YAMAHA

XJ900S(G)^{'95}

SERVICE MANUAL



NOTICE

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

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

PARTICULARY IMPORTANT INFORMATION

This material is distinguished by the following notation.

CAUTION:

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

A WARNING

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

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

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

HOW TO USE THIS MANUAL

CONSTRUCTION OF THIS MANUAL

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

1st title 1): This is a chapter with its symbol on the upper right of each page.

2nd title 2: This title appears on the upper of each page on the left of the chapter

symbol. (For the chapter "Periodic inspection and adjustment" the 3rd

title appears.)

3rd title ③: This is a final title.

MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspections.

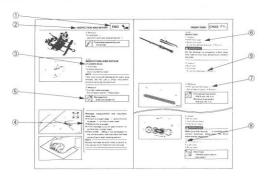
A set of particularly important procedure (a) is placed between a line of asterisks "*"with each procedure preceded by "\texts".

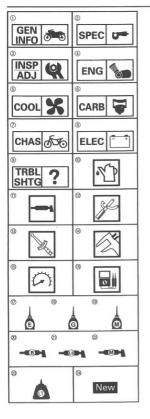
IMPORTANT FEATURES

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

EXPLODED DIAGRAM

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





ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① to ③ are designed as thumb tabs to indicate the chapter's number and content.

- General information
 Specifications
- Periodic inspection and adjustment
- Engine
 Cooling system
- Carburetion
- (f) Chassis
- ® Electrical
- Troubleshooting

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

- @ Filling fluid
- ① Lubricant
- Special tool
- (3) Tightening (4) Wear limit, clearance
- (3) Engine speed
- (θ Ω, V, A

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

- Apply engine oil
- Apply gear oil
- (9) Apply molybdenum disulfide oil
- Apply wheel bearing grease
 Apply lightweight lithium-soap base grease
- Apply molybdenum disulfide grease
- @ Apply locking agent (LOCTITE®)
- @ Use new one

INDEX

GEN INFO
SPEC 2
INSP ADJ
ENG 4
CARB 5
chas 6
ELEC 7
TRBL SHTG

CONTENTS

CHAPTER 1. GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION1-1	
VEHICLE IDENTIFICATION NUMBER (For E, AUS and NZ)1-1	
FRAME SERIAL NUMBER (Except for E, AUS and NZ)1-1	
FNGINE SERIAL NUMBER1-1	
LIVOINE VOIDEN	
IMPORTANT INFORMATION1-2	
PREPARATION FOR REMOVAL	
ALL REPLACEMENT PARTS1-2	
GASKETS, OIL SEALS, AND O-RINGS1-2	
LOCK WASHERS/PLATES AND COTTER PINS1-3	
BEARINGS AND OIL SEALS1-3	
CIRCLIPS1-3	
SPECIAL TOOLS1-4	
FOR TUNE UP	
FOR FOR ENGINE SERVICE	
FOR CHASSIS SERVICE	
FOR ELECTRICAL COMPONENTS	
FOR ELECTRICAL COMPONENTS	
CHAPTER 2.	
SPECIFICATIONS	
GENERAL SPECIFICATIONS2-1	
GENERAL SPECIFICATIONS	
MAINTENANCE SPECIFICATIONS2-4	1
ENGINE	
CHASSIS	3
ELECTRICAL2-17	
	7
EXCLUSIVE SPECIFICATION2-20	7
)
EXCLUSIVE SPECIFICATION)
)
HOW TO USE THE CONVERSION TABLE	1
HOW TO USE THE CONVERSION TABLE	1 1 2
HOW TO USE THE CONVERSION TABLE	1 1 2 2

LUBRICATION DIAGRAMS2-24	
CABLE ROUTING 2-28	
CABLE ROOTING	-
	0
CHAPTER 3.	GEN
	INFO
PERIODIC INSPECTION	11410
AND ADJUSTMENT	U=
INTRODUCTION3-1	SPEC
THOUSE TO THE	
PERIODIC MAINTENANCE/LUBRICATION INTERVALS3-1	0
	INICD
SIDE COVER, FUEL TANK AND COWLING3-3	INSP
REMOVAL 3-3	ADJ
INSTALLATION	4
INSTALLATION	0
ENGINE	ENG
VALVE CLEARANCE ADJUSTMENT3-6	
CARBURETOR SYNCHRONIZATION3-13	
IDLING SPEED ADJUSTMENT3-15	1
THROTTLE CABLE ADJUSTMENT3-16	0488
SPARK PLUG INSPECTION	CARB
IGNITION TIMING CHECK	
COMPRESSION PRESSURE MEASUREMENT3-20	1
ENGINE OIL LEVEL INSPECTION3-22	0
ENGINE OIL REPLACEMENT	CHAS
CLUTCH ADJUSTMENT	CHAS
FUEL LINE INSPECTION	
FUEL LINE INSPECTION5-27	-
CHASSIS3-28	ELEC
FRONT BRAKE LEVER POSITION ADJUSTMENT3-28	
REAR BRAKE ADJUSTMENT3-28	
BRAKE FLUID LEVEL INSPECTION3-30	1 4
BRAKE PAD INSPECTION3-31	TRBL
BRAKE LIGHT SWITCH ADJUSTMENT3-31	SHTG
BRAKE HOSE INSPECTION	oniu
AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)	
FINAL GEAR OIL LEVEL INSPECTION	
FINAL GEAR OIL REPLACEMENT	
STEERING HEAD INSPECTION	
FRONT FORK INSPECTION	
REAR SHOUL ABSURBER AUJUS I MEN I	

TIRE INSPECTION	
WHEEL INSPECTION	
CABLE INSPECTION AND LUBRICATION	
LEVER AND PEDAL LUBRICATION	
SIDESTAND LUBRICATION	3-43
CENTERSTAND LUBRICATION	3-43
REAR SUSPENSION LUBRICATION	3-43
ELECTRICAL	2-44
BATTERY INSPECTION	
FUSE INSPECTION	
HEADLIGHT BEAM ADJUSTMENT	
HEADLIGHT BULB REPLACEMENT DIGITAL CLOCK ADJUSTMENT	
DIGITAL CLOCK ADJUSTMENT	3-53
CHAPTER 4.	
ENGINE OVERHAUL	
ENGINE OVERWAGE	
ENGINE REMOVAL	4-1
FUEL TANK AND COWLINGS	
ENGINE OIL	4-1
BATTERY LEADS	4-1
AIR FILTER CASE	
A.I.S (AIR INDUCTION SYSTEM)	
CARBURETOR	4-2
HOSES AND LEADS	4-2
CLUTCH CABLE	4-3
SHIFT PEDAL	4-3
STARTER MOTOR	4-3
A.C. GENERATOR	4-4
EXHAUST PIPE	
OIL COOLER	4-4
DRIVE SHAFT RUBBER BOOT	4-5
ENGINE REMOVAL	
LITORIE ILEMOVILE	
ENGINE DISASSEMBLY	4-6
CYLINDER HEAD COVER, CAMSHAFT AND CYLINDER I	
CYLINDER AND PISTON	
PICKUP COIL	
CLUTCH	
OIL PAN AND OIL PUMP	
SHIFT SHAFT	
MIDDLE GEAR	
CRANKCASE DISASSEMBLY	
SHIFT FORK AND SHIFT CAM	
TRANSMISSION	4-15

CRANKSHAFT AND STARTER CLUTCH4-15	
VALVE	
CONNECTING ROD4-16	
OIL PUMP4-18	
INSPECTION AND REPAIR	8
CYLINDER HEAD	GEN
VALVE AND VALVE GUIDE 4-19	INFO
VALVE SEAT	
VALVE SPRING	0
VALVE LIFTER	-
CAMSHAFT	SPEC
TIMING CHAIN, SPROCKET AND CHAIN GUIDE 4-27	OI LO
TIMING CHAIN TENSIONER	4.
CYLINDER AND PISTON	
PISTON RING 4-28	
PISTON PIN 4-30	INSP
PISTON PIN	ADJ
OIL PUMP	4
PRIMARY DRIVE	
STARTER DRIVES 4-37	
CLUTCH	ENG
TRANSMISSION AND SHIFTER	
SHIFT SHAFT AND STOPPER LEVER 4-42	-
OIL-JET NOZZLE 4-42	l 4
RELIEF VALVE, OIL PIPE AND STRAINER	_
OIL COOLER 4-42	CARB
CRANKCASE 4-43	
CRANKCASE 4-43 BEARING AND OIL SEAL 4-43	2
CIRCLIP AND WACHED	0
CIRCLIP AND WASHER4-43	_
	CHAS
MIDDLE GEAR SERVICE4-44	
REMOVAL	-
DISASSEMBLY	
INSPECTION	
REASSEMBLY	ELEC
INSTALLATION	
GEAR LASH MEASUREMENT	-
GEAR LASH ADJUSTMENT	
MIDDLE DRIVE GEAR AND DRIVEN GEAR POSITIONING4-50	TRBL
20 7	SHTG
NGINE ASSEMBLY AND ADJUSTMENT4-54	JIIIG
OIL PLIMP	
OIL PUMP 4-54 CONNECTING ROD 4-56	
VALVE	
TRANSMISSION	
SHIFT FORK AND SHIFT CAM	



MIDDLE GEAR SHAFT4	64
SHIFT SHAFT4	-64
OIL PAN AND OIL PUMP4	65
CLUTCH AND PICKUP COIL4	-67
PISTON AND CYLINDER4	
CYLINDER HEAD AND CAMSHAFT4	72
TIMING CHAIN TENSIONER4	
CYLINDER HEAD COVER4	
ENGINE REMOUNTING4	
ETTOTILE TELESTON	
CHAPTER 5.	
CARBURETION	
CARBURETOR	5-1
REMOVAL	5-2
DISASSEMBLY	5-2
INSPECTION	5-5
ASSEMBLY	5-7
INSTALLATION	5-9
FUEL LEVEL ADJUSTMENT	5-9
TPS (THROTTLE POSITION SENSOR) ADJUSTMENT	
AND INSPECTION5	10
A.I.S. (AIR INDUCTION SYSTEM)5	12
AIR INJECTION	
AIR CUT VALVE	
A.I.S. (AIR INDUCTION SYSTEM) DIAGRAMS	
A.I.S. (AIR INDUCTION SYSTEM) INSPECTION5	
A.I.S. (AIR INDUCTION SYSTEM) ADJUSTMENT5	
CHAPTER 6.	
CHASSIS	
OTIAGGIO	
FRONT WHEEL	6-1
REMOVAL	
INSPECTION	
INSTALLATION	
STATIC WHEEL BALANCE ADJUSTMENT	
	_
REAR WHEEL	6-7
REMOVAL	6-8
INSPECTION	
INSTALLATION	
STATIC WHEEL BALANCE ADJUSTMENT6	

CRANKCASE ASSEMBLY......4-61

FRONT AND REAR BRAKE	6-11
BRAKE PAD REPLACEMENT	6-13
CALIPER DISASSEMBLY	6-17
MASTER CYLINDER DISASSEMBLY	6-20
INSPECTION AND REPAIR	6-22
CALIPER ASSEMBLY	6-25
MASTER CYLINDER ASSEMBLY	6-30
FRONT FORK	6-35
REMOVAL	6-36
DISASSEMBLY	6-37
INSPECTION	6-38
ASSEMBLY	6-39
INSTALLATION	6-42
STEERING HEAD AND HANDLEBAR	
REMOVAL	
INSPECTION	
INSTALLATION	6-47
REAR SHOCK ABSORBER AND SWINGARM	6-52
HANDLING NOTES	
NOTES ON DISPOSAL	
REMOVAL	
INSPECTION	
INSTALLATION	
INSTALLATION	0-56
SHAFT DRIVE	6-61
TROUBLESHOOTING	6-62
REMOVAL	6-66
FINAL DRIVE GEAR CASE	6-66
DRIVE SHAFT	6-76
INSTALLATION	6-76
CHAPTER 7.	
ELECTRICAL	
ELECTRICAL COMPONENTS	7-1
CHECKING OF CONNECTIONS	7-3
IGNITION SYSTEM	7-4
CIRCUIT DIAGRAM	
TROUBLESHOOTING	

















STARTING CIRCUIT OPERATION7-12
TROUBLESHOOTING7-13
STARTER MOTOR7-19
CHARGING SYSTEM7-24
CIRCUIT DIAGRAM7-24
TROUBLESHOOTING7-25
LIGHTING SYSTEM7-29
CIRCUIT DIAGRAM7-29
TROUBLESHOOTING7-30
LIGHTING SYSTEM CHECK7-33
SIGNAL SYSTEM7-37
CIRCUIT DIAGRAM
TROUBLESHOOTING
SIGNAL SYSTEM CHECK
SIGNAL SYSTEM CHECK7-41
FUEL PUMP SYSTEM7-53
CIRCUIT DIAGRAM7-53
FUEL PUMP CIRCUIT OPERATION7-54
TROUBLESHOOTING7-55
FUEL PUMP TEST
· -
CARBURETOR HEATER SYSTEM7-59
CIRCUIT DIAGRAM
TROUBLESHOOTING7-60
MODELSHOOTHVO
TPS (THROTTLE POSITION SENSOR) SELF DIAGNOSIS7-64
CIRCUIT DIAGRAM7-64
TROUBLESHOOTING7-65
CHAPTER 8.
TROUBLESHOOTING
TROUBLESHOOTING
STARTING FAILURE/HARD STARTING8-1
FUEL SYSTEM8-1
FI FCTRICAL SYSTEM8-1
COMPRESSION SYSTEM8-2
COMPRESSION STSTEM
POOR IDLE SPEED PERFORMANCE8-2
POOR IDLE SPEED PERFORMANCE8-2
I OUT IDEE OF EED I ET COMMENTE

ELECTRIC STARTING SYSTEM 7-11
CIRCUIT DIAGRAM 7-11

	POOR MEDIUM AND HIGH SPEED PERFORMANCE8-2	
	POOR MEDIUM AND HIGH SPEED PERFORMANCE8-2	
	FAULTY GEAR SHIFTING8-3	
	HARD SHIFTING8-3	
	SHIFT PEDAL DOES NOT MOVE8-3	
	JUMP-OUT GEAR8-3	
	CLUTCH SLIPPING/DRAGGING8-3	
	CLUTCH SLIPPING8-3	
	CLUTCH DRAGGING8-3	
	OVERHEATING8-4	
	OVERHEATING8-4	
	EALILTY RDAVE	
	FAULTY BRAKE8-4	
	POOR BRAKING EFFECT8-4	
	FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION8-4	
	OIL LEAKAGE 8-4	
	MALFUNCTION8-4	
	INSTABLE HANDLING8-4	-
	INSTABLE HANDLING8-4	
	FAULTY LIGHTING AND SIGNAL SYSTEM8-5	i
•	HEADLICHT DARK	- 1
	HEADLIGHT DARK8-5	- 1
	BULB BURNT OUT8-5	- 1
	FLASHER DOES NOT LIGHT8-5	- [
	FLASHER WINKS SLOWER8-5	ī
	FLASHER KEEPS ON8-5	- 1
	FLASHER WINKS QUICKER8-5	ŀ
	HORN IS INOPERATIVE8-5	-1
		- 1

XJ900S(G) '95 WIRING DIAGRAM



















GENERAL INFORMATION MOTORCYCLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER

(For E, AUS and NZ)

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

Starting serial number:

JYA4KMS0 * SA023101 (E) JYA4PST0 * SA000101 (AUS, NZ)

NOTE: _

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



FRAME SERIAL NUMBER

(Except for E, AUS and NZ)

The frame serial number (1) is stamped into the right side of the steering head.

Starting serial number: 4KM-000101 4PR-000101 (CH, A)

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

ENGINE SERIAL NUMBER

The engine serial number (1) is stamped into crankcase.

Starting serial number: 4KM-000101 4KM-023101 (E) 4PR-000101 (CH, A) 4PS-000101 (AUS, NZ)

- . The first three digits of these numbers are for model identification; the remaining digits are the unit production number.
- . Designs and specifications are subject to change without notice.





IMPORTANT INFORMATION PREPARATION FOR REMOVAL

 Remove all dirt, mud dust, and foreign material before removal and disassembly.



- 2.Use proper tools and cleaning equipment. Refer to "SPECIAL TOOLS".
- 3.When disassembling the machine keep mated parts together. This includes gears, cylinders, pistons, and other mated parts that have been "mated" through normal wear. Mated parts must be reused as an assembly or replaced.



- 4.During the machine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled.
- 5.Keep away from fire.



ALL REPLACEMENT PARTS

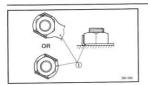
1.Use only genuine Yamaha parts for all replacements. Use oil and/or grease recommended by Yamaha for assembly and adjustment. Other brands may be similar in function and appearance, but inferior in quality.

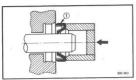
GASKETS, OIL SEALS, AND O-RINGS

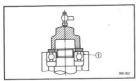
- 1.All gaskets, seals and O-rings should be replaced when an engine is overhauled. All gaskets surfaces, oil seal lips and Orings must be cleaned.
- Properly oil all mating parts and bearing during reassembly. Apply grease to the oil seal lips.

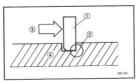
IMPORTANT INFORMATION











LOCK WASHERS/PLATES AND COTTER PINS

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

BEARINGS AND OIL SEALS

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

CAUTION:

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

① Bearing

CIRCLIPS

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

The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques. The shape and part number used for the special tool differ by country, so two types are provided.

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

FOR TUNE UP



This tool is needed for detecting engine rpm.

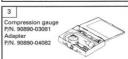


This tool is necessary for checking ignition timing.



This gauge is needed for carburetor synchronization.





This gauge is used to measure the engine compression.



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





FOR ENGINE SERVICE

Tappet adjusting tool P/N. 90890-04125

This tool is necessary to replace valve adjusting pads.

Piston pin puller P/N. 90890-01304

This tool is used to remove the piston pin.

Valve spring compressor P/N. 90890-04019

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

6 | Valve guide remover (6.0 mm) P/N. 90890-04064

This tool is used to remove the valve guides.

8 | Valve guide reamer (6.0 mm) P/N. 90890-04066

This tool is used to rebore the new valve quide.

Universal clutch holder P/N. 90890-04086

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

Attachment P/N. 90890-01243

OB

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

Valve guide installer (6.0 mm) P/N. 90890-04065

This tool is needed to install the valve guides properly.

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

9



This tool is used to adjust the valve clearance.



10

YAMAHA Bond No. 1215

P/N. 90890-85505



This sealant (Bond) is used for crankcase mating surfaces, etc.

12

Universal joint holder P/N, 90890-04062



This tool is used when disassembling/assembling the U-joint and adjusting gear lash.

14



This tool is used to compress piston rings when installing the cylinder.

16

Oil filter wrench P/N, 90890-01426



This tool is used to remove and install the oil filter.

T-handle P/N. 90890-01326

This tool is used to loosen and tighten the front fork damper rod holding bolt.

11

Damper spring compressor





This tool is needed to disassemble and reassemble the middle gear damper.

13

Middle gear backlash tool P/N, 90890-04080



This tool is needed when measuring gear lash.

15

Piston base P/N. 90890-01067



Use four pieces of these to hold the pistons during cylinder installation.

FOR CHASSIS SERVICE

2

Front fork cylinder complete holder (27 mm) P/N, 90890-01388



This tool is used to loosen and tighten the front fork damper rod holding bolt.



3

Fork seal driver weight P/N, 90890-01367



This tool is used when installing the fork seal.

Ring nut wrench P/N. 90890-01403



This tool is used to loosen and tighten the steering ring nut.

7

Middle and final gear holding tool P/N. 90890-01229



This tool is used when measuring gear lash.

FOR ELECTRICAL COMPONENTS

Pocket tester P/N. 90890-03112

This instrument is invaluable for checking the electrical system.

4

Fork seal driver attachment (ø41) P/N, 90890-01381



This tool is used when installing the fork seal.

6

Final gear backlash band P/N. 90890-01230



This tool is needed when measuring gear lash.

18

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



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

1 Ignition

Ignition checker P/N. 90890-06754



This instrument is necessary for checking the ignition system components. SPECIFICATIONS



GENERAL SPECIFICATIONS

Model	XJ900S
Model code:	4KM1
Engine starting number:	4KM-000101
Frame starting number:	4KM-000101
Dimensions:	
Overall length	2,230 mm
Overall width	735 mm
Overall height	1,300 mm
Seat height	795 mm
Wheelbase	1,505 mm
Minimum ground clearance	130 mm
Minimum turning radius	3,000 mm
Basic weight:	
With oil and full fuel tank	265 kg
Engine:	
Engine type	Air-cooled 4-stroke, DOHC
Cylinder arrangement	Forward-inclined parallel 4-cylinder
Displacement	892 cm ³
Bore × stroke	68.5 × 60.5 mm
Compression ratio	10:1
Compression pressure (STD)	1,200 kPa (12 kg/cm², 12 bar) at 330 r/min
Starting system	Electric starter
Lubrication system:	Wet sump
Oil type or grade:	
Engine oil	SAE20W40 type SE motor oil
Final gear oil:	SAE80API "GL-4" Hypoid Gear Oil
Oil capacity:	
Engine oil	
Periodic oil change	3.2 L
With oil filter replacement	3.4 L
Total amount	4.4 L
Final gear case oil	
Total amount	0.2 L
Air filter:	Dry type element
Fuel:	
Туре	Regular unleaded gasoline
Fuel tank capacity	24 L
Fuel reserve amount	5 L



Model		XJ900S
Carburetor:		
Type / quantity		BDSR34/4
Manufacturer		MIKUNI
Spark plug:		
Туре		DPR8EA-9/X24EPR-U9
Manufacturer		NGK/NIPPONDENSO
Spark plug gap		0.8 ~ 0.9 mm
Clutch type:		Wet, multiple-disc
Transmission:		vvet, multiple-disc
Primary reduction system		Spur gear
Primary reduction ratio		97/58 (1.672)
Secondary reduction system	m	Shaft drive
Secondary reduction ratio		46/38X19/18X32/11 (3.717)
Transmission type		Constant mesh 5-speed
Operation		Left foot operation
Gear ratio	1st	35/16 (2.188)
	2nd	30/20 (1.500)
	3rd	30/26 (1.154)
	4th	28/30 (0.933)
	5th	26/32 (0.813)
Chassis:		
Frame type		Double cradle
Caster angle		27°
Trail		121 mm
Tire:		
Type		Tubeless
Size	front	120/70-17 58V
	rear	150/70-17 69V
Manufacturer	front	METZLER/BRIDGESTONE/DUNLOP
	rear	METZLER/BRIDGESTONE/DUNLOP
Type	front	ME33/G601/K505F
	rear	ME55A/G602/K505
Tire pressure (cold tire):	1001	
Maximum load-except mot	orcycle	205 kg
Loading condition A*	o.cyolo	0 ~ 90 kg
Locality condition Ax	front	225 kPa (2.25 kg/cm², 2.25 bar)
	rear	
Londing condition D.	rear	250 kPa (2.5 kg/cm², 2.5 bar)
Loading condition B*		90 ~ 205 kg
	front	250 kPa (2.5 kg/cm², 2.5 bar)
	rear	290 kPa (2.9 kg/cm², 2.9 bar)
Brake:		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Right foot operation

GENERAL SPECIFICATIONS SPEC



Model	XJ900S
Suspension:	C200 0 50 0
Front suspension	Telescopic fork
Rear suspension	Swingarm (link suspension)
Shock absorber:	
Front shock absorber	Coil spring / Oil damper
Rear shock absorber	Coil-gas spring / Oil damper
Wheel travel:	
Front wheel travel	140 mm
Rear wheel travel	110 mm
Electrical:	
Ignition system	T.C.I. (digital)
Generator system	A.C. generator
Battery type	YTX14-BS
Battery capacity	12 V 12 AH
Headlight type:	Quartz bulb (halogen)
Bulb wattage x quantity:	
Headlight	12 V 60 W / 55 W
Auxiliary light	12 V 4 W × 1
Tail / brake light	12 V 5 W / 21 W × 2
Flasher light	12 V 21 W × 4
Licence light	12 V 5 W × 2
Meter light	12 V 3.4 W × 4
Indicator light	
NEUTRAL	12 V 3.4 W × 1
TURN	12 V 3.4 W × 2
OIL LEVEL	12 V 3.4 W × 1
HIGH BEAM	12 V 3.4 W × 1
FUEL	12 V 3.4 W × 1

ENGINE

Model		XJ900S					
Cylinder head:							
Warp limit		0.03 mm					
	*						
Cylinder:							
Bore size		68.49 ~ 68.54 mm					
Taper limit		0.05 mm					
Out of round limit		0.01 mm					
Camshaft:							
Drive method		Chain drive (center)					
Cam cap inside diameter		25.000 ~ 25.021 mm					
Camshaft outside diameter		24.967 ~ 24.980 mm					
Shaft-to-cap clearance		0.020 ~ 0.054 mm					
Cam dimensions							
	C A						
Intake	"A"	36.75 ~ 36.85 mm					
	"B"	27.975 ~ 28.075 mm					
	"C"	8.75 ~ 8.85 mm					
Exhaust	"A"	36.75 ~ 36.85 mm					
	"B"	27.975 ~ 28.075 mm					
	"C"	8.75 ~ 8.85 mm					
Camshaft runout limit		0.03 mm					
~~~~							

## MAINTENANCE SPECIFICATIONS | SPEC



Model		V 10	00S
Cam chain:			003
Cam chain type / No. of links		SILENT-CHAIN/150	
Cam chain type / No. or links Cam chain adjustment metho		Automatic	
	u	Automatic	
Valve, valve seat, valve guide:		044 045	
Valve clearance (cold)	IN	0.11 ~ 0.15 mm	
Valve dimensions:	EX	0.16 ~ 0.20 mm	
varvo annononon		100	
	X. →*B*	7.0	
	$\rightarrow \uparrow$		
Head Dia Face V	Vidth	Seat Width	Margin Thickness
"A" head diameter	IN	33.9 ~ 34.1 mm	
	EX	27.9 ~ 28.1 mm	
"B" face width	IN	2.3 mm	
	EX	2.3 mm	
"C" seat width	IN	0.9 ~ 1.1 mm	
	EX	0.9 ~ 1.1 mm	
"D" margin thickness	IN	1 mm	
	EX	1 mm	
Stem outside diameter	IN	5.975 ~ 5.990 mm	
	EX	5.960 ~ 5.975 mm	
Guide inside diameter	IN	6.000 ~ 6.012 mm	
	EX	6.000 ~ 6.012 mm	
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm	
	EX	0.025 ~ 0.052 mm	
Stem runout limit		0.01 mm	
Valve seat width	IN	0.9 ~ 1.1 mm	
	EX	0.9 ~ 1.1 mm	
Valve spring:			
Inner spring		1000000	
Free length	IN	37.4 mm	
	EX	37.4 mm	
Set length (valve closed)	IN	31.8 mm	
	EX	31.8 mm	
Compressed pressure (installed)	IN	6.35 ~ 7.45 kg	
	EX	6.35 ~ 7.45 kg	



Model		XJ900S			
Tilt limit	IN	2.5'/1.6 mm			
	EX	2.5*/1.6 mm			
20.00					
7//////////////////////////////////////					
Direction of winding		Clockwise			
(top view)	IN	CIOCKWISC			
(top view)	EX	Clockwise			
Outer spring					
Free length	IN	39.85 mm			
	EX	39.85 mm			
Set length (valve closed)	IN	33.8 mm			
	EX	33.8 mm			
Compressed pressure					
(installed)	IN	12.1 ~ 14.1 kg			
	EX	12.1 ~ 14.1 kg			
Tilt limit	IN	2.5°/1.7 mm			
	EX	2.5°/1.7 mm			
-11 W					
*					
7//////////////////////////////////////					
Direction of winding		Counterclockwise			
(top view)	IN				
	EX	Counterclockwise			
		( )			
		• /			
Piston:					
Piston to cylinder clearance		0.03 ~ 0.05 mm			
<limit></limit>		<0.1 mm>			



Model	XJ900S
Piston size "D"	68.45 ~ 68.50 mm
	Би
Measuring point "H"	5.5 mm
Oversize 2nd	69 mm
4th	69.5 mm
Piston off-set	0.5 mm
Piston off-set direction	IN side
Piston pin bore inside diameter	16.002 ~ 16.013 mm
Piston pin outside diameter	15.990 ~ 16.000 mm
iston rings:	
Top ring:	
	<u>Г</u> в
Туре	Barrel
Dimensions (B × T)	1.2 × 2.5 mm
End gap (installed)	0.10 ~ 0.25 mm
Side clearance (installed)	0.025 ~ 0.080 mm
2nd ring:	
T	Īв
Type	Taper
Dimensions (B × T)	1.2 × 3.1 mm
End gap (installed)	0.30 ~ 0.45 mm
Side clearance	0.02 ~ 0.06 mm
Oil ring:	
	В
Dimensions (B × T)	2.5 × 2.8 mm
End gap (installed)	0.2 ~ 0.7 mm
onnecting rod:	
Oil clearance	0.026 ~ 0.055 mm

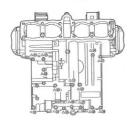
SPEC U

Mode	el	XJ900S
Crankshaft:		
-1-	D B A	
Assembly width "B"		340.8 ~ 342.0 mm
Runout limit "C"		0.03 mm
Big end side clearance	"D"	0.160 ~ 0.262 mm
Big end radial clearance	e "E"	0.016 ~ 0.040 mm
Journal oil clearance		0.020 ~ 0.052 mm
Color code (correspon	ding size)	① Blue ② Black ③ Brown ④ Green ⑤ Yellow
Clutch:		
Friction plate thickness	3	2.9 ~ 3.1 mm
Quantity		8
Friction plate wear lim	it	2.8 mm
Clutch plate thickness		1.9 ~ 2.1 mm
Quantity		7
Warp limit		0.05 mm
Clutch spring free leng	th	51.8 mm 6
Quantity Minimum length		50 mm
Clutch release method		Outer pull, rack & pinion pull
Transmission:		Outer pull, rack & piritori pull
Main axle deflection lir	nit	0.08 mm
Drive axle deflection li		0.08 mm
Shifter:	iiit.	0.00 11111
Shifter type		Guide bar
Carburetor:		
I. D. mark		4KM 00
Main jet	(M.J)	#100
Main air jet	(M.A.J)	#72.5
Jet needle	(J.N)	5DT3-2
Needle jet	(N.J)	0-2
Pilot air jet	(P.A.J.1)	#120
Pilot outlet	(P.O)	1.0
Pilot jet	(P.J)	#12.5
Bypass 1	(B.P.1)	0.9
Bypass 2	(B.P.2)	0.8
Bypass 3	(B.P.3)	0.9
Pilot screw	(P.S)	1-1/2
Valve seat size	(V.S)	1.5

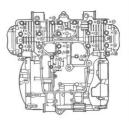


Model		XJ900S		
Starter jet (G.S.1) Throttle valve size (Th.V) Fuel level (F.L) Engine idle speed Intake vacuum		#30 #125 6 ~ 7 mm 950 ~ 1,050 r/min 30.3 ~ 32.9 kPa (230 ~ 250 mmHg)		
Lubrication system: Oil filter type Oil pump type Tip clearance Side clearance Bypass valve setting pres Relief valve operating pre Oil pressure (hot)		Paper type Trochoid type 0.03 - 0.09 mm 0.03 - 0.08 mm 120 ~ 160 kPa (1.2 ~ 1.6 kg/cm², 1.2 ~ 1.6 bar 540 ~ 660 kPa (5.4 ~ 6.6 kg/cm², 5.4 ~ 6.6 bar 80 kPa (0.8 kg/cm², 0.8 bar) at 1,000 r/min		
Shaft drive: Middle gear backlash Final gear backlash	=	0.1 ~ 0.2 mm 0.1 ~ 0.2 mm		

#### Crankcase tightening sequence:

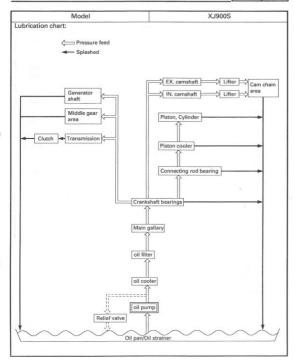


#### Crankcase (lower) Crankcase (upper)



- x: M8 bolt: 24 Nm (2.4 m + kg)
- △: M6 bolt: 12 Nm (1.2 m kg)









#### **Tightening torques**

Part to be tightened	Part name	Thread	Q'ty		ening que	Remarks
Tart to be lightered	T dit name	size		Nm	m-kg	
Camshaft cap	Bolt	M6	24	10	1.0	
Cylinder head (cam chain)	Stud bolt	M6	4	5	0.5	<b>— G</b>
Cylinder head (exhaust pipe)	Stud bolt	M8	8	15	1.5	<b>— ⊙</b>
Oil gallery bolt	_	M6	1	8	0.8	
Spark plug	_	M12	4	18	1.8	
Cylinder head	Nut	M10	12	32	3.2	<b>-0</b>
Cylinder head cover	Bolt	M6	12	10	1.0	
Cylinder (cam chain)	Stud bolt	M8	1	8	0.8	-0
Cylinder	Nut	M8	1	20	2.0	
Cylinder head	Nut	M6	4	10	1.0	
Connecting rod	Nut	M8	8	37	3.7	- M
Cam sprocket	Bolt	M7	4	24	2.4	_
Guide stopper	Screw	M6	1	7	0.7	
Chain guide (intake)	Bolt	M8	1	20	2.0	
Oil pump sprocket	Bolt	M6	1	12	1.2	
Oil pump	Bolt	M6	3	12	1.2	
Oil filter housing	Union bolt	M20	1	50	5.0	
Oil delivery pipe	Bolt	M12	2	32	3.2	
Drain bolt	Plug	M14	1	43	4.3	
Oil level switch	Bolt	M6	2	10	1.0	
Oil filter	_	M20	1	17	1.7	
Carburetor joint	Bolt	M6	8	12	1.2	
Air filter case	Bolt	M6	1	10	1.0	
Exhaust pipe	Nut	M8	8	20	2.0	
Muffler and stay	Bolt	M10	2	25	2.5	
Exhaust pipe blind plug (CO test)	Bolt	M6	4	7	0.7	
Exhaust pipe and stay	Bolt	M10	1	25	2.5	
Exhaust pipe and muffler	Bolt	M8	2	20	2.0	
Reed valve bracket and cowling stay	Bolt	M6	4	10	1.0	
Pipe 2, 3 and cowling stay	Bolt	M6	2	7	0.7	
Air cut valve and cowling stay	Screw	M6	2	7	0.7	
Crankcase	Stud bolt	M10	12	20	2.0	-0
Crankcase	Bolt	M8	19	24	2.4	-0
Crankcase	Bolt	M6	20	12	1.2	-0
Bearing holder	Screw	M8	4	25	2.5	Stake
Oil baffle plate	Screw	M6	7	8	0.8	
Oil baffle plate	Screw	M6	1	8	0.8	-0
Shift shaft lever cover	Bolt	M6	10	12	1.2	-
Drive axle bearing housing	Bolt	M6	3	12	1.2	
Clutch cover	Bolt	M6	10	12	1.2	

## MAINTENANCE SPECIFICATIONS | SPEC | U

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque		Remarks
		Size	- 53	Nm	m-kg	1
Clutch cable stay	Bolt	M6	2	12	1.2	
Generator bearing housing	Bolt	M6	3	10	1.0	
Plate stopper	Bolt	M6	1	10	1.0	Use lock washer
HY-VO chain guide	Bolt	M6	2	10	1.0	
Clutch spring	Screw	M6	6	8	0.8	
Clutch boss	Nut	M20	1	70	7.0	Use lock washer
Middle drive pinion gear	Nut	M18	1	110	11	Use lock washer
Yoke joint	Nut	M14	1	90	9.0	
Middle driven bearing housing	Bolt	M8	4	25	2.5	
Shift pedal adjuster	Nut	M6	2	10	1.0	
Shift arm	Bolt	M6	1	10	1.0	
Shift cam bearing holder	Screw	M6	2	10	1.0	
Self locking nut	-	M14	1	110	11	
Final gear bearing housing	Bolt	M10	2	23	2.3	
Final gear bearing housing	Nut	M8	6	23	2.3	
Final gear oil filler bolt	Plug	M14	1	23	2.3	
Final gear oil drain plug	Plug	M14	1	23	2.3	
Final drive bearing retainer	_	M65	1	110	11	
Final gear case	Stud bolt	M10	4	18	1.8	
Final gear case	Stud bolt	M8	6	9	0.9	
Final gear case and swingarm	Nut	M10	4	42	4.2	
A.C. generator	Bolt	M8	2	25	2.5	
A.C. generator	Bolt	M8	1	25	2.5	-6
Pickup coil base	Screw	M6	2	8	0.8	_
Timing plate	Bolt	M10	1	45	4.5	
Starter motor	Bolt	M6	1	7	0.7	YAMAHA Bold No. 1215
Starter motor and crankcase	Bolt	M6	1	12	1.2	<b>-0</b>
Neutral switch	_	M10	1	20	2.0	_





#### CHASSIS

Model		XJ900S			
Steering system:					
Steering bearing type		Ball bearing			
Front suspension:					
Front fork travel		140 mm			
Fork spring free length		505 mm			
Spring rate	(K1)	5.0 N/mm (0.5 kg/mm)			
	(K2)	9.0 N/mm (0.9 kg/mm)			
Stroke	(K1)	0 ~ 80 mm			
	(K2)	80 ~ 140 mm			
Optional spring		No			
Oil capacity		444 cm ³			
Oil level		133 mm			
Oil grade		Fork oil 5 W or equivalent			
Rear suspension:					
Shock absorber travel		50 mm			
Spring free length		177 mm			
Fitting length		161.5 mm (157.5 ~ 165.5 mm)			
Spring rate	(K1)	155.0 N/mm (15.5 kg/mm)			
Stroke	(K1)	0 ~ 50 mm			
Optional spring		No			
Swingarm:					
Free play limit	end	1 mm			
	side	1 mm			
Front wheel:					
Type		Cast wheel			
Rim size		17 X MT3.00			
Rim material		Aluminum			
Rim runout limit	radial	1 mm			
	lateral	0.5 mm			
Rear wheel:					
Type		Cast wheel			
Rim size		17 X MT4.00			
Rim material		Aluminum			
Rim runout limit	radial	1 mm			
	lateral	0.5 mm			
Front disc brake:					
Type		Dual			
Disc outside diameter x thi	ckness	320 × 4 mm			
Disc deflection limit		0.15 mm			
Pad thickness	inner	6.1 mm			
<limit></limit>		<0.8 mm>			
Pad thickness	outer	6.1 mm			



Model	XJ900S
<limit></limit>	<0.8 mm>
Master cylinder inside diameter Caliper cylinder inside diameter Caliper cylinder inside diameter Brake fluid type	15.87 mm 30.2 mm 33.3 mm DOT #4
Rear disc brake: Type Disc outside diameter × thickness Disc deflection limit Pad thickness inner <limit> Pad thickness outer <limit></limit></limit>	Single 267 × 5 mm 0.15 mm 5.5 mm <0.5 mm> 5.5 mm <0.5 mm>
Master cylinder inside diameter Caliper cylinder inside diameter Brake fluid type	14 mm 42.85 mm DOT #4
Brake lever & brake pedal:  Brake lever free play (at lever pivot)  Brake pedal position  Brake pedal free play  Clutch lever free play (at lever end)  Throttle cable free play	0 mm 30 mm 0 mm 10 ~ 15 mm 3 ~ 5 mm





#### **Tightening torques**

Part to be tightened	Thread size		tening que	Remarks
Tart to be tightened	1111000 0120	Nm	m-kg	
Chassis:				
Handle crown and inner tube	M8×1.25	30	3.0	
Handle crown and steering stem	M14×1.25	110	11.0	
Handle crown and handlebar (upper)	M8× 1.25	23	2.3	
Steering stem and ring nut	M25×1.0	18	1.8	
		See "	NOTE"	
Front master cylinder and cap	M4×0.7	2	0.2	
Front master cylinder and bracket	M6× 1.0	9	0.9	
Front brake hose and union bolt	M10×1.25	30	3.0	
Cowling and cowling stay	M5×0.8	0.7	0.07	
Cowling and frame	M5×0.8	0.7	0.07	
Cowling and windscreen	M5×0.8	0.7	0.07	
Cowling and inner panel	M5×0.8	4	0.4	
Cowling and headlight	M6× 1.0	7	0.7	
Cowling stay and frame	M8×1.25	16	1.6	
oovining stay and manne	M6×1.0	7	0.7	
Cowling stay and meter	M6× 1.0	7	0.7	
Cowling stay and front flasher light	M12×1.25	13	1.3	
Meter and meter cable	M12×1.0	3	0.3	
Brake hose holder and front fork	M6× 1.0	7	0.7	
Engine mount (front-upper/lower)	M10×1.25	48	4.8	
(rear-upper/lower)	M10×1.25	48	4.8	
Down tube and frame	M10×1.25	89	8.9	
Engine stay (front) and frame	M8×1.25	30	3.0	
Engine stay (rear) and frame	M8×1.25	30	3.0	
Pivot shaft (left) and frame	M22 × 1.5	100	10.0	
Pivot shaft (right) and frame	M22×1.5	7	0.7	
Pivot shaft (right) and locknut	M22×1.5	100	10.0	
Relay arm and frame	M10×1.25	48	4.8	
Relay arm and connecting rod	M12 × 1.25	48	4.8	
Connecting rod and rear arm	M12×1.25	48	4.8	
Rear shock absorber and frame	M10×1.25	40	4.0	
Rear shock absorber and relay arm	M10×1.25	48	4.8	
Fuel cock and fuel tank	M6×1.0	7	0.7	
Fuel sender and fuel tank	M5×0.8	4	0.4	
Rear fender and frame	M6× 1.0	7	0.7	
Taillight	M6× 1.0	7	0.7	
Rear fender cover and side cover	M5×0.8	4	0.4	
Side cover and frame	M5×0.8	4	0.4	
Rear fender stay and frame	M6×1.0	10	1.0	



Part to be tightened	Thread size	Tightening torque		Remarks
		Nm	m-kg	
Rear brake reservoir tank and rear fender	M6×1.0	7	0.7	
Rear flasher light and rear fender	M12×1.25	4	0.4	
Reflector bracket and rear fender	M4×0.7	3	0.3	
Rear fender and flap	M4×0.7	3	0.3	
Battery cover and frame	M6×1.0	7	0.7	
Footrest bracket and frame	M8 × 1.25	30	3.0	
Rear footrest and frame	M8×1.25	30	3.0	
Rear master cylinder and bracket	M8×1.25	30	3.0	
Brake hose and union bolt	M10×1.25	30	3.0	
Shift pedal	M8×1.25	30	3.0	
Brake pedal and brake shaft	M6×1.0	8	0.8	
Mainstand bolt and nut	M10×1.25	56	5.6	
Front wheel axle	M14×1.5	59	5.9	
Rear wheel axle and nut	M16×1.5	105	10.5	
Front brake caliper and front fork	M10×1.25	35	3.5	
Rear brake caliper and caliper bracket	M10×1.25	35	3.5	
Disc brake and hub (front/rear)	M6×1.0	20	2.0	-0
Front brake caliper and bleed screw	M7×1.0	6	0.6 -	
Rear brake caliper and bleed screw	M8 × 1.25	6	0.6	
Speedometer cable and gear unit	M12×1.0	3	0.3	
Front wheel axle pinch bolt	M8×1.25	19	1.9	
Rear wheel axle pinch bolt	M8×1.25	16	1.6	
Front brake caliper retaining bolt	M8×1.25	22	2.2	
Front fender and front fork	M6×1.0	9	0.9	
Rear brake hose and hose joint	M10×1.0	16	1.6	
Rear brake caliper and hose joint	M10×1.0	30	3.0	

#### NOTE

^{1.}First, tighten the ring nut approximately 52 Nm (5.2 m • kg) by using the torque wrench, then loosen the ring nut one turn.

^{2.}Retighten the ring nut to specification.

# MAINTENANCE SPECIFICATIONS

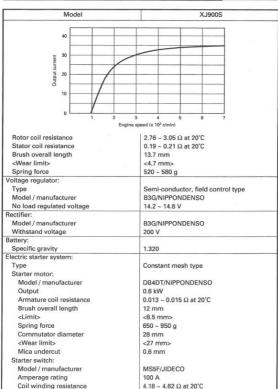


# ELECTRICAL

Model	XJ900S				
Voltage:	12 V				
Ignition system:					
Ignition timing (B.T.D.C.)	5° at 1,000 r/min				
Advanced timing (B.T.D.C.)	40° at 5,000 r/min				
Advancer type	Electrical type				
Advancer type	1				
Throttle open (%)	O Engine speed (x 10° /min)				
T.C.I.: Pickup coil resistance / color	446 ~ 545 Ω at 20°C / White/Red – White/Green				
T.C.I. unit model / manufacturer	J41031/WIT30BI3/II				
Ignition coil: Model / manufacturer	JO312,JO313/NIPPONDENSO				
Minimum spark gap	6 mm				
Primary winding resistance	1.87 ~ 2.53 Ω at 20°C				
Secondary winding resistance	12 ~ 18 kΩ at 20°C				
	12 - 10 RES OLEO O				
Spark plug cap:	Resin type				
Туре	10 kΩ				
Resistance	10 K22				
Charging system:					
Туре	A.C. generator				
Model / manufacturer Nominal output	B3G/NIPPONDENSO  14 V 33 A at 5,000 r/min				

# MAINTENANCE SPECIFICATIONS





# MAINTENANCE SPECIFICATIONS | SPEC



Model	XJ900S		
Horn: Type Quantity Model / manufacturer Maximum amperage	Plane type 1 YF-12/NIKKO 2.5 A		
Flasher relay: Type Model / manufacturer Self cancelling device Flasher frequency Wattage	Full transistor type FE246BH/NIPPONDENSO No 75 ~ 95 cycle/min 21 W x 2 + 3.4 W		
Oil level switch: Model / manufacturer	4H7/NIPPONDENSO		
Fuel gauge:  Model / manufacturer  Sender unit resistance full empty	4KM/NIPPONDENSO 4 ~ 10 Ω at 20°C 90 ~ 100 Ω at 20°C		
Starting circuit cut off relay: Model / manufacturer Coil winding resistance Diode	3EN/OMRON 202.5 ~ 247.5 Ω at 20°C Yes		
Circuit breaker: Type Amperage for individual circuit MAIN	Fuse		
HEAD SIGNAL IGNITION	15 A × 1 20 A × 1 10 A × 1		
CLOCK Reserve Reserve	10 A × 1 20 A × 1 10 A × 1		

# **EXCLUSIVE SPECIFICATION**



## **EXCLUSIVE SPECIFICATION**

The following specifications are exclusive for the below listed countries.

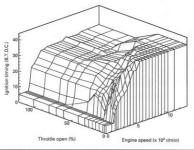
For specifications other than below, please refer to the General and maintenance specifications.

#### For Spain

Model code:	4KM2		
Engine starting number:	4KM-023101		
Vehicle identification number:	JYA4KMS0*SA023101		

## For Switzerland, Austria

Model code:	4PR1	
Engine starting number:	4PR-000101	
Frame starting number:	4PR-000101	
Carburetor: I.D. mark	4PR00	
Ignition system:		



# T.C.I.: T.C.I. unit model/manufacturer J4T052/MITSUBISHI

### For Australia

Model code:	4PS1	
Engine starting number:	4PS-000101	
Vehicle identification number:	JYA4PST0 * SA000101	
Fuel: Type	Unleaded fuel only	

# HOW TO USE THE CONVERSION TABLE/ GENERAL TORQUE SPECIFICATIONS





# HOW TO USE THE CONVERSION TABLE

All specification data in this manual is listed in SI and METRIC UNITS.

Use this table to convert METRIC unit data to IMP unit data.

## Ex.

METRIC		MULTIPLIER		IMP
** mm	×	0.03937	=	** in
2 mm	×	0.03937	-	0.08 in

## **CONVERSION TABLE**

	METR	IC TO IMP	
	Known	Multiplier	Result
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
Distance	km/hr km m m cm	0.6214 0.6214 3.281 1.094 0.3937 0.03937	mph mi ft yd in
Volume/ Capacity	cc (cm³) cc (cm³) lit (liter) lit (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu-in qt (IMP liq.) gal (IMP liq.)
Miscella- neous	kg/mm kg/cm ² Centigrade	55.997 14.2234 9/5(°C)+32	lb/in psi (lb/in²) Fahrenheit (°F)

# GENERAL TORQUE SPECIFICATIONS

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



A: Distance across flats B: Outside thread diameter

Α	В	General torque specifications		
(Nut)	(Bolt)	Nm	m•kg	
10 mm	6 mm	6	0.6	
12 mm	8 mm	15	1.5	
14 mm	10 mm	30	3.0	
17 mm	12 mm	55	5.5	
19 mm	14 mm	85	8.5	
22 mm	16 mm	130	13.0	

# LUBRICATION POINT AND GRADE OF LUBRICANT | SPEC |



# LUBRICATION POINT AND GRADE OF LUBRICANT **ENGINE**

Lubrication Point	Symbol
Oil seal lips	-69
O-ring	-43
Bearing	-0
Piston surface	-0
Piston pin	-0
Crankshaft pin	-0
Crankshaft journal/big end	-0
Connecting rod bolt/nut	
Connecting rod small end	-0
Middle drive shaft (drive damper cam/driven damper cam)	-0
Middle drive gear	-0
Middle driven gear	-0
Camshaft cam lobe/journal	-0
Valve stem (IN, EX)	0
Valve stem end (IN, EX)	-0
Valve lifter	<b>—</b> @
Oil pump rotor (inner/outer), housing	-0
Oil strainer assembly	-0
Idle gear surface	-0
Starter idle gear	<b>—</b> 0
Starter idle gear shaft	<b>⊸</b> 0
Starter clutch (outer/roller)	-@
Crankcase cover (pull rod hole)	
Primary drive gear/damper	-0
Transmission gear (wheel/pinion)	@
Axle (main/drive)	-@
Pull rod (bearing/washer)	-694
Shift cam	-@
Shift fork/guide bar	<b>—</b> 0
Shift shaft assembly	-0

# LUBRICATION POINT AND GRADE OF LUBRICANT SPEC





Lubrication Point	Symbol
Steering bearing (upper/lower)	-01
Front wheel oil seal (right/left)	-694
Rear wheel oil seal	-694
Clutch hub oil seal	-494
Clutch hub fitting area	- 6
Rear brake pedal shaft	-494
Shift pedal	-6
Center stand sliding surface	-494
Side stand sliding surface	-694
Tube guide (throttle grip) inner surface	-69-
Clutch cable end (lever side)	-694
Brake lever bolt, sliding surface	-@4
Clutch lever bolt, sliding surface	-694
Rear footrest pivot	-69
Rear shock absorber (upper)	
Rear shock absorber (lower - oil seal)	
Connecting rod bearing (on the swingarm)	
Swingarm pivot bearing	
Swingarm pivot oil seal	
Relay arm bearing (inner)	
Final drive gear/ring gear	-@
Drive shaft (final gear side)	-494
Drive shaft (middle gear side)	

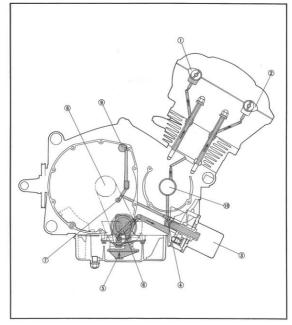
(8) Main axle

@ Crankshaft

(9) Starter clutch

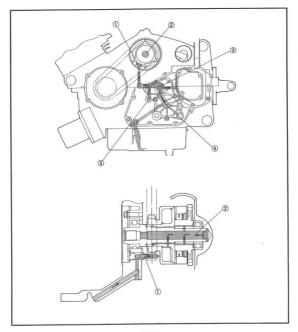
## LUBRICATION DIAGRAMS

- ① Camshaft (intake) (2) Camshaft (exhaust)
- 3 Oil filter
- Main gallery
- 6 Oil pump Shift guide bar
- (5) Oil strainer

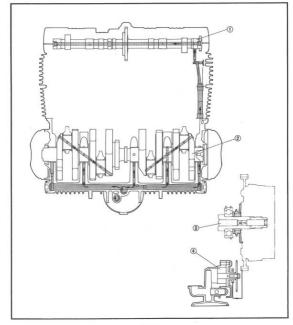


- ① Oil nozzle ② Starter clutch ③ Main axle

- Drive axle
   Shift guide bar

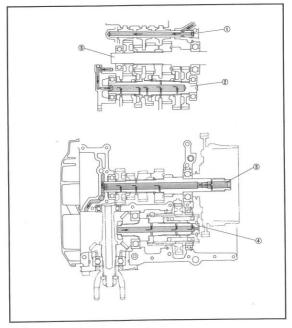


- Camshaft
   Crankshaft
   Main axle
   Oil pump



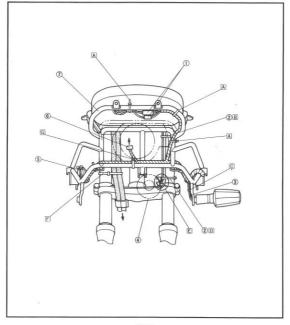
# LUBRICATION DIAGRAMS

- Shift guide bar
   Drive axle
   Main axle
   Middle drive shaft





- ① Meter assembly coupler
- ② Band
- 3 Flasher lead
- (4) Horn
- ⑤ Thermo switch Headlight coupler
- A Clamp the meter lead to the cowling stay. B Clamp the horn lead to the inner fork tube 60 mm from the handle crown.
- Pass the left and right flasher leads through the cowling stay guide wire.
- O Clamp the horn lead to the inner fork tube 20 mm from the under bracket.
- E When connecting the horn lead, make sure that the lead points downwards from the connector so that water cannot get inside when it rains.
- ⑦ Cowling stay F Clamp the brake hoses to the inner fork tube.
  - G Clamp the wire harness to the cowling stay.

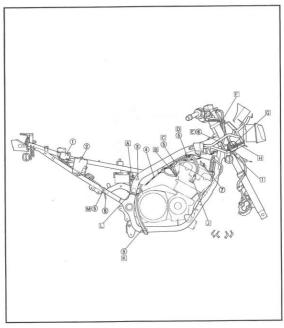








- ① Fuse box
- 2 Ignitor unit
- 3 Fuel sender lead
- (4) Clutch cable
- (6) Clamp
- Band ① Clip
- (8) Rear brake switch lead
- A Clamp the fuel sender wire harness to the side cover stay.
- B Clamp the high tension cord, #4, to the upper part, and the #2 cord to the lower part at the marked position.
- C Clamp the high tension cords and clutch cable and sensing hose. D Clamp the high tension cords, #1, #2, #3 and #4 to the clamp on the
  - frame at the marked positions accordingly.



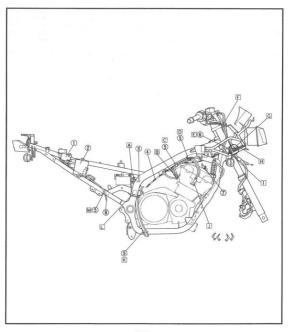




- E Clamp the brake hoses to the inner tube.
- F Clamp the brake hoses to the guide wire.

  G After connecting the left and right flasher leads, clamp them to the cowling stay. Connect the thermo switch lead to the plug with
- white tape affixed to it.

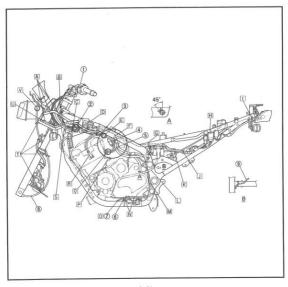
  H Clamp the auxiliary light lead and wire harness to the cowling stay.
- Clamp the flasher lead and thermo switch lead to the cowling stay.
- Position the spark plug cap so that it is facing inwards.
- K Pass the drain hoses for the tank and the drain hose for the air filter case through the clamp.
  - Pass the battery ⊝ lead under the cross pipe and secure it to the side of the battery ⊝ terminal.
- M Clamp the rear brake switch lead to the back stay.





- ① Handlebar switch (left)
- ② Main switch coupler
- ③ High tension cord (#1)④ High tension cord (#2)
- (5) High tension cord (#4)
- 6 Sidestand switch lead
- ① Oil level switch lead
- Speed meter cable
   Starter motor lead
- A Clamp the wire harness to the cowling stay.
- B Clamp the left handlebar switch lead to the inner tube.
- Clamp the left handlebar switch lead, the main switch lead and the starter cable to the tension pipe.

  D Clamp the wire harness at the point where the white tape is affixed to it.
- E Clamp the high tension cords (#1 and #2).
- F Clin both ends of the fuel hose.
- G Clamp the wire harness inside the seat rail.
- H Point the clamp end so that it is facing downwards.
- Pass the flasher lead inside the protruding tab on the rear fender.
- Clamp the wire harness and the fuel pump lead. Position the fuel pump lead behind the wire harness.
- Rass the wire harness and the fuel pump lead through the guide wire on the stay lock. Position the fuel pump lead behind the wire harness.
- Pass the starter motor lead under the cross pipe, then clamp it to the cross pipe. Pass the starter motor lead inside the tab on the rear fender and then inside the bracket on the rear shock absorber.

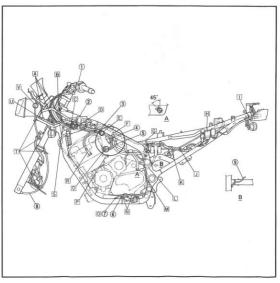






- M Pass the side stand switch lead through the inner part of the rear arm.
- N Clamp the side stand switch lead and the oil level switch lead with the engine clamp.
- level switch lead with the engine clamp.
   Pull the oil level switch lead backwards slightly so that it is not slack.
- P Pass the throttle position sensor lead inside the high tension cords (#1 and #2).
  - the high tension cords (#1 and #2).
     Either one of the high tension cords (#1) and (#2) can be uppermost.
  - Pass the cord (#4) outside the fuel hose and breather hose.
  - Pass the cord (#1) outside the fuel hose, breather hose and throttle position sensor lead.

- Clamp the high tension cord, #4, to the upper part at the marked position, and the high tension cord #2 to the lower part.
- Position the spark plug cap so that it is facing inwards.
- S Clamp the left handlebar switch lead, main switch lead, starter cable and throttle cables.
- The state speedometer cable to the left of the headlight and pass it through the guide wire, which secures the cowling stay guide wire, brake hose holder, fender bracket guide wire and caliper.
- U Clamp the part of the wire harness which has white tape affixed to it onto the cowling stay.
- When installing the cowling, make sure that the speedometer cable is not pinched between the headlight and the cowling.

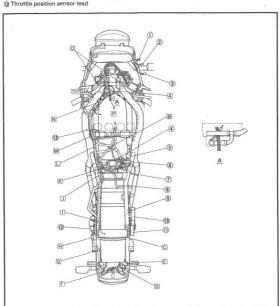




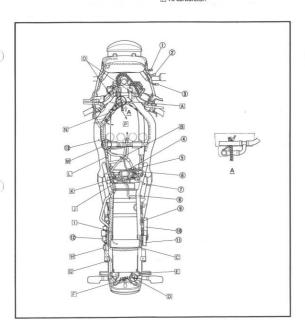


- ① Front flasher light (right) lead
- ② Auxiliary light lead 3 Thermo switch lead
- (4) Oil level switch lead
- (5) Side stand switch lead
- ® Fuel sender lead
- ⑦ Battery ⊝ lead
- ® Battery ⊕ lead
- (9) Main fuse @ lanitor unit
- 1 Fuse box
- 12 Flasher relay

- A The wire harness must be uppermost, followed by the clutch wire, with the throttle wire underneath.
- B Clamp the AC generator lead, fuel hose and air filter case drain hose.
- Pass the wire harness through the guide on the rear fender, then pass it around to the left side of the motorcycle.
- D Pass the rear flasher leads underneath the point where the tail light is installed.
- E Pass the left and right rear flasher leads through the guide hole in the rear fender.
- F Connect the leads and clamp them to the frame at the guide hole.



- G Clamp the wire harness to the rear fender at the tab.
- Pass the coupler for the wire harness outside the rear fender.
- Pass the seat lock wire outside the rear fender.
- Pass the wire harness underneath the point where the rear fender and fuel filter are installed, then pass it above the frame and the bracket of the rear shock absorber.
- K Pass the starter motor lead under the wire harness and fuel hose.
- Clamp the portion of the wire harness marked with white tape.
- M Fasten the ground terminal and the ignition coil together.
- N Clamp the wire harness, main switch lead and starter cable.
- Clamp the handlebar switch lead to the handlebar.
- P To carburetor.



# PERIODIC INSPECTION AND ADJUSTMENT

# INTRODUCTION

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

# PERIODIC MAINTENANCE/LUBRICATION INTERVALS

Unit: km

100000		BREAK-IN	EVERY	
ITEM	REMARKS	1,000	6,000 or 6 months	12,000 or 12 months
Valve	Check valve clearance. Adjust if necessary.	EVERY 24,000		
Spark plugs	Check condition. Clean or replace if necessary.	0	0	0
Air filter	Clean. Replace if necessary.		0	0
Carburetor*	Check idle speed/synchronization/starter opera- tion.  Adjust if necessary.	0	0	0
Fuel line*	Check fuel hose for cracks or damage. Replace if necessary.		0	0
Engine oil	Replace (Warm engine before draining).	0	0	0
Engine oil filter*	Replace.	0		0
Final gear oil	Check oil level/oil leakage. Replace every 24,000 or 24 months.	Replace	0	0
Brakes*	Check operation/fluid leakage (see NOTE). Correct if necessary.		0	0
Clutch	Check operation. Adjust if necessary.		0	0
Rear arm pivot*	Check rear arm assembly for looseness. Correct if necessary. Moderately repack every 24,000 or 24 months.***			0
Rear suspension link piv- ots	Check operation. Apply grease lightly every 24,000 or 24 months.***			0
Wheels*	Check balance/damage/runout. Replace if necessary.		0	0
Wheel bearings*	Check bearings assembly for looseness/damage. Replace if damaged.		0	0
Steering bearings*	Check bearings assembly for looseness. Correct if necessary. Moderately repack every 24,000 or 24 months.**	0		0
Front forks*	Check operation/oil leakage. Repair if necessary.		0	0
Rear shock absorber*	Check operation/oil leakage. Repair if necessary.		0	0
Fittings/Fasteners*	Check all chassis fittings and fasteners. Correct if necessary.	0	0	0
Centerstand and sidestand*	Check operation. Repair if necessary.	0	0	0
Sidestand switch*	Check operation. Clean or replace if necessary.	0	0	0

^{*:} It is recommended that these items be serviced by a Yamaha dealer.

^{**:} Medium weight wheel bearing grease. (bearing type)

^{***:} Molybdenum disulfide grease.

# PERIODIC MAINTENANCE/LUBRICATION INTERVALS



NOTE: _

Brake fluid replacement:

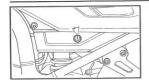
 When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.

2.On the inner parts of the master cylinder and caliper cylinder, replace the oil seals every two years.

3. Replace the brake hoses every four years, or if cracked or damaged.

# SIDE COVER, FUEL TANK AND COWLING

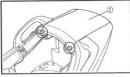




# SIDE COVER, FUEL TANK AND COWLING

### REMOVAL 1.Remove:

Seat

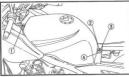


- 2.Remove:
- Tail cover ①



#### 3.Remove:

- . Grab bars (left and right) 1
- . Side covers (left and right) ②



#### 4.Remove:

- · Bolt ①
- · Bolt ②
- Plate ③
- Damper rubber ④



## 5.Turn the fuel cock ① to "OFF". 6.Disconnect:

- Fuel sender coupler ②
- Fuel hose ③



## A WARNING

Gasoline is highly flammable.

Avoid spilling fuel on the hot engine.

# SIDE COVER, FUEL TANK AND COWLING



### NOTE: ___

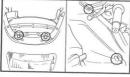
Place a rag under the fuel hose to avoid spilling fuel.

- 7.Remove:
- · Fuel tank



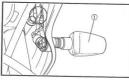
## 8.Remove:

- Screws
- Windscreen ①
- Rubber plugs
   Inner cover ②
- .....



# 9.Remove:

Bolts



## 10.Disconnect:

- Flasher light lead (front)
- 11.Remove:
- Flasher light (front) ①



## 12.Disconnect:

- · Head light lead
- 13.Remove:
- Cowling

# SIDE COVER, FUEL TANK AND COWLING



## INSTALLATION

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



## 1.Install:

Fuel tank



#### 2.Install:

Side covers



#### 3.Install:

Seat

#### NOTE: _

Insert the lobes on the front of the seat into the bracket on the frame, then push down the seat end.



# ENGINE

# VALVE CLEARANCE ADJUSTMENT

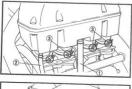
#### NOTE

- The valve clearance should be adjusted when the engine is cool to the touch.
- The piston must be at Top Dead Center (T.D.C.) on compression stroke to check or adjust the valve clearance.

## 1.Remove:

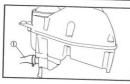
- Seat
- · Fuel tank
- Cowling

Refer to "SIDE COVER, FUEL TANK AND COWLING".



### 2.Disconnect:

- Breather hose (1)
- Drain hose ②
- 3.Loosen:
- Screws ③



## 4.Disconnect:

Hose (air filter case - air cut valve) ()
(from air filter case)



# 5.Remove:

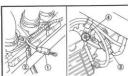
Air filter case ①



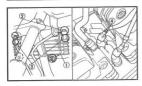




- . Throttle cables (1)
- Starter choke cable ②



- 7.Disconnect:
- · Carburetor heater coupler ①
- Fuel hose ②
- TPS (throttle position sensor) coupler ③ 8.Loosen:
- · Screws (carburetor joint) (4)
- 9.Remove:
- Carburetor assembly



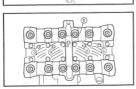
#### 10.Remove:

· Oil cooler ① Refer to "ENGINE REMOVAL" in CHAP-

TER 4. CAUTION:

When removing the union bolt @, be sure to secure the hexagonal part 3 to stop it turning.

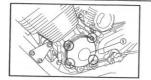
- 11.Remove:
- Spark plug caps (4)
- 12.Remove:
- . Air cut valves (1)
- Reed valves ②
- Pipes ③
- Hose 4



#### 13.Remove:

. Cylinder head cover (1)





# 14.Remove:

· Timing plate cover (1)

## 15.Check:

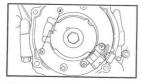
Valve clearance

Out of specification → Adjust.



Valve clearance (cold): Intake valve: 0.11 ~ 0.15 mm

Exhaust valve: 0.16 ~ 0.20 mm

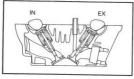


## Checking steps:

- *********** Turn the crankshaft counterclockwise with a wrench.
- Align the TDC mark @ with the align mark 6 when #1 piston is at TDC on compression stroke.



TDC on compression stroke can be found when the cam lobes are opposite each other as shown.





· Measure the valve clearance using a feeler gauge ①.

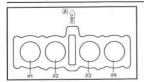
# NOTE: _

- · Record the measured reading if the clearance is incorrect.
- · Measure the valve clearance in the following sequence.

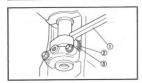
Measuring sequence:

 $#1 \rightarrow #2 \rightarrow #4 \rightarrow #3$ 





В	_	0°	180°	360°	540°	720
П	#1	> ├- 1 □		+	+	
C	#2		[			
	#3				1	0]
ΙÌ	#4			1	O]	



A Front

Turn the crankshaft by the number of degrees indicated below counterclockwise from #1 cylinder TDC.

Crankshaft counterclockwise turning angle
 Cylinder number

D Combustion

#2 Cylinder	180 degrees
#4 Cylinder	360 degrees
#3 Cylinder	540 degrees

16.Adjust:

Valve clearance

*******

Adjustment steps:

Position the valve lifter slots (intake and

exhaust) opposite each other.

• Attach the tappet adjusting tool ①.



Tappet adjusting tool: P/N 90890-04125

....

Make sure the tool only contacts the lifter (2), not the pad (3).

- Slowly turn the tappet adjusting tool so that the pads can be removed.
- Remove the pads from the lifters. Use a small screwdriver and a pair of tweezers for removal. Note pad numbers.
- Select the proper valve adjusting pad from the following chart.



## INTAKE

MEASURED										- 11	NST	ALLE	D PA	AD N	IMAD	CD	_	_	_		_		_	_	
CLEARANCE 0.00 ~ 0.05	200	20	5 210	215	220	225	230	23	240	240	25/	3 260	300				Tone	laor	Toos	1	-				
$0.00 \sim 0.05$			200	208	210	218	220	229	230	235	26	245	250	200	2/0	2/5	280	285	290	295 285	300	305	310	315	320
$0.06 \sim 0.10$	ion.	200	208	210	215	220	225	230	236	240	24	25/	250	200	200	200	270	275	280	285 290	290	295	300	305	310
0.11 ~ 0.15					055	100	10000	1200	1200	2.40	CTAI	EDA	200	LEAF	265	270	275	280	285	290	295	300	305	310	315
0.16 ~ 0.20	205	210	215	220	225	230	235	240	245	250	255	200	1000					1		300					233
0.21 ~ 0.25	210	215	220	225	230	235	240	245	250	200	200	200	200	270	275	280	285	290	295	300 305	305	310	315	320	$\overline{}$
0.26 ~ 0.30	215	220	225	230	235	240	245	250	255	260	205	270	270	2/5	280	285	290	295	300	305 310	310	315	320		
0.31 ~ 0.35	220	225	230	235	240	245	250	255	200	200	200	270	2/5	280	285	290	295	300	305	310	315	320			
0.36 ~ 0.40	225	230	235	240	245	250	255	200	200	200	270	2/5	280	285	290	295 300	300	305	310	315	320				
0.41 ~ 0.45	230	235	240	245	250	255	260	200	270	270	2/5	280	285	290	295	300	305	310	315	320					
0.46 ~ 0.50	235	240	245	250	255	260	266	270	275	200	280	285	290	295	300	305	310	315	320						
0.51 ~ 0.55	240	245	250	255	260	200	270	270	2/0	280	285	290	295	300	305	310	315	320							
0.56 ~ 0.60	245	250	255	260	265	270	270	200	200	200	290	295	300	305	310	315	320								
0.61 ~ 0.65	250	255	260	265	270	275	200	200	285	290	295	300	305	310	315	320									
	255	260	265	270	275	200	200	200	290	295	300	305	310	315	320										- 1
	260	266	270	270	200	285	280	290	295	300	305	310	315	320											- 1
	200	200	270	2/5	280	285	290	295	300	305	310	315	320												- 1
	265	2/0	275	280	285	290	295	300	305	310	315	320													- 1
	2/0	275	280	285	290	295	300	305	310	315	320														- 1
	275	280	285	290	295	300	305	310	315	320					VAL	VE	LLE	ARA	ANC	E (c	old	):			- 1
	280	285	290	295	300	305	310	315	320							.11									- 1
0.96 ~ 1.00	285	290	295	300	305	310	315	320						- 1	Exa	mple	e: In	stal	led	is 2	50				- 1
1.01 ~ 1.05	290	295	300	305	310	315	320								N	leas	ure	d cl	ears	ance	ie	1 22	mn		- 1
1.06 ~ 1.10	295	300	305	310	315	320								-	Reni	ace	250	na	die	ith 2	100				- 1
1.11 ~ 1.15	300	305	310	315	320										D	ad a	200	pa	u w	ILII 2	00	pad			- 1
1.16 ~ 1.20	305	310	315	320											-	au I	um	oer.	(ex	amı	ple)				- 1
		315	320												P	ad I	10. 2	250	= 2.	50 n	nm				- 1
1.26 ~ 1.30	315	320																		60 n					- 1
1.31 ~ 1.35	20													1	Alwa	evs	nst:	all n	adı	with	nu	mh	ar d	~	. I

#### **EXHAUST**

MEASURED										12	NST	ALLE	n PA	D NU	IMP	CD	_	_							_
CLEARANCE	200	20	5 210	215	220	225	230	235	240	245	250	255	200	265	DIVID	ER	Inne	1000							
0.00 ~ 0.05				200	205	210	215	220	225	230	235	240	245	250	2/0	2/5	280	285	290	295	300	305	310	315	320
0.06 ~ 0.10			200	205	210	215	220	225	230	235	240	245	250	255	200	200	265	270	275	280	285	290	295	300	305
0.11 ~ 0.15		200	205	216	215	220	225	230	235	240	245	250	250	260	200	205	270	275	280	285	290	295	300	305	310
0.16 ~ 0.20	500		100	1000		1000	2000	1000	200	6	TAN	IDAL	230	EAR	205	2/0	2/5	280	285	290	295	300	305	310	315
0.21 ~ 0.25	205	210	215	220	225	230	235	240	245	250	200	200	1000	020				100	2000						
0.26 ~ 0.30																								320	
0.31 - 0.35																							320		
0.36 ~ 0.40																					315	320			
0.41 ~ 0.45																					320				
																			315	320					
																		315	320						
																	315	320							
																315	320								
															315	320									
0.71 - 0.75	200	200	265	270	275	280	285	290	295	300	205	210	215	320	320										- 1
0.70 ~ 0.00	200	265	2/0	275	280	285	290	295	300	206	210	215	320	020											- 1
0.01 ~ 0.05	265	270	275	280	285	290	295	300	205	210	215	220	OLU												- 1
0.86 ~ 0.90	270	275	280	285	290	295	300	305	210	215	220	-													- 1
0.91 ~ 0.95	275	280	285	290	295	300	305	310	315	320	-			1	/AL	VE	CLE	ARA	ANC	E (0	old	):			- 1
0.96 ~ 1.00	280	285	290	295	300	305	310	315	320							.16									- 1
1.01 ~ 1.05	285	290	295	300	305	310	315	320						E	xar	mpl	e: In	stal	led	is 2	50				- 1
1.06 ~ 1.10	290	295	300	305	310	315	320								M	leas	ure	d cl	oore	noc	in	0 22			- 1
1.11 ~ 1.15	295	300	305	310	315	320	_							F	lani	ace	250	100	J	inte	1 15	0.32	mr	п	- 1
1.16 ~ 1.20	300	305	310	315	320										D.	acc	250	ha	u w	itn .	265	pad			- 1
1.21 ~ 1.25	305	310	315	320											D.	ad n	um	Der.	(e)	am	pie)				- 1
	310		320												Pa	A be	10. 2	250	= 2.	50 r	mm				- 1
	315	320														A be									- 1
1.36 ~ 1.40	320													Α	lwa	lys i	inst	all p	ad	with	nu	mb	er d	OVA	٠l



Pad	range	Pad availability: 25 increments					
No. 200 ~ No. 320	2.00 mm ~ 3.20 mm	Pads are stepped in 0.05 mm incre- ments					

NOT	F.						
		of each	pad	is mar	ked or	the	pac
face	that	contacts	the	valve	lifter	(not	the
cam	).						

 Round off the hundredths digit of the original pad number to the nearest 0.05 mm increment.

Hundredths digit	Rounded value
0 or 2	0
5	(NOT ROUNDED OFF)
8	10

#### EXAMPLE:

Original pad number = 248 (2.48 mm) Rounded off digit = 250

# NOTE

Pads can only be selected in 0.05 mm increments.

 Locate the previously installed pad number on the chart. Locate the measured valve clearance on the chart. The point where these coordinates intersect is the new pad number.

#### NOTE: _

Use the new pad number as a guide only if the number must be verified.

- Install the new pad with the numbered side down.
- Remove the adjusting tool.



- Recheck the valve clearance.
- If the clearance is incorrect, repeat all of the clearance adjustment steps until the specified clearance is obtained.

***********************

#### 17.Install:

All removed parts

#### NOTE: _

Install all removed parts in reversed order of their removal. Note the following points.

#### 18.Install:

. Timing plate cover



Screw (timing plate cover):

8 Nm (0.8 m · kg)

#### 19.Install:

- · Cylinder head cover
- Spark plugs



Bolt (cylinder head cover): 10 Nm (1.0 m • kg) Spark plug:

18 Nm (1.8 m · kg)

#### 20.Install:

Oil cooler

# CAUTION:

When installing the union bolt, be sure to secure the hexagonal part to stop it turning.



Nut (oil cooler - frame): 10 Nm (1.0 m • kg)

Bolt (oil cooler - oil pipe): 32 Nm (3.2 m · kg)

# CARBURETOR SYNCHRONIZATION



#### CARBURETOR SYNCHRONIZATION

#### HOTE.

Valve clearance and idling speed should be adjusted properly before synchronizing the carburetors.

1.Place the motorcycle on a level surface.

#### NOTE

Place the motorcycle on its centerstand if a centerstand is equipped. If not, place a suitable stand under the motorcycle.

#### 2 Remove:

- Seat
  - Fuel tank

Refer to "SIDE COVER, FUEL TANK AND COWLING".

- 3.Attach:
- Adapters
- Vacuum gauge (1)
- Inductive tachometer ②
   (to #1 spark plug lead)



Vacuum gauge: 90890-03094 Adapter: 90890-03060 Inductive tachometer: 90890-03113

 Start the engine and let it warm up for several minutes.

5.Check:

Engine idling speed

Out of specification → Adjust.

Refer to "IDLING SPEED ADJUSTMENT".



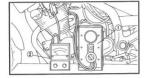
Engine idling speed: 950 ~ 1,050 r/min

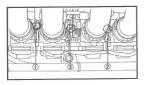
#### 6.Adjust:

- · Carburetor synchronization
  - ***********

## Adjustment steps:

- Synchronize carburetor #1 to carburetor #2 by turning synchronizing screw (1) until both gauges read the same.
- Race the engine for less than a second, two or three times and check the synchronization again.





# CARBURETOR SYNCHRONIZATION



- Repeat the above steps to synchronize carburetor #4 to carburetor #3 by turning synchronizing screw ② until both gauges read the same.
- Repeat the same steps to synchronize carburetor #2 to carburetor #3 by turning synchronizing screw (3) until both gauges read the same.

Vacuum pressure at idle speed: 30.3 ~ 32.9 kPa (230 ~ 250 mm Hg)

#### NOTE:

The difference between both carburetors should be 1.33 kPa (10 mm Hg) or less.

*************

## 7.Check:

Engine idling speed
 Out of specification → Adjust.

Stop the engine and detach the measuring equipment.

#### 9.Adjust:

Throttle cable free play.
 Refer to "THROTTLE CABLE ADJUST-MENT".



Free play: 3 ~ 5 mm

At throttle grip flange

#### 10.Install:

- · Fuel tank
- Seat

Refer to "SIDE COVER, FUEL TANK AND COWLING".

# IDLING SPEED ADJUSTMENT



#### IDLING SPEED ADJUSTMENT

#### NOTE

The carburetor synchronization should be adjusted properly before adjusting the idling speed.

- Start the engine and let it warm up for several minutes.
- 2.Attach:
- Inductive tachometer (to the #1 spark plug lead)



Inductive tachometer: 90890-03113

- 3.Check:
- Engine idling speed
- Out of specification → Adjust.



Engine idling speed: 950 ~ 1.050 r/min



- 4.Adjust:
- · Engine idling speed
  - **********
- Adjustment steps:
- Turn the pilot screw (1) until it is lightly
- Turn out the pilot screw for the specified number of turns.



Carburetor angle driver: 90890-03158

Pilot screw: 1-1/2 turns out

 Turn the throttle stop screw ② in or out until specified idling speed is obtained.

Turning in → Idling speed increased.
Turning out → Idling speed decreased.

## IDLING SPEED ADJUSTMENT/ THROTTLE CABLE ADJUSTMENT



### 5.Adjust:

 Throttle cable free play Refer to "THROTTLE CABLE ADJUST-MENT".



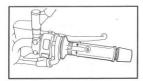
Free play: 3 ~ 5 mm

At throttle grip flange

#### THROTTLE CABLE ADJUSTMENT

#### NOTE:

Engine idling speed and carburetor synchronization should be adjusted properly before adjusting the throttle cable free play.



#### 1.Check:

Throttle cable free play ⓐ
 Out of specification → Adjust.



Free play: 3 ~ 5 mm

At throttle grip flange

#### 2.Remove:

- Seat
- · Fuel tank

Refer to "SIDE COVER, FUEL TANK AND COWLING".

· Air filter case

Refer to "VALVE CLEARANCE ADJUST-MENT".



## 3.Adjust:

. Throttle cable free play

********************

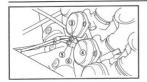
#### Adjustment steps:

#### NOTE

When accelerating, throttle cable #1 ① is pulled and throttle cable #2 ② is pushed.

# THROTTLE CABLE ADJUSTMENT





#### First step:

Loosen the locknut ③ on throttle cable #2.

 Turn the adjuster (4) in or out until all slack is removed from throttle cable #2.

#### Second step:

Loosen the locknut (5) on throttle cable #1.

 Turn the adjuster (§) in or out until the specified free play is obtained.

Turning in → Free play is increased.
Turning out → Free play is decreased.

Tighten the locknuts.

#### NOTE

If the free play can not be adjusted here, adjust it at the throttle grip side of the cable.

#### Final step:

· Loosen the locknut 7.

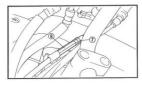
 Turn the adjuster ® in or out until the specified free play is obtained.

Turning in → Free play is increased.
Turning out → Free play is decreased.

Tighten the locknut.

#### A WARNING

After adjusting, turn the handlebar to the right and left, making sure that the engine idling speed does not change.



#### 4.Install:

· Air filter case

Refer to "VALVE CLEARANCE ADJUST-MENT".

- · Fuel tank
- Seat

Refer to "SIDE COVER, FUEL TANK AND COWLING".



#### SPARK PLUG INSPECTION

- 1.Remove:
- Spark plug caps
- Spark plugs

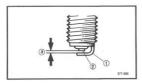
#### CAUTION:

Before completely removing the spark plug, use compressed air to clean the cylinder head cover areas to prevent dirt from falling into the engine.

#### 2.Inspect:

- Spark plug type
- Incorrect → Replace.

Standard spark plug: DPR8EA-9 (NGK) X24EPR-U9 (NIPPONDENSO)



#### 3.Inspect:

- Electrode ①
  - Wear/Damage → Replace.
- Insulator ②
  - Abnormal color → Replace.
- Normal color is a medium-to-light tan color.
- 4 Clean:
- · Spark plug
- (with spark plug cleaner or wire brush)
- 5.Measure:
- Spark plug gap @
- Use a wire gauge.
  Out of specification → Re-gap.



Spark plug gap: 0.8 ~ 0.9 mm



Spark plug



18 Nm (1.8 m • kg)

#### NOTE:

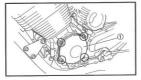
Before installing a spark plug, clean the gasket surface and plug surface.



#### IGNITION TIMING CHECK

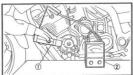
### NOTE: _

Carburetor synchronization, engine idle speed and throttle cable free play should be adjusted properly before checking the ignition timing.



## 1.Remove:

• Timing plate cover (1)



## 2.Attach:

- · Timing light ①
- Inductive tachometer ② (to the #1 spark plug lead)



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

#### 3.Check:

Ignition timing

Checking steps:

************ Start the engine and let it warm up for several minutes. Let the engine run at the specified speed.





Engine speed: 950 ~ 1,050 r/min

 Visually check the align mark (a) to verify it is within the required firing range (b) indicated on the timing plate.

Incorrect firing range -> Check timing plate and/or pickup assembly. ***********





## 4.Install:

· Timing plate cover

## COMPRESSION PRESSURE MEASUREMENT

## NOTE:

Insufficient compression pressure will result in performance loss.

#### 1 Check:

- Valve clearance
  - Out of specification → Adjust. Refer to "VALVE CLEARANCE ADJUST-
- MENT". 2.Start the engine and let it warm up for several minutes.
- 3.Stop the engine.

#### 4.Remove:

- Spark plug caps
- Spark plugs

# CAUTION:

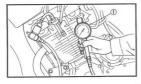
Before completely removing the spark plug, use compressed air to clean the cylinder head cover areas to prevent dirt from falling into the engine.

#### 5.Attach:

Compression gauge ①



90890-03081 Adapter: 90890-04082



# COMPRESSION PRESSURE MEASUREMENT



- 6.Measure:
- · Compression pressure

#### Above the maximum pressure:

Inspect the cylinder head, valve surfaces, and piston crown for carbon deposits.

# Below the minimum pressure:

Squirt a few drops of oil into the affected cylinder and measure again.

. Refer to the table below.

	mpression pressure oil applied into cylinder)
Reading	Diagnosis
Higher than without oil	Worn or damaged pistons → Repair
Same as without oil	Defective ring(s), valves, cylinder head gasket or piston is possible → Repair



## Compression pressure (at sea level): Standard:

1,200 kPa (12 kg/cm², 12 bar) Minimum:

1,000 kPa (10 kg/cm², 10 bar) Maximum:

1,400 kPa (14 kg/cm², 14 bar)

# 

 Crank over the engine with the throttle wide-open until the reading on the compression gauge stabilizes.

### A WARNING

Before cranking the engine, ground all spark plug leads to prevent sparking.

 Repeat the previous steps for the other cylinders.

#### NOTE: _

The difference of compression pressure between the highest and lowest cylinder compression readings should be 100 kPa (1 kg/cm², 1bar) or less.

# COMPRESSION PRESSURE MEASUREMENT/ ENGINE OIL LEVEL INSPECTION



7.Install:

- Spark plugs
- Spark plug caps



Spark plug: 18 Nm (1.8 m • kg)

## ENGINE OIL LEVEL INSPECTION

# NOTE: _

Position the motorcycle straight up when inspecting the oil level.

1.Place the motorcycle on a level surface.

#### NOTE: _

Place the motorcycle on its centerstand if a centerstand is equipped. If not, place a suitable stand under the motorcycle.

#### 2.Inspect:

- · Oil level
- Oil level should be between maximum (a) and minimum (b) marks.
- Oil level low -> Add oil to proper level.



Recommended oil:

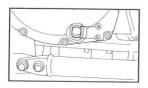
SAE 20W40 type SE motor oil

# NOTE:

Recommended oil classification: API Service "SE", "SF" and "SG" type or equivalent (e.g. "SF-SE", "SF-SE-CC", "SF-SE-SD" etc.).

# CAUTION:

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



# ENGINE OIL LEVEL INSPECTION/ ENGINE OIL REPLACEMENT



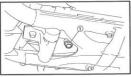
- 3.Start the engine and let it warm up for several minutes.
- 4.Stop the engine and inspect the oil level once again.

### NOTE: _

Wait a few minutes until the oil settles before inspecting the oil level.

#### ENGINE OIL REPLACEMENT

- 1.Start the engine and let it warm up for several minutes.
- 2.Stop the engine and place an oil pan under the drain bolt.







3.Remove:

- · Oil filler plug
- Drain bolt (1)

Drain the crankcase of its oil.

4.If the oil filter is to be replaced during this oil change, remove the following parts and reinstall them. ********



Remove the oil filter ① using the oil filter wrench (2).



Oil filter wrench: 90890-01426

Apply engine oil to the O-ring 3 of the new oil filter.

Make sure the O-ring (3) is positioned cor-

# ENGINE OIL REPLACEMENT





Tighten the oil filter using the oil filter wrench.

Oil filter: 17 Nm (1.7 m • kg)

#### 5.Install:

Drain bolt



Drain bolt: 43 Nm (4.3 m • kg)

#### NOTE:

Check the gasket (drain plug). If damaged, replace it with a new one.

#### 6.Fill:

Crankcase
 Refer to "ENGINE OIL LEVEL INSPECTION".



Oil quantity: Total amount:

4.4 L Periodic oil change:

3.2 L With oil filter replacement: 3.4 L

#### 7.Install:

- · Oil filler plug
- Warm up the engine for a few minutes, then stop the engine.

## 9.Inspect:

- . Engine (for oil leaks)
- Oil level

#### 10.Check:

· Oil pressure

**********

## Checking steps:

- Slightly loosen the oil gallery bolt ①.
- Start the engine and keep it idling until oil starts to seep from the oil gallery bolt. If no oil comes out after one minute, turn the engine off so it will not seize.



# ENGINE OIL REPLACEMENT/CLUTCH ADJUSTMENT



- Check oil passages, oil filter and oil pump for damage or leakage. Refer to "INSPEC-TION AND REPAIR" in CHAPTER 4.
- Start the engine after solving the problem(s) and recheck the oil pressure.
- Tighten the oil gallery bolt to specification.



Oil gallery bolt: 8 Nm (0.8 m • kg)

*******************



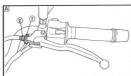
# **CLUTCH ADJUSTMENT**

1.Check:

Clutch cable free play ③
 Out of specification → Adjust.



Free play: 10 ~ 15 mm At clutch lever end



#### 2.Adjust:

- · Clutch cable free play

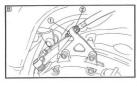
#### Adjustment steps:

- Loosen the locknut(s) ①.
- Turn the adjuster(s) ② in or out until the specified free play is obtained.

Turning in  $\rightarrow$  Free play is increased. Turning out  $\rightarrow$  Free play is decreased.

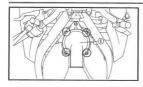


- *******************
- A Handlebar side
  B Engine side



# AIR FILTER CLEANING



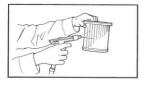


# AIR FILTER CLEANING

- 1.Remove:
- Seat
- Fuel tank
   Refer to "SIDE COVER, FUEL TANK AND COWLING"
- 2 Remove:
- · Air filter case cover ①
- 3.Remove:
- Air filter element

# CAUTION:

Never operate the engine with the air filter element removed. Unfiltered air will cause rapid wear of engine parts and possible engine damage. Additionally, operation without the filter element will affect carburetor tuning with subsequent poor performance and possible engine overheating.



# 4.Inspect:

- · Air filter element
- Damage → Replace.
- 5.Clean:
- · Air filter element

Blow out the dust in the outer surface of the element with compressed air.

#### 6 Install:

- · Air filter element
- · Air filter case cover

#### NOTE:

When installing the element in its case, be sure its sealing surface matches the sealing surface of the case so there is no air leak.

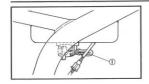
#### 7.Install:

- · Fuel tank
- Seat

Refer to "SIDE COVER, FUEL TANK AND COWLING".

# FUEL LINE INSPECTION



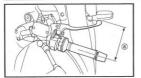


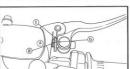
# **FUEL LINE INSPECTION**

- 1.Inspect:
- Fuel hose ①

## FRONT BRAKE LEVER POSITION ADJUSTMENT/ REAR BRAKE ADJUSTMENT







### CHASSIS

## FRONT BRAKE LEVER POSITION ADJUSTMENT

- 1.Adjust:
- · Brake lever position
  - (distance (a) from handle grip to front brake lever)

*********

#### Adjustment steps:

- Push the brake lever forward. Turn the adjuster (1) in or out.

Turning in → Distance is smaller. Turning out → Distance is largest.

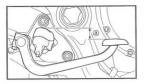
· Align the mark @ on the adjuster with the mark (b) on the lever. **********

### CAUTION:

Make sure that the brake does not drag after adjusting it.

## A WARNING

A soft spongy feeling in the brake lever can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the system will cause greatly diminished braking capacity and can result in loss of control and an accident. Inspect and bleed the system if necessary.



## REAR BRAKE ADJUSTMENT

- 1.Check:
- . Brake pedal height (a)
  - Out of specification → Adjust.

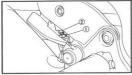


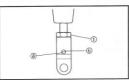
Brake pedal height: 30 mm

Below top of footrest

# REAR BRAKE ADJUSTMENT







2.Adjust:

· Brake pedal height

**********

Adjustment steps:

· Loosen the locknut(s) ①.

 Turn the adjuster(s) ② in or out until the specified pedal height is obtained.

Turning in → Pedal height is down. Turning out → Pedal height is up.

# **A** WARNING

After adjusting brake pedal height, visually check the adjuster end through the hole (a). The adjuster end (b) must be visible within this hole.

Tighten the locknut (1).

#### CAUTION:

Make sure that the brake does not drag after adjusting it.

# **▲** WARNING

A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. This air must be removed by bleeding the brake system before the motorcycle is operated. Air in the system will cause greatly diminished braking capability and can result in loss of control and an accident. Inspect and bleed the system if necessary.

3.Adjust:

 Brake light switch Refer to "BRAKE LIGHT SWITCH ADJUSTMENT".

**********

#### BRAKE FLUID LEVEL INSPECTION

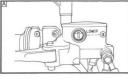
NOTE

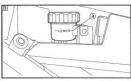
Position the motorcycle straight up when inspecting the fluid level.

1.Place the motorcycle on a level surface.

NOTE: _

Place the motorcycle on its centerstand if a centerstand is equipped. If not, place a suitable stand under the motorcycle.





### 2.Inspect:

Fluid level

Fluid level is under "LOWER" level line ⓐ

→ Fill to proper level.



Recommended fluid: DOT #4

A Front brake

B Rear brake

#### NOTE:

When inspecting the fluid level in the reservoir on the handlebar, make sure the master cylinder top is horizontal.

## CAUTION:

Brake fluid may corrode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

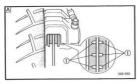
# A WARNING

- Use only the designated quality fluid.
   Otherwise, the rubber seals may deteriorate causing leakage and poor brake performance.
- Refill with the same type of fluid. Mixing fluids may result in a harmful chemical reaction leading to poor brake performance.

# BRAKE FLUID LEVEL INSPECTION/BRAKE PAD INSPECTION/BRAKE LIGHT SWITCH ADJUSTMENT



 Be careful that water does no enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and could cause vapor lock.





#### BRAKE PAD INSPECTION

Activate the brake lever or brake pedal.
 Inspect:

- Brake pad (front)
- Brake pad (rear)
- Wear indicator ① almost contacting the brake disc → Replace brake pad as a set. Refer to "FRONT AND REAR BRAKE" in CHAPTER 6.
- A Front
  B Rear

#### BRAKE LIGHT SWITCH ADJUSTMENT

#### NOTE

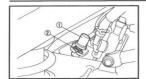
The brake light switch is operated by movement of the brake pedal.

Proper adjustment is achieved when the brake light comes on just before the brake begins to take effect.

- 1.Check:
- Brake light operation timing Incorrect → Adjust.

# BRAKE LIGHT SWITCH ADJUSTMENT/ BRAKE HOSE INSPECTION





#### 2.Adjust:

- . Brake light operating timing

## Adjustment steps:

 Hold the main body ① of the switch with your hand so that it does not rotate, and turn the adjuster ② in or out until the operating timing is correct.

Turning in → Brake light on later.
Turning out → Brake light on sooner.

# BRAKE HOSE INSPECTION

- 1.Inspect:
- Brake hoses
- Cracks/Wear/Damage → Replace.
- 2.Check:
- Brake hose clamp Loosen → Tighten.
- Hold the motorcycle on upright position and apply the front or rear brake.
- 4.Check:
- Brake hoses

Activate the brake lever or pedal several times.

Fluid leakage → Replace the hose.

Refer to "FRONT AND REAR BRAKE" in CHAPTER 6.

# AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)



## AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)

#### A WARNING

Bleed the brake system if:

- . The system has been disassembled.
- · A brake hose has been loosened or removed.
- . The brake fluid has been very low.
- . The brake operation has been faulty.
- A loss of braking performance may occur if the brake system is not properly bled.





1.Bleed:

Brake system

******************

Air bleeding steps:

a.Add proper brake fluid to the reservoir.

- b.Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
- c.Connect a clear plastic hose ① tightly to the caliper bleed screw (2). B Rear

A Front

- d.Place the other end of the hose into a con-
- e.Slowly apply the brake lever or pedal several times.
- f. Pull the lever in or push down on the pedal. Hold the lever or pedal in position.
- g.Loosen the bleed screw and allow the lever or pedal to travel towards its limit.
- h.Tighten the bleed screw when the lever or pedal limit has been reached, then release the lever or pedal.
- i. Repeat steps (e) to (h) until all air bubbles have disappeared from the fluid.
- j. Tighten the bleed screw.



Bleed screw: 6 Nm (0.6 m · kg)

# AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)/ FINAL GEAR OIL LEVEL INSPECTION



#### NOTE: _

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 system have disappeared.

k.Add brake fluid to proper level.

Refer to "BRAKE FLUID LEVEL INSPEC-TION".

## A WARNING

Check the operation of the brake after bleeding the brake system.

#### FINAL GEAR OIL LEVEL INSPECTION

## NOTE: _

Position the motorcycle straight up when inspecting the oil level.

1.Place the motorcycle on a level surface.

#### NOTE:

Place the motorcycle on its centerstand if a centerstand is equipped. If not, place a suitable stand under the engine.

#### 2.Remove:

- · Oil filler bolt ①
- 3.Inspect:
- Oil level
   Oil level should be up to bottom brim ②

Oil level low → Add oil to proper level.



# Recommended oil:

SAE 80 API "GL-4" Hypoid gear oil

If desired, an SAE 80W90 hypoid gear oil may be used for all conditions.

# NOTE: _

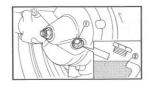
"GL-4" is a quality and additive rating. "GL-5" or "GL-6" rated hypoid gear oils may also be used.

## 4.Install:

· Oil filler bolt

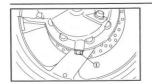


Oil filler bolt: 23 Nm (2.3 m • kg)



# FINAL GEAR OIL REPLACEMENT/ STEERING HEAD INSPECTION





# FINAL GEAR OIL REPLACEMENT

- Place an oil pan under the final gear case.
   Remove:
- Oil filler bolt
- Drain plug (1)
- Drain the final gear case of its oil.

## 3.Install:

Drain plug



Drain plug: 23 Nm (2.3 m • kg)

#### NOTE:

Check the gasket (drain plug). If damaged, replace it with a new one.

### 4.Fill:

· Final gear case



Oil quantity: 0.2 L

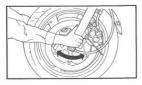
Refer to "FINAL GEAR OIL LEVEL INSPEC-

#### STEERING HEAD INSPECTION

# A WARNING

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

1.Place the motorcycle on a level place.



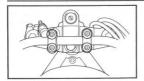
- Elevate the front wheel by placing a suitable stand under the exhaust pipe.
- 3.Check:
- · Steering assembly bearings

Grasp the bottom of the front forks and gently rock the fork assembly back and forth.

Looseness → Adjust the steering head.

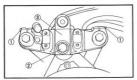
# STEERING HEAD INSPECTION





## 4.Remove:

Handlebar



#### 5.Loosen:

- Pinch bolts ①
- 6.Remove:
- Nut ②Upper bracket ③

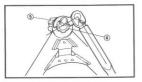


# 7.Adjust:

- · Steering head
- *************

## Adjustment steps:

- Remove the special washer ①, ring nut ② (upper) and rubber washer ③.
- Loosen the ring nut (lower) (4).
- Tighten the ring nut (lower) using the ring nut wrench ⑤.



# Set the torque wrench to the ring nut wrench so that they form a right angle.

NOTE: _

Ring nut wrench: 90890-01403



 Loosen the ring nut (lower) @ completely, then retighten it to specification.

### A WARNING

Do not overtighten.



Ring nut (lower): (final tightening): 18 Nm (1.8 m • kg)

# STEERING HEAD INSPECTION



 Check the steering head by turning it lock to lock. If it binds, remove the steering stem assembly and inspect the steering bearings.

Refer to "STEERING HEAD AND HANDLE-BAR" in CHAPTER 6.



- Install the rubber washer (3).
- Install the ring nut (upper) 2.
- Finger tighten the ring nut (upper) ②, then align the slots of both ring nuts. If necessary, hold the ring nut (lower) and tighten the ring nut (upper) until their slots are aligned.
- Install the lock washer ①.

# NOTE:

Make sure the lock washer tabs sit correctly in the slots.

*********************

#### 8.Install:

- Upper bracket
- Handlebar



Nut: 10 Nm (11.0 m • kg) Pinch bott (upper bracket): 30 Nm (3.0 m • kg) Pinch bott (handlebar holder): 23 Nm (2.3 m • kg)



#### FRONT FORK INSPECTION

#### A WARNING

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

1.Place the motorcycle on a level place.

#### 2.Check:

- Inner tube
- Scratches/Damage → Replace.
- Oil seal
  - Excessive oil leakage → Replace.
- Hold the motorcycle in an upright position and apply the front brake.



#### 4.Check:

- Operation
  - Pump the front fork up and down for several times.

 $\label{eq:continuous} \begin{array}{l} \mbox{Unsmooth operation} \rightarrow \mbox{Repair}. \\ \mbox{Refer to "FRONT FORK" in CHAPTER 6.} \end{array}$ 

#### REAR SHOCK ABSORBER ADJUSTMENT

# A WARNING

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

#### Spring preload

- 1.Adjust:
- · Spring preload

# NOTE: _

Use the special wrench and extension bar included in the owner's tool kit to adjust.

# REAR SHOCK ABSORBER ADJUSTMENT/ TIRE INSPECTION







# ******** Adjustment steps:

• Turn the adjuster (1) in or out.

Turning lower number → Spring preload is softer. Turning higher number →

Spring preload is harder.

Adjuster position:

Standard: Minimum: Maximum: 7

CAUTION:

Never turn the adjuster beyond the maximum or minimum setting. 





#### TIRE INSPECTION

- 1.Measure:
- Tire pressure Out of specification → Adjust.

### A WARNING

- . Tire inflation pressure should be checked and adjusted when the temperature of the tire equals the ambient air temperature. Tire inflation pressure must be adjusted according to total weight of cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model), and vehicle speed.
- · Proper loading of your motorcycle is important for the handling, braking, and other performance and safety characteristics of your motorcycle. Do not carry loosely packed items that can shift. Securely pack your heaviest items close to the center of the motorcycle, and distribute the weight evenly from side to side. Properly adjust the suspension for your load, and check the condition and pressure of your tires.



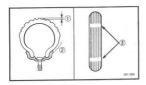
NEVER OVERLOAD YOUR MOTORCYCLE Make sure the total weight of the cargo,

Make sure the total weight of the cargo, rider, passenger, and accessories (fairing, saddlebags, etc. if approved for this model) does not exceed the maximum load of the motorcycle.

Operation of an overloaded motorcycle could cause tire damage, an accident, or even injury.

Basic weight: With oil and full fuel tank	265 kg	
Maximum load*:	205 kg	
Cold tire pressure:	Front	Rear
Up to 90 kg load*	225 kPa (2.25 kgf/cm², 2.25 bar)	250 kPa (2.5 kgf/cm², 2.5 bar)
90 kg ~ Maxi- mum load*	250 kPa (2.5 kgf/cm², 2.5 bar)	290 kPa (2.9 kgf/cm², 2.9 bar)
High speed riding	250 kPa (2.5 kgf/cm², 2.5 bar)	290 kPa (2.9 kgf/cm², 2.9 bar)

Load is the total weight of cargo, rider, passenger, and accessories.



- 2.Inspect:
- Tire surfaces

Wear/Damage → Replace.

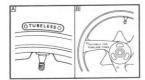


Minimum tire tread depth: (front and rear): 1.0 mm

- ① Tread depth
- ② Side wall③ Wear indicator

# TIRE INSPECTION





# A WARNING

 It is dangerous to ride with a worn-out tire. When a tire tread begins to show lines, replace the tire immediately.

 Do not use tubeless tires on a wheel designed for tube type tires only. Tire failure and personal injury may result from sudden deflation.

A Tire

B Wheel

Tube type wheel → Tube type tire only.
Tubeless type wheel →
Tube type or tubeless tire.

 Be sure to install the correct tube when using tube type tires.

# A WARNING

After extensive tests, the tires mentioned below have been approved by Yamaha Motor Co., Ltd. for this model. No guarantee for handling characteristics can be given if a tire combinations other than the approved is used on this motorcycle. The front and rear tires should always be of the same manufacture and design.

#### FRONT:

Manufacturer	Size	Type
METZELER	120/70-17 58V	ME33
BRIDGESTONE	120/70-17 58V	G601
DUNLOP	120/70-17 58V	K505F

#### RFAR-

Manufacturer	Size	Type
METZELER	150/70-17 69V	ME55A
BRIDGESTONE	150/70-17 69V	G602
DUNLOP	150/70-17 69V	K505

#### A WARNING

After mounting a tire, ride conservatively for a while to give the tire time to seat itself properly in the rim. Failure to do so could lead to an accident with possible injury to the rider or damage to the motorcycle.

# WHEEL INSPECTION/ CABLE INSPECTION AND LUBRICATION



## WHEEL INSPECTION

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

NOTE

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

# A WARNING

Never attempt to make any repairs to the wheel.

#### CABLE INSPECTION AND LUBRICATION

# **▲** WARNING

Damaged cable sheaths may cause corrosion and interfere with the cable movement. Replace damaged cables as soon as possible.

- 1.Inspect:
- · Cable sheath
- Damage → Replace.
- 2.Check:
- Cable operation

Unsmooth operation → Lubricate.

Recommended lubricant:
SAE 20W40 motor oil



#### NOTE:

Hold cable end up and pour a few drops of lubricant into the cable sheath.



## LEVER AND PEDAL LUBRICATION

Lubricate levers and pedals at their pivoting points.



Recommended lubricant: SAE 20W40 motor oil

#### SIDESTAND LUBRICATION

Lubricate the sidestand at pivoting points.



Recommended lubricant: Lithium soap base grease

#### CENTERSTAND LUBRICATION

Lubricate the centerstand at pivoting points.



Recommended lubricant: Lithium soap base grease

# REAR SUSPENSION LUBRICATION

Lubricate the rear suspension at pivoting points.



Recommended lubricant: Molybdenum disulfide grease

# BATTERY INSPECTION





# ELECTRICAL BATTERY INSPECTION

#### NOTE:

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

#### **CAUTION:**

## CHARGING METHOD

- This is a sealed type battery. Never remove the sealing caps. If the sealing caps have been removed, the balancing will not be maintained, and battery performance will deteriorate.
- Never add water, as this will affect the chemical reaction in the battery and cause loss of performance.
- Charging time, charging current and charging voltage for the MF battery are different from general type batteries.
  - The MF battery should be charged as explained in "CHARGING METHOD". If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.
- Never use an electrolyte other than specified. The specific gravity of the MF battery electrolyte is 1.32 at 20°C, whereas the specific gravity of a general type battery electrolyte is 1.28. if electrolyte with a specific gravity lower than 1.32 is used, the concentration of sulfuric acid will decrease, resulting in poor battery performance. If an electrolyte with a specific gravity higher than 1.32 is used, the battery plates will corrode and battery life will be shortened.

## **RATTERY INSPECTION**



# A WARNING

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

Always follow these preventive measures:

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

## Antidote (EXTERNAL):

- . SKIN Flush with water.
- EYES Flush with water for 15 minutes and get immediate medical attention.
- Antidote (INTERNAL):
- Drink large quantities of water or milk follow with milk of magnesia, beaten egg, or vegetable oil. Get immediate medical attention.

Batteries generate explosive hydrogen gas. Always follow the following preventive measures:

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

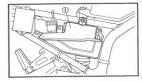
KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.



 Side cover (right)
 Refer to "SIDE COVER, FUEL TANK AND COWLING".

2.Remove:

• Cover ①





# 3.Disconnect: Battery leads

· Dattery lead

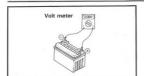
Disconnect the negative lead ① first, then the positive lead ②.

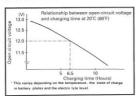
4.Remove:

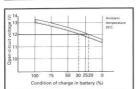
Battery

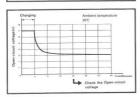
# BATTERY INSPECTION











## 5.Check:

- · Battery condition
- *********************

# Battery condition checking steps:

 Connect a digital voltmeter to the battery terminals.

Tester (+) lead → Battery (+) terminal Tester (-) lead → Battery (-) terminal

#### NOTE.

The charge state of an MF battery can be checked by measuring the open circuit voltage (i.e. when the positive terminal is disconnected).

Open-circuit voltage	Charging time	
12.8V or higher	No charging is necessary.	

 Check the condition of the battery using the charts.

#### Example:

- Open circuit voltage = 12.0V
- Charging time = 6.5 hours
- Charge condition of the battery = 20 ~ 30%
- Charging method of MF batteries

# CAUTION:

- If it is impossible to set the standard charging current, be careful not to overcharge.
- When charging the battery, be sure to remove it from the motorcycle. (If charging has to be done with the battery mounted on the motorcycle for some reason, be sure to disconnect the wire at the negative terminal.)
- Never remove the sealing caps of an MF battery.
- Take care that the charging clips are in a full contact with the terminal and that they are not shorted. (A corroded clip of the charger may cause the battery to generate heat at the contact area. A weak clip spring may cause sparks.)

# BATTERY INSPECTION

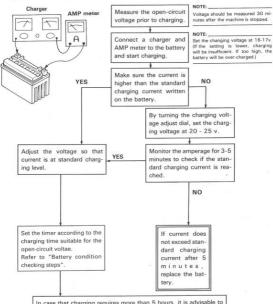


- Before removing the clips from the battery terminals, be sure to turn off the power switch of the charger.
- The open-circuit voltage variation of the MF battery after charging is shown below. As shown in the figure, the opencircuit voltage stabilizes about 30 minutes after charging has been completed. Therefore, to check the condition of the battery after charging, wait 30 minutes before measuring the open-circuit voltage.

---------



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



In case that charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.

Measure the battery open-circuit voltage after having left the battery unused for more than 30 minutes.

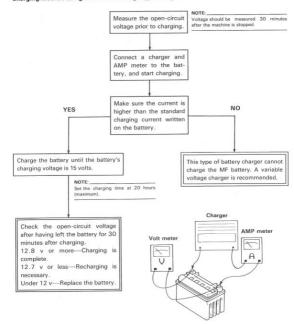
12.8 v or more --- Charging is complete.

12.7 v or less --- Recharging is required.

Under 12.0 v --- Replace the battery.



# Charging method using a constant-voltage type charger



Charging method using a constant current type charger

This type of battery charger cannot charge the MF battery.

# BATTERY INSPECTION/FUSE INSPECTION



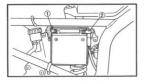
#### 6.Inspect:

Battery terminal

Dirty → Clean with a wire brush. Poor connection → Correct.

NOTE: _

After cleaning the terminals, grease them lightly.



## 7.Install:

- Battery
- 8.Connect:
- Battery leads

#### CAUTION:

Connect the positive lead ① first, then the negative lead ②.

#### 9.Install:

 Side cover (right)
 Refer to "SIDE COVER, FUEL TANK AND COWLING".

# **FUSE INSPECTION**

# CAUTION:

Always turn off the main switch when checking or replacing the fuse. Otherwise, a short circuit may occur.

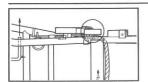
## 1.Remove:

 Side cover (right)
 Refer to "SIDE COVER, FUEL TANK AND COWLING".

# FUSE INSPECTION







2.Inspect:

Fuses

**********

#### Inspection steps:

· Connect the pocket tester to the fuse and check it for continuity.

# NOTE: _

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



Pocket tester: 90890-03112

If the tester indicates ∞, replace the fuse.

********

#### 3.Replace:

· Blown fuse

**********

## Replacement steps:

- Turn off the ignition.
- Install a new fuse of proper amperage.
- Turn on the switches to verify operation of related electrical devices.
- olf the fuse immediately blows again, check the electrical circuit.

*********

Description	Amperage	Quantity
Main	30A	1
Head	15A	1
Signal	20A	1
Ignition	10A	1
Clock	10A	1

### A WARNING

Never use a fuse with a rating other than specified. Never use other materials in place of a fuse. An improper fuse may cause extensive damage to the electrical system, malfunction of lighting and ignition and possibly cause a fire.

#### 4 Install:

· Side cover (right)

Refer to "SIDE COVER, FUEL TANK AND COWLING".

# HEADLIGHT BEAM ADJUSTMENT/ HEADLIGHT BULB REPLACEMENT





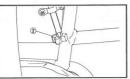
# HEADLIGHT BEAM ADJUSTMENT

1.Adjust:

Headlight beam (vertically)

Turn the adjuster (1) in or out.

Turning in → Headlight beam higher. Turning out → Headlight beam lower.

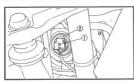


#### 2.Adjust:

Headlight beam (horizontally)

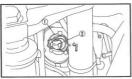
Turn the adjuster ② in or out.

Turning in → Headlight beam to the right. Turning out → Headlight beam to the left.



#### HEADLIGHT BULB REPLACEMENT

- 1.Disconnect:
- · Headlight lead ①
- 2.Remove:
- Cover ②



### 3.Unhook:

- Bulb holder (1)
- 4.Remove:
- Bulb ②

#### A WARNING

Keep flammable products and your hands away from the bulb while it is on, as it will be hot. Do not touch the bulb until it has cooled down.

# HEADLIGHT BULB REPLACEMENT/ DIGITAL CLOCK ADJUSTMENT





. Bulb (new)

Secure the new bulb with the bulb holder.

# CAUTION:

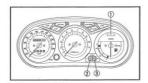
Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Hook:

- Bulb holder
- 7 Install:
- Cover

#### 8.Connect:

· Headlight lead



#### DIGITAL CLOCK ADJUSTMENT

#### ...

This digital clock always shows the time regardless of the main switch position.

1.Adjust:

. Digital clock ①

*******************

- Digital clock adjustment steps:

  Turn the main switch to "ON".
- The time (hour) setting can be made by pushing or holding the "H" switch (2).
- The time (minute) setting can be made by pushing or holding the "M" switch (3).

#### NOTE: _

When setting the clock after is power source is cut by a removed battery, etc., first set the time for 1:00 AM, then, go on to set it for the correct time.





## **ENGINE OVERHAUL** ENGINE REMOVAL

## A WARNING

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

NOTE: _ It is not necessary to remove the engine in order to remove the following components:

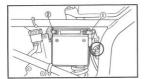
- Cylinder head
- Cylinder
- Piston
- Clutch Oil cooler
  - Starter motor
- · A.C. generator
- · Oil pan

## **FUEL TANK AND COWLINGS**

- 1.Remove:
- Seat
- Fuel tank
- Cowling
- Side cover Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.

## **ENGINE OIL**

- 1.Drain:
- · Engine oil
  - Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.



## BATTERY LEADS

- 1.Disconnect:
- · Battery leads

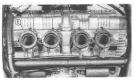
## CAUTION:

Disconnect the negative lead ① first and then disconnect the positive lead 2.

## A.I.S. (AIR INDUCTION SYSTEM)

1.Remove:

. A.I.S. (AIR INDUCTION SYSTEM) Refer to "VALVE CLEARANCE ADJUST-MENT" in CHAPTER 3.



## CARBURETOR

- 1.Remove:
  - Carburetor

Refer to "CARBURETOR" in CHAPTER 5.

Carburetor joint ①



## HOSES AND LEADS

- 1.Disconnect:
- Spark plug caps ①
- 2.Remove:
- · Spark plug



## 3.Disconnect:

- Breather hose (1)
- · A.C. generator coupler
- · Pickup coil coupler
- 4.Remove:
- Bands

# ENGINE REMOVAL ENG







## 5.Remove:

. Side stand switch lead 1 from the clamp.



## CLUTCH CABLE

- 1.Remove:
- . Clutch cable (1)

## Removal steps:

- · Loosen the locknut ②.
- Turn the adjuster 3 enough to free the clutch cable.

************

- Unhook the cable end (4).
- **********
- . Cable stay (5)



## SHIFT PEDAL

- 1.Remove:
- · Bolt ①
- 2.Disconnect:
- Shift arm ②



## STARTER MOTOR

- 1.Disconnect:
- Starter motor lead ①
- 2.Remove:
- Starter motor (2)



## A.C. GENERATOR

- 1.Remove:
- A.C. generator ①



## **EXHAUST PIPE**

- 1.Loosen:
- · Bolt ① 2.Remove:
- Muffler ②



## 3.Remove:

- · Bolt ①
- Nuts
- Exhaust pipe ②
- Gasket



## OIL COOLER

- 1.Remove:
- · Oil cooler ①



When removing the union bolt @, be sure to secure the hexagonal part 3 to stop it turning.



- 2.Remove:
- Oil filter housing ①
- Oil pipe ②



## **ENGINE REMOVAL**









## DRIVE SHAFT RUBBER BOOT

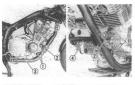
- 1.Peel back:
- Rubber boot (1)

## ENGINE REMOVAL

1.Place suitable stand under the frame and engine.

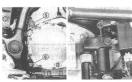
## A WARNING

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



## 2.Remove:

- Mounting bolt (front) ①
- Engine stay (front) ②
- · Down tube (right) ③
- · Cross tube (front) (4)
- . Mounting bolt (rear upper) (5)
- . Mounting bolt (rear lower) ®
- Engine stay (rear) ⑦



## 3.Remove:

 Engine assembly (from the right side of the motorcycle)

## CAUTION:

Cover the front fender with a rug to prevent scratching.



# CYLINDER HEAD COVER, CAMSHAFT AND

## NOTE: _

With the engine mounted, the cylinder head cover, camshaft and cylinder head can be maintained by removing the following parts:

- Fuel tank
- Cowling
- · Air filter case
- Carburetor
- · A.I.S. assembly
- Oil cooler
- 1.Remove:
- Cylinder head cover ①

#### .,....

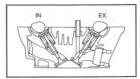
Loosen the bolts in a crisscross pattern 1/4 turn each. Remove them after all are loosened.

## 2.Remove:

. Timing plate cover (1)







## 3.Align:

"TDC" mark

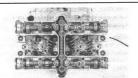
(with stationary pointer)

## NOTE: .

- The #1 piston is in compression stroke TDC when the cam lobes are turned away from each other, as shown.









. Bolts (cam sprockets) (1)



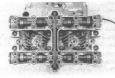
## 5.Loosen:

- Tensioner bolt ①
- 6.Remove:
- Timing chain tensioner ②



## 7.Remove:

• Chain guide (exhaust side) ①



## 8.Remove:

- · Camshaft caps (intake)
- · Camshaft caps (exhaust)
- Dowel pins



Remove the camshaft cap bolts in a crisscross pattern from the outside working inwards.



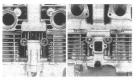
The bolts (camshaft caps) must be removed evenly to prevent damage to the cylinder head, camshaft or camshaft caps.

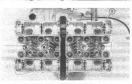
#### 9.Remove:

· Camshaft (intake (1) and exhaust (2))

Attach a wire 3 to the timing chain to prevent it from falling into the crankcase.









## 10.Remove:

Nuts (cylinder head)

#### NOTE.

- Loosen the bolts in their proper loosening sequence.
- Start by loosening each nut 1/2 turn until all are loose.

## 11.Remove:

- Cylinder head ①
- . Gasket (cylinder head) ②
- Dowel pins ③
- O-rings 4

## CYLINDER AND PISTON

## NOTE: _

With the engine mounted, the cylinder and piston can be maintained by removing the following parts:

- · Fuel tank
- Cowling
- Air filter case
- Carburetor
- · A.I.S. assmbly
- Oil cooler
- Cylinder head
- 1.Remove:
- Nut ①
- Washer











## 2.Remove:

- Cylinder
- Gasket (cylinder) ①



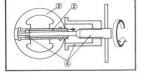


## 3.Remove:

- Piston pin clips ①
- Piston pins ②
- Pistons ③

## NOTE: _

- Before removing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase cavity.
- Put identification marks on each piston head for reference during reinstallation.
- Before removing the piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and piston pin is still difficult to remove, use the piston pin puller (a).



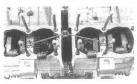


Piston pin puller: 90890-01304



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







## PICKUP COIL

- 1.Remove:
- Bolt (timing plate) ①
- Timing plate (2)
- Pin (3)
- Pickup coil base 4

## CLUTCH

NOTE: .

With the engine mounted, the clutch assembly can be maintained by removing the following part:

· Clutch cover



## 1.Remove:

- · Circlip (1)
- Washer
- Pull lever ②
- · Return spring
- Plate washer



## 2.Remove:

- · Clutch cable bracket
- Clutch cover (1)
- Gasket
- · Dowel pins

#### NOTE

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



- · Circlip ①
- Washer ②
- . Clutch pull lever shaft (3)
- Gear (4)

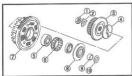














## 4.Remove:

- . Bolts (clutch spring) (1)
- Clutch springs ②
- Pressure plate ③
- Pull rod 4
- Washer (5)
- Friction plates ®
- Clutch plates ⑦
- Oil guide plates ®

# 5.Straighten the lock washer tabs. 6.Loosen:

Nut (clutch boss) ①

#### NOTE

Loosen the nut (clutch boss) ① while holding the clutch boss ② with the universal clutch holder.



## Universal clutch holder: 90890-04086

#### 7.Remove:

- Nut (clutch boss) (1)
- Lock washer ②
- Clutch boss ③
- Thrust plate (4)
- Spacer (5)
- Bearing ⑥
- Clutch housing ⑦
- · Oil pump drive sprocket (8)
- Collar (9)
- Washer (10)

## NOTE: _

Install a 6 mm screw (f) onto the spacer. Then remove the spacer by pulling on the screw.

#### OIL PAN AND OIL PUMP

#### NOTE

With the engine mounted, the oil pan, oil filter and oil strainer can be maintained by removing the following part:

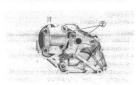
Exhaust pipe













## 1.Remove:

- · Oil level switch (1)
- Oil level switch (
   Oil pan ②)
- Gasket
- Dowel pins

## NOTE:

Loosen the bolts in a crisscross pattern 1/4 turn each. Remove them after all are loosened.

#### 2.Remove:

- Oil pump assembly (1)
- 3.Disconnect:
- Neutral switch lead ②
- 4.Remove:
- Neutral switch ③

## SHIFT SHAFT

- 1.Remove:
- . Shift shaft lever cover ①
- Gasket
- Dowel pins
- 2.Remove:
- Covers (2)
- Gaskets

- 3.Remove:
- . Shift shaft (1)
- Washer
- . Shift lever (2)
  - Omit iovor &
- Spring
- Stopper lever 4

## NOTE: _

Release the shift arm ③ from the drum pins while pulling out the shift shaft assembly.







## MIDDLE GEAR

- 1.Loosen:
- Bolts (crankcase) ①
- 2.Remove:
- Middle driven shaft assembly ②
- · Shim



## 3.Remove:

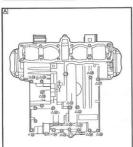
- . Bearing holder ①
- Middle drive shaft assembly ②
- Shim ③



## CRANKCASE DISASSEMBLY

1.Remove:

· Crankcase cover (right) ①



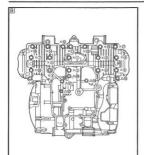
## 2.Remove:

· Bolts (crankcase)

#### NOT

- Loosen the bolts 1/4 turn each and remove them after all are loosened.
- Remove the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase designate the crankcase tightening sequence.
- 3.Place the engine upside down.
  - 4.Remove:
- Crankcase (lower)
- A Upper case





## CAUTION:

Use a soft hammer to tap on the case half. Tap only on reinforced portions of the case. Do not tap on the gasket mating surface. Work slowly and carefully. Make sure that the case halves separate evenly.

- Dowel pins
- O-ring
- B Lower case
- △:M6 bolts
- ×:M8 bolts



## 5.Remove:

 Main journal bearing (from lower crankcase)

## NOTE: -

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



## SHIFT FORK AND SHIFT CAM

- 1.Remove:
- Guide bars (shift fork) ①
- . Shift fork "R" ②
- . Shift fork "C" (3)
- Shift fork "L" ④



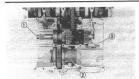
- Bearing holder ①
- . Shift cam assembly ②











## TRANSMISSION

- 1.Remove:
- Main axle assembly ①
- Middle drive shaft assembly holder ②
- Bearing ③



## 2.Remove:

- . Bearing housing ①
- Drive axle gear (5TH) ②
- . Drive axle assembly (3)



## CRANKSHAFT AND STARTER CLUTCH

- 1.Straighten:
- Lockwasher tab (a)
- 2.Remove:
- Bolt ①
- . Shaft (idle gear) ②
- Idle gear ③



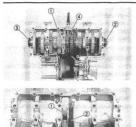
## 3.Remove:

- Bearing holder ①
- Oil nozzle ②
- Bearing ③
- Starter clutch shaft 4
- Starter clutch (5)









## 4.Remove:

- · Crankshaft assembly (1)
- Oil seal (2)
- Plug ③
- Timing chain ④
   HY-VO chain ⑤

## 5.Remove:

- Timing chain guide (intake side) ①
- Chain guide (HY-VO chain) ②

#### VALVE

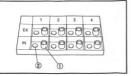
## NOTE:

With the engine mounted, the valve and camshaft can be maintained by removing the following parts:

- · Fuel tank
- · Center cowlings
- · Air filter case
- Carburetor
- · A.I.S. assembly
- Oil cooler
- · Cylinder head

#### NOTE

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



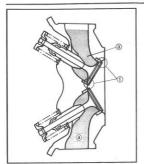
## 1.Remove:

- . Lifters (1)
- Pads ②

#### NOTE

Identify each lifter ① and pad ② position very carefully so that they can be reinstalled in their original place.





## 2.Check:

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

  Refer to "VALVE SEAT".

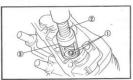
*********

## Checking steps:

- Pour a clean solvent (a) into the intake and exhaust ports.
- Check the valve seating.

There should be no leakage at the valve seat (1).

************



#### 3.Remove:

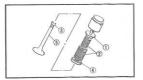
• Valve cotters ①

## NOTE: ..

Attach the valve spring compressor ② and attachment ③ between the valve spring retainer and cylinder head to remove the valve cotters.



Valve spring compressor: 90890-04019 Attachment: 90890-01243



## 4.Remove:

- · Valve retainer (1)
- Valve springs ②
- · Oil seal ③
- . Spring seat (4)
- Valve

#### NOTE:

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





## CONNECTING ROD

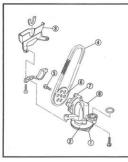
- 1.Remove:
- Connecting rod ①
- . Bearings (connecting rod)

## NOTE: _

Identify each bearing position very careful so that it can be reinstalled in its original place.

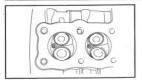
## OIL PUMP

- 1.Remove:
- Oil strainer (1)
- Oil strainer cover ②
- Chain cover ③
- Chain (4)
- · Bolt ⑤ Sprocket
- Pump cover (7)
- Inner rotor
- · Pump shaft · Pin
- Outer rotor
- Spring Relief valve
- · Oil pump housing ®









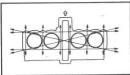
# INSPECTION AND REPAIR CYLINDER HEAD

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

## NOTE: _

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

- Spark plug threads
- Valve seat
- 2.Inspect:
- Cylinder head
- Scratches/Damage → Replace.





## 3.Measure:

Cylinder head warpage
 Out of specification → Resurface.



## Cylinder head warpage: Less than 0.03 mm

# 

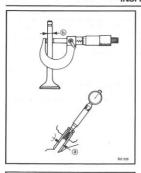
- steps:

  Hold a straight edge ① and a thickness gauge ② to the cylinder head.
- Measure the warpage.
- If the warpage is out of specification, resurface the cylinder head.
- Place a 400 ~ 600 grit wet sandpaper on the surface plate, and resurface the head using a figure-eight sanding pattern.

#### NOTE:

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





## VALVE AND VALVE GUIDE

- 1.Measure:
- · Stem-to-guide clearance

Stem-to-guide clearance =

Valve guide inside diameter (a) -Valve stem diameter (b)

Out of specification → Replace valve quide.



Stem-to-guide clearance: Intake:

0.010 ~ 0.037 mm <Limit>: 0.08 mm Exhaust:

0.025 ~ 0.052 mm <Limit>: 0.10 mm



## 2.Replace:

- Valve guide
- **********

## Replacement steps:

## NOTE: _

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

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



Valve guide remover (6.0 mm): 90890-04064

Valve guide installer (6.0 mm): 90890-04065

Valve guide reamer (6.0 mm): 90890-04066







Reface the valve seat after replacing the valve guide.

## 3.Eliminate:

 Carbon deposit (from valve face)

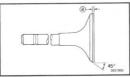
## 4.Inspect:

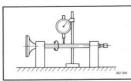
Valve face

Pitting/Wear → Grind the face.

## · Valve stem end

Mushroom shape or diameter larger than rest of stem  $\rightarrow$  Replace.





## 5.Measure:

Margin thickness @

Out of specification → Replace.



Margin thickness: 1 mm

## 6.Measure:

· Runout (valve stem) Out of specification → Replace.



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



## VALVE SEAT

- 1.Eliminate:
- · Carbon deposit
- (from valve face and valve seat)
- 2.Inspect: · Valve seat
- Pitting/Wear → Reface valve seat.





## 3.Measure:

· Valve seat width @

Out of specification → Reface valve seat.



302 027

Valve seat width: Intake: 0.9 ~ 1.1 mm Exhaust: 0.9 ~ 1.1 mm

## Measurement steps:

- *********** · Apply the Mechanic's blueing dve (Dykem) (b) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact. blueing will have been removed.
- olf the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced. ***********



## 4.Reface:

Valve seat

Use 31°, 45° and 60° valve seat cutter.

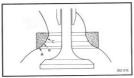


Valve seat cutter: YM-91043-C

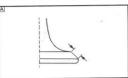


## CAUTION:

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



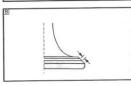
Cut sections as follows:	
Section	Cutter
Α	31°
В	45°
С	60°



## Refacing steps:

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

Valve seat cutter set		Desired result
Use lightly	First: 31° cutter Second: 60° cutter	To reduce valve seat width to 1.0 mm



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

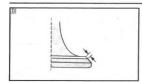
Valve s	seat cutter set	Desired result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm



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

Valve s	seat cutter set	Desired result
Use	First: 31° cutter Second: 45° cutter	To center the seat and to achieve its width of 1.0 mm





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

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

#### 5.Lap:

- Valve face
- Valve seat

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



## Lapping steps:

****** Apply a coarse lapping compound (a) to the valve face.

## CAUTION:

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



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



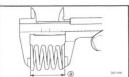
To obtain the best lapping result, lightly tap the valve seat while rotating the valve back and forth between your hand.

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

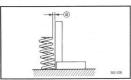












Be sure to clean off all compound from the valve face and valve seat after every lapping operation.

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

**********

## VALVE SPRING

- 1 Measure:
- · Free length (valve spring) (a) Out of specification → Replace.



Free length (valve spring): Inner (intake/exhaust): 37.40 mm Outer (intake/exhaust): 39.85 mm

- 2.Measure:
- Compressed force (valve spring) (a) Out of specification → Replace. (b) Installed length



Compressed force: Inner (intake/exhaust): 6.35 ~ 7.45 kg at 31.8 mm

Outer (intake/exhaust): 12.1 ~ 14.1 kg at 33.8 mm

- 3.Measure:
- . Spring tilt @

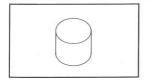
Out of specification → Replace.



Spring tilt limit: Inner (intake/exhaust): 1.6 mm

Outer (intake/exhaust): 1.7 mm

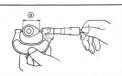




## VALVE LIFTER

- 1.Inspect:
- Valve lifters

Scratches/Damage → Replace both lifters and cylinder head.



## CAMSHAFT

- 1.Inspect:
- Cam lobes

Pitting/Scratches/Blue discoloration → Replace.

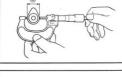
- 2.Measure:
- . Cam lobes length (a) and (b)
  - Out of specification → Replace.



## Cam lobes length limit:

Intake:

- ③ 36.75 mm ⑤ 27.975 mm
  - (a) 36.75 mm
  - 6 27.975 mm



## 3.Measure:

Runout (camshaft)

Out of specification → Replace.



Runout (camshaft): Less than 0.03 mm



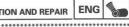
## 4.Measure:

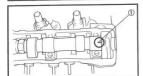
· Camshaft-to-cap clearance

Out of specification → Measure bearing diameter (camshaft)



Camshaft-to-cap clearance: 0.020 ~ 0.054 mm





## Measurement steps:

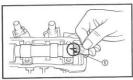
- Install the camshaft onto the cylinder
  - Position a strip of Plastigauge® (1) onto the camshaft.
  - Install the dowel pins and camshaft caps.



Bolts (camshaft cap) 10 Nm (1.0 m · kg)

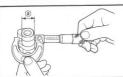
## NOTE: _

- . Tighten the bolts (camshaft cap) in a crisscross pattern from innermost to outer
- . Do not turn the camshaft when measuring clearance with the Plastigauge[®].



Remove the camshaft caps and measure the width of the Plastigauge® (1).

------



## 5.Measure:

- . Bearing diameter (camshaft) (a) Out of specification -> Replace the cam-
  - Within specification → Replace cylinder head and camshaft caps as a set.



Bearing diameter (camshaft): 24.967 ~ 24.980 mm



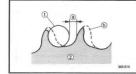
1.Inspect:

. Timing chain ①

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







2.Inspect:

· Cam sprockets

Wear/Damage → Replace cam sprocket

and timing chain as a set.

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

3.Inspect:

- . Timing chain guide (exhaust)
- Timing chain guide (intake)
- . Timing chain guide (upper)

Wear/Damage → Replace.

## TIMING CHAIN TENSIONER

1.Check:

One-way cam operation
 Unsmooth operation → Replace.

2.Inspect:

· All parts

Damage/Wear → Replace.

## CYLINDER AND PISTON

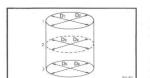
1.Inspect:

. Cylinder and Piston walls

Vertical scratches → Rebore or replace cylinder and piston.

2.Measure:

· Piston-to-cylinder clearance



## Measurement steps:

First step:

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

***********

## NOTE: _

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



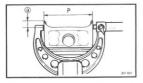


Cylinder bore "C"	68.49 ~ 68.54 mm
Taper limit "T"	0.05 mm
Out of round "R"	0.01 mm

"T" = (Maximum D,, or D,) - (Maximum D, or D,)

"R" = (Maximum  $D_1$ ,  $D_2$  or  $D_5$ ) - (Minimum  $D_2$ ,  $D_4$  or  $D_6$ )

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



## 2nd step:

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

  (a) 5.5 mm from the piston bottom edge.

	Piston size P
Standard	68.45 ~ 68.50 mm
Oversize 2	69.0 mm
Oversize 4	69.5 mm

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

## 3rd step:

 Calculate the piston-to-cylinder clearance with following formula:

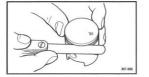
Piston-to-cylinder clearance = Cylinder bore "C" – Piston skirt diameter "P"



Piston-to-cylinder clearance: 0.03 ~ 0.05 mm <Limit>: 0.1 mm

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





## PISTON RING

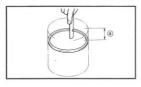
- 1.Measure:
- Side clearance
- Out of specification → Replace piston and rings as a set.

## NOTE: _

Eliminate the carbon deposits from the piston ring grooves and rings before measuring the side clearance.



Side clearance: Top ring: 0.025 ~ 0.080 mm 2nd ring: 0.02 ~ 0.06 mm



## 2.Position:

 Piston ring (into cylinder)

#### NOTE

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

(a) 20 mm

## 3.Measure:

End gap

Out of specification → Replace.

#### NOTE:

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



End gap: Top ring: 0.10 ~ 0.25 mm 2nd ring: 0.30 ~ 0.45 mm Oil ring: 0.20 ~ 0.70 mm



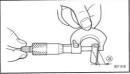


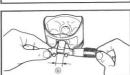
## PISTON PIN

- 1.Inspect:
- · Piston pin

Blue discoloration/Grooves → Replace, then inspect lubrication system.

- 2.Measure:
- Piston pin-to-piston clearance





## Measurement steps:

***************** · Measure the piston pin outside diameter

If out of specification, replace the piston



Outside diameter (piston pin): 15.990 ~ 16.000 mm

Measure the piston inside diameter (b).

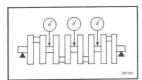
· Calculate the piston pin-to-piston clearance with following formula:

Piston pin-to-piston clearance = Bore size (piston pin) 6 -Outside diameter (piston pin) (3)

olf out of specification, replace the piston.



Piston pin-to-piston clearance = 0.002 ~ 0.023 mm <Limit>: 0.07 mm



## CRANKSHAFT AND CONNECTING ROD

********************

- 1.Measure:
- · Runout (crankshaft) Out of specification → Replace.



Runout: Less than 0.03 mm



## 2.Inspect:

- · Main journal surfaces
- Crank pin surfaces
- Bearing surfaces
   Wear/Scratches → Replace.

## 3.Measure:

- Oil clearance (main journal)
  - Out of specification → Replace bearing.



Oil clearance:

## Measurement steps:

## CAUTION:

Do not interchange the bearings and connecting rod. They must be installed in their original positions, or the correct oil clearance may not be obtained causing engine damage.

*****************

- Clean the bearings, main journals and bearing portions of the crankcase.
- Place the crankcase (upper) on a bench in an upside down position.
- Install the upper half of the bearings ①
   and the crankshaft into the crankcase
   (upper).

## 

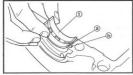
Put a piece of Plastigauge® ② on each

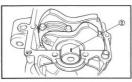
## Put a piece of Plastigauge[®] ② on each main journal.

#### NOTE:

Do not put the Plastigauge® over the oil hole in the main journal of the crankshaft.

 Install the lower half of the bearings into the crankcase (lower) and assemble the crankcase halves.

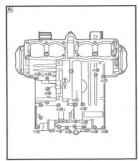






#### NOTE.

- Align the projection of the bearing with the notch in the crankcase.
- Do not move the crankshaft until the oil clearance has been completed.



 Tighten the bolt to specification in the tightening sequence cast on the crankcase.

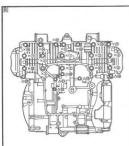


Bolt (crankcase):

24 Nm (2.4 m ⋅ kg) △M6:

12 Nm (1.2 m · kg)

A Upper case

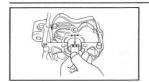


## B Lower case

#### NOTE

- Lubricate the threads of bolts (M8) with engine oil.
- Lubricate the threads of bolts (M6) with engine oil.
- Remove the crankcase (lower) and lower half of the bearing.





- Measure the compressed Plastigauge[®] width © on each main journal.
  - If oil clearance is out of specification, select a replacement bearing.
- ***********
- 4.Measure:
- Oil clearance (crank pin)
   Out of specification → Replace bearing.



Oil clearance: 0 026 ~ 0.055 mm

......



## CAUTION:

Do not interchange the bearings and connecting rod. They must be installed in their original positions, or the correct oil clearance may not be obtained causing engine damage.

- Clean the bearings, crank pins and bearing portions of the connecting rods.
- Install the upper half of the bearing into the connecting rod and lower half of the bearing into the connecting rod cap.

#### NOTE: _

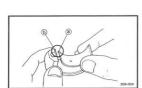
Align the projection @ of the bearing with the notch @ of the cap and connecting rod.

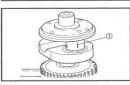
Put a piece of Plastigauge[®] ① on the crank pin.

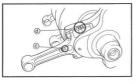
Assemble the connecting rod halves.

#### NOTE:

- Do not move the connecting rod or crankshaft until the oil clearance measurement has been completed.
- Apply molybdenum disulfide grease to the bolts, threads and nut seats.
- Make sure the "Y" marks © on the connecting rods face the left side of the crankcheft.
- Make sure that the letters @ on both components align to form a perfect character.











Tighten the nuts.



37 Nm (3.7 m · kg)

## CAUTION:

- Be sure to use an F-type torque wrench when tightening the nuts.
  - When you reach 3.0 m kg, keep tightening until the final torque is obtained.
     Apply continuous torque until the specified torque is obtained.

Refer to "ENGINE ASSEMBLY AND ADJUSTMENT" — "CONNECTING ROD".

- Remove the connecting rods and bearings.

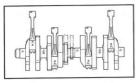
  Measure the compressed Plastigauge®
  - width (a) on each crank pin.

    If oil clearance is out of specification, select a replacement bearing.

## ********

## 5.Select:

- Main journal bearing (J₁ ~ J₂)
- Crank pin bearing (P, ~ P,)



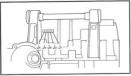


Example 1: Main journal bearing

•If "J," on the crankcase is "6" and "2" on the crankweb, then the bearing size for "J," is:

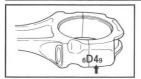






BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green
5	Yellow







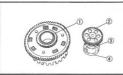


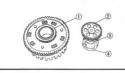
olf "P," on the connecting rod is "4" and "1" on the crankweb, then the bearing size for "P," is:

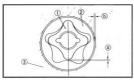
Bearing size of P,: Connecting rod P, - Crankweb P, = 4-1=3 (Brown)

BEARING COLOR CODE	
1	Blue
2	Black
3	Brown
4	Green

**********







## OIL PUMP

- 1.Inspect:
- Drive gear (oil pump (1))
- Driven gear (oil pump (2))
- Pump housing ③
- Pump housing cover (4)
- Wear/Cracks/Damage → Replace.

## 2.Measure:

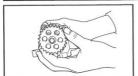
- Tip clearance (a) (between the inner rotor (1) and the outer rotor (2)
- Side clearance (between the outer rotor (2) and the pump housing (3) Out of specification -> Replace the oil pump assembly.



Tip clearance: 0.03 ~ 0.09 mm Side clearance: 0.03 ~ 0.08 mm







3.Check:

Oil pump operation

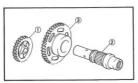
Unsmooth → Repeat steps 1 and 2 or replace defective parts.

#### PRIMARY DRIVE

1.Inspect:

- · Gear teeth (primary drive)
- · Gear teeth (primary driven)

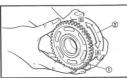
Wear/Damage  $\rightarrow$  Replace both gears. Excessive noises during operation  $\rightarrow$  Replace both gears.



#### STARTER DRIVES

- 1.Inspect:
- Gear teeth (starter idle ①)
- . Gear teeth (starter drive (2))
- Gear teeth (starter wheel ③)

Burrs/Chips/Roughness/Wear → Replace.



2.Check:

Starter clutch operation

***********

# Clutch operation checking steps:

- Install the starter wheel gear ① to the starter clutch ②, and hold the starter clutch.
- When turning the starter wheel gear clockwise A, the starter clutch and the wheel gear should be engaged.

If not, the starter clutch is faulty. Replace it.

 When turning the starter wheel gear counterclockwise 
 B, the starter wheel gear should turn freely.

If not, the starter clutch is faulty. Replace

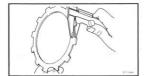
IT.



## CLUTCH

- 1.Inspect:
- Friction plate

Damage/Wear → Replace friction plates as a set.



# 2.Measure:

- · Friction plate thickness
  - Out of specification → Replace friction plates as a set.

Measure at four points.

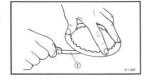


## Thickness: 2.9 ~ 3.1 mm

<Limit>: 2.8 mm

# 3.Inspect:

- · Clutch plate
- Damage → Replace clutch plates as a set.



# 4.Measure:

- · Clutch plate warpage
  - Out of specification → Replace clutch plate as a set.

Use a surface plate and feeler gauge ①.



# Warp limit:

Less than 0.05 mm

# 5.Inspect:

- · Clutch spring
  - Damage → Replace springs as a set.









• Free length (clutch spring) (a)

Out of specification → Replace spring as a



Free length (clutch spring):

51.8 mm <Limit>: 50.0 mm



7.Inspect:

Dogs

(on the clutch housing)
Pitting/Wear/Damage → Deburr or

replace.

• Clutch housing bearing

Wear/Damage → Replace clutch housing.



Pitting on the clutch housing dogs will cause erratic operation.

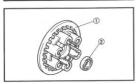
# 8.Inspect:

· Clutch boss splines

Pitting/Wear/Damage → Replace clutch boss.

#### NOTE: _

Pitting on the clutch boss splines will cause erratic operation.



9.Inspect:

• Pressure plate (1)

Cracks/Damage → Replace.

• Bearing (2)

Wear/Damage → Replace.

## 10.Inspect:

· Gear teeth (pull lever pinion gear)

· Gear teeth (pull rod)

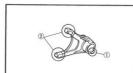
Wear/Damage → Replace as a set.





#### 11.Inspect:

· Bearing (pull rod) ① Wear/Damage → Replace.



# TRANSMISSION AND SHIFTER

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



# 2.Inspect:

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

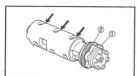
## A WARNING

Do not attempt to straighten a bent guide bar.



## 3.Check:

- . Shift fork movement
  - (on its quide bar)
  - Unsmooth operation → Replace the fork and guide bar.

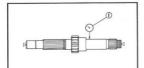


## 4.Inspect:

- · Shift cam grooves
  - Wear/Damage/Scratches → Replace.
- . Shift cam segment ①
- Damage/Wear → Replace.
- . Shift cam bearing ② Pitting/Damage → Replace.





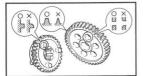


#### 5 Measure:

Axle runout (main and drive)
 Use a centering device and dial gauge ①.
 Out of specification → Replace.

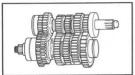


Runout limit: 0.08 mm



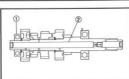
## 6.Inspect:

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



## 7.Check:

- Proper gear engagement (each gear) (to its counter part) Incorrect → Reassemble.
- Gear movement Roughness → Replace.



# Press the bearing ① in the main axle ② as shown.

CAUTION:
When you have finished pressing the bearing ①, make sure that the 5th pinion gear rotates smoothly.

# 8.Inspect:

Circlips

Damage/Looseness/Bends → Replace.

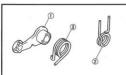




# SHIFT SHAFT AND STOPPER LEVER

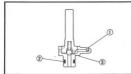
- 1.Inspect:
- . Shift shaft (1)
- Shift lever ②
   Return spring (shift arm) ③

Bends/Wear/Damage → Replace.



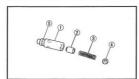
## 2.Inspect:

- Stopper lever ①
  - Roller turns roughly → Replace. Bends/Damage → Replace.
- 3.Inspect:
- Return spring (shift shaft) ②
- Return spring (stopper lever) ③
   Wear/Damage → Replace.



# OIL-JET NOZZLE

- 1.Check:
- Oil-iet nozzles ①
- O-ring (2)
- · Check ball (3)
  - Damage/Wear → Replace oil jet nozzle assembly.
- Oil jet passage
   Clogged → Blow out with compressed air.



## RELIEF VALVE, OIL PIPE AND STRAINER

- 1.Check:
- · Relief valve body (1)
- Valve ②
- Spring ③
- Spring seat (4)
- O-ring (5)
  - Damage/Wear → Replace.

# 2.Check:

- Oil delivery pipe
  - Damage → Replace.
  - Contamination → Wash and blow out the passage.

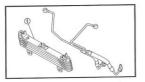




3.Inspect:

Oil strainer

Damage → Replace.



## **OIL COOLER**

1.Check:

- Oil cooler ①
- Inlet hose (oil cooler)
   Outlet hose (oil cooler)

Cracks/Wear/Damage → Replace.

# CRANKCASE

- Thoroughly wash the case halves in mild solvent.
- Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.
   Inspect:
- S.IIIspect.
- Crankcase
- Cracks/Damage → Replace.
- · Oil delivery passages
- Clogged → Blow out with compressed air.

  BEARING AND OIL SEAL
- 1.Inspect:
- Bearings
  - Clean and lubricate, then rotate inner race with finger.
  - Roughness → Replace.
- 2.Inspect:
- · Oil seals
  - Damage/Wear → Replace.



- 1.Inspect:
- Circlips
- Washers

Damage/Looseness/Bends → Replace.



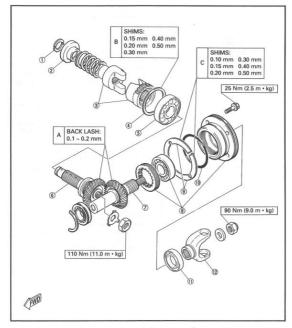
# MIDDLE GEAR SERVICE | ENG





# MIDDLE GEAR SERVICE

- ① Spring retainer
- ② Spring seat
- 3 Damper cam (4) Shim
- (5) Bearing 6 Middle drive shaft
- Middle driven shaft
- ® Bearing housing assembly
- Shim
- @ O-ring
- ① Oil seal
- @ Universal joint

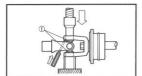




## REMOVAL

- 1.Remove:
- · Middle driven shaft assembly
- · Middle drive shaft assembly

Refer to "ENGINE DISASSEMBLY".



#### DISASSEMBLY

# Middle driven shaft assembly

# 1.Remove:

Universal joint

**********

#### Removal steps:

- Remove the circlips ①.
- Place the U-joint in a press.
- With a suitable diameter pipe beneath the yoke, press the bearing into the pipe as shown.

# NOTE: .

It may be necessary to lightly tap the yoke with a punch.

- Repeat the steps for the opposite bearing.
- Remove the yoke.

# NOTE: _

It may be necessary to lightly tap the yoke with a punch.



. Universal joint holder 1)

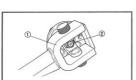
Onto the universal joint yoke.



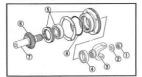
## Universal joint holder: 90890-04062

#### 3.Loosen:

Nut (middle driven shaft) ②





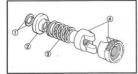


## 4.Remove:

- . Nut (middle driven shaft) (1)
- Washer ②
- Yoke (3) • Oil seal (4)
- . Bearing housing assembly (5)
- Driven pinion gear (6)
- . Middle driven shaft (7)
- O-ring (8)

## CAUTION:

Always replace the collapsible collar whenever the middle gear is disassembly.



# Middle drive shaft assembly

- 1.Remove:
- Spring retainers (1)
- . Spring seat ②
- Spring ③
- Damper cam (4)

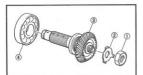
#### NOTE: _

Attach the damper spring compressor (5) on the spring seat and compress the spring, then remove the spring retainer.





Damper spring compressor: P/N 90890-04090



## 2.Straighten:

- Lock washer
- 3.Remove:
- Nut (middle drive shaft) ①
- Lock washer ②
- Drive pinion gear ③
- · Bearing (4)





# Removal steps:

- Attach the folded rag ①.
- Secure the middle drive shaft end in the

**********

- Remove the nut (middle drive shaft), lockwasher, drive pinion gear and bearing.
- *********

#### INSPECTION

# Middle driven shaft assembly

- 1.Inspect:
- · Middle gear teeth
  - Pitting/Galling/Wear → Replace middle gear as a set.
- 2.Inspect:
- Bearing

Pitting/Damage → Replace bearing housing assembly.

- 3.Inspect:
- · O-ring
- Oil seal
   Damage → Replace.
- 4.Check:
- U-joint movement

Roughness → Replace U-joint.

#### Middle drive shaft assembly

- 1.Inspect:
- Damper cam surface
  - Wear/Scratches → Replace damper cam as a set.
- 2.Inspect:
- Damper spring
  - Damage/Cracks → Replace.

## REASSEMBLY

Reverse the "DISASSEMBLY" procedures.

Note the following points.

Middle driven shaft assembly

#### 1.Tighten:

Nut (middle driven shaft)
 Attach the universal joint h

Attach the universal joint holder onto the universal joint yoke.



Universal joint holder: P/N 90890-04062



Nut (middle driven shaft): 90 Nm (9.0 m • kg)







## 2.Position:

- Yoke
  - into the U-joint.



## 3.Install:

- Bearings
- onto the yoke.

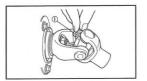
# CAUTION:

Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.

 Press each bearing into U-joint using a suitable socket.

## NOTE: _

Bearing must be inserted far enough into U-joint so that circlip can be installed.



## 5.Install:

- · Circlips (1)
- Into groove of each bearing.

## Middle drive shaft assembly

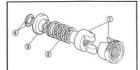
- 1.Tighten:
- Nut (middle drive shaft)



Nut (middle drive shaft): 110 Nm (11 m • kg)







# 2.Install:

- Damper cam (1)
- . Spring (2)
- Spring seat ③ Spring retainers (4)

#### NOTE: _

Attach the damper spring compressor on the spring seat and compress the spring, then remove the spring retainer.



Damper spring compressor: P/N 90890-04090

## INSTALLATION

#### 1 Install:

- · Middle drive shaft assembly
- · Middle driven shaft assembly

Refer to "ENGINE ASSEMBLY AND ADJUSTMENT".

## NOTE: _

Before tighten the bolts

- 1.Adjust the gear lash of the middle gear. Refer to "GEAR LASH ADJUSTMENT".
- 2. Check the middle driven gear operation.



## Bolts

(middle driven gear assembly):

25 Nm (2.5 m · kg)

## GEAR LASH MEASUREMENT

- 1.Measure:
- Gear lash

Out of specification → Adjust.



# Gear lash:

0.1 ~ 0.2 mm





Measurement steps:

Install the middle gear backlash tool 1.



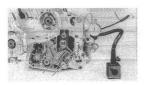
Middle gear backlash tool: P/N 90890-04080

- Align the dial gauge with the yoke.
- · Measure the gear lash while rotating the yoke gently back and forth.

Measure the gear lash at each 90° rotation to obtain four measurements. ************

GEAR LASH ADJUSTMENT

- 1.Loosen:
- · Bolts (driven gear bearing housing)
- 2.Remove:
- . Shims



3.Tighten:

· Bolts (driven gear bearing housing)

Clearance between the crankcase and driven gear bearing housing should be about 2 mm. Measure gap with feeler gauge ①.

# CAUTION:

Do not overtighten bearing housing bolts or you may obtain too little gear lash and cause damage to gears. If over tightened, loosen the 4 bolts so that crankcase/bearing housing clearance is about 2 mm and repeat all previous steps.



## 4.Rotate:

U-ioint

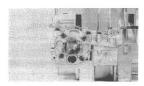
Rotate it back and forth, while carefully tightening the bolts in a crisscross pattern until the dial gauge reads 0.1 ~ 0.2 mm.



Middle gear lash: 0.1 ~ 0.2 mm

# 5.Measure:

Crankcase/bearing housing clearance
 Use a feeler gauge.



## 6.Select:

· Shim(s) ①

*********

## Selection steps:

 If the clearance between crankcase and bearing housing is 0.42 mm.

 The chart instructs you to round off 2 to 0 at the hundredth place. Thus, the shim thickness is 0.40 mm.

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

Shim sizes are supplied in the following thickness.

Middle driv	ve pinio	n gear sl	nim:
Thickness (mm)	0.10	0.20	0.40
Tillokiless (IIIII)	0.15	0.30	0.50

**********



- 7.Loosen:
- Bolts (driven gear bearing housing)
- 8.Install: Shims
- 9.Tighten:
- · Bolts (driven gear bearing housing)



Bolt (driven gear bearing housing): 25 Nm (2.5 m · kg)

# 10.Measure:

Gear lash



Middle gear lash: 0.1 ~ 0.2 mm

If the gear lash is incorrect → Repeat.

# MIDDLE DRIVE GEAR AND DRIVEN GEAR POSITIONING

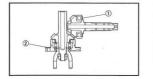
Gear positioning is necessary when any of the following parts are replaced.

- · Crankcase assembly
- · Middle drive shaft
- · Middle gear bearing housing

# 1.Select:

. Middle drive gear shim (1)

Select the middle driven gear shim ② by calculating out the middle drive gear shim 1) and then actually measuring the gear lash.



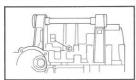
# ******************** Middle drive gear shim selection steps:

- Position middle drive gear by using shims
- 1) with their respective thickness calculated from information marked on crankcase, and drive gear end.
- 1 Shim thickness "A" (middle drive gear)









 To find shim thickness "A" use following formula.

Middle drive pinion gear shim thickness:

#### Where:

- (a) = a numeral (usually a decimal number) on the drive pinion gear is either added to or subtracted from "43.00".
- (considered constant).
- © = a numeral (usually a decimal number) on the crankcase (upper) half near the main bearing selection numbers and added to the nominal size "60".

## Example:

- If the drive pinion gear is marked "-10".... (a) is 42.90
- 2) (b) is 16.94
- 3) If the crankcase (upper) is marked "48"..... © is 60.48
  - "A" = 60.48 42.90 16.94 = 0.64
- Round off hundredths digit and select appropriate shim(s).

In the example above, the calculated number is 0.64. The chart instructs you to round off 4 to 5 at the hundredth place. Thus, the shim thickness is 0.65 mm.

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

Shim sizes are supplied in the following thickness.



**********



# A WARNING

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

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

# OIL PUMP

1.Lubricate:

- Inner rotor
- Outer rotor
- · Pump shaft



## Recommended lubricant: SAE 20W40 motor oil

- 2.Install:
- Oil pump housing ①
- Relief valve
- Spring ②
- Pin (3)
- · Outer rotor (4)
- Pump shaft (5) • Inner rotor (6)
- Pump cover ⑦
- Pin (8)
- Sprocket
- · Bolt @
- Chain (f)
- Chain cover (2)
- . Oil strainer cover (3)
- Oil strainer (4)



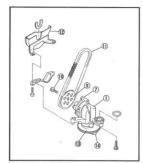
Screw (pump housing): 12 Nm (1.2 m · kg)



When installing the inner rotor, align the pin (8) in the pump shaft with the groove (9) on the inner rotor (6).

## 3.Check:

· Oil pump operation Refer to "INSPECTION AND REPAIR".



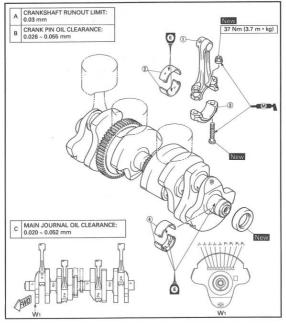






# CONNECTING ROD AND CRANKSHAFT

- ① Connecting rod
- Plain bearing (connecting rod)
- 3 Connecting rod cap
- (4) Plain bearing (crankshaft-main journal)





## CONNECTING ROD

- 1.Apply:
- Molybdenum disulfide grease
- (onto threads of bolts and nut seats) · Engine oil inner surfaces of connecting rods)
  - (onto crank pins, crank pin bearings and



#### 2.Install:

- · Bearings (crank pin) ①
- . Connecting rods (2)
- Connecting rod caps ③ (onto crank pins)



- · Align the projection of bearing with the groove of the caps and connecting rod.
- Make sure to reinstall each connecting rod bearing in its original place.
- . The stamped "Y" mark @ on the connecting rods should face towards the left of the crankshaft.
- . Be sure that the letter (b) on both components align to form a perfect character.



# 3.Align:

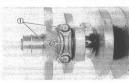
- . Bolt head (1)
- (with connecting rod cap)
- 4. Tighten:
- Nuts (connecting rods)



Nut (connecting rod): 37 Nm (3.7 m · kg)



- . Be sure to use an F-type torque wrench when tightening the nuts.
- When you reach 3.0 m kg, keep tightening until the final torque is obtained. Apply continuous torque until the specified torque is obtained.



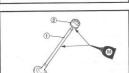




# VALVE

- 1.Deburr:

   Valve stem end
  - Use an oil stone to smooth the stem end.



# 2.Apply:

 Molybdenum disulfide oil (onto valve stem ① and oil seal ②)



## 3.Install:

- Valve ①
- Spring seat ②
- · Oil seal (3)
- Valve spring 4
- Valve retainer (5) (into cylinder head)

#### NOTE:

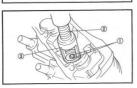
Install the valve spring with the larger pitch (a) facing upwards.

# Smaller pitch

- 4.Install:

   Valve cotters ①
- NOTE: _

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





Valve spring compressor ②: 90890-04019 Attachment ③: 90890-01243

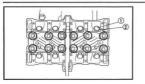
 Secure the valve cotters ① onto the valve stem by tapping lightly with a piece of wood.

#### NOTE:

Do not hit so much as to damage the valve.



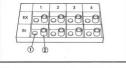




# 6.Install:

- · Pads ①
- Valve lifters ②

- . The valve lifters must move smoothly when rotated with the finger.
- · Each valve lifter and pad must be reinstalled in their original position.





# CRANKSHAFT AND STARTER CLUTCH

- 1.Install:
- Timing chain guide (intake side) ①
- . Chain guide (HY-VO chain) (2)



Bolt (timing chain guide): 20 Nm (2.0 m • kg) Bolt (HY-VO chain guide): 10 Nm (1.0 m • kg)

## 2.Install:

· Main journal bearings (onto upper crankcase)

- NOTE: _ · Align the projection of the bearing with the notch in the case.
- · Be sure to install each bearing (crankshaft) in its original place.
- 3.Apply engine oil to the bearing (main iournal) surfaces.

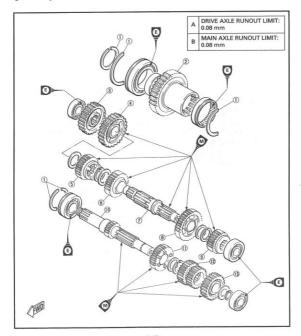


## TRANSMISSION

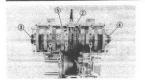
- ① Circlip
- ② Middle driven gear
- 3 Middle drive gear
- 4 1st wheel gear
- (5) 4th wheel gear
- 6 3rd wheel gear
- 7 Drive axle
- ® 2nd wheel gear

- (9) 5th wheel gear

- @ Main axle
- ① 4th pinion gear
- 2nd pinion gear
- (3) 5th pinion gear



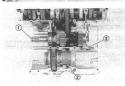












# 4.Install:

- HY-VO chain ①
- Timing chain ②
- Plug ③
- Oil seal 4
- Crankshaft assembly (5)
   Install:
- Starter clutch
- Starter clutch shaft (1)
- Bearing ②
- · Oil nozzle (3)
- . Bearing holder (4)

# NOTE: _

Align the projection of the oil nozzle with notch in the crankcase.



Bolt (bearing holder): 10 Nm (1.0 m • kg)

- Idle gear (5)
- . Shaft (idle gear) ®
- . Lock washer (7)

# A WARNING

Always use a new lock washer.

Bolt ®



Bolt:

10 Nm (1.0 m · kg)

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

- TRANSMISSION
- 1.Install:
- Drive axle assembly (1)
- Drive axle gear (5TH) ②
- Bearing housing (3)



Bolt (bearing housing): 12 Nm (1.2 m • kg)

#### 2.Install:

- . Main axle assembly (1)
- Middle drive shaft assembly holder ②
- Bearing ③











. Shift cam assembly (1) · Bearing holder ②



Bolt (bearing holder): 10 Nm (1.0 m • kg)



# 2.Install:

- . Guide bars (shift fork) (1)
- . Shift fork "R" (2) . Shift fork "C" (3)
- . Shift fork "L" (4)

#### NOTE: _

Install the shift forks with the embossed mark to the right and in sequence (R, C, L) beginning from the right.

# CRANKCASE ASSEMBLY

- 1.Apply:
- · Engine oil
- (onto main journal bearings)
- Sealant

(onto crankcase mating surfaces)



Yamaha bond No. 1215: 90890-85505

DO NOT ALLOW any sealant to come in contact with the oil gallery or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm of the bearings.

## 2.Install:

· Dowel pin



 Main journal bearings (onto lower crankcase)

#### NOTE:

- . Align the projection (a) of the bearing with the notch (b) in the crankcase.
- Install each bearing in its original place.

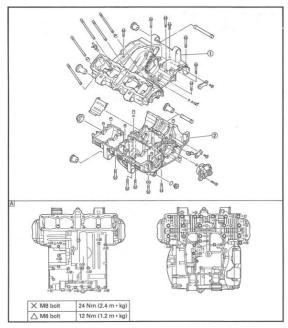




# CRANKCASE

Crankcase upper
 Crankcase lower

A Crankcase sequence tightening











4.Set shift cam and transmission gears in "NEUTRAL" position.

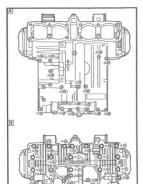
# 5.Install:

Lower crankcase ①
 (onto upper crankcase ②)

Place the lower crankcase assembly onto the upper crankcase assembly.

# NOTE: _

- Carefully guide the shift forks so that they mesh smoothly with the transmission
- Mesh the shift fork "C" with the 2nd pinion gear (3) on the main axle.



#### CAUTION:

Before tightening the crankcase bolts, check the following points:

 Be sure the gears shift correctly when the shift cam is turned by hand.

## 6. Tighten:

Lower crankcase bolt

(follow the proper tightening sequence)

Upper crankcase bolt



△ M6 bolt: 12 Nm (1.2 m • kg) × M8 bolt: 24 Nm (2.4 m • kg)

A Upper crankcase
B Lower crankcase

# NOTE: _

Tighten the bolts in the tightening sequence cast on the crankcase.







Crankcase cover (right) ①



Screw (crankcase cover):



8 Nm (0.8 m • kg)



#### MIDDLE GEAR SHAFT

1.Install:

- . Shim (1)
- Middle drive shaft assembly ②
- · Bearing holders ③



Screw (bearing holder): 25 Nm (2.5 m · kg)

# CAUTION:

After tightening the bearing holder with the screws, make sure that you stake them.

# A WARNING

#### Always use a new screw.

2.Loosen:

- Bolts (crankcase) (4)
- 3.Install:
- Shim
- . Middle driven shaft assembly (5)



Bolt (driven shaft assembly): 25 Nm (2.5 m · kg)

- 4. Tighten:
- Bolts (crankcase) (4)



Bolt (crankcase): 24 Nm (2.4 m • kg)



- 1.Install:
- · Stopper lever ①
- Spring ②
- . Shift lever ③

# NOTE: _

- . Hook the spring ends on the stopper lever ① and crankcase boss.
- . Mesh the stopper lever (1) with the shift















- Washer
- Shift shaft (4)

#### NOTE: _

- · Apply grease to the oil seal lips.
- Hook the spring ends onto the stopper (5).

#### 2.Install:

- Gaskets
- Covers ®
- Dowel pins
- Gasket
- Shift shaft lever cover ⑦



Screw (cover): 8 Nm (0.8 m • kg) Bolt (shift shaft lever cover): 12 Nm (1.2 m • kg)

# OIL PAN AND OIL PUMP

- 1.Install:
- Oil pump assembly ①
- · Neutral switch ②
- 2.Connect:
- Neutral switch lead ③



Bolt (oil pump): 12 Nm (1.2 m • kg)

# Ø

- 3.Install: • Dowel pins
- Gasket
- Oil pan ①
  Oil level switch ②

# A WARNING

Always use new copper washer and gasket.

#### NOTE: __

- Tighten the bolts (oil pan) in a crisscross
- Apply engine oil to the O-ring of the oil level switch.
- Drain bolt



Bolt (oil pan): 12 Nm (1.2 m · kg) Bolt (oil level switch): 10 Nm (1.0 m · kg) Drain bolt:

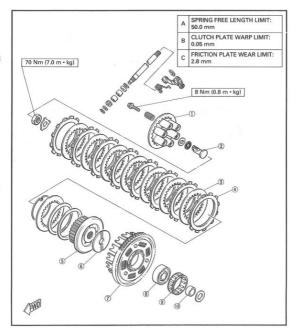
43 Nm (4.3 m · kg)



# CLUTCH

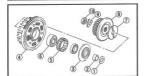
- ① Pressure plate 2 Pull rod
- 3 Clutch plate
- Friction plate
   Clutch boss
- ® Thrust plate (7) Clutch housing

- ® Spacer
- Bearing
- @ Collar









# CLUTCH AND PICKUP COIL

- 1.Install:
- Washer (1)
- Collar ②
- . Oil pump drive sprocket (3)
- Clutch housing (4)
- Bearing ⑤
- Spacer ®
- Thrust plate ⑦
- Clutch boss ®
- Lock washer (9)Nut (clutch boss) (0)

#### NOTE: .

Install the spacer (a) with the two screw holes towards the clutch boss.

#### A ......

Always use a new lock washer.

# 2.Tighten:

• Nut (clutch boss) (1)



Nut (clutch boss): 70 Nm (7.0 m • kg)

#### NOTE:

Tighten the nut (clutch boss) ① while holding the clutch boss with the universal clutch holder ②.



Universal clutch holder: 90890-04086

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

#### 4.Install:

- Friction plates
  - Clutch plates

## NOTE: _

Mount friction and clutch plate alternately.







## 5.Install:

- Washer (1)
- Bearing ②
- Pull rod (3)

#### NOTE: _

Apply molybdenum disulfide grease onto bearing/gear teeth of pull rod.



## 6.Install:

Pressure plate

## NOTE: _

Align the punched mark @ on the clutch boss with the punched mark (b) on the pressure plate.



# 7.Install:

- · Clutch springs ①
- . Bolts (clutch spring) ②



Bolt (clutch spring): 8 Nm (0.8 m • kg)

Tighten the bolts (clutch spring) in stage, using a crisscross pattern.

# 8.Install:

- · Pickup coil (1)
- Pin (2)
- . Timing plate (3)
- . Bolt (timing plate) (4)



Bolt (timing plate): 45 Nm (4.5 m • kg)



# 9.Install:

- Gasket
- Dowel pins

# **A WARNING**

Always use a new gasket.

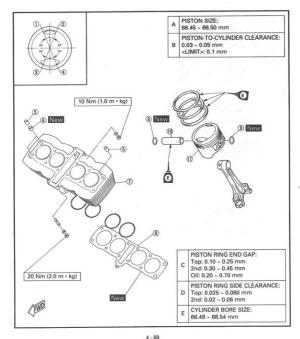




## PISTON AND CYLINDER

- ① Top ring
- ② Oil ring (lower)
- 3 Oil ring (upper)
- (4) Second ring ⑤ Dowel pin
- O-ring
- ① Cylinder

- ® Gasket
- (9) Circlip
- @ Piston pin
- (f) Piston







# 10.Install:

· Clutch cover (1)



Bolt (clutch cover): 12 Nm (1.2 m • kg)



using a crisscross pattern.

# 11.Install:

- Plate washer
- · Return spring
- Pull lever
- Washer
- · Circlip
- NOTE: _

Align the punched mark @ on the clutch pull lever shaft with the slit (b) on the pull lever.



## PISTON AND CYLINDER

1.Install:

· Oil-jet nozzles ① (with O-ring)

NOTE: _

Apply engine oil to the O-rings.



# 2.Install:

· Piston rings

#### NOTE: _

Be sure to install rings so that the manufacturer's marks or numbers are located on the upper side of the rings. Oil the pistons and rings liberally.











3.Install:

- Piston pins ①
- Pistons ②
- · Piston pin clips (3)

- . Apply engine oil to the piston pins.
- . Be sure that the arrow mark @ on the pis-
- ton points to the exhaust side of the engine.
- . Before installing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase.
- · Reinstall each piston into the cylinder it came from (numbering order 1 to 4 from the left).

# A WARNING

Always use new piston pin clip.

4.Install:

- . Gasket (cylinder) (1)
- · Dowel pins ②

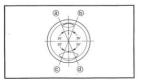
# **A WARNING**

Always use a new gasket (cylinder).

#### 5.Lubricate:

- Pistons
- Piston rings
- Cylinder

Apply a liberal coating of engine oil.



- 6.Position:
- · Top ring
- · 2nd ring
- · Oil ring
  - Offset the piston ring end gaps as shown.
- (a) Top ring end
- (lower) Oil ring end (lower)
- © Oil ring end (upper)
- @ 2nd ring end



# 7.Install:

Cylinder

# NOTE:

. Install the #2 and #3 pistons first.

. Pass the timing chain and timing chain guide (intake side) through the timing chain cavity.

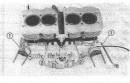


# Installation steps:

- *********************** Set the piston ring compressor (1) to the #2 and #3 pistons.
- Install the #2 and #3 pistons to the cylinder.
- Remove the piston ring compressors.
- Set the piston ring compressors (1) and piston bases ② to the #1 and #4 pistons.
- Install the #1 and #4 pistons to the cylin-
- Remove the piston ring compressors and piston bases.



Piston ring compressor: 90890-04008 Piston base: 90890-01067 ***********************



## 8.Install:

- Washer
- · Nut (cylinder) ①



Nut (cylinder): 20 Nm (2.0 m · kg)



# CYLINDER HEAD AND CAMSHAFT

- 1.Install:
- Gasket (cylinder head) (1)
- Dowel pins (2)
- · O-rings (3)



# A WARNING

Always use a new gasket (cylinder head).





## CYLINDER HEAD AND CYLINDER HEAD COVER

- ① Rubber
- ② Cylinder head cover 3 Cylinder head gasket
- (4) Circlip
- ⑤ Valve guide
- Dowel pin
- ⑦ Cylinder head
- (8) Spark plug Gasket

SPARK PLUG TYPE: DPR8EA-9 (NGK) X24EPR-U9 (NIPPON DENSO) 10 Nm (1.0 m • kg) SPARK PLUG GAP: 0.8 ~ 0.9 mm CYLINDER HEAD WARPAGE LIMIT: 0.03 mm 10 Nm (1.0 m + kg) 8 Nm (0.8 m • kg) 32 Nm (3.2 m • kg) 18 Nm (1.8 m • kg) 9 New

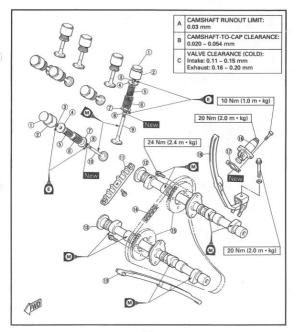


#### CAMSHAFT, VALVE AND TIMING CHAIN

- ① Valve pad
- ② Valve lifter
- 3 Valve cotter4 Valve retainer
- (5) Valve spring (inner)
- 6 Valve spring (inner)
- (7) Spring seat

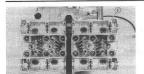
- ® Valve stem seal
- Intake valveExhaust valve
- (f) Chain guide (upper)
- @ Camshaft (intake)
- (3) Camshaft (exhaust)
- (4) Timing chain

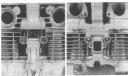
- (3 Cam sprocket
- (6) Chain tensioner (7) Gasket
- (8) Chain guide (intake)
- (9) Chain guide (exhaust)







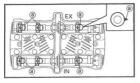












#### 2.Install:

- · Cylinder head ①
- Washers
- · Copper washers
- Nuts



Nut (cylinder head): 32 Nm (3.2 m · kg)

#### NOTE: _

- Apply the engine oil onto the nut threads.
- . Tighten the nuts in a crisscross pattern.

#### 3.Install:

- Washers
- Nuts



(cylinder head - front/rear side): 10 Nm (1.0 m · kg)

#### 4.Install:

- · Exhaust camshaft ①
- Intake camshaft ②

(with cam sprocket temporarily tighten)

Install the camshaft with the punch mark facing upward.

## 5.Install:

- Dowel pins
- · Camshaft caps (intake camshaft)
- · Camshaft caps (exhaust camshaft)

· Make sure that each camshaft cap is installed in its original place by reference to its embossed identification mark, as follows: Intake: I

#### Exhaust: E

. Install the camshaft cap with the arrow mark (a) embossed facing right side of the engine.

#### 6.Install:

Bolts (camshaft caps)



Bolt (camshaft cap): 10 Nm (1.0 m · kg)



#### NOTE: __

Tighten the bolts (camshaft cap) in a crisscross pattern from the inside outwards.

#### CAUTION:

The bolts (camshaft caps) must be tightened evenly or damage to the cylinder head, camshaft caps and camshaft will result.

#### 7.Install:

• Cam sprockets ①

**********

#### Installing steps:

- Turn the crankshaft counterclockwise until the TDC mark (a) is aligned with the align mark (b).
- Fit the timing chain onto both cam sprockets and install the cam sprockets on the camshafts.

#### NOTE: _

When installing the cam sprockets, start with the exhaust camshaft to keep the timing chain as tense as possible on the exhaust side, and set the hole of "EX" mark side @ on the cam sprocket to the camshaft.

"IN": Intake side "EX": Exhaust side.

## CAUTION:

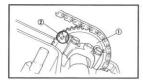
Do not turn the crankshaft during the camshafts installation. Damage or improper valve timing will result.

- ■Turn both camshafts opposite to each other until the punch mark ② on the camshaft is aligned with the hole ③ on the camshaft cap. Make sure that the "E" on the exhaust camshaft ③ and the "I" on the intake camshaft ① are visible from the top.
- While holding the camshafts, temporarily tighten the bolts.

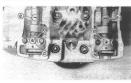
**********

#### 8.Install:

. Chain guide (exhaust) (1)







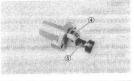




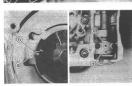












### TIMING CHAIN TENSIONER

- 1.Install:
- . Timing chain tensioner

## **********

- Installation steps: Remove the tensioner cap bolt (1), washer ② and springs ③.
- Release the timing chain tensioner oneway cam (4) and push the tensioner rod (5) all the way in.
- Install the tensioner with a new gasket (6) onto the cylinder.



Bolt (timing chain tensioner): 10 Nm (1.0 m · kg)

Install the springs (3), washer (2) and cap bolt (1).

-------



Cap bolt (timing chain tensioner): 20 Nm (2.0 m · kg)

### 2.Turn:

- Crankshaft
- Counterclockwise several turns
- 3.Check:
- TDC mark @
- Align with the align mark (b).
- Camshaft timing punch mark © Align with the camshaft cap hole @. Out of alignment → Adjust. Refer to "VALVE CLEARANCE ADJUST-MENT" in CHAPTER 3.
- 4.Install:
- · Timing plate cover



Screw (timing plate cover): 8 Nm (0.8 m · kg)

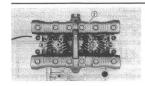
#### 5. Tighten:

Bolt (cam sprocket)



Bolt (cam sprocket): 24 Nm (2.4 m · kg)





#### CYLINDER HEAD COVER

- 1.Install:
- Gasket (cylinder head cover)
- Cylinder head cover ①



Bolt (cylinder head cover): 10 Nm (1.0 m · kg)

#### **FNGINE REMOUNTING**

When remounting the engine, reverse the removal procedure.

Note the following points:

## 1.Install:

Engine assembly

(from the right side of the motorcycle)









- . Engine stay (rear) 1
- . Mounting bolt (rear-lower) ②
- . Mounting bolt (rear-upper) (3)
- . Down tube (right) (4)
- · Cross tube (front) (5)
- Engine stay (front) (6)
- . Mounting bolt (front) (7)



Bolt (engine stay): 30 Nm (3.0 m · kg) Mounting bolt (rear-upper/lower): 48 Nm (4.8 m • kg) Bolt (down tube): 89 Nm (8.9 m · kg) Mounting bolt (front): 48 Nm (4.8 m • kg)





- 3.Install:
- Gaskets
- Exhaust pipe (1) · Bolt ②



Nut (exhaust pipe): 20 Nm (2.0 m · kg) Bolt:

25 Nm (2.5 m · kg)









- · Muffler (1)
- 5. Tighten:
- · Bolt ②



Bolt (muffler): 25 Nm (2.5 m • kg) Bolt (exhaust pipe-muffler): 20 Nm (2.0 m · kg)



#### 6.Install:

. A.C. generator (1)



Bolt (A.C. generator) 2: 25 Nm (2.5 m · kg) Bolt (A.C. generator) ③: 25 Nm (2.5 m · kg)

**LOCTITE®** 

#### 7.Install:

Starter motor (1)



Bolt (starter motor) 2: 12 Nm (1.2 m · kg) Bolt (starter motor) (3): 7 Nm (0.7 m • kg) YAMAHA Bond No.1215

## 8.Connect:

- Starter motor lead 4
- 9.Install:
- Shift pedal link



Bolt (shift pedal link) ①: 10 Nm (1.0 m · kg)



Align the punched mark @ on the shaft with the slot (b) on the shift arm (2).



#### 10.Install:

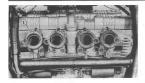
- · Cable stay (1)
- · Clutch cable ②



Bolt (cable stay): 12 Nm (1.2 m · kg)







11.Install:

Carburetor joint (1)



Bolt (carburetor joint): 12 Nm (1.2 m · kg)

 Carburetor Refer to "CARBURETOR" in CHAPTER 5.

12.Connect:

Battery leads

CAUTION:

Connect the positive lead ① first and then the negative lead 2.

13.Fill:

 Crankcase Refer to "ENGINE OIL REPLACEMENT" in CHAPTER 3.



Total amount: 4.4 L

14.Adjust:

· Idle speed Refer to "IDLING SPEED ADJUSTMENT" in CHAPTER 3.



Idle speed: 950 ~ 1,050 r/min

15.Adjust:

· Throttle cable free play Refer to "THROTTLE CABLE ADJUST-MENT" in CHAPTER 3.



Throttle cable free play: 3 ~ 5 mm At throttle grip flange







## CARBURETION

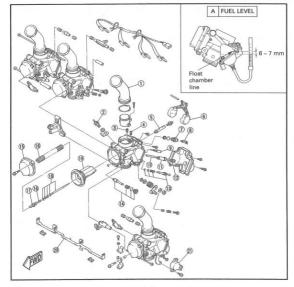
## CARBURETOR

- ① Air funnel
- ② Carburetor heater
- 3 Pilot air jet
- 4 Main air jet
- (5) Needle iet ® Float
- 7 Valve seat
- ® Needle valve
- @ Pilot iet
- Main jet nozzle
- 1 Main jet holder
- 1 Main jet
- (3) Pilot screw set

- (4) Starter plunger set
- (3) Vacuum chamber cover
- ® Spring 1 Jet needle holder
- (8) Jet needle set
- (9) Piston valve
- @ Joint (starter lever)
- @ TPS (throttle position sensor)

	I. D. Mark	4KM00	4PR00
	MAIN JET	#100	
	MAIN AIR JET	#72.5	
	PILOT JET	#12.5	
	PILOT AIR JET 1	#120	
	JET NEEDLE	5DT3-2 1-1/2 turns out #125 950 ~ 1,050 r/min	
	PILOT SCREW		
	THROTTLE VALVE		
	ENGINE IDLE SPEED		
ELIEL LEVEL		6 - 7 mm	

SPECIFICATIONS





## REMOVAL

- 1.Remove:
- Seat
- Fuel tank Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.
- · Air filter case

Refer to "VALVE CLEARANCE ADJUST-MENT" in CHAPTER 3.



- Throttle cables (1)
- Starter cable (2)





- . Carburetor heater coupler ①
- 4.Remove:
- Fuel hose (2)





### 5.Disconnect:

- Throttle sensor lead ①
- 6.Loosen:
- Screws
- 7.Remove:
- · Carburetor assembly



## DISASSEMBLY

The following parts can be cleaned and inspected without carburetor separation. (All inner parts except starter plunger can be cleaned and inspected without carburetor separation.)

- Throttle valve
- Piston valve





- · All jets
- Float
- Needle valve
- Valve seat
- Main nozzle
- Jet needle





- Clamps ②
- . Carburetor heater lead (3)
- Throttle sensor (4)
- O-ring





- · Collars (2)
- · Lever connecter (3)
- Throttle cable holder ④
- . Starter joint (5)
- Carburetor hold bolt ®
- Collar (7)
- Rod (8) . Joint hose (9)
- Joint pipe ®
- CAUTION:

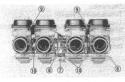
Never disassemble the joint (fuel feed) ①.

. Since the parts that were removed are defective, do not reuse them.

Be careful not to lose the return spring (1) under the synchronizing screw @ when disassembling the carburetor.

























#### 3.Remove:

• Starter plunger ①

#### NOTE: _

Unhook the hooks from the carburetor body and then pull out the starter plunger.

#### 4.Remove:

- Carburetor heater ②
- Washer
- Terminal ③
- 5.Remove:
- Vacuum chamber cover ①
- . Spring ②
- . Jet needle holder ③
- · Spring 4
- Jet needle (5)
- Piston valve 6

## 6.Remove:

- Float chamber ①
- Gasket ②
- Screw (3)
- Float 4 • Float pin (5)
- Screw
- Needle valve
- Valve seat
- · O-ring
- 7.Remove:
- Main jet ①
- . Main jet holder ②
- Main jet nozzle
- Screw ③
- Needle jet
- Pilot jet ④
- Pilot screw (5)

## 8.Remove:

- Main air jet ①
- Pilot air jet ②





#### INSPECTION

- 1.Inspect:
- Carburetor body
- Float chamber
- Jet housing
- Cracks/Damage → Replace. Fuel passage
- Contamination → Clean as indicated. · Carburetor float chamber body Contamination → Clean.
- -------

#### Cleaning steps:

- · Wash carburetor in petroleum based solvent. (Do not use any caustic carburetor cleaning solution.)
- · Blow out all passages and jets with compressed air.

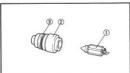
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## 2.Inspect:

Floats

Damage → Replace.



#### 3.Inspect:

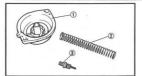
- Needle valve (1)
- Valve seat ②
- O-ring (3)

Damage/Wear/Contamination → Replace as a set.



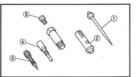
## 4.Inspect:

- Throttle valve (1) Scratches/Wear/Damage → Replace.
- Rubber diaphragm ②
- Tears → Replace.



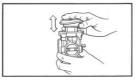
#### 5.Inspect:

- · Vacuum chamber cover ①
- Spring ②
- Jet needle holder ③
   Cracks/Damage → Replace.



## 6.Inspect:

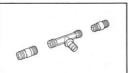
- Jet needle ①
- Needle jet ②
- Main jet ③
- Pilot jet ④
- Pilot screw ⑤
   Bends/Wear/Damage → Replace.
   Contamination → Blow out jets with compressed air.



#### 7.Check:

Free movement

Insert the throttle valve into the carburetor body, and check for free movement. Stick ightarrow Replace.



### 8.Inspect:

- · Joint (ventilation hose)
- Joint (fuel hose)
- . Joint (fuel feed)
- Cracks/Damage → Replace.



#### ASSEMBLY

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

#### CAUTION:

- Before reassembling, wash all parts in clean petroleum based solvent.
- · Always use a new gasket.

#### 1.Install:

- · O-ring
- Washer
- Spring
- · Pilot screw

Pilot screw (turns out): 1-1/2

## 2.Install:

- Throttle valve (1)
- Jet needle ②
- Jet needle holder ③
- Spring ④Vacuum chamber cover ⑤

### NOTE:

- Insert the spring end onto the spring guide on the vacuum chamber cover.
- Match the tab on the diaphragm to the recess in the carburetor body.

#### 3.Install:

- Starter plunger (1)
- Terminal (2)
- Washer
- Carburetor heater ③



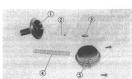
Carburetor heater: 3 Nm (0.3 m • kg)

#### NOTE: _

- Use "Heat Sinker" when installing the carburetor heater ③.
- . Align the corner of terminal 2 with a.



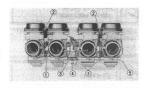
Heat sinker





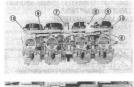
#### NOTE:

"HEAT SINKER" is the name of a product, sold at most electrical appliance dealers.



#### 4.Install:

- . Joint pipe (1)
- Joint hose ②
- Rod (3)
- · Collar (4)
- Carburetor hold bolt (5)
- Starter joint (6)
- Throttle cable holder (7)
- Lever connector (8)
- · Collars (9)
- · Screws (1)



- . Do not tighten the connecting bolts yet.
- Insert the throttle arm @ (on the #1, #2, #4 carburetors) between the spring (1) and synchronizing screw (3).



Hook the starter joint arm onto each starter plunger.





- · Place the carburetor assembly on a surface plate with the intake manifold side down and then tighten the connecting bolts while pushing down the respective carburetor with an even force.
- · After tightening, check the throttle lever and starter joint for smooth action.





#### INSTALLATION

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

- 1.Adjust:
- Carburetor synchronization Refer to "CARBURETOR SYNCHRONIZA-TION" in CHAPTER 3.
- 2.Adjust:
- · Idle speed



Engine idle speed: 950 ~ 1,050 r/min

Refer to "IDLING SPEED ADJUSTMENT" in CHAPTER 3.

- 3.Adjust:
- · Throttle cable free play



Throttle cable free play: 3 ~ 5 mm

Refer to "THROTTLE CABLE ADJUST-MENT" in CHAPTER 3.

## **FUEL LEVEL ADJUSTMENT**

- 1.Measure:
- . Fuel level @
- Out of specification → Adjust.



Fuel level:

6 ~ 7 mm Below the float chamber line

************

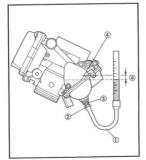
# Fuel level measurement and adjustment

- Place the motorcycle on a level surface.
- •Use a garage lack under the engine to ensure that the carburetor is positioned vertically.
- Connect the fuel level gauge 1 to the drain pipe (2).



Fuel level gauge: 90890-01312

- Loosen the drain screw (3).
- · Hold the gauge vertically next to the float chamber line (4).
- Measure the fuel level @ with the gauge. ************







### TPS (THROTTLE POSITION SENSOR) ADJUSTMENT AND INSPECTION

#### NOTE:

- · Idle speed should be adjusted properly before adjusting the throttle sensor position.
- . When installing the TPS, observe the display on the tachometer and adjust the angle accordingly. Refer to the adjustment procedure below.

#### 1.Adjust:

· Throttle position sensor position

***********

#### Adjustment steps:

- Turn the main switch to "ON".
- Disconnect the throttle sensor coupler.
- Reconnect the throttle sensor coupler.

#### NOTE: _

When the above procedure is commenced, the machine switches to TPS adjustment mode.

- Loosen the throttle sensor screws (1).
- · Adjust the throttle sensor position.

The angle of the TPS is shown on the tachometer.

 Adjust the angle of the TPS as appropriate as shown below.

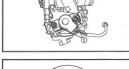
When the angle is correct, the tachometer reads 5,000 rpm. ②

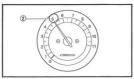
When the angle is too wide, the tachometer reads 10,000 rpm.

When the angle is too narrow, the tachometer reads 0 rpm.

· After adjusting the angle, tighten the throttle sensor screws.

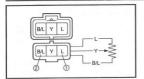
To return to normal mode, start the engine or reset the main switch. -------













Throttle sensor

*****************

Inspection steps:

Disconnect the throttle sensor coupler.

Remove the throttle sensor from carbure-

or.

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

Tester (+) lead → Blue terminal ①
Tester (-) lead → Black/Blue terminal ②

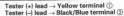
Check the throttle sensor resistance.



Throttle sensor resistance: 3.5 ~ 6.5 kΩ at 20°C (Blue — Black/Blue)

Out of specification  $\rightarrow$  Replace the throttle

 Connect the pocket tester (Ω × 1k) to throttle sensor coupler.



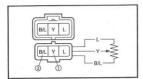
Check the throttle sensor resistance while turning throttle slowly.



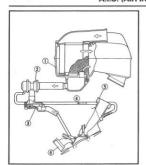
Throttle sensor resistance:  $0 \sim 5 \pm 1.5 \text{ k}\Omega$  at 20°C (Yellow — Black/Blue)

Out of specification → Replace the throttle sensor.

***********







## A.I.S. (AIR INDUCTION SYSTEM)

## AIR INJECTION

This system reburns unburned exhaust gas by mixing fresh air (secondary air) in at the exhaust port to reduce hydrocarbon.

When the pressure around the exhaust port is reversed (negative), the reed valve is opened and the secondary air flows into the exhaust port. Required temperature for reburning of unburned exhaust gas is approximately 600° to 700°C.

- ① Air cleaner
- 2 Air cut valve
- ③ Reed valve
- Vacuum signal
   Carburetor joint
- Exhaust port

### AIR CUT VALVE

The air cut valve is operated by intake gas pressure through the diaphragm. Normally, this valve is opened in order to allow fresh air to flow into the exhaust port. When the throttle is closed rapidly, negative pressure is generated and this valve is closed in order to prevent after-burning.

Additionally, even if the engine is run at high RPM and the pressure decreases, the valve automatically closes in order to guard against a loss of performance due to self-E.G.R. (Exhaust Gas Recirculation).

(This "low-boost close" function is the same as the A.I.S. air cut valve function on the FZR600 (3HW), however, the XV750 models work differently.)

VIEW 1.

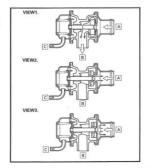
During normal operation, the valve is open.

When decelerating suddenly (throttle valve suddenly closes), the valve closes.

VIEW 3.

When running at high PRM's, the valve is closed.

- A From air cleaner
- B To reed valve
- C To carburetor joint

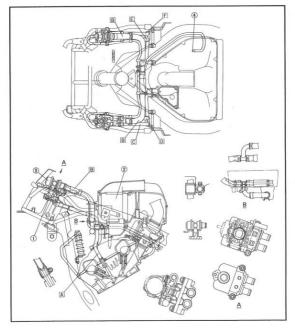


## A.I.S. (AIR INDUCTION SYSTEM)

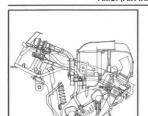


## A.I.S. (AIR INDUCTION SYSTEM) DIAGRAMS

- ① Reed valve
- ② Air cleaner
- Air cut valve
   No. 4 cylinder (carburetor joint)
- A To cylinders
- B To air cut valve
  C To No. 1 cylinder
- D To No. 2 cylinder
- E To No. 3 cylinder
- F To No. 4 cylinder







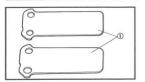
#### A.I.S. (AIR INDUCTION SYSTEM) INSPECTION

#### NOTE: _

If the specified idling speed cannot be obtained, even after the adjustment procedures described in the "Inspection and adjustment" section have been carried out, follow the procedures below.

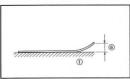
#### 1.Inspect:

- Hose connection
  - Poor connection → Correct. Loose connection → Correct properly.
- Hoses
- Cracks/Damage → Replace. · Pipes
- Cracks/Damage → Replace.



#### 2.Inspect:

- · Reed valves ①
- · Reed valve stopper
- Cracks/Damage → Replace.



#### 3.Measure:

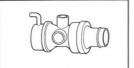
- . Reed valve bending limit @
- Out of specification → Replace.

Reed valve bending limit:



## 0.4 mm ① Surface plate





#### 4.Inspect:

- · Air cut valve
- Cracks/Damage → Replace.

## A.I.S (AIR INDUCTION SYSTEM)





### A.I.S. (AIR INDUCTION SYSTEM) ADJUSTMENT

#### NOTE: _

The above inspection and adjustment procedures are unnecessary for ordinary inspection and adjustment.

#### NOTE: _

Valve clearance and carburetor synchronization should be adjusted properly before adjusting the A.I.S.

#### NOTE: __

Place the motorcycle on its centerstand if a centerstand is equipped. If not, place a suitable stand under the motorcycle.

#### 1.Remove:

- Seat
- Fuel tank
- Cowling Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.

#### 2.Adjust:

. A.I.S. (Air Induction System)

## 

#### 1st step:

- Remove the hose ① from the air cut valve
- Fit rubber plugs into the air cut valve ② and hose ① to cut off the air.
- Start the engine and let it warm up until it reaches the specified temperature.
- Use a temperature probe tester connected to the drain bolt thread.



Temperature: 65 ~ 75°C

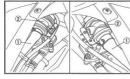
Adjust engine idling speed.

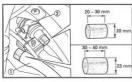
#### NOTE:

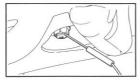
Be careful not to get burned during the operation as the exhaust pipe generates considerable heat.



Engine idling speed: 950 ~ 1,050 r/min

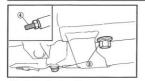


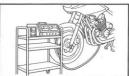




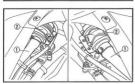
## A.I.S (AIR INDUCTION SYSTEM)











Remove the exhaust bolt 3 and install the exhaust attachment (4).



Exhaust attachment: 90890-03134

#### A WARNING

Be careful not to get burned when removing or installing the exhaust bolt or exhaust attachment, as the exhaust pipe generates considerable heat.

 Check the CO density by connecting a CO meter to the exhaust attachment

 Use a carburetor angle driver to adjust the pilot screw until the specified value is ohtained



Standard CO density: 4.5%



Carburetor angle driver: 90890-03158

 Remove the exhaust attachment and install the exhaust holt.

#### A WARNING

Be careful not to get burned when removing or installing the exhaust bolt or exhaust attachment, as the exhaust pipe generates considerable heat.



**Exhaust bolt:** 7 Nm (0.7 m • kg)

#### 2nd step:

- Remove the rubber plugs from the air cut valve (2) and hose (1), and activate the A. I.
- Adjust engine idling speed once more.



Engine idling speed: 950 ~ 1,050 r/min ************

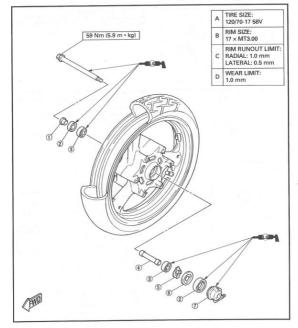


## CHASSIS

## FRONT WHEEL

- ① Collar
- ② Oil seal
- (3) Bearing
- (4) Spacer
- (5) Meter clutch
- ③ Speedometer gear unit
- ® Clutch retainer
- TIRE PRESSURE (COLD) Maximum load* 205 kg Cold tire pressure: Front 225 kPa (2.25 kg/cm², 2.25 bar) 250 kPa (2.5 kg/cm², 2.5 bar) Up to 90 kg load* 90 kg load ~ Maximum 250 kPa (2.5 kg/cm², 2.5 bar) 290 kPa (2.9 kg/cm², 2.9 bar) load* 250 kPa (2.5 kg/cm², 2.5 bar) 290 kPa (2.9 kg/cm², 2.9 bar) High speed riding

* Load is the total weight of cargo, rider, passenger, and accessories.



## A WARNING

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

1.Place the motorcycle on a level place.



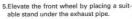
- Speedometer cable ①
- 3.Remove:
- Speedometer cable guide ②
- Brake calipers (left and right) ③
- . Bolt (brake hose holder) (4)

#### NOTE: .

Do not depress the brake lever when the wheel is off the motorcycle otherwise the brake pads will be forced shut.

#### 4.Loosen:

- Pinch bolt (front wheel axle) 1
- Front wheel axle ②



#### 6.Remove:

- Front wheel axle
- Front wheel

## 7.Remove:

- · Collar ①
- Speedometer gear unit ②





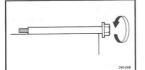






## FRONT WHEEL





#### INSPECTION

- 1.Inspect:
- Front wheel axle
   Roll the axle on a flat surface.
   Bends → Replace.

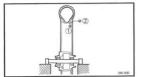
### A WARNING

Do not attempt to straighten a bent axle.

#### 2.Inspect:

- Tire
- Wear/Damage → Replace.
  Refer to "TIRE INSPECTION" in CHAPTER
- 3.
- · Wheel

Refer to "WHEEL INSPECTION" in CHAP-TER 3.



## 3.Measure:

- Wheel runout
  - Over specified limit  $\rightarrow$  Replace.



Rim runout limits:

Radial ①: 1.0 mm Lateral ②: 0.5 mm



#### 4.Inspect:

- Wheel bearings
- Bearings allow play in the wheel hub or wheel turns roughly → Replace.
- Oil seals
- Wear/Damage → Replace.



### 

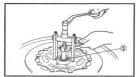
- Clean the outside of the wheel hub.
- Remove the oil seals (1) use a flat-head screw driver.

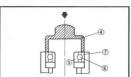
## NOTE: __

Place a rag ② on the outer edge to prevent damage.

## FRONT WHEEL







- Remove the bearing ③ using a general bearing puller.
- Install the new bearing and oil seal by reversing the previous steps.

#### NOTE: _

Use a socket (4) that matches the outside diameter of the race of the bearing and oil seal

### CAUTION:

Do not strike the center race (§) or balls (§) of the bearing. Contact should be made only with the outer race (⑦).

*********

#### INSTALLATION

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

1.Lubricate:

- Front wheel axle
- Bearings
- · Oil seal (lips)
- Drive/Driven gear (speedometer)



Recommended lubricant: Lithium soap base grease

#### 2.Install:

· Speedometer gear unit

## NOTE: _

Be sure that two projections inside the wheel hub mesh with the two slots in the gear unit assembly.



#### 3.Install:

Front wheel

#### NOTE: _

Be sure that the projection (torque stopper) of the gear unit housing is positioned correctly.

## FRONT WHEEL



- 4. Tighten:
- · Front wheel axle
- · Pinch bolt (front wheel axle)
- · Bolt (brake caliper)



Front wheel axle: 59 Nm (5.9 m · kg) Pinch bolt (front wheel axle): 19 Nm (1.9 m · kg) Bolt (brake caliper): 35 Nm (3.5 m · kg)

#### CAUTION:

Before tightening the pinch bolt, stroke the front fork several times to check for proper fork operation.

#### A WARNING

Make sure that the brake hose is routed properly.

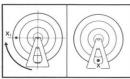
#### STATIC WHEEL BALANCE ADJUSTMENT

#### MOT

- After replacing the tire and/or rim, wheel balancer should be adjusted.
- Adjust the wheel balance with brake disk installed.
- 1.Remove:
- · Balancing weight
- 2.Set the wheel on a suitable stand.



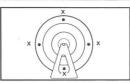












#### 3.Find:

- · Heavy spot
- **********

## Procedure:

- a.Spin the wheel and wait for it to rest.
- b.Put an "X." mark on the wheel bottom
  - c.Turn the wheel so that the "X1" mark is 90° up.
  - d.Left the wheel fall and wait for it to rest. Put an "X2" mark on the wheel bottom spot.
  - e.Repeat the above b., c., and d. several times until these marks come to the same
  - f. This spot is the heavy spot "X".

# ***********

### 4.Adjust:

- Wheel balance
- ***********

#### Adjusting steps:

Install a balancing weight (1) on the rim exactly opposite to the heavy spot "X".

# Start with the smallest weight.

- Turn the wheel so that the heavy spot is
  - Check that the heavy spot is at rest there. If not, try another weight until the wheel is balanced.

## ***********

#### 5.Check:

- Wheel balance
- ***********

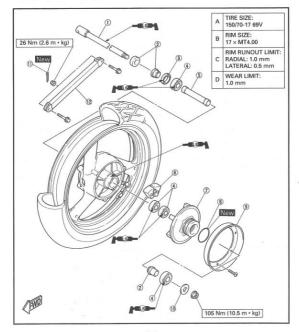
### Checking steps:

- Turn the wheel so that it comes to each noint as shown.
- · Check that the wheel is at rest at each point. If not, readjust the wheel balance. ************

### **REAR WHEEL**

- ① Wheel axle
- (2) Collar
- 3 Oil seal
- (4) Bearing (5) Spacer
- ⑥ Clutch damper

- (?) Clutch hub
- ® O-ring
- Dust cover plate
- @ Plate washer
- ① Cotter pin
- @ Tension bar



### REMOVAL

#### A WARNING

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

1.Place the motorcycle on a level place.



#### 2.Remove:

Brake caliper (1)

#### NOTE: _

Do not depress the brake pedal while the caliper is removed.



#### 3.Loosen:

- · Pinch bolt ①
- 4.Remove:
- Nut (rear wheel axle) ②
- Washer
- Rear wheel axle (3)

Pull the wheel to the right, to separate it from the final gear case.



#### 5.Remove:

· Rear wheel





#### INSPECTION

- 1.Inspect:
- · Rear wheel axle
- Wheel
- · Wheel bearing
- Oil seals

Refer to "FRONT WHEEL".

#### 2 Measure

 Wheel runout Refer to "FRONT WHEEL".

#### INSTALLATION

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

- 1.Lubricate:
- · Rear wheel axle
- Bearings
- Oil seals



Recommended lubricant: Lithium soap base grease

# 2.Tighten:

- Nut (rear wheel axle)
- Pinch bolt
- . Bolts (brake caliper)



Nut (rear wheel axle): 105 Nm (10.5 m • kg) Pinch bolt:

16 Nm (1.6 m • kg) Bolt (brake caliper): 35 Nm (3.5 m • kg)



### STATIC WHEEL BALANCE ADJUSTMENT

## NOTE: ____

- After replacing the tire and/or rim, wheel balance should be adjusted.
- Adjust the wheel balance with brake disc and hub installed.

#### 1.Adjust:

Wheel balance

Refer to "FRONT WHEEL".

# FRONT AND REAR BRAKE CHAS

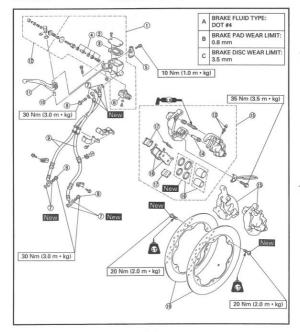


## FRONT AND REAR BRAKE

#### FRONT BRAKE

- Master cylinder assembly 2 Master cylinder cap
- ③ Diaphragm
- (4) Master cylinder kit
- (5) Master cylinder bracket 6 Front brake switch
- ⑦ Copper washer
- ® Union bolt

- Brake hose
- @ Collar
- (f) Brake lever Master cylinder screw kit
- (3) Bleed screw
- (4) Retaining bolt (6) Caliper assembly
- (6) Caliper piston assembly
- (7) Pad spring
- ® Brake pad (9) Brake disc

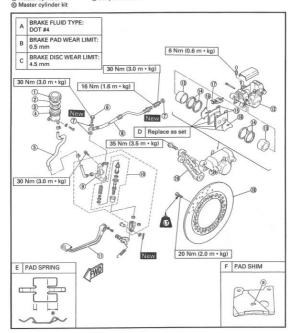


## FRONT AND REAR BRAKE



#### REAR BRAKE

- (1) Reservoir tank cap
- 2 Holder (diaphragm)
- ③ Diaphragm (4) Reservoir tank
- (5) Reservoir hose
- ® Union bolt
- ⑦ Copper washer
- ® Brake hose Master cylinder
- (f) Brake pedal
- (2) Brake caliper
- (3) Piston
- (14) Piston seal (5) Brake pad
- 6 Shim
- n Pad spring
- (8) Brake disc
- @ Caliper bracket
- must point in the disc rotating direction.
- F The arrow mark @ on the pad shim must point in the disc rotating direction.





## CAUTION:

Disc brake components rarely require disassembly. DO NOT:

- · Disassemble components unless absolutely necessary.
- · Use solvents on internal brake components.
- · Use contaminated brake fluid for cleaning.
- Use only clean brake fluid.
- · Allow brake fluid to come in contact with the eyes, otherwise eye injury may occur.
- · Allow brake fluid to contact painted surfaces or plastic parts otherwise damage may occur.
- · Disconnect any hydraulic connection otherwise the entire system must be disassembled, drained, cleaned, and then properly filled and bled after reassembly.

#### BRAKE PAD REPLACEMENT

#### NOTE:

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



#### Front brake

- 1.Remove:
- Bolt (brake hose holder) ①
- Caliper assembly ②
- · Retaining bolt ③



· Brake pads

#### NOTE: _

- . Replace the pad spring if the pad replacement is required.
- · Replace the pads as a set if either is found to be worn to the wear limit.



Wear limit: 0.8 mm











#### 3.Install:

- Brake pads (1)
- Pad springs (2)

#### Installation steps:

- ********** Connect a suitable hose 3 tightly to the caliper bleed screw. Then, place the other end of this hose into an open container.
- · Loosen the caliper bleed screw and push the pistons into the caliper with the finger.
- Tighten the caliper bleed screw.



#### Caliper bleed screw: 6 Nm (0.6 m · kg)

- · Be careful to install the pad springs in proper position.
- Install the brake pads.

Be sure to position the pad so that its round side A is forward.

4.Lubricate:

- . Retaining bolt (caliper body) ①
- . Caliper guide shaft (2)



Recommended lubricant: Lithium soap base grease

#### CAUTION:

- . Take care not to allow the brake pads to be smeared by grease.
- · Wipe off any unnecessary grease that comes out of place.

#### 5.Install:

- · Retaining bolt
- · Caliper assembly
- Brake hose holder





Retaining bolt: 22 Nm (2.2 m • kg) Bolt (caliper bracket): 35 Nm (3.5 m • kg) Bolt (brake hose holder):

7 Nm (0.7 m • kg)



#### 6.Inspect:

- Brake fluid level
   Refer to "BRAKE FLUID LEVEL INSPECTION" in CHAPTER 3.
- @ "LOWER" level line

#### 7.Check:

· Brake lever operation

A soft spongy feeling → Bleed brake system.

Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.



#### Rear brake

- 1.Remove:
- Brake caliper ①
- Pad cover ②

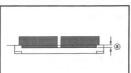


#### 2.Remove:

- · Retaining clips ①
- Retaining pins ②
- Pad spring (3)







#### 3.Remove:

- Brake pads ①
- (with pad shims)

#### NOTE:

- · When pad replacement is required, also
- replace the pad spring and shims.
- Replace the pads as a set if either is found to be worn to the wear limit (a).

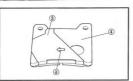


Wear limit @: 0.5 mm

#### 4.Install:

- Pad shims
- (onto brake pads)
- Brake pads
- · Pad spring





#### Installation steps:

- Connect a suitable hose ① tightly to the caliper bleed screw ②. Then, place the other end of this hose into an open container.
- Loosen the caliper bleed screw and push the pistons into the caliper with the finger.
- Tighten the caliper bleed screw (2).



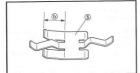
Caliper bleed screw: 6 Nm (0.6 m • kg)

 Install the pad shim (new) 3 on the brake pad (new) 4.

#### NOTE:

The arrow mark (a) on the pad shim must point in the direction of the disc rotation.





 Install the brake pads (new) and pad spring (new) (5).

## NOTE: ____

The longer tangs (b) of the pad spring must point in the direction of the disc rotation.

*********

#### 5 Install:

- · Retaining pins
- Retaining clips
- Pad cover
- Brake caliper



Bolt (brake caliper): 35 Nm (3.5 m • kg)



#### 6.Inspect:

- Brake fluid level Refer to "BRAKE FLUID LEVEL INSPEC-TION" in CHAPTER 3.
- @ "LOWER" level line

#### 7.Check:

- . Brake pedal operation
- A soft or spongy feeling → Bleed brake system.

Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.

#### CALIPER DISASSEMBLY

#### NOTE

Before disassembling the front brake caliper or rear brake caliper, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.





#### Front brake

- 1.Remove:
- · Union bolt ①
- · Copper washers ②
- Brake hose

Place the open end hose into a container and pump the oil fluid out carefully.



#### 2.Remove:

- . Bolt (brake hose holder) (1)
- · Caliper assembly ②
- Retaining bolt (3)
- Brake pads Pad springs
- 3 Remove:
- Pistons (1)
- · Piston seals (2)



· Blow compressed air into the hose joint opening to force out the caliper piston from the caliper body.



## A WARNING

- . Never try to pry out the piston.
- · Cover the piston with a rag. Use care so that piston does not cause injury as it is expelled from the cylinder.

************

Remove the piston seals.





#### Rear brake

- 1.Loosen:
- Union bolt
- 2.Remove:
- Brake caliper Pad cover
  - · Retaining clips

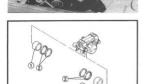
  - · Retaining pins · Pad spring
- · Brake pads
- (with pad shims) Refer to "BRAKE PAD REPLACEMENT".
- 3.Remove: · Union bolt ①
- · Copper washer ②
- Brake hose (3)



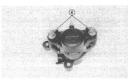
Place the open end of the hose into a container and pump the oil fluid out carefully.

## 4.Remove:

- Pistons (1)
- Piston seals (2)







## Removal steps:

- *********** Using a wood piece (3), lock the right side piston.
- · Blow compressed air into the hose joint opening @ to force out the left side piston from the caliper body.
- Remove the piston seals and reinstall the piston.
- Repeat previous step to force out the right side piston from the caliper body.

-----

## A WARNING

- . Never try to pry out the piston.
- . Do not loosen the bolts (4).



#### MASTER CYLINDER DISASSEMBLY

#### NOTE

Before disassembling the front or rear brake master cylinders, drain the brake hose, master cylinder, brake caliper and reservoir tank of their brake fluid.



## Front brake

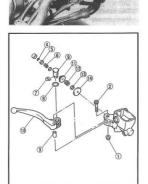
- 1.Remove:
- · Union bolt ①
- . Copper washers (2)
- Brake switch lead ③

#### NOTE: _

Disconnect the brake switch coupler from the brake lever while the hook of the brake switch is pushed by suitable rod.

## 2.Remove:

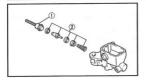
. Master cylinder (1)



#### 3.Remove:

- · Nut (1)
- Bolt ②
- Collar ③
- · Circlip (4)
- Nut ⑤
- Spring ®
- Plate
- e riate
- Circlip ⑦
- Washer ®
- Retaining pin (9)
- Brake lever (1)
- Adjuster (1)
- Spring @
- Nut (3)
- Plate (4)





- 4.Remove:
- Rod ①
- Master cylinder kit ②

#### Rear brake

- 1.Remove:
- Seat
- Side cover (right)

Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.



#### 2.Remove:

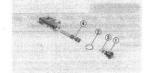
- Union bolt ①
- · Copper washers ②
- 3.Remove:
- Hose ③
- 4.Loosen:
- Lock nut (4)
- 5.Disconnect:
- Brake adjuster
- 6.Remove:
- Master cylinder ⑤
- Reservoir tank



#### 7.Remove:

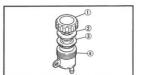
. Hose (reservoir tank) (1)





#### 8.Remove:

- . Dust cover (1)
- · Circlip ②
- Rod (3)
- . Master cylinder kit (4)



#### 9.Remove:

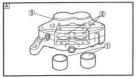
- Cap (reservoir tank) (1)
- Holder (diaphragm) ②
- Diaphragm (3)
- · Reservoir tank (4)

### INSPECTION AND REPAIR

	l brake component ent schedule:
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every two years
Brake fluid	Replace only when brakes are disassembled.

## **▲** WARNING

All internal parts should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.

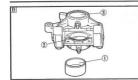


### 1.Inspect:

- · Caliper piston (1) Scratches/Rust/Wear → Replace caliper assembly.
- · Caliper cylinder (2) Wear/Scratches → Replace caliper assembly.
- · Caliper body (3)
- Cracks/Damage → Replace.
- Oil delivery passage (caliper body) 6-22 Blow out with compressed air.

# FRONT AND REAR BRAKE CHAS





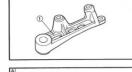
## A WARNING

Replace the piston seal and dust seal whenever the caliper is disassembled.

- A Front
- B Rear

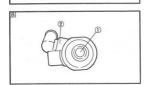


· Caliper bracket ① Cracks/Damage → Replace.





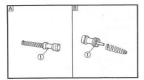
- Master cylinder ① Wear/Scratches → Replace the master cylinder assembly.
- Master cylinder body ②
- Cracks/Damage → Replace.
- Oil delivery passage (master cylinder body) Blow out with compressed air.
  - A Front B Rear



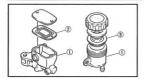
#### 4.Inspect:

- Master cylinder kit ① Scratches/Wear/Damage → Replace as a set.
- A Front



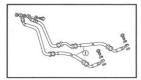






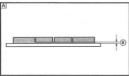


- · Reservoir tank (1)
- Cracks/Damage → Replace.
- Diaphragm (front) ②
- Diaphragm (rear) ③
- Wear/Damage → Replace.



## 6.Inspect:

- . Brake hoses (1)
- Cracks/Wear/Damage → Replace.



#### 7.Measure:

- Brake pads (thickness)
- Out of specification  $\rightarrow$  Replace.

#### NOTE:

- · When pad replacement is required, also
  - replace the pad spring and shims.
- Replace the pads as a set if either is found to be worn to the wear limit (a).





Wear limit @: Front: 0.8 mm Rear: 0.5 mm

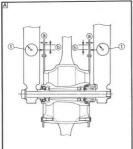
A Front B Rear

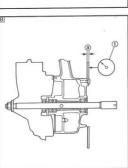


#### 8.Inspect:

- Brake discs (front and rear)
   Galling/Damage → Replace.
- A Front







9.Measure:

Brake disc deflection

Out of specification → Inspect wheel runout.

If wheel runout is in good condition, replace the brake disc(s).

Maxim

Maximum deflection: Front: 0.15 mm Rear: 0.15 mm

Brake disc thickness ③
 Out of specification → Replace.



Minimum thickness: Front: 3.5 mm Rear: 4.5 mm

① Dial gauge

6 Measuring point 1 ~ 3 mm

A Front

B Rear

NOTE:

Tighten the bolts (brake disc) in stage using a crisscross pattern.



Bolt (brake disc): 20 Nm (2.0 m • kg) LOCTITE®

#### CALIPER ASSEMBLY

#### A WARNING

 All internal parts should be cleaned in new brake fluid only.

 Internal parts should be lubricated with brake fluid when installed.



Recommended brake fluid: DOT #4

 Replace the piston seals and dust seals whenever a caliper is disassembled.







#### Front brake

- 1.Install:
- Piston seals (1)
- Pistons (2)

### **A WARNING**

Always use new piston seals.

#### 2.Install:

- Brake caliper (temporarily) ①
- · Copper washers
- Brake hose ②
- Union bolt ③



Union bolt: 30 Nm (3.0 m • kg)

## CAUTION:

When installing the brake hose on the caliper ①, take care that the pipe touches the projection @ on the brake caliper.

## A WARNING

- Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".
- · Always use new copper washers.

## 3.Remove:

- · Brake caliper
- 4.Install:
- · Brake pads
- Pad springs
- · Retaining bolt
- Brake caliper
- Brake hose holder
- Refer to "BRAKE PAD REPLACEMENT".



Retaining bolt: 22 Nm (2.2 m • kg) Bolt (brake caliper): 35 Nm (3.5 m • kg) Bolt (brake hose holder): 7 Nm (0.7 m • kg)

5.Fill:

· Reservoir tank



Recommended brake fluid: DOT #4

#### CAUTION:

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

#### A WARNING

- Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.

### 6.Air bleed:

 Brake system
 Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.





#### 7.Inspect:

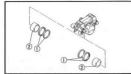
Brake fluid level
 Fluid level is under "LOWER" level line →

Replenish.

Refer to "BRAKE FLUID LEVEL INSPEC-TION" in CHAPTER 3.

@ "LOWER" level line







#### Rear brake

- 1.Install:
- Piston seals ①
- Pistons ②

#### A WARNING

Always use new piston seals.

#### 2.Install:

- Brake caliper (temporarily) ①
- · Copper washer
- Brake hose ②
- Union bolt ③



Union bolt:

30 Nm (3.0 m • kg)

## A WARNING

- Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".
- . Always use new copper washers.
- 3.Remove:
- Brake caliper
- 4.Install:
- Brake pads
- (with pad shims)
- Pad spring
- · Retaining pins
- Retaining clips
- Pad cover
   Brake caliper
- Refer to "BRAKE PAD REPLACEMENT".



Bolt (brake caliper): 35 Nm (3.5 m • kg)



5.Fill:

· Reservoir tank



Recommended brake fluid: DOT #4

#### CAUTION:

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

### A WARNING

- Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.

#### 6 Air bleed:

Brake system
 Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.



#### 7.Inspect:

Brake fluid level
 Fluid level is under "LOWER" level line →
 Replenish.

Refer to "BRAKE FLUID LEVEL INSPEC-TION" in CHAPTER 3.

@ "LOWER" level line



#### MASTER CYLINDER ASSEMBLY

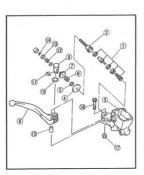
#### A WARNING

- . All internal parts should be cleaned in new brake fluid only.
- . Internal parts should be lubricated with brake fluid when installed.



Recommended brake fluid: **DOT #4** 

· Replace the piston seals and dust seals whenever a caliper is disassembled.



#### Front brake

- 1.Install:
- Master cylinder kit ①
- Rod ②
- Master cylinder ③
- Plate (4)
- · Nut ⑤
- Spring ⑥ Adjuster ⑦
- Brake lever (8)
- Retaining pin (9)
- Washer (10)
- · Circlip (1)
- Plate . Spring (2)
- · Nut ®
- · Circlip (4)
- . Collar (5)
- · Bolt ®
- · Nut @

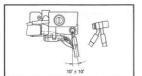


2.Install:

Master cylinder



Bolt (master cylinder): 9 Nm (0.9 m • kg)



#### 3.Install:

- · Copper washers
- Brake hose
- · Union bolt



Union bolt: 30 Nm (3.0 m • kg)

#### NOTE:

- Tighten the union bolt while holding the brake hose as shown.
- Check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.) by turning the handlebar left and right, and correct if necessary.

#### A WARNING

- Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".
- · Always use new copper washers.

#### 4.Install:

- Brake lever
- Diake level
- Reservoir tank
- 5.Connect:

   Brake switch leads

#### 6.Fill:

· Reservoir tank



Recommended brake fluid: DOT #4

#### CAUTION:

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

## **▲** WARNING

- · Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- . Refill with the same type of brake fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- . Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.

#### 7.Air bleed:

### Brake system

Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.

#### 8.Inspect:

- Brake fluid level
  - Fluid level is under "LOWER" level line → Replenish.
- Refer to "BRAKE FLUID LEVEL INSPEC-TION" in CHAPTER 3
- a) "LOWER" level line





#### 1.Install:

- Reservoir tank
- (onto frame)
- . Master cylinder kit ①
- Push rod (2)
- · Circlip (3)
- Dust boot (4)

#### 2 Install:

Master cylinder (1)

Bolt (master cylinder): 30 Nm (3.0 m • kg)











3.Install:

- · Copper washers
- Brake hoses
- Union bolt



Union bolt: 30 Nm (3.0 m • kg)

#### CAUTION:

When installing the brake hose on the master cylinder, take care that the pipe touches the projection (a) as shown.

#### A WARNING

- Proper hose routing is essential to insure safe motorcycle operation. Refer to "CABLE ROUTING".
- · Always use new copper washers.

4.Fill:

Reservoir tank



Recommended brake fluid: DOT #4

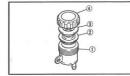
## CAUTION:

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

## **▲** WARNING

- Use only the designated quality brake fluid: otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the fluid and may result in vapor lock.





#### 5.Install:

- Reservoir tank ①
- Diaphragm ②
- Holder (diaphragm) ③
- Cap (reservoir tank) (4)

#### 6.Air bleed:

- Brake system
  - Refer to "AIR BLEEDING (HYDRAULIC BRAKE SYSTEM)" in CHAPTER 3.



#### 7.Inspect:

- · Brake fluid level
- Fluid level is under "LOWER" level line  $\rightarrow$  Replenish.
- Refer to "BRAKE FLUID LEVEL INSPEC-TION" in CHAPTER 3.
- @ "LOWER" level line



#### 8.Adjust:

- . Brake pedal height @
- Refer to "REAR BRAKE ADJUSTMENT" in CHAPTER 3.



## Brake pedal height:

30 mm Below top of footrest.

#### 9.Adjust:

- · Brake light switch
  - Refer to "BRAKE LIGHT SWITCH ADJUSTMENT" in CHAPTER 3.

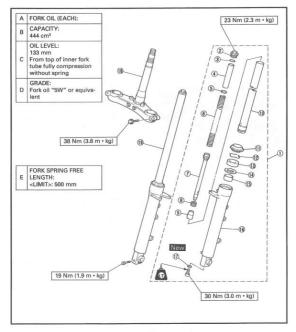


### FRONT FORK

- (1) Front fork assembly (left)
- ② Cap bolt ③ O-ring
- (4) Spacer
- ⑤ Spring seat
- 6 Fork spring
  Damper rod

- ® Damper rod spring® Oil lock piece
  - @ Inner tube
  - ① Dust seal
- @ Retaining clip
- (3) Oil seal
- Seal spacer

- (5) Slide metal
- @ Outer tube
- (f) Copper washer (f) Under bracket
- @ Front fork assembly (right)



#### REMOVAL

## A WARNING

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

1.Place the motorcycle on a level place.

- 2. Elevate the front wheel by placing suitable stand under the engine.
- 3.Remove:
- · Front wheel
- Refer to "FRONT WHEEL".



#### 4.Remove:

- Fork brace ①
- Front fender (2)
- . Brake hose holder ③



#### 5.Remove:

- Bands
- 6.Loosen:
- Pinch bolts (upper bracket) ①
- · Cap bolts (2)
- Pinch bolts (lower bracket) ③



## **▲** WARNING

Support the fork before loosening the pinch bolts.

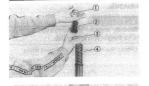


Front fork(s)



## FRONT FORK





## DISASSEMBLY

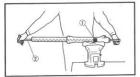
- 1.Remove:
- · Cap bolt ①
- Spacer ② Spring seat ③
- Spring (4)
- 2.Drain:
- · Fork oil

#### 3.Remove:

- · Dust seal ①
- · Retaining clip ②
- Use a slotted-head screwdriver.



Take care not to scratch the inner tube.



#### 4.Remove:

Bolt (damper rod)

## NOTE: _

Loosen the bolt (damper rod) while holding the damper rod with the T-handle @ and holder (1).



#### Damper rod holder: 90890-01388

T-Handle: 90890-01326



. Damper rod (1)



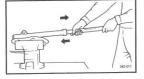


Inner fork tube

**********

## Removal steps:

- Hold the fork leg holizontally.
- · Clamp the caliper mounting boss of the outer tube securely in a vise with soft iaws.
- Pull out the inner fork tube from the outer tube by forcefully, but carefully, with 6-37 drawing the inner tube.



### CAUTION:

- . Excessive force will damage the oil seal and/or the bushes. Damage oil seal and busing must be replaced.
- . Avoid bottoming the inner tube in the outer tube during the above procedure, as the oil lock piece will be damaged.

**********************



- · Oil seal (1)
- . Seal spacer ②
- Slide metal (3)
- Piston metal
- · Oil lock piece





- Inner fork tube ①
- · Outer fork tube ②

Scratches/Bends/Damage → Replace.

### A WARNING

Do not attempt to straighten a bent inner fork tube as this may dangerously weaken the tube.

#### 2.Measure:

. Fork spring @

Over specified limit → Replace.



Fork spring free length (limit): 500 mm





## 3.Inspect:

Damper rod (1)

Wear/Damage → Replace. Contamination -> Blow out all oil pas-

sages with compressed air.

· Oil lock piece (2) Damage → Replace.

342-018

## FRONT FORK CHAS





#### 4.Inspect:

- · O-ring (cap bolt)
  - Wear/Damage → Replace.

#### ASSEMBLY

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

#### NOTE

- In front fork reassembly, be sure to use following new parts.
  - * Piston metal
  - * Slide metal
  - * Oil seal
- * Dust seal
- Make sure that all components are clean before reassembly.

#### 1.Install:

Damper rod ①

# CAUTION:

Allow the damper rod to slide slowly down the inner fork tube until it protrudes from the bottom, being careful not to damage the inner fork tube.

#### 2.Lubricate:

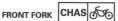
. Inner fork tube (outer surface)

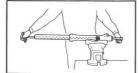


#### 3.Install:

- Piston metal (1)
- Oil lock piece ②







#### 4. Tighten:

· Bolt (damper rod)



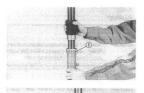


#### NOTE: _

Tighten the bolt (damper rod) while holding the damper rod with the T-handle and holder.



T-handle: 90890-01326 Damper rod holder: 90890-01388



#### 5.Install:

. Slide metal (1)

Use the fork seal driver weight and adapter.



Fork seal driver weight: 90890-01367 Adapter: 90890-01381

#### 6.Install:

- Seal spacer
- · Oil seal (1)

Use the fork seal driver weight and adapter.



Fork seal driver weight: 90890-01367 Adapter: 90890-01381

NOTE: _

Before installing the oil seal, apply the lithium soap base grease onto the oil seal lips.

## CAUTION:

Be sure that the oil seal numbered side face upward.



## FRONT FORK



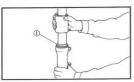


### 7.Install:

· Retaining clip (1)

#### NOTE: _

Fit retaining clip correctly in the groove in the outer tube.



#### 8.Install:

• Dust seal ①

Use the fork seal driver weight.



Fork seal driver weight: 90890-01367

### 9.Fill:

· Fork oil



#### Each fork: 444 cm³

Fork oil 5W or equivalent. After filling, slowly pump the fork up and down to distribute oil.



### Oil level:

133 mm

from the top of inner fork tube fully compressed without spring

#### NOTE:

Place the fork on upright position.

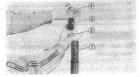
#### 10.Install:

- · Fork spring ①
- . Spring seat (2)
- . Spacer collar (3)
- · Cap bolt (4)

#### NOTE: _

 Fork spring must be installed with the smaller pitch upward.

- Before installing the cap bolt, apply the grease to the O-ring.
- . Temporarily tighten the cap bolt.



# FRONT FORK CHAS





#### INSTALLATION

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

- 1.Install:
- Front fork(s)
  - Temporary tighten the pinch bolts.

Be sure the inner fork tube end is flush with the top of the handle crown.

#### 2.Tighten:

- Pinch bolts (lower bracket) ①
- Cap bolts ②
- · Pinch bolts (upper bracket) (3)



Pinch bolt (lower bracket): 38 Nm (3.8 m • kg) Cap bolt:

23 Nm (2.3 m · kg) Pinch bolt (upper bracket): 30 Nm (3.0 m · kg)

## 3.Install:

- Bands
- 4.Install:
- Front fender
- Fender bracket · Brake hose holder



Bolt (front fender): 9 Nm (0.9 m · kg)

#### 5.Install:

- · Front wheel
- · Brake caliper

Refer to "FRONT WHEEL".



Front axle: 59 Nm (5.9 m · ka) Bolt (brake caliper): 35 Nm (3.5 m • kg) Pinch bolt (front axle): 19 Nm (1.9 m · kg)

#### A WARNING

Make sure that the brake hose are routed properly.



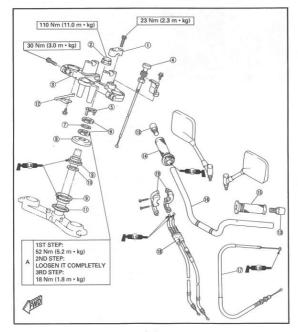
## STEERING HEAD AND HANDLEBAR

- (1) Handlebar holder
- 2 Steering stem nut
- 3 Upper bracket
- Starter cable S Lock washer
- ® Ring nut (7) Rubber washer
- ® Bearing cover Bearing
  - @ Rubber seal
  - (f) Bearing race

  - @ Cable holder (3) Grip end
- (6) Handlebar
- (f) Clutch cable ® Throttle cable
  - (9) Throttle cable housing

(4) Handlebar grip (right)

(S) Handlebar grip (left)





### REMOVAL

## **▲** WARNING

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

1.Place the motorcycle on a level place.



#### 2.Remove:

. Master cylinder (1)



## 3.Remove:

- Handlebar switches (right) ①
- 4.Disconnect:
- Rubber cover ②
- 5.Remove:
- . Throttle cable housing ③
- · Grip end (right)
- Grip (right) (4)



#### 6.Remove:

- Handlebar switches (left) (1)
- 7.Remove:
- Grip end (left) ②
- Grip (left) (3)



#### 8.Disconnect:

- · Clutch cable (1)
- · Clutch switch lead ②
- 9.Remove:
- . Clutch lever holder (3)









- Handlebar ①
- 11.Remove:
- Front wheel
- Refer to "FRONT WHEEL".
- · Front fork
- Refer to "FRONT FORK". 12.Remove:
- Fuel tank
  - Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.
  - 13.Disconnect:
  - . Main switch lead 14.Remove:
  - . Upper bracket ①
  - . Choke knob holder ②
  - . Cable holder (3)
  - Brake hose holder (4)







## 15.Remove:

- . Lock washer (1)
- Ring nut (upper) (2)
- Rubber washer

16.Remove:

· Ring nut (lower) (1)

Use the ring nut wrench 2.

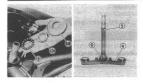


Ring nut wrench: 90890-01403

## **A** WARNING

Support the steering shaft so that it may not fall down.





## 17.Remove:

- . Bearing cover (1)
- Bearing race (2)
- Bearing (upper) ③
- · Lower bracket (4)
- · Rubber seal (5)
- . Bearing (lower) (6)



#### INSPECTION

- 1. Wash the bearing and bearing races with a solvent.
- 2.Inspect:
- Bearings (1)
- Bearing races ②



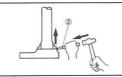


#### Bearing race replacement steps:

Remove the bearing races on the head pipe using long rod (1) and the hammer as shown.

*********************

- Remove the bearing race on the under bracket using the floor chisel (2) and the hammer as shown. ***********
- Install the new dust seal and races.



#### NOTE: _

- · Always replace bearings and races as a
- Replace the dust seal whenever a steering head is disassembled.

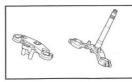


If the bearing race is not fitted squarely, the head pipe could be damaged.

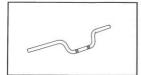


- Upper bracket
- Under bracket
- (with steering stem)

Cracks/Bends/Damage → Replace.







4.Inspect:

Handlebars
 Bends/Cracks/Damage → Replace.

## **A** WARNING

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

*********

#### Left handlebar replacement steps:

- Remove the handlebar grip.
- Apply a light coat of an adhesive for rubber on the handlebar end.
- Install the handlebar grip.

## NOTE: _

Wipe off excess adhesive with a clean rag.

#### A WARNING

Leave the handlebar intact until the adhesive becomes dry enough to make the grip and handlebar stuck securely.

#### INSTALLATION

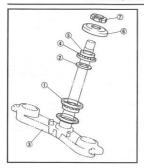
Reverse the "REMOVAL" procedure. Note the following points.

- 1.Lubricate:
- . Bearings (upper and lower)
- . Bearing races



Recommended lubricant: Lithium-soap base grease





#### 2.Install:

- Bearing (lower) (1)
- Rubber washer ②
- Lower bracket (3)
- Bearing (upper) (4)
- Bearing race ⑤
- Bearing cover (6)
  Ring nut (lower) (7)

## CAUTION:

Hold the steering stem until it is secured.



#### 3. Tighten:

. Ring nuts (lower and upper)

*****************

#### Tightening steps:

 Tighten the ring nut (lower) ① using the ring nut wrench ②.

## NOTE: _

Set the torque wrench to the ring nut wrench so that they form a right angle.



Ring nut wrench: 90890-01403



Ring nut (initial tightening): 52 Nm (5.2 m • kg)

- Turn the steering stem left and right for several times.
- Loosen the ring nut completely and retighten it to specification.

#### A WARNING

Do not over tighten.



Ring nut (final tightening): 18 Nm (1.8 m • kg)

# STEERING HEAD AND HANDLEBAR







- Check the steering stem by turning lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings.
- Install the rubber washer (1).
- Install the ring nut (upper) 2.
- Finger tighten the ring nut, then align the slots of both ring nuts. If not aligned, hold the lower ring nut and tighten the other until they are aligned.
- Install the lock washer.

NOTE: _

Make sure that the lock washer tab is placed in the slots.

************

# 4.Install:

- Upper bracket
- Nut (steering stem)

NOTE:

Temporarily tighten the steering stem nut.

### 5.Install:

· Front forks

Refer to "FRONT FORK".

#### NOTE:

In this stage, temporarily tighten the pinch bolt.

### 6. Tighten:

- . Nut (steering stem)
- · Pinch bolt (lower bracket)
- · Pinch bolt (upper bracket)



Nut (steering stem): 110 Nm (11.0 m • kg) Pinch bolt (lower bracket): 38 Nm (3.8 m • kg) Pinch bolt (upper bracket): 30 Nm (3.0 m • kg)

### 7 Install

- · Front wheel
  - Refer to "FRONT WHEEL".

### 8 Install:

- Handlebar
- Handlebar holders

2

Bolt (handlebar holder): 23 Nm (2.3 m • kg)

# STEERING HEAD AND HANDLEBAR











#### MOTE

- Before installing the handlebar onto the handle crown, apply a light coat of lithium soap base grease onto the handlebar end and install the throttle housing to the handlebar.
- The upper handlebar holder should be installed with the arrow mark @ forward

### CAUTION:

- First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.
- Check the handlebar by turning from lock to lock. If there is any contact to the fuel tank, adjust the handlebar position.

### 9.Connect:

Throttle cable

# A WARNING

Make sure that projection (a) on the throttle housing is aligned with the hole (b) on the handlebar.

### 10.Install:

. Handlebar switches (left and right)

#### NOTE

Align the projection (a) on the handlebar switch with the hole (b) on the handlebar.

### 11.Install:

. Master cylinder (front brake)



Bolt (master cylinder bracket): 9 Nm (0.9 m • kg)

# STEERING HEAD AND HANDLEBAR



12.Connect:

Clutch cable

# NOTE: __

Apply a light coat of lithium soap base grease onto the clutch cable end.

Clutch switch lead

### 13.Adjust:

 Clutch cable free play Refer to "CLUTCH ADJUSTMENT" in CHAPTER 3.



Free play:

10 ~ 15 mm at lever end

### 14.Adjust:

 Throttle cable free play Refer to "THROTTLE CABLE ADJUST-MENT" in CHAPTER 3.



Free play:

3 ~ 5 mm at throttle grip flange

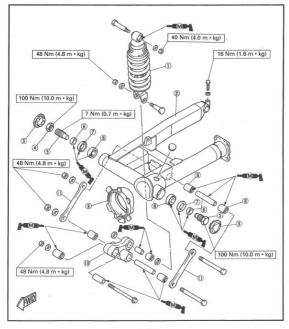


### REAR SHOCK ABSORBER AND SWINGARM

- Shock absorber
   Swingarm
- 3 Cover
- ④ Pivot shaft nut
- ⑤ Pivot shaft⑥ Collar⑦ Oil seal
- Bearing
- ③ Rubber boot⑩ Relay arm
- (f) Connecting rod

#### NOTE: .

Coat the bearings, oil seals, and collars with a liberal amount of molybdenum disulfide grease before installing. After installing, thoroughly wipe off excess grease.





### HANDLING NOTES

### A WARNING

This shock absorber contains highly compressed nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling.

- Do not tamper or attempt to open the cylinder assembly.
- Do not subject shock absorber to an open flame or other high heat. This may cause the unit to explode due to excessive gas pressure.
- Do not deform or damage the cylinder in any way. Cylinder damage will result in poor damping performance.



### NOTES ON DISPOSAL

### Shock absorber disposal steps:

Gas pressure must be released before disposing of the shock absorber. To do so, drill a 2 ~ 3 mm hole through the cylinder wall at a point 15 ~ 20 mm from the end of the gas chamber.

***********

### A WARNING

Wear eye protection to prevent eye damage from escaping gas and/or metal chips.

### REMOVAL

Rear shock absorber
1.Place the motorcycle on the level place.

### A WARNING

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



- 2.Remove:
- · Side cover
- · Fuel tank
- Refer to "SIDE COVER, FUEL TANK AND COWLING" in CHAPTER 3.





- · Cover (right) ①
- · Cover (left) ②



### 4.Disconnect:

Battery leads

### CAUTION:

Disconnect the negative lead ① first, than the positive lead 2.

### 5.Remove:

Battery



- Fuel filter ①
- . Starter relay (2)
- 7.Remove:
- · Rear wheel

Refer to "REAR WHEEL".



### 8.Remove: Bolts

- Rear fender
  - move the rear fender a little to the back.





- 9.Remove:
- Muffler
- Exhaust pipe

Refer to "ENGINE REMOVAL" in CHAPTER 4.



### 10.Remove:

- . Bolt (relay arm frame) (1)
- . Bolt (shock absorber lower) (2)
- . Bolt (connecting rod relay arm) (3)
- Relay arm (4)



### 11 Remove:

- . Bolt (shock absorber upper) ①
- Rear shock absorber ②

### Swingarm

1.Place the motorcycle on a level place.

# A WARNING

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

- 2.Remove:
- · Rear wheel
- Refer to "REAR WHEEL".
- 3.Remove:
- . Bolt (relay arm frame) (1)
- Bolt (shock absorber lower) ②
- . Bolt (connecting rod relay arm) (3)
- Relay arm 4







### 4.Check:

- . Swingarm free play
- *********

# Inspection steps:

 Check the tightening torque of the pivot shaft (swingarm) securing nut.



Nut (swingarm pivot shaft): Left: 100 Nm (10.0 m • kg) Right: 7 Nm (0.7 m • kg) Right - lock nut: 100 Nm (10.0 m • kg)

 Check the swingarm side play A by moving it from side to side.

If side play is noticeable, check the inner collar, bearing, washer and thrust cover.



Side play (at end of swingarm): 1.0 mm

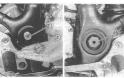
Check the swingarm vertical movement
 B by moving it up and down.

If vertical movement is tight, binding or rough, check the inner collar, bearing,

washer and thrust cover.







### 5.Remove:

- . Connecting rod (left and right) ①
- Tension bar ②

### 6.Remove:

- . Covers (left and right)
- · Pivot shaft nut ①
- Pivot shaft (right) ②
- Pivot shaft (left) ③
- Swingarm





### 7.Remove:

 Final gear case assembly ① from the swingarm

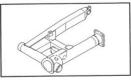


### INSPECTION

### Rear shock absorber

1.Inspect:

- · Rear shock absorber rod
- Bents/Damage → Replace the rear shock absorber assembly.
- Rear shock absorber
- Oil leaks/Gas leaks → Replace the rear shock absorber assembly.
- Spring
  - Wear/Damage → Replace the rear shock absorber assembly.
- Bushings
- Dust seals
  - Wear/Damage → Replace.
- · Bolts
  - Wear/Bends/Damage → Replace.



### Swingarm

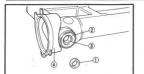
- 1.Inspect:
- Swingarm
- Crack/Bents/Damage → Replace.



### 2.Inspect:

- Pivot shaft
  - Damage/Wear → Replace.





3.Inspect:

- Collar ①
- Oil seal ②
- Bearing ③
   Rubber boot ④

### INSTALLATION

Rear shock absorber

Reverse the "REMOVAL" procedure.

Note the following points.

- 1.Lubricate: • Collars
- Bearings



Recommended lubricant: Molybdenum disulfide grease

### 2.Install:

Rear shock absorber



Nut (shock absorber - upper): 40 Nm (4.0 m • kg) Nut (shock absorber - lower): 48 Nm (4.8 m • kg) Nut (relay arm - frame): 48 Nm (4.8 m • kg)

### NOTE: ___

Lift up the swingarm to install rear shock absorber.

- 3.Connect:
- · Battery leads

### CAUTION:

Connect the positive lead first and then connect the negative lead.



### Swingarm

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

1.Lubricate:

· Drive shaft spline



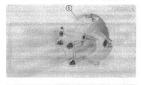
Recommended lubricant: Lithium soap base grease

2.Lubricate:

- Bearings
- Collars
- Oil seals



Recommended lubricant: Molybdenum disulfide grease





Final gear case assembly ①



42 Nm (4.2 m • kg)



Swingarm



Pivot shaft (left) ①: 100 Nm (10 m • kg) Pivot shaft (right) ②: 7 Nm (0.7 m • kg) Pivot shaft nut ③: 100 Nm (10 m • kg)



# 5.Install:

· Relay arm

Connecting rod (left and right)



Nut (shock absorber - lower) ①: 48 Nm (4.8 m • kg) Nut (connecting rod) ②: 48 Nm (4.8 m • kg) Nut (relay arm - frame) ③:



### CAUTION:

Insert the bolt (connecting rod) ② from the left.

48 Nm (4.8 m • kg)



6.Install:

Tension bar



Nut (tension bar): 26 Nm (2.6 m • kg)

### A WARNING

Always use a new cotter pin.

7.Install:

· Rear wheel

Refer to "REAR WHEEL".

# SHAFT DRIVE

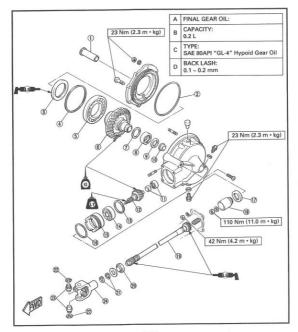


### SHAFT DRIVE

- ① Collar
- ② O-ring
- 3 Oil seal (4) Shim(s)
- (6) Bearing
- 7 Thrust washer
- 6 Ring gear

- ® Bearing Oil seal
- @ Guide collar
- (1) Bearing
- @ Final drive shaft
- (3) Shim(s)
- (A) Bearing
- (5) Bearing retainer

- 6 O-ring
- ெ Oil seal ® Gear coupling
- Drive shaft
- @ Oil seal @ Circlip
- @ Circlip
- @ Bearing
- @ Universal joint



### TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

A	Symptoms	В	Possible Causes
ment d sustaine fused w charact 2.A "rol speed; from a s 3.A locke mechar	ounced hesitation or "jerky" mo uring acceleration, deceleration, de de speed. (This must not be co with engine surging or transmissi eristics.) ling rumble" noticeable at la a high-pitched whine; a "clur shaft drive component or area. ad-up condition of the shaft dri isim; no power transmitted for to rear wheel.	or A.I. on- on- ion C.C. ow D.I. ive om G.S.	Bearing damage. mproper gear lash. Gear tooth damage. Broken drive shaft. Broken gear teeth. Seizure due to lack of lubrication. Small foreign object lodged between mov- no parts.

#### NOTE:

Areas A B and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal motorcycle operating noise. If there is reason believe these components are damaged, remove the components for specific inspection.



### Inspection notes

1.Investigate any unusual noises.

*********************

The following "noises" may indicate a mechanical defect:

a.A "rolling rumble" noise during coasting, acceleration, or deceleration. The noise increase with rear wheel speed, but it does not increase with higher engine or transmission speeds.

Diagnosis: Possible wheel bearing dam-

b.A "whining" noise that varies with acceleration and deceleration.

Diagnosis: Possible incorrect reassembly, too-little gear lash.

### CAUTION:

Too-little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage.

c.A slight "thunk" evident at low speed operation. This noise must be distinguished from normal motorcycle operation.

Diagnosis: Possible broken gear teeth.

# A WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in a locking loss of control of the shaft drive assembly, causing loss of control of the dike and possible injury to the rider.

********

### 2.Inspect:

Drained oil

Drain plug shows large amount of metal particles → Check bearing for seizure.

#### NOTE.

A small amount of metal particles in the oil is normal.

### INSTABLE HANDLING/ FAULTY LIGHTING AND SIGNAL SYSTEM

### Swingarm

- · Worn bearing or bush
- Bent or damaged

# Rear shock absorber

- · Fatigued spring · Oil and gas leakage
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Unevenly worn tires

### Wheels

- Incorrect wheel balance
- Deformed cast wheel
- Damaged bearing
- · Bent or loose wheel axle
- Excessive wheel run-out

### Frame

- Twisted
- · Damaged head pipe
  - Improperly installed bearing race

### FAULTY LIGHTING AND SIGNAL SYSTEM

### HEADLIGHT DARK

- Improper bulb
- · Too many electric accessories
- · Hard charging (broken stator coil wire, faulty rectifier/regulator)
- Incorrect connection
- Improperly grounded
- · Poor contacts (main or light switch)
- Bulb life expires

### **BULB BURNT OUT** Improper bulb

- · Faulty battery
- · Faulty rectifier/regulator
- · Improperly grounded
- · Faulty main and/or light switch
- · Bulb life expires

### FLASHER DOES NOT LIGHT

- · Improperly grounded
- · Discharged battery
- · Faulty turn switch
- . Faulty flasher relay
- Broken wireharness
- Loosely connected coupler · Bulb burnt out
- Faulty fuse

# FLASHER WINKS SLOWER

- . Faulty flasher relay
- . Faulty main and/or turn switch
- Improper bulb

### FLASHER KEEPS ON

- Faulty flasher relay
- . Bulb burnt out

# FLASHER WINKS QUICKER

- Improper bulb
- · Faulty flasher relay
- Bulb burnt out

### HORN IS INOPERATIVE

- Faulty battery
- Faulty fuse
- · Faulty main and/or horn switch
- · Improperly adjusted horn
- Faulty horn
- Broken wireharness

### OVERHEATING/FAULTY BRAKE/FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION/INSTABLE HANDLING

# OVERHEATING

### OVERHEATING **lanition** system

- · Improper spark plug gap
- · Improper spark plug heat range

### · Faulty ignitor unit

# Fuel system

- Improper carburetor main iet (improper setting)
- Improperly adjusted fuel level
- · Clogged air filter element

### **FAULTY BRAKE**

### POOR BRAKING EFFECT Disc brake

- Worn brake pads
- Worn disc
- · Air in brake fluid
- Leaking brake fluid
- Faulty cylinder kit cup
- · Faulty caliper kit seal
- Loose union bolt
- Broken brake hose
- Oily or greasy disc/brake pads
- Improper brake fluid level

# MALFUNCTION

FRONT FORK OIL LEAKAGE AND FRONT FORK MALFUNCTION

- . Bent, deformed or damaged inner tube
- . Bent or deformed outer tube
- Damaged fork spring

Compression system

· Incorrect oil level

Dragging brake

Engine oil

Heavy carbon build-up

· Improper oil viscosity · Inferior oil quality

- Worn or damaged slide metal
- · Bent or damaged damper rod
- Improper oil viscosity
- Improper oil level

# OIL LEAKAGE

- · Bent, damaged or rusty inner tube
- · Damaged or cracked outer tube
- Damaged oil seal lip
- Improperly installed oil seal
- Improper oil level (too much)
- Loose damper rod holding bolt
- Broken cap bolt O-ring
- Loose drain bolt
- Damaged drain bolt gasket

### INSTABLE HANDLING

### INSTABLE HANDLING

### Handlebar Improperly installed or bent

- Steering
- Improperly installed handlebar crown · Bent steering stem
- · Improperly installed steering shaft
- (improperly tightened ring nut)
- · Damaged ball bearing or bearing race

### Front forks

- · Uneven oil levels on both sides
- Uneven spring tension
- (uneven damping force adjuster position)
- Broken spring
- · Twisted front forks

### FAULTY GEAR SHIFTING/ CLUTCH SLIPPING/DRAGGING



### **FAULTY GEAR SHIFTING**

### HARD SHIFTING

Refer to "CLUTCH DRAGGING".

# SHIFT PEDAL DOES NOT MOVE

### Shift shaft

- Improperly adjusted shift rod
- · Bent shift shaft

### Shift cam, shift fork

- Groove jammed with impurities
- Seized shift fork
- . Bent shift fork guide bar

### JUMP-OUT GEAR Shift shaft

- Improperly adjusted shift lever position
- Improperly returned stopper lever Shift fork
- · Worn shift fork

### Shift cam · Improper thrust play

- · Worn shift cam groove

### Transmission

Transmission Seized transmission gear

Jammed impurities

· Incorrectly assembled transmission

Worn gear dog

### CLUTCH SLIPPING/DRAGGING CLUTCH SLIPPING

### Clutch

- · Improperly adjusted clutch cable
- · Loose clutch spring
- · Fatigued clutch spring
- · Worn, friction plate/clutch plate
- · Incorrectly assembled clutch

### CLUTCH DRAGGING

### Clutch

- · Warped pressure plate
- · Unevenly tensioned clutch springs
- · Bent push rod
- · Broken clutch boss
- · Burnt primary driven gear bushing
- · Bent clutch plate
- Swollen friction plate
- · Match marks not aligned

### **Engine oil**

- · Low oil level
- Improper quality/(low viscosity)
- Deterioration

### Engine oil

- Improper oil level
- Improper quality/(high viscosity)
- Deterioration

# STARTING FAILURE/HARD STARTING/POOR IDLE SPEED PERFORMANCE/POOR MEDIUM AND HIGH SPEED PERFERMANCE



### COMPRESSION SYSTEM

# Cylinder and cylinder head

- Loose spark plug
- · Loose cylinder head or cylinder
- · Broken cylinder head gasket
- Worn, damaged or seized cylinder
- Improperly sealed valve
- · Improperly contacted valve and valve seat
- · Improper valve timing
- · Broken valve spring

### Piston and piston rings

- Improperly installed piston ring
- · Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

### Crankcase and crankshaft

- · Improperly seated crankcase
- Seized crankshaft

## POOR IDLE SPEED PERFORMANCE

# POOR IDLE SPEED PERFORMANCE

# Carburetor

- · Improperly returned starter plunger
- Loose pilot jet
- Clogged pilot air jet
- Improperly synchronized carburetors
- Improperly adjusted idle speed (throttle stop screw)
- · Improper throttle cable free play
- Flooded carburetor
- Faulty A.I.S. (AIR INDUCTION SYSTEM)

### Electrical system

- Faulty battery
- · Faulty spark plug
- Faulty ignitor unit
- Faulty pickup coil
   Faulty ignition coil
- Valve train
- Improperly adjusted valve clearance
- Air cleaner
- · Clogged air filter

# POOR MEDIUM AND HIGH SPEED PERFORMANCE

### POOR MEDIUM AND HIGH SPEED PERFORMANCE

Refer to "STARTING FAILURE/HARD STARTING". (Fuel system, electrical system, compression system and valve train)

### Carburetor

- Diaphragm malfunction
- · Improperly adjusted fuel level
- · Clogged or loose main jet

### Air cleaner

· Clogged air filter element

### Fuel pump

· Faulty fuel pump

8

# STARTING FAILURE/HARD STARTING



# TROUBLESHOOTING

The following troubleshooting does not cover all the possible causes of trouble. If should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for inspection, adjustment and replacement of parts.

# STARTING FAILURE/HARD STARTING

### FUEL SYSTEM

### Fuel tank

- Empty · Clogged fuel filter
- · Clogged fuel strainer
- · Clogged fuel tank drain hose
- · Clogged roll over valve
- · Clogged roll over valve breather hose
- · Deteriorated fuel or fuel containing water or foreign material

### Fuel cock

· Clogged fuel hose

### Carburetor

- · Deteriorated fuel, fuel containing water or
- foreign material · Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Groove-worn needle valve
- · Improperly sealed valve seat
- Improperly adjusted fuel level
- · Improperly set pilot jet
- · Clogged starter jet
- Starter plunger malfunction
- · Improperly adjusted starter cable

### Air cleaner

- Clogged air filter
- Fuel pump
- · Faulty fuel pump
- · Faulty fuel pump relay

### ELECTRICAL SYSTEM

### Spark plug

- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- · Faulty spark plug cap

### Ignition coil

- · Broken or shorted primary/secondary
- · Faulty spark plug lead

# Broken body

- Full-transistor system
- · Faulty pick up coil
- Faulty ignitor unit

- Switches and wiring
- · Faulty main switch
- . Faulty "ENGINE STOP" switch
- · Broken or shorted wiring
- · Faulty neutral switch
- . Faulty "START" switch · Faulty sidestand switch
- · Faulty clutch switch

# Starter motor

- · Faulty starter motor . Faulty starter relay
- · Faulty circuit cut-off relay

· Faulty starter clutch

# TPS (THROTTLE POSITION SENSOR) SELF DIAGNOSIS



### TROUBLESHOOTING

WHEN THE TPS SELF-DIAGNOSIS DEVICE DETECTS A DEFECT IN THE CIRCUIT

### Procedure

### Check:

1.TPS (throttle position sensor)

2. Wire harness

### NOTE

Use the following special tool in this troubleshooting.

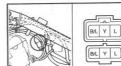


Pocket tester: 90890-03112

# 1.TPS (throttle position sensor)

- Disconnect the throttle sensor coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the throttle sensor.
   Refer to "TPS (THROTTLE POSITION SENSOR) ADJUSTMENT AND INSPEC-

TION" in CHAPTER 5.



# Check the TPS (throttle position sensor) BAD CONDITION

GOOD

### 2.Wire harness

for continuity.

Check the wire harness for continuity.

Refer to "CIRCUIT DIAGRAM".



This circuit is good.



Replace TPS (throttle position sensor).

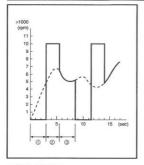
### NO CONTINUITY



Repair or replace wire harness.

# TPS (THROTTLE POSITION SENSOR) SELF DIAGNOSIS





# TPS (THROTTLE POSITION SENSOR) SELF-DIAGNOSIS

When the needle of the tachometer shows the following pattern while either running or stopped when the main switch is on, the throttle position sensor circuit is broken, shorted, or the TPS (throttle position sensor) is locked. In that case, it would be best to inspect it.

① 0 rpm - 3 seconds

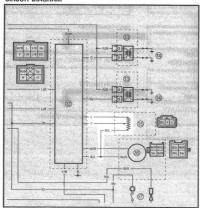
2 10,000 rpm - 2.5 seconds

③ present engine revolutions - 3 seconds The above pattern is repeated.

### NOTE:

The ignition timing is determined by the characteristics of the throttle when fully open.

### CIRCUIT DIAGRAM



When the wiring is broken or shortened, or when the TPS (throttle position sensor) is locked as shown in the figure to the left, the tachometer pattern above is shown.

(§ TPS (throttle position sensor)





### 7.Carburetor heater

- Remove the carburetor heater from the carburetor body.
- Connect the pocket tester to the carburetor heater.

Tester (+) lead → Heater terminal ①
Tester (-) lead → Heater body ②

Measure the heater resistance.



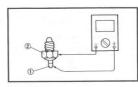
Carburetor heater resistance:  $6 \sim 10 \Omega$  at 20°C



### 8. Wiring connection

 Check the entire carburetor heater system for connections.

Refer to "CIRCUIT DIAGRAM".



IN CORRECT

Replace carburetor heater.

POOR CONNECTION

7

Correct.



Battery (+) terminal → Brown terminal ①

Battery (-) terminal → Light green terminal ②

Tester (+) lead → Brown terminal ③
Tester (-) lead →

Black/Yellow terminal (4)

. Check the starter relay for no continuity.



### 6.Thermo switch

- Remove the thermo switch from the thermo switch plate.
- Connect the pocket tester to the thermo switch lead.

Tester (+) lead → Black lead ①
Tester (-) lead → Black lead ②

- Immerse the thermo switch in the water
   3.
- Check the thermo switch for continuity.
   Note the temperatures while heating the water with the temperature gauge (4).

Test step	Water temperature	Good condition
1	Less than 23 ± 3°C	0
2	More than 23 ± 3°C	×
3	More than 12 ± 4°C	×
4	Less than 12 ± 4°C	0

Test 1 & 2: Heat-up test

O: Continuity

Test 3 & 4: Cool-down test

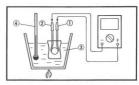
X: No continuity

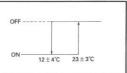
 If condition is not good, replace the thermo switch.





Replace starter relay.





NO CONTINUITY

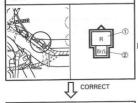
Replace thermo switch.





### 3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".

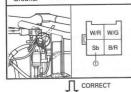


# INCORRECT

Replace main switch.

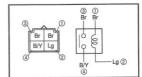
### 4.Neutral switch

- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and Ground.



### INCORRECT

Replace neutral switch.



### 5. Heater relay

- Disconnect the relay unit coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the relay unit coupler terminals.



### TROUBLESHOOTING

# CARBURETOR HEATER SYSTEM DOES NOT OPERATE

### Procedure

Check:

1.Fuse (main and signal)

- 2.Battery
- 3.Main switch
- 4.Neutral switch

- 5.Heater relay
- 6.Thermo switch
- 7.Carburetor heater
- 8. Wiring connection

### NOTE: _

 Remove the following parts before troubleshooting.

1)Seat

2)Side cover

3)Cowling

 Use the following special tool(s) in this troubleshooting.



Pocket tester: 90890-03112

- 1.Fuse (main and ignition)
- · Remove the fuses.
- Connect the pocket tester ( $\Omega \times 1$ ) to the fuses
- . Check the fuses for continuity.



Replace fuse(s).

# CONTINUITY

### 2.Battery

· Check the battery condition.

Refer to "BATTERY INSPECTION" in CHAPTER 3

CHAPTER 3.

Open circuit voltage: 12.8V or more at 20°C INCORRECT

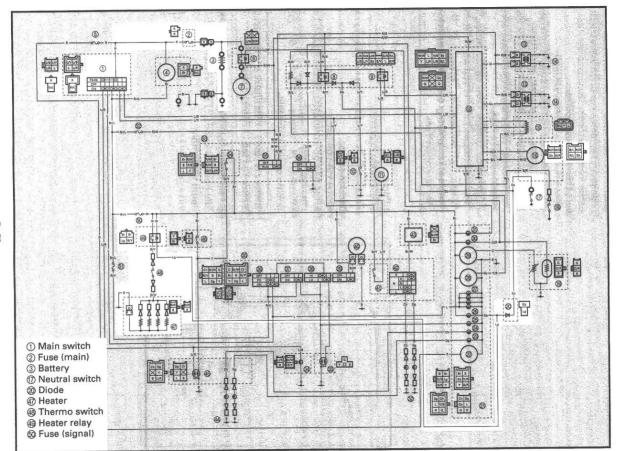


- Clean battery terminals.
- . Recharge or replace the battery.

CIRCUIT DIAGRAM

CARBURETOR HEATER SYSTEM





### FUEL PUMP SYSTEM

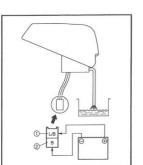


### FUEL PUMP TEST

### A WARNING

Gasoline is extremely flammable and there is danger of explosion or combustion under certain circumstances. Be extremely careful of the following points:

- . Stop the engine before refuelling.
- Do not smoke, and keep away from open flames, sparks, or any other kind of fire.
- Take care not to spill gasoline. If you do accidentally spill some, wipe it up immediately with dry rags.
- If gasoline touches the engine when it has just stopped and is still hot, there is danger of combustion. Make sure the engine is completely cool before performing any operations.



### 1.Check:

. Fuel pump operation

********************

### Checking steps:

- Fill up the fuel tank.
- Place an open container under the end of the fuel hose.
- Connect the battery (12V) to the fuel pump coupler terminals.

Battery (+) lead → Blue/Black ① terminal Battery (-) lead → Black ② terminal

•If fuel flows out from the fuel hose, the fuel pump is good. If not, replace the fuel pump assembly.

### FUEL PUMP SYSTEM





Battery (+) terminal → Red/Black terminal (1) Battery (-) terminal → Blue/Red terminal ②

Tester (+) lead → Red/Black terminal (1) Tester (-) lead → Blue/Black terminal ③

· Check the starting circuit cut-off relay for continuity.



### 6.Fuel pump resistance

- · Disconnect the fuel pump coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel pump coupler terminals.

Tester (+) lead → Black/Blue terminal ① Tester (-) lead → Black terminal ②

 Check the fuel pump for specified resistance.



Fuel pump resistance: 4 ~ 10 Ω at 20°C



# 7. Wiring connection

· Check the entire fuel pump system for connections.

Refer to "CIRCUIT DIAGRAM".

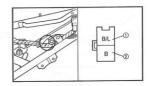


Replace ignitor unit.

### NO CONTINUITY



Replace starting circuit cut-off relay.



# **OUT OF SPECIFICATION**



Replace fuel pump.

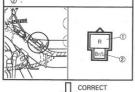
POOR CONNECTION

Correct.



# 3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue



# INCORRECT



### 4. "ENGINE STOP" switch

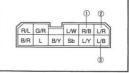
- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for continuity between "Red/White ① and Red/White ②".



### INCORRECT

Replace handlebar switch (right).

- Starting circuit cut-off relay (fuel pump relay)
- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starting circuit cutoff relay coupler terminals.







### TROUBLESHOOTING

### FUEL PUMP FAILS TO OPERATE.

### Procedure

Check

1.Fuse (main and ignition)

2.Battery

3.Main switch

4. "ENGINE STOP" switch

5.Starting circuit cut-off relay (fuel pump relay)

6.Fuel pump

7. Wiring connection (entire fuel system)

Pocket tester: 90890-03112

### NOTE: _

· Remove the following parts before troubleshooting.

1)Seat

2)Side cover

3)Fuel tank

4)Air filter case

· Use the following special tool(s) in this troubleshooting.

### 1.Fuse (main and ignition)

· Remove the fuses.

 Connect the pocket tester (Ω × 1) to the fuses.

Check the fuses for continuity.



NO CONTINUITY

### 2.Battery

Check the battery condition.

Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:





### INCORRECT

· Clean battery terminals.

Recharge or replace the battery.



### FUEL PUMP CIRCUIT OPERATION

The fuel pump circuit consists of the fuel pump relay, fuel pump, "ENGINE STOP" switch and ignitor unit.

The ignitor unit includes the control unit for the fuel pump.

① Battery

② Fuse (MAIN)

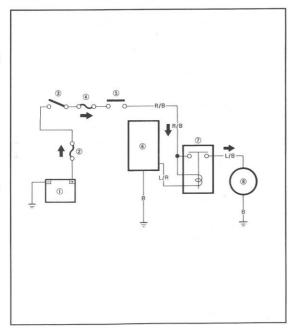
3 Main switch

(4) Fuse (IGNITION)

(5) "ENGINE STOP" switch (6) Ignitor unit

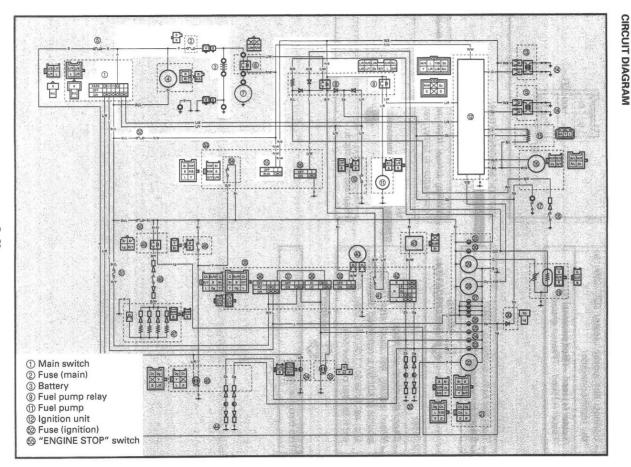
Tuel pump relay

Fuel pump rela
 Fuel pump



**FUEL PUMP SYSTEM** 



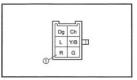


### 8.Clock does not come on.

### 1.Voltage

 Connect the pocket tester (DC 20V) to the clock connector.

Tester (+) lead → Red terminal ①
Tester (-) lead → Frame ground



- . Turn the main switch to "ON".
- Check for voltage (12V).



### 2.Clock

- . Check the clock condition.
- When setting the clock after is power source is cut by a removed battery, etc., first set time for 1:00 AM, then, go on to set it for the correct time.



This circuit is good.

# OUT OF SPECIFICATION

Wiring circuit from main switch to clock connector is faulty, repair.

### INCORRECT

Replace the clock.

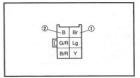
+



### 2.Voltage

 Connect the pocket tester (DC 20V) to the fuel gauge coupler.

Tester (+) lead → Brown terminal ①
Tester (-) lead → Black terminal ②



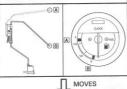
Turn the main switch to "ON".

 Check for voltage (12V) on the "Brown" lead at the fuel meter coupler.



### 3.Fuel gauge

- . Turn the main switch to "ON".
- Move the float to "UP A" or "DOWN
   IB".
- Check the fuel gauge needle moves "FULL" or "EMPTY".



# 4.Wiring connection

 Check the entire signal system for connections.

# OUT OF SPECIFICATION

Check the entire signal system for connections.

### NOTE: _

Before reading the meter, stay put the float for more than three minutes respectively at "UP" or "DOWN".

### DOES NOT MOVE

Replace fuel gauge.



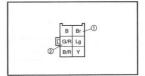


#### 3.Voltage

 Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Brown lead ①

Tester (-) lead → Green/Red lead ②



- . Turn the main switch to "ON".
- Check for voltage (12V).



This circuit is good.

7.Fuel gauge does not operate.

#### 1.Fuel sender

- Remove the fuel sender from the fuel tank.
- Connect the pocket tester to the fuel sender coupler.

Tester (+) lead → Green terminal ①
Tester (-) lead → Black terminal ②

Check the fuel sender for specificated resistance.



Fuel sender resistance (up  $\triangle$ ):  $(\Omega \times 1)$ 

10 Ω at 20°C

Fuel sender resistance (down  $\square$ ): ( $\Omega \times 10$ ) 90  $\Omega$  at 20°C

BOTH MEET SPECIFICATION





Wiring circuit from main switch to bulb socket connector is faulty, repair.





#### OUT OF SPECIFICATION



Replace fuel sender.

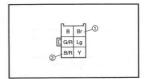




#### 4.Voltage

 Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Brown lead ①
Tester (-) lead → Black/Red lead ②



- Turn the main switch to "ON".
- Check for voltage (12V).



This circuit is good.

"FUEL" level indicator light does not come on, when fuel level is low.

#### 1.Bulb and bulb socket

 Check the bulb and bulb socket for continuity.



#### 2.Fuel sender

- Drain the fuel and remove the fuel sender from the fuel tank.
- Disconnect the fuel sender coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the fuel sender.

Tester (+) lead → Green/Red terminal ①
Tester (-) lead → Black terminal ②

· Check the fuel sender for continuty.



# OUT OF SPECIFICATION

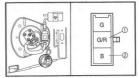


Wiring circuit from main switch to bulb socket connector is faulty, repair.

#### NO CONTINUITY



Replace bulb and/or bulb socket.



#### BAD CONDITION



Replace fuel sender.



5."OIL LEVEL" indicator light does not come on, when engine oil level is low.

#### 1.Bulb and bulb socket

 Check the bulb and bulb socket for continuity.



#### 2.Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the starting circuit cut-off relay coupler terminals.
- Check the resistor for specification resistance.

Tester (+) terminal →
Black/Red terminal ①
Tester (-) terminal → Red/Blue ②

rester /-

202.5 ~ 247.5 Ω at 20°C



#### 3.Oil level switch

- Drain the engine oil and remove the oil level switch from the oil pan.
- Connect the pocket tester (Ω × 1) to the oil level switch.

Tester (+) lead → Black/Red terminal ①

Tester (-) lead → Frame ground

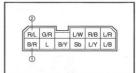
. Check the oil level switch for continuity.



#### NO CONTINUITY



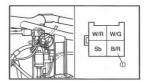
Replace bulb and/or bulb socket.



#### **OUT OF SPECIFICATION**



Replace starting circuit cut-off relay.



#### BAD CONDITION

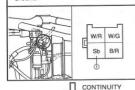


Replace oil level switch.



#### 2.Neutral switch

- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and Ground.



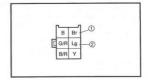
# NO CONTINUITY

Replace neutral switch.

# 3.Voltage

 Connect the pocket tester (DC 20V) to the bulb socket coupler.

Tester (+) lead  $\rightarrow$  Brown terminal ① Tester (-) lead  $\rightarrow$  Light green terminal ②



Turn the main switch to "ON".

Check for voltage (12V).

MEETS SPECIFICATION

This circuit is good.

# OUT OF SPECIFICATION

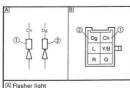
Wiring circuit from main switch to bulb socket connector is faulty, repair.





#### 5.Voltage

· Connect the pocket tester (DC 20V) to the bulb socket connector.



- B "TURN" indicator light
- Turn the switch to "ON".
- . Turn the "TURN" switch to "L" or "R".
- · Check for voltage (12V) on the "Chocolate" lead or "Dark green" lead at the bulb socket connector.



This circuit is good.

4."NEUTRAL" indicator light does not come on.

#### 1.Bulb and bulb socket

· Check the bulb and bulb socket for continuity.



#### At flasher light (left):

Tester (+) lead → Chocolate lead ① Tester (-) lead → Frame ground

At flasher light (right):

Tester (+) lead → Dark green lead ② Tester (-) lead → Frame ground

#### OUT OF SPECIFICATION



Wiring circuit from "TURN" switch to bulb socket connector is faulty, repair.

#### NO CONTINUITY



Replace bulb and/or bulb socket.

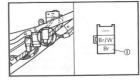




# 3.Voltage

 Connect the pocket tester (DC 20V) to the flasher relay coupler.

Tester (+) lead → Brown terminal ①
Tester (-) lead → Frame ground



- . Turn the main switch to "ON".
- Check for voltage (12V) on the "Brown"
- 1 lead at the flasher relay terminal.



#### 4.Voltage

nal.

 Connect the pocket tester (DC 20V) to the flasher relay coupler.

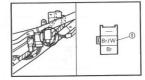
Tester (+) lead →
Brown/White terminal ①
Tester (-) lead → Frame ground

- Turn the main switch to "ON".
- Turn the "TURN" switch to "L" or "R".
  Check for voltage (12V) on the "Brown/ White" (1) lead at the flasher relay termi-





Wiring circuit from main switch to flasher relay connector is faulty, repair.

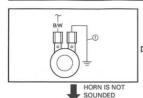


#### **OUT OF SPECIFICATION**



Flasher relay is faulty, replace.





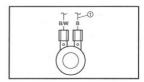
HORN IS SOUNDED

Horn is good.

# 4.Voltage

 Connect the pocket tester (DC 20V) to the horn at the "Black" terminal.

Tester (+) lead → Black lead ①
Tester (-) lead → Frame ground



- . Turn the main switch to "ON".
- Check for voltage (12V) on the "Black" lead at the horn terminal.



Adjust or replace horn.



- 1.Bulb and bulb socket
- Check the bulb and bulb socket for continuity.



# OUT OF SPECIFICATION



Replace horn.

#### NO CONTINUITY



Replace bulb and/or bulb socket.

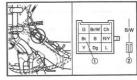




#### SIGNAL SYSTEM CHECK

1 Horn does not sound.

#### 1."HORN" switch.



- Disconnect the handlebar switch (left) coupler from wire harness.
- · Check the switch component for continuity between "Brown (1) and Black/ White @".



#### 2.Voltage

· Connect the pocket tester (DC 20V) to the horn lead.

Tester (+) lead→ Black/White lead ① Tester (-) lead → Frame ground

- . Turn the main switch to "ON".
- · Push the "HORN" switch.
- . Check for voltage (12V) on the "Black/ White" lead at the horn terminal.

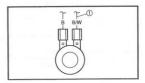


#### 3.Hom

- Disconnect the "Black" lead at the horn
- Connect a jumper lead 1 to the horn terminal and ground the jumper lead.
- Turn the main switch to "ON".



Replace handlebar switch (left).



# OUT OF SPECIFICATION

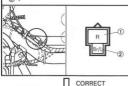


Wiring circuit from main switch to horn terminal is faulty, repair.



#### 3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".



# INCORRECT

Replace main switch.

#### 4. Wiring connection

 Check the entire signal system for connections.
 Refer to "WIRING DIAGRAM".



Check condition of each circuit for signal system. Refer to "SIGNAL SYSTEM CHECK".

# POOR CONNECTION

Correct.



#### TROUBLESHOOTING

 FLASHER LIGHT, BRAKE LIGHT AND/OR INDICATOR LIGHT DO NOT COME ON.

. HORN DOES NOT SOUND.

#### Procedure

Check:

- 1.Fuse (main, signal and clock)
- 2.Battery
- 3.Main switch
- 4. Wiring connection (entire signal system)

#### NOTE: _

· Remove the following parts before troubleshooting.

1)Seat

2)Side cover

3)Cowling

. Use the following special tool in this troubleshooting.

Pocket tester: 90890-03112

#### 1.Fuse (main, signal and clock)

- · Remove the fuses.
- Connect the pocket tester (Ω × 1) to the
- Check the fuses for continuity.



#### 2.Battery

. Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:

12.8V or more at 20°C



#### NO CONTINUITY

Replace fuse(s).

#### INCORRECT



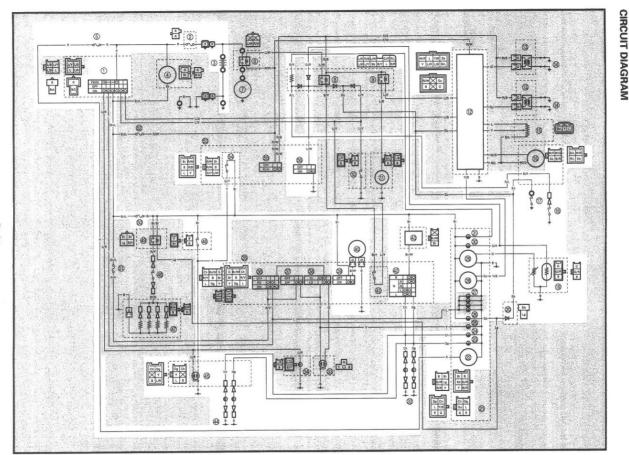
- Clean battery terminals.
- Recharge or replace the battery.



- 1 Main switch
- ② Fuse (main)
- 3 Battery
- (5) Fuse (clock)
- (2) Ignitor unit
- (7) Neutral switch
- ® Oil level switch
- @ Fuel sender
- @ Diode
- @ Clock
- @ "TURN" indicator light (right)
- @ "TURN" indicator light (left)
- @ "NEUTRAL" indicator light
- @ Tachometer

- @ Fuel level meter
- @ "FUEL LEVEL" indicator light 3 "OIL LEVEL" indicator light
- @ Front flasher light
- @ "HORN" switch @ Horn
- @ "TURN" switch
- Flasher relay
- Rear flasher light
- (6) Tail/brake light
- Rear brake switch
- @ Fuse (signal)
- A Front brake switch
- @ "START" switch

7 - 38



LIGHTING SYSTEM ELEC



. Turn the main switch to "ON".

- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue/ Red" lead at the bulb socket connector.



This circuit is good.

3.Auxiliary light does not come on.

#### 1.Bulb and bulb socket

 Check the bulb and bulb socket for continuity.



#### 2.Voltage

 Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Blue/Red terminal ①
Tester (-) lead → Black terminal ②

- . Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" or "PO" position.
- Check for voltage (12V) on the "Blue/ Red" lead at the bulb socket connector.



This circuit is good.

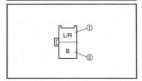
# OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair.

#### NO CONTINUITY



Bulb and/or socket are faulty, replace.



# OUT OF SPECIFICATION



Wiring circuit from main switch to bulb socket connector is faulty, repair.



#### Meter light does not come on.

#### 1.Bulb and bulb socket

· Check the bulb and bulb socket for continuity.



#### 2.Voltage

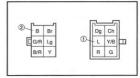
· Connect the pocket tester (20V) to the bulb socket coupler.

Tester (+) lead → Blue terminal ① Tester (-) lead → Black terminal ②

#### NO CONTINUITY



Replace bulb and/or bulb socket.



- Turn the main switch to "ON".
- . Turn the "LIGHTS" switch to "ON" or
- "PO" position. . Check for voltage (12V) on the "Blue"
  - lead at the bulb socket connector.



This circuit is good.

OUT OF SPECIFICATION

Wiring circuit from main switch to bulb socket connector is faulty, repair,

#### 3. Taillight does not come on.

#### 1. Bulb and bulb socket

· Check the bulb and bulb socket for conti-



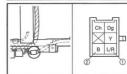
#### 2.Voltage

. Connect the pocket tester (DC 20V) to the bulb socket connector.

Tester (+) lead → Blue/Red terminal ① Tester (-) lead → Black terminal ②

# NO CONTINUITY

# Replace bulb and/or bulb socket.





#### LIGHTING SYSTEM CHECK

 Headlight and "HIGH BEAM" indicator light does not come on.

#### 1.Bulb and bulb socket

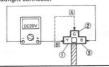
 Check the bulb and bulb socket for continuity.



#### 2.Voltage

- Connect the pocket tester (DC 20V) to the headlight and "HIGH BEAM" indicator light couplers.
- A When "LIGHTS" (dimmer) switch is "LO"
- When "LIGHTS" (dimmer) switch is "HI" position.

#### Headlight connector



- Turn the main switch to "ON".
- Turn the "LIGHTS" switch to "ON" position.
- Turn the "LIGHTS" (dimmer) switch to "LO" or "HI" position.
- Check for voltage (12V) on the "Green" and "Yellow" lead at bulb socket connectors.



This circuit is good.

#### NO CONTINUITY



Replace bulb and/or bulb socket.

Head light:
Tester (+) lead →
Yellow ① or Green ② lead.
Tester (-) lead → Black ③ lead.
"HIGH BEAM" indicator light:
Tester (+) lead → Yellow ② lead.
Tester (-) lead → Black ⑤ lead.

B Meter connector



#### OUT OF SPECIFICATION

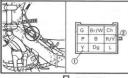


Wiring circuit from main switch to bulb socket connector is faulty, repair.



#### 5. "PASS" switch

- Disconnect the handlebar switch (left) coupler from the wire harness.
- Check the switch component for the continuity between "Yellow ① and Red/ Yellow ②".



CORRECT

# 6.Wiring connection

Check the entire lighting system for connections.
 Refer to "WIRING DIAGRAM".



Check condition of each circuit for lighting system.

Refer to "LIGHTING SYSTEM CHECK".

#### INCORRECT

"PASS" switch is faulty, replace handlebar switch (left).

#### POOR CONNECTION

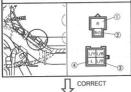
Correct.





#### 3.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②", "Blue/Red ③ and Blue @", "Red ① and Blue/Red ③".



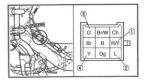
#### "LIGHTS" switch/"LIGHTS" (dimmer) switch

- Disconnect the handlebar switch (left) coupler from the wire harness.
- Turn the "LIGHTS" switch to the "ON" or "PO".
- Check the switch component for continuity between "Red/Yellow ① and Blue ②".
- Turn the "LIGHTS" (dimmer) switch to the "LO".
- Check the switch component for continuity between "Red/Yellow (1) and Green (3)".
- Set the position of the "LIGHTS" (dimmer) switch to the "HI".
- Check the switch component for continuity between "Red/Yellow ① and Yellow ④".



# INCORRECT

Replace main switch.



#### INCORRECT

1

"LIGHTS" switch/"LIGHTS" (dimmer) switch are faulty, replace handlebar switch (left).



#### TROUBLESHOOTING

HEADLIGHT "HIGH BEAM" INDICATOR LIGHT, TAILLIGHT, AUXILIARY LIGHT AND/OR METER LIGHT DO NOT COME ON.

#### Procedure

Check.

- 1.Fuse (main and head)
- 2.Battery
- 3.Main switch
- 4."LIGHTS" switch/"LIGHTS" (dimmer) switch

#### NOTE: _

- · Remove the following parts before troubleshooting.
- 1)Seat
- 2)Side cover
- 3)Cowling
- · Use the following special tool(s) in this troubleshooting.

#### 1.Fuse (main and head)

- · Remove the fuses.
- Connect the pocket tester (Ω × 1) to the
- · Check the fuses for continuity.



#### 2.Battery

- Check the battery condition.
- Refer to "BATTERY INSPECTION" in CHAPTER 3
  - Open circuit voltage:
    - 12.8V or more at 20°C



5."PASS" switch

6.Wiring connection

(entire lighting system)



Pocket tester: 90890-03112

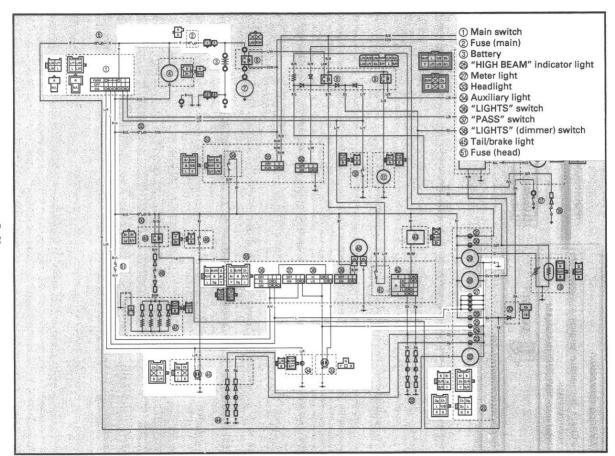
#### NO CONTINUITY

Replace fuse(s).

#### INCORRECT

- Clean battery terminals.
- · Recharge or replace the battery.

CIRCUIT DIAGRAM LIGHTING SYSTEM









# 7.Wiring connection

· Check the entire charging system for connections. Refer to "CIRCUIT DIAGRAM".

CORRECT

Replace rectifier/regulator.

POOR CONNECTION

Correct.

# CHARGING SYSTEM





#### 5.Brush inspection

- · Remove the brush holder ①.
- Inspect the brush spring.
- · Check the brush length.



Brush spring force: 520 ~ 580 g



INCORRECT

Replace the brush and spring.

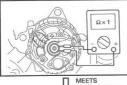


#### 6.Field coil (rotor) resistance

- Connect the pocket tester " $\Omega \times 1$ " to the
- Measure the resistance.







**OUT OF SPECIFICATION** 

Replace field coil (rotor).

#### CHARGING SYSTEM





#### 3.Charging voltage

- Connect the inductive tachometer to spark plug lead.
- Connect the pocket tester (DC 20V) to the battery.

Tester (+) lead  $\rightarrow$  Battery (+) terminal Tester (-) lead  $\rightarrow$  Battery (-) terminal

- Start the engine and accelerate to about, 3,000 r/min.
- Check charging voltage.



Charging voltage: 14V at 3,000 r/min

# NOTE: ________Use a full charged battery.

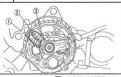
OUT OF SPECIFICATION

#### 4.Stator coil resistance

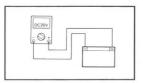
- · Remove the generator cover.
- Connect the pocket tester "Ω × 1" to the stator coils.
- Measure the stator coil resistance.



Stator coil resistance: 0.19 ~ 0.21 Ω at 20°C



BOTH MEET SPECIFICATION



# MEETS SPECIFICATION

J

Charging circuit is good.

Tester (+) lead → White lead ① Tester (-) lead → White lead ②

Tester (+) lead → White lead ① Tester (-) lead → White lead ③

#### OUT OF SPECIFICATION

7

Replace stator assembly.



#### TROUBLESHOOTING

#### THE BATTERY IS NOT CHARGED.

#### Procedure

Check:

1.Fuse (main)

2.Battery

3.Charging voltage

4.Stator coil resistance

5.Brush inspection

6. Field coil (rotor) resistance

7. Wiring connection

(entire charging system)

H

Inductive tachometer: 90890-03113 Pocket tester: 90890-03112

#### NOTE: _

 Remove the following parts before troubleshooting.

1)Seat

2)Side cover

3)Fuel tank

4)Air filter case

 Use the following special tool(s) in this troubleshooting.

#### 1.Fuse (main)

- · Remove the fuses.
- $\bullet$  Connect the pocket tester ( $\Omega\times$  1) to the
- · Check the fuses for continuity.

T CONTINUITY

#### 2.Battery

Check the battery condition.
 Refer to "BATTERY INSPECTION" in

CHAPTER 3.

Open circuit voltage: 12.8V or more at 20°C



#### NO CONTINUITY

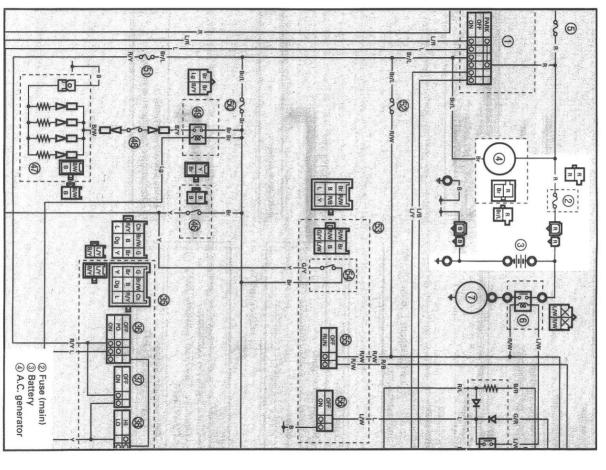
Replace fuse(s).

#### INCORRECT

- · Clean battery terminals.
- . Recharge or replace the battery.

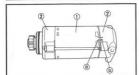
# **CHARGING SYSTEM**

CIRCUIT DIAGRAM







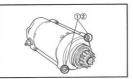


#### 3.Install:

- · Yoke ①
- Brackets ②

# NOTE: _

Align the match marks (a) on the yoke with the match marks (b) on the brackets.



# 4.Install:

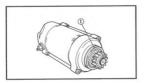
- O-rings ①
- Washer
- Bolts ②

# **A** WARNING

Always use new O-rings.



Bolt (yoke assembly): 7 Nm (0.7 m • kg)



#### Installation

1.Install:

Starter motor

#### NOTE:

Apply a grease lightly to the O-ring ①.



Bolt (starter motor): 12 Nm (1.2 m • kg) Bolt (starter motor):

7 Nm (0.7 m • kg) YAMAHA Bond No. 1215

Refer to "ENGINE ASSEMBLY AND ADJUSTMENT" in CHAPTER 4.



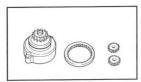
#### 6.Measure:

Brush spring force

Fatigue/Out of specification → Replace as



Brush spring force: 650 ~ 950 g



#### 7.Inspect:

- · Gear teeth
  - Wear/Damage → Replace.



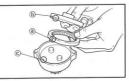
#### Assembly

Reserve the "Removal" procedure.

Note the following points.

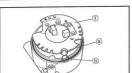
- 1.Install: • Gears
- Cover
- Cover

NOTE: _______
Apply a molybdenum grease to the gears.



#### NOTE: ___

Align the position (a) on the internal gear and position (b) on the cover with the stopper (c) on the bracket.



#### 2.Install:

. Brush seat (1)

#### NOTE:

Align the projection (a) on the brush seat with the match make (b) on the yoke.







Commutator wear limit: 27 mm

#### 3.Measure:

Mica undercut (a)

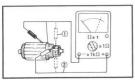
Out of specification → Scrape the mica to proper value (a hacksaw blade can be ground to fit).



Mica undercut: 0.6 mm

#### NOTE:

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.



#### 4.Inspect:

Armature coil (insulation/continuity)
 Defects → Replace starter motor.

# **********

- Inspecting steps:

  Connect the pocket tester for continuity check (1) and insulation check (2).
- Measure the armature resistances.



Armature coil resistance: Continuity check ①:

0.013 ~ 0.015 Ω at 20°C Insulation check ②: More than 1 MΩ at 20°C

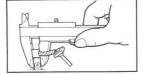
• If the resistance is incorrect, replace the starter motor.



Brush length ⓐ
 Out of specification → Replace.



Brush length limit: 8.5 mm





#### Removal

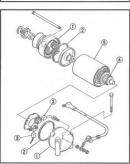
- 1.Remove:
- Starter motor

Refer to "ENGINE REMOVAL" in CHAP-TER 4.



#### Disassembly

- 1.Remove:
- Bolts ①
- (with washer and O-ring)



#### 2.Remove:

- Bracket ①
- O-ring ②
- Brush ③
- Armature ④
- · Yoke ⑤



#### Inspection and repair

- 1.Inspect:
- Commutator
- Dirty → Clean it with #600 grit sandpaper.
- 2.Measure:
- Commutator diameter (a)

Out of specification  $\rightarrow$  Replace starter motor.



#### STARTER MOTOR

- ① O-ring
- ② Bracket
- ③ Yoke
- Armature
   Brush

MICA UNDERCUT:

0.6 mm 7 Nm (0.7 m + kg) 12 Nm (1.2 m • kg)





#### 11."START" switch

- Disconnect handlebar switch (right) coupler from wire harness.
- Check the "START" switch component for continuity between "Blue/White ① and Black ② ".



4

# 12.Wiring connection

 Check the entire starting system for connections.
 Refer to "CIRCUIT DIAGRAM". INCORRECT

Replace handlebar switch (right).

POOR CONNECTION

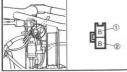
Correct.





#### 9. Sidestand switch

- Disconnect the sidestand switch coupler from the wire harness.
- Check the switch component for continuity between "Black ① and Black ②".



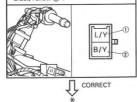


# INCORRECT

Replace sidestand switch.

#### 10.Clutch switch

- Disconnect the clutch switch coupler from the wire harness.
- Check the clutch switch component for continuity between "Blue/Yellow (1) and Black/Yellow (2)".



# INCORRECT

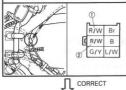
Replace clutch switch.





#### 7. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for continuity between "Red/White ① and Red/White ②".

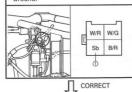




Replace handlebar switch (right).



- Disconnect the neutral switch coupler from the wire harness.
- Check the switch component for continuity between "Sky blue ①" and Ground.



INCORRECT

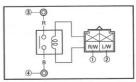
Replace neutral switch.





# 5.Starter relay

- Disconnect the relay unit coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the relay unit coupler terminals.



Battery (+) terminal → Red/White terminal ①
Battery (-) terminal → Blue/White terminal ②

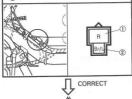
Tester (+) lead → Red terminal ③
Tester (-) lead → Black terminal ④

· Check the starter relay for continuity.



#### 6.Main switch

- Disconnect the main switch coupler from the wire harness.
- Check the switch component for continuity between "Red ① and Brown/Blue ②".





#### Replace starter relay.

#### INCORRECT

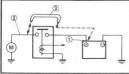
Replace main switch.





#### 3.Starter motor

- Connect the battery positive terminal ①
   and starter motor cable ② using a
   jumper lead ③ *
- · Check the starter motor for operation.





#### 4.Starting circuit cut-off relay

- Disconnect the starting circuit cut-off relay coupler from the wire harness.
- Connect the pocket tester (Ω × 1) and battery (12V) to the starting circuit cutoff relay coupler terminals.

Battery (+) terminal →
Red/Black terminal ①
Battery (-) terminal →
Black/Yellow terminal ②

Tester (+) terminal → Blue terminal ③
Tester (-) terminal →
Blue/White terminal ④

 Check the starting circuit cut-off relay for continuity.



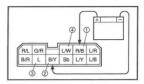
# A WARNING

- A wire for jumper lead must have the equivalent capacity as that of the battery lead or more, otherwise it may cause the jumper lead to be burned.
- This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

#### DOES NOT MOVE



Repair or replace starter motor.



#### NO CONTINUITY



Replace starting circuit cut-off relay.



#### TROUBLESHOOTING

#### STARTER MOTOR DOES NOT OPERATE.

#### Procedure

Check:

1.Fuse (main and ignition)

2.Battery

3.Starter motor

4.Starting circuit cut off-relay

5.Starter relay 6.Main switch

7. "ENGINE STOP" switch

8.Neutral switch

9.Sidestand switch

10.Clutch switch

11 "START" switch

12.Wiring connection (entire starting system)

NOTE: _

· Remove the following parts before troubleshooting.

1)Seat

2)Fuel tank

3)Air filter case 4)Side cover

· Use the following special tool(s) in this troubleshooting.

Pocket tester: 90890-03112

1.Fuse (main and ignition)

· Remove the fuses.

 Connect the pocket tester (Ω × 1) to the fuses.

· Check the fuses for continuity.



#### 2.Battery

. Check the battery condition. Refer to "BATTERY INSPECTION" in CHAPTER 3.

Open circuit voltage:

12.8V or more at 20°C



NO CONTINUITY

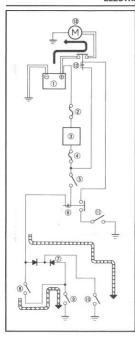
Replace fuse(s).

INCORRECT

Clean battery terminals.

Recharge or replace the battery.





#### STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the "ENGINE STOP" switch and the main switch are both closed, the starter motor can operate only

The transmission is in neutral (the neutral switch is closed).

#### or if

The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter from operating when neither of these conditions 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 however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.



WHEN THE TRANSMISSION IS IN NEUTRAL



WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS **PULLED IN** 



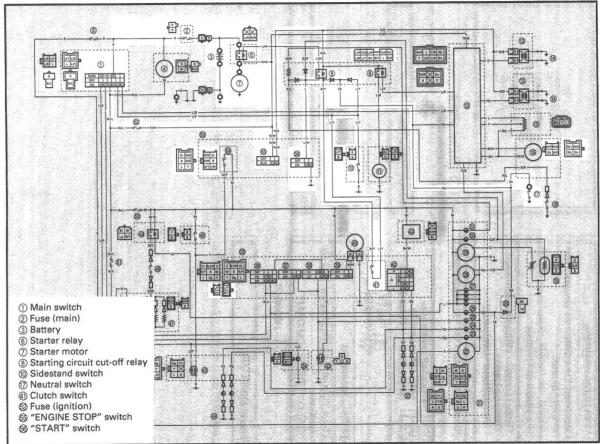
- ① Battery
- ② Fuse (main) 3 Main switch
- (4) Fuse (ignition)
- (5) "ENGINE STOP" switch
- (6) Starting circuit cut-off relay
- (7) Diode
  - ® Clutch switch
  - (9) Sidestand switch @ Neutral switch
- @ "START" switch
- Starter relay
- 3 Starter motor



ELE

0

CIRCUIT DIAGRAM **ELECTRIC STARTING SYSTEM** 



## **IGNITION SYSTEM**





#### 11.Pickup coil resistance

- Disconnect the pickup coil coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

Tester (+) lead  $\rightarrow$  White/Red terminal ① Tester (-) lead  $\rightarrow$ 

White/Green terminal ②

 Check the pickup coil for specificated resistance.



Pickup coil resistance: 446 ~ 545 Ω at 20°C

(White/Red - White/Green)



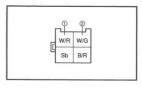
#### 12. Wiring connection

 Check the entire ignition system for connections.

Refer to "CIRCUIT DIAGRAM".



Replace ignitor unit.



## OUT OF SPECIFICATION



Replace pickup coil.

#### POOR CONNECTION

7

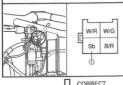
Correct.





# 9.Neutral switch

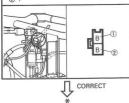
- · Disconnect the neutral switch coupler from the wire harness.
- · Check the switch component for the continuity between "Sky blue ①" and Ground.





#### 10.Sidestand switch

- · Disconnect the sidestand switch coupler from the wire harness.
- · Check the switch component for the continuity between "Black (1) and Black @".



# INCORRECT

Replace neutral switch.

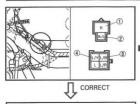
#### INCORRECT

Replace sidestand switch.

## **IGNITION SYSTEM**

Replace main switch.



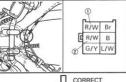




7

## 8. "ENGINE STOP" switch

- Disconnect the handlebar switch (right) coupler from the wire harness.
- Check the switch component for the continuity between "Red/White ① and Red/White ② ".





#### INCORRECT

Replace handlebar switch (right).

## IGNITION SYSTEM



 Check the spark plug cap for specificated resistance.



Spark plug cap resistance: 10 kΩ at 20°C



#### 6.Ignition coil resistance

- Disconnect the ignition coil connector from the wire harness.
- Connect the pocket tester (Ω × 1) to the ignition coil.

 Check the primary coil for specificated resistance.



Primary coil resistance: 1.87 ~ 2.53 Ω at 20°C

- Connect the pocket tester (Ω × 1k) to the ignition coil.
- Check the secondary coil for specificated resistance.



Secondary coil resistance: 12 ~ 18 kΩ at 20°C



#### 7.Main switch

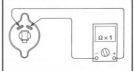
- Disconnect the main switch coupler from the wire harness.
- Check the switch component for the continuity between "Red ① and Brown/ Blue ②" and "Blue/Black ③ and Blue/ Yellow ④".

#### OUT OF SPECIFICATION

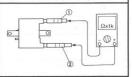


Replace spark plug cap.

Tester (+) lead → Red/Black terminal Tester (-) lead → Orange (Gray) terminal



Tester (+) lead → Spark plug lead ①
Tester (-) lead → Spark plug lead ②



**OUT OF SPECIFICATION** 



Replace ignition coil.





#### 3.Spark plug

- · Check the spark plug condition.
- . Check the spark plug type.
- . Check the spark plug gap.
- Refer to "SPARK PLUG INSPECTION" in CHAPTER 3.

Standard spark plug: DPR8EA-9/X24EPR-U9 NGK/NIPPONDENSO



#### Spark plug gap: 0.8 ~ 0.9 mm



## INCORRECT



## Repair or replace spark plug.

#### 4.Ignition spark gap

- Disconnect the spark plug cap from spark plug.
- Connect the ignition checker (1) as shown.
- Spark plug cap
- Turn the main switch to "ON".



## Check the ignition spark gap @.

 Crank the engine by pushing the starter switch, and increase the spark gap until a misfire occurs.



#### Minimum spark gap: 6.0 mm

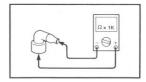


#### Ignition system is good.

MEETS SPECIFICATION

### 5.Spark plug cap resistance

- . Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug cap.







IF IGNITION SYSTEM SHOULD BECOME INOPERATIVE (NO SPARK OR INTERMIT-TENT SPARK)

#### Procedure

Check:

1.Fuse (main and ignition)

- 2.Battery
- 3.Spark plug
- 4.Ignition spark gap
- 5. Spark plug cap resistance
- 6.Ignition coil resistance
- 7 Main switch

NOTE: __

- Remove the following parts before troubleshooting.
- 1)Seat
- 2)Fuel tank
- 3)Air filter case
- 4)Side cover
- Use the following special tool(s) in this troubleshooting.

- 8. "ENGINE STOP" switch
- 9 Neutral switch
- 10. Sidestand switch
- 11.Pick up coil resistance
- 12.Wiring connection (entire ignition system)



Ignition checker: 90890-06754 Pocket tester: 90890-03112



- · Remove the fuses.
- $\bullet$  Connect the pocket tester ( $\Omega\times$  1) to the
- fuses.
- · Check the fuses for continuity.



#### 2.Battery

- Check the battery condition.
   Refer to "BATTERY INSPECTION" in CHAPTER 3.
  - Open circuit voltage: 12.8V or more at 20°C



NO CONTINUITY

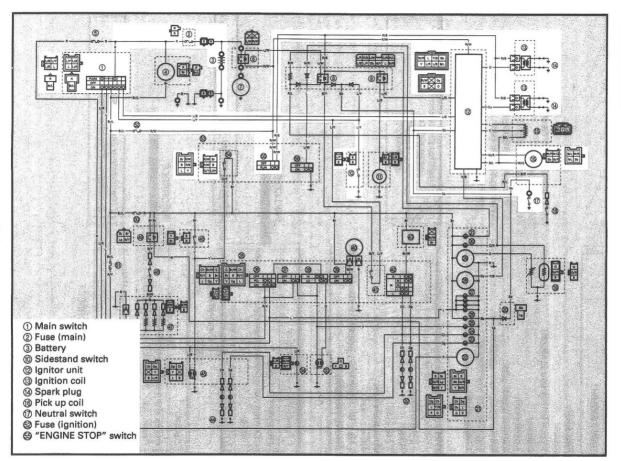
Replace fuse(s).

INCORRECT



- · Clean battery terminals.
- Recharge or replace the battery.





## CHECKING OF CONNECTIONS

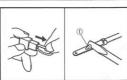




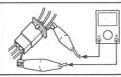
## CHECKING OF CONNECTIONS

Dealing with stains, rust, moisture, etc. on the connector.

- 1.Disconnect:
- Connector
- 2.Dry each terminal with an air blower.



- Connect and disconnect the connector two or three times.
- Pull the lead to check that it will not come off.
- 5.If the terminal comes off, bend up the pin ① and reinsert the terminal into the connector.



#### 6.Connect:

Connector

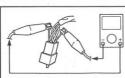
#### ....

The two connectors "click" together.

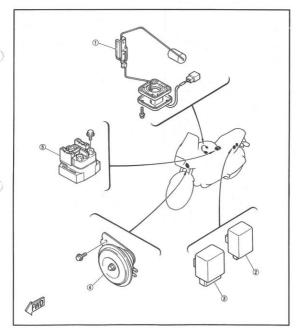
7. Check for continuity with a tester.



- If there is no continuity, clean the terminals.
- Be sure to perform the steps 1 to 7 listed above when checking the wire harness.
- For a field remedy, use a contact revitalizer available on the market.
- . Use the tester on the connector as shown.



- ① Fuel sender
- ② Flasher relay
  ③ Starting circuit cut-off relay
- 4 Horn
- Starter relay









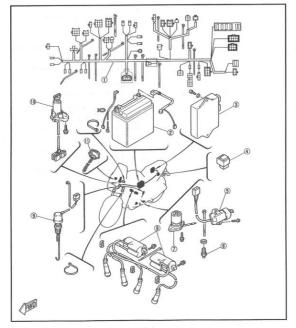
## ELECTRICAL

## **ELECTRICAL COMPONENTS**

- ① Wire harness
- ② Battery
- (3) Ignitor unit (4) Heater relay
- (5) Sidestand switch
- (6) Neutral switch
- ① Oil level switch
- (8) Ignition coil

- Rear brake switch
- @ Main switch
- 1 Thermo switch
- IGNITION COIL:
  - PRIMARY WINDING RESISTANCE: 1.87 ~ 2.53 Ω at 20°C
  - SECONDARY WINDING RESISTANCE: 12 ~ 18 kΩ at 20° C
  - BATTERY: CAPACITY: 12V 12AH

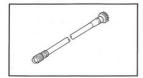






# SHAFT DRIVE CHAS





#### **DRIVE SHAFT**

#### Inspection

1.Inspect:

· Drive shaft splines

Wear/Damage → Replace.

#### INSTALLATION

Reverse the "REMOVAL" procedure.

Note the following points. 1.Lubricate:

Shaft splines



Molybdenum disulfide grease

- 2.Apply:
- Sealant
- (to the mating surface of both case halves)



Yamaha bond No. 1215: P/N 90890-85505

- 3. Tighten:
- · Nuts (final gear case)



Nuts (final gear case): 42 Nm (4.2 m • kg)

#### 4.Install:

- · Rear wheel
- Refer to "REAR WHEEL".



Thrust clearance measurement steps:

- Remove the ring gear assembly.
- Place four pieces of Plastigage[®] between originally fitted thrust washer and ring gear.
  - Install the ring gear assembly and tighten the bolts and nuts to specification.



Bolts (bearing housing): 23 Nm (2.3 m · kg) Nuts (bearing housing): 23 Nm (2.3 m · kg)

Do not turn the shaft drive and ring gear when measuring clearance with Plastigage®.



- Remove the ring gear assembly.
- Measure the thrust clearance. Calculate width of flattened Plastigage® ①.



Ring gear thrust clearance: 0.1 ~ 0.2 mm

- If the clearance is correct, install the ring gear assembly.
- olf the out of specification, select the correct washer.

#### Thrust washer selection steps:

· Select the suitable thrust washer by the following chart.



#### Trust washer

Thickness (mm)

1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1

 Repeat measurement steps until the ring gear thrust clearance is within the specified limits



Ring gear thrust clearance: 0.1 ~ 0.2 mm **********

# SHAFT DRIVE CHAS



#### 2.Install:

- . Shims (proper size as calculated)
- · Final drive shaft assembly
- Bearing retainer (final drive shaft)
   Use a final drive shaft bearing retainer wrench.

#### NOTE: _

The bearing retainer has left-hand threads. Turn retainer counterclockwise to tighten it.



Bearing retainer wrench: P/N 90890-04050



Bearing retainer: 110 Nm (11.0 m · kg)

#### 3.Install:

- · Coupling gear
- Self locking nut (coupling gear)
   Use a final drive shaft holder.



Final drive shaft holder: P/N 90890-01229



Self locking nut (coupling gear): 110 Nm (11.0 m • kg) LOCTITE®

#### 4.Install:

- Ring gear assembly (without thrust washer)
- 5.Adjust:
- Gear lash

Refer to "Gear lash measurement" and "Gear lash adjustment".

- 6.Measure/Select:
- · Ring gear thrust clearance





- a numeral (usually a decimal number) on inside of ring gear either added to or subtracted from 35.40.
- (f) =a bearing thickness (considered constant).



Bearing thickness ①: 13.00 mm

#### Example:

- 1)If gear case is marked "45.51"...........© is

- 4)(f) is 13.00
  - "B" = 45.51 + 3.35 (35.35 + 13.00) = 48.86 - (48.35)
    - = 0.51
- Therefore, shim thickness is 0.51 mm.
   Shim sizes are supplied in following thickness.



Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

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

In the example above, the calculated shim thickness is 0.51 mm. The chart instructs you, however, to round off the 1 to 0. Thus you should use a 0.50 mm shim.

***********





Final drive gear shim thickness: A = @ - \bar{D}

#### Where:

- (a) = a numeral (usually a decimal number) on the gear is either added to or subtracted from "84".
- (i.e. 83.50)



1)If final drive shaft gear is marked "+01"......... is 84.01.

"A" = 84.01 - 83.50 = 0.51

Therefore, shim thickness is 0.51 mm.
 Shim sizes are supplied in following thickness.



Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

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

In the example above, the calculated shim thickness is 0.51 mm. The chart instructs you, however, to round off the 1 to 0. Thus you should use a 0.50 mm shim.

 To find shim thickness "B", use following formula.

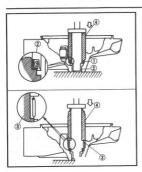
Ring gear shim thickness:  $B = \bigcirc + \bigcirc - (\bigcirc + \bigcirc)$ 



- © =numeral on gear case (i.e. 45.51)
- anumeral (usually a decimal number) on outside of ring gear bearing housing (i.e. 3.35).







#### 5.Install:

- Guide collar (1)
- Oil seal (new) ②
- Roller bearing (outer race) ③
- Use a suitable press tool (4) and a press to install the above components into the main housing.

#### Final drive/Ring gear positioning

#### NOTE: __

Gear positioning is necessary when any of the following parts are replaced:

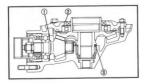
- · Final gear case
- · Ring gear bearing housing
- Bearing(s)

#### 1.Select:

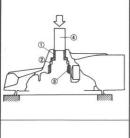
- Final drive gear shim ①
- Ring gear shim ②
- **********

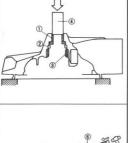
#### Selecting steps:

- Position final drive gear and ring gear by using shims ① and ② with their respective thickness calculated from information marked on final gear case and drive gear end.
- Shim thickness "A"
- ② Shim thickness "B"
- 3 Thrust washer "C"
- To find shim thickness "A" use following formula:









#### Bearing removal and reassembly

- 1.Remove:
- · Guide collar (1)
- · Oil seal ②
- · Roller bearing (3)
  - Use a suitable press tool @ and an appropriate support for the main housing.

#### 2.Inspect:

· Roller bearing

Damage → Replace.

The roller bearing can be reused, but Yamaha recommends installation of new bearing. Do not reuse the oil seal.

#### 3.Remove:

. Final drive roller bearing (5)

******

#### Removing steps:

- · Heat the bare housing to 150°C.
- Remove the roller bearing outer races with an appropriately shaped punch (6).
- Remove the inner race from the final drive shaft.

The removal of the final drive shaft roller bearing is difficult and seldom necessary.

*********

#### 4.Install:

· Final drive shaft roller bearing (new)

**********

#### Installing steps:

- Heat the bare housing to 150°C.
- Install the roller bearing outer race using the proper adapter.
- Install the inner race onto the drive shaft. *********







- Bearing housing (1)
- Shim(s)
- Thrust washer



#### 3.Remove:

Self-locking nut (coupling gear) ①
 Use a final drive shaft holder ②.



Final drive shaft holder: P/N 90890-01229

Gear coupling



#### 4.Remove:

Bearing retainer (final drive shaft)
 Use a final drive shaft bearing retainer wrench ①.



Bearing retainer wrench: P/N 90890-04050

#### CAUTION:

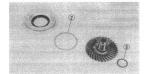
Final drive shaft bearing retainer has lefthand threads. Turn retainer clockwise to loosen it.

· Final drive shaft assembly

Tap lightly on the final drive shaft end with a soft hammer.

#### CAUTION:

Final drive shaft removal should be performed only if gearing replacement is necessary. Do not reuse bearing or races after removal.



#### Adjustment steps:

 Select the suitable shims and thrust washer by the following chart.

*********

Too-little gear lash → Reduce shim thickness. Too-large gear lash → Increase shim thickness.

olf increase by more than 0.1 mm:

Reduce thrust washer thickness by 0.1 mm for every 0.1 mm of ring gear shim increase.

If reduce by more than 0.1 mm:

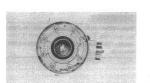
Increase thrust washer thickness by 0.1 mm for every 0.1 mm of ring gear shim decrease.

ling gear shim
0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50

Thrust washer

Thickness (mm) 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1

***********



## Final drive gear disassembly

1.Remove:

- Nuts (bearing housing)
- Bolts (bearing housing)

Working in a crisscross pattern, loosen nut 1 /4 turn each, Remove them after all loos-

ened.





5.Attach:

· Gear lash measurement tool ①

• Dial gauge ②



Final gear back lash band: P/N 90890-01230

③ Position mark

#### 6.Measure:

Gear lash

Gently rotate the gear coupling from engagement to engagement.

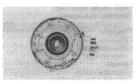
Over specified limit → Adjust.



Final gear lash: 0.1 ~ 0.2 mm

#### NOTE:

Measure the gear lash at 4 positions. Rotate the shaft 90" each time.



#### Gear lash adjustment

1.Remove:

· Nuts (bearing housing)

Bolts (bearing housing)

#### NOTE:

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



- 2.Remove:
- Bearing housing ①
- Ring gear
- Shim(s) (2)
- Thrust washer ③
- 3.Adjust:
- Gear lash



#### REMOVAL

#### **▲** WARNING

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

#### 1.Remove:

· Rear wheel

Refer to "REAR WHEEL".

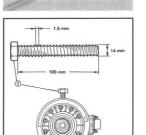


• Final gear assembly ①





• Drive shaft ①



#### FINAL DRIVE GEAR CASE

#### Gear lash measurement

- 1.Secure the gear case in a vise or other support.
- 2.Remove:
- · Drain plug
- Drain the oil.
- 3.Install:
- · Specified bolt (1)
- (into the drain plug hole)
- 4. Finger tighten the bolt until it holds the ring gear.

#### NOTE: _

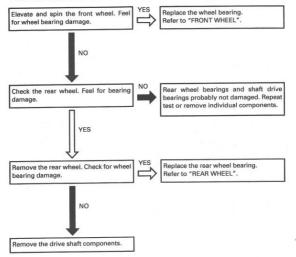
Do not over tighten the bolt; finger-tight is sufficient.





#### **Troubleshooting Chart**

When basic conditions "a" and "b" above exist, check the following points:





3.Inspect:

· Oil leakage

**********

#### Inspection steps:

- · Clean the entire motorcycle thoroughly, then dry it.
- Apply a leak-localizing compound or dry powder spray to the shaft drive.
- Road test the motorcycle for the distance necessary to locate the leak.

Leakage → Inspect component housing, gasket and/or seal for damage.

Damage → Replace component.

- ① Oil seal
- ② O-ring ③ Forward

### NOTE: __

- · An apparent oil leak on a new or nearly new motorcycle may be the result of a rust preventive coating or excessive seal lubrication.
- · Always clean the motorcycle and recheck the suspected location of an apparent leakage. ************

