9) Engine stop switch(10) Start switch
- (11) Fuse
- (12) Rear brake switch
- 3 Sidestand switch
- 14 Neutral switch \*1: for Europe \*2: for AUS

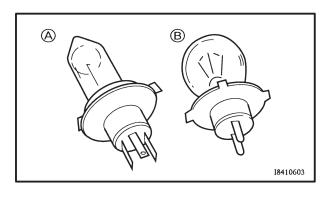


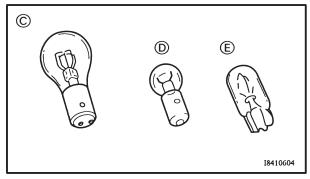
# CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear  $\rightarrow$  Repair or replace the bulb, bulb socket or both.

Improperly connected  $\rightarrow$  Properly connect. Incorrect continuity reading  $\rightarrow$  Repair or replace the bulb, bulb socket or both.





## TYPES OF BULBS

The bulbs used on this motorcycle are shown in the illustration on the left.

- ° Bulbs (A) and (B) are used for headlights and usually use a bulb holder which must be detached before removing the bulb. The majority of these bulbs can be removed from their respective socket by turning them counterclockwise.
- <sup>°</sup> Bulb <sup>©</sup> is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- ° Bulbs (D) and (E) are used for meter and indicator lights and can be removed from their respective socket by turn (D) and pulling (E) them out.

# CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

1. Remove:

°bulb

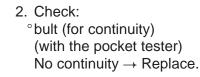


## 

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

## **CAUTION:**

- <sup>°</sup> Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- <sup>o</sup> Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.



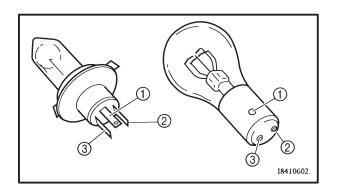
Pocket tester 90890-03112

## NOTE: -

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.

#### 

- a. Connect the tester positive probe to terminal
  ① and the tester negative probe to terminal
  ②, and check the continuity.
- b. Connect the tester positive probe to terminal
  ① and the tester negative probe to terminal
  ③, and check the continuity.
- c. If either of the readings indicate no continuity, replace the bulb.





# CHECKING THE CONDITION OF THE BULB SOCKETS

The following procedure applies to all of the bulb sockets.

- 1. Check:
  - ° bulb socket (for continuity) (with the pocket tester) No continuity  $\rightarrow$  Replace.



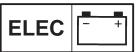
#### NOTE: -

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

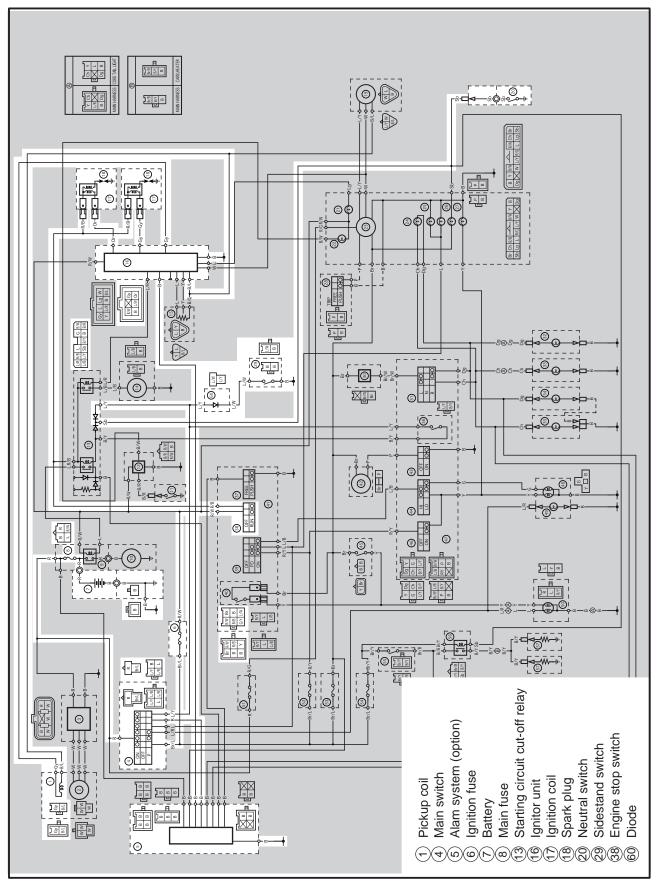
- \*\*\*\*
- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

\*\*\*\*

**IGNITION SYSTEM** 



## IGNITION SYSTEM CIRCUIT DIAGRAM



## **IGNITION SYSTEM**



#### EAS00737

#### TROUBLESHOOTING

# The ignition system fails to operate (no spark or intermittent spark).

#### Check:

- 1. main and ignition fuses
- 2. battery
- 3. spark plugs
- 4. ignition spark gap
- 5. spark plug cap resistance
- 6. ignition coil resistance
- 7. pickup coil resistance
- 8. main switch
- 9. engine stop switch
- 10. neutral switch
- 11. sidestand switch
- 12. diode
- 13. starting circuit cut-off relay (diode)
- 14. wiring
  - (of the entire ignition system)

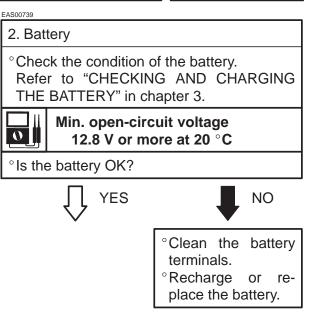
#### NOTE: ·

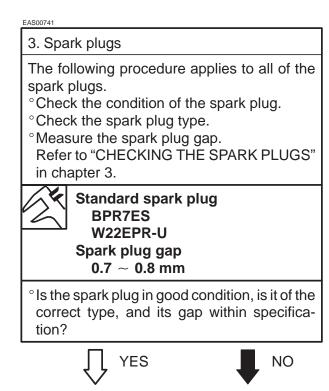
- <sup>o</sup>Before troubleshooting, remove the following part(-s):
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) steering head side covers
- 5) tool box cover
- 6) left side cover
- 7) cylinder head covers
- <sup>o</sup>Troubleshoot with the following special tool(-s).



#### Ignition checker 90890-06754 Pocket tester 90890-03112

EAS00738
1. Main and ignition fuses
Check the main and ignition fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
Are the main and ignition fuses OK?
YES
NO
Replace the fuse(-s).





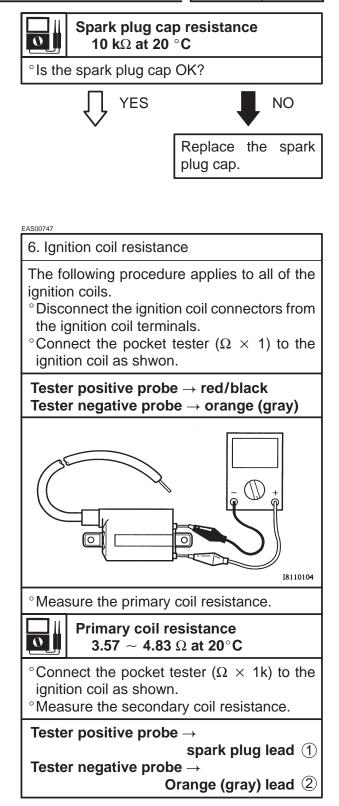
Re-gap or replace the spark plug.

## **IGNITION SYSTEM**



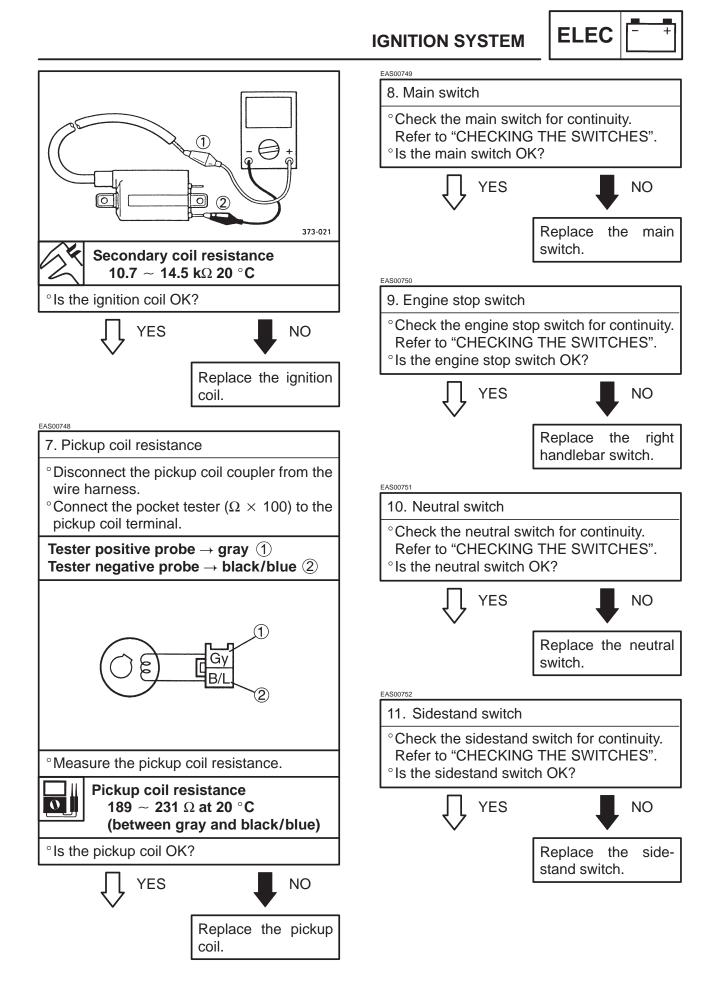
4. Ignition spark gap The following procedure applies to all of the spark plugs. °Disconnect the spark plug cap from the spark plug.  $^{\circ}$ Connect the ignition checker (1) as shown.  $^{\circ}(2)$  Spark plug cap ° Set the main switch to "ON".  $^{\circ}$ Measure the ignition spark gap (a). ° Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs. (2)(1)18110202 Min. ignition spark gap 6 mm ° Is there a spark and is the spark gap within specification ? NO YES The ignition system is OK. EAS00745 5. Spark plug cap resistance. The following procedure applies to all of the spark plug caps. <sup>o</sup>Disconnect the spark plug cap from the spark plug. °Connect the pocket tester ( $\Omega \times 1k$ ) to the spark plug cap as shown. <sup>o</sup>Measure the spark plug cap resistance.  $\Omega \times 1k$ 

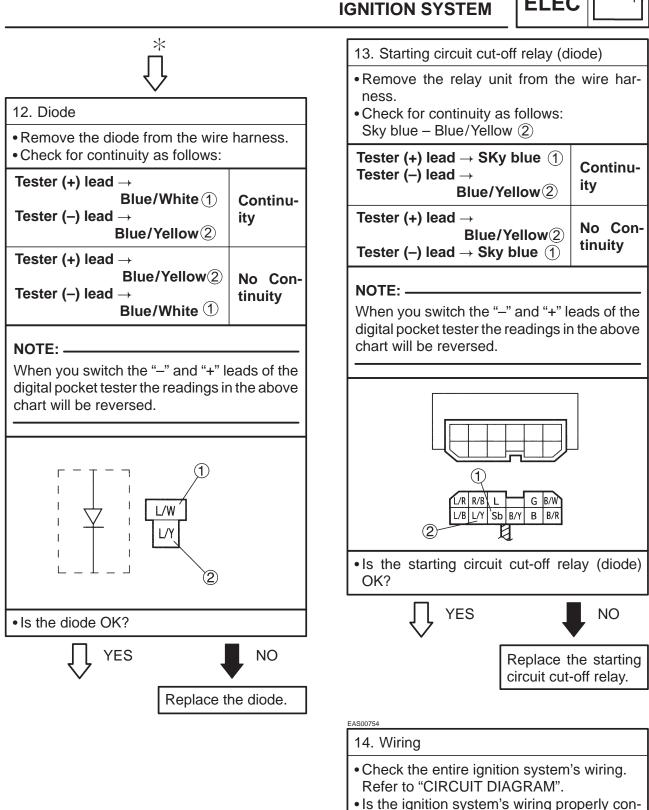
EAS00743



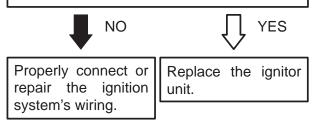
7-10

18040101





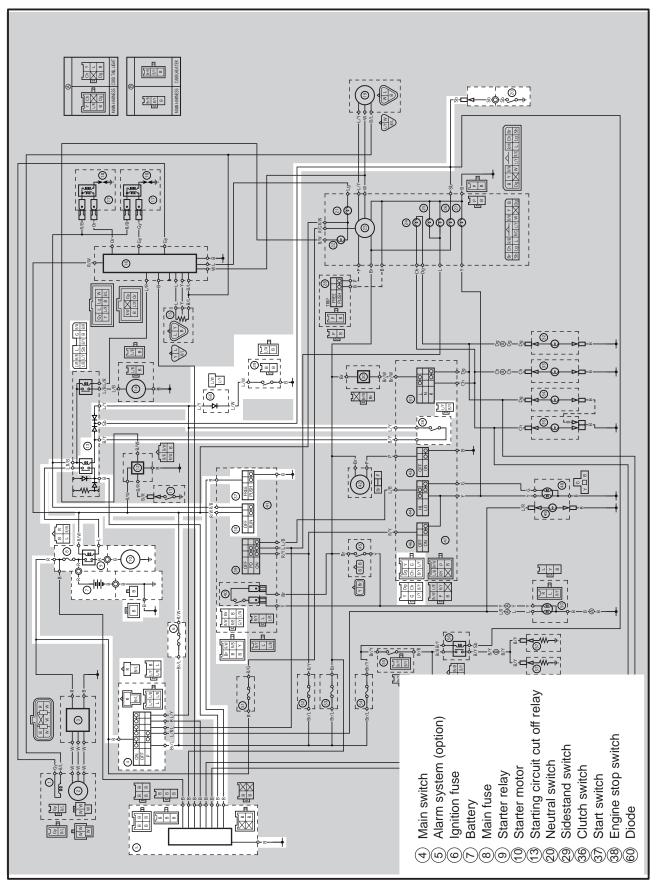
nected and without defects?



ELEC

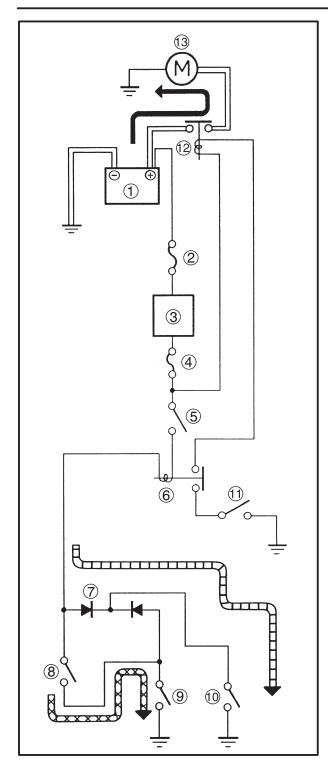


## ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM



EB803010





## STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch is on "RUN" and the main switch is on "ON" (both switches are closed), the starter motor can operate only if:

The transmission is in neutral (the neutral switch is closed).

or if

The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter from operating when neither of these conditions have been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

When at least one of the above conditions have been met however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.

WHEN THE TRANSMISSION IS IN NEUTRAL

# WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

- 1 Battery
- (2) Main fuse
- 3 Main switch
- (4) Ignition fuse
- (5) Engine stop switch
- (6) Starting circuit cut-off relay
- ⑦ Diode
- (8) Clutch switch
- (9) Sidestand switch
- 10 Neutral switch
- (1) Start switch
- 12 Starter relay
- 13 Starter motor



## TROUBLESHOOTING

#### The starter motor fails to turn.

Check:

EAS00757

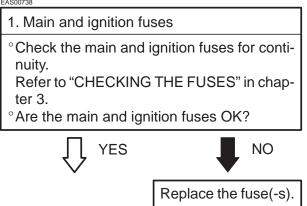
- 1. main and ignition fuses
- 2. battery
- 3. starter motor
- 4. starting circuit cutoff relay
- 5. starting circuit cutoff relay (diode)
- 6. starter relay
- 7. main switch
- 8. engine stop switch
- 9. neutral switch
- 10. sidestand switch
- 11. clutch switch
- 12. start switch
- 13. diode
- 14. wiring
  - (of the entire starting system)

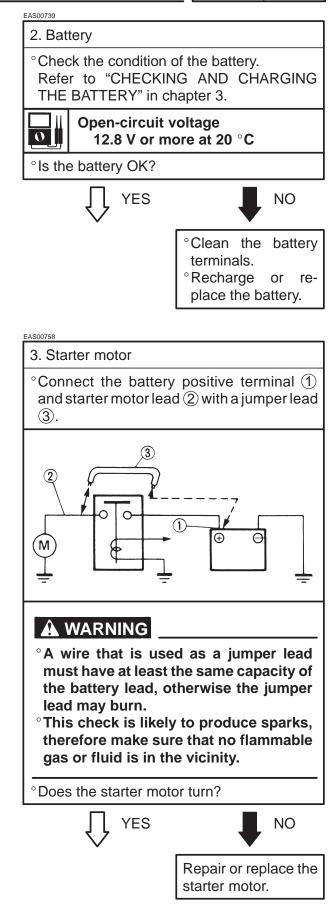
### NOTE: -

- °Before troubleshooting, remove the following part(-s):
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) steering head side covers
- 5) left side cover
- °Troubleshoot with the following special tool(-s).

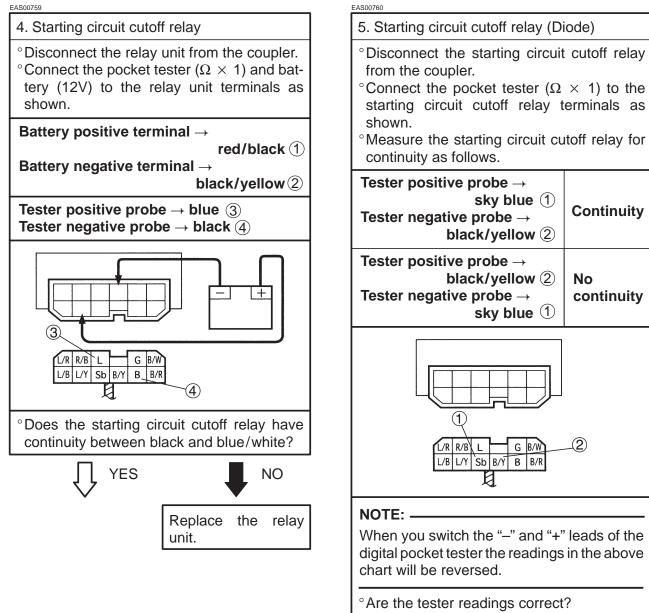
## **Pocket tester** 90890-03112

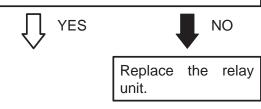
EAS00738



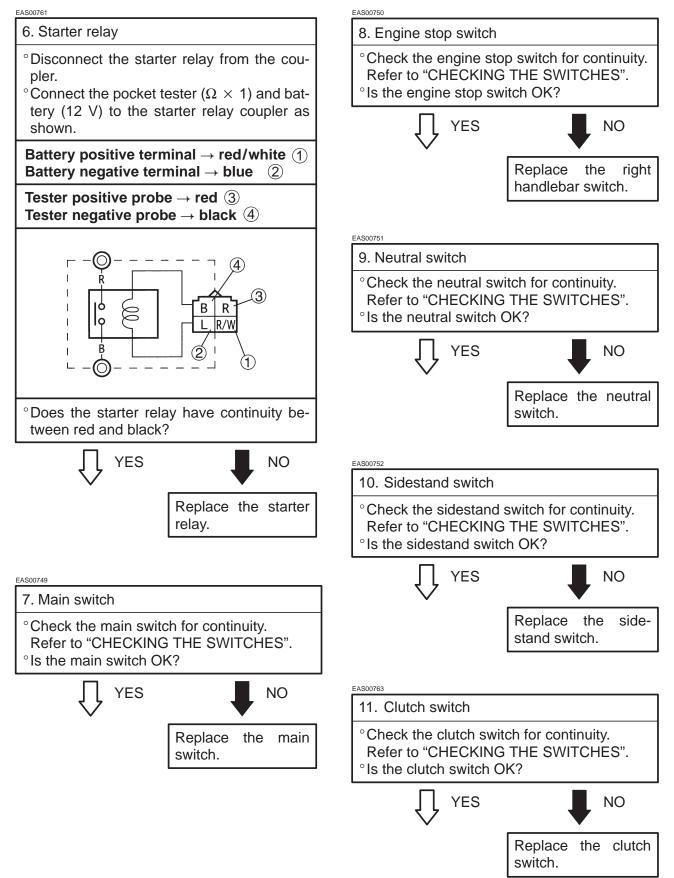




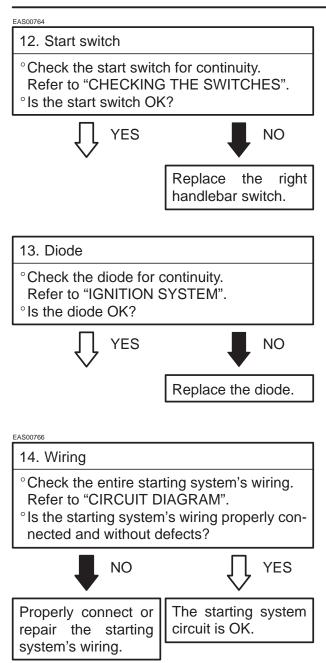






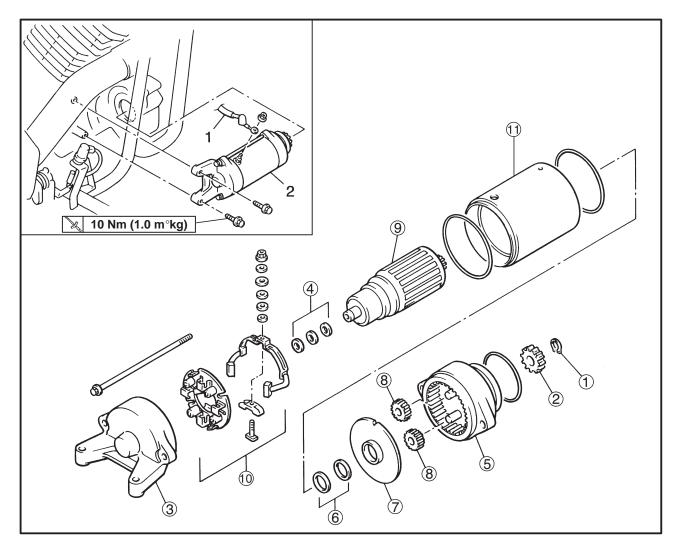








## STARTER MOTOR

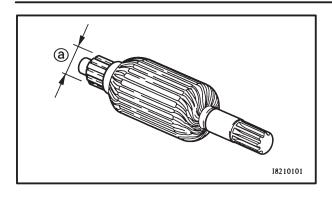


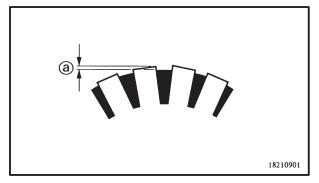
Order	Job name/Part name	Q'ty	Remarks
1 2	<b>Removing the starter motor</b> Starter motor lead Starter motor assembly	1 1	Remove the parts in the order listed. For installation, reverse the removal procedure.
EQ@Q@Q@Q@E	Disassembling the starter motor Circlip Starter motor drive gear Starter motor rear cover Washer set Starter motor front cover Washer set End bracket Planetary gears Armature assembly Brush holder/brush Starter motor yoke	1 1 1 1 1 2 1 1/1 - 1 -	Disassembly the pats in the order listed. Refer to "Assembling the starter motor." Refer to "Assembling the starter motor." Refer to "Assembling the starter motor." Refer to "Assembling the starter motor." For assembly, reverse the disassembly procedure



EAS00769







### Checking the starter motor

- 1. Check:
  - ° commutator
  - Dirt  $\rightarrow$  Clean with 600 grit sandpaper.
- 2. Measure:
  - ° commutator diameter (a) Out of specification  $\rightarrow$  Replace the starter motor.



### Min. commutator diameter 27 mm

- 3. Measure:
  - ° mica undercut (a)

Out of specification  $\rightarrow$  Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.

Mica undercut

## NOTE: -

The mica must be undercut to ensure proper operation of the commutator.

0.7 mm

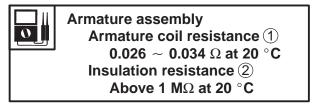
- +0 I8210201
- 4. Measure:
  - °armature assembly resistances (commutator and insulation)

Out of specification  $\rightarrow$  Replace the starter motor.

#### -----

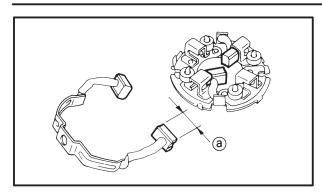
a. Measure the armature assembly resistances with the pocket tester.

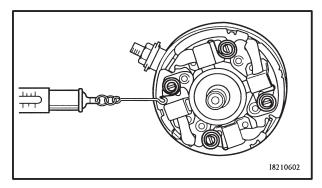
Pocket tester 90890-03112

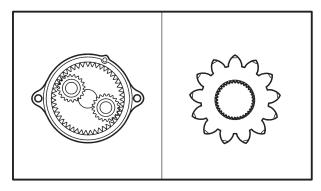


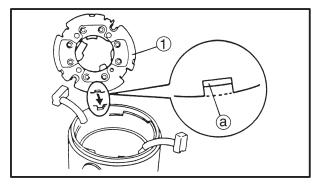
b. If any resistance is out of specification, replace the starter motor. 

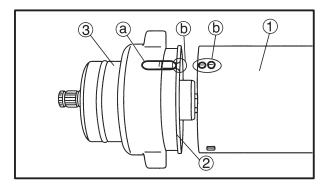










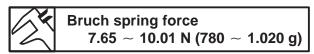


5. Measure:
 °brush length ⓐ
 Out of specification → Replace the brushes as a set.

Min. brush length 5 mm

6. Measure: °brush spring force

Out of specification  $\rightarrow$  Replace the brush springs as a set.



- 7. Check:
   °gear teeth
   Damage/wear → Replace the gear.
- 8. Check:
   °oil seal
   Damage/wear → Replace the defective part(-s).

#### EAS00772

#### Assembling the starter motor

- 1. Install:
  - $^{\circ}$  brush holder (1)

#### NOTE: -

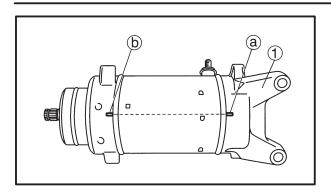
Align the tab (a) on the brush holder with the slot in the starter motor rear cover.

- 2. Install:
  - $^{\circ}$  starter motor yoke (1)
  - °end bracket 2
  - ° starter motor front cover 3

#### NOTE: \_

Align the projection (a) on the front cover with the slot (b) on the end cover and starter motor yoke.





3. Install:

 $^\circ {\rm Starter}$  motor rear cover 1

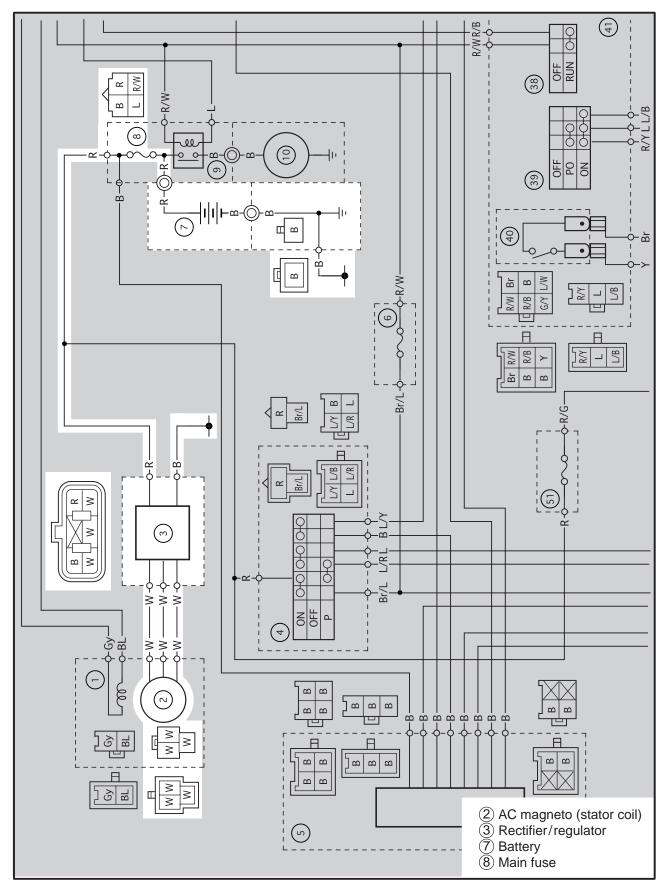
## NOTE: \_\_\_\_

Align the match marks (a) on the rear cover with the match marks (b) on the front cover.

CHARGING SYSTEM

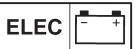


## CHARGING SYSTEM CIRCUIT DIAGRAM



CHARGING SYSTEM

EAS00739



EAS00774

### TROUBLESHOOTING

#### The battery is not being sharged.

Check:

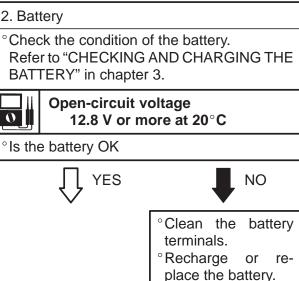
- 1. main fuses
- 2. battery
- 3. charging voltage
- 4. startor coil assembly resistance
- 5. wiring (of the entire charging system)

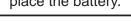
#### NOTE: -

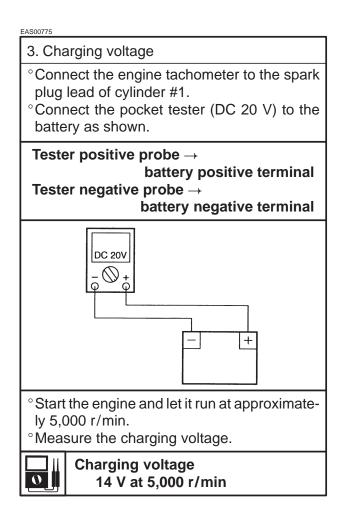
- °Before troubleshooting, remove the following part(-s):
- 1) battery cover
- 2) rider's seat
- 3) left side cover
- <sup>o</sup>Troubleshoot with the following special tool(-s).

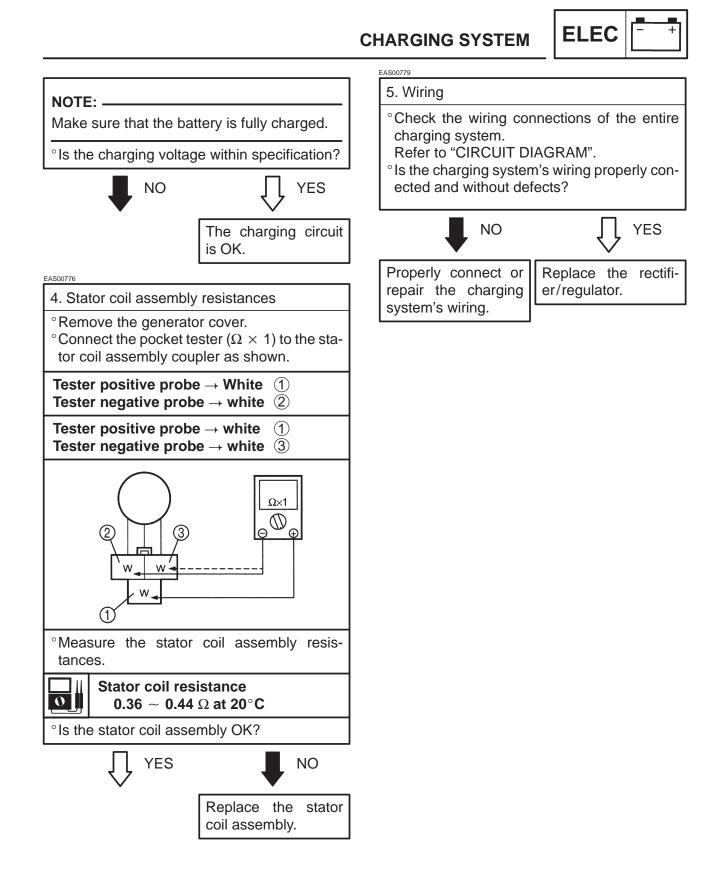
Engine tachometer 90890-03113 Pocket tester 90890-03112

EAS00738		
1. Main fuse		
<ul> <li>°Check the main fuse for continuity.</li> <li>Refer to "CHECKING THE FUSES" in chapter 3.</li> <li>°Is the main fuse OK?</li> </ul>		
VES	NO	
	Replace the fuse.	



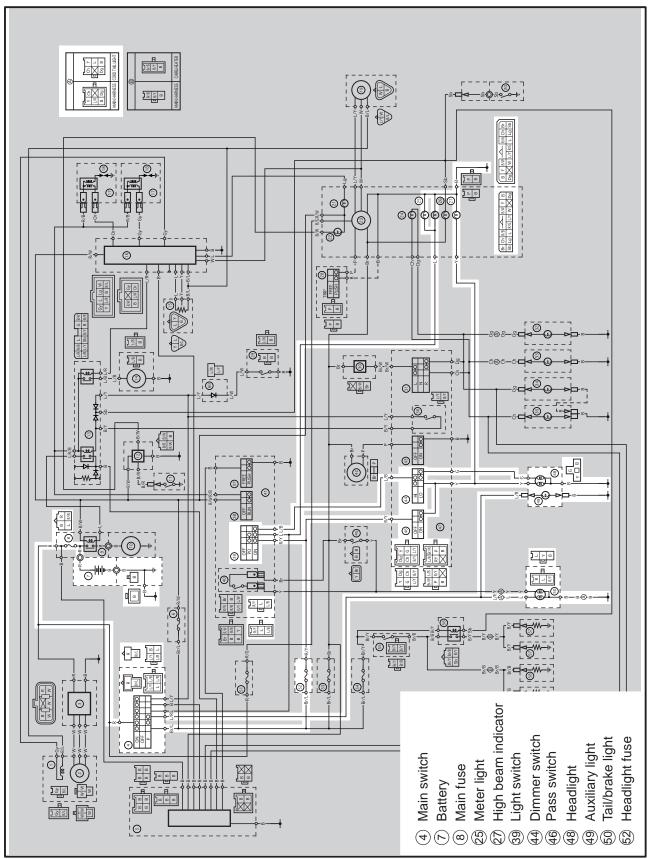








## LIGHTING SYSTEM CIRCUIT DIAGRAM





#### EAS00781 TROUBLESHOOTING

### Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light (for Europe) or meter light.

#### Check:

- 1. main and headlight fuses
- 2. battery
- 3. main switch
- 4. lights switch (for Europe)
- 5. dimmer switch
- 6. pass switch
- 7. wiring
  - (of the entire charging system)

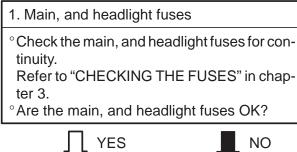
#### NOTE: -

- <sup>o</sup>Before troubleshooting, remove the following part(-s).
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) steering head side covers
- 5) headlight lens unit
- 6) tool box cover
- <sup>o</sup>Troubleshoot with the following special tool(-s).

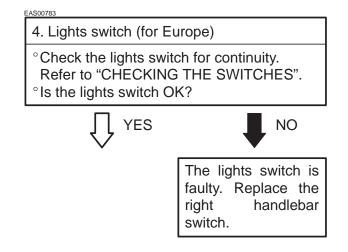


#### Pocket tester 90890-03112

EAS00738



Replace the fuse(-s).



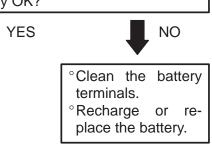
### 2. Battery

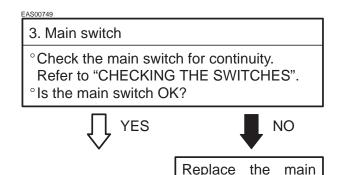
EAS00739

°Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

#### Open-circuit voltage 12.8 V or more at 20°C

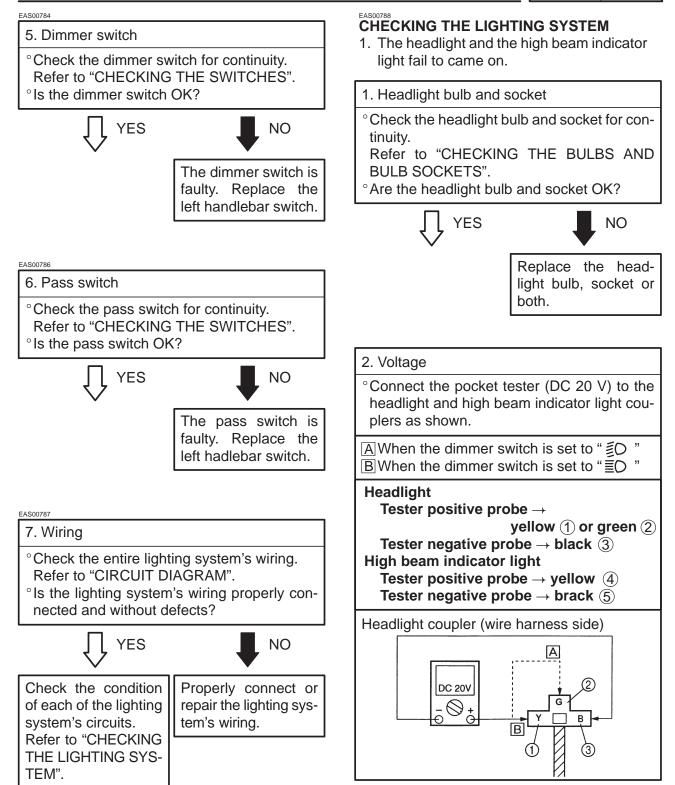
° Is the battery OK?



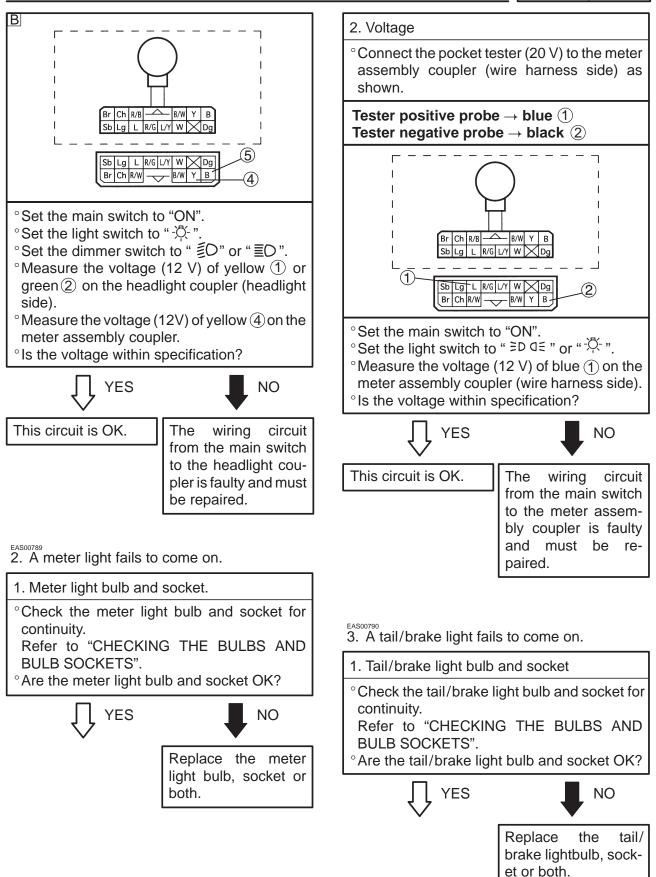


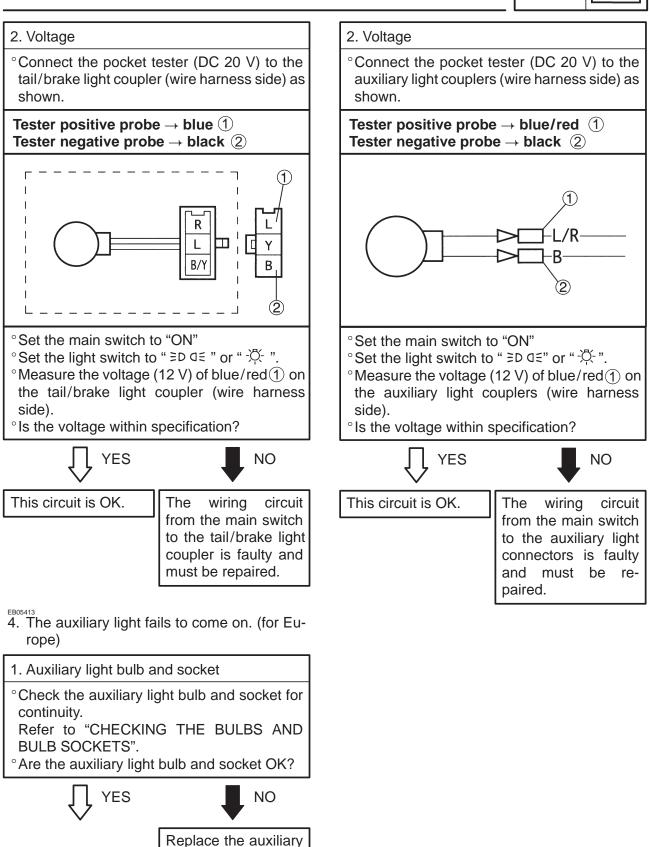
switch.











# LIGHTING SYSTEM



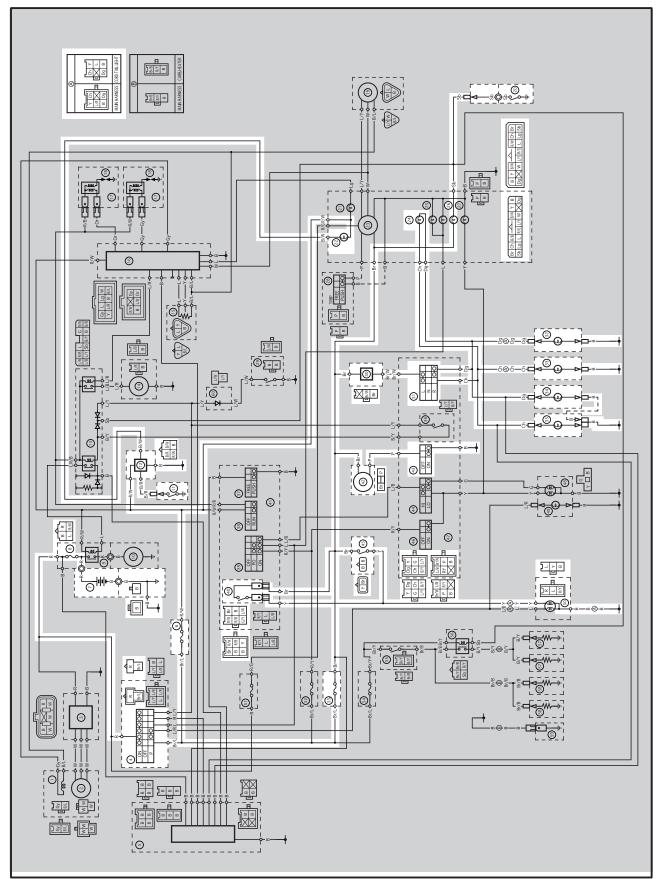
light bulb, socket or

both.

SIGNAL SYSTEM



# SIGNAL SYSTEM CIRCUIT DIAGRAM



SIGNAL SYSTEM



- (4) Main switch
- 6 Ignition fuse
- ⑦ Battery
- (8) Main fuse
- (1) Oil level gauge
- 12 Oil lamp relay
- 20 Neutral switch
- 2 Oil warning light
- 24 Turn signal indicator light
- 26 Neutral indicator light
- 30 Flasher relay
- 31) Turn signal switch
- 32 Rear turn signal light (R)
- 33 Rear turn signal light (L)
- 34 Front turn signal light (R)
- 35 Front turn signal light (L)
- (40) Front brake switch
- (42) Horn
- (43) Horn switch
- 45 Rear brake switch
- 50 Tail/brake light
- 53 Signal fuse

# SIGNALING SYSTEM



### TROUBLESHOOTING

# Any of the following fail to light: turn signal light, brake light or an indicator light. The forn fails to sound.

### Check:

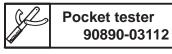
EB806010

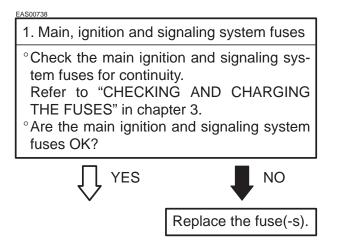
- 1. main and signaling system fuses
- 2. battery
- 3. main switch
- 4. wiring

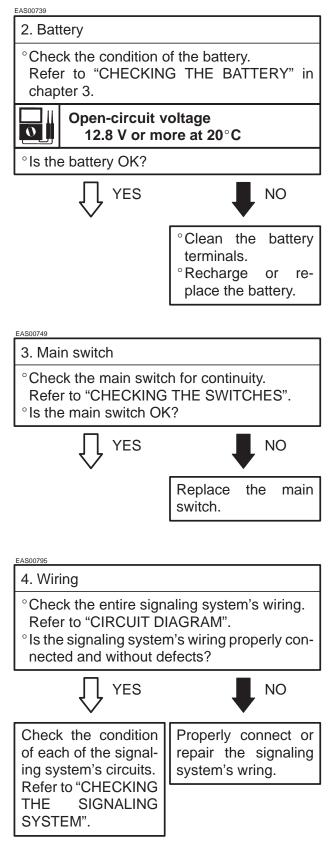
(of the entrire signaling system)

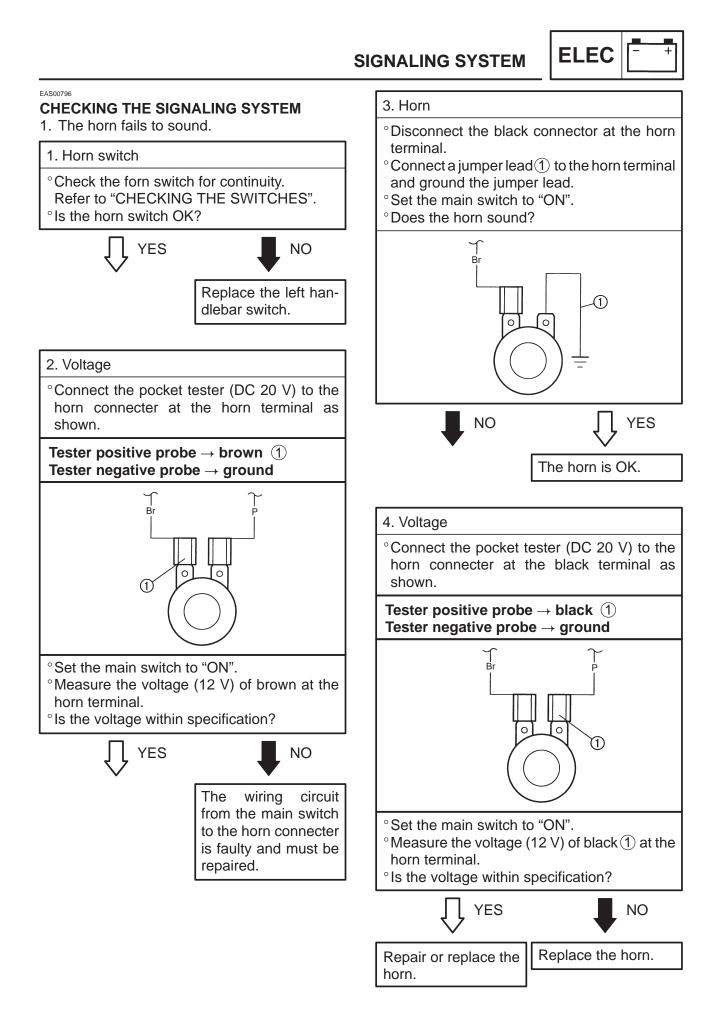
### NOTE: -

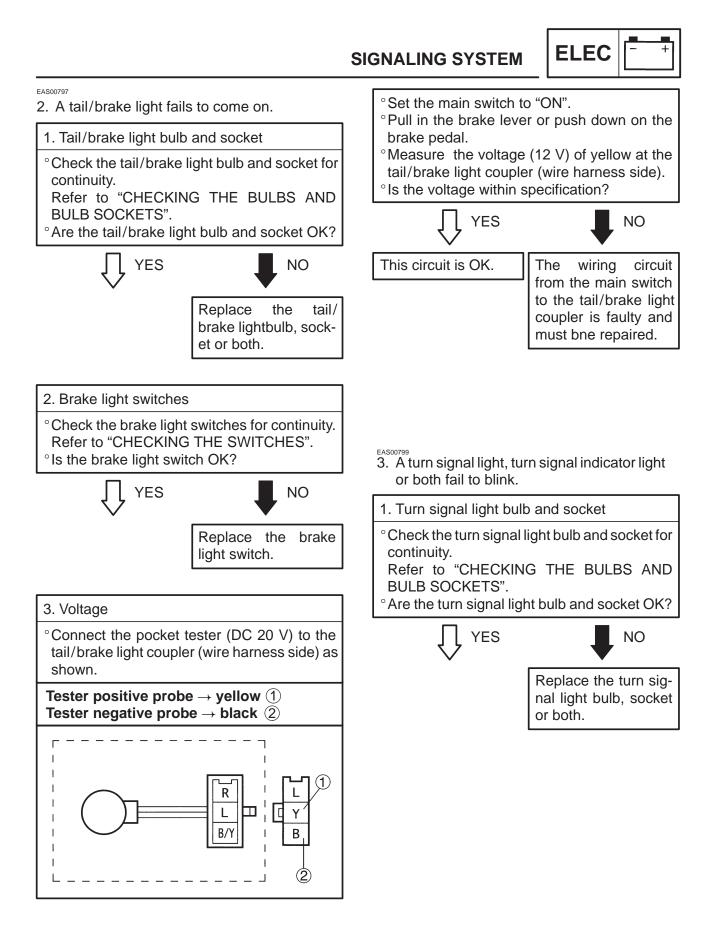
- °Before troubleshooting, remove the following part(-s):
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) steering head side covers
- 5) headlight lens unit
- 6) tool box cover
- 7) left side cover
- <sup>o</sup>Troubleshoot with the following special tool(-s).





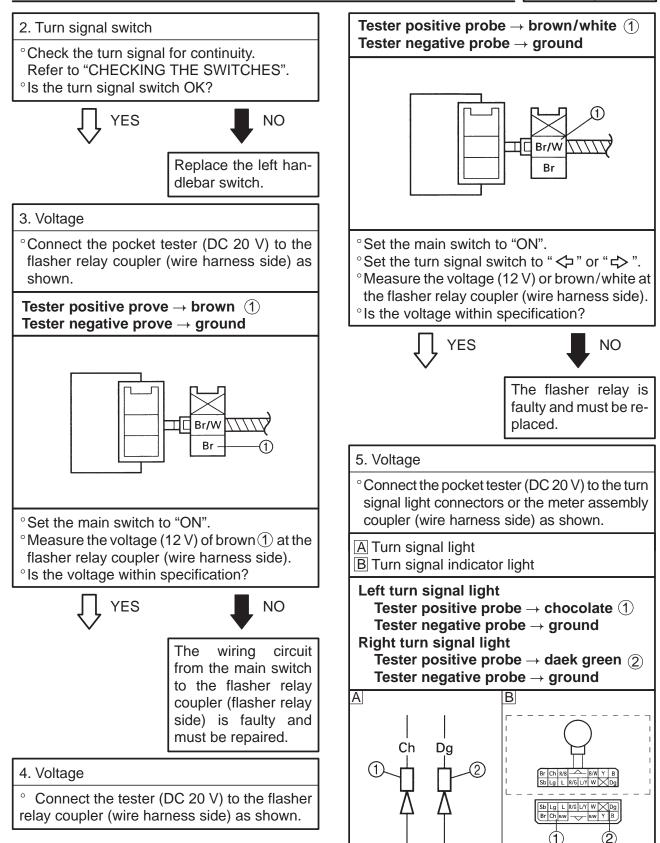


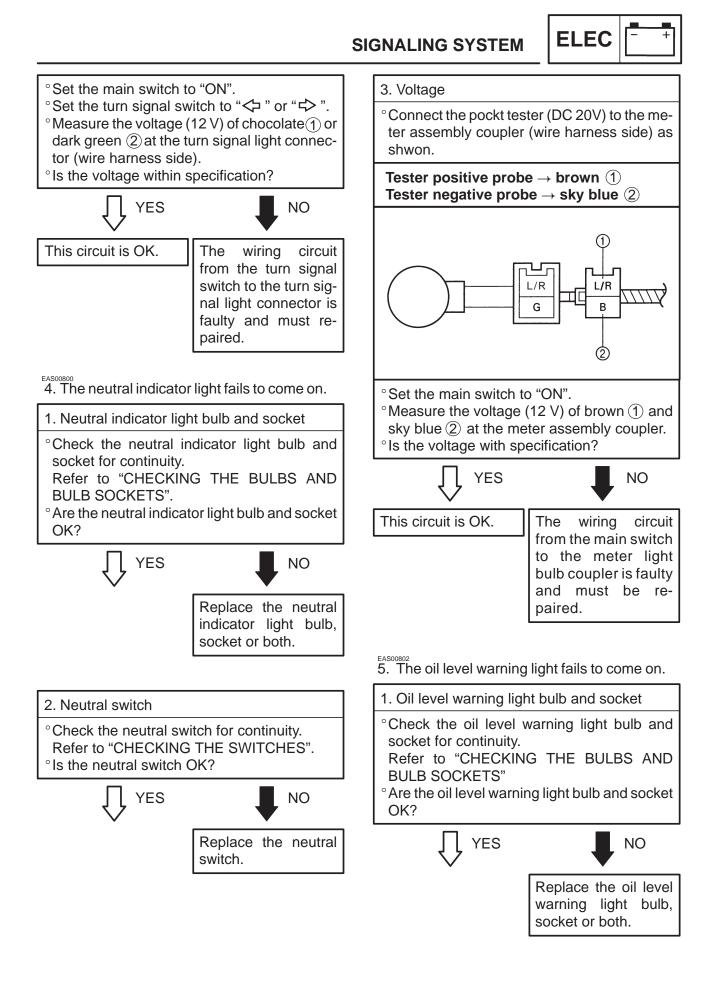




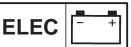
# SIGNALING SYSTEM

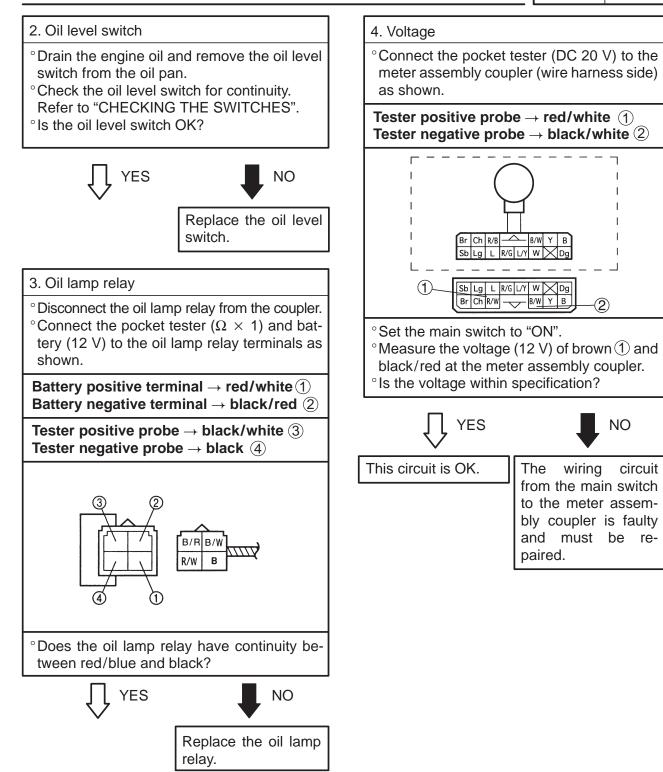






# SINGNAL SYSTEM

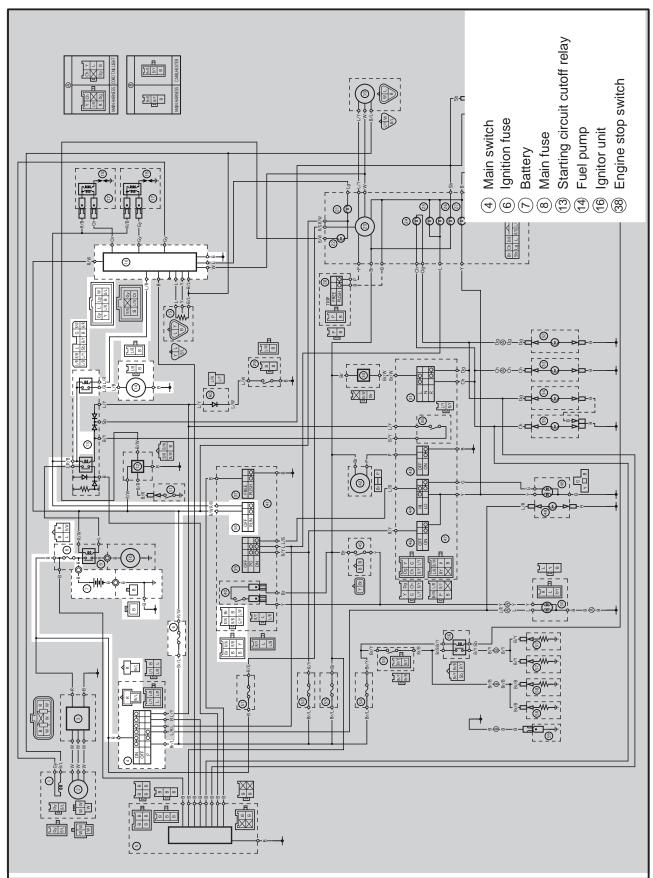


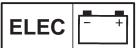


# FUEL PUMP SYSTEM



# FUEL PUMP SYSTEM CIRCUIT DIAGRAM





### FUEL PUMP CIRCUIT OPERATION

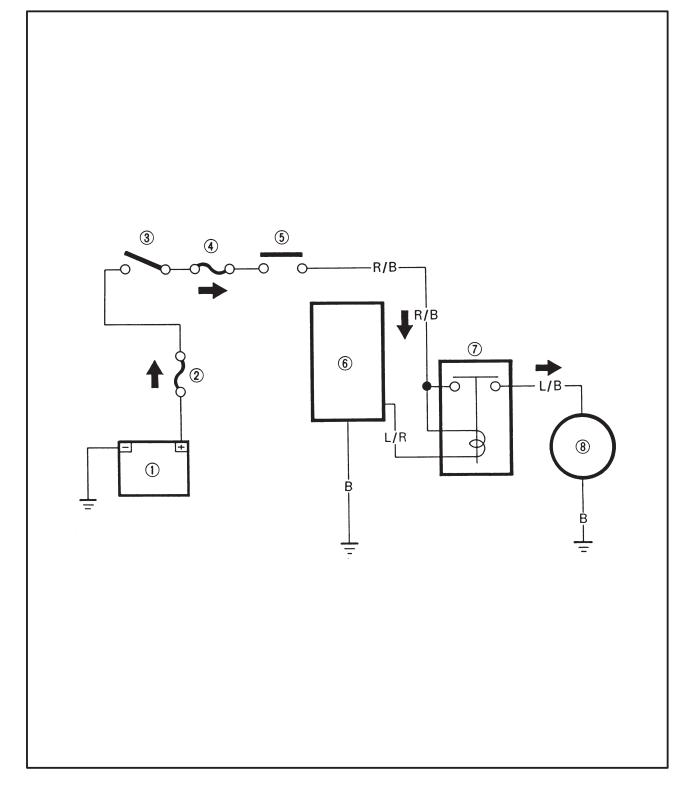
EB808010

The fuel pump circuit consists of the fuel pump relay, fuel pump, engine stop switch and ignitor unit.

The ignitor unit includes the control unit for the fuel pump.



- (3) Main switch
- (4) Ignition fuse 5 Engine stop switch
- 6 Ignitor unit
- 7 Fuel pump relay
- 8 Fuel pump



FUEL PUMP SYSTEM



### TROUBLESHOOTING

### The fuel pump fails to operate.

### Check:

EAS00781

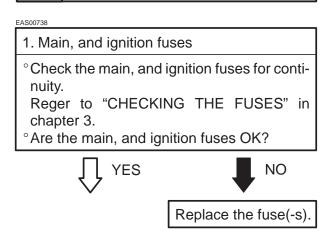
- 1. main, and ignition fuses
- 2. battery
- 3. main switch
- 4. engine stop switch
- 5. starting circuit cutoff relay (fuel pump relay)
- 6. fuel pump
- 7. wiring

(of the entire charging system)

### NOTE: -

- °Before troubleshooting, remove the following part (-s):
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) tool box cover
- 5) left side cover
- °Troubleshoot with the following special tool (-s).

### Pocket tester 90890-03112

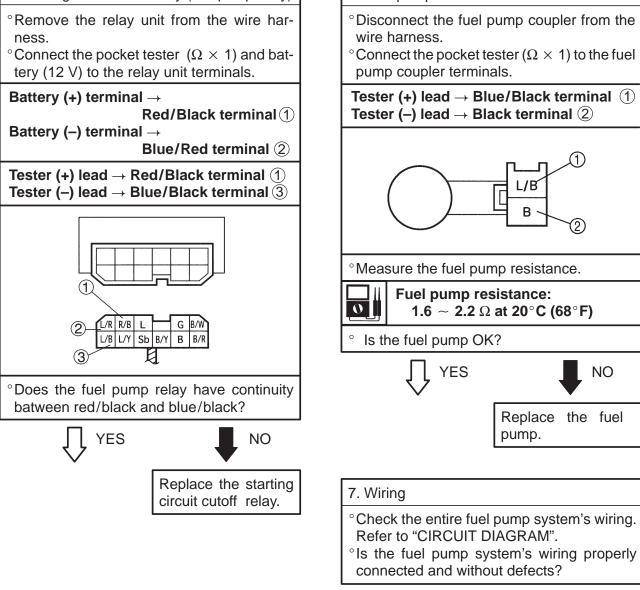


# EAS00739 2. Battery °Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3. **Open-circuit voltage** 0 12.8 V or more at 20°C ° Is the battery OK? YES NO °Clean the battery terminals. °Recharge or replave the battery. EAS00749 3. Main switch <sup>o</sup>Check the main switch for continuity. Refer to "CHECKING THE SWITCHES". ° Is the main switch OK? YES NO Replace the main switch. EAS00750 4. Engine stop switch

<sup>°</sup>Check the engine stop switch for continuity. Refer to "CHECKING THE SWITCHES". <sup>°</sup>Is the engine stop switch OK?



NO



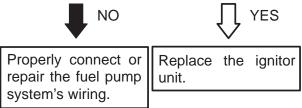
EB803023

5. Starting circuit cutoff relay (fuel pump relay)

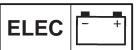
**FUEL PUMP SYSTEM** 

6. Fuel pump resistance

EB808021



EB808030



### FUEL PUMP TEST

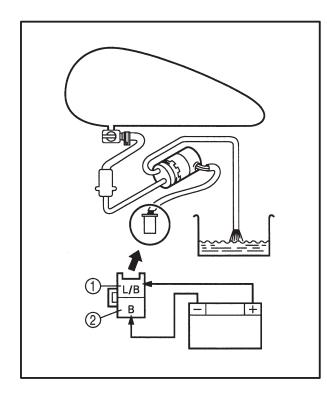
## 

Gasoline is extremely flammable and under certain circumstances there can be a danger of an explosion or combustion. Be extremely careful and note the following points:

- $^\circ\mbox{Stop}$  the engine before refuelling.
- <sup>o</sup>Do not smoke and keep away from open flames, sparks, or any other source of fire.
- <sup>o</sup> Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.
- <sup>o</sup> If gasoline touches the engine when the engine is still hot, there is a danger of combustion. Make sure that the engine is completely cool before performing the following test.
- 1. Check:
- ° Fuel pump operation
- a. Fill up the fuel tank.
- b. Put the end of the fuel hose into an open container.
- c. Connect the battery (12 V) to the fuel pump coupler terminals.

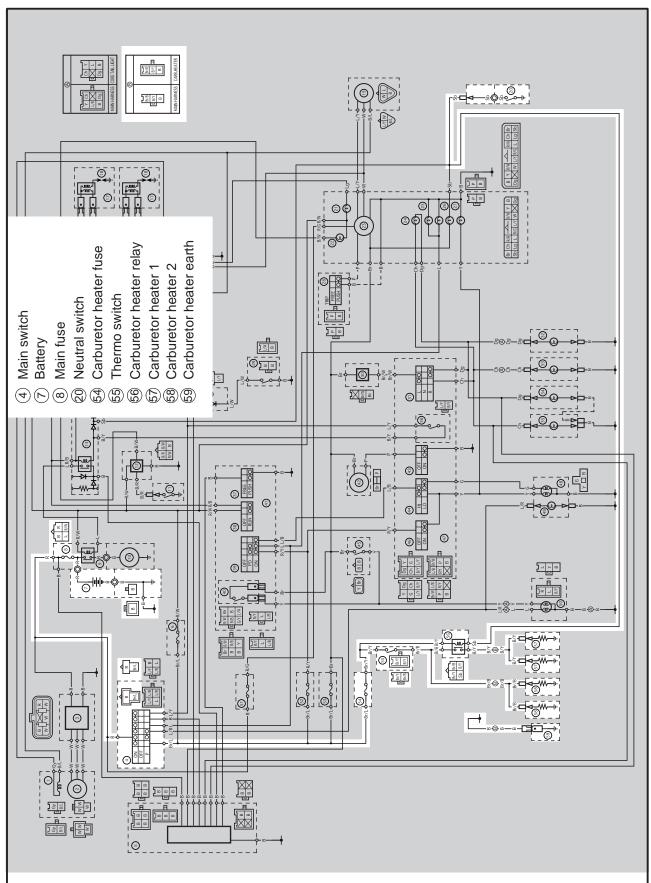
Battery (+) lead  $\rightarrow$  Blue/black terminal (1) Battery (-) lead  $\rightarrow$  Black terminal (2)

d. If fuel flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.





## CARBURETOR HEATER SYSTEM CIRCUIT DIAGRAM



# CARBURETOR HEATER SYSTEM

EAS00739



### TROUBLESHOOTING

### The carburetor heater fails to operate.

Check:

EAS00781

- 1. main, and carburetor heater
- 2. battery
- 3. main switch
- 4. neatral switch
- 5. carburetor heater relay
- 6. thermo
- 7. carburetor heater
- 8. wiring
  - (of the entire charging system)

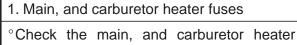
### NOTE: -

- <sup>°</sup>Before troubleshooting, remove the following part (-s):
- 1) battery cover
- 2) rider's seat
- 3) fuel tank
- 4) steering head side covers
- 5) tool box cover
- °Troubleshoot with the following special tool (-s).



### Pocket tester 90890-03112

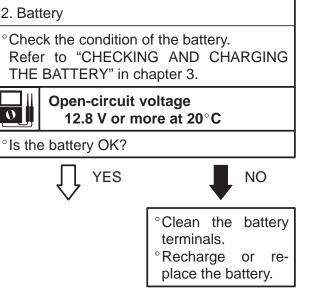
EAS00738

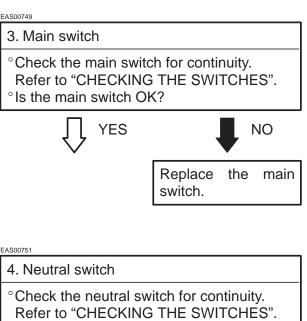


- fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- <sup>o</sup>Are the main, and carburetor heater fuses OK?

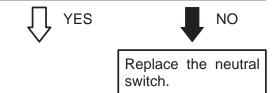
NO

Replace the fuse(-s).

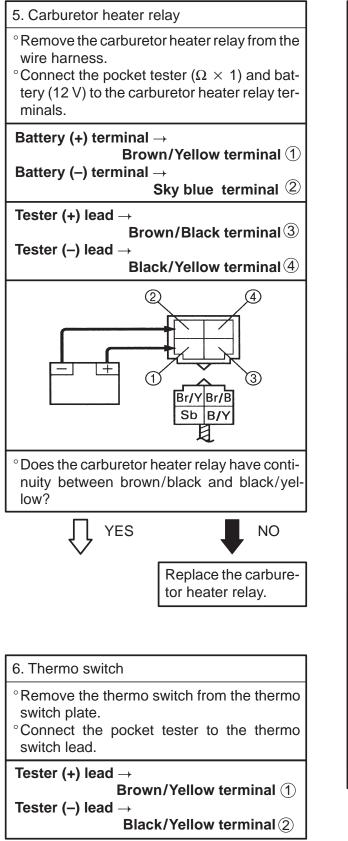


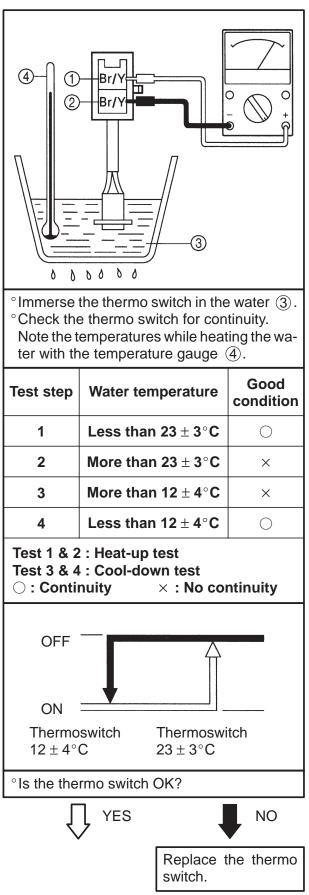


° Is the neutral switch OK?



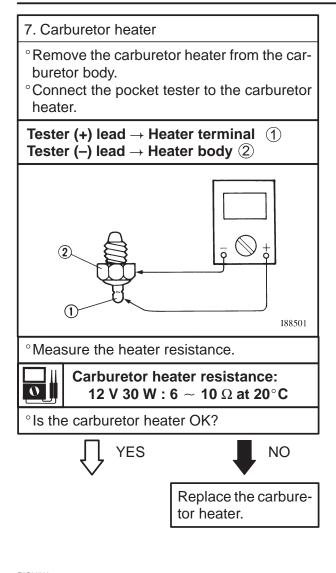
## **CARBURETOR HEATER SYSTEM**

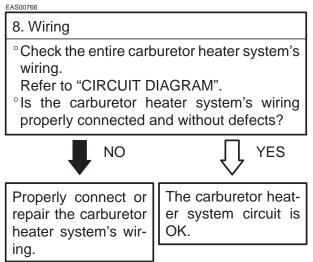




# CARBURETOR HEATER SYSTEM







SELF-DIAGNOSIS



# SELF-DIAGNOSIS

The XVS1100 features self-diagnosis.

When the main switch is turned to "ON", the following items are monitored and the condition codes are displayed on the engine indicator light (irrespective of whether the engine is running or not).

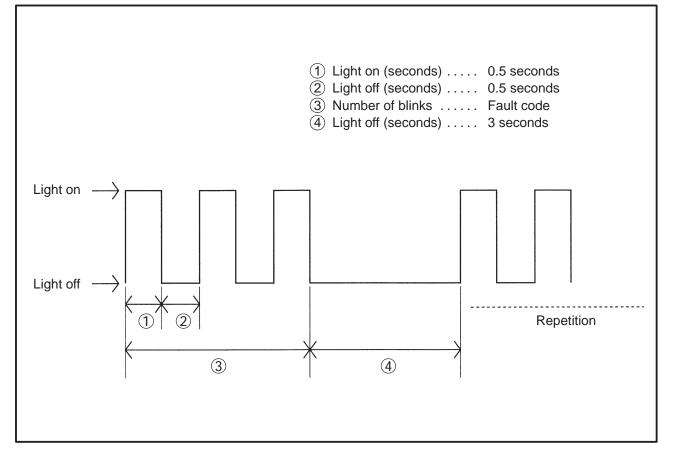
### NOTE: -

The XVS1100 features a self-diagnosing system.

In the XVS1100, when the main switch is turned on the "Engine indicator light" in the speedometer comes on for 1.4 seconds then goes off. However, if there is a malfunction, it comes on for 1.4 seconds, goes off and then begins flashing. (However, it is on while the engine is running.)

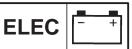
			Display condition code		
Item	Condition	Response	When engine is stationary	When engine is running	
Throttle position sensor (TPS)	Disconnected Short-circuit Locked	<ul> <li><sup>°</sup>Enables the motorcycle to run so that the ignition timing is fixed when the throttle is fully opened.</li> <li><sup>°</sup>Displays the condition code on the engine indicator light.</li> </ul>	Blinks in Fault code: 3	Light on	
Speed sensor	Disconnected short-circuit	<sup>°</sup> Displays the condition code on the enigne indicator light.	Blinks in Fault code: 4	Light on	

### Display order on the engine indicator light



# SELF-DIAGNOSIS

1. Wire harness



### EAS00835

### TROUBLESHOOTING

# The engine warning light starts to display the self-diagnosis sequence.

### Check:

- 1. throttle position sensor
- 2. speed sensor

### NOTE: -

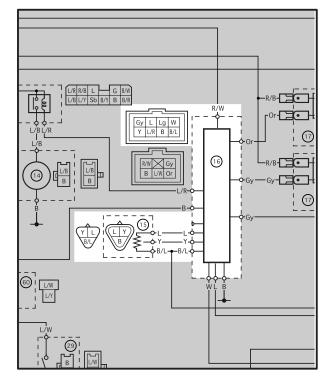
- <sup>o</sup>Before troubleshooting, remove the following part(-s):
- 1) rider seat
- 2) fuel tank
- 3) air filter case
- 4) left side cover
- °Troubleshoot with the following special tool(-s).

A

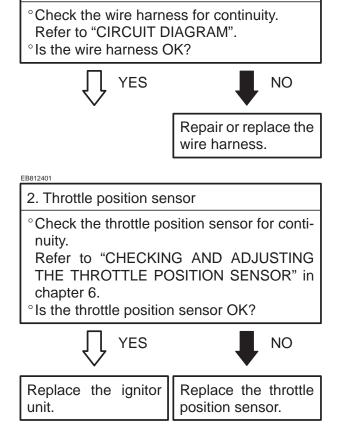
Pocket tester 90890-03112

EAS00836

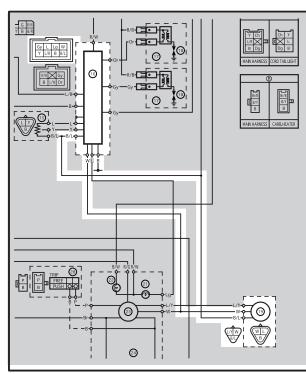
### 1. Throttle position sensor CIRCUIT DIAGRAM



(15) Throttle position sensor(16) Ignitor unit



### 2. Speed sensor CIRCUIT DIAGRAM



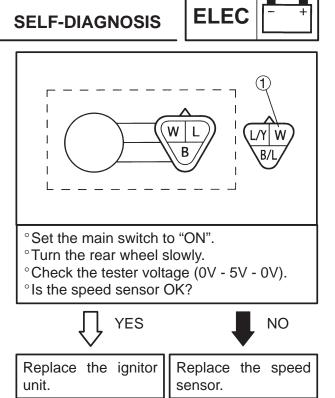
- (16) Ignitor unit
- (19) Speed sensor

### 1. Wire harness

- °Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".
- ° Is the wire harness OK?

wire harness.

2. Speed sensor				
<ul> <li>Place the motorcycle on a suitable stand so that the rear wheel is elevated.</li> <li>Connect the pocket tester (DC 20V) to the speed sensor connector.</li> </ul>				
Tester (+) lead → White ① terminal Tester (–) lead → Body earth				



+





# CHAPTER 8. TROUBLESHOOTING

STARTING FAILURE/HARD STARTING
COMPRESSION SYSTEM 8-2
POOR IDLE SPEED PERFORMANCE       8-2         POOR IDLE SPEED PERFORMANCE       8-2
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FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION8-4MALFUNCTION8-4OIL LEAKAGE8-4
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# STARTING FAILURE/HARD STARTING



#### EB900000

# TROUBLESHOOTING

#### NOTE: -

The following guide for troubleshooting does not cover all the possible causes of problems. 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 strainer
- °Clogged fuel tank drain hose
- °Clogged roll-over valve
- °Clogged roll-over valve breather hose
- <sup>o</sup>Deteriorated or contaminated fuel

### Fuel cock

°Clogged fuel hose

### ELECTRICAL SYSTEM Spark plug

- ° Improper plug gap
- °Worn electrodes
- °Wire between terminals severed
- ° Improper heat range
- °Faulty spark plug cap

### **Ignition coil**

- °Broken or shorted primary/secondary
- °Faulty spark plug lead
- °Broken body
- **Full-transistor system**
- ° Faulty ignitor unit
- °Faulty pickup coil

### Carburetor

- °Deteriorated or contaminated fuel
- °Clogged pilot jet
- °Clogged pilot air passage
- °Sucked-in air
- ° Deformed float
- °Worn needle valve
- ° Improperly sealed valve seat
- ° Improperly adjusted fuel level
- ° Improperly set pilot jet
- °Clogged starter jet
- °Faulty starter plunger
- <sup>°</sup>Improperly adjusted starter cable
- Air filter
- °Clogged air filter element
- Fuel pump
- °Faulty fuel pump
- °Faulty relay unit (fuel pump relay)

### Switch and wiring

- °Faulty main switch
- °Faulty engine stop switch
- <sup>°</sup>Broken or shorted wiring
- °Faulty neutral switch
- °Faulty start switch
- ° Faulty sidestand switch
- °Faulty clutch switch

### Starter motor

- °Faulty starter motor
- °Faulty starter relay
- °Faulty relay unit (starting circuit cut-off relay)
- °Faulty starter clutch

### STARTING FAILURE/HARD STARTING/POOR IDLE SPEED PERFORMANCE/POOR MEDIUM-AND HIGH-SPEED PERFORMANCE



### COMPRESSION SYSTEM Cylinder and cylinder head

### °Loose spark plug

- °Loose cylinder head or cylinder
- °Faulty cylinder head gasket
- °Worn, damaged or seized cylinder
- ° Improperly sealed valve
- ° Improper valve-to-valve seat contact
- ° Improper valve timing
- °Faulty valve spring

### Piston and piston ring

- ° 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

# POOR IDLE SPEED PERFORMANCE

### Carburetor

- ° Improperly returned starter plunger
- °Loose pilot jet
- °Clogged pilot air jet
- ° Improperly synchronized carburetors
- <sup>o</sup> Improperly adjusted idle speed (throttle stop screw)
- <sup>°</sup> Improper throttle cable free play
- ° Flooded carburetor

### **Electrical system**

- °Faulty battery
- °Faulty spark plug
- °Faulty ignitor unit
- °Faulty pickup coil
- °Faulty ignition coil

### Valve train

° Improperly adjusted valve clearance Air filter

°Clogged air filter element

EB902000

### POOR MEDIUM-AND HIGH-SPEED PERFORMANCE POOR MEDIUM-AND HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURE/HARD STARTING". (Fuel system, electrical system, compression system and valve train)

### Carburetor

Faulty diaphragm
 Improperly adjusted fuel level
 Clogged or loose main jet

Air filter °Clogged air filter element Fuel pump °Faulty fuel pump

## FAULTY GEAR SHIFTING/ CLUTCH SLIPPING/DRAGGING



# FAULTY GEAR SHIFTING

Refer to "CLUTCH DRAGGING".

# SHIFT PEDAL DOES NOT MOVE Shift shaft

Improperly adjusted shift pedal link
 Bent shift shaft

### Shift cam, shift fork

- °Groove jammed with impurities
- ° Seized shift fork
- <sup>°</sup>Bent shift fork guide bar

### JUMPS-OUT-OF GEAR

### Shift shaft

<sup>°</sup> Improperly adjusted shift lever position
 <sup>°</sup> Improperly returned stopper lever
 Shift fork
 <sup>°</sup> Worn shift fork

### CLUTCH SLIPPING/DRAGGING CLUTCH SLIPPING Clutch

° Improperly adjusted clutch cable

### °Loose clutch spring

- °Fatigued clutch spring
- °Worn friction plate/clutch plate
- ° Incorrectly assembled clutch

### CLUTCH DRAGGING Clutch

- °Warped pressure plate
- °Unevenly tensioned clutch springs
- °Bent push rod
- °Broken clutch boss
- °Burnt primary driven gear bushing
- °Bent clutch plate
- °Swollen friction plate
- °Match marks not aligned

### Transmission

- °Seized transmission gear
- ° Jammed impurities
- °Incorrectly assembled transmission

### Shift cam

<sup>°</sup> Improper thrust play
 <sup>°</sup> Worn shift cam groove
 **Transmission** <sup>°</sup> Worn gear dog

### Engine oil

Improper oil level
 Improper viscosity (low)
 Deterioration

### Engine oil

- ° Improper oil level
- ° Improper viscosity (high)
- ° Deterioration

### **OVERHEATING/FAULTY BRAKE/FRONT FORK OIL** LEAKAGE AND FRONT FORK MALFUNCTION



### EB905000 **OVERHEATING OVERHEATING**

# Ignition system

- ° Improper spark plug gap
- ° Improper spark plug heat range
- °Faulty ignitor unit

### **Fuel system**

- ° Improper carburetor main jet setting
- ° Improper fuel level
- °Clogged air filter element

### **Compression system**

°Heavy carbon build-up Engine oil ° Improper oil level ° Improper oil viscosity ° Inferior oil quality **Brake** °Brake drag

### EB906001 **FAULTY BRAKE** POOR BRAKING PERFORMANCE Disc brake

- °Worn brake pad
- °Worn disc
- °Air in brake fluid
- °Leaking brake fluid
- °Faulty cylinder kit cup
- °Faulty caliper kit seal
- °Loose union bolt
- °Broken brake hose
- °Oily or greasy disc/brake pad
- ° Incorrect brake fluid level

#### EB907000 FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION MALFUNCTION **OIL LEAKAGE**

- °Bent, deformed or damaged inner tube
- °Bent or deformed outer tube
- <sup>o</sup>Damaged fork spring
- °Worn or damaged slide metal
- °Bent or damaged damper rod
- ° Improper oil viscosity
- ° Improper oil level

- °Bent, damaged or rusty inner tube
- <sup>o</sup>Damaged or cracked outer tube
- °Damaged oil seal lip
- ° Improperly installed oil seal
- ° Improper oil level (too high)
- °Loose damper rod holding bolt
- °Broken cap bolt O-ring
- °Loose drain bolt
- <sup>o</sup>Damaged drain bolt gasket



# UNSTABLE HANDLING UNSTABLE HANDLING Handlebar

° Improperly installed or bent

### Steering

- ° Improperly installed handlebar crown
- °Bent steering stem
- <sup>o</sup> Improperly installed steering shaft (improperly tightened ring nut)
- °Damaged ball bearing or bearing race

### Swingarm

- °Worn bearing or bushing
- °Bent or damaged

### **Rear Shock absorber**

- °Faulty spring
- °Oil and gas leakage

### Tire

- °Uneven tire pressures on both sides
- ° Incorrect tire pressure
- °Uneven tire wear

# FAULTY LIGHTING AND SIGNAL SYSTEMS HEADLIGHT DOES NOT LIGHT BULB

- ° Improper bulb
- °Too many electric accessories
- <sup>o</sup>Hard charging (broken stator coil wire, faulty rectifier/regulator)
- °Incorrect connection
- ° Improperly grounded
- <sup>°</sup>Poor contacts (main or lights switch)
- °Bulb life expired

### FLASHER DOES NOT LIGHT

- ° Improperly grounded
- ° Discharged battery
- °Faulty turn switch
- °Faulty flasher relay
- °Faulty wire harness
- °Loosely connected coupler
- °Burnt-out bulb
- °Faulty fuse

### FLASHER BLINKS SLOWLY

- °Faulty flasher relay
- °Faulty main and/or turn switch
- ° Improper bulb

### Front fork

- °Uneven oil levels on both sides
- °Uneven spring tension
- (uneven damping force adjuster position)
- °Broken spring
- °Twisted front fork

### Wheel

- ° Incorrect wheel balance
- ° Deformed cast wheel
- <sup>o</sup>Damaged bearing
- °Bent or loose wheel axle
- °Excessive wheel runout
- °Loosed spoke
- Frame
- °Bent
- °Damaged steering head tube
- ° Improperly installed bearing race

# BULB BURNT OUT

- ° Improper bulb
- °Faulty battery
- °Faulty rectifier/regulator
- ° Improperly grounded
- °Faulty main and/or lights switch
- °Bulb life expired

### FLASHER REMAINS LIT

- °Faulty flasher relay
- °Burnt-out bulb

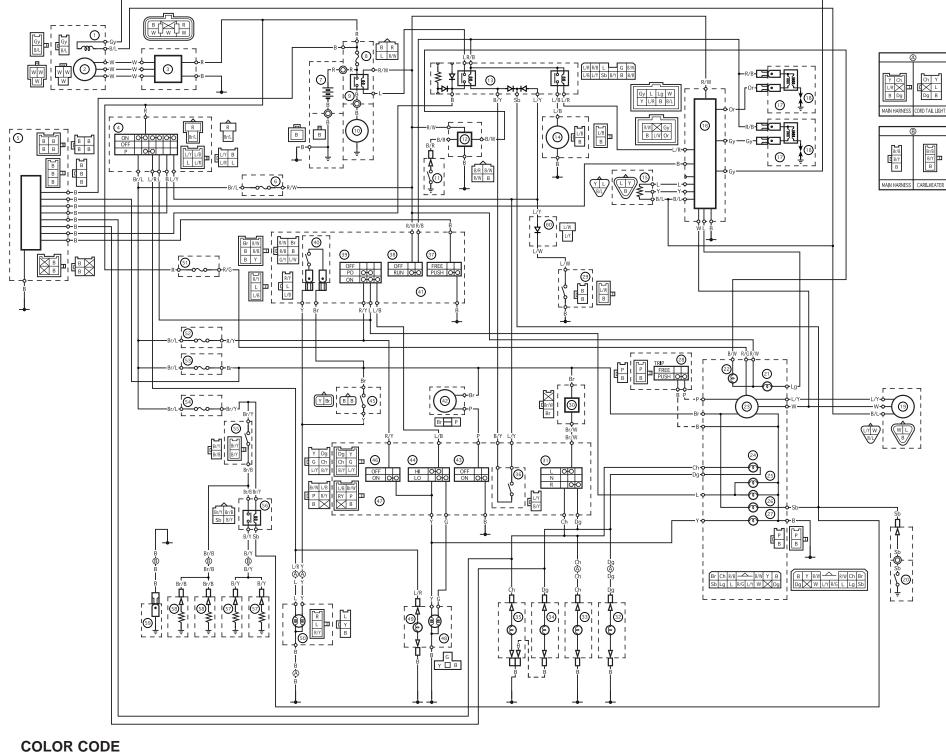
### FLASHER BLINKS QUICKLY

- ° Improper bulb
- °Faulty flasher relay
- °Burnt-out bulb

### HORN DOES NOT SOUND

- °Faulty battery
- °Faulty fuse
- °Faulty main and/or horn switch
- ° Improperly adjusted horn
- °Faulty horn
- °Broken wire harness

# XVS1100 WIRING DIAGRAM (for Europe)

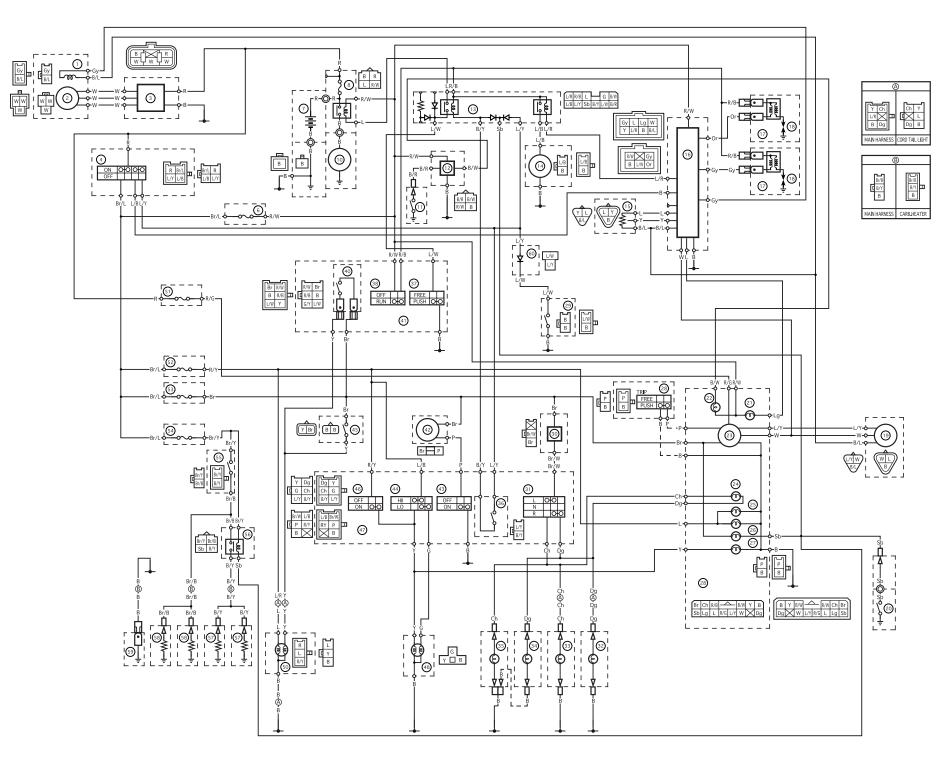


В	Black	L	Blue	Ψ	White	Br/L	Brown/Blue	L/Y	Blue/Yellow
Br	Brown	Lg	Light green	Υ	Yellow	Br/W .	Brown/White	R/B	Red/Black
Ch	Chocolate	Ο	Orange	B/L	Black/Blue	Br/Y	Brown/Yellow	R/G	Red/Green
Dg	Dark green	Ρ	Pink	B/W	Black/White	L/B	Blue/Black	R/W	Red/White
G	Green	R	Red	B/Y	Black/Yellow	L/R	Blue/Red	R/Y	Red/Yellow
Gy	Gray	Sb	Sky blue	Br/B	Brown/Black	L/W	Blue/White		

(1) Pickup coil 6 Ignition fuse7 Battery (8) Main fuse 9 Starter relay (14) Fuel pump (16) Igniter unit (17) Ignition coil 18 Spark plug 25 Meter light 28 Trip switch 37) Start switch 39 Light switch 42 Horn 43 Horn switch 46 Pass switch 48 Headlight 60 Diode

(2) A.C. magneto 3 Rectifier/regulator
4 Main switch 5 Alarm system (Option) 10 Starter motor (1) Oil level gauge (12) Oil lamp relay (13) Starting circuit cut-off relay (15) Throttle position sensor (19) Speed sensor 20 Neutral switch 2) Engine warning light 22 Oil warning light 23 Speedometer 24 Turn signal indicator light 26 Neutral indicator light 27) High beam indicator light 29 Sidestand switch 30 Flasher relay 31 Turn signal switch 32 Rear turn signal light (right) 33 Rear turn signal light (left) 34 Front turn signal light (right) 35 Front turn signal light (left) 36 Clutch switch 38 Engine stop switch 40 Front brake switch AT Right handlebar switch 44 Dimmer switch 45 Rear brake switch 47) Left handlebar switch 49 Auxiliary light 50 Tail/brake light 51) Backup fuse 53 Signal fuse 54 Carburetor heater fuse 55 Thermo switch 56 Carburetor heater relay (57) Carburetor heater 1 58 Carburetor heater 2 59 Carburetor heater earth

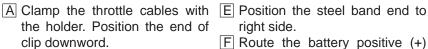
# XVS1100L WIRING DIAGRAM (for AUS)



### **COLOR CODE**

B Black	L Blue	W White	Br/L Brown/Blue	L/Y Blue/Yellow
Br Brown	Lg Light green	Y Yellow	Br/W . Brown/White	R/B Red/Black
Ch Chocolate	O Orange	B/L Black/Blue	Br/Y Brown/Yellow	R/G Red/Green
Dg Dark green	P Pink	B/W Black/White	L/B Blue/Black	R/W Red/White
G Green	R Red	B/Y Black/Yellow	L/R Blue/Red	R/Y Red/Yellow
Gy Gray	Sb Sky blue	Br/B Brown/Black	L/W Blue/White	

(1) Pickup coil (2) A.C. magneto 3 Rectifier/regulator (4) Main switch (6) Ignition fuse (7) Battery (8) Main fuse (9) Starter relay (10) Starter motor (11) Oil level gauge (12) Oil lamp relay (13) Starting circuit cut-off relay (14) Fuel pump (15) Throttle position sensor (16) Igniter unit (17) Ignition coil (18) Spark plug (19) Speed sensor 20 Neutral switch 21) Engine warning light 2 Oil warning light 23 Speedometer 24) Turn signal indicator light 25 Meter light 26 Neutral indicator light (27) High beam indicator light 28 Trip switch 29 Sidestand switch 30 Flasher relay (31) Turn signal switch 32 Rear turn signal light (right) 33 Rear turn signal light (left) 34 Front turn signal light (right) (35) Front turn signal light (left) 36 Clutch switch 37) Start switch 38 Engine stop switch (40) Front brake switch (41) Right handlebar switch (42) Horn (43) Horn switch (4) Dimmer switch 45 Rear brake switch 46 Pass switch  $\overline{(47)}$  Left handlebar switch 48 Headlight 50 Tail/brake light (51) Backup fuse (52) Headlight fuse 53 Signal fuse 54 Carburetor heater fuse (55) Thermo switch 56 Carburetor heater relay (57) Carburetor heater 1 58 Carburetor heater 2 (59) Carburetor heater earth 60 Diode



clip downword.

vor hose.

forward.

side bracket.

B Route the rear brake switch lead

C Position the band end of right

D Position the steel band end to

under the master cylinder reser-

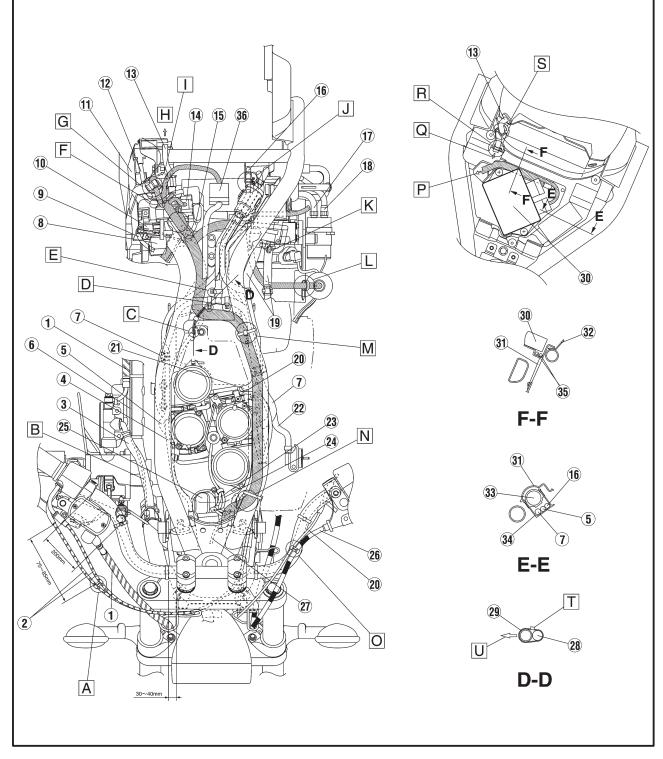
- lead through the slit of the battery box.
- G Clamp the igniter unit lead to the frame with a holder.

H To the rear fender.

### E Position the steel band end to Connect the wireharness to the ignitar unit through the hole of LID. 2.

SPEC

J Route the fuel tank breather hose under the fuel filter and connect it (fuel tank sideroll over valve side) with a joint. Position the end of clip outside.



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# **CABLE ROUTING**