# **YBR250**

## SERVICE MANUAL

YBR250
SERVICE MANUAL
©2007 Yamaha Motor da Amazônia Ltda.
First edition, February 2007
All rights reserved.
Any reproduction or unauthorized use without the written permission of Yamaha Motor da Amazônia Ltda is expressly prohibited.

### NOTICE

This manual was produced by the YAMAHA MOTOR DA AMAZÔNIA LTDA., 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. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

YAMAHA MOTOR DA AMAZÔNIA LTDA. is continually striving to improve all of 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.

NOTE:

Designs and specifications are subject to change without notice.

#### IMPORTANT MANUAL INFORMATION

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

SAFETY

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

**⚠** WARNING

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

CAUTION:

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

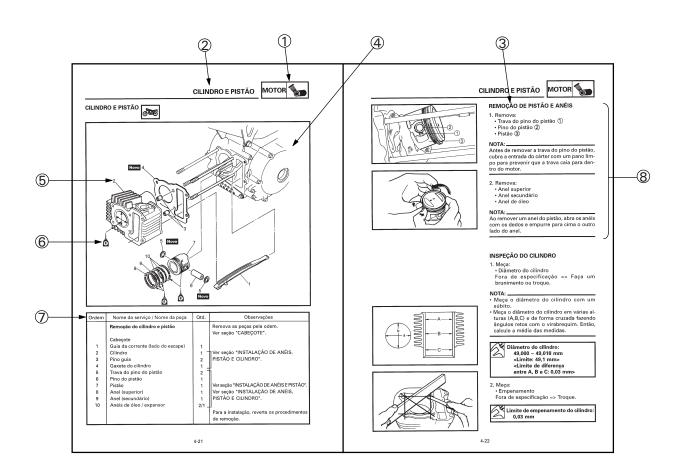
NOTE:

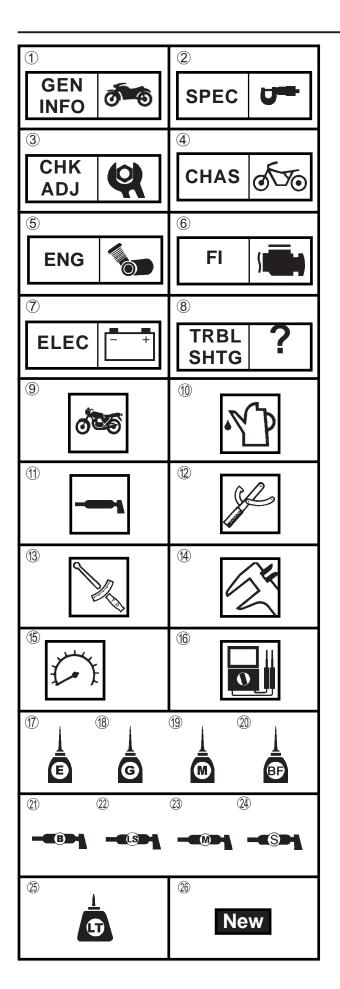
A NOTE provides key information to make procedures easier or clearer.

### HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

- 1 The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter.
- 2 Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 ("PERIODIC CHECKS AND ADJUSTMENTS"), where the sub-section title(s) appears.
- 3 Sub-section titles appear in smaller print than the section title.
- 4 To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.
- 5 Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.
- 6 Symbols indicate parts to be lubricated or replaced. Refer to "SYMBOLS".
- 7 A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- 8 Jobs requiring more information (such as special tools and technical data) are described sequentially.





### **SYMBOLS**

The following symbols are not common to all vehicles

Symbols 1 - 8 indicate the subject of each chapter.

- General information
- ② Specifications
- 3 Periodic checks and adjustments
- 4 Chassis
- (5) Engine
- 6 Fuel Injection system
- 7 Electrical system
- 8 Troubleshooting

Symbols 9 - 16 indicate the following:

- 9 Serviceable with engine mounted
- 10 Filling fluid
- 11) Lubricant
- ② Special tool
- Tightening torque
- (4) Clearance, wear limit
- (5) Engine speed
- 6 Electrical data

Symbols  $\widehat{\mathbb{T}}$  -  $\widehat{\mathbb{Q}}$  in the exploded diagrams indicate the types of lubricants and lubrication points.

- ① Engine oil
- (18) Gear oil
- 19 Molybdenum-disulphide oil
- 20 Brake fluid
- 21 Wheel-bearing grease
- ② Lithium-soap-based grease
- Molybdenum-disulphide grease
- Silicone grease

Symbols ② - ③ in the exploded diagrams indicate the following.

- ② Apply locking agent (LOCTITE®)
- 26 Replace the part.

## **TABLE OF CONTENTS**

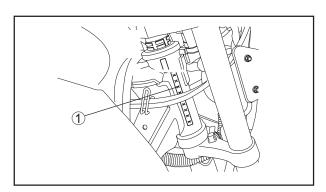
GENERAL INFORMATION	GEN INFO
SPECIFICATIONS	SPEC 2
PERIODIC CHECKS AND ADJUSTMENTS	CHK ADJ 3
CHASSIS	chas 4
ENGINE	ENG 5
FUEL INJECTION SYSTEM	FI 6
ELECTRICAL SYSTEM	ELEC 7
TROUBLESHOOTING	?

### **CHAPTER 1**

### **GENERAL INFORMATION**

VEHICLE IDENTIFICATION	
VEHICLE IDENTIFICATION NUMBER	1-1
MODEL LABEL	
FEATURES	
FEATURES	
FI SYSTEM	1-3
IMPORTANT INFORMATION	
PREPARATION FOR REMOVAL AND DISASSEMBLY	
REPLACEMENT PARTS	
GASKETS, OIL SEALS AND O-RINGS	
LOCK WASHERS, PLATES AND COTTER PINS	1-5
BEARINGS AND OIL SEALS	1-5
CIRCLIPS	1-5
CHECKING THE CONNECTIONS	1-6
SPECIAL TOOLS	1-7

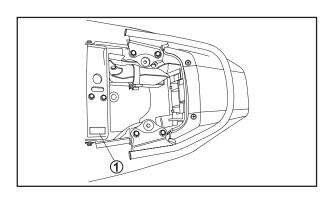




### **VEHICLE IDENTIFICATION**

### **VEHICLE IDENTIFICATION NUMBER**

Chassis serial number ① is stamped into the right side of the steering head pipe.



### **MODEL LABEL**

The model label ① is affixed to the frame.

This information will be needed to order spare parts.

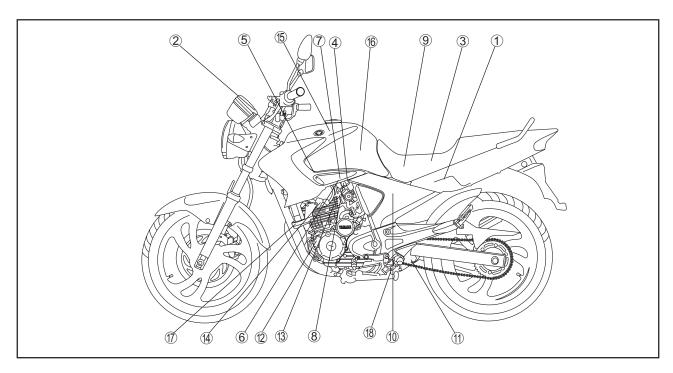
### **FEATURES**

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet that is used in the respective chamber.

Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.



- ① ECU (engine control unit)
- ② Engine trouble warning light
- 3 Lean angle sensor
- 4 Fuel delivery hose
- ⑤ Ignition coil
- 6 Fuel injector

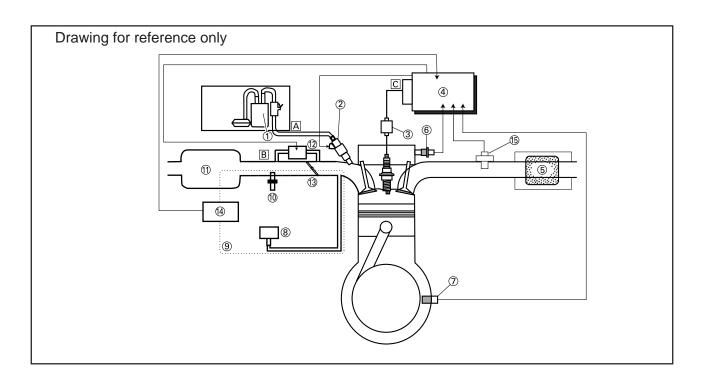
- FID (fast idle solenoid)
- Throttle body sensor assembly
- 9 Battery
- ① Air filter case
- ① Catalytic converter
- Crankshaft position sensor

- ③ Engine temperature sensor
- Spark plug
- (15) Fuel tank
- 16 Fuel pump
- Air induction system (A.I.System)
- 18 O<sub>2</sub> sensor

### FI SYSTEM

The fuel pump delivers fuel to the injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the injector at 36,3psi (250 kpa). Accordingly, when the energizing signal from the ECU energizes the injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, atmospheric pressure sensor, intake temperature sensor, coolant temperature sensor, and  $O_2$  sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



- 1 Fuel pump
- 2 Fuel injector
- 3 Ignition coil
- 4 ECU (Engine control unit)
- ⑤ Catalytic converter
- 6 Engine temperature sensor
- ⑦ Crankshaft position sensor
- 8 Intake air pressure sensor
- 9 Throttle body
- ① Intake air temperature sensor
- 1 Air filter case
- ② FID (fast idle solenoid)
- ③ TPS (throttle position sensor)
- Throttle body sensor assembly =
  - 8 + 10 + 13
- O<sub>2</sub> sensor
- A Fuel system
- B Air system
- C Control system

### IMPORTANT INFORMATION





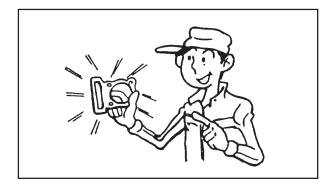




### IMPORTANT INFORMATION

## PREPARATION FOR REMOVAL AND DISASSEMBLY

- 1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.
- 2. Use only the proper tools and cleaning equipment.
  - Refer to the "SPECIAL TOOLS".
- When disassembling, 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.
- During disassembly, clean all of the 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.



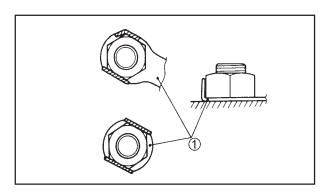
### REPLACEMENT PARTS

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.

## GASKETS, OIL SEALS AND O-RINGS

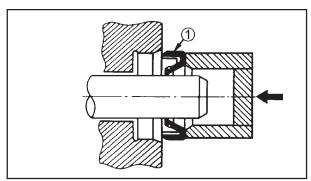
- 1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
- 2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.





## LOCK WASHERS / PLATES AND COTTER PINS

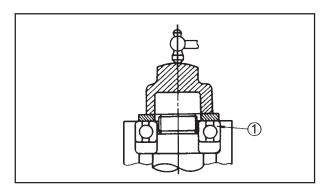
After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



#### **BEARINGS AND OIL SEALS**

Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

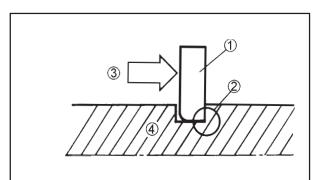
1 Oil Seal



### **CAUTION:**

Do not spin the bearing with compressed air because this will damage the bearing surfaces.

1 Bearing



### **CIRCLIPS**

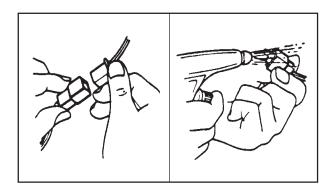
Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip ①, make sure the sharp-edged corner ② is positioned opposite the thrust ③ that the circlip receives.

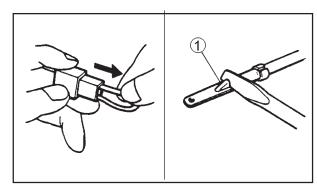
4 Shaft

### **CHECKING THE CONNECTIONS**









### CHECKING THE CONNECTIONS

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

- 1. Disconnect:
  - lead
  - coupler
  - connector
- 2. Check
- lead
- coupler
- connector
   Moisture --> Dry with an air blower.

   Rust/stains --> Connect and disconnect several times.
- 3. Check:
- all connections
   Loosen connection --> Connect properly

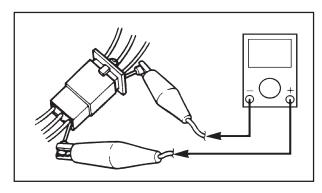
NOTE: \_

If the pin ① on the terminal is flattened, bend it up.

- 4. Connect:
- lead
- coupler
- connector

NOTE: \_

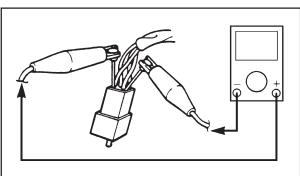
Make sure that all connections are tight.



- 5. Check
- continuity
   (with the pocket tester)



Pocket tester 90890-03174



#### NOTE:

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

### **SPECIAL TOOLS**

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country. When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name / Function	Illustration
90890-01084 90890-01083	Sliding hammer ① Shaft ②	2
	Use to install or remove shafts of rocker arm.	0 1
90890-01135	Crankshaft puller	
	Use to remove crankshaft	
90890-04019 90890-01243	Valve spring compressor ① Adapter ②	
	Use to install or remove valves.	
90890-01268	Ring nut wrench	
	Use to loosen or tighten ring nuts to steering, exhaust and shock absorber.	
90890-01274	Crankshaft installer ①	
90890-01275 90890-01383	Traction fuse ② Adapter (10mm) ③	
	Use to install crankshaft.	
90890-01311	Adjustment screw wrench	
	Use to adjust valves clearance.	
90890-01326 90890-01294	T-handle ① Adapter ②	
	Use to fix or extract bolt from the front suspension rod	
90890-01362	Magneto flywheel puller	
	Use to extract magneto flywheel	
90890-01367 90890-01371	Staff oil seal installer ① Adapter ②	
	Use to install oil seal, outer bushing from staffs of the front fork and dust seal	<b>)</b>



Tool No.	Tool name / Function	Illustration
90890-01403	Steering nut wrench	<b>a</b>
	Use to fix or extract ring nuts	(4)
90890-01701	from steering Sheave holder	_ ^
90690-01701	Sheave noider	
	Use to fix the flywheel magneto rotor.	
90890-03079	Feeler gauge	$\sim$
	Use to check valve clearance.	<i>G</i>
90890-03081	Compression gauge	
	Use to measure engine compression.	
90890-01519 90890-01520	Rear shock absorber wrench Handle spanner	
00000 01020	Use together with the socket extensor,	
	for adjusting preload of the shock	
90890-03141	absorber spring.	<b>A</b>
<del>७</del> ७०७७-७३१४१	Timing light	
	Use to check ignition timing.	
90890-03153	Fuel pressure gauge	
90890-03176	Fuel pressure adapter	
		and other mass
	Use to measure fuel pump pressure.	
90890-03174	Pocket tester	
	Use to check electrical system	
90890-06754	Spark dynamic tester	
	Use to check the length of spark at the spark plug.	
90890-85505	Yamaha Bond # 1215	
	Use to seal surfaces (e.g.: engine cases).	



Tool N⁰ Tool name / Function Illustration		
		inustration
90890-06760	Inductive tachometer	
	Use to check engine rotation.	<b>3</b>
90890-04064	Valve guide extractor  Use to extract and install valve guides.	
90890-04065	Valve guide installer  Use to install valve guides.	
90890-04066	Valve guide reamer  Use to rebore the hole on the new valve guides.	
90890-03182	FI electronic injection diagnosis  Use to adjust the exhaust gas.	
90890-04086	Clutch hub holder  Use to fix the clutch holder.	
90890-04101	Valve polisher  Use to spin and polish valves.	

### **CHAPTER 2**

### **SPECIFICATIONS**

GENERAL SPECIFICATIONS	. 2-1
ENGINE SPECIFICATIONS	. 2-2
CHASSIS SPECIFICATIONS	2-10
ELECTRICAL SPECIFICATIONS	2-14
CONVERSION TABLE	2-16
GENERAL TIGHTENING TORQUE SPECIFICATION	2-16
TIGHTENING TORQUES	2-17
ENGINECHASSIS	2-21
OIL COOLING SYSTEM DIAGRAM	2-23
LUBRICATION FLOW	2-24
LUBRICATION SYSTEM DIAGRAMS	2-25
CABLE ROUTING	2-29

## **GENERAL SPECIFICATIONS**



## SPECIFICATIONS GENERAL SPECIFICATIONS

Item	Standard	Limit
Model	YBR250	
Model code	5D11	
Dimensions Overall length Overall width Overall height Seat height	2,025 mm (79,724 in) 745 mm (29,33 in) 1,065 mm (41,93 in) 805 mm (31,69 in)	 
Wheelbase Ground clearance Minimum turning radius	1,360 mm (53,54 in) 190 mm (7,48 in) 2,395 mm (94,29 in)	
<b>Weight</b> Dry	138.0 kg (304 lb)	
With oil and fuel	154.0 kg (339 lb)	
Maximum load (total of cargo, conductor, passenger and accessories)	167.0 kg (368 lb)	

SPEC U

ltem	Standard	Limit
Engine Engine type Cylinder arrangement Displacement Cylinder - bore x stroke Compression ratio Idle speed Oil temperature	Air-cooled, 4-strokes, SOHC 249.0 cm³ (15 cu.in) Forward-inclined 1-cylinder 74.0 x 58.0 mm (2.91 x 2.28 in) 9,8 : 1 1,300 ~ 1,500 r/min 70.0~90.0°C	
Fuel  Recommended fuel Full tank capacity Total (including reserve tank) Reserve	Regular Unleaded Gasoline  19.2 L (17.4 Imp.gal, 20.3 US.gal) 4.5 L (4.0 Imp.gal, 4.7 US.gal)	
Engine oil Lubrication system Recommended oil  Quantity Total amount Periodic oil change With oil filter replacement	Wet sump SAE20W40 OR SAE20W50 API service SG type or higher JASO standard MA  1.55 L (1.4 Imp.gal, 1.6 US.gal) 1.35 L (1.2 Imp.gal, 1.4 US.gal) 1.45 L (1.3 Imp.gal, 1.5 US.gal)	 
Oil filter Oil filter type Place for pressure checking	Wire mesh Drain screw on cylinder head	
Oil pump Oil pump type Inner-rotorto-outerrotor-tip clearance Outer-rotor-to-oil-pump-housing clearance Oil-pump-housing-to-inner-rotor-and- outer-rotor clearance	Trochoidal 0.15 mm (0.006 in) 0.10 ~ 0,151 mm (0.004 ~ 0.006 in) 0.04 ~ 0,09 mm (0.0016 ~ 0.0035 in)	0.20 mm (0.008 in) 0.20mm (0.008 in) 0.15 mm (0.006 in)
Cooling system Radiator core Width Height Depth	187.0 mm (7.36 in) 35.2 mm (1.38 in) 32.0 mm (1.26 in)	
Starting system type	Electric starter	
Spark plug  Model / manufacturer x quantity  Gap between electrodes	DR8EA/NGK x 1 0.6~0.7 mm (0.224 ~ 0.028 in)	



Item	Standard	Limit
Cylinder head Volume Maximum distortion *	20.50~21.50 cm³ (1.25 ~ 1.31 cu.in) 	0.03 mm (0.001 in)
Camshaft Drive system Camshaft dimensions (intake)	Chain drive (right)	
Measurement A  Measurement B  Camshaft dimensions (exhaust)	36.890~36,990 mm (1.452 ~ 1.456 in) 30.111~30,211 mm (1.185 ~ 1.189 in)	
Measurement A  Measurement B  Maximum camshaft runout	36.891~36,991 mm (1.452 ~ 1.456 in) 30.092~30,192 mm (1.185 ~1.189 in)	0.030 mm
		(0.001 in)
Timing chain  Model / number of links  Tensioning system	DID SCR-0404 SV / 104 Automatic	





Item	Standard	Limit
Rocker / Rocker shaft Rocker inner diameter Shaft outer diameter Gap between rocker and shaft	12.000~12.018 mm (0.4724 ~0.4731 in) 11.981~11.991 mm (0.4717 ~0.4721 in) 0.009~0.037 mm (0.0003 ~0.0014 in)	12.036mm (0.4739 in) 11.955mm (0.4707 in)
Valves, valve seats, valve guides  Valve clearance (cold)  Intake Exhaust  Valve dimensions	0.05~0.10 mm (0.002 ~0.004 in) 0.08~0.13 mm (0.003 ~ 0.005 in)	
"A"— Head diameter Face width	"B" Seat width Margin	"D" thickness
Diameter A Intake Exhaust	33.90~34,10 mm (1.33 ~ 1.34 in) 28.40~28,60 mm (1.11 ~ 1.12 in)	
Face width B Intake Exhaust	2.260 mm (0.089 in) 2.260 mm (0.089 in)	
Seat width C Intake Exhaust	0.90~1,10 mm (0.03 ~ 0.04 in) 0.90~1,10 mm (0.03 ~ 0.04 in)	
Diameter thickness D Intake Exhaust	0.80~1.20 mm (0.032 ~ 0.047 in) 0.80~1.20 mm (0.032 ~ 0.047 in)	
Valve stem diameter Intake	5.975~5.990 mm (0.23524 ~ 0.23583 in)	5.950 mm (0.23425 in)
Exhaust	5.960~5.975 mm (0.23464 ~ 0.23524 in)	5.935 mm (0.23366 in)
Valve guide inner diameter Intake	6.000~6.012 mm (0.23622 ~ 0.23669 in)	6.042 mm
Exhaust	6.000~6.012 mm (0.23622 ~ 0.23669 in)	(0.23787 in) 6.042 mm (0.23787 in)





Item	Standard	Limit
Valve stem clearance Intake	0.010~0.037 mm (0.0004 ~ 0.0015 in)	0.080 mm
Exhaust	0.025~0.052 mm (0.0010 ~ 0.0020 in)	(0.0032 in) 0.100 mm
Valve stem limit and runout		(0.0040 in) 0.030 mm (0.0012 in)
Valve seat width		
Intake	0.90~1.10 mm (0.03 ~0.04 in)	1.7 mm (0.0669 in)
Exhaust	0.90~1.10 mm (0.03 ~0.04 in)	(0.0669 in) 1.7 mm (0.0669 in)
Valve springs		
Free lenght (Inner) Intake	36.17 mm (1.424 in)	34.47 mm
( Inner ) Exhaust	36.17 mm (1.424 in)	(1.357 in) 34.47 mm
( Outer ) Intake	36.63 mm (1.442 in)	(1.357 in) 34.63 mm (1.363 in)
( Outer ) Exhaust	36.63 mm (1.442 in)	34.63 mm (1.363 in)
Lenght (installed valve) ( Inner ) Intake / Exhaust ( Outer ) Intake / Exhaust	30.50 mm (1.2008 in) 32.00 mm (1.2598 in)	
Compression pressure (installed) ( Inner ) Intake / Exhaust	75~91 N at 30.5 mm (7.5~9.1 kgf at 30.5 mm	
( Outer ) Intake / Exhaust	17 ~ 20.5 lbf at 1.20 in) 128.5 ~ 157.9 N at 32 mm (12.85 ~ 15.79 kgf at 32 mm 29~ 35.5 lbf at 1.26 in)	 
Spring tilt*		
( Inner / Outer ) Intake		2.5°/1.6mm
(Inner / Outer) Exhaust		(2.5°/0.063 in) 2.5°/1.6mm (2.5°/0.063 in)
Winding direction (top view) ( Inner ) Intake / Exhaust ( Outer ) Intake / Exhaust	Counterclockwise Clockwise	





Item	Standard	Limit
Cylinder Cylinder arrangement Bore Taper Out of round	Forward inclined 1-cylinder 74.000 ~ 74.016 mm (2.913 ~ 2.914 in)	74.10 mm (2.917 in) 0.05 mm (0.002 in) 0.05 mm (0.002 in)
Piston Piston-to-cylinder clearance Diameter D	0.010~0.025 mm (0.0004 ~ 0.0010 in) 73.983~73.998 mm (2.9127 ~ 2.9133 in)	0.15mm (0.006 in) 
Height H Offset Offset direction Piston pin bore (in the piston) Diameter	5.0 mm (0.20 in) 0.50 mm 0.020 in) Intake side 17.002~17.013 mm (0.6694 ~ 0.6698 in)	  17.043 mm (0.6709 in)
Piston pin Outside diameter  Piston rings Top ring	16.991~17.000 mm (0.6689 ~0.6692 in)	16.97mm (0.6681 in)
Ring type Dimensions (B x T) End gap (installed) Ring side clearance	Barrel 0.90 x 2.75 mm (0.0354 x 0.1083 in) 0.19~0.31 mm (0.0075 x 0.0122 in) 0.030~0.065 mm (0.0011 ~ 0.0026 in)	0.60mm (0.0236 in)
g : 5.00a.a		(0.004 in)

Item	Standard	Limit	
2nd ring  T  Ring type	Taper		
Dimensions (B x T) End gap (installed) Ring side clearance	0.80 x 2.80 mm (0.0315 x 0.1102 in) 0.30-0.45 mm (0.0118 ~ 0.0177 in) 0.020-0.055 mm (0.0008 ~ 0.0022 in)	0.60mm (0.0236 in) 0.10mm	
Oil ring		(0.004 in)	
Dimensions (B x T) End gap (installed)	1.50 x 2.60 mm (0.0590 x 0.1024 in) 0.10-0.35 mm (0.004 ~0.0137 in)		
Crankshaft			
Width A Maximum runout C	69.25 ~69.30 mm (2.7264 ~2.7283 in) 	 0.03 mm (0.0012 in)	
Big end side clearance D	0.350 ~ 0.650mm (0.013 ~ 0.026 in)		
Balancer Balancer drive method	Gear		





Item	Standard	Limit	
Clutch Clutch type Clutch release method	Wet, multiple discs Inner push, cam push		
Clutch cable free play (at the end of clutch lever) Friction plate Thickness	Left hand 10.0 ~ 15.0mm (0.4~0.6 in) 2.90 ~ 3.10 mm (0.11 ~0.12 in)	 2.80mm	
Number of discs	6 pcs (1pc+4pcs+1pc)	(0.11 in)	
Clutch plate Thickness Number of discs Maximum warpage	1.50 ~1.70 mm (0.060 ~ 0.067 in) 5 pcs	0.20 mm (0.079 in)	
Clutch spring Free lenght  Number of springs	41.60 mm (1.64 in) 4	39.60 mm (1.56 in)	
Transmission  Transmission type Primary reduction system Primary reduction ratio Secondary reduction system Secondary reduction ratio Operation Gear ratio 1st 2nd 3rd 4th 5th Max. main axle runout Max. drive axle runout	Constant mesh, 5 speed Spur gear 74/24 (3.083) Chain drive 44/15 (2,933) Left foot 36/14 (2.571) 32/19 (1.684) 28/22 (1.273) 26/25 (1.040) 23/27 (0.852)	    0.08mm (0.031 in) 0.08mm (0.031 in)	
Shifting mechanism  Shift mechanism type Shift fork thickness	Shift drum and guide bar 4.76 ~ 4.89 mm (0.18 ~ 0.19 in)		



Item	Standard	Limit
Air filter Air filter element	Wet element	
Fuel pump Type of pump Model / manufacturer Amperage consumption <maximum> Output pressure  Fuel injector Model / manufacturer Quantity</maximum>	Electrical 5VK/DENSO 3,5 A 250 kPa (1875.2 mmHg, 73.825 inHg)	 
Throttle body  Model / manufacturer / quantity Identification mark  Throttle cable free play (at the throttle flange)	33EHS-3D01 / MIKUNI /1 5D11 00 3.0 ~ 5.0 mm (0.12 ~0.20 in)	



Item	Standard	Limit
Frame Frame type Caster angle Trail	Steel double cradle 26.5° 104.5 mm (4.1142 in)	
Front wheel Wheel type Rim Size	Cast wheel  17M/C X MT2.15	
Material Wheel travel	Aluminium 120.0 mm (4.7244 in)	
Rim runout Maximum radial runout  Maximum lateral runout  Axle bending limit	 	1.00mm (0.04 in) 0.50mm (0.02 in) 0.25mm (0.001 in)
Rear wheel Wheel type Rim Size	Cast wheel 17M/C X MT3.00	
Material Wheel travel	Aluminium 120.0 mm (4.7244 in)	
Runout Maximum radial runout  Maximum lateral runout  Axle bending limit		1.00mm (0.04 in) 0.50mm (0.02 in) 0.25mm (0.001 in)



Item	Standard	Limit
Front tire Tire type Size Model / manufacturer Tire pressure (cold) 0 ~ 90kg (0 ~ 198 lb) 90kg - Maximum load* (198lb - Maximum load)	Tubeless 100/80-17M/C 52S SPORT DEMON / PIRELLI  225 kPa (2.25 kgf/cm², 33 psi) 225 kPa (2.25 kgf/cm², 33 psi)  *Load is total weight of cargo, rider, passenger and accessories.	
Minimum thread depth		0.9 mm (0.03 in)
Rear tire Tire type Size Model / manufacturer Tire pressure (cold) 0 ~ 90kg (0 ~ 198 lb) 90Kg - Maximum load* (198lb - Maximum load)	Tubeless 130/70-17M/C 62S SPORT DEMON / PIRELLI  250 kPa (2.50 kgf/cm², 36 psi) 250 kPa (2.50 kgf/cm², 36 psi)  *Load is total weight of cargo, rider, passenger and accessories.	
Minimum thread depth		0.9 mm (0.03 in)
Front brake Brake type Operation Recommended fluid Brake discs Diameter x thickness Minimum thickness Maximum deflection Pad thickness inner Pad thickness outer Master cylinder inside diameter Calipers cylinder inside diameter	Single disc brake Right hand DOT 4  282 x 4.0 mm (11 x 0.16 in)  5.2 mm (0.20 in)  5.2 mm (0.20 in)  11.0mm (0.43 in) 25.4mm x 2 (1 in x 2)	3.50mm (0.14 in) 0.10mm (0.004in) 1.50mm (0.06 in) 1.50mm (0.06 in)



Item	Standard	Limit
Rear brake Brake type Operation Brake pedal position (below the rider footrest) Brake pedal free play Rear drum brake Drum brake type	Drum brake Right foot 29.0 mm (1.14 in)  15.0 ~ 20.0 mm (0.6 ~ 0.8 in)  Leading trailing	
Drum inside diameter  Brake drum lining thickness  Shoe spring free length	130.0 mm (5.12 in) 4.0 mm (0.16 in) 52.0 mm (2.04 in)	
Steering Steering bearing type Stopper angle (left) Stopper angle (right)	Angular bearing 39.0° 39.0°	
Front suspension Suspension type Front fork type Front fork travel Spring Free lenght Installed lenght Spring force (K1) Spring stroke (K1)	Telescopic fork Coil spring / Oil damper 120.0 mm (4.72 in)  480.4 mm (18.9 in) 462.4mm (18.2 in) 6.37 N/mm (0.637 kgf/mm, 35.72 lb/in) 0 ~120.0 mm (0 ~4.72 in)	 470.80mm (18.5 in) 
Optional spring available Inner tube outer diameter Fork oil Recommended coil Amount (Each front staff)	No 37.0 mm (1.45 in) Fork oil 10W or equivalent 0.319 L (0.07 Imp.qt, 0.08 US.qt)	
Level (from the top of inner tube, and the tube fully compressed without the spring)	123.0 mm (4.8 in)	



54.0 11111 (2.13 111)	
183.4 mm (7.22 in)	
168.4mm (6.63 in)	
0 ~ 54.0 mm (0 ~ 2.13 in)	
No	
INO	
	1.00mm (0.04 in) 0.70mm (0.027 in)
428V / DAIDO 132 25.0 ~ 35.0mm (0.98 ~1.38 in) 191.5 mm (7.54 in)	
	168.4mm (6.63 in) 98.1N/mm (9.81 kgf/mm, 550 lb/in) 0 ~ 54.0 mm (0 ~ 2.13 in)  No  428V / DAIDO 132 25.0 ~ 35.0mm (0.98 ~1.38 in)

## **ELECTRICAL SPECIFICATIONS**

SPEC U

### **ELECTRICAL SPECIFICATIONS**

Item	Standard	Limit
System voltage	12V	
Ignition system Ignition system type Ignition timing (BTDC) Advancer type Pickup coil resistance  Engine control unit Model / ECU manufacturer	Transistorized ignition coil (digital) 10.0 degrees / 1.400 r/min Digital 192 ~ 288 Ω at 20 °C (68 °F) Blue / yellow - green AZ112100-6110 / DENSO	
Ignition coil  Model / manufacturer  Minimum ignition spark gap  Primary coil resistance  Secondary coil resistance	2JN / YAMAHA 6.0mm (0.24 in) 2.16 ~ 2.64 Ω at 20 °C (68 °F) 8.64 ~ 12.96 KΩ+-20 % at 20 °C (68 °F)	
Spark plug cap Material Resistance	Resin 5.0 k Ω at 20°C (68°F)	
Charging system System type Model / manufacturer Standard output Charging coil resistance	A.C. magneto TLLZ79 / DENSO 14.0V 200W 5,000 r/min 0,42 $\sim$ 0,62 $\Omega$ at 20°C (68°F) white-white	
Rectifier/regulator Regulator type Regulated voltage (DC) Rectifier capacity Withstand voltage	Semiconductor, short circuit 14.1 ~ 14.9 V 25 A 200.0 V	
Battery Type / battery manufacturer Voltage capacity Specific gravity 10 hours amperage rate	YTX7L-BS / GS YuASA 12 V, 6,0 Ah 1.320 0.60 A	
Headlight bulb	Halogen bulb	
Indicator lights (voltage/wattage x quantity) Neutral indicator light High beam indicator light Turn signal indicator light Engine trouble warning light	14 V, 1,4 W x 1 14 V, 1,4 W x 1 14 V, 1,4 W x 2 LED	
Bulbs (voltage x wattage x quantity) Headlight Tail / brake light Front turn signal Rear turn signal Auxiliary light Panel lighting	12 V x 35 W / 35 W x 1 12 V x 5 W / 21 W x 1 12 V x 10 W x 2 12 V x 10 W x 2 12 V x 5 W x 1 14 V x 2 W x 2	

## **ELECTRICAL SPECIFICATIONS**



Item	Standard	Limit
Electric starting system System type	Constant mesh	
Starter motor Model / manufacturer Power output	SM13/MITSUBA DO BRAZIL LTDA 0.65 kW	
Armature coil resistance Brushes	0.0012~0.0022 Ω at 20°C (68°F)	
Overall length	12.5 mm (0.5 in)	4.00mm (0.16 in)
Spring force	7.65 ~ 10.01 N (780 ~ 1021 gf, 28 ~ 36 oz)	
Commutator diameter	28.0mm (1.1 in)	27.00mm (1.063 in)
Mica undercut	0.70mm (0.028 in)	
Starter relay Model / manufacturer	MS5F-721/JIDECO	
Maximum amperage	20.0 A	
Coil resistance	4.18 ~ 4.62 at 20°C (68°F)	
Horn Horn type Model / manufacurer x quantity Maximum amperage Performance	Plane 1532D2911000 / LOCAL MADE x 1 3.5 A 105~115 dB/2m	
Turn signal relay Relay type Model / manufacturer Self-canceling device built-in Frequency	Fully transistorized 05 0150 00 / KOSTAL No 60 ~ 120 times / minute	
Temperature sensor  Model / manufacturer  Resistance at 80°C  Resistance at 100°C	1S4 / MIKUNI 1,569.0~1,945.0 Ω 902.5~1,142.0 Ω	 
Fuses ( amperage x quantity )  Main fuse Signaling system fuse Headlight fuse Ignition fuse Backup fuse ( panel ) Reserve fuse Reserve fuse	20 A x 1 10 A x 1 10 A x 1 10 A x 1 10 A x 1 20 A x 1	   

### CONVERSION TABLE / GENERAL TIGHTENING TORQUE SPECIFICATIONS

SPEC



### **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.

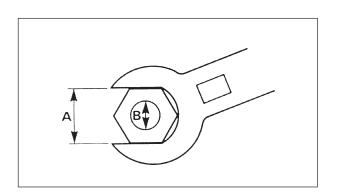
Ex.

## GENERAL TIGHTENING TORQUE SPECIFICATIONS

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening 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 pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.

#### **CONVERSION TABLE**

METRIC TO IMPERIAL				
	Metric unit Multiplier Imperial uni			
Tighten- ing torque	m•kg m•kg cm•kg cm•kg	7.233 86.794 0.0723 0.8679	ft•lb in•lb ft•lb in•lb	
Weight	kg g	2.205 0.03527	lb oz	
Speed	km/hr	0.6214	mph	
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	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.)	
Misc.	kg/mm kg/cm <sup>2</sup> Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in <sup>2</sup> ) Fahrenheit (°F)	



A: Distance between flats

B: Outside thread diameter

A	АВ		General tightening torque		
(Nut)	(Bolt)	N.m	kgf.m	ft.lb	
10 mm	6 mm	6	0.6	4.3	
12 mm	8 mm	15	1.5	11	
14 mm	10 mm	30	3.0	22	
17 mm	12 mm	55	5.5	40	
19 mm	14 mm	85	8.5	61	
22 mm	16 mm	130	13.0	94	





### **TIGHTENING TORQUES**

### **ENGINE TIGHTENING TORQUES**

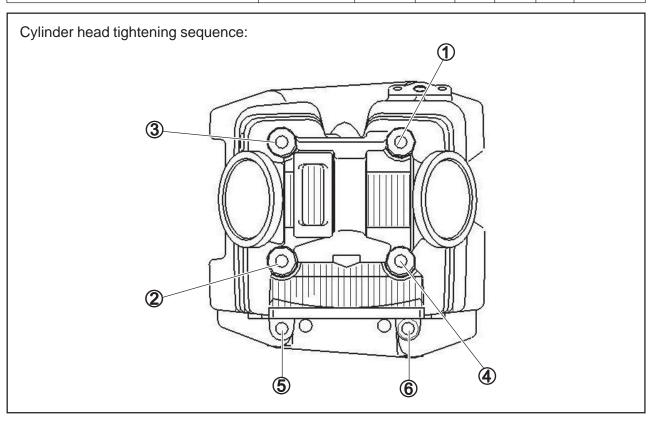
Part to be tightened	Part name	Thread size	Qty	Tightening torque			Remarks
				N.m	kgf.m	ft.lb	Remarks
Clutch push lever	Bolt	M8	1	12	1.2	8.9	
Gearshift cam selector stopper	Bolt	M6	1	10	1.0	7.2	-  🕒
Clutch cable holder	Bolt	M6	1	10	1.0	7.2	
Neutral switch	Sensor	M10	1	20	2.0	14	
Crankcase oil drain screw	Plug	M12	1	20	2.0	14	
Speed sensor	Bolt	M6	1	10	1.0	7.2	
Oil pump	Bolt	M6	3	7.0	0.7	5.1	
Drive chain guide	Bolt	M6	2	8.0	0.8	5.9	-I ( <del>-</del> )
Secondary shaft bearing plate	Bolt	M6	1	10	1.0	7.2	
Valve clearance adjuster	Nut	M6	2	14	1.4	10.3	
Oil timing tube (cylinder side)	Bolt	M8	1	17	1.7	12.5	
Drive shaft sprocket cover	Bolt	M6	2	10	1.0	7.2	
One way starting gear	Bolt	M8	3	30	3.0	22	-1 🕞
Stator assembly	Bolt	M6	3	10	1.0	7.2	-1 😉
Pulse coil holder	Bolt	M5	2	7.0	0.7	5.1	
Stator assembly wire harness holder	Bolt	M5	1	7.0	0.7	5.1	-  🗗
Crankshaft (timing display)	Plug	M32	1	4.0	0.4	2.9	
Magneto rotor (timing display)	Plug	M14	1	4.0	0.4	2.9	
Oil hose to radiator	Bolt	M6	4	10	1.0	7.2	
Radiator side brackets	Bolt	M6	2	7.0	0.7	5.1	
Injection body clamp	Bolt	M4	1	2.0	0.2	1.4	
Drive shaft mounting plate	Bolt	M6	2	10	1.0	7.2	-  😉
Temperature	Sensor	M8	1	9.0	0.9	6.6	
Injection body junction	Bolt	M6	2	10	1.0	7.2	
Exhaust tube to cylinder head	Stud	M8	2	15	1.5	11	
A.I. System tube	Bolt	M6	2	10	1.0	7.2	
Spark plug	Bolt	M12	1	18	1.8	13.3	_
Springs / Clutch housing pressure plate	Bolt	M6	4	8.0	0.8	5.9	— <b>d</b> Use new
Primary clutch	Nut	M16	1	75	7.5	55	lock washer
5.	N					40.5	<b>—</b> @
Balancer gear	Nut	M12	1	55	5.5	40.5	Use new lock washer
Oil flands and the	Dalt	N.40		7.0	0.7	- A	<b>⊸</b> @
Oil flow screw	Bolt	M6	1	7.0	0.7	5.1	
Cylinder (drive side)	Do!t	N 40		10	40	7.0	
L = 65mm	Bolt	M6	2	10	1.0 11.0	7.2	Use new
Transmission chain sprocket	Nut	M18	'	110	11.0	81	lock washer
Right side cover	Pol+	Me	1	10	1.0	7.2	
L = 55mm	Bolt	M6	1 3	10	1.0	7.2 7.2	
L = 50mm	Bolt	M7	1	1		7.2 7.2	
L = 35mm L = 25mm	Bolt Bolt	M8 M9	1 8	10 10	1.0 1.0	7.2 7.2	
L – 20111111	DOIL	IVIS		10	1.0	1.2	

## TIGHTENING TORQUE





Part to be mounted	Part name	Thread size	Qty	Tightening torque			
rait to be inculted				N.m	kgf.m	ft.lb	Remarks
Oil filter cap							
L = 70mm	Bolt	M6	1	10	1.0	7.2	
L = 20mm	Bolt	M6	2	10	1.0	7.2	
Cylinder head (drive side)							
L = 45mm	Bolt	M8	2	20	2.0	14	<b>—</b> (0)
L = 117mm	Bolt	M8	4	22	2.2	16	<b>—</b>   <b>•</b>
Starting motor	Bolt	M6	2	10	1.0	7.2	
Magneto rotor	Bolt	M10	1	60	6.0	44	<b>—</b>   <b>•</b>
Oil timing tube (right case)	Bolt	M10	1	20	2.0	14	
Synchronism chain sprocket	Bolt	M10	1	60	6.0	44	
Drive chain puller	Bolt	M6	2	10	1.0	7.2	
Drive chain puller (inner)	Bolt	M6	1	7.5	0.75	5.5	
Left side cover							
L = 50mm	Bolt	M6	1	10	1.0	7.2	
L = 45mm	Bolt	M7	3	10	1.0	7.2	
L = 30mm	Bolt	M8	5	10	1.0	7.2	
Gear cap (starting motor)	Bolt	M6	3	10	1.0	7.2	
Oil hose on engine	Bolt	M6	2	10	1.0	7.2	
Engine cases							
L = 60mm	Bolt	M6	2	10	1.0	7.2	
L = 70mm	Bolt	M6	3	10	1.0	7.2	
L = 45mm	Bolt	M6	4	10	1.0	7.2	
L = 55mm	Bolt	M6	3	10	1.0	7.2	
Air filter box cover	Bolt	M6	4	2.0	0.2	1.4	
Exhaust pipe and cylinder	Nut	M8	2	20	2.0	14	
Exhaust and central connection (footrest)	Bolt	M10	2	20	2.0	14	
Exhaust and footrest bracket (back)	Bolt	M10	1	40	4.0	30	
Exhaust guard screw	Bolt	M6	5	8.0	0.8	5.9	



# TIGHTENING TORQUE



## CHASSIS TIGHTENING TORQUE

Part to be mounted	Part name	Thread	Qty	Tighte	ening t	orque	Remarks	
Fait to be induited	Part name	size	Qty	N.m	kgf.m	ft.lb	1 Ciliai N3	
Locknut of transmission chain								
clearance adjusters	Nut	M8	2	16	1.6	11.8		
Rear grab bar	Bolt	M8	4	30	3.0	22.0		
Shock absorber and chassis	Bolt	M12	1	58	5.8	42.8	LS)	
Fuel tank dumper	Bolt	M6	1	10	1.0	7.2		
Sidestand	Nut	M10	1	43	4.3	31.7		
Clutch pedal knuckle	Bolt	M6	1	8.0	0.8	5.9		
Rear arm and relay connector rod	Bolt	M12	1	58	5.8	42.8	(LS)	
Recoil bar and rear arm	Nut	M10	1	49	4.9	36.0		
Head light optical block	Bolt	M8	2	7.0	0.7	5.1		
Ignition coil	Nut	M6	2	7.0	0.7	5.1		
Relay arm and dumper	Bolt	M12	1	58	5.8	42.8	LS .	
Relay arm and chassis	Bolt	M12	i	58	5.8	42.8	<b>(</b> )	
Horn	Bolt	M6	1	7.0	0.7	5.1		
Starting relay cables	Bolt	M6	2	7.0	0.7	5.1		
Air cleaner box and chassis	Bolt	M6	2	65	6.5	47.9		
Chassis and engine bracket	Nut	M10	6	30	3.0	22.0		
Ignition key	Bolt	M6	2	7.0	0.7	5.1		
Steering head pipe ( 1. torque )	Nut	M25	1	52	5.2	38.4	See	
Steering head pipe ( 2. torque )	Nut	M25	1	18	1.8	13.3	NOTE	
Transmission sprocket and rear	1 101	11120		.		10.0		
wheel hub	Nut	M8	6	43	4.3	31.7		
Brake disc and front wheel hub	Bolt	M8	5	23	2.3	17.0		
Front wheel axle	Bolt	M14	1	59	5.9	43.0	-  G	
Rear wheel axle	Nut	M16		104	10.4	76.7		
Head lamp assembly	Bolt	M5	2	3.5	0.3	2.6		
	Bolt	M8	4		2.3	16.9		
Handle bar top holder Relay and arm relay connector rod	Bolt	M12	1 1	23 58	5.8	42.8		
Rear brake switch	Bolt	M5	2	4.0	0.4	3.0		
Brake lever and handle bar	Bolt	M6	2	10	1.0	7.2		
Steering stem and front fork	Bolt	M10	2	30	3.0	22.0		
	Nut	M22	1	110	11.0	81.1		
Steering stem upper bracket Steering stem upper bracket and	INUL	IVIZZ	'	110	11.0	01.1		
front fork	Bolt	M8	2	25	2.5	18.4		
	Bolt	M10	5		6.5	48.0		
Engine and chassis Front fender	Bolt	M6	4	65 7.0	0.7	5.1		
					1			
Fender and chain guard	Bolt	M6	4	11	1.1	8.0		
Clutch pedal and rear footrest bracket	Bolt	M8	1	30	3.0	22		

# TIGHTENING TORQUE



Part to be mounted	Part name	Thread	Qty	Tightening torque		Remarks	
		size		N.m	kgf.m	ft.lb	
Fork and break calipers	Bolt	M8	2	30	3.0	22	
Chassis and oil radiator	Bolt	M6	2	1.0	0.1	0.7	
Rectifier regulator	Bolt	M6	2	7.0	0.7	5.1	
Break calipers bleeder	Bolt	M8	1	6.0	0.6	4.4	
Leaning angle shutoff sensor	Bolt	M4	2	2.0	0.2	1.4	
Turn signal lamps	Nut	M8	4	1.5	0.15	1.1	
Brake light bracket	Bolt	M6	3	7.0	0.7	5.1	
License plate bracket	Bolt	M6	4	11	1.1	8.0	
Brake hose bracket	Bolt	M6	1	25	2.5	18.5	
Front axle bracket	Bolt	M8	1	54	5.4	40	
Chassis and footrest bracket	Bolt	M8	4	23	2.3	17	
Sprocket cover	Bolt	M6	3	10	1.0	7.2	
Side cover	Bolt	M5	4	7.0	0.7	5.1	
Handle bar terminal	Bolt	M6	2	4.0	0.4	3.0	
Seat lock	Bolt	M6	2	7.0	0.7	5.1	
Air induction valve A.I.System	Bolt	M6	2	7.0	0.7	5.1	

#### NOTE:\_

- 1. First, using the **Torque wrench**, apply a torque of **52 N.m (5.2 kgf.m, 38.4 ft.lb)** on the lower ring nut of the steering head pipe. After doing so, fully loosen the ring nut.
- 2. Retighten the lower ring nut, using the **Torque wrench** once again, and apply the final torque of **18 N.m (1.8 kgf.m, 13.3 ft.lb)**.





# LUBRICATION POINTS AND LUBRICANT TYPES ENGINE

Lubrication Point	Symbol
Oil seals lips	-430-1
O-rings	
Bearings	<b>-</b> - <b> </b> €
Cylinder head mounting bolts	IE
Cylinder mounting bolts	<b>⊸</b> (€
Crankshaft pin	<b>-</b> - <b> </b> €
Drive chain inner surface	
Connecting rod (bottom)	IE
Piston pin	- <b>√</b> (E)
Piston ring groove	IB
Balancer mounting nut	- <b>-</b>  €
AC magneto rotor mounting bolt	- <b>-</b>  €
Valve stems (intake and exhaust)	—-IM
Valve stem ends (intake and exhaust)	IM
Balancer shaft	<b>-</b>  €
Drive shaft cams	
Oil pump rotor (inner and outer)	<b> </b> €
Oil bump shaft	<b>⊸</b> (E
Clutch gear (inner and outer)	IE
Clutch assembly	- <b>√</b> (E)
Primary clutch mounting nut	
Primary clutch	IB
Clutch hub mounting nut	IE
Driving rod	
Transmission gears (sprocket and pinion)	100
Driving main shaft	
Gearshift forks	<b>√</b> (E)
Gearshift cam	<b> </b> [E]
Forks shaft	IE
Speed sensor (O-rings)	
Crankcase mating surface	Yamaha Bond N° 1215
A.C. magneto wireharness grommer (A.C. magneto cover)	Yamaha Bond N° 1215
Oil timing pipe mounting bolt	Yamaha Bond N° 1215

# LUBRICATION POINTS AND LUBRICANT TYPES



## **CHASSIS**

Lubrication Points	Symbol
Front wheel oil seal lips (left and right)	
Rear wheel oil seal lips (left and right)	
Rear wheel drive hub mating surface	
Pivot shaft of swingarm and oil seals	
Boot surfaces	LS
Damper and rear arm screw	
Damper and swingarm oil seal lips	
Relay arm and rear arm screw	
Relay arm and rear arm seal lips	
Connector rod and rear arm screw	
Connector rod and rear arm seal lips	-(3)
Brake pedal outer surface	
Steering head pipe bearings (upper and lower)	
Guide inner surface (of throttle cable)	LS
Clutch lever screw surface	
Side rest mating surface	- (8)
Main pedal pivot	
Pedal spring end	
Rear axle outer surface	
Passenger pedal pivot	-LS
Caliper piston seal	-69
Rubber parts inside the master cylinder	
Caliper piston dust seal	-(5)
Brake lever retaining bolt	-034
Sliding area between brake lever and master cylinder	<b>(3)</b>
Caliper bracket slide pins and/or retaing bolts	<b>-49</b>

# **OIL COOLING SYSTEM DIAGRAM**

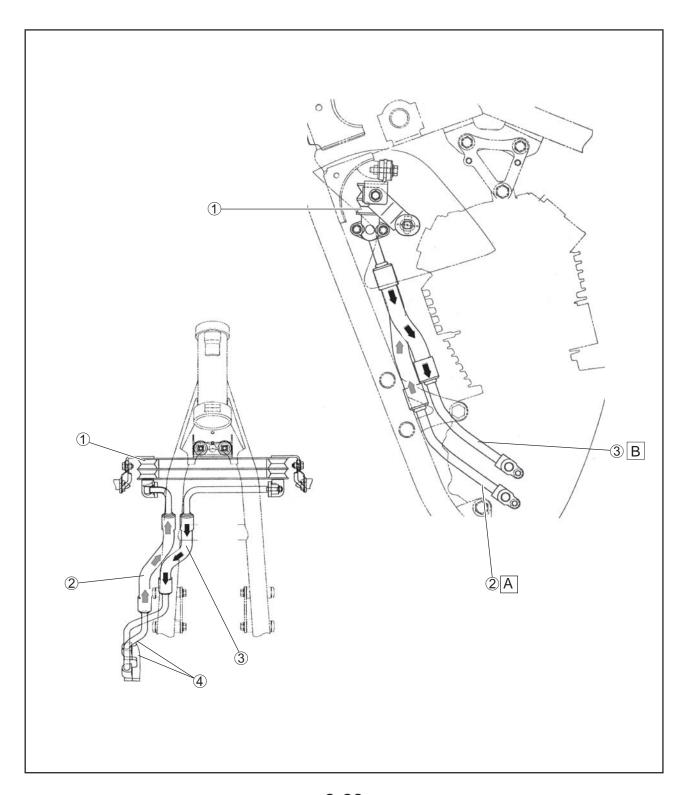


# **OIL COOLING SYSTEM DIAGRAM**

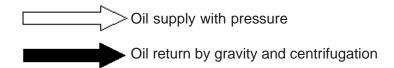
- 1 Radiator
- ② Oil inlet hose
- 3 Oil outlet hose
- 4 Seal rings "O-rings"

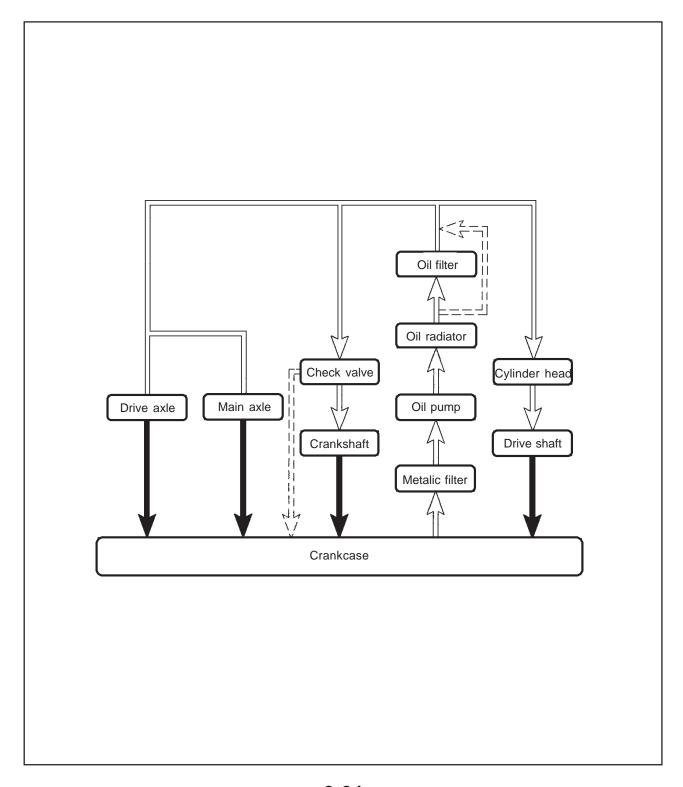
- A Hot oil inlet
- **B** Cooled oil outlet





## **LUBRICATION FLOW**



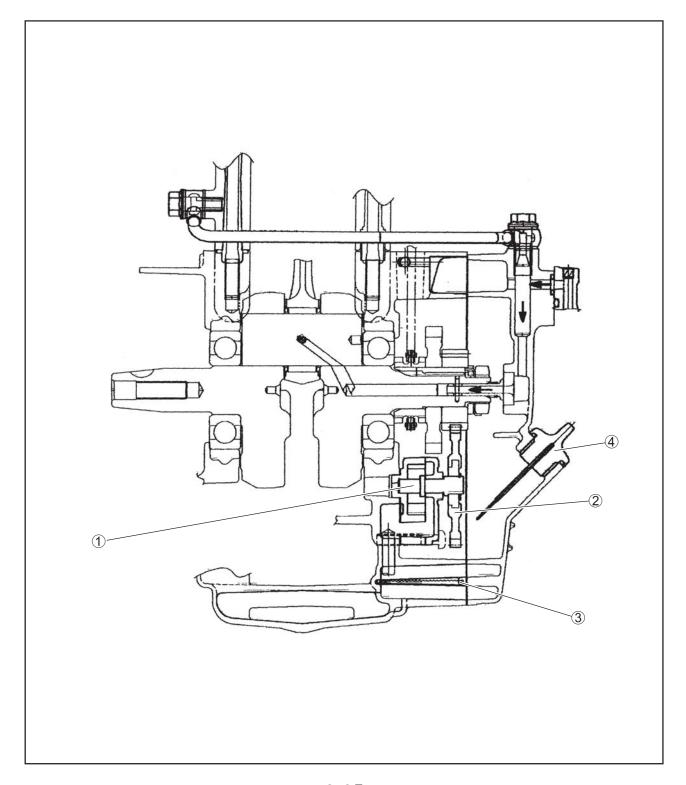


# LUBRICATION SYSTEM DIAGRAMS



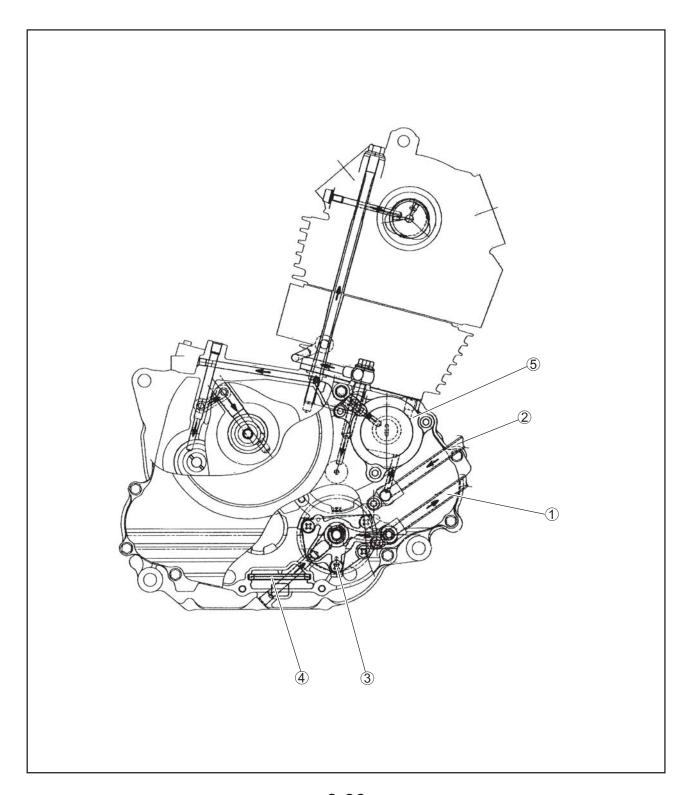
# **LUBRICATION SYSTEM DIAGRAMS**

- ① Oil pump
- 2 Pump driving gear3 Strainer (oil sub-filter)
- 4 Oil level gauge



# LUBRICATION SYSTEM DIAGRAMS

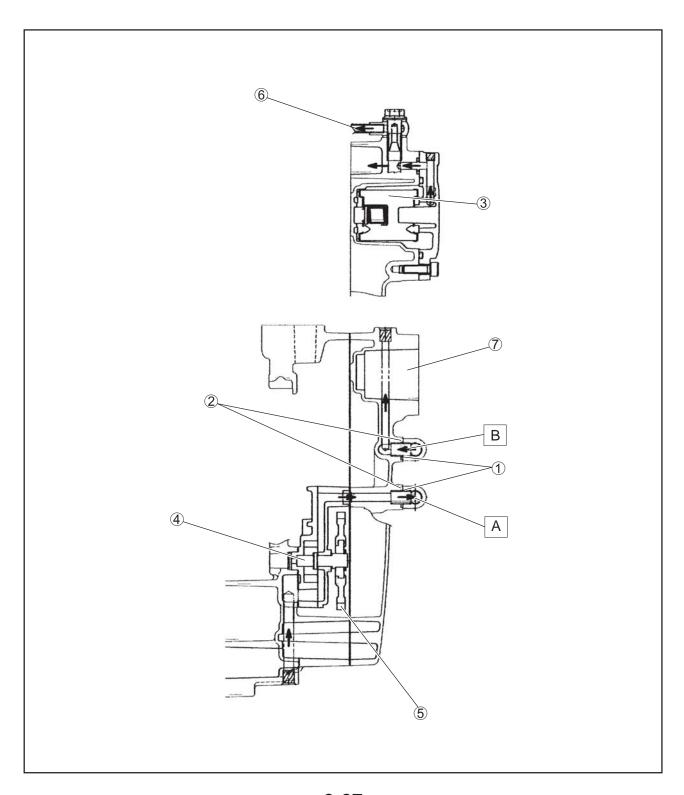
- Oil delivery hose
   Oil return hose
- ③ Oil pump
- 4 Strainer (oil sub-filter)
- ⑤ Oil filter



# **LUBRICATION SYSTEM DIAGRAMS**

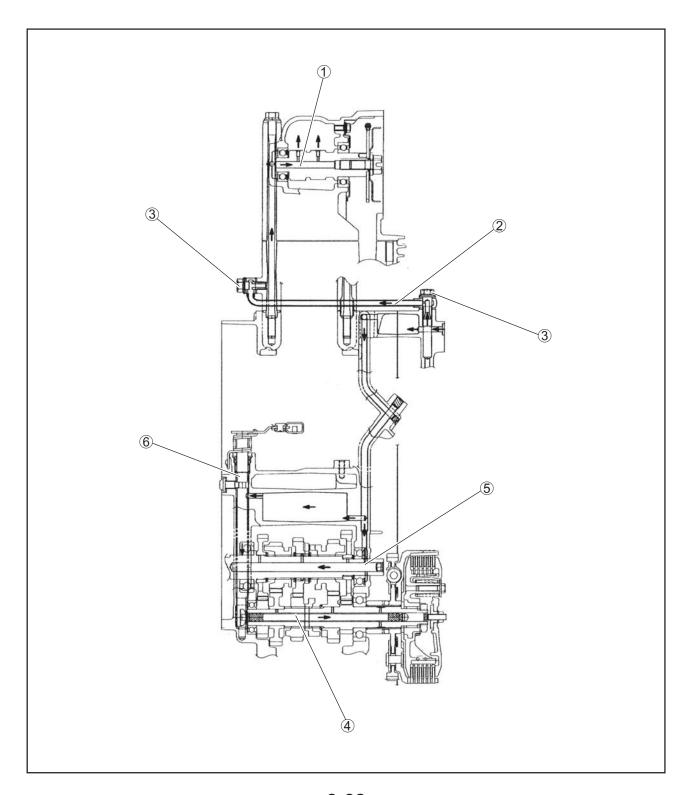
- ① Guide pins
- ② Seal rings "O-rings"
- 3 Oil filter
- 4 Oil pump rotor 1
- 5 Oil pump driving gear
- 6 Oil timing tube
- ⑦ Oil filter housing

- A Arrow indicates direction to the oil radiator
- B Arrow indicates direction from the oil radiator



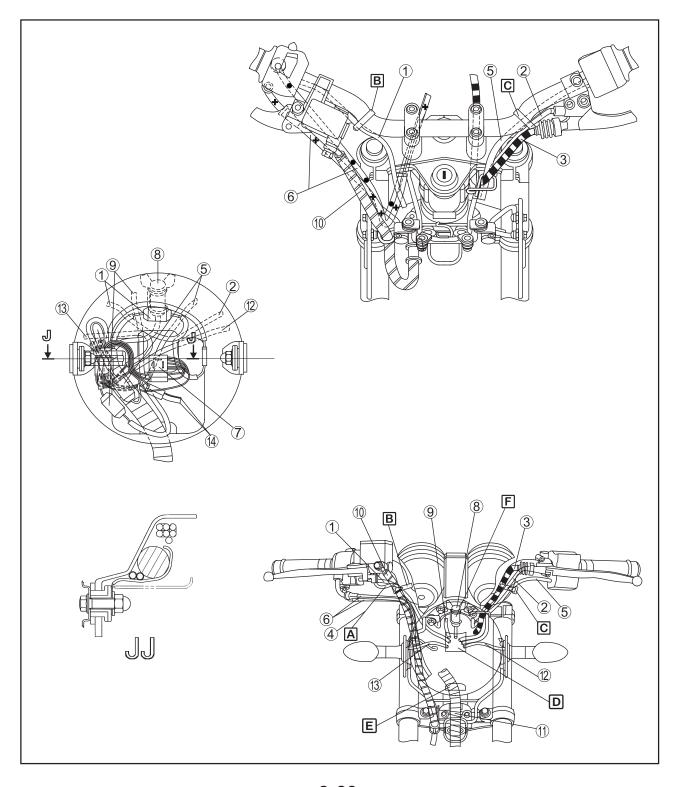


- ① Valve driving shaft
- ② Oil timing tube
- ③ Screw gasket
- 4 Main axle
- ⑤ Drive axle
- 6 Clutch lever rod



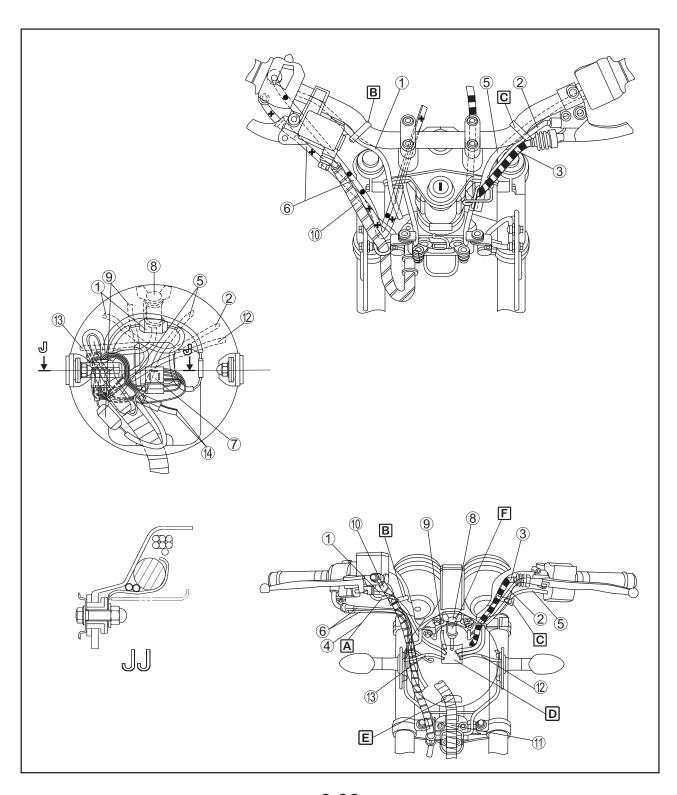
- ① Handlebar switch wire harness (RS)
- 2 Clutch switch wire harness
- 3 Clutch cable
- 4 Front brake switch wire harness
- ⑤ Handlebar switch wire harness (LS)
- 6 Throttle cables
- Headlight connector

- 8 Instruments panel wireharness
- 9 Ignition key wireharness
- 10 Brake hose
- 11) Main wire harness
- 12 Front flasher wire harness (RS)
- Tront flasher wire harness (LS)
- Auxiliary light wire harness





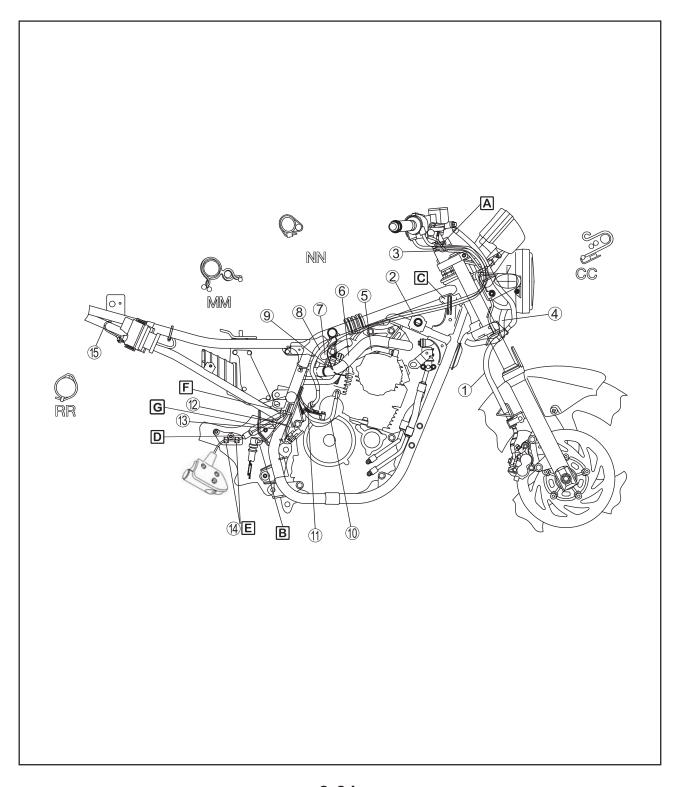
- A When fastening the wire harness, of the front break switch let a clearance at the shown area.
- B Fasten the brake switch (front) and the handlebar switch wire harness (RS) with a band. Place the band end forward.
- Tasten the handlebar switch wire harness (LS) and the clutch switch wire harness with a band. Place the band end forward.
- D Put inside the headlight box the wire harnesses of the instruments panel, ignition key, handlebar switches (LS and RS) and the front turn indication lights (left and right).
- Pass the wireharness through the lower hole.
- F Route the meter lead wire through the headlight bracket stay guide.





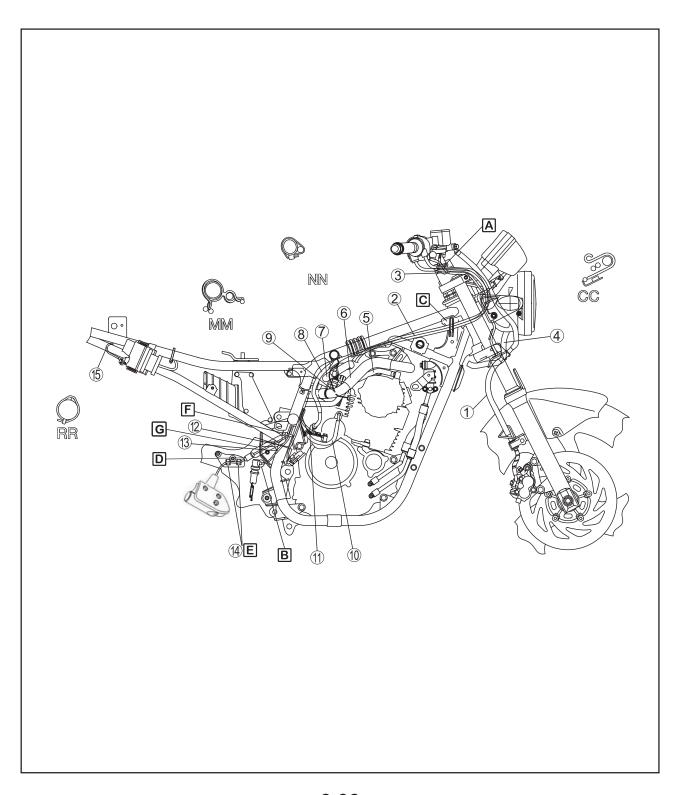
- ① Brake hose
- 2 Throttle cable
- 3 Handlebar switch wire harness (RS)
- 4 Main wire harness
- 5 Engine breather hose
- 6 Air induction valve hose
- 7 Fuel supply hose

- 8 Clutch cable
- 9 Temperature sensor wire harness
- 10 Starter motor cable
- ① Grounding cable (negative)
- ② Speed sensor wire harness
- (3) Rear brake switch wire harness
- (4) O<sub>2</sub> sensor wire harness
- (5) Grounding wire harness





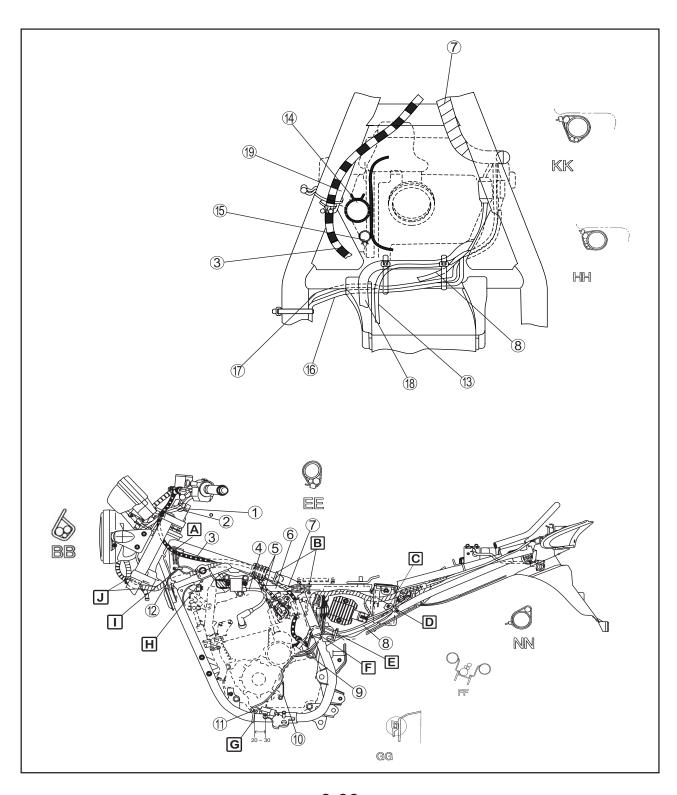
- a plastic band.
- B Taking out lead wire shall be in front of the vehicle.
- C Route the two throttle cables through the inside portion of the bracket.
- D O<sub>2</sub> sensor conector shall be in front of the bracket cable.
- $oxed{A}$  Fasten the wire harness switch to the handlebar with  $oxed{E}$   $O_2$  sensor lead wire shall be through cable bracket guide.
  - F Fix the rear brake switch wire harness and the O<sub>2</sub> sensor wire harness to the chassis with a plastic
  - G No slack of lead wire in this region.





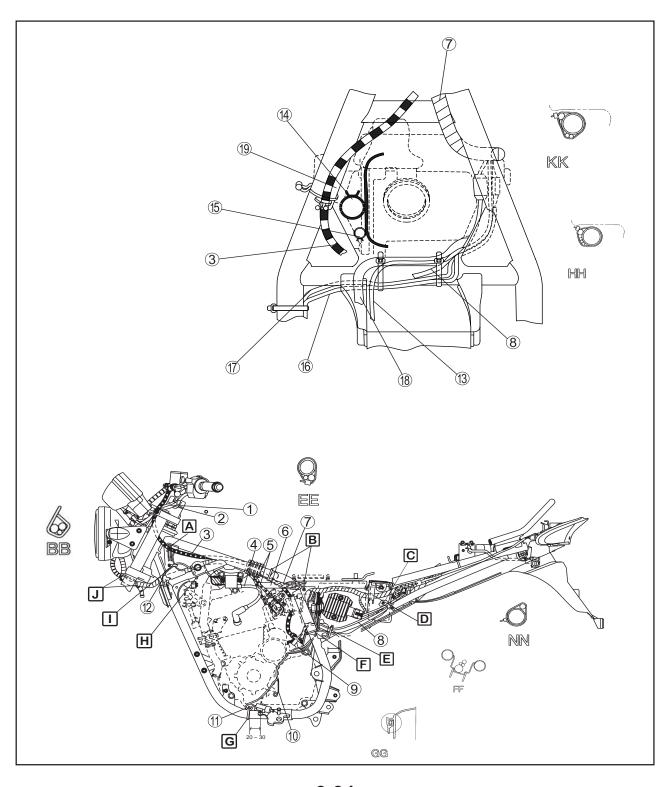
- 1 Left handlebar switch wire harness
- 2 Clutch switch wire harness
- 3 Clutch cable
- 4 High voltage cable
- ⑤ Throttle cables
- 6 Fuel supply hose
- 7 Main wire harness
- 8 Grounding cable (negative)
- 9 Stator wire harness
- 10 Neutral switch wire

- Sidestand switch wire harness
- Horn wire harness
- Speed sensor wire harness
- (14) Air induction hose
- (5) Engine breather hose
- 16 Rear brake switch wire harness
- ① O<sub>2</sub> sensor wire harness
- ® Starter cable
- 19 Heat sensor wire harness



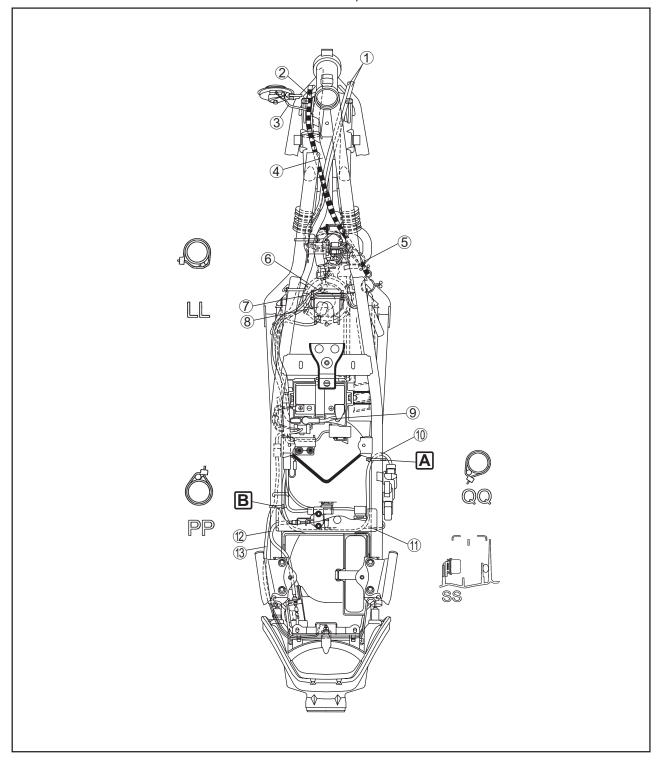


- A Pass the clutch cable through the guide.
- B Clamp wire harness.
- C Cover side wire harness should not be bent.
  D Wire harness through battery box guide.
- E Starter motor lead clamp and negative battery lead clamp.
- F Fix the sidestand switch, neutral switch and stator wire harness with a plastic band.
- G Clamp sidestand switch lead wire to pipe.
- H Clamp wire harness to pipe.
- L Clamp horn lead wire to chassi.
- J Route wire harness through headlight stay.



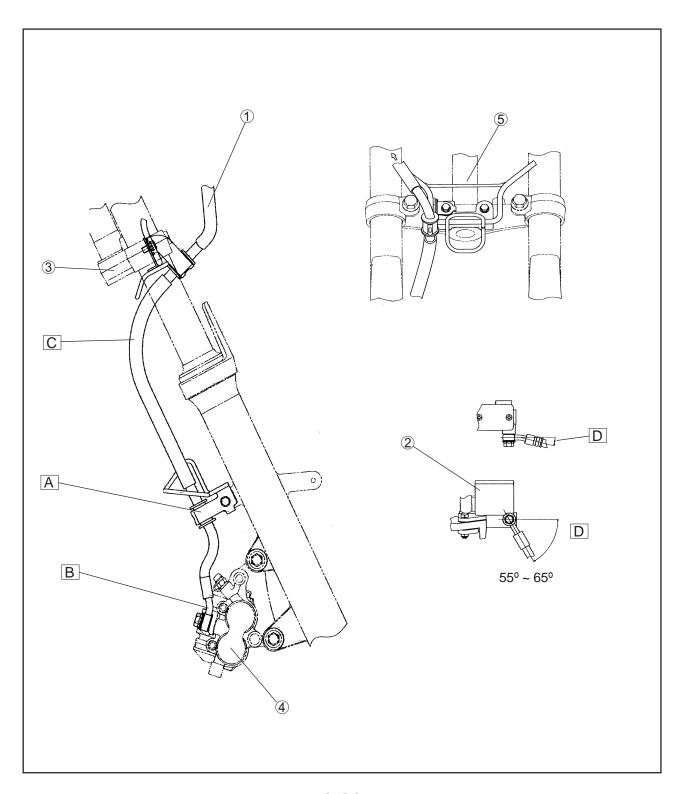
- 1 Throttle cable
- 2 Clutch cable
- 3 Horn wire harness
- 4 Main wire harness
- 5 Engine temperature sensor wire harness
- 6 Starter motor cable
- ⑦ Grounding cable (negative)

- 8 Fuel pump connector
- 9 Battery negative cable
- 10 ECU cable
- (1) Grounding wire harness
- Seat lock cable
- ® Rear light wire harness
- A Fix the ECU cable with a plastic band.
- B Fix the ECU cable and the ground wire harness with a plastic band.



- 1 Front brake hose
- 2 Front brake master cylinder
- 3 Lower bracket
- 4 Front brake calipers
- 5 Headlight bracket

- A Fit the brake hose grommet into the holder.
- B Assemble the brake hose with the metalic terminal contacting the brake calipers stopper.
- The brake hose must not be assembled twisted, bended or forcibly.
- D The upper terminal position of the brake hose must be as shown.



# **CHAPTER 3**

# PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION	3-1
PERIODIC MAINTENANCE AND LUBRICATION TABLE	3-1
COWLING AND SIDE COVERS	3-3
SIDE COVERS	
FUEL TANK	2-1
REMOVING THE FUEL TANK	
REMOVING THE FUEL PUMP	
INSTALLING THE FUEL PUMP	
INSTALLING THE FUEL HOSE	
ENOINE	0.7
ADJUSTING THE VALVE CLEARANCE	
ADJUSTING THE VALVE CLEARANCE	
ADJUSTING THE EXHAUST GAS VOLUME	
ADJUSTING THE ENGINE IDLING SPEED	
CHECKING THE SPARK PLUG	
CHECKING THE IGNITION TIMING	
CHECKING THE COMPRESSION	
CHECKING THE ENGINE OIL LEVEL	
CHANGING THE ENGINE OIL	-
ADJUSTING THE CLUTCH CABLE FREE PLAY	
CHECKING THE AIR FILTER ELEMENT	
CHECKING THE THROTTLE BODY JUNCTION	
CHECKING THE FUEL HOSE	
CHECKING THE ENGINE BREATHER HOSE	3-25
CHECKING THE EXHAUST SYSTEM	3-25
CHECKING THE OIL RADIATOR	3-26
CHASSIS	3-27
CHECKING THE BRAKE FLUID LEVEL	
CHECKING THE FRONT BRAKE PADS	
BLEEDING THE HYDRAULIC BRAKE SYSTEM	
CHECKING THE FRONT BRAKE HOSE	
ADJUSTING THE REAR BRAKE PEDAL	
CHECKING THE BRAKE LINING	
ADJUSTING THE REAR BRAKE SWITCH	
ADJUSTING THE SHIFT PEDAL	
ADJUSTING THE DRIVE CHAIN SLACK	
LUBRICATING THE DRIVE CHAIN	
CHECKING AND ADJUSTING THE STEERING HEAD	3-35
CHECKING THE FRONT FORK	
ADJUSTING THE REAR SHOCK ABSORBER	3-38
CHECKING THE TIRES	
CHECKING AND LUBRICATING THE CABLES	
LUBRICATING THE BRAKE LEVERS AND PEDALS	
LUBRICATING THE SIDESTAND	3-42

ELETRICAL SYSTEM	3-43
CHECKING AND CHARGING THE BATTERY	3-43
CHECKING THE FUSES	3-49
REPLACING THE HEADLIGHT BULB	3-50
REPLACING THE HEADLIGHT AUXILIARY BULB	3-51
ADJUSTING THE HEADLIGHT BEAM	3-51
ADJUSTING THE DIGITAL CLOCK	3-51

# INTRODUCTION/PERIODIC MAINTENANCE AND LUBRICATION TABLE





#### PERIODIC CHECKS AND ADJUSTMENTS

#### **INTRODUCTION**

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. 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 AND LUBRICATION TABLE

#### NOTE:\_

- The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.
- From 50.000 km, repeat the maintenance intervals starting from 10.000 km.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

N	0	ITEM	CHECK OR MAINTENANCE JOB	O	ODOMETER READING (x 1,000KM)		G	ANNUAL CHECK	
				1	10	20	30	40	0112011
1	*	Fuel line	<ul> <li>Check fuel hoses for cracks or damage</li> </ul>		•	•	•	•	•
2		Spark plug	Check condition     Clean and regap		•		•		
			Replace			•		•	
3	*	Valves	Check valve clearance     Adjust		•	•	•	•	
4		Air filter element	Clean     Replace if necessary		•	•	•	•	
5		Clutch	Check operation     Adjust	•	•	•	•	•	
6	*	Front brake	Check operation, fluid level and vehicle for fluid leakages	•	•	•	•	•	•
			Replace brake pads	Whenever worn to the limit				nit	
7	*	Rear brake	Check operation and adjust brake pedal free play	•	•	•	•	•	•
			Replace brake shoes	Whenever worn to the limit			nit		
8	*	Brake hose	Check for cracks or damage		•	•	•	•	•
		Brake need	• Replace			Ev	ery 4 ye	ears	
9		Wheels	Check runout and for damage			•	•	•	
10		Tires	Check tread depth and for damage Replace if necessary Check the air pressure Correct if necessary		•	•	•	•	•
11	*	Wheel bearings	Check bearing for looseness or damage		•	•	•	•	
12	*	Swingarm	Check the operation and for excessive play		•	•	•	•	
12		3 w myarin	Lubricate with molybdenum disulfide grease	Every 50,000Km					
13		Drive chain	Check chain slack, alignment and condition. Adjust and lubricate chain with special O-ring chain lubricant thoroughly.	Every	500 km		er wash n the ra	•	ehicle or riding

# INTRODUCTION/PERIODIC MAINTENANCE AND LUBRICATION TABLE





N	0	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (x 1,000KM)		G	ANNUAL CHECK		
				1	10	20	30	40	CHECK
14	*	Steering bearings	Check bearing play and steering for roughness	•	•	•	•	•	
			Lubricate with lithium-based-soap grease		-	Every	/ 20,00	00 Km	
15		Chassis fasteners	Make sure that all nuts, bolts and screws are properly tightened.		•	•	•	•	•
16		Sidestand	Check the operation     Lubricate		•	•	•	•	•
17		Sidestand switch	Check the operation	•	•	•	•	•	•
18		Front fork	Check the operation and for oil leakage		•	•	•	•	
19		Shock absorber assembly	Check the operation and shock absorber for oil leakage		•	•	•	•	
		Rear suspension	Check the operation		•	•	•	•	
20	*	relay arm and connection arm pivoting points	Lubricate with lithium-based-soap grease			•		•	
21		Fuel injection	Check engine idle speed	•	•	•	•	•	•
22	*	Engine oil	Change     Check oil level and vehicle for oil leakage	•	•	•	•	•	•
23		Engine oil filter element	• Replace	•		•		•	
24		Front and rear brakes switches	Check operation	•	•	•	•	•	•
25		Moving parts and cables	Lubricate		•	•	•	•	•
26	*	Throttle grip housing and cable	Check operation and free play     Adjust the throttle cable free play if necessary.     Lubricate the throttle grip housing and cable.		•	•	•	•	•
27		Air induction system	Check the air cut-off valve, reed valve, and hose for damage Replace any damaged parts if necessary.		•	•	•	•	•
28		Muffler and exhaust pipe	Check the screw clamp for looseness	•	•	•	•	•	
29		Lights, signals and switches	Check operation     Adjust the headlight beam	•	•	•	•	•	•

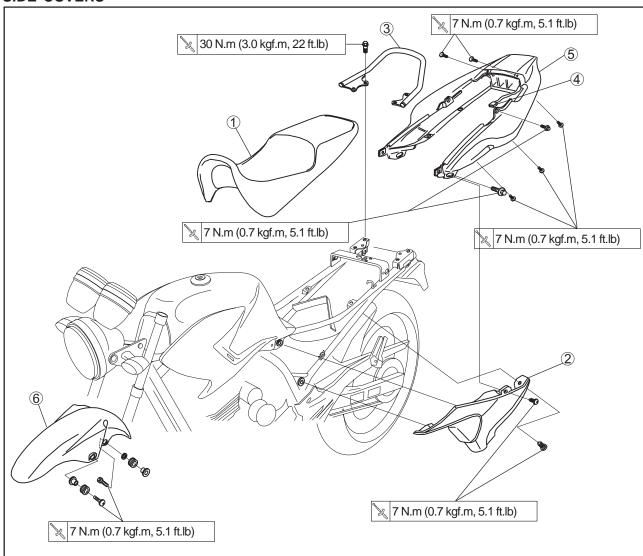
#### NOTE:\_

- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake maintenance.
  - Regularly check and, if necessary, correct the brake fluid level.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.



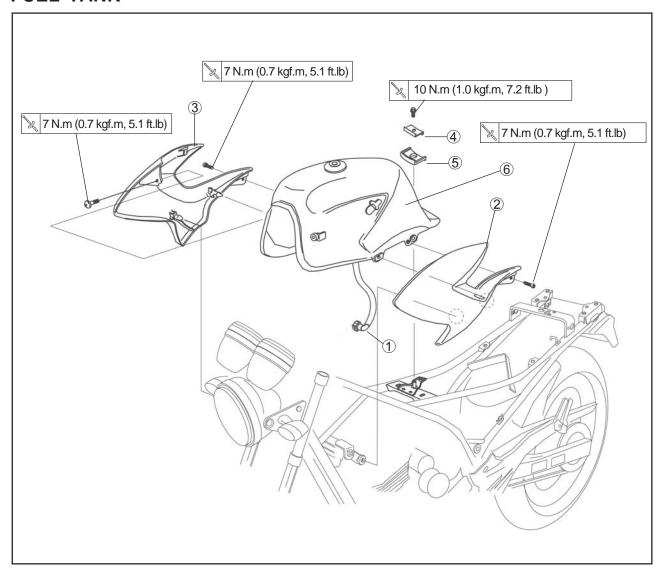
## **COWLING AND SIDE COVERS**

### SIDE COVERS

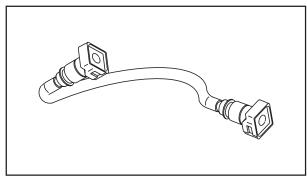


Order	Job/Part	Q'ty	Remarks
	Removing the side covers		Remove the parts in the order listed
1	Seat	1	Turn the wrench, under the left side cover to release the seat
2	Left / right side cover	1/1	
3	Safety bar	1	
4	Rear light connector	1	Disconnect
5	Tail assembly	1	
6	Front fender	1	
			For instalation, reverse the removal procedure.

## **FUEL TANK**



Order	Job / Part	Q'ty	Remarks
	Removing the fuel tank		Remove the parts in the order listed.
	Seat/Side covers (left and right)		
	Fuel tank		Drain.
1	Fuel hose	1	Disconnect.
2	Tank left cover	1	
3	Tank right cover	1	
4	Tank plate	1	
5	Damper	1	
6	Fuel tank	1	
			For installation, reverse the removal procedure



#### REMOVING THE FUEL TANK

- 1. Extract the fuel in the fuel tank through the fuel tank filling cap with a pump.
- 2. Remove:
  - fuel hose

CAUTION:
Although the fuel has been removed from the fuel tank be careful when removing the fuel hose, since there may be fuel remaining in it.
NOTE:
<ul> <li>Before removing the hoses, place a few rags in the area under where it will be removed.</li> </ul>
3. Remove:

• fuel tank

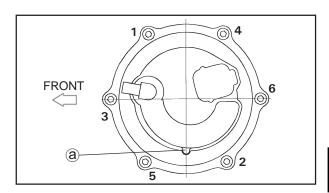
NOTE:
Do not set the fuel tank down so that the installation
surface of the fuel pump is directly under the tank.
Be sure to lean the fuel tank in an upright position.

#### **REMOVING THE FUEL PUMP**

- 1. Remove:
  - fuel pump

# **CAUTION:**

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.



#### **INSTALLING THE FUEL PUMP**

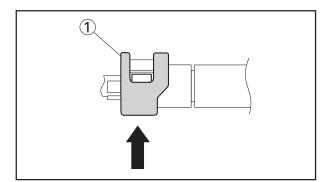
- 1. Install:
  - fuel pump



Fuel pump screw 4 N.m (0.4 kgf.m, 2.9 ft.lb)

#### NOTE: \_

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use @ new fuel pump gasket.
- Align the a projection in the fuel pump with the groove at the bracket.
- Tighten the fuel pump bolts in stages in a crisscross pattern and to the specified torque.
- Install the fuel pump as shown in the illustration.



#### **INSTALLING THE FUEL HOSE**

- 1. Install:
  - fuel hose (fuel pump side)

## **CAUTION:**

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose connector cover on the fuel hose is in the correct position, otherwise the fuel hose will not be properly installed.

#### NOTE: \_

- Install the fuel hose securely onto the fuel pump until a distinct "click" is heard.
- To install the fuel hose onto the fuel pump, slide the fuel hose connector cover ① on the end of the hose in the direction of the arrow shown.

#### **ENGINE**

#### 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:

- seat
- side covers and cowlings (left and right)
  Refer to "COWLING AND SIDE COVERS".
- fuel tank Refer to "FUEL TANK".



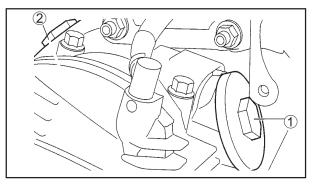
- tappet cover (intake) 1
- tappet cover (exhaust) 2
- · drive shaft sprocket cap

#### 3. Disconnect:

Spark plug cap

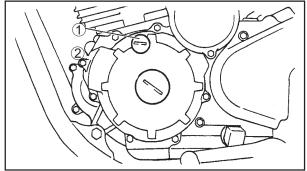
#### 4. Remove:

· Spark plug





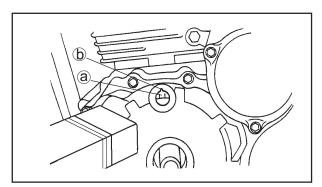
- timing mark accessing screw ①
- crankshaft accessing screw ②



# ADJUSTING THE VALVE CLEARANCE







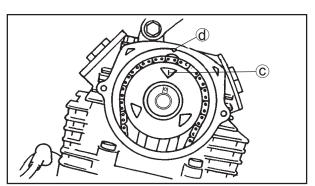


 valve clearance Out of specification --> Adjust.



Valve clearance (cold) Intake valve 0.05 ~ 0.10mm (0.002 ~ 0.004 in)

**Exhaust valve** 0.08 ~ 0.13mm (0.003 ~ 0.005 in)



a. Turn the crankshaft counterclockwise.

b. When piston #1 is at TDC on the compression stroke, align the TDC mark @ on the AC magneto with the mark (b) on the crankcase cover.

#### NOTE: .

To place the piston at the Upper Dead Center (UDC) on the compression time, match the "I" mark © of the sprocket camshaft with the mark @ at the cylinder head, as shown in the illustration.

c. Measure the valve clearance with a thickness gauge 1.

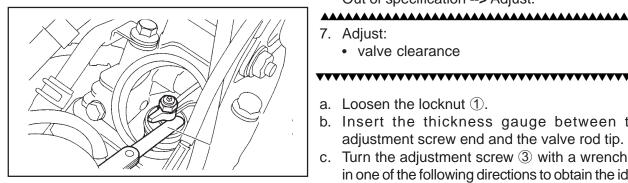


Thickness gauge 90890-03079

Out of specification --> Adjust.



valve clearance



- a. Loosen the locknut 1.
- b. Insert the thickness gauge between the adjustment screw end and the valve rod tip.
- c. Turn the adjustment screw ③ with a wrench ② in one of the following directions to obtain the ideal clearance.

Clockwise	The clearance is increased
Counter- clockwise	The clearance is decreased



Adjustment screw wrench 90890-01311

# ADJUSTING THE VALVE CLEARANCE



d. Prevent the bolt from moving by holding it and tighten the locknut to the specified torque.



#### Locknut

14 N.m (1.4 kgf.m, 10.3 ft.lb)

- e. Measure the clearance valve 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.

\_\_\_\_\_

#### 8. Install:

- - o-ring New
  - accessing screw to the timing mark
  - o-ring New
- crankshaft accessing screw
- 9. Install:
  - spark plug



## Spark plug

18 N.m (1.8 kgf.m, 13.3 ft.lb)



- spark plug cap
- 11. Install:
  - · camshaft sprocket cover



### Camshaft sprocket cover 10 N.m (1.0 kgf.m, 7.2 ft.lb)

- o-rings 1 New
- tappet cover (intake)



### Tappet cover (intake) 18 N.m (1.8 kgf.m, 13.3 ft.lb)

tappet cover (exhaust)



**Tappet cover (exhaust)** 18 N.m (1.8 kgf.m, 13.3 ft.lb)

#### 12. Install:

- fuel tank Refer to "FUEL TANK".
- side covers and cowlings (right and left)
- seat Refer to "COWLING AND SIDE COVERS".



New

3-9

## ADJUSTING THE EXHAUST GAS VOLUME

#### ADJUSTING THE EXHAUST GAS VOLUME

## **⚠** WARNING

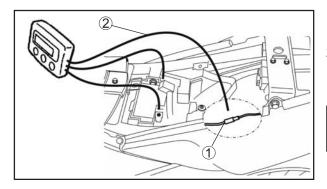
Carry out the adjustments after being sure that the battery is fully charged.

To adjust the exhaust gas volume, it is necessary:

- Gas analyzer;
- Use forced vent addressed to the vehicle engine when starting the engine.

NOTE: -

Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.

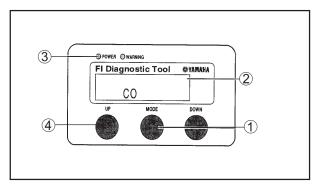


- 1. Set the starting switch to "OFF" and the "engine stop" switch to "ON".
- Disconnect the "self-diagnostic" signal terminal

   and connect the injection diagnostic terminal
   .



Injection diagnostic 90890-03182



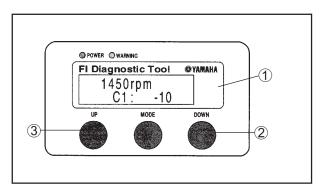
3. While keeping the "MODE" button ① pressed, turn the starting switch to "ON".

#### NOTE:

- "DIAG" will be indicated on the display ②
- The green LED "POWER" ③ is lighten
- 4. Press the "UP" button ④ and select "CO" to change the "CO" or "DIAG" mode to diagnostic mode.
- 5. After selecting "CO", set the "MODE" button ①.
- 6. Note that "C1" will be indicated on the display, then press the "MODE" button ①.
- 7. Start the engine.

# **ADJUSTING THE EXHAUST GAS VOLUME**





8. Change the CO volume adjustment by pressing the "UP" and "DOWN" buttons.

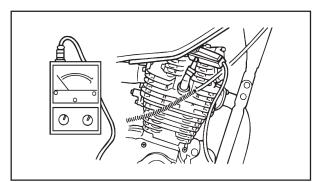
#### NOTE: \_

The CO volume adjusted and the low idle rotation are indicated on the display ①.

- To reduce the CO volume adjusted, press "DOWN" (2).
- To increase the CO volume adjusted, press "UP"
  3.
- 9. Perform the selected adjustment when releasing the pushed button ("UP" or "DOWN").
- 10. Turn the starting switch to "OFF" for canceling the adjusting mode.
- 11. Disconnect the injection diagnostic and reconnect the self-diagnostic signal terminal.

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





#### ADJUSTING THE ENGINE IDLING SPEED

#### NOTE:

Before adjusting the engine idling speed, the air filter case should be clean and the engine should have adequate compression.

- 1. Start the engine and let it warm up for several minutes.
- 2. Connect:
  - inductive tachometer to the spark plug lead

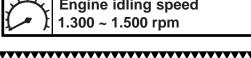


#### Inductive tachometer 90890-06760

- 3. Idling speed (standard) out of adjustment --> adjust
- 4. Adjust:
  - · engine idling speed

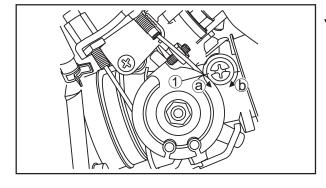


**Engine idling speed** 1.300 ~ 1.500 rpm



a. Turn the throttle stop screw 1 in direction a or **b** until the specified engine idling is obtained.

Direction @	Engine idling speed is increased
Direction (b)	Engine idling speed is decreased



## 

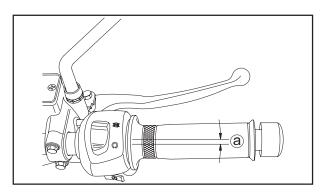
- 5. Adjust:
  - throttle cable free play Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY".

#### ADJUSTING THE THROTTLE CABLE FREE **PLAY**

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

# **ADJUSTING THE THROTTLE CABLE FREE PLAY**



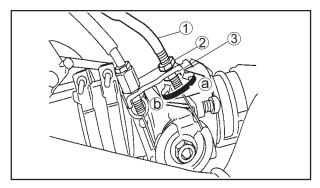




throttle cable free play @
 Out of specification --> Adjust.



Throttle cable free play (at the flange of the throttle grip) 3,0 ~ 5,0 mm (0.12 ~ 0.20 in)



#### 2. Adjust:

throttle cable free play

NOTE: .

When the throttle is opened, the throttle cable ① is pulled.

## End of throttle body

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

Direction @	The free play is increased
Direction (b)	The free play is decreased

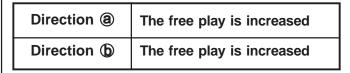
c. Tighten the locknuts

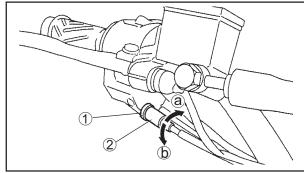
NOTE:

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.

#### Handlebar side

- a. Loosen the lock nut ①.
- b. Turn the adjusting nut ② in direction ③ or ⑤ until the specified throttle cable free play is obtained.





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





c. Tighten the locknut.

## **⚠** WARNING

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

\_\_\_\_

#### CHECKING THE SPARK PLUG

- 1. Disconnect:
  - · spark plug cap.
- 2. Remove:
  - spark plug.

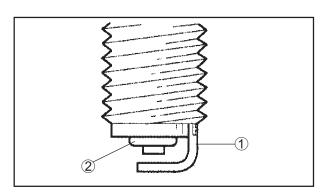
#### **CAUTION:**

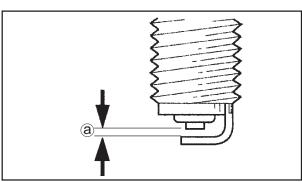
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling into the cylinders.

- 3. Check:
  - spark plug type Incorrect --> Replace.



Spark plug type (manufacturer) DR8EA (NGK)

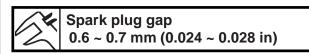




- 4. Check:
  - side electrode ①
     Damage/wear --> Replace the spark plug.
  - insulator ②
     Abnormal color --> Replace the spark plug.
     Normal color is medium-to-light tan.
- 5. Clean:
  - spark plug (with a spark plug cleaner or wire brush)
- 6. Measure:
  - Spark plug gap (a)

     (with a wire Thickness gauge)

     Out of specification --> Regap.



# CHECKING THE SPARK PLUG/ **CHECKING THE IGNITION TIMING**





spark plug



Spark plug 18 N.m (1.8 kgf.m, 13.3 ft.lb)

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

8. Connect:

spark plug cap

#### CHECKING THE IGNITION TIMING



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



timing mark accessing screw ①

2. Connect:

• timing light ② (onto the spark plug lead)

• inductive tachometer ③



Timing light ② 90890-03141 Inductive tachometer ③ 90890-06760



3. Check:

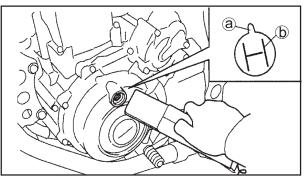
• ignition timing

a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.



**Engine idling speed** 1,300 ~ 1,500 rpm

b. Check that the stationary pointer (a) is within the firing range (b) on the AC magneto. Out of firing range --> Check the ignition system.



3

NOTE:

The ignition timing is not adjustable.

# **CHECKING THE COMPRESSION**



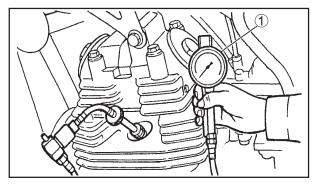
#### **CHECKING THE COMPRESSION**

Insufficient compression pressure will result in a loss of performance.

- 1. Measure:
  - valve clearance
     Out of specifications --> Adjust.
     Refer to "ADJUSTING THE VALVE
     CLEARANCE".
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Disconnect:
  - spark plug cap
- 4. Remove:
  - spark plug

## **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



Compression gauge 90890-03081

## **CHECKING THE COMPRESSION**



- 6. Measure:
  - compression pressure Out of specification --> Refer to steps (c) and



Compression (at sea level) Standard 1200Kpa (12kg/cm<sup>2,</sup> 170.7 psi) Minimum 1050Kpa (10.5kg/cm<sup>2</sup>, 152.3 psi) Maximum 1300Kpa (13.0kg/cm<sup>2</sup>, 188.5 psi)

a. Set the starting switch to "ON" and the "engine

- stop" switch to " $\Omega$ ".
- b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

### **⚠** WARNING

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

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.

Carbon deposits --> Eliminate.

d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.

Refer to the following table.

Compression pressure (with oil applied into the cylinder)		
Reading Diagnosis		
Higher than without oil	Piston ring(s) wear or damage> Repair.	
Same as without oil	Piston, valves, cylinder head gasket or piston possibly defective> Repair.	

## CHECKING THE COMPRESSION/ CHECKING THE ENGINE OIL LEVEL

- 7. Install:
  - spark plug



Spark plug 18 N.m (1.8 kgf.m, 13.3 ft.lb)

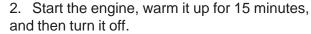
- 8. Connect:
  - · spark plug cap

#### CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

#### NOTE: \_

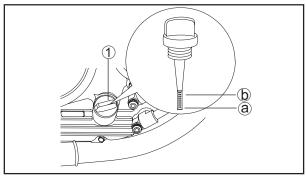
- Stand the vehicle on a suitable stand.
- Make sure the vehicle is upright.



- 3. Check:
  - engine oil level

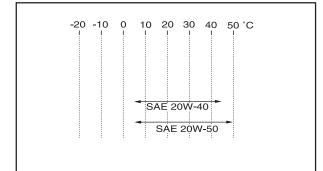
The engine oil level should be between the minimum level mark ⓐ and the maximum level mark ⓑ.

Below the minimum level mark --> Add the recommended engine oil to the proper level.



#### NOTE: .

- Before checking the engine oil level, wait a few minutes until the oil has settled.
- Do not screw the dipstick ① when checking the oil level.



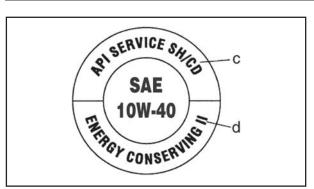


Recommended Engine oil type SAE20W40 or SAE20W50 Engine oil grade recommended API service SG type or higher JASO standard MA

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





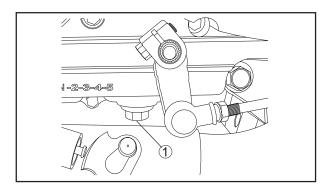


## **CAUTION:**

- 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 © or higher and do not use oils labeled "ENERGY CONSERVING II" © or higher.
- Do not allow foreign materials to enter the crankcase.
- 4. Start the engine, warm it up for several minutes, and then turn it off.
- 5. Check the engine oil level again.

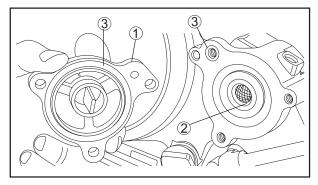
NOTE:

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:
  - Dipstick
  - Oil drain bolt 1
  - Gasket
- 4. Drain:
  - engine oil (completely from the crankcase and oil tank)
- 5. If the oil filter element is also to be replaced, perform the following procedure.



#### \*

- a. Remove the oil filter element cover ① and oil filter element ②.
- b. Check the O-rings ③ and replace them if are found damage.
- c. Install the new oil filter element and the oil filter element cover.



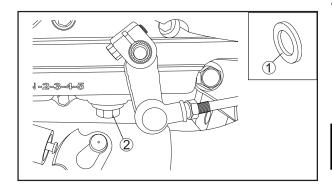
Oil filter element cover bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)

\_\_\_\_

## **CHANGING THE ENGINE OIL**



- 6. Check:
  - engine oil drain bolt gasket ①
     Damage --> Replace.



#### 7. Install:

• oil drain bolt ② (crankcase) (along with the gasket)



Oil drain bolt (crankcase) 20 N.m (2.0 kgf.m, 14 ft.lb)

#### 8. Fill:

 crankcase (with the specified amount of the recommended crankcase)



#### Quantity

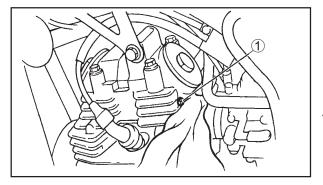
Total amount
1.550L (1.4 Imp.qt, 1.6 US.qt)
Without oil filter element
replacement
1.350L (1.2 Imp.qt, 1.4 US.qt)
With oil filter element
replacement

1.450L (1.3 Imp.qt, 1.5 US.qt)

## **CHANGING THE ENGINE OIL**



- 9. Install:
  - dipstick
- 10. Start the engine, warm it up for several minutes and turn it off.
- 11. Check:
  - engine (for engine oil leaks)
- 12. Check:
  - engine oil level Refer to "CHECKING THE ENGINE OIL LEVEL"

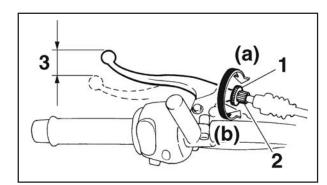


- 13. Check:
  - engine oil pressure
- a. Place a rag under the oil gallery bolt.
- b. Slightly loosen the oil gallery bolt ①.
- c. Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
- d. Check the engine oil passages, the oil filter and the oil pump. Refer to "OIL PUMP" in Chapter 5.
- e. Start the engine after solving the problem (-s) and check the engine oil pressure again.
- f. Tighten the oil gallery bolt to specification.



## ADJUSTING THE CLUTCH CABLE FREE PLAY





## ADJUSTING THE CLUTCH CABLE FREE PLAY

- 1. Check:
  - clutch cable free play 3
     Out of specification --> Adjust.



Clutch cable free play (at the end of the clutch lever) 10 ~ 15 mm (0.4 ~ 0.6 in)

- 2. Adjust:
  - clutch cable free play

## •••••

#### Handlebar side

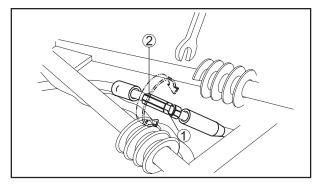
- a. Remove the rubber cap.
- b. Loosen the locknut 1.
- c. Turn the adjusting bolt ② in direction ③ or ⑤ until the specified clutch cable free play is obtained.

Direction @	The free play is increased	
Direction (b)	The free play is decreased	

- d. Tighten the locknut
- e. Fit the rubber cap back to its position.

#### NOTE:

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



#### **Engine side**

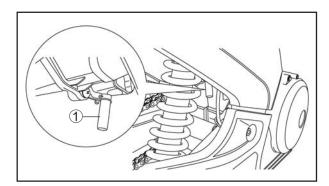
- a. Remove the protection caps.
- b. Loosen the locknut 1.
- c. Turn the adjusting bolt ② in one of the following directions until the specified clutch cable free play is obtained.

Clockwise	The free play is increased
Counterclockwise	The free play is decreased

\_\_\_\_

- d. Tighten the locknut.
- e. Cover nuts with the protection caps.

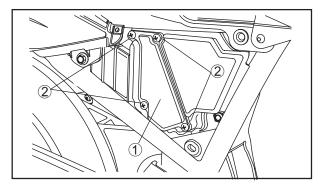
## CHECKING THE AIR FILTER ELEMENT



#### CHECKING THE AIR FILTER ELEMENT

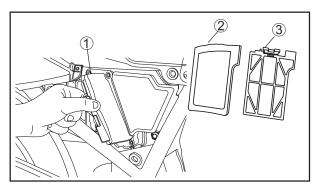
NOTE: \_

There is a checking hose ① in the bottom of the air filter case. If dust and/or water accumulate into this hose, clean the air filter and the air filter case.



#### 1. Remove:

- seat
- right side cover Refer to "COWLING AND SIDE COVERS".
- 2. Remove:
  - air filter case cover (right) 1
  - bolts ②



#### 3. Remove:

- air filter element ①.
- 4. Check:
  - air filter element ②
    Damage --> Replace.
  - air filter element guide 3

#### 5. Install:

- · air filter element
- · air filter case cover

## **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 FI tuning, leading to poor engine performance and possible overheating.



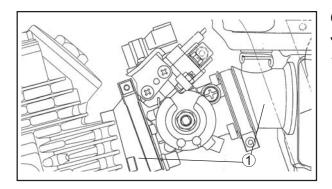
Air filter cover bolt 2 N.m (0.2 kgf.m, 1.4 ft.lb)

# CHECKING THE AIR FILTER ELEMENT/ CHECKING THE THROTTLE BODY JUNCTION / CHECKING THE FUEL HOSE



- 6. Install:
  - right side cover
  - seat

Refer to "COWLING AND SIDE COVERS".



## CHECKING THE THROTTLE BODY JUNCTION

- 1. Check:
  - injection body junction ①
     Breakage/damage --> Replace.
     Refer to "FUEL INJECTION SYSTEM" in
     Chapter 6.

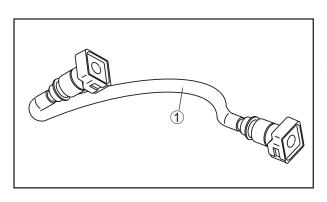
#### **CHECKING THE FUEL HOSE**

- 1. Remove:
  - seat
  - side covers (left and right)
     Refer to "COWLING AND SIDE COVERS".
  - fuel tank
     Refer to "FUEL TANK"



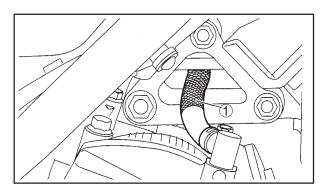
fuel hose ①
 Breakage/damage --> Replace.
 Loosen connection --> Connect.

- 3. Install:
  - fuel tank
     Refer to "FUEL TANK".
  - side covers (left and right)
  - seat Refer to "COWLING AND SIDE COVERS".



# CHECKING THE ENGINE BREATHER HOSE / CHECKING THE EXHAUST SYSTEM



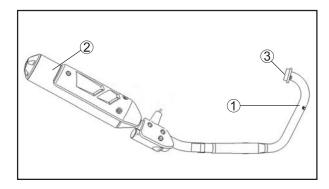


#### CHECKING THE ENGINE BREATHER HOSE

- 1. Check:
  - crankcase breather hose ①
    Cracks/damage --> Replace.

#### **CAUTION:**

Make sure the engine breather hose is routed correctly.



#### CHECKING THE EXHAUST SYSTEM

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

- 1. Check:
  - exhaust pipe 1
  - muffler ②
    Cracks/damage --> Replace.
  - gasket ③ Exhaust gas leaks --> Replace.
- 2. Check:
  - tightening torque



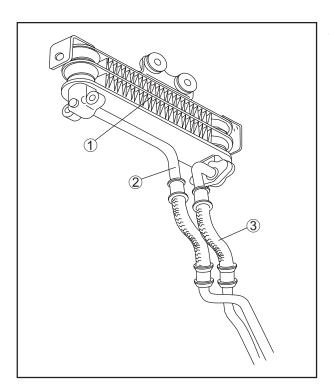
Exhaust pipe nut 17.5 N.m (1.7 kgf.m, 12.9 ft.lb) Central mounting bolt 20 N.m (2.0 kgf.m, 14.7 ft.lb) Muffler rear bolt 40 N.m (4.0 kgf.m, 29.5 ft.lb)

## **CHECKING THE OIL RADIATIOR**



#### CHECKING THE OIL RADIATOR

- 1. Remove:
  - seat
  - tank side covers Refer to "COWLING AND SIDE COVERS"



#### 2. Check:

- oil radiator ①
- radiator output hose ②
- radiator input hose ③
   Cracks / damage --> Replace
   Refer to "OIL COOLING SYSTEM" in
   chapter 5

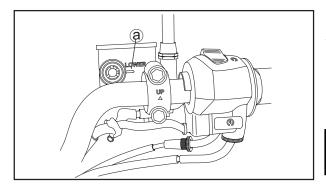
#### **CHASSIS**

#### **CHECKING THE BRAKE FLUID LEVEL**

1. Stand the vehicle on a level surface.

#### NOTE: .

- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.



#### 2. Check:

brake fluid level
 Below the minimum mark level @ --> Add the
 recommended brake fluid.



Recommended brake fluid DOT 4

#### **⚠** WARNING

- Use only the designated brake fluid. Other brake fluids may cause piston seals to deteriorate, and provoke leakage and poor performance.
- Refill with the same brake fluid type that is already in the system. Mixing brake fluids can result in a harmful chemical reaction, leading to a defective performance.
- When refilling, be careful not to drop any water into the fluid reservoir. The water will reduce significantly the brake fluid boiling point, causing air bubbles.

#### **CAUTION:**

The brake fluid can damage painted surfaces and plastic parts. Therefore, always clean any dropped brake fluid immediately.

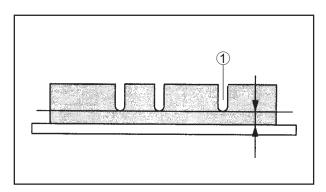
#### NOTE: \_

To ensure a correct reading of the brake fluid level, make sure that the reservoir upper part be is at the horizontal position.

## CHECKING THE FRONT BRAKE PADS/ BLEEDING THE HYDRAULIC BRAKE SYSTEM







#### CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads

- 1. Operate the front brake.
- 2. Check:
  - front brake pads
     Wear indicator groove ① almost disappeared

--> Replace the brake pad as a set.

Refer to "REPLACING THE FRONT BRAKE PADS" in chapter 4.



Wear limit of the rear brake pad 1.5 mm (0.06 in)

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

#### **M** WARNING

Bleed the hydraulic brake system whenever:

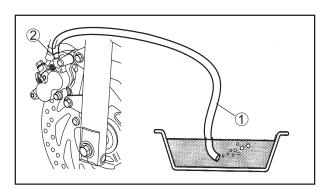
- the system is disassembled.
- a brake hose is loosened, disconnected or replaced.
- · the brake fuel level is very low.
- brake operation is faulty.

#### NOTE: \_

- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure 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.
- 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.

## **BLEEDING THE HYDRAULIC BRAKE SYSTEM**



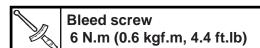


- 1. Bleed:
  - hydraulic brake system.
- a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
- b. Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
- c. Connect a clear plastic hose ① tightly to the bleed screw ②.
- d. Place the other end of the hose into a container.
- e. Slowly apply the brake several times.
- f. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
- g. Loosen the bleed screw and let the lever moves up to its limit.

#### NOTE:

Loosening the bleed screw will release the pressure and cause the brake lever to contact the throttle grip

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



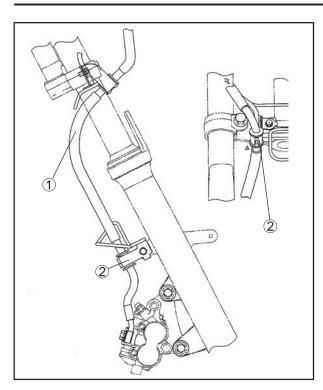
k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to "CHECKING THE BRAKE FLUID LEVEL".

## **⚠** WARNING

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

\_\_\_\_

## CHECKING THE FRONT BRAKE HOSE/ ADJUSTING THE REAR BRAKE PEDAL



#### CHECKING THE FRONT BRAKE HOSE

The following procedure applies to all of the brake hose clamps.

- 1. Check:
  - front brake hose ①
     Cracks/damage/wear --> Replace.
- 2. Check:
  - brake hose bracket ②
     Loosen --> Screw the clamp bolt.
- 3. Keep the vehicle upright and operate the brake several times
- 4. Check:
  - brake hoses

Brake fluid leakage --> Replace the damage hose.

Refer to "FRONT AND REAR BRAKES" in chapter 4.

#### ADJUSTING THE REAR BRAKE PEDAL

#### Λ

#### **WARNING**

After adjusting the brake pedal position or free play, adjust the brake light switch also.



brake pedal position (a)
 Out of specification --> Adjust.

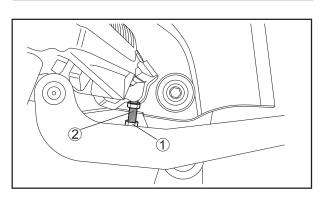
\*



(a)

Brake pedal position (top of the rider footrest) 29.0 mm (1.14 in)

- 2. Adjust:
  - brake pedal position



- a. Loosen the locknut 1
- b. Turn the adjusting bolt ② to inside or outside until the specified brake pedal position is obtained.

Inside	Brake pedal is raised
Outside	Brake pedal is lowered

## ADJUSTING THE REAR BRAKE PEDAL/ CHECKING THE BRAKE LINING/





c. Loosen the locknut

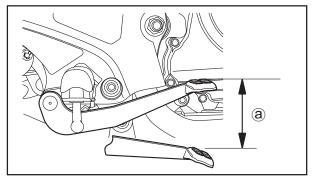


Brake pedal locknut 7 N.m (0.7 kgf.m, 5.1 ft.lb)

#### **★** WARNING

After adjusting the pedal position, adjust the brake pedal free play.

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



- 3. Check:
  - brake pedal free play (a)
     Out of specification --> Adjust.



Brake pedal free play 15 ~20 mm (0.6 ~0.8 in)

#### NOTE:

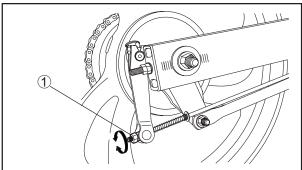
Before adjusting the brake pedal free play, the brake pedal position should be adjusted.

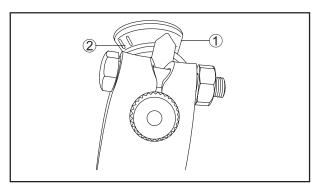






Refer to "CHECKING THE BRAKE LINING".



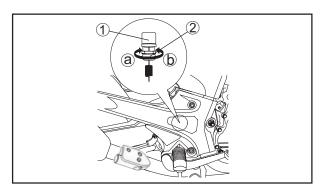


#### CHECKING THE BRAKE LINING

- 1. Press the brake pedal
- 2. Check:
  - wear display ①
     Indicated at the wear limit line ② --> Change the brake linings. Refer to "REAR WHEEL" in chapter 4.

# ADJUSTING THE REAR BRAKE SWITCH/ ADJUSTING THE SHIFT PEDAL





## ADJUSTING THE REAR BRAKE SWITCH

NOTE: .

The rear brake light switch is operated by the 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:
  - brake light operation.
     Incorrect--> Adjust.
- 2. Adjust:
- brake light operation

a. Hold the main body ① of the rear brake light switch and turn the adjusting nut ② in direction
② or ⑤ until the rear brake light comes on at the proper time.

Direction @	Brake light comes on sooner	
Direction (b)	Brake light comes on later	

#### ADJUSTING THE SHIFT PEDAL

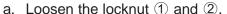
- 1. Check
  - shift pedal position
     Out of specification --> Adjust.



Shift pedal position 30.0 mm (1.18 in)



shift pedal position

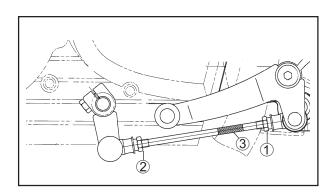


b. Turn the adjusting bolt ③ to obtain the specified position.

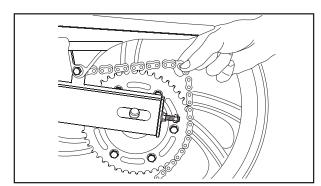
Clockwise	The free play increases
Counterclockwise	The free play decreases

c. Tighten the locknuts





## ADJUSTING THE DRIVE CHAIN SLACK



#### ADJUSTING THE DRIVE CHAIN SLACK

NOTE

The drive chain slack must be checked at the tightest point on the chain.

#### **CAUTION:**

A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

1. Stand the vehicle on a level surface.

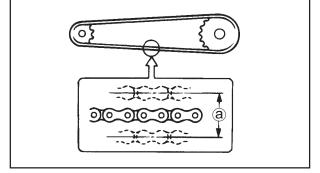
### **MARNING**

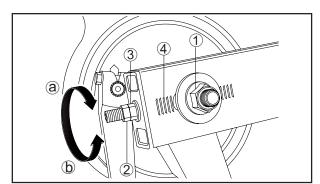
Securely support the vehicle so that there is no danger of it falling over.

#### NOTE: \_

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

- 2. Spin the rear wheel several times and find the tightest position of drive chain.
- 3. Check:
  - drive chain slack (a)
     Out of specification --> Adjust.







Drive chain slack 25 ~ 35 mm (0.98 ~ 1.38 in)

- 4. Adjust:
  - drive chain slack
- a. Loosen the wheel axle nut 1.
- b. Loosen the locknut 2 and the adjusting nut 3.

\*

c. Turn the adjusting nuts ③ from both vehicle sides, in one of the following directions until the specified position is obtained.

## ADJUSTING THE DRIVE CHAIN SLACK/ LUBRICATING THE DRIVE CHAIN



Direction @	Drive chain is tightened
Direction (b)	Drive chain is loosened

#### NOTF:

To maintain the proper wheel alignment, adjust both sides evenly, using the arm grooves ④ as reference.

d. Tighten both locknuts to specification.



e. Tighten the wheel axle nut to specification.

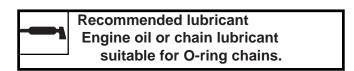


\_\_\_\_

#### **LUBRICATING THE DRIVE CHAIN**

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the vehicle is used in dusty areas.

This vehicle is provided with rubber O-rings between each sideplate. Steam cleaning, high pressure wash up, some specific solvents and hard brushes may damage those rings. Accordingly, use only kerosene for the chain cleaning. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for non-Oring chains. Do not use any other lubricant type in the drive chain or they may contain solvents that will harm the O-rings.



# CHECKING AND ADJUSTING THE STEERING HEAD



## CHECKING AND ADJUSTING THE STEERING HEAD

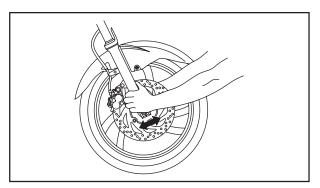
1. Stand the vehicle on a level surface.

#### **⚠** WARNING

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

NOTE:

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

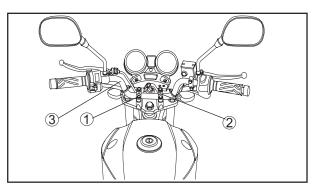


#### 2. Check:

• Steering head.

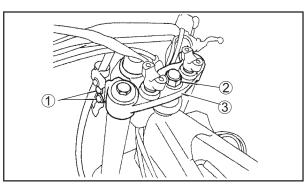
Grasp the bottom of the front fork legs and gently rock the front fork.

Binding/looseness --> Adjust the steering head.



#### 3. Remove:

- handlebar holder screws 1
- handlebar holders ②
- handlebar ③



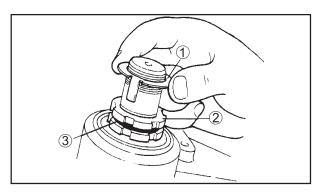
#### 4. Loosen:

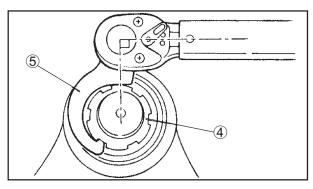
- upper bracket pinch bolts 1
- 5. Remove:
  - steering sterm nut 2
  - washer
  - upper bracket ③

# CHECKING AND ADJUSTING THE STEERING HEAD









- 6. Adjust:
  - Steering head

- a. Remove the lock-washer ①, the upper ring nut② and the rubber washer ③.
- b. Loosen the lower ring nut ④ and then tighten it to the specified torque with the steering nut wrench ⑤.

#### NOTE:

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



Steering nut wrench 90890-01403



Lower ring nut (initial tightening torque) 52 N.m (5.2 kgf.m, 38.4 ft.lb)

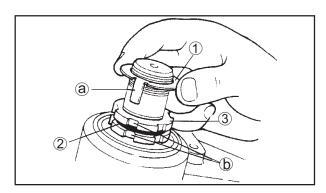
c. Loosen back the lower ring nut in 1/4 and tighten it to the specified torque.

#### **★** WARNING

Do not over tighten the lower ring nut



Lower ring nut (final tightening torque) 18 N.m (1.8 kgf.m, 13.3 ft.lb)



- 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 check the upper and lower bearings.
  - Refer to "STEERING HEAD" in chapter 4.
- e. Install the rubber washer ②.
- f. Install the upper ring nut 3.
- g. Finger tighten the upper ring nut ③ 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 the lock washer tabs ⓐ sit correctly in the ring nut slots ⓑ.

\*\*\*\*\*

# CHECKING AND ADJUSTING THE STEERING HEAD/ CHECKING THE FRONT FORK

- 7. Install:
  - upper bracket
  - washer
  - steering stem nut



Steering stem nut 110 N.m (11.0 kgf.m, 81.1 ft.lb)

- 8. Fix:
  - steering stem side bolts

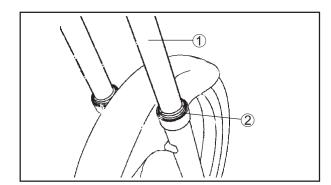


Steering stem side bolt 25 N.m (2.5 kgf.m, 18.4 ft.lb)

- 9. Install:
  - handlebar
  - handlebar upper holders



Handlebar upper holders 23 N.m (2.3 kgf.m, 16.9 ft.lb)



#### CHECKING THE FRONT FORK

1. Stand the vehicle on a level surface.

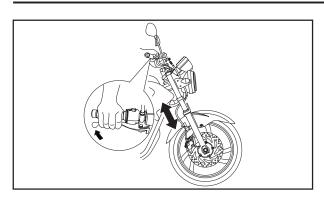
## **⚠** WARNING

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

- 2. Check:
  - inner tubes ①
    Damage/scratches --> Replace.
  - Oil seals ②
    Oil leakage --> Replace.

# CHECKING THE FRONT FORK/ ADJUSTING THE REAR SHOCK ABSORBER





- 3. Hold the vehicle upright and apply the front brake.
- 4. Check:
  - front fork operation

Push down hard on the handlebar several times and check if the front fork rebounds smoothly. Rough movement --> Repair.

Refer to "FRONT FORK" in chapter 4.

#### ADJUSTING THE REAR SHOCK ABSORBER

### **⚠** WARNING

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

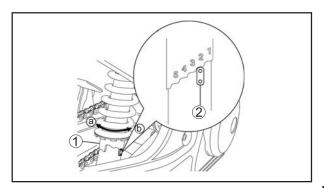
Spring preload:

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
  - spring preload

a. Adjust the spring preload with the special tool.





Suspension set wrench

90890 - 01519 90890 - 01520

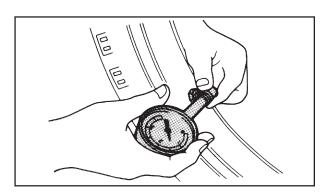
- b. Turn the adjusting ring 1 in direction a or b.
- c. Align the desired position on the adjusting ring with the stopper ②.

Direction @	Spring preload is increased (suspension is harder
Direction (b)	Spring preload is decreased (suspension is softer)

Adjusting positions		
Minimum:	1	
Standard:	2	
Maximum:	5	

## **CHECKING THE TIRES**





#### **CHECKING THE TIRES**

The following procedure applies to both of the tires.

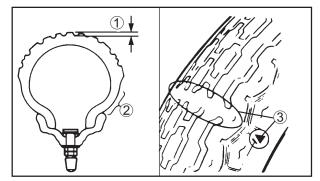
- 1. Check:
  - tire pressure
     Out of specification --> Adjust.

## **⚠** WARNING

- The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.
- 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.
- Operation of an overloaded vehicle could cause tire damage, an accident or an injury.
   NEVER OVERLOAD A VEHICLE.

Basic weight (with oil and a full fuel tank)	153.0Kg (337 lb)	
Maximum load*	167.0Kg (368 lb)	
Cold tire pressure	Front	Rear
Up to 90kg load	227.5 kPa (2.32 kgf/cm², 33 psi)	
90kg ~ maximum load	227.5 kPa (2.32 kgf/cm², 33 psi)	1

## **CHECKING THE TIRES**



#### **⚠** WARNING

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

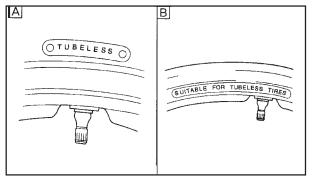
#### 2. Check

tire surfaces
 Damage/wear -->Replace.



Minimum tire tread depth 1.0 mm (0.04 in)

- 1 Tire tread deep
- 2 Sidewall
- ③ Wear indicator



#### **M** WARNING

- 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 tube tires, be sure to install the correct tube.
- Always replace a new tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel rim band and tube are centered in the wheel groove.
- 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.
  - A Tire
  - B Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

 After extensive tests, the tires listed below have been approved to this model. The 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 vehicle.

## **CHECKING THE TIRES**

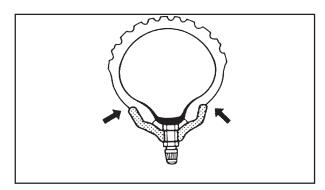


#### Front tire

Manufacturer	Model	Size
PIRELLI	SPORT DEMON	100/80 -17M/ C 52S

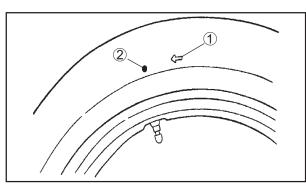
#### Rear tire

Manufacturer	Model	Size
PIRELLI	SPORT DEMON	130/70 -17M/ C 62S



## **⚠** WARNING

New tires have a relative low adherence until they are slightly wear. Therefore, riders are advised to drive the initial 100Km in a restrained speed, before driving in high speed.



#### NOTE

For tires with brand in the rotation direction ①:

- Install the tire with the brand pointing to the wheel rotation direction.
- Align the brand ② with the valve installation point.

## CHECKING AND LUBRICATING THE CABLES/ LUBRICATING THE BRAKE LEVERS AND PEDALS/ LUBRICATING THE SIDESTAND



#### CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the inner

### **⚠** WARNING

Damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.

and outer cables.

- 1. Check:
  - outer cable
     Damage --> Replace.
- 2. Check:
  - cable operation
     Rough movement --> 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 lubricating device.

## LUBRICATING THE BRAKE LEVERS AND PEDALS

Lubricate the pivoting point and the moving parts of the levers and pedals.



Recommended lubricant Lithium-soap-based grease

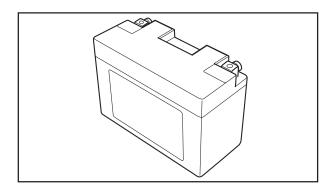
#### LUBRICATING THE SIDESTAND

Lubricate the pivoting point and the moving parts of the sidestand.



Recommended lubricant Lithium-soap-based grease





#### **ELECTRICAL SYSTEM**

CHECKING AND CHARGING THE BATTERY

#### **★** 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:

- 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).
- 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:

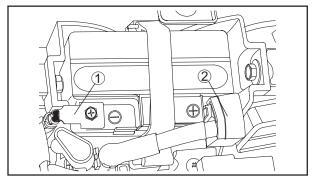
 Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

#### **CAUTION:**

- This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for an 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.

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:

- seat
  - Refer to "COWLING AND SIDE COVERS".
- band
- 2. Disconnect:
  - battery leads (from the battery terminals)

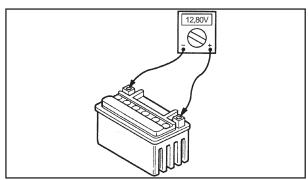


First, disconnect the negative battery lead ①, and then the positive battery lead ②.



- battery
- 4. Check:
  - battery charge

a. Connect a pocket tester to the battery terminals



Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)

13.0

12.5

12.0

Charging time (hours)

These values with the temperature, the condition of the battery plates, and the electrolyte level.

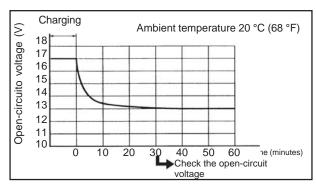
#### NOTE:

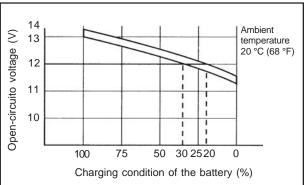
- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.
- b. Check the charge of the battery, as shown in the charts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

#### **Example**

- c. Open-circuit voltage = 12.0 V
- d. Charging time = 6.5 hours
- e. Charge of the battery = 20 ~ 30%







#### 5. Charge:

 battery (refer to the appropriate charging method illustration)

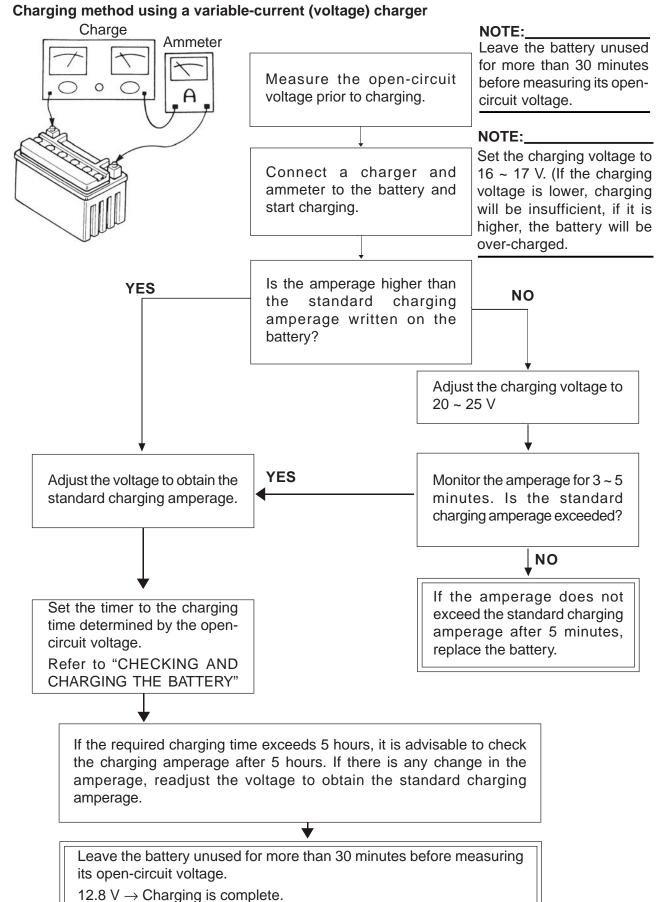
#### **⚠** WARNING

Do not quick charge a battery.

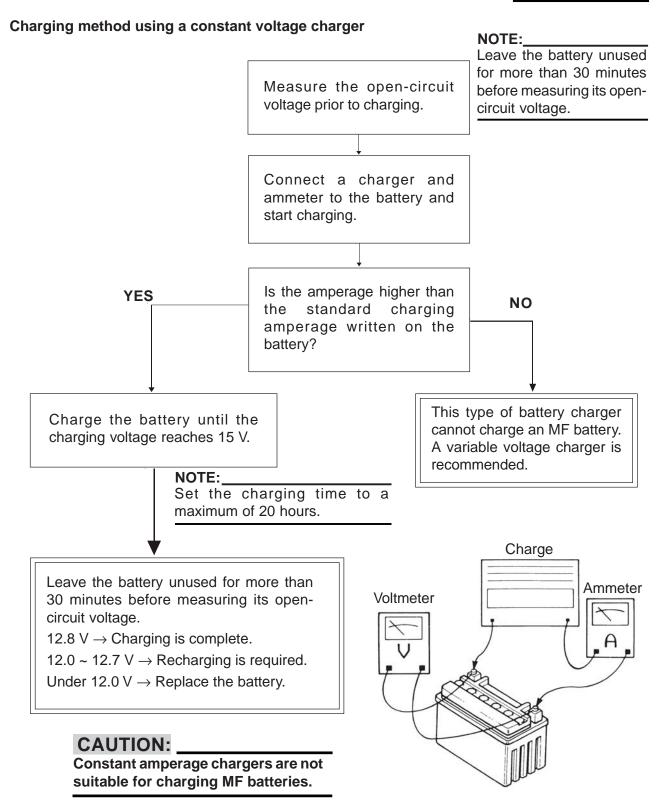
#### **CAUTION:**

- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)
- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure 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.
- 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!
- As shown in the following illustration, the open-circuit voltage of an 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.

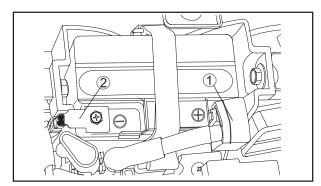




12.0 ~ 12.7 V  $\rightarrow$  Recharging is required. Under 12.0 V  $\rightarrow$  Replace the battery.







- 6. Install:
  - battery
- 7. Connect:
  - battery leads (to the battery terminals)

## **CAUTION:**

First, connect the positive battery lead ①, and then the negative battery lead ②.

- 8. Check:
  - battery terminals
     Dirt --> Clean with a wire brush
     Loosen connection --> Connect properly.
- 9. Lubricate:
  - · battery terminals



Recommended lubricant Dielectric grease

- 10. Install:
  - · battery band
  - seat

Refer to "COWLING AND SIDE COVERS"

## **CHECKING THE FUSES**





#### CHECKING THE FUSES

The following procedure applies to all of the fuses.

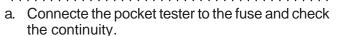
#### **CAUTION:**

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

- 1. Remove:
  - seat

Refer to "COWLING AND SIDE COVERS".

- 2. Check:
  - fuse box 1 ①
  - fuse box 2 ②

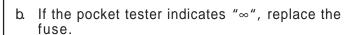




Adjust the pocket tester selector 1 to " $\Omega$  x 1".



Pocket tester 90890-03174



\_\_\_\_\_

\*

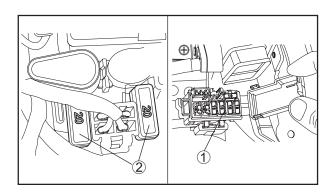
#### Poplace:

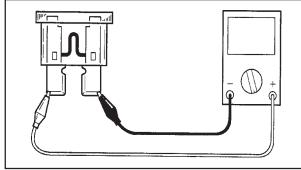
- 3. Replace:
  - blown fuse
- a. Set the main switch to "OFF".
- b. Install a new fuse with identical amperage.
- c. Set on the switches to verify if the electrical circuit is operational.
- d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage	Qt'y
Main	20A	1
Headlight	10A	1
Signaling system	0A	1
Electronic injection	10A	1
Display backup	10A	1
Reserve	20A	1
Reserve	10A	1

### **⚠** WARNING

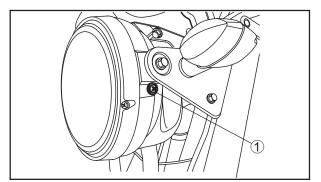
Never use a fuse with amperage rating other than that specified. Using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, and even a fire.





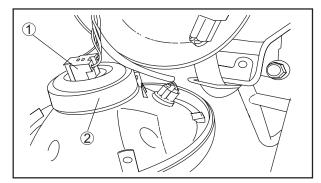
## CHECKING THE FUSES/ REPLACING THE HEADLIGHT BULB





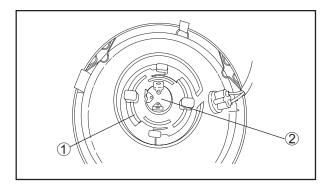
- 4. Install:
  - seat

Refer to "COWLING AND SIDE COVERS".



#### REPLACING THE HEADLIGHT BULB

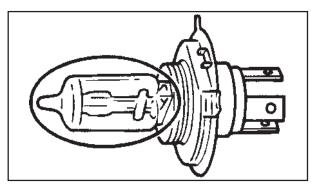
- 1. Remove:
  - headlight bolts ①
- 2. Disconnect:
  - headlight bulb connector ①
- 3. Remove:
  - headlight bulb holder cover ②



#### **⚠** WARNING

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

- 4. Remove:
  - headlight bulb holder 1
  - headlight bulb 2



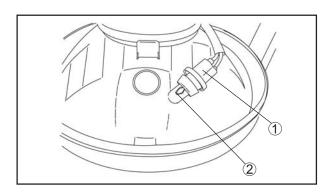
- 5. Install:
  - headlight bulb
  - headlight bulb holder
  - · headlight bulb cover
- 6. Connect:
  - headlight bulb connector
- 7. Install:

#### **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.

## ADJUSTING THE HEADLIGHT BEAM/ ADJUSTING THE DIGITAL CLOCK





#### REPLACING THE HEADLIGHT AUXILIARY BULB

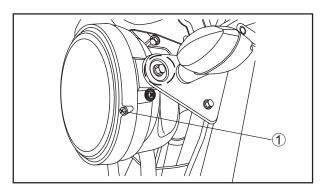
- 1. Remove:
  - headlight bolts
  - socket (1)
- 2. Remove:
  - auxiliary bulb ②

### **⚠** WARNING

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

- 3. Install:
  - auxiliary bulb New



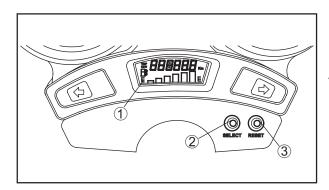


#### ADJUSTING THE HEADLIGHT BEAM

- 1. Adjust:
  - headlight beam (vertically)
- a. Loosen the headlight side bolts 1)
- b. Move the optical block in one of the following directions, to change the headlight beam.

Upward	Headlight beam is raised
Downward	Headlight beam is lowered

\_\_\_\_



#### ADJUSTING THE DIGITAL CLOCK

- 1. Adjust:
  - digital clock 1
- a. Press the keys "SELECT" 2 and "RESET" 3 simultaneously for 2 seconds or more.
- b. When the hour digits start blinking, press "RESET" 3 to set the hour.
- c. Press "SELECT" 2 to fix the hour. The minutes digits will blink.

\_\_\_\_

- d. Press "RESET" ③ to set the minutes.
- e. Press "SELECT" 2 to fix the minutes.

## **CHAPTER 4**

## **CHASSIS**

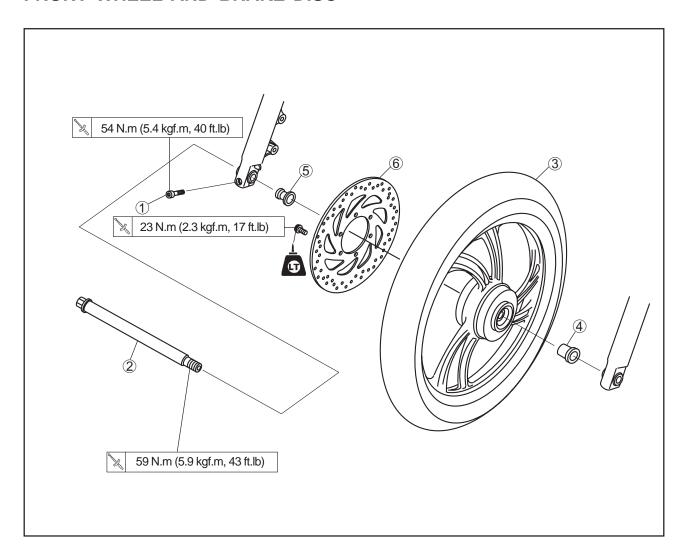
FRONT WHEEL AND BRAKE DISC	4-1
FRONT WHEEL	4-2
REMOVING THE FRONT WHEEL	
CHECKING THE FRONT WHEEL	4-3
CHECKING THE FRONT BRAKE DISC	4-6
INSTALLING THE FRONT WHEEL	
ADJUSTING THE FRONT WHEEL STATIC BALANCING	
REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET	
REAR WHEEL	
BRAKE SHOE PLATE AND REAR WHEEL SPROCKET	
WHEEL	
BRAKE SHOE PLATE	
REMOVING THE REAR WHEEL	
CHECKING THE REAR WHEEL	
CHECKING AND REPLACING THE SPROCKET	
CHECKING THE REAR WHEEL DRIVE HUB	
REMOVING THE REAR BRAKE LINING	
CHECKING THE REAR BRAKE	
ASSEMBLING THE REAR BRAKE	
INSTALLING THE REAR WHEELREAR WHEEL STATIC BALANCE	
REAR WHEEL STATIC BALANCE	4-23
FRONT BRAKE	4-24
FRONT BRAKE PADS	
REPLACING THE FRONT BRAKE PADS	4-25
FRONT BRAKE MASTER CYLINDER	
DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER	
CHECKING THE BRAKE MASTER CYLINDER	
ASSEMBLING AND INSTALLING THE BRAKE MASTER CYLINDER .	
FRONT BRAKE CALIPERS	
REMOVING THE FRONT BRAKE CALIPER	
CHECKING THE BRAKE CALIPER	
ASSEMBLING THE BRAKE CALIPER	
INSTALLING THE BRAKE CALIPER	4-39
FRONT FORK	4-41
REMOVING THE FRONT FORK LEGS	4-45
DISASSEMBLING THE FRONT FORK LEGS	
CHECKING THE FRONT FORK LEGS	
ASSEMBLING THE FRONT FORK LEGS	4-48
INSTALLING THE FRONT FORK LEGS	
HANDLEBAR	
REMOVING THE HANDLEBAR	
CHECKING THE HANDLEBAR	
INSTALLING THE HANDLEBAR	4-56

STEERING HEAD	4-60
REMOVING THE LOWER BRACKET	4-62
CHECKING THE STEERING HEAD	4-62
INSTALLING THE STEERING HEAD	4-63
REAR SHOCK ABSORBER ASSEMBLY	4-65
HANDLING THE REAR SHOCK ABSORBER	4-67
DISPOSING A REAR SHOCK ABSORBER	4-67
REMOVING THE REAR SHOCK ABSORBER ASSEMBLY	4-68
CHECKING THE REAR SHOCK ABSORBER ASSEMBLY	4-69
CHECKING THE CONNECTING ARMS AND RELAY ARMS	4-69
INSTALLING THE RELAY ARM	4-69
INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY	4-70
SWINGARM AND DRIVE CHAIN	4-71
REMOVING THE SWINGARM	
CHECKING THE SWINGARM	
REMOVING THE SPROCKET	
REMOVING THE DRIVE CHAIN	
CHECKING THE DRIVE CHAIN	4-75
INSTALLING THE SWINGARM	4-78



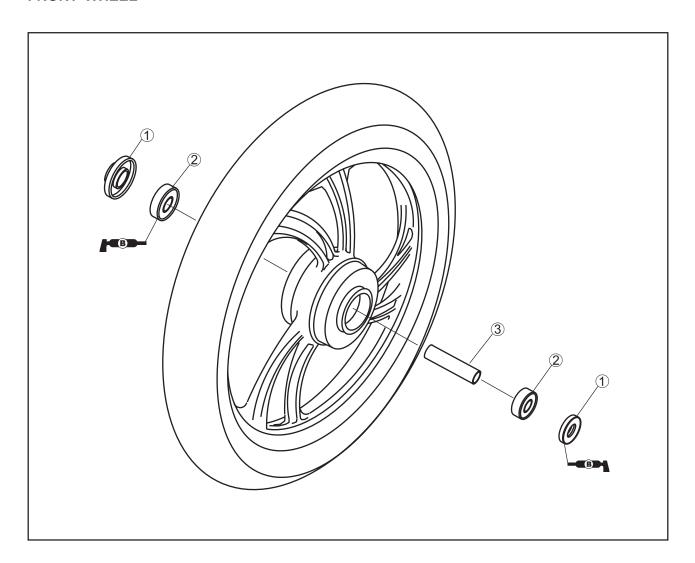
### **CHASSIS**

#### FRONT WHEEL AND BRAKE DISC



Order	Job/Part	Qt'y	Remarks
	Removing the front brake disc and wheel		Remove the parts in the order listed  NOTE:  Place the vehicle on a suitable stand so that the front wheel is elevated.
1 2 3 4 5	Wheel axle pinch bolt Front wheel axle Front wheel Collar (left) Collar (right) Brake disc	1 1 1 1 1	Refer to "REMOVING THE FRONT WHEEL" and "INSTALLING THE FRONT WHEEL"
			To install, reverse the removal procedure

#### **FRONT WHEEL**



Order	Job/Part	Qt'y	Remarks
	Disassembling the front wheel		Remove the parts in the order listed
1	Oil seal	2	
2	Bearing	2	
3	Collar	1	
			For assembly, reverse the disassembly procedure





#### **REMOVING THE FRONT WHEEL**

1. Stand the vehicle on a level surface.

## **⚠** WARNING

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

#### NOTE: \_

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

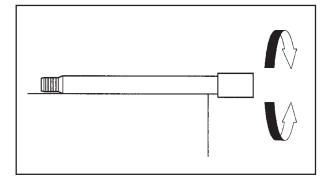
#### NOTE: \_

Do not operates the brake lever when removing the front wheel.

- 2. Elevate:
  - front wheel

#### NOTE: \_

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



#### CHECKING THE FRONT WHEEL

- 1. Check:
- wheel axle

Roll the axle on a flat surface.

Bents --> Replace.

## **⚠** WARNING

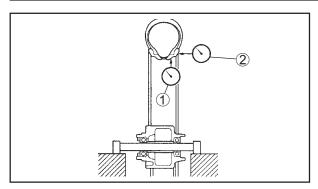
Do not attempt to straighten a bent wheel axle.

- 2. Check:
  - tire
  - front wheel

Damage / wear --> Replace.

Refer to "CHECKING THE TIRES" in chapter 3.





#### 3. Measure:

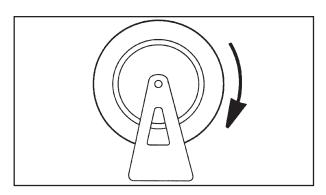
- radial alignment 1
- lateral alignment ②
   Above the specified limits --> Replace.



Radial alignment limit 1.0 mm (0.04 in) Lateral alignment limit 0.5 mm (0.02 in)

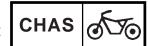
### **⚠** WARNING

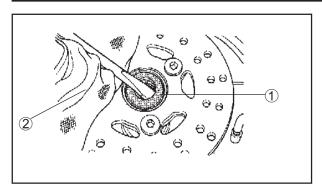
After assembling a new tire, drive carefully during a period for getting used to the new tire "sensation" and to fit the tire to the rim. Failure to follow these instructions may result in accident with possible injury to the rider or damage to the vehicle.



#### 5. Check:

- wheel bearing
   The front wheel spins roughly or is loosen
   --> replace the wheel bearings
- oil seals
   Damage/wear --> Replace





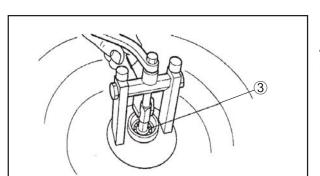
6. Replace:

• oil seal New

wheel bearing New

a. Clean the outer part of the front wheel hub.

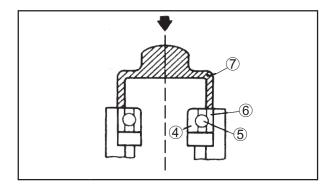
b. Remove the oil seals ① with a flat-head screwdriver.



NOTE:

To prevent damaging the wheel, place a rag ② between the screwdriver and the wheel.

c. Remove the wheel bearings ③ with a general bearing puller.



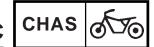
d. Install the new wheel bearings and oil seals in the reverse order of disassembly.

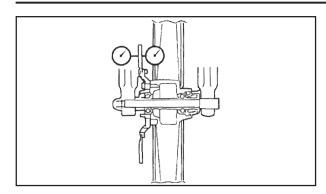
**CAUTION:** 

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

NOTE:

Use a socket ⑦ that matches the diameter of the wheel bearing outer race and oil seal.





#### CHECKING THE FRONT BRAKE DISC

- 1. Check:
  - brake disc
     Damage/friction --> Replace.
- 2. Measure:
  - brake disc deflection
     Out of specification --> correct the brake disc deflection or replace.

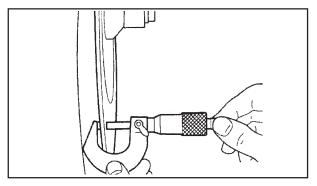


Deflection limit (maximum) 0.10 mm (0.04 in)

### •••••

- a. Place the vehicle on a suitable stand so that the front wheel is elevated.
- b. Before measuring the brake disc deflection, rock the handlebar to the left or right to ensure that the front wheel is balanced.
- c. Remove the brake calipers.
- d. Keep the gauge in a straight angle to the brake disc surface.

e. Measure the deflection at 3.0mm below the brake disc border.



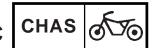
#### 3. Measure:

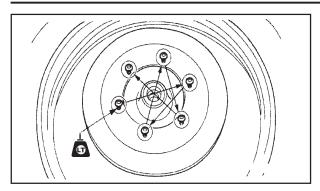
front disc thickness
 Measure the front disk thickness at different
 points.

Out of specification --> Replace



Thickness limit (minimum) 3.5 mm (0.14 in)





- 4. Adjust:
  - brake disc deflection

#### a. Remove the brake disc.

- b. Offset the brake disc from one screw hole to another.

\*

c. Install the brake disc.

#### NOTE:

Tighten the brake discs screws in stages and in a crisscross pattern.



**Brake disc screw** 23 N.m (2.3 kgf.m, 17 ft.lb) LOCTITE ®

- d. Measure the brake disc deflection.
- e. If it is found out of specification, repeat the adjusting steps until obtain the brake disc deflection to specification.
- f. If the brake disc deflection could not reach the specification, replace the disc.

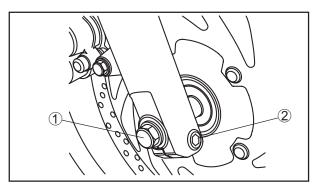
#### **INSTALLING THE FRONT WHEEL**

- 1. Lubricate
  - oil seal lips



**Recommended Iubricant** Lithium-soap-based grease





2. Install:

• wheel axle (from the right side) ①



Wheel axle

59 N.m (5.9 kgf.m, 43 ft.lb)

• axle mounting bolt 2



Axle mounting bolt 54 N.m (5.4 kgf.m, 40 ft.lb)

### **^**WARNING

Make sure that the brake hose is properly placed.

#### NOTE: \_

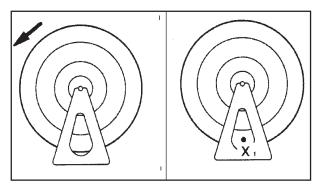
- After replacing the tire, the wheel, or both, carry out the front wheel static balancing.
- Adjust the front wheel static balancing with the brake disc installed.

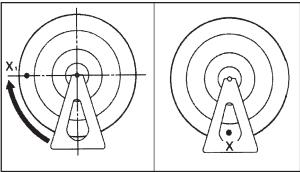
## ADJUSTING THE FRONT WHEEL STATIC BALANCING

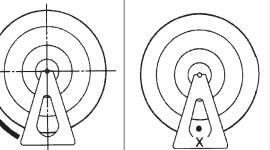
- 1. Remove:
  - · balancing weight









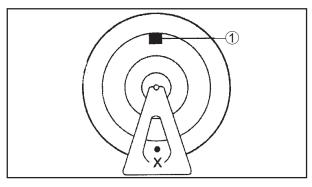




heavy spot "x" (unbalance)

Place the front wheel over a suitable stand for balancing.

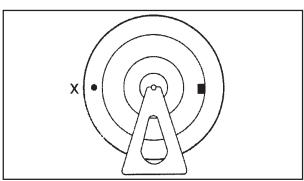
- a. Spin the front wheel.
- b. When the wheel stops, make a "x" mark at its lowest part found.
- c. Rotate the front wheel 90° so that the "x" mark is positioned as shown.
- d. Release the front wheel.
- e. When the wheel stops, make a "x2" mark at its lower part.
- f. Repeat the steps "d" to "e" several times until the marks start matching.
- g. The medium point where the marks matched is the front wheel's heavy spot "x".



3. Adjust:

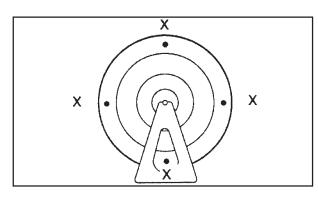
- wheel static balancing
- a. Install a balancing weight ① to the wheel at the exactly opposite place to the "x" weight point.

NOTE: Start with a lighter weight.



- b. Rotate the wheel at 90° so that the weight point be positioned as shown.
- c. If the weight point do not reach this position, install a larger weight.
- d. Repeat steps (b) and (c) until the front wheel is balanced.

\_\_\_\_



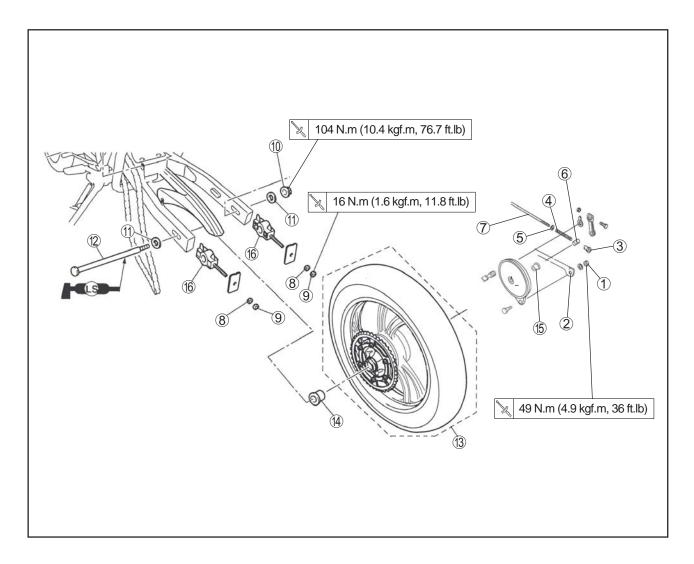
- 4. Check:
  - Wheel static balancing
- a. Rotate the wheel and make sure that it can be in every position shown.

b. If the wheel could not stop in all the positions, performance the balance again.

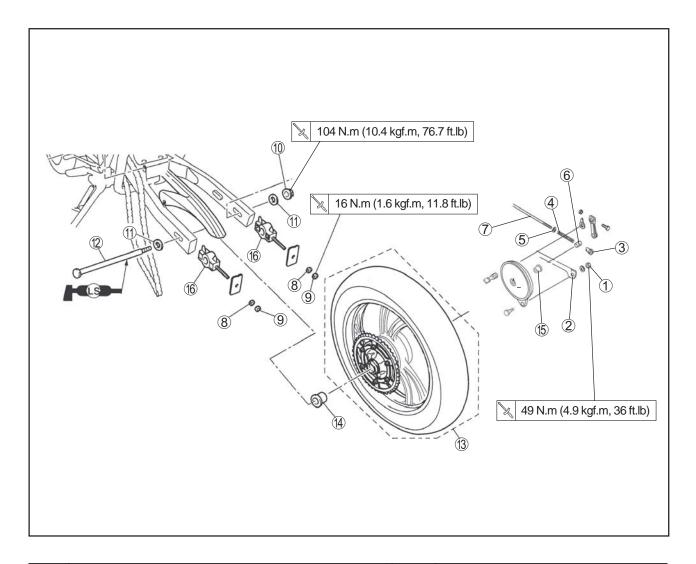


## REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET

#### **REAR WHEEL**

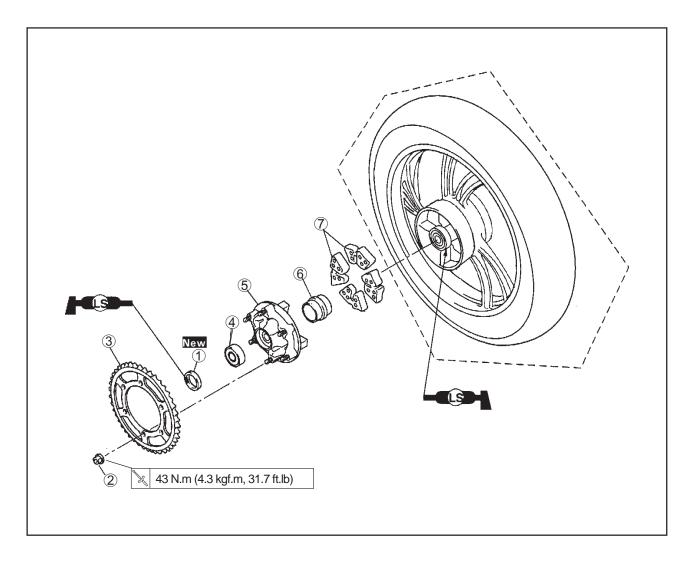


Order	Job/Part	Qt'y	Remarks
	Removing the rear wheel		Remove the parts in the order listed
			NOTE:
			Place the vehicle on a suitable stand so that the rear wheel is elevated.
1	Nut	1	
2	Brake torque rod	1	Loosen
3	Adjusting nut	1	
4	Brake rod spring	1	
5	Washer	1	
6	Brake lever pin	1	
7	Brake rod	1	Release
8	Locknut	2	



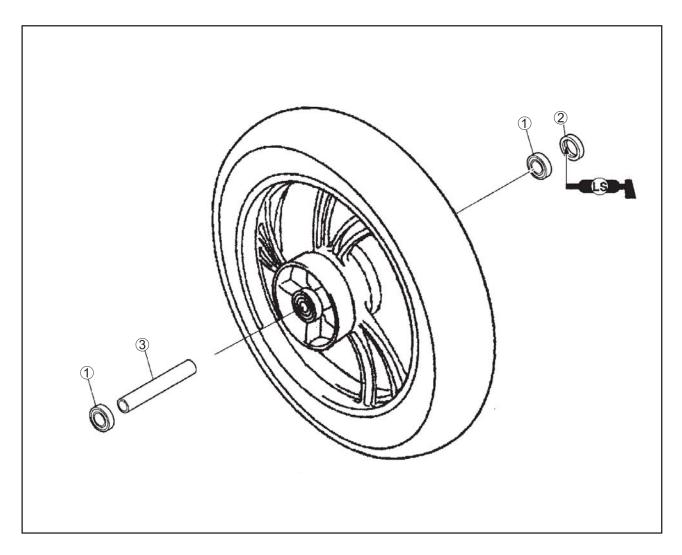
Order	Job/Part	Qt'y	Remarks
9	Adjusting nut	2	
10	Wheel axle nut	1	Refer to "INSTALLING THE
11	Wheel axle washer	2	REAR WHEEL"
12	Rear wheel axle	1	
13	Rear wheel assembly	1	Refer to "REMOVING THE REAR WHEEL" and "INSTALLING THE REAR WHEEL"
14	Left collar	1	
15	Right collar	1	
16	Chain puller	2	
			For installation, reverse the removal procedure

#### BRAKE SHOE PLATE AND REAR WHEEL SPROCKET



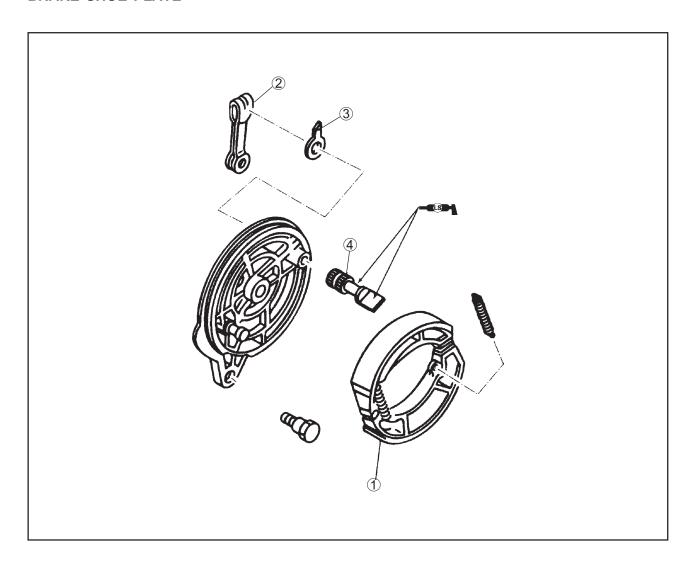
Order	Job/Part	Qt'y	Remarks
	Removing the brake shoe plate and sprocket		Remove the parts in the order listed
1	Oil seal	1	
2	Sprocket mounting nuts	6	
3	Sprocket	1	- Remove
4	Bearing	1	
5	Rear wheel drive hub	1	
6	Collar	1	
7	Rear wheel drive hub damper	1	
			For installation, reverse the removal procedure

#### WHEEL



Order	Job/Part	Qt'y	Remarks
	Disassembling the rear wheel		Remove the parts in the order listed
1	Bearing	2	
2	Oil seals	1	
3	Collar	1	
			For assembling, reverse the disassembly procedure

#### **BRAKE SHOE PLATE**



Order	Job/Part	Qt'y	Remarks
	Disassembling the brake lining		Remove the parts in the order listed
(1)	Brake shoe assembly	1	
2	Brake camshaft lever	'	
3	Brake shoe wear indicator	1	
4	Brake camshaft	1	
			For assembly, reverse the disassembly procedure

#### REMOVING THE REAR WHEEL

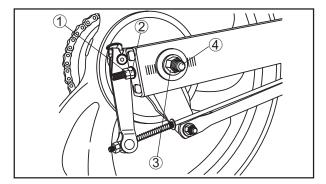
1. Stand the vehicle on a level surface.

### **⚠** WARNING

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

NOTE:

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



- 2. Loosen:
  - locknut (1)
  - adjusting nut ②
- 3. Remove:
  - rear axle nut ③
  - washer
  - wheel axle 4
  - washer
  - rear wheel

#### NOTE: \_

Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.

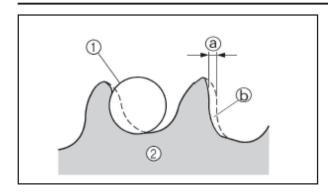
- 4. Remove:
  - rear brake plate

#### CHECKING THE REAR WHEEL

- 1. Check:
  - · wheel axle
  - · rear wheel
  - wheel bearings
  - oil seals
     Refer to "CHECKING THE FRONT
     WHEEL".
- 2. Check:
  - tire
  - rear wheel Refer to "CHECKING THE TIRES" in chapter 3.
- 3. Measure:
  - radial alignment 1
  - lateral alignment ②
     Above the specified limits --> Replace.

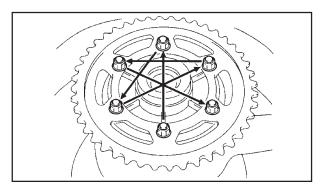






## CHECKING AND REPLACING THE SPROCKET

- 1. Check:
  - sprocket
     More than 1/4 tooth @ wear --> Replace
     the rear wheel spur gear.
     Bent teeth => Replace.
- **b** correct
- 1 drive chain roller
- 2 sprocket



- 2. Replace:
  - sprocket
- a. Remove the self-locking nuts and the sprocket.
- b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
- c. Install the new sprocket.



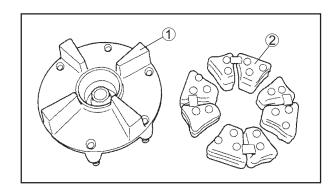
Rear wheel sprocket self-locking nut 43 N.m (4,3 kgf.m, 31.7 ft.lb)

#### NOTE: .

Tighten the self-locking nuts in stages and in a crisscross pattern.

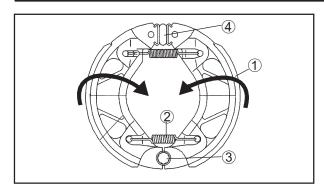
\_\_\_\_\_

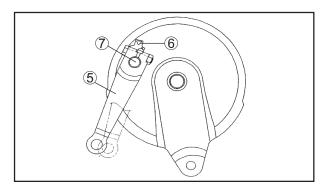
#### CHECKING THE REAR WHEEL DRIVE HUB



- 1. Check:
  - rear wheel drive hub ①
     Cracks/damage --> Replace.
  - rear wheel drive hub damper ②
     Damage/wear --> Replace.







#### REMOVING THE REAR BRAKE LINING

- 1. Remove:
  - brake shoe lining ①
  - springs ②

NOTE: \_\_

Remove the linings pulling them out, with the pivoting pin ③ and the brake camshaft ④ as support points, in the arrow direction.

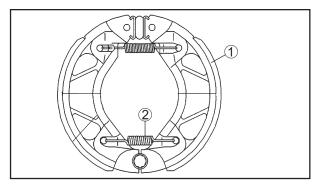
- 2. Remove:
  - brake camshaft lever (5)
  - brake shoe wear indicator ⑥
  - brake camshaft (7)

#### CHECKING THE REAR BRAKE

- 1. Check:
  - · brake lining plate
  - pivoting pin
  - brake camshaft
     Damage --> Replace.

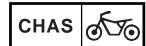


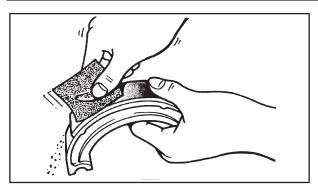
- brake shoe lining 1
- springs ②
  Damage/Wear --> Replace



NOTE

When replacing the brake lining, also replace the springs.



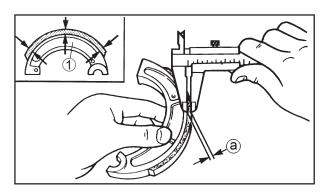


#### 3. Check:

 brake shoe lining surface Glazed areas --> Remove. Use a rough sandpaper.

	_	_	_	
ı	$\cap$	г		
	v		ᆫ	

After using the sandpaper, clean the remaining particles with a cloth.



#### 4. Measure:

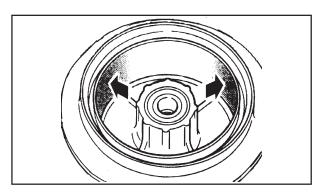
brake shoe lining thickness (a)
 Out of specification --> Replace.
 Measuring points (1)

#### NOTE:

Replace the linings if damaged or when they reach the wear limit.



Brake shoe lining thickness: 4 mm (0.16 in) Wear limit 2 mm (0.08 in)

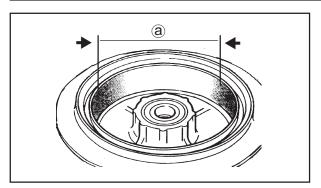


#### 5. Check:

brake drum inner surface
 Oil / Scratches --> Repair.

Oil	Use a wet cloth with solvent or thiner.
Scratches	Eliminate, polishing with a thin sandpaper.





6. Measure:

brake drum inner diameter @
 Out of specification --> Replace the rear
 wheel.



Brake drum inner diameter: Standard: 130 mm (5.12 in)

Limit: 131mm (5.16 in)

#### **ASSEMBLING THE REAR BRAKE**

Reverse the "REMOVING THE BRAKE LININGS" procedure.

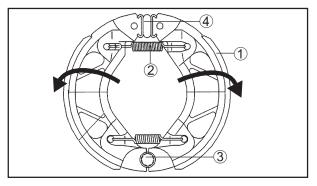
- 1. Lubricate:
  - brake camshaft
  - pivoting pin



Recommended lubricant Lithium-soap-based grease

### **CAUTION:**

Install the came axle and the pivoting point using some grease. Wipe off the grease excess.



2. Install:

- brake shoe lining 1
- springs ②

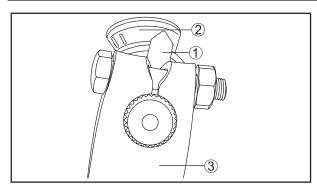
NOTE:

• When installing the brake shoe linings, use the pivoting pin ③ and the brake camshaft ④ as standing points, and press the linings following the arrows directions.

#### **CAUTION:**

- Do not strain nor damage the spring hooks when installing with calipers.
- Do not apply grease on the lining surfaces.





#### 3. Install:

brake shoe wear indicator ①

#### NOTE: \_

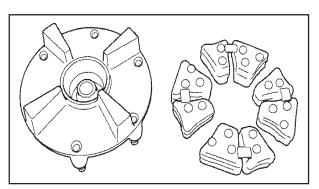
When installing the brake shoe wear indicator, place the lobes into the brake camshaft groove and align the pointer with the wear display ②.

#### 4. Install:

• brake camshaft lever 3.



Brake camshaft lever screw 10 N.m (1.0 kgf.m, 7.2 ft.lb)



#### 5. Install:

rear wheel
 Reverse the removal procedure
 Refer to "REAR WHEEL, BRAKE DISC
 AND REAR WHEEL SPROCKET".

#### NOTE: \_

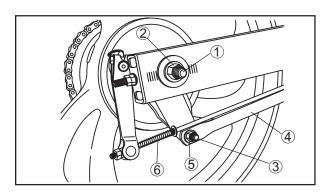
Make sure that the rear wheel drive hub damper are properly fit to the rear wheel drive hub.

#### INSTALLING THE REAR WHEEL

- 1. Lubricate:
  - wheel axle
  - oil seal lips



Recommended lubricant Lithium-based-soap grease



- 2. Install:
  - rear wheel
  - drive chain
  - washer
  - rear wheel axle 1
  - washer
  - rear wheel axle nut 2
- 3. Install:
  - brake torque rod bolt ③
  - brake torque rod 4
  - brake torque rod nut ⑤



Brake torque rod nut 49 N.m (4.9 kgf.m, 36 ft.lb)

- 4. Install:
  - · brake lever pin
  - washer
  - brake rod spring 6
  - rear brake pedal adjusting nut Refer to "ADJUSTING THE REAR BRAKE PEDAL".
- 5. Adjust:
  - drive chain slack



Drive chain slack 25.0 ~ 35.0 mm (0.98 ~ 1.38 in)

Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.

- 6. Tighten:
  - rear wheel axle nut



Rear wheel axle nut 104 N.m (10.4 kgf.m, 76.7 ft.lb)

CHAS 🔊

#### **REAR WHEEL STATIC BALANCE**

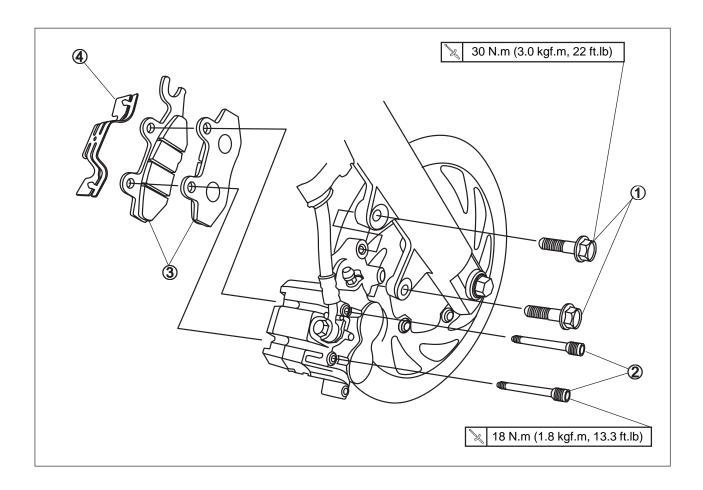
		_	_	_	
-1	NI	$\boldsymbol{\cap}$	т		=
-1	N	u			

- After replacing the tire, wheel or both, the rear wheel static balance must be performed.
- Adjust the rear wheel static balance with the sprocket and the hub installed.

#### 1. Adjust:

 rear wheel static balance Refer to "FRONT WHEEL STATIC BALANCE".

#### FRONT BRAKE PADS



Order	Job/Part	Qt'y	Remarks
	Removing the front brake pads		Remove the parts in the order listed
1	Brake caliper bolt	2	7
2	Guide pins	2	Refer to "REPLACING THE
3	Brake pads	2	FRONT BRAKE PADS"
4	Brake pads springs	1	
			For installation, reverse the removal procedure

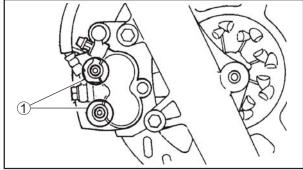


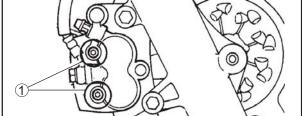
#### **CAUTION:**

Disc brake components rarely require disassembly.

Therefore, always follow these preventive measures:

- **Never disassemble brake components** unless absolutely necessary.
- 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.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- 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 immediate medical attention.



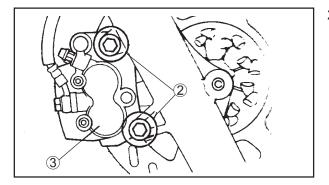


#### REPLACING THE FRONT BRAKE PADS

NOTE:

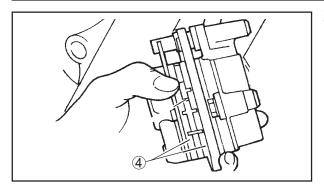
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

- 1. Remove:
  - guide pins ①
- 2. Remove:
  - brake caliper bolts 2
  - brake calipers ③

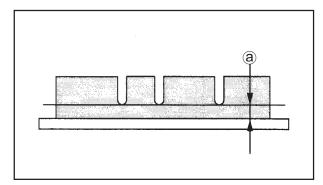








- 3. Remove:
  - brake pads 4
  - · brake pads spring



#### 4. Measure:

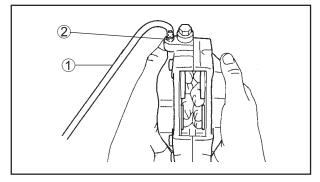
brake pads wear limit @
 Out of specification --> Replace the brake
 pads as a set.



Pad wear limit 1.5 mm (0.06 in)

#### 5. Check:

• brake pad guide pins Damage/Wear --> Replace.



#### 6. Install:

- pad springs
- pads

#### NOTE:

Always replace the springs and the brake pads 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.

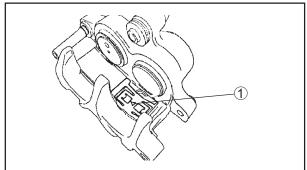


Bleed screw

6 N.m (0.6 kgf.m, 4.4 ft.lb)

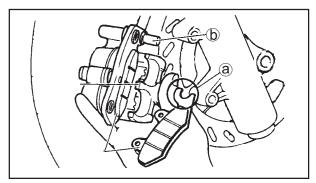






- d. Install the new spring 1.
- e. Install the brake pads.





#### 7. Install:

- brake pad guide pins
- brake calipers
- calipers screws

#### NOTE:

Install the inner pad with the (a) detail aligned with the calipers (b) pin.



#### **Guide pins**

18 N.m (1.8 kgf.m, 13.3 ft.lb)



#### 8. Check:

· brake fluid level

Below the minimum level mark @ --> Add the recommended brake fluid to the proper

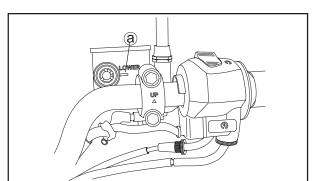
Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

#### 9. Check:

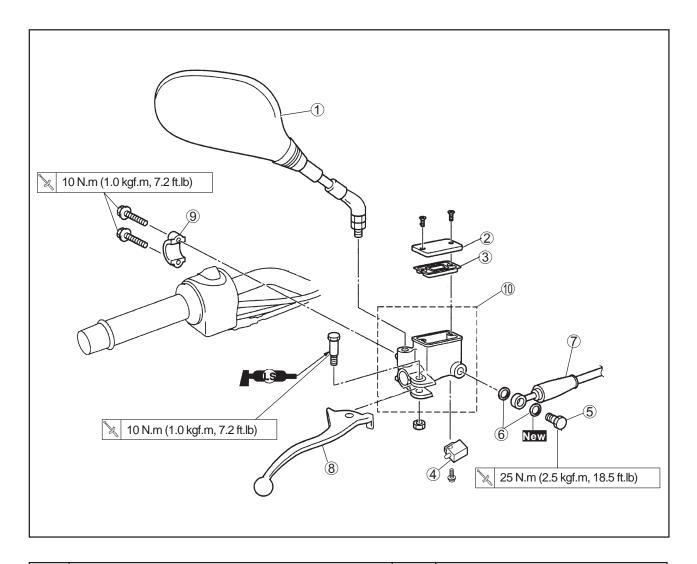
brake lever operation

Soft or spongy feeling --> Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.

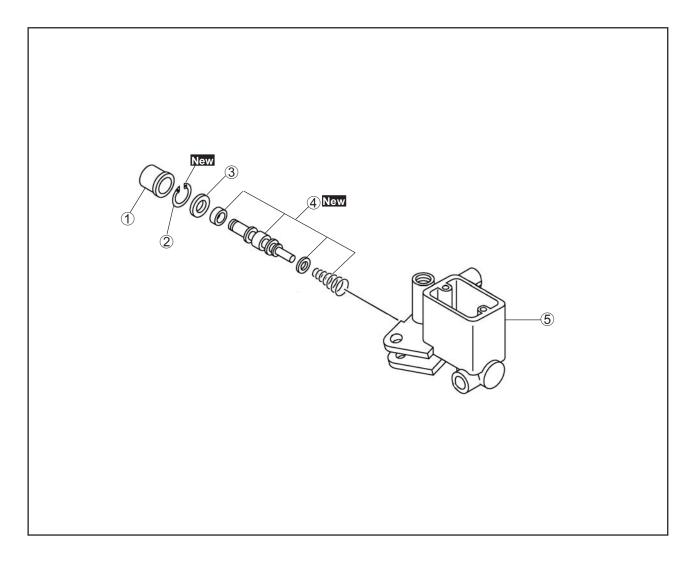


#### FRONT BRAKE MASTER CYLINDER



Order	Job/Part	Qt'y	Remarks
	Removing the front brake master cylinder		Remove the parts in the order listed
	Brake fluid		Drain
1	Rearview mirror (right)	1	
2	Brake master cylinder cap	1	
3	Master cylinder diaphragm	1	Refer to
4	Brake front switch	1	Disconnect   "DISASSEMBLING
5	Union bolt	1	THE FRONT
6	Copper washer	2	MASTER CYLINDER
7	Brake hose	1	Disconnect   " and "INSTALLING   THE FRONT
8	Front brake lever	1	MASTER CYLINDER"
9	Brake master cylinder holder	1	
10	Brake master cylinder	1	
			For installation, reverse the removal procedure

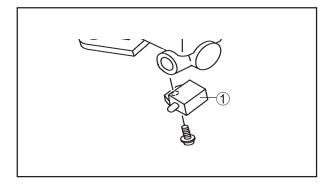




Order	Job/Part	Qt'y	Remarks
	Disassembling the brake master cylinder		Remove the parts in the order listed
	Dust boot	1	
2	Circlip	1	
3	Washer	1	
4	Brake master cylinder kit	1	
5	Brake master cylinder	1	
			For assembly, reverse the
			disassembly procedure

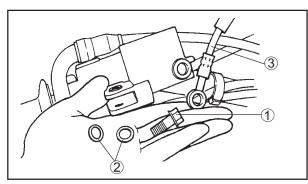
## DISASSEMBLING THE FRONT BRAKE MASTER CYLINDER

Before disassembling the brake master cylinder, drain the brake system fluid.



#### 1. Disconnect:

• brake front switch ①



#### 2. Remove:

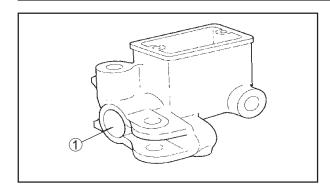
- union bolt ①
- copper washers ②
- brake hose ③

#### NOTE: \_

To collect any remaining brake fluid, place a container under the brake master cylinder and the end of the brake hose.

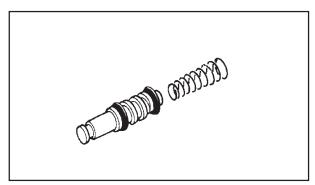






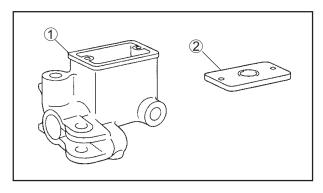
#### CHECKING THE BRAKE MASTER CYLINDER

- 1. Check:
  - brake master cylinder ①
     Damage/Scratches/Wear --> Replace.
  - brake fluid routing (master cylinder body).
     Clog --> Blow out with compressed air



#### 2. Check:

 brake master cylinder kit Damage/Scratches/Wear --> Replace as a set.



#### 3. Check:

- brake master cylinder reservoir ① Cracks/Damage --> Replace.
- master cylinder reservoir cap ②
   Cracks/Damage --> Replace.

#### 4. Check:

brake hoses
 Cracks/Damage/Wear --> Replace.

## ASSEMBLING AND INSTALLING THE BRAKE MASTER CYLINDER

#### **⚠** WARNING

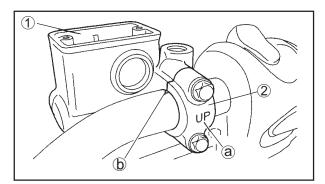
- Before installing, all internal brake components must be cleaned and lubricated with new brake fluid.
- Never use solvents on internal brake components.



Brake fluid recommended DOT4







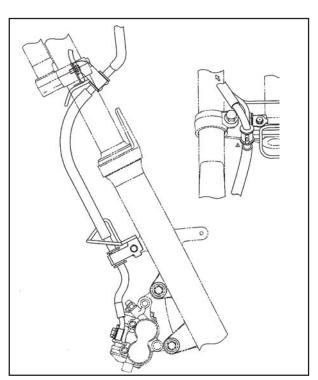
- 1. Install:
  - brake master cylinder 1
  - brake master cylinder holder 2



Master cylinder holder bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)

#### NOTE:

- Install the brake master cylinder holder with the "UP" mark @ facing up.
- Align the end of the master cylinder holder with the punch mark (b) on the handlebar.
- First, tighten the upper bolt, and then the lower bolt.
- 2. Install:
  - copper washer **New**
  - brake hoseunion bolt

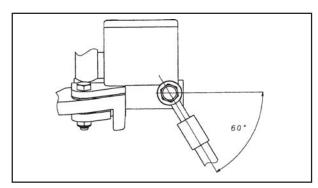




Union bolt 25 N.m (2.5 kgf.m, 18.5 ft.lb)

#### **★** WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.



#### NOTE:

- Install the brake hose with the upper terminal in the leaning angle shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

- 1. Fill:
  - Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



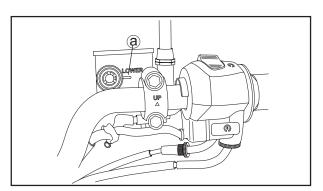
Brake fluid recommended DOT4

### **★** WARNING

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- 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.
- When refilling, be careful that water does not enter the brake master cylinder 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.

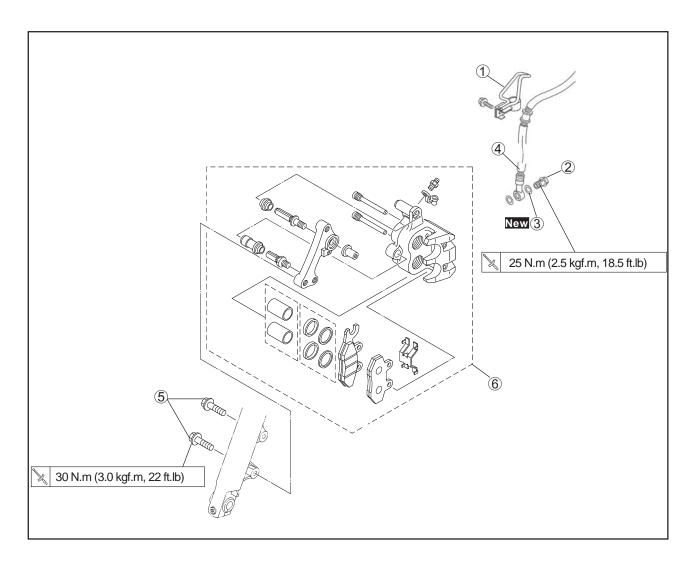


- 4. Bleed:
  - brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
- 5. Check:
  - brake fluid level
     Below the minimum level mark @ --> Add
     the recommended brake fluid to the proper
     level.

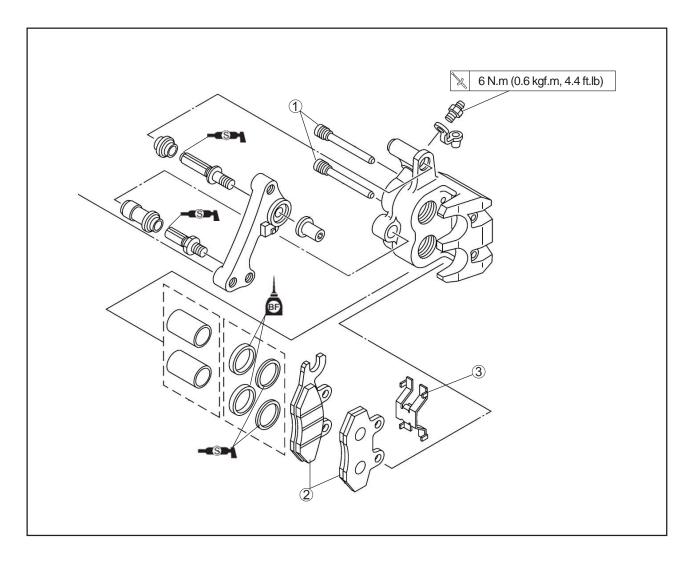
Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

- 6. Check:
  - brake lever operation
     Soft or spongy feeling --> Bleed the brake
     system.
     Refer to "BLEEDING THE HYDRAULIC
     BRAKE SYSTEM" in chapter 3.

## FRONT BRAKE CALIPERS

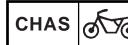


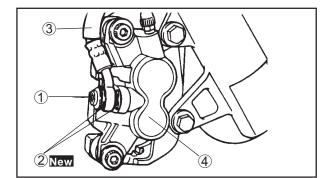
Order	Job/Part	Qt'y	Remarks	
	Removing the front brake caliper		Remove the parts in the order listed	
	Brake fluid		Drain	
1	Brake hose bracket	1		
2	Union bolt	1	]	
3	Copper washer	2	Refer to	
4	Brake hose	1	Disconnect - "INSTALLING	
5	Brake calipers bolt	2	THE BRAKE	
6	Brake calipers assembly	1	CALIPERS"	
			For installation, reverse the removal procedure	



Order	Job/Part	Qt'y	Remarks
	Disassembling the front brake caliper		Remove the parts in the order listed
1 2 3	Guide pins Brake pads Brake pad spring	2 2 1	- Refer to "INSTALLING THE - FRONT BRAKE CALIPERS"  For assembly, reverse the disassembly procedure

### FRONT BRAKE





#### REMOVING THE FRONT BRAKE CALIPER

V	0	Т	Ε	:	

Before removing the brake caliper, drain the brake fluid from the brake systems.

- 1. Remove:
  - union bolt ①
  - copper washer ② New
  - brake hose ③
  - brake caliper 4
     Refer to "REPLACING THE FRONT BRAKE PADS".

N	റ	т	F	1
-17	$\mathbf{}$		_	ì

Put the end of the brake hose into a container and pump out the brake fluid carefully.

#### CHECKING THE BRAKE CALIPER

Recommended schedule for replacing the hydraulic brake components.

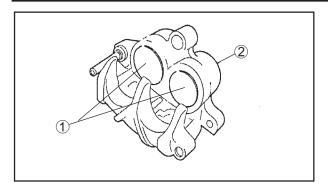
Brake pads	If necessary		
Brake hoses	Every four years		
Brake fluid	Every two years and whenever the brake is disassembled		

#### **MARNING**

Only wash the internal components with brake fluid. Do not use solvents for cleaning.

### FRONT BRAKE





- 1. Check:
  - brake caliper pistons ①
     Rust/scratches/wear --> Replace the brake caliper.
  - brake caliper body ②
     Cracks/damage --> Replace the brake caliper.
  - brake calipers
     Brake fluid leakage --> Replace the brake caliper

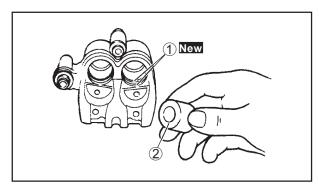
#### **M** WARNING

Replace the piston oil seal whenever the caliper is disassembled.

- 2. Check:
  - brake calipers bracket
     Cracks/Damage --> Replace.

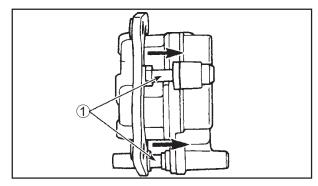
- 3. Check:
  - oil ports
     Unblock blowing with compressed air.





#### ASSEMBLING THE BRAKE CALIPER

- 1. Install:
  - oil seals ① New
  - brake caliper piston ②

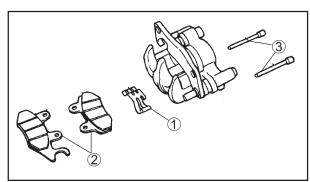


#### 2. Install:

• brake caliper bracket

#### NOTE

Place tightly the rubber sleeve into the proper groove of the guide pin ①.



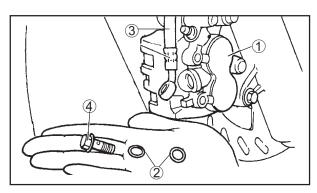
#### 3. Install:

- brake pad spring ①
- brake pads ②
- guide pins ③
   Refer to "REPLACING THE FRONT BRAKE PADS".



#### **Guide pins**

18 N.m (1.8 kgf.m, 13.3 ft.lb)



#### 4. Install:

- caliper ①
- copper washers 2
- brake hose ③
- union bolt 4



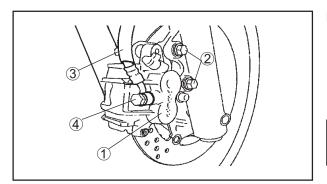
#### **Union bolt**

25 N.m (2.5 kgf.m, 18.5 ft.lb)

### **↑** WARNING

The hose correct position is important to the rider safety. Refer to "CABLE ROUTING", in chapter 2.





#### **INSTALLING THE BRAKE CALIPER**

- 1. Install:
  - brake caliper ①
  - brake caliper bolts 2



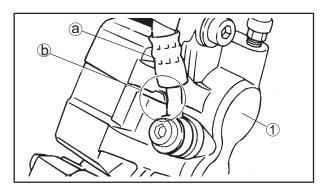
Brake caliper bolts 30 N.m (3.0 kgf.m, 22 ft.lb)

- copper washers New
- brake hose ③
- union bolt 4



**Union bolt** 

25 N.m (2.5 kgf.m, 18.5 ft.lb)



#### **⚠** WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

#### **CAUTION:**

When installing the brake hose onto the brake caliper ①, make sure the metallic end tube ② touches the brake caliper body stopper ⑤.

- 2. Fill:
  - master cylinder reservoir (with the specified amount of the recommended brake fluid)



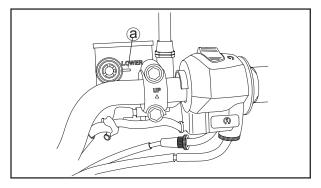
Recommended brake fluid DOT4

#### **⚠** WARNING

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- 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.
- When refilling, be careful that water does not enter the brake master cylinder 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.



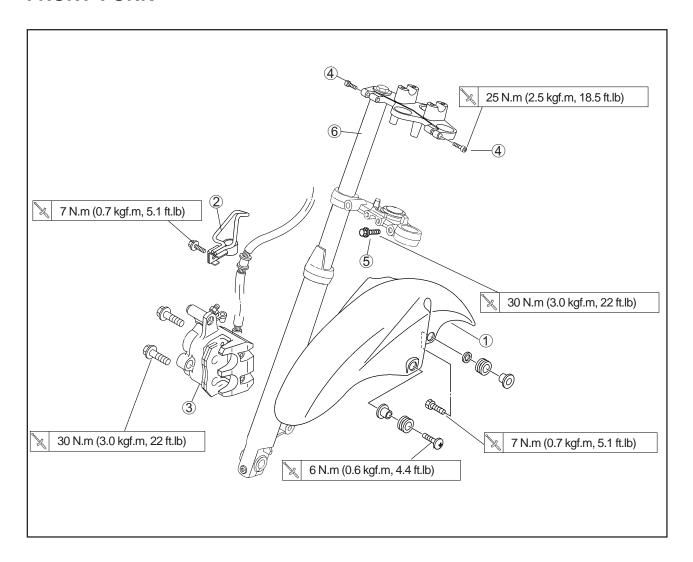
- 3. Bleed:
  - brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
- 4. Check:
  - brake fluid level
     Below the minimum level mark @ --> Add
     the recommended brake fluid to the proper
     level.

Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.

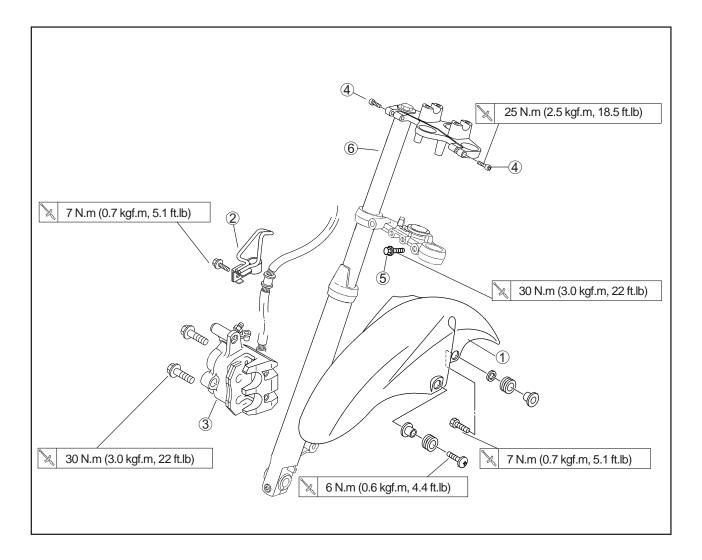
- 5. Check:
  - brake lever operation
     Soft or spongy feeling --> Bleed the brake
     system.

     Refer to "BLEEDING THE HYDRAULIC
     BRAKE SYSTEM" in chapter 3.

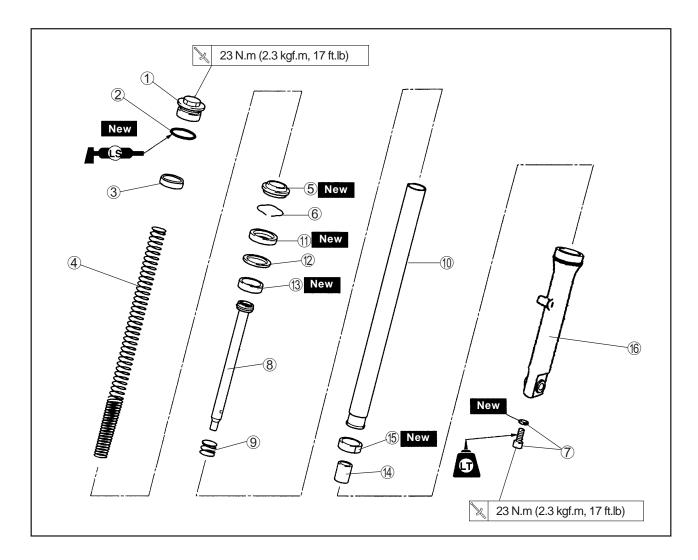
#### **FRONT FORK**



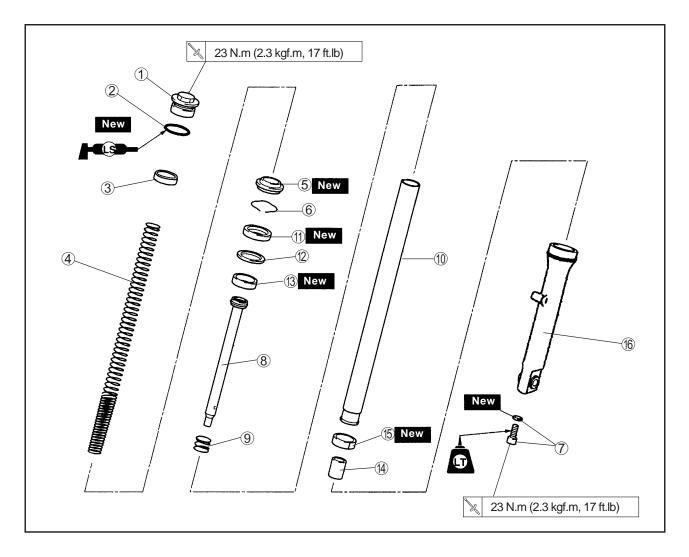
Order	Job/Part	Qt'y	Remarks
	Removing the front fork legs		Remove the parts in the order listed  NOTE: The following procedure applies to the two front fork legs.
1 2 3	Front wheel  Front fender Brake hose holder Front brake caliper	1 1 1	Refer to "FRONT BRAKE DISC AND WHEEL" Refer to "COWLING AND SIDE COVERS" in chapter 3.  Refer to "REPLACING THE BRAKE PADS" Refer to "INSTALLING THE FRONT FORK LEGS"



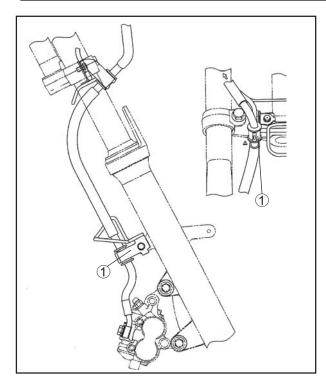
Order	Job/Part	Qt'y	Remarks
4 5 6	Upper bracket mounting bolt Lower bracket mounting bolt Front fork leg	2 2 2	Loosen Refer to "REMOVING THE FRONT FORK LEGS" and "INSTALLING THE FRONT FORK LEGS"  For installation, reverse the removal procedure



Order	Job/Part	Qt'y	Remarks
	Disassembling the front fork leg		Remove the parts in the order listed
			NOTE:
1	Cap bolt	1	The following procedure applies to both
2	O-ring	1	front fork legs.
3	Spacer	1	
4	Fork spring	1	
⑤	Boot	1	Refer to "DISASSEMBLING THE
6	Oil seal clip	1	FRONT FORK LEGS"
7	Shock absorber rod bolt/Copper washer	1/1	and "ASSEMBLING THE FRONT
8	Shock absorber rod	1	FORK LEGS"
9	Rebound spring	1	



Order	Job/Part	Qt'y	Remarks
10	Inner tube	1	Ţ
11)	Oil seal	1	
12	Washer	1	Refer to "ASSEMBLING THE
13	Outer tube bushing	1	FRONT FORK LEG"
(14)	Oil flow stopper	1	
15)	Inner tube bushing	1	
16	Outer tube	1	
			For assembly, reverse the disassembly procedure



#### REMOVING THE FRONT FORK LEGS

The following procedure applies to both front fork legs.

1. Stand the vehicle on a level surface.

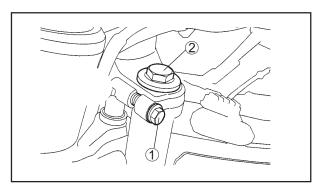
#### **MARNING**

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

#### NOTE:

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

- 2. Remove:
  - brake hose holders ①

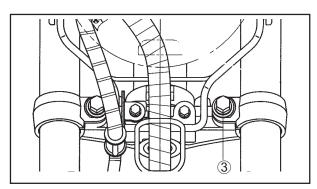


#### 3. Loosen:

- upper bracket mounting bolt ①
- cap bolt ②
- lower bracket mounting bolts ③

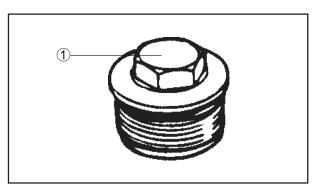
#### **M**WARNING

Before loosening the upper and lower bracket mounting bolts, support the front fork leg.



#### 4. Remove:

- · front fork legs
- front brake caliper Refer to "FRONT BRAKE DISC AND WHEEL".



#### DISASSEMBLING THE FRONT FORK LEGS

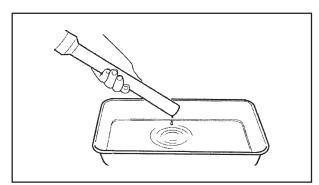
The following procedure applies to both front fork legs.

- 1. Remove:
  - cap bolt 1
  - spacer
  - fork spring

# FRONT FORK CHAS





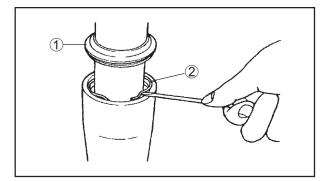


2. Drain:

fork oil

NOTE: \_

Move the outer tube several times while drain the fork oil.

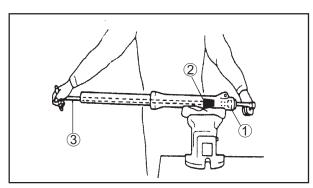


3. Remove:

- boot 1
- oil seal clip ② (flat head screwdriver)

#### **CAUTION:**

Do not scratch the inner tube.



4. Remove:

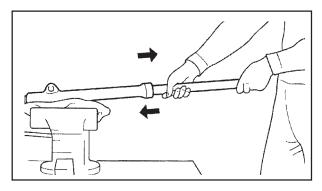
- shock absorber rod bolt 1
- copper washer

While holding the shock absorber rod assembly with the adapter 2 and T-handle 3, loosen the shock absorber rod bolt 1.



T handle 90890-01326 Adapter 90890-01294

- 5. Remove:
  - inner tube

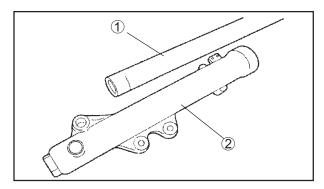


- a. Hold the front fork leg horizontally.
- b. Slowly push the inner tube into the outer tube and just before it bottoms out, pull the inner tube back quickly.
- c. Repeat this step until the inner tube separates from the outer tube.

#### **CAUTION:**

- Excessive force will damage the oil seal and the inner tube bushing. A damaged oil seal or bushing must be replaced.
- Avoid standing the inner tube from the outer tube during the above procedure, or this will damage the oil flow tip.

\*\*\*\*\*



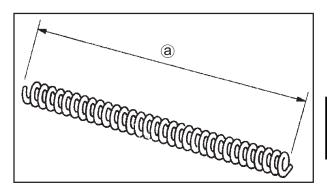
#### CHECKING THE FRONT FORK LEGS

The following procedure applies to both front fork legs.

- 1. Check:
  - inner tube ①
  - outer tube ②
     Damage/Scratches --> Replace.

#### **^**WARNING

Do not attempt to align a bent inner tube as this may dangerously weaken it.



#### 2. Measure:

spring free length (a)
 Out of specification --> Replace.

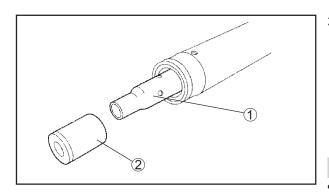


Spring free lenght 480.4 mm (18.9 in) imit>: 470.80 mm (18.5 in)

#### **FRONT FORK**







- 3. Check:
  - shock absorber rod ①
     Damage/Wear --> Replace.
     Clogged --> Blow out all of the oil passages with compressed air.
  - oil flow switch ②
     Damage --> Replace.

#### **CAUTION:**

- The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.
- When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.

#### ASSEMBLING THE FRONT FORK LEGS

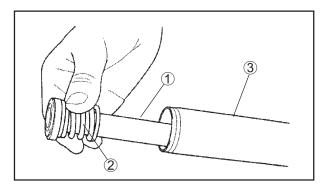
The following procedure applies to both front fork legs.

#### **MARNING**

- Make sure the oil levels in both front fork legs are equal.
- 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;
  - boot.
- Before assembling the front fork leg, make sure all of the components are clean.



- 1. Install:
  - shock absorber rod ①
  - rebound spring ②

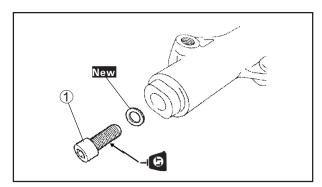
#### **CAUTION:**

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.

- 2. Lubricate:
  - inner tube's outer surface



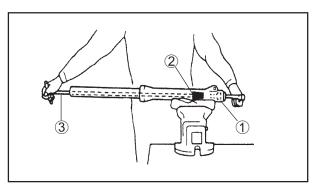
**Recommended Iubricant** fork and shock oil 10 W or equivalent



- 3. Tighten:
  - shock absorber rod bolt 1

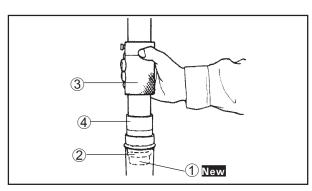


Shock absorber rod mounting 23 N.m (2.3 kgf.m, 17 ft.lb) LOCTITE ®



#### NOTE:

While holding the damper rod assembly with the shock absorber rod holder 2 and the T-handle 3, tighten the shock absorber rod assembly bolt 1.

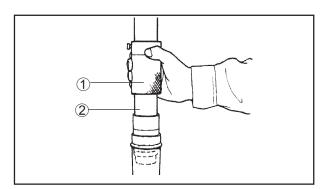


- 4. Install:
  - outer tube bushing ① New (with the sliding installer to the fork retainer 3 and adapter 4)
  - washer 2



Leg retainer installer 90890-01367 Adapter 90890-01371

# FRONT FORK CHAS



5. Install:

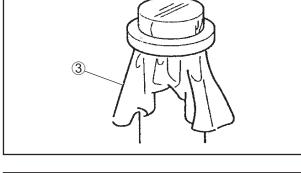
 oil seal New (with the sliding installer 1) and the adapter

#### **CAUTION:**

Make sure the numbered side of the oil seal faces up.

#### NOTE: \_

- Before installing the oil seal, lubricate its lips with lithium-soap-based grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Cover the top of the front fork leg with a plastic bag ③ to protect the oil seal during installation.

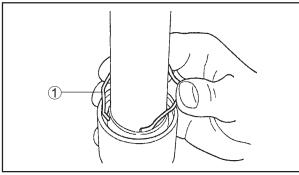


6. Install:

• oil seal clip ①

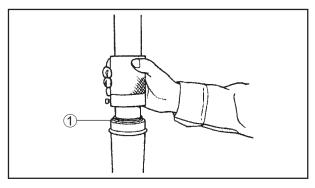
#### NOTE: \_

Adjust the oil seal clip so that it fits into the outer tube's groove.



7. Install:

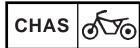
• boot (1)

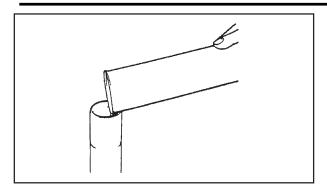




Leg retainer installer 90890-01367 Adapter 90890-01371

### FRONT FORK





(a)

#### 8. Fill:

 front fork leg (with the specified amount of the recommended fork oil)



Amount (each leg)
0.319 L (0.07 Imp gal, 0.08 US gal)
Recommended oil
Fork and shock oil 10W or
equivalent

#### 9. Measure:

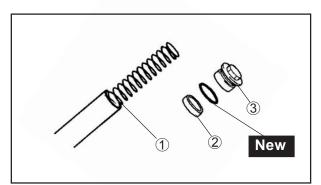
leg oil level @
 Out of specification --> Correct.



Leg oil level (from the top of the inner tube, with the inner tube fully compressed, and without the spring)
123.0 mm (4.8 in)

#### NOTE: \_

- While filling the front fork leg, keep it upright.
- After filling, slowly rock the front fork leg upward and downward to spread the fork oil.



#### 10. Install:

- spring ①
- spacer ②
- o-ring New
- cap bolt ③

#### NOTE:

- Install the spring with the bigger pitch facing up.
- Before installing the cap bolt, lubricate its o-ring with lithium-soap-based grease.
- Temporarily tighten the cap bolt.

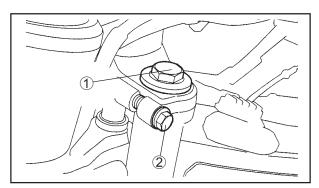
#### **INSTALLING THE FRONT FORK LEGS**

The following procedure applies to both front fork legs.

- 1. Install:
  - front fork leg
     Temporarily tighten the lower bracket mounting bolts.

#### NOTE:

When installing the front fork leg, align the inner tube with its upper end exceeding the upper bracket top in 1.0 mm.



- 2. Tighten:
  - leg cap bolt 1



Leg cap bolt 23 N.m (2.3 kgf.m, 17 ft.lb)

- · lower bracket mounting bolt
- upper bracket mounting bolt 2

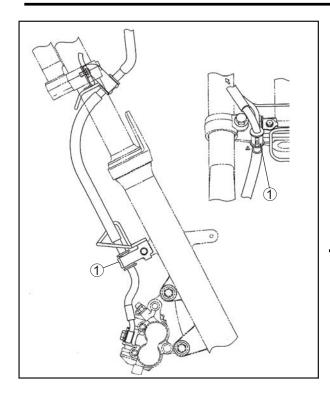


Mounting bolts
Lower bracket:
30 N.m (3.0 kgf.m, 22 ft.lb)
Upper bracket:
25 N.m (2.5 kgf.m, 18.5 ft.lb)

#### **M**WARNING

Make sure that the brake hose is properly installed.





3. Tighten:

• brake hose holders 1



**Brake hose holders** 7 N.m (0.7 kgf.m, 5.1 ft.lb)

• front fender

#### **⚠** WARNING

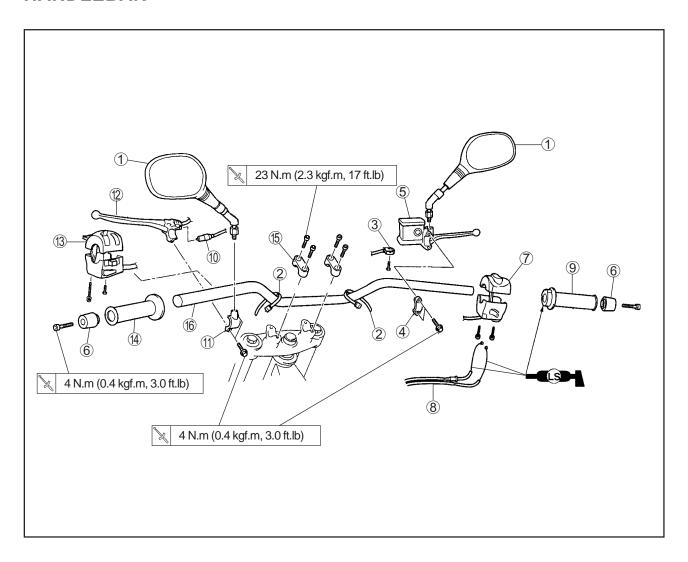
Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" in chapter 2.

- 4. Install:
  - bolts (brake caliper)

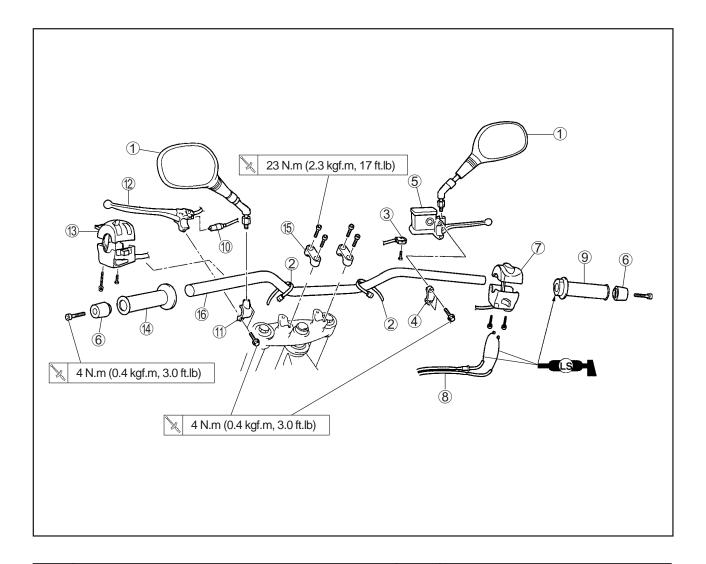


**Bolts (brake caliper)** 30 N.m (3.0 kgf.m, 22 ft.lb)

- 5. Install:
  - front wheel Refer to "FRONT BRAKE DISC AND WHEEL".



Order	Job/Part	Qt'y	Remarks
	Removing the handlebar		Remove the parts in the order listed
1	Rearview mirror (left and right)	2	
2	Plastic clamp	2	
3	Front brake light switch	1	Disconnect
			Refer to "REMOVING THE
4	Brake master cylinder holder	1	HANDLEBAR"
5	Brake master cylinder	1	
6	Grip end	2	Refer to "INSTALLING THE
7	Right handlebar switch	1	HANDLEBAR"
8	Throttle cable	2	]



Order	Job/Part	Qt'y	Remarks
9	Throttle grip	1	Disconnect ]
10	Clutch switch	1	Refer to "INSTALLING
11	Clutch lever holder	1	THE HANDLEBAR"
12	Clutch lever	1	
13	Left handlebar switch	1	
14	Handlebar grip	1	Refer to "REMOVING THE HANDLEBAR" and "INSTALLING THE HANDLEBAR"
15	Handlebar upper holder	2	Refer to "INSTALLING THE
16	Handlebar	1	HANDLEBAR"
			For installation, reverse the removal procedure

#### REMOVING THE HANDLEBAR

1. Stand the vehicle on a level surface.

#### **MARNING**

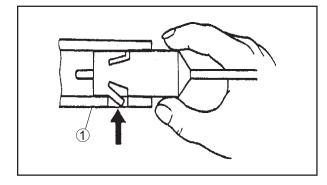
Securely support the vehicle so that there is no danger of it falling over.



- front brake light switch
- clutch switch 1



Push the lock to remove the clutch lever clutch switch.

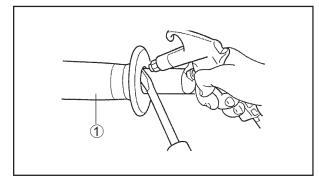


#### 3. Remove:

• handlebar lever 1

#### NOTE:

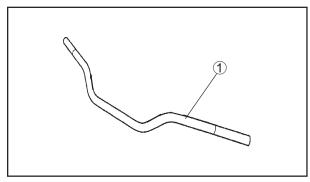
Blow compressed air between the handlebar and the handlebar grip, and gradually push the grip off the handlebar.



#### CHECKING THE HANDLEBAR

1. Check:

handlebar ①
 Seizure/Scratches/Damage --> Replace.



#### **⚠** WARNING

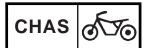
Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

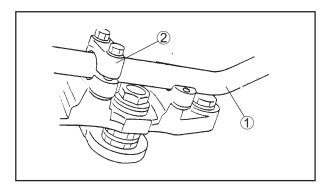
#### **INSTALLING THE HANDLEBAR**

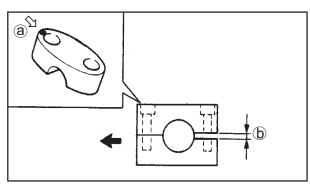
1. Stand the vehicle on a level surface.

### **M**WARNING

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









- handlebar (1)
- handlebar upper holders 2



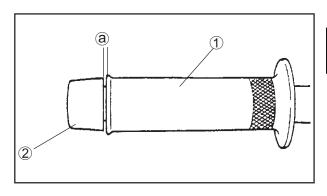
Handlebar upper holders 23 N.m (2.3 kgf.m, 17 ft.lb)

#### **CAUTION:**

- First, tighten the bolts on the front side of the handlebar upper holder, and then the rear side bolts.
- Turn the handlebar completely to the left or right. If there is any contact with the fuel tank, adjust the handlebar position.

#### NOTE

- The upper handlebar holders should be installed with the arrow marks @ facing forward.
- Align the match marks (b) on the handlebar with the upper surface of the lower handlebar holders.



- 3. Install:
  - throttle grip ①
  - grip end ②



Grip end bolt

4 N.m (0.4 kgf.m, 3.0 ft.lb)

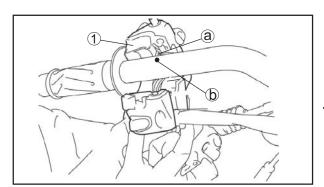
- a. Lubricate the handlebar left end with a thin coat of rubber seal.
- b. Slide the grip through the handlebar left end.
- c. Wipe off any rubber seal excess with a clean cloth.

#### **▲** WARNING

Do not touch the handlebar lever until the rubber seal is completely dry.

#### NOTE:

There must be a 1 to 3 mm free play ⓐ between the handlebar lever and its end.

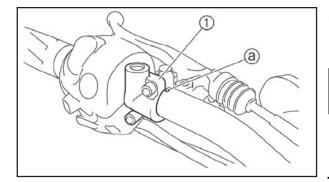


4. Install:

left handlebar switch ①

#### NOTE

Align the projection ⓐ on the left handlebar switch with the hole ⓑ in the handlebar.



5. Install:

- · clutch lever
- clutch lever holder 1

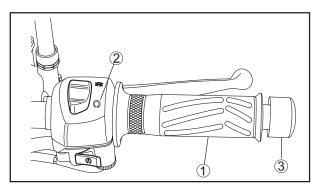


Lever holder bolt

4 N.m (0.4 kgf.m, 3.0 ft.lb)

#### NOTE:

Align the contact surfaces of the clutch lever holder with the punction mark (a) in the handlebar.



6. Install:

- throttle grip ①
- · throttle cables
- right handlebar switch 2
- grip end ③

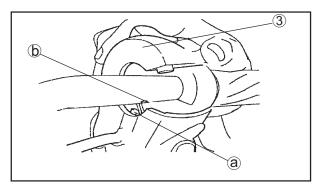


Grip end bolt

4 N.m (0.4 kgf.m, 3.0 ft.lb)

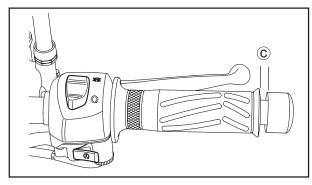
#### NOTE:

- Lubricate the inner part of the throttle grip with a thin coat of lithium-soap-based grease and install it to the handlebar.
- Route the throttle cables through the groove into the right handlebar switch, and then install the cables.
- Align the projection ⓐ on the right handlebar switch with the hole ⓑ on the handlebar.
- There must be a 1 to 3 mm free play © between the throttle lever and its end.



7. Install:

• throttle cable holder



#### **↑** WARNING

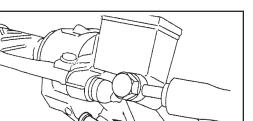
Make sure that the throttle grip operates smoothly.



- 8. Install:
  - brake master cylinder
  - brake master cylinder holder Refer to "REAR AND FRONT BRAKES".

#### 9. Adjust:

 clutch cable free play Refer to "ADJUSTING THE CLUTCH CABLE FREE PLAY" in chapter 3.





Clutch cable free play (on the clutch lever end)

10.0 ~ 15.0 mm (0.4 ~ 0.6 in)

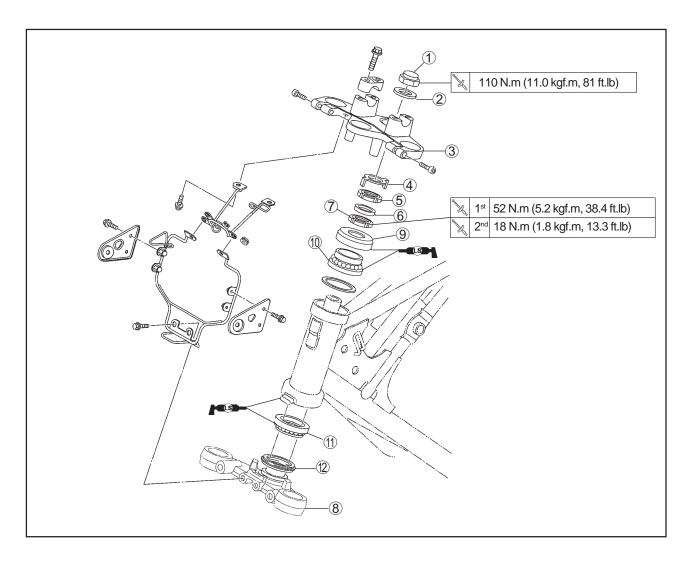
#### 10. Adjust:

 throttle cable free play Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.

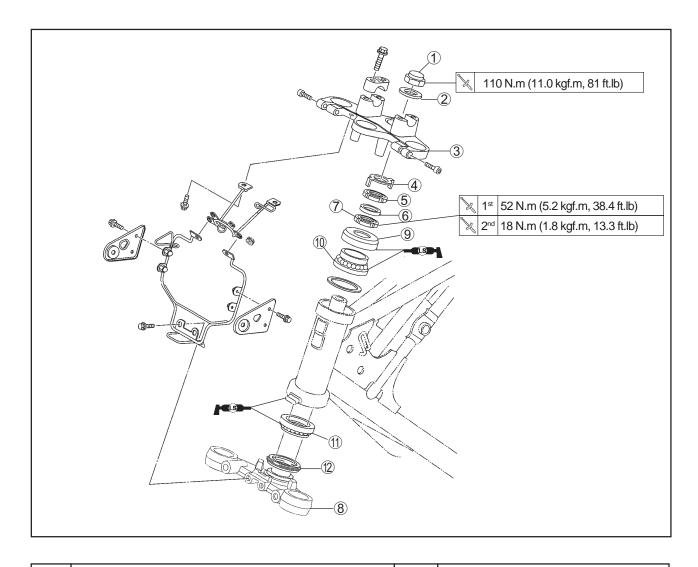


Throttle cable free play (in the grip) 3.0 ~ 5.0 mm (0.12 ~ 0.20 in)

#### STEERING HEAD



Order	Job/Part	Qt'y	Remarks
	Removing the lower bracket		Remove the parts in the order listed
	Front wheel		Refer to "FRONT BRAKE DISC AND WHEEL"
	Front fork legs		Refer to "FRONT FORK"
	Handlebar		Refer to "HANDLEBAR"
	Front fender		
1	Steering stem nut	1	h
2	Washer	1	Refer to "REMOVING THE
3	Upper bracket	1	LOWER BRACKET" and
4	Lock washer	1	"INSTALLING THE HEAD
5	Upper ring nut	1	STEERING"
6	Rubber washer	1	1



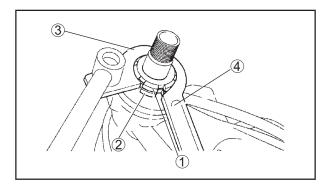
Order	Job/Part	Qt'y	Remarks
7	Lower ring nut	1	Refer to "REMOVING THE
8	Lower bracket	1	LOWER BRACKET" and
			"INSTALLING THE STEERING
9	Bearing cover	1	HEAD"
10	Upper bearing	1	Refer to "INSTALLING THE
11	Lower bearing	1	STEERING HEAD"
12	Seal bearing	1	_
			For installation, reverse the removal procedure

#### REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

#### **MARNING**

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



#### 2. Remove:

- upper ring nut ①
- rubber washer
- lower ring nut 2
- lower bracket

#### NOTE:

Using the handlebar nut wrench ③, tighten the lower ring nut and remove the upper ring nut with the ring nut wrench ④.



Steering nut wrench 90890-01403 Ring nut wrench 90890-01268

#### **⚠** WARNING

Securely support the lower bracket so that there is no danger of it falling.

#### CHECKING THE STEERING HEAD

- 1. Wash:
  - bearing cover
  - upper bearing
  - lower bearing



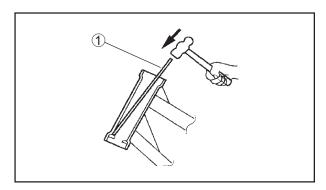
Recommended cleaning solvent Kerosene

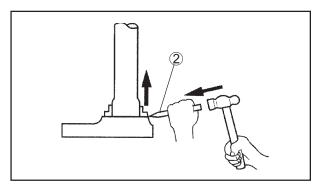
- 2. Check:
  - bearing cover
  - upper bearing
  - lower bearing Damage/Pitting --> Replace.

### STEERING HEAD









3. Replace:

- bearing cover
- · upper bearing
- lower bearing

a. With a long rod ① and a hammer, remove the

- bearing races from the steering head.
- b. Remove the lower bracket bearing race with a floor chisel ② and a hammer.
- c. Install new bearing races.

#### NOTE:

Always replace the bearings and its races as a set.

\_\_\_\_\_

4. Check:

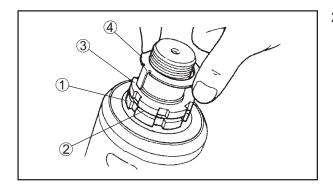
- upper bracket
- lower bracket (along with the steering head) Bends/Cracks/Damage --> Replace.

#### **INSTALLING THE STEERING HEAD**

- 1. Lubricate:
  - · bearing cover
  - upper bearing
  - lower bearing



Recommended lubricant Lithium-soap-based grease



- 2. Install:
  - lower ring nut 1
  - rubber washer ②
  - upper ring nut ③
  - lock washer 4
     Refer to "CHECKING THE STEERING HEAD" in chapter 3.

### **STEERING HEAD**

- 3. Install:
  - upper bracket
  - steering head nut

#### NOTE:

Temporarily tighten the steering rod nut.

- 4. Install:
  - front fork legs
     Refer to "INSTALLING THE FRONT FORK
     LEGS".

#### NOTE: \_

Temporarily tighten the lower bracket.

- 5. Tighten:
  - steering stem nut



Steering stem nut 110 N.m (11.0 kgf.m, 81 ft.lb)

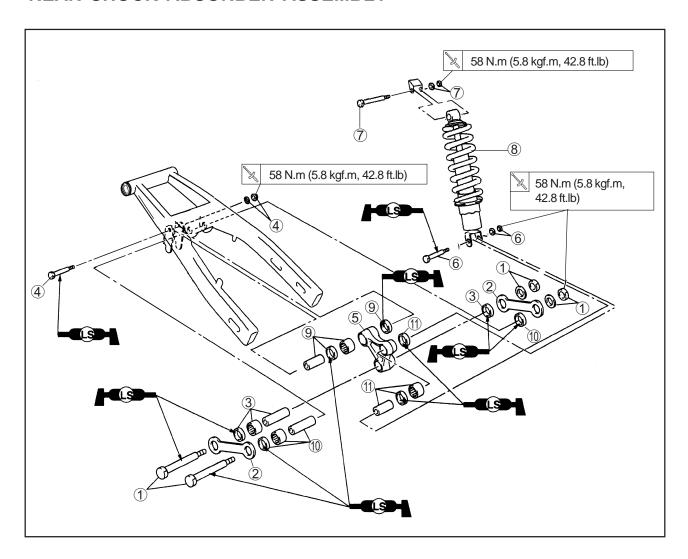
- 6. Install:
  - handleabr
  - handlebar upper holders Refer to "HANDLEBAR".
- 7. Tighten:
  - handlebar upper holder nuts



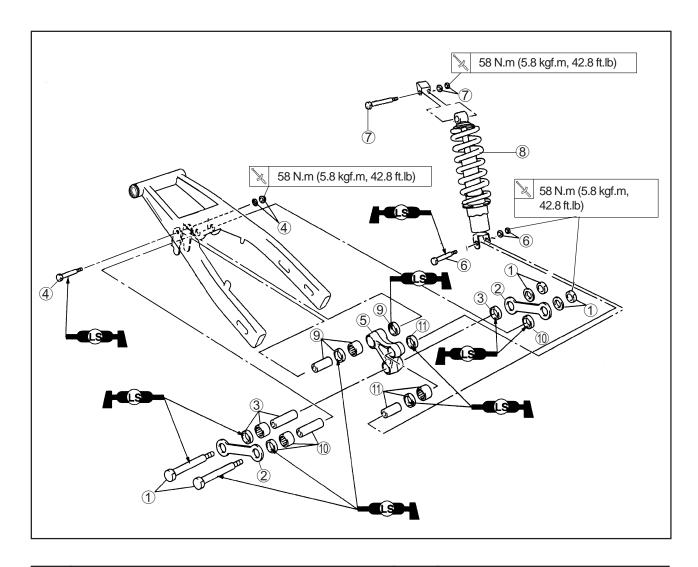
Upper holder nuts 23 N.m (2.3 kgf.m, 17 ft.lb)



#### REAR SHOCK ABSORBER ASSEMBLY



Order	Job/Part	Qt'y	Remarks
	Removing the rear shock absorber assembly Seat / rear side covers (left and right) / tail Rear fender / air filter case		Remove the parts in the order listed Refer to "COWLING AND SIDE COVERS" in chapter 3
	Rear wheel		Refer to "REAR WHEEL, BRAKE DISC AND REAR WHEEL SPROCKET"
1 2 3	Self-locking nut / washer / bolt Connecting arm Oil seal / bushing / spacer	2/2/2 2 2/1/1	Refer to "REMOVING THE REAR SHOCK ABSORBER ASSEMBLY" and "INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY"



Order	Job/Part	Qt'y	Remarks
4	Self-locking nut / washer / bolt	1/1/1	Refer to "REMOVING THE
5	Relayarm	1	REAR SHOCK ABSORBER
6	Self-locking nut / washer / bolt	1/1/1	ASSEMBLY" and "INSTALLING
7	Self-locking nut / washer / bolt	1/1/1	THE REAR SHOCK ABSORBER
8	Rear shock absorber assembly	1	ASSEMBLY"
9	Oil seal / bushing / spacer	2/1/1	]
10	Oil seal / bushing / spacer	2/1/1	- Refer to "INSTALLING THE
11	Oil seal / bushing / spacer	2/1/1	RELAY ARM"
			For installation, reverse the
			removal procedure

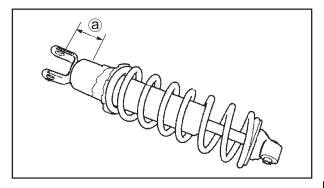


#### HANDLING THE REAR SHOCK ABSORBER

#### **⚠** WARNING

This rear shock absorber contain highly compressed nitrogen gas. Before handling the rear shock absorber, 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.

- Do not tamper or attempt to open the rear shock absorber
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. If the rear shock absorber is damaged, damping performance will suffer.



#### DISPOSING A REAR SHOCK ABSORBER

Gas pressure must be released before disposing of a rear shock absorber and gas cylinder. To release the gas pressure, drill a 2 ~3 mm hole at the point @ 30 to 60 mm from its end as shown.

#### **M** WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.



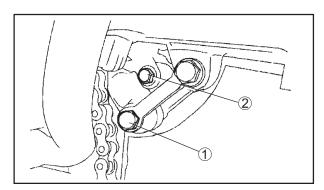
## REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

### **⚠** WARNING

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

NOTE:
Place the vehicle on a suitable stand so that the
rear wheel is elevated.



#### 2. Remove:

- connecting arm bolt 1
- lower bolt of the rear shock absorber assembly ②

#### NOTE:

While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.

#### 3. Remove:

- upper bolt of the rear shock absorber assembly
- · rear shock absorber assembly

#### NOTE:

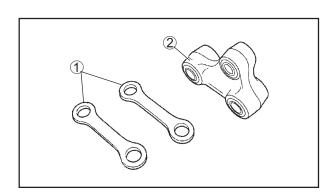
Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm and relay arm.



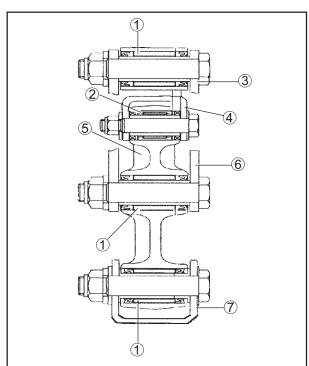
## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Check:
  - rear shock absorber rod Bends/Damage --> Replace the rear shock absorber assembly.
  - rear shock assembly
     Oil leakage --> Replace the rear shock
     absorber assembly.
  - spring
     Damage/Wear --> Replace the rear shock absorber assembly.
  - bolts
     Bents/Damage/Wear --> Replace.

## CHECKING THE CONNECTING ARMS AND RELAY ARMS



- 1. Check:
  - connecting arms 1
  - relay arms ②
     Damage/Wear --> Replace.
- 2. Check:
  - spacers
  - oil seals
  - bushings
     Damage/Pitting/Scratches --> Replace.



#### **INSTALLING THE RELAY ARM**

- 1. Install:
  - bushing ①
     (in the relay arm and rear swingarm)
  - bushing ② (in the relay arm)
- 3 Rear swingarm
- 4 Rear shock absorber
- ⑤ Relay arm
- 6 Connecting arm
- 7 Chassis



## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Lubricate:
  - bushings
  - bolt



Recommended lubricant Lithium-soap-based grease

- 2. Install:
  - · rear shock absorber assembly

#### NOTE:

When installing the rear shock absorber assembly, lower the rear swingarm.

- 3. Tighten:
  - upper nut of the rear shock absorber assembly



Upper nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

Lower nut of the rear shock absorber assembly



Lower nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

• relay arm nut - chassis



Relay arm nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

relay arm nut - connecting arm



Connecting arm nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

• connecting arm nut - rear swingarm



Connecting arm nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

- 4. Adjust:
  - chain slack
     Refer to "ADJUSTING THE DRIVE CHAIN
     SLACK" in chapter 3.

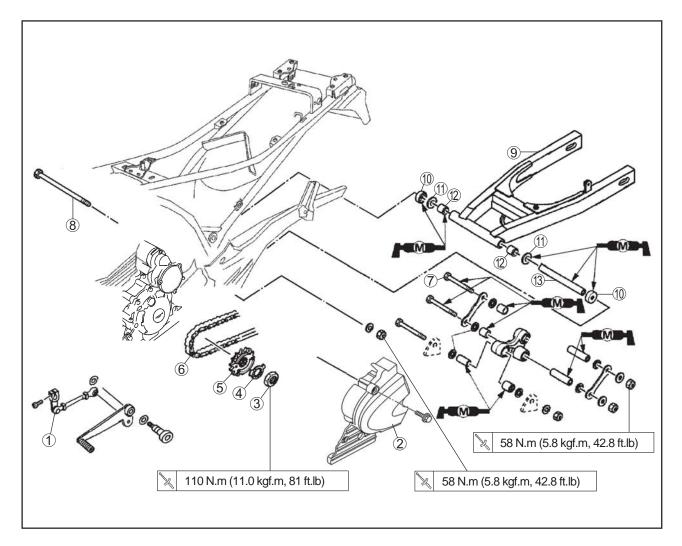


Drive chain slack

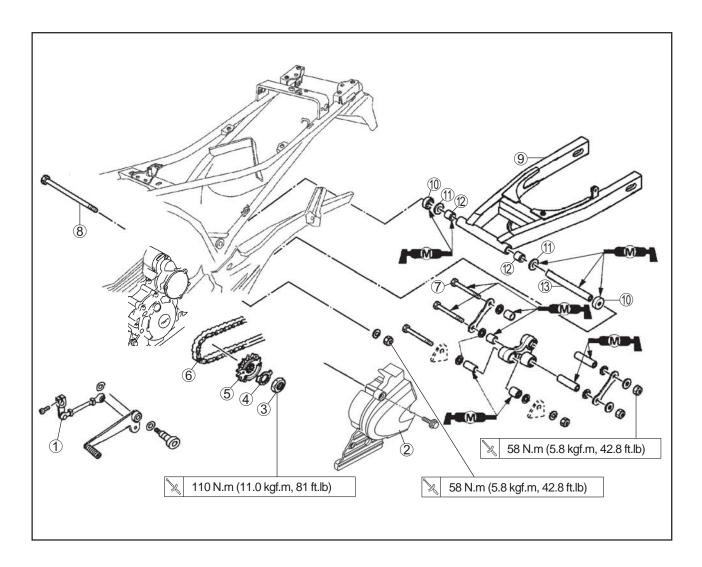
25.0 ~ 35.0 mm (1.0 ~ 1.4 in)

# SWINGARM AND DRIVE CHAIN CHAS

#### **SWINGARM AND DRIVE CHAIN**



Order	Job/Part	Qt'y	Remarks
	Removing the swingarm and drive chain		Remove the parts in the order listed
	Rear Wheel		Refer to "REAR WHEEL, BRAKE
	Shock absorber		DISC, AND REAR WHEEL
			SPROCKET"."
			Refer to "REAR SHOCK ABSORBER"
1	Shift pedal pivot	1	Loosen
2	Drive sprocket cover	1	
3	Drive sprocket nut	1	
4	Lock washer	1	
5	Drive sprocket	1	
6	Drive chain	1	Refer to "REMOVING THE DRIVE CHAIN"



Order	Job/Part	Qt'y	Remarks
7	Bolt (relay arm - connecting arm)	1	
8	Swingarm shaft	1	
9	Swingarm	1	
10	Cover	2	
11	Washer	2	Refer to "INSTALLING THE
12	Bearing	2	REAR SWINGARM".
13	Spacer	1	
			For installation, reverse the removal procedure





#### **REMOVING THE SWINGARM**

1. Stand the vehicle on a level surface.

## **⚠** WARNING

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

### NOTE:

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

- 2. Measure:
  - swingarm side play
  - swingarm vertical movement
- a. Measure the tightening torque of the swingarm shaft nut.



Rear swingarm shaft nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

- b. Measure the lateral play A by moving the swingarm from side to side.
- c. If the swingarm side play is out of specification, check the spacers, bushings and dust seals.

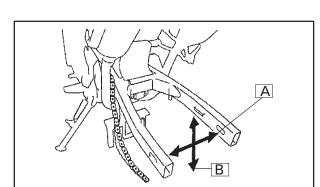


Swingarm side play (at the end of the swingarm) 1.0 mm (0.04 in)

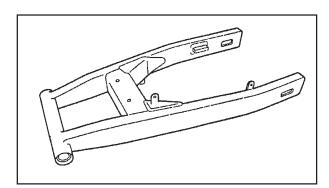
d. Check the swingarm vertical movement
 B by moving the swingarm up and down.
 If swingarm vertical movement is not smooth or if there is binding, check the spacers, bushings and dust seals.

\_\_\_\_

- 3. Remove:
  - swingarm shaft nut
  - swingarm shaft
  - swingarm

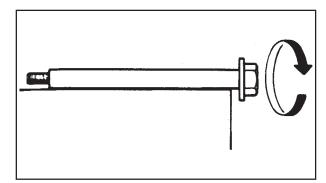






## **CHECKING THE SWINGARM**

- 1. Check:
  - swingarm Bends/Cracks/Damage --> Replace.



## 2. Check:

Swingarm shaft
 Roll the rear swingarm shaft on a level
 surface.

Bends --> Replace.

## **⚠** WARNING

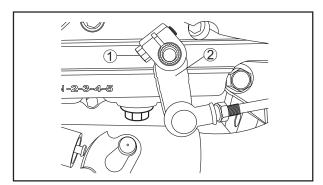
Do not attempt to straighten a bent pivot shaft.

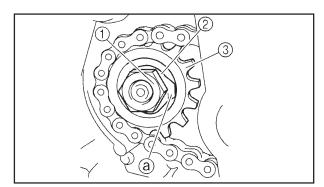
- 3. Wash:
  - swingarm shaft
  - dust seals
  - spacer
  - bushing
  - bearing



Recommended cleaning solvent Kerosene

- 4. Check:
  - Dust seals
  - spacers
  - oil seals
    - Damage/Wear --> Replace.
  - bushings
     Damages/Pitting --> Replace.





#### REMOVING THE SPROCKET

#### NOTE

Loosen the drive sprocket nut before removing the rear wheel.

- 1. Remove:
  - bolt (1)
  - shift pedal pivot 2
- 2. Remove:
  - drive sprocket cover
- 3. Lift the lock washer tab (a)
- 4. Remove:
  - drive sprocket nut 1
  - lock washer ②
  - drive sprocket ③

## **REMOVING THE DRIVE CHAIN**

1. Stand the vehicle on a level surface.

## **⚠** WARNING

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

## NOTE:

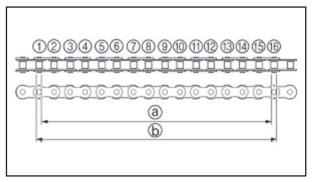
Place the vehicle on a suitable stand so that the rear wheel is elevated.

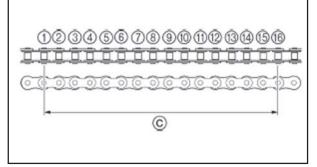
- 2. Remove:
  - drive chain

## CHECKING THE DRIVE CHAIN

- 1. Measure:
  - The 15-links length in the inner part (a) and the outer part (b) in the roller and calculate the length between the central rollers.
  - Length © between central rollers = (inner dimension @ + outer dimension ®)/2.
  - Drive chain 15-links segment.

Out of specification --> Replace the drive chain, drive sprocket and driven sprocket as a set.



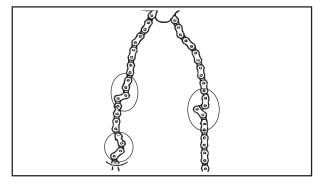




15-links segment limit (maximum) 191.5 mm (7.54 in)

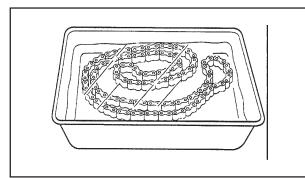
### NOTE:

- While measuring the 15-links segment, push down on the drive chain to increase its tension.
- Perform this measurement at two or three different places.



### 2. Check:

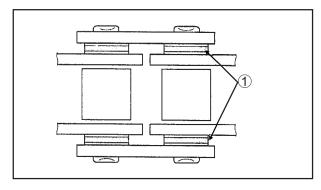
drive chain
 Stiffness --> clean and lubricate or replace.



### 3. Clean:

drive chain

- a. Wipe the drive chain with a clean cloth.
- b. Put the drive chain in kerosene and remove any remaining dirt.
- c. Remove the drive chain from the kerosene and completely dry it.



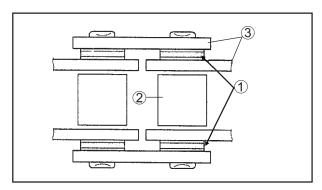
## **CAUTION:**

 This vehicle has a drive chain with small rubber O-rings ① between the drive chain side plate. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain.

High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosene to clean the drive chain.

 Do not dip the drive chain into kerosene for more than 10 minutes, otherwise the O-rings may be damaged.

\_\_\_\_



## 4. Check:

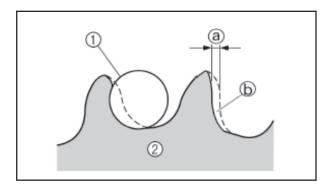
- O-rings ①
   Damage --> Replace the drive chain.
- drive chain rollers ②
   Damage/Wear --> Replace the drive chain.
- drive chain side plates ③
   Cracks --> Replace the drive chain and make sure the battery breather hose is properly routed away from the drive chain and below the rear swingarm.

## 5. Lubricate:

drive chain



Recommended lubricant Engine oil or chain lubricant suitable for non-O-ring chains



## 6. Check:

- drive sprocket
- driven sprocket

More than  $^{1}/_{_{4}}$  tooth ⓐ wear --> Replace the drive sprocket and the driven sprocket as a set.

Bent teeth --> Replace the drive sprocket and the driven sprocket as a set.

- **(b)** Correct
- 1 Chain roller
- 2 Drive sprocket

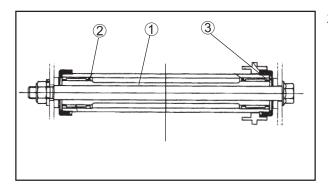


## INSTALLING THE SWINGARM

- 1. Lubricate:
  - spacers
  - dust seals
  - swingarm shaft



Recommended lubricant lithium-soap-based grease



- 2. Install:
  - bushing 1
  - bearings 2
  - washers ③

- 3. Install:
  - swingarm
  - swingarm shaft
  - swingarm shaft nut



Rear swingarm shaft nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

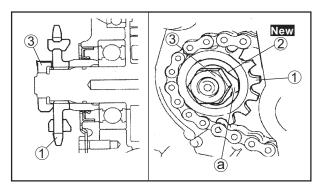
- 4. Install:
  - connecting arm bolt
  - washer
  - connecting arm nut



Connecting arm nut 58 N.m (5.8 kgf.m, 42.8 ft.lb)

 rear wheel Refer to "INSTALLING THE REAR WHEEL".





- 5. Install:
  - drive sprocket ①
  - lock washer ②Ne
  - drive sprocket nut 3



Drive sprocket nut 110 N.m (11.0 kgf.m, 81.0 ft.lb)

## NOTE:

- Install the drive sprocket ① and the nut ③ as shown above.
- While operating the rear brake, tighten the drive sprocket nut.
- 6. Bend the lock washer tab ⓐ at the drive sprocket nut side.

## 7. Adjust:

 drive chain slack Refer to "ADJUSTING THE DRIVE CHAIN SLACK" in chapter 3.



Drive chain slack 25.0 ~ 35.0 mm (1.0 ~ 1.4 in)

## 8. Adjust:

 shift pedal position Refer to "ADJUSTING THE SHIFT PEDAL POSITION" in chapter 3.



Shift pedal position (Top of the rider footrest) 30.0 mm (1.18 in)

# **CHAPTER 5**

# **ENGINE**

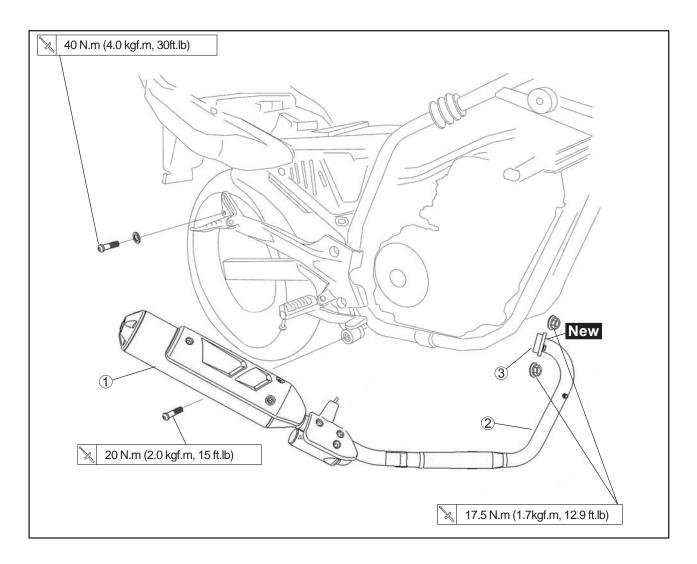
REMOVING THE ENGINE	
MUFFLER AND EXHAUST PIPE	5-1
LEADS, CABLES, HOSES AND IGNITION COIL	
ENGINE	
INSTALLING THE ENGINE	5-6
CYLINDER HEAD	5-7
REMOVING THE CYLINDER HEAD	
CHECKING THE CYLINDER HEAD	
CHECKING THE TAPPET COVERS AND CAMSHAFT	0 10
SPROCKET COVER	5-10
CHECKING THE TIMING CHAIN TENSIONER	
CHECKING THE CAMSHAFT SPROCKET	
INSTALLING THE CYLINDER HEAD	
	- 40
ROCKER ARMS AND CAMSHAFT	
REMOVING THE ROCKER ARMS AND CAMSHAFT	
CHECKING THE CAMSHAFT	
CHECKING THE ROCKER ARMS AND CAMSHAFTS	
INSTALLING THE ROCKER ARMS AND CAMSHAFTS	5-19
VALVES AND VALVE SPRINGS	5-21
REMOVING THE VALVES	
CHECKING THE VALVES AND VALVE GUIDES	
CHECKING THE VALVE SEAT	
CHECKING THE VALVE SPRINGS	
INSTALLING THE VALVES	5-28
CYLINDED AND DICTON	<b>-</b> 20
CYLINDER AND PISTON	
REMOVING THE CYLINDER AND PISTON	
CHECKING THE CYLINDER AND PISTON	
CHECKING THE PISTON RINGSCHECKING THE PISTON PIN	
INSTALLING THE CYLINDER AND PISTON	
INSTALLING THE CYLINDER AND PISTON	5-35
CLUTCH	5-37
CLUTCH COVER	5-37
PULL LEVER SHAFT	5-38
CLUTCH	5-39
REMOVING THE CLUTCH	
CHECKING THE PRIMARY DRIVE GEAR	5-42
CHECKING THE FRICTION PLATES	5-42
CHECKING THE CLUTCH PLATES	5-42
CHECKING THE CLUTCH SPRINGS	
CHECKING THE CLUTCH HOUSING	
CHECKING THE PRESSURE PLATE	
CHECKING THE PUSH LEVER SHAFT AND PUSH ROD	
CHECKING THE PRESSURE PLATE	5-44
INSTALLING THE CLUTCH	5-44

OIL PUMP AND BALANCER GEAR	
OIL PUMP	
CHECKING THE OIL PUMP	
CHECKING THE OIL DELIVERY HOSES AND PIPES	
ASSEMBLING THE OIL PUMP	
INSTALLING THE OIL PUMP	
REMOVING THE BALANCER GEAR	
CHECKING THE BALANCER GEAR	
ASSEMBLING THE BALANCER GEAR	
BALANCER GEAR TIMING WITH THE DRIVE GEAR	. 5-55
OIL COOLER	
CHECKING THE OIL COOLER	
ASSEMBLING THE OIL COOLER	. 5-59
SHIFT SHAFT	
SHIFT SHAFT AND STOPPER LEVER	
DISASSEMBLING THE SHIFT SHAFT	
CHECKING THE SHIFT SHAFT	. 5-61
CHECKING THE STOPPER LEVER	. 5-61
INSTALLING THE SHIFT SHAFT	. 5-61
STARTER CLUTCH AND AC MAGNETO	
REMOVING THE AC MAGNETO	
CHECKING THE STARTER CLUTCH (ONE WAY)	. 5-66
ASSEMBLING THE AC MAGNETO	. 5-66
CRANKSHAFT AND CRANKCASES	. 5-69
DISASSEMBLING THE CRANKCASES	. 5-71
REMOVING THE BALANCER AND CRANKSHAFT	
ASSEMBLY	. 5-72
CHECKING THE CRANKSHAFT	. 5-72
CHECKING THE CRANKCASES	. 5-73
CHECKING THE TIMING CHAIN GUIDE AND TIMING CHAIN	. 5-73
ASSEMBLING THE CRANKSHAFT	
INSTALLING THE CRANKSHAFT ASSEMBLY	. 5-74
ASSEMBLING THE CRANKCASE (RIGHT SIDE)	. 5-75
TRANSMISSION	. 5-77
MAIN AXLE/ DRIVE AXLE	. 5-78
REMOVING THE TRANSMISSION	
CHECKING SHIFT DRUM AND SHIFT FORKS	
CHECKING THE TRANSMISSION	
INSTALLING THE TRANSMISSION	



## **ENGINE**

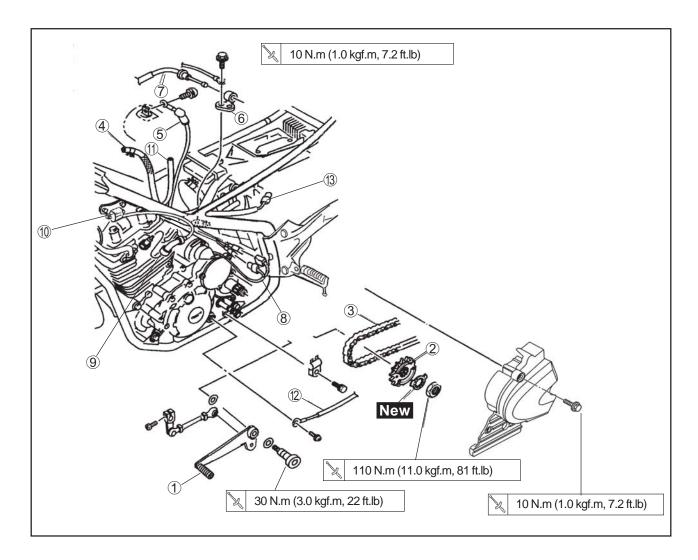
## **MUFFLER AND EXHAUST PIPE**



Order	Job/Part	Qt'y	Remarks
	Removing the muffler and the exhaust pipes		Remove the parts in the order listed
1	Muffler	1	
2	Exhaust pipe	1	
3	Gasket	1	
			For installation, reverse the
			removal procedure

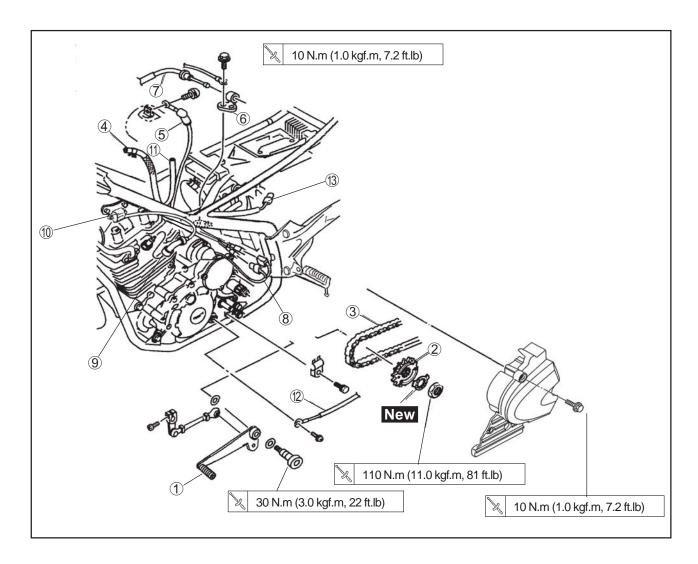


## LEADS, CABLES, HOSES AND IGNITION COIL



Order	Job/Part	Qt'y	Remarks
	Removing the leads, cables, hoses		Remove the parts in the order listed
	and ignition coil		
	Radiator / engine oil		Drain
	Seat/ side covers (left and right) / tail		Refer to "COWLING AND SIDE COVERS" in chapter 3.
	Fuel tank side covers (right and		
	left) / fuel tank		Refer to "FUEL TANK" in chapter 3.
	Throttle body assy		Refer to "INJECTION BODY ASSEMBLY" in chapter 6.
1	Shift pedal	1	Refer to "DRIVE CHAIN" in chapter 4.
2	Drive sprocket	1	

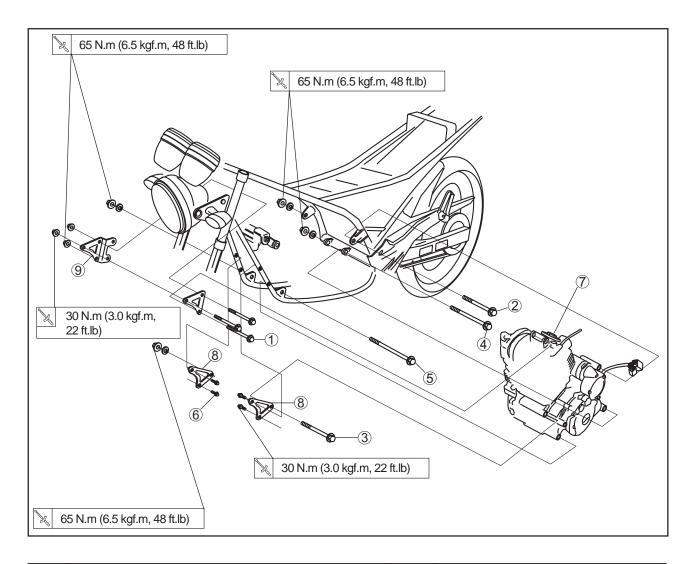




Order	Job/Part	Qt'y	Remarks
3	Drive chain	1	1
4	Engine breather hose	1	- Disconnect
5	Starter motor cable	1	
6	Clutch cable lock	1	
7	Clutch cable	1	h
8	Main wire harness connectors	5	- Disconnect
9	Spark plug cap	1	]
10	Ignition coil	1	
11	Vacuum hose	1	Disconnect
12	Neutral switch wire	1	Disconnect
13	Speed sensor wire harness	1	Disconnect

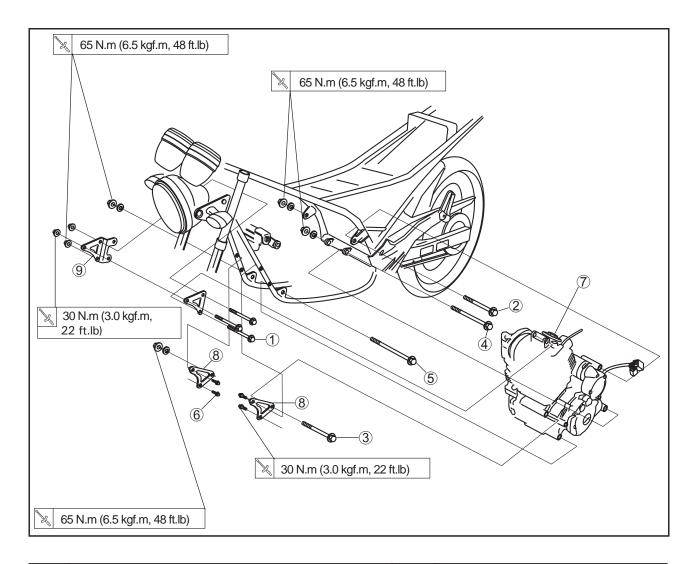


## **ENGINE**



Order	Job/Part	Qt'y	Remarks
	Removing the engine		Remove the parts in the order listed  NOTE:  Place a suitable stand under the chassi.
			CAUTION: Install all the bolts and nuts and tighten them to the specified torque.
1	Bolts / nuts (upper bracket)	3/3	
2	Bolt / nut (upper rear)	1/1	Refer to "INSTALLING THE
3	Bolt / nut (upper front)	1/1	ENGINE".
4	Bolt / nut (lower rear)	1/1	



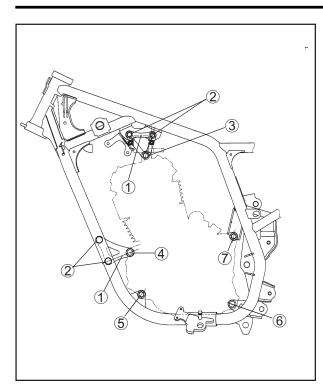


Order	Job/Part	Qt'y	Remarks
5 6 7 8 9	Bolt / nut (lower front) Bolts (front brackets) Engine assembly Front brackets Upper brackets	1/1 4 1 2 2	NOTE: Refer to "INSTALLING THE ENGINE".  For installation, reverse the removal procedure

## **REMOVING THE ENGINE**







#### **INSTALLING THE ENGINE**

- 1. Install:
  - front / upper brackets ①
  - bolts (front brackets) 2
  - bolts / nut (upper bracket) ③
  - bolt / nut (upper front) 4
  - bolt / nut (lower front) ⑤
  - bolt / nut (lower rear) 6
  - bolt / nut (upper rear) ⑦

NOTE: .

Do not fully tighten the bolts.

- 2. Tighten:
  - brackets bolts to chassis (2)



Bracket bolts / nuts 30 N.m (3.0 kgf.m, 22 ft.lb)

• upper bracket mounting bolt / nut ③



Upper bracket mounting bolt / nut 65 N.m (6.5 kgf.m, 48 ft.lb)

• upper rear mounting bolt / nut 4



Upper rear mounting bolt / nut 65 N.m (6.5 kgf.m, 48 ft.lb)

• lower front mounting bolt / nut ⑤



Lower front mounting bolt / nut 65 N.m (6.5 kgf.m, 48 ft.lb)

• lower rear mounting bolt / nut 6



Lower rear mounting bolt / nut 65 N.m (6.5 kgf.m, 48 ft.lb)

• bolt / nut (upper rear) 7

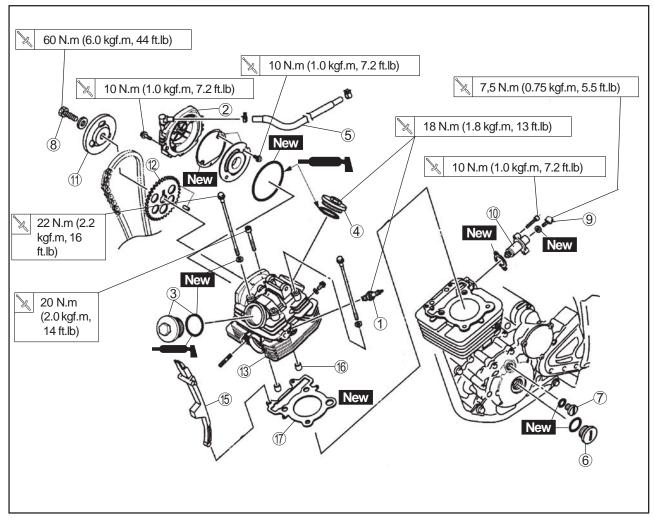


Lower rear mounting bolt / nut 65 N.m (6.5 kgf.m, 48 ft.lb)



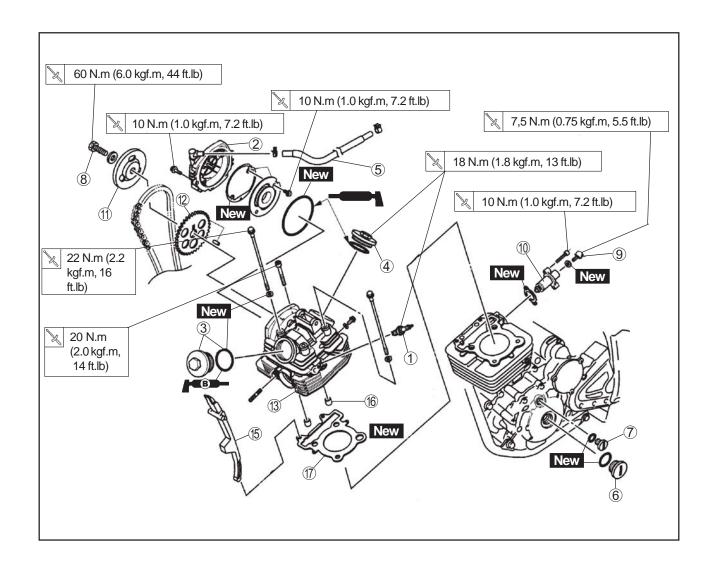
# CYLINDER HEAD





Order	Job/Part	Qt'y	Remarks
	Removing the cylinder head		Remove the parts in the order listed
	Engine		Refer to "REMOVING THE ENGINE".
	Radiator		Refer to "OIL COOLER SYSTEM" in chapter 5.
1	Spark plug	1	
2	Camshaft sprocket cover / O-ring	1/1	
3	Tappet cover / O-ring (exhaust)	1/1	
4	Tappet cover / O-ring (intake)	1/1	Refer to "REMOVING THE
5	Breather hose	1	CYLINDER HEAD" and
6	Crankshaft plug	1	"INSTALLING THE
			CYLINDER HEAD".



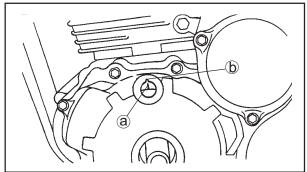


Order	Job/Part	Qt'y	Remarks
7	Timing adjusting plug	1	
8	Screw	1	
9	Timing chain tensioner cap bolt	1	
10	Timing chain tensioner / gasket	1/1	
11	Breather plate	1	
12	Camshaft sprocket / guide pin	1/1	- Refer to "REMOVING THE
13	Cylinder head assembly	1	CYLINDER HEAD" and
14	Timing Chain guide (front)	1	"INSTALLING THE CYLINDER
15	Dowel pins	2	HEAD"
16	Cylinder head gasket	1	
			For installation, reverse the removal procedure

## **HEAD CYLINDER**





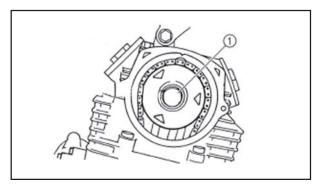




- 1. Align:
  - "I" mark (a) on the AC magneto (with the stationary pointer (b) on the AC magneto cover)
- a. Turn the crankshaft counterclockwise.
- b. When piston is at TDC on the compression stroke, align the "I" mark © on the timing sprocket with the stationary pointer @ at the head cylinder.

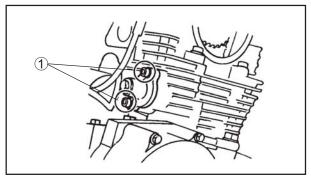
\_\_\_\_

\*



### 2. Loosen:

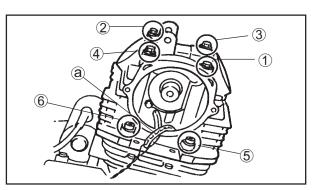
• timing sprocket bolt 1



- 3. Loosen:
  - timing chain tensioner bolts ①
- 4. Remove:
  - timing chain tensioner (with the gasket)
  - camshaft sprocket

NOTE: \_
To prever

To prevent the drive chain from falling down into the crankcase, fix it with a wire ⓐ.



- 5. Remove:
  - cylinder head

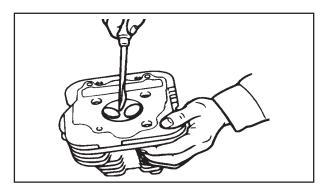
## NOTE: .

- Loosen the bolts in the correct sequence, as shown by ①, ②, ③, ④, ⑤ and ⑥.
- Loosen each bolt <sup>1</sup>/<sub>2</sub> of a turn at a time. When all the bolts are completely loosen, remove them.

## **CYLINDER HEAD**







## CHECKING THE CYLINDER HEAD

- 1. Dispose:
  - combustion chambers carbon deposits (with a round scraper)

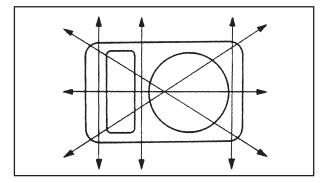
## NOTE:

Do not use a sharpen tool, to prevent damage or scratches in:

- spark plug threads
- · valve seats

#### 2. Check:

cylinder head
 Damage/Scratches --> Replace.

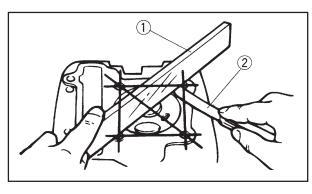


## 3. Measure:

cylinder head runout
 Out of specification --> Remove the cylinder
 head.



Maximum runout 0.03 mm (0.001 in)



- a. Place a ruler ① and a thickness gauge ② along the cylinder head.
- b. Measure the runout.
- c. When the limit is exceed, rebore the cylinder.
- d. With a thin sandpaper (400 to 600 grainy) is applied to the cylinder head surface, carry out the grinding, making movements following the "8" shape.

NOTE: \_

To ensure a level surface, spin the cylinder head several times.

\_\_\_\_

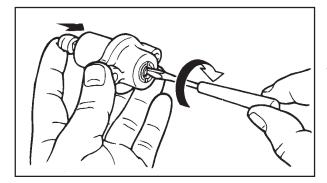


# CHECKING THE TAPPET COVERS AND CAMSHAFT SPROCKET COVER

- 1. Check:
  - valve covers
  - · timing sprocket cap
  - O-rings
    Damage/Wear --> Replace.

## CHECKING THE TIMING CHAIN TENSIONER

- 1. Check:
  - timing chain tensioner
     Cracks/Damage --> Replace.
- 2. Check:
  - one way came operation Rough movement --> Replace.
- 3. Check:
  - timing chain tensioner bolt
  - gasket New
  - timing chain tensioner rod Damage/Wear --> Replace.
- 4. Check:
  - lock and release the operation Rough movement --> Replace.

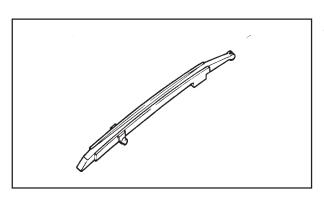


## CHECKING THE CAMSHAFT SPROCKET

1. Check:

(1)

- camshaft sprocket
   Wear/Damage --> Replace the sprocket and
   the timing chain as a set.
- 1 Drive chain
- 2 Camshaft sproket



- 2. Check:
  - timing chain guide (front)
    Damage/Wear --> Replace.

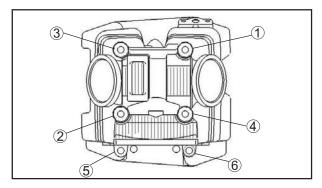


## **INSTALLING THE CYLINDER HEAD**

- 1. Install:
  - dowel pins
  - cylinder head gasket New
- 2. Install:
  - cylinder head
  - washers New
  - cylinder head bolts

## NOTE: \_

- Lubricate the threads and the mating surface of the cylinder head bolts with engine oil.
- Install the washers with its rounded surface turned to the bolt bottom.



## 3. Tighten:

• cylinder head bolt  $\ell$  = 45mm  $\circ$  and  $\circ$ 



Cylinder head bolts 20 N.m (2.0 kgf.m, 14 ft.lb)

• cylinder head bolts  $\ell$  = 17mm ①, ②, ③ and ④



Cylinder head bolts 22 N.m (2.2 kgf.m, 16 ft.lb)

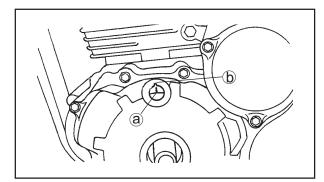
## NOTE: \_

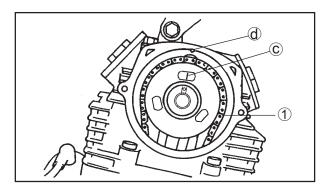
Tighten the cylinder head bolts in the specified sequence as shown, and then tighten them in two stages.

## **CYLINDER HEAD**









4. Install:

camshaft sprocket

- a. Turn the crankshaft counterclockwise.
- b. Align the "I" mark (a) on the AC magneto with the stationary pointer (b) on the AC magneto cover.
- c. Remove the wire which blocks the cam chain downfall.
- d. Install the drive chain ① onto the camshaft sprocket, install the camshaft sprocket onto the camshaft, and finally tighten the bolt handly.
- e. Make sure that the "I" mark © of the timing sprocket is aligned with the stationary pointer d in the cylinder head.

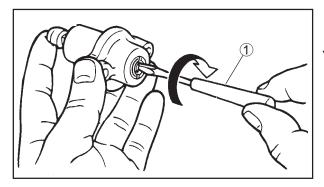
NOTE:

- When installing the camshaft sprocket, be sure to keep the chain tensioned on the exhaust side.
- Align the camshaft pin with the sprocket rip.

## **CAUTION:**

Do not turn the crankshaft when installing the camshaft to prevent damages or incorrect valve timing.

\_\_\_\_

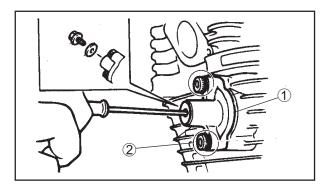


5. Install:

• timing chain tensioner

- a. While gently finger tightening the timing chain tensioner rod, use a screwdriver ① to fully spin the shaft clockwise.
- b. With the rod totally removed, install the gasket and the timing chain tensioner and tighten the mounting bolts to the specified torque.
- c. Release the system, turning the screwdriver counter clockwise. Make sure that the gasket ① is properly set and tighten the bolts ② to the specified torque.

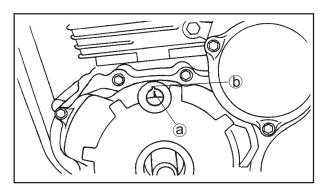






Bolts (cam chain puller): 10 N.m (1.0 kgf.m, 7.2 ft.lb) Cap bolt (cam chain puller): 7.5 N.m (0.75 kgf.m, 5.5 ft.lb)

\_\_\_\_

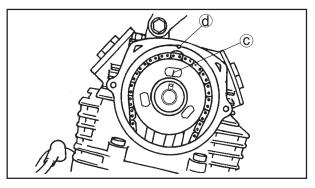


## 6. Turn:

- crankshaft (several times counterclockwise)
- 7. Check:
  - "I" mark @

#### NOTF:

Check if the "I" mark in the AC magneto is aligned with the stationary pointer (b) on the AC magneto cover.



## NOTE: \_

Check if the "I" mark on the timing sprocket is aligned with the pointer @ on the cylinder head.

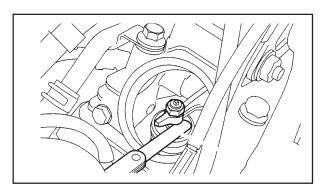
"I" mark © on the cylinder head.
 Out of alignment --> Correct.
 Repeat the steps 4 to 7, if necessary.



- 8. Tighten:
  - timing sprocket bolt



Timing sprocket bolt 60 N.m (6.0 kgf.m, 44 ft.lb)

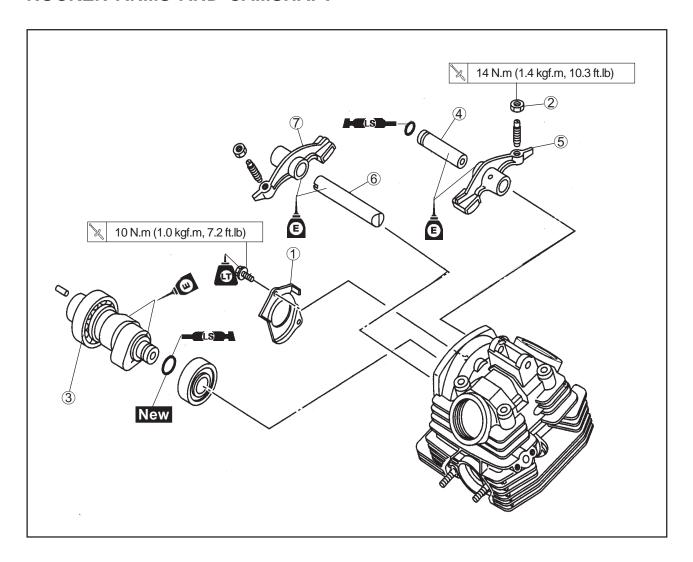


## 9. Measure:

valve clearance
 Out of specification --> Adjust.
 Refer to "ADJUSTING THE VALVE
 CLEARANCE" in chapter 3.



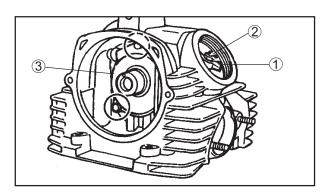




Order	Job/Part	Qt'y	Rem	arks
	Removing the rocker arms and camshaft Cylinder head		Remove the parts Refer to "CYLIND	in the order listed ER HEAD"
1	Bearing holder	1	7	Refer to
2	Adjusting bolt / locknut	2/2	<b>CAUTION:</b>	"REMOVINGTHE
3	Camshaft	1	Do not	ROCKER ARMS AND CAMSHAFT"
4	Rocker shaft (intake)	1	disassemble	and "INSTALLING
5	Rocker arm (intake)	1	the camshaft	THE CAMSHAFT
6	Rocker shaft (exhaust)	1	assembly.	AND ROCKER
7	Rocker arm (exhaust)	1		ARMS"
			For installation removal proced	′

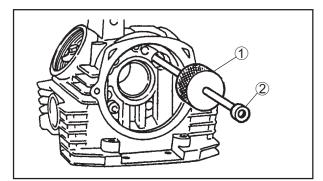






# REMOVING THE ROCKER ARMS AND CAMSHAFT

- 1. Loosen:
  - Locknuts ①
  - clearance adjusting bolts 2
- 2. Remove:
  - camshaft holder ③



### 3. Remove:

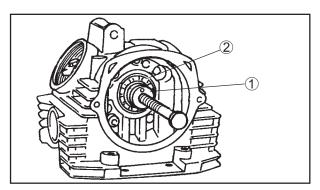
- intake rocker shaft
- · exhaust rocker shaft
- intake rocker arm
- exhaust rocker arm

## NOTE: \_

Remove the rocker shafts with the sliding hammer ① and the shaft ②.



Sliding hammer 90890-01084 Shaft 90890-01083



## 4. Remove:

- camshaft 1
- bearing 2

#### NOTE

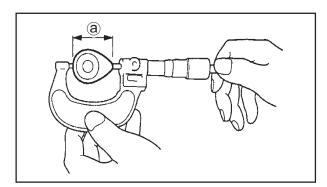
Use a bolt with thread of 10mm to pull the camshaft out.

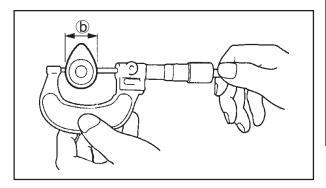
## **CHECKING THE CAMSHAFT**

- 1. Check:
  - camshaft cames
     Blue color/Pitting/Scratches --> Replace the camshaft and the timing sprocket.









#### 2. Measure:

camshaft came dimensions (a) and (b)
 Out of specification --> Replace the camshaft



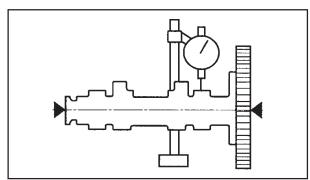
# Camshaft came dimensions Intake

- @ 36.890 ~36.990mm
  - (1.452 ~1.456 in)
- (b) 30.111 ~ 30.211mm (1.185 ~ 1.189 in)

**Exhaust** 

- **a** 36.891 ~ 36.991mm
  - (1.452 ~ 1.456 in)
- **(b)** 30.092 ~ 30.192mm

(1.185 ~1.189 in)

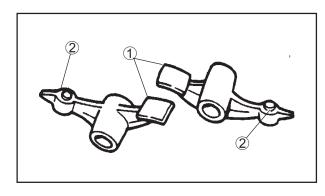


## 3. Measure:

camshaft runout
 Out of specification --> Replace.



Camshaft runout limit 0.030 mm (0.001 in)



# CHECKING THE ROCKER ARMS AND CAMSHAFTS

The following procedures applie to the rocker arms and rocker shafts.

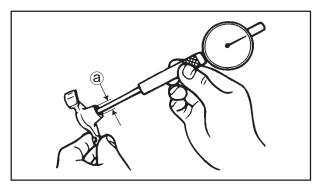
- 1. Check:
  - projections mating surface ①
  - adjusting bolts mating surfaces ②
     Damage/Wear --> Replace.

## 2. Check:

rocker shaft
 Blue discoloration/Excessive wear/Pitting/
 Scratches --> Replace and check the
 lubrication system







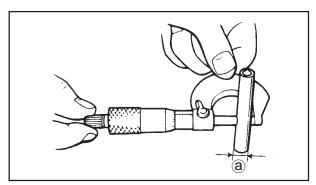
#### 3. Measure:

rocker arm inner diameter @
 Out of specification --> Replace.



Rocker arm inner diameter 12.000 ~ 12.018mm (0.4724 ~ 0.4731 in) init>: 12.036mm

(0.4739 in)



### 4. Measure:

rocker arm outer diameter @
 Out of specification --> Replace.



Rocker arm outer diameter

11.981 ~ 11.991mm (0.4717 ~0.4721 in) <limit>: 11.955mm

(0.4707 in)

# INSTALLING THE ROCKER ARMS AND CAMSHAFT

#### 1. Lubricate:

- · camshaft
- bearing



**Recommended Iubricant** 

Camshaft

Molybdenum disulfide oil

Bearing

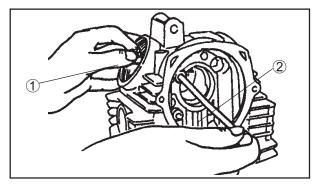
**Engine oil** 

## 2. Apply:

molybdenum disulfide oil (in the rocker arm and rocker shaft)



Recommended lubricant Molybdenum disulfide



### 3. Install:

- rocker arm ①
- rocker shaft ②

#### NOTE: .

Use the sliding hammer shaft to install the rocker shaft.

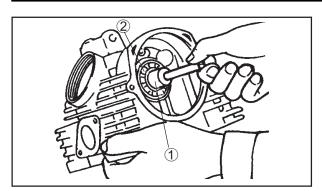


Shaft

90890-01084







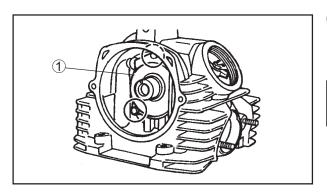
- 4. Install:
  - camshaft ①
  - bearing 2

## NOTE: \_\_

- Place the guide pin hole upward.
- Use a bolt with 10mm thread to install the camshaft.
- 5. Apply:
  - molybdenum disulfide oil



Recommended lubricant Molybdenum disulfide oil



- 6. Install:
  - camshaft holder 1
  - bolts

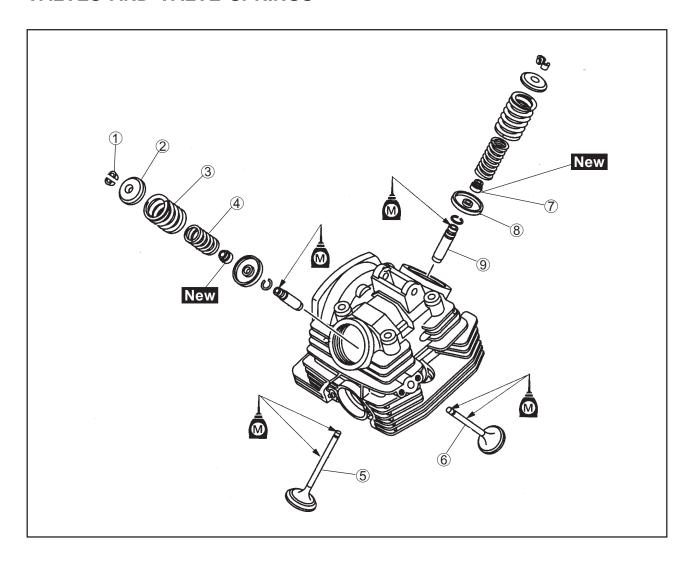


**Holder bolts** 

10 N.m (1.0 kgf.m, 7.2 ft.lb)

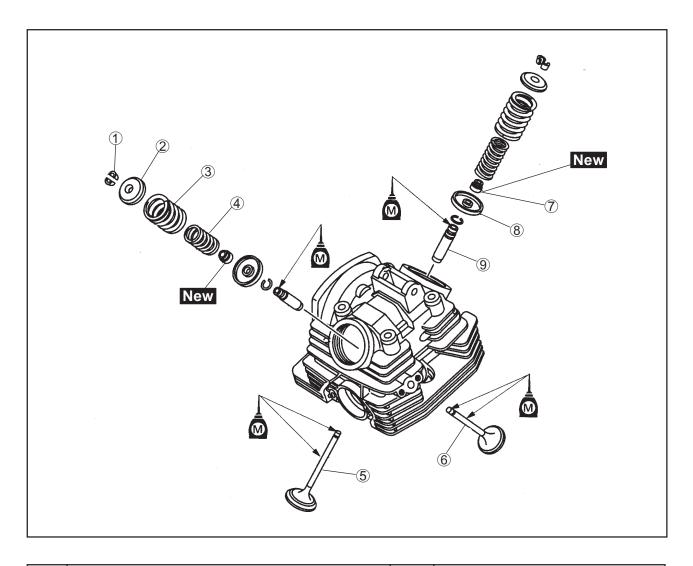






Order	Job/Part	Qt'y	Remarks
	Removing the valves and valve springs		Remove the parts in the order listed
	Cylinder head		Refer to "CYLINDER HEAD"
	Rocker arms / rocker shafts / camshaft		Refer to "ROCKER ARMS AND CAMSHAFT"
1	Valve cotters	4	]
2	Valve spring retainer	2	Refer to "REMOVING THE
3	Outer valve spring	2	- VALVES" and "INSTALLING
4	Inner valve spring	2	THE VALVES"
5	Intake valve	1	





Order	Job/Part	Qt'y	Remarks
6	Exhaust valve	1	]
7	Valve stem seal	2	Refer to "REMOVING THE
8	Valve spring seat	2	VALVES" and "INSTALLING
9	Valve guide	2	THE VALVES"



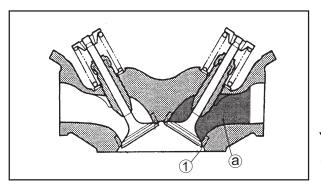


#### REMOVING THE VALVES

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 the valves are properly sealed.



### 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".

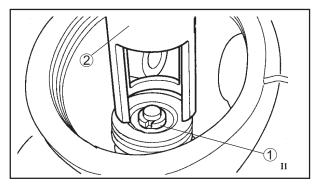
\*

- a. Pour a clean solvent ⓐ into the intake and exhaust ports.
- b. Check that the valves are properly sealed.

NOTE: .

There should be no leakage at the valve seat ①.

\_\_\_\_



### 2. Remove:

valve cotters

NOTA:

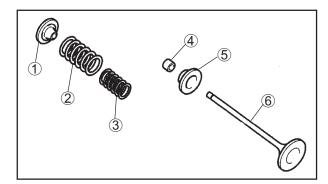
Remove the valve cotters ① by compressing the valve spring with the valve spring compressor and the attachment ②.



Valve spring compressor 90890-04019 Valve spring compressor attachment 90890-01243





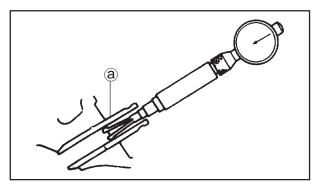


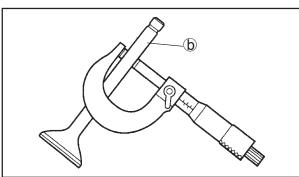
### 3. Remove:

- valve spring retainer ①
- outer valve spring ②
- inner valve spring ③
- valve stem seal 4
- valve spring seat ⑤
- valve 6

## NOTE: \_

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





# CHECKING THE VALVES AND VALVE GUIDES

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

## 1. Measure:

clearance between the stem and the valve guide

clearance between the stem and the valve guide = valve guide inside diameter ⓐ - valve stem outside diameter ⓑ.

Out of specification --> Replace the valve guide.



Clearance between the stem and the valve guide

Intake

0.010 ~ 0.037mm

 $(0.0004 \sim 0.0015 in)$ 

0.080mm

(0.0032 in)

**Exhaust** 

0.025 ~ 0.052mm

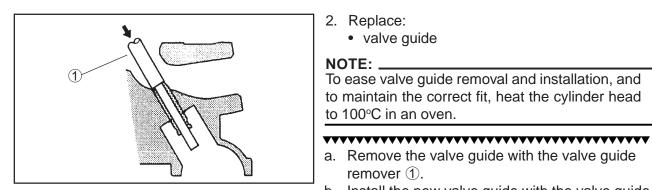
 $(0.0010 \sim 0.0020 \text{ in})$ 

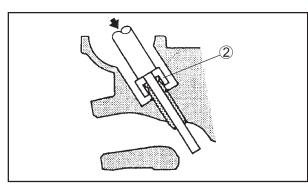
0.100mm

(0.0040 in)











· valve guide

#### NOTE: .

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100°C in an oven.

a. Remove the valve guide with the valve guide remover (1).

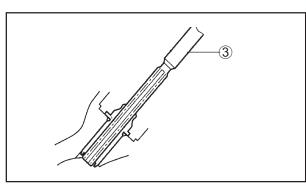
b. Install the new valve guide with the valve guide installer (2).

c. After installing the valve guide, bore the valve guide with the valve guide reamer 3 to obtain the proper valve-stem-to-valve-guide clearance.

## NOTE: .

After replacing the valve guide, reface the valve

\_\_\_\_





Valve guide remover (ø6) 90890-04064 Valve guide installer (ø6) 90890-04065 Valve guide reamer (ø6) 90890-04066

3. Eliminate:

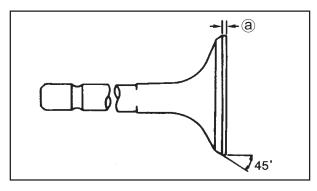
· carbon deposits

4. Check:

· valve face Pitting/Wear --> Grind the valve face.

· valve stem end Mushroom shape or diameter larger than the body of the valve stem

--> Replace the valve.



5. Measure:

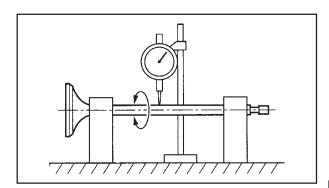
 valve margin thickness @ Out of specification --> Replace the valve.



Valve margin thickness 0.80 ~ 1.20 mm (0.032 ~ 0.047 in)







- 6. Measure:
  - stem runout
     Out of specification --> Replace the valve.

#### NOTE:

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, replace the valve stem oil seal.



Runout limit

0.030 mm (0.0012 in)

## CHECKING THE VALVE SEAT

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

- 1. Eliminate:
  - carbon deposits



valve seat
 Pitting/Wear --> Replace the cylinder head.

- 3. Measure:
  - valve seat width @
     Out of specification --> Replace the cylinder head.



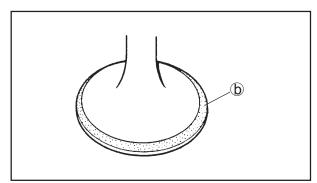
Valve seat width

Intake

0.90 ~ 1.10mm (0.03 ~ 0.04 in)

**Exhaust** 

0.90 ~ 1.10mm (0.03 ~ 0.04 in)



- 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 impression.
- d. Measure the valve seat width.

## NOTE: \_

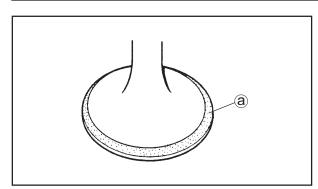
Where the valve seat and valve face contacted one another, the blueing will have been removed.

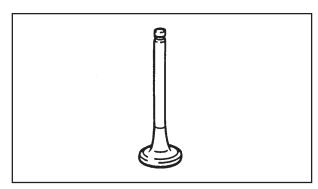
\_\_\_\_

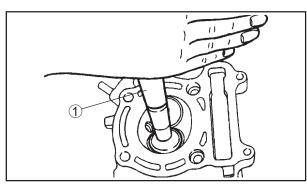
## **VALVES AND VALVE SPRINGS**

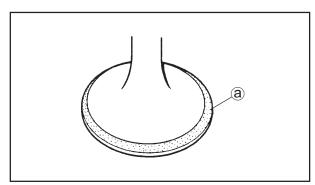












4. Lap:

- 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.

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

## **CAUTION:**

Do not let the lapping compound enter the gap between the 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.



Valve polisher ① 90890-04101

## NOTE:

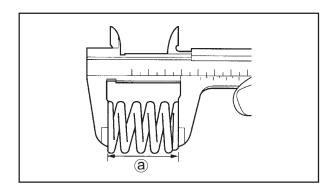
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- 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) (a) onto the valve face.
- h. Install the valve into the cylinder head.
- 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.

\_\_\_\_

## **VALVES AND VALVE SPRINGS**





## **CHECKING THE VALVE SPRINGS**

The following procedure applies to all of the valve springs.

- 1. Measure:
  - spring free length (a)
     Out of specification --> Replace.



Spring free length Intake (inside)

36.17mm (1.424 in)

1.357 in)

Exhaust (inside)

36.17mm (1.424 in)

34.47mm (1.357 in)

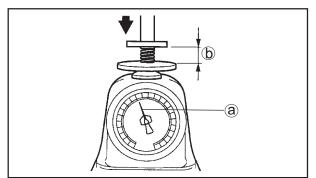
Intake (outside)

36.63mm (1.442 in)

1.363 in)

Exhaust (outside) 36.63mm (1.442 in)

34.63mm (1.363 in)



## 2. Measure:

- compressed spring force @
   Out of specification --> Replace.
- **b** Installed length



# Compressed spring force Inside

75 ~ 91 N at 30.5 mm (7.50 ~ 9.10 kgf at 30.5 mm,

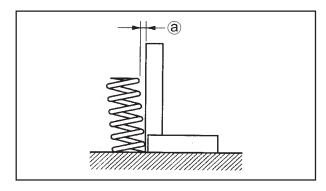
17 ~ 20.5 lbf at 1.20 in)

Outside

128.5 ~ 157.9 N at 32.0 mm

(12.85 ~ 15.79 kgf.m at 32.0 mm

29 ~ 36 lbf at 1.26 in)



## 3. Measure:

spring tilt @
 Out of specification --> Replace.



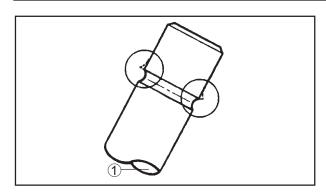
Spring tilt limit (all)

2.5°/1.6 mm (2.5°/0.063 in)

## **VALVES AND VALVE SPRINGS**



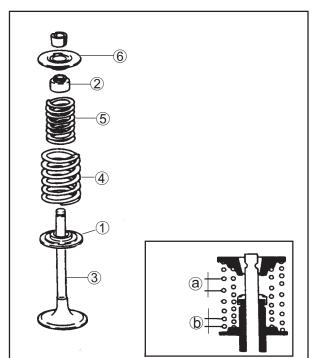




## **INSTALLING THE VALVES**

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 (1)
  - valve stem seal New (with the recommended lubricant)





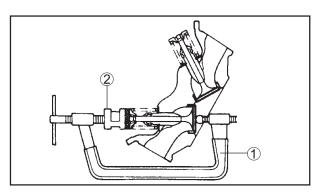
# Recomended lubricant Molybdenum disulfide oil

- 3. Install:
  - valve spring seat 1
  - vale stem seal 2 New
  - valve ③
  - outer valve spring 4
  - inner valve spring ⑤
  - valve spring retainer 6

#### NOTE: \_

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

- **b** Smaller pitch
- 4. Install:
  - valve cotters

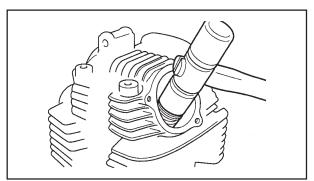


NOTE:

Install the valve cotters by pressing the valve spring with the valve spring compressor 1 and the compressor attachment 2.



Valve spring compressor 90890-04019 Attachment 90890-01243



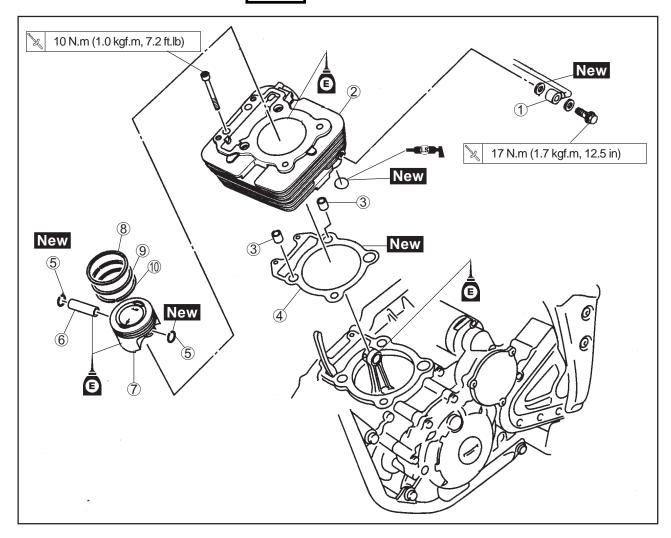
5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a plastic hammer.

## **CAUTION:**

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



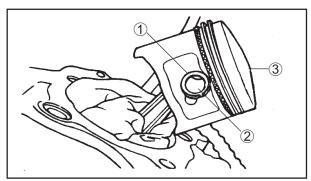


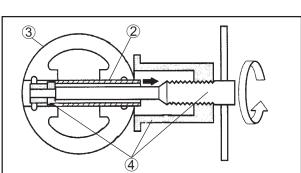


Order	Job/Part	Qt'y	Remarks
	Removing the cylinder and piston		Remove the parts in the order listed
1	Oil delivery pipe	1	Refer to "INSTALLING THE
2	Cylinder	1	- PISTON AND CYLINDER"
3	Dowel pins	2	
4	Cylinder gasket	1	
5	Piston pin circlip	2	Refer to "REMOVING THE
6	Piston pin	1	CYLINDER AND PISTON" and
7	Piston	1	"INSTALLING THE CYLINDER AND
8	Top ring	1	PISTON"
9	2nd ring		
10	Oil ring		
			For instalation, reverse the removal procedure









## REMOVING THE CYLINDER AND PISTON

- 1. Remove:
  - piston pin circlips ①
  - piston pin ②
  - piston ③

## **CAUTION:**

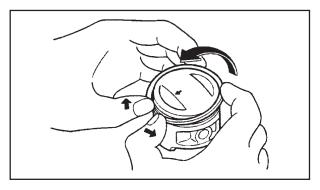
Do not use a hammer to drive the piston pin out.

## NOTE:

- 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.
- 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 set 4.



Piston pin puller set 90890-01304



## 2. Remove:

- top ring
- 2nd ring
- oil ring

#### NOTE: \_

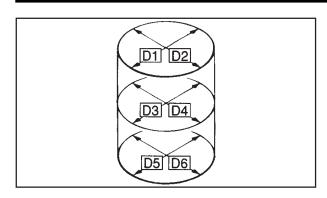
To remove a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.

## CHECKING THE CYLINDER AND PISTON

- 1. Check:
  - piston wall
  - cylinder wall
     Vertical scretches --> Replace the cylinder and piston and the piston rings as a set.







- 2. Measure:
  - piston-to-cylinder clearance

 Measure the cylinder diameter "C" with the cylinder bore gauge.

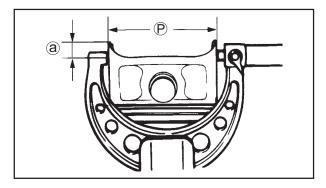
#### NOTE: .

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

	1
Cylinder bore "C"	74.000 ~74.016mm (2.913 ~2.194 in)
Wear limit	74.10mm (2.917 in)
Taper limit "T"	0.050mm (0.0020 in)
Out of round "R"	0.005mm (0.0002 in)

"C" = maximum of  $D_1 \sim D_2$ "T" = maximum of  $D_1$  or  $D_2$  - maximum of  $D_5$  or  $D_6$ "R" = maximum of  $D_1$ ,  $D_3$  or  $D_5$  - (minimum of  $D_2$ ,  $D_4$  or  $D_6$ )

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





Piston size diameter 73.983 ~ 73.998 mm (2.9127 ~2.9133 in)

- 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")



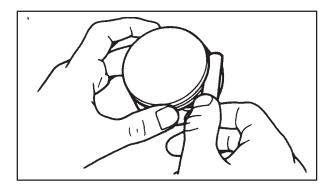
Piston-to-cylinder clearance 0.010 ~ 0.025mm (0.0004 ~ 0.0010 in) imit>: 0.15 mm (0.006 in)

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

**\*** 







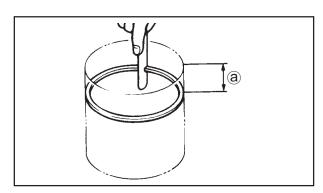
## **CHECKING THE PISTON RINGS**

- 1. Measure:
  - piston ring side clearance
     Out of specification --> 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.





- 2. Install:
  - ring (inside the cylinder)

#### NOTE

Level the piston ring into the cylinder with the piston sprocket.

- (a) 40mm
- 3. Measure:
  - piston ring end gap
     Out of specification --> Replace.

## NOTE: \_

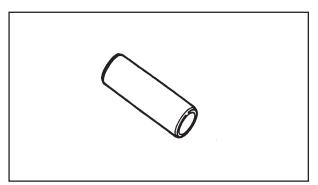
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings as a set.



Piston ring end gap
Compression ring
0.19 ~ 0.31 mm
(0.0075 ~0.0122 in)
limit>: 0.60 mm (0.0236 in)
Scratcher ring
0.30 ~ 0.45 mm
(0.0118 ~ 0.0177 in)
limit>: 0.60 mm (0.0236 in)
Oil ring
0.10 ~ 0.35 mm
(0.004 ~ 0.0137 in)



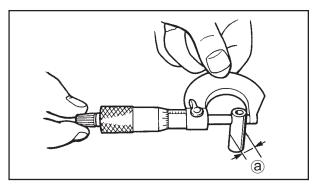




## **CHECKING THE PISTON PIN**

## 1. Check:

 piston pin Blue discoloration/grooves --> Replace the pin and check the lubrication system.

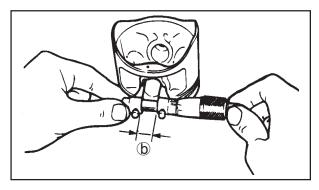


## 2. Measure:

piston pin outside diameter (a)
 Out of specification --> Replace.



Piston pin outside diameter 16.991 ~ 17.000 mm (0.6689 ~ 0.6692 in) <Limit>: 16.970 mm (0.6681 in)



## 3. Measure:

piston pin bore diameter (b)
 Out of specification --> Replace the piston.



Piston pin bore diameter 17.002 ~ 17.013 mm (0.6694 ~ 0.6698 in) <Limit>: 17.043 mm (0.6709 in)

## 4. Measure:

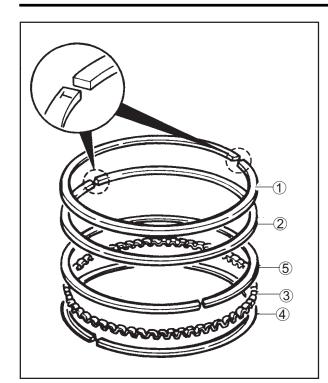
 clearance between the pin bore and the piston pin
 Out of specification --> Replace the piston pin and piston as a set.

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



Piston-pin-to-piston clearance 0.010 ~ 0.025 mm (0.0004 ~0.0010 in) <Limit>: 0.015 mm (0.0006 in)



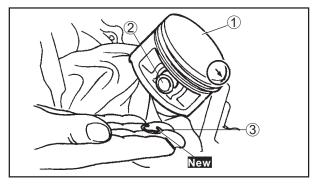


## INSTALLING THE CYLINDER AND PISTON

- 1. Install:
  - top ring ①
  - 2nd ring ②
  - oil ring expander ③
  - lower oil ring rail 4
  - upper oil ring rail 5

## NOTE: .

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



## 2. Install:

- piston ①
- piston pin ②
- piston pin circlip ③ New

## NOTE: \_

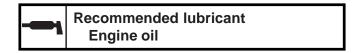
- Apply engine oil onto the piston pin.
- Make sure that the mark ⓐ on the piston faces towards the exhaust side of the engine.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.

## 3. Install:

- cylinder gasket New
- dowel pins

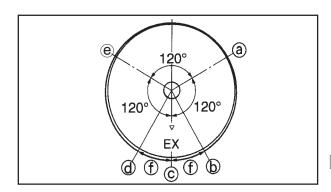
## 4. Lubricate:

- piston
- rings
- cylinder (use the recommended lubricant)

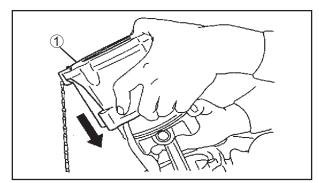








- piston ring end gaps
- a top ring
- **(b)** Oil ring upper trail
- © Oil ring expander
- d Oil ring lower rail
- e 2nd ring
- (f) 20mm
- A Exhaust side

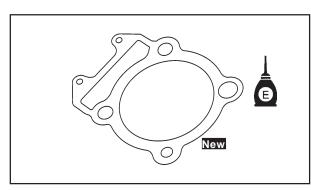


## 6. Install:

- cylinder ①
- timing chain guide (exhaust)

## NOTE: \_

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



## 7. Install:

- o-rings New
- gasket New
- cylinder bolts

## NOTE: .

- Lubricate the cylinder bolt threads and mating surface with engine oil.
- Install the washers with its printed surface facing up.



Cylinder bolts

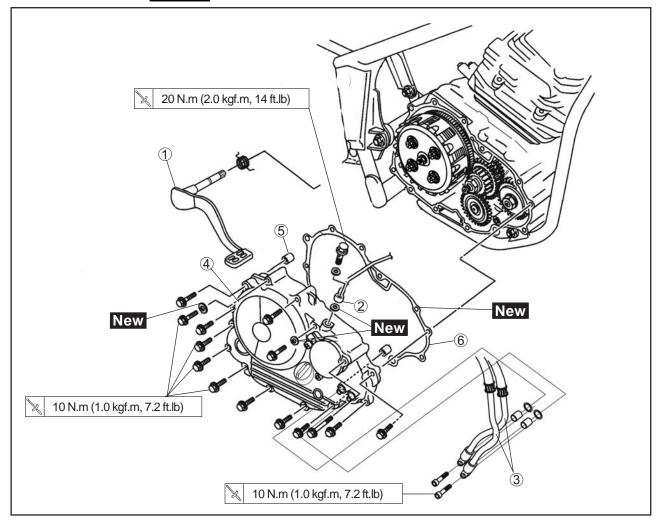
10 N.m (1.0 kgf.m, 7.2 ft.lb)



# **CLUTCH**

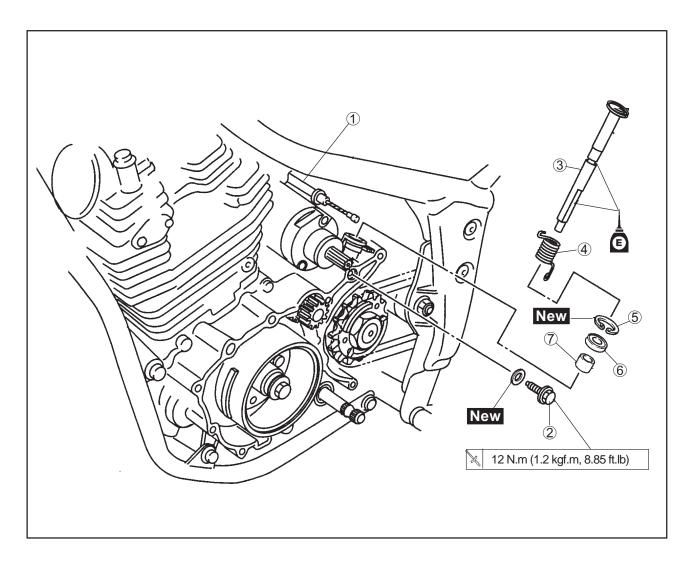
## **CLUTCH COVER**





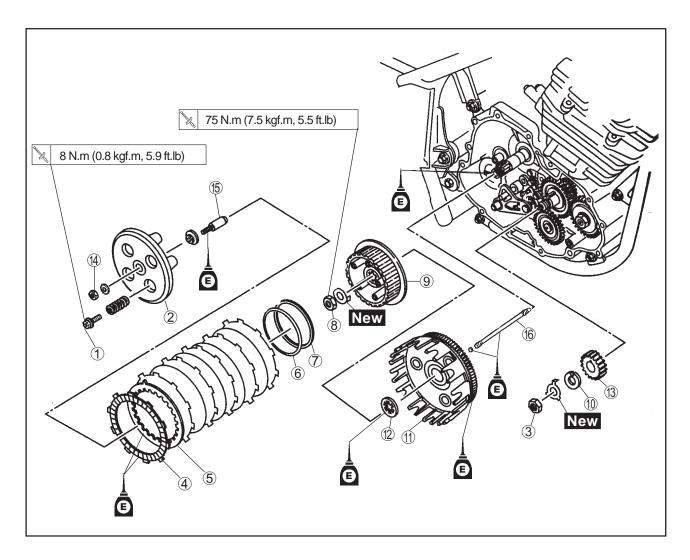
Order	Job/Part	Qt'y	Remarks
	Removing the clutch		Remove the parts in the order listed
	Engine oil		Refer to "CHANGING THE ENGINE OIL" in chapter 3
	Rear brake rod		Refer to "ADJUSTING THE REAR BRAKE" in chapter 3
1	Rear brake pedal	1	]
2	Oil delivery pipe	1	
3	Oil radiator hoses	2	Disconnect
4	Clutch cover	1	
5	Dowel pins	2	
6	Clutch cover gasket	1	
			For installation, reverse the removal procedure

## **PULL LEVER SHAFT**



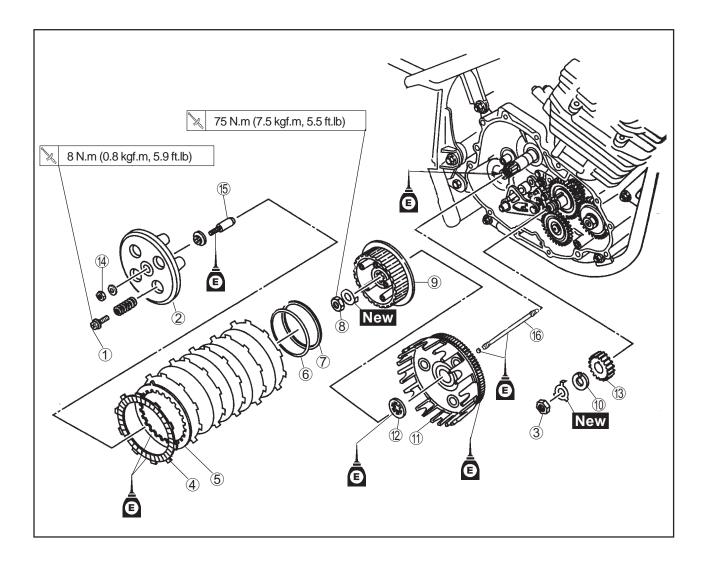
Order	Job/Part	Qt'y	Remarks
1 2 3 4 5 6 7	Removing the pull lever shaft Clutch pedal Starter worm gear Neutral switch wire Engine left cover Clutch cable Bolt Push lever shaft Spring Locknut Bearing Spacer	1 1 1 1 1	Remove the parts in the order listed Refer to "REMOVING THE ENGINE" Refer to "STARTER MOTOR"  - Disconnect
			For installation, reverse the removal procedure

## **CLUTCH**

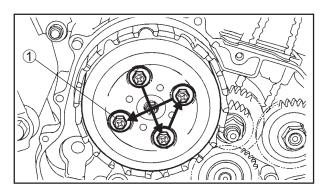


Order	Job/Part	Qt'y	Remarks
	Removing the clutch		Remove the parts in the order listed
1	Clutch spring / bolt	4/4	]
2	Pressure plate	1	
3	Primary gear nut	1	
4	Friction plates	6	
5	Clutch plate	5	
6	Cusion plate	1	Refer to "INSTALLING THE
7	Seat plate	1	CLUTCH"
8	Clutch boss nut	1	
9	Clutch boss	1	
10	Washer	1	
11	Clutch housing	1	





Order	Job/Part	Qt'y	Remarks
12	Thrust washer	1	
13	Primary drive gear	1	Refer to "REMOVING THE
14	Locknut	1	- CLUTCH" and "INSTALLING THE
15	Adjusting bolt	1	CLUTCH"
16	Ball / push rod	1/1	
			For installation, reverse the removal procedure

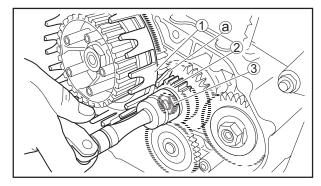


## REMOVING THE CLUTCH

- 1. Remove:
  - bolts ①

NOTE

Loosen each bolt  $^{1}/_{_{4}}$  of a turn in crisscross pattern. After all the bolts are fully loosen, remove them.

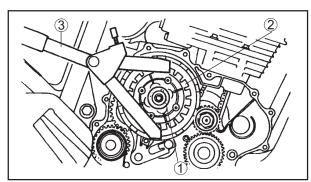


2. Loosen:

• primary gear nut ③

NOTE:

- Place a kinked aluminum plate (a) between the primary gear tooth (2) and the clutch housing teeth (1).
- Take care not to damage the gear teeth.



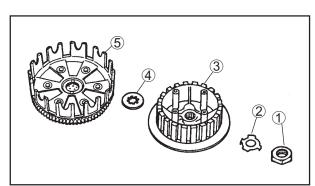
- 3. Correct the lock washer tab.
- 4. Loosen:
  - gear boss nut 1

NOTE: \_

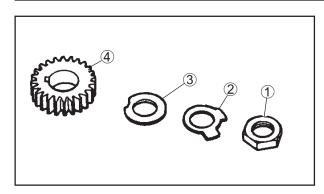
While holding the clutch boss ② with the universal clutch holder ③, loosen the boss nut.



Universal clutch holder 90890-04086



- 5. Remove:
  - nut 1
  - lock washer ②
  - thrust washer 4
  - clutch housing ⑤



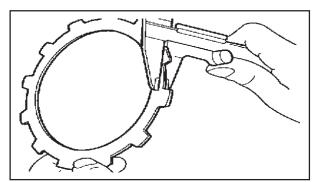
## CHECKING THE PRIMARY DRIVE GEAR

- 1. Check:
  - primary gear nut ①
  - lock washer ②
  - washer ③
  - primary drive gear 4 Wear/Cracks --> Replace.

## CHECKING THE FRICTION PLATES

The following procedure applies to all of the clutch plates.

- 1. Check:
  - friction plates (narrow)
  - friction plate
     Damage/Wear --> Replace the friction
     plates as a set.



## 2. Measure:

- friction plate thickness (narrow)
- friction plate thickness
   Damage/Wear --> Replace the friction plates as a set.

#### NOTE:

Measure the friction plate at four points.



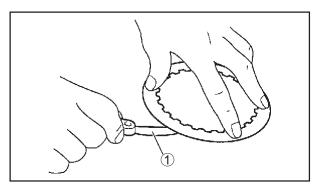
Friction plats thickness 2.90 ~ 3.10 mm (0.11 ~ 0.12 in)

## CHECKING THE CLUTCH PLATES

The following procedure applies to all of the steel discs.

- 1. Check:
  - clutch plates

Damage --> Replace the clutch plates as a set.



## 2. Measure:

• steel disc runout (use the thickness gauge 1) Out of specification --> Replace the steel discs as a set.



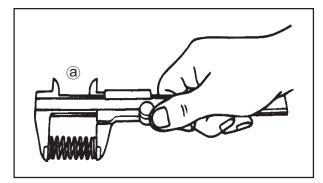
Clutch plate runout limit 0.20 mm (0.079 in)



## **CHECKING THE CLUTCH SPRINGS**

The following procedure applies to all of the clutch springs.

- 1. Check:
  - clutch spring
     Damage --> Replace the springs as a set.



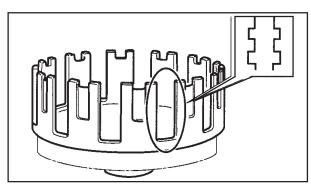
#### 2. Measure:

 spring free length (a)
 Out of specification --> Replace the clutch springs as a set.



Spring free length 41.60 mm (1.64 in)

<Limit>: 39.60 mm (1.56 in)

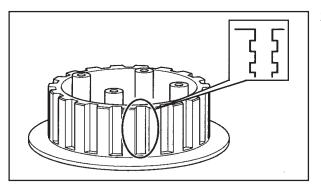


## CHECKING THE CLUTCH HOUSING

- 1. Check:
  - clutch housing dogs
     Damage/Pitting/Wear --> Deburr or replace the clutch housing.

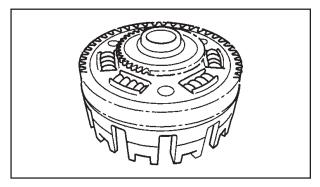


Pitting on the clutch housing dogs will cause erratic clutch operation.



## 2. Check:

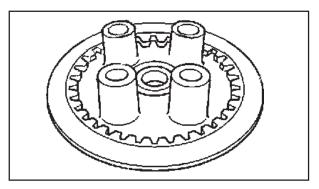
clutch boss splines
 Damage/Wear --> Deburr or replace the clutch boss.



## 3. Check:

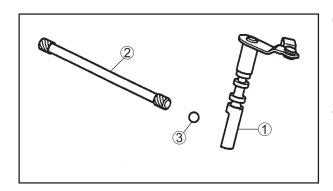
driven gear
 Damage/Wear --> Replace the driven gear
 and the clutch housing as a set.

 Excessive noise during the operation -->
 Replace the driven gear and the clutch
 housing as a set.



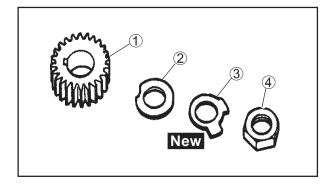
## CHECKING THE PRESSURE PLATE

- 1. Check:
  - pressure plate
     Cracks/Damage --> Replace.



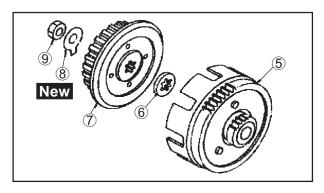
# CHECKING THE PUSH LEVER SHAFT AND PUSH ROD

- 1. Check:
  - pull lever shaft cames ①
    Damage/Wear --> Replace.
- 2. Check:
  - pull rod ②
  - steel ball ③
     Damage/Wear --> Replace all the components as a set.



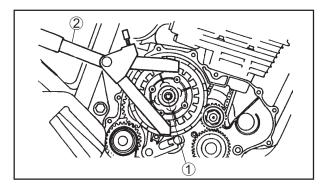
## **INSTALLING THE CLUTCH**

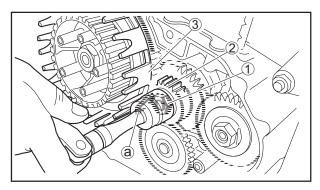
- 1. Install:
  - primary drive gear ①
  - washer ②
  - lock washer ③ New
  - primary gear nut 4

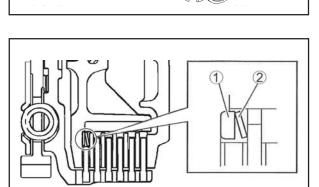


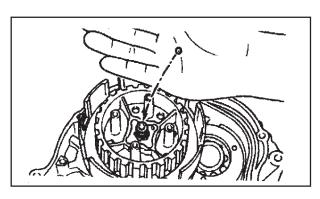
- clutch housing ⑤
- thrust washer 6
- clutch boss 7
- lock washer ® New
- nut (9)











## 2. Tighten:

• clutch boss nut 1

## NOTE: \_

While holding the clutch boss with the universal clutch holder ②, tighten the clutch boss nut ①.



Universal clutch holder 90890-04086



Clutch boss nut 75 N.m (7.5 kgf.m, 5.5 ft.lb)

## 3. Tighten:

• primary gear nut 1

#### NOTE:

Place a kinked aluminum plate ⓐ between the primary drive gear teeth ② and the clutch housing teeth ③.



Primary gear tooth 75 N.m (7.5 kgf.m, 5.5 ft.lb)

## 4. Kink:

• lock washer tab (to the nut flat side ①)

## 5. Install:

- friction plates ①
- clutch plate 2
- cusion plate ③
- seat plate 4

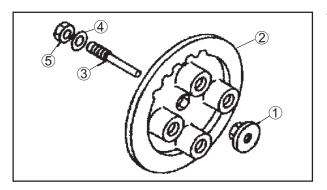
#### NOTE:

- Install the seat plate ① and cushion spring ② as shown.
- First, install a friction plate and then alternate between a clutch plate and a friction plate.

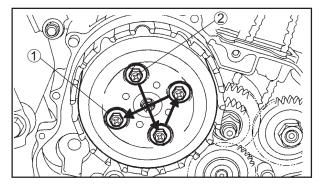
## 6. Install:

• ball





- 7. Install:
  - adjusting bolt nut ①
  - pressure plate ②
  - adjusting bolt ③
  - washer 4
  - nut (5)





- clutch springs ①
- bolts ①

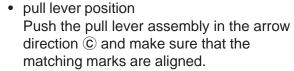


Bolts (clutch spring) 8 N.m (0.8 kgf.m, 5.9 ft.lb)

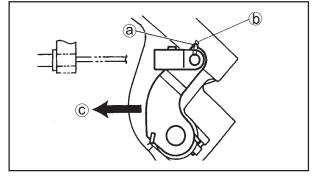
## NOTE: \_

Tighten the spring bolts in stages and in a crisscross patern.





- a Pull lever mark
- **(b)** Crankcase mark



10. Adjust:

pull lever position

## Adjustment steps:

- a. Loosen the locknut 1.
- b. Turn the adjuster ② clockwise or counter clockwise to align the marks.
- c. Hold the adjuster to prevent it for moving, and then tighten the locknut.



Take care not to excessively tighten the adjuster ② and remove the clearance between both driven rods.

d. Tighten the locknut 1.



Locknut

8 N.m (0.8 kgf.m, 5.9 ft.lb)

- 11. Install:
  - dowel pins

  - cover gasket Newcrankcase cover (RS)

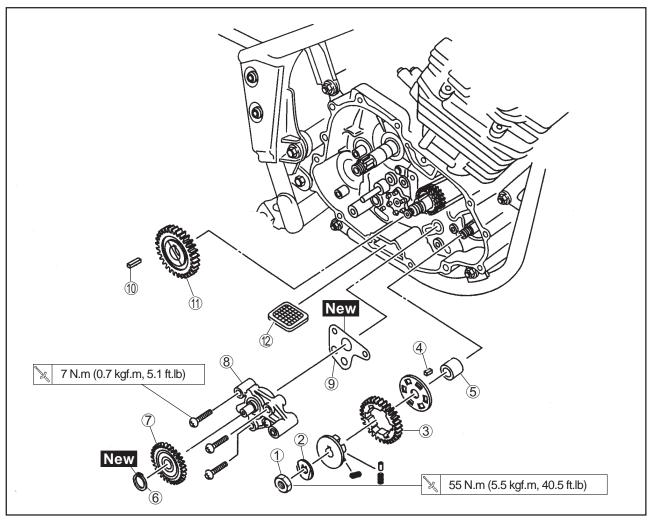


**Crankcase cover bolts** 10 N.m (1.0 kgf.m, 7.2 ft.lb)



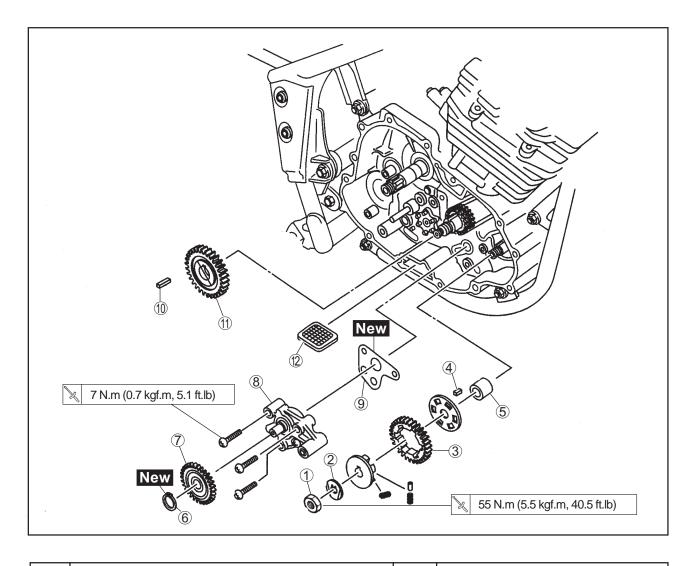
# OIL PUMP AND BALANCER GEAR





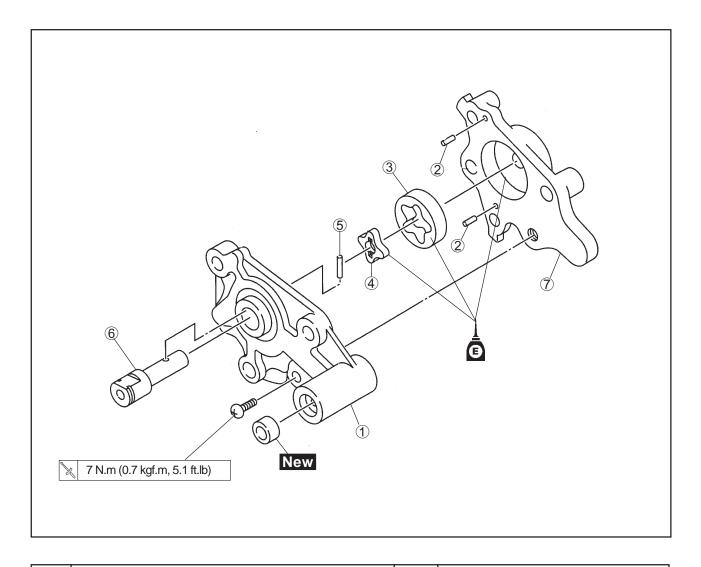
Order	Job/Part	Qt'y	Remarks
	Removing the oil pump and the balancer gear		Remove the parts in the order listed
	Engine oil		Drain
	Clutch cover		Refer to "CLUTCH COVER"
	Primary drive gear		Refer to "CLUTCH"
1	Nut	1	h
2	Lock washer	1	
3	Balancer gear	1	Refer to "ASSEMBLING THE
4	Woodruff key	1	BALANCER GEAR"
5	Spacer	1	Ц





Order	Job/Part	Qt'y	Remarks
6	Circlip	1	1
7	Oil pump gear	1	
8	Oil pump	1	
9	Oil pump gasket	1	- Refer to "ASSEMBLING THE
10	Woodruff key	1	OIL PUMP"
11	Drive gear	1	
12	Strainer (oil sub-filter)	1	
			For installation, reverse the removal procedure



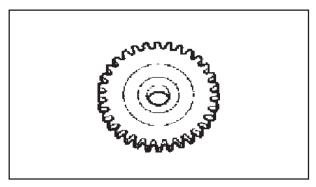


Order	Job/Part	Qt'y	Remarks
	Disassembling the oil pump		Remove the parts in the order listed
1	Oil pump cover	1	
2	Dowel pin	2	
3	Outer rotor	1	
4	Inner rotor	1	
(5)	Lock pin	1	
6	Shaft	1	
7	Oil pump housing	1	
			For assembly, reverse the removal procedure

## **OIL PUMP AND BALANCER GEAR**

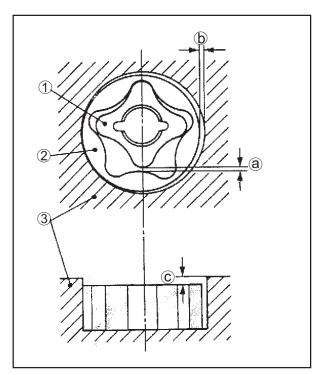






## CHECKING THE OIL PUMP

- 1. Check:
  - · oil pump gear Cracks/Damage/Wear --> Replace the damaged part(s).



#### 2. Measure:

- clearance (a) between the outer rotor and the inner rotor
- clearance (b) between the outer rotor and the oil pump crankcase
- clearance © between the oil pump crankcase and the inner and outer rotors Out of specification --> Replace the oil pump.
- 1 Inner rotor
- 2 Outer rotor
- 3 Oil pump housing



Clearance between the outer rotor and inner rotor 0.15 mm (0.006 in)

<Limit.>: 0.2 mm (0.008 in)

Clearance between the outer rotor and the oil pump crankcase

0.10 ~ 0.15 mm (0.004 ~0.006 in)

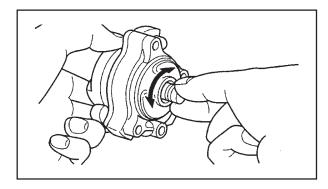
<Limit>: 0.20 mm (0.008 in)

Clearance between the oil pump housing and the inner and outer rotors

0.04 ~ 0.09 mm

 $(0.0016 \sim 0.0035 in)$ 

<Limit>: 0.15 mm ( 0.006 in)



## 3. Check:

• oil pump operation Improper movement --> Repeat steps 1 and 2 or replace the damaged part(s).



# CHECKING THE OIL DELIVERY HOSES AND PIPES

The following procedure applies to all of the oil delivery hoses and pipe.

- 1. Check:
  - oil delivery pipe
  - oil delivery hose
     Damage --> Replace.
     Clogged --> Wash and blow out with compressed air.

## **ASSEMBLING THE OIL PUMP**

- 1. Lubricate:
  - oil pump inner rotor
  - oil pump outer rotor
  - oil pump shaft (use recommended lubricant).



## Recommended lubricant Engine oil

- 2. Install:
  - oil pump outer rotor
  - oil pump inner rotor (until the oil pump crankcase)
  - oil pump housing



# Oil pump housing bolt 7 N.m (0.7 kgf.m, 5.1 ft.lb)

## NOTE: \_

- Install the oil pump inner and outer rotors with the alignment marks facing up.
- When installing the inner rotor, align the pin at the oil pump shaft with the groove in the inner rotor.
- 3. Check:
  - oil pump operation Refer to "CHECKING THE OIL PUMP".





## **INSTALLING THE OIL PUMP**

- 1. Install:
  - oil pump gasket
  - oil pump



Oil pump crankcase bolt 7 N.m (0.7 kgf.m, 5.1 ft.lb)

- oil pump gear
- circlip New

## **CAUTION:**

After tighten the bolts, make sure the pump oil turns smoothly.

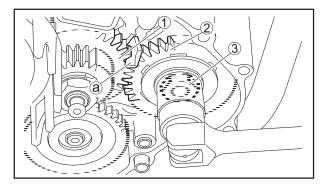
## NOTE: \_

- Install the oil pump gear with the manufacturer mark facing up.
- Install the circlip with its printed surface facing to the engine side.

# **BALANCER GEAR**







## REMOVING THE BALANCER GEAR

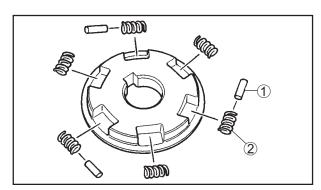
- 1. Straighten the lock washer tab
- 2. Loosen:
  - balancer gear nut ③
  - balancer gear

## NOTE: \_\_\_

- Place a kinked aluminum plate (a) between the driven gear teeth (1) and the balancer gear teeth (2).
- Take care not to damage the gears teeth.

## 3. Loosen:

 primary drive gear Refer to "REMOVING THE CLUTCH".



## CHECKING THE BALANCER GEAR

- 1. Check:
  - pins 1
  - compression springs ②

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

Use a proper place to prevent losses when disassembling.

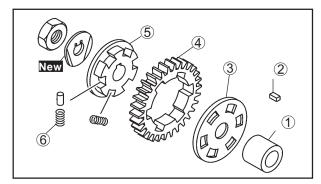
## 2. Check:

balancer gear
 Damage/Cracks --> Replace.

## **BALANCER GEAR**







## ASSEMBLING THE BALANCER GEAR

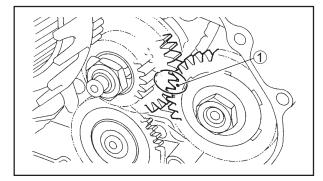
- 1. Install:
  - spacer ①
  - woodruf key 2
  - absorber plate ③
  - balancer gear 4

(with the timing point facing up)

- boss **5**
- compression springs and pins ⑥

NOTE:

Be sure to carry out the balancer gear assembly properly.



# BALANCER GEAR TIMING WITH THE DRIVE GEAR

- 1. Install:
  - balancer gear

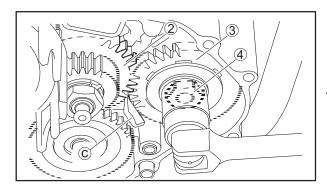
NOTE:

Place the balancer gear timing point ① towards the drive gear timing point.

- 2. Install:
  - lock washer New
  - nut 4



Balancer gear nut 55 N.m (5.5 kgf.m, 40.5 ft.lb)



NOTE:\_\_\_\_

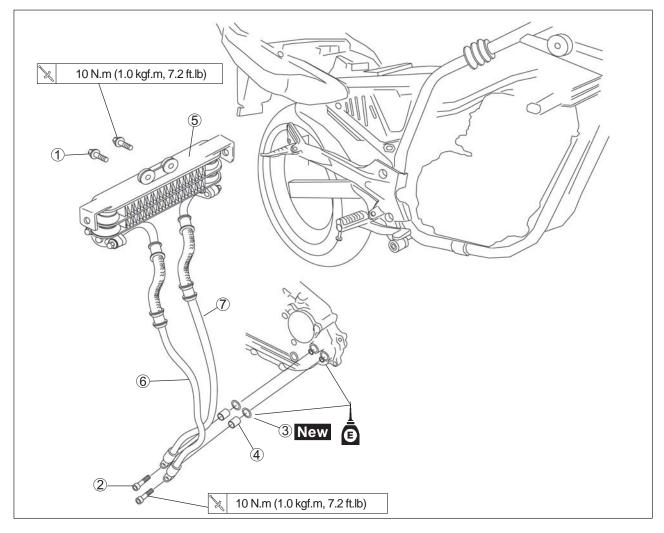
Place a kinked aluminum plate c between the drive gear teeth 2 and the balancer gear teeth 3.

• Take care not to damage the gears teeth.



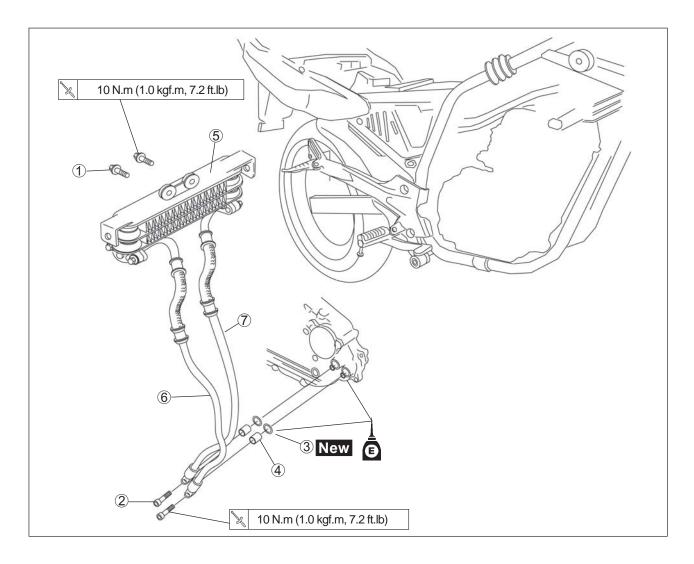
# OIL COOLER





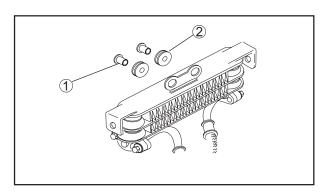
Order	Job/Part	Qt'y	Remarks
	Removing the oil cooler		Remove the parts in the order listed.
	Seat		Refer to "COWLING AND SIDE COVERS" in chapter 3.
	Fuel tank side covers (left and right)/ fuel tank		Refer to "FUEL TANK" in chapter 3.
	Engine oil		Drain
1 2	Cooler mounting bolts Hoses mounting bolts	2	NOTE: Place a rag under the engine to collect the remaining oil.





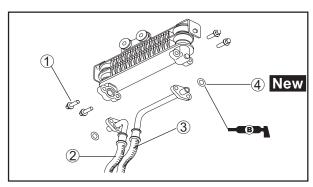
Order	Job/Part	Qt'y	Remarks
3	O-rings	2	
4	Guide pins	2	
5	Radiator	1	
6	Oil hose 1	1	
7	Oil hose 2	1	
			For installation, reverse the removal procedure.





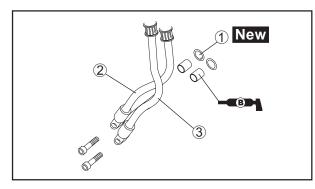
## **CHECKING THE OIL COOLER**

- 1. Remove:
  - spacers ①
  - grommets ②
- 2. Check:
  - grommets Damage/Wear --> Replace.



## 3. Remove:

- hose upper bolts ①
- oil hoses 1 2
- oil hoses 2 ③
- o-rings 4 New

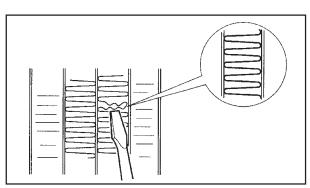


## 4. Check:

- o-rings 1 New
- oil hose 1 ②
- oil hose 2 ③
  Damage/Wear/Leakage --> Replace.

## NOTE: \_

Watch over the assembly position of the hoses during checking and disassembly steps.



## 5. Check:

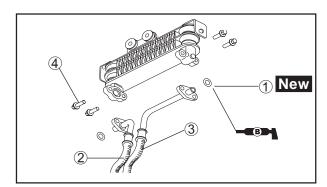
radiator fins

Clogged --> Clean.

Apply compresed air to the oil cooler radiator.

Damage --> Repair or replace.





## **ASSEMBLING THE OIL COOLER**

- 1. Install:
  - o-rings 1 New
  - oil hose 1 2
  - oil hose 2 ③
  - upper bolts 4



Upper bolts

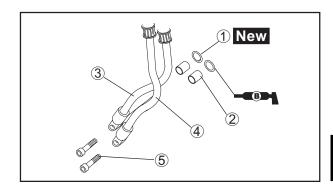
10 N.m (1.0 kgf.m, 7.2 ft.lb)



Recommended lubricant Lithium-soap-based grease

## NOTE: .

- Lubricate the O-rings with a thin coat of lithiumsoap-based grease.
- Install the hoses 1 and 2 aligning the bolt holes.
- Make sure that they are at the same position of the disassembly and inspection steps.



## 2. Install:

- o-rings 1 New
- spacers ②
- oil hose 1 ③
- oil hose 2 4
- lower bolts ⑤



Lower bolts

10 N.m (1.0 kgf.m, 7.2 ft.lb)

## 3. Install:

- radiator
- · mounting bolts



Mounting bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)

## 4. Fill:

 lubrication system (with the specified amount of recommended oil)

Refer to "CHANGING THE OIL" in chapter 3.

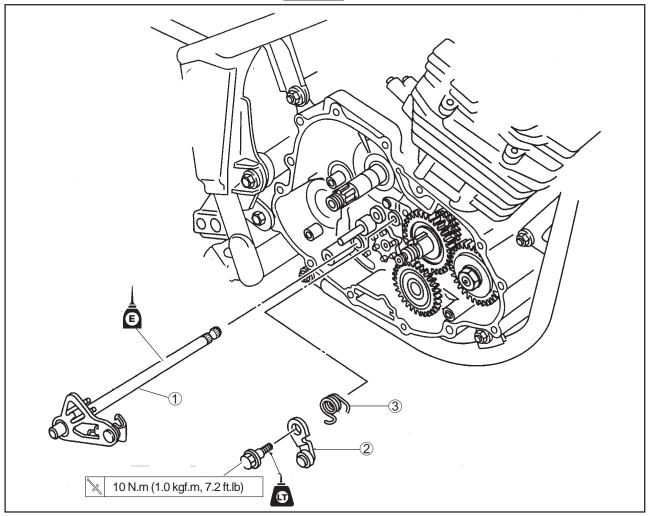




## **SHIFT SHAFT**

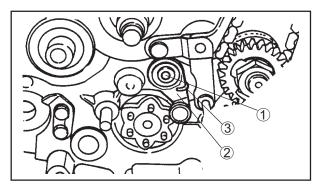
# SHIFT SHAFT AND STOPPER LEVER





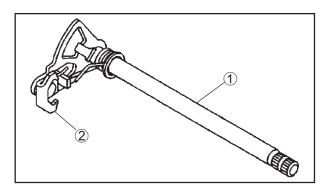
Order	Job/Part	Qt'y	Remarks
	Removing the shift shaft and stopper lever		Remove the parts in the order listed
	Engine oil		Drain
	Clutch cover		Refer to "CLUTCH COVER"
	Clutch pedal pivot		
1	Shift shaft	1	Refer to "DISASSEMBLING THE
2	Stopper lever	1	- SHIFT SHAFT AND THE
3	Stopper lever spring	1	STOPPER LEVER"
			For installation, reverse the removal procedure





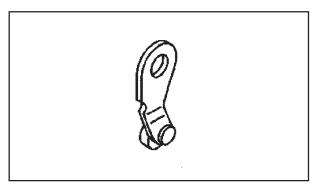
## DISASSEMBLING THE SHIFT SHAFT

- 1. Remove:
  - shift shaft
  - bolt 1
  - stopper lever ②
  - stopper lever spring ③



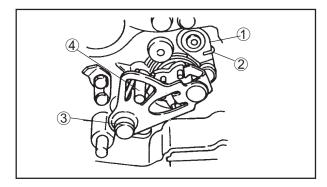
## CHECKING THE SHIFT SHAFT

- 1. Remove:
  - shift shaft 1
  - shift shaft pawl ②
    Runout/Wear --> Replace.



## **CHECKING THE STOPPER LEVER**

- 1. Check:
  - stopper lever Runout/Damage --> Replace.
     Roller turns roughly --> Replace the stopper lever.



## **INSTALLING THE SHIFT SHAFT**

- 1. Install:
  - stopper lever ①
  - stopper lever spring ②
  - shift shaft ③

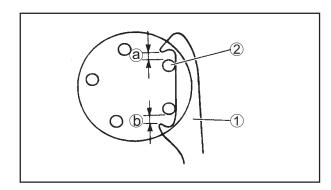
## NOTE:

- 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.
- Lubricate the stopper lever mounting bolt with lithium-soap-based grease.
- Hook the end of the shift shaft spring onto the shift shaft spring stopper ④, as illustrated.

# **SHIFT SHAFT**







## 2. Check:

- driven pawl ①
- shift drum segment ②
  Difficult meshing --> Adjust.

NOTE: -

The measurements @ and ⓑ must be identical.



Stopper lever bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)

## 3. Install:

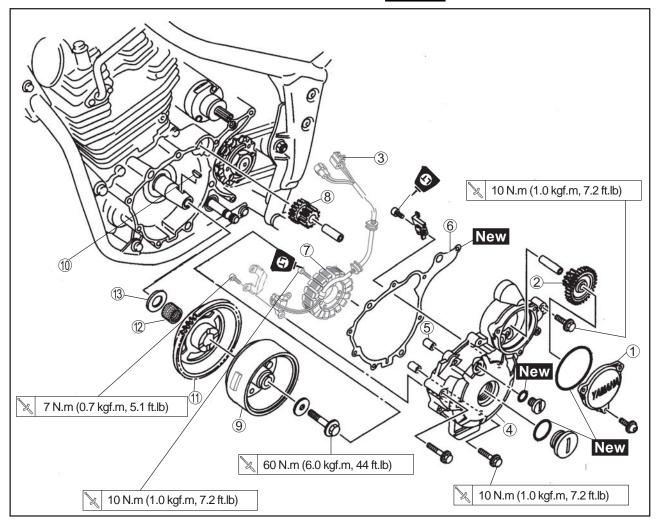
 clutch pedal pivot Refer to "ADJUSTING THE CLUTCH PEDAL" in chapter 3.





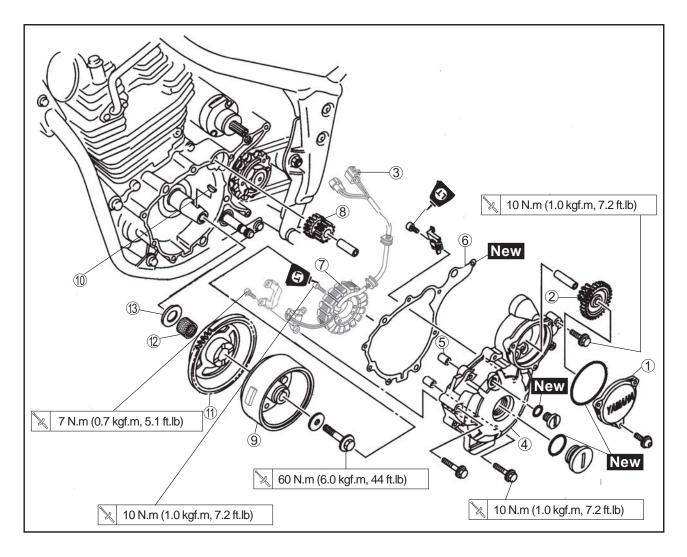
### STARTER CLUTCH AND AC MAGNETO





Order	Job/Part	Qt'y	Remarks
	Removing the starter clutch and the AC magneto		Remove the parts in the order listed
	Engine oil		Drain
	Shift pedal pivot		Refer to "REAR BALANCE"
	Pinion cover		in chapter 4
1	O-ring / starter idle gear cover 1	1/1	
2	shaft / starter idle gear 1	1/1	
3	Stator connector	2	Disconnect
4	Crankcase cover (left)	1	
5	Dowel pins	2	
6	Crankcase cover	1	
7	Pulser	1/1	

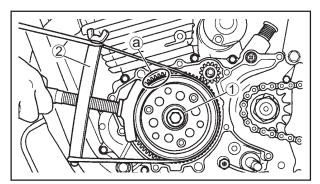




Order	Job/Part	Qt'y	Remarks
8	Starter idle gear 2/ shaft	1/1	
9	AC magneto	1	
10	Woodruff key	1	
11	Starter wheel gear	1	
12	Bearing	1	
13	Washer	1	
			For installation, reverse the
			removal procedure







### **REMOVING THE AC MAGNETO**

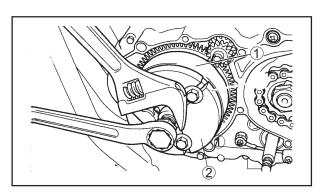
- 1. Remove:
  - AC magneto bolt
  - washer
  - AC magneto

### NOTA:

- While holding the AC magneto 1 with the sheave holder ②, loosen the rotor bolt.
- Do not allow the sheave holder to touch the projection ⓐ on the AC magneto.



Sheave holder 90890-01701

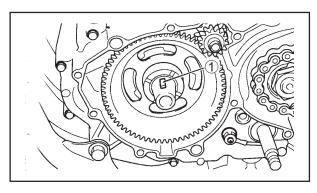


### 2. Remove:

AC magneto ①
 (with the flywheel puller ②)

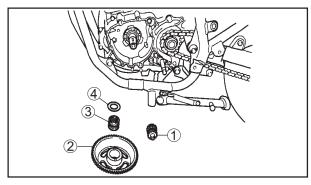


Flywheel puller 90890-01362



### 3. Remove:

• woodruff key ①

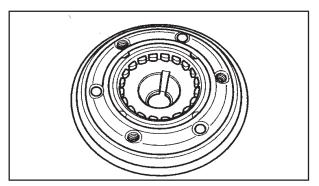


### 4. Remove:

- starter idle gear 2 ①
- starter wheel gear 2
- bearing ③
- washer 4

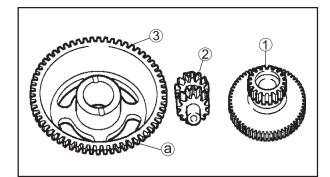






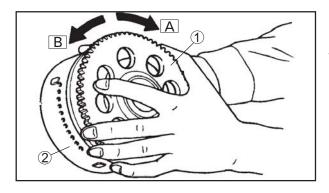
### **CHECKING THE STARTER CLUTCH (ONE WAY)**

- 1. Check:
  - starter clutch rollers ①
     Damage/Wear --> Replace.



### 2. Check:

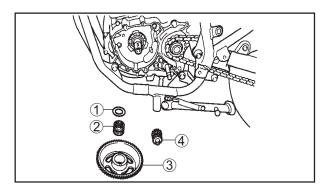
- starter idle gear 1 ①
- starter idle gear 2 ②
- starter wheel gear ③
   Burrs/Wear --> Replace the defective part(s).
- 3. Check:
  - starter clutch contacting surfaces a Damage/Pitting/Wear --> Replace.



### 4. Check:

starter clutch operation (one way)

- a. Install the starter clutch gear ① onto the rotor② and hold the starter clutch.
- b. When turning the starter clutch gear clockwise A, it should turn freely, otherwise the starter clutch is defective and must be replaced.
- c. When turning the starter clutch gear counter clockwise B, the starter clutch gear and the rotor should engage, otherwise the starter clutch gear is defective and should be replaced.

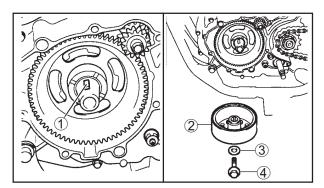


### **ASSEMBLING THE AC MAGNETO**

- 1. Install:
  - washer ①
  - bearing 2
  - starter wheel gear ③
  - starter idle gear 2 4





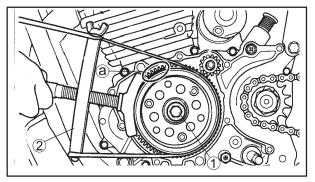


#### 2. Install:

- woodruff key 1
- AC magneto 2
- washer ③
- rotor bolt 4

### NOTE:

- Clean the crankshaft and AC magneto bevel portion.
- When installing the AC magneto, make sure the woodruff key is properly installed at the crankshaft groove.
- Lubricate the crankshaft end thread with engine oil.



### 3. Install:

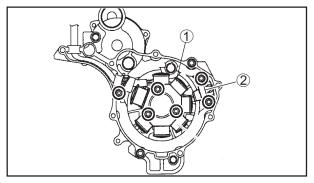
• rotor bolt (1)



Rotor bolt 60 N.m (6.0 kgf.m, 44 ft.lb)

### NOTE:

- While holding the AC magneto with the sheave holder ②, tighten the rotor bolt.
- Do not allow the sheave holder to touch the AC magneto projection (a).



### 4. Install:

• stator coil assembly 1



Stator coil assembly bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)



• pulser coil ②



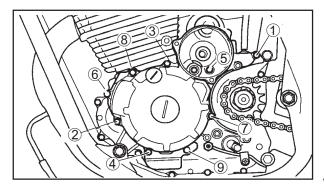
Pulser coil bolt

7 N.m (0.7 kgf.m, 5.1 ft.lb)









5. Install:

- gasket New
- crankcase cover (left)



Crankcase cover bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)

NOTE: \_

Tighten the crankcase cover bolts in stages and in a crisscross pattern.

- 6. Install:
  - · neutral switch wire

NOTE: .

Place the neutral switch terminal so that the wire is fitted, refer to "CABLE ROUTING" in chapter 2.

• bolts M6 x 30mm from 1 to 5



Bolts M6 x 30mm 10 N.m (1.0 kgf.m, 7.2 ft.lb)

• bolts M6 x 45mm from ⑥



Bolt M6 x 45mm 10 N.m (1.0 kgf.m, 7.2 ft.lb)

• bolts M6 x 40mm from 7 to 9



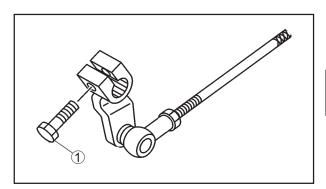
Bolts M6 x 40mm 10 N.m (1.0 kgf.m, 7.2 ft.lb)



- shift pedal pivot
- pivoting bolts ⑦



Pivoting bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)

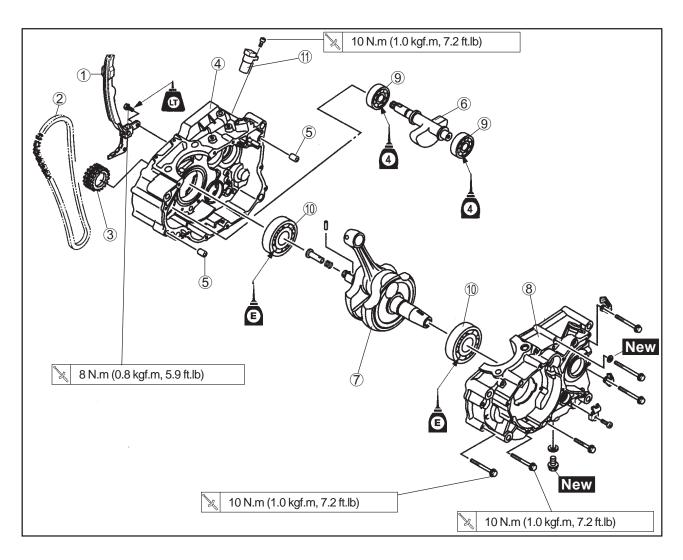


- 8. Install:
  - o-ring New
  - starter idle gear cover 1
  - starter idle cover bolt



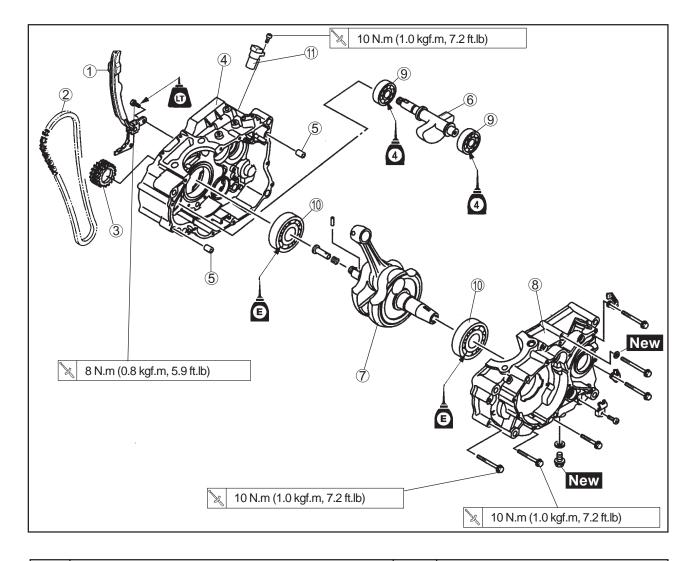
Starter idle bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)





Order	Job/Part	Qt'y	Remarks
	Separating the crankcases and removing the		Remove the parts in the order listed
	crankshaft		
	Engine oil		Drain
	Engine		Refer to "REMOVING THE ENGINE"
	Cylinder head		Refer to "CYLINDER HEAD"
	Cylinder/Piston		Refer to "CYLINDER AND PISTON"
	AC magneto		Refer to "STARTER CLUTCH AND
			AC MAGNETO"
	Clutch		Refer to "CLUTCH"
	Balancer gear/driven gear		Refer to "BALANCER DRIVEN
			GEAR"
	Oil pump		Refer to "OIL PUMP"
	Shift shaft		Refer to "SHIFT SHAFT"
	AC magneto		Refer to "STARTER CLUTCH AND
	Starter gear		AC MAGNETO"

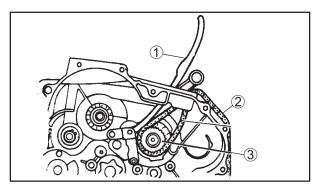




Order	Job/Part	Qt'y	Remarks
1	Timing chain guide (intake side)	1	
2	Timing chain	1	
3	Crankshaft sprocket	1	
4	Crankcase (right)	1	
5	Dowel pin	2	
6	Balancer	1	
7	Crankshaft assembly	1	Refer to "REMOVING THE BALANCER AND CRANKSHAFT ASSEMBLY"
8	Crankcase (left)	1	
9	Balancer bearing	2	
10	Crankshaft bearing	2	
11	Speed sensor	1	
			For installation, reverse the removal procedure

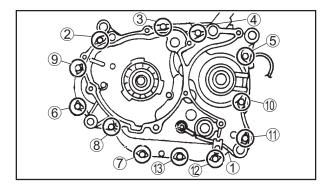






### DISASSEMBLING THE CRANKCASES

- 1. Remove:
  - timing chain guide ①
  - timing chain ②
  - crankshaft sprocket ③

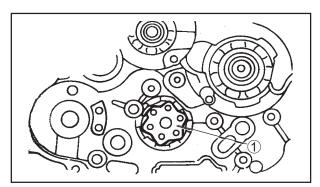


#### 2. Remove:

- neutral switch wire 1
- bolt with washer 2, 3 and 4
- engine bolts 5 to 13

### NOTE: \_

- Loosen each bolt 1/4 of a turn at a time, and when all of the bolts are fully loosened, remove them.
- Loosen the bolts in stages and in a crisscross pattern.
  - M6 x 70 mm (2.76 in) bolts from ② to ④
  - M6 x 60 mm (2.36 in) bolts 5, 6
  - M6 x 55 mm (2.16 in) bolts 7 to 9
  - M6 x 45 mm (1.77 in) bolts from 10 to 13
- 3. Remove:
  - speed sensor
- 4. Remove:
  - gearshift cam selector



### NOTE: \_

Turn the gearshift cam selector segment ①, avoiding its contact with the crankcase during separation.

- 5. Remove:
  - crankcase (RH)

NOTE:

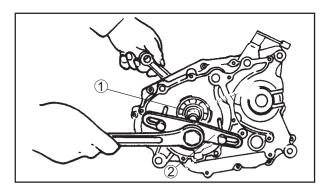
Place the engine with the crankcase (LH) facing down and use a screwdriver to separate the crankcases.

### CAUTION:

- Use the screwdriver at the proper place.
- The crankcase (LH) should remain below.
- Separate the crankcases only after making sure the gearshift cam segment is properly placed.





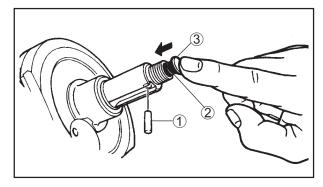


## REMOVING THE BALANCER AND CRANKSHAFT ASSEMBLY

- 1. Remove:
  - balancer
  - crankshaft assembly ①

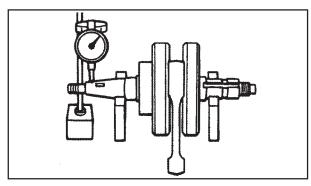
#### NOTE:

- Remove the crankshaft along with the crankshaft extractor ②.
- Tighten the crankhaft extractor bolts until the end.
- Make sure the extractor shaft is aligned with the crankshaft.



### CHECKING THE CRANKSHAFT

- 1. Check:
  - lock pin ①
  - compression spring 2
  - plunger seal ③
     Damage/Wear/Locking --> Replace.



### 2. Measure:

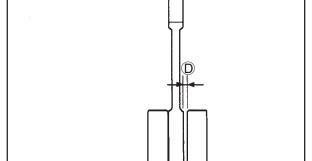
crankshaft alignment
 Out of specification --> Replace the crankshaft, the bearing or both of them.

#### NOTE:

Turn the crankshaft slowly.



Crankshaft maximum misalignment 0.030 mm (0.0012 in)



#### 3. Measure:



Connecting rod side clearance 0.350 ~ 0.650 mm (0.013 ~ 0.026 in)

### 4. Measure:

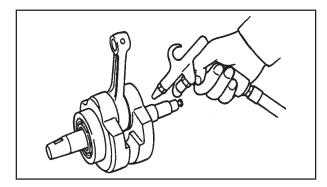


Crankshaft width 69.25 ~ 69.30 mm (2.7264 ~ 2.7283 in)





- 5. Check:
  - bearing
     Damage/Excessive noise --> Replace.

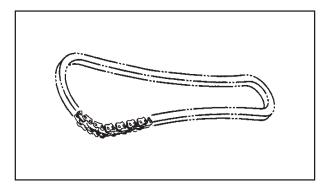


### 6. Check:

crankshaft oil galleries
 Obstruction --> Blow out with compressed air.

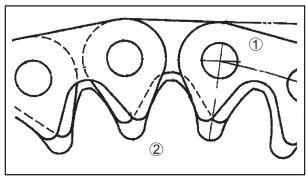
### **CHECKING THE CRANKCASES**

- 1. Check:
  - crankcase (right)
     Runout/Cracks --> Replace.
  - oil routing galleries
     Obstruction --> Blow out with compressed air.
- 2. Check:
  - crankcase (left)
     Runout/Cracks --> Replace.
  - oil routing galleries
     Obstruction --> Blow out with compressed air.
- 3. Clean:
  - · bond residues
  - · gasket residues



# CHECKING THE TIMING CHAIN GUIDE AND TIMING CHAIN

- 1. Check:
  - timing chain
     Damage/Stiffness --> Replace the timing chain and the crankshaft sprocket as a set.

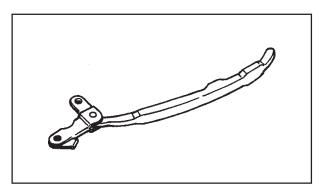


### 2. Check:

- crankshaft sprocket
   Wear higher to <sup>1</sup>/<sub>4</sub> of tooth --> Replace the
   components as a set (camshaft sprocket,
   crankshaft sprocket and timing chain).
- 1 chain link
- 2 crankshaft sprocket

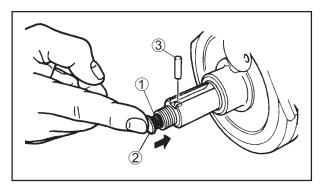






### 3. Check:

 timing chain guide (intake side)
 Damage/Wear --> Replace.



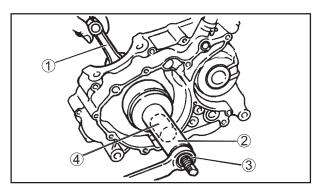
#### ASSEMBLING THE CRANKSHAFT

#### 1. Install:

- compression spring ①
- plunger seal ②
- lock pin ③

### 2. Check:

plunger seal operation



### **INSTALLING THE CRANKSHAFT ASSEMBLY**

#### 1. Install:

crankshaft assembly ①

### NOTE: .

Install the crankshaft assembly with the crankshaft installer kit.



Crankshaft installer ②
90890-01274

Traction spindle ③
90890-01275

Adapter ④
90890-01383

### **CAUTION:**

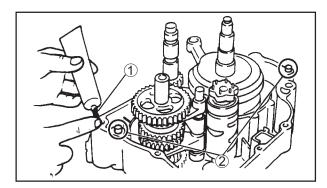
To prevent scratching the crankshaft and ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease, and then lubricate the bearings with engine oil.

#### NOTE: \_

Hold the connecting rod at the top dead center (TDC) with one hand while turning the nut onto the crankshaft installer bolt with the other hand. Turn the crankshaft installer bolt until its lower part touches the bearing.







### CRANKCASE (RIGHT SIDE)

- 1. Apply:
  - bond ①
     (at the crankcase closing surfaces).



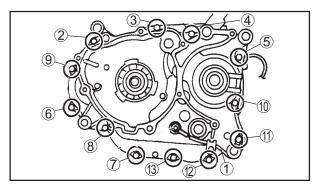
### Bond:

Yamaha Bond no. 1215 90890-85505

### NOTE:

Do not allow the bond to get into contact with the oil galleries.

- 2. Install:
  - dowel pines ②
- 3. Fit the right crankcase to the right crankcase. Tap softly with a plastic hammer.



- 4. Install:
  - neutral switch wire 1
- 5. Tighten:
  - bolts

(fix in the bolts 2, 3 and 4 and the gaskets).

### NOTE: .

Tighten the bolts starting from the lower number.

• M6 x 70mm bolts from 2 to 4



M6 x 70mm bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)

• M6 x 60mm bolts 5, 6



M6 x 60mm bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)

• M6 x 55mm bolts from 7 to 9



M6 x 55mm bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)

• M6 x 45mm bolts from 10 to 13

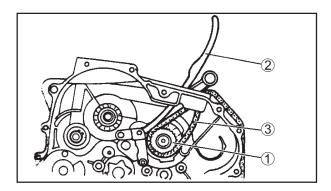


M6 x 45mm bolts 10 N.m (1.0 kgf.m, 7.2 ft.lb)



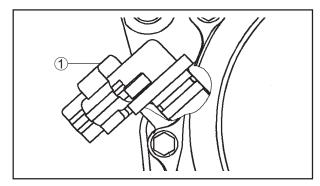


- 6. Apply
  - engine oil 4T (to the bearings and oil galleries)
- 7. Check:
  - transmission and crankshaft operation
     Defective operation --> Repair.
- 8. Install:
  - neutral switch wire



### 9. Install:

- crankshaft sprocket 1
- timing chain guide ②
- timing chain ③



### 10. Install:

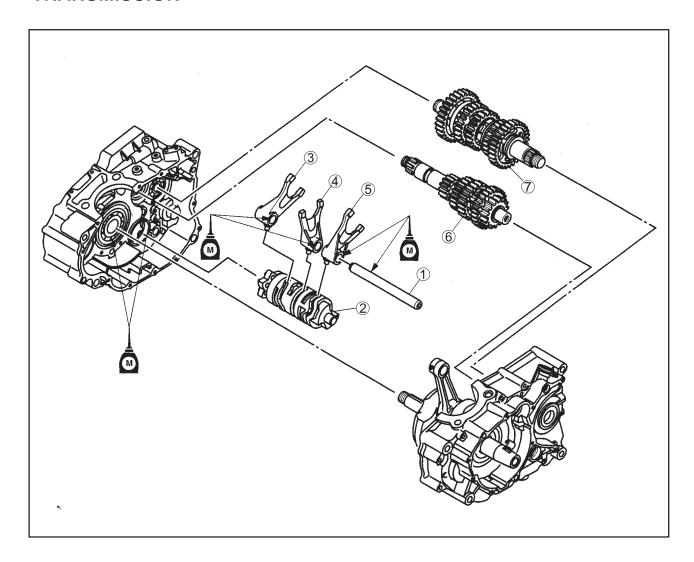
• speed sensor ①



Speed sensor bolt 10 N.m (1.0 kgf.m, 7.2 ft.lb)



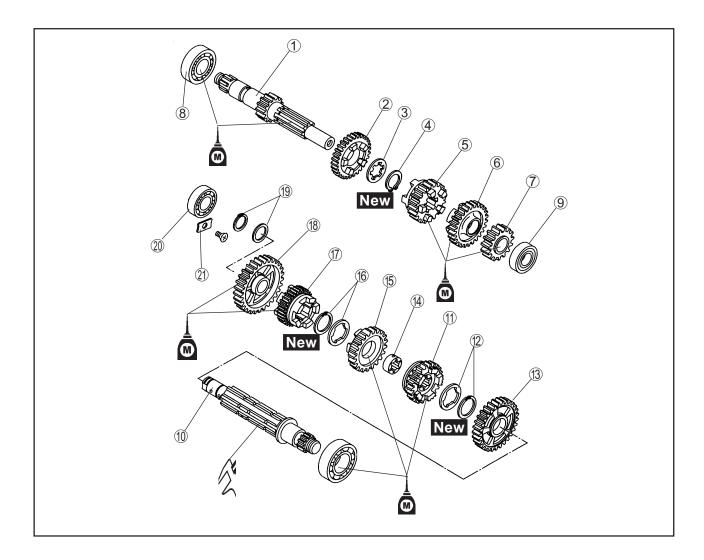
### **TRANSMISSION**



Order	Job/Part	Qt'y	Remarks
	Removing the transmission, shift drum, shift forks		Remove the parts in the order listed
	Crankcases		Separate
			Refer to "CRANKCASES"
1	Shift fork shaft	1	
2	Shift drum assembly	1	
3	Shift fork 3 (R)	1	
4	Shift fork 2 (C)	1	
5	Shift fork 1 (L)	1	
6	Main axle assembly	1	
7	Drive axle assembly	1	
			For installation, reverse the removal procedure

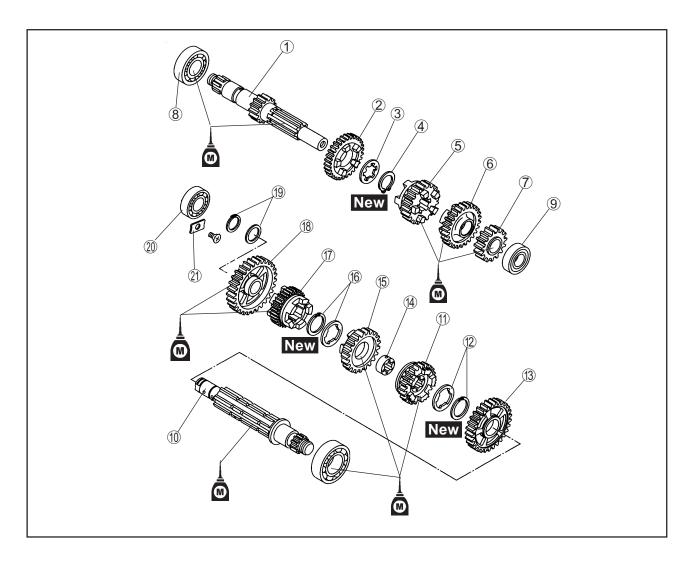


### MAIN AXLE / DRIVE AXLE



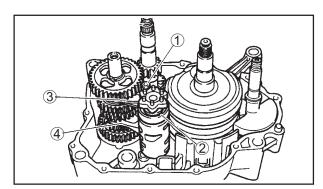
Order	Job/Part	Qt'y	Remarks
	Disassembling the main axle assembly and		Remove the parts in the order listed
	the drive axle assembly		
1	Main axle and 1st pinion gear	1	
2	4 <sup>th</sup> pinion gear	1	
3	Washer	1	
4	Circlip	1	
(5)	3 <sup>rd</sup> pinion gear	1	
6	5 <sup>th</sup> pinion gear	1	
7	2 <sup>nd</sup> pinion gear	1	
8	Bearing	1	
9	Bearing	1	
10	Drive axle	1	
11)	5 <sup>th</sup> wheel gear	1	





Order	Job/Part	Qt'y	Remarks
12	Washer / circlip	1/1	
13	2 <sup>nd</sup> wheel gear	1	
14)	Spacer	1	
15)	3 <sup>rd</sup> wheel gear	1	
16	Washer / circlip	1/1	
17)	4 <sup>th</sup> wheel gear	1	
18	1 <sup>st</sup> wheel gear	1	
19	Washer / circlip	1/1	
20	Bearing	1	
21)	Bearing lock	1	
			For assembly, reverse the disassembly procedure



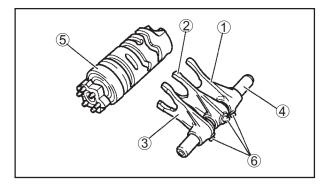


### **REMOVING THE TRANSMISSION**

- 1. Remove:
  - shift fork shaft ①
  - shift drum assembly 2
  - shift fork 3 (R) ③
  - shift fork 2 (C)
  - shift fork 1 (L) 4

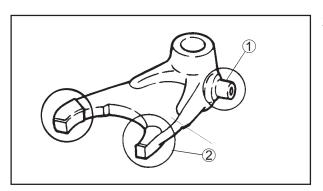
NOTE: .

Move the gears to ease the forks removal.



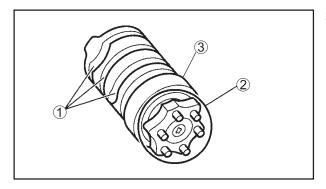
### CHECKING SHIFT DRUM AND SHIFT FORKS

- 1. Check:
  - shift fork 3 (R) 1
  - shift fork 2 (C) 2
  - shift fork 1 (L) 3
  - shift fork shaft 4
  - shift drum assembly (5)
  - shift fork cam follower ⑥
     Rough movement --> Replace the shift forks.



### 2. Check:

- shift fork cam follower 1
- shift fork pawl ②
   Damage/Wear --> Replace.



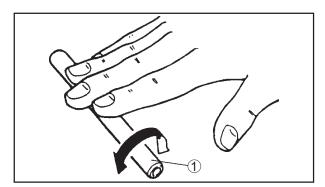
### 3. Check:

- shift drum assembly
- shift drum groove ①
   Damage/Scratches/Wear --> Replace.
- shift drum segment ②
   Damage/Scratches/Wear --> Replace.
- shift drum bearing ③
   Damage/Pitting --> Replace.

### **TRANSMISSION**





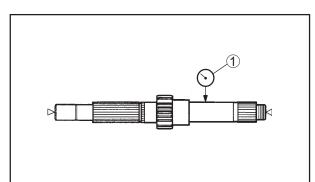


### 4. Check:

shift fork shafts ①
 Runout/Wear --> Replace.

### **CAUTION:**

Do not attempt to align a bent shift fork shaft.



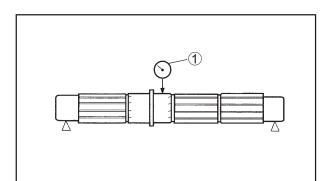
### **CHECKING THE TRANSMISSION**

#### 1. Measure:

 main axle alignment (use the centering device and a dial gauge ①).
 Out of specification --> Replace.



Misalignment limit 0.08 mm (0.0031 in)

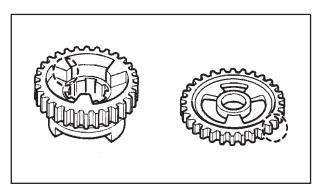


### 2. Measure:

 drive axle alignment (use the centering device and a dial gauge ①).
 Out of specification --> Replace.

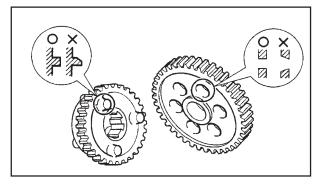


Misalignment limit 0.08 mm (0.0031 in)



### 3. Check:

- transmission gears
   Blue discoloration/Pitting/Wear --> Replace
   the defective part(s).
- transmission gear dogs Cracks/Damage/Rounded edges
  - --> Replace the defective gear(s).



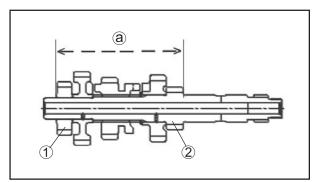
### 4. Check:

 transmission gear engagement (each gear to its respective coupler gear).
 Incorrect --> Reassembly the transmission assembly.

NOTE: .

Eliminate obstructions and locking.





### INSTALLING THE TRANSMISSION

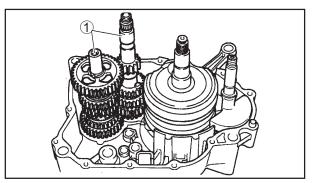
- 1. Install:
  - 2nd pinion gear ①

NOTE:

Press the 2nd pinion gear onto the main axle ②, as shown in the illustration.

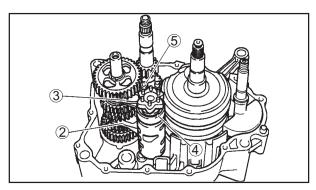


2nd pinion press length 102.2 ~102.4 mm (4.02 ~ 4.03 in)



#### 2. Install:

- transmission assembly ①
- shift fork 1 (L) 2
- shift fork 2 (C)
- shift fork 3 (R) ③
- shift drum 4
- shift fork shaft ⑤

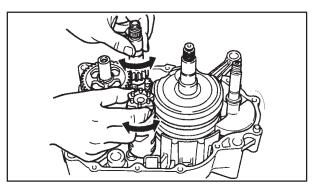


### NOTE: \_

Make sure that the shift fork cam follower is properly installed into the shift drum groove.

### 3. Check:

gearshift operation
 Unsmoothly operation --> Repair.



### NOTE: \_

- Apply engine oil to each gear and bearing.
- Before assembling the crankcases, make sure the transition is at neutral and the gears spin freely.

## **CHAPTER 6**

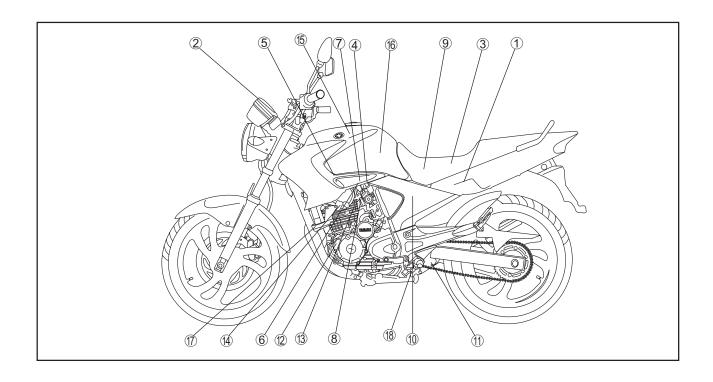
FUEL INJECTION SYSTEM	6-1
ELECTRICAL CIRCUIT DIAGRAM	6-2
ECU'S SELF-DIAGNOSTIC FUNCTION	6-3
SELF-DIAGNOSTIC FUNCTION TABLE	6-5
TROUBLESHOOTING METHOD DIAGNOSTIC MODE	
TROUBLESHOOTING DETAILS	6-14
THROTTLE BODY  REMOVING THE FUEL HOSE  REMOVING THE FUEL PUMP  CHECKING THE FUEL INJECTOR  CHECKING THE THROTTLE BODY  INSTALLING THE THROTTLE BODY  CHECKING THE FUEL PUMP  INSTALLING THE FUEL PUMP  INSTALLING THE FUEL HOSE  CHECKING THE F.I.D. (FAST IDLE SOLENOID) SYSTEM	6-30 6-31 6-31 6-32 6-33 6-33
AIR INDUCTION SYSTEM	6-35 6-36





- ① ECU (engine control unit)
- ② Engine trouble warning light
- 3 Lean angle sensor
- 4 Fuel delivery hose
- ⑤ Ignition coil
- 6 Fuel injector

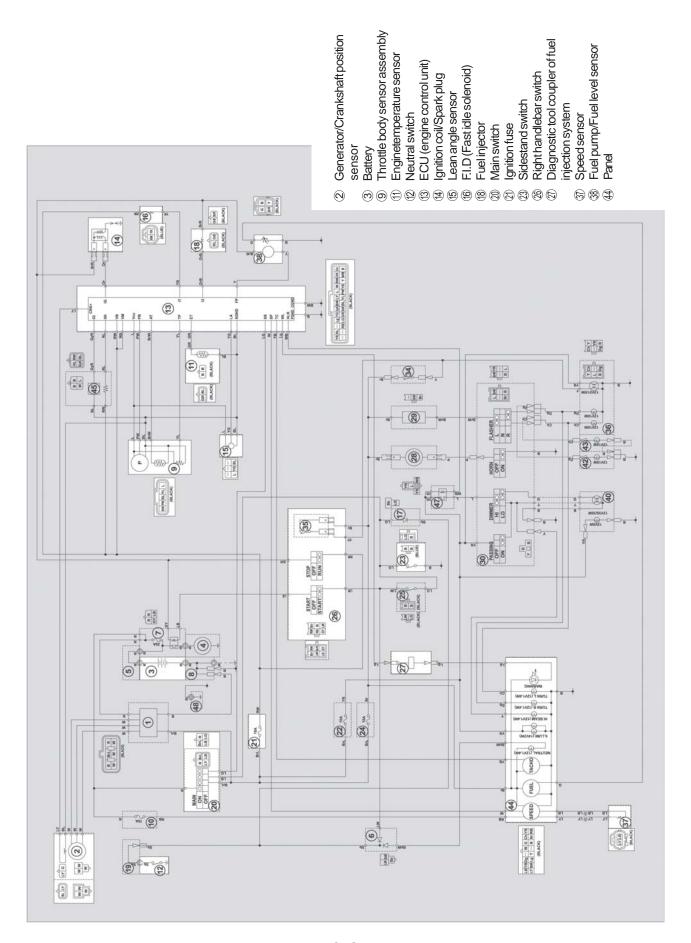
- FID (fast idle solenoid)
- Throttle body sensor assembly
- 9 Battery
- ① Air filter case
- ① Catalytic converter
- ② Crankshaft position sensor
- Tengine temperature sensor
- Spark plug
- 15 Fuel tank
- 16 Fuel pump
- ① Air induction system (A.I.System)
- ® O<sub>2</sub> sensor







### **ELECTRICAL CIRCUIT DIAGRAM**



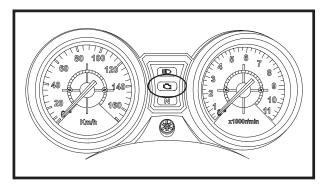




### ECU'S SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the engine control system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the ECU memory in the form of a fault code.

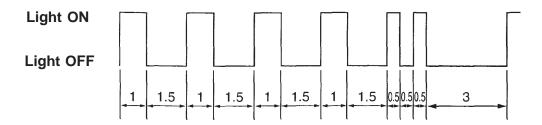
- To inform the rider that the fuel injection stop function is active, the engine trouble warning light blinks while the start switch is being pressed to start the engine.
- If a malfunction in the system is detected by the self-diagnostic function, this mode provides an
  appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by
  illuminating a engine trouble warning light.
- After the engine has been stopped, the lower fault code will be displayed at the failure warning light (or at the F.I. diagnostic tool display). Once a self-diagnostic fault code has been displayed, it remains stored in the ECU memory until a deletion operation is performed.



### Engine trouble warning light fault code indication

Ten digit: Cycles of 1 sec ON and 1.5 sec OFF. Unity digit: Cycles of 0.5 sec ON and 0.5 sec OFF.

<Example>: Fault code number 42.







### Engine trouble warning light indication and fuel injection system operation

Warning light indication	ECU operation	Fuel injection operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

<sup>\*</sup> The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

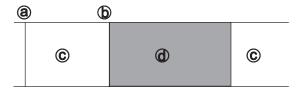
12: 13:	Crankshaft position sensor Intake air pressure sensor	30:	Lean angle sensor (latch up detected)
	(open or short circuit)	33:	Faulty ignition
14:	Intake air pressure sensor	39:	Fuel injector
	(hose line)		(open or short circuit)
15:	Throttle position sensor	41:	Lean angle sensor
	(open or short circuit)		(open or short circuit)
16:	Throttle position sensor (stuck)	50:	ECU internal malfunction (memory check error)

FI



### Checking the engine trouble warning light bulb

The engine trouble warning light comes on for 3 seconds after main switch has been turned to "ON". If the warning light does not come on under these conditions, the warning light bulb may be defective.



- (a) Main switch "OFF"
- (b) Main switch "ON"

- © Engine trouble warning light off
- d Engine trouble warning light on for 3 seconds

### SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

### **Self-Diagnostic Function table**

Fault code No.	Item	Symptom	Fail-safe action	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Stops the engine (by stopping the injection and ignition).	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor: open or short circuit detected.	Stops the engine (by stopping the injection and ignition)	Able	Able
14	Intake air pressure sensor (hose line)	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	Intake air pressure	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor: open or short circuit detected.	Intake air pressure	Able	Able
16	Throttle position sensor (stuck)	Throttle position sensor is stuck	Fixes the temperature to 20°C	Able	Able

## FI



Fault code No.	Item	Symptom	Fail-safe action	Able / unable to start	Able / unable to drive
22	Intake air temperature sensor (open or short circuit)	Intake air temperature sensor: open or short circuit detected		Able	Able
24	O <sub>2</sub> sensor	No normal signal is received from the O <sub>2</sub> sensor.		Able	Able
28	Engine temperature sensor (open or short circuit)	Engine temperature sensor: open or short circuit is detected.	Fixes the engine temperature as follows:  • Until 10s after the engine starts: 30 °C  • 10-20s after the start: 30-100°C  • After operating for 20s: 100 °C	Able	Able
30	Lean angle sensor (latch up detected)	No normal signal is received from the lean angle sensor.	Stops the engine (by stopping the injection)	Unable	Unable
31	O <sub>2</sub> sensor	The amount of air-fuel ratio feed-back compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio).		Able	Able
32	O <sub>2</sub> sensor	The amount of air-fuel ratio feed-back compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio)		Able	Able
33	Ignition coil (open circuit)	Primary lead of the ignition coil: open circuit detected.	Stops the engine (by stopping the injection and ignition)	Unable	Unable
39	Fuel injector	Fuel injector: open or short circuit detected	Stops the engine (by stopping the injection)	Unable	Unable
41	Lean angle sensor (open or short circuit)	Lean angle sensor: open or short circuit detected	Stops the engine (by stopping the injection)	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.		Able	Able
44	Error in reading from or writing on EEPROM	Error is detected while reading from or writing on EEPROM (CO adjustment value, code re-registering key code, and throttle valve fully closed notification value).		Able	Able
46	Vehicle system power supply (Monitoring voltage)	Power supply to the fuel injection system is not normal		Able	Able
50	ECU internal malfunction (memory check error)	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)		Unable	Unable
	Start unable warning	Engine trouble warning light flashes when the start switch is turned ON.	The engine fault warning blinks when the starter switch is turned ON.	Unable	Unable





### TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

\*

- 1. Check:
  - · fault code number
- a. Check the fault code number displayed on the FI diagnostic tool.
- b. Identify the faulty system with the fault code. Refer to "Self-Diagnostic Function table".
- c. Identify the probable cause of the malfunction. Refer to "Diagnostic code table".

#### 

Check and repair the probable cause of malfunction.

Fault code No.	No fault code No.
Check and repair.	Check and repair.
Refer to	Refer to "Self-Diagnostic
"TROUBLESHOOTING	Function table"
DETAILS".	
Monitor the operation of	
the sensors and	
actuators in the	
diagnostic mode.	
Refer to "Sensor	
operation table" and	
"Actuator operation	
table".	

3. Perform Fuel Injection System reinstatement action.

Refer to "Reinstatement method" of table in "TROUBLESHOOTING DETAILS".

4. Turn the main switch to "OFF" and back to "ON", then check that no fault code number is displayed.

### NOTE: \_

If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to "Sensor operation table (Diagnostic code No. 62)".

#### NOTE: \_

Turning the main switch to "OFF" will not erase the malfunction history.

The engine operation is not normal but the engine trouble warning light does not come on.

 Check operation of following sensors and actuators in the Diagnostic mode. Refer to "Sensor operation table" and "Actuator operation table".

30: Ignition coil

36: Fuel injector

If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts. If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

FΙ

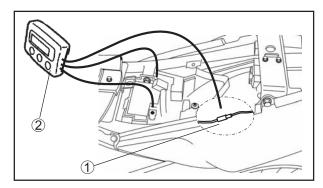


### **DIAGNOSTIC MODE**

It is possible to monitor the sensor output data or activate the actuators by connecting the F.I. diagnostic tool on the normal mode or in the diagnostic mode.



F.I. diagnostic tool 90890-03182

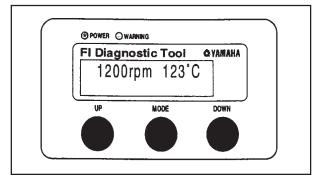


### Setting the normal mode

1. Set the main switch to "OFF" and the engine stop switch to "ON".

### NOTE:

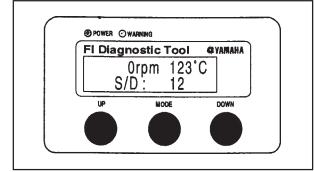
The rotation, engine temperature and the fault code, whether detected, can be displayed on the F.I. diagnostic panel, when connected to the vehicle in normal mode.



- 2. Disconnect the connector of self-diagnostic signal ① and connect the tool ②, as shown.
- 3. Set the starter switch to "ON" and function the engine.

#### NOTE:

- The rotation and temperature will appear on the display.
- The green LED "POWER" is illuminated.
- If a failure has been found in the system, the "WARNING" LED (orange) will illuminate. However, the fault code will not appear on the display.



4. Stop the engine.

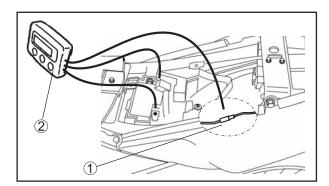
#### NOTE: .

If a failure has been found in the system, the fault code will be displayed. The "WARNING" LED (orange) will also be illuminated.

- 5. Turn OFF the starter switch to cancel the normal mode.
- 6. Disconnect the F.I. diagnostic tool and return to the original condition.







### Setting the diagnostic mode

- Set the starter switch to OFF and the stop engine switch to ON.
- Disconnect the connector of the self-diagnostic
   and connect the diagnostic tool ② as shown.

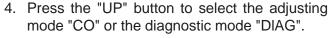
### **⚠** WARNING

Disconnect the fuel pump connector to prevent fuse blowing.

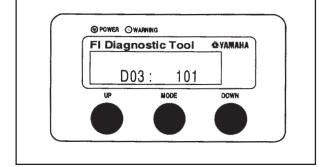
3. At the same time, press the "MODE" button and turn the starter switch to ON.

#### **NOTE**

- "DIAG" appears on the tool display.
- The "POWER" LED (green) is illuminated.



- 5. After selecting "DIAG", press the "MODE" button.
- Select the diagnostic code number which applies to the item detected with the fault code by pressing the "UP" and "DOWN" buttons. The diagnostic code number appears on the display (01 ~ 70).



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

- To decrease the selected diagnostic code number, press "DOWN" button. Pressing this button for 1 second or more will automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code numbers, press "UP" button. Pressing this button for 1 second or more will automatically increase the diagnostic code numbers.
- 7. Check the sensor or actuator operation.
  - Sensor operation
     The data representing the sensor operational conditions are shown on the display.
  - Actuator operation
     Press the "MODE" button to activate the actuator.
- 8. Set the starter switch to "OFF" to cancel the diagnostic mode.
- 9. Disconnect the F.I. diagnostic tool and return to the original connection.

## FΙ



### Diagnostic code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
12	No normal signals are received from the crankshaft position sensor.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective crankshaft position sensor.</li> <li>Malfunction in ACM rotor.</li> <li>Improperly installed sensor.</li> <li>Malfunction in ECU.</li> </ul>	
13	Intake air pressure sensor: open or short circuit detected.	<ul> <li>Open or short circuit in wire harness.</li> <li>Defective intake air pressure sensor.</li> <li>Malfunction in ECU.</li> </ul>	D03
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose).	<ul> <li>Intake air pressure sensor hose is detached, clogged, kinked, or pinched.</li> <li>Malfunction in ECU.</li> </ul>	D03
15	Throttle position sensor: open or short circuit detected.	<ul> <li>Open or short circuit in wire harness.</li> <li>Defective throttle position sensor.</li> <li>Improperly installed throttle position sensor.</li> <li>Malfunction in ECU.</li> </ul>	D01
16	Throttle position sensor is stuck	<ul><li>Stuck throttle position sensor.</li><li>Malfunction in ECU.</li></ul>	D01
22	Intake air temperature sensor: open or short circuit detected.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective air temperature sensor.</li> <li>Improperly installed intake air temperature sensor.</li> <li>Malfunction in ECU.</li> </ul>	D05
24	No normal signal is received from the O <sub>2</sub> sensor.	<ul> <li>Open or short circuit in wiring harness.</li> <li>Defective O<sub>2</sub> sensor.</li> <li>Improperly installed sensor.</li> <li>Malfunction in ECU.</li> </ul>	
28	Engine temperature sensor: open or short circuit detected.	<ul> <li>Open or short circuit in wire harness.</li> <li>Defective engine temperature sensor.</li> <li>Improperly installed sensor.</li> <li>Malfunction in ECU.</li> </ul>	D11
30	No normal signal is received from the lean angle sensor	<ul><li>Overturned.</li><li>Malfunction in ECU.</li></ul>	D08



Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
31	The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the upper limit (lean air-fuel ratio).	<ul> <li>Open or short circuit in wiring harness.</li> <li>Fuel pressure too low.</li> <li>Clogged injectors.</li> <li>Defective O<sub>2</sub> sensor (unable to output a rich signal)</li> <li>Malfunction in other areas of the fuel system.</li> <li>Malfunction in ECU.</li> </ul>	
32	The amount of air-fuel ratio feedback compensation is maintained continuously in the vicinity of the lower limit (rich air-fuel ratio)	<ul> <li>Open or short circuit in wiring harness.</li> <li>Fuel pressure too high.</li> <li>Faulty injectors (excessive injection volume).</li> <li>Defective O<sub>2</sub> sensor (unable to output a lean signal).</li> <li>Malfunction in other areas of the fuel system.</li> <li>Malfunction in ECU.</li> </ul>	
33	Primary lead of the ignition coil: open circuit detected.	<ul> <li>Open circuit in wire harness.</li> <li>Malfunction in ignition coil.</li> <li>Malfunction in a component of ignition cut-off circuit system.</li> <li>Malfunction in ECU.</li> </ul>	D30
39	Fuel injector: open or short circuit detected.	<ul> <li>Open or short circuit in wire harness.</li> <li>Defective fuel injector.</li> <li>Improperly installed fuel injector</li> <li>Malfunction in ECU.</li> </ul>	D36
41	Lean angle sensor: open or short circuit detected	<ul> <li>Open or short circuit in wire harness.</li> <li>Defective lean angle sensor.</li> <li>Malfunction in ECU.</li> </ul>	D08





Fault code	Symptom	Probable cause of malfunction	Diagnostic code No.
42	No normal signals are received from the speed sensor.	<ul> <li>Open circuit in wire harness.</li> <li>Defective speed sensor.</li> <li>Defective neutral switch.</li> <li>Malfunction in vehicle speed sensor defected.</li> <li>Malfunction in ECU</li> </ul>	D07
44	Error is detected while reading or writing on EEPROM.	<ul> <li>Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory).</li> </ul>	D60
46	Power supply to the fuel injection system is not normal.	Malfunction in the charging system.	
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the LCD of the FI diagnostic tool.)	<ul> <li>Malfunction in ECU (The program and data are not properly written on or read from the internal memory.)</li> </ul>	

### Diagnostic mode table

Switch the FI diagnostic tool display screen: from the Normal mode to the Diagnostic monitoring mode. To show the display screen, refer to "DIAGNOSTIC MODE".

### NOTE: -

- Check the intake air temperature as close as possible to the intake air temperature sensor.
- When it is not possible to check the intake air temperature, use the room temperature as reference.

Diagnostic code No.	Item	FI diagnostic tool display	Checking method
D01	Throttle angle  Fully closed position  Fully opened position	15 ~ 18 94 ~ 99	Check with throttle fully closed. Check with throttle fully open.
D03		Displays the intake air pressure.	Operate the throttle while pushing the start switch "." (If the display value changes, the performance is OK.)
D05	Intake air temperature	Displays the intake air temperature	Compare the actually measured air temperature with the display value.





Lean angle sensor  Upright  Overturned  Overturned  Displays the engine temperature.  Check the engine temperature.  Ugnition coil  Fuel injector  Fuel injector  Fuel injector  Actuates the fuel injector five times at one-second intervals. Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  Headlight relay  Fill (fast idle solenoid)  F	Diagnostic code No.	Item	FI diagnostic tool display	Checking method	
Open	D07		0 ~ 999	the front wheel is rotated. The number is cumulative and does not reset each time	
voltage (battery voltage).    Voltage (battery voltage)	D08	• Upright			
Image: Check the engine temperature. Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.    Fuel injector	D09	voltage (battery	Approximately 12.0	battery voltage. (If the battery voltage is lower, perform	
times at one-second intervals. Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  Fuel injector  Actuates the fuel injector five times at one-second intervals. Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  Headlight relay  Actuates the headlight relay five times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  FID (fast idle solenoid)  FID (fast idle solenoid)  FID (fast idle solenoid)  Actuates the FID five times at one-second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  FID (fast idle solenoid)  Actuates the FID five times at one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  FID (fast idle solenoid)  Actuates the FID five times at one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  Film (agnostic tool)  Actuates the FID five times at one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  Film (agnostic tool)  Film (agnostic tool)  Film (agnostic tool)  Actuates the FID five times at one second intervals. Illuminates the "WARNING" on the FID five times.  Check the operating sound of the FID five times.  Check the operating sound of the FID five times.  Check the operating sound of the film the fi	D11		temperature.		
times at one-second intervals.  Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  Actuates the headlight relay five times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  FID (fast idle solenoid)  FID (fast idle solenoid)  Actuates the FID five times at one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  Illuminate the "WARNING" on the FI diagnostic tool.  EEPROM fault code display  No history History exists  Malfunction history History exists  Malfunction history History exists  Malfunction history Malfunction history History exists  Malfunction history Malfunction history History exists  Malfunction history History exists  Malfunction history Up to 18 fault codes  To erase the history, press the "MODE"	D30	Ignition coil	times at one-second intervals.  Illuminates the "WARNING" on the FI diagnostic tool and engine	'	
times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the "WARNING" on the FI diagnostic tool and engine trouble warning light.  FID (fast idle solenoid)  Actuates the FID five times at one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  EEPROM fault code display No history History exists  Malfunction history code display No history History exists  Malfunction history History exists  Malfunction history History exists  Malfunction history History exists  Malfunction history Office the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  Malfunction history code erasure  Malfunction history code erasure  No alfunction history code erasure  To erase the history, press the "MODE"	D36	Fuel injector	times at one-second intervals.  Illuminates the "WARNING" on the FI diagnostic tool and engine		
D54 solenoid) one second intervals. Illuminate the "WARNING" on the FI diagnostic tool.  D60 EEPROM fault code display No history History exists  D61 Malfunction history code display No history History exists  D61 Malfunction history code display Malfunction history Malfunction history code display Malfunction history Malfunction history code erasure  D60 Malfunction history code erasure  D61 Malfunction history code erasure  D62 Malfunction history code erasure  D63 Malfunction history code erasure  D64 Malfunction history code erasure  D65 Malfunction history code erasure  D66 Malfunction history code erasure  D66 Malfunction history code erasure  D67 Malfunction history code erasure  D68 Malfunction history code erasure  D68 Malfunction history code erasure  D68 Malfunction history code erasure  D69 Malfunction history code erasure  D70 Malfunction history code erasure	D52	Headlight relay	times at one-second intervals. (ON 2 seconds, OFF 3 seconds) Illuminates the "WARNING" on the FI diagnostic tool and engine		
Code display  No history History exists  Malfunction history Code display No history  No history  No history History exists  Malfunction history  No history History exists  Malfunction history Malfunction history Up to 18 fault codes  O1  O2  Fault codes 12-50  (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  Malfunction history Code erasure  O1  O2  Fault codes 12-50  (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  Malfunction history Code erasure  O2  Up to 18 fault codes  To erase the history, press the "MODE"	D54	. `	one second intervals. Illuminate the "WARNING" on	1	
Code display No history History exists  Office the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  Malfunction history code erasure  Office the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  Malfunction history code erasure  Office the display alternates every two seconds to show all the detected code numbers are shown, the display repeats the same process.)  To erase the history, press the "MODE"	D60	code display • No history	01 01: CO adjustment value is	_	
code erasure Up to 18 fault codes To erase the history, press the "MODE"	D61	code display  No history	Fault codes 12-50  • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers are shown, the display		
• History exists	D62	• No history		— To erase the history, press the "MODE" button of the FI diagnostic tool.	
D70 Control number 0 ~ 254 —	D.70	Control number	0 254	_	



### Communication error with the FI diagnostic tool

LCD Display	Symptom	Probable cause of malfunction
Waiting for connection	No signals received from the ECU	<ul> <li>Improper connection in connecting lead.</li> <li>The main switch is OFF position.</li> <li>Malfunction in FI diagnostic tool.</li> <li>Malfunction in ECU.</li> </ul>
Commands from the FI diagnostic tool are not accepted by the ECU		<ul> <li>Turn the main switch to "OFF" once, and then set the FI diagnostic tool to CO adjustment mode or diagnostic mode.</li> <li>Vehicle battery insufficiently charged.</li> <li>Malfunction in FI diagnostic tool.</li> <li>Malfunction in ECU.</li> </ul>

### TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the FI diagnostic tool. Check and service the items or components that are the probable cause of the malfunction following the order given.

After the check and service of the malfunctioning part has been completed, reset the FI diagnostic tool display according to the reinstatement method.

Fault code No.:

Fault code number displayed on the FI diagnostic tool when the engine failed to work normally. Refer to "Diagnostic code table"

Diagnostic monitoring code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "Sensor operation table and Actuator operation table".

Fault code No.	12	Symptom	N	lo normal signals are received from the c	crankshaft position
Diagnostic code	No.	_	_		
Order		omponents and bable cause		Check or maintenance job	Reinstatement method
1	Installed condition of crankshaft position sensor.			Check for looseness or pinching	Cranking the engine.
2	<ul><li>Crankshaft position sensor coupler</li><li>Main wire harness ECU</li></ul>		r	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	
3	Open or short circuit in wire			Repair or replace if there is an open or short circuit.     Between the crankshaft position sensor coupler and ECU coupler.     Blue / Yellow – Black / Blue	
4	Defective c sensor	rankshaft positio	n	Replace if defective.     Refer to "CHECKING THE     CRANKSHAFT POSITION SENSOR".	



Fault o	code No.	13	Symptom	Intake air pressure sensor: open or sho	rt circuit defected
Diagno	stic code	No.	D03	Intake air pressure sensor	
Order	Item/co	mponents a	nd probable cause	Check or maintenance job	Reinstatement method
1	Connections • Intake air pressure sensor coupler • Main wire harness ECU coupler		•	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or short circuit in wiring harness			Repair or replace if there is an open or short circuit     Between intake air pressure sensor coupler and ECU coupler     Black / Blue - Black / Blue     Pink / White - Pink / White     Blue - Blue	
	Do no	FION: _ot remove e body s		Execute the diagnostic mode. (code no. D03). Replace the throttle body defective.  1. Connect the multimeter (DC 20V) to the intake air pressure sensor connector (at the wiring end) as shown.	
3	Defective	e intake air p	ressure sensor	Positive end> pink/white ① Negative end> black/blue ②  2 2 2 2 3 4. Is the intake air pressure sensor OK?	





Fault code No. 14 Symptom			Intake air pressure sensor hose (disconnected or clogged)			
Diagnost	ic code	No.	D03		Intake air pressure sensor	
Order		n/componerobable o			Check or maintenance job	Reinstatement method
1	Intake air pressure sensor malfunction at intermediate electrical potential			eck and repair the connection. place it if there is a malfunction.	Starting the engine and operating it at 3.000 r/min and above.	
2	Connections  Intake air pressure sensor coupler  Main wire harness ECU coupler			pu • Ch • If th	eck the coupler for any pins that may be led out. eck the locking condition of the coupler. here is a malfunction, repair it and connect e coupler securely.	
3	Defective intake air pressure sensor			(C) • Re	ecute the diagnostic mode. ode No. D03) place throttle body if defective.  AUTION: o not remove throttle body sensor sembly	
				Re	efer to "THROTTLE BODY"	





Fault code No.	15	Symptom	Throttle position	sensor: open or short circ	cuit defected.
Diagnostic code	No.	D01	Throttle position	sensor	
Order		mponents and able cause	Check or	maintenance job	Reinstatement method
1	Installed co	ondition of sition sensor	Check for loosen     Check that the searchied position	ensor is installed in the	Turning the main switch to "ON"
2	Connections  • Throttle position sensor coupler  • Main wire harness ECU coupler		<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>		
3	Open or sh harness	nort circuit in wire	Repair or replace if there is an open or short circuit.     Between throttle position sensor coupler and ECU coupler     Black / Blue - Black / Blue     Yellow / Blue - Yellow / Blue     Blue - Blue		
	Throttle position sensor lead wire open circuit output voltage check		Check for open circuit and replace the throttle position sensor.		
			Open circuit item	Output voltage	
4			Ground wire open circuit	5 V	
			Output wire open circuit	0 V	
			Power supply wire open circuit	0 V	
	Defective throttle position sensor.		Execute the diagnostic mode.     (Code No. D01)     Replace throttle body if defective.		
5			CAUTION:		
			assembly	throttle body sensor	
			Refer to "THROTT	LE BODY"	

Fault code no.	16	Symptom	Throttle position sensor is stuck.	
Diagnostic cod	le No.	D01	Throttle position sensor	
Order		nponents and able cause	Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.		Check for looseness or pinching.     Check that the sensor is installed in the specified position.	Starting the engine and operating it at idle, and then by racing it.
	Defective throttle position sensor		Execute the diagnostic mode.     (Code No. D01)     Replace throttle body if defective.	
2			CAUTION:  Do not remove the throttle body sensor assembly	
			Refer to "THROTTLE BODY"	





Fault code no.	22	Symptom	Intake air temperature sensor: open or s detected.	short circuit
Diagnosti	c code No.	D05	Intake air temperature sensor	
Order		nponents and ble cause	Check or maintenance job	Reinstatement method
1	sensor co	temperature	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the couplers.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch ON.
2	Open or sho harness	rt circuit in wire	Repair or replace if there is an open or short circuit.     Between throttle body sensor assembly coupler and ECU coupler	
3	Open circuit	in wiring	Check the wiring continuity between the ECU and sensor connectors. Black / Blue - Black / Blue Brown / White - Brown / White.	
4	Defective int temperature		<ul> <li>Execute the diagnostic mode. (Code no. D05).</li> <li>Replace the throttle body if defective.</li> <li>1. Connect the pocket tester to the intake air temperature sensor terminal, as shown.</li> <li>Positive end&gt; brown/white ① Negative end&gt; black/blue ②</li> <li>2. Measure the resistance at the intake air temperature sensor.</li> <li>Intake air temperature sensor resistance 220 ~ 280 Ω (at 20°C)</li> <li>AWARNING</li> <li>Handle the air intake temperature sensor with special care.</li> <li>Do not submit the air intake temperature sensor to strong impact. If the sensor fall over, replace it.</li> <li>3. Is the intake air temperature sensor OK?</li> </ul>	



FI



Fault code no.	24	Symptom	No normal signal is received fro	om the O <sub>2</sub> sensor.
Diagnost	ic code No.	_		
Order	Item/compone	ents and probable cause	Check or maintenance job	Reinstatement method
1	Installed state	e of O <sub>2</sub> sensor.	Check for looseness or pinching	Reinstated by starting the
2	Connections • O <sub>2</sub> sensor co • Main wire ha	oupler arness ECU coupler	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	engine operating it at idle is 15 minutes and running at 80 km/h, until the warning light turn off
3	Open or short	t circuit in wire harness	<ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between O<sub>2</sub> sensor coupler and ECU coupler.</li> <li>Gray / Red - Blue</li> <li>Red / Blue - Black.</li> </ul>	
4	Check fuel pro	essure	Refer to "CHECKING THE FUEL PUMP AND PRESSURE REGULATOR OPERATION".	
5	Defective O <sub>2</sub> s	sensor	Replace if defective	





28	Symptom	Engine temperature sensor: open or short c	ircuit detected.
Diagnostic code No. D11		Engine temperature sensor	
		Check or maintenance job	Reinstatement method
Engine te sensor co	emperature oupler	<ul> <li>Check the coupler for any pins that may be pulled out</li> <li>Check the locking condition of the couplers.</li> <li>If there is a malfunction, repair it and connect the coupler seculery.</li> </ul>	Turning the main switch ON.
Open or sho harness.	ort circuit in wire	Repair or replace if there is an open or short circuit.     Between engine temperature sensor coupler and ECU coupler.     Black / Blue - Black / Blue     Green / Red - Green / Red	
	•	<ul> <li>Execute the diagnostic mode. (Code no. D11).</li> <li>Replace if defective.         <ol> <li>Remove the engine temperature sensor from the cylinder.</li> <li>Connect the pocket tester to the engine temperature sensor as shown.</li> </ol> </li> <li>Positive end&gt; green/red ①</li></ul>	
	c code No.  Item / conproba  Connections  Engine te sensor co  Main wire coupler  Open or sho harness.	c code No. D11  Item / components and probable cause  Connections • Engine temperature sensor coupler • Main wire harness ECU coupler  Open or short circuit in wire	tem / components and probable cause  Connections  • Engine temperature sensor coupler  • Main wire harness ECU coupler  Open or short circuit in wire harness.  • Repair or replace if there is an open or short circuit.  • Between engine temperature sensor coupler and ECU coupler.  Black / Blue - Black / Blue Green / Red  • Execute the diagnostic mode. (Code no. D11).  • Replace if defective.  1. Remove the engine temperature sensor from the cylinder.  2. Connect the pocket tester to the engine temperature sensor as shown.  Positive end → spreen/red ↑ Negative end → black/blue ②  Positive end → spreen/red ↑ Negative end → black/blue ②  ■ Engine temperature sensor resistance  11 ~ 13K Ω (at 20°C)  ★ WARNING  • Handle the air intake temperature sensor impact.



Fault code No.	30	Symptom	No normal signal is received from th sensor.	e lean angle
Diagnostic code	Diagnostic code No. Do		Lean angle sensor	
Order	Item / cor probable	nponents and cause	Check or maintenance job	Reinstatement method
1	The vehic		Raise the vehicle upright.	Turning the main switch to
2	Installed of lean angle	condition of the sensor.	Check for looseness or pinching.	"ON" (however, the engine
3	Connections      Lean angle sensor coupler      Main wire harness ECU coupler		<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition condition of the coupler.</li> <li>If there is a malfuction, repair it and connect the coupler securely.</li> </ul>	unless the main switch is first turned
4	Defective sensor.	lean angle	<ul> <li>Execute the diagnostic mode. (Code no. D08).</li> <li>Replace if defective. Refer to "Ignition system" in chapter 7.</li> <li>Remove the lean angle sensor.</li> <li>Connect the lean angle sensor to the wiring harness.</li> <li>Connect the pocket tester (DC 20V) to the switch terminal as shown.</li> <li>Positive end&gt; yellow/green ① Negative end&gt; black/blue ②</li> <li>Turn the sensor and check for changes in pocket tester reading from 0.9V to 4.1V when the angle reaches 45°.</li> <li>Is the lean angle sensor Ok?</li> </ul>	





Fault c	Fault code No. 31 Symptom		Symptom	The amount of air-fuel ratio feedback compesation is maintained continously in the vicinity of the upper limit		
Diagno	stic cod	e No.	_	_		
Order		ompone le cause		Check or maintenance job	Reinstatement method	
1	Installed	d state of	O <sub>2</sub> sensor	Check for looseness or pinching.	Reinstated by	
2	Connections  O <sub>2</sub> sensor coupler  Main wire harness ECU coupler			<ul> <li>Check the coupler for any pins that may b pulled out.</li> <li>Check the locking condition of the coupler .</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	starting the engine operating it at idle 15 minutes and running at 80 km/h until the warning light turns off.	
3	Open or short circuit in wire harness  Check fuel pressure.			<ul> <li>Repair or replace if there is na open or short circuit.</li> <li>Between O<sub>2</sub> sensor coupler and ECU coupler.         Gray / Red - Blue         Red / Blue – Black.</li> </ul>		
4				Refer to "THROTTLE BODY".		
5		/e O₂ sen to output	sor. : a rich signal)	Replace if defective.		







Fault co	de No.	32	Symptom	The amount of air-fuel ratio feedback comp maintained continuously in the vicinity of I ratio is rich).	
Diagnos	tic coc	le No.	_	_	
Order		componable caus	ents and	Check or maintenance job	Reinstatement method
1	Install	led state	of O <sub>2</sub> sensor	Check for looseness or pinching.	Reinstated by
2	Connections:  O <sub>2</sub> sensor coupler  Main wire harness ECU coupler			<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler</li> <li>If there is a malfunction, repair it and connect the coupler securely</li> </ul>	starting the engine operating it at idle 15 minutes and running at 80 km/h until the warning light turns off.
3	Open or short circuit in wire harness		circuit in	<ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between O<sub>2</sub> sensor coupler and ECU coupler         Gray / Red - Blue         Red / Blue - Black.</li> </ul>	
4	Check fuel pressure		ssure	Refer to "THROTTLE BODY".	
5		etive $O_2$ sole to out		Replace if defective.	



Fault code No.	33	Symptom	Primary lead of the ignition coil: open circuit	t detected.
Diagnost	ic code No.	D30	Ignition coil	
Order	Item / com probable c	ponents and cause	Check or maintenance job	Reinstatement method
1	Connections  Ignition coil connection (primary coil side)  Main wire harness ECU coupler		<ul> <li>Check the connector and coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the connector and coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Starting the engine and operating it at idle.
2	Open short circuit in wire harness and/or sub lead.		<ul> <li>Repair or replace if there is an open or short circuit</li> <li>Between ignition coil connector and ECU coupler/main wire harness.         (Orange-Orange)     </li> </ul>	
3	Defective ig	gnition coil.	<ul> <li>Execute the diagnostic mode. (Code No. D30).</li> <li>Test the primary and secondary coils for continuity.</li> <li>Replace if defective. Refer to "IGNITION SYSTEM".</li> </ul>	

Fault code No.	39	Symptom	Open or short circuit detected in fuel injector	r.
Diagnost	Diagnostic code No. D36		Fuel injector	
Order	Item / comp probable c	oonents and ause	Check or maintenance job	Reinstatement method
1	Connections  • Fuel injector coupler  • Main wire harness ECU coupler		<ul> <li>Ckeck the couplers for any pins that may pulled out.</li> <li>Check the locking condition of the couplers</li> <li>It there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Reinstated by starting the engine and operating it at idle.
2	Open or short circuit in wire harness		<ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between ignition coil connector and ECU coupler</li> <li>Brown / Red- Red / Blue</li> <li>Orange / Black- Orange / Black</li> </ul>	
3	Defective prinjector.	orimary	<ul> <li>Execute the diagnostic mode. (Code no. D36).</li> <li>Replace if defective. Refer to "CHECKING THE FUEL INJECTOR".</li> </ul>	



Fault code No.	41	Symptom	Lean angle sensor: open or short circuit det	ected.
Diagnost	ic code No.	D08	Lean angle sensor	
Order	Item / com probable o	ponents and cause	Check or maintenance job	Reinstatement method
1	coup • Main	angle sensor	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Turning the main switch to "ON".
2	Open or s lead wire.	short circuit in	<ul> <li>Repair or replace if the is an open or short circuit.</li> <li>Between lean angle sensor coupler and ECU coupler.</li> <li>Black / Blue - Black / Blue</li> <li>Yellow / Green - Yellow Green</li> <li>Blue - Blue</li> </ul>	
3	Defective sensor	lean angle	<ul> <li>Execute the diagnostic mode. (Code no. D08).</li> <li>Replace if defective. Refer to "Fault code no. D30".</li> </ul>	

Fault code No.	42	Symptom	No normal signals are received from the spe	ed sensor.
Diagnost	ic code No.	D07	Speed sensor	
Order	Item / com probable o	ponents and cause	Check or maintenance job	Reinstatement method
1	•	sensor coupler vire harness	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Reinstated by starting the engine and inputting the speed signals by operating vehicle at low speed of 20 to 30 km/h
2	Open or sh speed sens	ort circuit in sor lead.	<ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between speed sensor coupler and ECU coupler.</li> <li>Blue / Yellow – Blue / Yellow</li> <li>Blue / Black - Blue / Black</li> </ul>	
3	Defective s	peed sensor	<ul> <li>Execute the diagnostic mode. (Code no. D07).</li> <li>Replace if defective. Refer to "FUEL INJECTION SYSTEM".</li> </ul>	



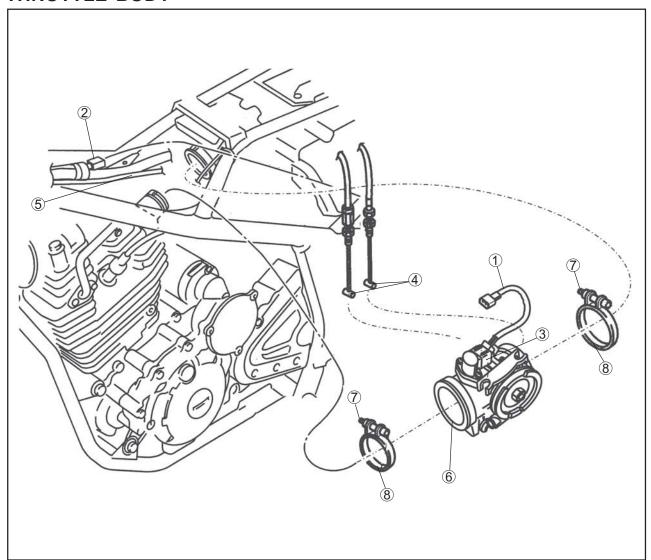
Fault code No.	44	Symptom	Error is detected while reading from writin adjustment value, code re-registering key fully closed notification value).	
Diagnost	ic code No.	D60	EEPROM fault code display	
Order	Item / com probable o	ponents and cause	Check or maintenance job	Reinstatement method
4	Malfunction	n in ECU	Execute the diagnostic mode. (Code no. D60).	Turning the main switch to "ON"
1			01 is displayed.  Replace ECU if defective.	

Fault code No.	46	Symptom	Power supply to the fuel injection system	is not normal.
Diagnost	ic code No.	_	_	
Order	Item / com probable o	ponents and cause	Check or maintenance job	Reinstatement method
1	Connection  Main wi coupler	is re harness ECU	<ul> <li>Check the coupler for any pins that may be pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect the coupler securely.</li> </ul>	Starting the engine and operating it at idle.
2	Faulty batte	ery.	Replace or recharge the battery. Refer to "CHECKING AND CHARGING THE BATTERY".	
3	Malfunction rectifier/reg		Replace if defective.     Refer to "CHARGING SYSTEM"	
4	Open or sh wire harnes	ort circuit in es	Repair or replace if there is an open or short circuit.  Between the battery and main switch. Red – Red  Between the main switch and ECU Brown / Blue - Brown / Blue	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfu ECU, the fault code number might not	
Diagnost	ic code No.	_	_	
Order	Item / com probable o	ponents and cause	Check or maintenance job	Reinstatement method
	Malfunction	n in ECU	Replace the ECU.  NOTE	Turning the main switch to "ON".
1			Do not perform this procedure with the main switch turned to "ON".	

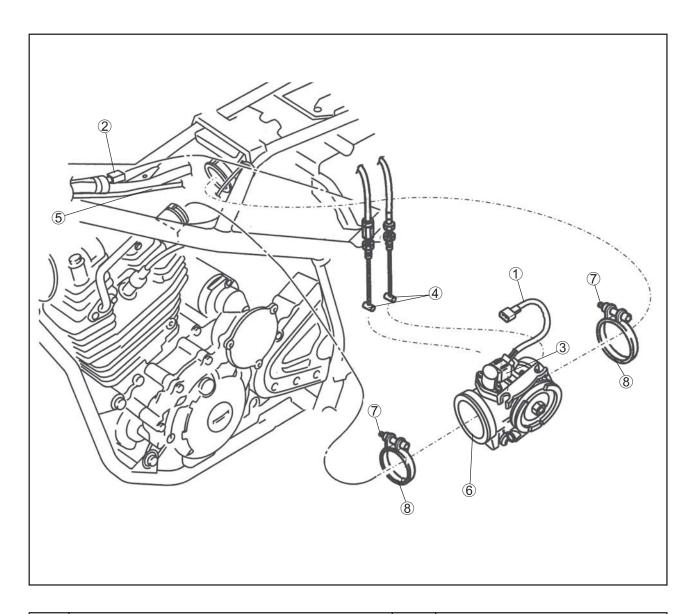


# THROTTLE BODY



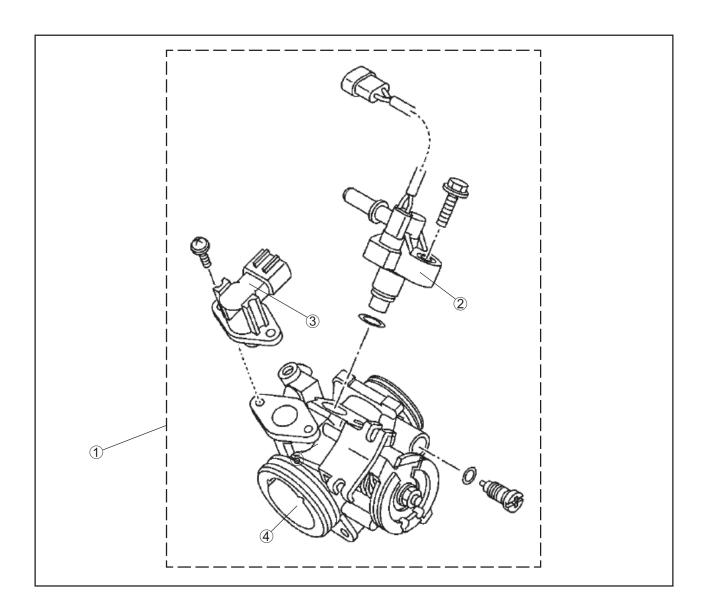
Order	Job/Part	Qt'y	Remarks
	Removing the Throttle body		Remove the parts in the order listed
	Seat		Refer to "COWLING AND SIDE COVERS" in chapter 3.
	Fuel tank		Refer to "FUEL TANK" in chapter 3.
1	Injector connector	1	Disconnect
2	Throttle body sensor assembly connector	1	Disconnect
3	FDI connector	1	Disconnect
4	Throttle cables	2	Disconnect
			Refer to "INSTALLING THE THROTTLE BODY".
5	Vacuum hose	1	Disconnect





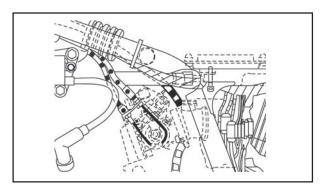
Order	Job/Part	Qt'y	Remarks
6 7 8	Throttle body Clamps bolt Clamps	1 1 2	Disconnect Refer to "INSTALLING THE THROTTLE BODY".  For installation reverse the removal procedure





Order	Job/Part	Qt'y	Remarks
	Disassembling the throttle body assembly		Remove the parts in the order listed
① ② ③ ④	Throttle body sensor assembly Injector FDI sensor Throttle body	1 1 1	CAUTION: Do not disassembly the throttle body.  For assembly, reverse the disassembly procedure.





#### **REMOVING THE FUEL HOSE**

1. Drain the fuel tank through the pump.

- 2. Remove:
  - hose connector (press and pull down the lock)
- 3. Disconnect
  - fuel hose.

### **CAUTION:**

Even with the fuel being removed from the tank, take care during the removal of the hose because there may be some fuel inside.

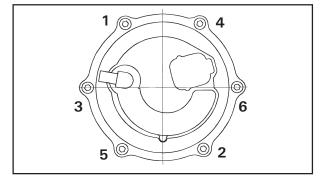
N	T	. Е	

Before removing the hose, place rags under the hose.

- 4. Remove:
  - fuel tank

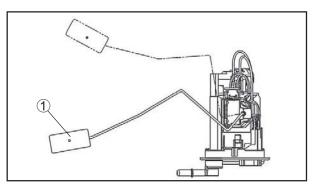
#### **REMOVING THE FUEL PUMP**

- 1. Remove:
  - fuel pump under the tank

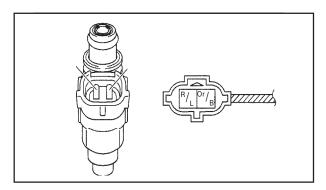


## CAUTION:

- Do not let the pump fall over or be exposed to shock.
- Do not touch the fuel level sensor assembly (float) ①.
- The fuel pump assembly should not be disassembled.





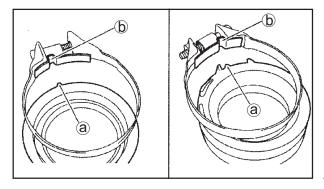


#### CHECKING THE FUEL INJECTOR

- 1. Check:
  - fuel injector
     Damage --> Replace.

#### CHECKING THE THROTTLE BODY

- 1. Check:
  - Throttle body Cracks/damage --> Replace the throttle body



#### **INSTALLING THE THROTTLE BODY**

- 1. Install:
  - throttle body junction clamps

NOTE

Align the union projection a to the groove b in the throttle body clamp.

- 2. Install:
  - throttle body assembly

NOTE

Align the projection c of the throttle body assembly to the intake manifold junction slot.

- 3. Install:
  - throttle cable
- 4. Adjust:
  - throttle handle play Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.
- 5. Adjust:
  - Engine idle Refer to "ADJUSTING THE ENGINE IDLE" in chapter 3.



#### CHECKING THE FUEL PUMP

### **⚠** WARNING

Gasoline is extremely inflammable and under certain conditions can provoke fire or explosion. Be extremely careful and watch over the following:

- Stop the engine before refilling.
- Do not smoke, and keep yourself away from open flames, sparks, or any other fire source.
- If gasoline has been accidentally spilled down, clean it immediately with a dry cloth.
- If gasoline get into contact with the engine while it is hot, there is danger of fire. Therefore, make sure that the engine has cooled down totally before proceeding with the following test:
- 1. Check:
  - fuel pressure
- a. Disconnect the fuel hose from the throttle body.

Refer to "FUEL TANK" in chapter 3.

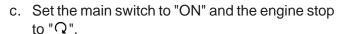


Even after the fuel being removed, be careful when removing the hose: there may be pressurized fuel into the circuit.

b. Connect the fuel pressure gauge



Fuel pressure gauge 90890-03153 / 90890-03176



- d. Start the engine.
- e. Measure the fuel pressure.Out of specification --> Replace the fuel pump.



Fuel pressure 250 kPa (2.5 kg.cm², 36 psi)

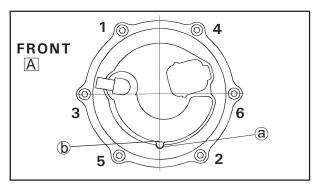
\_\_\_\_

**ا** 

### **THROTTLE BODY**







#### **INSTALLING THE FUEL PUMP**

- 1. Install:
  - fuel pump



Fuel pump bolt

4 N.m (0.4 kgf.m, 3,0 ft.lb)

### NOTE:\_

- When installing the fuel pump, take care not to damage the tank pump surface.
- Always use a new gasket. New
- Align the fuel tank projection ⓐ to the fuel pump detail ⓑ.
- Tighten the fuel pump bolts to the specified torque according to the sequence shown.

A Front

#### **INSTALLING THE FUEL HOSE**

- 1. Install:
  - fuel hose
  - fuel hose connector (press and push the lock upwards)

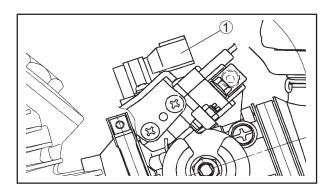
### **CAUTION:**

Make sure to connect the hose securely.
Install the connector in the correct position, otherwise the hose will not be properly installed.

# **THROTTLE BODY**

FI





# CHECKING THE FID (FAST IDLE SOLENOID) SYSTEM

- 1. Check:
  - FID (Fast idle solenoid)
- a. Disconnect the FID system connector from the wiring harness.
- b. Connect the pocket tester to the FID connector terminals 1.

Positive probe --> red/white Negative probe --> yellow/red



Pocket tester 90890-03174

c. Measure the FID system resistance Out of specification --> Replace.



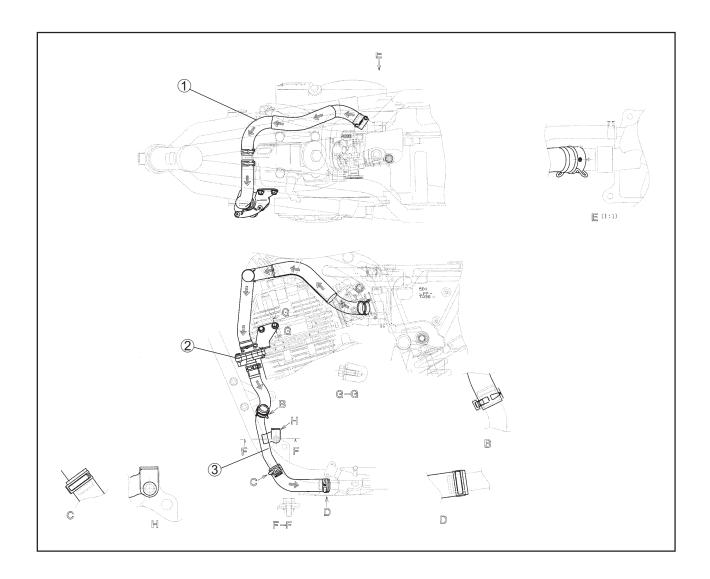
FID system resistance  $30 \sim 40 \Omega$  at  $20 ^{\circ}$ C

\_\_\_\_\_



### AIR INDUCTION SYSTEM DIAGRAM

- ① Hose 1 (air filter case to the air cut-off valve)
- 2 Air cut-off valve
- ③ Hose 2 (air cut-off valve to the exhaust)



### **AIR INDUCTION SYSTEM**



#### **AIR INJECTION**

The air induction system bums unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700°C.

#### CHECKING THE AIR INDUCTION SYSTEM

- 1. Check:
  - hoses

Disconnected --> Connect properly. Cracks/damage --> Replace.

• pipe

Cracks/damage --> Replace.

- 2. Check:
  - inner blade valve
  - blade valve stopper

Cracks/damage --> Replace the blade valve.

- 3. Check:
  - air cut-off valve

Cracks/damage --> Replace.

# **CHAPTER 7**

# **ELECTRICAL SYSTEM**

ELECTRICAL COMPONENTS	7-1
CHECKING SWITCH CONTINUITY	7-3
CHECKING THE SWITCHES	7-4
CHECKING THE BULBS AND BULB SOCKETS	7-5
TYPES OF BULBS	
CHECKING THE CONDITION OF THE BULBS	7-6
CHECKING THE CONDITION OF THE BULB SOCKETS	7-7
IGNITION SYSTEM	7-8
CIRCUIT DIAGRAM	7-8
TROUBLESHOOTING	7-9
ELECTRIC STARTING SYSTEM	7-13
CIRCUIT DIAGRAM	
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION	
TROUBLESHOOTING	7-15
STARTER MOTOR	
CHECKING THE STARTER MOTOR	
ASSEMBLING THE STARTER MOTOR	7-22
CHARGING SYSTEM	
CIRCUIT DIAGRAM	
TROUBLESHOOTING	7-24
LIGHTING SYSTEM	_
CIRCUIT DIAGRAM	
TROUBLESHOOTING	
CHECKING THE LIGHTING SYSTEM	7-29
SIGNALING SYSTEM	
CIRCUIT DIAGRAM	
TROUBLESHOOTING	
CHECKING THE SIGNALING SYSTEM	7-33

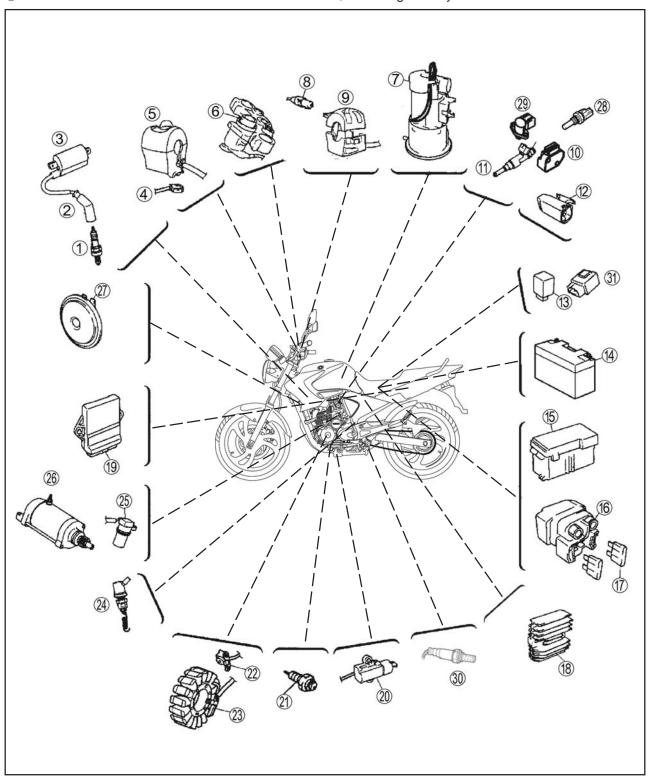
# **ELECTRICAL COMPONENTS**



# ELECTRICAL SYSTEM ELECTRICAL COMPONENTS

- ① Spark plug
- 2 Spark plug cap
- 3 Ignition coil
- 4 Brake front switch
- 5 Right handlebar switch
- 6 Main switch
- 7 Fuel pump
- 8 Clutch switch

- 9 Left handlebar switch
- 10 Hybrid sensor:
  - TPS
  - · Air intake temperature
  - Air intake pressure
- 1 Fuel injector
- Lean angle sensor
- 13 Turn signal relay

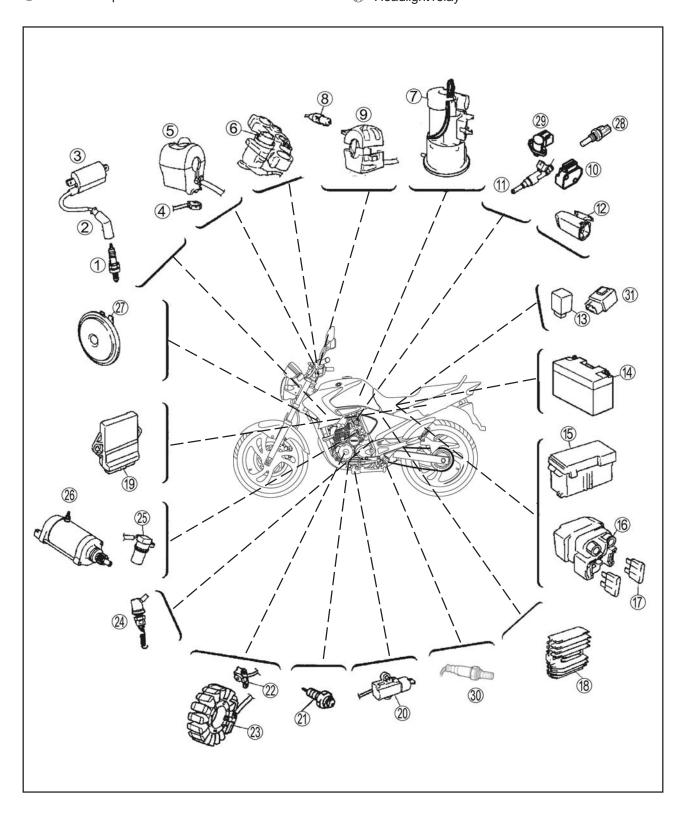


# **ELECTRICAL COMPONENTS**

ELEC - +

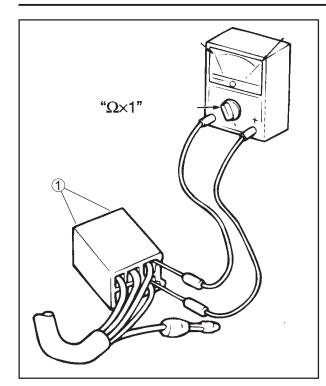
- Battery
- 15 Fuse case 1
- 6 Starter relay
- Main fuse
- ® Rectifier/regulator
- 19 ECU
- 20 Sidestand switch
- 21 Neutral switch
- 22 Crankshaft position sensor

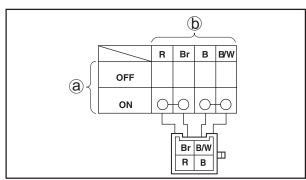
- 23 Stator coil
- 24 Rear brake switch
- ② Speed sensor
- 26 Starter motor
- ② Horn
- ② Temperature Sensor
- 29 F.I.D.
- (3) O<sub>2</sub> Sensor
- 3) Headlight relay



### **CHECKING SWITCH CONTINUITY**







#### 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.



#### NOTE

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega x1$ " range.

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 ⓐ are shown in the far left column and the switch lead colors ⓑ 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 black and black/white when the switch is set to "OFF".

There is continuity between red lead and brown/blue. There is continuity between red and brown when the switch is set to "ON".

## **CHECKING THE SWITCHES**



#### **CHECKING THE SWITCHES**

Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".

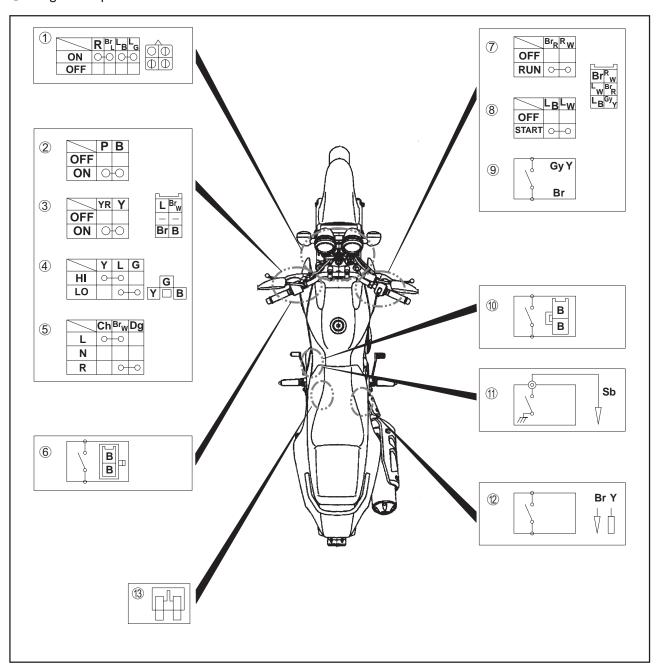
Damage/wear --> Repair or replace.

Improperly connected --> Properly connect.

Incorrect continuity reading --> Replace.

- 1 Main switch
- 2 Horn switch
- ③ Pass switch
- 4 Dimmer switch
- 5 Turn signal switch
- 6 Clutch switch
- 7 Engine stop switch

- 8 Start switch
- 9 Front brake light switch
- 10 Sidestand switch
- 11 Neutral switch
- Rear brake light switch
- 13 Fuses



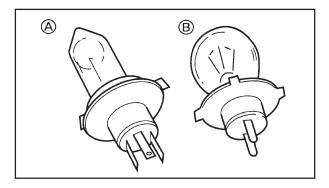


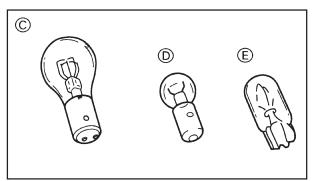
# CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear --> Repair or replace the bulb, bulb socket or both.

Improperly connected --> Properly connect. No continuity -->Repair or replace the bulb, bulb socket or both.





#### TYPES OF BULBS

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs (A) and (B) are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulb © is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.

#### CHECKING THE CONDITION OF THE BULBS

The following procedure applies to all of the bulbs.

- 1. Remove:
  - bulb

#### **★** WARNING

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

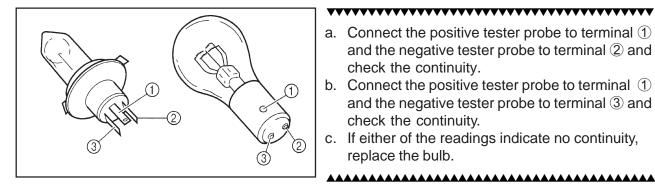
#### **CAUTION:**

- 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.
- 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.
- 2. Check:
  - bulb (for continuity) (with the pocket tester) No continuity --> Replace.



Pocket tester 90890-03174

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega x1$ " range.



- a. Connect the positive tester probe to terminal ① and the negative tester probe to terminal 2 and check the continuity.
- b. Connect the positive tester probe to terminal ① and the negative tester probe to terminal 3 and check the continuity.
- c. If either of the readings indicate no continuity, replace the bulb.

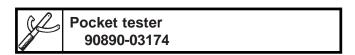
## CHECKING THE CONDITION OF THE SOCKETS

|--|

#### CHECKING THE CONDITION OF THE **SOCKETS**

The following procedure applies to all of the bulb sockets.

- 1. Check:
  - bulb socket (continuity) (with the pocket tester) No continuity --> Replace.



#### NOTE: \_

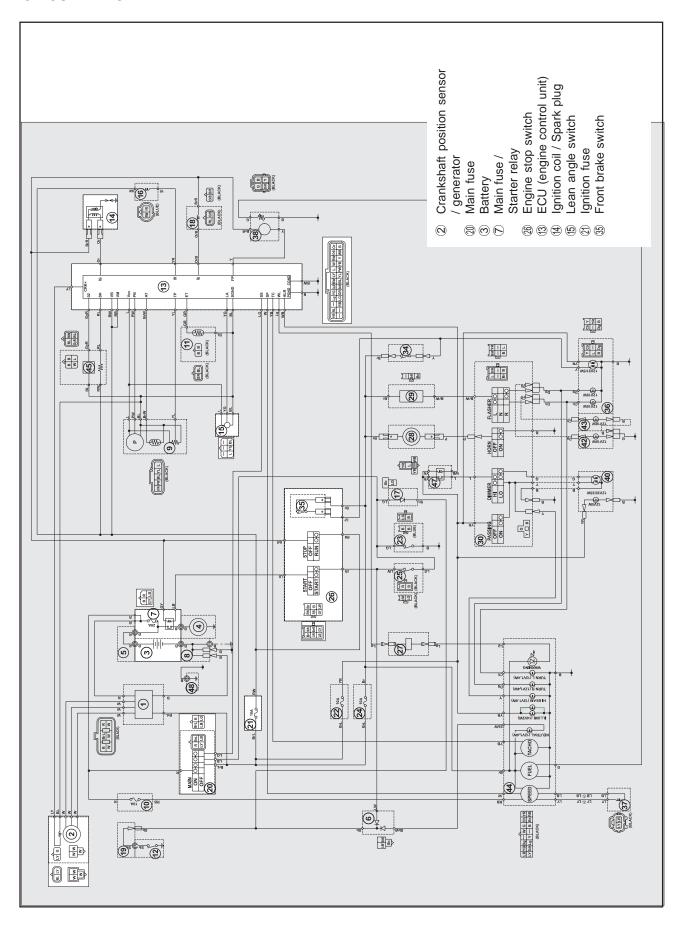
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- 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 CIRCUIT DIAGRAM





#### **TROUBLESHOOTING**

The ignition system fails to operate (no spark or intermittent spark).

#### Check:

- 1. Main and ignition fuses
- 2. Battery
- 3. Spark plug
- 4. Spark
- 5. Spark plug cap resistance
- 6. Ignition coil resistance
- 7. Crankshaft position sensor resistance
- 8. Main switch
- 9. Engine stop switch
- 10. Lean angle sensor
- 11. Wiring connections (of the entire ignition system)

#### NOTE: \_

- Before troubleshooting, remove the following part(s):
- 1. seat
- 2. side cowling (left)
- 3. fuel tank side covers (left and right)
- 4. fuel tank
- Troubleshoot with the following special tool(s).

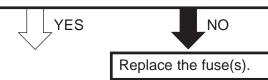


Pocket tester 90890-03174 Spark dynamic tester 90890-06754

- 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?



#### 2. Battery

 Check the condition of the battery.
 Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage 12.8 V or more at 20°C (68°F)

• Is the battery OK?



Clean the battery terminals.

NO

Recharge or replace the battery.

#### 3. Spark plugs

- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
   Refer to "CHECKING THE SPARK PLUGS" in chapter 3.



Spark plug
DR8EA (NGK)
Spark plug gap
0.6~0.7 mm (0.024 ~ 0.028 in)

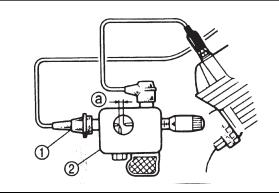
 Is the spark plug in good condition, is it of the correct type, and is its gap within specification?





Re-gap or replace the spark plug.

- 4. Ignition spark gap
- Disconnect the spark plug cap ① from the spark plug.
- Connect the spark dynamic tester ② as shown.
- Set the main switch to "ON".
- Measure the ignition spark gap @.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



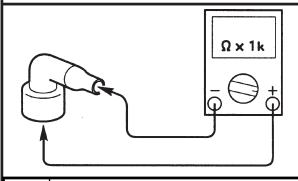
Minimum ignition spark gap 6.0 mm (0,024 in)

• Is there a spark and is the spark gap within specification?



The ignition system is OK.

- 5. Spark plug cap resistance
- Remove the spark plug cap from lead.
- Connect the pocket tester to the spark plug cap, as shown.
- Measure the spark plug cap resistance.



Spark plug cap resistance 5.0 kΩ at 20°C (68°F)

• Is the spark plug cap OK?

YES NO

Replace the spark plug cap.

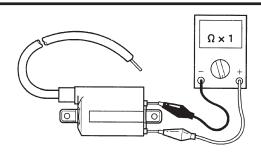
**ELEC** 



#### 6. Ignition coil resistance

- Disconnect the ignition coil leads from the wire harness.
- Connect the pocket tester to the ignition coil, as shown.

Positive tester probe --> brown/red Negative tester probe --> orange



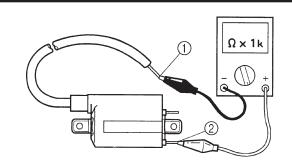
· Measure the primary coil resistance.



Primary coil resistance 2.1 ~ 2.6  $\Omega$  at 20°C (68°F)

 Connect the pocket tester to the ignition coil, as shown.

Negative tester probe --> spark plug lead ①
Positive tester probe --> brown/red ②



Measure the secondary coil resistance.



Secondary coil resistance 8.64 ~ 12.96kΩ at 20°C (68°F)

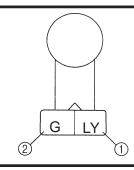
• Is the ignition coil OK?



Replace the ignition coil.

- 7. Crankshaft position sensor resistance
- Disconnect the crankshaft position sensor connector from the witing harness.
- Connect the pocket tester ( $\Omega$  x 100) to the sensor probe, as shown.

Positive tester probe --> blue/yellow ① Negative tester probe --> green ②



Measure the crankshaft position sensor resistance.



Crankshaft position sensor resistance 192 ~ 288 Ω at 20°c (68°F) (between green and blue/yellow)

• Is the crankshaft position sensor OK?

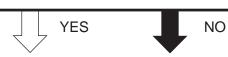




Replace the crankshaft position sensor

#### 8. Main switch

- Check the main switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the ignition ok?



Replace the main switch

- 9. Engine stop switch
- Check the engine stop switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?



Replace the right handlebar switch.

#### 11. Wiring

- Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the ignition system's wiring properly connected and without defects?



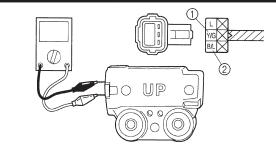
Replace ECU.

Properly connect or repair the ignition system's wiring.

#### 10. Lean angle sensor

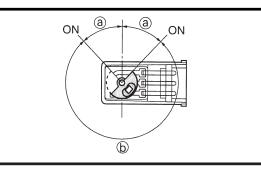
- Check the connection of the connector.
- Connect the pocket tester (DC 20 V) to the terminals of the indicated switch.
- Set the starter switch to ON.

Positive tester probe -->yellow/green ① Negative tester probe --> black/blue ②

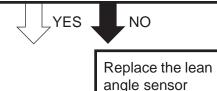




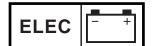
Lean angle sensor voltage Below 45° @ --> 0.4 ~ 1.4 V Above 45° \( \hat{D} \) --> 3.7 ~ 4.4 V



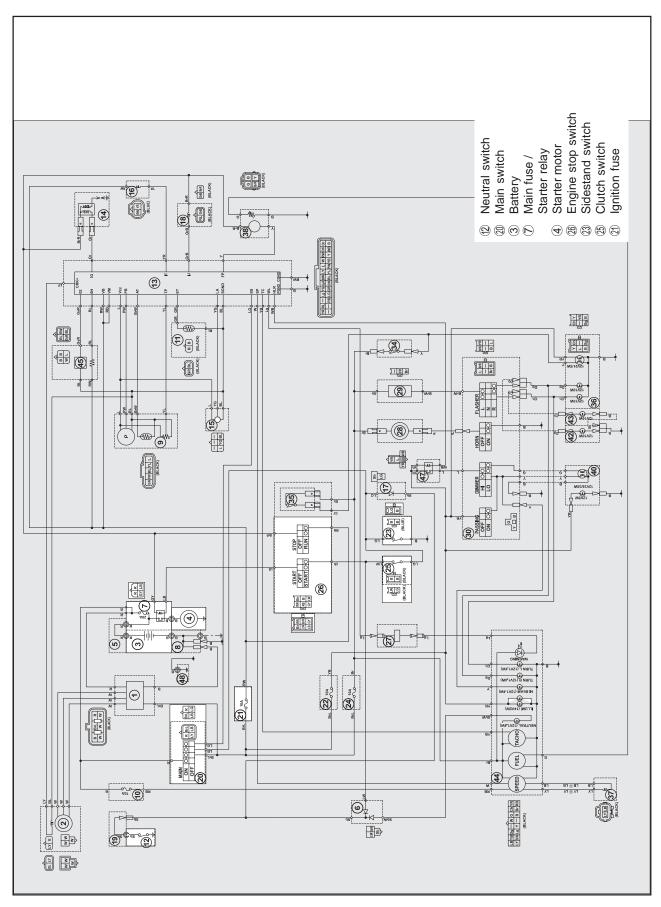
• Is the lean angle sensor OK?



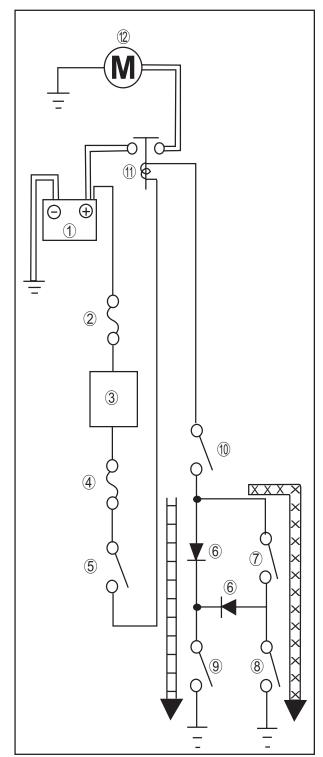
# **ELECTRIC STARTING SYSTEM**



# ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM



## **ELECTRIC STARTING SYSTEM**



# STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to " $\Omega$ " and the main switch is set to "ON" (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is set to neutral (the neutral switch is closed).
- 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 motor from operating when neither of these conditions has 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 has been met 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 TO THE HANDLEBAR

- Battery
- 2 main fuse
- ③ Main switch
- 4 Ignition fuse
- 5 Engine stop switch
- 6 Diode
- 7 Clutch switch
- 8 Sidestand switch
- Neutral switch
- 10 Start switch
- ① Starter relay
- ① Starter motor

# **ELECTRIC STARTING SYSTEM**

ELEC - +

#### **TROUBLESHOOTING**

#### The starter motor fails to turn.

#### Check:

- 1. Main and ignition fuses
- 2. Battery
- 3. Starter motor
- 4. Starter relay
- 5. Main switch
- 6. Engine stop switch
- 7. Neutral switch
- 8. Sidestand switch
- 9. Clutch switch
- 10. Diode A
- 11. Diode B
- 12. Start switch
- 13. Wiring connections (Starting system)

#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1. seat
- 2. side cowling (left)
- 3. fuel tank side covers (left and right)
- 4. fuel tank
- •Troubleshoot with the following special tool(s).



# Pocket tester 90890-03174

- 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?





Replace the fuse(s).

# 2. Battery

 Check the condition of the battery.
 Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage 12.8 V or more at 20°C (68°F)

Is the battery OK?



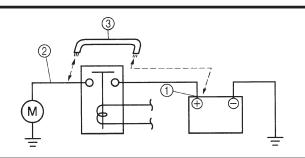
 Clean the battery terminals.

NO

 Recharge or replace the battery.

### 3. Starter motor

Connect the positive battery terminal ①
 and the starter motor lead ② with a jumper lead ③.



## **↑** WARNING

- A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.
- Does the starter motor turn?



Repair or replace the starter motor.

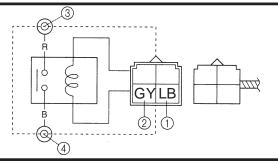
# **ELECTRIC STARTING SYSTEM**

#### 4. Starter relay

- · Disconnect the starter relay connector.
- Connect the Pocket tester (Ω x 1) and the battery (12V) to the starter relay connector, as shown.

Battery positive terminal --> blue/black ①
Battery negative terminal --> green/yellow ②

Positive tester probe --> red ③
Negative tester probe --> black ④



 Does the starting circuit cut-off relay have continuity between red and black?

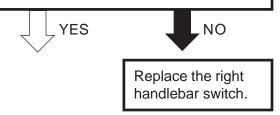


Replace the starter relay

#### 6. Engine stop switch

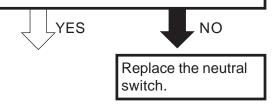
- Check the engine stop switch for continuity.

  Particle 14 CONTENT ON THE CONTENT
  - Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?



#### 7. Neutral switch

- Check the neutral switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?



## 5. Main switch

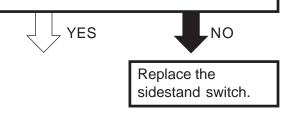
- Check the main switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?



Replace the main switch.

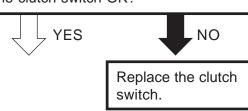
#### 8. Sidestand switch

- Check the sidestand switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the sidestand switch OK?



### 9. Clutch switch

- Check the clutch switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the clutch switch OK?



# **ELECTRIC STARTING SYSTEM**

ELEC - +

# 10. Start switch

- Check the start switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the start switch OK?



Replace the start switch.

# 11. Wiring

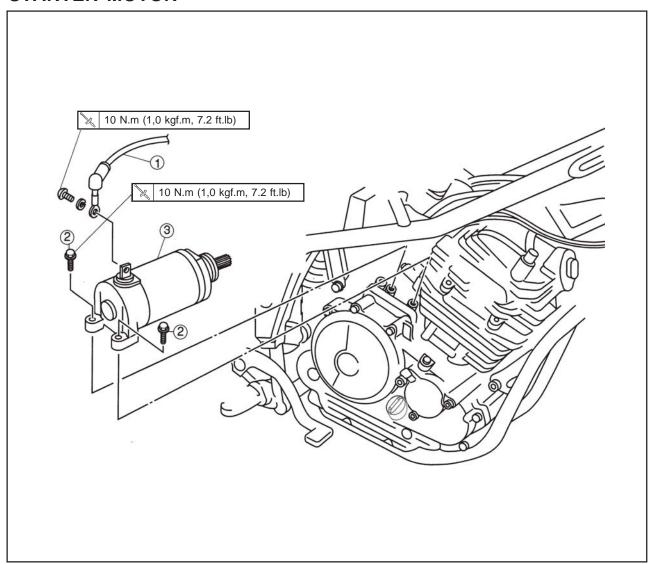
- Check the entire starting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the starting system's wiring properly connected and without defects?



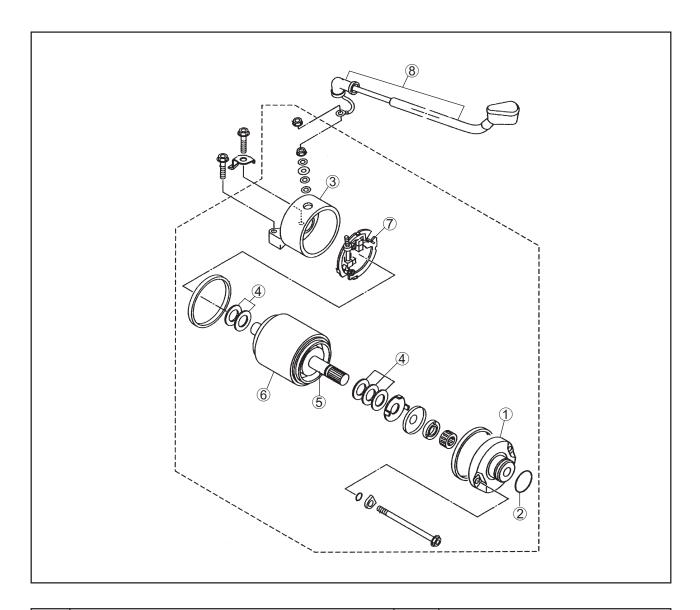
The starting system circuit is OK.

Properly connect or repair the starting system's wiring.

# STARTER MOTOR

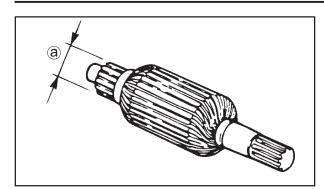


Order	Job/Part	Qt'y	Remarks
	Removing the starter motor		Remove the parts in the order listed
1	Battery positive lead	1	Disconnect
2	Bolts	2	
3	Starter motor	1	
			For installation, reverse the removal procedure



Order	Job/Part	Qt'y	Remarks
	Disassembling the starter motor		Remove the parts in the order listed
① ② ③ ④ ⑤ ⑥ ⑦ ⑧	Front bracket O-ring Rear bracket Bearing washer Armature assembly Starter motor yoke Brush assembly Starter motor cable	1 1 5 1 1 1	For assembly, reverse the disassembly procedure



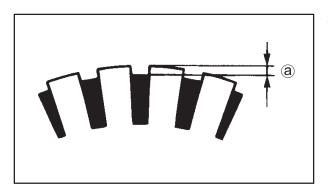


#### CHECKING THE STARTER MOTOR

- 1. Check:
  - inducted commutator
     Dirt --> Clean with 600 grit sandpaper.
- 2. Measure:
  - commutator diameter (a)
     Out of specification --> Replace

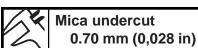


Commutator diameter limit 27.0 mm (1.06 in)



#### 3. Measure:

 mica undercut (a)
 Out of specification --> Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



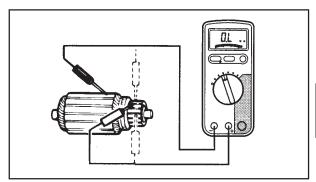
#### NOTE: \_

The mica of the commutator must be undercut to ensure proper operation of the commutator.

#### 4. Measure:

 armature assembly resistances (commutator and insulation)
 Out of specification --> Replace





- a. Measure the resistances with the pocket tester.
- b. If any resistance is out of specification, replace the starter motor.

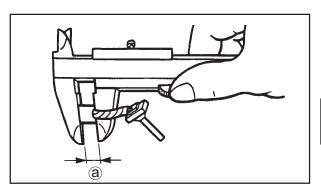


Pocket tester 90890-03174



Armature coil Commutator resistance 0.0012 ~ 0.0022  $\Omega$  at 20 °C (68°C) Insulation resistance above 1M $\Omega$  at 20 °C (68°F)

\_\_\_\_\_



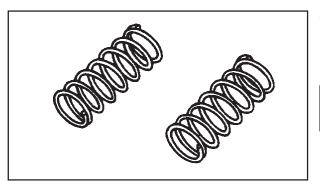
#### 5. Measure:

 brush length (a).
 Out of specification --> Replace the brushes as a set.



Wear limit

4.0 mm (0.16 in)



## 6. Measure:

brush spring force
 Out of specification --> Replace the brush
 springs as a set.

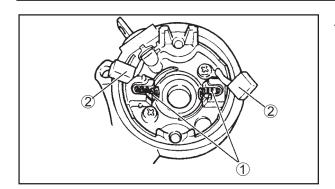


**Brush spring force** 

7.65~10.01 N (780~1021 gf, 28~36 oz)

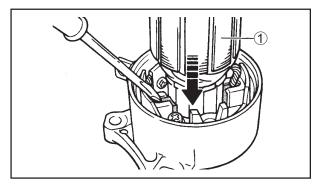
# 7. Check:

- inducted shaft grooves
   Damage/wear --> Replace the starter motor
- 8. Check:
  - bearing
  - oil seal Damage/Wear --> Replace defective parts.



#### ASSEMBLING THE STARTER MOTOR

- 1. Install:
  - brush holder ①
  - brushes ②

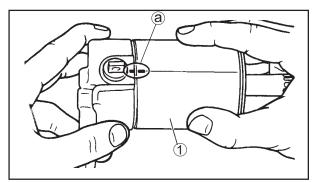


## 2. Install:

• inducted ①

## NOTE:\_\_

- Tighten the rear bracket to ease the operation.
- With a screwdriver, block one of the brushes.

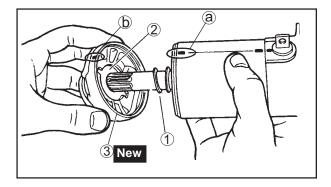


## 3. Install:

rear bracket

#### NOTE: \_\_

Align the tab a on the rear bracket to the shield tab 1.



## 4. Install:

- bearing washer 1
- front bracket / bearing / oil seal ②
- outer o-ring 3 New
- bolts

9	
\ \	<b>\</b> //

#### Front bracket bolts

5 N.m (0.5 kgf.m, 3.7 ft.lb)

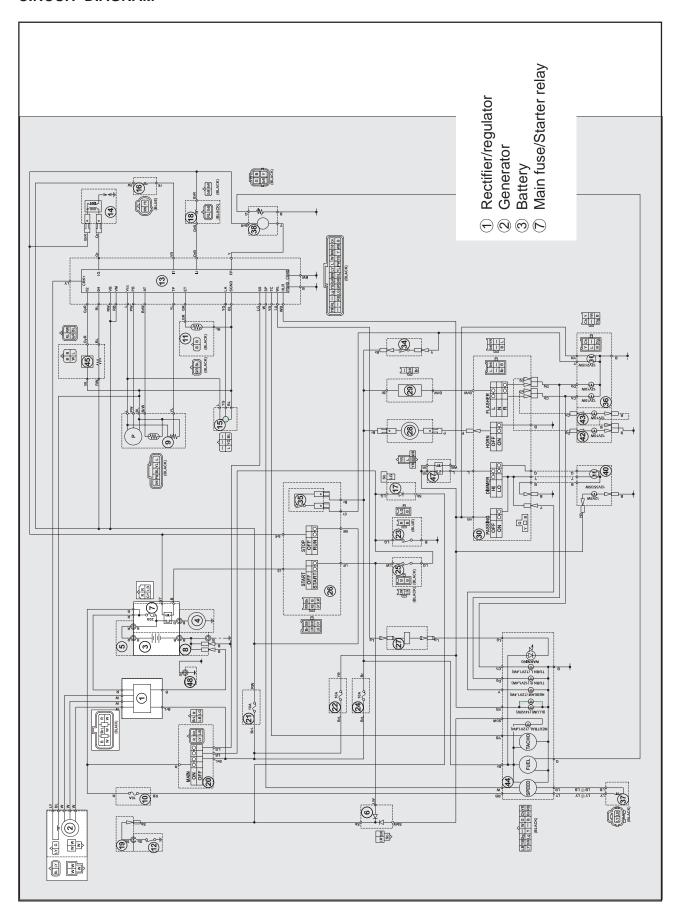
NOTE: \_

Align the match marks (a) on the starter motor shield to the match marks (b) on front and rear brackets.

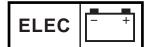
# **CHARGING SYSTEM**



# CHARGING SYSTEM CIRCUIT DIAGRAM



# **CHARGING SYSTEM**



#### **TROUBLESHOOTING**

The battery is not being charged.

## Check:

- 1. main fuse
- 2. battery
- 3. charging voltage
- 4. stator assembly resistance
- 5. wiring connections (of the entire charging system)

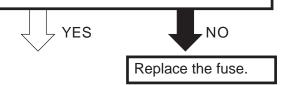
#### NOTE: \_

- Before troubleshooting, remove the following part(s):
- 1. seat
- 2. left side cover
- Troubleshoot with the following special tool(s).



Pocket tester 90890-03174

- 1. Main fuse
- Check the main fuse for continuity.
   Refer to "CHECKING THE FUSES" in chapter 3.
- Is the main fuse OK?



- 2. Battery
- Check the condition of the battery.
   Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage 12.8 V or more at 20°C (68°F)

Is the battery OK?



YES



- Clean the battery terminals.
- Recharge or replace the battery.

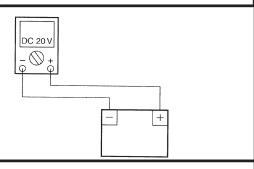
# **CHARGING SYSTEM**

# 3. Charging voltage

 Connect the pocket tester (DC 20 V) to the battery, as shown.

Positive tester probe--> battery positive terminal

Negative tester probe --> battery negative terminal



- Start the engine and let it run at approximately 5,000 r/min.
- · Measure the charging voltage.



Charging voltage 14.0 V at 5,000 rpm

# NOTE:\_

Make sure the battery is fully charged.

• Is the charging voltage within specification?



The charging circuit is OK.

If the charging voltage is above the standard, replace the rectifier (regulator).

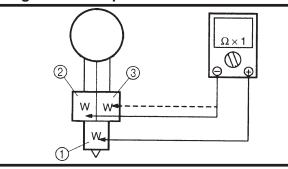
If the charging voltage is below the standard, check the stator coil resistance.

#### 4. Stator coil resistance

- Disconnect the generator connector from wiring harness.
- Connect the pocket tester (Ω x 1) to the charging coils, as shown.

Positive tester probe --> white ①
Negative tester probe --> white ②

Positive tester probe --> white ①
Negative tester probe --> white ③

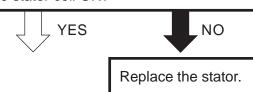


• Measure the stator coil resistance.



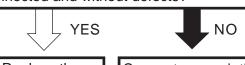
Stator coil resistance  $0.42 \sim 0.62 \Omega$  --> at  $20^{\circ}$ C (68°F) (between black and white)

• Is the stator coil OK?



#### 5. Wiring

- Check the connections of the charging system. Refer to "CIRCUIT DIAGRAM".
- Is the charging system's wiring properly connected and without defects?

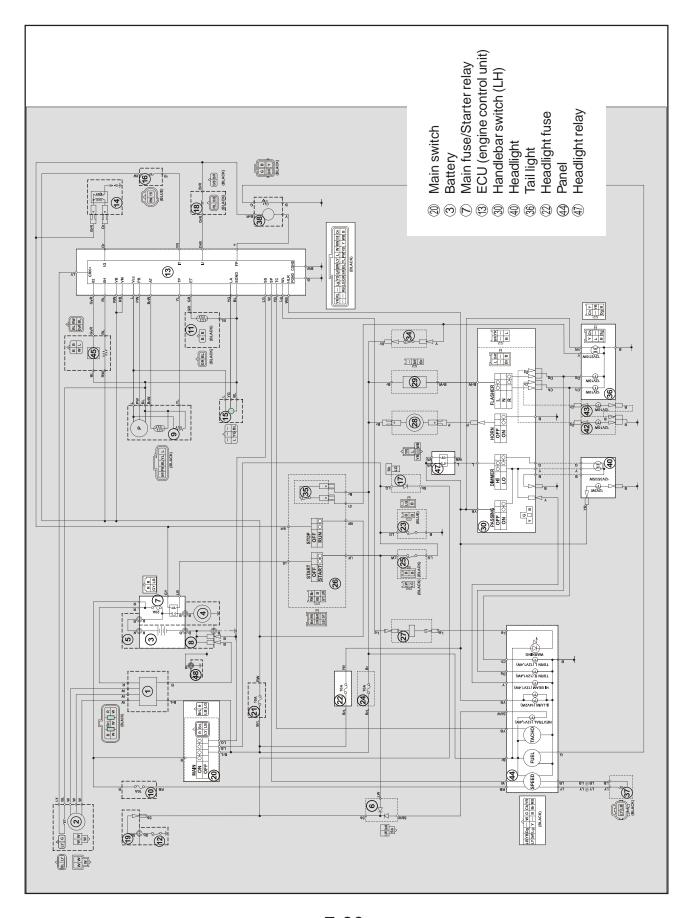


Replace the rectifier/ regulator.

Connect or repair the charging system wiring.



# LIGHTING SYSTEM CIRCUIT DIAGRAM



#### **TROUBLESHOOTING**

Any of the following fail to light: headlight, high beam indicator light, taillight, auxiliary light or meter light.

# Check:

- 1. main and headlight fuses
- 2. battery
- 3. main switch
- 4. dimmer switch
- 5. pass switch
- 6 headlight relay
- 7. wiring connections (of the entire lighting system)

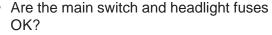
#### NOTE: -

- Before troubleshooting, remove the following part(s):
- 1. seat
- 2. side cowling (left)
- 3. rear cowling
- 4. headlight assembly
- Troubleshoot with the following special tool(s).



Pocket tester 90890-03174

- 1. Headlight and main switch fuses
- Check the main switch and headlight fuses for continuity.
   Refer to CHECKING THE FUSES" in
- chapter 3.





Replace the fuse(s).

- 2. Battery
- Check the condition of the battery.
   Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage 12.8 V or more at 20°C (68°F)

Is the battery OK?



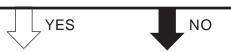
- Clean the battery terminals.
- Recharge or replace the battery.
- 3. Main switch
- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?



switch.

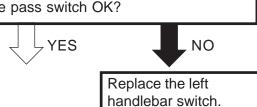
# **LIGHTING SYSTEM**

- 4. Dimmer switch
- · Check the dimmer switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the dimmer switch OK?



Replace the left handlebar switch.

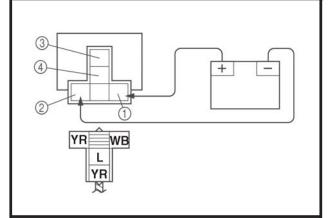
- 5. Pass switch
- · Check the pass switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the pass switch OK?



- 6. Headlight relay
- Disconnect the headlight relay from the wire harness
- Connect the pocket tester ( $\Omega$  x 1) (12V) to the headlight relay terminal, as shown.
- Check the headlight relay for continuity.

Positive battery terminal —> White / Black ① Negative battery terminal —> Yellow / Red ②

Positive tester probe —> Yellow / Red ① Negative tester probe —> Blue ②



Does the headlight relay have continuity between red / blue and blue / white?



Replace the headlight relay.

#### 7. Wiring

- Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system's wiring properly connected and without defects?



Check the condition of each of the lighting system's circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

Properly connect or repair the lighting system's wiring.

# **LIGHTING SYSTEM**

#### CHECKING THE LIGHTING SYSTEM

- 1. The headlight and the high beam indicator light fail to come on.
  - 1. Headlight bulb and socket.
  - Check the headlight bulb and socket for continuity.

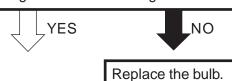
Refer to "CHECKING THE BULBS AND BULB SOCKETS"

Are the headlight bulb and socket OK?



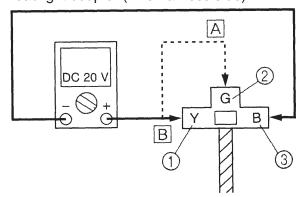
Replace the headlight bulb, socket or both.

- 2. High beam indicator light
- Check the high bem indicator light.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Is the high beam indicator light OK?



- 3. Voltage
- Connect the pocket tester (DC 20 V) to the panel and headlight couplers, as shown.
- A When the dimmer switch is set to " ≣○ "
- B When the dimmer switch is set to " ≣○ "

Headlight coupler (wire harness side)



## Headlight

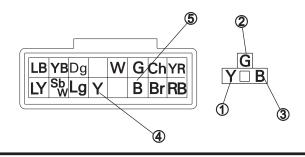
Positive tester probe --> yellow ① or green ② Negative tester proble --> black ③

High beam indicator light

Positive tester probe --> yellow 4

Negative tester proble -->black ⑤

Panel couplers (wire harness)



- Set the main switch to "ON"
- Start the engine.
- Measure the voltage (DC 12 V) of yellow
   1 or green 2 on headlight coupler (wire harness) and yellow 4 on panel coupler (wire harness).
- Is the voltage within specification?



The circuit is OK.

The wiring from the main switch to the headlight coupler is faulty and must be repaired.

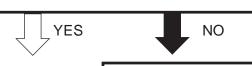
# LIGHTING SYSTEM



- 2. The tail/brake light fails to come on.
- Tail/brake light bulb and socket
- Check the tail/brake light bulb and socket for continuity.

Refer to "CHECKING THE BULBS AND **BULB SOCKETS**"

Are the tail/brake light bulb and socket OK?



Replace the tail/brake light bulb, socket or both.

- 3. The auxiliary light fails to come on.
- Auxiliary light bulb and socket.
- Check the auxiliary light bulb and socket for continuity.

Refer to "CHECKING THE BULB AND BULB SOCKETS".

Are the auxiliary light bulb and socket OK?



Connect the pocket tester (DC 20 V) to

the auxiliary light coupler (wire harness),

Positive tester probe --> blue/red ①

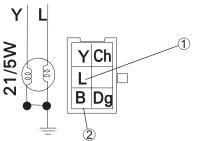
Negative tester probe -->black 2

Replace the auxiliary light bulb, socket, or both.

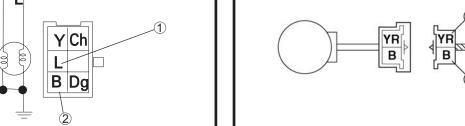
## 2. Voltage

• Connect the pocket tester (DC 20 V) to the tail light coupler (wire harness), as shown.

Positive tester probe --> blue 1 Negative tester probe -->black 2



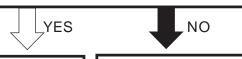
- Set the main switch to "ON"
- Measure the voltage (DC 12 V) of blue ① on the brake light coupler (wire harness).
- · Is the voltage within specification?



2. Voltage

as shown.

- Set the main switch to 'ON'
- Measure the voltage (DC 12V) of blue/red 1 on the auxiliary light coupler (wire harness).
- Is the voltage within specification?



The circuit is OK.

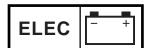
The wiring circuit from the main switch to the meter assembly coupler is faulty and must be repaired.



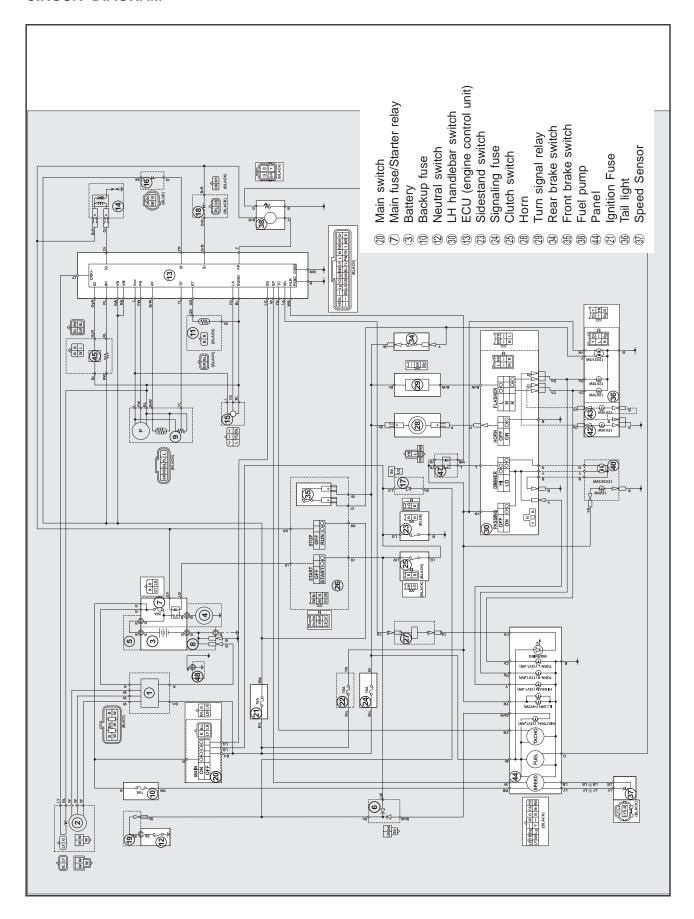


The circuit is OK.

The wiring circuit from the main switch to the auxiliary light coupler is faulty and must be repaired.



# SIGNALING SYSTEM CIRCUIT DIAGRAM



#### **TROUBLESHOOTING**

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.

#### Check:

- signaling system, backup, main and ignition fuses.
- 2. battery
- 3. main switch
- 4. wiring connections (of the entire signaling system)

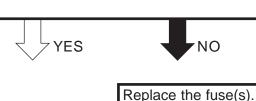
#### NOTE:

- Before troubleshooting, remove the following part(s):
- 1. seat
- 2. side cowling (left)
- 3. rear cover (left and right)
- 4. headlight assembly
- Troubleshoot with the following special tool(s).

# K

# Pocket tester 90890-03174

- Signaling system, backup, main and ignition fuses.
- Check the main and signaling system for continuity.
  - Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and signaling system fuses OK?



#### 2. Battery

Check the condition of the battery.

Refer to "CHECKING AND CHARGING THE BATTERY", in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

• Is the battery OK?



- Clean the battery terminals
- Recharge or replace the battery.

#### 3. Main switch

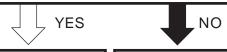
- Check the main switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?



Replace the main switch.

### 4. Wiring

- Check the entire signal system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the signaling system's wiring properly connected and without defects?



Check the condition of each of the signaling system's circuits.

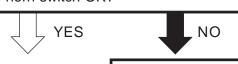
Refer to "CHECKING THE SIGNALING SYSTEM". Properly connect or repair the signaling system's wiring.

#### CHECKING THE SIGNALING SYSTEM

1. The horn fails to sound.



- Check the horn switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the horn switch OK?

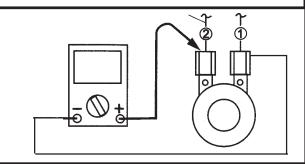


Replace the left handlebar switch.

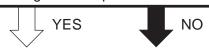
## 2. Voltage

• Connect the Pocket tester (DC 20 V) to the horn connector, as shown.

Positive tester probe --> brown 2 Negative tester probe --> pink ①



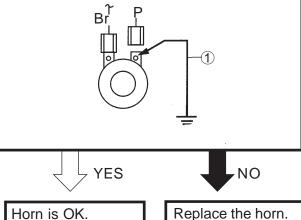
- Set the main switch to "ON".
- Push the horn switch.
- Measure the voltage (DC 12 V) of brown on the horn terminal.
- Is the voltage within specification?



The wiring circuit from the main switch to the horn connector is faulty and must be repaired.

#### Horn

- Disconnect the pink connector at the horn terminal.
- Connect a jumper lead 1 to the horn terminal.
- · Push the horn switch.
- · Does the horn sound?



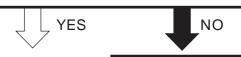
Replace the horn.

2. The brake light fails to come on.

- 1. Brake light bulb and socket.
- Check the brake light bulb and socket for continuity.

Refer to "CHECKING THE BULBS AND BULB SOCKETS"

Are the brake light bulb and socket OK?

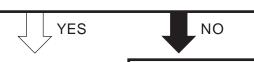


Replace the brake light bulb, socket or both.

- 2. Brake light switches
- Check the brake light switches for continuity.

Refer to "CHECKING THE SWITCHES".

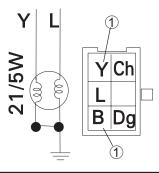
• Is the brake light switch OK?



Replace the brake light switch.

- 3. Voltage
- Connect the pocket tester (DC 20 V) to the brake light coupler (wire harness side) as shown.

Positive tester probe --> yellow ① Negative tester probe --> black ②



- Set the main switch to "ON".
- Pull in the brake lever or push down on the brake pedal.
- Measure the voltage (DC 12 V) of yellow

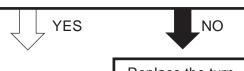
   on the brake light coupler (wire harness).
- Is the voltage within specification?



The circuit is OK.

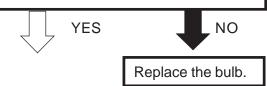
The wiring circuit from the main switch to the brake light coupler is faulty and must be repaired.

- 3. The turn signal light, turn signal indicator light or both fail to blink.
- 1. Turn signal indicator light bulb and socket
- Check the turn signal light bulb and socket for continuity.
  - Refer to "CHECKING THE BULBS AND BULB SOCKETS"
- Are the turn signal light bulb and socket OK?

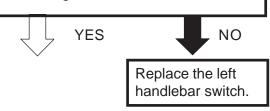


Replace the turn signal light bulb, socket or both.

- 2. Turn signal switch. (on the panel)
- Check the turn signal switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?

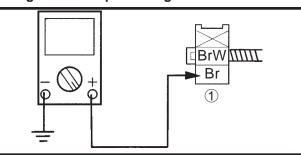


- 3. Turning signal switch
- Check the turn signal switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the turn signal switch OK?



- 4. Input voltage
- Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness), as shown.

Positive tester probe --> brown ①
Negative tester probe --> ground



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of brown ①
   on the turn signal coupler (wire harness).
- Is the voltage within specification?

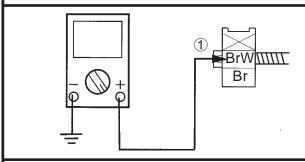


The wiring circuit from the turn signal relay coupler is faulty and must be replaced.

#### 5. Output voltage

 Connect the pocket tester (DC 20 V) to the turn signal relay coupler (wire harness), as shown.

Positive tester probe --> brown/white ①
Negative tester probe --> ground



- Set the main switch to "ON".
- Set the turn signal switch to ⇔ or ⇒.
- Measure the voltage (DC 12 V) of brown/ white ① on the turn signal relay coupler (wire harness).
- Is the voltage within specification?



The wiring circuit from the main switch to the turn signal relay coupler is faulty and must be repaired.

## 6. Voltage

- Connect the pocket tester (DC 20 V) to the turn light coupler or to the panel (wire harness), as shown.
- A Right turn signal lights
- B Left turn signal lights
- C Turn indicator light

Left turn signal light

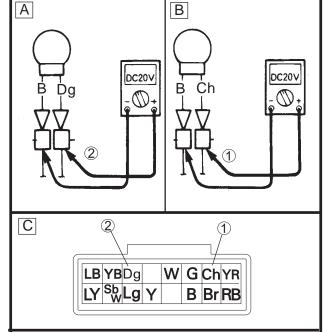
Positive tester probe --> chocolate ①

Negative tester probe --> black

Right turn signal light

Positive tester probe --> dark green 2

Negative tester probe --> black



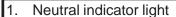
- Set the main switch to "ON".
- Set the turn signal switch to ⇔ or ⇒.
- Measure the voltage (DC 12 V) of chocolate ① and dark green ② on the turn signal light couplers or on the panel coupler (wire harness).
- Is the voltage within specification?



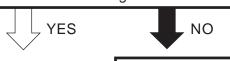
The circuit is OK.

The wiring circuit from the main switch to the turn signal light couplers or panel coupler is faulty and must be replaced.

4. The neutral indicator light fails to come on.



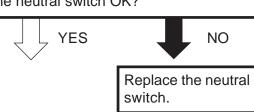
- Check the neutral indicator light.
   Refer to "CHECKING THE BULBS AND BULB SOCKETS".
- Is the neutral indicator light OK?



Replace the bulb.

#### 2. Neutral switch

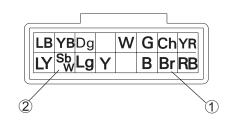
- Check the neutral switch for continuity.
   Refer to "CHECKING THE SWITCHES".
- Is the neutral switch OK?



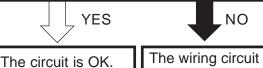
# 3. Voltage

• Connect the pocket tester (DC 20 V) to the panel coupler (wire harness), as shown.

Positive tester probe --> brown ①
Negative tester probe --> light blue/white ②



- Set the main switch to "ON".
- Set the transmission to neutral.
- Measure the voltage (DC 12 V) of light blue/white ① to the brown ② on the panel coupler (wire harness).



from the main switch to the panel coupler is faulty and must be

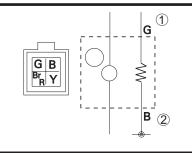
repaired.

5. The fuel level gauge fails to operate.

# 1. Fuel gauge

- Disconnect the fuel gauge coupler from the fuel pump.
- Connect the pocket tester  $(K\Omega \times 1)$  to the fuel gauge, as shown.

Positive tester probe --> green ①
Negative tester probe --> black ②



- Check the fuel gauge for continuity.
- Is the fuel gauge OK?

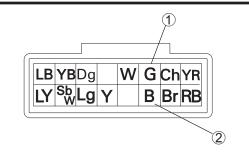


Replace the fuel gauge.

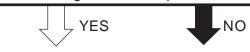
# 2. Voltage

• Connect the pocket tester (DC 20 V) to the panel coupler (wire harness), as shown.

Positive tester probe --> green ①
Negative tester probe --> black ②



- Set the main switch to "ON".
- Measure the voltage (DC 12 V) of green ①
   and black ② on the panel coupler (wire
   harness).
- Is the voltage within the specified?



The circuit is OK.

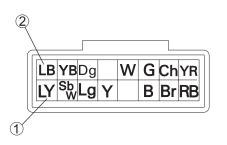
The wiring circuit from the main switch to the panel coupler is faulty and must be repaired.

6. The speedometer fails to operate.

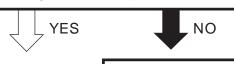


• Connect the pocket tester (DC 20 V) to the panel coupler (wire harness), as shown.

Positive tester probe --> blue/yellow ①
Negative tester probe --> blue/black ②



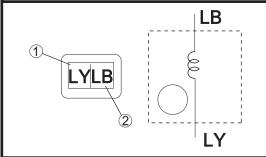
- Set the main switch to "ON".
- · Lift the rear wheel and spin it slowly.
- Measure the voltage (DC 5 V) of blue/ yellow ① on the panel coupler (wire harness).
- · Is the voltage within the specified?



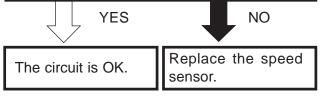
Replace the panel.

- 2. Speed sensor
- Connect the pocket tester (DC 20 V) to the speed sensor, as shown.

Positive tester probe --> blue/yellow ①
Negative tester probe --> blue/black ②



- Set the main switch to "ON".
- Lift the rear wheel and spin it slowly.
- Measure the voltage (DC 5 V) at each full turn of the rear wheel, the voltage reading should oscillate around the levels 0.6 V to 4.8 V to 0.6 V to 4.8 V.
- Is the voltage reading routes correctly through the cycles?





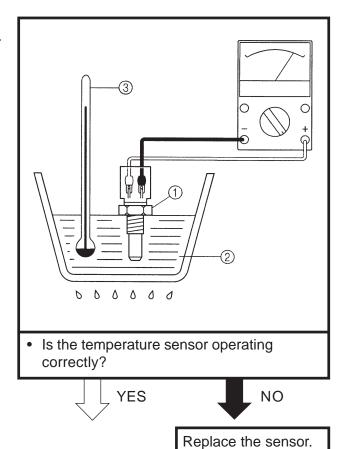
- 7. The engine falls to operate and the temperature is high.
- 1. Temperature sensor
- Remove the temperature sensor from the engine.
- Connect the pocket tester to the temperature sensor ①, as shown.
- Plunge the temperature sensor into a container with engine oil ②.

#### NOTE:\_

Make sure the sensor terminals are not moist.

- Put a thermometer 3 into the oil.
- Warm up slowly to the temperature specified in the table.
- Check the sensor for the continuity indicated in the table.

TEMPERATURE	RESISTANCE	
80°C	1,570 ~ 1,945 Ω	
100°C	902.5 ~ 1142 Ω	



# **↑** WARNING

- Handle the temperature sensor carefuly.
- Never expose the temperature sensor to strong impacts. If the sensor temperature fall down, replace it.

# 2. Wiring

- Check the electrical system wiring circuit. Refer to "ELECTRICAL DIAGRAM".
- Is the wiring properly connected and free from defects?



Replace the ECU.

Properly connect or repair the wiring circuit of the cooling system.

# **CHAPTER 8**

# **TROUBLESHOOTING**

STARTING FAILURES	8-1
INCORRECT ENGINE IDLING SPEED	8-2
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE	8-3
FAULTY GEAR SHIFTING	8-3
FAULTY CLUTCH	8-3
OVERHEATING	8-4
POOR BRAKING PERFORMANCE	8-4
FAULTY FRONT FORK LEGS	8-5
UNSTABLE HANDLING	8-5
FAULTY LIGHTING OR SIGNALING SYSTEM	8-6
ELECTRICAL DIAGRAM / COLOR CODE	8-7

# **TROUBLESHOOTING**

#### NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

# STARTING FAILURES

#### **ENGINE**

## Cylinder and cylinder head

- Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Damaged cylinder gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- · Faulty valve spring
- Seized valve

## Piston and piston rings

- Improperly installed piston ring
- Damaged, worn or fatigued piston ring
- Seized piston ring
- Seized or damaged piston

#### Air filter

- Improperly installed air filter
- Clogged air filter element

# Crankcase and crankshaft

- · Improperly assembled crankcase
- Seized crankshaft

### **FUEL SYSTEM**

#### Fuel tank

- Empty fuel tank
- Clogged fuel tank drain hose
- Deteriorated or contaminated fuel

#### **Fuel pump**

Defective fuel pump

# **Throttle body**

- Deteriorated or contaminated fuel
- Sucked-in air

#### **ELECTRICAL SYSTEMS**

### **Battery**

- Discharged battery
- Faulty battery

#### Fuse(s)

- · Incorrect, damaged or blown fuse
- Improperly installed fuse

# Spark plug

- Incorrect spark plug type
- Incorrect temperature range
- Rusted spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

#### **Ignition** coil

- Cracked or broken ignition coil body
- Broken or shorted primary or secondary coils
- Faulty spark plug lead

#### Ignition system

- Faulty ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

# Switches and wiring

- Faulty ignition
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- · Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Improperly grounded circuit
- Loosen connections

### **Pulling out system**

- Faulty starter motor
- Faulty starter relay
- Faulty starter clutch

# INCORRECT ENGINE IDLING SPEED

#### **ENGINE**

#### Cylinder and cylinder head

- Incorrect valve clearance
- Damaged components in valve system

#### Air filter

Clogged air filter element

# **FUEL SYSTEM**

# Throttle body

- Damaged or loose throttle body joint
- Engine idling speed improperly adjusted
- Improper throttle cable free play
- Faulty throttle body
- Faulty air induction system

#### **ELECTRICAL SYSTEMS**

#### **Battery**

- Discharged battery
- Faulty battery

#### Spark plug

- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn or damaged electrode
- Worn or damaged insulator
- Faulty spark plug cap

# **Ignition coil**

- Broken or shorted primary or secondary coils
- · Faulty spark plug lead
- Cracked or broken ignition coil

#### **Ignition system**

- Faulty ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

# POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURES".

#### **ENGINE**

#### Air filter

· Clogged air filter element

# **FAULTY GEAR SHIFTING**

### SHIFTING IS DIFFICULT

Refer to "CLUTH DRAGS"

#### SHIFT PEDAL DOES NOT MOVE

#### Shift shaft

- · Improperly adjusted shift rod
- Bent shift shaft.

#### Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

#### **Transmission**

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

#### **FUEL SYSTEM**

### **Fuel pump**

Faulty fuel pump

#### JUMPS OUT OF GEAR

#### Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

#### Shift forks

Worn shift fork

#### Shift drum

- Incorrect axial play
- Worn shift drum groove

#### **Transmission**

Worn gear dog

# **FAULTY CLUTCH**

#### **CLUTCH SLIPS**

#### Clutch

- Improperly assembled clutch
- Improperly adjusted clutch cable
- Loose or fatigued clutch spring
- Worn friction plate
- Worn clutch plate

#### **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity (low)
- Deteriorated oil

#### **CLUTCH DRAGS**

#### Clutch

- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- · Bent clutch push rod
- Damaged clutch boss
- Burnt driven gear bushing

#### **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

## **OVERHEATING**

#### **ENGINE**

## **Engine oil**

- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

### **COOLING SYSTEM**

#### Radiator

- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin

#### **FUEL SYSTEM**

# Throttle body

- Faulty throttle body
- · Damaged or loose throttle body joint

#### Air filter

· Clogged air filter element

## **CHASSIS**

# Brake(s)

· Dragging brake

## **ELECTRICAL SYSTEMS**

#### Spark plug

- Incorrect spark plug gap
- · Incorrect spark plug heat range

## **Ignition system**

Faulty ECU

# POOR BRAKING PERFORMANCE

- Worn brake pad
- · Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

# **FAULTY FRONT FORK LEGS**

#### OIL LEAKAGE

- · Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- · Cracked or damaged cap bolt O-ring
- · Damaged oil seal lip

#### **MALFUNCTION**

- · Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- · Worn or damaged outer tube bushing
- Bent or damaged damper rod
- · Incorrect oil viscosity
- Incorrect oil level

## UNSTABLE HANDLING

#### Handlebar

Bent or improperly installed handlebar

## Steering head components

- Improperly installed upper bracket
- Improperly installed lower bracket (improperly tightened ring nut)
- · Bent steering stem
- Damaged ball bearing or bearing race

# Front fork legs

- Uneven oil levels
- Unevenly tensioned fork spring
- Broken fork spring
- · Bent or damaged inner tube
- Bent or damaged outer tube

## Rear swingarm

- · Worn bearing or bushing
- Bent or damaged swingarm

#### Rear shock absorber assembly

- · Faulty rear shock absorber spring
- · Oil or gas leakage

# Tire(s)

- Tires from different manufacturers
- Incorrect tire pressure
- Uneven tire wear

#### Wheel(s)

- Incorrect wheel balance
- Loose or broke cotter
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout

#### **Frame**

- Bent frame
- Damaged steering head pipe
- Improperly installed bearing race

## FAULTY LIGHTING OR SIGNALING SYSTEM

#### HEADLIGHT DOES NOT COME ON

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb
- Faulty ECU

## **HEADLIGHT BULB BURNT OUT**

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

# BRAKE LIGHT DOES NOT COME ON

- Wrong brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out brake light bulb

#### BRAKE LIGHT BULB BURNT OUT

- Wrong brake light bulb
- Faulty battery
- · Incorrectly adjusted rear brake light switch
- · Brake light bulb life expired

#### TURN SIGNAL DOES NOT COME ON

- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

## TURN SIGNAL BLINKS SLOWLY

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

#### **TURN SIGNAL REMAINS LIT**

- Faulty turn signal relay
- Burnt-out turn signal bulb

#### TURN SIGNAL BLINKS QUICKLY

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

#### HORN DOES NOT SOUND

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

## WIRING DIAGRAM

# YBR250 2007

- Rectifier/ regulator
- ② Generator/Crankshaft position sensor
- 3 Battery
- 4 Starter motor
- ⑤ Positive cable
- 6 Diode B
- Main fuse/Starter relay
- 8 Negative cable
- 9 Throttle body sensor assembly
- ① Backup fuse
- 11 Engine temperature sensor
- 1 Neutral switch
- (13) ECU (engine control unit)
- (4) Ignition coil/Spark plug
- 15 Lean angle sensor
- (fast idle solenoid)
- (17) Diode A
- ® Fuel injector
- 19 Terminal
- 20 Main switch
- 21 Ignition fuse
- ② Headlight fuse
- 23 Sidestand switch
- ② Signaling fuse
- ② Clutch switch② Right handlebar switch
- ② Diagnostic tool coupler of fuel injection system
- 28 Horn
- 29 Turn signal relay
- 30 Left handlebar switch
- 34 Rear brake switch
- 35 Front brake switch
- 36 Brake / turn signal light
- ③ Speed sensor
- 38 Fuel pump/Fuel level sensor
- **40** Headlight
- 42 Front turn signal light (right)
- 43 Front turn signal light (left)
- (4) Panel
- 45 O<sub>2</sub> sensor
- Headlight relay
- (48) Grounding

## **COLOR CODES**

В	Black
Br	Brown

Ch ..... Chocolate

Dg ..... Dark green

G ..... Green Gy ..... Gray

L ..... Blue

Lg ..... Light green O ..... Orange

P...... Pink

R ..... Red

Sb ..... Sky blue

W ..... White Y ..... Yellow

B/L ..... Black/Blue

B/R ..... Black/Red

B/W ..... Black/White

B/Y ..... Black/Yellow

Br/L ..... Brown/Blue Br/R ..... Brown/Red

Br/W ..... Brown/White

G/L..... Green/Blue G/R.... Green/Red

G/W ..... Green/White

G/Y ..... Green/Yellow L/B ...... Blue/Black

L/G ..... Blue/Green

L/R..... Blue/Red L/W..... Blue/White

L/Y ..... Blue/Yellow

O/R..... Orange/Red

O/B ..... Orange/Black

P/W ..... Pink/White R/B ..... Red/Black

R/G..... Red/Black

R/L ..... Red/Blue

R/W ...... Red/White R/Y ...... Red/Yellow

Y/B ...... Yellow/Black

Y/G ..... Yellow/Green

Y/L ..... Yellow/Blue Y/R ..... Yellow/Red



