YAMAHA

VMX12 '86

2EN-ME1

SERVICE MANUAL

VMX12
SERVICE MANUAL
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NOTICE

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha 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 unsafe.
Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

TECHNICAL PUBLICATIONS
SERVICE DIVISION
MOTORCYCLES OPERATIONS
YAMAHA MOTOR CO., LTD.

HOW TO USE THIS MANUAL

PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.

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

CAUTION: **A CAUTION** indicates special procedures that must be followed to avoid damage to the motorcycle.

WARNING: **A WARNING** indicates special procedures that must be followed to avoid injury to a motorcycle operator or person inspecting or repairing the motorcycle.

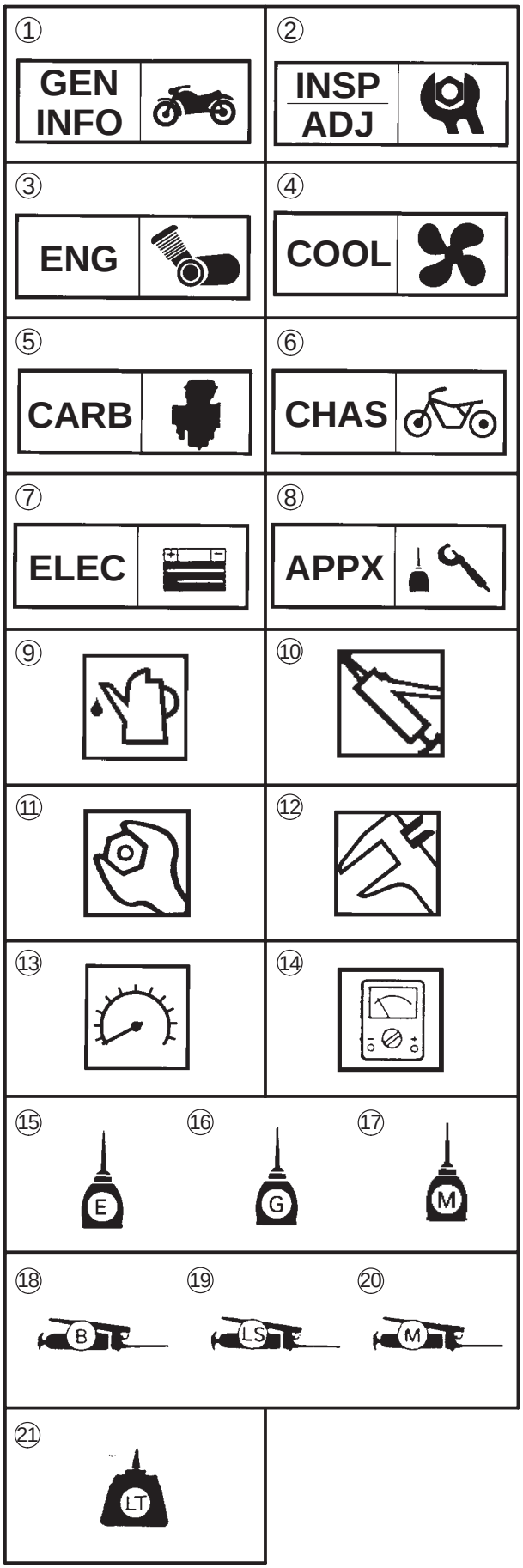
MANUAL FORMAT

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 inspection operations.
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

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 ⑧ are designed as thumb tabs to indicate the chapter's number and content.

① General information
② Periodic inspection and adjustment
③ Engine
④ Cooling system
⑤ Carburetion
⑥ Chassis
⑦ Electrical
⑧ Appendices

Illustrated symbols ⑨ to ⑭ are used to identify the specifications appearing in the text.

⑨ Filling fluid
⑩ Lubricant
⑪ Tightening
⑫ Wear limit, clearance
⑬ Engine speed
⑭ Ω, V, A

Illustrated symbols ⑮ to ㉑ in the exploded diagram indicate grade of lubricant and location of lubrication point.

⑮ Apply engine oil
⑯ Apply gear oil
⑰ Apply molybdenum disulfide oil
⑱ Apply wheel bearing grease
⑲ Apply lightweight lithium-soap base grease
⑳ Apply molybdenum disulfide grease
㉑ Apply locking agent (LOCTITE®)

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ENGINE OVERHAUL	 ENG 3
COOLING SYSTEM	 COOL 4
CARBURETION	 CARB 5
CHASSIS	 CHAS 6
ELECTRICAL	 ELEC 7
APPENDICES	 APPX 8

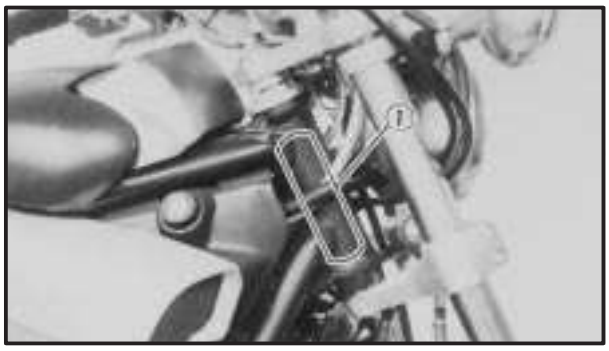
CHAPTER 1.
GENERAL INFORMATION

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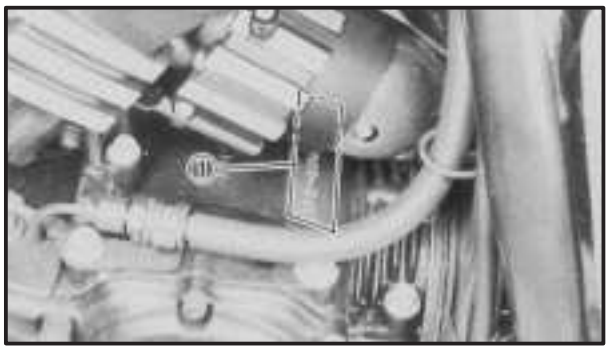


GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER

The frame serial number ① is stamped into the steering head pipe.



ENGINE SERIAL NUMBER

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

NOTE:

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

Starting Serial Number:
VMX12 . . . . . 2EN-000101

NOTE:

Designs and specifications are subject to change without notice.



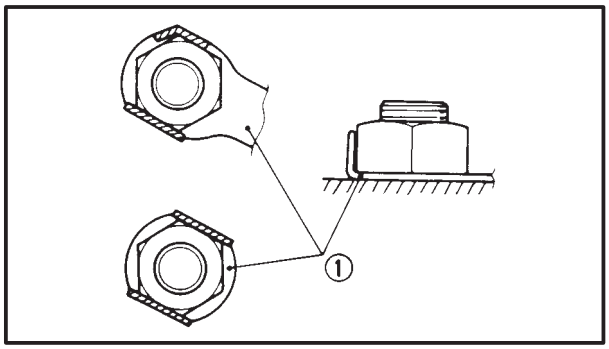
IMPORTANT INFORMATION

ALL REPLACEMENT PARTS

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

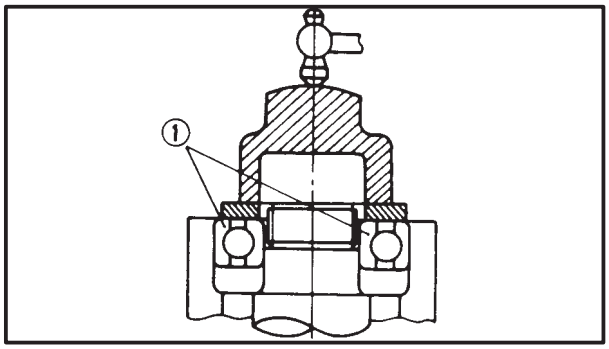
GASKETS, OIL SEALS, AND O-RINGS

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



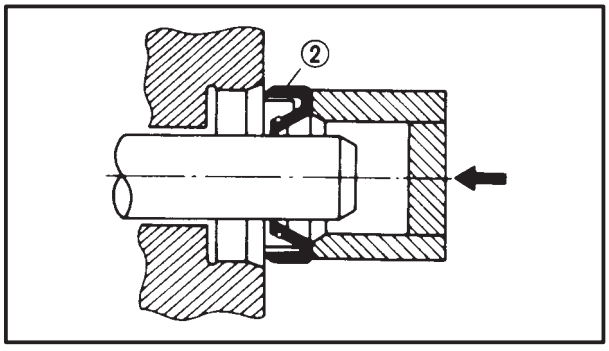
LOCK WASHERS/PLATES AND COTTER PINS

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.



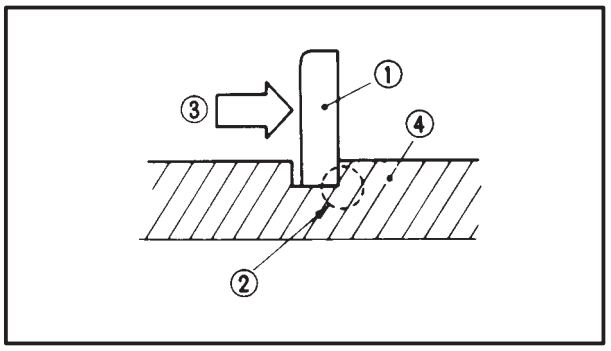
BEARINGS AND OIL SEALS

1. Install the bearing(s) ① and oil seal(s) ② with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of light-weight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.



CAUTION:

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



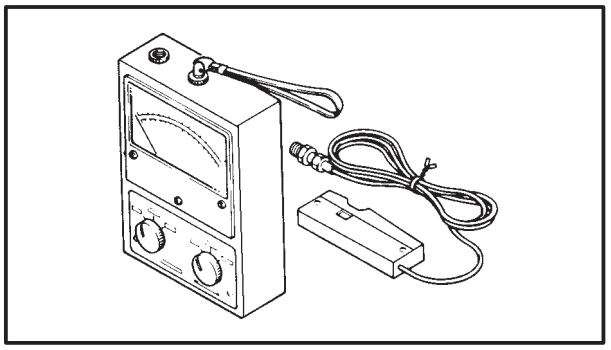
CIRCLIPS

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

④ Shaft

SPECIAL TOOLS

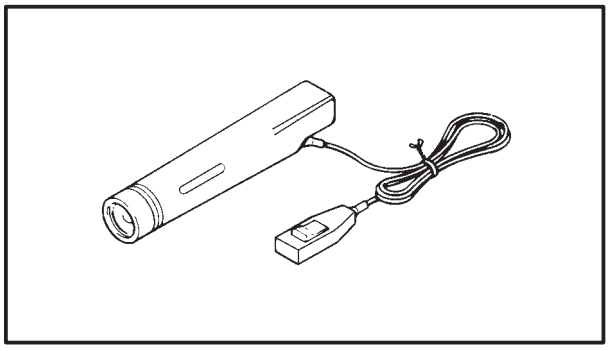
The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.



FOR TUNE UP

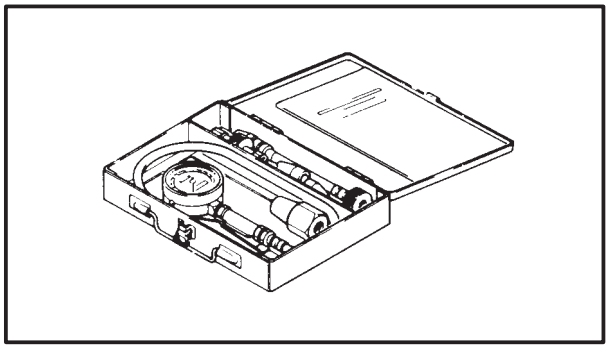
1. Inductive Tachometer
   P/N 90890-03113

This tool is needed for detecting engine rpm.



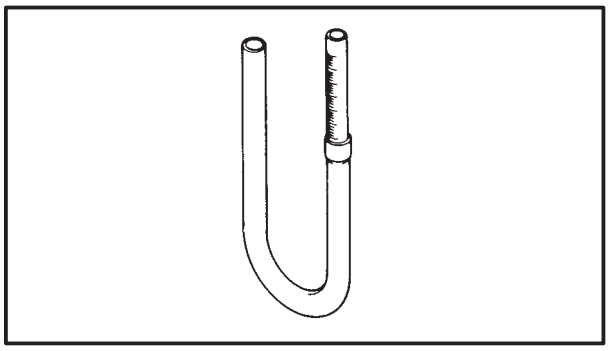
2. Inductive Timing Light
   P/N 90890-03109

This tool is necessary for checking ignition timing.



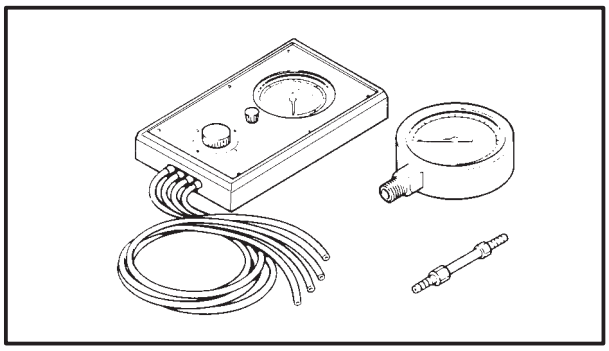
3. Compression Gauge
   P/N 90890-03081

This gauge is used to measure the engine compression.



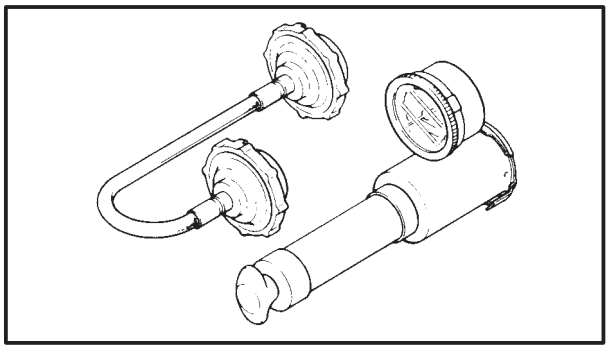
4. Fuel Level Gauge
   P/N 90890-01312

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



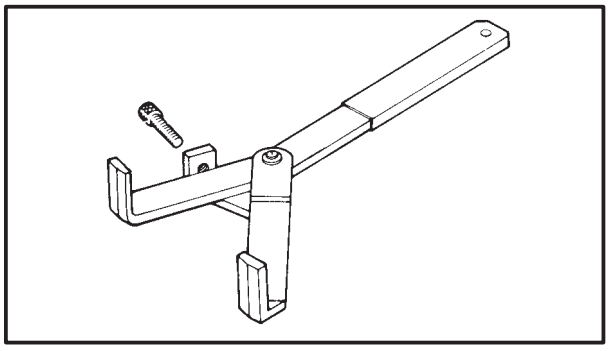
5. Vacuum Gauge
   P/N 90890-03094

This gauge is needed for carburetor synchronization.



6. Radiator Cap Tester
   P/N 90890-01325

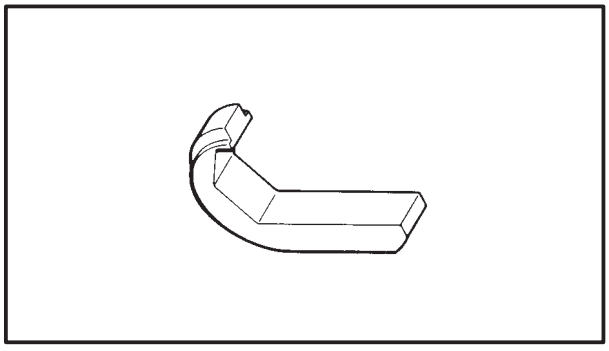
This tester is needed for checking the cooling system.



FOR ENGINE SERVICE

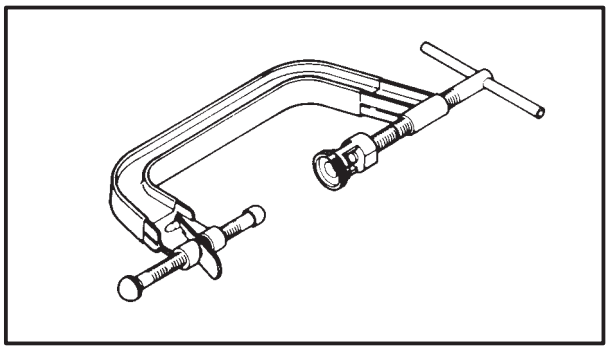
1. Clutch Holder
   P/N 90890-04086

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

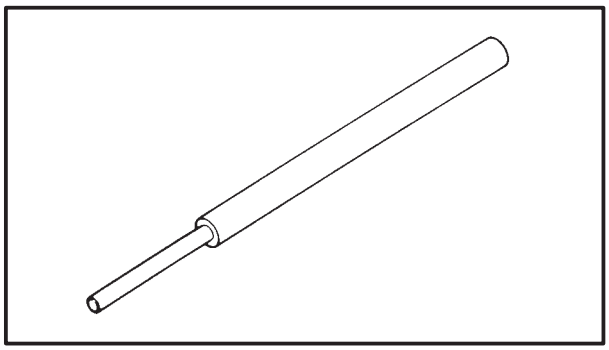


2. Tappet Adjusting Tool
   P/N 90890-04105

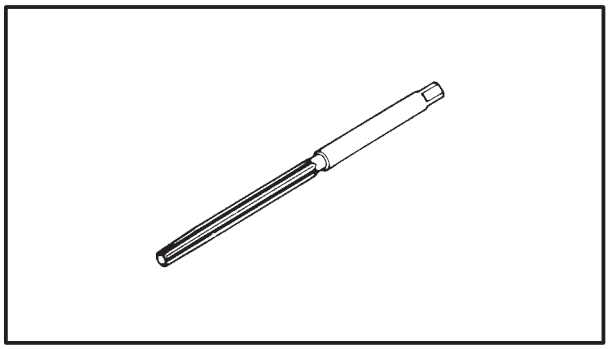
This tool is necessary to replace valve adjusting pads.



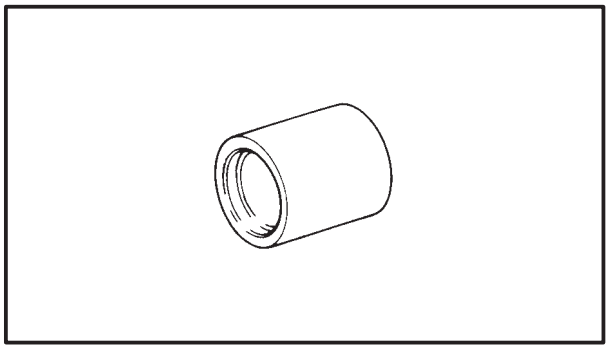
3. Valve Spring Compressor
   P/N 90890-04019
This tool is needed to remove and install the valve assemblies.



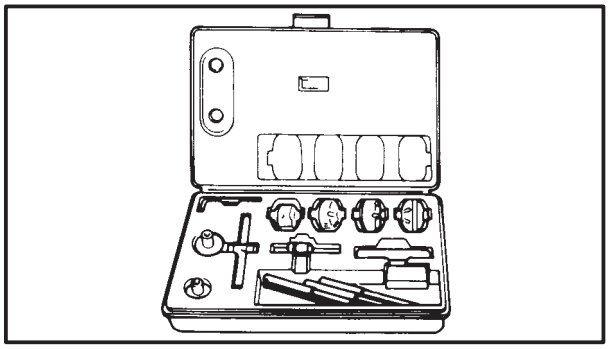
4. Valve Guide Remover (5.5 mm)
   P/N 90890-01122
This tool is used to remove the valve guides.



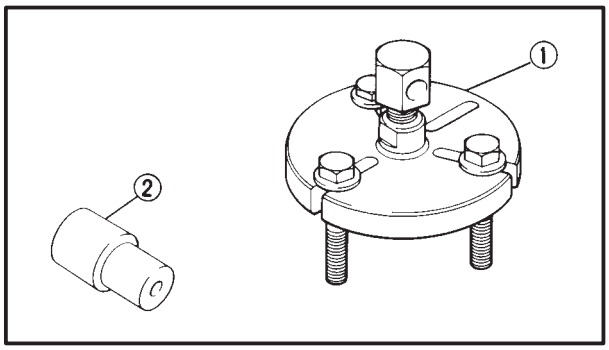
5. Valve Guide Reamer (5.5 mm)
   P/N 90890-01196
This tool is used to rebore the new valve guide.



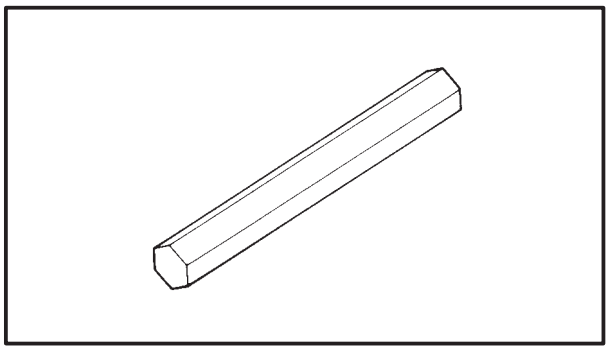
6. Valve Guide Installer
   P/N 90890-04015
This tool is needed to install the valve guides properly.



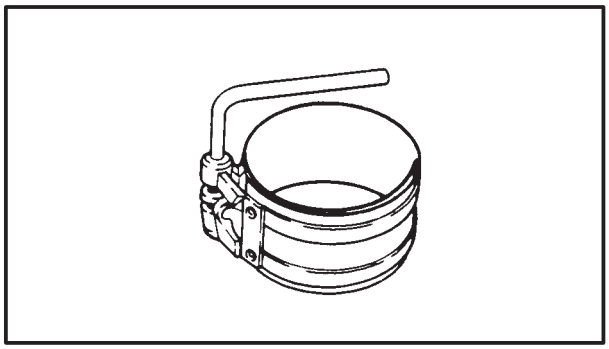
7. Valve Seat Cutter Set
   P/N YM-91043
This tool is needed to resurface the valve seat.



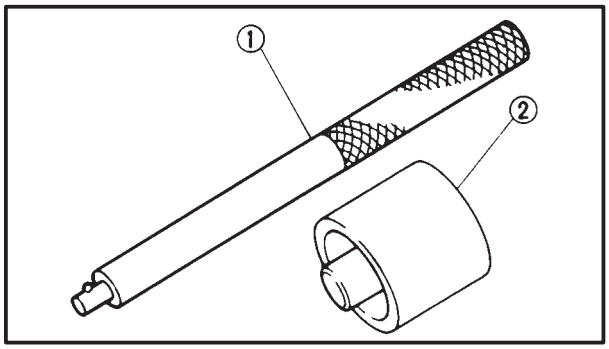
8. Flywheel Puller
   P/N 90890-01362 –①
   Adapter
   P/N 90890-04089 –②
These tools are used to remove the flywheel.



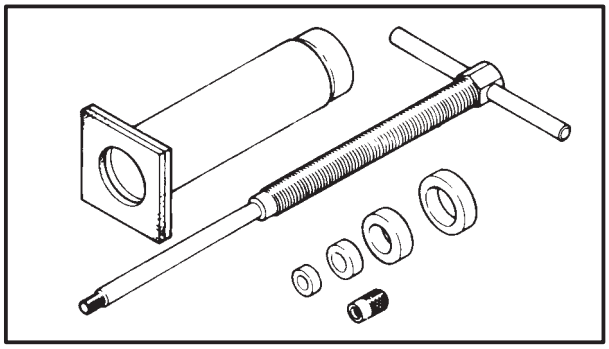
9. 8 mm Wrench Adapter
   P/N 90890-04076
This tool is used to loosen or tighten the cylinder head securing nut.



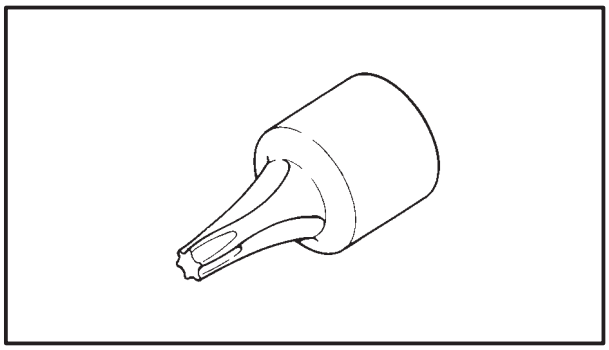
10. Piston Ring Compressor
    P/N 90890-05158
This tool is used when installing the piston into the cylinder.



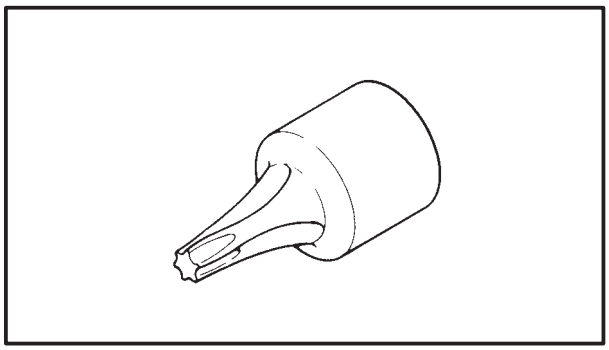
11. Water Pump Seal Installer
    Handle
    P/N 90890-04058 –①
    Adapter
    P/N 90890-04078 –②
This tool is needed for proper installation of the water pump seal.



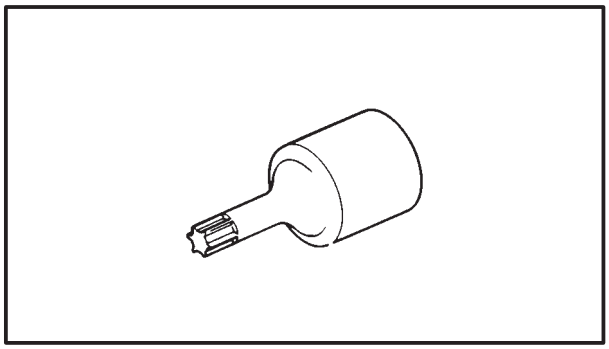
12. Piston Pin Puller
    P/N 90890-01304
This tool is used to remove the piston pin.



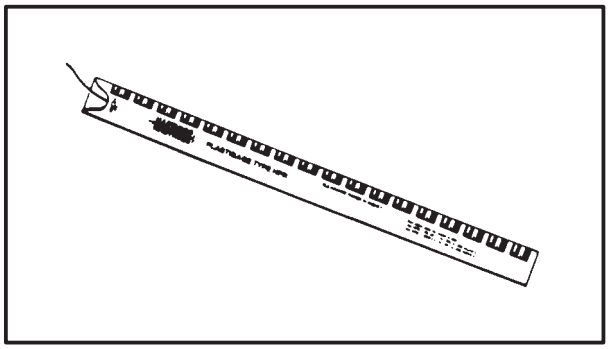
13. #40 Torx Driver
P/N 90890-04049
This tool is used to loosen or tighten the middle gear bearing retainer bolt.



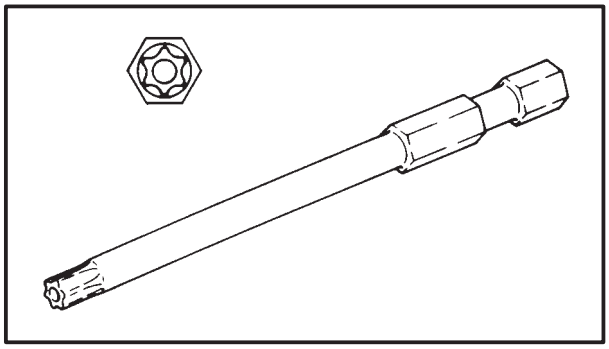
14. #30 Torx Driver
P/N YU-29843-6
This tool is used to loosen or tighten the drive axle bearing retainer bolt.



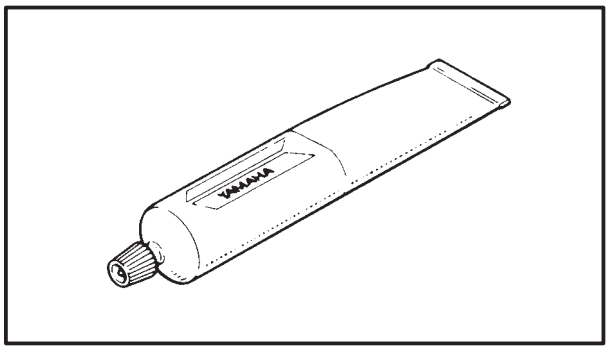
15. #25 Torx Driver
P/N YU-29843-4
This tool is used to loosen or tighten the shift cam segment securing bolt.



16. Plastigage® Set “Green”
P/N YU-33210
This gauge is needed to measure the clearance for the connecting rod bearing.

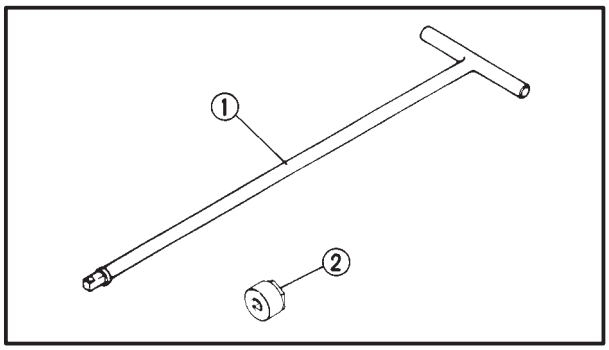


17. Special Torx Driver
P/N 90890-05349
This tool is used when overhauling the carburetors.



18. Yamaha Bond No.1215
    P/N 90890-85505

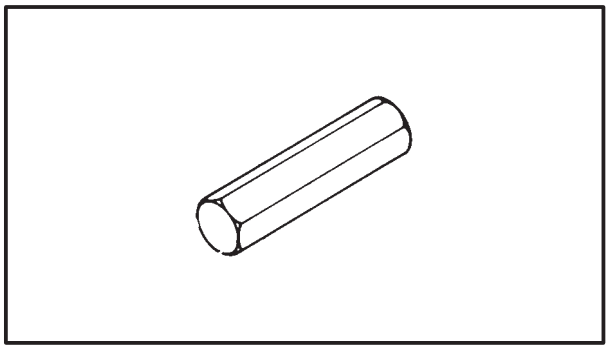
This sealant (bond) is used for crankcase mating surfaces, etc.



FOR CHASSIS SERVICE

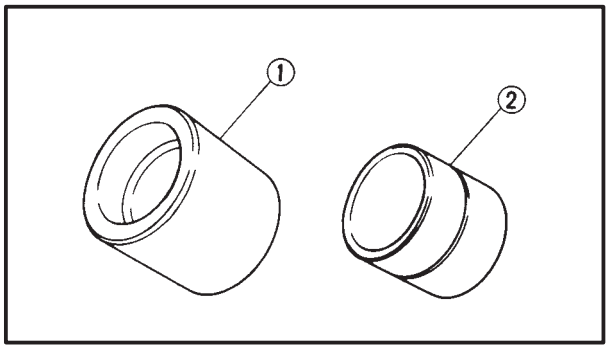
1. T-Handle
   P/N 90890-01326 –①
   Damper Rod Holder (24 mm)
   P/N 90890-01328 –②

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



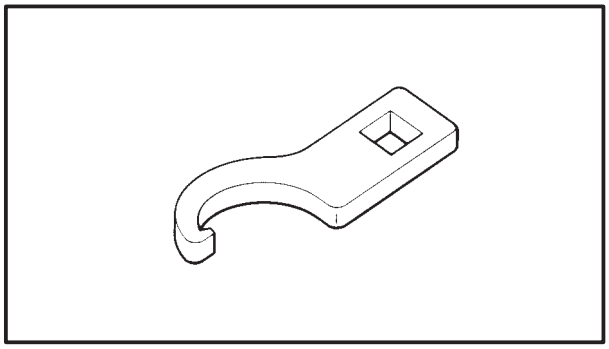
2. Front Fork Cap Socket (17 mm)
   P/N 90890-01104

This tool is needed when loosening and tightening the front fork cap bolt.



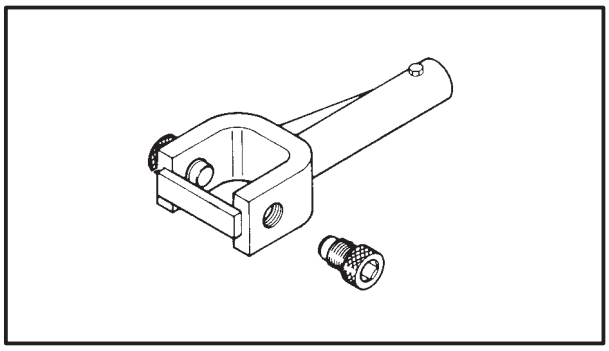
3. Front Fork Seal Driver Weight
   P/N 90890-01367 –①
   Adapter (40 mm)
   P/N 90890-01373 –②

These tools are used when installing the fork seal.



4. Ring Nut Wrench
   P/N 90890-01403

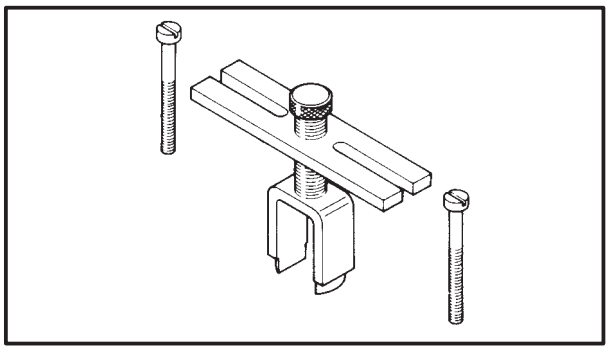
This tool is used to loosen and tighten the steering ring nut.



FOR MIDDLE GEAR SERVICE

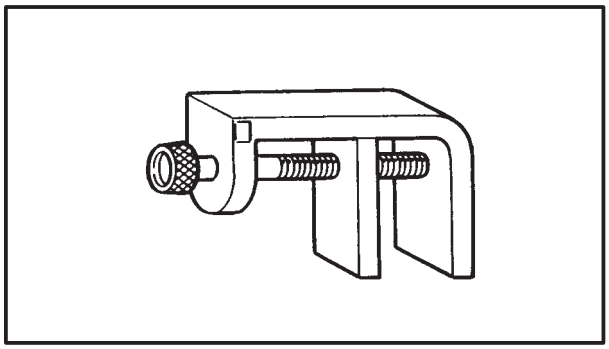
1. Universal Joint Holder
   P/N 90890-04062

This tool is used when adjusting the gear lash in the middle gear.



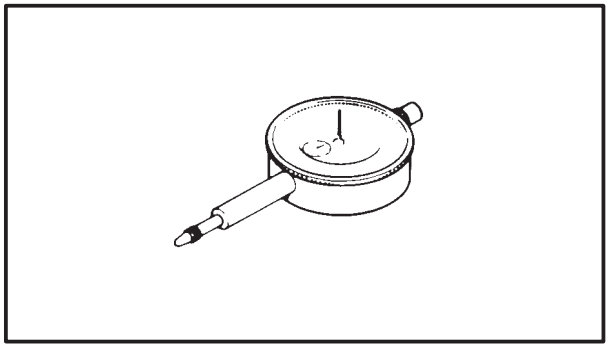
2. Middle Drive Gear Holder
   P/N 90890-04080

This tool is needed when measuring the middle gear lash.



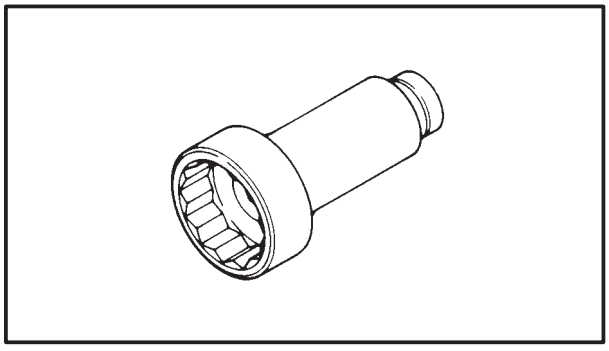
3. Damper Spring Compressor
   P/N 90890-04090

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



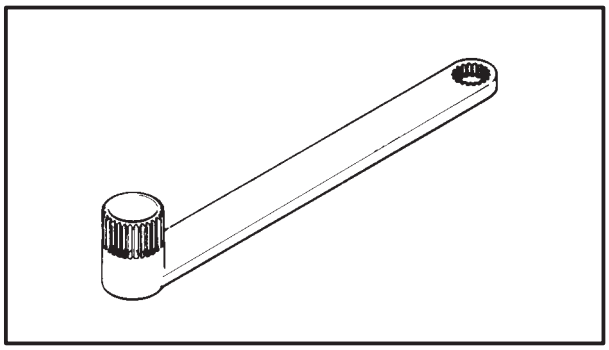
4. Dial Gauge
   P/N 90890-03097

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

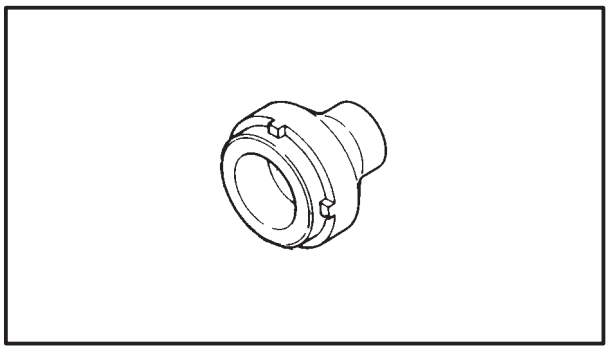


5. 55 mm Offset Wrench
   P/N 90890-04054

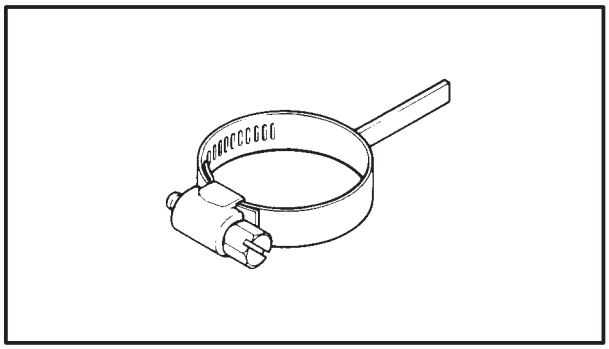
This tool is used to loosen and tighten the drive shaft nut.



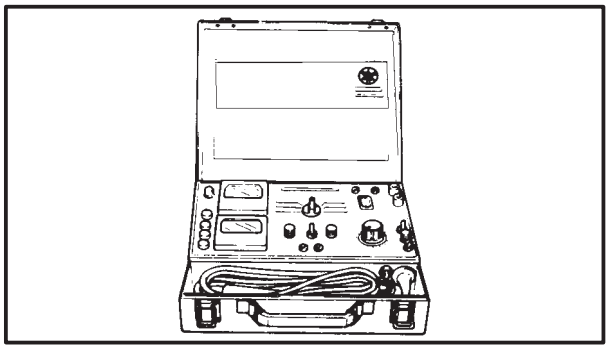
6. Final Drive Shaft Holder
   P/N 90890-01229
This tool is used when adjusting the gear lash for the final gear.



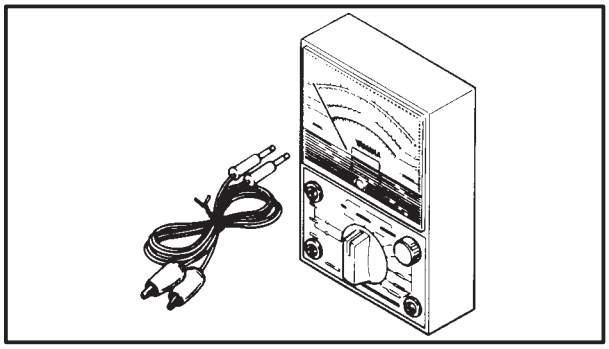
7. Final Drive Shaft Bearing Retainer Wrench
   P/N 90890-04050
This tool is used to remove and install the bearing retainer.



8. Gear Lash Measurement Tool
   P/N 90890-01230
This tool is used to measure gear lash.



FOR ELECTRICAL COMPONENTS
1. Electro Tester
   P/N 90890-03021
This instrument is necessary for checking the ignition system components.



2. Pocket Tester
   P/N 90890-03112
This instrument is invaluable for checking the electrical system.

CHAPTER 2.
PERIODIC INSPECTIONS AND ADJUSTMENTS

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PERIODIC INSPECTIONS AND ADJUSTMENTS

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 (miles)

Item	Remarks	Break-in 1,000 (600)	EVERY	
			6,000 (4,000) or 6 months	12,000 (8,000) or 12 months
Valve(s)*	Check valve clearance. Adjust if necessary.	○		○
Spark plug(s)	Check condition. Clean or replace if necessary.	○	○	○
Air filter	Clean. Replace if necessary.		○	○
Carburetor*	Check idle speed/synchronization/starter operation. Adjust if necessary.	○	○	○
Fuel line*	Check fuel hose (and vacuum pipe) for cracks or damage. Replace if necessary.		○	○
Fuel filter*	Check condition. Replace if necessary.			○
Engine oil	Replace (Warm engine before draining). See NOTE.	○		○
Engine oil filter*	Replace.	○		○
Final gear oil	Check oil level/oil leakage. Replace every 24,000 (16,000) or 24 months.	Replace	○	○
Brake*	Check operation/fluid leakage/See NOTE. Correct if necessary.		○	○
Clutch*	Check operation/fluid leakage/See NOTE. Correct if necessary.		○	○
Rear arm pivot*	Check rear arm assembly for looseness. Correct if necessary. Moderately repack every 24,000 (16,000) or 24 months.**			○
Wheels*	Check balance/damage/runout. Repair if necessary.		○	○
Wheel bearings*	Check bearings assembly for looseness/damage. Replace if damaged.		○	○
Steering bearing*	Check bearings assembly for looseness. Correct if necessary. Moderately repack every 24,000 (16,000) or 24 months.**	○		○
Front forks*	Check operation/oil leakage. Repair if necessary.		○	○
Rear shock absorber*	Check operation/oil leakage. Repair if necessary.		○	○
Cooling system	Check coolant leakage. Repair if necessary. Replace coolant every 24,000 (16,000) or 24 months.		○	○

INSP ADJ

Item	Remarks	Break-in 1,000 (600)	EVERY	
			6,000 (4,000) or 6 months	12,000 (8,000) or 12 months
Fittings/Fasteners*	Check all chassis fittings and fasterners. Correct if necessary.	○	○	○
Center and sidestand*	Check operation. Repair if necessary.	○	○	○
Battery*	Check specific gravity. Check breather pipe for proper operation. Correct if necessary.		○	○

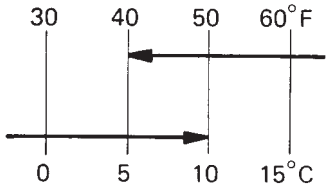
* : It is recommended that these items be serviced by a Yamaha dealer.
**: Medium weight wheel bearing grease.

NOTE:

- Brake fluid replacement (brake and clutch):

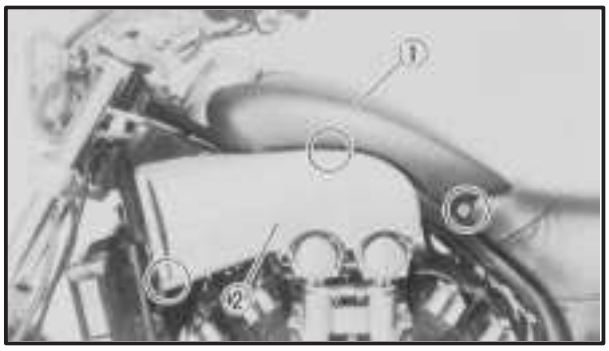
1) When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2) On the inner parts of the master cylinder and caliper cylinder, replace the oil seals every two years.
3) Replace the brake (clutch) hoses every four years, or it cracked or damaged.

- Engine oil:



SAE 20W40 Type SE Motor Oil

SAE 10W30 Type SE Motor Oil

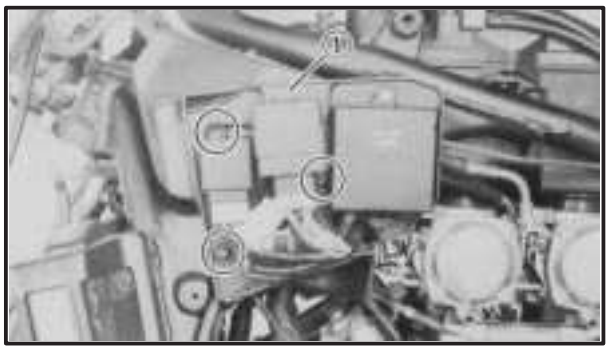


ENGINE

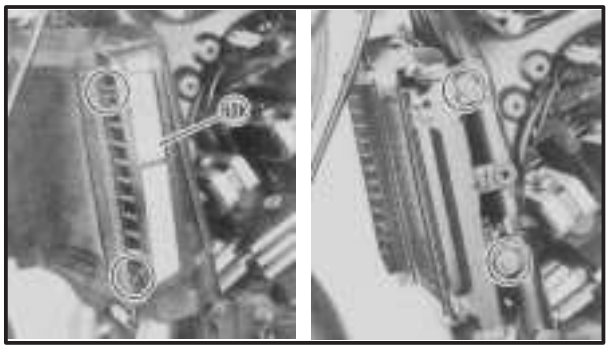
VALVE CLEARANCE ADJUSTMENT

Removal

1. Remove:
   - Top cover ①
   - Covers (left and right) ②



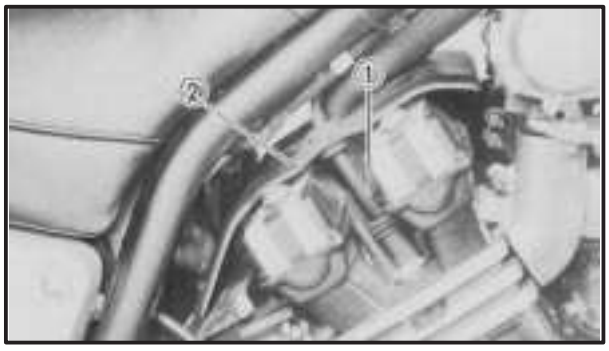
2. Remove:
   - Electrical components board ①
3. Disconnect:
   - All electrical component leads



4. Remove:
   - Side covers (radiator) ①
   - Bolts (radiator)

NOTE:

It is not necessary to remove the radiator completely from the motorcycle.



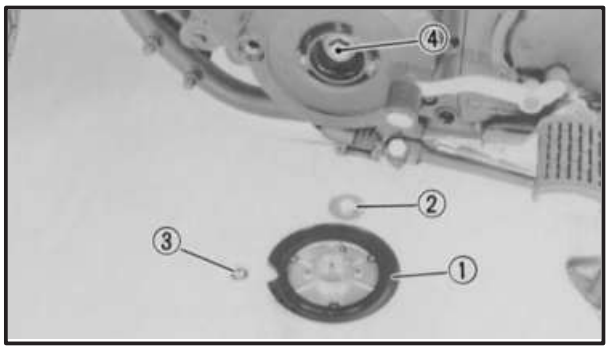
5. Disconnect:
   - Spark plug caps ①
6. Remove:
   - Air baffle plate (rear) ②



7. Remove:
   - Cylinder head covers

NOTE:

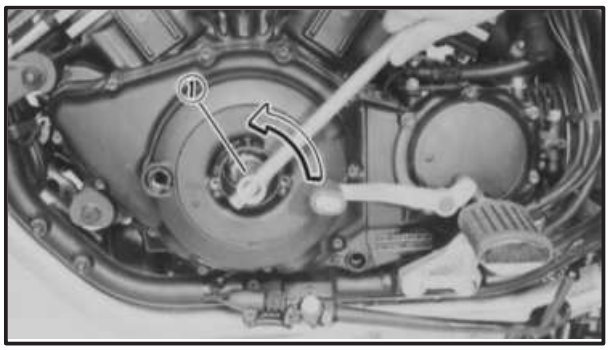
Be sure you do not lose the oil plugs ① on the camshaft caps.



8. Remove:
   - Crankcase cover plate ①
   - Special washer ②
   - Timing plug ③

NOTE:

Check for clog of oil passage ④ in the bolt. If any, clean the oil passage.

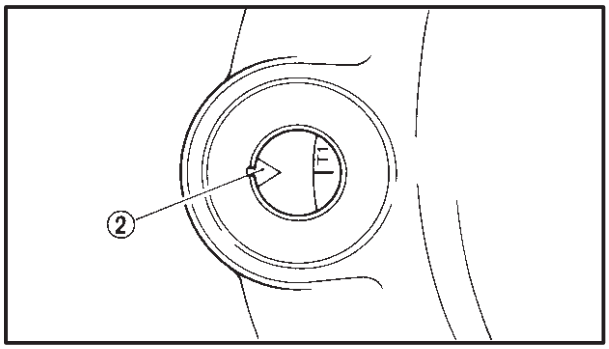


Inspection and Adjustment

1. Measure:
   - Valve clearance

NOTE:

Be sure piston is at Top Dead Center (TDC) when measuring clearance.



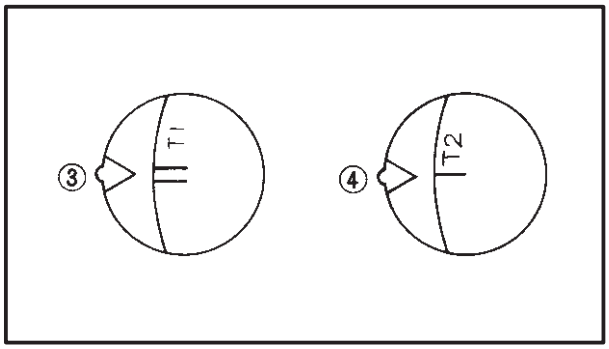
Valve Clearance measurement steps:

- Turn the crankshaft counterclockwise with a 32 mm (1.26 in) socket wrench ①.

NOTE:

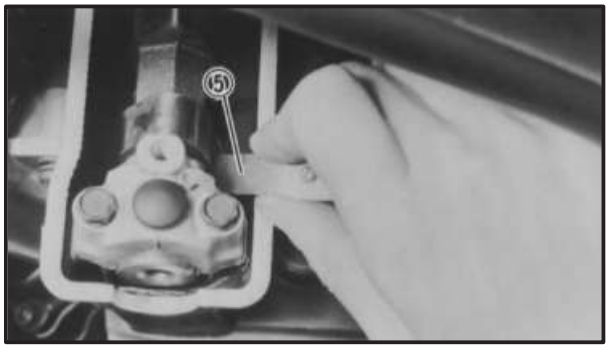
Valve clearance must be measured when the engine is cool to the touch.

- Align the "T_1" mark (for the No.1 cylinder) on the flywheel with the stationary pointer ② on the crankcase cover. When the "T_1" mark is aligned with the stationary pointer ②, the piston is at top dead center TDC.
- Note marks on flywheel to obtain correct valve clearance measurements.

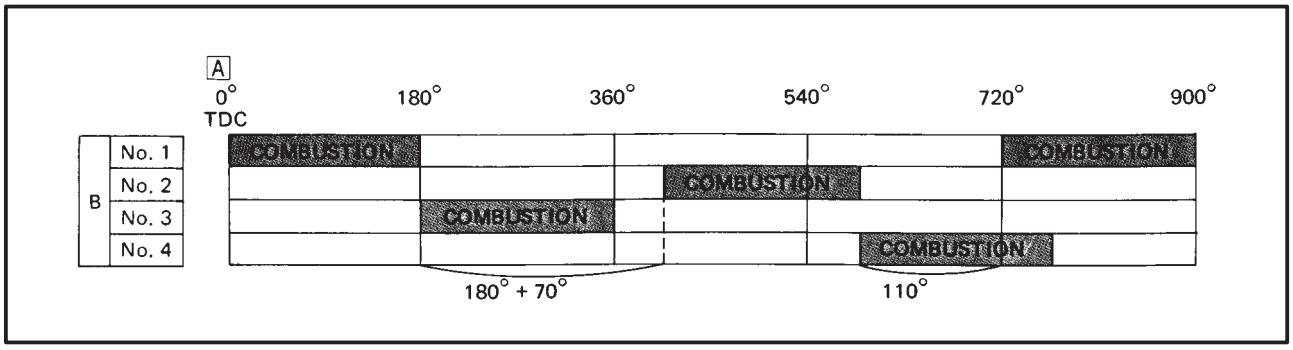


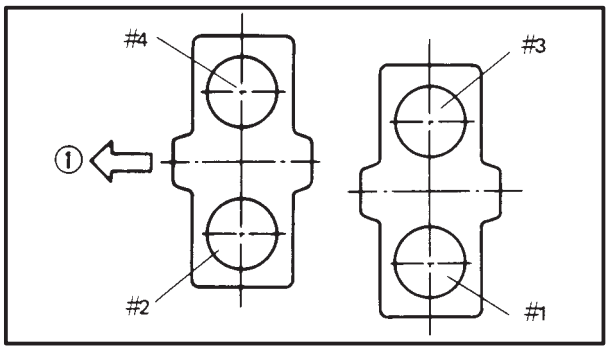
③ TDC for No.1 cylinder
④ TDC for No.2 cylinder

- Measure the valve clearance using a Feeler Gauge ⑤.
- Record the measured amount if the clearance is incorrect.



Intake Valve (cold):
0.11 ~ 0.15 mm
(0.004 ~ 0.006 in)
Exhaust Valve (cold):
0.26 ~ 0.30 mm
(0.010 ~ 0.012 in)

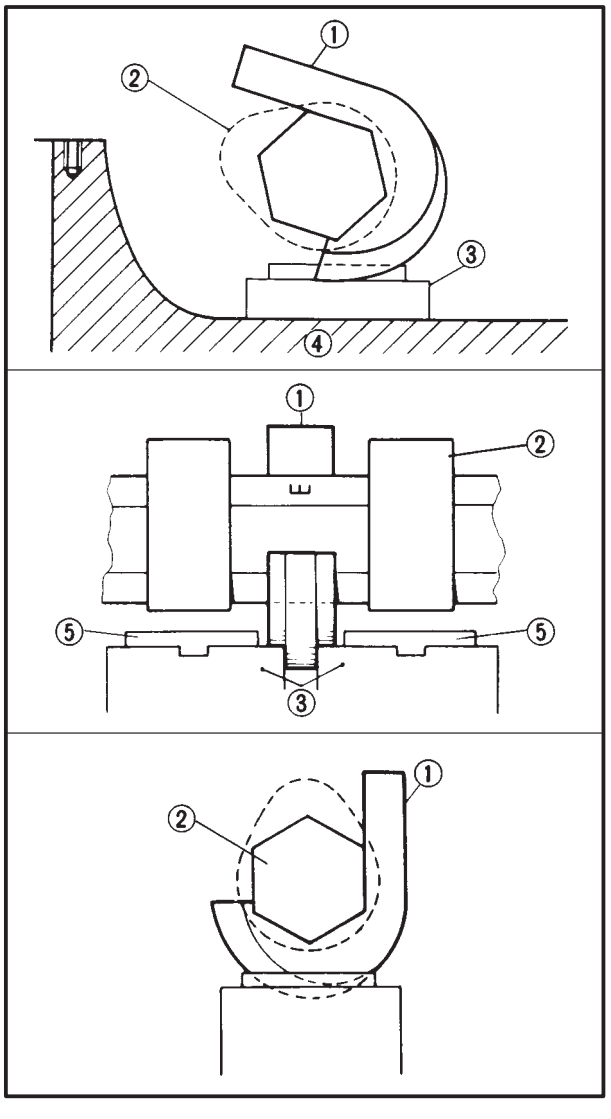




Ⓐ Crankshaft degree
Ⓑ Cylinder
- Measure the valve clearance, in sequence, for Nor.3, 4, and No.2 cylinders.
  Out of specification → Adjust clearance.

① Front

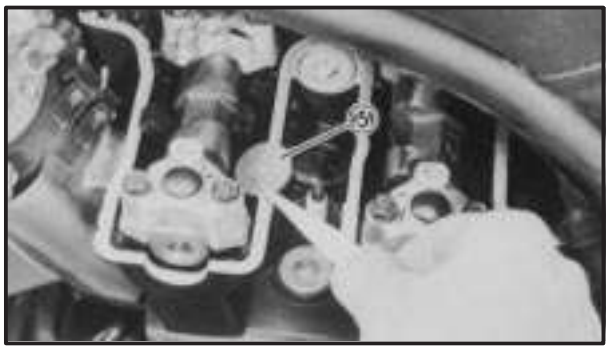
Firing Sequence:
1 – 3 – 4 – 2

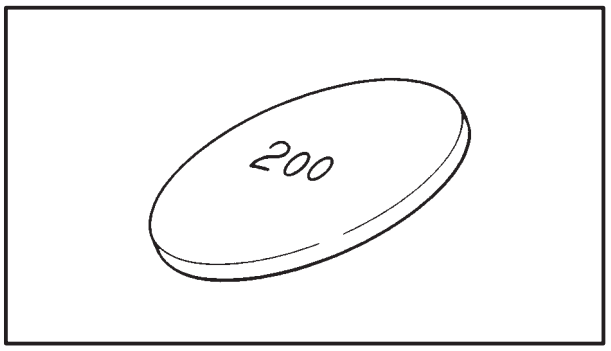


2. Adjust:
   - Valve clearance

Valve clearance adjustment steps:
- Position the valve lifter slots (intake and exhaust side) opposite each other.
- Install the Tappet Adjusting Tool ① (90890-04105) onto the camshaft ②.
- Turn the crankshaft until the lobe of the tool ① depresses the valve lifters ③.

④ Cylinder head
⑤ Pad





- Remove the pads ⑤ from the lifters. Use a small screwdriver and a magnetic rod for removal.
- Note pad numbers.
- Select the proper valve adjusting pad from the chart below:

Pad range		Pad Availability: 25 increments
No. 200 ~ No. 320	200 mm (0.079 in) ~ 320 mm (0.130 in)	Pads stepped in 0.05 mm (0.002 in) increments

NOTE:

The thickness of each pads is marked on the pad 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 valve
0 or 2	0
5	(NOT ROUNDED OFF)
8	10

EXAMPLE:
Original pad number = 258 (2.58 mm)
Rounded off digit = 260

NOTE:

Pads can only be selected in 0.05 mm (0.002 in) increments.

- Locate the “Installed Pad Number” on the chart, and then find the measured valve clearance. The point where these coordinates intersect is the new pad number.

NOTE:

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

Pad number verification steps:
- Install the new pad with the number down.
- Remove the adjusting tool.
- Recheck the valve clearance.
- If the clearance is incorrect, repeat all of the clearance adjustment steps until the proper clearance is obtained.

INTAKE

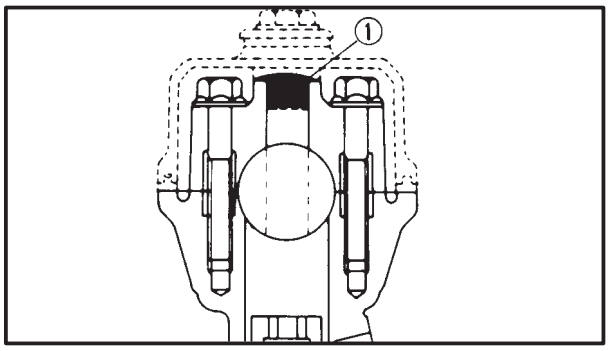
B MEASURED CLEARANCE	A INSTALLED PAD NUMBER																								
	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
0.00 ~ 0.05			200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310
0.06 ~ 0.10		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315
0.11 ~ 0.15																									
0.16 ~ 0.20	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.21 ~ 0.25	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320		
0.26 ~ 0.30	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320			
0.31 ~ 0.35	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.36 ~ 0.40	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.41 ~ 0.45	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.46 ~ 0.50	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.51 ~ 0.55	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.56 ~ 0.60	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.61 ~ 0.65	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.66 ~ 0.70	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.71 ~ 0.75	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.76 ~ 0.80	265	270	275	280	285	290	295	300	305	310	315	320													
0.81 ~ 0.85	270	275	280	285	290	295	300	305	310	315	320														
0.86 ~ 0.90	275	280	285	290	295	300	305	310	315	320															
0.91 ~ 0.95	280	285	290	295	300	305	310	315	320																
0.96 ~ 1.00	285	290	295	300	305	310	315	320																	
1.10 ~ 1.05	290	295	300	305	310	315	320																		
1.06 ~ 1.10	295	300	305	310	315	320																			
1.11 ~ 1.15	300	305	310	315	320																				
1.16 ~ 1.20	305	310	315	320																					
1.21 ~ 1.25	310	315	320																						
1.26 ~ 1.30	315	320																							
1.31 ~ 1.35	320																								

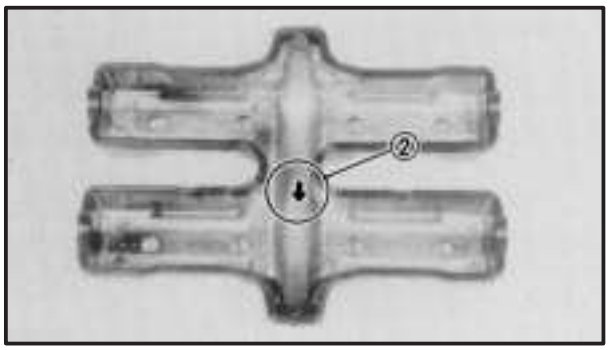
VALVE CLEARANCE (cold):
0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
Example: Installed is 250
Measured clearance is 0.32 mm (0.013 in)
Replace 250 pad with 270 pad
*Pad number: (example)
Pad No.250 = 2.50 mm (0.098 in)
Pad No.255 = 2.55 mm (0.100 in)
Always install pad with number down.

EXHAUST

B MEASURED CLEARANCE	A INSTALLED PAD NUMBER																								
	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
0.00 ~ 0.05				200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305
0.06 ~ 0.10			200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310
0.11 ~ 0.15		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315
0.16 ~ 0.20																									
0.21 ~ 0.25	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.26 ~ 0.30	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320		
0.31 ~ 0.35	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320			
0.36 ~ 0.40	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.41 ~ 0.45	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.46 ~ 0.50	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.51 ~ 0.55	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.56 ~ 0.60	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.61 ~ 0.65	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.66 ~ 0.70	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.71 ~ 0.75	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.76 ~ 0.80	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.81 ~ 0.85	265	270	275	280	285	290	295	300	305	310	315	320													
0.86 ~ 0.90	270	275	280	285	290	295	300	305	310	315	320														
0.91 ~ 0.95	275	280	285	290	295	300	305	310	315	320															
0.96 ~ 1.00	280	285	290	295	300	305	310	315	320																
1.10 ~ 1.05	285	290	295	300	305	310	315	320																	
1.06 ~ 1.10	290	295	300	305	310	315	320																		
1.11 ~ 1.15	295	300	305	310	315	320																			
1.16 ~ 1.20	300	305	310	315	320																				
1.21 ~ 1.25	305	310	315	320																					
1.26 ~ 1.30	310	315	320																						
1.31 ~ 1.35	315	320																							
1.36 ~ 1.40	320																								

VALVE CLEARANCE (cold):
0.26 ~ 0.30 mm (0.010 ~ 0.012 in)
Example: Installed is 250
Measured clearance is 0.32 mm (0.013 in)
Replace 250 pad with 265 pad
*Pad number: (example)
Pad No.250 = 2.50 mm (0.098 in)
Pad No.255 = 2.55 mm (0.100 in)
Always install pad with number down.





Assembly

When installing the top cover, reverse the removal procedure. Note the following points.

1. Install:
   - Cylinder head covers

NOTE:

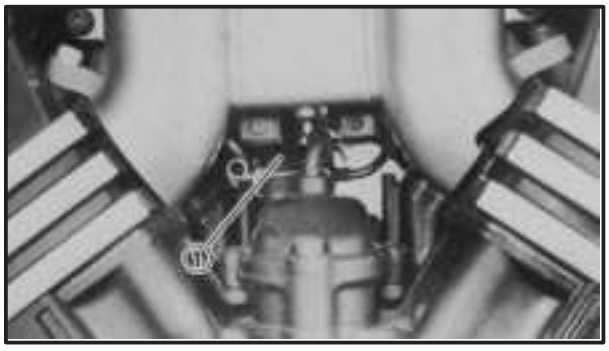
- Be sure all cam caps are coverd with oil plug ①.
- Arrow mark ② on the cover should face toward the exhaust side.
- Inspect the head cover gasket and replace it if damaged.

2. Tighten:
   - Bolts (cylinder head cover)

	Bolts (Cylinder Head Cover): 10 Nm (1.0 m•kg, 7.2 ft•lb)

3. Tighten:
   - Bolts (radiator)

	Bolts (Radiator): 7 Nm (0.7 m•kg, 5.1 ft•lb)

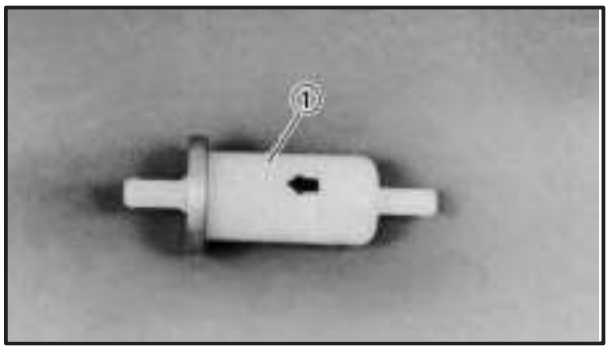


CRANKCASE VENTILATION SYSTEM INSPECTION

1. Inspect:
   - Crankcase ventilation hose ①
     Cracks/Damage → Replace.

FUEL LINE INSPECTION

1. Inspect:
   - Fuel hoses
   - Vacuum lines
     Cracks/Damage → Replace.



FUEL FILTER REPLACEMENT

1. Remove:
   - Seat
   - Bracket
   - Fuel filter ①
2. Inspect:
   - Fuel filter
     Dirty/Damage → Replace.
3. Install:
   - Components in above list (step "1")

INTAKE MANIFOLD INSPECTION

1. Tighten:
   - Carburetor clamps
   - Carburetor joint bolts
   - Carburetor joint nuts
2. Inspect:
   - Carburetor joint
   - Gaskets
     Cracks/Damage → Replace.

EXHAUST SYSTEM INSPECTION

1. Inspect:
   - Exhaust pipe
   - Muffler clamp gasket(s)
     Damage → Replace.
2. Tighten:
   - Exhaust pipe bolts
   - Muffler bolts

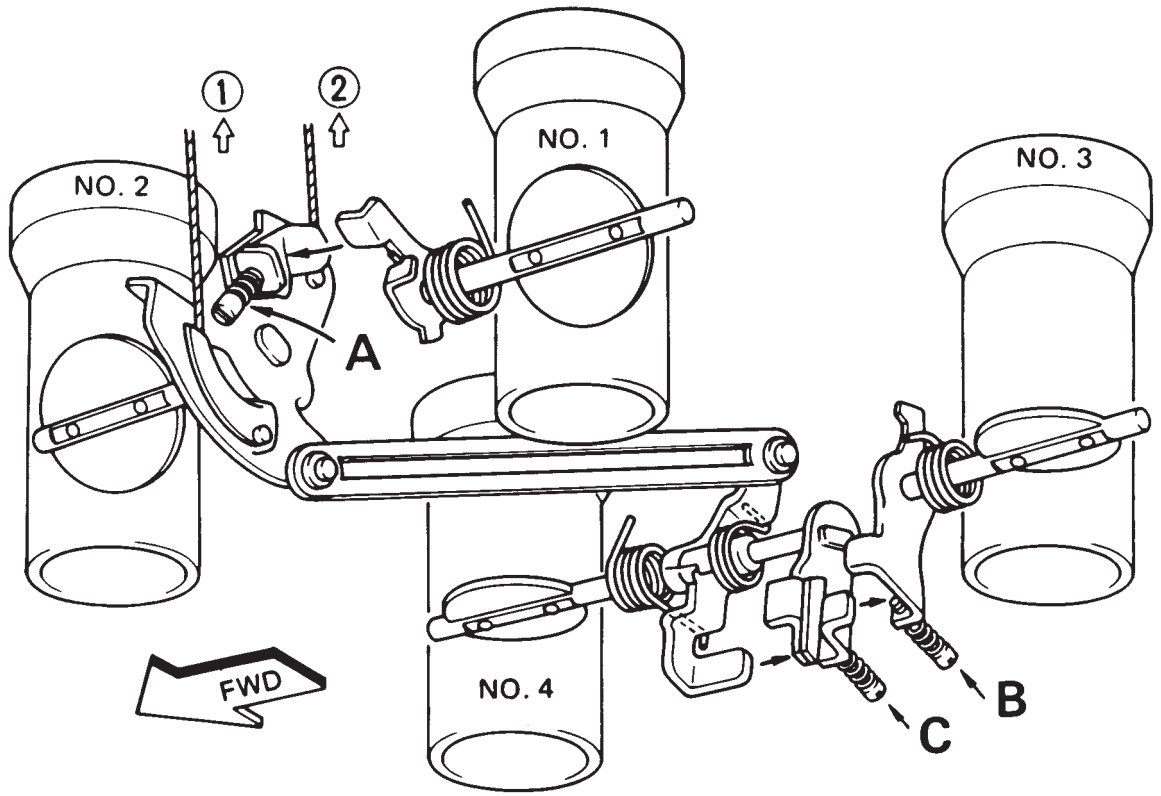
Exhaust Pipe Joint:
7 Nm (0.7 m•kg, 5.1 ft•lb)
Exhaust Pipe Flange:
20 Nm (2.0 m•kg, 14 ft•lb)
Muffler Clamp:
20 Nm (2.0 m•kg, 14 ft•lb)

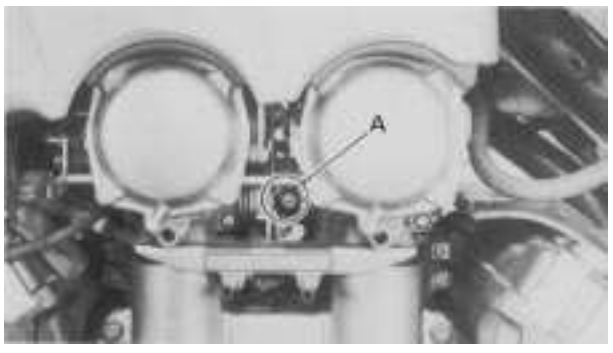
CARBURETOR SYNCHRONIZATION

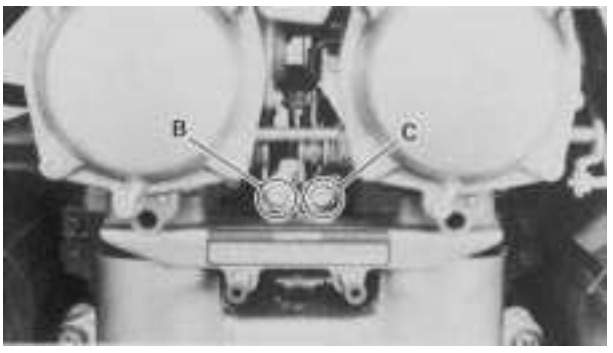
NOTE:

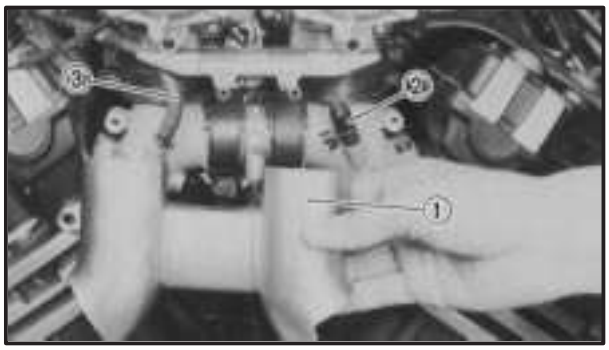
Valve clearance must be set properly before synchronizing the carburetors.

① OPEN
② CLOSE

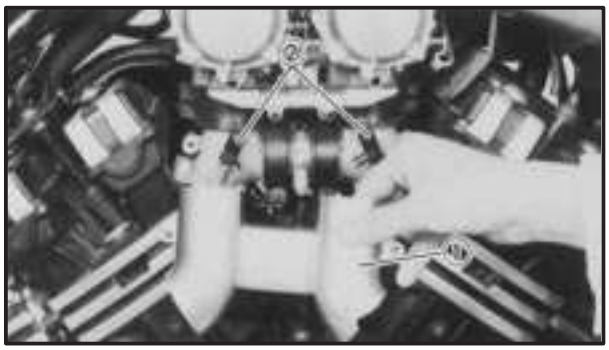


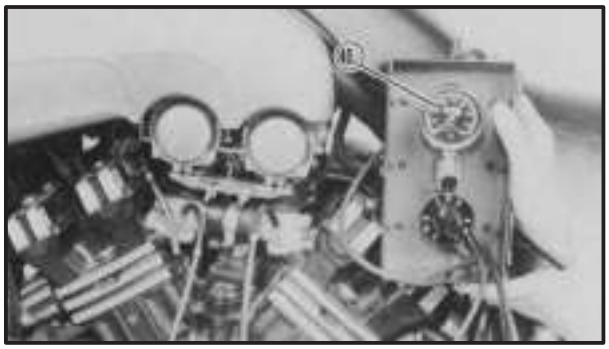




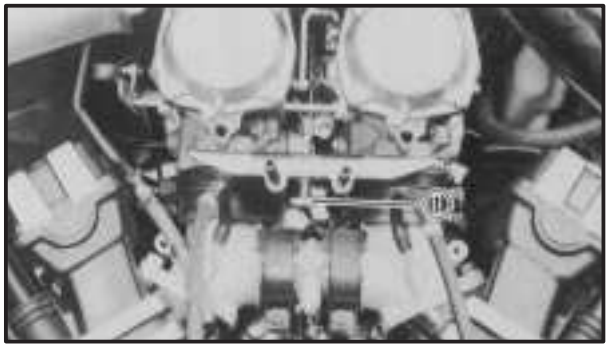


1. Remove:
   - Carburetor joint covers (left and right) ①
   - Vacuum plugs (left and right) ②
   - Vacuum hose ③



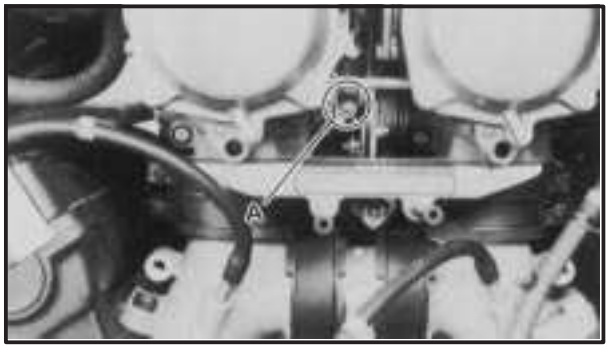


2. Attach:
   - Vacuum Gauge ① (90890-03094)
     To the vacuum plugs.
3. Start the engine and let it warm up.



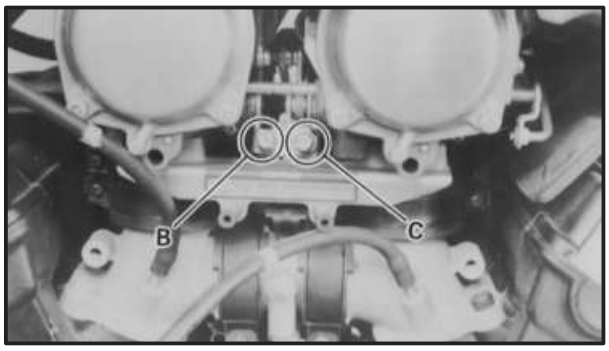
4. Adjust:
   - Idle speed
     Out of specification →
     Turn the throttle stop screw ① to adjust.

Idle Speed:
950 ~ 1,050 r/min



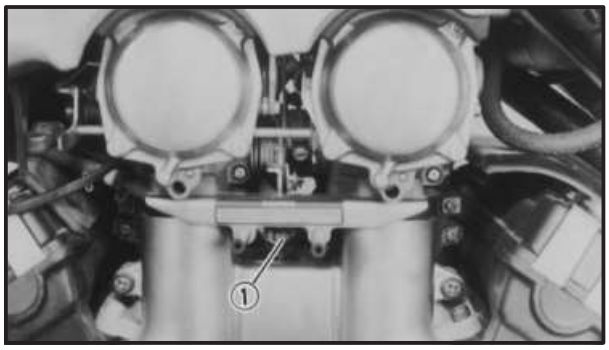
5. Adjust:
   - Carburetor synchronization

Carburetor synchronization adjustment steps:
- Synchronize carburetor No.1 to carburetor No.2 by turning synchronizing screw "A" until both gauges read the same.
- Rev the engine for a fraction of a second, two or three times, and check the synchronization again.



Vacuum Pressure at Idle Speed:
22.61 kPa (170 mm Hg, 6.69 in Hg)
Vacuum Synchronous Difference:
2.66 kPa (30 mm Hg, 0.79 in Hg)

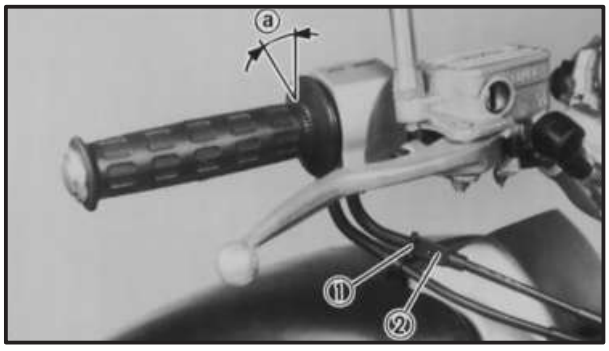
- Repeat the above steps to synchronize carburetor No.3 to carburetor No.4 by turning synchronizing screw "B" until both gauges read the same.
- Repeat the same steps to synchronize No.4 carburetor to No.2 carburetor, then turn synchronizing screw "C" until both gauges read the same.



IDLE SPEED ADJUSTMENT

1. Adjust
   - Idle speed
     Warm up the engine and turn the throttle stop screw ①to adjust.

Idle Speed:
950 ~ 1,050 r/min



THROTTLE CABLE ADJUSTMENT

NOTE:

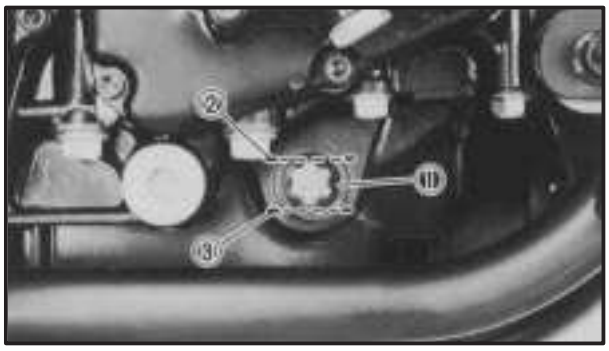
Before adjusting the throttle cable free play, the engine idling speed should be adjusted.

1. Check:
   - Throttle cable free play ⓐ
     Out of specification → Adjust.

Throttle Cable Free Play ⓐ:
4 ~ 7 mm (0.16 ~ 0.28 in)

2. Adjust:
   - Throttle cable free play

Throttle cable adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② clockwise or counterclockwise until proper free play is attained.
- Tighten the locknut.



ENGINE OIL LEVEL INSPECTION

1. Inspect:
   • Oil level
   Oil level low → Add sufficient oil.

Engine oil level visual inspection steps:
• Place the motorcycle on its centerstand and warm up the engine for several minutes.

NOTE:

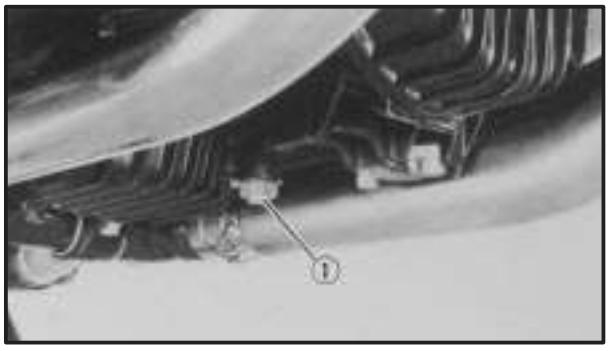
Position motorcycle straight up when checking oil level, a slight tilt to the side can produce false readings.

• Stop the engine and visually check the oil level through the level window ①.
② Maximum
③ Minimum

ENGINE OIL REPLACEMENT

Engine Oil Replacement (Without Oil Filter)

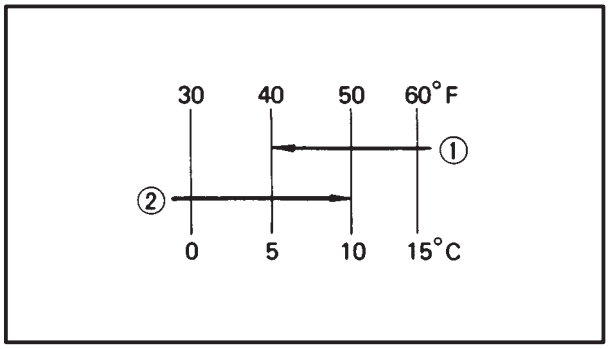
1. Warm up the engine for several minutes, then place a receptacle under the engine.
2. Remove:
   • Oil filler cap



3. Remove:
   • Drain plug ①
   Drain the engine oil.
4. Tighten:
   • Drain plug ①

Drain Plug:
43 Nm (4.3 m•kg, 31 ft•lb)

5. Fill:
   • Crankcase



Recommended Oil:
At 5°C (40°F) or Higher ①:
SAE 20W40 Type SE Motor Oil
At 15°C (60°F) or Lower ②:
SAE 10W30 Type SE Motor Oil
Periodic Oil Change:
3.5 L (3.1 Imp qt, 3.7 US qt)

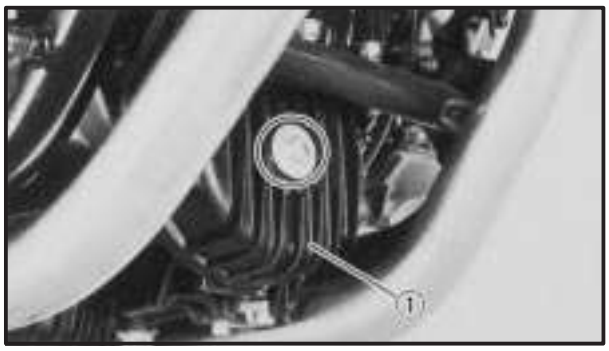
CAUTION:

Do not allow foreign material to enter the crankcase.

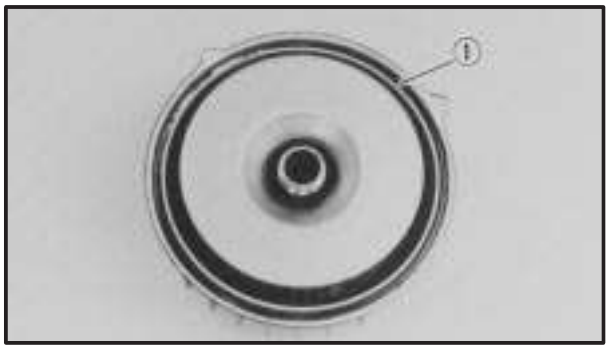
6. Install:
   • Filler cap
7. Inspect:
   • Oil leaks
   • Oil level

Engine Oil Replacement (With Oil Filter)

1. Warm up the engine and place a receptacle under the engine.
2. Remove:
   • Oil filler cap
   • Drain plug
   Drain the engine oil.
3. Remove:
   • Oil filter cover ①
4. Install:
   • Drain plug



Drain Plug:
43 Nm (4.3 m•kg, 31 ft•lb)



   • Oil filter (new)
   • O-ring (new)
   • Oil filter cover

NOTE:

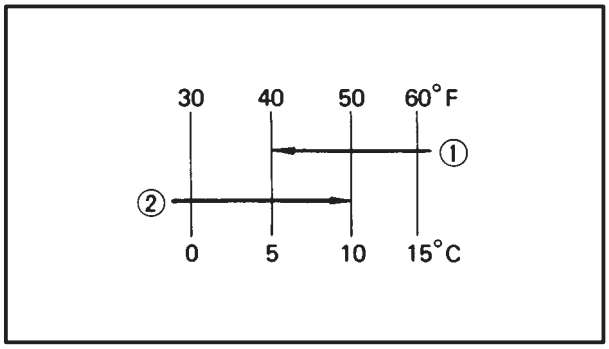
Be sure the O-ring ① is positioned properly.

5. Tighten:
   • Bolt (oil filter)

Bolt (Oil Filter):
32 Nm (3.2 m•kg, 23 ft•lb)

6. Fill:
   • Crankcase

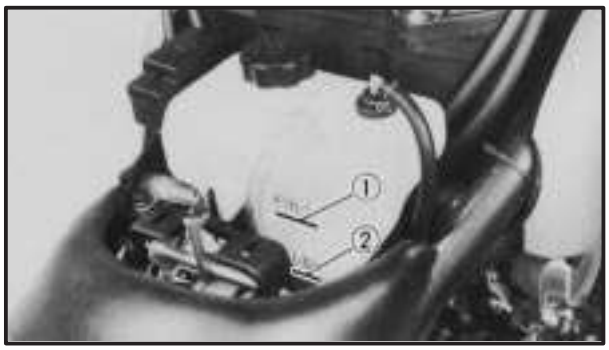
Recommended Oil:
At 5°C (40°F) or Higher ①:
SAE 20W40 Type SE Motor Oil
At 15°C (60°F) or Lower ②:
SAE 10W30 Type SE Motor Oil
With Oil Filter Replacement:
3.8 L (3.3 Imp qt, 4.0 US qt)



CAUTION:

Do not allow foreign material to enter the crankcase.

7. Install:
   • Oil filter cap
8. Inspect:
   • Oil leaks
   • Oil level



COOLANT LEVEL INSPECTION

1. Remove:
   • Top cover
2. Inspect:
   • Coolant level (reservoir tank)
   Level low → Add tap water (soft water).
   Change the Coolant every two years.
   Refer to Chapter 4 “COOLING SYSTEM” for more detail.

① “FULL” level

② “LOW” level

WARNING:

Do not remove the radiator cap when the engine is hot.

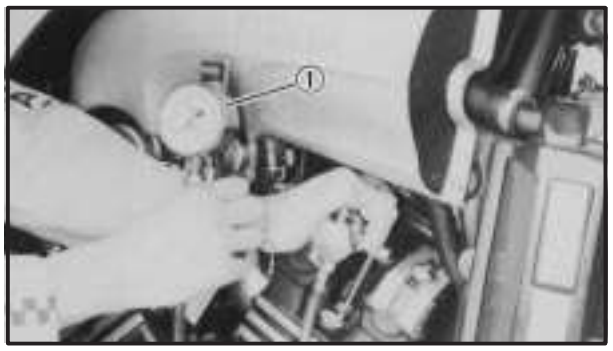
CAUTION:

Hard water or salt water is harmful to the engine parts; use boiled or distilled water if you can’t get soft water.

Total Amount:
3.05 L (2.69 Imp qt, 3.22 US qt)
Reservoir Tank Capacity:
0.30 L (0.26 Imp qt, 0.32 US qt)
From LOW to FULL Level:
0.20 L (0.18 Imp qt, 0.21 US qt)

COOLING SYSTEM INSPECTION

1. Inspect:
   • Hoses
   Cranks/Damage → Replace.



COMPRESSION PRESSURE MEASUREMENT

NOTE:

Insufficient compression pressure will result in performance loss.

1. Measure:
   • Valve clearance
   Out of specification → Adjust.
2. Warm up the engine.
3. Remove:
   • Spark plugs
4. Measure:
   • Compression pressure

Compression pressure measurement steps:
- Install the Compression Gauge ① (90890-03081) using an adapter.
- Crank over the engine with the electric starter (be sure the battery is fully charged) with the throttle wide open until the compression reading on the gauge stabilizes.
- Check redings with specified levels (See chart)

Compression Pressure (at sea level):
Standard:
980 kPa (10 kg/cm^2, 142 psi)
Minimum:
882 kPa (9 kg/cm^2, 128 psi)
Maximum:
1,176.8 kPa (12 kg/cm^2, 171 psi)

WARNING:

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

- Repeat the previous steps for the other cylinders.
- If pressure falls bellow the minimum level:

1) Squirt a few drops of oil into the affected cylinder.
2) Measure the compression again.

Compression Pressure (with oil introduced into cylinder)

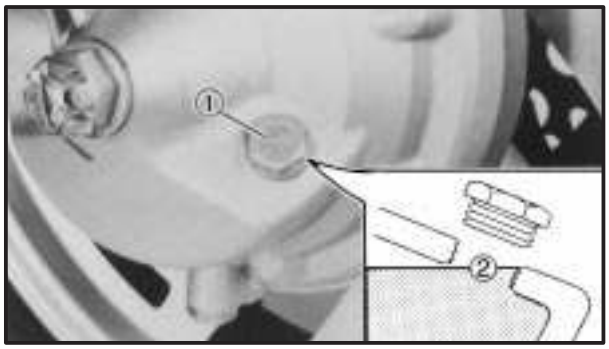
Reading	Diagnosis
Higher than without oil	**Worn or damaged pistons**

Same as without oil	**Defective ring(s), valves, cylinder head gasket or piston is possible.**
Above maximum level	**Inspect cylinder head, valve surfaces, or piston crown for carbon deposits.**

NOTE:

The difference between the highest and lowest cylinder compression readings must not vary more than the specified value.

Difference Between Each Cylinder:
Less than 98 kPa (1 kg/cm^2, 14 psi)



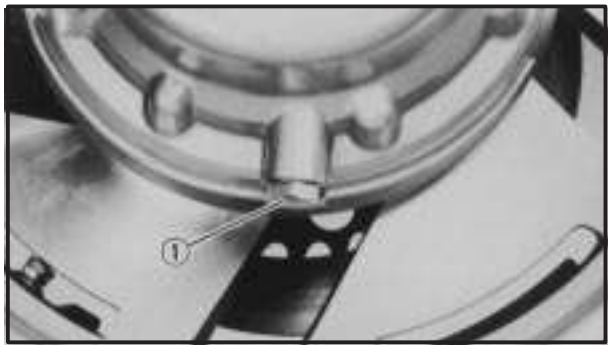
CHASSIS

FINAL GEAR OIL LEVEL INSPECTION

1. Inspect:
   - Final gear oil level
     Oil level low → Add sufficient oil.

Final gear oil level visual inspection steps:
- Position the motorcycle on a level area and place on its centerstand.
- Remove the oil filler cap ①.
- Visually check the oil level. Correct oil level ② should be at the brim of the hole.
- If the oil level is low, add sufficient oil.
- Tighten the oil filler cap to specification.

Oil Filler Cap (Final Gear):
23 Nm (2.3 m•kg, 17 ft•lb)



FINAL GEAR OIL REPLACEMENT

1. Place a receptacle under the final gear case.
2. Remove:
   - Oil filler cap
   - Drain plug ①
     Drain the oil.

3. Install:
   • Drain plug

Drain Plug (Final Gear):
23 Nm (2.3 m•kg, 17 ft•lb)

4. Fill:
   • Final gear case

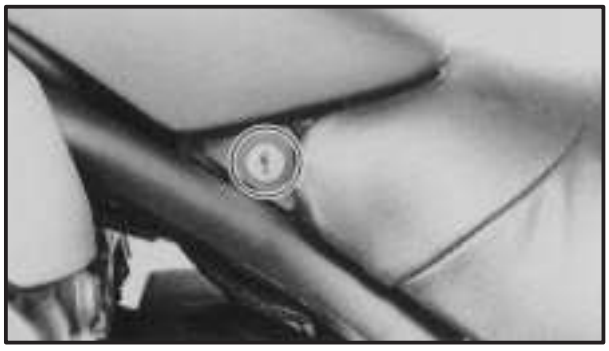
Oil Capacity:
0.2 L (0.18 Imp qt, 0.21 US qt)
Final Gear Oil:
SAE 80 API "GL-4" Hypoid Gear Oil
If desired, an SAE 80W90 Hypoid gear oil may be used for all conditions.

WARNING:

Do not allow the gear oil to contact the tire or wheel.

5. Install:
   • Oil filler cap

Oil Filler Cap (Final Gear):
23 Nm (2.3 m•kg, 17 ft•lb)



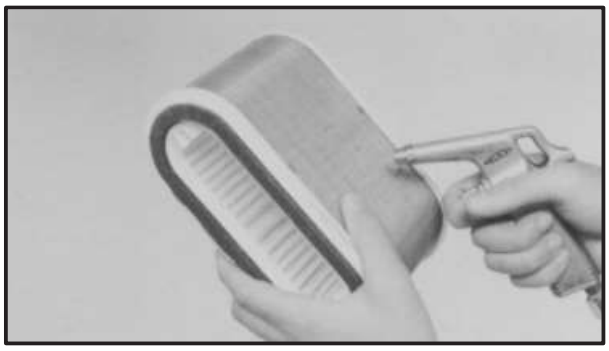
AIR FILTER CLEANING
1. Remove:
   • Top cover



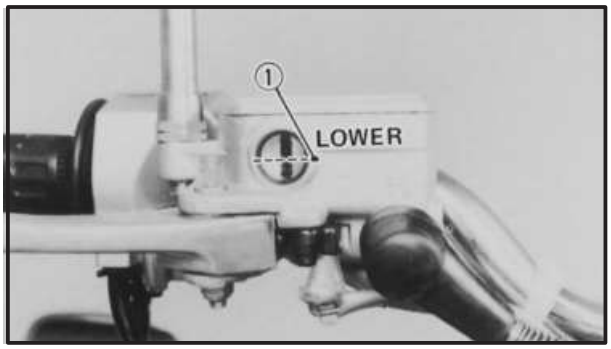
2. Remove:
   • Air filter case cover
   • Air filter element

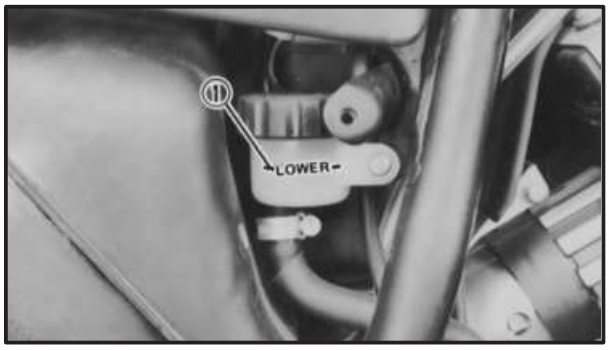
CAUTION:

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



3. Eliminate:
   • Dust
   Use the compressed air.
   Blow out dust in the element from the outer surface.
4. Inspect:
   • Element
   Damage → Replace.
5. Install:
   • Element
   • Air filter case cover
   • Top cover





BRAKE FLUID LEVEL INSPECTION
Brake Inspection

1. Inspect:
   • Brake fluid level (brake master cylinder)
   Level low → Replenish fluid.

Brake Fluid:
DOT #3

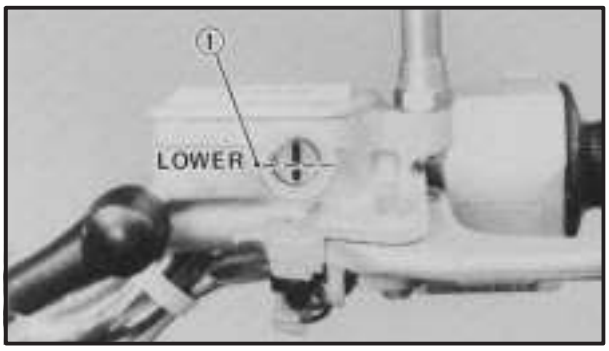
① Lower level

NOTE:

Be sure that:
• Spilled fluid is cleaned up immediately to prevent painted surfaces or plastic parts from eroding.

WARNING:

- **Use only the designated quality brake fluid, otherwise poor brake performance will result.**
- **Water does not enter the master cylinder when refilling, otherwise poor brake performance.**



Clutch Inspection

This motorcycle has a hydraulic clutch. There are no adjustments to perform, but the clutch system must be inspected periodically for fluid level and leakage.

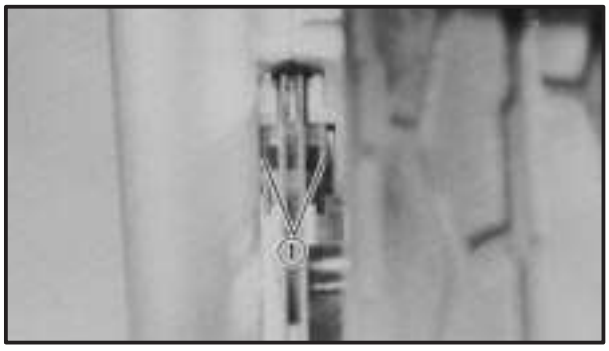
1. Inspect:
   - Brake fluid level (clutch master cylinder)
     Level low → Replenish fluid.

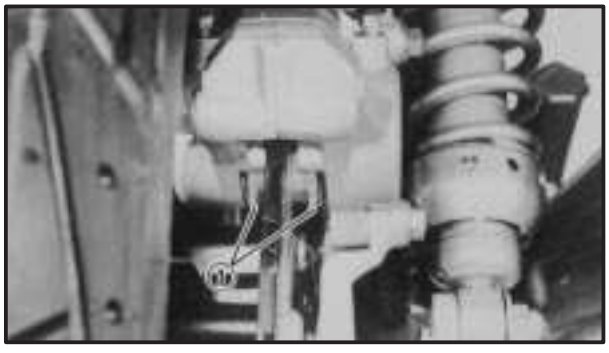
Brake Fluid:
DOT #3

① Lower level

NOTE:

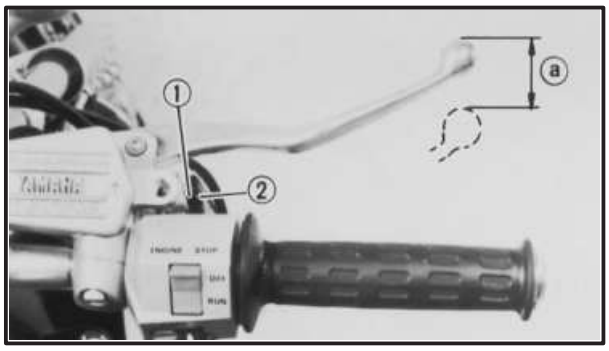
Be sure that:
- Use only the designated quality brake fluid.
- Water does not enter the master cylinder when refilling.
- Spilled fluid is cleaned up immediately to prevent painted surfaces or plastic parts from eroding.





FRONT AND REAR BRAKE PAD INSPECTION

1. Activate the brake lever or brake pedal.
2. Inspect:
   - Wear indicator ①
     Indicator almost contacts disc → Replace pads.
     Refer to “Chapter 5 CHASSIS” section.



FRONT BRAKE ADJUSTMENT

1. Loosen:
   • Lockunt ①
2. Adjust:
   • Free play ⓐ
   Turn the adjuster ② until the free play ⓐ is within the specified limits.

Free play ⓐ:
2 ~ 5 mm (0.08 ~ 0.20 in)

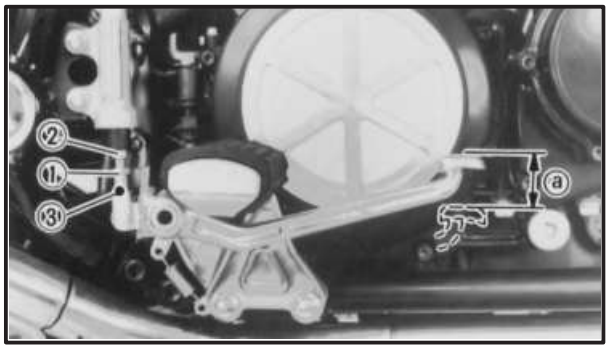
CAUTION:

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

WARNING:

A soft or spongy feeling in the brake lever can indicate the pressence 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. Tighten:
   • Locknut



REAR BRAKE ADJUSTMENT

1. Loosen:
   • Locknut ①
2. Adjust:
   • Brake pedal height ⓐ
   Turn the adjuster ② until the brake pedal position is at the specified height.

Brake Pedal Height ⓐ:
20 mm (0.8 in)
Below the Top of the Footrest

WARNING:

After adjusting the brake pedal height, visually check the adjuster end through the hole ③ of the joint holder. The adjuster end must appear within this hole.

CABLE INSPECTION AND LUBRICATION

Cable inspection and lubrication steps:
- Remove the screws that secure throttle housing to handlebar.
- Hold cable end high and apply several drops of lubricant to cable.
- Coas metal surface of disassembled throttle twist grip with suitable all-purpose grease to minimize friction.
- Check for damage to cable insulation. Replace any corroded or obstructed cables.
- Lubricate any cables that do not operate smoothly.



SAE 10W30 Motor Oil

BRAKE AND CHANGE PEDALS/BRAKE AND CLUTCH LEVERS LUBRICATION

Lubricate pivoting parts of each lever and pedal.



SAE 10W30 Motor Oil

CENTERSTAND AND SIDESTAND LUBRICATION

Lubricate the centerstand and sidestand at their pivot points.



SAE 10W30 Motor Oil

SWINGARM LUBRICATION

Lubricate the swingarm bearing.



Medium Weight Wheel Bearing Grease

FRONT FORK OIL CHANGE

WARNING:

- **Fork oil leakage can cause loss of stability and safe handling. Have any problem corrected before operating the motorcycle.**
- **Securely support the motorcycle so there is no danger of it falling over.**



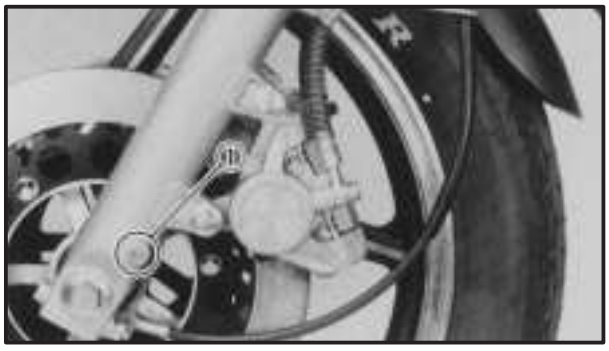
1. Elevate the front wheel by placing a suitale stand under the engine.
2. Remove:
   - Air valve cap (left)
   - Fork caps ①

NOTE:

Keep the valve open by pressing it for several seconds so that the air can be let out of the inner tube.



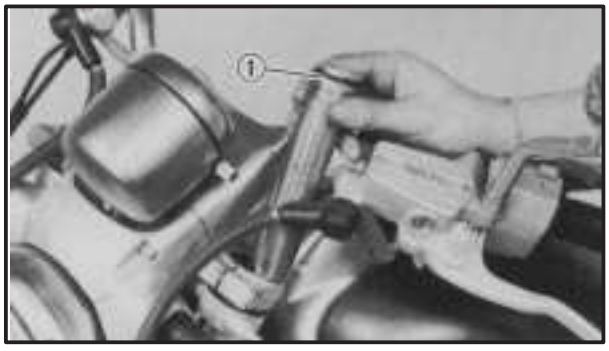
3. Loosen:
   - Pinch bolts (steering crown) ①
4. Remove:
   - Cap bolts ②
     Use the Front Fork Cap Socket ③ (90890-01104).
   - Collars
5. Place a receptacles under the drain screws.



6. Remove:
   - Drain screws ①
     Drain the fork oil.

WARNING:

Do not allow any oil to contact the disc brake components. If oil is discovered, be sure to remove it, otherwise diminished braking capacity and damage to the rubber components of the brake assembly will occur.



7. Inspect:
   - O-rings (cap bolt) ①
   - Gaskets (drain screw)
     Wear/Damage → Replace.

8. Install:
   - Drain screws
   - Collars
9. Fill:
   - Front forks



Each Fork:
451 cm^3 (15.9 Imp oz, 15.3 US oz)
Fork Oil 10 wt or Equivalent
After filling, pump the forks slowly up and down to distribute the oil.

10. Tighten:
    - Cap bolts
      Use the Front Fork Cap Socket (90890-01104).
    - Pinch bolts (steering crown)



Cap Bolt:
23 Nm (2.3 m•kg, 17 ft•lb)
Pinch Bolts (Steering Crown):
20 Nm (2.0 m•kg, 14 ft•lb)

11. Adjust:
    - Front fork air pressure
      Refer to "FRONT FORK ADJUSTMENT" section.

FRONT FORK ADJUSTMENT

1. Elevate the front wheel by placing a suitable stand under the engine.

NOTE:

When checking and adjusting the air pressure, there should be no weight on the front end of the motorcycle.

2. Adjust:
   - Air pressure

NOTE:

The air pressure of the front forks can be adjusted to suit rider's preference, weight, and the course condition.



Air pressure adjustment steps:
- Remove the valve cap.
- Using the air check gauge ①, check and adjust the air pressure.

Stiffer → Increase the air pressure. (Use an air pump or pressurized air supply.)
Softer → Decrease the air pressure. (Release the air by pushing the valve.)

Standard Air Pressure:
39.2 kPa (0.4 kg/cm^2, 5.7 psi)
Maximum Air Pressure:
98.1 kPa (1.0 kg/cm^2, 14.2 psi)

CAUTION:

Never exceed the maximum pressure, or oil seal damage may occur.

- Install the valve cap securely.

REAR SHOCK ABSORBER ADJUSTMENT

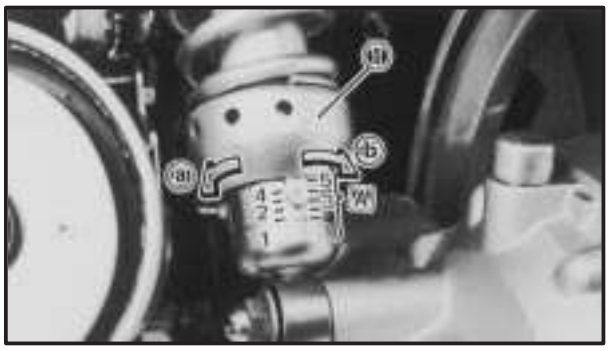
1. Adjust:
   - Spring preload
   - Damping

NOTE:

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

WARNING:

Always adjust rear shock absorber preload and damping to the same setting. Uneven adjustment can cause poor handling and loss of stability.



Spring preload adjustment steps:
- Using the screwdriver, adjust the spring preload.

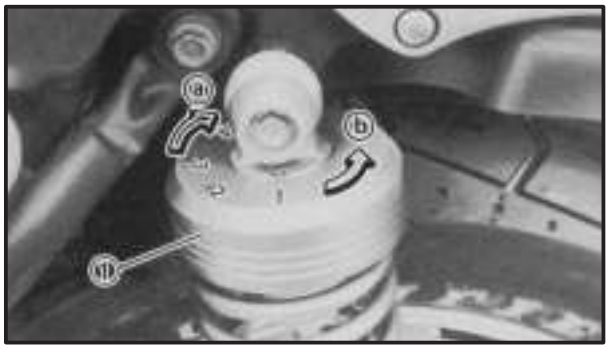
Stiffer ⓐ → **Increase the spring preload. (Turn the spring seat ① clockwise.)**
Softer ⓑ → **Decrease the spring preload. (Turn the spring seat ① counter-clockwise.)**

A Position: 5 (Maximum)
4
3
2
1 (Minimum/Standard)

Standard Position (Minimum Position):
1
Maximum Position:
5

CAUTION:

Never attempt to turn the spring seat beyond the maximum or minimum setting.



Damping adjustment steps:
- Adjust the damping with the damping adjuster ①.

Stiffer ⓐ → **Increase the damping. (Turn the adjuster ① clockwise.)**
Softer ⓑ → **Decrease bhe damping (Turn the adjuster ① counterclockwise.)**

Standard Position (Minimum Position):
1
Maximum Position:
4

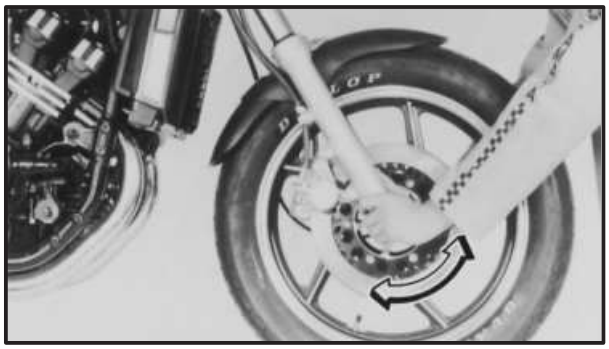
CAUTION:

Never attempt to turn the adjuster beyond the maximum or minimum setting.

RECOMMENDED COMBINATIONS OF THE FRONT FORK AND THE REAR SHOCK ABSORBER SETTINGS

Use this table as guidance to meet specific riding conditions and motorcycle load.

A Front fork	C Rear shock absorber		F Loading condition			
B Air pressure	D Spring seat	E Damping adjuster	G Solo rider	H With passenger	I With accessory equipments	J With accessory equipments and passenger
39.2 ~ 58.8 kPa (0.4 ~ 0.6 kg/cm^2, 5.7 ~ 8.5 psi)	1 or 2	1 or 2	○			
39.2 ~ 98.1 kPa (0.4 ~ 1.0 kg/cm^2, 5.7 ~ 14.2 psi)	3 ~ 5	2 ~ 4		○	○	
39.2 ~ 98.1 kPa (0.4 ~ 1.0 kg/cm^2, 5.7 ~ 14.2 psi)	5	4				○



STEERING HEAD INSPECTION

WARNING:

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

1. Place the motorcycle on its centerstand, then elevate the front wheel.
2. Check:
   - Steering assembly bearings
     Grasp the bottom of the forks and gently rock the fork assembly back and forth.
     Looseness → Adjust steering head.

STEERING HEAD ADJUSTMENT

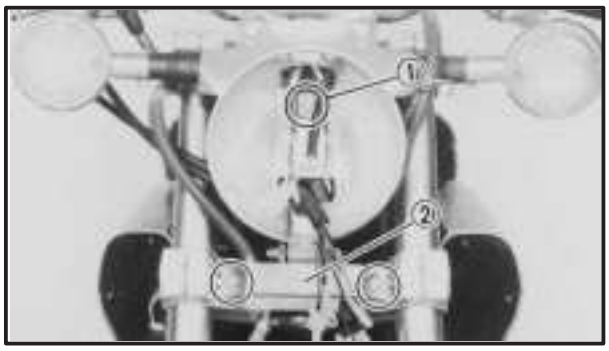
WARNING:

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

1. Elevate the front wheel by placing a suitable stand under the engine.



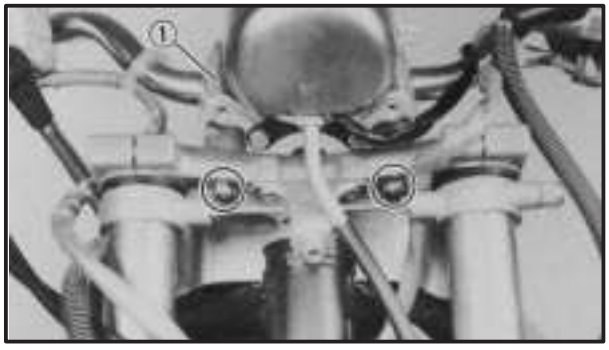
2. Remove:
   • Headlight lens unit ①
3. Disconnect:
   • All leads (in the headlight body)



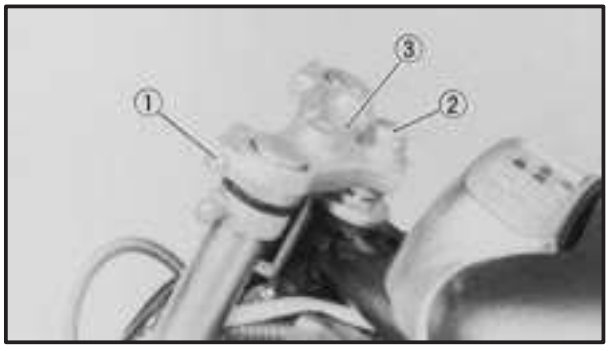
4. Remove:
   • Bolt (headlight body bracket) ①
   • Emblem ②



5. Remove:
   • Flasher light bracket assembly ①

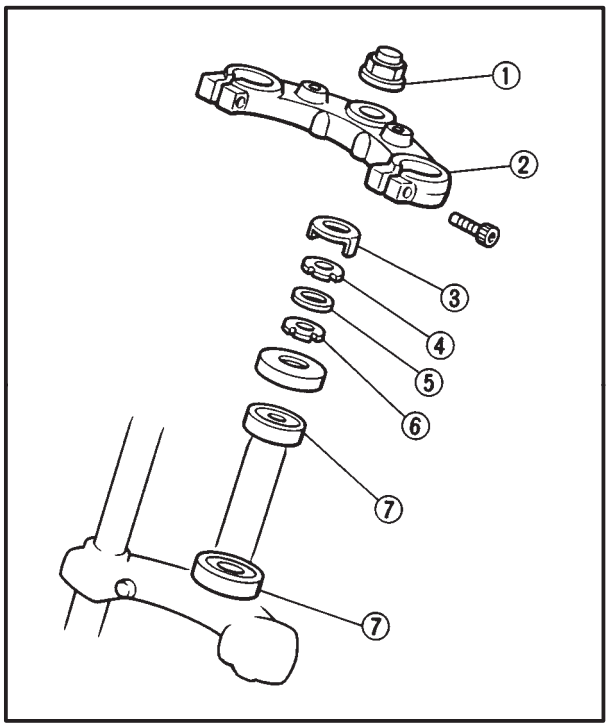


6. Remove:
   • Handlebar holder assembly ①



7. Loosen:
   • Pinch bolts (steering crown) ①
8. Remove:
   • Nut (steering stem) ②
   • Steering crown ③





9. Remove:
   - Lock washer (ring nut) ①
   - Ring nut (upper) ②
   - Washer ③
   - Ring nut (lower) ④

WARNING:

Support the under bracket so that it may not fall down.

10. Tighten:
    - Ring nuts (lower and upper)

Ring nuts tightening steps:

NOTE:

Set the Torque Wrench to the Ring Nut Wrench so that they form a right angle.

- Install the ring nut (lower) ⑥.

NOTE:

The tapered side of ring nut must face downward.

- Tighten the ring nut ⑥ using the Ring Nut Wrench (90890-01403).

Ring Nut ⑥ (Initial Tightening): 50 Nm (5.0 m•kg, 36 ft•lb)

- Loosen the ring nut ⑥ completely and retighten it to specification.

WARNING:

Do not over-tightening.

Ring Nut ⑥ (Final Tightening): 3 Nm (0.3 m•kg, 2.2 ft•lb)

- Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering barings ⑦.
  Refer to “CHAPTER 6. STEERING HEAD” for more details.
- Install the washer ⑤.
- Install the ring nut (upper) ④.

NOTE:

The tapered side of ring nut must face downward.

- Finger tighten the ring nut ④, then align the slots of both ring nuts. If not aligned, hold the lower ring nut ⑥ and tighten the other until they are aligned.

• Install the lock washer ③.

NOTE:

Make sure the lock washer tab is placed in the slots.

• Install the steering crown ② and tighten the steering stem nut ① to specification.

	Nut (Steering Stem): 110 Nm (11.0 m•kg, 80 ft•lb)

• Tighten the pinch bolts to specification.

	Pinch Bolt (Steering Crown): 20 Nm (2.0 m•kg, 14 ft•lb)

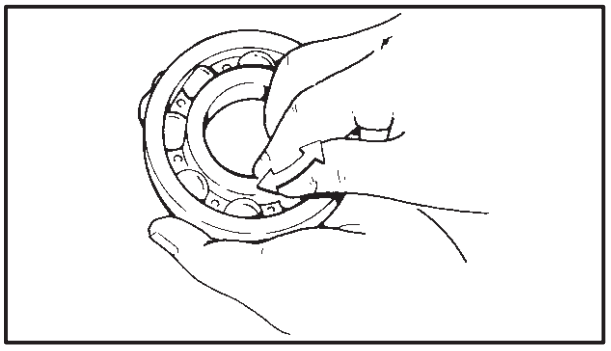
11. Install:
• Components in above list (steps "6 ~ 2")

	Handlebar Lower Holder: 40 Nm (4.0 m•kg, 29 ft•lb)

WHEEL BEARINGS CHECK

Front Wheel

1. Check:
• Front wheel bearings
Raise the front end of the motorcycle, and spin the wheel by hand. Touch the axle or front fender while spinning the wheel.
Excessive vibration → Replace bearings.



Rear Wheel

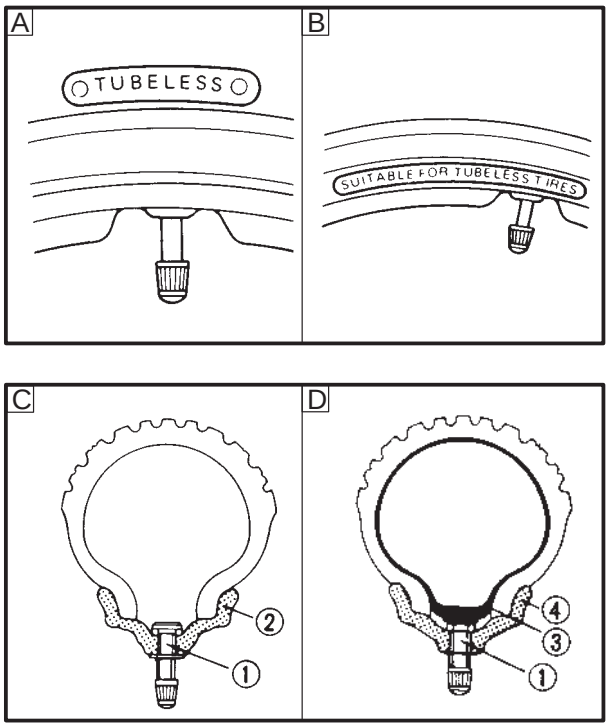
1. Remove:
• Rear wheel
2. Check:
• Bearing movement
With the fingers.
Roughness/Wear → Replace.

TIRES CHECK

WARNING:

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

Wheel	Tire
Tube type	Tube type only
Tubeless	Tube type of tubeless



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

A Tire
B Wheel
C Tubeless tire
D Tube type tire
① Air valve
② Aluminum wheel (tubeless type)
③ Tube
④ Aluminum wheel (tube type)

WARNING:

This motorcycle is fitted with "V" range tires (for super high speed running). The following points must be observed in order for you to make fully effective use of these tires.
- **Never fail to use "V" range tires in tire replacement. "S" or "H" tires may be in danger of bursting at super high-speeds.**
- **New tires have a relatively poor adhesion on the road surface so do not allow them to be subjected to high speed load from maximum speed until after a break-in run of approx. 100 km (60 mi).**
- **Before any high-speed runs, remember to allow a sufficient warm-up time for the tires.**
- **Always use the correct tire inflation pressure according to the operation conditions.**

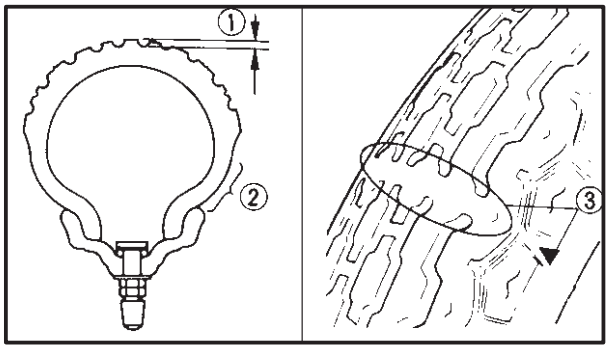
1. Measure:
   - Tire pressure
     Out of specification → Adjust.

Basic weight: With oil and full fuel tank	281 kg (619 lb)	
Maximum load*	218 kg (481 lb)	
Cold tire pressure	Front	Rear
Up to 90 kg (198 lb) load*	235 kPa (2.4 kg/cm^2, 34 psi)	255 kPa (2.6 kg/cm^2, 36 psi)
90 kg (198lb) ~ Maximum load*	235 kPa (2.4 kg/cm^2, 34 psi)	275 kPa (2.8 kg/cm^2, 40 psi)
High speed riding	235 kPa (2.4 kg/cm^2, 34 psi)	255 kPa (2.6 kg/cm^2, 36 psi)

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

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 motorcyle. Do not carry loosely packed items that can shift. Securely pack your heaviest items close to the center of the motorcycle, and destribute 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, 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.



2. Inspect:
• Tire surfaces
Wear/Damage → Replace.

Minimum Tire Tread Depth: (Front and Rear)
1.0 mm (0.04 in)

① Tread depth
② Side wall
③ Wear indicator

WARNING:

• It is dangerous to ride with a wornout tire. When a tire tread begins to show lines, replace the tire immediately.
• Patching a punctured tube is not recommended.
If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.

WHEELS CHECK

1. Inspect:
   • Aluminum wheels
   Damage/Bends → Replace.

NOTE:

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

WARNING:

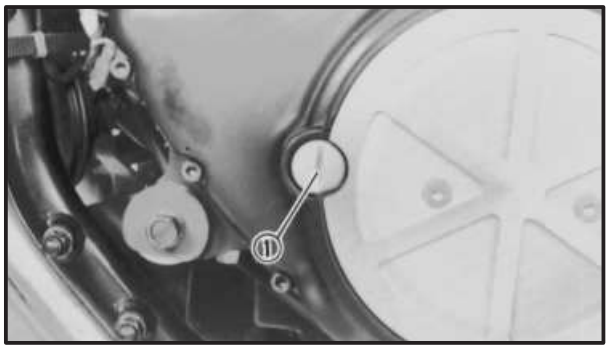
Never attempt even small repairs to the wheel.

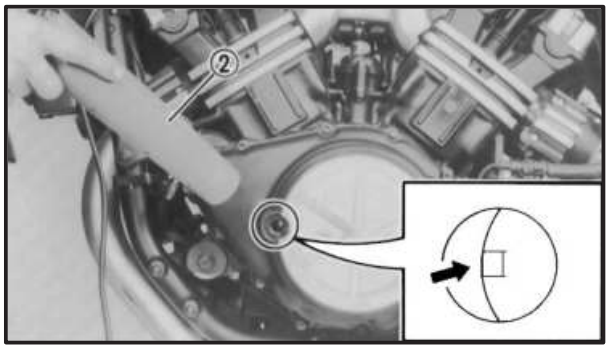
2. Tighten:
   • Valve stem locknut

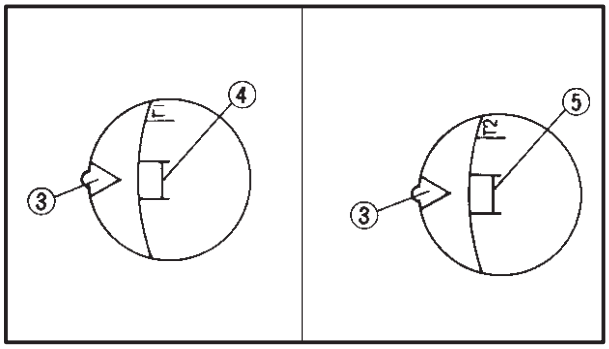
Valve Stem Locknut:
1.5 Nm (0.15 m•kg, 1.1 ft•lb)

WARNING:

Ride conservatively after installing a tire to allow it to seat itself properly on the rim.







ELECTRICAL

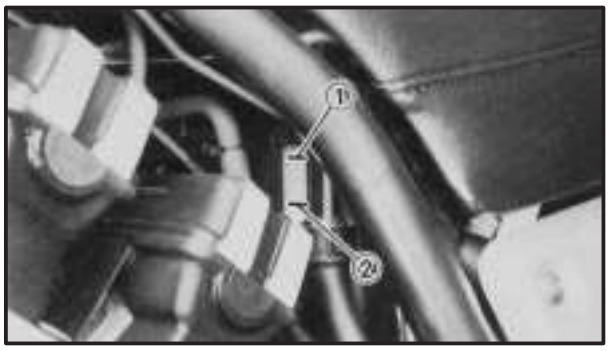
IGNITION TIMING CHECK

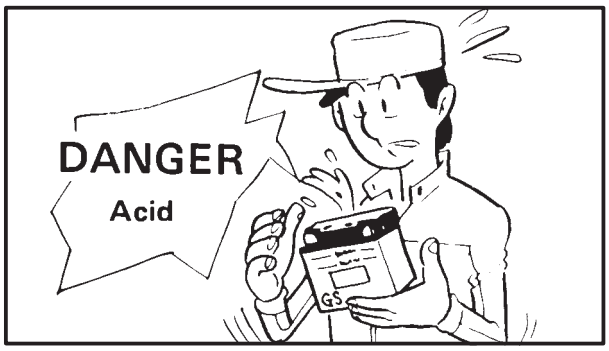
1. Check:
   • Ignition timing
   By the following steps.

Ignition timing check steps:
- Remove the timing plug ①.
- Connect the Timing Light ② (90890-03109) to No.1 or No.2 cylinder spark plug lead.
- Warm up the engine and let it idle at the specified idle speed of 1,000 r/min.
- Visually check the stationary pointer ③ in the timing window to vertify it is within the required firing range indicated on the flywheel.

Incorrect firing range → Check flywheel and/or pickup assembly (tightness damage).
Refer to “CHAPTER 7, ELECTRICAL” for further information.

④ Firing range for the No.1 cylinder
⑤ Firing range for the No.2 cylinder





BATTERY INSPECTION

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

① Upper level
② Lower level

CAUTION:

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

WARNING:

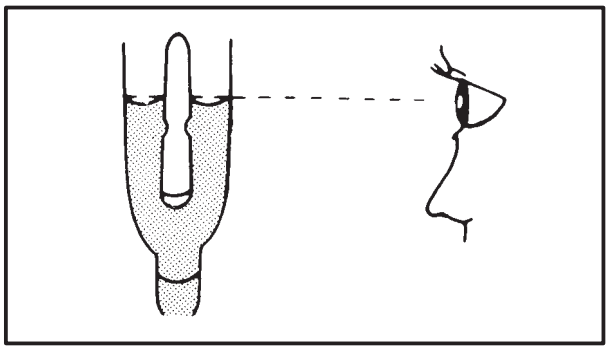
Battery electrolyte is dangerous; it contains sulfuric acid and therefore is poisonous and highly caustic.
Always follow these preventive measures:
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**
- **Wear protective eye gear when handling or working near batteries.**

Antidote (EXTERNAL):
- **SKIN – Flush with water.**
- **EYES – Flush with water for 15 minutes and get immediate medical attention.**

Antidote (INTERNAL):
- **Drink large quantities of water or milk follow with milk of magnesia beaten egg, or vegetable oil. Get immediate medical attention.**

Batteries also generate explosive hydrogen gas, therefore you should always follow these preventive measures:
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks, or open flames (e.g., welding equipment, lighted cigarettes, etc.)**
- **DO NOT SMOKE when charging or handling batteries.**

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

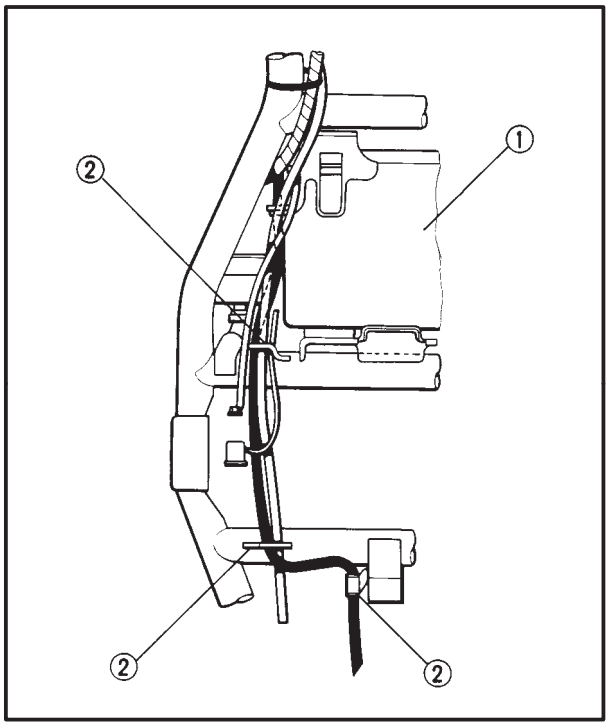


2. Remove:
   • Battery
3. Inspect:
   • Battery fluid specific gravity
   Out of specification → Charge.

CAUTION:

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

Charging Current:
1.4 amps/10 hrs
Specific gravity:
1.280 at 20°C (68°F)



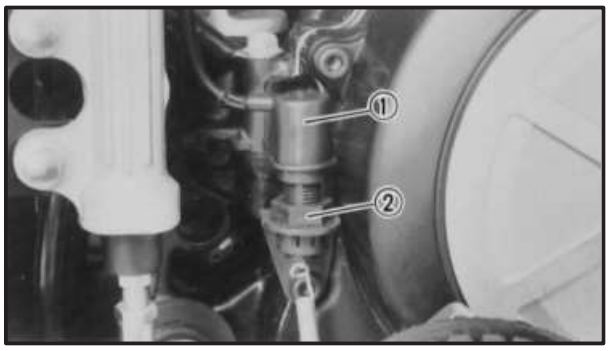
4. Install:
   • Battery
5. Connect:
   • Breather hose
   Be sure the hose is properly attached and routed.

CAUTION:

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

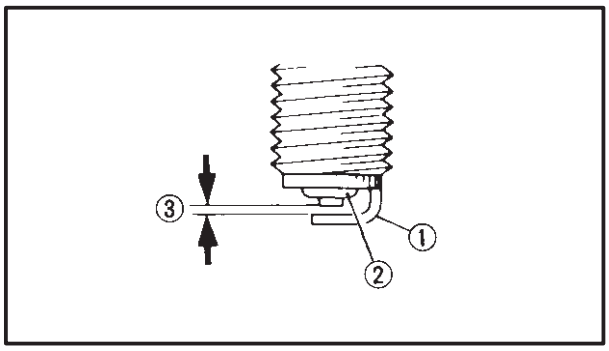
① Battery
② Pass through guide

6. Inspect:
   • Breather hose
   Obstruction → Remove.
   Damage → Replace.



BRAKE LIGHT SWITCH ADJUSTMENT

1. Adjust:
   - Brake light operating timing
     Hold the main body ① of the switch with your hand so it does not rotate, and turn the adjuster ② until the operating timing is correct.



SPARK PLUG INSPECTION

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

③ Spark plug gap

2. Clean:
   - Spark plug
     Clean the spark plug with a spark plug cleaner or wire brush.
3. Inspect:
   - Spark plug type
     Incorrect → Replace

Standard Spark Plug:
DPR8EA-9 (NGK)
X24EPR-U9 (N.D.)

4. Measure:
   - Spark plug gap
     Out of specification → Regap.
     Use a wire gauge.

Spark Plug Gap:
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)

5. Tighten:
   - Spark Plug

NOTE:

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

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

NOTE:

If a torque wrench is not available when you are installing a spark plug, a good estimate of the correct torque is 1/4 to 1/2 turns part finger tight. Have the spark plug torqued to the correct value as soon as possible with a torque wrench.



HEADLIGHT BULB REPLACEMENT

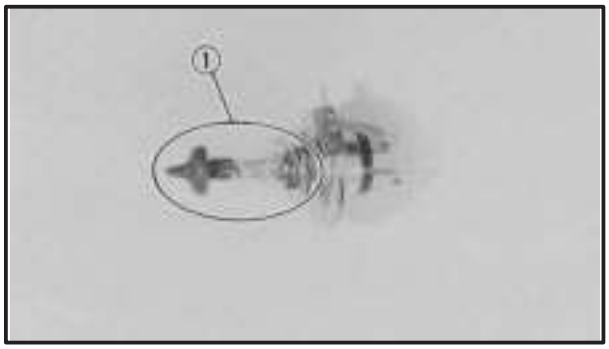
1. Remove:
   • Headlight lens unit ①
2. Disconnect:
   • Headlight lens unit leads



3. Remove:
   • Bulb
   Turn the bulb holder ① counterclockwise to release bulb.

WARNING:

Do not touch headlight bulb when it is on as the bulb generates enormous heat; keep flammable objects away.



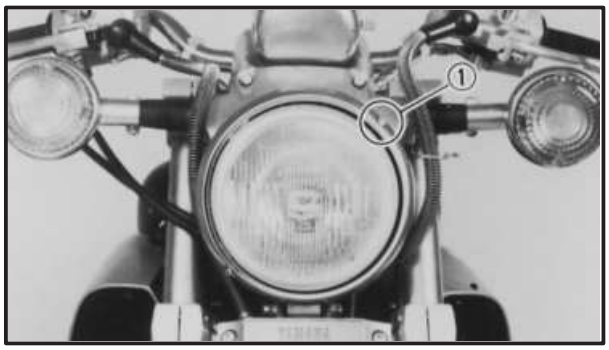
4. Install:
   • Bulb (new)
   Secure the new bulb with the bulb holder.

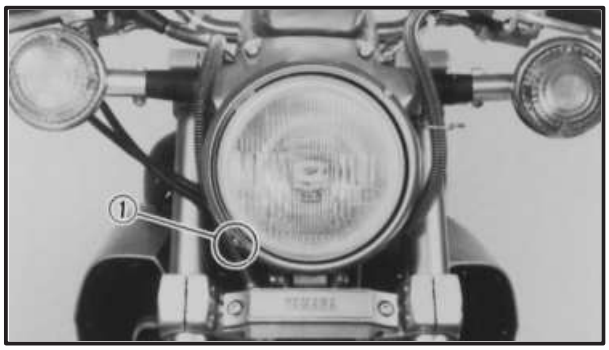
CAUTION:

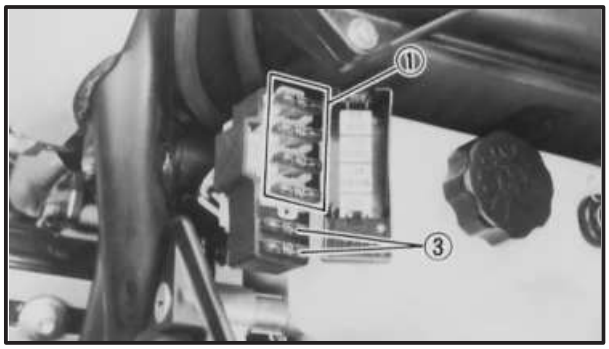
Avoid touching glass part of bulb. Also keep it free from oil otherwise, transparency of glass, bulb life and illuminous flux will be adversely affected. If oil gets on bulb, clean it with a cloth moistened thoroughly with alcohol or lacquer thinner.

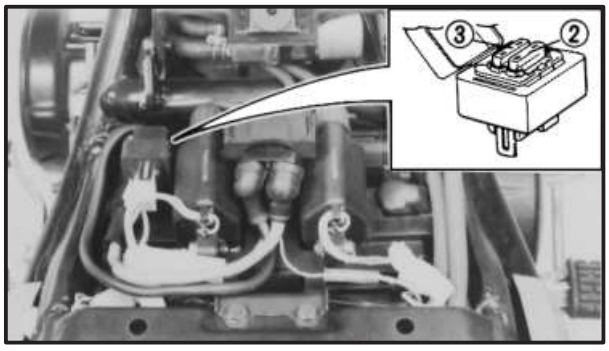
① Don't touch

5. Install:
   • Headlight lens unit









HEADLIGHT BEAM ADJUSTMENT

1. Adjust:
   • Headlight beam (horizontally)

Horizontal Adjustment	
Right	**Turn adjusting screw ① clockwise**
Left	**Turn adjusting screw ① counter-clockwise**

2. Adjust:
   • Headlight beam (vertically)

Vertical Adjustment	
Higher	**Turn the adjusting screw ① clockwise.**
Lower	**Turn the adjusting screw ① counterclockwise.**

FUSE INSPECTION

The fuse panel is located under the top cover and seat.

1. Inspect:
   • Fuses ①
   • Main fuse ②
   Defective → Replace.
   Blown fuse (new) → Inspect circuit.

CAUTION:

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

③ Spare fuses

Description	Amperage	Quantity
Main	**30 A**	**1**
Headlight	**15 A**	**1**
Signal	**15 A**	**1**
Ignition	**10 A**	**1**
Reserve	**30 A**	**1**
	15 A	**1**
	10 A	**1**

CHAPTER 3.
ENGINE OVERHAUL

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ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

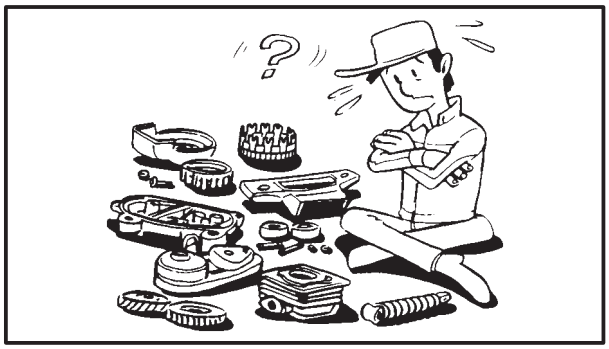
It is not necessary to remove the engine in order to remove the following components:
- Clutch
- Carburetor
- Water pump
- AC magneto

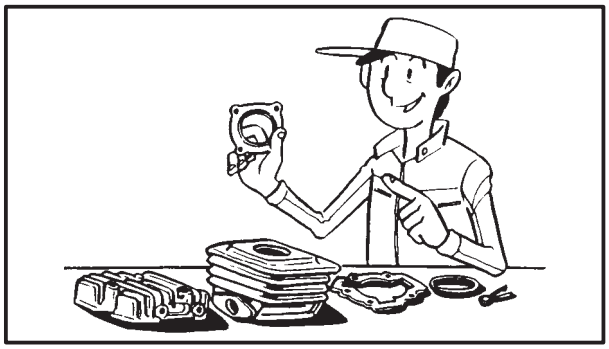
PREPARATION FOR REMOVAL

1. Remove all dirt, mud, dust, and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to “CHAPTER 1. SPECIAL TOOL” section.

NOTE:

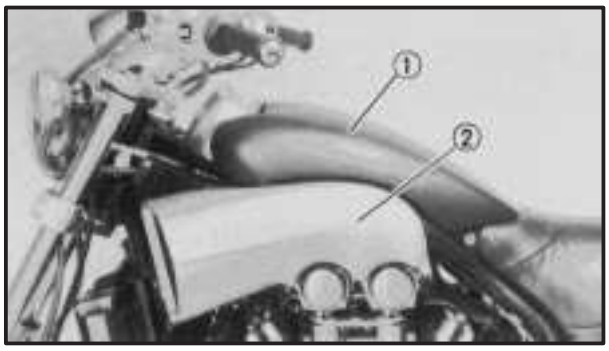
When disassembling the engine, keep mated parts together. This includes gears, cylinders, pistons, and other parts that have been “mated” through normal wear. Mated parts must be reused as an assembly or replaced.





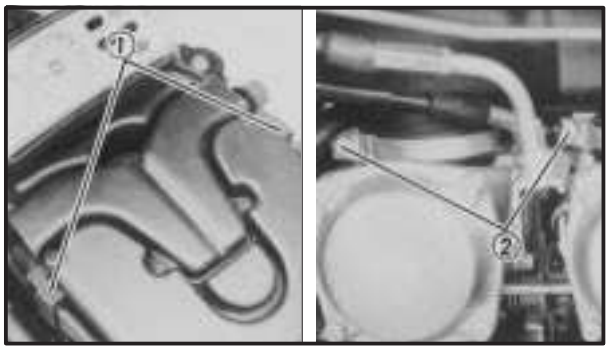
3. During engine disassembly, clean all parts and place them in trays in the order of disassembly. This will speed up assembly time and help assure that all parts are correctly reinstalled in the engine.

4. Drain engine oil completely.
   Refer to “CHAPTER 2. ENGINE OIL REPLACEMENT” section.
5. Drain coolant completely.
   Refer to “CHAPTER 4. COOLANT REPLACEMENT” section.

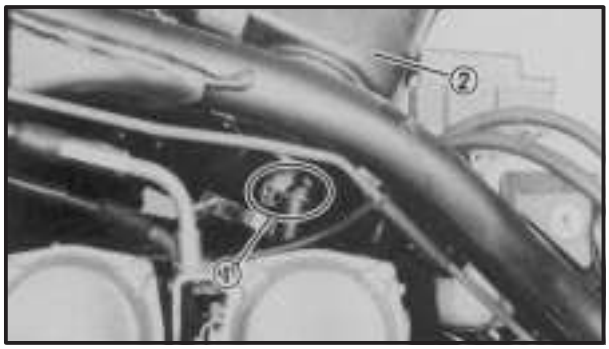


CARBURETOR

1. Remove:
   - Top cover ①
   - Covers (left and right) ②



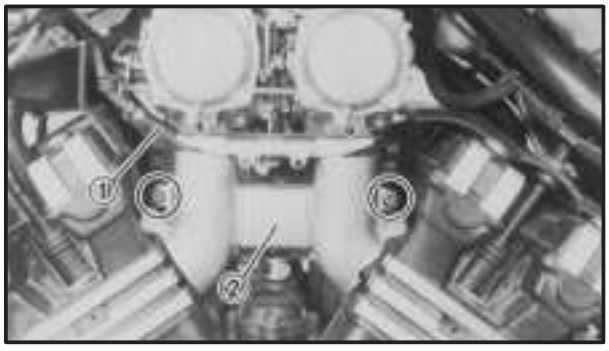
2. Remove:
   - Holders (carburetor overflow hose) ①
3. Loosen:
   - Screws (air cleaner joint) ②



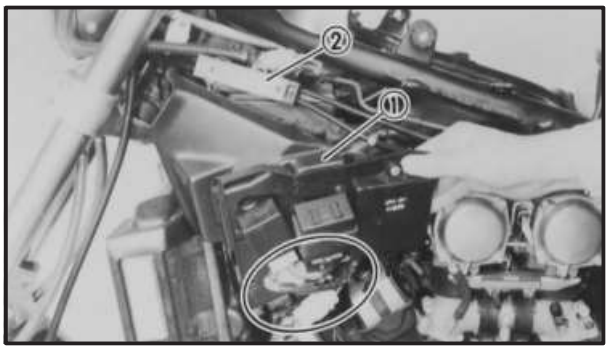
4. Remove:
   - Ventilation hose (crankcase) ①
   - Air cleaner assembly ②



5. Disconnect:
   - Fuel hose ①



6. Disconnect:
   - Vacuum hose (ignition advance) ①
7. Loosen:
   - Screws (carburetor joint)
8. Remove:
   - Carburetor joint cover (left and right) ②



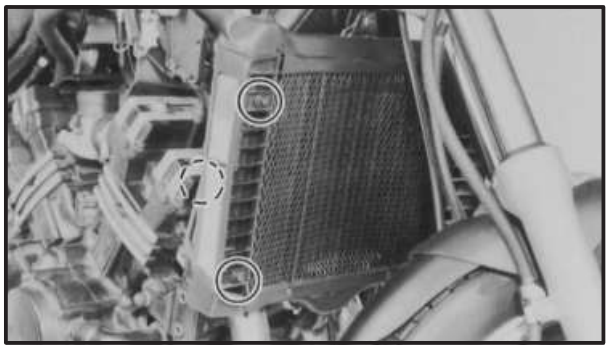
9. Remove:
   • Electrical components board ①
   • Throttle cable cylinder ②
10. Disconnect:
   • All leads and cables



11. Remove:
   • Carburetor assembly

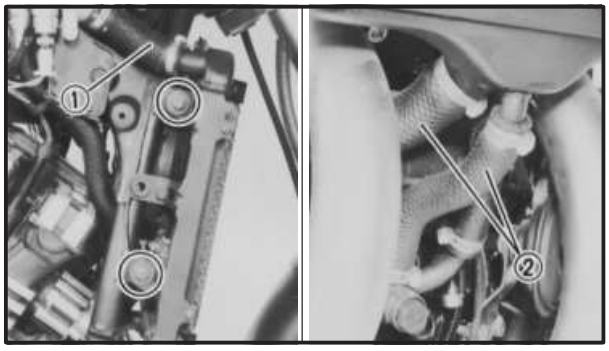
NOTE:

Cover the carburetor with a clean rag to prevent dirt or foreign matter into the carburetor.

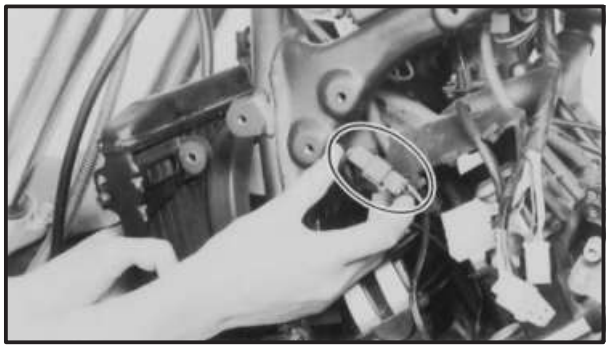


RADIATOR

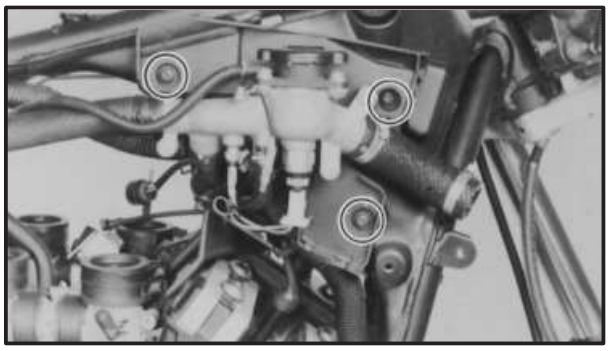
1. Remove:
   • Radiator covers



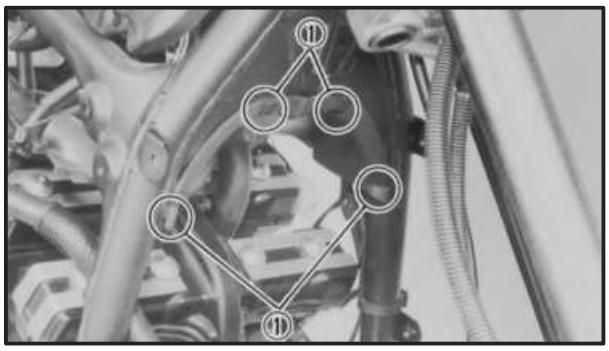
2. Remove:
   • Bolts (radiator)
3. Disconnect:
   • Upper hose ①
   • Lower hoses ②



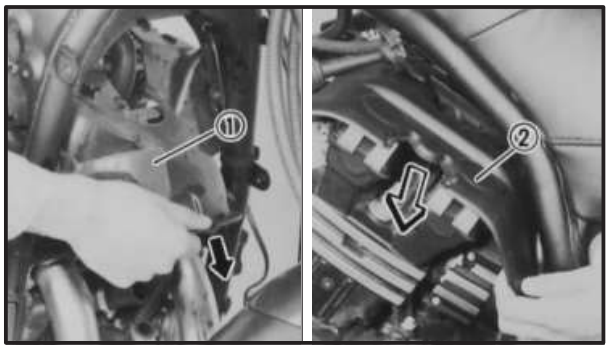
4. Disconnect:
   • Fan motor coupler
5. Remove:
   • Radiator assembly
   • Horn



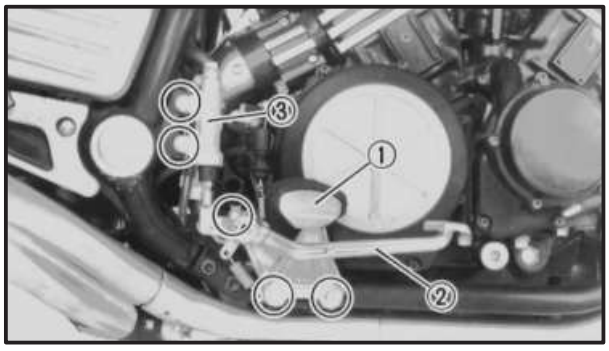
6. Disconnect:
   • All hoses and leads (conduit)
7. Remove:
   • Screws (conduit)



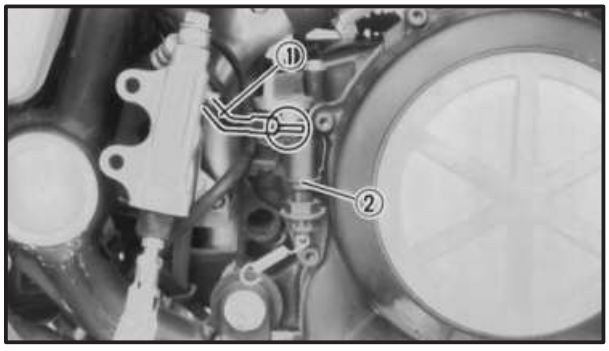
AIR BAFFLE PLATE
1. Disconnect:
   • Spark plug caps
2. Straighten:
   • Tabs (front baffle plate) ①



3. Remove:
   • Air baffle plate (front) ①
   • Air baffle plate (rear) ②



FOOTREST (RIGHT) AND BRAKE PEDAL
1. Remove:
   • Footrest (right) ①
   • Brake pedal assembly ②
   • Brake master cylinder ③

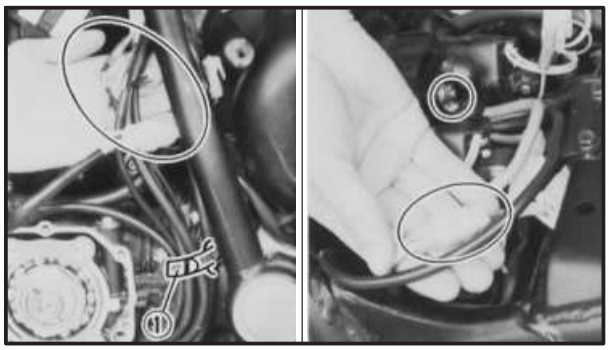


2. Disconnect:
   • Ground lead ①
3. Remove:
   • Rear brake switch ②

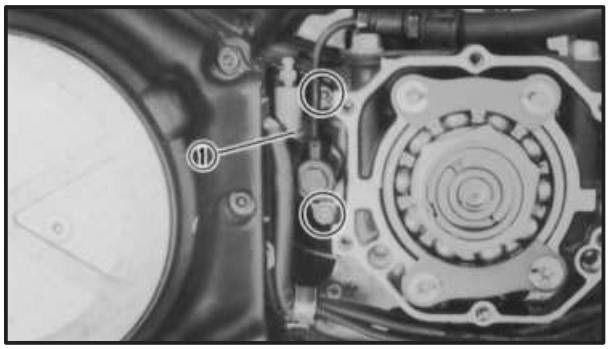


FOOTREST (LEFT) AND CLUTCH RELEASE CYLINDER

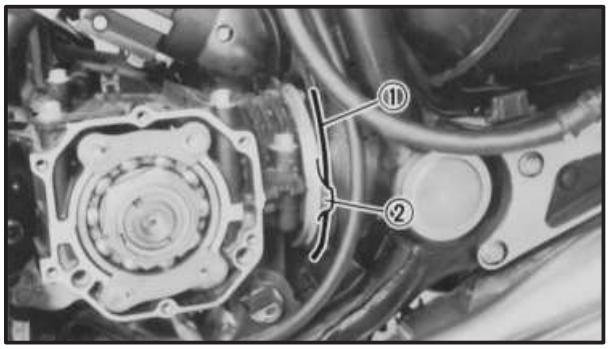
1. Remove:
   - Footrest (left) ①
   - Change pedal assembly ②
   - Middle gear case cover ③



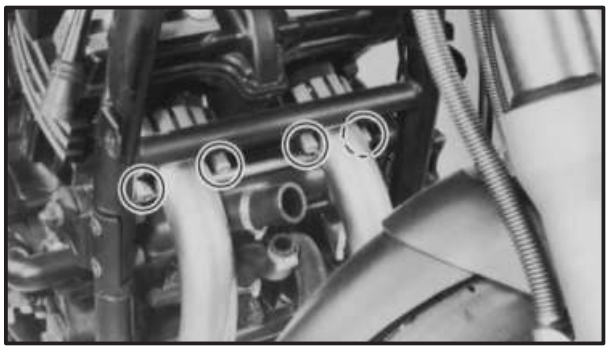
2. Remove:
   - Seat
   - Side cover (left)
3. Disconnect:
   - All leads (engine)
4. Remove:
   - Band ①



5. Remove:
   - Clutch release cylinder ①

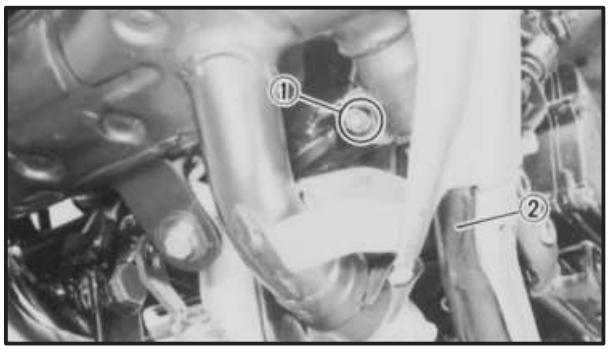


6. Remove:
   - Spring ①
7. Disconnect:
   - Rubber boot ②

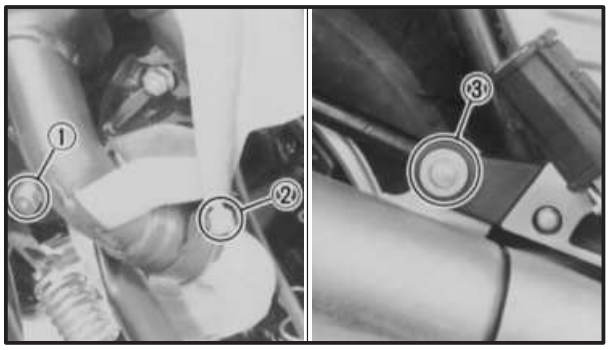


EXHAUST PIPE AND MUFFLER

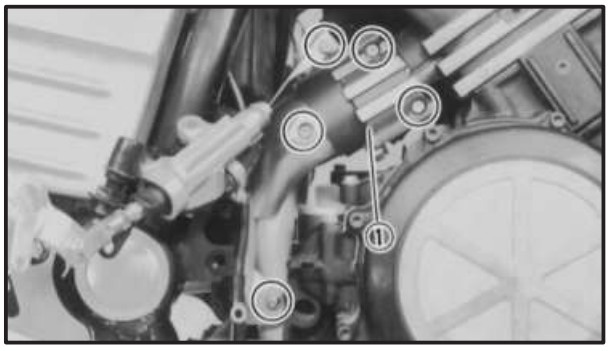
1. Remove:
   - Flange bolts (front exhaust pipe)



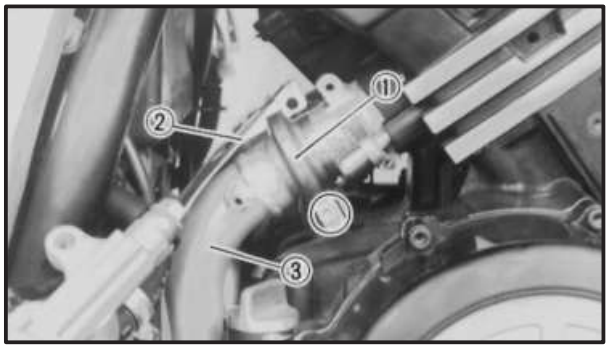
2. Loosen:
   - Bolts (front exhaust pipe) ①
3. Remove:
   - Front exhaust pipes ②



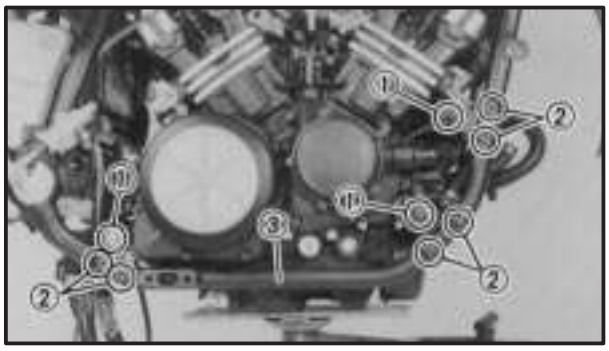
4. Remove:
   - Bolt (muffler chamber) ①
5. Loosen:
   - Bolts (muffler) ②
6. Remove:
   - Bolts (muffler bracket) ③
   - Mufflers



7. Remove:
   - Screws (rear exhaust protector)
   - Covers (rear exhaust) ①

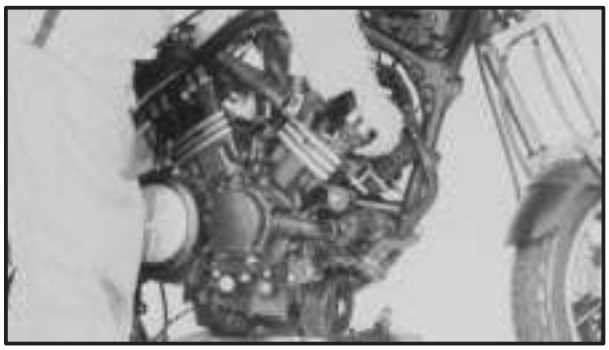


8. Remove:
   - Clamps (rear exhaust pipes) ①
   - Protector ②
   - Rear exhaust pipes ③



ENGINE REMOVAL

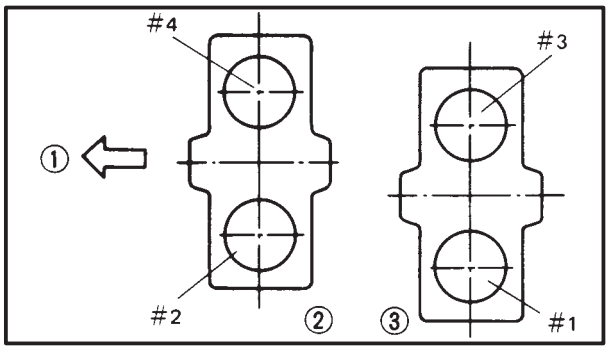
1. Place a suitable stand under the engine.
2. Remove:
   - Bolt (engine) ①
   - Bolts (down tube) ②
   - Down tube frame (right) ③



3. Remove:
   - Engine assembly
     From right side.

NOTE:

Remove the rear cylinder head cover if difficulties are encountered with any of the previous steps.



ENGINE DISASSEMBLY

CYLINDER HEAD AND CAMSHAFT

Rear Cylinder Head

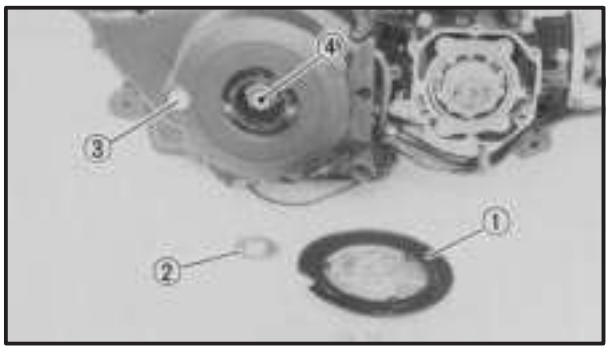
1. Remove:
   - Cylinder head covers (rear and front)
   - Gaskets
   - Spark plugs

① Front

② Front cylinder

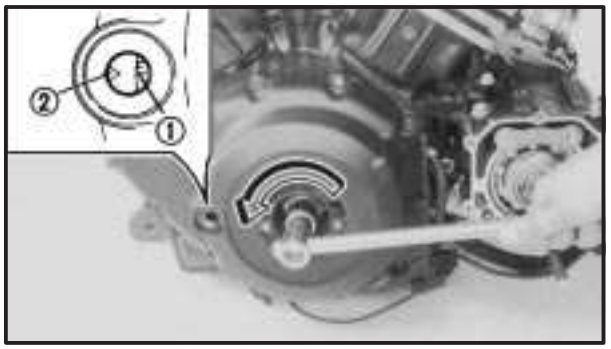
③ Rear cylinder

2. Remove:
   - Crankcase cover plate ①
   - Special washer ②
   - Timing plug ③

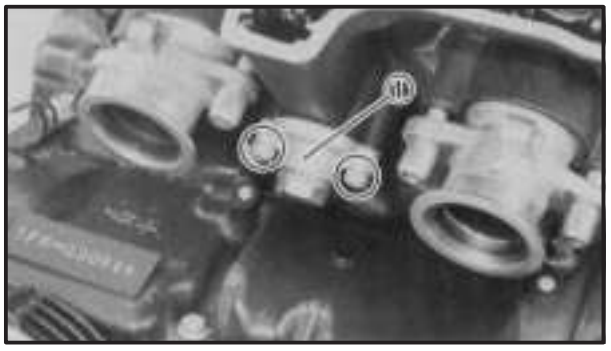


NOTE:

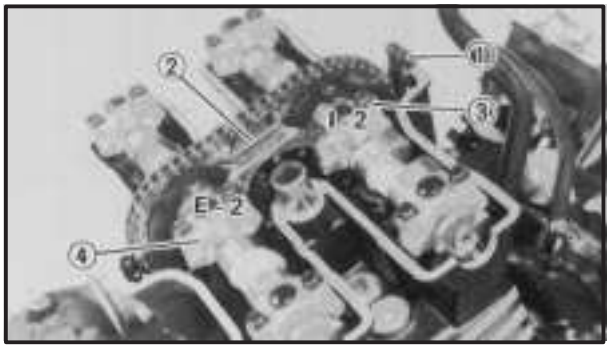
Check for clog of oil passage ④ in the bolt.
If any, clean the oil passage.



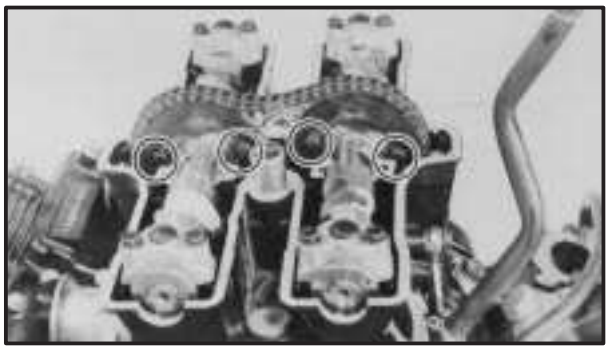
3. Align:
   - Flywheel "T-1" mark ① with stationary pointer ② on crankcase cover



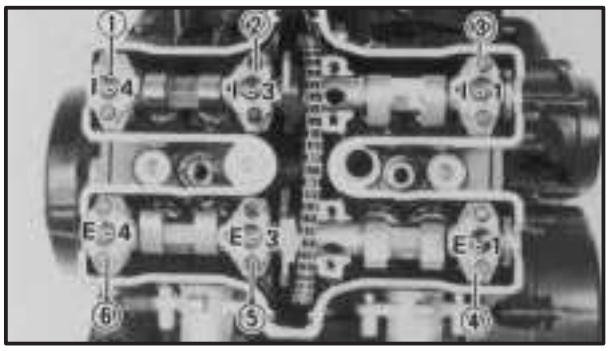
4. Remove:
   - Cam chain tensioner (rear) ①



5. Remove:
   - Chain guides ①, ②
   - Camshaft caps ③, ④
     They was marked "I-2" ③ and "E-2" ④.



6. Remove:
   • Bolts (cam chain sprocket).
   Use 22 mm wrench to hold camshaft.



7. Remove:
   • Camshaft caps ①, ②, ③, ④, ⑤, ⑥

NOTE:

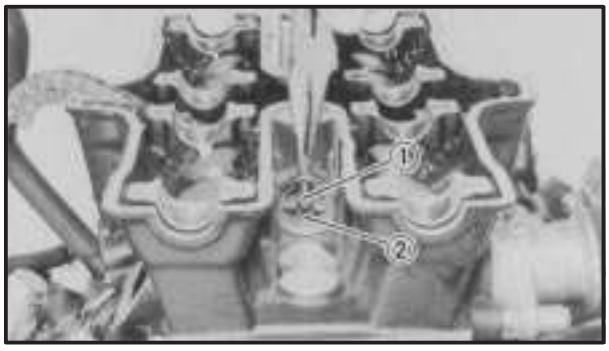
When loosing camshaft cap bolts, be sure camshaft cam lobes do not touching valve lifters.



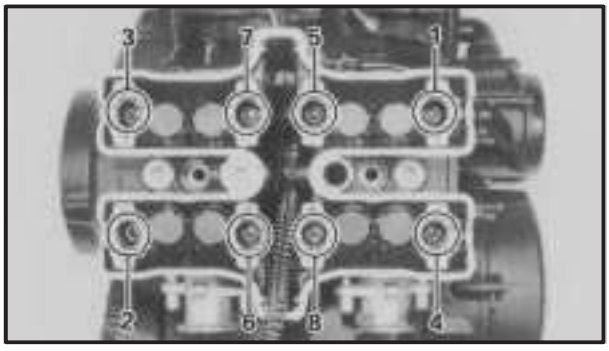
8. Remove:
   • Camshafts
   • Sprockets
   Slip the sprockets from mounting boss on camshaft.

NOTE:

Fasten a safety wire ① to the cam chain.



9. Remove:
   • Lock pin ①
   • Water jacket joint ②



10. Remove:
    • Nuts (cylinder head)
    Use 8 mm Wrench Adapter (90890-04076).

NOTE:

Follow numerical order shown in photo. Start by loosening each nut 1/2 turn until all are loose.

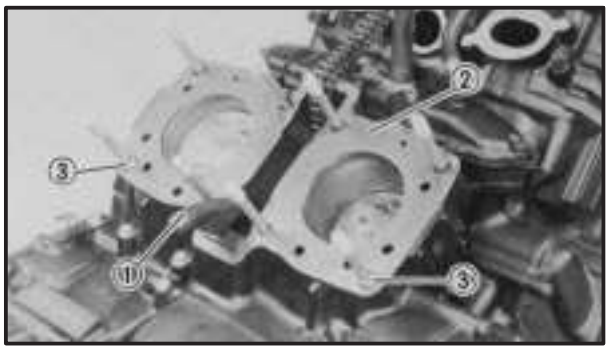


11. Remove:
    • Oil delivery pipe ①

NOTE:

When removing the pipe, be sure not to lose the washers that may fall out.

    • Cylinder head

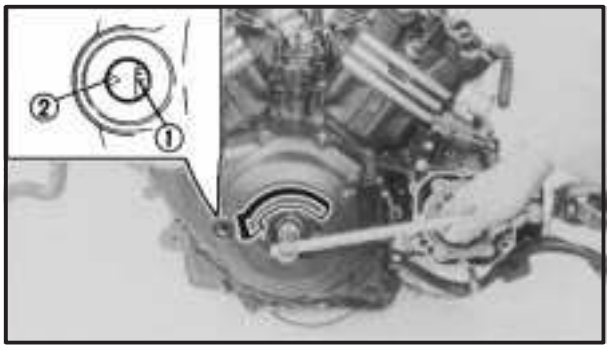


12. Remove:
    • Cam chain guide (rear) ①
    • Gasket ②
    • Dowel pins ③

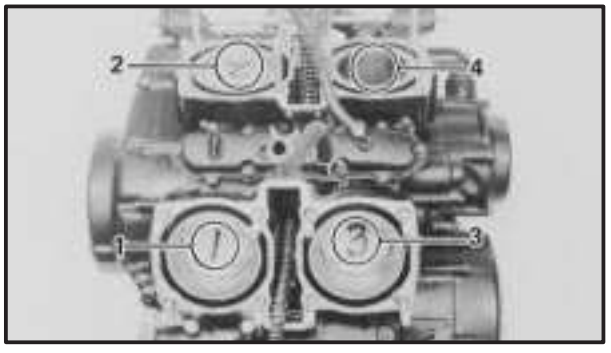
Front Cylinder Head

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

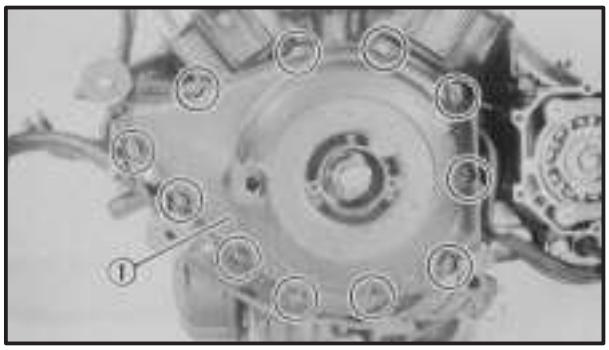
1. Rotate:
    • Crankshaft
    Counterclockwise 360° plus an added 70° (430° total) from the “T-1” mark.



2. Align:
    • Flywheel “T-2” mark ① with stationary pointer ② on crankcase cover

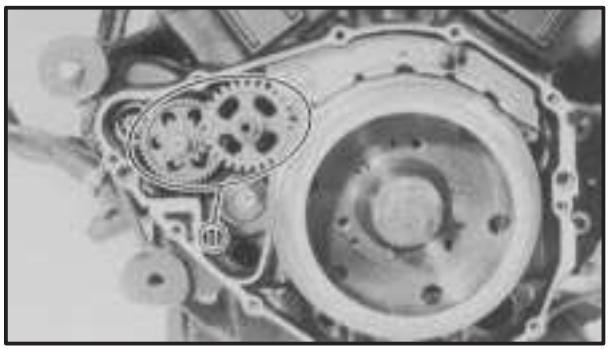


3. Mark:
    • Pistons
    With piston number designations as shown.

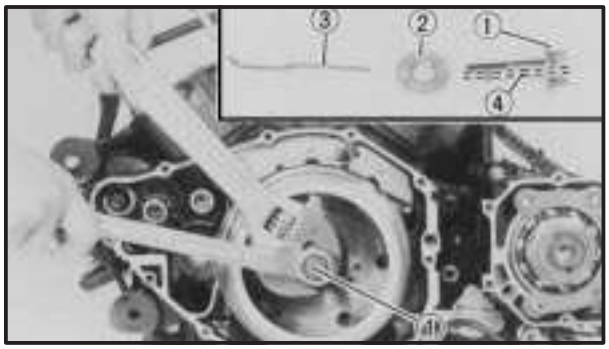


STARTER IDLE GEARS AND FLYWHEEL

1. Remove:
   - Crankcase cover (left) ①
   - Gasket
   - Dowel pins



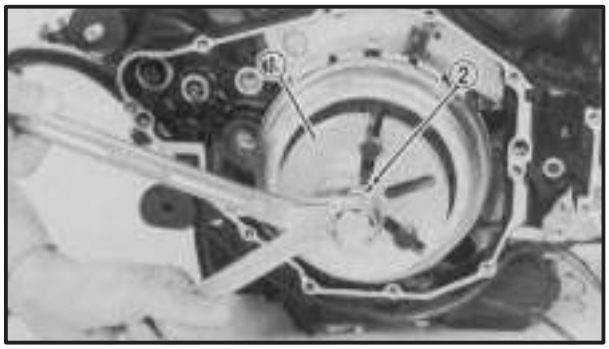
2. Remove:
   - Starter idle gears ①



3. Remove:
   - Bolt (flywheel) ①
   - Plain washer ②
   - Pin ③

NOTE:

Check for clog of oil passage ④ in the bolt.
If any, clean the oil passage.

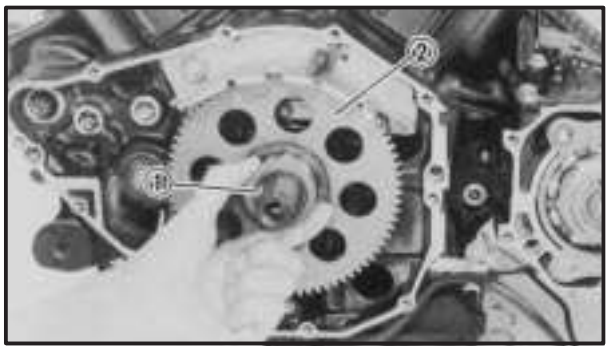


4. Remove:
   - Flywheel
     Use the Flywheel Puller (90890-01362) ① with the Puller Adapter (90890-04089) ②.

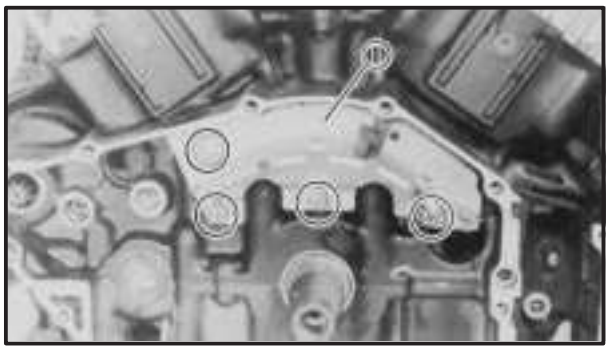
NOTE:

When removing the flywheel, do not allow the oil baffle plate ③ to touch the projections ④ on the flywheel.

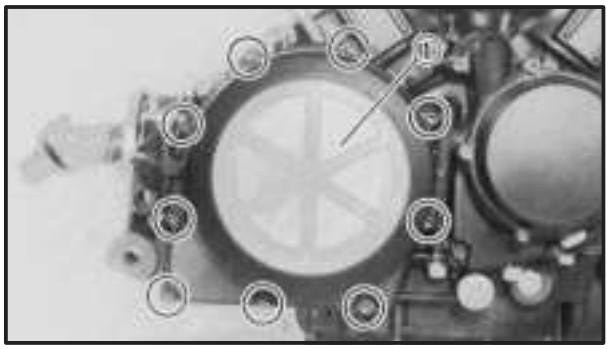




5. Remove:
   - Woodruff key ①
   - Starter clutch gear ②



6. Remove:
   - Oil baffle plate ①



CLUTCH AND OIL PUMP DRIVE GEAR

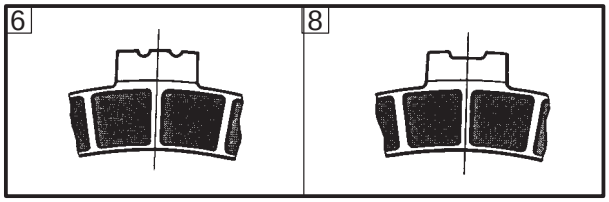
1. Remove:
   - Crankcase cover (right) ①

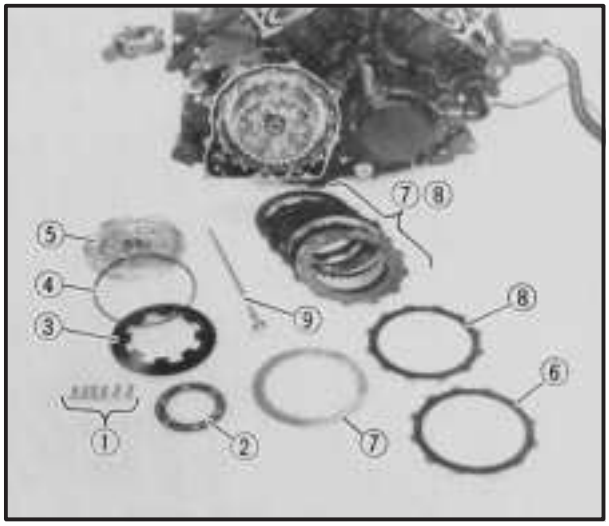
NOTE:

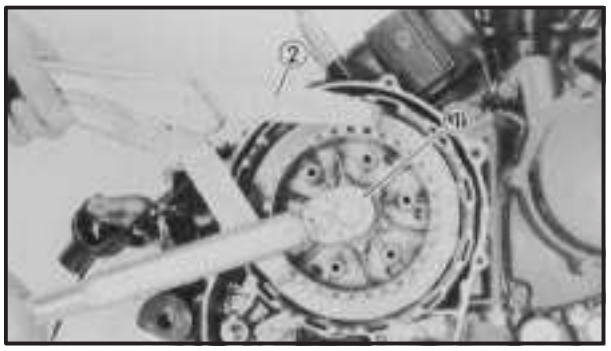
Working in a crisscross pattern, loosen the bolts 1/4 turn each. Remove them after all are loosened.

   - Gasket
   - Dowel pins

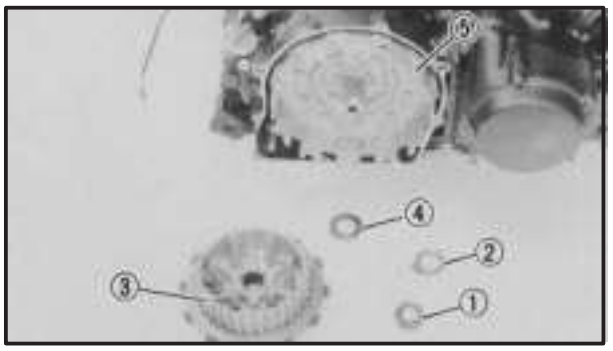
2. Remove:
   - Bolts (clutch spring) ①
   - Plate washer ②
   - Clutch spring ③
   - Spring seat ④
   - Pressure plate ⑤
   - Friction plate ⑥
   - Clutch plates ⑦
   - Friction plates ⑧
   - Push rod ⑨



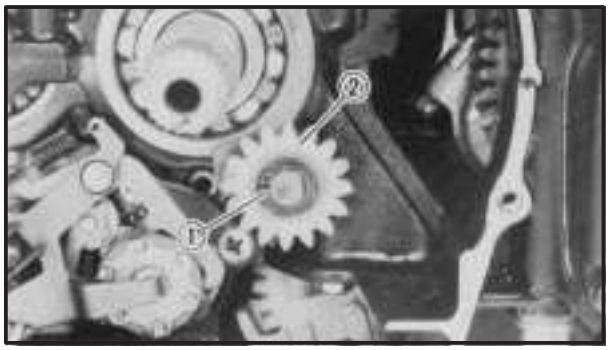




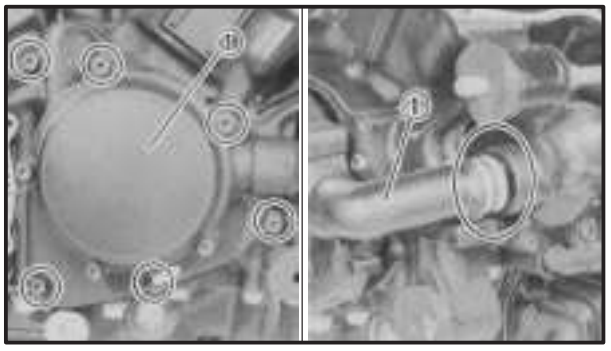
3. Straighten the lock washer tabs.
4. Loosen:
   • Nut (clutch boss) ①
   Use the Clutch Holder (90890-04086) ② to hold the clutch boss.



5. Remove:
   • Nut (clutch boss) ①
   • Lock washer ②
   • Clutch boss ③
   • Thrust washer ④
   • Clutch housing ⑤

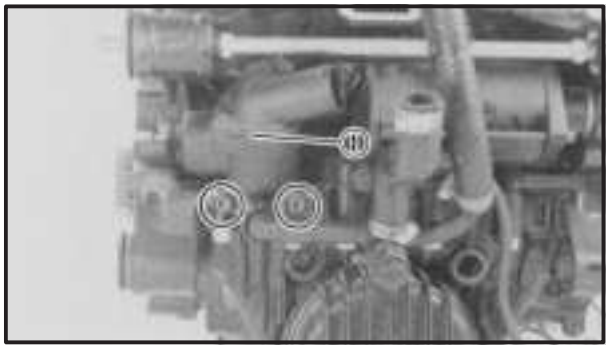


6. Remove:
   • Circlip ①
   • Oil pump drive gear ②

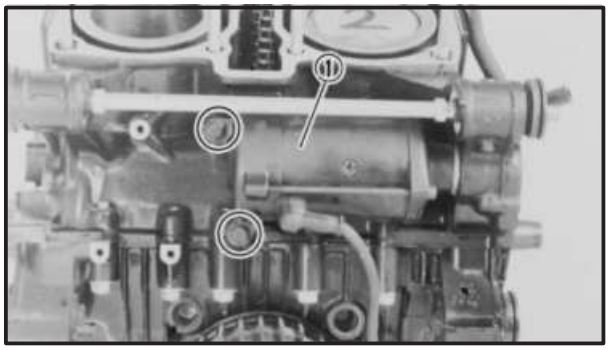


WATER PUMP AND THERMOSTATIC VALVE

1. Remove:
   • Waster pump cover/Water pump cable①
   • Gasket
   • Dowel pins

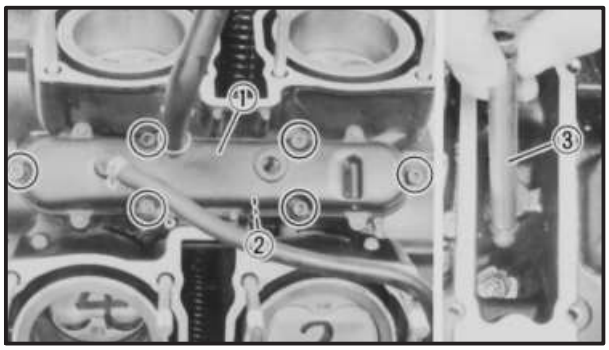


2. Remove:
   • Thermostat assembly ①

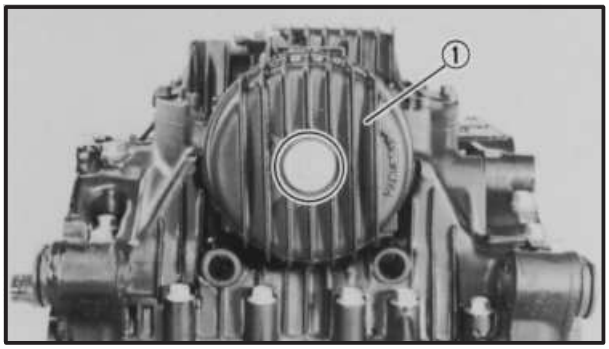


STARTER MOTOR AND BREATHER COVER

1. Remove:
   - Starter motor ①

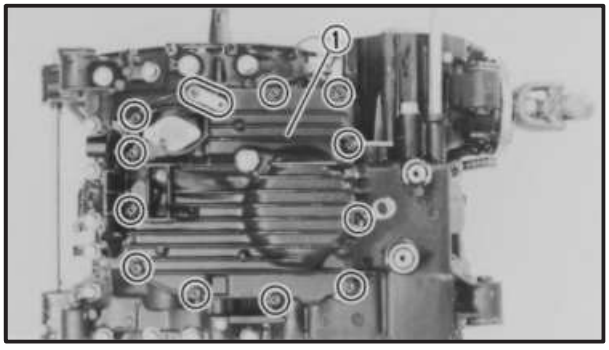


2. Remove:
   - Breather cover ①
   - Breather cover spacer ②
   - Oil pipe ③

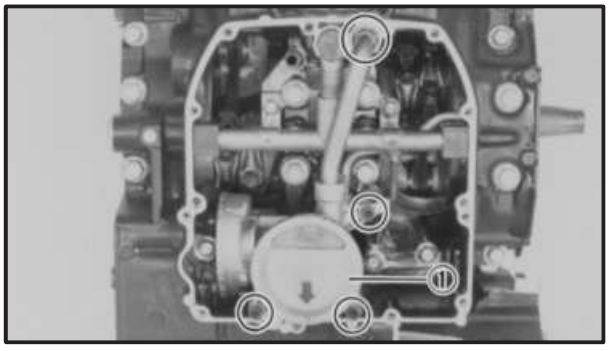


OIL PAN AND OIL PUMP

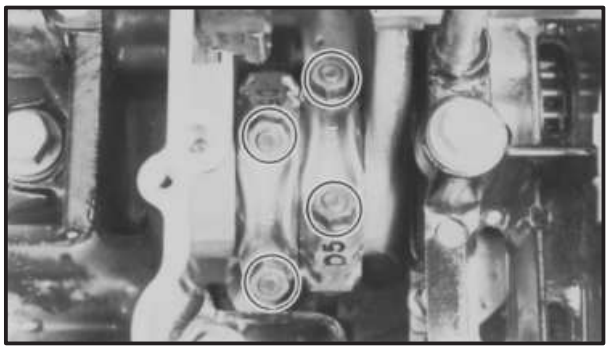
1. Remove:
   - Oil filter cover ①



2. Remove:
   - Oil pan ①
   - Gasket
   - Dowel pins

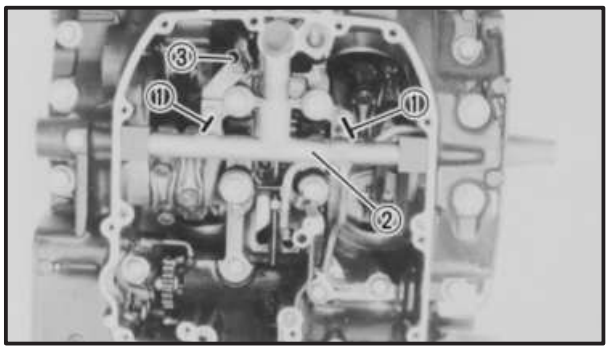


3. Remove:
   - Oil pump assembly ①
   - Dowel pins

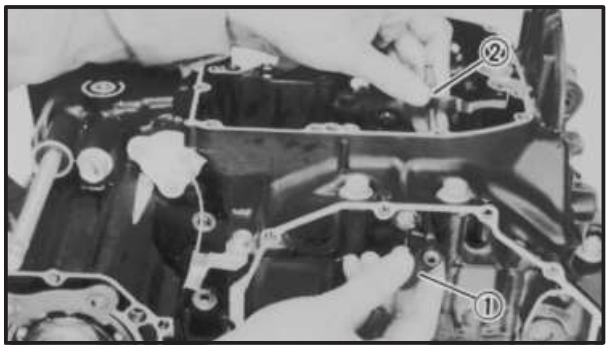


NOTE:

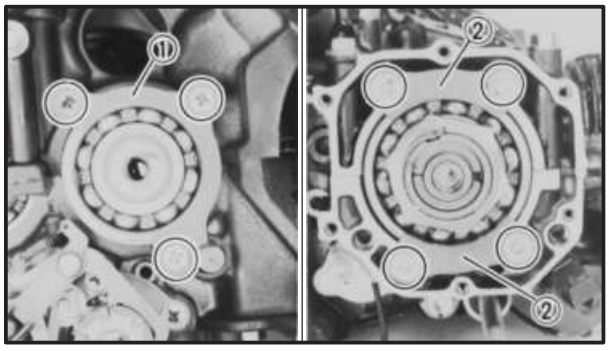
At this stage it is possible to replace the piston, connecting rod, and big-end bearing by simply removing the connecting rod nut. None of the steps below are necessary to replace the above components.



4. Straighten the bracket tabs ①.
5. Remove:
   - Oil pipe ②
   - Main oil gallery pipe ③



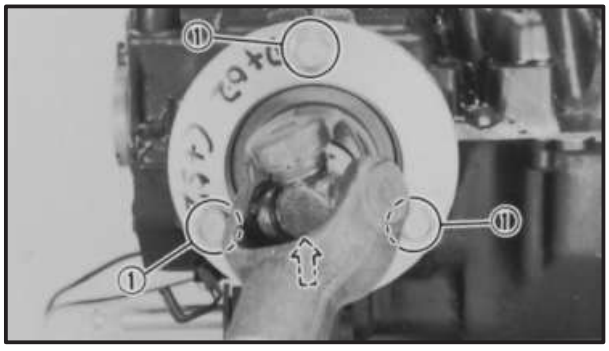
6. Remove:
   - Damper (oil pump pipe) ①
   - Oil pump pipe ②



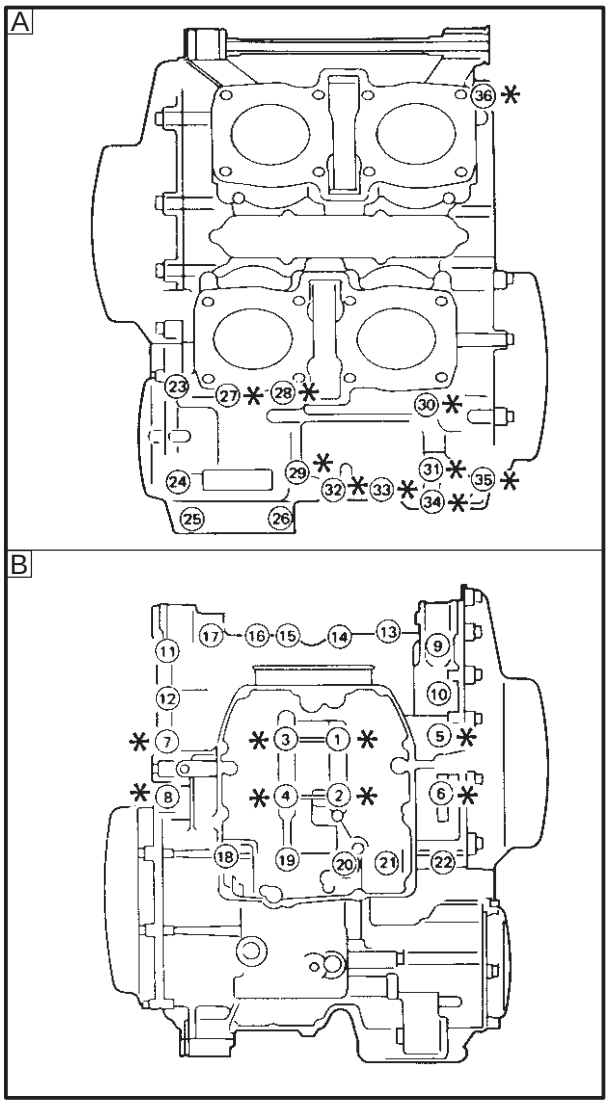
CRANKCASE DISASSEMBLY

1. Remove:
   - Retainer (main axle bearing) ①
   - Retainers (middle gear bearing) ②

   Use the #40 Torx Driver (90890-04049).



2. Remove:
   - Bolts (middle driven gear housing) ①

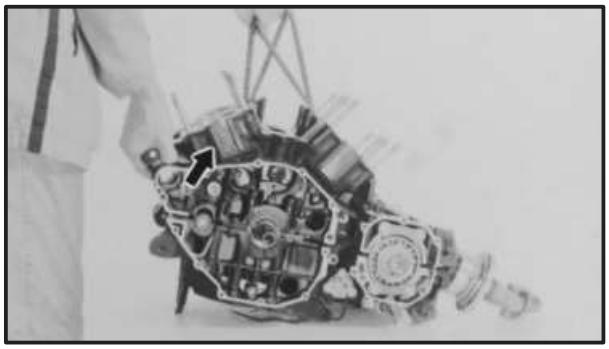


3. Remove:
   • Bolts (crankcase)

NOTE:

- Remove the bolts starting with the highest numbered one.
- The embossed numbers in the crankcase designate the crankcase tightening sequence.

✻ With washer
A UPPER CASE
B LOWER CASE

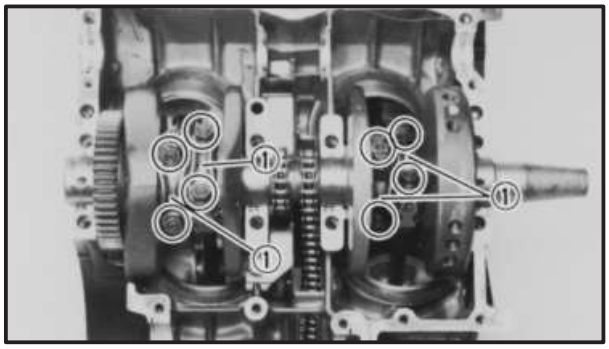


4. Remove:
   • Crankcase (upper)
   Use a soft hammer.

NOTE:

Pull out the crankcase (upper) while pulling up the cam chain.

• Dowel pins



UPPER CRANKCASE

1. Remove:
   • Connecting rod caps ①
   • Connecting rod/Piston assembly

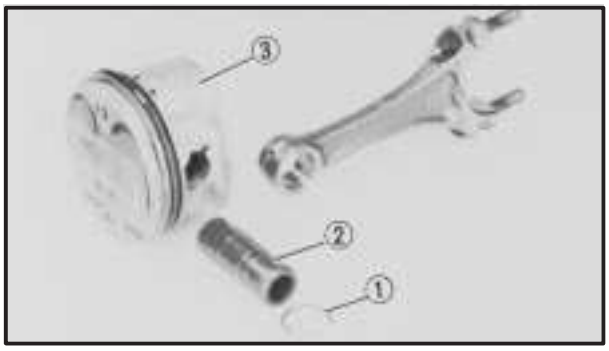
CAUTION:

Do not hammer out the connecting bolts to remove the connecting rod assembly.

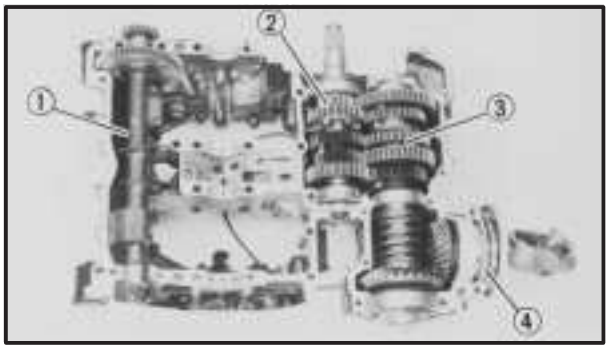
2. Remove:
   • Crankshaft
   • Plane bearings (crankshaft/connecting rods/balancer shaft)

NOTE:

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



3. Remove:
   • Piston pin clip ①
   • Piston pin ②
   • Piston ③

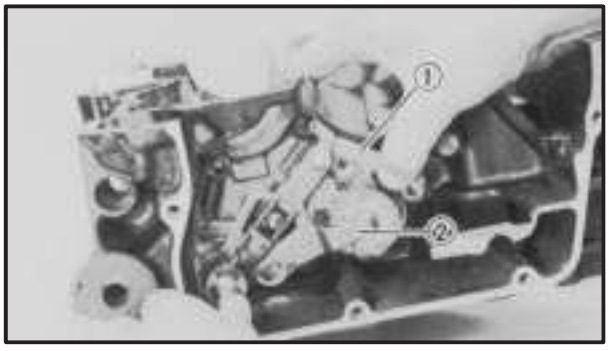


TRANSMISSION

1. Remove:
   • Balancer shaft ①
   • Main axle assembly ②
   • Drive axle assembly ③
   • Middle driven gear assembly ④
   • Plane bearings (Crankshaft/balancer shaft)

NOTE:

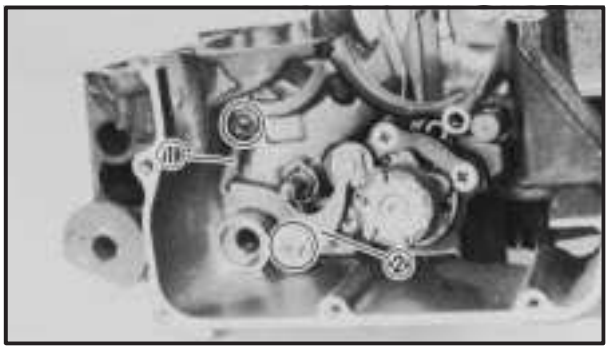
Identify each plane bearing position very carefully so that it can be reinstalled in its original place.



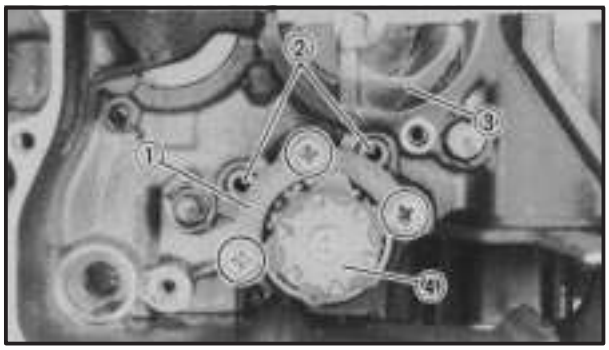
LOWER CRANKCASE

1. Remove:
   • Shift shaft assembly

① Shift lever 1
② Shift lever 2



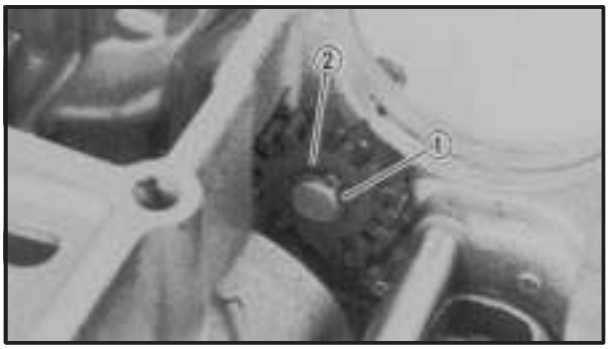
2. Unhook:
   • Tension spring ①
3. Remove:
   • Shift cam stopper lever ②



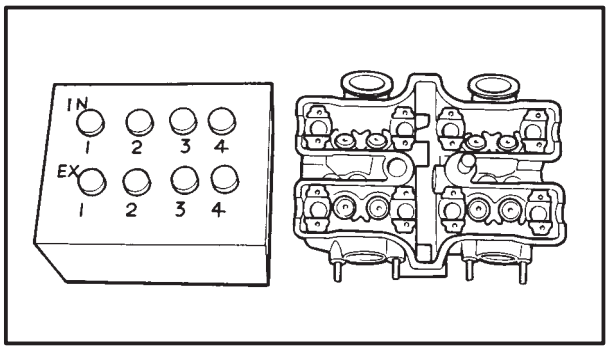
4. Remove:
   • Bearing retainer (shift cam) ①
   • Guide bars ②
   • Shift forks ③
   • Shift cam ④

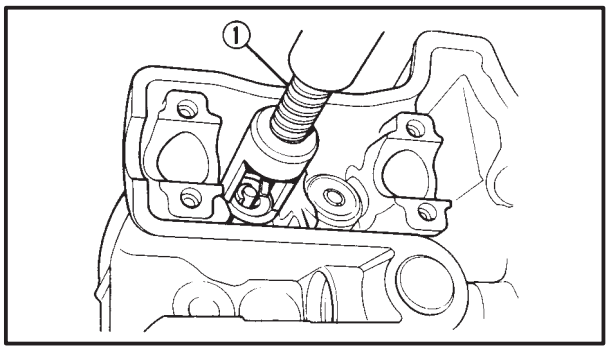
NOTE:

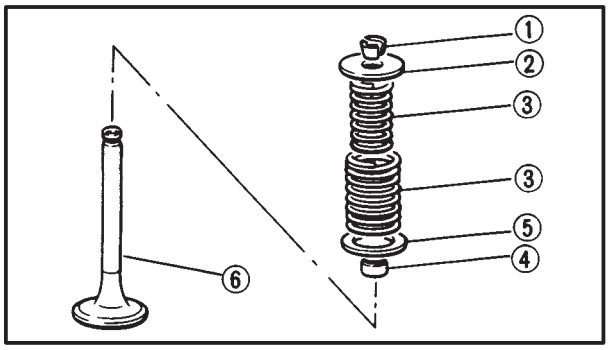
Note the position of each part. Pay particular attention to the location and direction of shift forks.

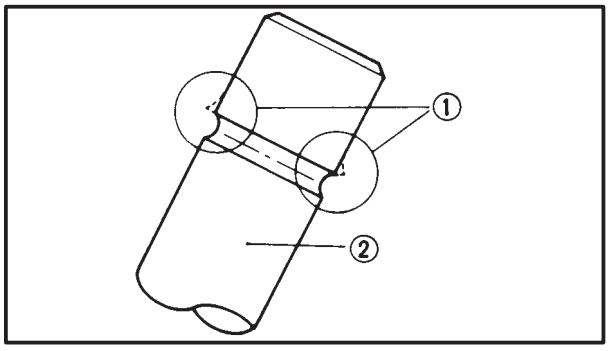


5. Remove:
   • Circlip ①
   • Oil pump idle gear ②









INSPECTION AND REPAIR

CYLINDER HEAD

1. Remove:
   - Valve pads
   - Lifters
   - Spark plugs

NOTE:

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

2. Attach:
   - Valve Spring Compressor (90890-04019) ①

3. Remove:
   - Valve retainers ①
   - Valve spring seat ②
   - Valve springs ③
   - Oil seal ④
   - Valve spring seat ⑤
   - Valve ⑥

NOTE:

Deburr any deformed valve stem end. Use an oil stone to smooth the stem end.

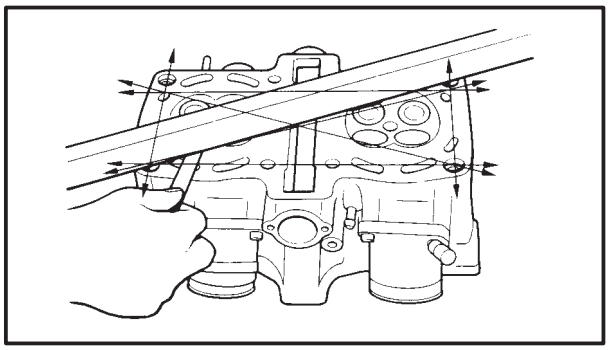
① Deburr

② Valve stem

4. Eliminate:
   - Carbon deposit
     Use rounded scraper.

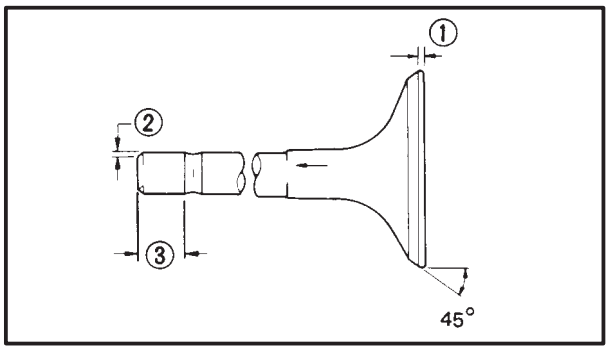
NOTE:

Do not use a sharp instrument and avoid damaging or scratching.
- Spark plug threads
- Valve seat
- Cylinder head



5. Measure:
   • Cylinder head warpage
   Under specification → Resurface.
   Over specification → Replace.

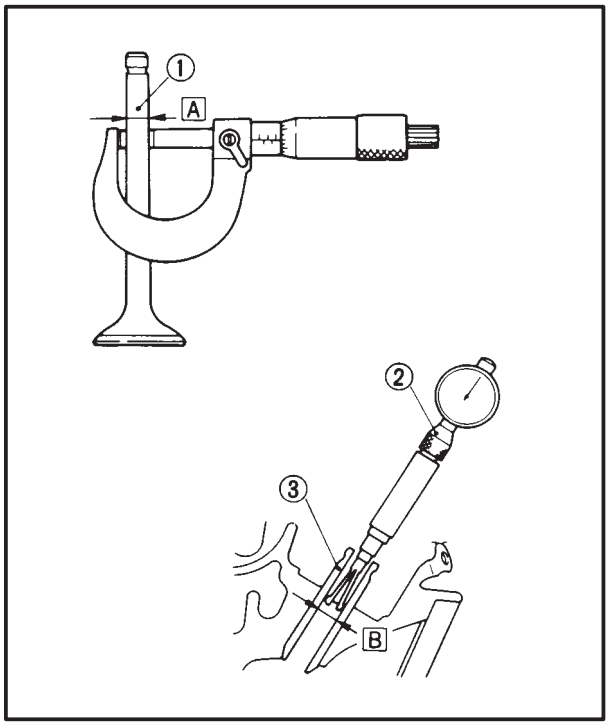
Cylinder Head Warp Limit:
Less than 0.03 mm (0.0012 in)



VALVE, VALVE GUIDE, AND VALVE SEAT
Intake and Exhaust Valve

1. Inspect:
   • Valve face
   • Stem end
   Wear/Pitting/Out of specification → Replace.

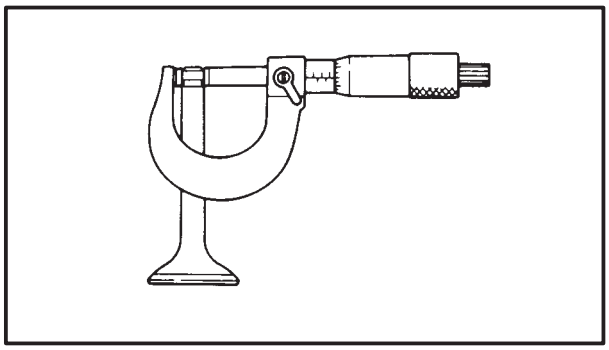
Minimum Thickness (Service limit)
①:0.7 mm (0.028 in)
Beveled ②: 0.5 mm (0.020 in)
Minimum Length (Service limit) ③:
4.0 mm (0.16 in)



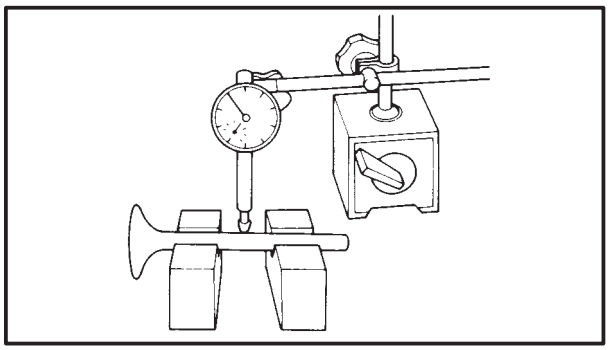
2. Measure:
   • Valve stem clearance
   Out of specification → Replace either valve and/or guide.
   Use the Micrometer and Bore Gauge.

	Valve Stem Clearance	Maximum
Intake	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.0031 in)
Exhaust	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.10 mm (0.0039 in)

① Valve
② Bore Gauge
③ Valve guide
A Valve stem outside diameter
B Valve guide inside diameter



3. Inspect:
   • Valve stem end
   Mushroom shape/Larger diameter than rest of stem → Replace valve, valve guide, and oil seal.



4. Measure:
   • Valve stem runout
   Out of specification → Replace.

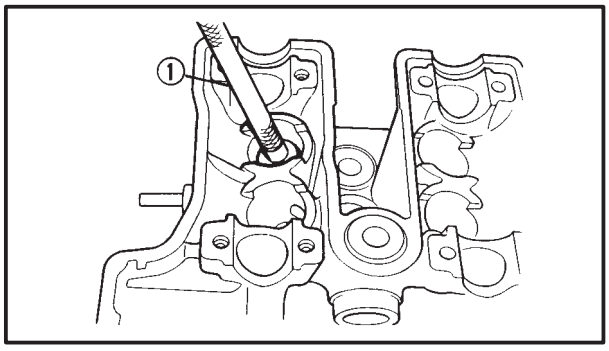
Maximum Runout:
0.01 mm (0.0004 in)

Valve Guide

NOTE:

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

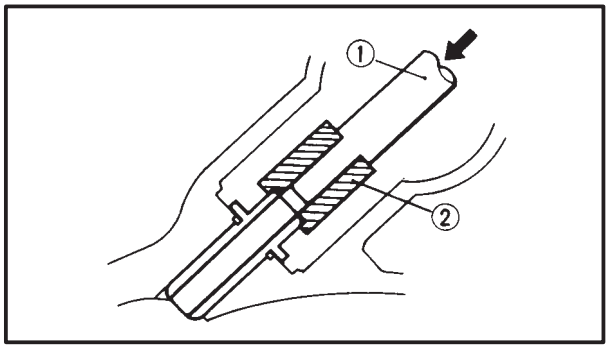
1. Inspect:
   • Valve guide
   Wear/Oil leakage into cylinder → Replace.



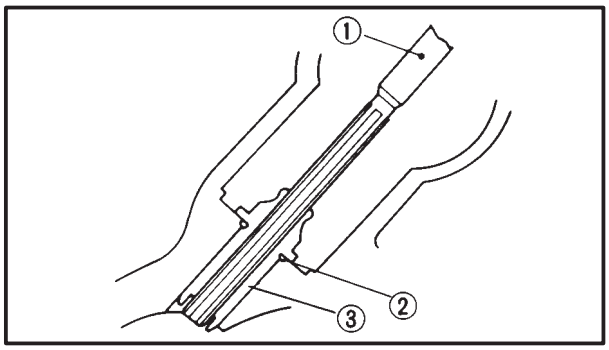
2. Remove:
   • Valve guide
   Use the Valve Guide Remover (90890-01122) ①.

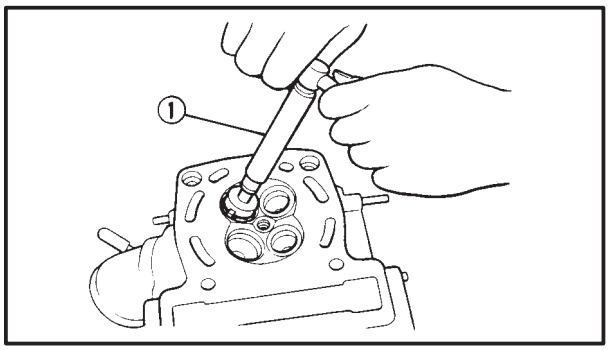
NOTE:

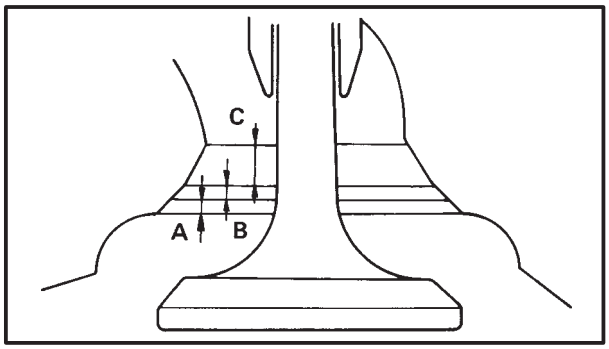
Heat the head in an oven to 100°C (212°F) to ease guide removal and installation and to maintain correct interference fit.



3. Install:
   • Circlip (new)
   • Valve guide (Oversize)
   Use the Valve Guide Remover (90890-01122) ① with the Valve Guide Installer (90890-04015) ②.







NOTE:

After installing valve guide:
- Use the 5.5 mm Valve Guide Reamer (90890-01196) ① to obtain proper valve guide/valve stem clearance.
- Recut the valve seat.

② Circlip

③ Valve guide

Valve Seat

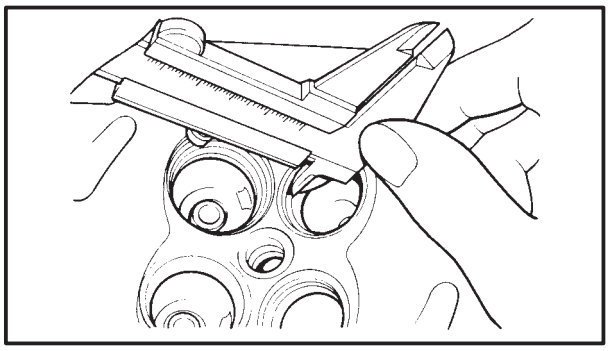
1. Inspect:
   - Valve seat
     Wear/Pitting/Valve replacement → Resurface seat at 45° angle.

CAUTION:

Clean valve seat if pitted or worn using a 45° Valve Seat Cutter (YM-91043) ①. When twisting cutter, keep an even downward pressure to prevent chatter marks.

Cut sections as follows	
Section	Cutter
A	30°
B	45°
C	60°

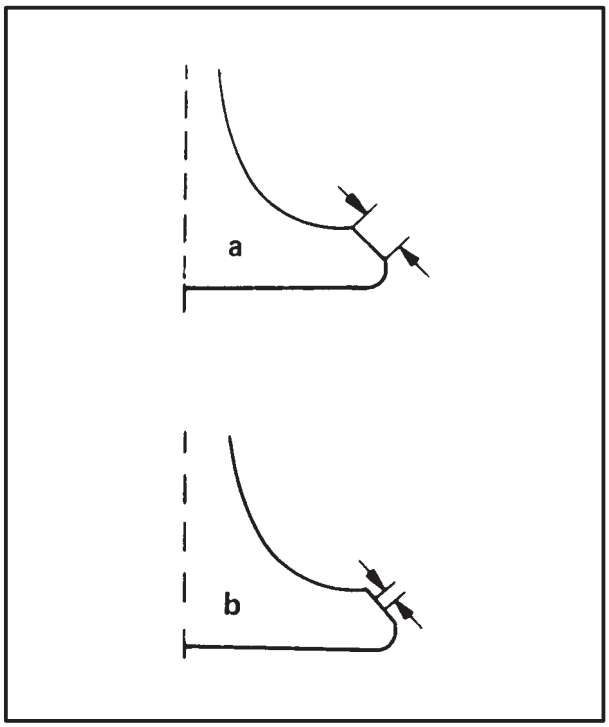
2. Measure:
   - Valve seat width
3. Apply:
   - Mechanics bluing dye (Dykem)
     To valve and seat.
   - Fine grinding compound (small amount)
     Ground surface of valve face.
4. Position:
   - Valves
     Into cylinder head.
     Spin it rapidly back and forth, then lift valve and clean off all grinding compound.
5. Inspect:
   - Valve seat surface
     Wherever valve seat and valve face made contact, bluing will have been removed.

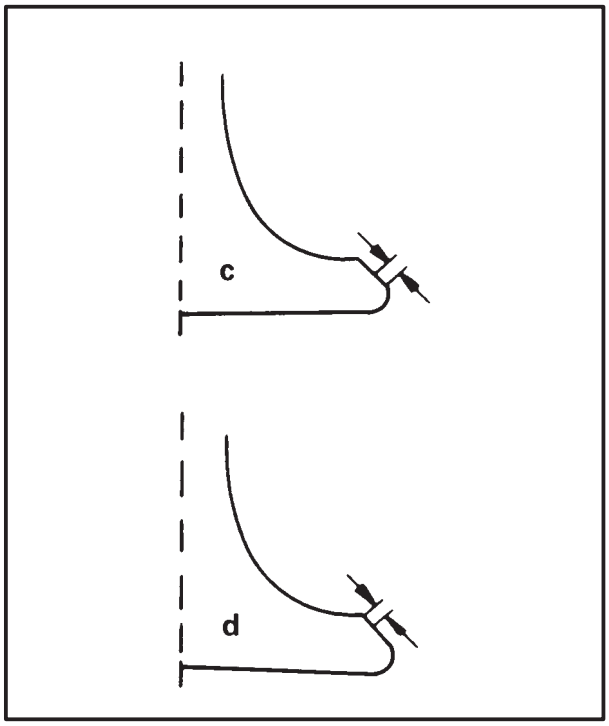


6. Measure:
   • Valve seat width
   Out of specification / Remaining pitting / Variation of valve seat width → Cut valve further.

CAUTION:

Remove just enough material to achieve satisfactory seat.





Seat Width:
Standard: 0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
Wear limit: 1.4 mm (0.055 in)

Valve seat recutting steps are necessary if:
• Valve seat is uniform around perimeter of valve face but too wide or not centered on valve face.

Valve Seat Cutter Set		Desired Result
Use either	30° cutter	To center the seat or to reduce its width
	45° cutter	
	60° cutter	

• Valve face indicates that valve seat is centered on valve face but is too wide (see “a” diagram).

Valve Seat Cutter Set		Desired Result
Use lightly	30° cutter	To reduce valve seat width to 1.0 mm (0.039 in)
	60° cutter	

• Valve seat is in the middle of the valve face but too narrow (see “b” diagram).

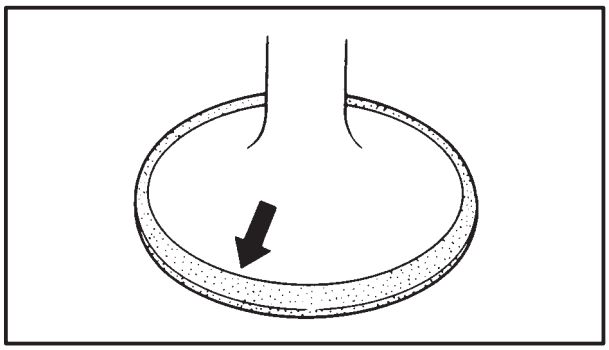
Valve Seat Cutter Set		Desired Result
Use	45° cutter	To achieve a uniform valve seat width of 1.0 mm (0.039 in)

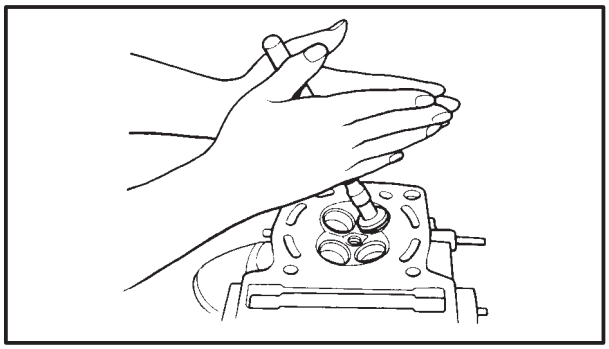
• Valve seat is too narrow and right up near valve margin (see “c” diagram).

Valve Seat Cutter Set		Desired Result
Use	30° cutter, first	To center the seat and to increase its width
	45° cutter	

• Valve seat is too narrow and is located down near the bottom edge of the valve face (see diagram “d”).

Valve Seat Cutter Set		Desired Result
Use	60° cutter, first	To center the seat and to increase its width
	45° cutter	





Valve/Valve Seat Assembly Lapping

1. Apply:
   • Coarse lapping compound (small amount)
   To valve face.
   • Molybdenum disulfide oil
   To valve stem.
2. Position:
   • Valves
   In cylinder head.
3. Rotate:
   • Valve
   Turn until valve and valve seat are evenly polished, then clean off all compound.
4. Apply:
   • Fine lapping compound (small amount)
   To valve face.
5. Repeat steps 2 and 3.

NOTE:

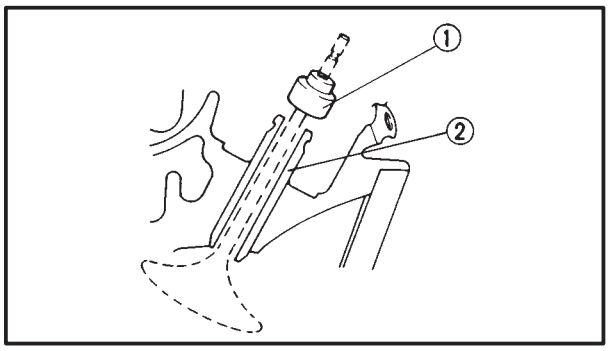
Be sure to clean off all compound from valve face after every lapping operation.

6. Inspect:
   • Valve face
   Not yet uniformly smooth → Repeat procedure from step 1.
7. Apply:
   • Mechanics bluing dye (Dykem)
   To valve face and seat.
8. Rotate:
   • Valve
9. Inspect:
   • Valve face
   Valve must make full seat contact indicated by grey surface all around. The valve face where bluing was removed.
   Faulty contact → Replace.
   (See procedure below)

10. Apply:
• Solvent
Into each intake and exhaust port.

NOTE:

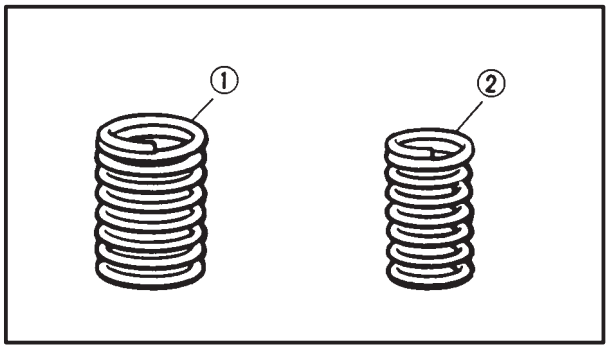
Pour solvent into intake and exhaust ports only after completion of all valve work and assembly of all head parts.



11. Check:
• Valve seals ①
Leakage past valve seat → Replace valve.
(See procedure below)

② Valve guide

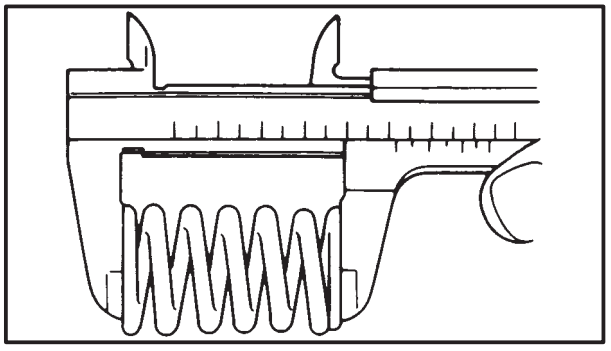
Relapping steps:
- Disassemble head parts.
- Repeat lapping steps using fine lapping compound.
- Clean all parts thoroughly.
- Reassemble and check for leakage again using solvent.
- Repeat steps as often as necessary to effect a satisfactory seal.



Valve Spring

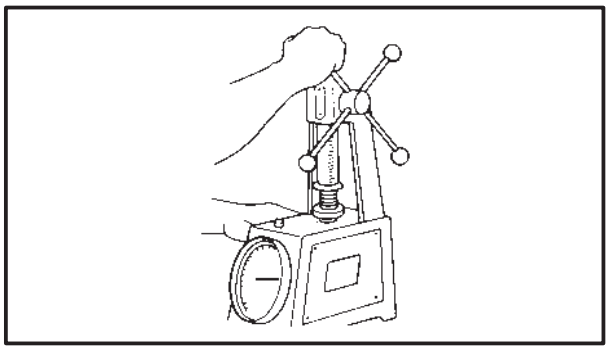
This engine uses two springs of different sizes to prevent valve float or surging. Valve spring specifications show the basic value characteristics.

① Outer spring
② Inner spring



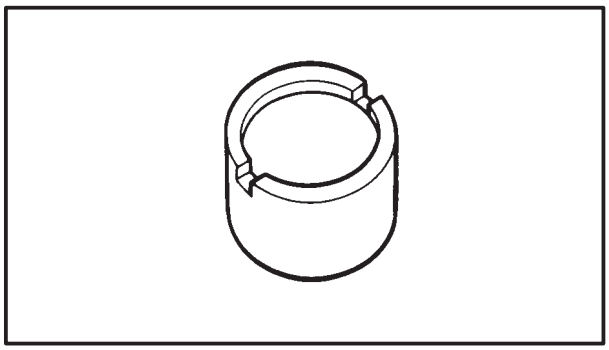
1. Measure:
• Spring free length
Out of specification → Replace.

Minimum Free Length:
Outer: 38.90 mm (1.531 in)
Inner: 37.45 mm (1.474 in)

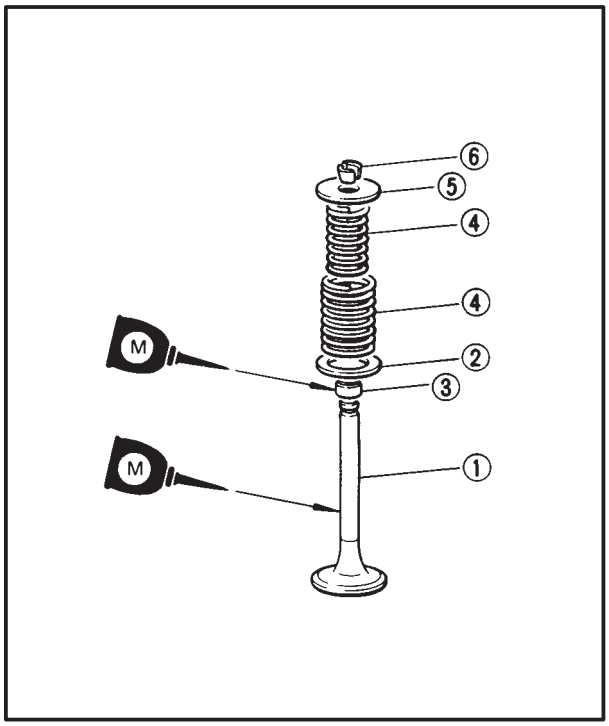


2. Measure:
   • Spring force (installed length)
   Out of specification → Replace.

Valve Compressed Force:
Outer: 13.3 ~ 15.7 kg (29.3 ~ 34.6 lb) at 33.8 mm (1.331 in)
Inner: 6.29 ~ 7.39 kg (13.9 ~ 16.3 lb) at 31.8 mm (1.75 in)



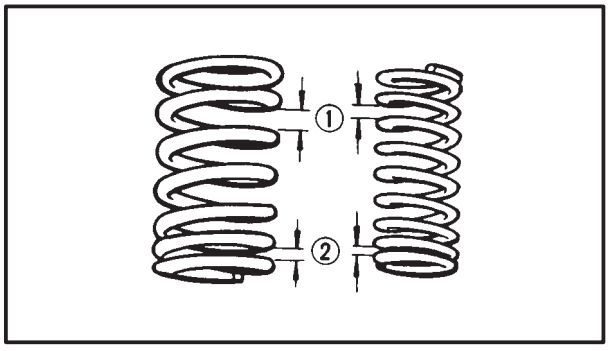
Valve Lifter
1. Inspect:
   • Valve lifter wall
   Scratches/Damage → Replace both lifter and cylinder head.



Valve Installation
1. Lubricate:
   • Valve stem
   • Oil seal

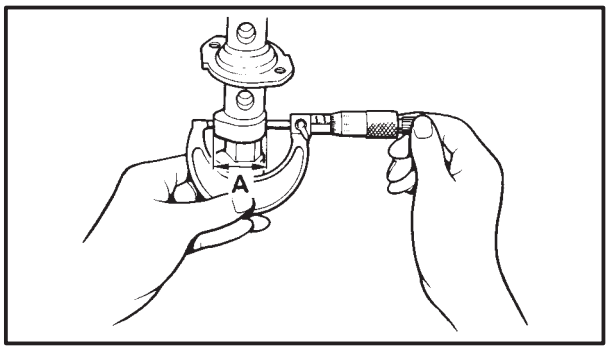
High-Quality Molybdenum Disulfide Motor Oil or Molybdenum Disulfide Grease

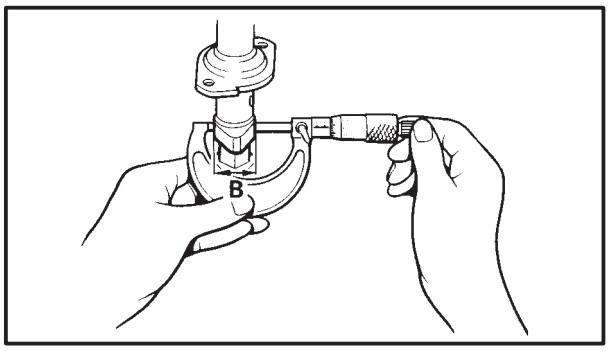
2. Install:
   • Valve ①
   • Valve spring seat ②
   • Oil seal ③
   • Valve springs ④
   • Valve spring seat ⑤
   • Valve retainers ⑥

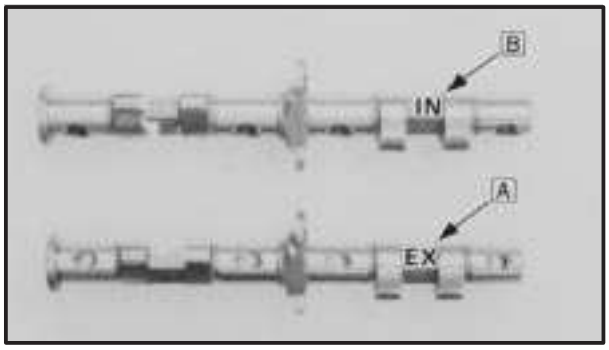


NOTE:
Install springs with wider-gapped coils facing upwards, as shown.

① Larger pitch
② Smaller pitch







CAMSHAFT, CAM CHAIN, AND CAM SPROCKET

Camshaft

1. Inspect:
   - Cam lobes
     Pitting/Scratches/Blue discoloration → Replace.
2. Measure:
   - Cam lobes
     Use the Micrometer.
     Out of specification → Replace.

	Cam Lobe "A" (Limit)	Cam Lobe "B" (Limit)
Intake	**35.65 mm (1.404 in)**	**26.95 mm (1.061 in)**
Exhaust	**35.65 mm (1.404 in)**	**26.95 mm (1.061 in)**

Camshaft/Cap Clearance Measurement

1. Install:
   - Camshaft
2. Attach:
   - Plastigage® (YU-33210)
     Onto camshaft.

A For Exhaust

B For Intake

3. Attach:
   - Camshaft cap ("1-3" or "E-3")
4. Install:
   - Camshaft caps (others)
5. Tighten:
   - Camshaft cap bolts

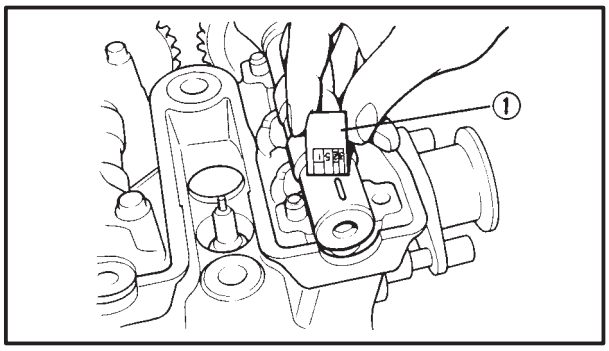
CAUTION:

First Tighten the Nos.2, 4, and 1 cap bolts in that order, then the No.3 cap bolts; otherwise, the No.3 caps may be damaged or bent.

Camshaft Cap:
10 Nm (1.0 m•kg, 7.2 ft•lb)

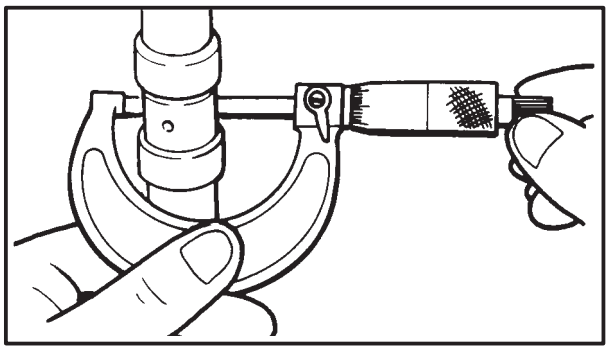
NOTE:

Do not turn the camshaft when measuring clearance with Plastigage®.



6. Remove:
   • Camshaft caps
7. Measure:
   • Width of Plastigage® ①
   Out of specification → Follow step 8.

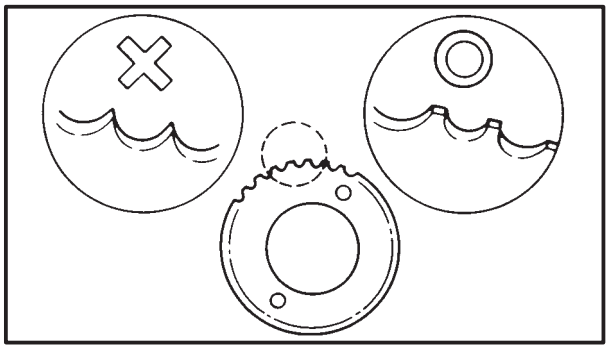
Camshaft-to-cap Clearance:
Standard: 0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)
Maximum: 0.160 mm (0.006 in)



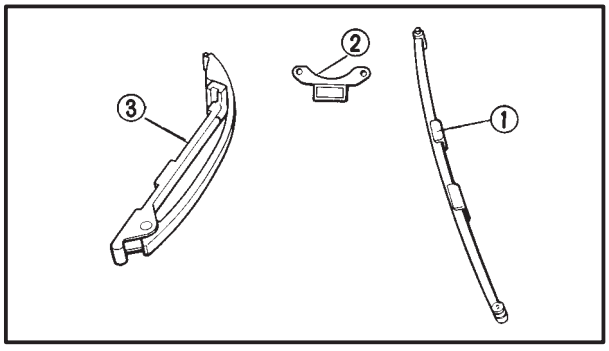
8. Measure:
   • Camshaft outside diameter
   Use a micrometer.
   Out of specification → Replace camshaft.
   Within specification → Replace cylinder head.

Camshaft Outside Diameter:
Standard: 24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in)
Cam Cap Inside Diameter:
Standard: 25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in)

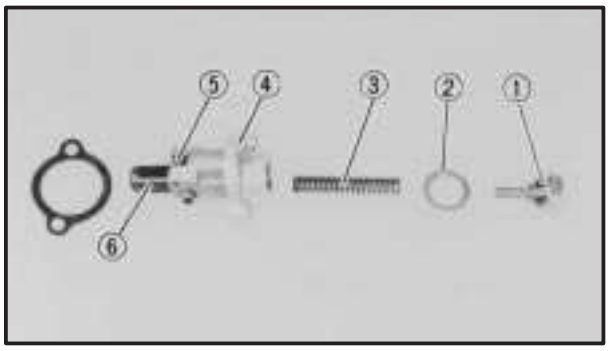
Cam Chains
1. Inspect:
   • Cam chains
   Chain stretch/Cracks → Replace.

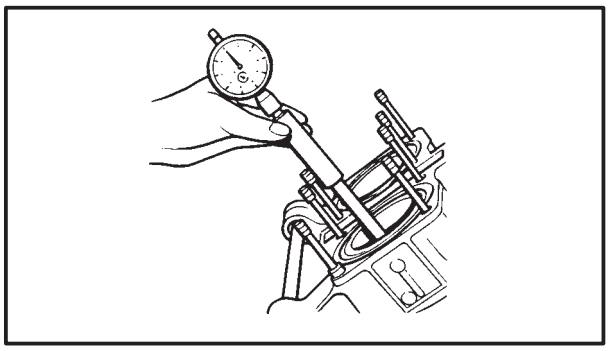


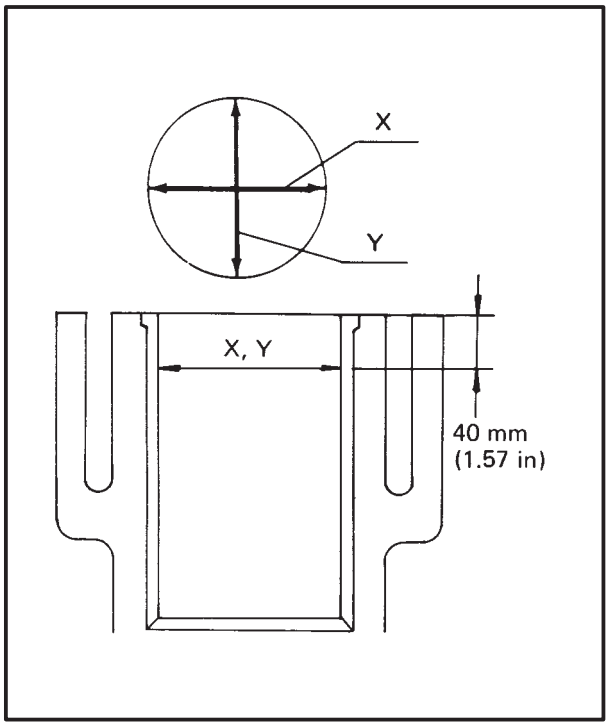
Cam Sprockets
1. Inspect:
   • Cam sprockets
   Wear/Damge → Replace.

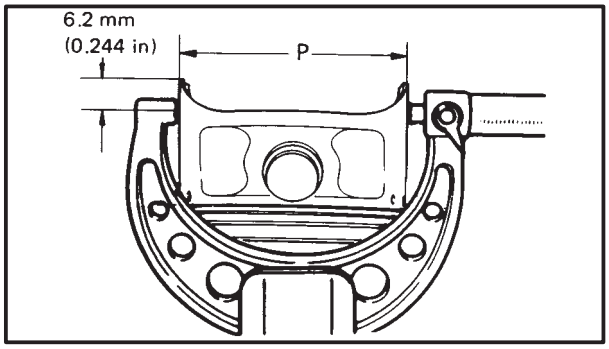


Chain Dampers
1. Inspect:
   • Upper damper ①
   • Front damper ②
   • Rear damper ③
   Wear → Replace.









Cam Chain Tensioner

1. Check:
   - One-way cam operation
     Unsmooth operation → Replace.
2. Inspect:
   - All parts
     Damage/Wear → Replace.

① End plug
② Washer
③ Spring
④ Tensioner body
⑤ One way cam
⑥ Tensioner rod

CYLINDER

1. Inspect:
   - Cylinder wall
     Wear/Scratches → Rebore or replace.
2. Measure:
   - Cylinder bore "C"
     Use the Cylinder Bore Gauge.
     Measure the cylinder bore "C" horizontally and laterally at 40 mm (1.57 in) from cylinder top.
     Then, find the coverage of the measurements.
     Out of specification → Rebore.

	Standard	Wear Limit
Cylinder Bore C:	75.967 ~ 76.016 mm (2.991 ~ 2.993 in)	76.1 mm (2.996 in)
$C = \frac{X + Y}{2}$		

PISTON, PISTON RING, AND PISTON PIN

Piston

1. Inspect:
   - Piston wall
     Wear/Scratches/Damage → Replace.
2. Measure:
   - Piston outside diameter "P"
     Use a Micrometer.
     Out of specification → Replace.

NOTE:

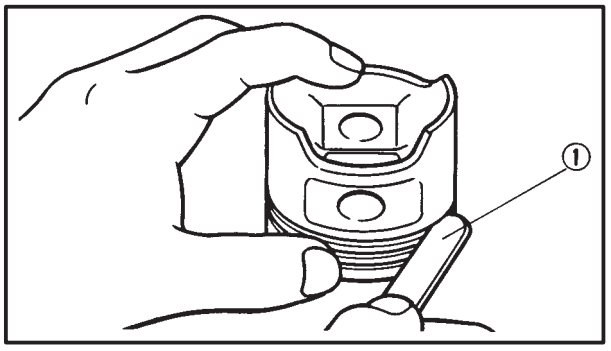
Measurement should be made at point 6.2 mm (0.244 in) above the bottom edge of the piston.

	Size "P"
Standard	75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in)
Oversize 1 Oversize 2	76.25 mm (3.002 in) 76.50 mm (3.012 in)

3. Measure:
   • Piston clearance
   Out of specification → Rebore cylinder or replace piston.

Piston Clearance = C – P:
0.055 ~ 0.075 mm
(0.0022 ~ 0.0030 in)

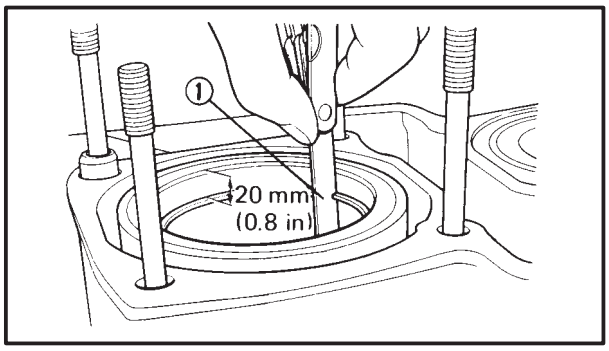
C: Cylinder bore P: Piston outside diameter



Piston Ring

1. Measure:
   • Side clearance
   Use the Feeler Gauge ①.
   Out of specification → Replace piston and/or rings.

	Side Clearance	
	Standard	Limit
Top Ring	0.03 ~ 0.07 mm (0.0012 ~0.0028 in)	0.12 mm (0.0047 in)
2nd Ring	0.02 ~ 0.06 mm (0.0008 ~0.0024 in)	0.12 mm (0.0047 in)



2. Position:
   • Piston ring
     Into cylinder.
     Push the ring with the piston crown.
3. Measure:
   • End gap
     Use the Feeler Gauge ①.
     Out of specification → Replace rings as set.

	End Gap	
	Standard	**Limit**
Top Ring	**0.35 ~ 0.50 mm (0.0138 ~0.0197 in)**	**0.75 mm (0.0295 in)**
2nd Ring	**0.35 ~ 0.50 mm (0.0138 ~0.0197 in)**	**0.75 mm (0.0295 in)**
Oil Ring	**0.2 ~ 0.8 mm (0.0080 ~0.032 in)**	**–**

Oversize Piston Rings

• The oversize top and middle ring sizes are stamped on top of the ring.

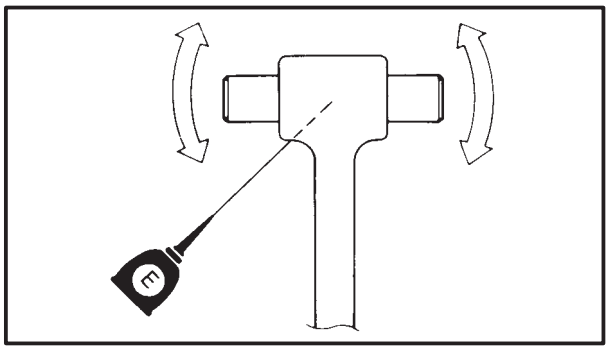
Oversize 1	**0.25 mm (0.0098 in)**
Oversize 2	**0.50 mm (0.0197 in)**

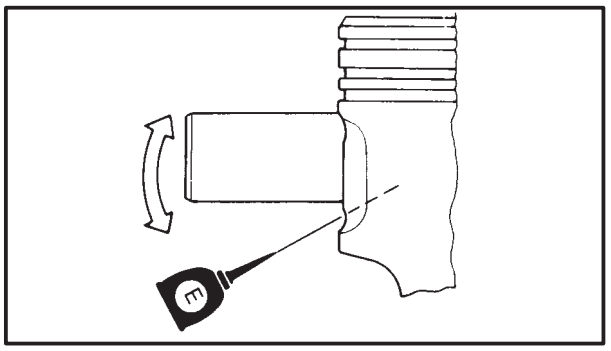
• The expander spacer of the bottom ring (oil control ring) is color-coded to identify sizes. The color mark is painted on the expander spacer.

Size	Color
Oversize 1	**Blue (Two)**
Oversize 2	**Red (One)**

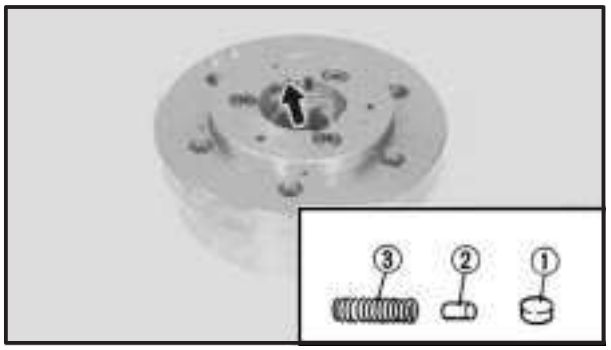
Piston Pin

1. Lubricate:
   • Piston pin (lightly)
2. Install:
   • Piston pin
     Into small end of connecting rod.

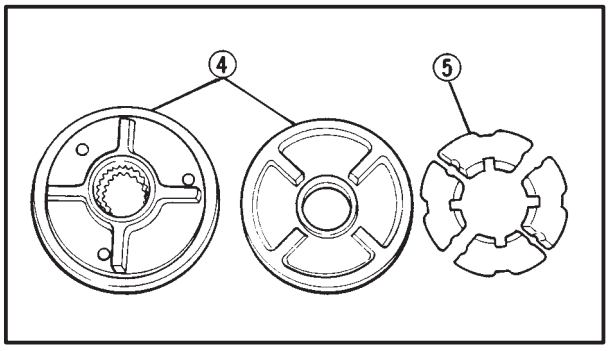




3. Check:
   • Free play
   Free play → Inspect connecting rod for wear.
   Wear → Inspect connecting rod and piston pin.
4. Position:
   • Piston pin
   Into piston.
5. Check:
   • Free play
   When pin is in place in piston.
   Free play → Replace piston pin and/or piston.

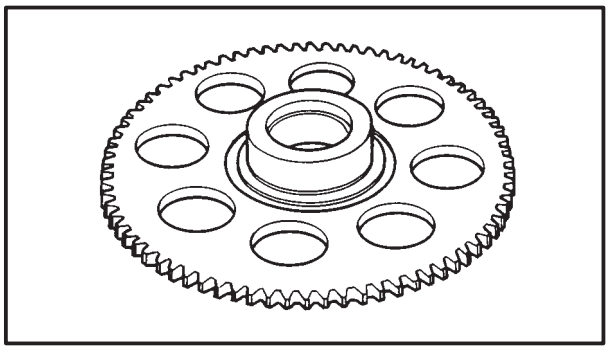


STARTER DRIVES
Electric Starter Clutch
1. Check:
   • Ball ① operation
   • Spring cap ② operation
   • Spring ③ operation
   Unsmooth operation → Replace one-way clutch.



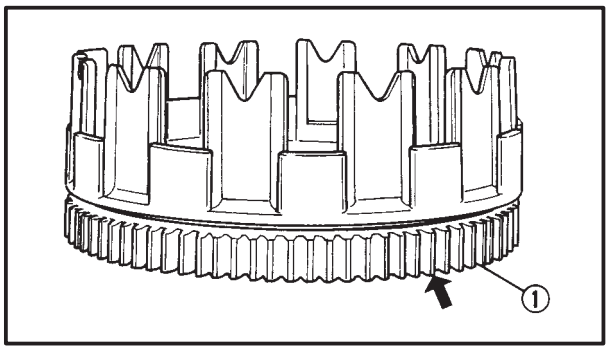
2. Check:
   • Damper housing ④
   • Rubber dampers ⑤
   Cracks/Wear/Damage → Replace.
3. Install:
   • Rubber damper
   • Damper housing
   • One-way clutch
4. Tighten:
   • Bolts (one-way clutch)

Bolts (Starter One-way Clutch):
24 Nm (2.4 m•kg, 17 ft•lb)
LOCTITE®
Stake Over the End of the Bolt



Starter Gears

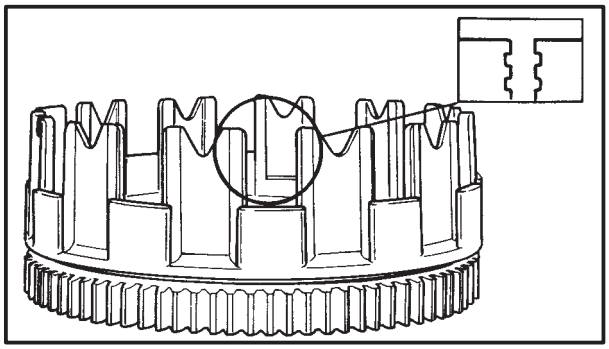
1. Inspect:
   - Idle gear surfaces
     Pitting/Wear/Damage → Replace.



PRIMARY GEARS

The drive gear is mounted on the crankshaft; the driven gear is mounted on the transmission and is intergrated with the clutch assembly.

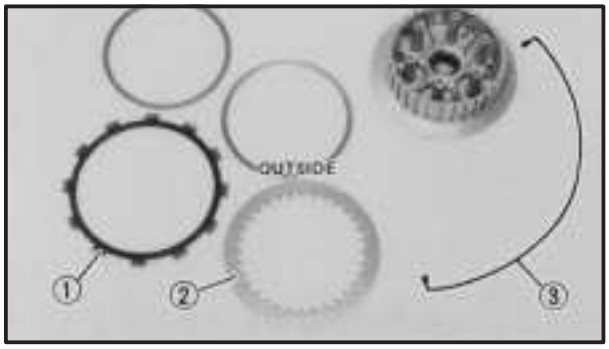
1. Inspect:
   - Drive gear
     Scratches/Wear/Damage → Replace crankshaft.
   - Driven gear ①
     Scratches/Wear/Damage → Replace clutch housing assembly.



CLUTCH

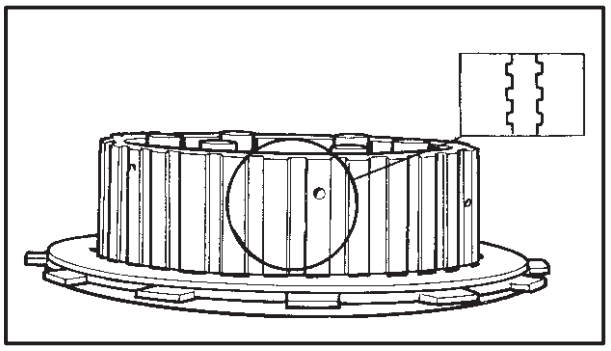
Clutch Housing

1. Inspect:
   - Dogs on the housing
     Cracks/Wear/Damage → Deburr or replace.
   - Clutch housing bearing
     Chafing/Wear/Damage → Replace.



Clutch Boss

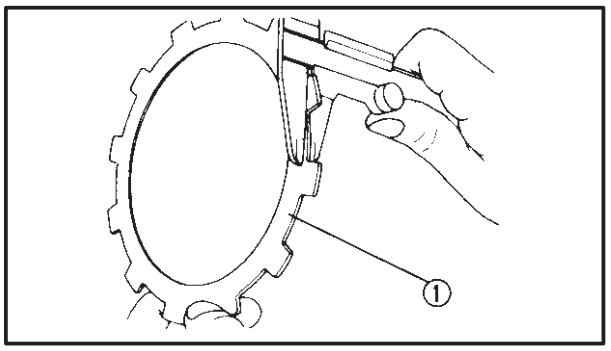
The clutch boss contains a built-in damper beneath the friction plate ① and clutch plate ②. It is not necessary to remove the wire circlip ③ and disassemble the built-in damper unless there is serious clutch chattering.



1. Inspect:
   • Clutch boss splines
   Scoring/Wear/Damage → Replace clutch boss assembly.

NOTE:

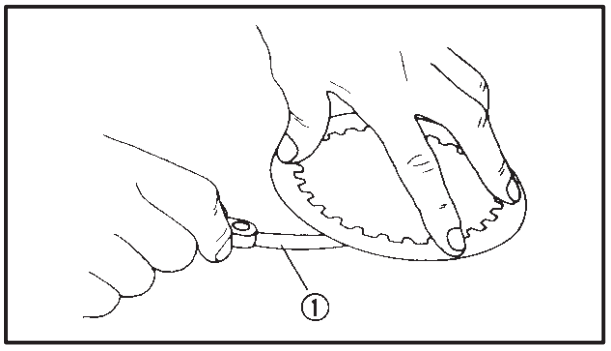
Scoring on the clutch plate splines will cause erratic operation.



Friction Plates

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

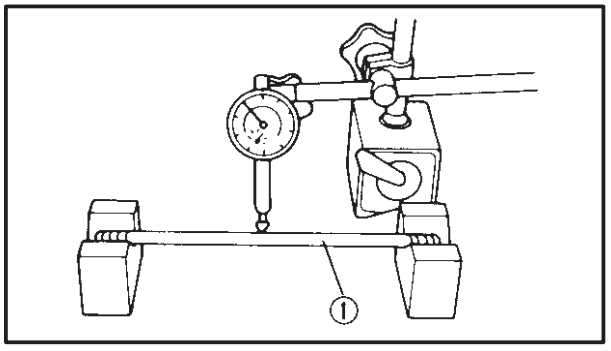
Wear Limit:
2.8 mm (0.11 in)



Clutch Plates

1. Measure:
   • Clutch plate warpage
   Use the surface plate and the Feeler Gauge ①.
   Out of specification → Replace.

Warp Limit:
0.2 mm (0.008 in)



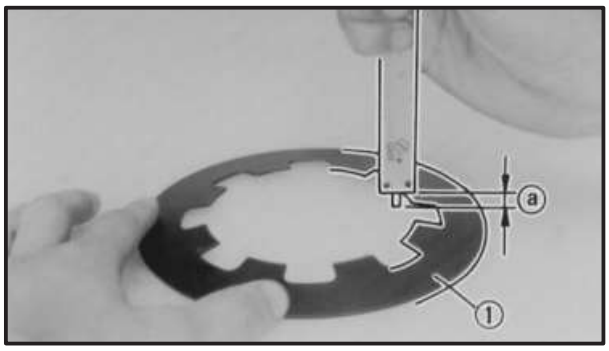
Push Rod

1. Measure:
   • Push rod runout ①
   Use V–Blocks and the Dial Gauge (90890-03097).
   Out of specification → Replace.

Bending Limit:
0.5 mm (0.02 in)

Clutch Bearing

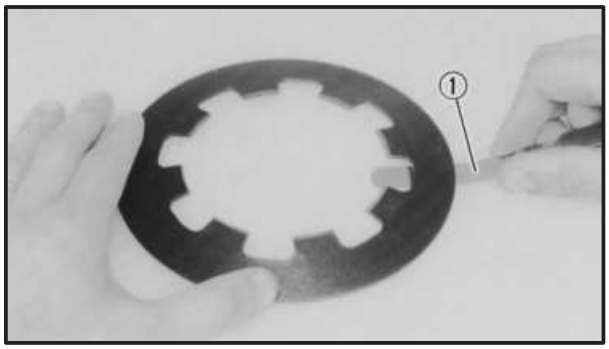
1. Inspect:
   • Bearing
   Pitting/Damage → Replace.



Clutch Spring

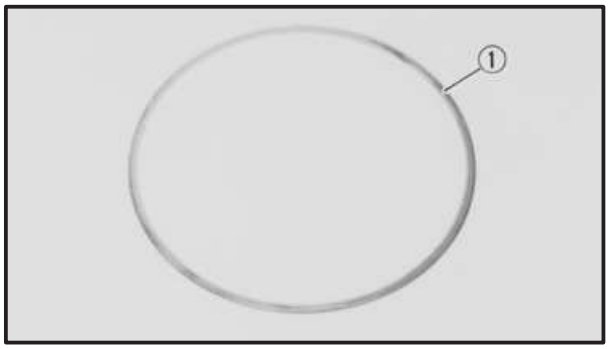
1. Inspect:
• Clutch spring ①
   Wear/Bends/Cracks → Replace.
2. Measure:
   • Clutch spring free height ⓐ
   Out of specification → Replace.

Clutch Spring Minimum Height:
6.5 mm (0.26 in)



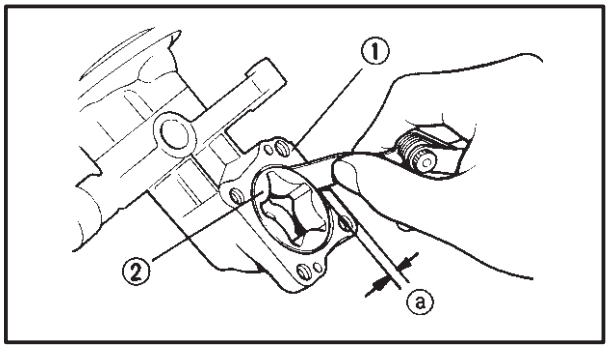
3. Measure:
   • Clutch spring warpage
   Use a surface plate and the Feeler Gauge ①
   Out of specification → Replace.

Warp Limit:
0.1 mm (0.004 in)



Clutch Spring Seat

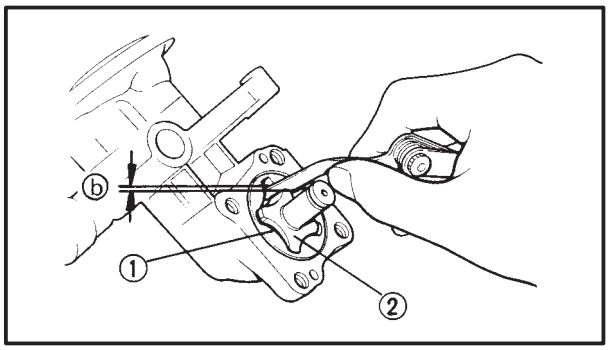
1. Inspect:
   • Clutch spring seat ①
   Wear/Bends/Damage → Replace.



OIL PUMP

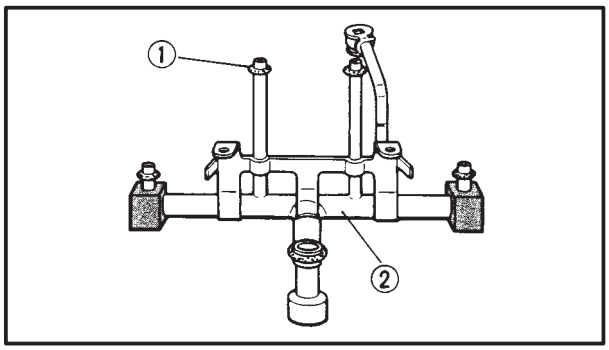
1. Measure:
   • Housing ①/Outer rotor② clearance ⓐ Use the Feeler Gauge.
   Out of specification → Replace oil pump assembly.

Side Clearance Limit:
0.08 mm (0.0031 in)

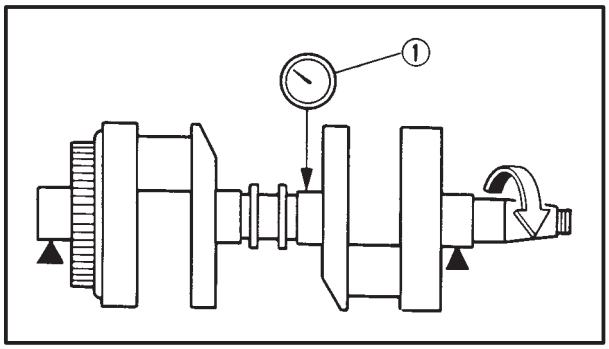


2. Measure:
   • Outer rotor ①/Inner rotor② clearance ⓑ
   Use the Feeler Gauge.
   Out of specification → Replace oil pump assembly.

Tip Clearance Limit:
0.17 mm (0.0067 in)



OIL GALLERY PIPE
1. Inspect:
   • O-rings ①
   Wear/Cracks/Damage → Replace.
   • Gallery pipe ②
   Cracks/Damage → Replace.



CRANKSHAFT
Crankshaft
1. Measure:
   • Runout
   Use the V–Blocks and Dial Gauge ① (90890-03097).
   Out of specification → Replace.

Runout Limit:
0.03 mm (0.0012 in)

2. Inspect:
   • Crankshaft bearing surfaces
   Wear/Scratches → Replace.

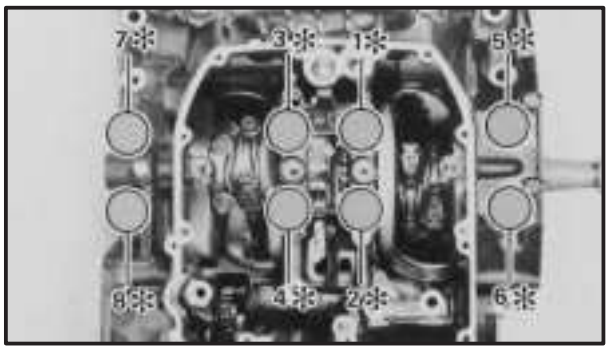
Crankshaft Main Bearing Clearance Measurement
1. Clean all parts.
2. Position:
   • Crankcase half (upper)
   Place on a bench in an upside down position.
3. Install:
   • Bearings
   Into the upper crankcase.
   • Crankshaft

4. Attach:
   • Plastigage® (YU-33210)
   Onto the crankshaft journal surface.

NOTE:

Do not turn the crankshaft until clearance measurement has been completed.

5. Install:
   • Bearings
   Into lower crankcase.
6. Tighten:
   • Bolts

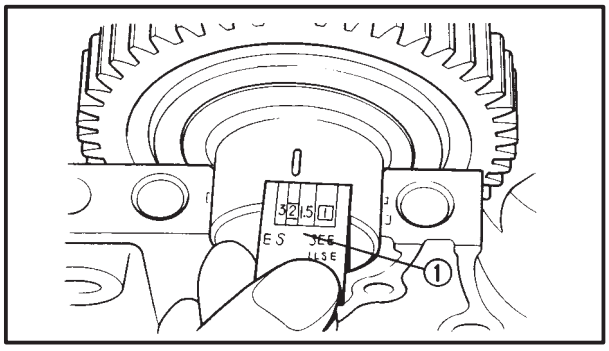


CAUTION:

Tighten to full torque in torque sequence as shown.

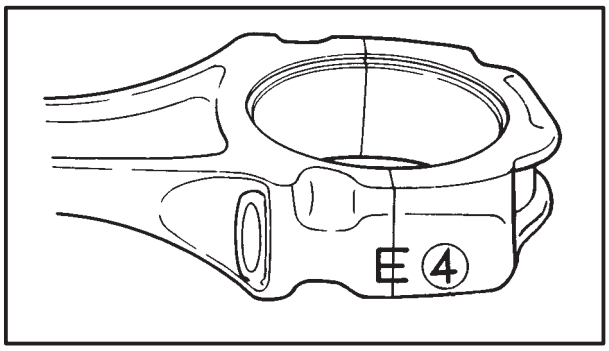
10 mm Bolts (Crankcase):
40 Nm (4.0 m•kg, 29 ft•lb)

* With a washer



7. Remove:
   • Bolts
   Reverse assembly order.
   • Crankcase (lower)
   Use care in removing.
8. Measure:
   • Width of Plastigage® ①
   Out of specification → Replace bearings; replace crankshaft if necessary.

Main Bearing Oil Clearance:
0.020 ~ 0.038 mm
(0.0008 ~ 0.0015 in)



Connecting Rod Bearing Clearance Measurement

1. Clean all parts.
2. Install:
   • Connecting rod bearings
   Into connecting rod and cap.
3. Attach:
   • Plastigage® (YU-33210)
   Onto the crank pin.
4. Install:
   • Connecting rod
   • Connecting rod cap

NOTE:

Be sure the letter on both components align to form perfect character.

5. Lubricate:
   • Bolt threads (connecting rod)

Molybdenum Disulfide Grease

6. Tighten:
   • Nuts (connecting rod cap)

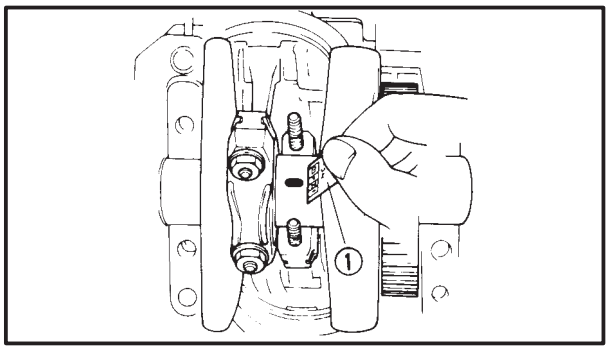
NOTE:

Do not turn connecting rod until clearance measurement has been completed.

CAUTION:

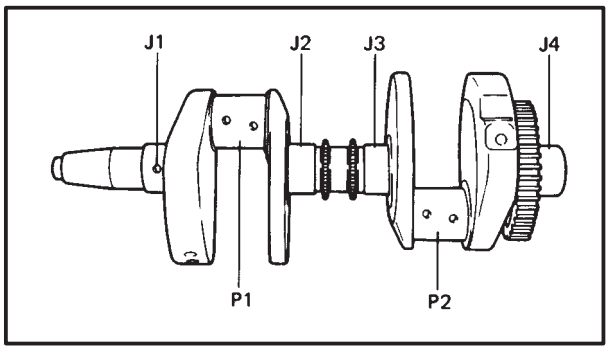
Tighten to full torque specification without pausing. Apply continuous torque between 3.0 and 3.8 m•kg. Once you reach 3.0 m•kg, DO NOT STOP TIGHTENING until final torque is reached. If tightening is interrupted between 3.0 and 3.8 m•kg, loosen nut to less than 3.0 m•kg and start again.

Connecting Rod Cap:
36 Nm (3.6 m•kg, 25 ft•lb)



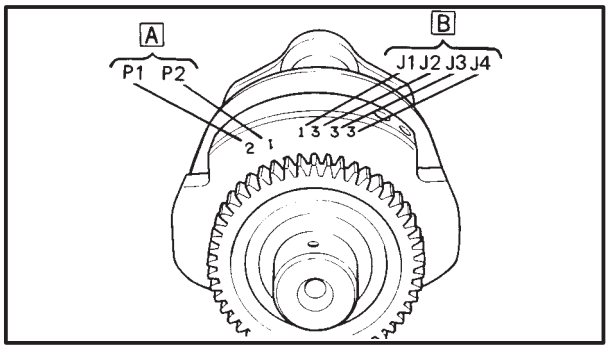
7. Remove:
   • Connecting rod cap
   Use care in removing.
8. Measure:
   • Width of Plastigage® ①
   Out of specification → Replace bearings and/or replace crankshaft if necessary.

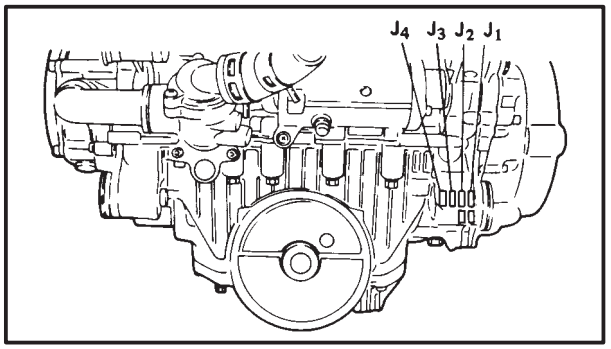
Connecting Rod Bearing Clearance:
0.021 ~ 0.039 mm
(0.0008 ~ 0.0015 in)



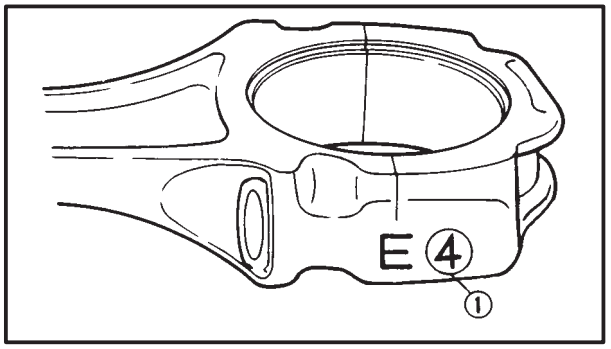
Crankshaft Main and Connecting Rod Bearing Selection

• Numbers used to indicate crankshaft journal sizes are stamped on the crankweb. The first two (2) Ⓐ are rod bearing journal numbers, starting with the left journal. The four (4) Ⓑ main bearing journal numbers follow in the same sequence.





• The lower crankcase half is numbered J1, J2, J3, and J4 on the front left boss as shown.



• The numbers ① are stamped in ink on the rod.

Example 1: Selection of the crankshaft main bearings;
- If the crankcase J1 and crankshaft J1 sizes are No.4 and No.1, respectively, the bearing size No. is:

Bearing Size No. =
Crankcase No. – Crankshaft No. =
4 – 1 = 3 (Brown)

BEARING COLOR CODE	
No.1	Blue
No.2	Black
No.3	Brown
No.4	Green
No.5	Yellow
No.6	Pink

Example 2: Selection of the connecting rod bearing;
- If the connecting rod P1 and crankshaft P1 sizes are No.5 and No.1, respectively, the bearing size No. is:

Bearing Size No. =
Connecting Rod No. – Crankshaft No. =
5 – 1 = 4 (Green)

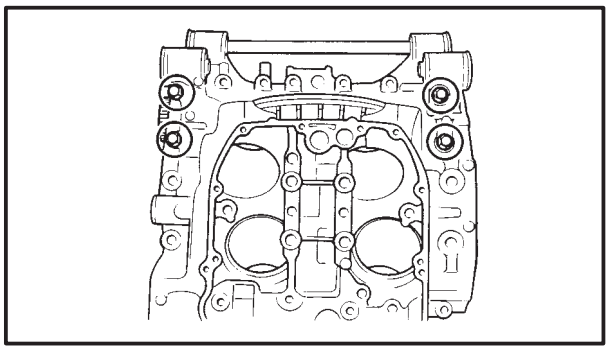
BEARING COLOR CODE	
No.1	Blue
No.2	Black
No.3	Brown
No.4	Green
No.5	Yellow
No.6	Pink
No.7	Red

BALANCER SHAFT

Balancer Shaft Bearing Clearance Measurement

1. Clean surfaces of balancer shaft and crakcase journal.
2. Position:
   - Crankcase half (upper)
     Place on a bench in an upside down position.

3. Install:
   • Bearings
   Into the upper crankcase.
4. Install:
   • Balancer shaft
   Into the upper crankcase.
5. Attach:
   • Plasticage® (YU-33210)
   Onto the balancer shaft journal surface.



NOTE:

Do not move balancer shaft until clearance measurement has been completed.

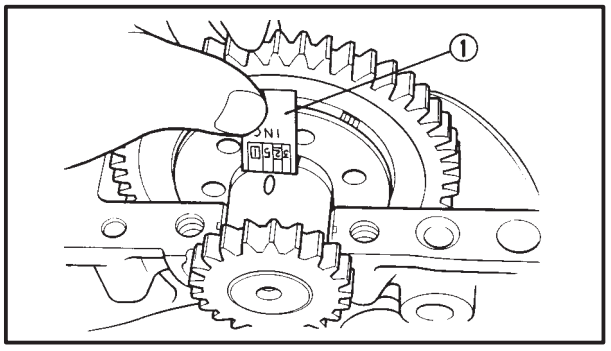
6. Install:
   • Bearings
   Into lower crankcase.
7. Tighten:
   • Bolts (crankcase)

CAUTION:

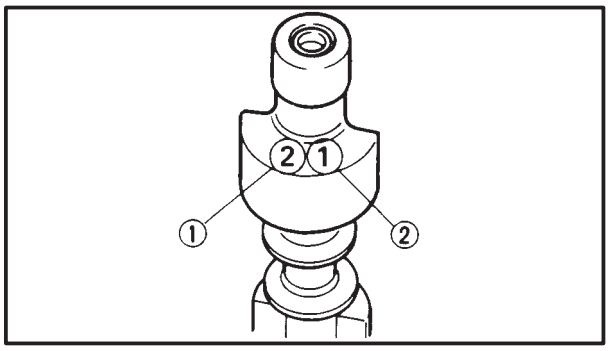
Tighten to full torque in torque sequence cast on the crankcase.

8 mm Bolt (Crankcase):
24 Nm (2.4 m•kg, 17 ft•lb)

8. Remove:
   • Bolts
   Reverse assembly order.
   • Crankcase (lower)
   Use care in removing.
9. Measure:
   • Plastigage® width ①
   Out of specification → Replace bearings; replace balancer shaft in necessary.



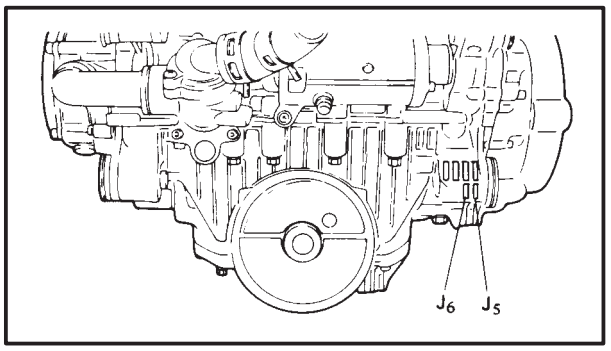
Balancer Shaft Bearing Oil Clearance:
0.020 ~ 0.048 mm
(0.0008 ~ 0.002 in)



Balancer Shaft Bearing Selection

- Numbers used to indicate balancer shaft journal sizes are stamped on the RH balancer web corner, starting with the left journal.

① Left balancer shaft journal size number
② Right balancer shaft journal size number



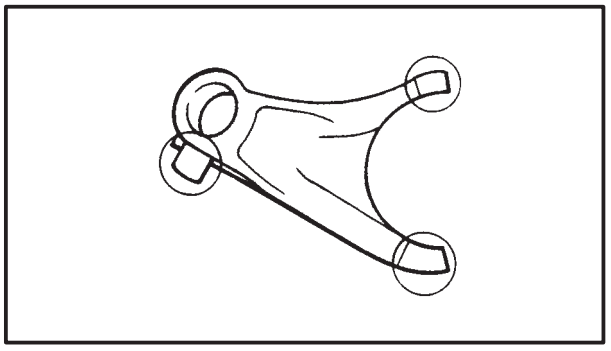
- The lower crankcase half is numbered J5, and J6 as shown.

Example: Selection of the balancer shaft bearings;

- If the crankcase J5 and left balancer shaft sizes are No.4 and No.1, respectively, the left balancer bearing size No. is:

Bearing Size No. =
Crankcase No. – Balancer Shaft No. =
4 – 1 = 3 (Brown)

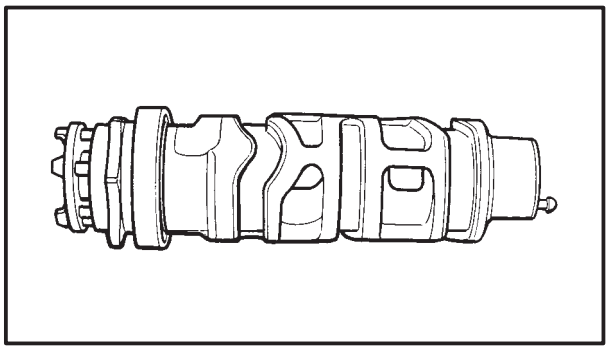
BEARING COLOR CODE	
No.1	Blue
No.2	Black
No.3	Brown
No.4	Green
No.5	Yellow
No.6	Pink



TRANSMISSION

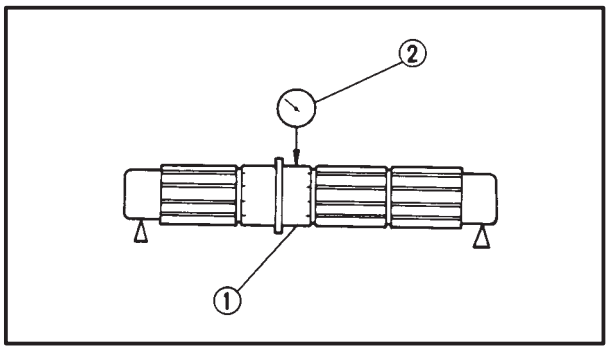
Shift Fork

1. Inspect:
   - Shift forks
     On the gear and shift cam contact surfaces.
     Wear/Chafing/Bends/Damage → Replace.
2. Check:
   - Shift fork movement
     On its guide bar.
     Unsmooth operation → Replace fork and/or guide bar.



Shift Cam

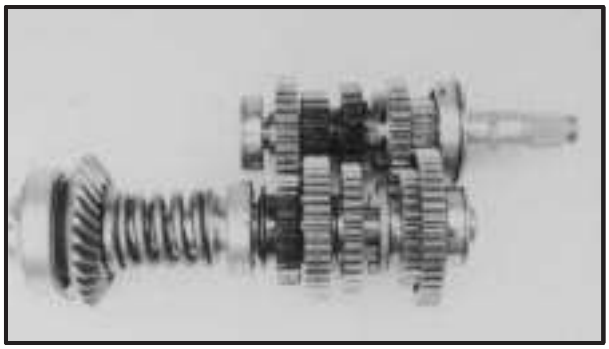
1. Inspect:
   - Shift cam grooves
     Wear/Damage/Scratches → Replace.
   - Shift cam segment
     Damage/Wear → Replace.
   - Shift cam bearing
     Pitting/Damage → Replace.



Main and Drive Axles

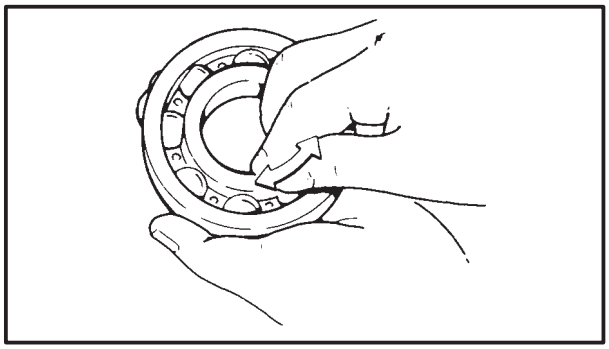
1. Measure:
   - Axle runout ①
     Use the centering device and Dial Gauge (90890-03097) ②.
     Out of specification → Replace.

Runout Limit: 0.08 mm (0.0031 in)



Gears

1. Inspect:
   - Gears
     Damage/Wear → Replace.
2. Check:
   - Gear movement
     Unsmooth operation → Replace.
3. Inspect:
   - Mating dogs
     Cracks/Wear/Damage → Replace.



BEARINGS

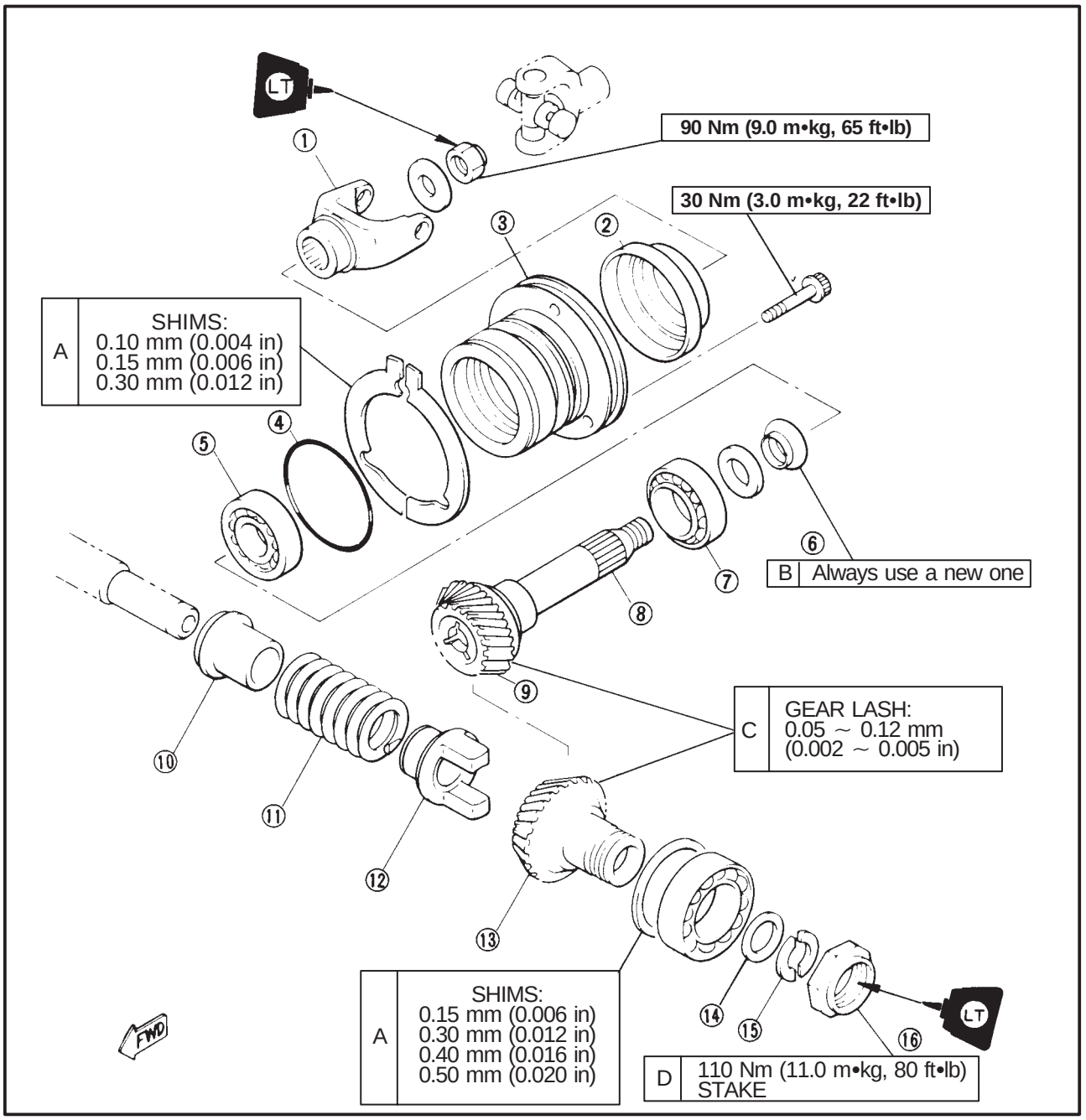
1. Inspect:
   - Axle bearings
   - Shift cam bearing
     Pitting/Damage → Replace.

CIRCLIPS AND WASHERS

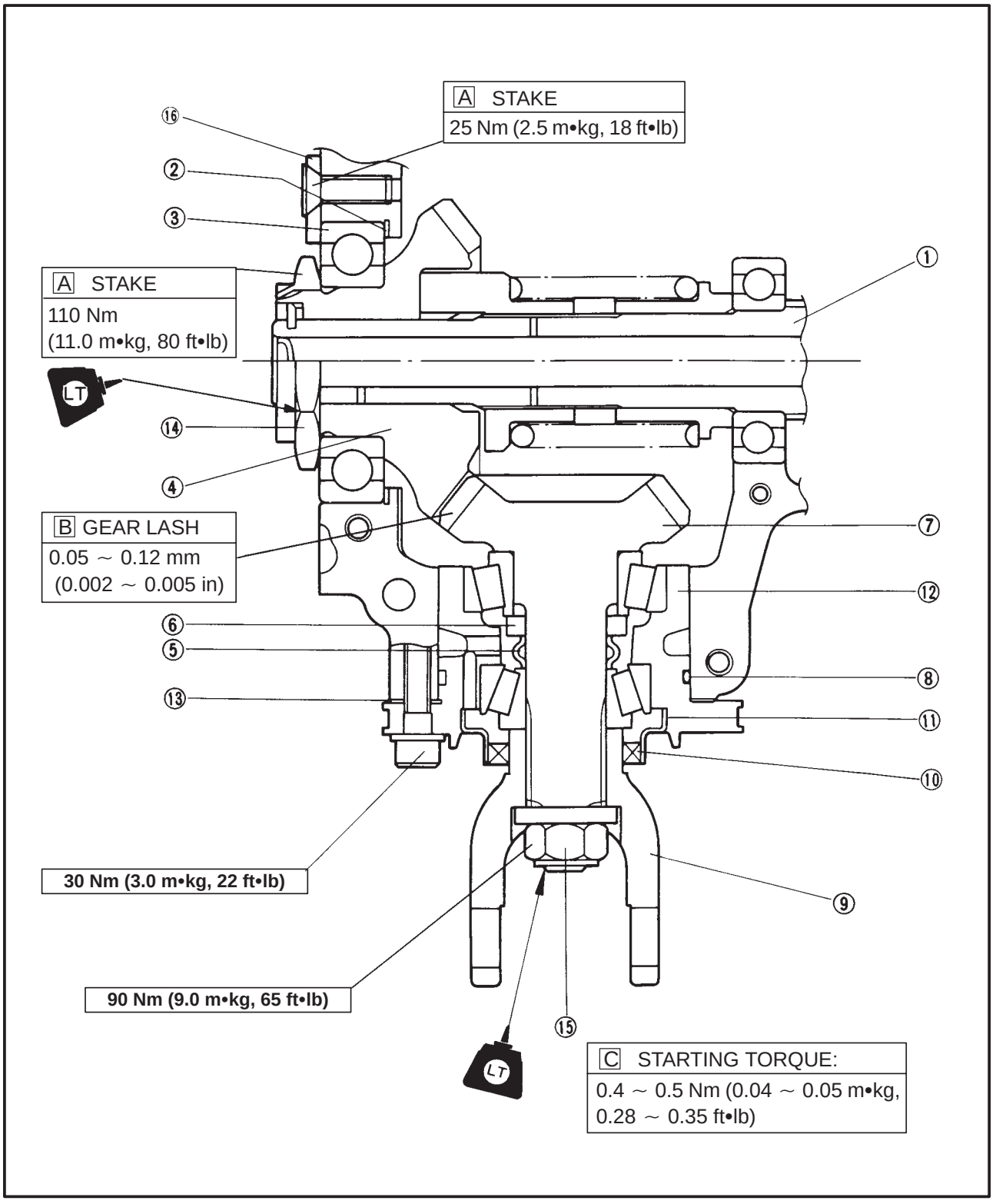
1. Inspect:
   - Circlips
   - Washers
     Damage/Looseness/Bends → Replace.

MIDDLE GEAR SERVICE

① Universal joint
② Dust seal
③ Housing
④ O-ring
⑤ Bearing
⑥ Collapsible collar
⑦ Bearing
⑧ Middle drive shaft
⑨ Middle driven pinion gear
⑩ Spring seat
⑪ Damper spring
⑫ Damper cam
⑬ Middle drive pinion gear
⑭ Thrust washer
⑮ Retainer



① Drive axle
② Drive pinion gear shim
③ Bearing
④ Middle drive pinion gear
⑤ Collapsible collar
(Always use a new one)
⑥ Spacer
⑦ Middle driven pinion gear
⑧ O-ring
⑨ Universal joint
⑩ Oil seal
⑪ Bearing retainer
⑫ Bearing housing
⑬ Driven pinion gear shim
⑭ Nut (drive pinion gear)
⑮ Nut (driven pinion gear)
⑯ Bearing stopper



DRIVE AXLE POSITIONING

When the crankcase assembly and/or the drive axle are replaced, you must position the drive axle in place.

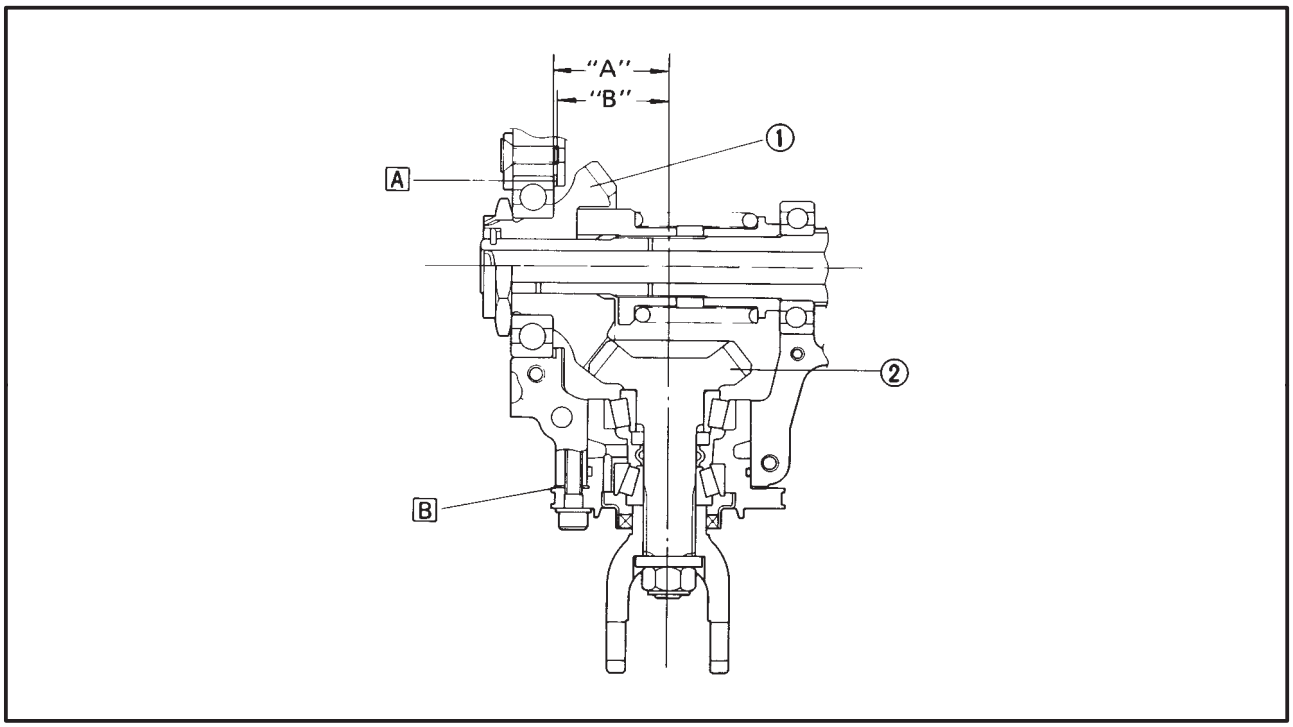
Refer to "Drive Pinion Gear Shim Selection and Middle Gear Lash Adjustment" section.

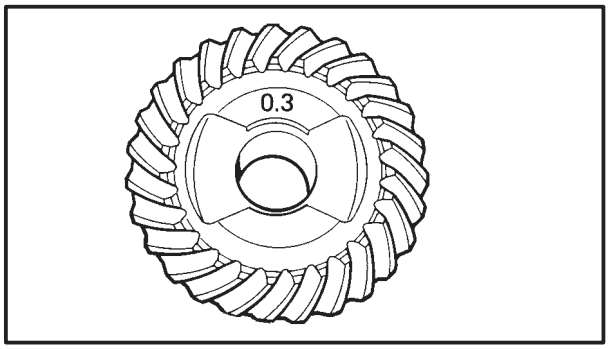
① Drive pinion gear

② Driven pinion gear

[A] Drive pinion gear shim

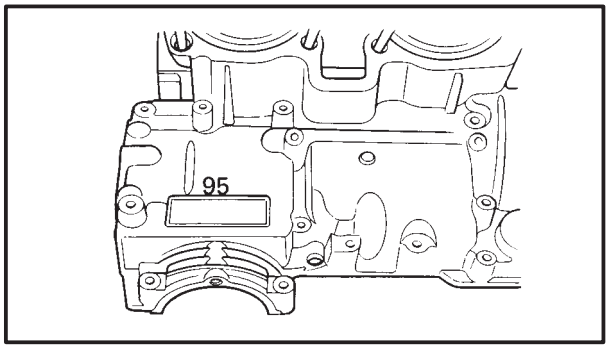
[B] Driven pinion gear shim





Drive Pinion Gear Shim Selection

- "A" = 54.5 plus or minus the number stamped on the drive pinon gear.



- "B" = 53 plus the number stamped on the left-side rear of the upper crankcase.

Example: Selection of the drive pinion gear shim;

Shim Thickness =
Distance "A" – Distance "B"

- If the drive pinion gear is stamped "03" (plus (+03) is implied here since only the minus (–) designations are stamped alongside the numbers), then:
  "A" = 54.5 + 0.03
  = 54.53

NOTE:

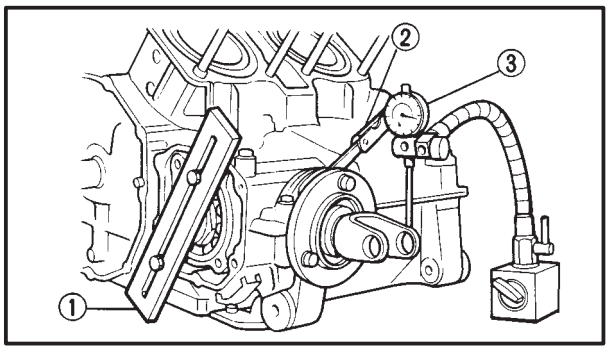
All stamped numbers are in hundredths of a mm.

- If the left-side-rear of the upper crankcase is stamped "95", then:
  "B" = 53 + 0.95
  = 53.95
  Therefore:
  T = A – B
  = 54.53 – 53.95
  = 0.58 mm
- The calculated shim thickness is 0.58 mm. Because shim can only be selected in 0.05 mm increments, use the following chart to round off the hundredths digit of the calculated thickness and selest the appropriate shim.

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

- Using the above example, the calculated shim thickness of 0.58 mm is rounded off to 0.60 mm. Therefore, you may choose either 4 – 0.15 mm shims, 2 – 0.30 mm shims, or 1 – 0.30 mm and 2 – 0.15 mm shims as selected from the shim thickness chart below. Shim size are supplied in the following thicknesses:

	Drive Pinion Gear Shim
Thickness (mm)	0.15 0.30 0.40 0.50



Middle Gear Lash Adjustment

1. Attach:
   - Middle Drive Gear Holder ① (90890-04080)
     This tool will prevent the drive axle from turning.
2. Install:
   - Bolts (three)
     On driven bearing housing.
     Finger-tighten the bolts.

NOTE:

Clearance between the crankcase and driven bearing housing should be about 2 mm.
Measure gap with Feeler Gauge ②.

3. Position:
   - Dial Gauge ③ (90890-03097)
     On the outside edge of U-joint.

NOTE:

Be sure the gauge is positioned over the centerline of the yoke bearing hole.

4. Rotate:
   - U-joint
     Move it gently back and forth.
5. Measure:
   - Gear lash
     Over specification → Follow next steps.
     Under or same specification → Incorrect; check for faulty parts and/or reassemble bearing housing.

Middle Gear Lash:
0.05 ~ 0.12 mm
(0.002 ~ 0.005 in)

CAUTION:

Do not hammer the U-joint or the collapsible collar of the driven pinion gear may be distorted.
This will result in a change in the standard starting torque, requiring replacement of the collapsible collar and reassembly of the driven gear assembly.

NOTE:

Check the gear lash at four positions. Rotate the U-joint 90 degrees each time and repeat the gear lash check.

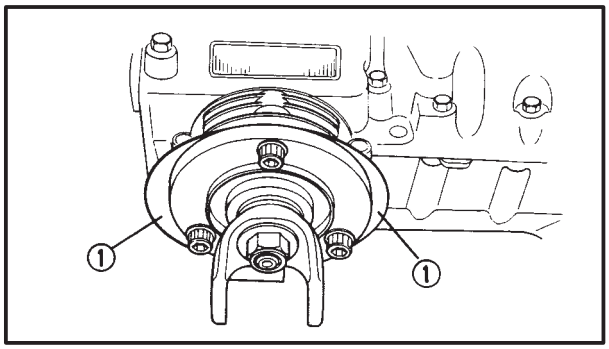
6. Tighten:
   • Bolt (Three)
   Tighten carefully one-thread turn only. Push in bearing housing and hold in position while tightening bearing housing bolts.

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 3 bolts so that crankcase/bearing housing clearance is about 2 mm (0.08 in) and repeat all previous steps.

7. Repeat steps 4 and 5 until correct gear lash is achieved.

Middle Gear Lash:
0.05 ~ 0.12 mm
(0.002 ~ 0.005 in)



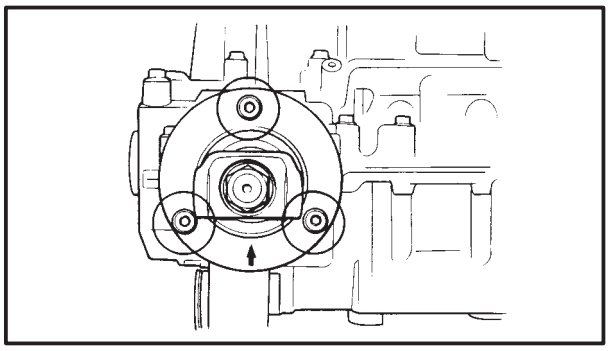
8. Measure:
   • Crankcase/bearing housing clearance
   Use a Feeler Gauge.
9. Select:
   • Shim(s) ①

Example: Selection of the driven pinion gear shim;
- If the clearance is 0.46 mm.
- The shim can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

Hundredths	Round Value
0, 1, 2	0
3, 4, 5, 6	5
7, 8, 9	10

- In the example above, the measured shim thickness is 0.46 mm. The chart instructs you, however, to round off the 6 to 5. Thus you should use 0.15 mm and 0.30 mm shims.
- Shim sizes are supplied in the following thickness.

	Driven Pinion Gear Shim
Thickness (mm)	0.10 0.15 0.30 0.40 0.50 0.60



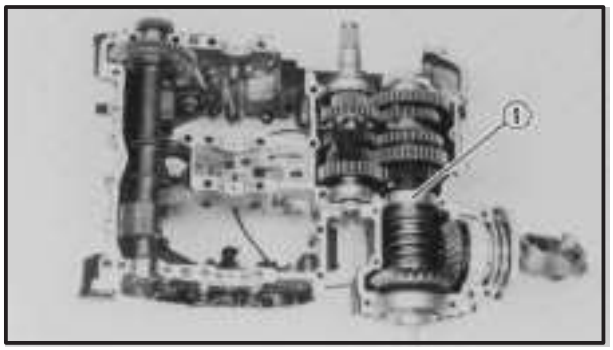
10. Tighten:
    • Bolts (bearing housing)

	Bolts (Bearing Housing): 30 Nm (3.0 m•kg, 22 ft•lb)

NOTE:

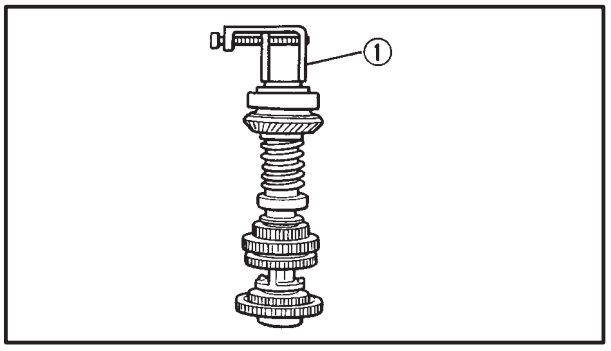
Before tightening the bolts, make sure that the arrow on the bearing housing points to the upper crankcase.

11. Measure:
    • Gear lash

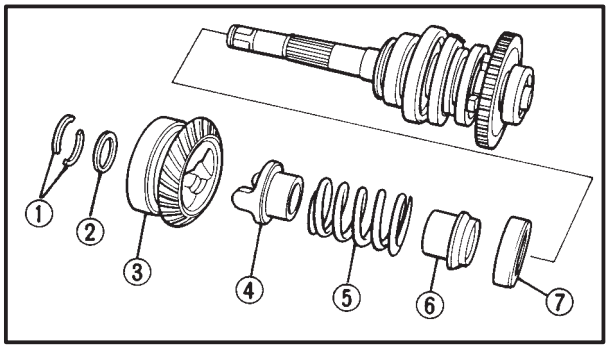


REMOVAL

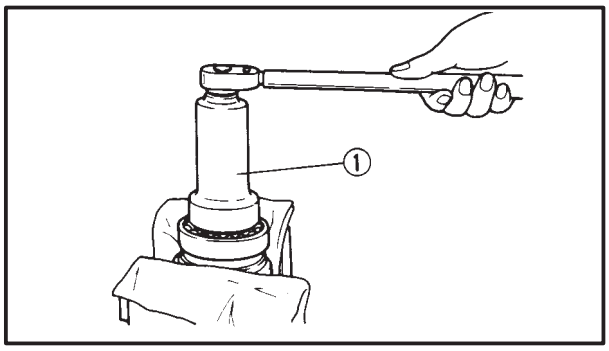
1. Remove:
    • Drive axle assembly ①



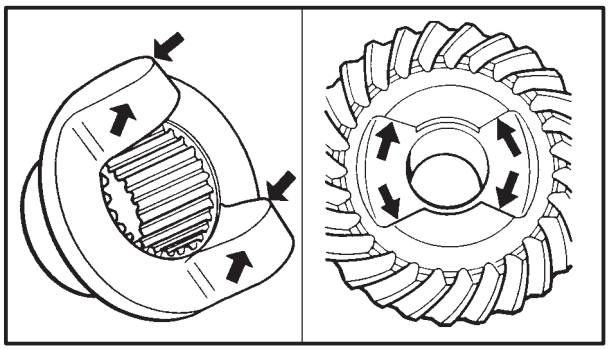
2. Attach:
    • Damper Spring Compressor (90890-04090) ①
    Onto drive pinion.
3. Position:
    • Drive axle shaft assembly
    Onto a Hydraulic Press.
4. Compress the damper spring on the drive axle shaft assembly.



5. Remove:
    • Retainers ①
    • Washer ②
    • Drive pinon gear ③
    • Damper cam ④
    • Damper spring ⑤
    • Spring seat ⑥
    • Bearing ⑦

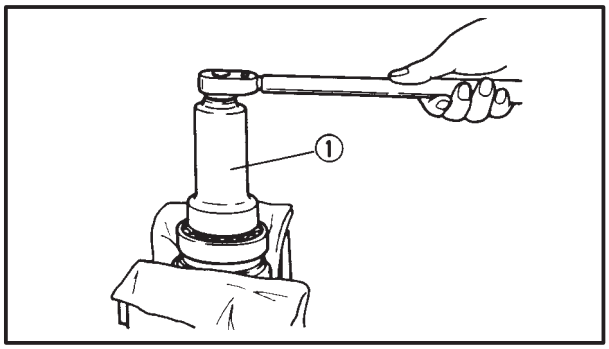


6. Remove:
   • Nut (drive gear)
     Use the Offset Wrench ① (90890-04054).
   • Bearing
   • Shim(s)



INSPECTION

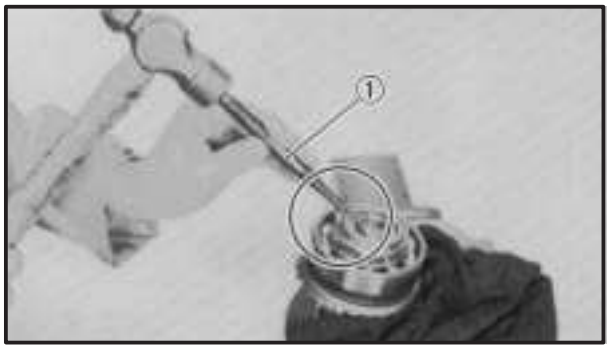
1. Inspect:
   • Damper cam surfaces
     Wear/Scratches → Replace damper and drive pinion gear as a set.
2. Inspect:
   • Damper spring
     Damage/Cracks → Replace.



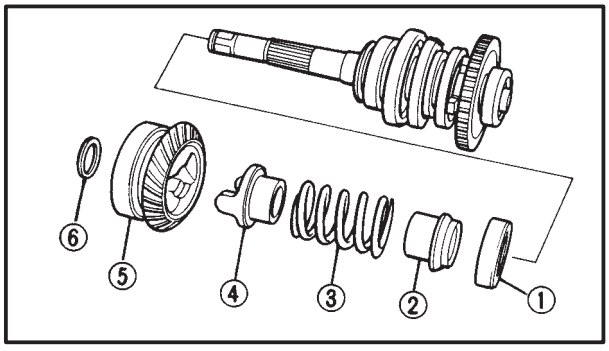
ASSEMBLY

1. Install:
   • Shim(s)
   • Bearing
   • Nut (drive gear)
     Use the Offset Wrench ① (90890-04054).

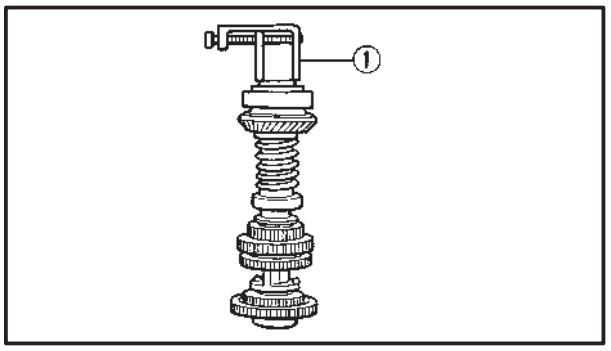
Nut (Drive Gear):
110 Nm (11 m•kg, 80 ft•lb)
LOCTITE®



2. Lock the threads with center punch ① as shown.



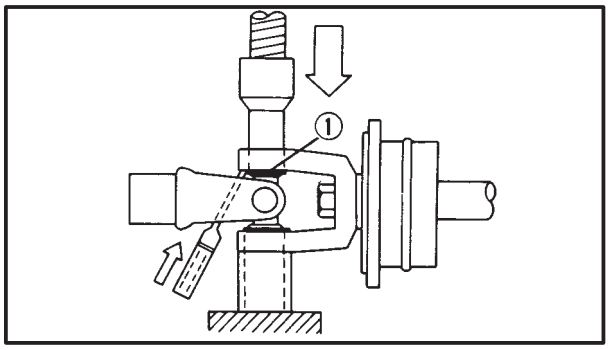
3. Install:
   • Bearing ①
   • Spring seat ②
   • Damper Spring ③
   • Damper cam ④
   • Drive gear assembly ⑤
   • Washer ⑥



4. Attach:
   • Damper Spring Compressor (90890-04090) ①
5. Position:
   • Drive axle shaft assembly
     Onto a Hydraulic Press.
6. Compress the damper spring on the drive axle assembly.
7. Install:
   • Retainers
     Into drive axle shaft groove.
   • Drive axle shaft assembly
     Onto the crankcase.

MIDDLE DRIVEN GEAR BEARINGS

The following procedures should be performed only if the middle driven gear or middle drive shaft bearing(s) must be replaced.



Universal Joint Removal

1. Remove:
   • Universal joint

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.

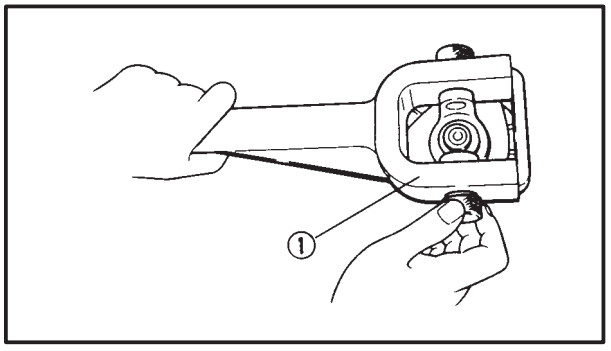
NOTE:

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.

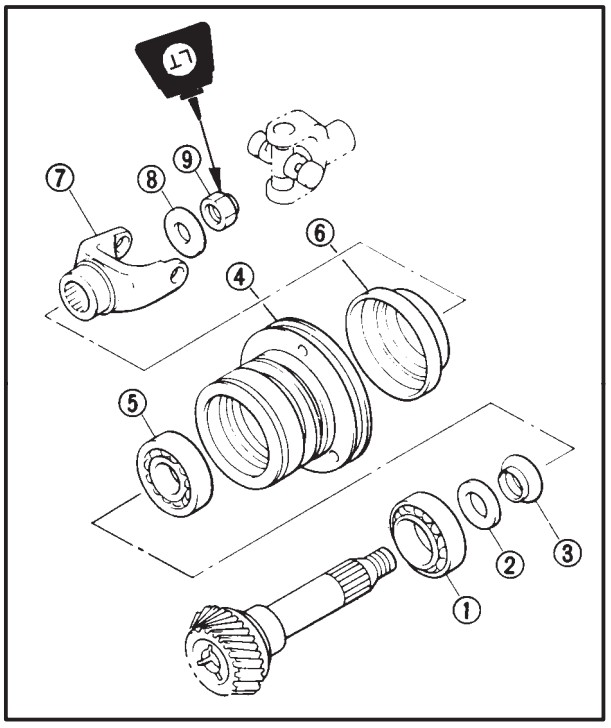


2. Attach:
   • Universal Joint Holder ① (90890-04062)
     Onto the universal joint yoke.

3. Remove:
   • Nut (driven pinion gear)
   • Washer
   • Yoke
   • Bearing
   • Bearing housing
   • Collapsible collar
   • Spacer

Inspection

1. Inspect:
   • Gear teeth
   Pitting/Galling/Wear → Replace middle gear as a set.
   • Bearings
   Pitting/Damage → Replace.
2. Check:
   • U-joint movement
   Roughness → Replace U-joint.



Assembly

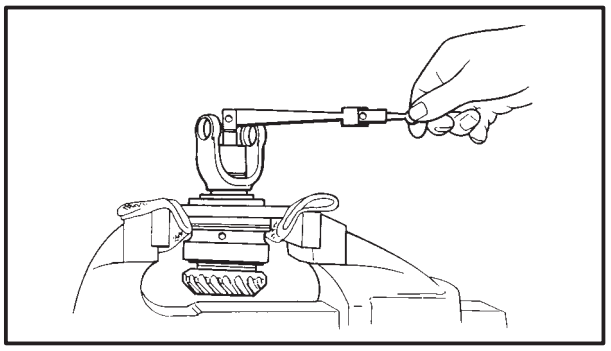
1. Install:
   • Bearing outer race
   Into the bearing housing.

CAUTION:

Do not press the bearing outer race. Always press the inner race with care when installing.

2. Install:
   • Inner bearing ①
   • Spacer ②
   • Collapsible collar ③ (new)
   • Bearing housing ④
   • Outer bearing ⑤
   • Dust seal ⑥
   • Yoke ⑦
   • Washer ⑧
   • Nut (driven pinion gear) ⑨
3. Attach:
   • Universal Joint Holder (90890-04062)
   Onto the universal joint yoke.
4. Tighten:
   • Nut (driven pinion gear)
   Torque nut carefully, little by little.

Nut (Driven Pinion Gear):
90 Nm (9.0 m•kg, 65 ft•lb)
LOCTITE®

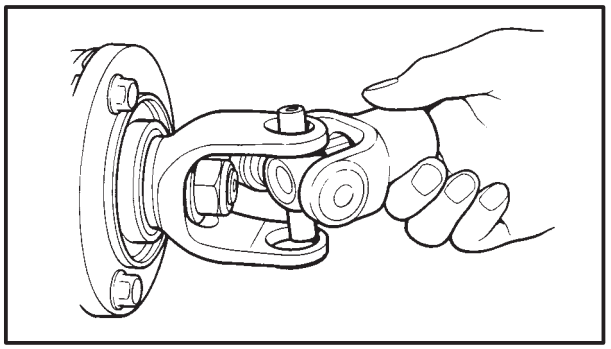


5. Measure:
   • Starting torque (driven pinion gear)
   Under specification → Repeat steps from 4.

Starting Torque (Driven Pinion Gear):
0.4 ~ 0.5 Nm (0.04 ~ 0.05 m•kg, 0.29 ~ 0.36 ft•lb)

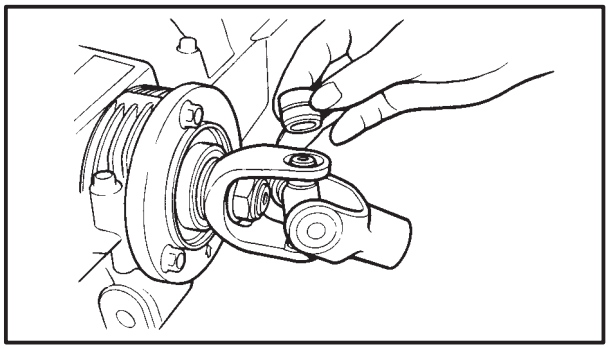
CAUTION:

- **Never exceed the standard starting torque.**
- **Be sure to tighten the driven pinion gear nut slowly, carefully checking measurements each time. Exceeding the standard starting torque may depress the collapsible collar, requiring reassembly.**
- **To reassemble, you must replace the collapsible collar and repeat the steps in 4 and 5 to obtain the standard starting torque.**



6. Position:
   • Yoke
   Into the U-joint.
7. Lubricate:
   • Bearings

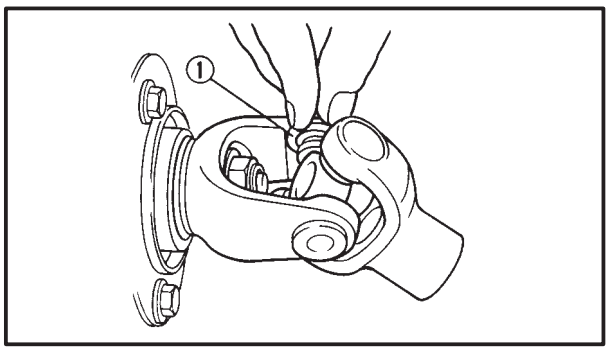
Wheel Bearing Grease



8. 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 palce.

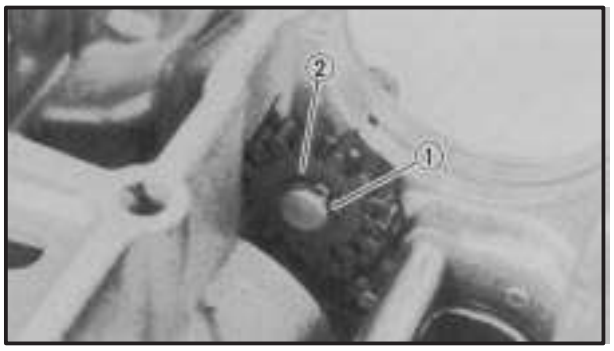


9. Press each bearing into U-joint using a suitable socket.

NOTE:

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

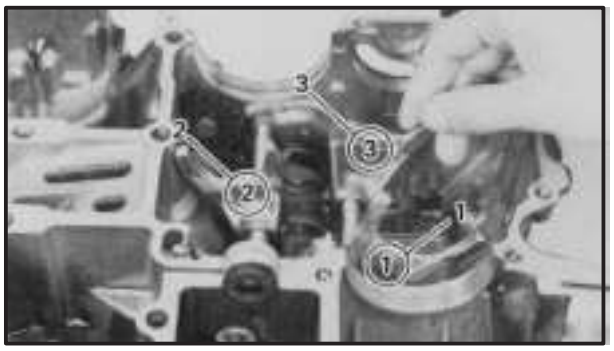
10. Install:
    • Circlips ①
    Into groove of each bearing.



ENGINE ASSEMBLY AND ADJUSTMENT

LOWER CRANKCASE

1. Install:
   - Oil pump idle gear ②
   - Circlip ①



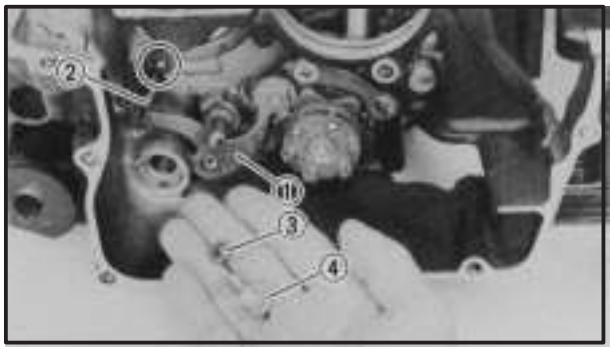
2. Install:
   - Shift cam
   - Shift forks (No.1, 2, 3)
   - Guide bars

NOTE:

All numbers should face the left side and be in sequence (1, 2, 3), begining from the left.

3. Install:
   - Bearing retainer (shift cam)
4. Tighten:
   - Screws (bearing retainer)

Screws (Bearing Retainer):
7 Nm (0.7 m•kg, 5.1 ft•lb)
LOCTITE®



5. Rotate the shift cam to neutral position.
6. Install:
   - Shift cam stopper lever ①
   - tension spring ②
   - Washer ③
   - Bolt (shift cam stopper lever) ④
7. Tighten:
   - Bolt (shift cam stopper lever)

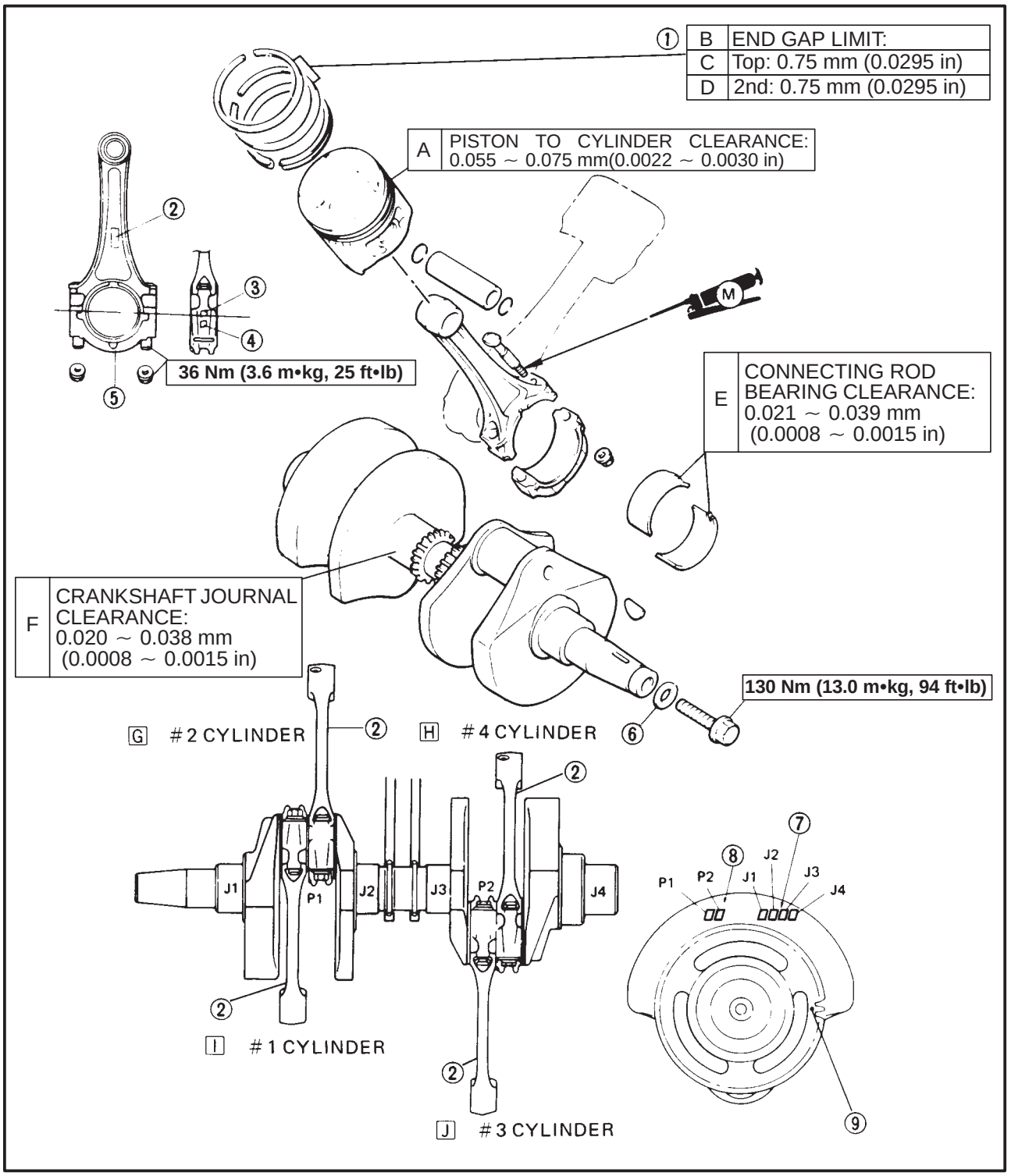
Bolt (Shift Cam Stopper Lever):
8 Nm (0.8 m•kg, 5.8 ft•lb)
LOCTITE®

NOTE:

Check for smooth operation after tightening the stopper lever.

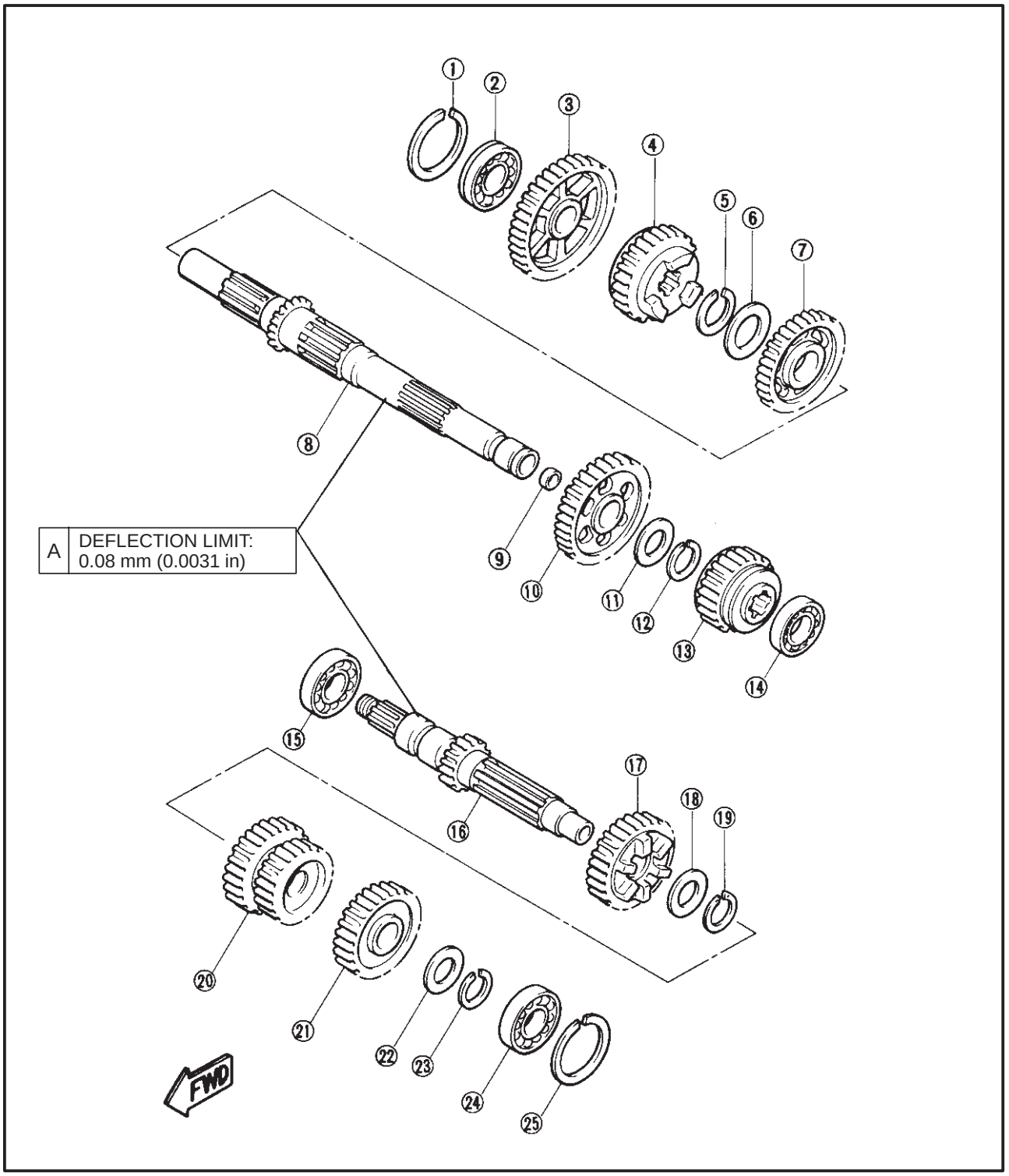
CRANKSHAFT/CONNECTING ROD/PISTON

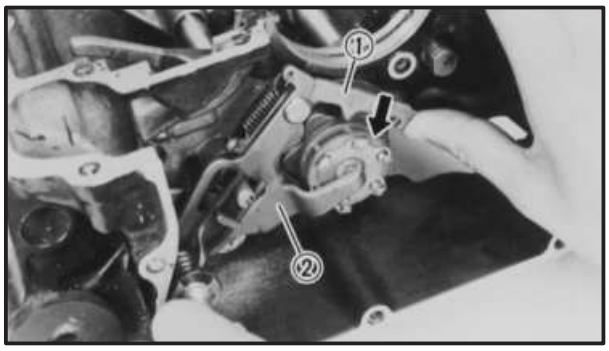
① Piston ring
② "Y" mark
③ Matching mark
④ Connecting rod bearing size
⑤ Projection
⑥ Washer
⑦ Journal bearing size
⑧ Crank pin size
⑨ Balancer matching mark



TRANSMISSION

① Circlip
② Bearing
③ 1st wheel gear (43T)
④ 4th wheel gear (28T)
⑤ Circlip
⑥ Washer
⑦ 3rd wheel gear (31T)
⑧ Drive axle
⑨ Plug
⑩ 2nd wheel gear (39T)
⑪ Washer
⑫ Circlip
⑬ 5th wheel gear (26T)
⑭ Bearing
⑮ Bearing
⑯ Main axle
⑰ 4th pinion gear (26T)
⑱ Washer
⑲ Circlip
⑳ 2nd, 3rd pinion gear (22/23T)
㉑ 5th pinion gear (28T)
㉒ Washer
㉓ Circlip
㉔ Bearing
㉕ Circlip





8. Install:
   • Shift shaft assembly

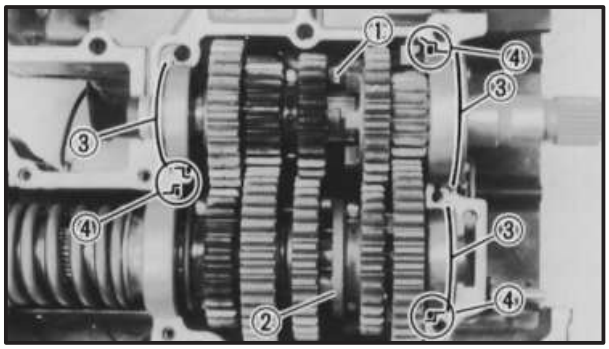
① Shift lever 1
② Shift lever 2

TRANSMISSION

1. Install:
   • Plane bearings (crankshaft/balancer shaft)

NOTE:

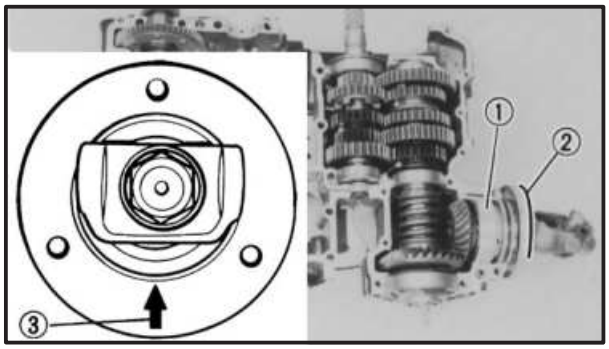
Identify each plane bearing position very carfuly so that it can be reinstalled in its original palce.



2. Install:
   • Main axle assembly ①
   • Drive axle assembly ②

NOTE:

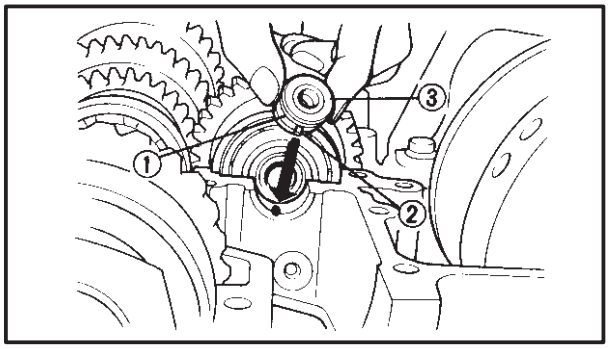
• Insert the bearing circlips ③ completely into lower crankcase positioning grooves.
• Position the bearing pin ④ as shown.



3. Install:
   • Middle driven pinion gear assembly ①

NOTE:

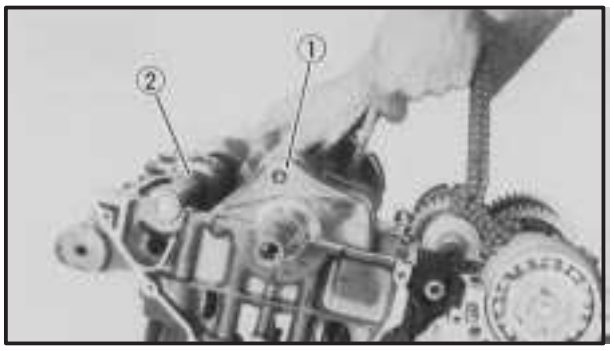
• Be careful not to damage the O-ring ② during installation.
• The arrow mark ③ on the bearing housing points to the upper crankcase.



4. Install:
   • Push rod support bearing ①

NOTE:

• Insert the bearing pin ② into the crankcase hole.
• Position the oil seal ③ snugly against the bearing.
• Lightly apply grease to the oil seal lips.





5. Check:
   • Transmission and shifter operation
   Unsmooth operation → Repair.

NOTE:

Oil each gear and bearing thoroughly.

6. Install:
   • Crankshaft with cam chains ①
   • Balancer shaft ②

NOTE:

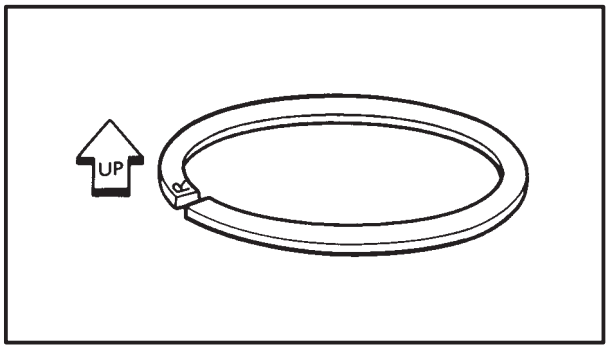
Align the mark ③ on the balancer shaft gear with the mark ④ on the crankshaft gear.

UPPER CRANKCASE

1. Install:
   • Plane bearings (crankshaft/balancer gear)

NOTE:

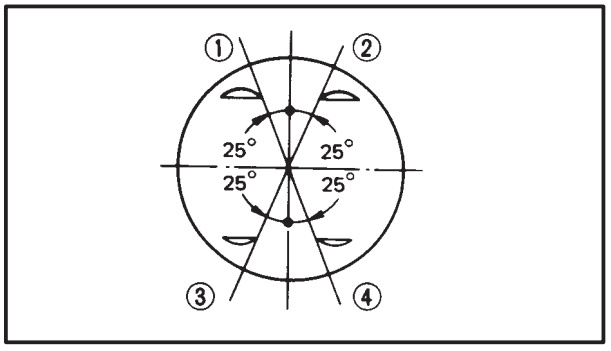
Identify each plane bearing position very carefuly so that it can be reinstalled in its original place.



2. Install:
   • Piston rings

NOTE:

Be sure to install rings so that Manufacturer's marks or numbers are located on the top side of the rings.

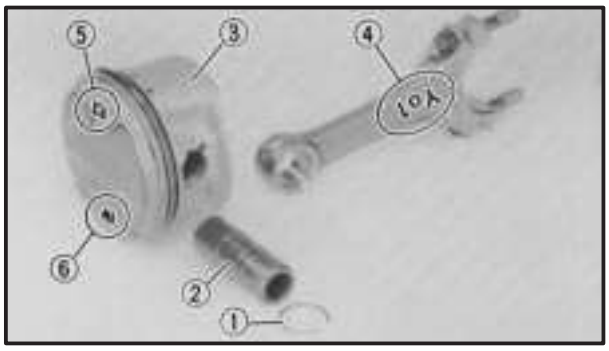


3. Oil liberally:
   • Pistons
   • Rings
   • Cylinders
4. Set:
   • Piston ring ends

CAUTION:

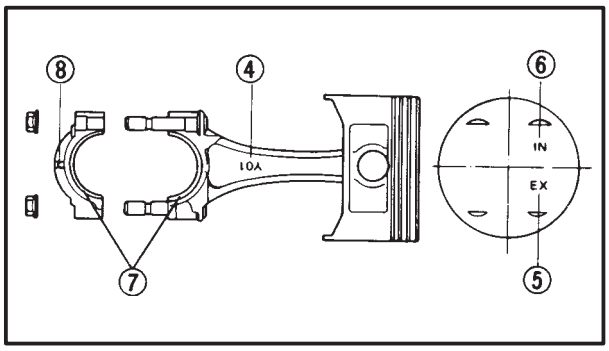
Make sure the ends of the oil ring expanders do not overlap.

① TOP ② OIL RING (LOWER RAIL)
③ OIL RING (UPPER RAIL) ④ 2ND



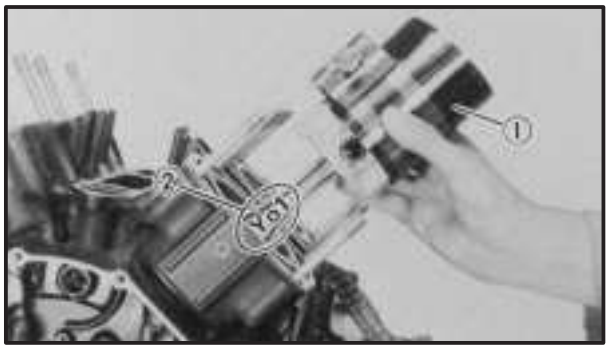
5. Install:
   - Piston ③
   - Piston pin ②
   - Piston pin clip ①

NOTE:
- Be sure the piston is positioned correctly as shown.
- Always install new piston pin clips.



- Plane bearings (connecting rods) ⑦
  Onto the connecting rod and cap.

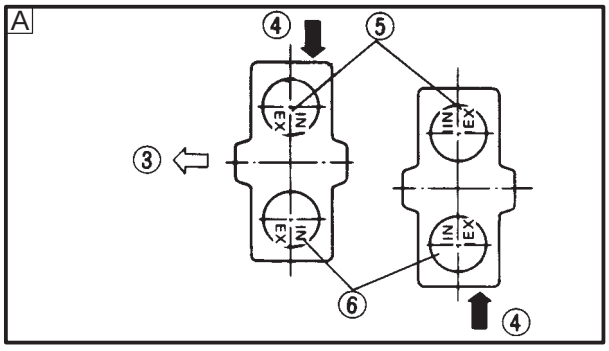
④ "Y" Mark
⑤ "EX" Exhaust side
⑥ "IN" Intake side
⑧ Projection



6. Install:
   - Piston/Connecting rod assembly (#1 ~ #4)
     Into the upper crankcase.

Piston/Connecting rod assembly installation steps:
- Attach the Piston Ring Compressor ① (90890-05158) to the piston.
- Install the piston to the cylinder.

NOTE:
- The stamped "Y" mark ② on the No.2 and No.4 connecting rods should face towards the RIGHT side of the crankcase.
- The stamped "Y" mar ② on the No.1 and No.3 connecting rods should face towards the LEFT side of the crankcase.



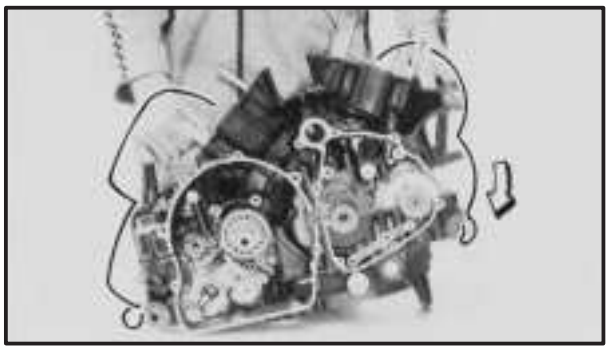
A Top view
③ Front
④ "Y"-mark facing direction
⑤ Piston exhaust mark
⑥ Piston intake mark

CRANKCASE ASSEMBLY

1. Apply:
   - Yamaha Bond No.1215 (90890-85505)
   To the mating surfaces of both case halves.

NOTE:

DO NOT ALLOW any sealant to come in contact with the oil gallery O-ring, or crankshaft bearings. Do not apply sealant to within 2 ~ 3 mm (0.08 ~ 0.12 in) of the bearings.



2. Set shift cam and transmission gears in NEUTRAL position.
3. Install:
   - Upper crankcase
   - Dowel pins
   To the lower crankcase.

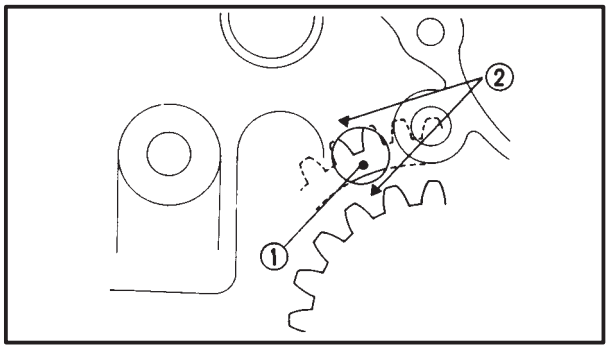
NOTE:

Attach wire to each cam chain and place cam chains on timing gear sprockets.

CAUTION:

Before tightening the crankcase bolts, check the following points:

- **Be sure the gear shifts correctly while handturning the shift cam.**
- **Be sure the balancer shaft gear is aligned so that the dot mark lines up between the triangular timing marks on the upper crankcase when the No.1 piston is at TDC.**

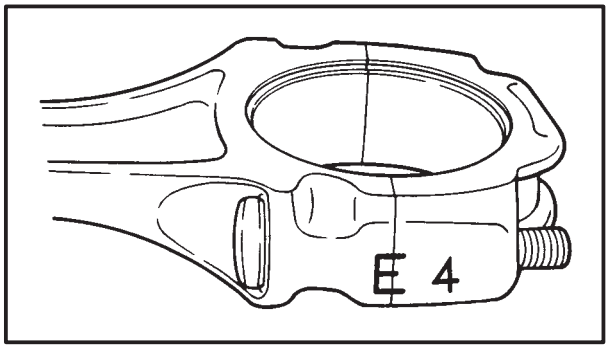


① Balancer shaft mark
② Triangular timing marks

4. Finger-tighten the several crankcase bolts, preferably wide apart. Then, turn the crankcase assembly upside down.

NOTE:

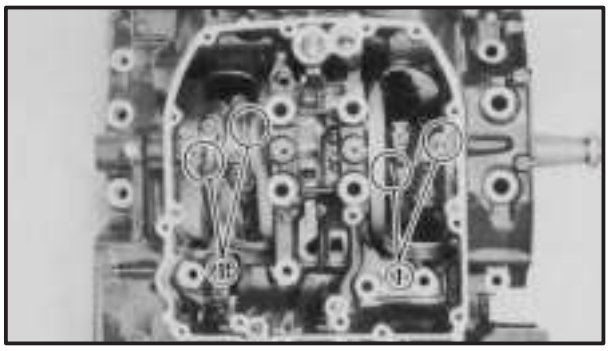
Be careful not to let pistons fall out of the cylinders.



5. Install:
   - Rod caps

NOTE:

Be sure the letters on both components align to form a perfect character.



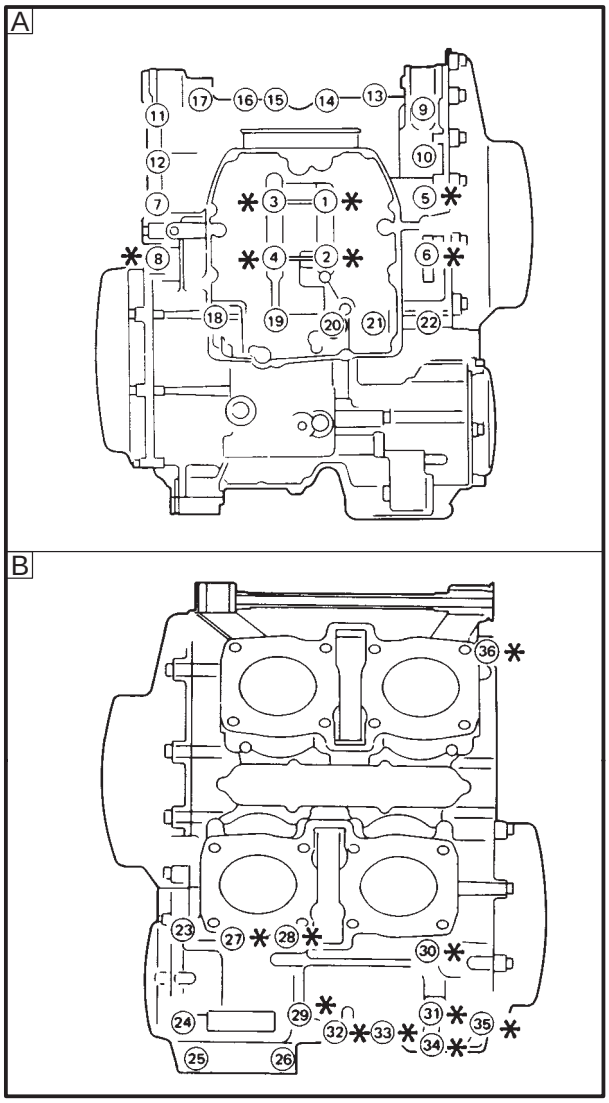
6. Tighten:
   • Nuts (connecting rod cap)

	Nut (Connecting Rod): **36 Nm (3.6 m•kg, 25 ft•lb)**

NOTE:
- Apply Molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.
- The projection ① on the connecting rod cap should faces the crankshaft web.

CAUTION:

When tightening the rod cap, apply continuous torque between 3.0 and 3.8 m•kg. Once you reach 3.0 m•kg of torque, DO NOT STOP TIGHTENING until final torque is reached. If tightening is interrupted between 3.0 and 3.8 m•kg, loosen the nut to less than 3.0 m•kg, and start again. Tighten to full-torque specification without pausing.



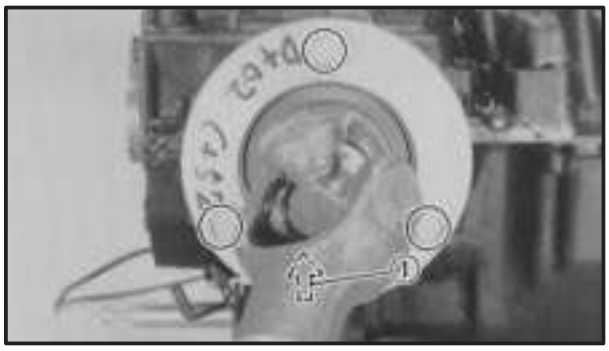
7. Tighten:
   • Bolts (crankcase)

NOTE:
Tighten the bolts starting with the lowest numbered one.

✻ With washer
A LOWER CASE
B UPPER CASE

	6 mm Bolt: **12 Nm (1.2 m•kg, 8.7 ft•lb)** **8 mm Bolt:** **24 Nm (2.4 m•kg, 17 ft•lb)** **10 mm Bolt:** **40 Nm (4.0 m•kg, 29 ft•lb)**

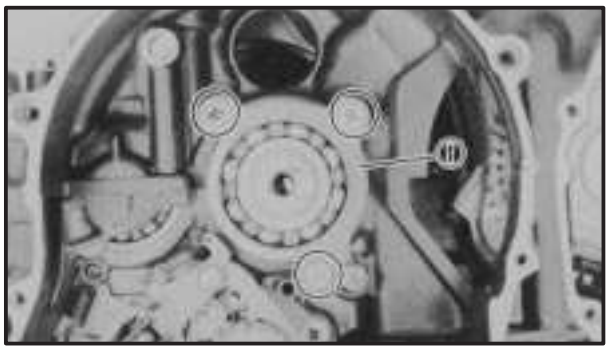
NOTE:
- Install the oil pipe bracket on Bolt Nos.1 and 3.
- Install the lead wire bracket on Bolt No.22.
- Install the battery ground lead on Bolt No.36.
- Install the copper washers on Bolt Nos.28 and 30.



8. Check:
   • Crankshaft operation
     Unsmooth operation → Repair.
9. Install:
   • Bolts (middle driven gear housing)

NOTE:

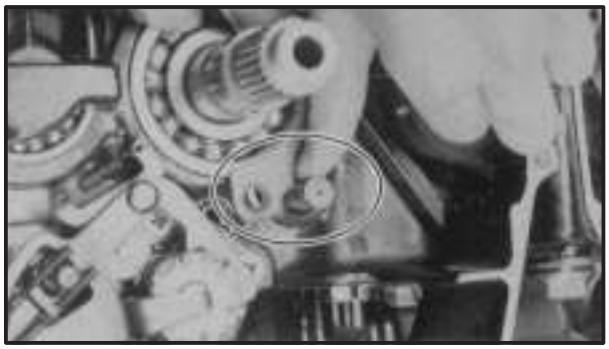
The arrow mark ① on the bearing housing points to the upper crankcase.



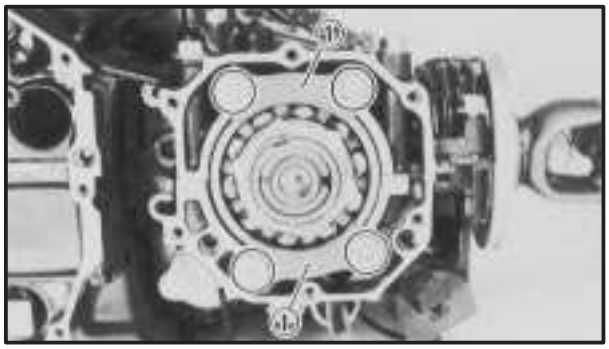
10. Install:
    • Retainer (main axle bearing) ①

NOTE:

Be sure that the groove in the shaft mesh with the slot in the retainer.

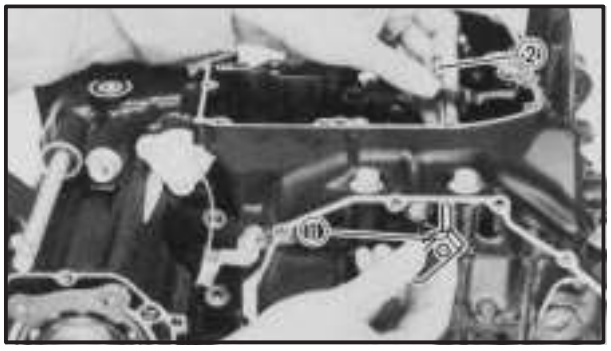


	Retainer (Main Axle Bearing): **7 Nm (0.7 m•kg, 5.1 ft•lb)** **LOCTITE®**



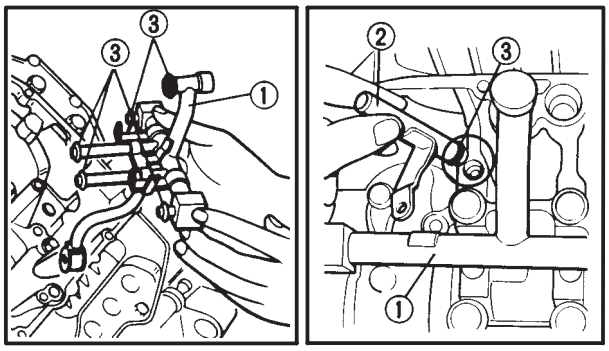
11. Install:
    • Retainers (middle gear bearing) ①
      Use the #40 Torx Drive (90890-04049).
      Stake screw head with center punch to lock.

	Retainers (Middle Gear Bearing): **25 Nm (2.5 m•kg, 18 ft•lb)**



OIL PUMP AND OIL PAN

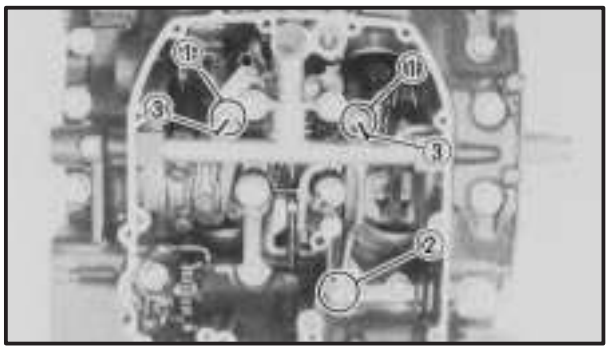
1. Install:
   • Damper (oil pump pipe) ①
   • Oil pump pipe ②



2. Install:
   • Main oil gallery pipe ①
   • Oil pipe ②

NOTE:

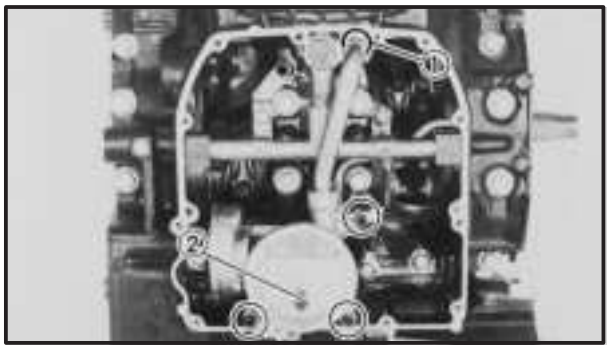
Make sure the correct O-rings ③ are installed on gallery pipe.



3. Tighten:
   • Bolts (main oil gallery pipe) ①, ②

6 mm Flange Bolt ①:
12 Nm (1.2 m•kg, 8.7 ft•lb)
8 mm Union Bolt ②:
18 Nm (1.8 m•kg, 13 ft•lb)

4. Bend the bracket tabs ③

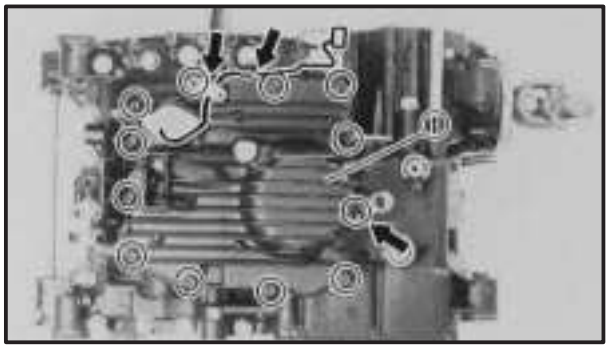


5. Install:
   • Dowel pins
   • Oil pump assembly

NOTE:

• Make sure the correct O-ring ① is installed on oil pump pipe.
• The arrow mark ② on the oil pump should face toward the rear.

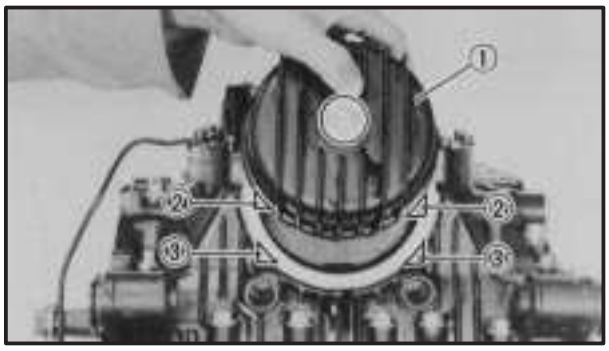
Oil Pump:
10 Nm (1.0 m•kg, 7.2 ft•lb)



6. Install:
   • Gasket
   • dowel pins
   • Oil pan ①

Oil Pan:
10 Nm (1.0 m•kg, 7.2 ft•lb)

7. Clamp the oil level gauge lead.

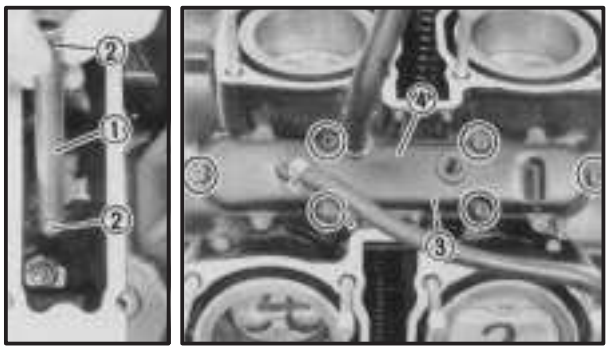


8. Install:
   • Oil filter cover ①

NOTE:

Be sure that the projections ② on the filter cover mesh with the slots ③ on the crankcase.

	Oil Filter Cover: 32 Nm (3.2 m•kg, 23 ft•lb)

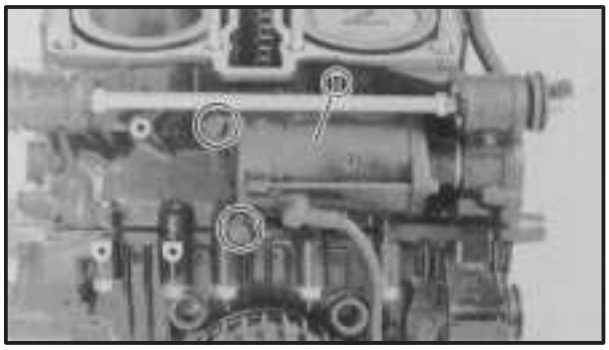


BREATHER COVER AND STARTER MOTOR

1. Install:
   • Oil pipe ①
   • Breather cover spacer ③
   • Breather cover ④

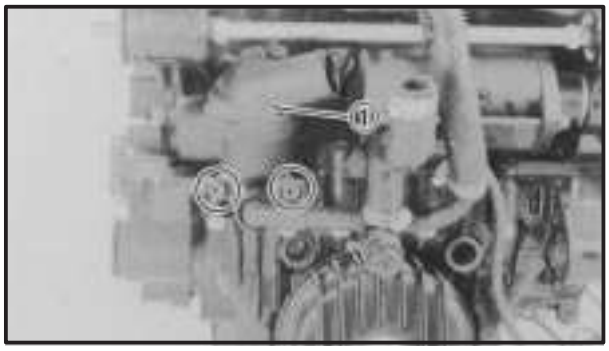
	Bolt (Breather Cover): 10 Nm (1.0 m•kg, 7.2 ft•lb)

② O-ring



2. Install:
   • Starter motor ①

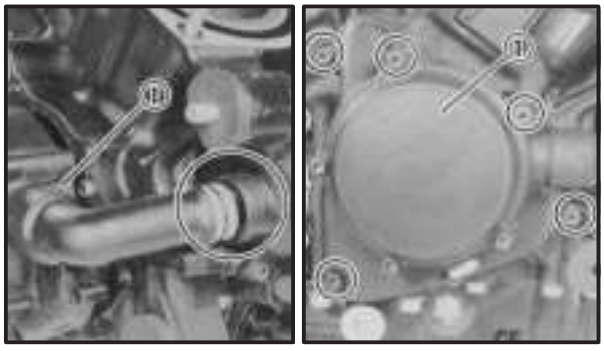
	Bolts (Starter Motor): 10 Nm (1.0 m•kg, 7.2 ft•lb)



WATER PUMP AND THERMOSTATIC VALVE

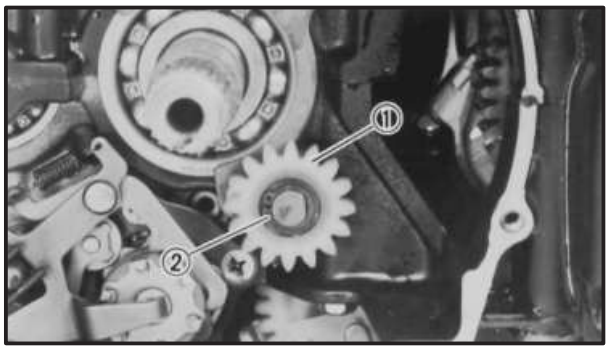
1. Install:
   • Thermostat assembly ①

	Thermostatic Valve Housing: 10 Nm (1.0 m•kg, 7.2 ft•lb)



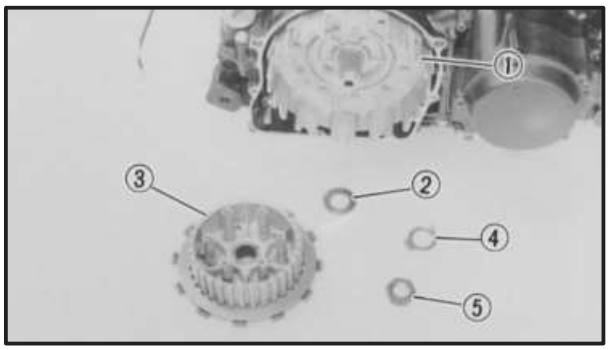
2. Install:
   • Dowel pins
   • Gasket
   • Water pump case/Water pump cover ①

	Water Pump Case and Housing: 10 Nm (1.0 m•kg,7.2 ft•lb)

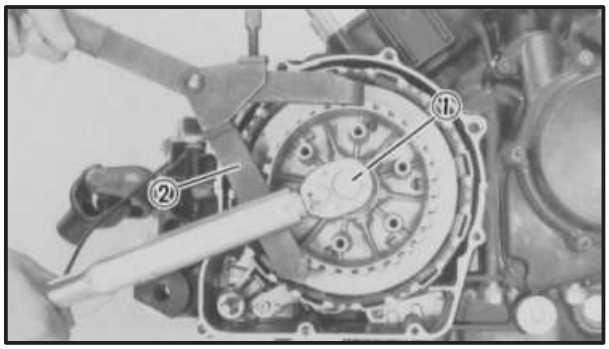


CLUTCH AND OIL PUMP DRIVE GEAR

1. Install:
   - Oil pump drive gear ①
   - Circlip ②

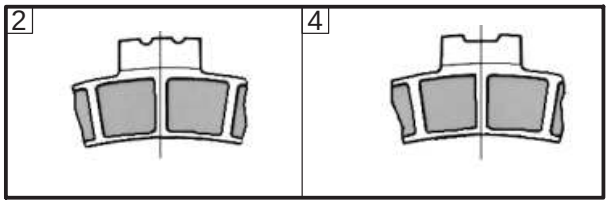


2. Install:
   - Clutch housing ①
   - Thrust washer ②
   - Clutch boss ③
   - Lock washer (new) ④
   - Nut (clutch boss) ⑤

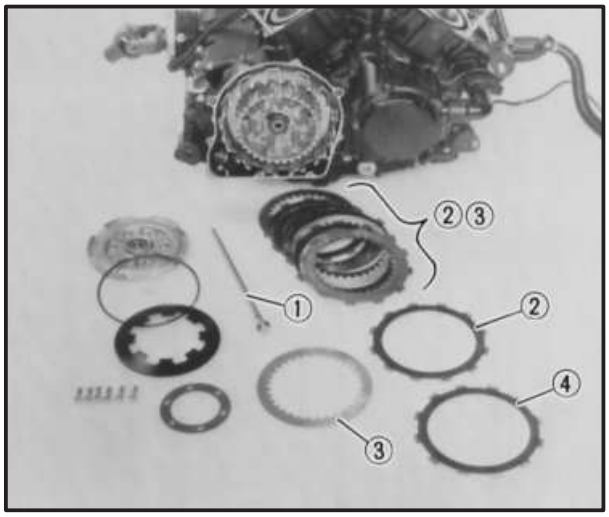


3. Tighten:
   - Nut (clutch boss) ①
     Use the Clutch Holder (90890-04086) ② to hold the clutch boss.

	Nut (Clutch Boss): 70 Nm (7.0 m•kg, 50 ft•lb)



4. Bend the lock washer tabs along the nut flat.
5. Install:
   - Push rod ①
   - Friction plates ②, ④
   - Clutch plates ③



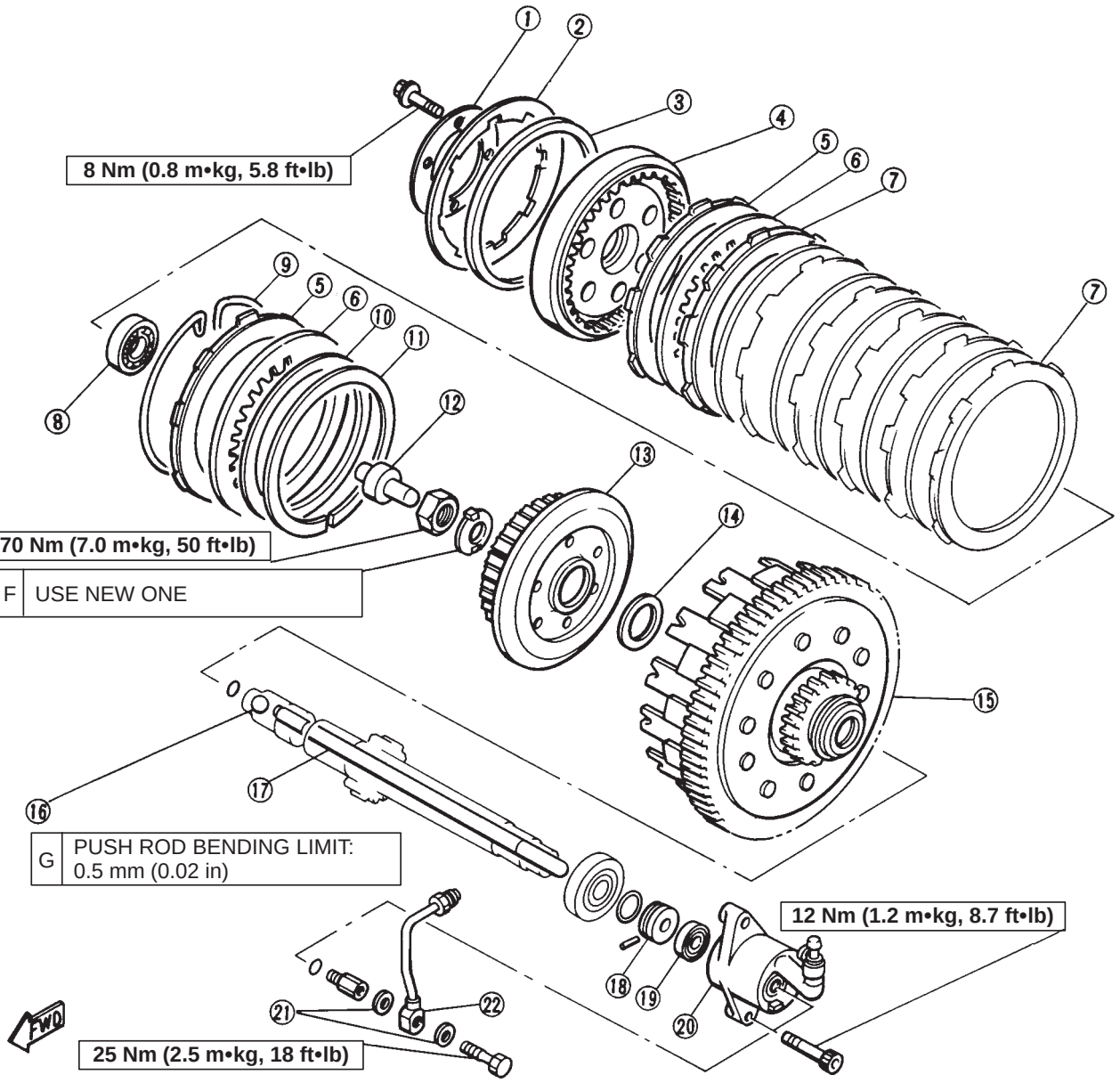
NOTE:

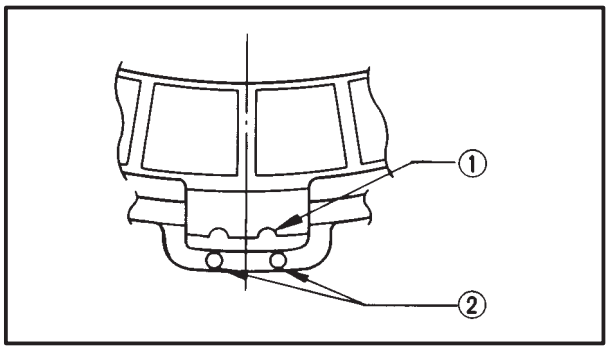
Install the friction plates and clutch plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.

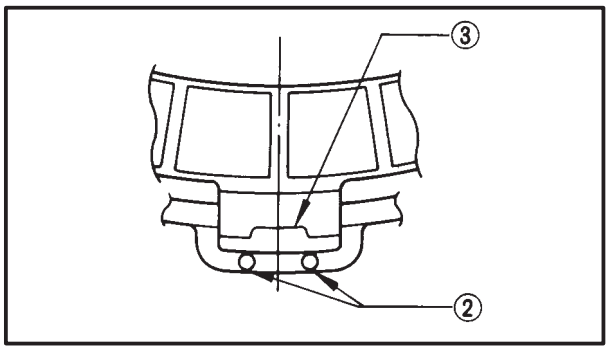
CLUTCH

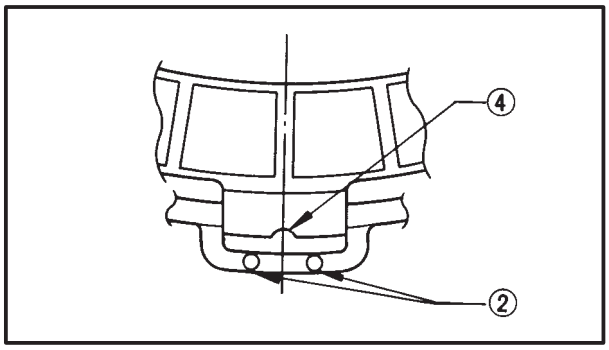
① Washer
② Clutch spring
③ Spring seat
④ Pressure plate
⑤ Friction plate (2 pcs)
⑥ Clutch plate (7 pcs)
⑦ Friction plate (6 pcs)
⑧ Bearing
⑨ Wire circlip
⑩ Washer
⑪ Circuit
⑫ Push rod (No.1)
⑬ Clutch boss
⑭ Thrust washer
⑮ Clutch housing
⑯ Ball
⑰ Push rod (No.2)
⑱ Push rod support bearing
⑲ Oil seal
⑳ Clutch release cylinder
㉑ Special washer
㉒ Clutch pipe

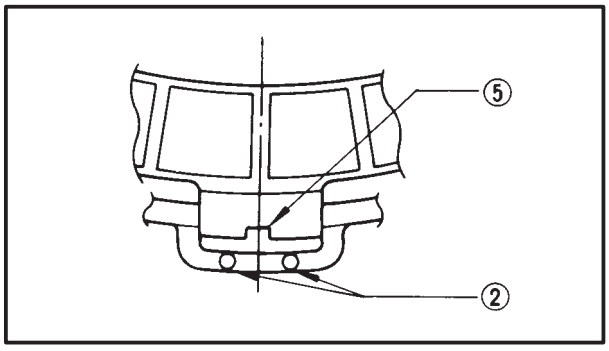
A	FRICTION PLATE THICKNESS:	D	CLUTCH SPRING MINIMUM HEIGHT: 6.5 mm (0.26 in)
B	WEAR LIMIT: 2.8 mm (0.11 in)		
C	CLUTCH PLATE WARP LIMIT: 0.2 mm (0.008 in)	E	CLUTCH SPRING WARP LIMIT: 0.1 mm (0.004 in)











Friction plates and clutch plates installation steps:

- Install the six friction plates (with the double semi-circular slots) and the six clutch plates.

NOTE:

Be sure the double semi-circular slots ① on the friction plate is aligned with the clutch housing embossed match marks ②.

- Install the clutch plate and the friction plate (with the wide square slot).

NOTE:

Be sure the wide square slot ③ on the friction plate is aligned with the clutch housing embossed match marks ②.

- If the clutch does not release due to hard meshing between the friction plates and the clutch housing, check to see if any of the friction plates fit too snugly into the clutch housing. Any tight-fitting friction plates must be repositioned as follows.
  1) Remove the friction plates and the clutch plates.
  2) Install the six friction plate (with the double semi-circular slots) and the six clutch plates.

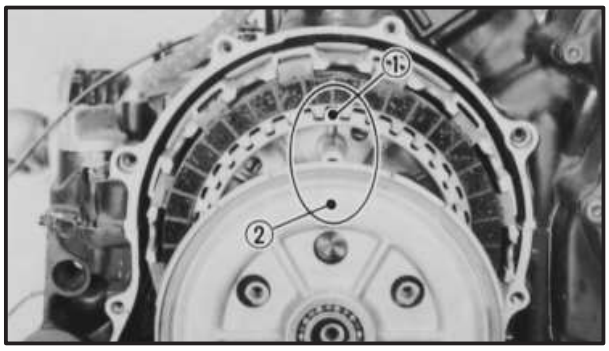
NOTE:

- Invert the friction plates.
- Be sure the single semi-circular slot ④ on the friction plate is aligned with the clutch housing embossed match marks ②.

3) Install the clutch plate and the friction plate (with the wide square slot).

NOTE:

- Invert the friction plates.
- Be sure the narrow square slot ⑤ on the friction plate is aligned with the clutch housing embossed match marks ②.



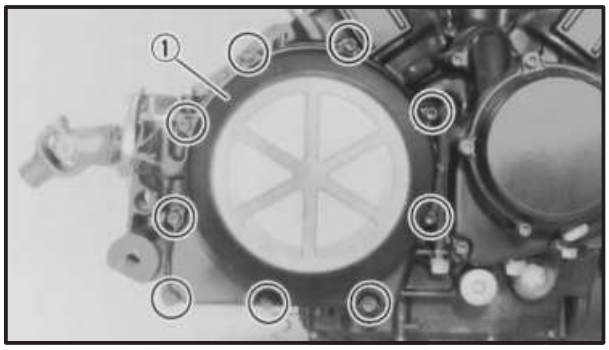
6. Install:
   • Pressure plate

NOTE:

Be sure the match mark ① on the clutch boss is aligned with the match mark ② on the pressure plate.

7. Install:
   • Spring seat
   • Clutch spring
   • Plate washer
   • Bolts (clutch spring)

Bolt (Clutch Spring):
8 Nm (0.8 m•kg, 5.8 ft•lb)

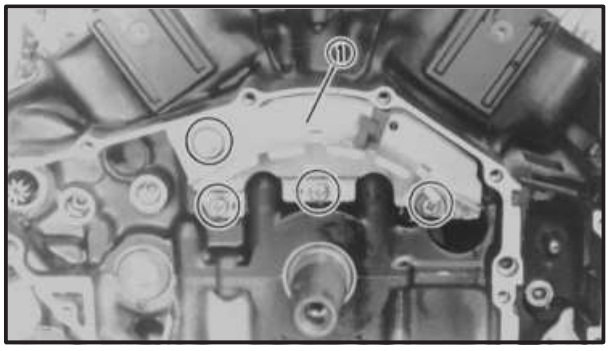


8. Install:
   • Dowel pins
   • Gasket
   • Crankcase cover (right) ①

NOTE:

Tighten the bolts in a crisscross pattern.

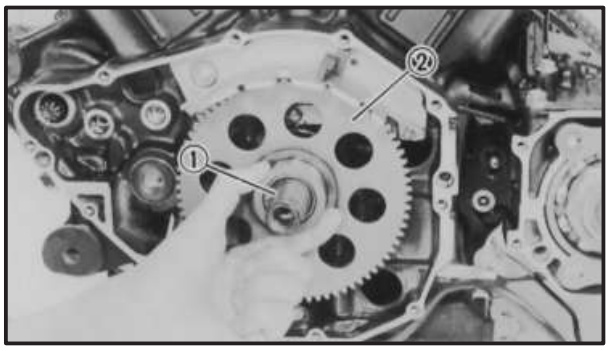
Crankcase Cover (Right):
10 Nm (1.0 m•kg, 7.2 ft•lb)



FLYWHEEL AND STARTER IDLE GEAR

1. Install:
   • Oil baffler plate ①

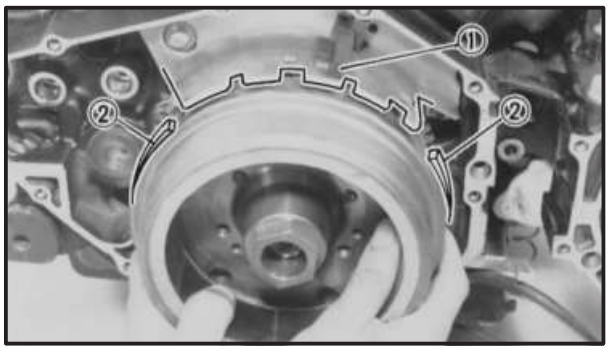
Oil Baffle Plate:
7 Nm (0.7 m•kg, 5.1 ft•lb)



2. Install:
   • Starter clutch gear ②
   • Woodruff key ①

CAUTION:

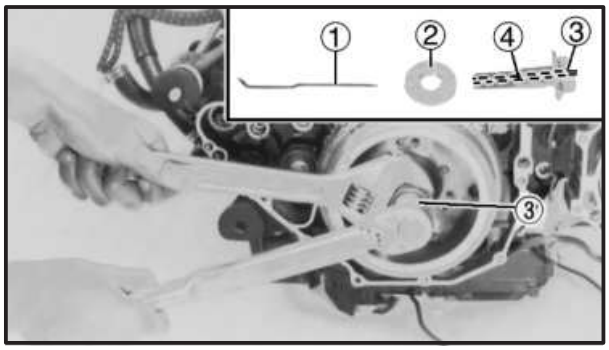
Be sure to remove any oil and or grease from the tapered portion of the crankshaft and rotor with a thinner.



3. Install:
   • Flywheel

NOTE:

When installing the flywheel, do not allow the oil baffle plate ① to touch the projections ② on the flywheel.

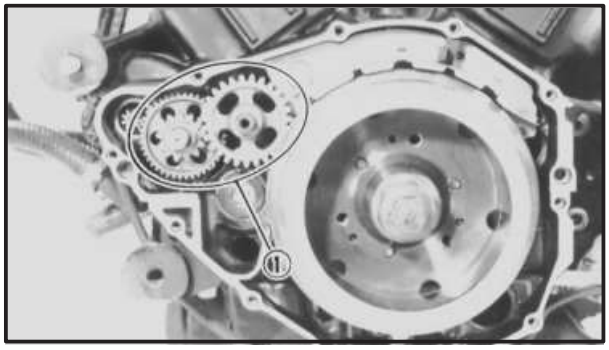


4. Install:
   • Pin ①
   • Plain washer ②
   • Bolt (flywheel) ③

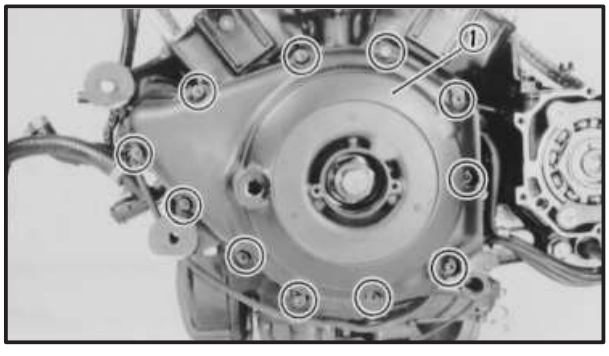
NOTE:

Check for clog of oil passage ④ in the bolt.If any, clean the oil passage.

	Bolt (Flywheel): 130 Nm (13.0 m•kg, 94 ft•lb)



5. Install:
   • Starter idle gears ①

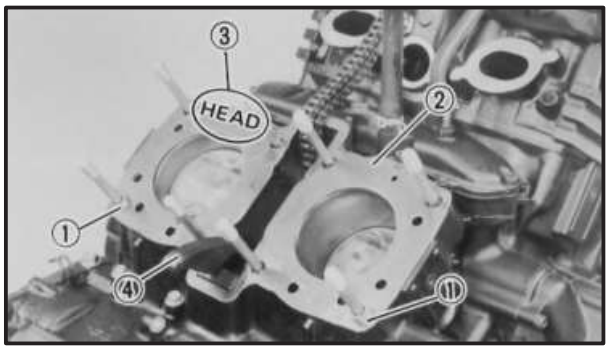


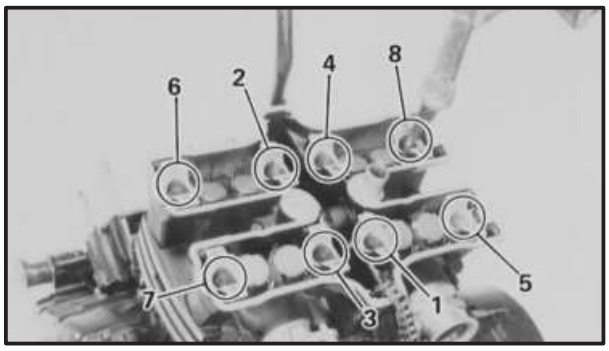
6. Install:
   • Dowel pins
   • Gasket
   • Crankcase cover (left) ①

NOTE:

Tighten the bolts in a crisscross pattern.

	Crankcase Cover (Left): 10 Nm (1.0 m•kg, 7.2 ft•lb)





CYLINDER HEAD AND CAMSHAFT
Rear Cylinder Head

1. Install:
   - Dowel pins ①
   - Gasket ②
   - Rear cam chain guide ④

NOTE:

- The gasket "HEAD" mark ③ should the upward.
- The lower end of chain guide must rest in the cam chain guide slot in the crankcase.

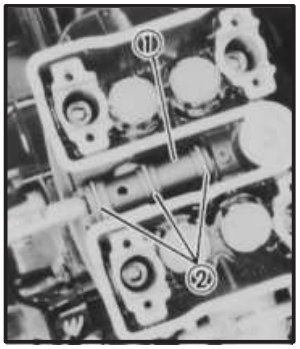
- Cylinder head
  Pass cam chain through cam chain cavity.

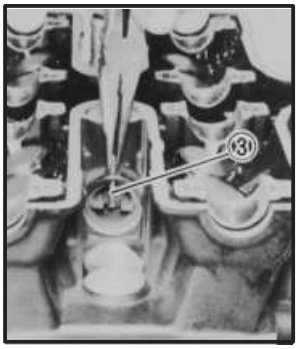
2. Install:
   - Nuts (cylinder head)
     Use 8 mm Wrench Adapter (90890-04076).

NOTE:

- In sequence as shown and torque nuts in two stages.
- Never lubricate the bolt threads with engine oil.

Nuts (Cylinder Head):
43 Nm (4.3 m•kg, 31 ft•lb)





3. Install:
   - Water jacket joints ①

NOTE:

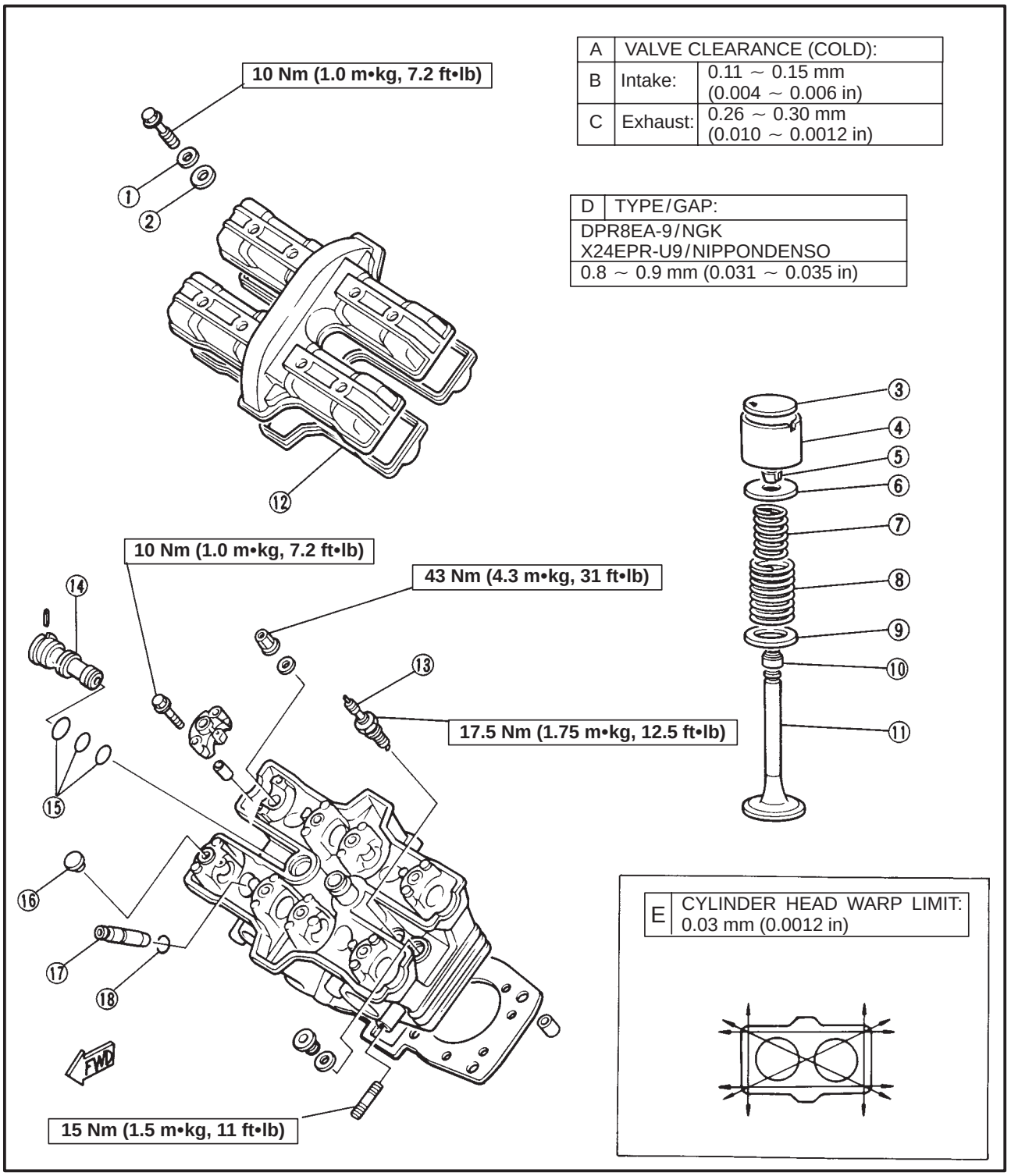
Be sure each joint passes through its corresponding cam chain.

- Lock pin ③

② O-ring

CYLINDER HEAD AND CAMSHAFT

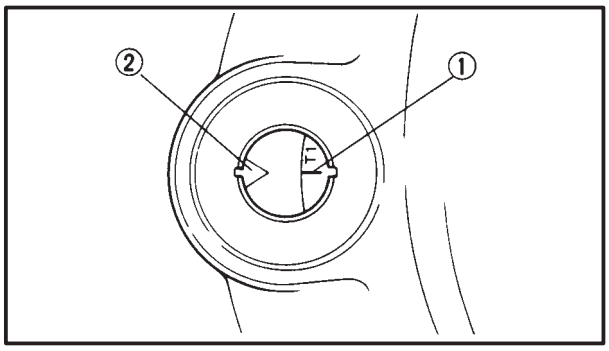
① Washer
② Rubber washer
③ Pad
④ Valve lifter
⑤ Valve retainer
⑥ Spring seat
⑦ Inner spring
⑧ Outer spring
⑨ Spring seat
⑩ Oil seal
⑪ Valve
⑫ Gasket
⑬ Sprak plug
⑭ Joint
⑮ O-ring
⑯ Oil plug
⑰ Valve guide
⑱ Circlip



A	VALVE CLEARANCE (COLD):	
B	Intake:	0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
C	Exhaust:	0.26 ~ 0.30 mm (0.010 ~ 0.0012 in)

D	TYPE/GAP:
DPR8EA-9/NGK X24EPR-U9/NIPPONDENSO	
0.8 ~ 0.9 mm (0.031 ~ 0.035 in)	

E	CYLINDER HEAD WARP LIMIT: 0.03 mm (0.0012 in)



4. Install:
   • Camshafts

Camshaft installation steps:
• Align the "T-1" mark ① on the flywheel with the stationary pointer ② on the crankcase cover use 32 mm wrench.

CAUTION:

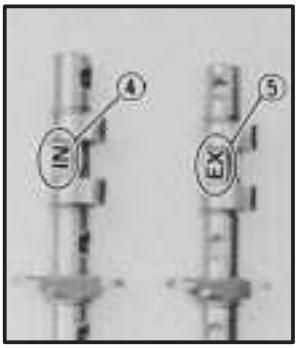
- **Never turn the flywheel installing bolt. Rotating the bolt may loosen it, causing the rotor to fall out.**
- **Do not turn the crankshaft during the camshafts installation.**

• Install the cam chain sprockets onto the camshafts.

NOTE:

Make sure the "REAR" mark ③ on the cam chain sprockets face away from the "IN" mark ④ and "EX" mark ⑤ on the camshafts.



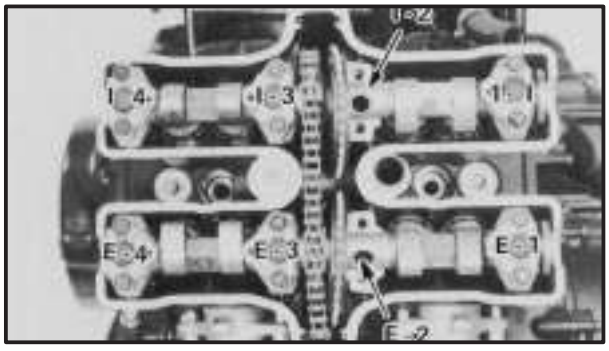


• Apply engine oil to the camshaft bearing surfaces.
• Install the "IN" marked camshaft onto the intake side and "EX" marked camshaft onto the exhaust side.
• Turn the camshafts by hand so that the timing markes ⑥ (○: small hole) on the camshaft face upward.
• Install the dowel pins into the cam caps.
• Install the cam caps (Nos.3, 1 and 4) onto the camshaft.

NOTE:

- Do not install No.2 intake and No.2 exhaust cam caps at this stage.
- The numbers are punched on the camshaft caps in increments from right to left.



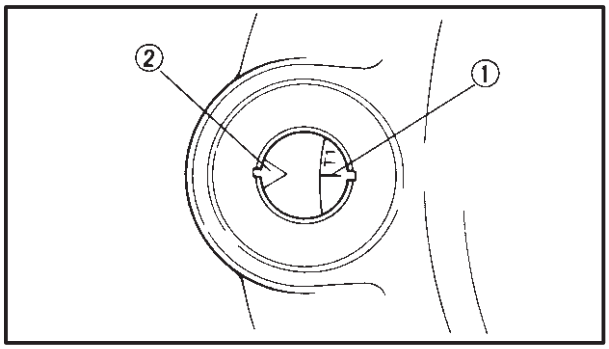


• Tighten the cap bolts.

NOTE:

First tighten the No.3, 1 and 4 cap bolts in that order, then the No.2 cap bolts.

Camshaft Cap:
10 Nm (1.0 m•kg, 7.2 ft•lb)



5. Install:
   • Cam chain sprockets

Cam chain sprockets installation steps:
• Align the "T-1" mark ① on the flywheel with the stationary pointer ② on the crankcase cover use 32 mm wrench.

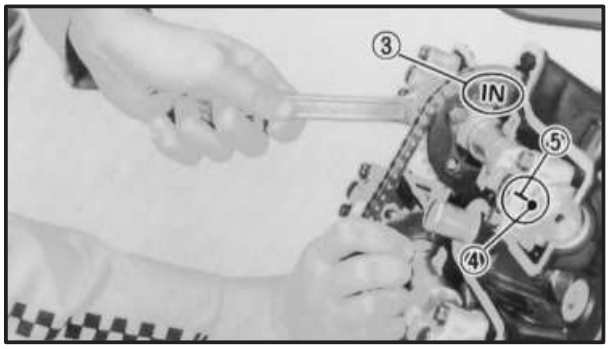
CAUTION:

- **Never turn the flywheel installing bolt. Rotating the bolt may loosen it, causing the rotor to fall out.**
- **Do not turn the crankshaft during the sprocket installation.**

• Place the cam chain onto the intake sprocket.
• Install the sprocket with the punched mark "REAR" facing outward and finger-tighten the sprocket bolts.

NOTE:

Align the "IN" mark ③ hole on the sprocket with the thread hole on the camshaft.



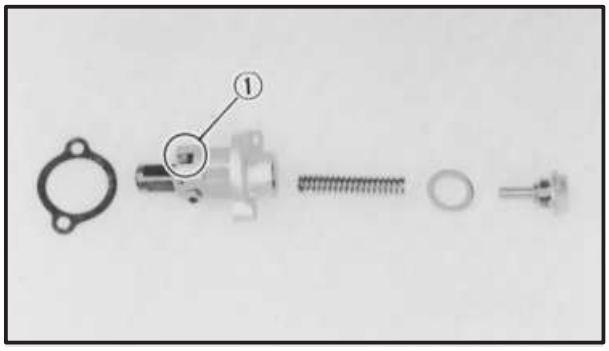
• Rotate the intake camshaft to align the timing mark ④ (○: small hole) on the camshaft with the embossed match mark ⑤ on the camshaft cap (I-4).

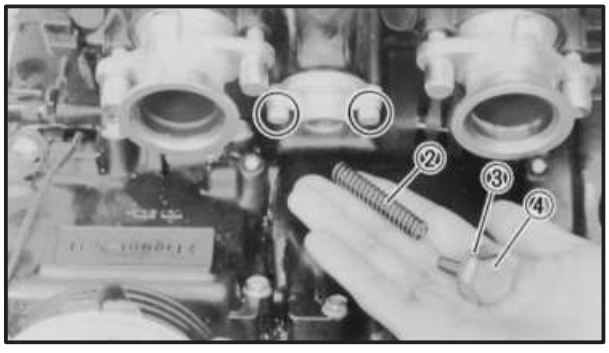
- Force the intake camshaft counterclockwise to remove the cam chain slack.
- Place the cam chain onto the exhaust sprocket.
- Install the sprocket with the punched mark "REAR" facing outward and finger-tighten the sprocket bolt.

NOTE:

Align the "EX" mark hole on the sprocket with the thread hole on the camshaft.

- Rotate the exhaust camshaft to align the timing mark (○: small hole) on the camshaft with the embossed match mark on the camshaft cap (E-4).
- Force the exhaust camshaft clockwise to remove all the cam chain slack.
- Insert your finger into the cam chain tensioner hole, and push the cam chain guide inward.
- While pushing the cam chain guide, be sure camshaft embossed match marks align with the timing marks on the camshaft.
- If marks do not align, change the meshing position of sprocket and cam chain.





6. Install:
   - Cam chain tensioner

Cam chain tensioner installation steps:
- Remove the tensioner end cap bolt and spring.
- Release the cam chain tensioner one-way cam ①.
- Install the tensioner with a new gasket into the cylinder.

Cam Chain Tensioner Body: 12 Nm (1.2 m•kg, 8.7 ft•lb)

- Install the tensioner spring ②, copper washer ③ and end cap bolt ④.

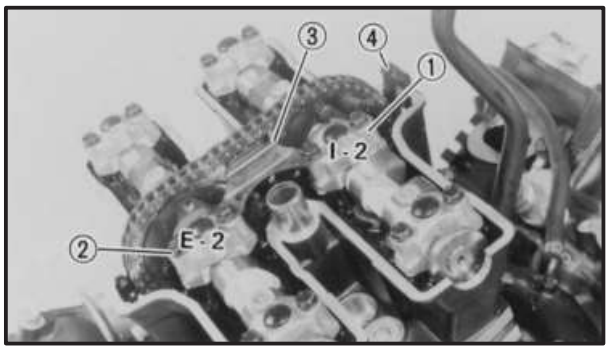
End Bolt (Cam Chain Tensioner): 20 Nm (2.0 m•kg, 14 ft•lb)

7. Turn the crankshaft and tighten the cam sprocket bolts.

Camshaft Sprocket:
24 Nm (2.4 m•kg, 17 ft•lb)

CAUTION:

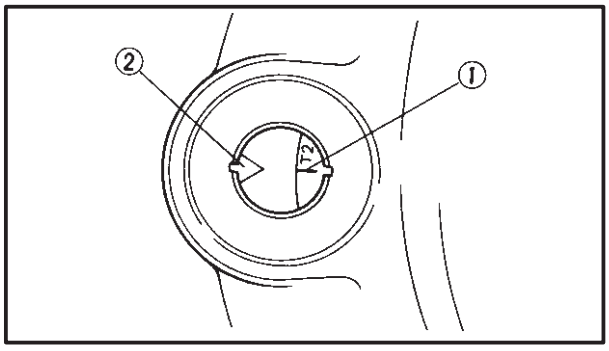
Be sure to attain the specified torque value to avoid the possibility of these bolts coming loose and causing damage to the engine.



8. Install:
   • Cam caps ("I-2" and "E-2") ①, ②

Camshaft Cap:
10 Nm (1.0 m•kg, 7.2 ft•lb)

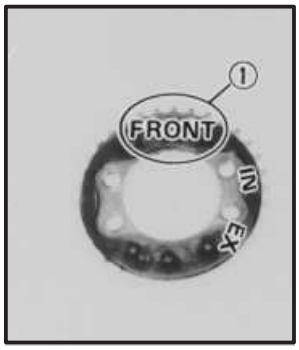
   • Cam chain guides ③, ④
9. Apply:
   • Engine oil
   To the cam chain, sprockets, camshaft and valves.

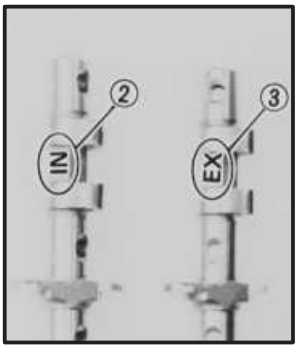


Front Cylinder Head

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

1. Install:
   • Camshafts
   1) Rotate the crankshaft counterclockwise 360° plus and added 70° (430° total) from the "T-1" mark.
   2) Align the "T-2" ① mark on the flywheel with the stationary pointer ② on the crankcase cover use 32 mm wrench.
   3) Install the cam chain sprockets onto the camshafts.

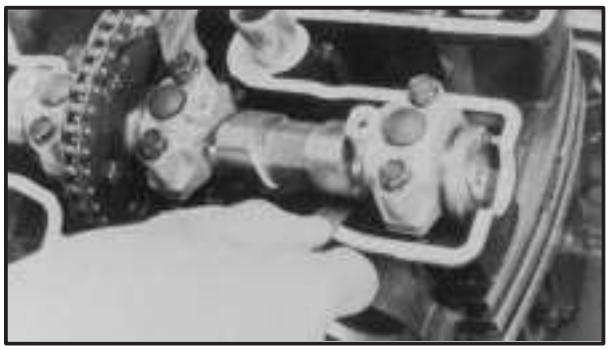




NOTE:

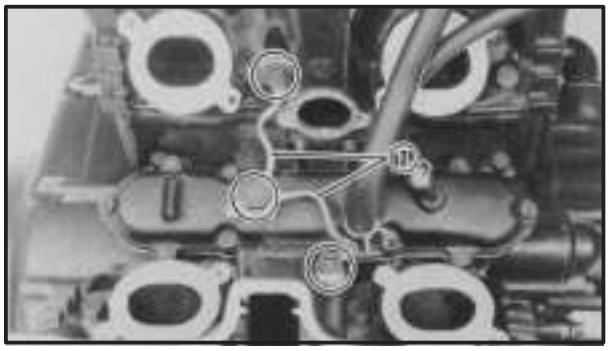
Make sure the "FRONT" mark ① on the cam chain sprockets face away from the "IN" mark ② and "EX" mark ③ on the camshaft.

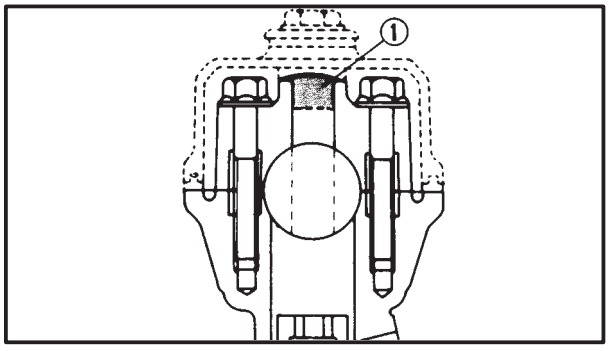
   4) Turn the camshafts by hand so that the timing marks (○: big hole) on the camshaft face upward.



2. Install:
   • Cam chain sprocket
   1) Align the "T-2" mark on the flywheel with the stationary pointer on the crankcase cover use 32 mm wrench.
   2) Install the sprocket with the punched mark "FRONT" facing outward and finger-tighten the sprocket bolts.
   3) Rotate the intake and exhaust camshafts to align the timing mark (○: big hole) on the camshaft with the embossed match mark-son the camshaft caps (I-4 and E-4).
3. Measure:
   • Valve clearance
   Out of specification → Adjust.
   Refer to "CHAPTER 2. VALVE CLEARANCE ADJUSTMENT" section.

Valve Clearance (Cold):
Intake: 0.11 ~ 0.15 mm
(0.004 ~ 0.006 in)
Exhaust: 0.26 ~ 0.30 mm
(0.010 ~ 0.012 in)





OIL DELIVERY PIPE AND CYLINDER HEAD COVER

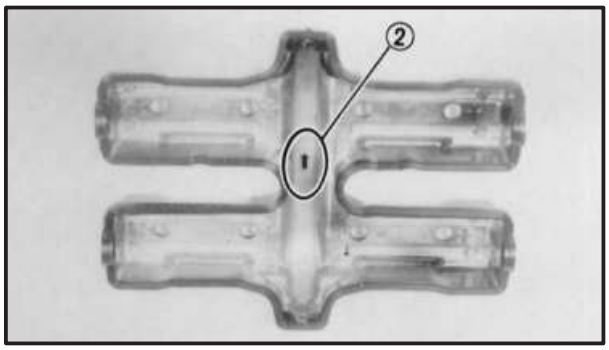
1. Install:
   • Oil delivery pipe ①

NOTE:

Tighten the three unin bolts evenly, then torque them to specification.

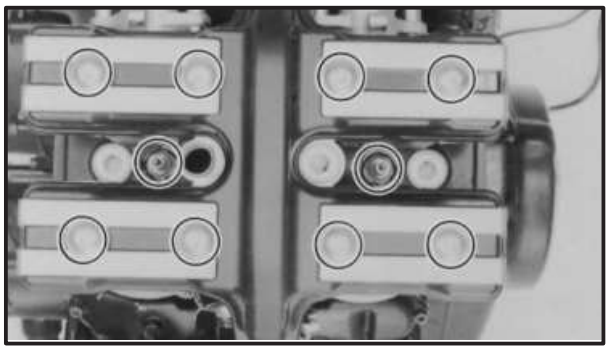
Oil Delivery Pipe:
8 mm Bolt:
18 Nm (1.8 m•kg, 13 ft•lb)
10 mm Bolt:
20 Nm (2.0 m•kg, 14 ft•lb)

2. Install:
   • Gasket
   • Cylinder head covers (rear and front)



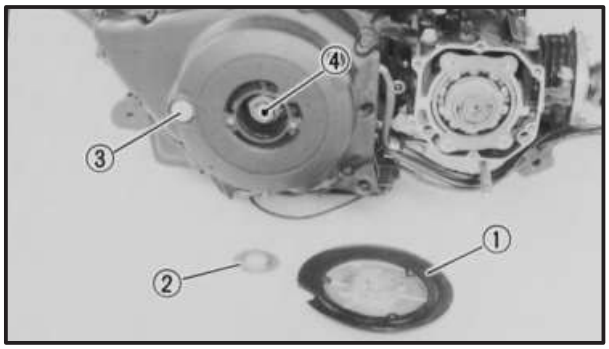
NOTE:

- Be sure all cam caps are covered with oil plugs ①.
- Arrow mark ② on the cover should face toward the exhaust side.
- Inspect the head cover gasket and replace it if damaged.



3. Tighten:
   - Bolts (cylinder head cover)
   - Spark plugs

Cylinder Head Cover:
10 Nm (1.0 m•kg, 7.2 ft•lb)
Spark Plug:
17.5 Nm (1.75 m•kg, 12.5 ft•lb)



4. Install:
   - Timing plug ③
   - Special washer ②
   - Crankcase cover plate ①

NOTE:

Check for clog of oil passage ④ in the bolt. If any, clean the oil passage.

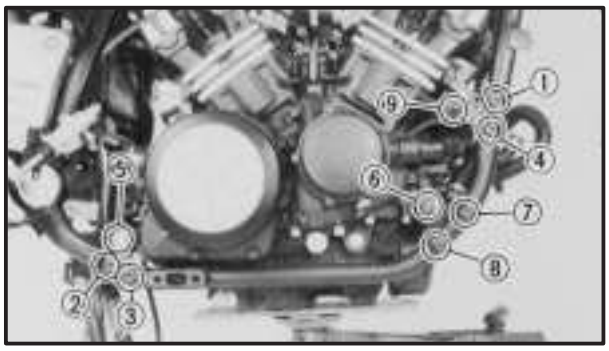
REMOUNTING ENGINE

When remounting the engine, reverse the removal procedure. Note the following points.

1. Install:
   - Down tube frame (right)
   - Bolts (down tube) ①, ②, ③, ④, ⑦, ⑧
   - Bolts (engine) ⑤, ⑥, ⑨

NOTE:

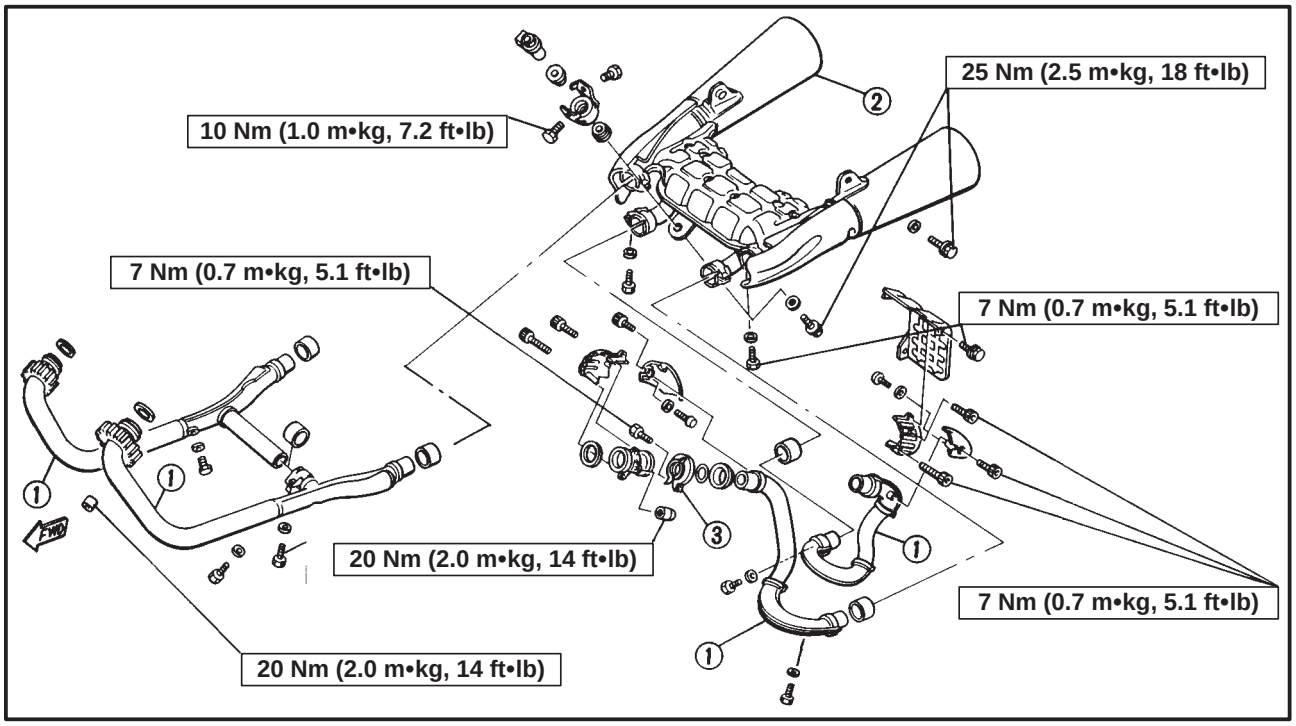
Tighten the bolts (#1 ~ #9) in that order.



Engine Mounting:
Bolts (Down Tube) ①, ②, ③, ④:
45 Nm (4.5 m•kg, 32 ft•lb)
Bolts (Engine) ⑤:
70 Nm (7.0 m•kg, 50 ft•lb)
Bolts (Engine) ⑥, ⑨:
40 Nm (4.0 m•kg, 29 ft•lb)
Bolts (Down Tube) ⑦, ⑧:
15 Nm (1.5 m•kg, 11 ft•lb)

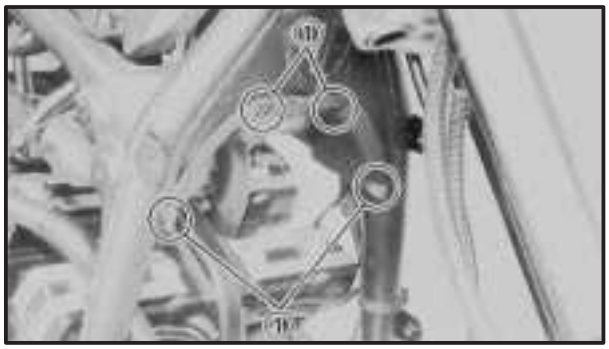
2. Tighten:
   - Exhaust pipes
   - Muffler

① Exhaust pipe
② Muffler
③ Clamp



3. Tighten:
   • All nuts or bolts
   By the following specification torque.

Clutch Release Cylinder:
12 Nm (1.2 m•kg, 8.7 ft•lb)
Middle Gear Case Cover:
10 Nm (1.0 m•kg, 7.2 ft•lb)
Change Pedal:
10 Nm (1.0 m•kg, 7.2 ft•lb)
Footrest (Left):
40 Nm (4.0 m•kg, 29 ft•lb)
Footrest (Right):
23 Nm (2.3 m•kg, 17 ft•lb)
Rear Brake Master Cylinder:
23 Nm (2.3 m•kg, 17 ft•lb)



4. Adjust:
   • Rear brake switch
   Refer to "CHAPTER 2. REAR BRAKE SWITCH ADJUSTMENT" section.
5. Bend the tabs ① on the air baffle plate (front) as shown.

6. Tighten:
   • All nuts or bolts.
   By the following specification torque.

Conduit:
7 Nm (0.7 m•kg, 5.1 ft•lb)
Radiator:
7 Nm (0.7 m•kg, 5.1 ft•lb)
Radiator Cover:
4 Nm (0.4 m•kg, 2.9 ft•lb)
Carburetor Joint:
10 Nm (1.0m•kg, 7.2 ft•lb)



7. Connect:
   • All hoses and lead (conduit)
   Refer to “CHAPTER 4. COOLING SYSTEM, RADIATOR AND CONDUIT” section.
8. Adjust:
   • Throttle calbe free play
   Refer to “CHAPTER 5. CARBURETION, THROTTLE CABLE CYLINDER” seciton.
9. Add:
   • Engien oil
   Refer to “CHAPTER 2. ENGINE OIL REPLACEMENT” section.
10. Add:
   • Coolant
   Refer to “CHAPTER 4. COOLING SYSTEM COOLANT” section.

CHAPTER 4.
COOLING SYSTEM

COOLANT 4-1
COOLANT FLOW 4-1
COOLANT REPLACEMENT 4-2

WATER PUMP 4-5
DISASSEMBLY 4-5
INSPECTION 4-5
BEARING AND SEAL REPLACEMENT 4-5
ASSEMBLY 4-7

THERMOSTATIC VALVE 4-8
REMOVAL 4-8
INSPECTION AND ASSEMBLY 4-8

COOLANT DRAIN VALVE 4-9
DISASSEMBLY 4-9
INSPECTION 4-9
ASSEMBLY 4-9

CYLINDER HEAD WATER JACKET JOINT 4-10
REMOVAL 4-10
INSPECTION 4-10
ASSEMBLY 4-10

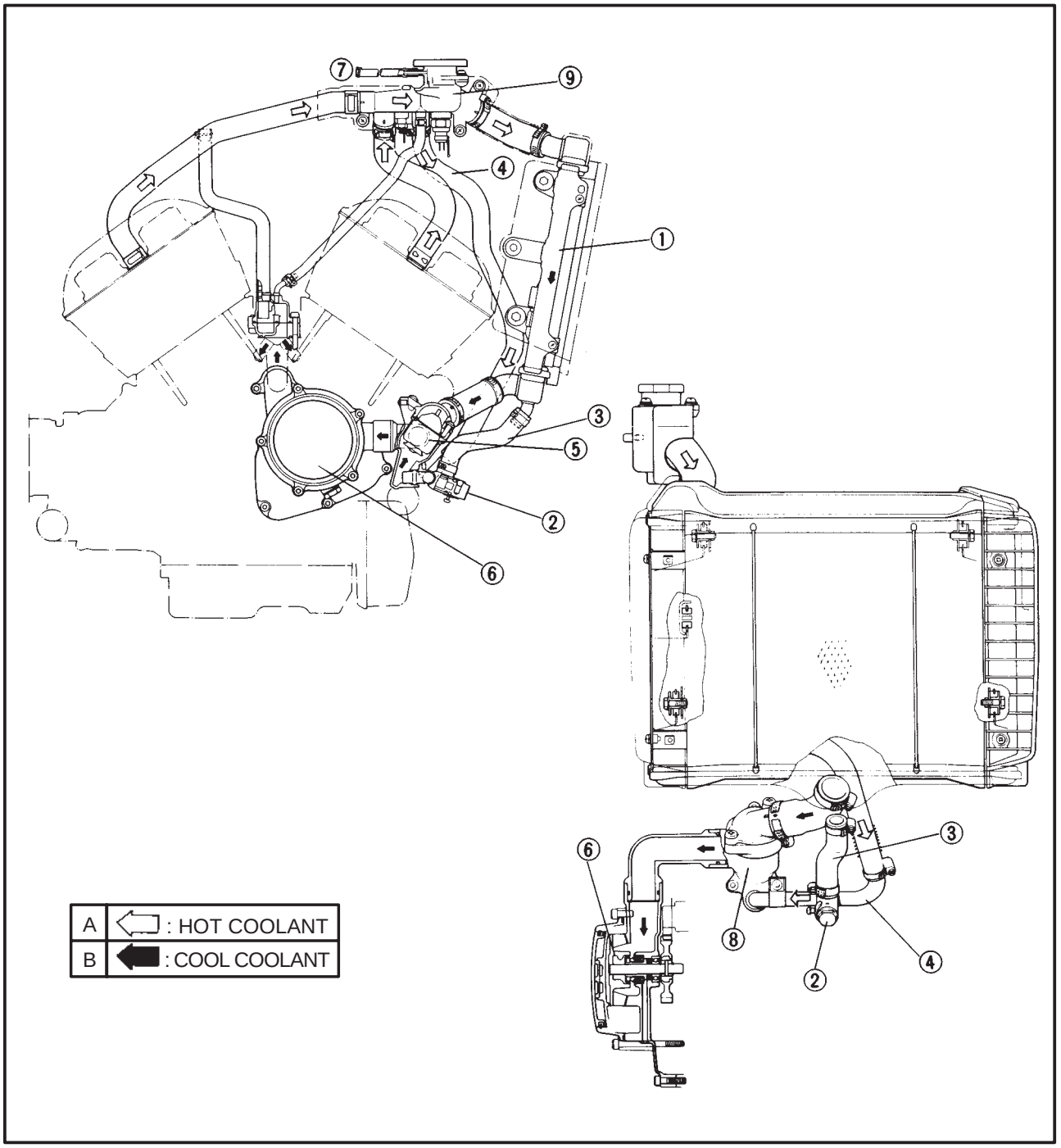
RADIATOR AND CONDUIT 4-10
DISASSEMBLY 4-10
INSPECTION 4-11
ASSEMBLY 4-12

COOLING SYSTEM

COOLANT

COOLANT FLOW

① Radiator
② Coolant drain valve
③ Bypass pipe to the coolant drain valve
④ Bypass pipe to the thermostatic valve
⑤ Thermostatic valve
⑥ Water pump
⑦ To the reservoir tank
⑧ Thermostat housing
⑨ Conduit

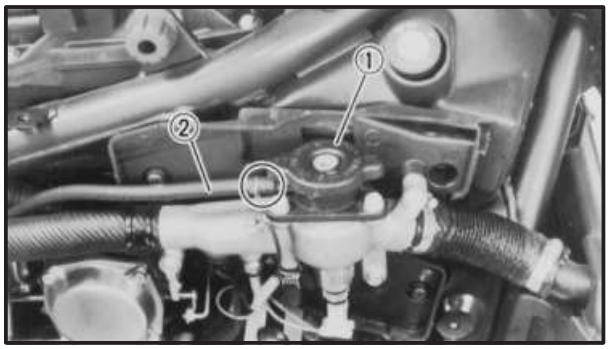


COOLANT REPLACEMENT

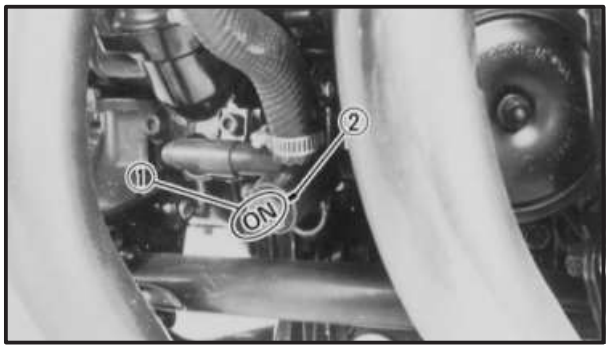
WARNING:

Do not remove the radiator cap when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, open the radiator cap by the following procedure:
Place a thick rag, like a towel, over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

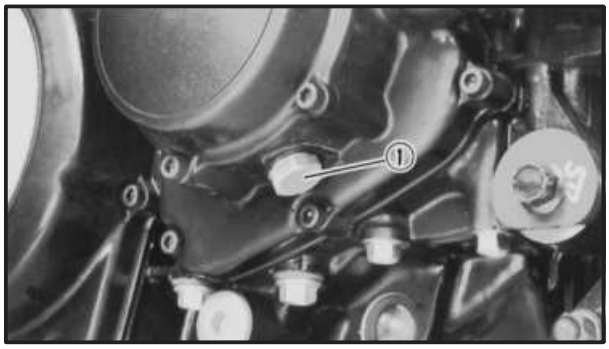
1. Place a receptacle under the coolant drain bolt.



2. Remove:
   - Cover (right)
   - To cover
   - Radiator cap ①
   - Feed hose (reservoir tank) ②

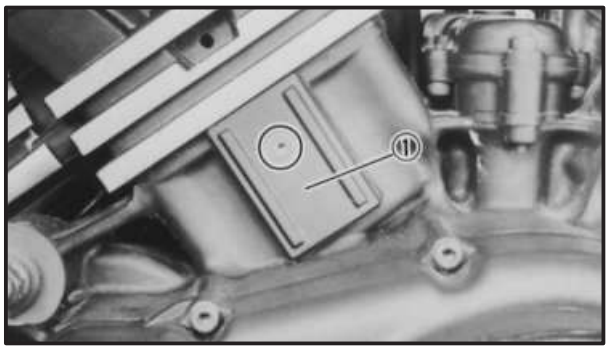


3. Align:
   - Coolant drain valve "ON" ① mark with match mark ② on drain valve housing

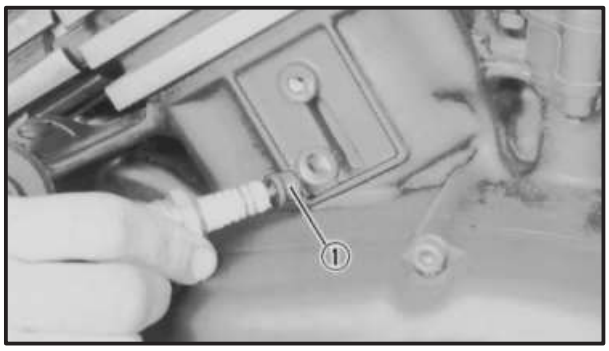


4. Remove:
   - Drain bolt ①

   Drain the coolant.



5. Remove:
   • Side covers (cylinder) ①



6. Remove:
   • Rubber plugs ①
   Drain the coolant.

NOTE:
To facilitate removal of the rubber plug's, screw a spark plug into the threaded hole and hand-pull the spark plug firmly.

7. Drain:
   • Coolant (completely)

NOTE:
Thoroughly flush the cooling system with clean tap water.

8. Inspect:
   • Rubber plugs
   Damage → Replace.
9. Tighten:
   • Drain bolt

Drain Bolt:
43 Nm (4.3 m•kg, 31 ft•lb)

10. Fill:
   • Cooling system

Recommended Coolant:
High Quality Ethylene Glycol Anti-Freeze containing Anti-Corrosion for Aluminum Engine Inhibitors
Coolant and Water Mixed Ratio:
50%/50%
Total Amount:
3.05 L (2.69 Imp qt, 3.22 US qt)

Reservoir Tank capacity:
0.30 L (0.26 Imp qt, 0.32 US qt)
From "LOW" to "FULL" Level:
0.20 L (0.18 Imp qt, 0.21 US qt)

CAUTION:

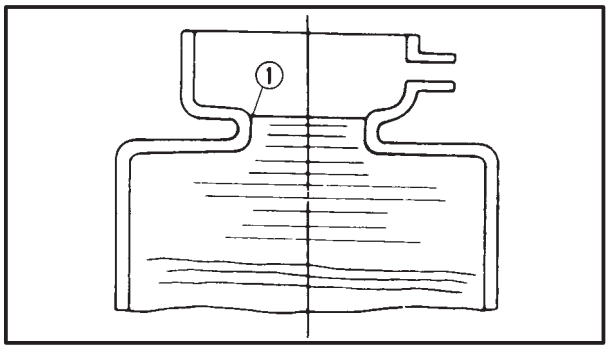
- **Hard water or salt water is harmful to the engine. You may use distilled water if you can't get soft water.**
- **Do not mix more than one type of ethlen glycol antifreeze containing corrosion for aluminum engine inhabitors.**

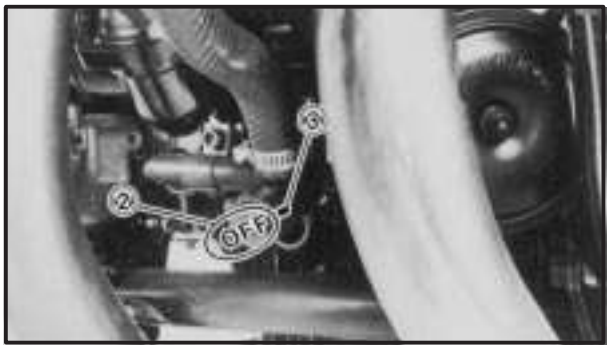
Coolant filling steps:
- Fill the coolant into the conduit until the conduit is full.
- Start the engine (coolant level decreases.)

CAUTION:

Always check coolant level, and check for coolant leakage before starting engine.

- Add the coolant while engine is running.
- Stop the engine when coolant level stabilizes.
- Add the coolant again to specified level ①.
- Install the radiator cap.
- Align the coolant drain valve "OFF" mark ② with the match mark ③ on drain valve housing.







11. Connect:
    - Feed hose (reservoir tank)
12. Fill:
    - Reservoir tank
      Add the coolant until liquid reaches "FULL" level mark.

① "FULL" level

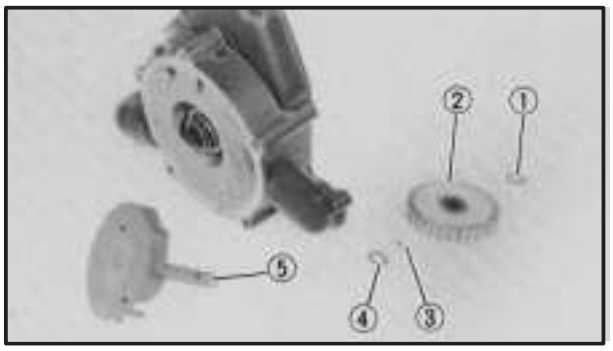
② "LOW" level

WATER PUMP

DISASSEMBLY

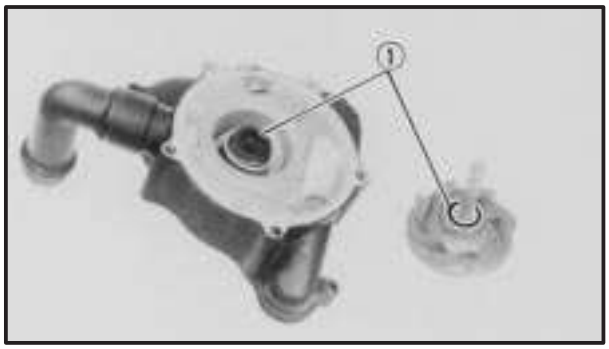
NOTE:

- Be sure to drain the coolant before disassembly of the cooling system components.
- Refer to Engine Disassembly for water pump disassembly.



1. Remove:
   - Circlip ①
   - Drive gear ②
   - Gear stopper pin ③
   - Circlip ④
   - Impeller shaft ⑤
2. Eliminate:
   - Deposits

   From the impeller and water pump housing.



INSPECTION

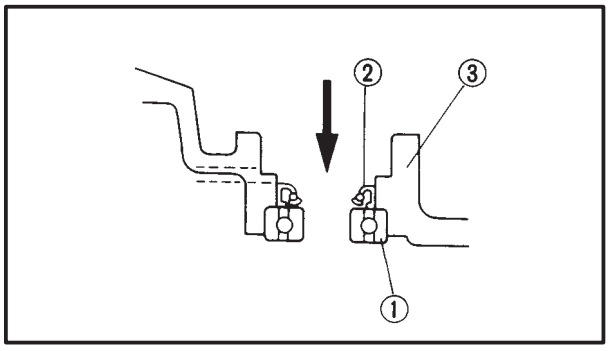
1. Inspect:
   - Bearing

     Wear/Damage → Replace.
   - Oil seal

     Wear/Damage → Replace.
   - Impeller

     Cracks/Wear/Damage → Replace.
   - Water pump seal set ①

     Wear/Damage → Replace.

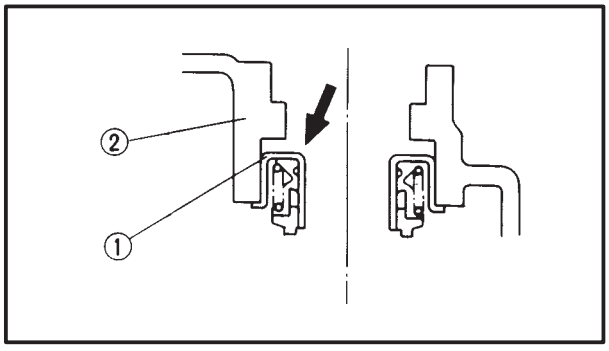


BEARING AND SEAL REPLACEMENT

1. Remove:
   - Bearing ①
   - Oil seal ②

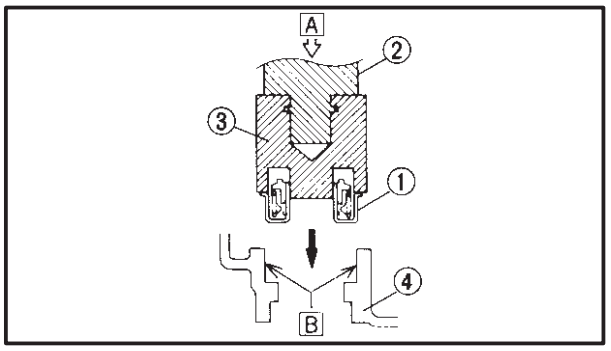
     Tap off both components from water pump seal side.

③ Crankcase cover



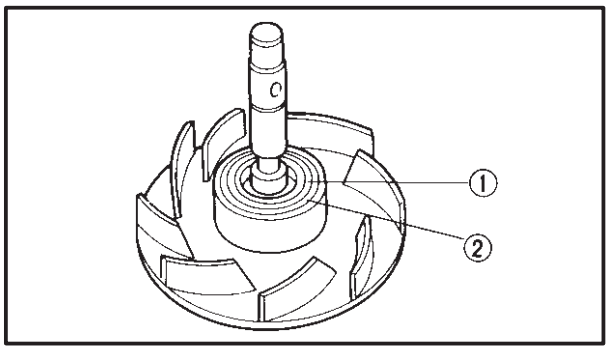
2. Remove:
   - Water pump seal (crankcase side) ①

     Tap it off from the cover ②.



3. Install:
   • Water pump seal ①
   Use Water Pump Seal Installer (90890-04058 ②, 90890-04078 ③)
   Apply Yamaha Bond No.4 to crankcase cover ④ before installing seal.

A PRESS
B APPLY YAMAHA BOND No.4

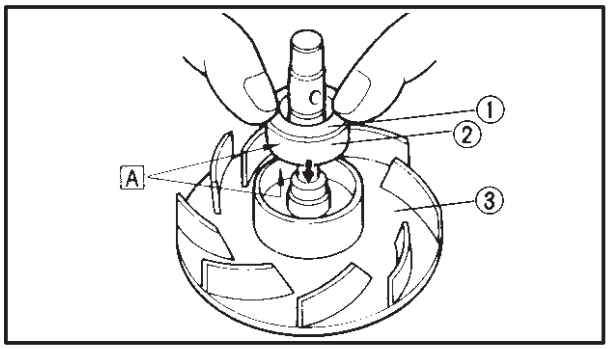


4. Remove:
   • Seal No.2 ①
   From impeller.
   Pry out with a small screwdriver.

NOTE:

Be careful not to scratch or bend the impeller shaft.

② Damper rubber



5. Apply:
   • Water or coolant
   To outer surface of damper rubber ② and impeller hub.

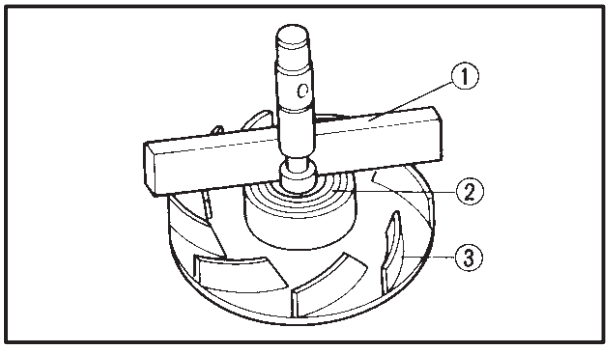
CAUTION:

Never apply oil or grease to water pump seal surfaces.

6. Assemble:
   • Seal No.2/Damper rubber ②
   To impeller hub.

① Slip ring
③ Impeller
A APPLICATION OF WATER OR COOLANT

7. Measure:
   • Tilt
   Out of specification → Repeat the above steps "4 ~ 6".

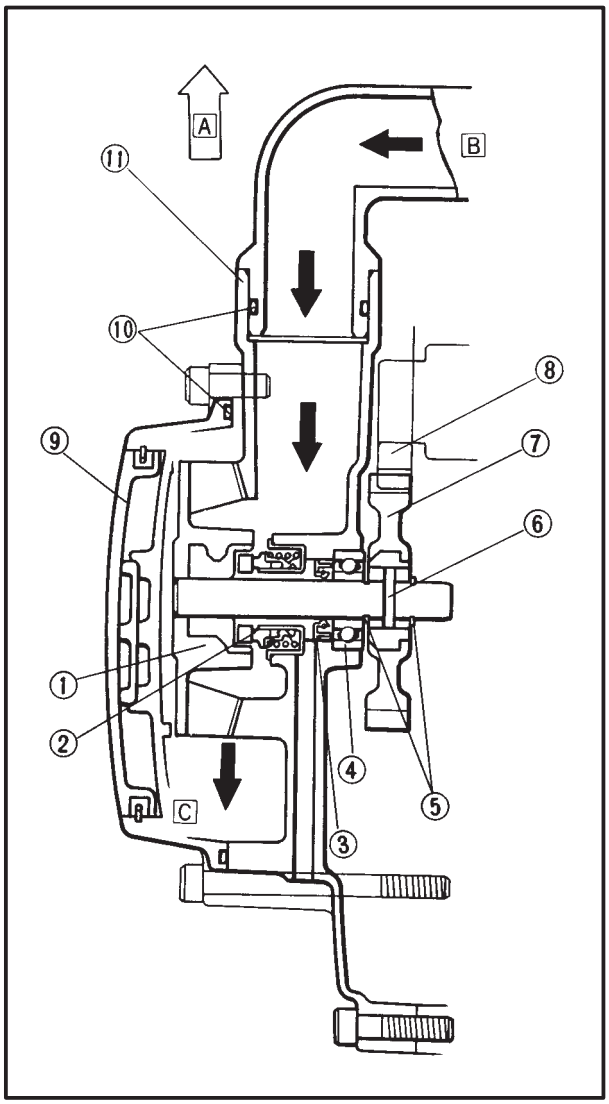


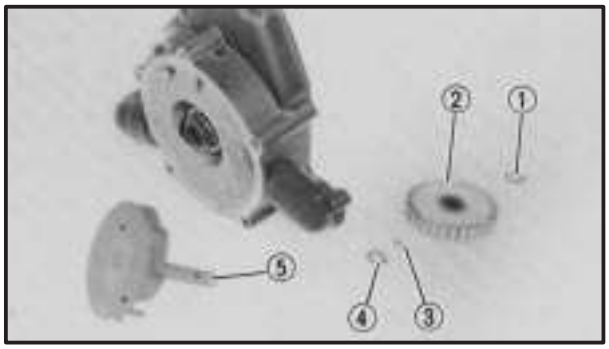
NOTE:

Be sure seal No.2 fits squarely.

Tilt Limit: 0.15 mm (0.006 in)

① Straight edge
② Seal No.2
③ Impeller





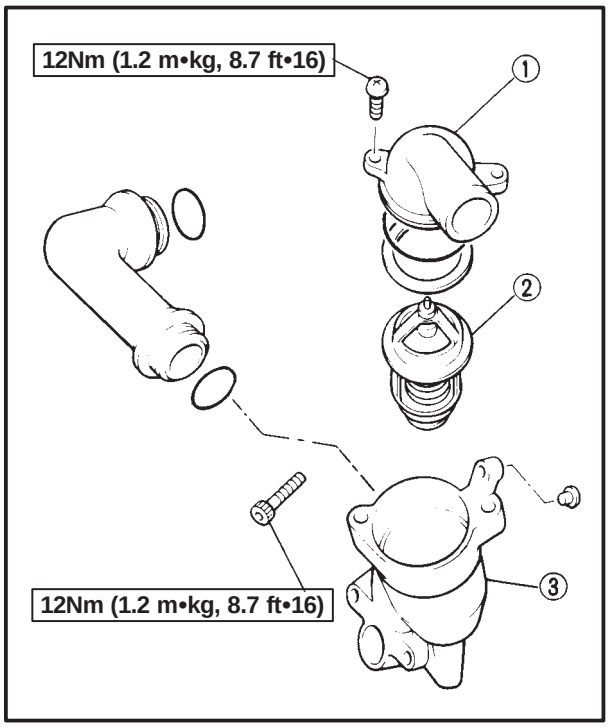
ASSEMBLY

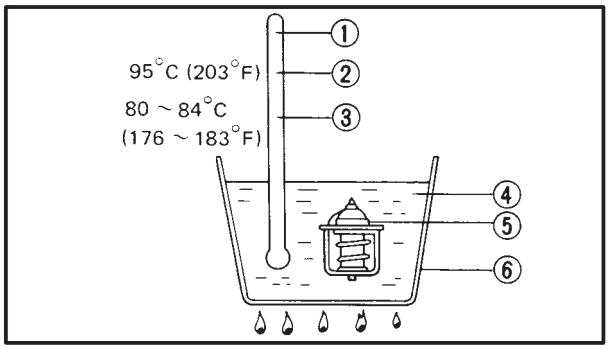
① Impeller
② Mechanical seal
③ Oil seal
④ Bearing
⑤ Circlip
⑥ Gear stopper pin
⑦ Driven gear
⑧ Drive gear
⑨ Water pump cover
⑩ O-ring
⑪ Crankcase cover
A FRONT
B FRONT RADIATOR
C TO CYLINDER

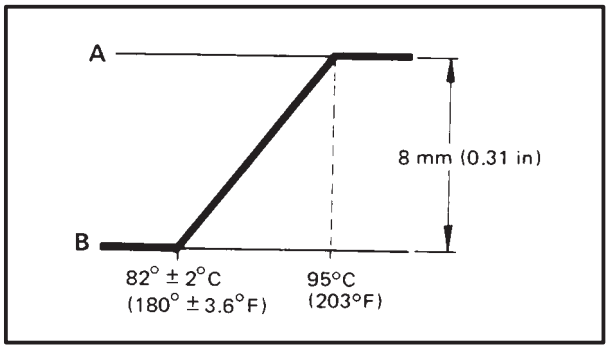
1. Install:
   - Impeller shaft ⑤
   - Circlip ④
   - Gear stopper pin ③
   - Drive gear ②
   - Circlip ①

CAUTION:

- **Be sure not to scratch the water pump mechanical seal while installing.**
- **Replace any scratched seal.**







THERMOSTATIC VALVE

REMOVAL

1. Remove:
   - Thermostat cover ①
   - Thermostatic valve ②

③ Thermostat housing

INSPECTION AND ASSEMBLY

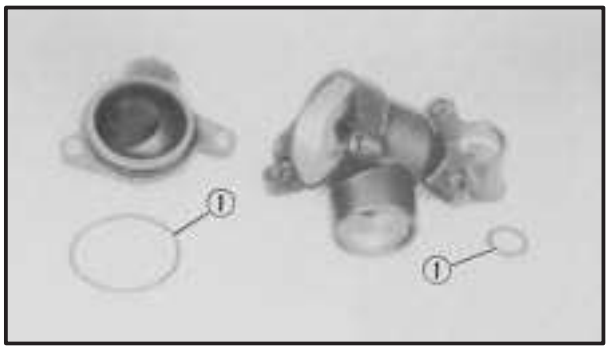
1. Inspect:
   - Thermostatic valve
     Valve does not open at 80 ~ 84°C (176 ~ 183°F) → Replace.

Thermostatic valve inspection steps:
- Suspend thermostatic valve in a vessel or water.
- Place reliable thermometer in water.
- Heat water slowly.
- Observe thermometer, while stirring water continually

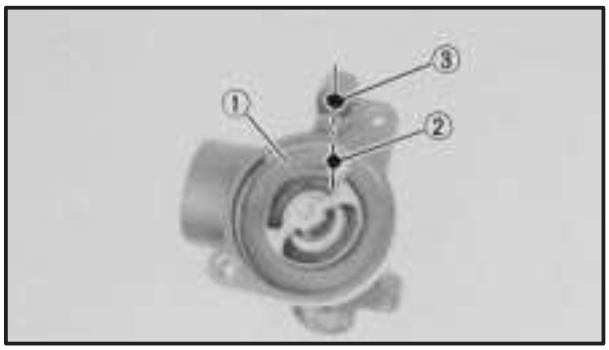
① Thermometer
② Full open
③ Opening sequence begins
④ Water
⑤ Thermostatic valve
⑥ Vessel
A OPEN
B CLOSE

NOTE:

Thermostat is sealed and its setting is specialized work. If its accuracy is in doubt, always replace it. A faulty unit could cause serious overheating or overcooling.



2. Inspect:
   • O-ring ①
   Wear / Damage → Replace.

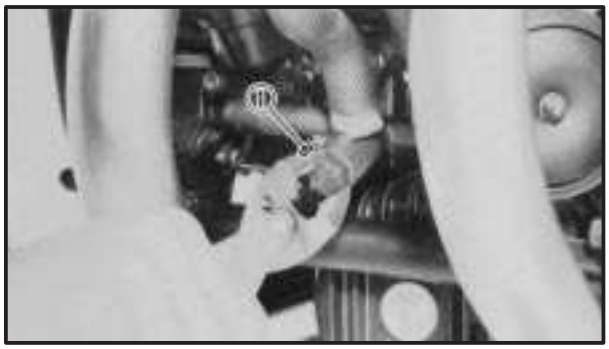


3. Install:
   • Thermostatic valve ①

NOTE:

Line up the valve breather hole ② with the housing projection ③.

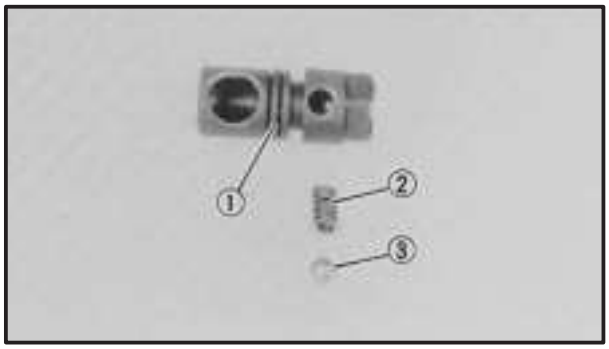
   • Thermostat cover
   • Thermostat housing



COOLANT DRAIN VALVE

DISASSEMBLY

1. Remove:
   • Retaining screw ①
   • Valve assembly



INSPECTION

1. Inspect:
   • O-ring ①
   Wear / Damage → Replace.
   • Spring ②
   Damage → Replace.
   • Stopper ball ③
   Wear / Damage → Replace.

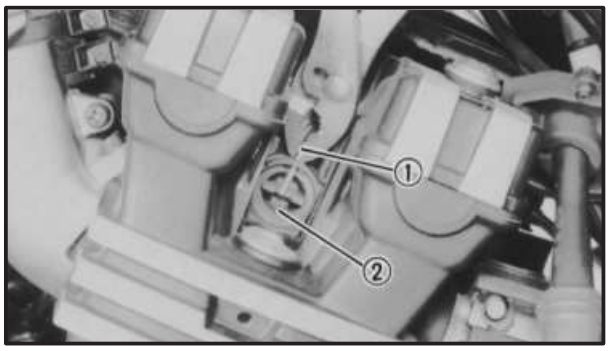
ASSEMBLY

1. Install:
   • Valve assembly
   Be sure stopper ball falls into body cavity.
2. Secure valve assembly with retaining screw.

CYLINDER HEAD WATER JACKET JOINT

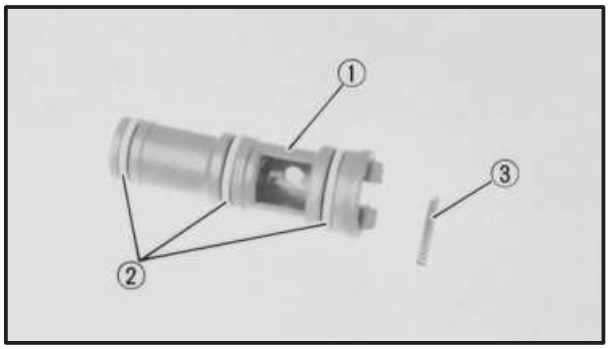
CAUTION:

- **Be sure to drain the coolant before you disassemble the water jacket joints otherwise the coolant will flow into the crankcase.**
- **Do not remove the water jacket joints unless absolutely essential; e.g., when overhauling the engine.**



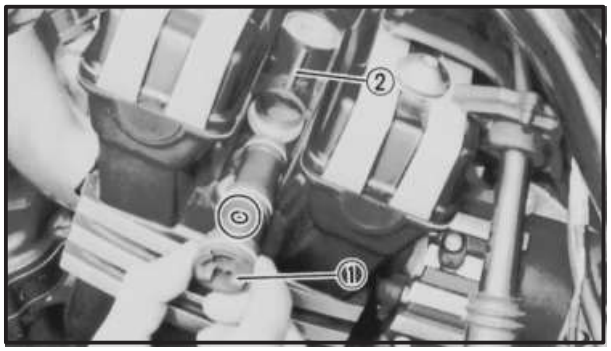
REMOVAL

1. Remove:
   - Stopper pins ①
   - Water jacket joints ②



INSPECTION

1. Inspect:
   - Water jacket joint ①
     Clogging → Clean.
   - O-rings ②
     Wear/Damage → Replace.
   - Stopper pin ③
     Wear/Bends → Replace.



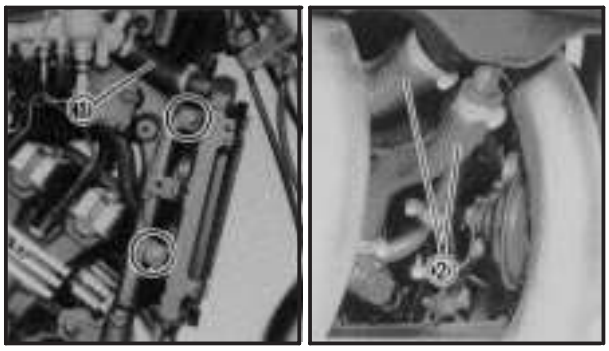
ASSEMBLY

1. Install:
   - Water jacket joints ①
   - Stopper pins ②

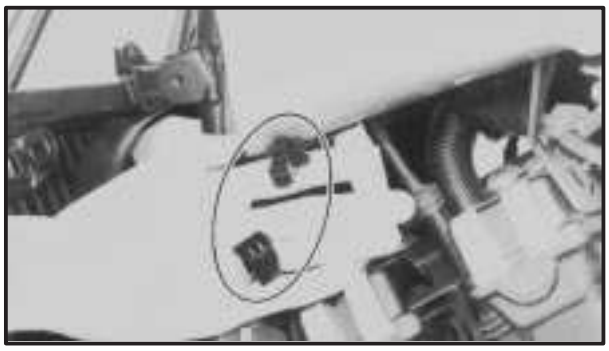
RADIATOR AND CONDUIT

DISASSEMBLY

1. Drain:
   - Coolant (completely)
     Refer to “COOLANT REPLACEMENT” section.



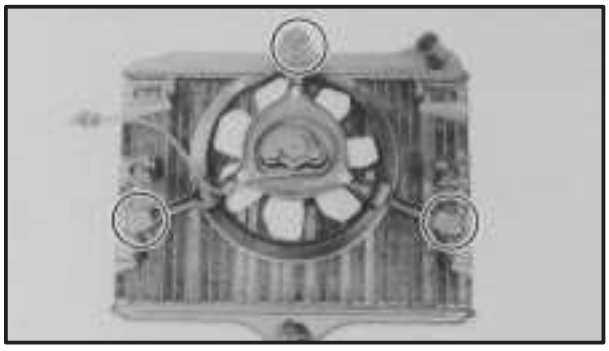
2. Remove:
   • Bolts (radiator)
3. Disconnect:
   • Upper hose ①
   • Lower hoses ②



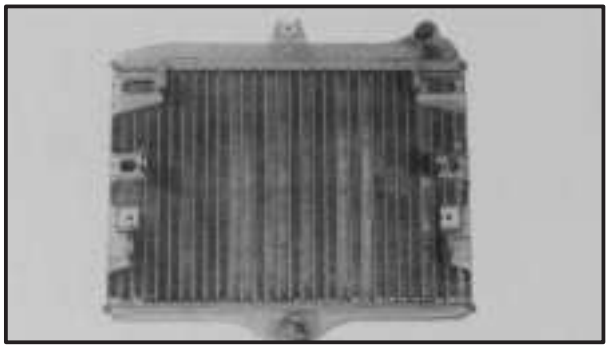
4. Disconnect:
   • Fan motor coupler
5. Remove:
   • Radiator assembly



6. Disconnect:
   • All hoses and leads (conduit)
7. Remove:
   • Screws (conduit)



8. Remove:
   • Fan motor assembly



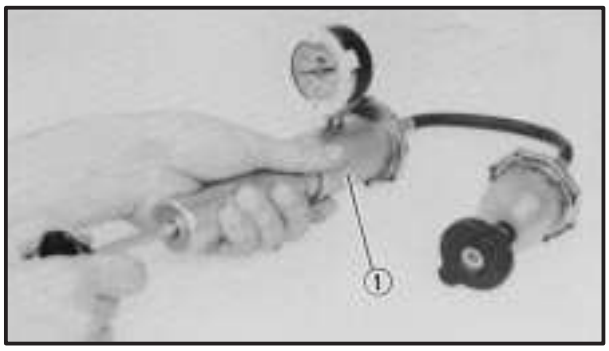
INSPECTION

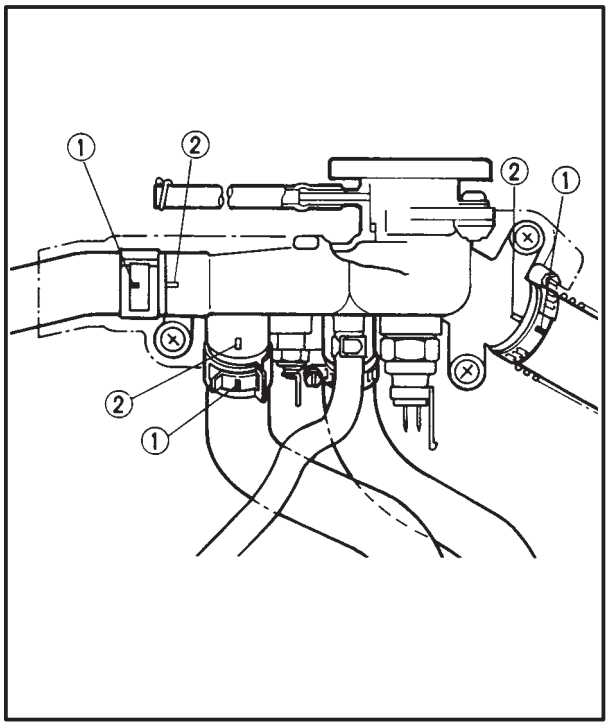
1. Inspect:
   • Radiator
   Obstruction → Blow out with compressed air through rear of radiator.
   Flattened fins → Repair.
   • Coolant hoses
   Cracks/Damage → Replace.

2. Inspect:
   • Vacuum valve spring
     Fatigue → Replace.
   • Vacuum valve seating condition
     Poor condition → Replace.
3. Measure:
   • Valve opening pressure

Valve opening pressure measurement steps:
• Measure the radiator cap pressure using the Radiator Cap Tester ① (90890-01325). Valve opens at pressure below specified valve or defective → Replace.

Valve Opening Pressure:
73.6 ~ 103.0 kPa (0.75 ~ 1.05 kg/cm², 10.7 ~ 14.9 lb/in²)





ASSEMBLY
When installing the radiator and conduit, reverse the removal procedure. Note the following points.
1. Install:
   • Conduit

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

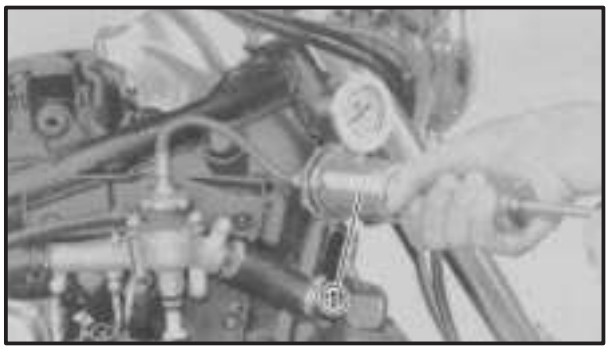
2. Connect:
   • All hoses and leads (conduit)

NOTE:
Align the hose match marks ① with the match marks ② on the conduit.

3. Install:
   • Radiator assembly

Bolts (Radiator):
7 Nm (0.7 m•kg, 5.1 ft•lb)

4. Fill:
   • Cooling system
     Refer to “COOLANT REPLACEMENT” section.



5. Inspect
   • Cooling system

Cooling system inspection steps:
• Connect Radiator Cap Tester (90890-01325) ①.
• Apply 98 kPa (1.0 kg/cm^2, 14 psi) pressure.
• Measure pressure with gauge.
Decrease of pressure (leaks) → Repair at required.

CHAPTER 5.
CARBURETION

CARBURETOR 5-1
SECTION VIEW 5-2
REMOVAL 5-3
DISASSEMBLY 5-3
INSPECTION 5-6
ASSEMBLY 5-7
INSTALLATION 5-8
ADJUSTMENT 5-9

THROTTLE CABLE CYLINDER 5-10
ADJUSTMENT 5-10

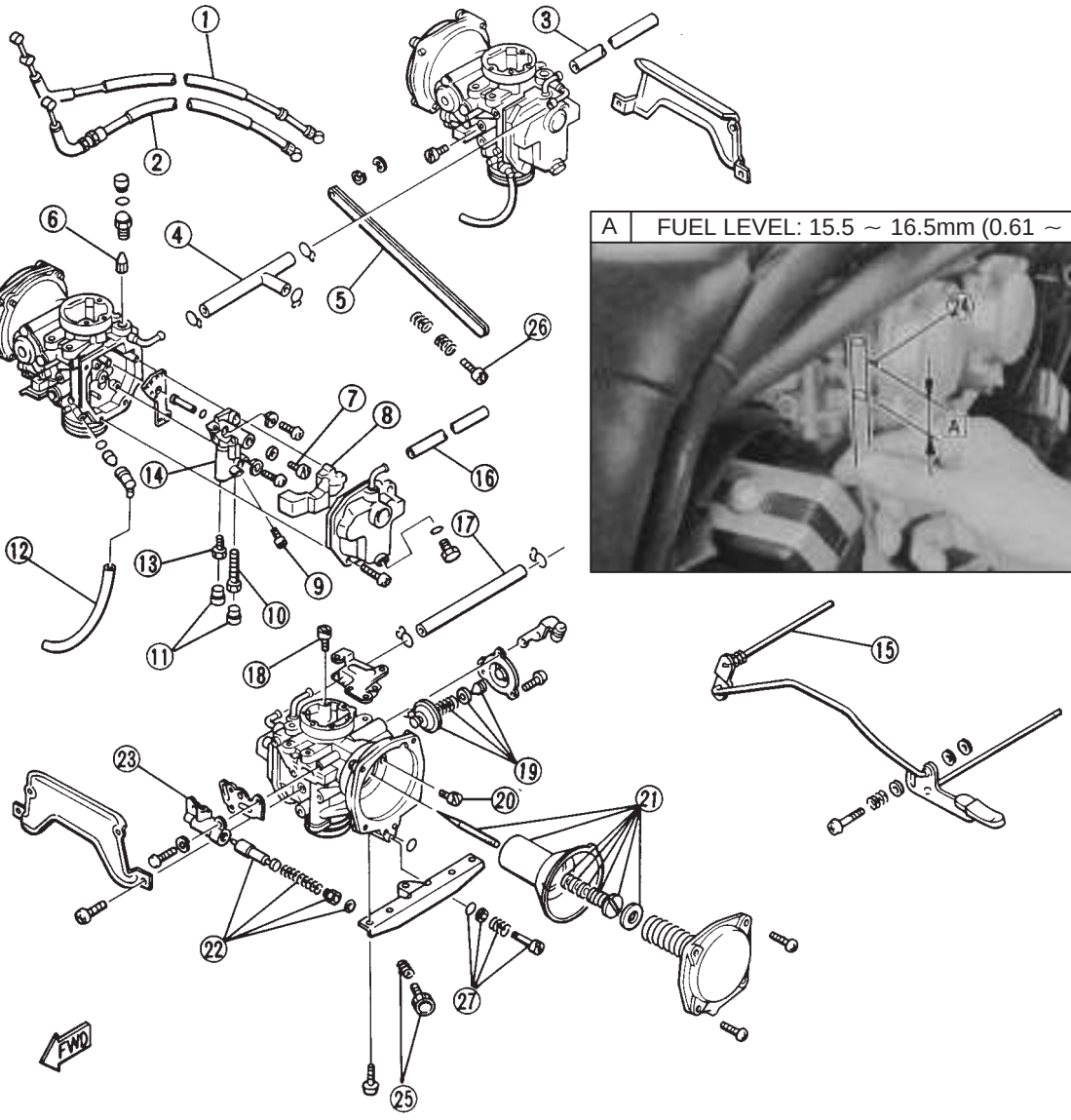
AIR CLEANER AND CRANKCASE VENTILATION SYSTEM 5-14

CARBURETION

CARBURETOR

① Throttle cable (Close side)
② Throttle cable (Open side)
③ Fuel overflow hose
④ Fuel feed hose
⑤ Syncronization rod
⑥ Float needle valve
⑦ Needle jet screw
⑧ Float
⑨ Main jet
⑩ Main bleed pipe
⑪ Rubber plug
⑫ Fuel drain hose
⑬ Pilot jet
⑭ Jet block
⑮ Starter lever shaft
⑯ Fuel overflow hose
⑰ Fuel feed hose
⑱ Pilot air jet No.1
⑲ Coasting enrichment valve assembly
⑳ Pilot air jet No.2
㉑ Piston valve assembly
㉒ Starter plunger assembly
㉓ Starter body
㉔ Piston valve center mark
㉕ Throttle stop screw set
㉖ Syncronization screw
㉗ Pilot screw set

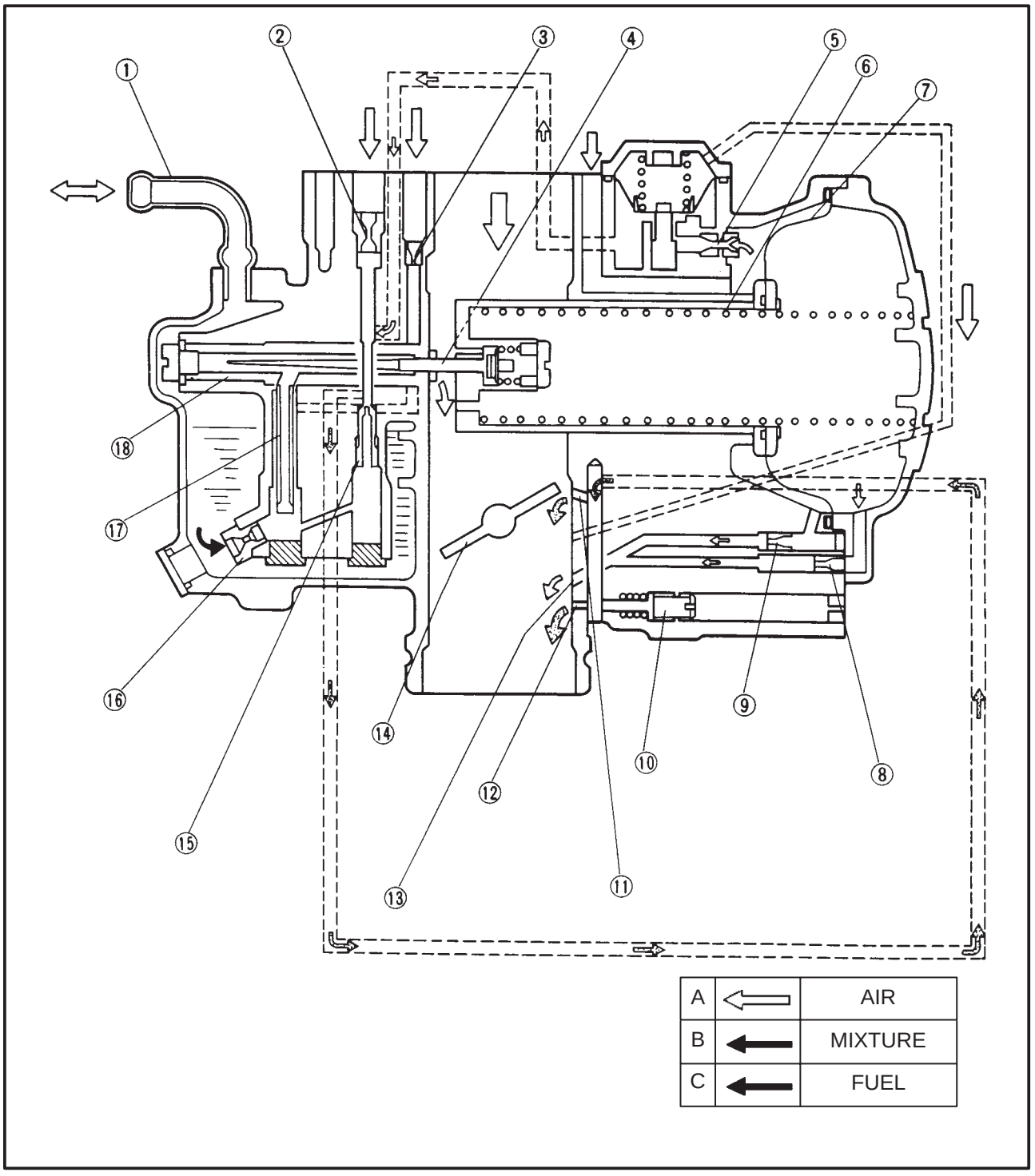
SPECIFICATIONS	
Main jet	#1& #3:# 152.5 #2& #4:# 150
Main air jet	ø 2.0
Jeet needle	5EZ47-3
Needle jet	Y-0
pilot jet	#37.5
Fuel level	15.5 ~ 16.5 mm (0.61 ~ 0.65 in)
Pilot screw	2
Float valve seat	1.5
Engine idle speed	950 ~ 1,050 r/min



A	FUEL LEVEL: 15.5 ~ 16.5mm (0.61 ~ 0.65 in)

SECTION VIEW

① Air vent
② Pilot air jet No.1
③ Main air jet
④ Jet needle
⑤ Pilot air jet No.2
⑥ Piston valve
⑦ Diaphragm
⑧ Purge jet No.2
⑨ Purge jet No.1
⑩ Pilot screw
⑪ Bypass hole
⑫ Pilot outlet
⑬ Purge hole
⑭ Throttle valve
⑮ Pilot jet
⑯ Main jet
⑰ Main bleed pipe
⑱ Needle jet



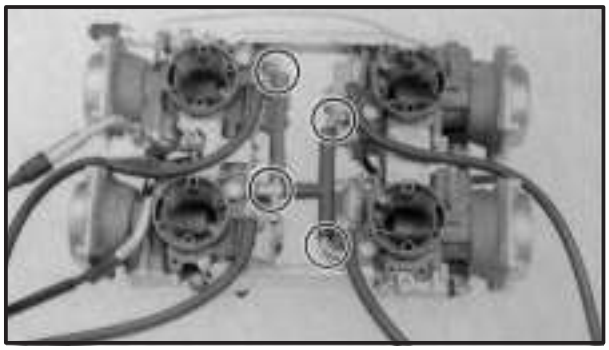
REMOVAL

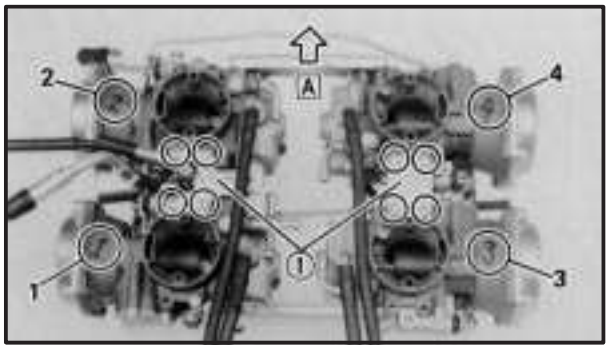
1. Remove:
   • Carburetor assembly
   Refer to engine removal section.

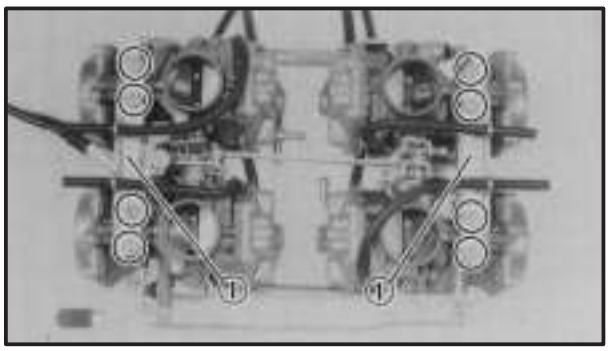
NOTE:

The following parts can be cleaned and inspected without disassembly.

• Piston valve
• Starter plunger
• Coasting enrichment valve







DISASSEMBLY

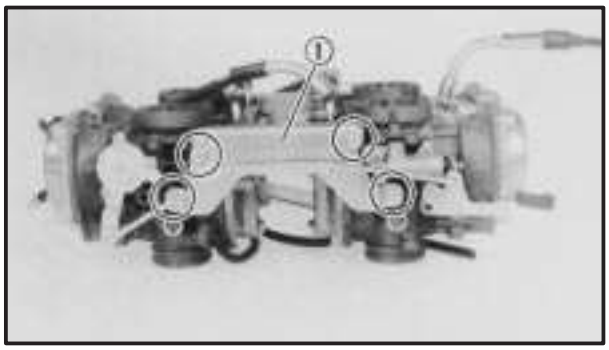
CAUTION:

The plastic piston valve is fragile and highly susceptible to damage. Be sure to handle with extreme care. Do not drop the valve or subject it to undue abuse as this can cause cracks that could severely weaken the piston valve.

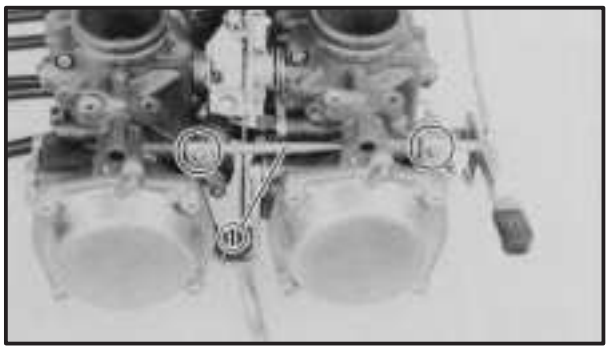
1. Remove:
   • Fuel lines
2. Number each carburetor before removing it from carburetor bracket.
3. Remove:
   • Upper brackets ①

Ⓐ FRONT

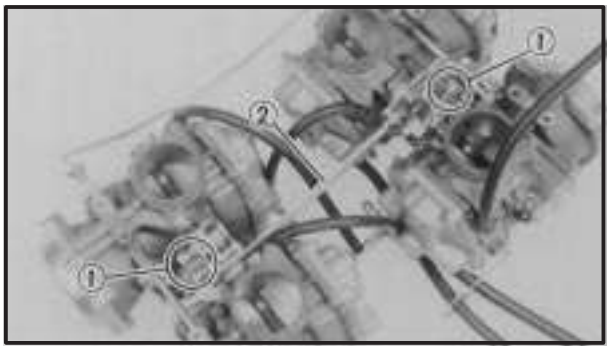
4. Remove:
   • Lower brackets ①



5. Remove:
   • Side brackets ①



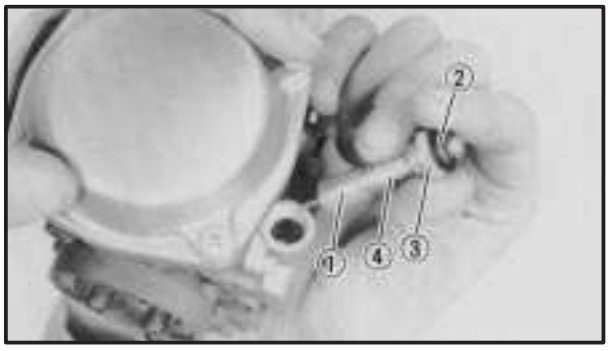
6. Remove:
   • Starter lever shafts ①



7. Remove:
   • Synchronization screws ①
   • Synchronization rod ②

NOTE:

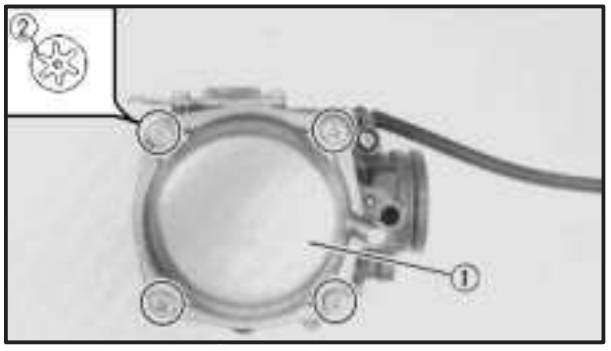
When separating the carburetors be sure not to lose the small spring that may fall out. This spring connects the throttle levers.



8. Remove:
   • Starter plunger ①
   • Starter plunger body ②

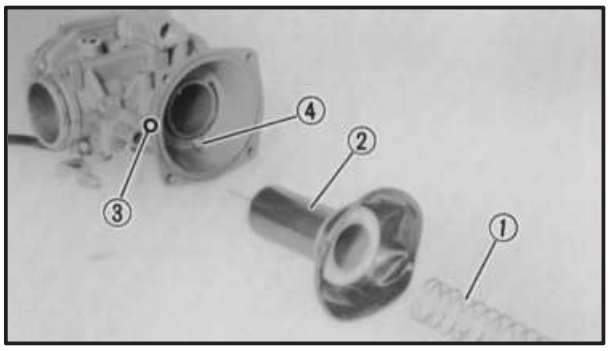
③ Nut

④ Spring

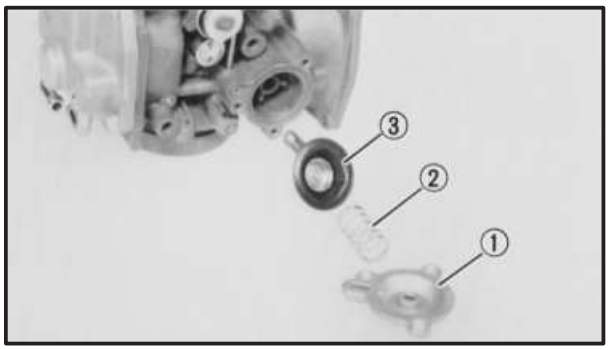


9. Remove:
   • Vacuum chamber cover ①
   Use the special Torx Driver (90890-05349).

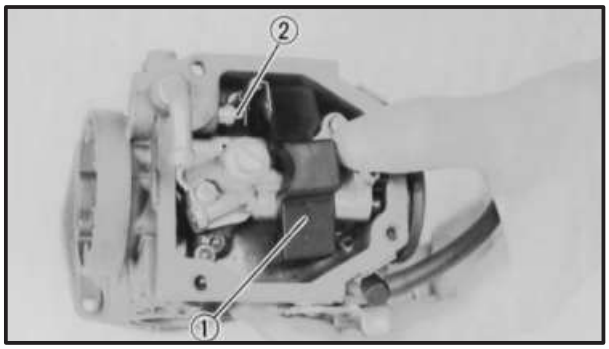
② Tamperproof screw



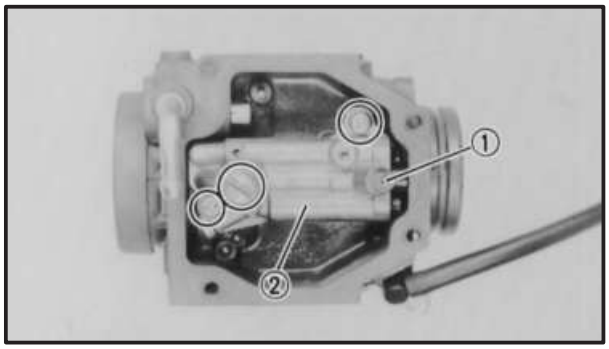
10. Remove:
- Spring ①
- Vacuum piston ②
- O-ring ③
- Pilot air jet No.2 ④



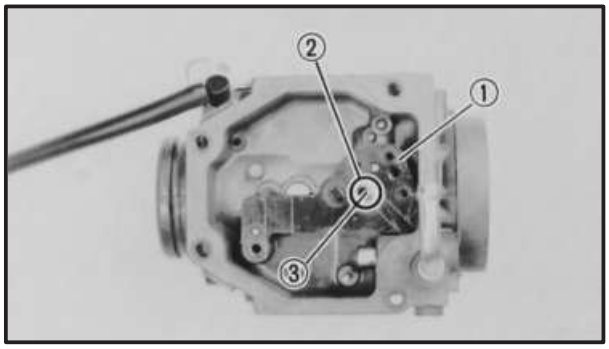
11. Remove:
- Coasting enrichment cover ①
- Spring ②
- Diaphragm ③



12. Remove:
- Float chamber cover
- Float ①
- Needle valve ②



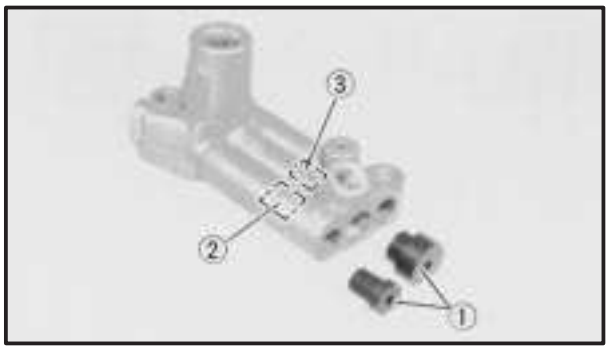
13. Remove:
- Main jet ①
- Jet block ②



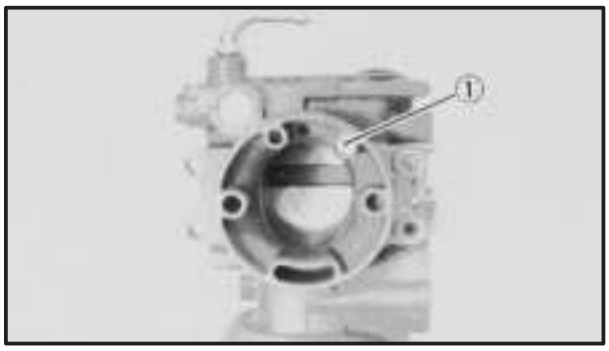
14. Remove:
- Gasket ①
- O-ring ②
- Needle jet ③

NOTE:

Move the needle jet toward the vacuum piston.



15. Remove:
- Rubber caps ①
- Pilot jet ②
- Main bleed pipe ③



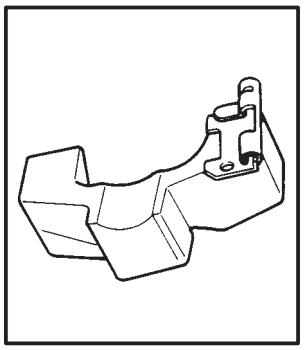
16. Remove:
- Pilot air jet No.1 ①

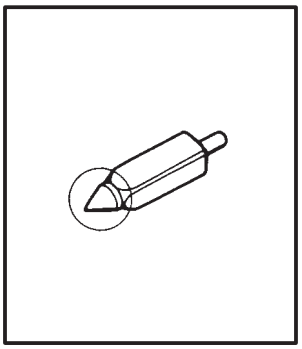
INSPECTION

1. Inspect:
- Carburetor body
  Contamination → Clean.

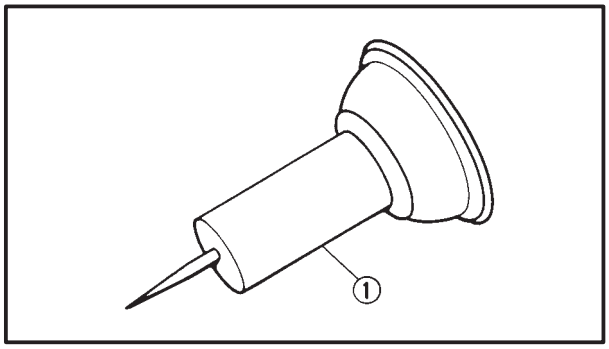
NOTE:

Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.





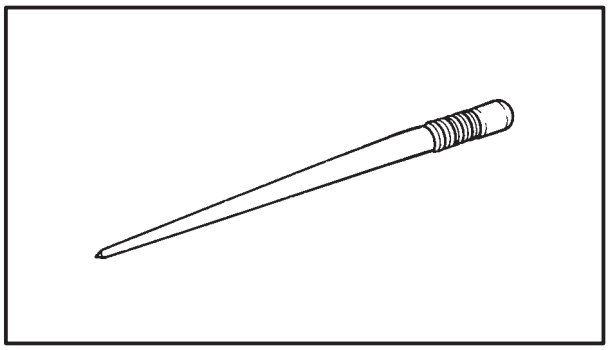
2. Inspect:
- Float
  Damage → Replace.
- Needle valve
  Wear/Contamination → Replace.



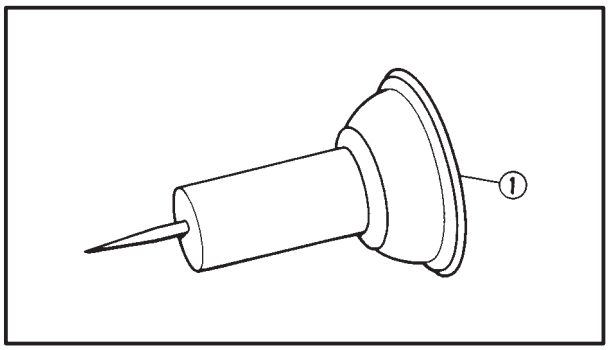
3. Inspect:
- Vacuum piston ①
  Cracks → Replace.

NOTE:

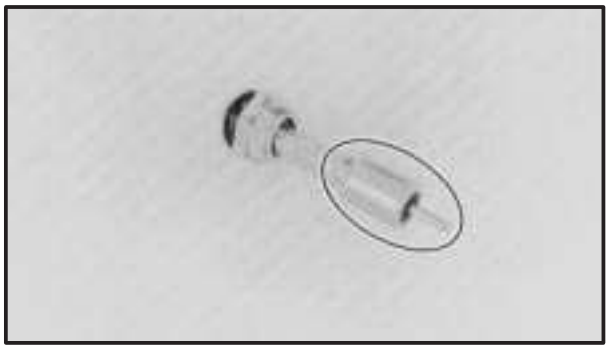
If you suspect the piston valve has been damaged, check the component for cracks by pouring gasoline into the valve. If it leaks, replace with a new piston valve.



4. Inspect:
   • Jet needle
   Bends/Wear → Replace.



5. Inspect:
   • Diaphragm ①
   Tears → Replace.



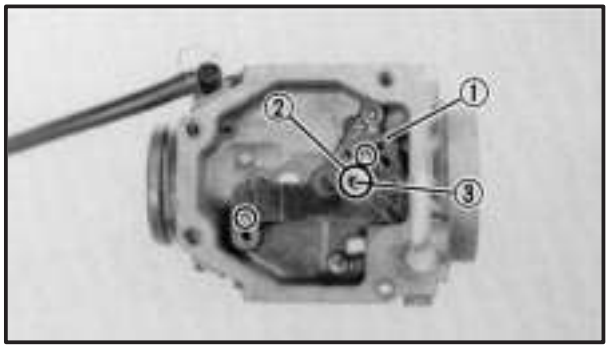
6. Inspect:
   • Starter plunger
   Damage/Wear → Replace.
7. Inspect
   • O-ring,
   • Gasket
   Damage → Replace.

ASSEMBLY

To assemble the carburetors, reverse the disassembly procedures. Note the following points.

CAUTION:

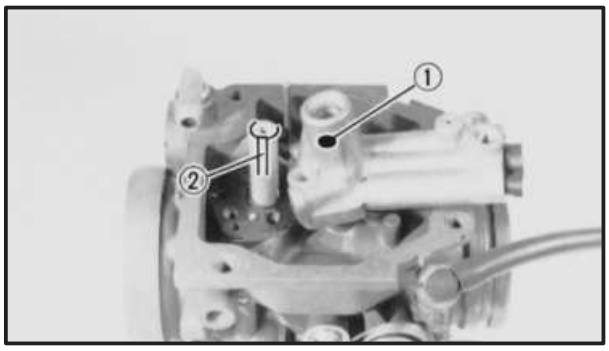
- **Before reassembling, wash all parts in clean gasoline.**
- **Always use a new gasket.**



1. Install:
   • Needle jet ③
   • O-ring ②
   • Gasket ①

NOTE:

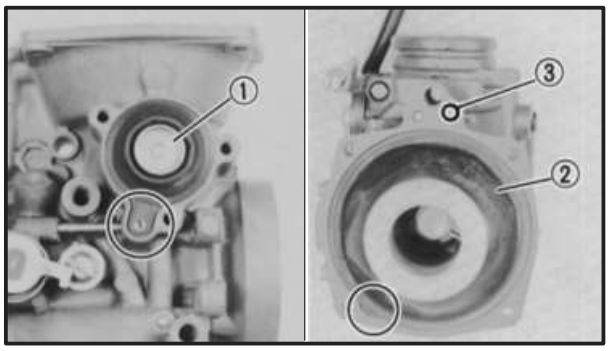
Make sure the projections on the carburetor body are meshed with the holes on the gasket.



2. Install:
   • Jet block

NOTE:

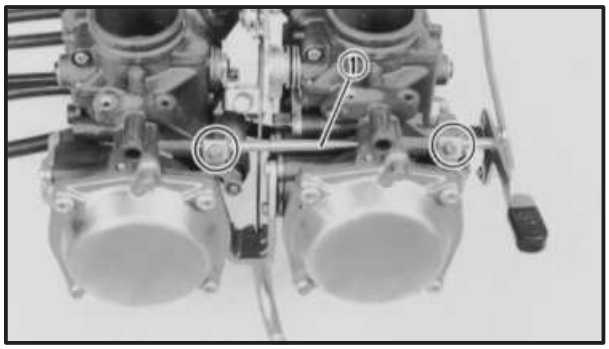
Make sure the projection ① on the jet block is meshed with the groove ② on the needle jet.



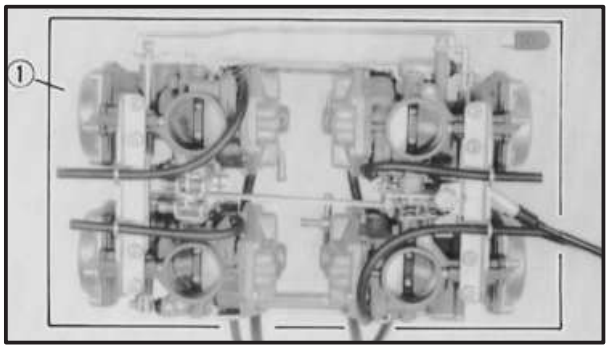
3. Install:
   • Coasting enricher ①
   • Vacuum piston ②
   • O-ring ③

NOTE:

There is a tab on the rubber diaphragm and a matching recess in the carburetor body to accept the diaphragm tab.



4. Install:
   • Starter lever shafts ①
   Apply LOCTITE® to the starter plunger lever securing screws.



5. Install:
   • Mounting brackets
   Apply LOCTITE® to the bracket securing screws.

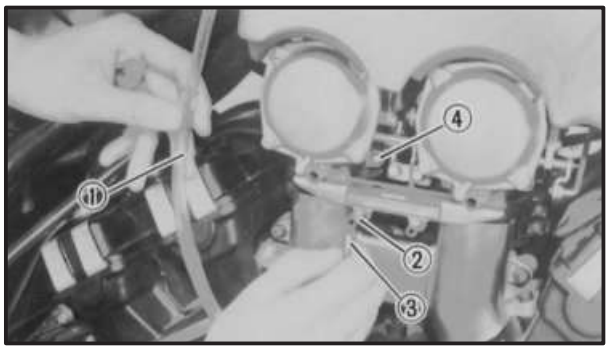
NOTE:

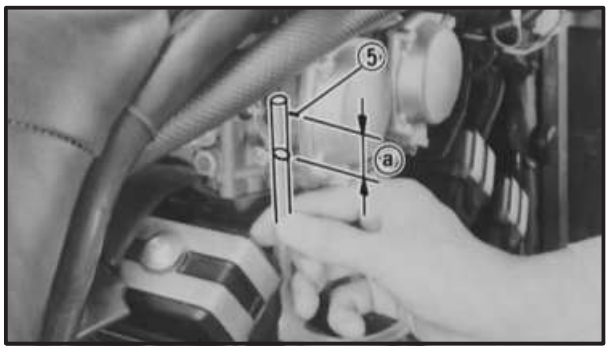
When reassembling, the surface plate ① should be used for proper carburetor alignment.

	Screws (Mounting Brackets): 5 Nm (0.5 m•kg, 3.6 ft•lb)

INSTALLATION

1. Install:
   • Carburetors
   Reverse the removal steps



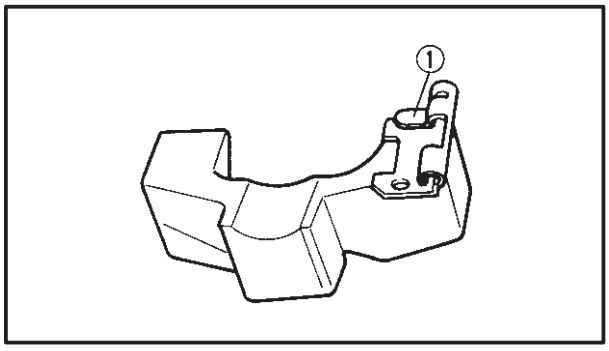


ADJUSTMENT

1. Measure:
   - Fuel level
     Out of specification → Adjust.

Fuel Level:
15.5 ~ 16.5 mm (0.61 ~ 0.65 in)
Below the Carburetor Piston Valve Center

Fuel level measurement steps:
- Place the motorcycle on a level surface.
- Use a garage jack under the engine to ensure that the carburetor is positioned vertically.
- Connect the Fuel Level Gauge ① (90890-01312) to the drain pipe ② using a level gauge adapter ③.
- Loosen the drain screw ④ and warm up the engine for several minutes.
- Measure the fuel level ⓐ with the gauge.
  ⑤ Piston valve center mark
- Repeat the above procedure for other carburetors.
- If the fuel level(s) is incorrect, adjust the fuel level(s).

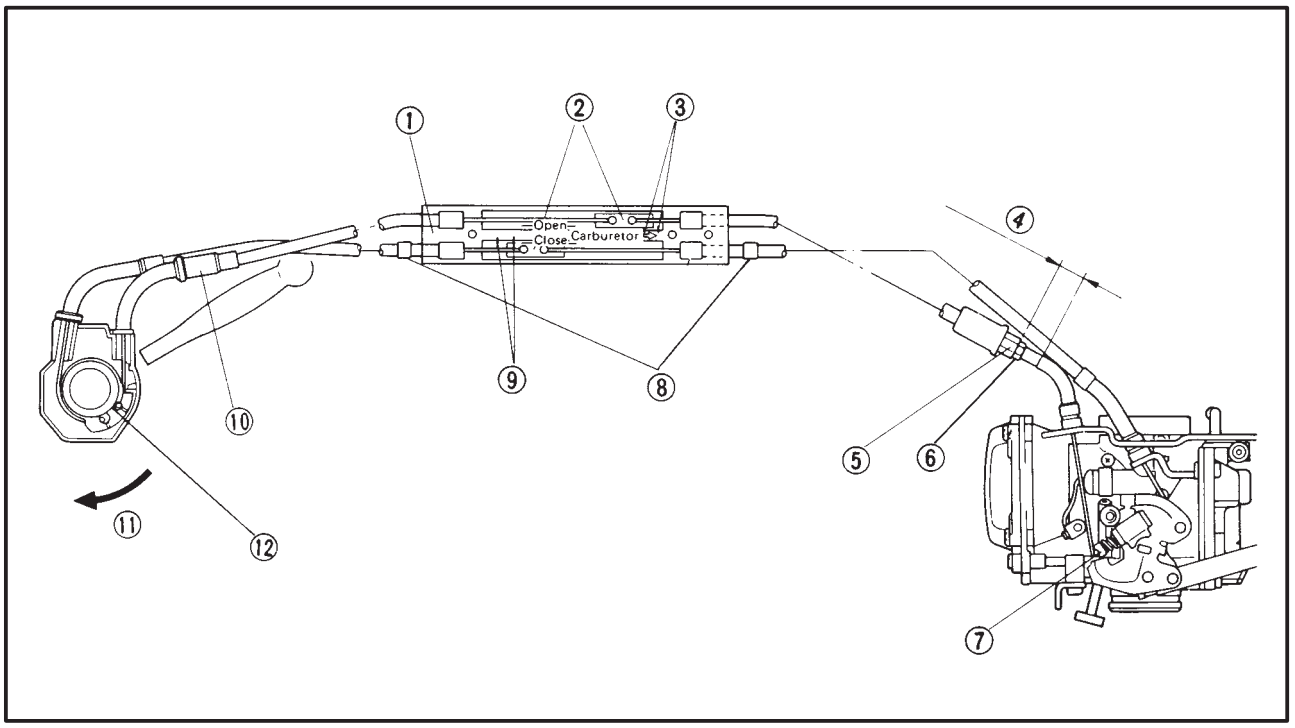


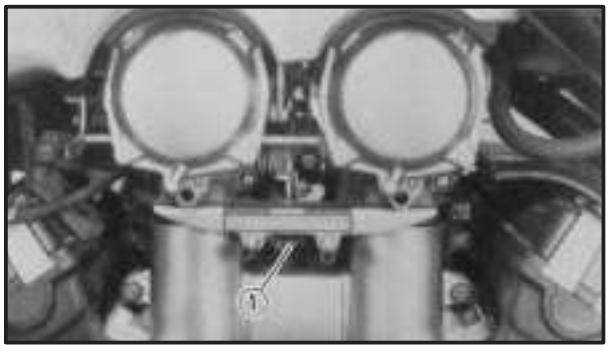
2. Adjust:
   - Fuel level

Fuel level adjustment steps:
- Remove the carburetors.
- Inspect the needle valve.
- If it is worn, replace it.
- If it is fine, adjust float level by bending the float tang ① slightly.
- Repeat the procedure for the other carburetors.

THROTTLE CABLE CYLINDER

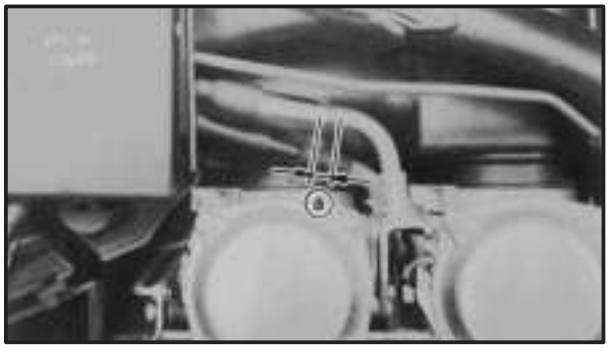
① Cable cylinder
② Slider
③ Cable adjustment mark (Open side)
④ Standard adjuster distance
⑤ Cable adjuster (Carburetor side)
⑥ Locknut (Carburetor side)
⑦ Throttle stop screw
⑧ Silver tape
⑨ Cable adjustment mark (Close side)
⑩ Cable adjuster (Throttle grip side)
⑪ Turning direction
⑫ Free play (Throttle grip)





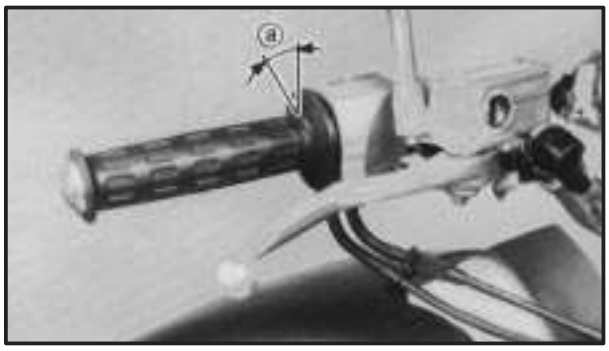
ADJUSTMENT

1. Loosen:
   • Throttle stop screw ①
   To set the throttle valve to full closed.



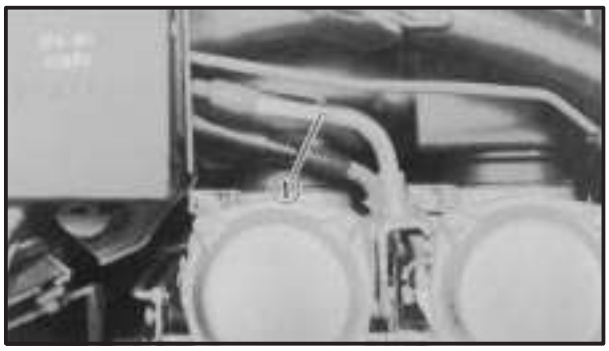
2. Adjust:
   • Distance ⓐ
   Between the threaded end of the tubular control cable guide and the adjuster.

Standard Carburetor Side Adjuster Distance:
15 mm (0.59 in)



3. Measure:
   • Free play (throttle grip) ⓐ
   Out of specification → Adjust.

Throttle Grip Free Play:
4 ~ 7 mm (0.16 ~ 0.28 in)

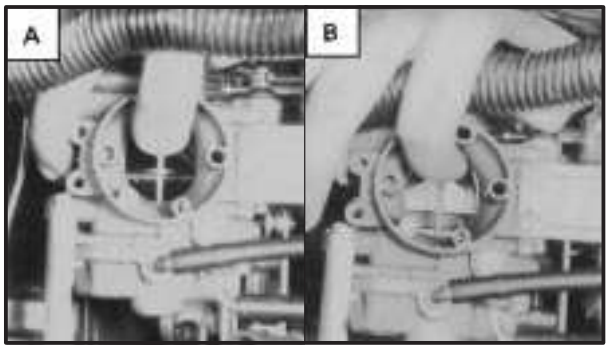


4. Check:
   • No.2 carburetor throttle valve operation

No.2 carburetor throttle valve operation checking steps:
- Loosen the locknut (carburetor side) ①.
- Turn throttle grip back and forth.
- Check No.2 carburetor to see if the throttle valve operates at full open and full closed.
  Operation of throttle valve normal → Tighten locknut ①.
  Throttle valve fails to operate at full closed → Adjust.

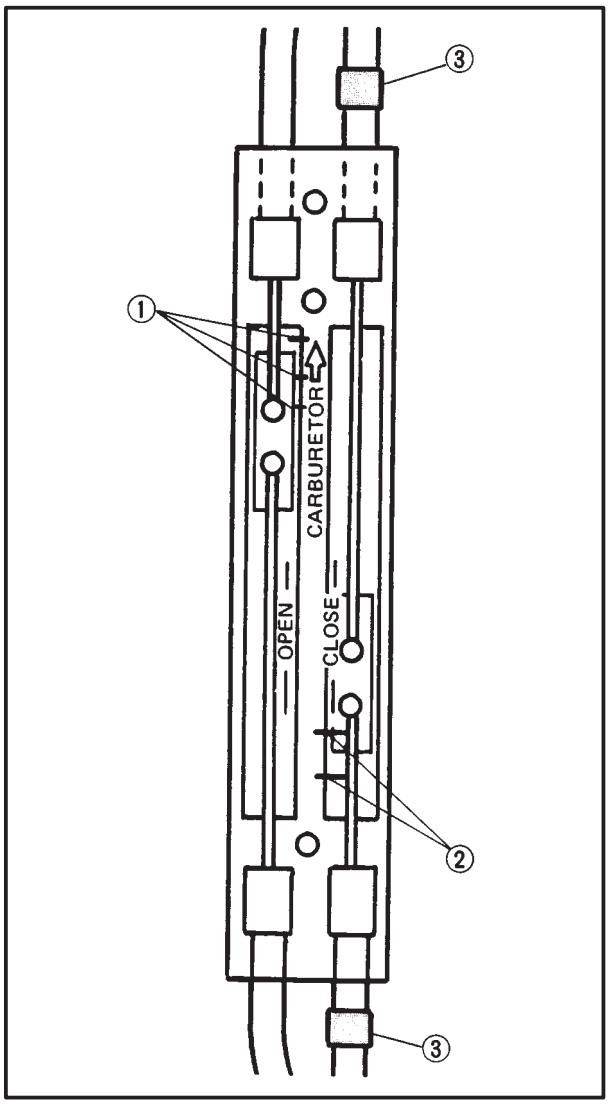
Ⓐ THROTTLE VALVE FULLY OPEN

Ⓑ THROTTLE VALVE FULLY CLOSED



5. Adjust:
   • No.2 carburetor throttle valve operation

No.2 carburetor throttle valve operation adjustment steps:
First step:
a. Loosen the locknut (carburetor side).
b. Turn the adjuster (carburetor side) clockwise a little.
c. Turn the adjuster (throttle grip side) counterclockwise and adjust free play (throttle grip) to within 4 ~ 7 mm (0.16 ~ 0.28 in).
d. Check to see if throttle valve operates at full closed.
   If not, repeat steps a ~ d.
e. Set the throttle valve at full closed and tighten locknut (carburetor side).
f. Check to see if throttle valve operates at full open.
   Throttle valve fails to operate at full open → Perform the next step.



Second step:

a. Loosen the locknut (carburetor side).
b. Turn the adjuster (carburetor side) counterclockwise a little.
c. Turn adjuster (throttle grip side) clockwise so that the free play (throttle grip) is within 4 ~ 7 mm (0.16 ~ 0.28 in).
d. Check to see if throttle valve operates at full open.
   If not, repeat steps a ~ d.
e. Tighten locknut (carburetor side).
f. Check to see if throttle valve operates at full open or full closed.
   Throttle valve fails to operate at full open or full closed → Perform the next step.

Third step:

- Check to see if throttle cable installation is correct.

NOTE:

Be sure that the silver throttle cable ③ is positioned opposite the adjusters.

- Check the position of the control cable sliders in the throttle cable cylinder.

NOTE:

- Be sure the open side slider (silver cable side) falls between the three adjustment marks on the carburetor side.
- Be sure the closed side slider falls between the two adjustment marks on the throttle grip side.

- If the slider(s) fall outside the adjustment marks then the throttle cable(s) must be replace.

① Cable adjustment mark (Open side)
② Cable adjustment mark (Closed side)

6. Install:
   • Air cleaner
7. Set engine idle speed.

	**Idle Speed: 950 ~ 1,050 r/min**

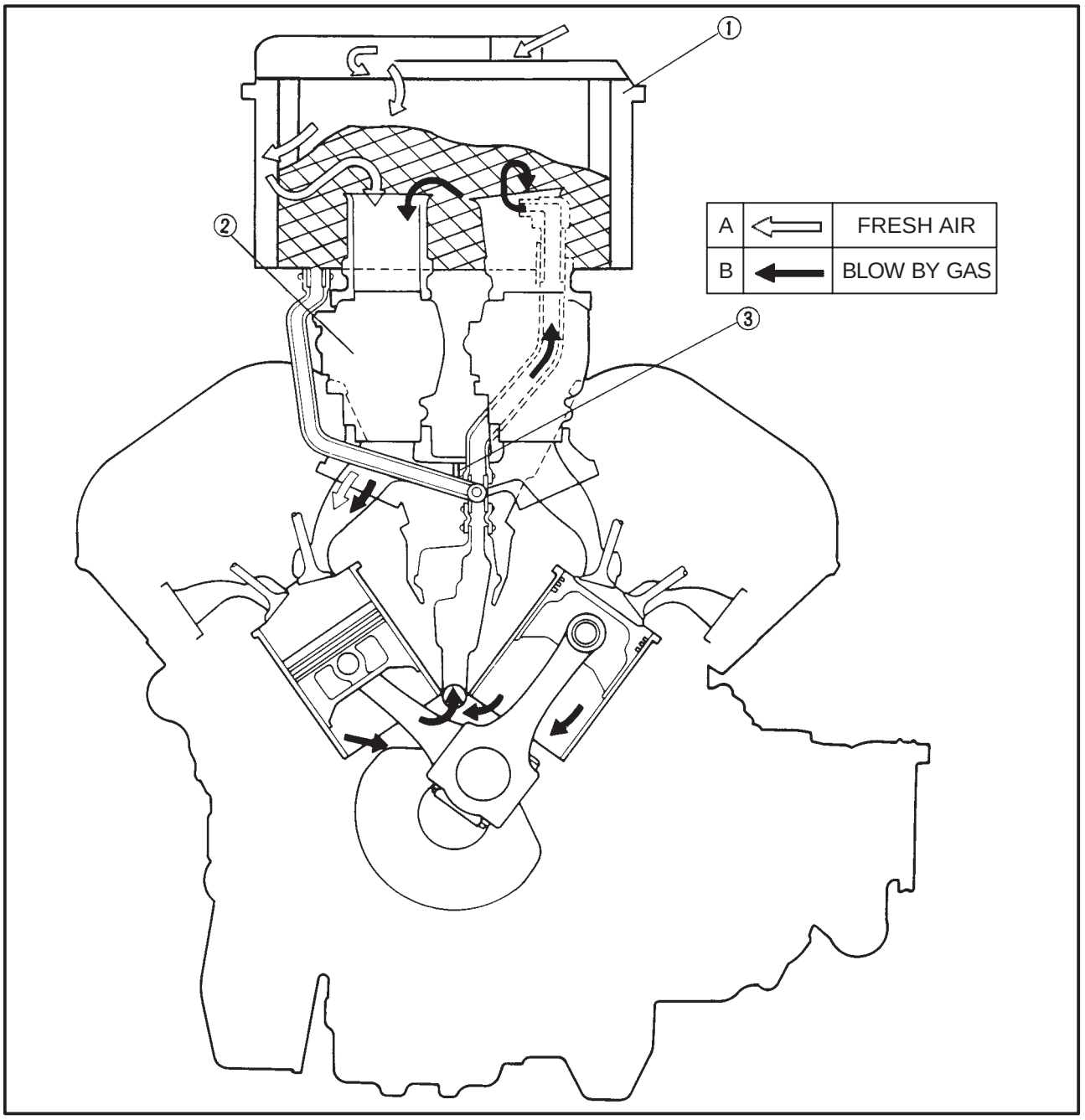
AIR CLEANER AND CRANKCASE VENTILATION SYSTEM

Refer to “CHAPTER 2” for the air cleaner maintenance.

① Air cleaner

② Carburetor

③ Blind plug



CHAPTER 6.
CHASSIS

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INSPECTION 6-2
INSTALLATION 6-4

REAR WHEEL 6-6
REMOVAL 6-7
INSPECTION 6-7
INSTALLATION 6-8

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CALIPER DISASSEMBLY 6-12
MASTER CYLINDER DISASSEMBLY 6-13
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BRAKE REASSEMBLY 6-17
AIR BLEEDING 6-19
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DRIVE SHAFT 6-62

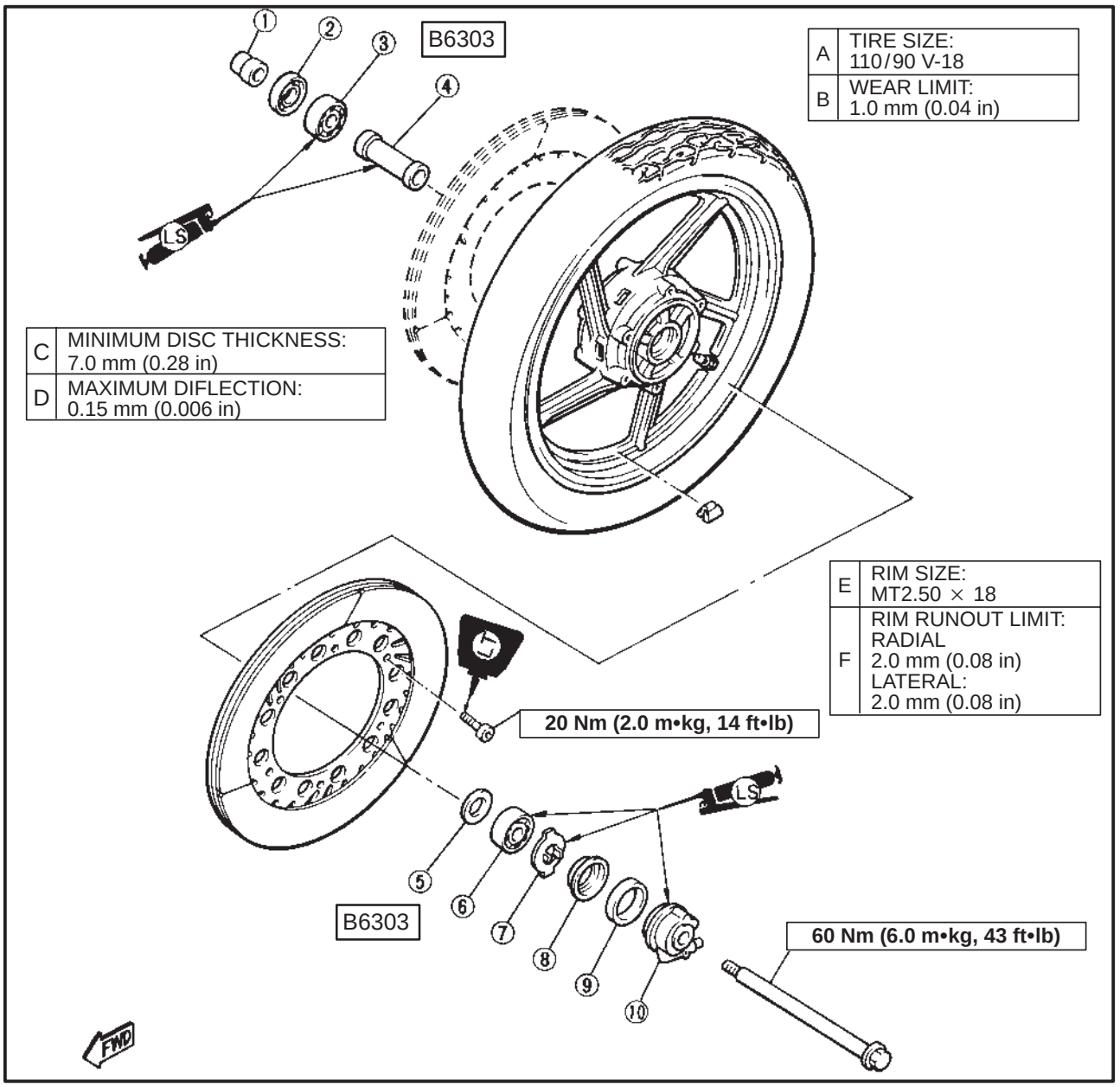
CHASSIS

FRONT WHEEL

① Collar
② Oil seal
③ Bearing
④ Spacer
⑤ Spacer flange
⑥ Searing
⑦ Meter clutch
⑧ Clutch retainer
⑨ Oil seal
⑩ Gear unit assembly

TIRE PRESSURE (COLD TIRE)		
Basic weight: With Oil and Full Fuel Tank	**281 kg (619 lb)**	
Maximum Load*	**218 kg (481 lb)**	
Cold Tire Pressure:	**FRONT**	**REAR**
Up to 90 kg (198 lb) Load*	**235 kPa (2.4 kg/cm², 34 psi)**	**255 kPa (2.6 kg/cm², 36 psi)**
90 kg (198 lb)* ~ Maximum Load*	**235 kPa (2.4 kg/cm², 34 psi)**	**275 kPa (2.8 kg/cm² 40 psi)**
High Speed Riding	**235 kPa (2.4 kg/cm², 34 psi)**	**255 kPa (2.6 kg/cm² 36 psi)**

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



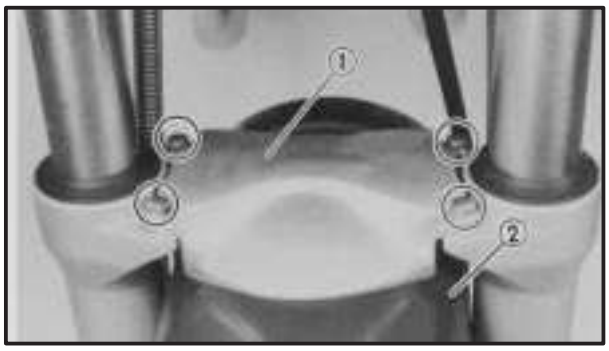


REMOVAL

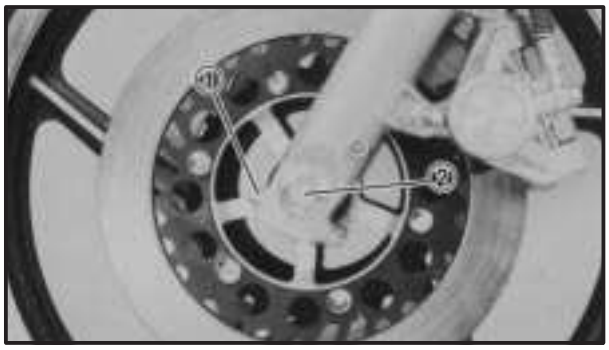
WARNING:

Securely support the motorcycle so it won't fall over when the front wheel.

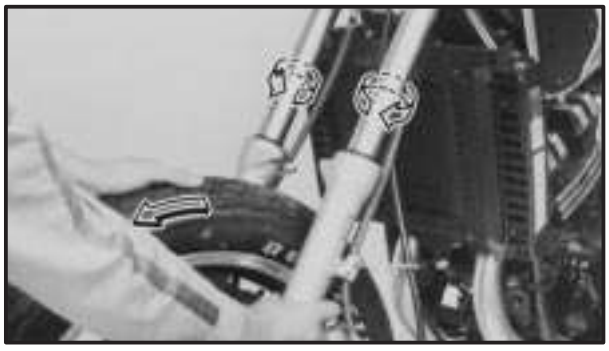
1. Place the motorcycle on its centerstand.
2. Remove:
   • Speedometer cable ①



3. Remove:
   • Fork brace ①
   • Front fender ②

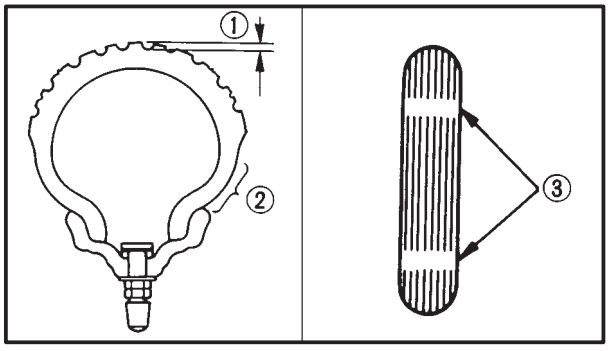


4. Loosen:
   • Pinch bolt (front axle) ①
   • Front axle ②
5. Elevate the front wheel by placing a suitable stand under the engine.
6. Remove:
   • Front axle
   • Front wheel
   Lower the wheel until the brake discs come off the calipers. Turn the brake calipers outward so they do not obstruct the wheel.



NOTE:

Do not squeeze the brake lever while the wheel is off the motorcycle.

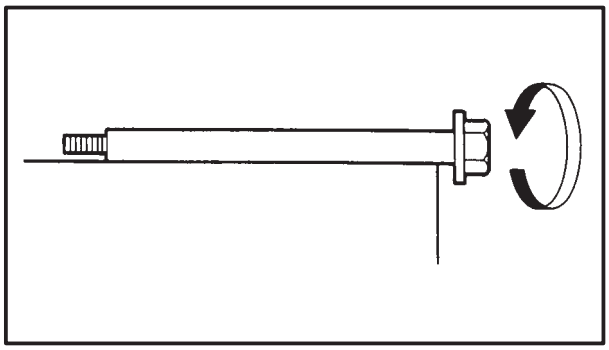


INSPECTION

1. Inspect:
   • Tire
   Tire tread shows crosswise lines (minimum tread depth)/Cracks → Replace.

Minimum Tire Tread Depth:
1.0 mm (0.04 in)

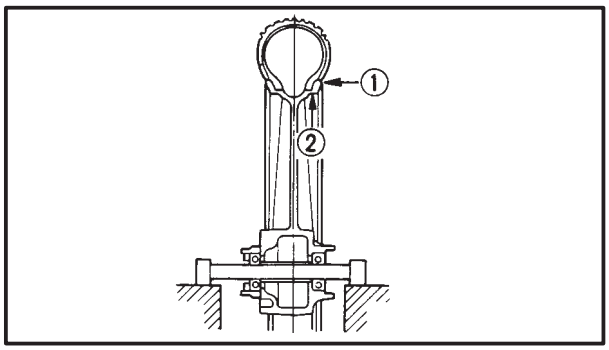
① Tread depth ②Side wall ③ Wear indicator



2. Inspect:
   • Front axle
   Bends → Replace.
   Roll the axle on a flat surface.

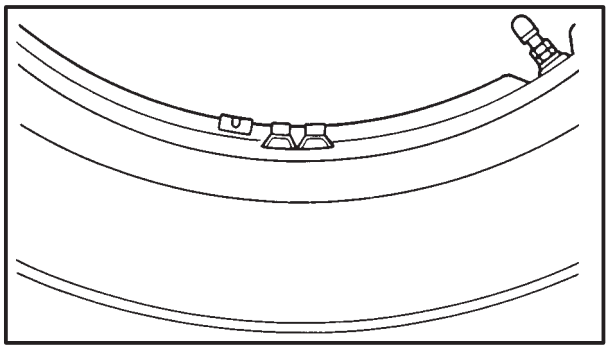
WARNING:

Do not attempt to straighten a dent axle.



3. Inspect:
   • Wheel
   Cracks/Bends/Warpage → Replace.
4. Measure:
   • Wheel runout
   Over specified limit → Replace.

Rim Runout Limits:
Radial ①: 2.0 mm (0.08 in)
Lateral ②: 2.0 mm (0.08 in)



5. Check:
   • Wheel balance
   Out of balance → Adjust.

NOTE:

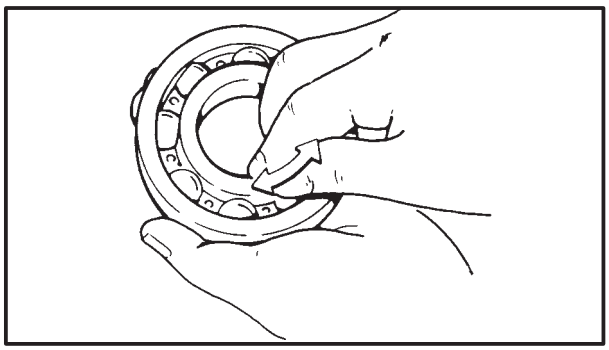
Balance wheels with the brake discs installed.

CAUTION:

Be sure the valve stem locknut is tightened securely after repairing or replacing a tire and/or wheel.

WARNING:

Ride conservatively after installing a tire to allow the tire to seat itself correctly on the rim.



6. Inspect:
   • Wheel bearings
   Bearings allow play in the wheel hub or wheel turns roughly → Replace.

Wheel bearing replacement steps:
• Clean the outside of the wheel hub.
• Drive out the bearing.

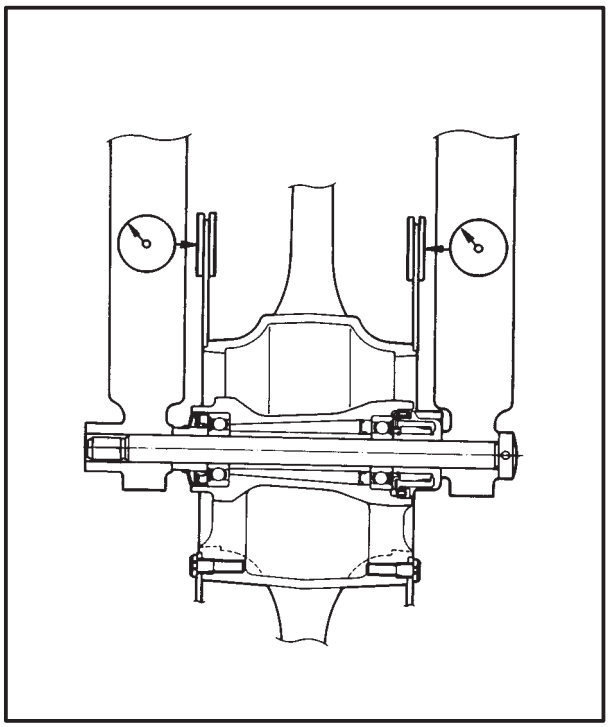
WARNING:

Eye protection is recommended when using striking tools.

- Install the new bearing by reversing the previous steps.

NOTE:

Use a socket that matches the outside diameter of the race of the bearing.

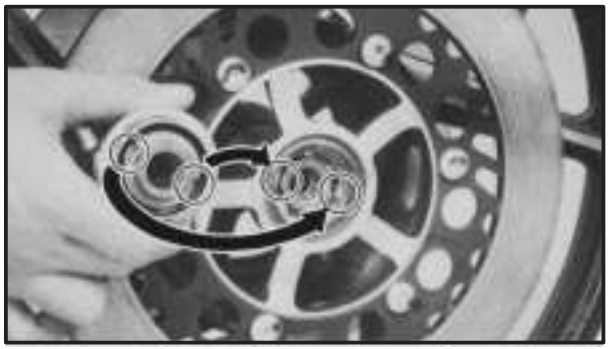


CAUTION:

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

7. Inspect:
   - Brake disc
     Wear/Over specified limit → Replace.

Maximum Deflection (Front and Rear):
0.15 mm (0.006 in)
Minimum Disc Thickness (Front and Rear):
7.0 mm (0.28 in)



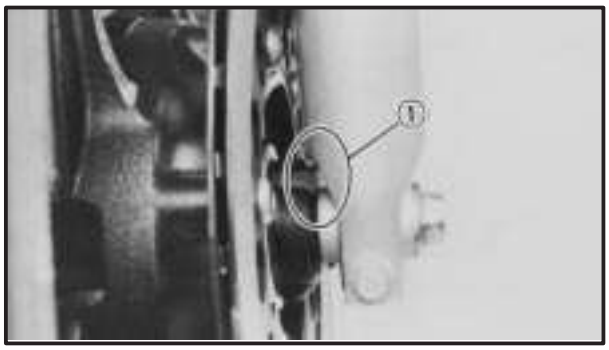
INSTALLATION

When installing the front wheel, reverse the removal procedure. Note the following points.

1. Apply:
   - Lithium base grease
     Lightly grease to the oil seal and gear unit.
2. Install:
   - Gear unit assembly

NOTE:

Be sure that the 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 projecting portion (torque stopper) ① of the gear unit housing is positioned correctly.

4. Tighten:
   • Front axle

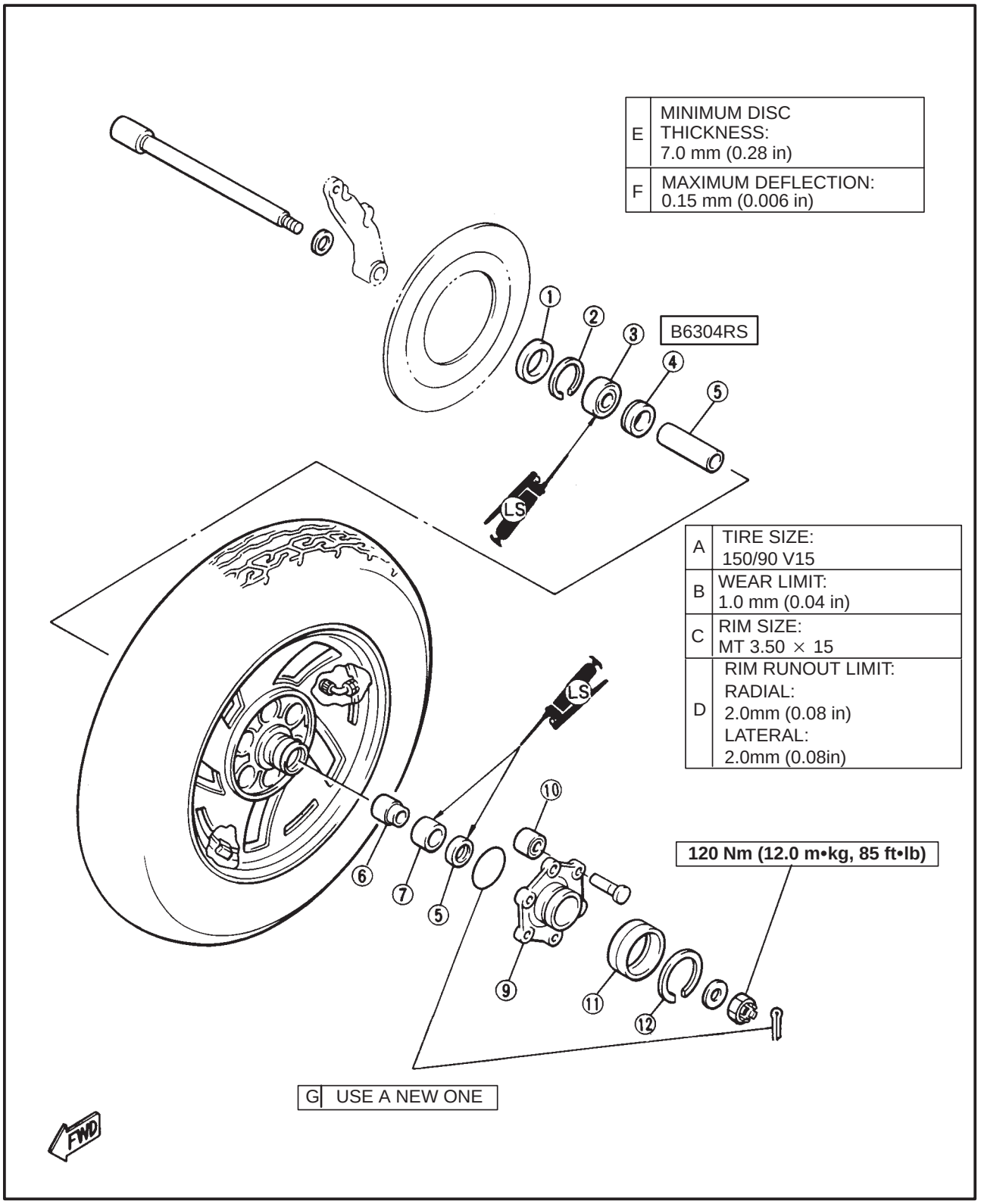
Front Axle:
60 Nm (6.0 m•kg, 43 ft•lb)

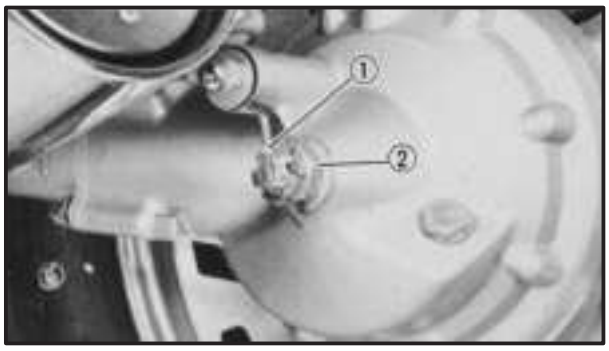
5. Tighten:
   • Pinch bolt (front axle)
   • Fork brace
   • Front fender

Pinch Bolt (Front Axle):
20 Nm (2.0 m•kg, 14 ft•lb)
Nuts (Fork Brace):
9 Nm (0.9 m•kg, 6.5 ft•lb)

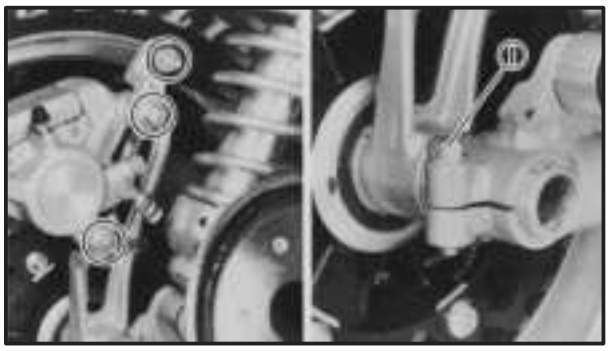
REAR WHEEL

① Oil seal
② Circlip
③ Bearing
④ Spacer flange
⑤ Spacer
⑥ Collar
⑦ Cylindrical bearing
⑧ Oil seal
⑨ Clutch hub
⑩ Damper
⑪ Hub dust seal
⑫ Circlip



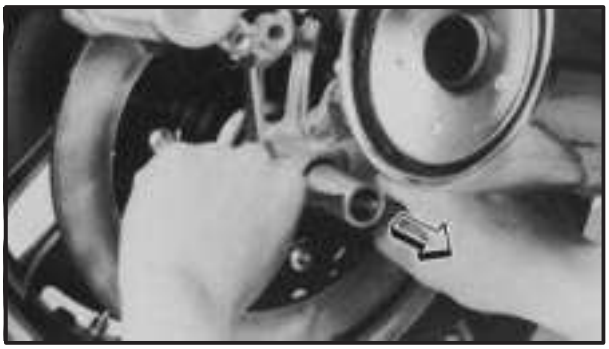


REMOVAL
1. Place the motorcycle on its centerstand.
2. Remove:
   - Cotter pin ①
   - Axle nut ②
   - Washer



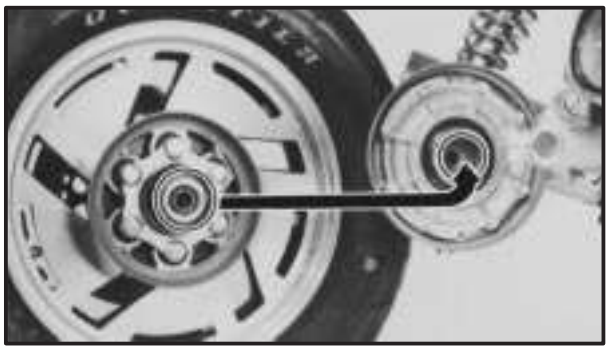
3. Remove:
   - Rear caliper
   - Tension bar

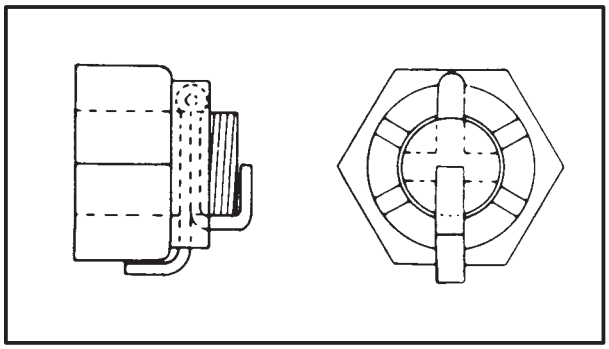
NOTE:
Do not depress the brake pedal when the wheel is off the motorcycle as the brake pads will be forced.



4. Loosen:
   - Pinch bolt (rear axle) ①
5. Remove:
   - Rear axle
     While supporting the brake caliper, pull out the rear axle.
   - Rear wheel
     Move the wheel to the right side to separate it from the final gear case.

INSPECTION
1. Inspect:
   - Tire
   - Rear axle
   - Wheel
   - Wheel bearings
   - Brake disc
     Refer to “FRONT WHEEL – INSPECTION” section.
2. Measure:
   - Wheel runout
     Refer to “FRONT WHEEL – INSPECTION” section.
3. Check:
   - Wheel balance
     Refer to “FRONT WHEEL – INSPECTION” section.





INSTALLATION

When installing the rear wheel, reverse the removal procedure. Note the following points.

1. Apply:
   - Lithium base grease

   Lightly grease to the final gear case splines.
2. Install:
   - Rear wheel assembly

NOTE:

Be sure the splines on the wheel hub fit into final gear case.

3. Tighten:
   - Wheel axle

Axle Nut:
120 Nm (12.0 m•kg, 85 ft•lb)
Pinch Bolt (Rear Wheel):
20 Nm (2.0 m•kg, 14 ft•lb)

CAUTION:

Always use a new cotter pin on the rear axle nut.

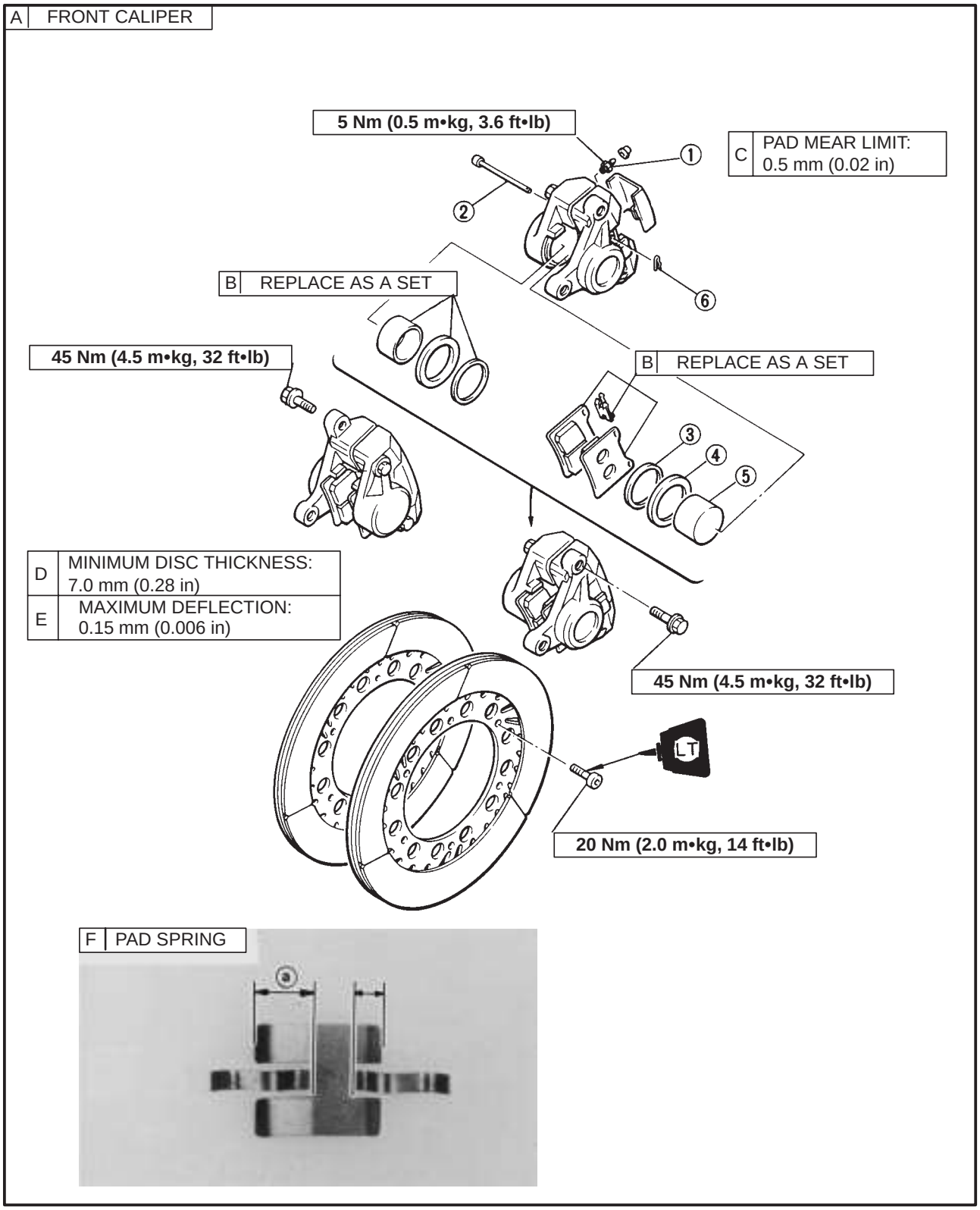
4. Tighten:
   - Tension bar
   - Rear caliper

Rear Caliper:
45 Nm (4.5 m•kg, 32 ft•lb)

FRONT AND REAR BRAKE

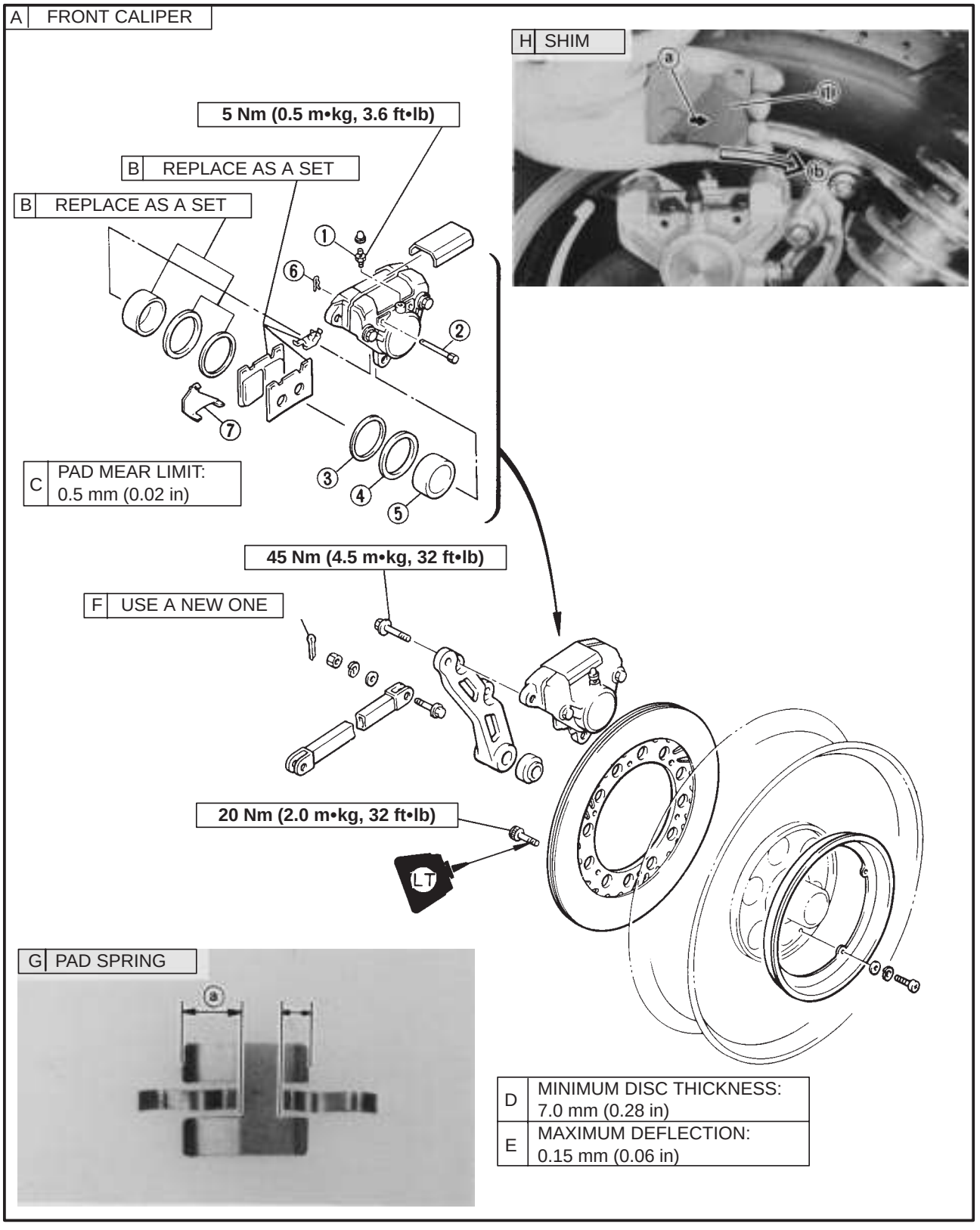
① Air bleed screw
② Retaining pin
③ Dust seal
④ Piston seal
⑤ Piston
⑥ Circlip

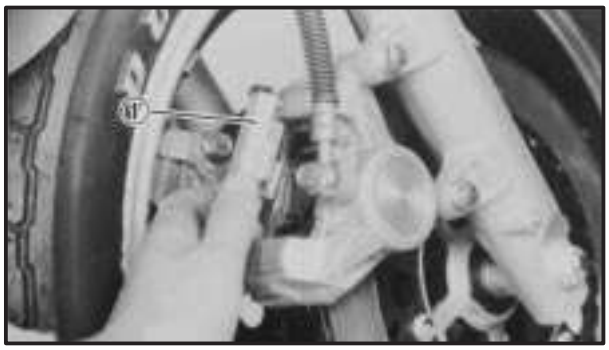
F – ⓐ : Install the pad spring with its longer tangs ⓐ in the disc rotating direction.



① Air bleed screw
② Retaining pin
③ Dust seal
④ Piston seal
⑤ Piston
⑥ Clirlip
⑦ Shim

G – ⓐ :
Install the pad spring with its longer tangs ⓐ in the disc rotating direction.
H – ⓐ :
Be sure to position the shim ① so that its arrow mark ⓐ points in the rotating direction ⓑ of the disc plate rotation.

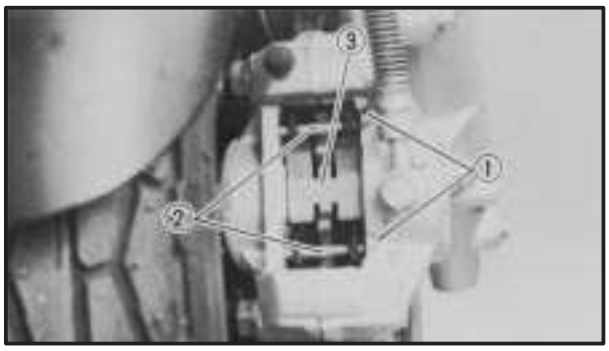




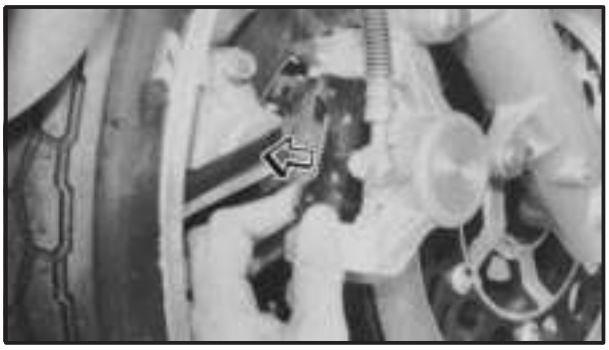
CALIPER PAD REPLACEMENT

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Remove:
   • Cover ①



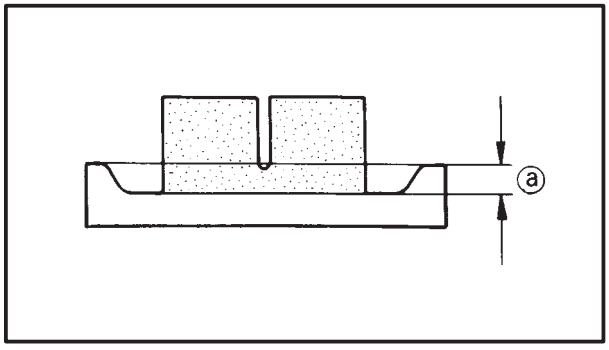
2. Remove:
   • Retaining clips ①
   • Retaining pins ②
   • Pad spring ③



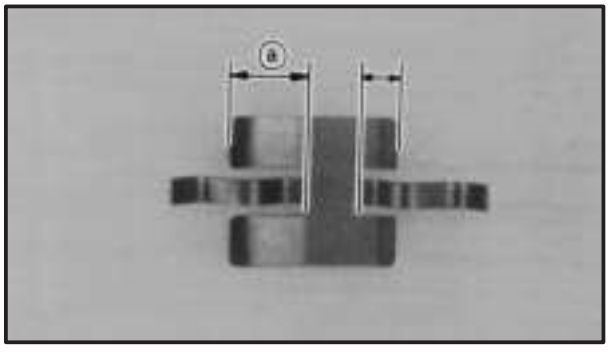
3. Remove:
   • Pads

NOTE:

- Replace the pad spring if pad replacement is required.
- Replace the pads as a set if either is found to be worn to the wear limit.



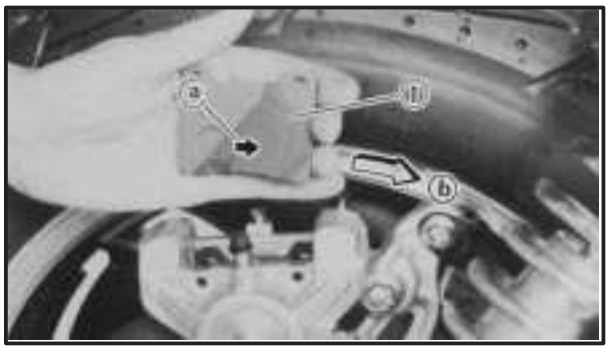
Wear Limit ⓐ:
0.5 mm (0.02 in)



4. Install:
   • Components in above list (steps “3 ~ 1”)

NOTE:

- FRONT AND REAR BRAKE:
  Install the pad spring with its longer tangs ⓐ facing towards the disc rotating direction.

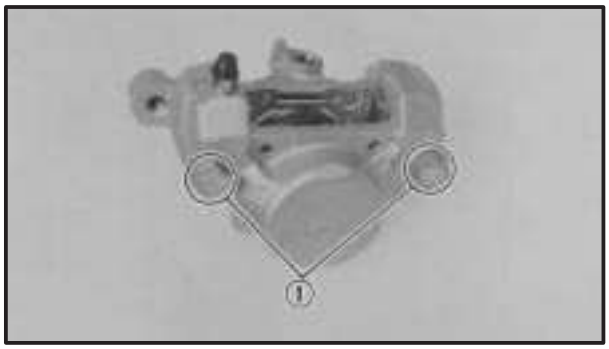


• REAR BRAKE ONLY:
Be sure to position the shim ① so that its arrow mark ⓐ points in the rotating direction ⓑ of the disc plate rotation.



CALIPER DISASSEMBLY

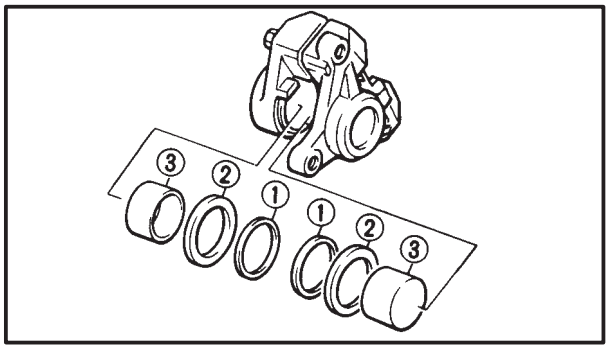
1. Remove:
   • Pads
   Refer to "CALIPER PAD REPLACEMENT" section.
2. Remove:
   • Brake hose ①
   Place the open hose end into a container and pump the old fluid out carefully.



3. Remove:
   • Caliper

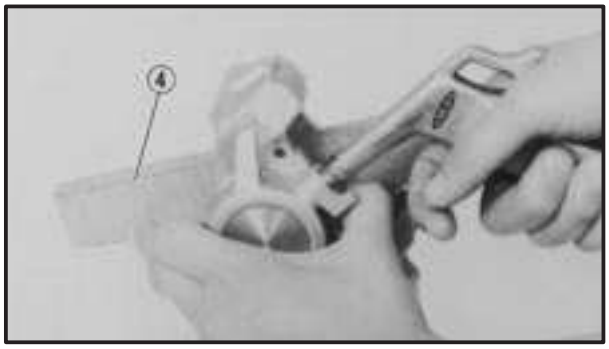
CAUTION:

Never loosen the bridge bolts ① on either side of the caliper.



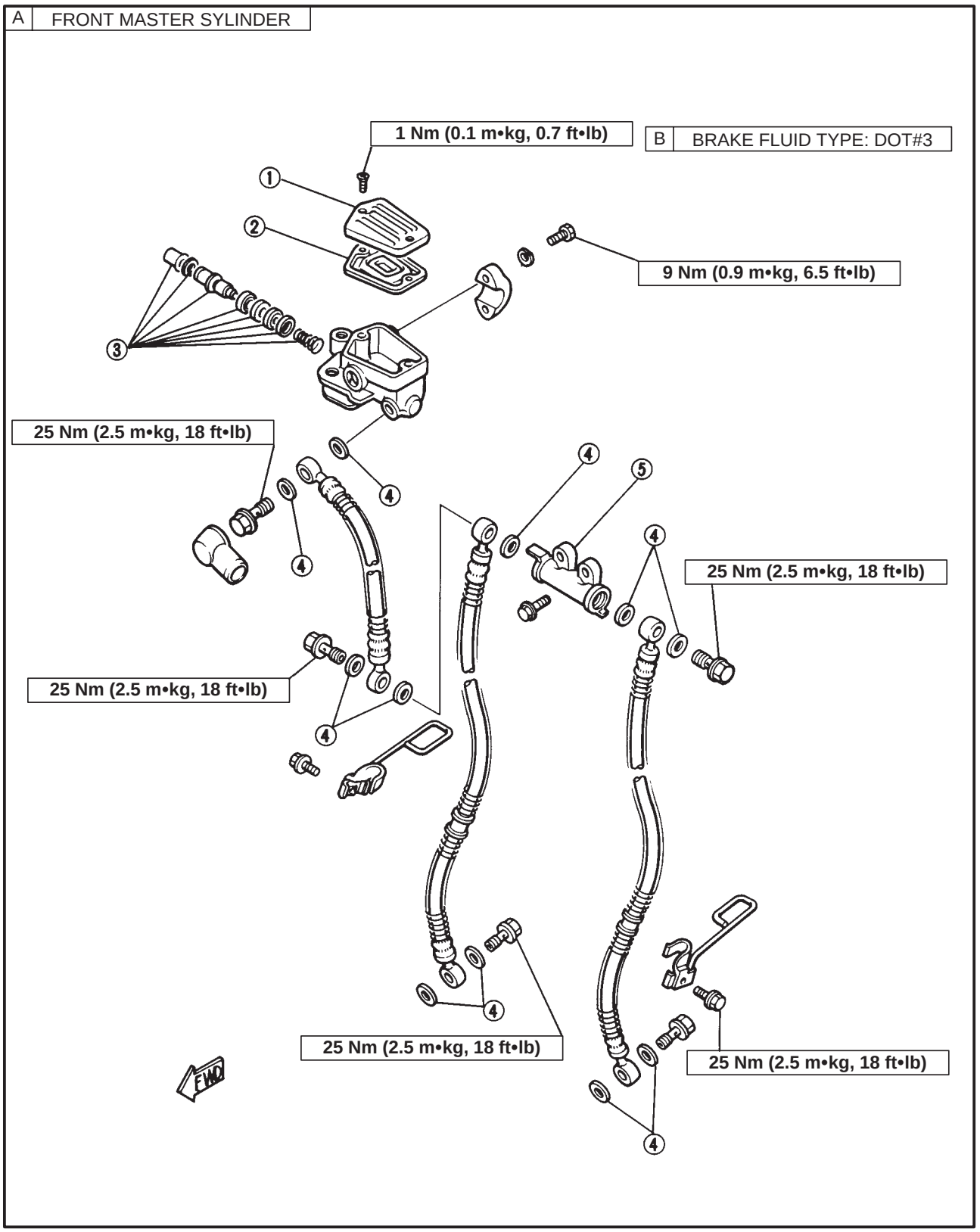
4. Remove:
   • Dust seals ①
   • Piston seals ②
   • Pistons ③

Caliper piston removal steps:
- Insert a plece of wooden board ④ into the caliper to lock the right side piston.
- Blow compressed air into the tube joint opening to force out the left side piston from the caliper body.
- Repeat previous step to force out the right side piston from the caliper body.



MASTER CYLINDER DISASSEMBLY

① Master cylinder cap
② Rubber seal
③ Master cylinder kit
④ Copper washer
⑤ Brake joint

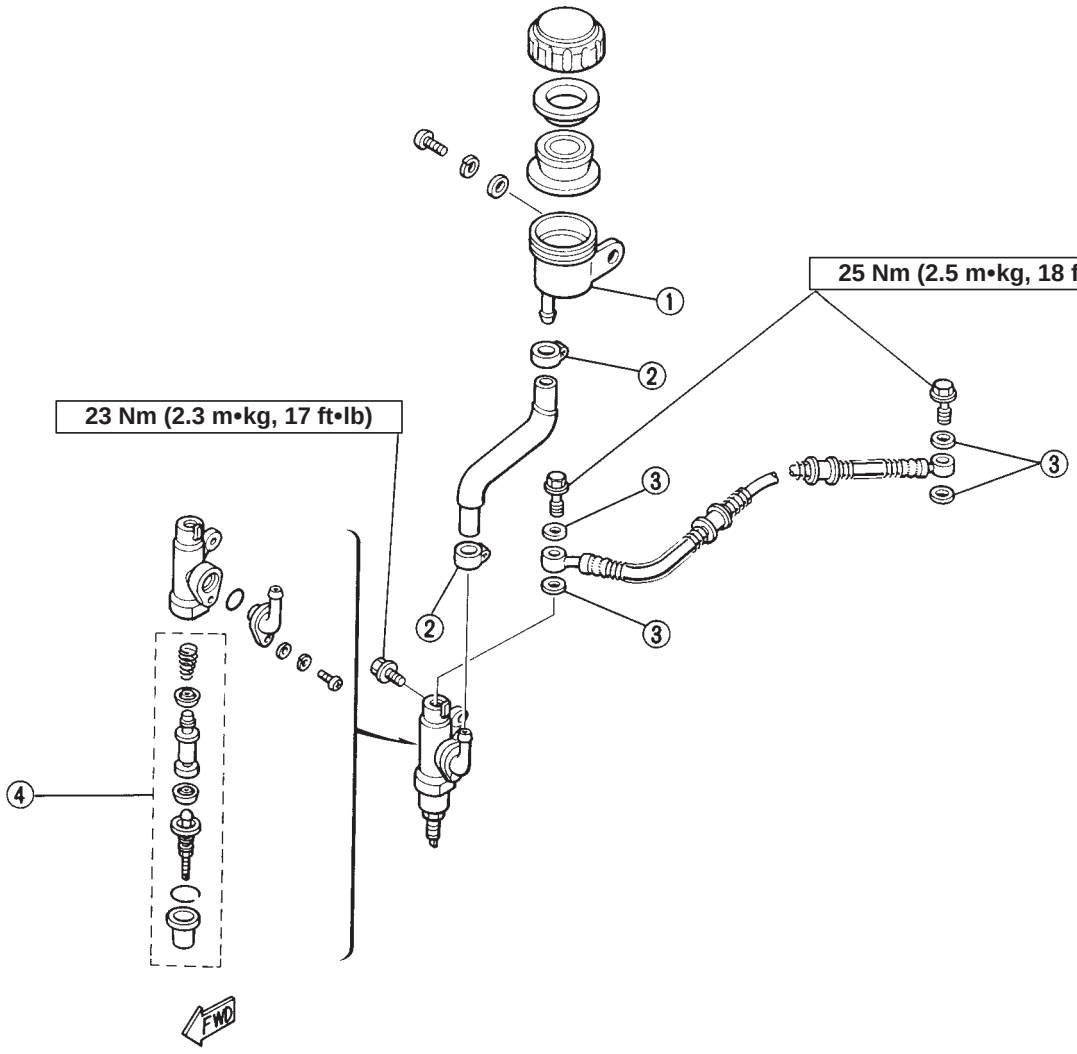


① Reservoir tank
② Band
③ Copper washer
④ Master cylinder kit

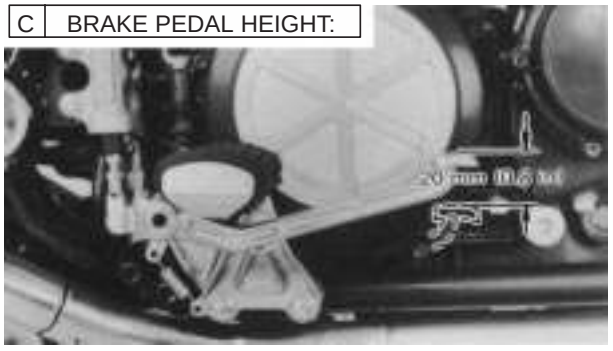
D BRAKE HOSE ROUNTING:
When installing the rear brake hose, align the brake pipe① with the front projection② on the master cylinder.

A REAR MASTER CYLINDER

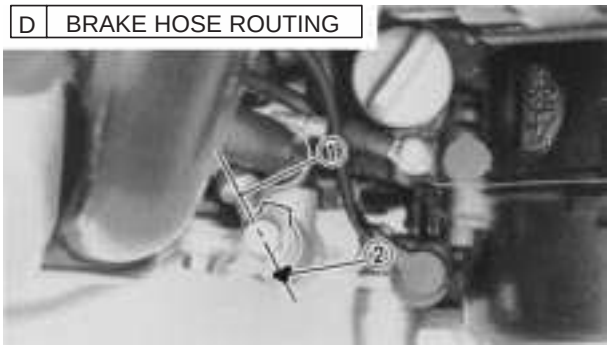
B BRAKE FLUIC TYPE: DOT #3

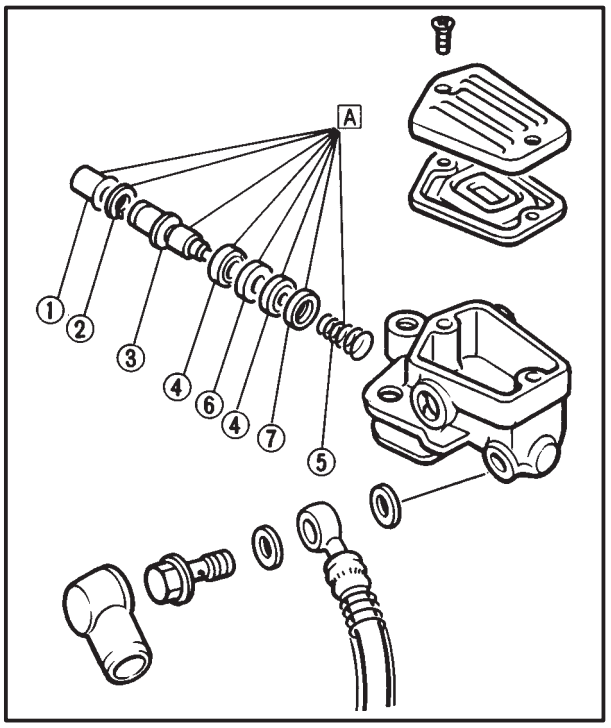


C BRAKE PEDAL HEIGHT:



D BRAKE HOSE ROUTING



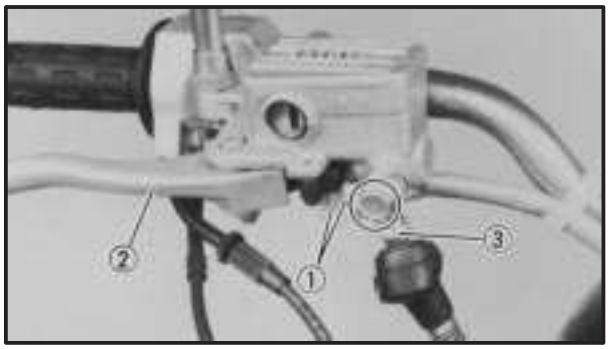


Front Brake Master Cylinder Disassembly

NOTE:

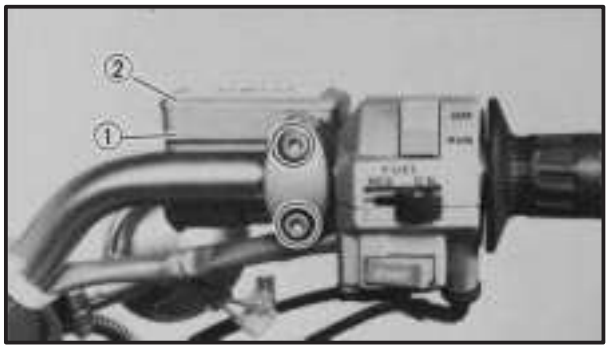
Drain the brake fluid before removing master cylinder.

① Dust boot
② Circlip
③ Piston
④ Piston cups
⑤ Return spring
⑥ Washer
⑦ Seat
A MASTER CYLINDER KIT (Replace as a set)

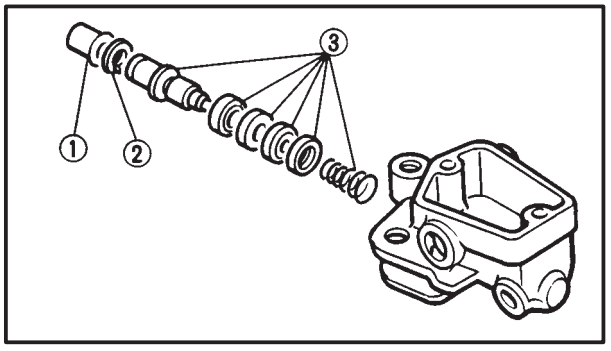


1. Remove:
   - Brake light switch leads ①
   - Brake lever ②
   - Lever spring
2. Disconnect:
   - Brake hose ③

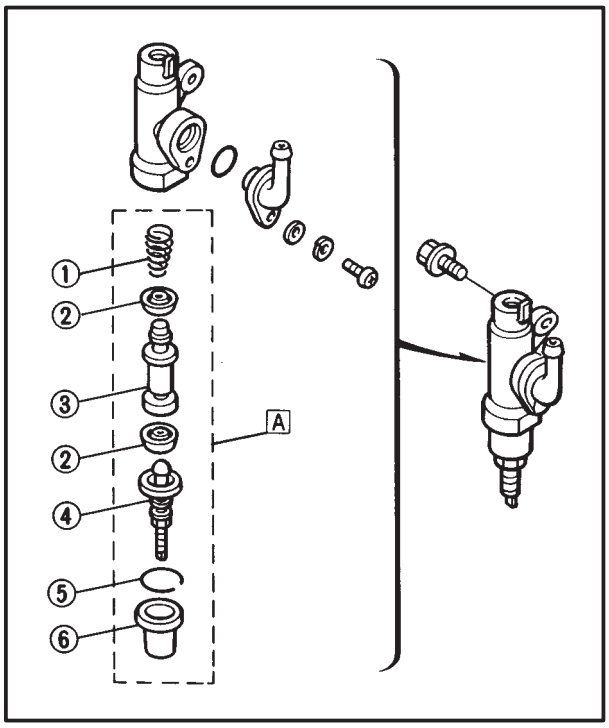
   Drain the fluid.



3. Remove:
   - Master cylinder ①
   - Master cylinder cap ②



4. Remove:
   - Dust boot ①
   - Circlip ②
   - Master cylinder kit ③



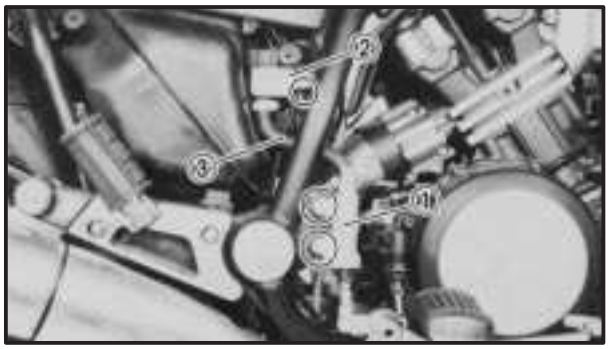
Rear Brake Master Cylinder Disassembly

NOTE:

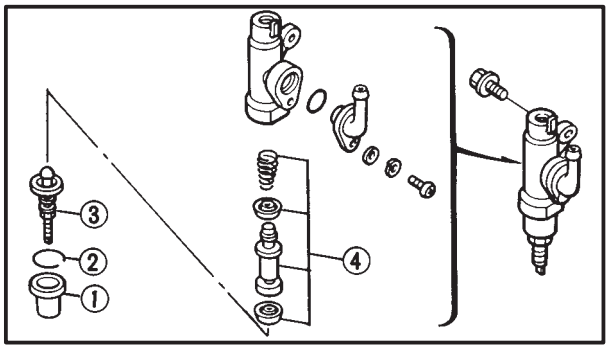
Drain the brake fluid before removing master cylinder.

1. Remove:
   - Side cover (right)
2. Disconnect:
   - Brake hose

① Spring
② Piston cup
③ Piston
④ Adjusting rod
⑤ Circlip
⑥ Dust boot
Ⓐ MASTER CYLINDER KIT (Replace as a set)



3. Remove:
   - Master cylinder ①
   - Fluid reservoir tank ②
     Drain the fluid.
4. Disconnect:
   - Tank hose ③



5. Remove:
   - Dust boot ①
   - Circlip ②
   - Adjusting rod ③
   - Master cylinder kit ④
     Drain the excess fluid.

BRAKE INSPECTION AND REPAIR

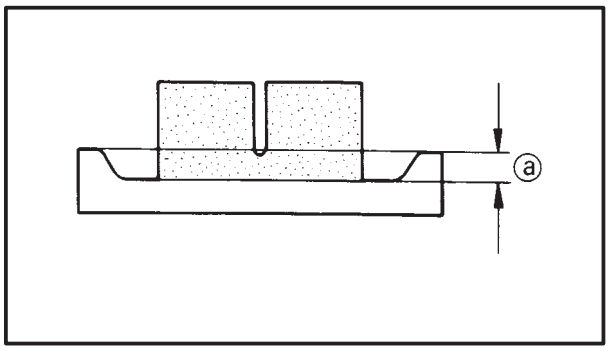
Recommended Brake Component Replacement Schedule:	
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Replace only when brakes are disassembled

WARNING:

All internal parts should be cleaned in new brake fluid only. Do not use solvents will cause seals to swell and distort.

1. Inspect:
   • Brake pads
   Over specified limit → Replace.

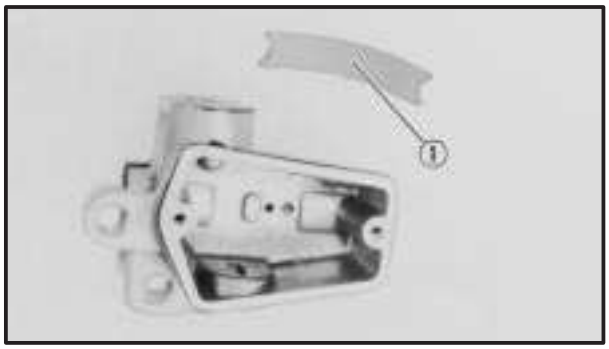
Wear Limit ⓐ:
0.5 mm (0.02 in)



2. Inspect:
   • Caliper piston
   Rust/Wear/Damage → Replace.
   • Dust seal/Piston seal
   Damage → Replace.

WARNING:

Replace the piston and dust seals whenever a caliper is disassembled.



• Master cylinder kit
• Master cylinder body
Scratches/Wear → Replace.

NOTE:

Clean all passages with new brake fluid.

① Oil baffle plate
• Brake hose
Cracks/Wear/Damage → Replace.

BRAKE REASSEMBLY

WARNING:

- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**

Brake Fluid:
DOT #3



Caliper Reassembly
When assembling the caliper, reverse the disassembly procedure. Note the following points.
1. Install:
   • Brake calipers
   • Brake hoses

Brake Caliper:
45 Nm (4.5 m•kg, 32 ft•lb)
Brake Hose:
25 Nm (2.5 m•kg, 18 ft•lb)

2. Bleed the air completely from the brake system.

Master Cylinder Reassembly
When assembling the master cylinder, reverse the disassembly procedure. Note the following points.
1. Install:
   • Master cylinder kit

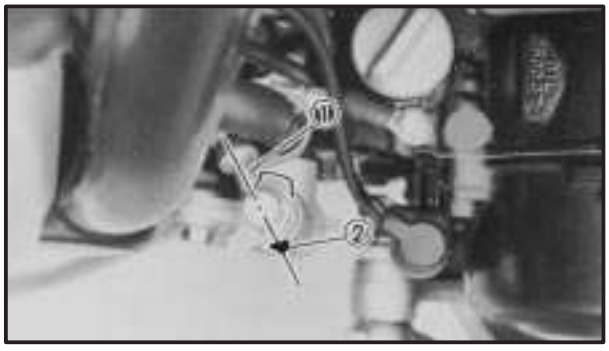
WARNING:

Internal parts should be lubricated with brake fluid when installed.



2. Install:
   • Master cylinders (front and rear)
   • Brake hoses

Front Master Cylinder:
9 Nm (0.9 m•kg, 6.5 ft•lb)
Rear Master Cylinder:
23 Nm (2.3 m•kg, 17 ft•lb)
Brake Hose:
25 Nm (2.5 m•kg, 18 ft•lb)



CAUTION:

When installing the rear brake hose, align the brake pipe ① with the front projection ② on the master cylinder.

3. Fill:
   • Master cylinders

	Brake Fluid: **DOT #3**

4. Bleed the air completely from the brake system.

AIR BLEEDING

WARNING:

Bleed the brake system it:
- **The system has been disassembled.**
- **A brake hose has been loosened or removed.**
- **The brake fluid is very low.**
- **The brake operation is faulty.**

A dangerous loss of braking performance may occur if the brake system is not properly bled.



1. Bleed:
   • Brake fluid

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 the clear plastic tube ① tightly to the caliper bleed screws.
d. Place the other end of the tube into a container.
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.

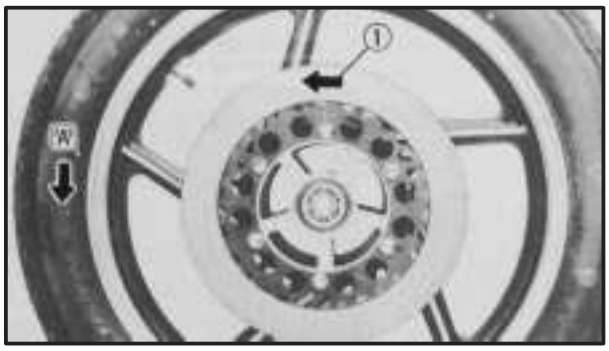
	Bleed Screw: **6 Nm (0.6 m•kg, 4.3 ft•lb)**

i Repeat steps (e) to (h) until of the air bubbles have been removed from the system.

NOTE:

If bleeding is difficult, it may be necessary to let the brake fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappered.

j. Add brake fluid to the level line on the reservoir.



BRAKE DISC INSTALLATION

1. Install:
   • Brake disc(s)

NOTE:

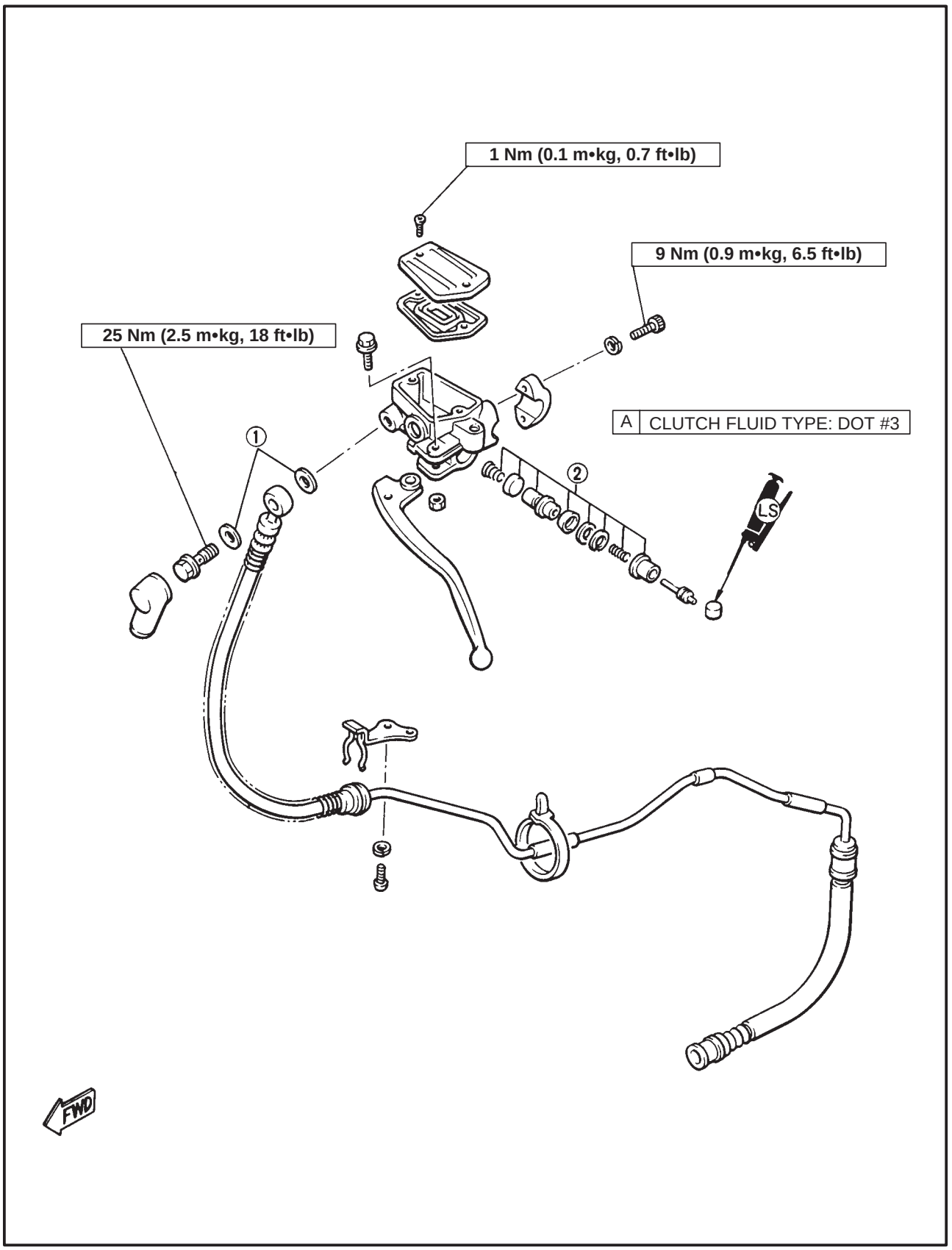
- The brake disc should be installed with the arrow mark ① face outward.
- The arrow mark ① on the disc must point toward the rotating direction A of the wheel.

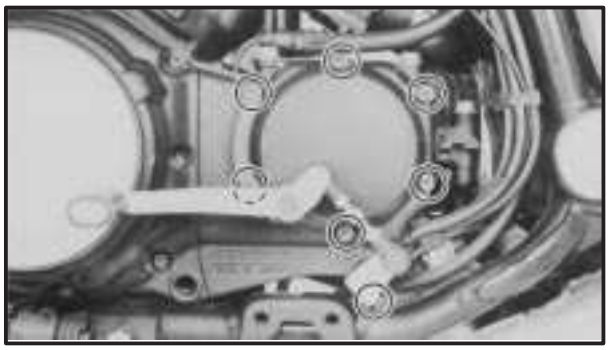
2. Tighten:
   • Bolts (disc)

Bolts (Brake Disc):
20 Nm (2.0 m•kg, 14 ft•lb)
LOCTITE®

HYDRAULIC CLUTCH

① Copper washer
② Master cylinder kit
(Replace as a set)



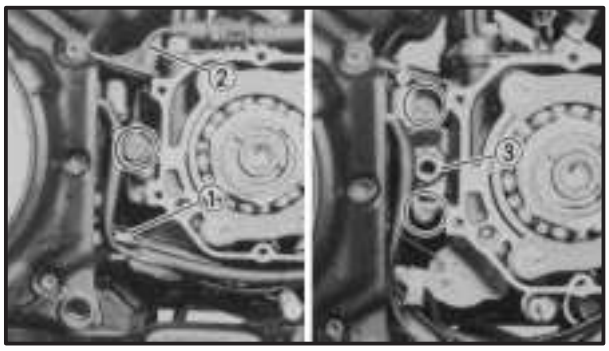


CLUTCH RELEASE DISASSEMBLY

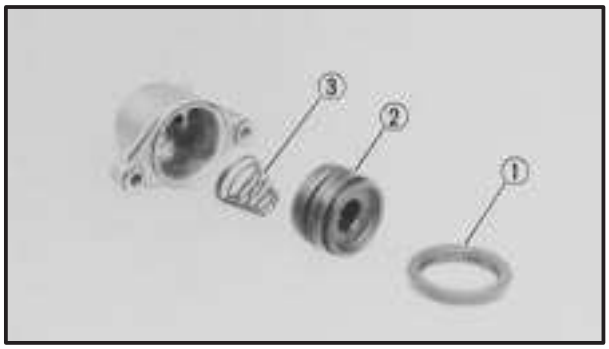
1. Remove:
   - Footrest
   - Change pedal
   - Middle gear case cover

NOTE:

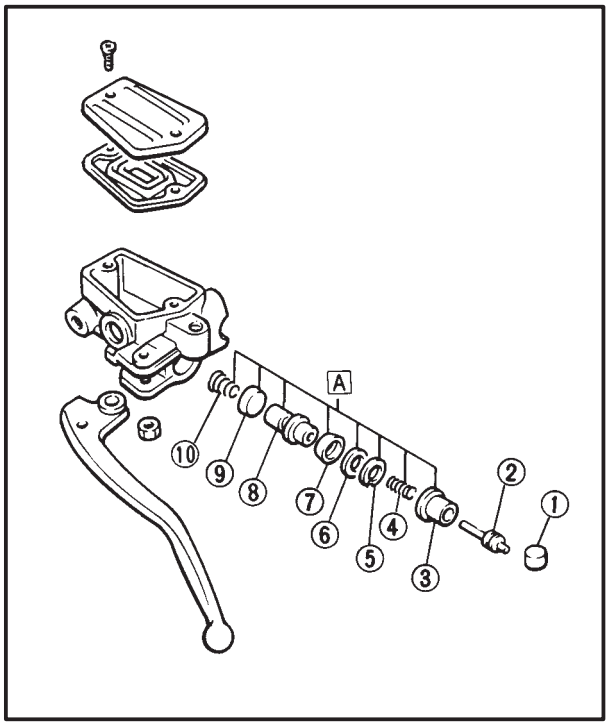
When removing the middle gear case cover, be sure oil does not leak out of the case.



2. Remove:
   - Clamp ①
   - Clutch hose ②
     Drain the fluid.
   - Clutch release assembly ③



3. Remove:
   - Dust seal ①
   - Piston assembly ②
   - Spring ③

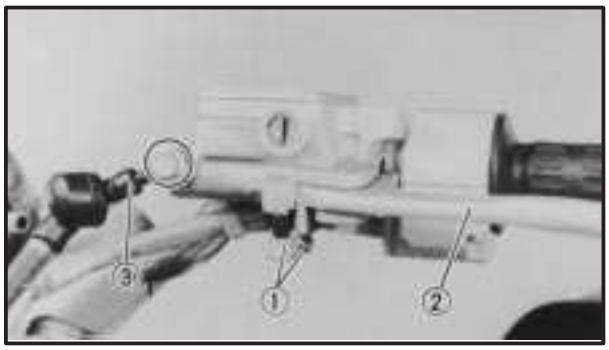


MASTER CYLINDER DISASSEMBLY

NOTE:

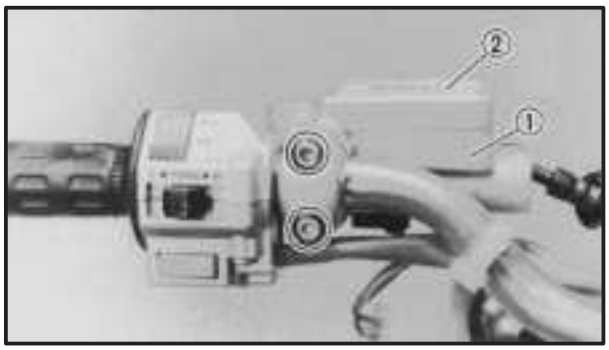
Drain the clutch fluid before removing master cylinder.

① Bush
② Push rod
③ Dust boot
④ Spring
⑤ Circlip
⑥ Washer
⑦ Piston cup
⑧ Piston
⑨ Seat
⑩ Return spring
Ⓐ Master cylinder kit (Replace as a set)



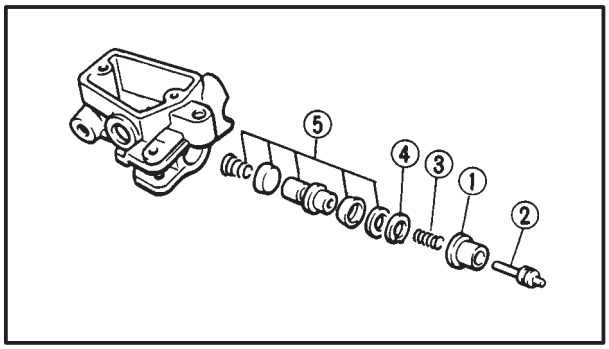
1. Remove:
   - Clutch switch leads ①
   - Clutch lever ②
   - Clutch hose ③

   Drain the fluid.



2. Remove:
   - Master cylinder ①
   - Cap ②

   Drain the excess fluid.



3. Remove:
   - Dust boot ①
   - Push rod ②
   - Spring ③
   - Circlip ④
   - Master cylinder kit ⑤

CLUTCH INSPECTION AND REPAIR

Recommended Clutch Component Replacement Schedule:	
Piston seal, dust sel	Every two years
Clutch hoses	Every four years
Clutch fluid	Replace only when clutch is disassembled

1. Inspect:
   - Cylinder body

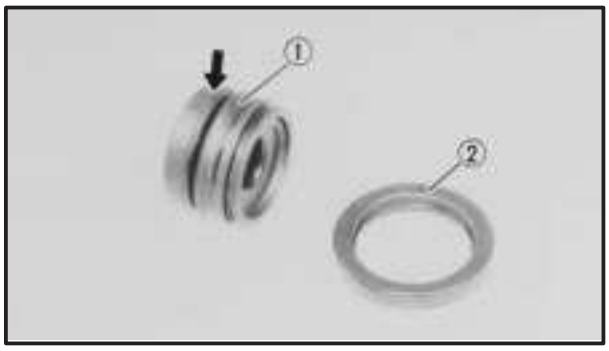
   Scratches/Wear → Replace.

NOTE:

Clean all passages with new brake fluid.

   - Clutch hoses

   Cracks/Wear/Damage → Replace.



2. Inspect:
   • Piston ①
   Scratches/Wear → Replace.
   • Piston seal ②
   Wear → Replace.

CLUTCH REASSEMBLY

WARNING:

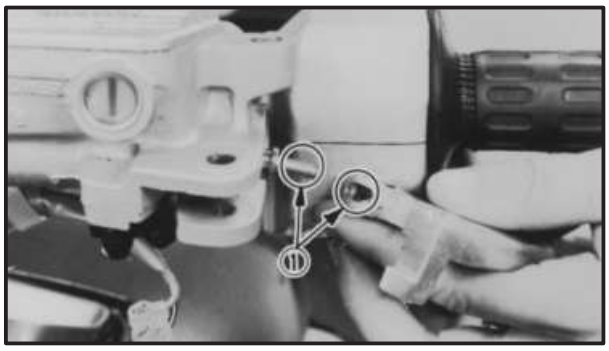
- **All internal parts should be cleaned in new brake fluid only.**
- **Internal parts should be lubricated with brake fluid when installed.**

Brake Fluid:
DOT #3

Clutch Release Reassembly
When assembling the clutch release, reverse the disassembly procedure. Note the following points.
1. Install:
   • Clutch release assembly
   • Clutch hose

Clutch Release Assembly:
12 Nm (1.2 m•kg, 8.7 ft•lb)
Clutch Hose:
25 Nm (2.5 m•kg, 18 ft•lb)

Master Cylinder Reassembly
When assembling the master cylinder, reverse the disassembly procedure. Note the following points.
1. Install:
   • Master cylinder
   • Clutch hose



Master Cylinder:
9 Nm (0.9 m•kg, 6.5 ft•lb)
Clutch Hose:
25 Nm (2.5 m•kg, 18 ft•lb)

2. Install:
   • Push rod
   • Lever

NOTE:
Grease the pivot point ①.

3. Fill:
   • Master cylinder

Brake Fluid:
DOT #3

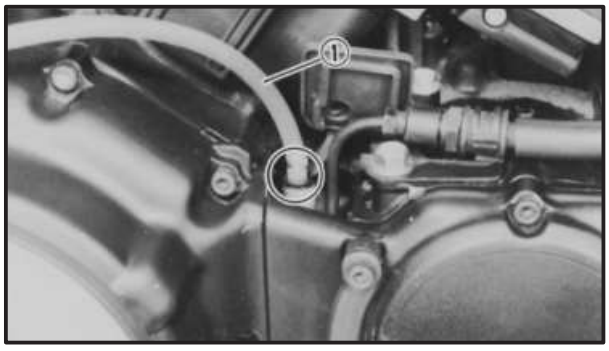
4. Bleed the air completely from the clutch system.

AIR BLEEDING

WARNING:

Bleed the clutch system it:
- **The system has been disassembled.**
- **A clutch hose has been loosened or removed.**
- **The clutch fluid is very low.**
- **The clutch operation is faulty.**

1. Bleed:
   • Clutch fluid (brake fluid)



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 over flow.
c. Connect the clear plastic hose ① to the bleed screw.
d. Place the other end of the tube into a container.
e. Slowly apply the clutch lever several times.
f. Pull in the lever and hold it in position.
g. Loosen the bleed screw and allow the lever to travel slowly toward its limit.
h. Tighten the bleed screw when the lever has reached its limit, then release the lever.

Bleed Screw:
6 Nm (0.6 m•kg, 4.3 ft•lb)

i. Repeat steps (e) to (h) until allow of the air bubbles have been removed from the system.

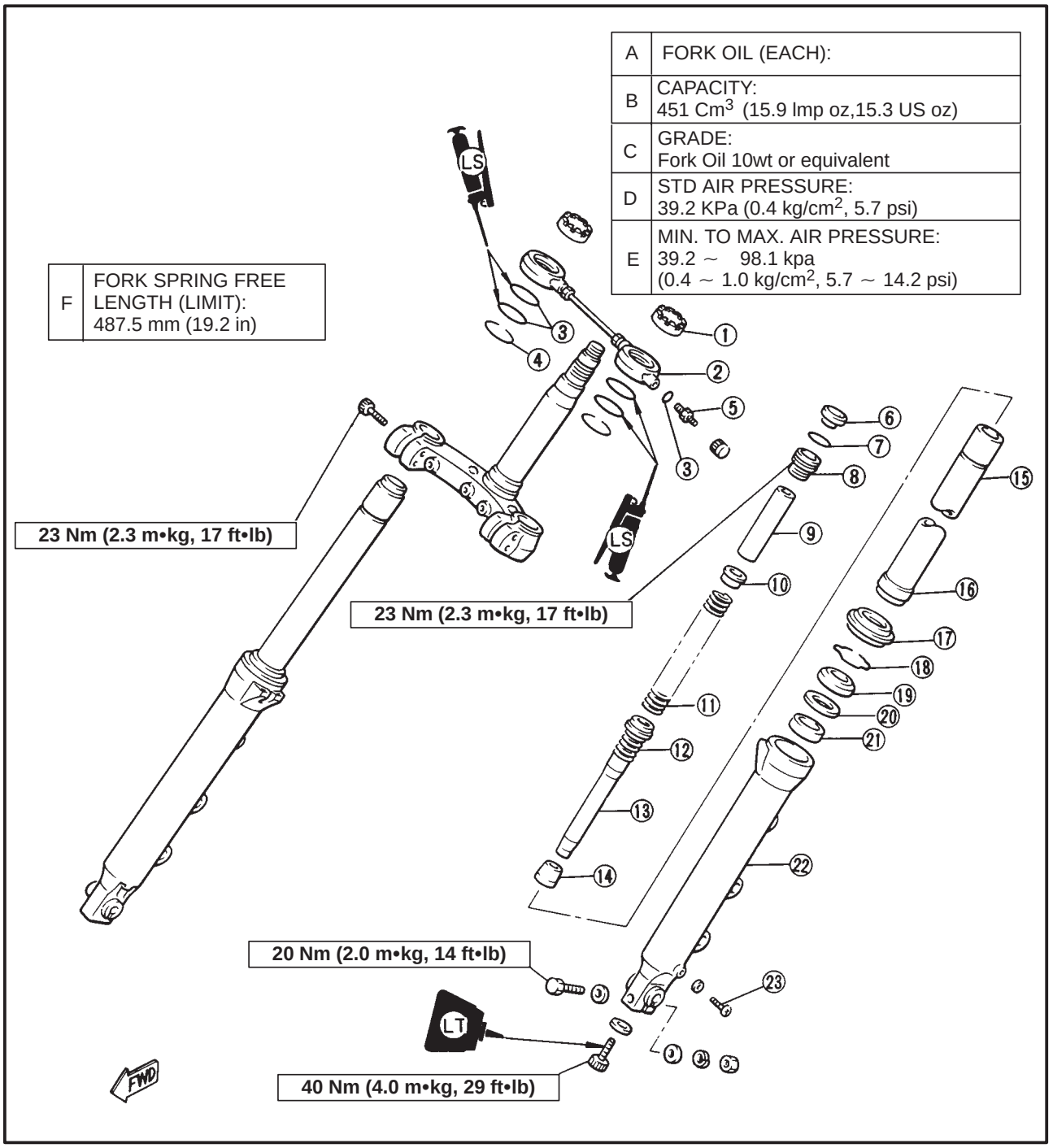
NOTE:

If bleeding is difficult, it may be necessary to let the clutch fluid system stabilize for a few hours. Repeat the bleeding procedure when the tiny bubbles in the system have disappeared.

j. Add brake fluid to the level line on the reservoir.

FRONT FORK

① Damper
② Air joint
③ O-ring
④ Circlip
⑤ Air valve
⑥ Fork cap
⑦ O-ring
⑧ Cap bolt
⑨ Collar
⑩ Spring seat
⑪ Fork spring
⑫ Rebound spring
⑬ Cylinder complete
⑭ Oil lock piece
⑮ Inner fork tube
⑯ Guide bush
⑰ Dust cover
⑱ Retaining clip
⑲ Oil seal
⑳ Seal spacer
㉑ Slide bush
㉒ Outer fork tube
㉓ Drain screw



REMOVAL

WARNING:

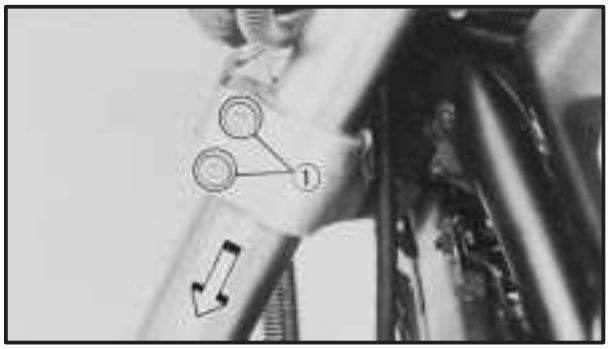
Securely support the motorcycle so it won't fall over when the front wheel and front forks are removed.



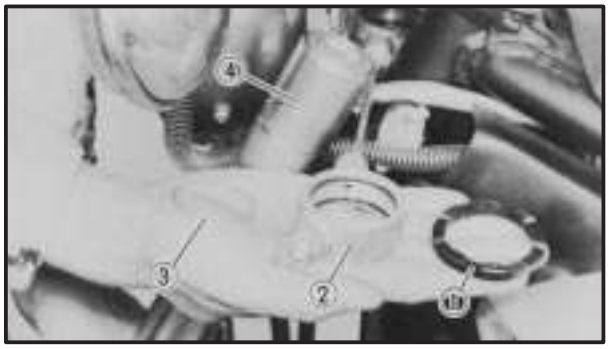
1. Remove:
   - Front wheel
     Refer to "FRONT WHEEL" section.
   - Brake calipers
   - Cable holders
2. Remove:
   - Air valve cap (left)
   - Fork cap ①
     Depress the valve until all of the air has been released.



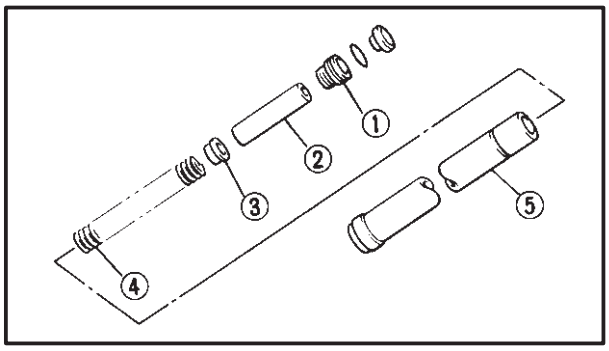
3. Loosen:
   - Pinch bolt (steering crown) ①
   - Cap bolt ②
     Use the Front Fork Cap Socket ③ (90890-01104).



4. Loosen:
   - Pinch bolts (under bracket) ①



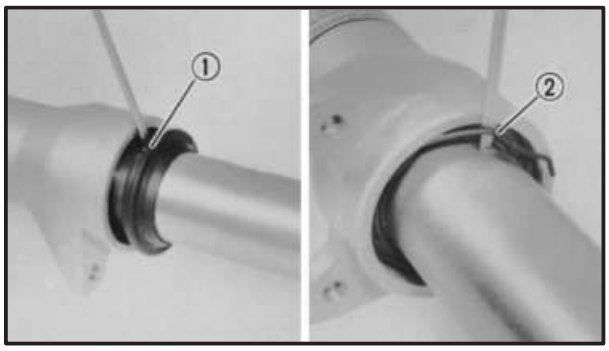
5. Remove:
   - Rubber damper ①
   - Air joint bracket ②
   - Circlip ③
   - Front fork(s) ④



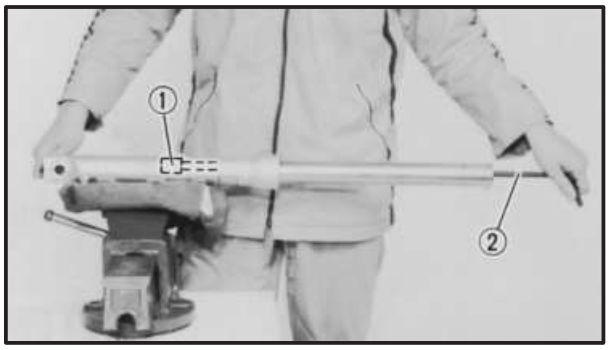
DISASSEMBLY

1. Remove:
   - Cap bolt ①
     Use the Front Fork Cap Socket (90890-01104).
   - Collar ②
   - Spring seat ③
   - Fork spring ④

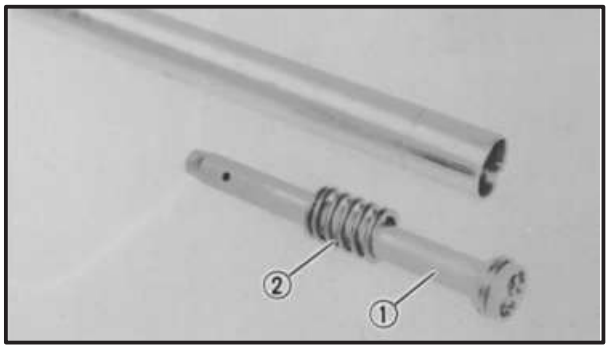
⑤ Inner fork tube



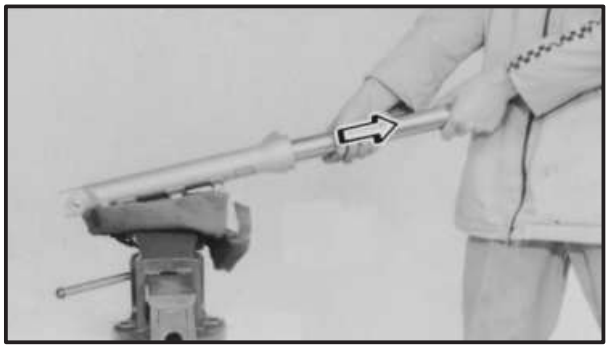
2. Remove:
   - Dust cover ①
   - Retaining clip ②
     Use a thin screwdriver, and be careful not to scratch the inner fork tube.



3. Remove:
   - Bolt (cylinder complete)
     Use the Damper Rod Holder ① (90890-01328) and the T-Handle ② (90890-01326) to lock the damper rod.



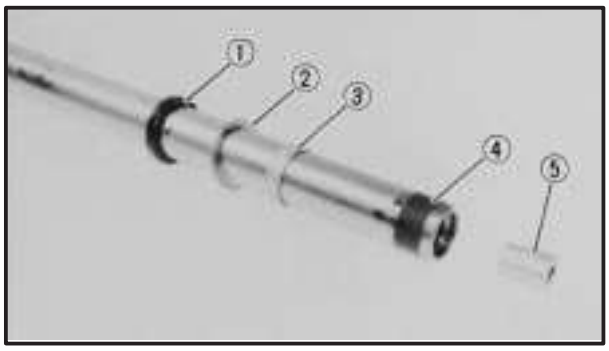
4. Remove:
   - Damper rod (cylinder complete) ①
   - Rebound spring ②



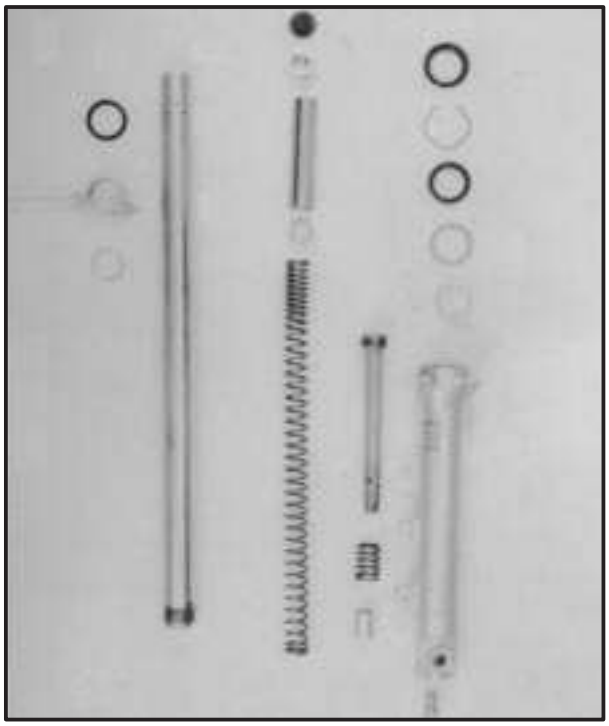
5. Remove:
   - Inner fork tube

Inner fork tube removal steps:
- Hold fork leg horizontally.
- Clamp the caliper mounting boss of the outer tube securely in a vise with soft jaws.
- Pull out the inner fork tube from the outer tube by forcefully, but carefully, with drawing the inner tube.

NOTE:
- Excessive force will damage the oil seal and/or the bushes. Damaged oil seal and bushing must be repalced.
- Avoid bottoming the inner tube in the outer tube during the above procedure, as the oil lock piece will be damaged.



6. Remove:
   - Oil seal ①
   - Seal spacer ②
   - Slide bush ③
   - Guide bush ④
   - Oil lock piece ⑤



INSPECTION

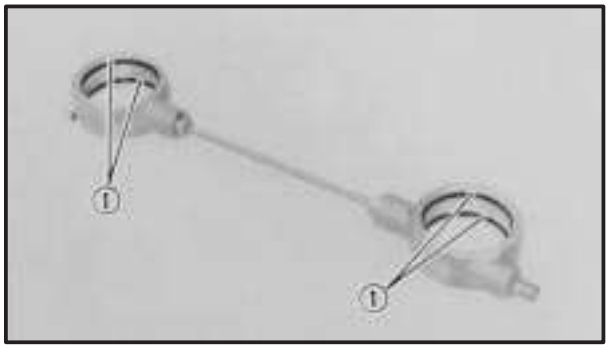
1. Inspect:
   - Inner fork tube
     Scratches/Bends → Replace.

WARNING:

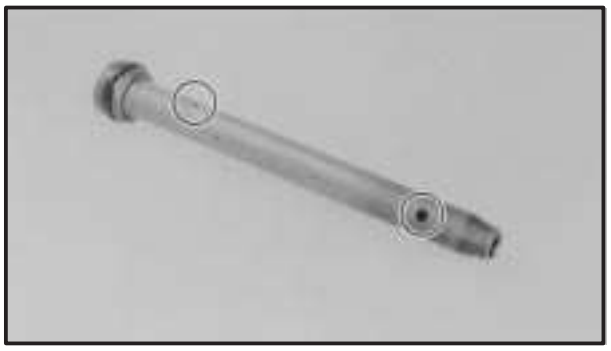
Do not attempt to straighten a bent inner fork tube as this may dangerously weaken the tube.

   - Outer fork tube
     Scratches/Bends/Damage → Replace.
   - Fork spring
     Over specified limit → Replace.

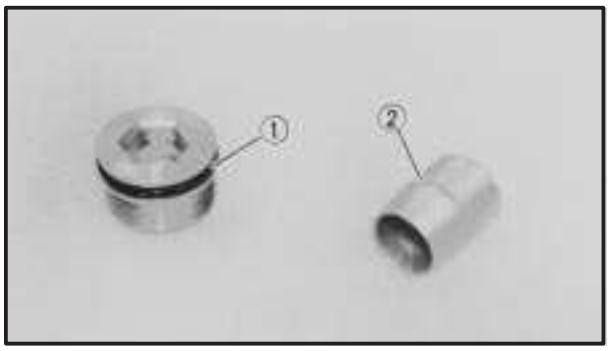
Fork Spring Free Length (limit):
487.5 mm (19.2 in)



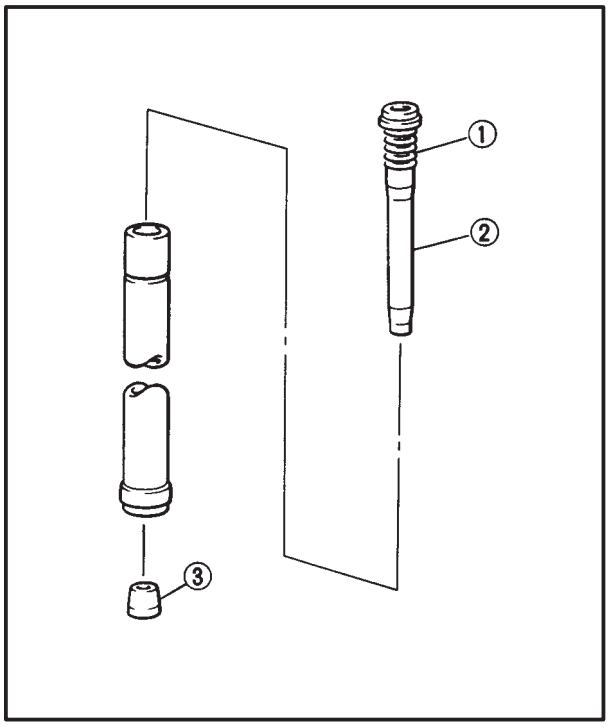
2. Inspect:
   - Air joint bracket
   - Air hose
     Cracks/Damage → Replace.
   - O-ring ①
     Damage → Replace.



3. Inspect:
   • Damper rod
   Wear/Damage → Replace.
   Contamination → Blow out all oil passages with compressed air.



4. Inspect:
   • O-ring (cap bolt) ①
   • Oil lock piece ②
   Damage → Replace.
   • Seals
   Wear/Damage → Replace.



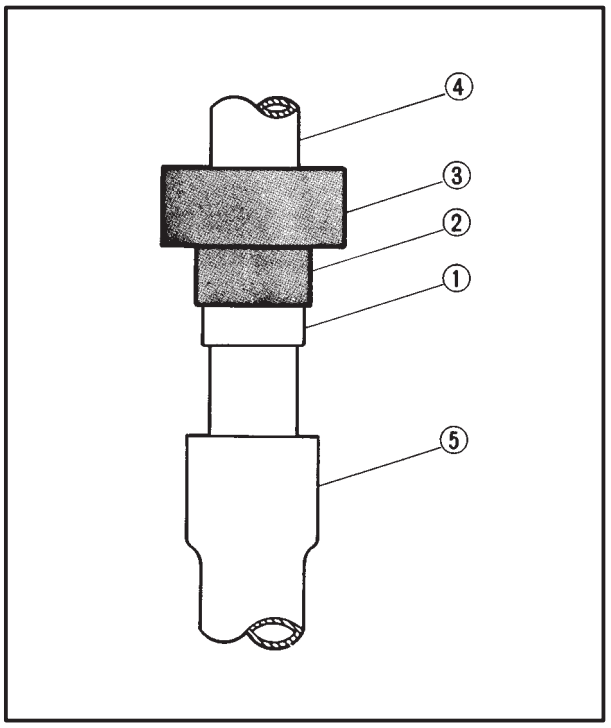
ASSEMBLY

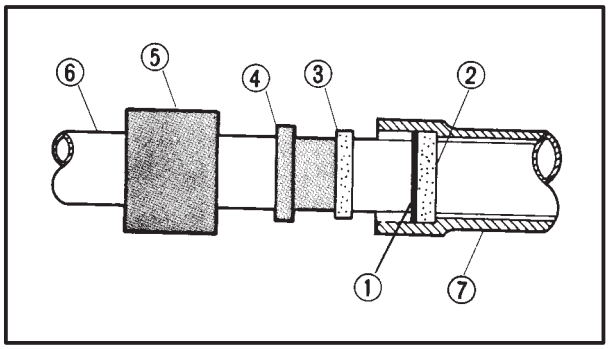
Before assembling, clean and inspect all parts and replace when necessary.

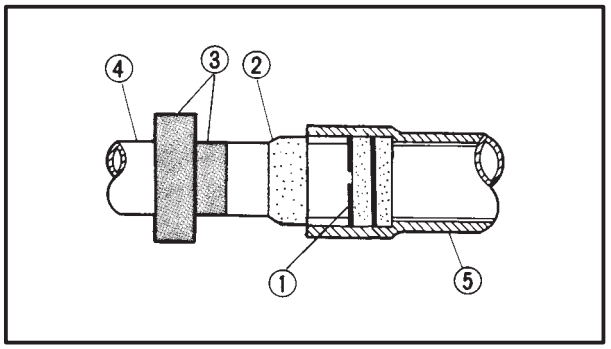
NOTE:

In front fork assembly, be sure to use following new parts. Do not reuse them.
• Slide bush
• Guide bush
• Oil seal
• Dust seal

1. Install:
   • Rebound spring ①
   • Damper rod ②
   Allow the rod to slide slowly down the tube until the it protrudes from the bottom.
   • Oil lock piece ③
   Fit oil lock piece over damper rod sticking out of the inner fork tube.
2. Install:
   • Inner fork tube
   Into outer tube.







3. Tighten:
   - Bolt (cylinder complete)
     Use the Damper Rod Holder (90890-01328) and the T-Handle (90890-01326).

Bolt (Cylinder Complete):
40 Nm (4.0 m•kg, 29 ft•lb)
LOCTITE®

4. Install:
   - Slide bush ①
     Into outer tube.
     Use the Fork Seal Driver Weight ③ (90890-01367) and the Adapter ② (90890-01373).

④ Inner tube
⑤ Outer tube

5. Install:
   - Seal spacer ①
     On top of the slide bush ②.
   - Oil seal ③
     Use the Fork Seal Driver Weight ⑤ (90890-01367) and the Adapter ④ (90890-01373), and install with numbered side up.

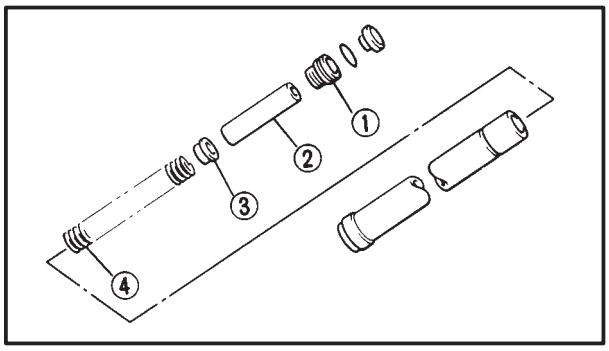
⑥ Inner tube
⑦ Outer tube

6. Install:
   - Retaining clip ①
   - Dust seal ②
     Use the Special Tools ③ (90890-01367, 90890-01373)

④ Inner tube
⑤ Outer tube

7. Fill:
   - Front fork

Each Fork:
451 cm³ (15.9 Imp oz, 15.3 US oz)
Fork Oil 10 wt or equivalent
After filling, slowly pump the fork up and down to distribute oil.



8. Install:
   - Fork spring ④
     With smaller pitch side up.
   - Spring seat ③
   - Collar ②
   - Cap bolt ①
     Temporarily tighten the cap bolt.

INSTALLATION

1. Install:
   - Front fork(s)
     Into underbracket.
   - Circlip
     Onto inner tube.
     Apply a light coat of lithium base grease to the O-rings in the air joint bracket.
   - Air joint bracket
   - Rubber damper
     Over inner fork tube.



2. Tighten:
   - Pinch bolts (under bracket)
     Temporarily tighten the pinch bolts.

NOTE:

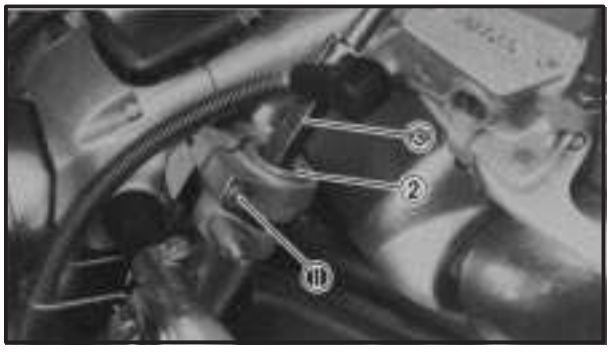
Position the inner tube end so that it is flush ⓐ with the top of the steering crown.

3. Tighten:
   - Pinch bolts (under bracket)

Pinch Bolts (Under Bracket):
23 Nm (2.3 m•kg, 17 ft•lb)

NOTE:

Do not tighten the pinch bolt (steering crown) in this stage.



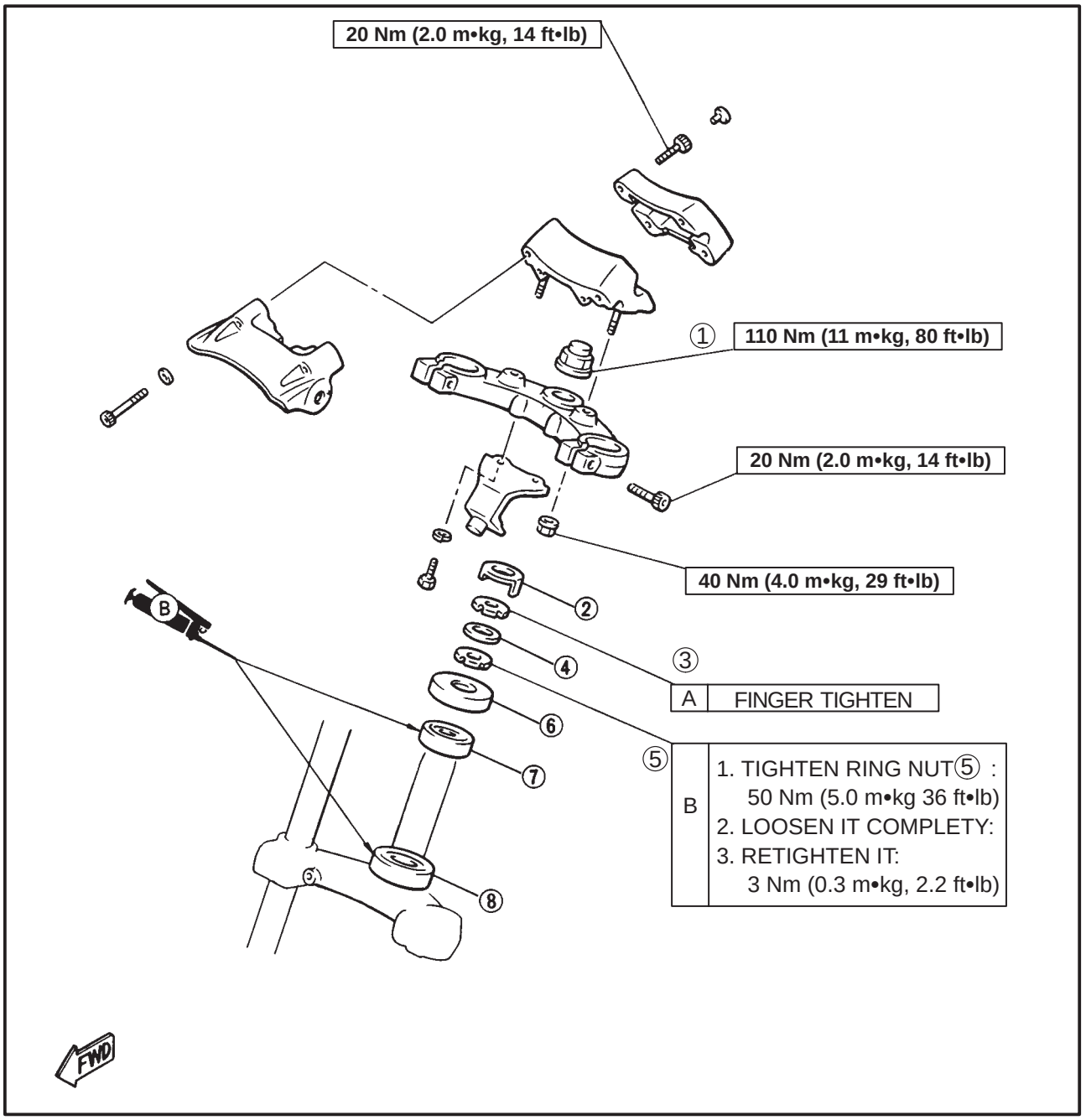
4. Tighten:
   - Cap bolt ②
     Use the Front Fork Cap Socket ③ (90890-01104).
   - Pinch bolt (steering crown) ①

Cap Bolt:
23 Nm (2.3 m•kg, 17 ft•lb)
Pinch Bolts (Steering Crown):
20 Nm (2.0 m•kg, 14 ft•lb)

5. Adjust:
   - Front fork air pressure
     Refer to “CHAPTER 2. FRONT FORK ADJUSTMENT” section.
6. Install:
   - Air valve cap
   - Fork cap
   - Brake calipers
   - Cable holders
     Refer to “FRONT AND REAR BRAKE” section.
   - Front wheel
     Refer to “FRONT WHEEL” section.

STEERING HEAD

① Steering stem nut
② Lock washer
③ Ring nut (Upper)
④ Washer
⑤ Ring nut (Lower)
⑥ Bearing cover
⑦ Bearing (Upper)
⑧ Bearing (Lower)

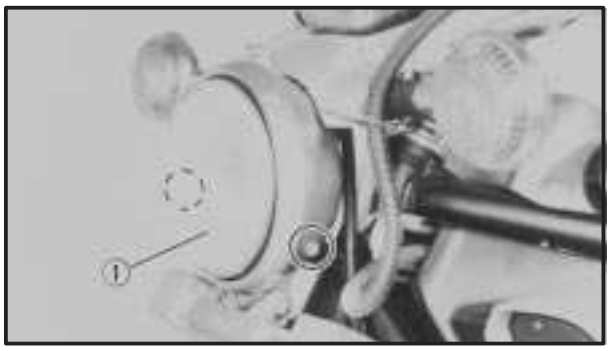


REMOVAL

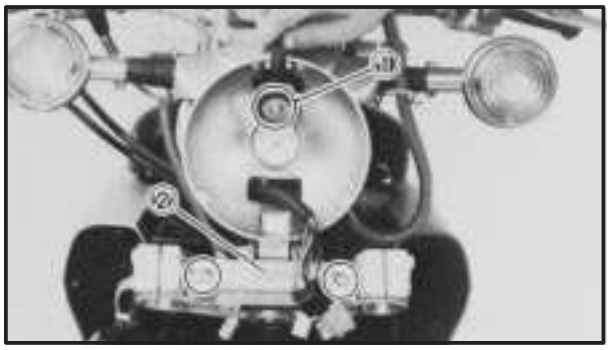
WARNING:

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

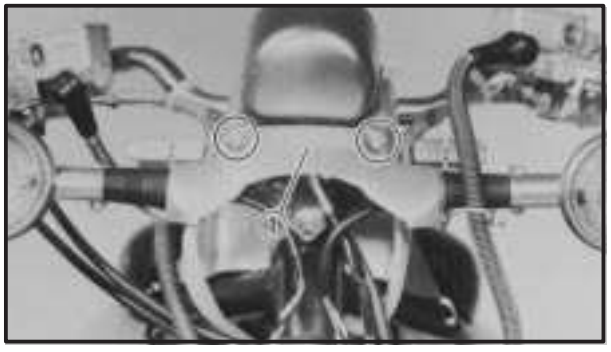
1. Remove:
   - Front wheel
   - Front forks
2. Remove:
   - Headlight lens unit ①
3. Disconnect:
   - All leads (in the headlight body)



4. Remove:
   - Bolt (headlight body bracket) ①
   - Emblem ②

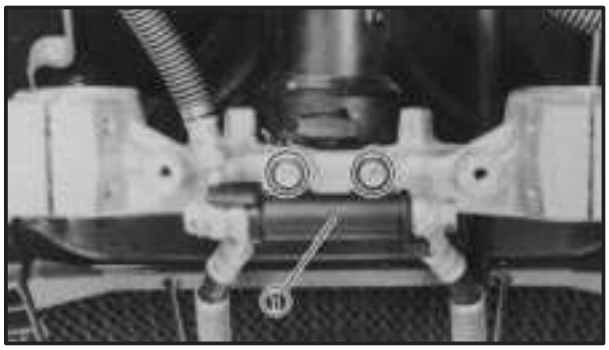


5. Remove:
   - Flasher light bracket assembly ①

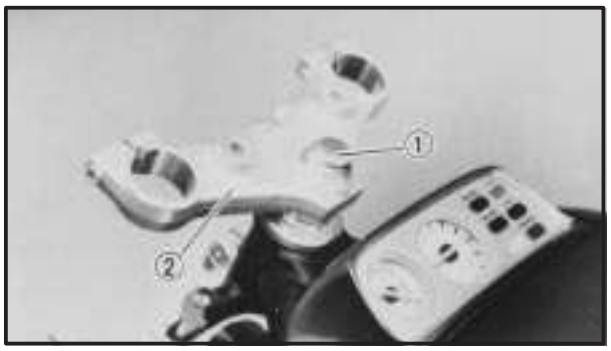


6. Remove:
   - Handlebar holder assembly ①

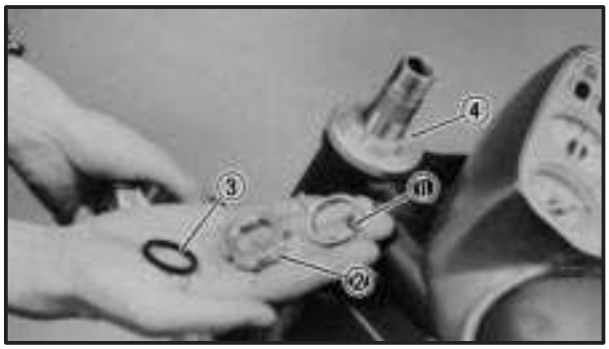




7. Remove:
   • Brake hose joint ①



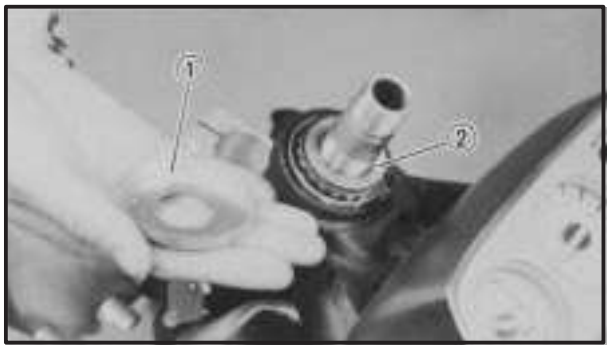
8. Remove:
   • Nut (steering crown) ①
   • Steering crown ②



9. Remove:
   • Lock washer (ring nut) ①
   • Ring nut (upper) ②
   • Washer ③
   • Ring nut (lower) ④

WARNING:

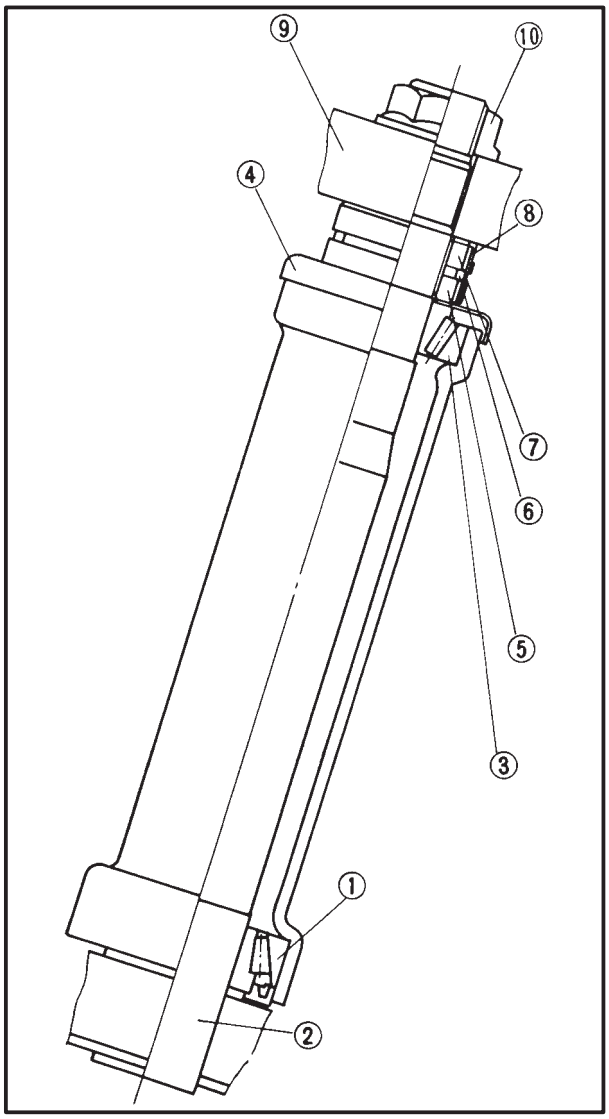
Support the under bracket so that it may not fall down.



10. Remove:
    • Steering stem
    • Bearing cover ①
    • Bearing (upper) ②
    • Bearing (lower) ③







INSPECTION

1. Wash the bearing in a solvent.
2. Inspect:
   - Bearings
   - Bearing race
     Pitting/Damage → Replace.

NOTE:

Always replace bearing and race as a set.

INSTALLATION

1. Lubricute:
   - Bearing and races

Wheel bearing grease

2. Install:
   - Bearing (lower) ①
     Onto steering stem.
   - Steering stem ②

CAUTION:

Hold the steering stem until it is secured.

   - Bearing (upper) ③
   - Ball race cover ④
   - Ring nut (lower) ⑤
3. Tighten:
   - Ring nuts (lower and upper)

Ring nuts tightening steps:

NOTE:

Set the Torque Wrench to the Ring Nut Wrench so that they form a right angle.

- Install the ring nut (lower) ⑤.

NOTE:

The tapered side of ring nut must face downward.

- Tighten the ring nut ⑤ using the Ring Nut Wrench (90890-01403).

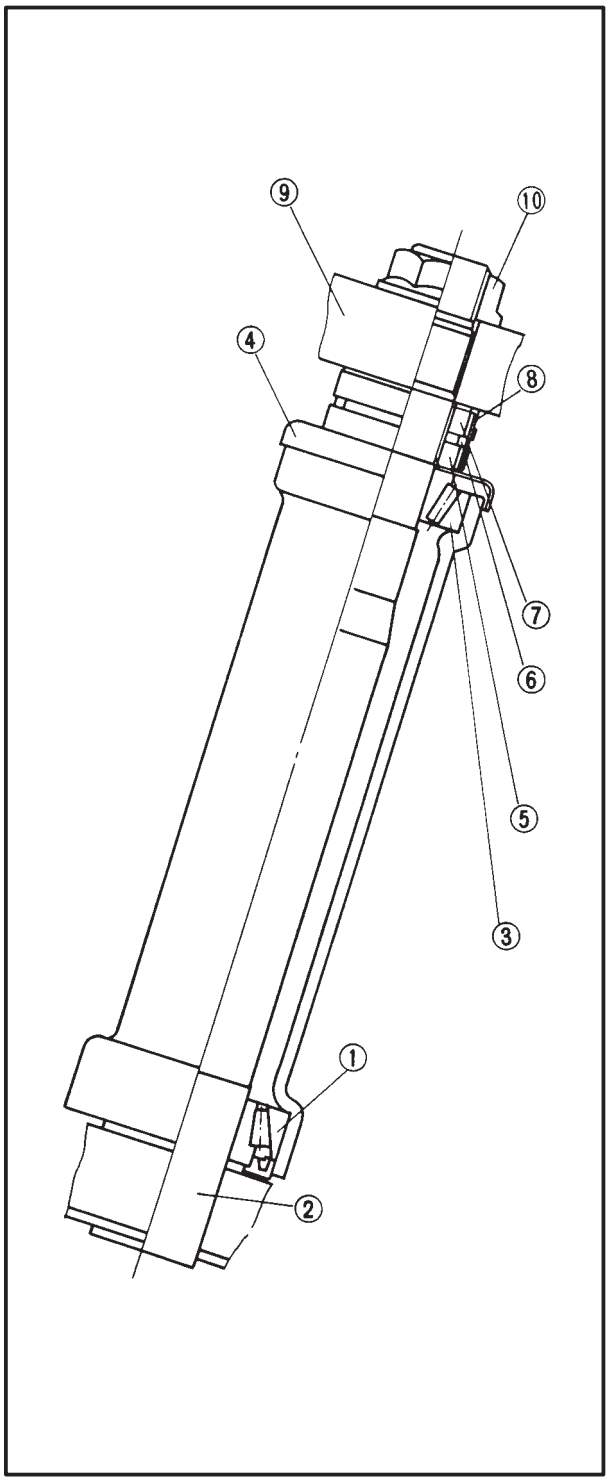
Ring Nut ⑤ (Initial Tightening): 50 Nm (5.0 m•kg, 36 ft•lb)

- Loosen the ring nut ⑤ completely and retighten it to specification.

WARNING:

Do not over-tightening.

Ring Nut ⑤ (Final Tightening): 3 Nm (0.3 m•kg, 2.2 ft•lb)



- Check the steering stem by turning it lock to lock. If there is any binding, remove the steering stem assembly and inspect the steering bearings ①, ③.
- Install the washer ⑥.
- Install the ring nut (upper) ⑦.

NOTE:

The tapered side of ring nut must face downward.

- Finger tighten the ring nut ⑦, then align the slots of both ring nuts. If not aligned, hold the lower ring nut ⑤ and tighten the other until they are aligned.
- Install the lock washer ⑧.

NOTE:

Make sure the lock washer tab is placed in the slots.

- Install the steering crown ⑨ and tighten the steering stem nut ⑩ to specification.

Nut (Steering Stem):
110 Nm (11.0 m•kg, 80 ft•lb)

- Tighten the pinch bolts to specification.

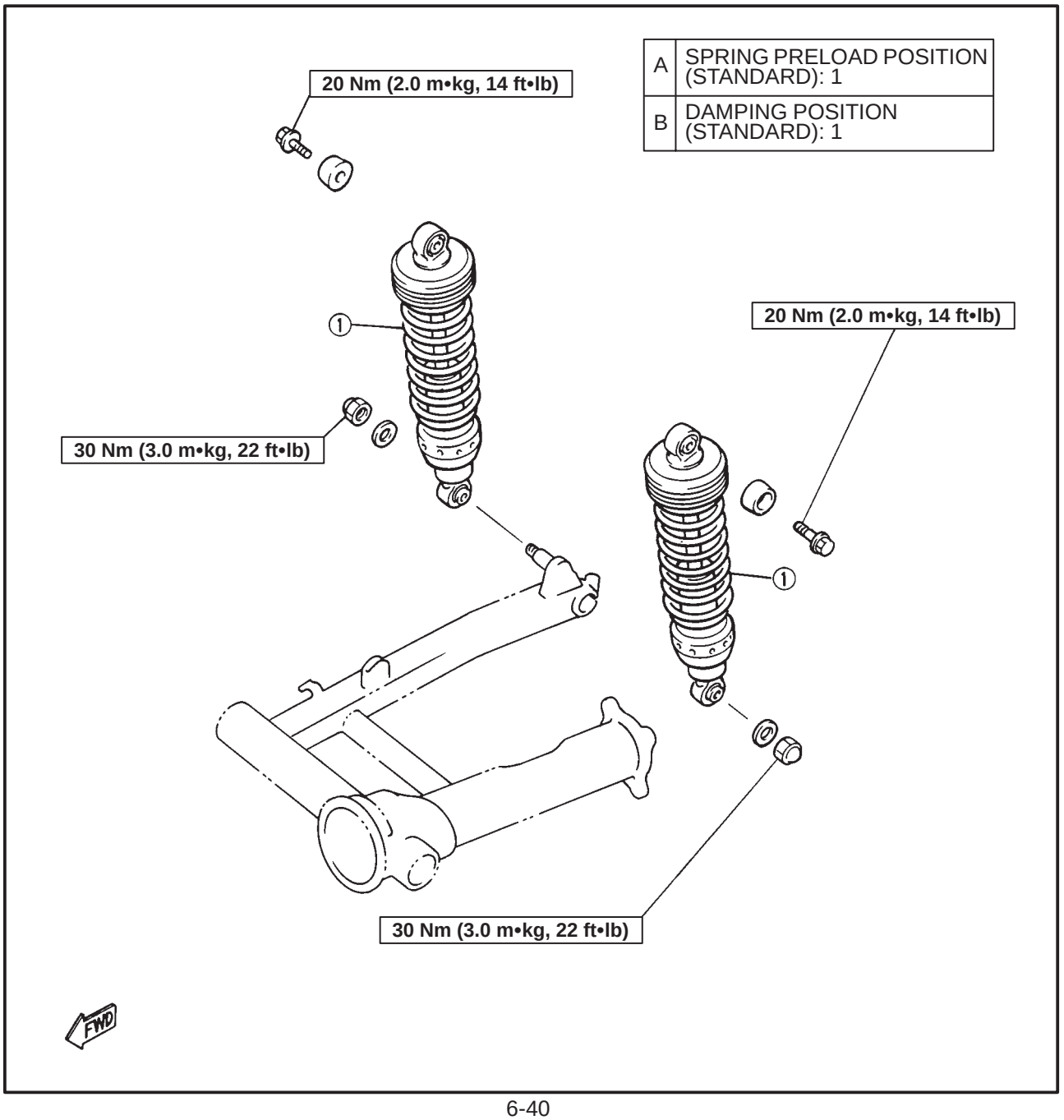
Pinch Bolt (Steering Crown):
20 Nm (2.0 m•kg, 14 ft•lb)

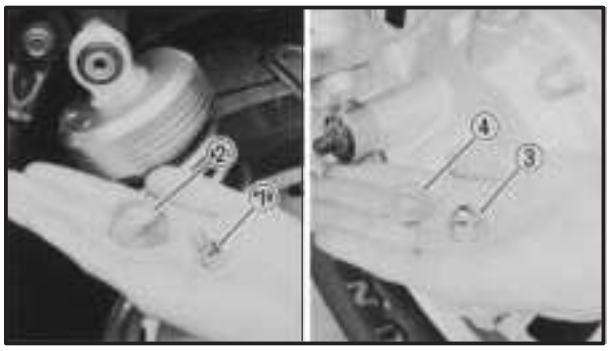
5. Install:
   - Components in aforementioned list (steps "7 ~ 1")

Handlebar Lower Holder:
40 Nm (4.0 m•kg, 29 ft•lb)

REAR SHOCK ABSORBER

① Rear shock absorber assembly



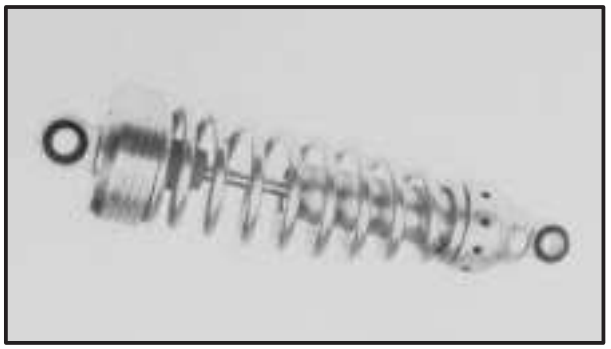


REMOVAL

1. Remove:
   - Bolt (shock absorber top) ①
   - Special washer ②
   - Nut (shock absorber bottom) ③
   - Plain washer ④



2. Pull out the shock absorber top, and turn the shock absorber clockwise.
3. Remove:
   - Rear shock absorber



INSPECTION

1. Inspect:
   - Shock absorber rod
     Bends/Damage → Replace the shock absorber assembly.
   - Shock absorber
     Oil leakes → Replace the shock absorber assembly.
   - Spring
     Fatigue → Replace the shock absorber assembly.
     Move the spring up and down.

INSTALLATION

When installing the rear shock absorber, reverse the removal procedure. Note the following points.

1. Apply:
   - Lithium base grease
     To the pivot points.



2. Install:
   • Rear shock absorber

NOTE:

The rear shock absorber should be installed so that the damping match mark ① on the shock absorber faces outward ②.

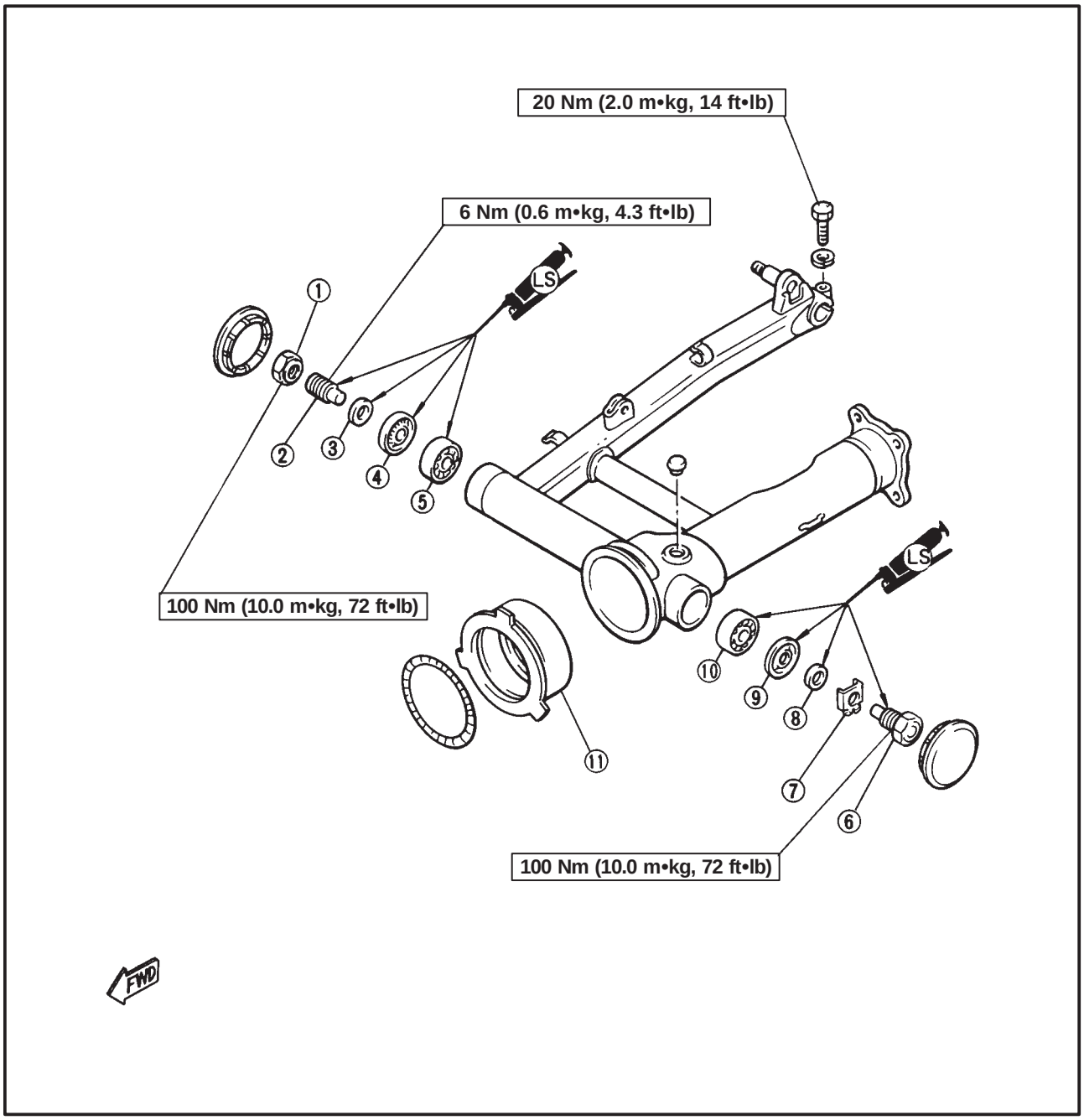
3. Tighten:
   • Bolt (shock absorber top)
   • Nut (shock absorber bottom)

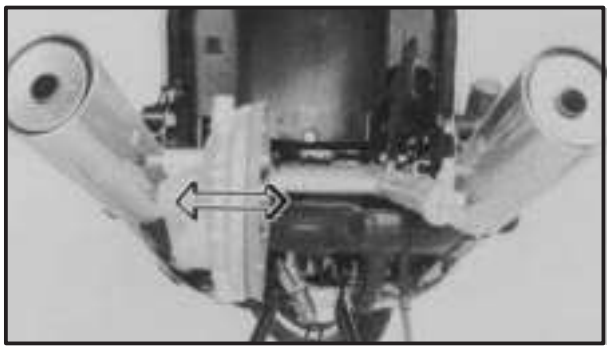
Bolt (Shock Absorber Top):
20 Nm (2.0 m•kg, 14 ft•lb)
Nut (Shock Absorber Bottom):
30 Nm (3.0 m•kg, 22 ft•lb)

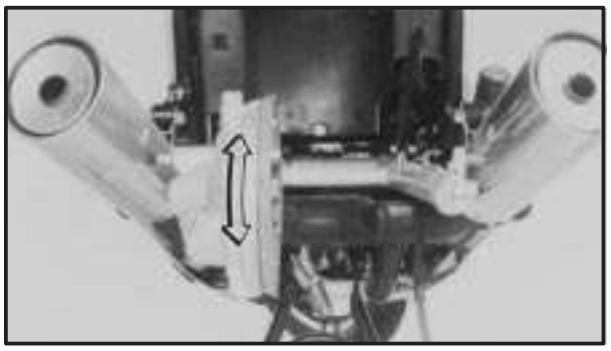
4. Adjust:
   • Spring preload
   • Damping force
   Refer to “CHAPTER 2. REAR SHOCK ABSORBER ADJUSTMENT” section.

SWINGARM

① Locknut
② Pivot shaft (right)
③ Collar
④ Oil seal
⑤ Taper roller bearing
⑥ Pivot shaft (left)
⑦ Lock washer
⑧ Collar
⑨ Oil seal
⑩ Taper roller bearing
⑪ Rubber boot





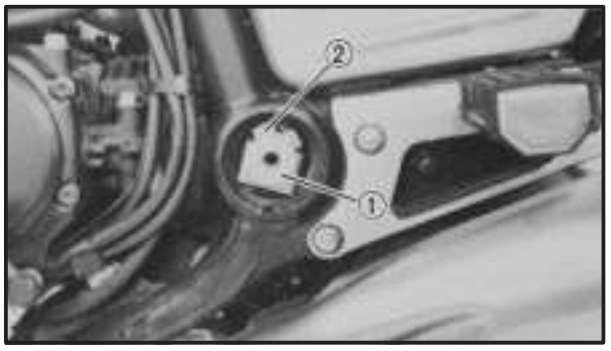


FREE PLAY INSPECTION

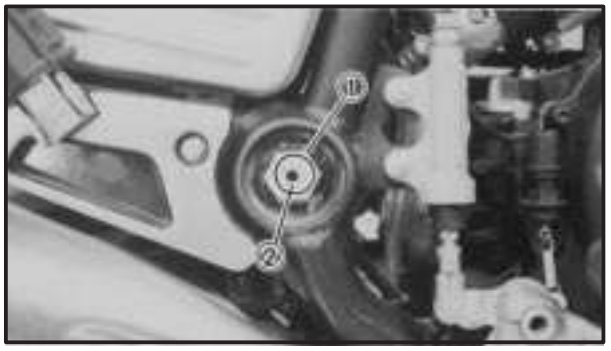
1. Remove:
   - Rear wheel
   - Rear shock absorbers
2. Check:
   - Swingarm (side play)
     Side play → Replace taper roller bearings and collars.
     Move the swingarm from side to side.
     There should be no noticeable side play.
3. Check:
   - Swingarm (vertical movement)
     Tightness/Binding/Rough spots → Replace bearings.
     Move the swingarm up and down.

REMOVAL

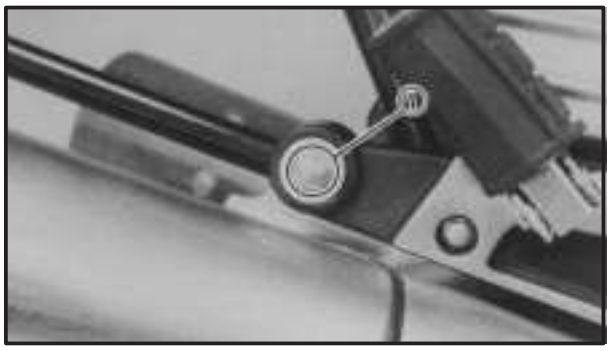
1. Remove:
   - Rear wheel
   - Rear shock absorbers
   - Pivot shaft caps
2. Flatten:
   - Lock washer tab
     Use a blunt chisel.



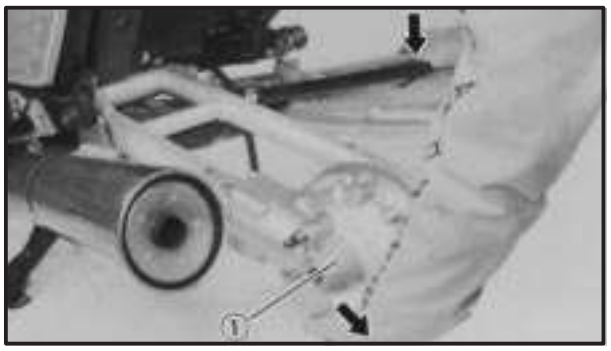
3. Remove:
   - Pivot shaft (left) ①
   - Lock washer ②



4. Remove:
   - Nut ①
   - Pivot shaft (right) ②



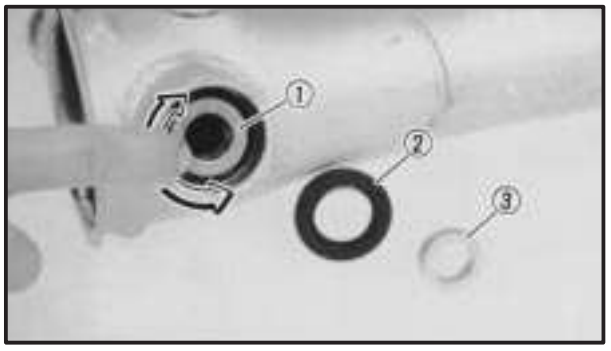
5. Remove:
   • Rubber boot
   • Bolts (muffler) ①



6. Remove:
   • Swingarm ①
   Push down the muffler.



7. Remove:
   • Final gear assembly

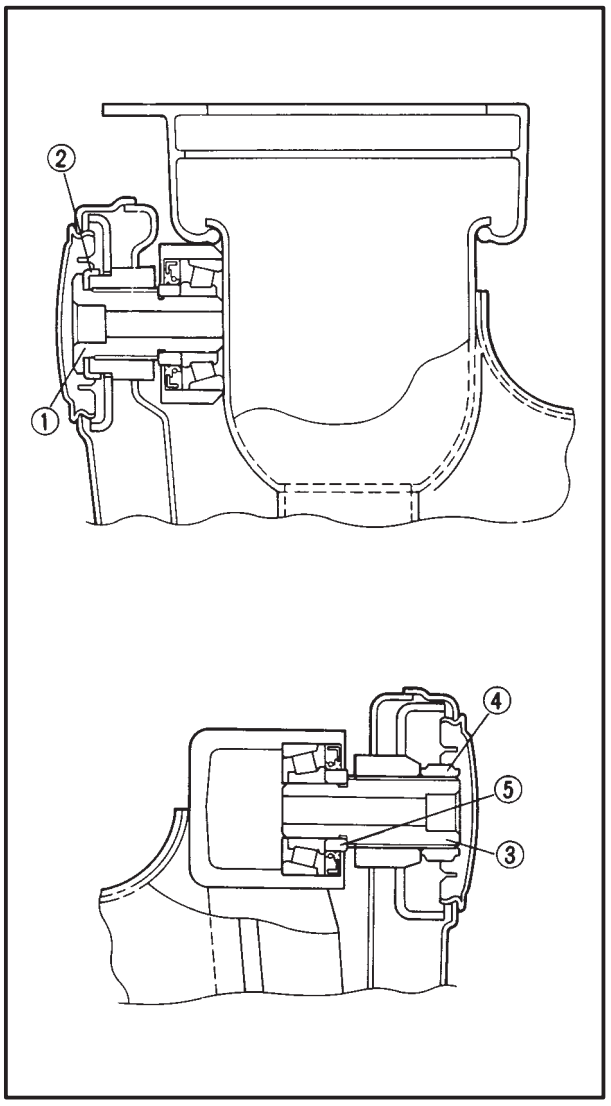


INSPECTION

1. Wash the bearings in a solvent.
2. Inspect:
   • Bearings (race/rollers) ①
   Pitting/Damage → Replace.
   • Oil seals ②
   • Collars ③
   Damage → Replace.



3. Inspect:
   • Rubber boot
   Damage → Replace.





INSTALLATION

When installing the swingarm, reverse the removal steps. Note the following points.

1. Lubricate:
   - Bearing
   - Oil seals

	Lithium Base Waterproof Wheel Bearing Grease

2. Install:
   - Swingarm
   - Pivot shafts
3. Tighten:
   - Pivot shafts

Pivot shaft tightening steps:

- Tighten the pivot shaft (left) ① to specification.

	Pivot Shaft (Left): 100 Nm (10.0 m•kg, 72 ft•lb)

- Tighten the pivot shaft (right) ③ until it contacts the collar ⑤.

	Pivot Shaft (Right): 6 Nm (0.6 m•kg, 4.3 ft•lb)

- Tighten nut (right pivot shaft) ④ to specification.

	Nut (Right Pivot Shaft): 100 Nm (10.0 m•kg, 72 ft•lb)

- Bend the lock washer tab ② along the nut flat.

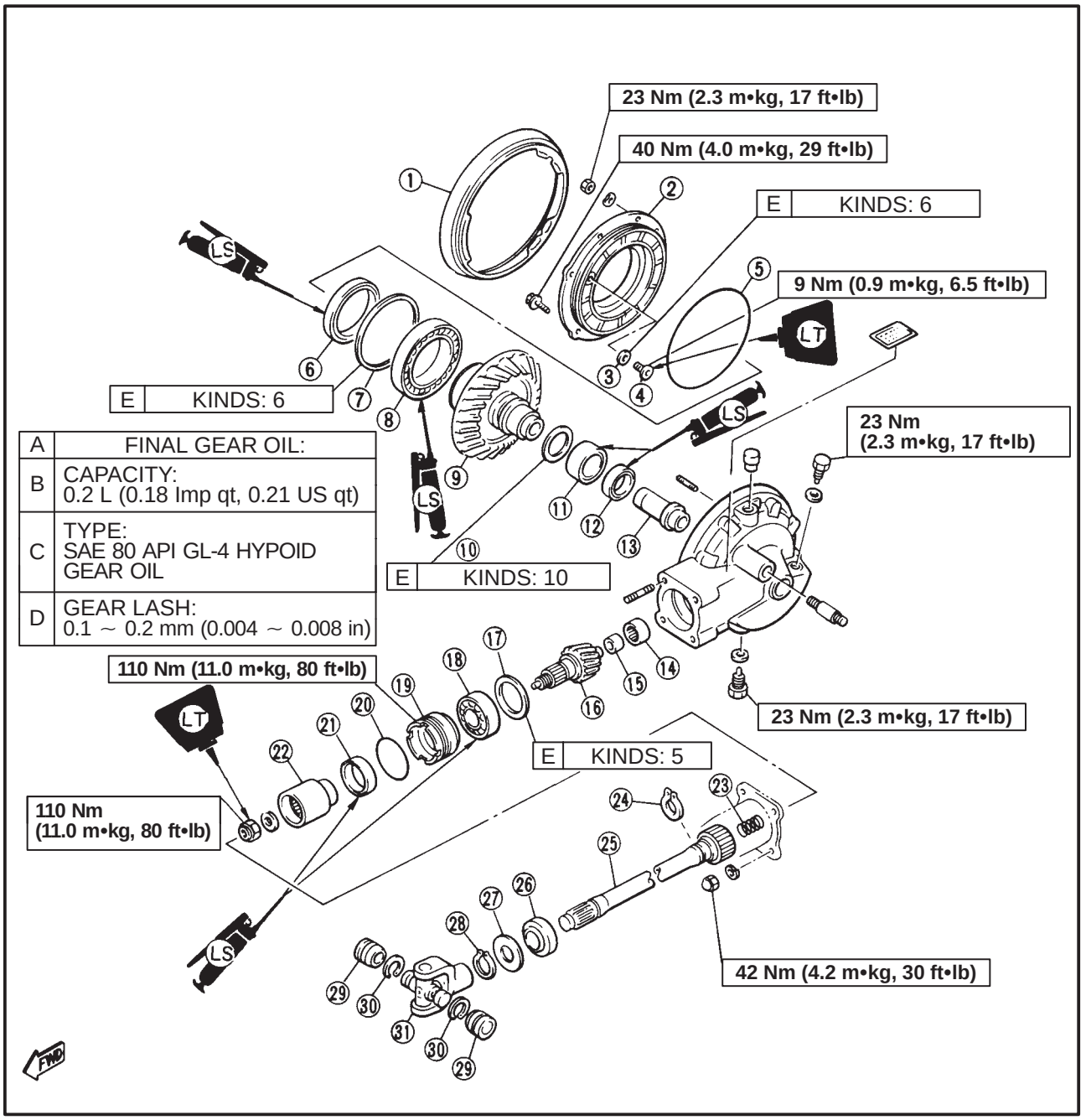
4. Apply:
   - Yamaha Bond No.1215 (90890-85505)
     To the mating surfaces of both case halves.
5. Install:
   - Final gear assembly

	Nuts (Final Gear Case): 42 Nm (4.2 m•kg, 30 ft•lb)

6. Check:
   - Swingarm (side play)
   - Swingarm (vertical movement)
     Refer to “FREE PLAY INSPECTION” section.

SHAFT DRIVE

① Dust cover
② Bearing housing
③ Ring gear stopper shim
④ Ring gear stopper
⑤ O-ring
⑥ Oil seal
⑦ Ring gear shim
⑧ Bearing
⑨ Ring gear
⑩ Thrust washer
⑪ Bearing
⑫ Oil seal
⑬ Collar
⑭ Bearing
⑮ Bearing
⑯ Drive pinion gear
⑰ Final drive gear shim
⑱ Bearing
⑲ Bearing retainer
⑳ O-ring
㉑ Oil seal
㉒ Coupling gear
㉓ Spring
㉔ Circlip
㉕ Drive shaft
㉖ Oil seal
㉗ Washer
㉘ Circlip
㉙ Bearing
㉚ Circlip
㉛ Universal joint



TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

A	Symptoms	B	Possible Causes
1.	A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.)	A.	Bearing damage.
2.	A "rolling rumble" noticeable at low speed; a high-piched whine; a "clunk" from a shaft drive component or area.	B.	Improper gear lash.
3.	A locked-up condition of the shaft drive mechanism; no power transmitted from engine to rear wheel.	C.	Gear tooth damage.
		D.	Broken drive shaft.
		E.	Broken gear teeth.
		F.	Seizure due to lack of lubrication.
		G.	Small foreign object lodged between moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal motorcycle operating noise. If there is reason to believe these components are damaged, remove the components for specific inspection.

Inspection Notes

1. Inrestigate any unusual noises

The following "Noises" may indicate a mechanical defect:

a. A "rolling rumble" noise during coasting, acceleration, or deceleration. The noise increases with rear wheel speed, but it does not increase with higher engine or transmission speeds.
   Diagnosis: Possible wheel bearing damage.

b. A "whining" noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly, 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.

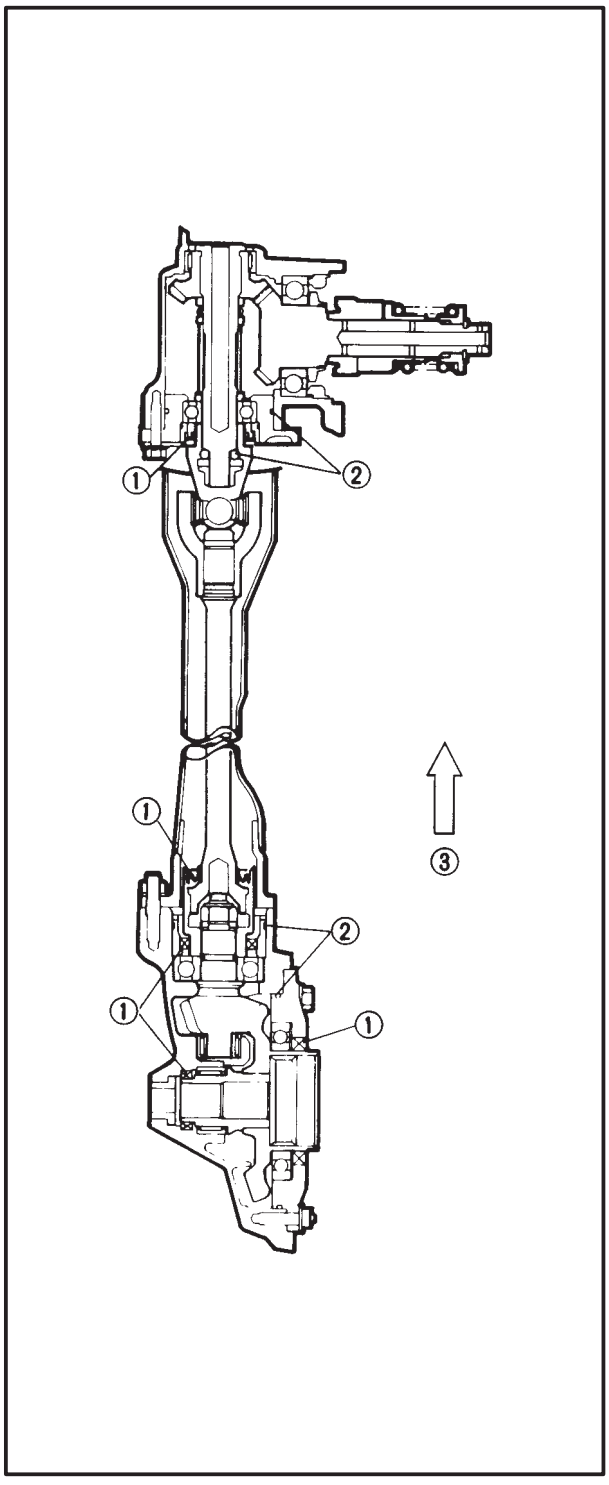
WARNING:

Stop riding immediately if broken gear teeth are suspected. This condition could result in a locking-up of the shaft drive assembly, causing loss of control of the dike and possible injury to the rider.

2. Inspect:
   • Drained oil
   Drain plug shows large amount of metal.
   Particles → Check bearing fur seizure.

NOTE:

A small amount of metal particles in the oil is normal.



3. Inspect:
   • Oil leakage

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 rest-preventative coating or excessive seal lubrication.
- Always clean the motorcycle and recheck the suspected location of an apparent leakage.

Troubleshooting Chart

When basic conditions “a” and “b” above exist, check the following points:

Elevate and spin the front wheel. Feel for wheel bearing damage.

YES ⇨ Replace the wheel bearing. (Refer to “CHAPTER 5. FRONT WHEEL”)

NO ↓

Check the rear wheel. Feel for bearing damage.

NO ⇨ Rear wheel bearings and shaft drive bearings probably not damaged. Repeat test or remove individual components.

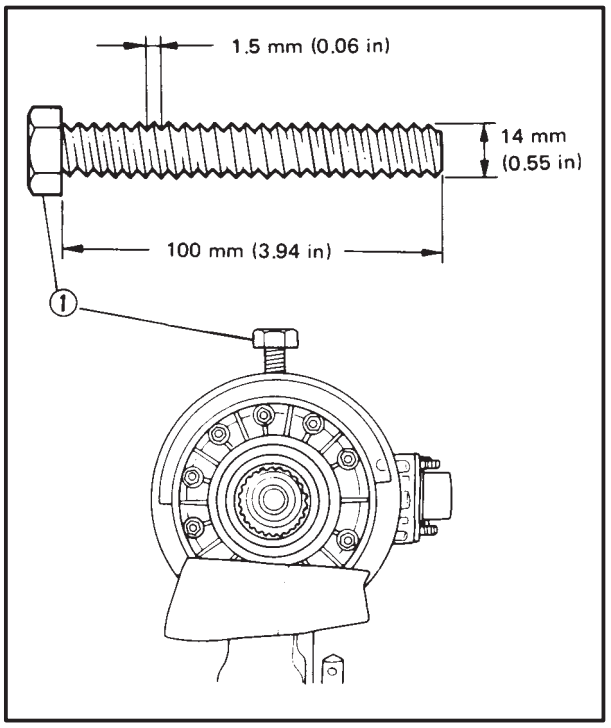
YES ↓

Remove the rear wheel. Check for wheel bearing damage.

YES ⇨ Replace the rear wheel bearing. (Refer to “CHAPTER 5. REAR WHEEL” section).

NO ↓

Remove the drive shaft components.



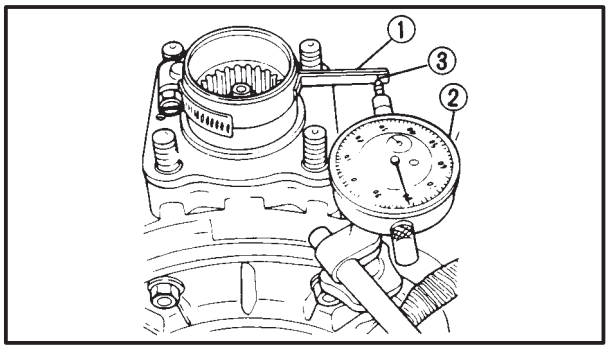
FINAL DRIVE GEAR

Gear Lash Measurement

1. Secure the gear case in a vise or other support.
2. Remove:
   - Drain plug
   Drain the oil.
3. Install:
   - A bolt of the specified size 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.



5. Attach:
   - Gear Lash Measurement Tool ① (90890-01230)
   - Dial Gauge ② (90890-03097)

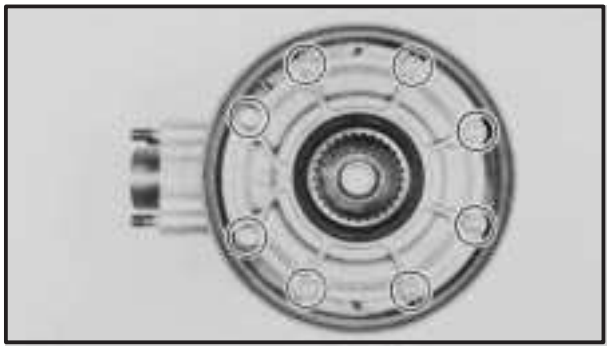
③ Position mark

6. Measure:
   - Gear lash
   Gently rotate the gear coupling from engagement to engagement.
   Over specified limit → Adjust.

Final Gear Lash:
0.10 ~ 0.20 mm
(0.004 ~ 0.008 in)

NOTE:

Measure the gear lash at 4 positions., Rotate the shaft 90° each time.

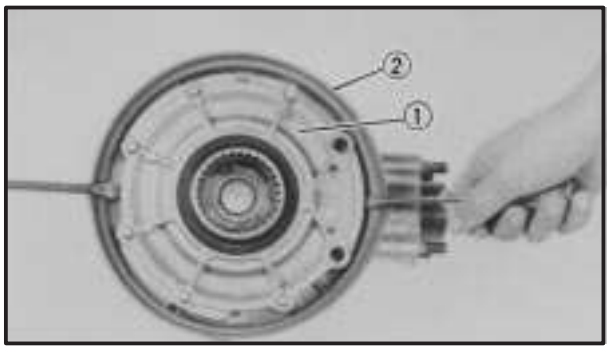


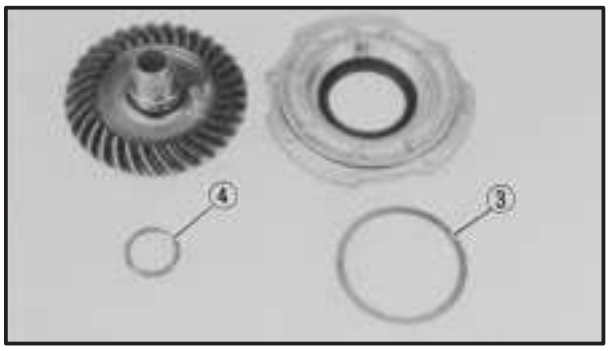
Gear Lash Adjustment

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
   - Dust cover ②
   - Rig gear
   - Shim(s) ③
   - Thrust washer ④
3. Adjust:
   - Gear lash

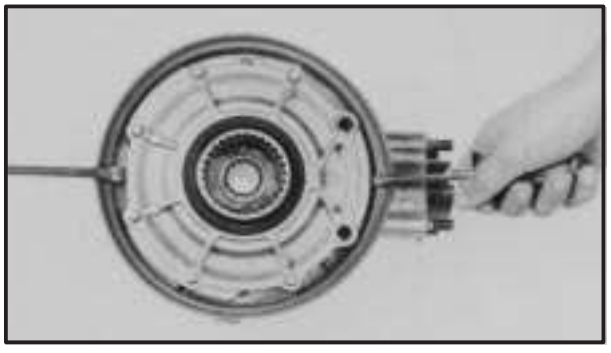
Gear lash adjustment steps:
- Select the suitable shims and thrust washer by the following chart.

Too-little gear lash → Reduce shim thickness.
Too-large gear lash → Increase shim thickness.

To Add or Reduce Ring Gear Shim Thickness	
Increase by more than 0.1 mm (0.004 in)	Reduce by more than 0.1 mm (0.004 in)
↓	↓
Reduce thrust washer thickness by 0.1 mm (0.004 in) for every 0.1 mm of ring gear shim increase. →	Reverse procedure

Ring Gear Shim	
Thickness (mm)	**0.25 0.30 0.35 0.40 0.45 0.50**

Thrust Washer	
Thickness (mm)	**1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3**

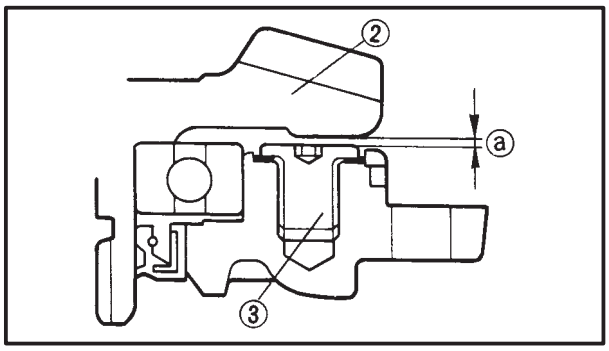


Ring Gear Stopper Clearance Measurement
1. Remove:
   - Bearing housing with ring gear
     Refer to “Gear Lash Adjustment” section.



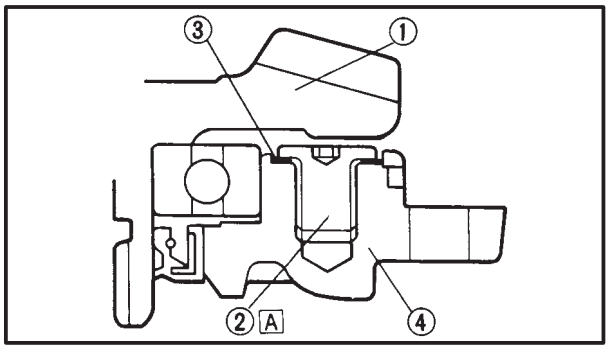
2. Measure:
   • Ring gear stopper clearance ⓐ
   Use the Feeler Gauge ①.
   Out of specification → Adjust.

	Ring Gear Stopper Clearance ⓐ: 0.30 ~ 0.60 mm (0.012 ~ 0.024 in)



② Ring gear stopper
③ Ring gear

3. Install:
   • Bearing housing with ring gear



Ring Gear Stopper Clearance Adjustment

1. Remove:
   • Ring gear ①
   • Rig gear stopper ②
   • Shim(s) ③

④ Bearing housing
A Left-hand-threads

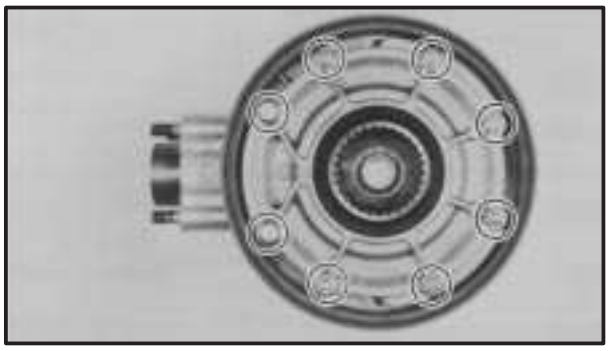
2. Select:
   • Suitable shim(s)
   By the following chart.

	Shim	
Thickness (mm)	**0.10** **0.20** **0.40**	**0.15** **0.30** **0.50**

3. Install:
   • Components in above list (step “1”)

	Ring Gear Stopper: 9 Nm (0.9 m•kg, 6.5 ft•lb) LOCTITE®

4. Measure:
   • Ring gear stopper clearance

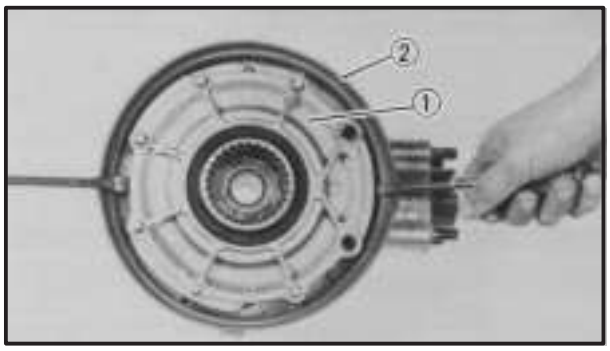


Final Drive Gear Disassembly

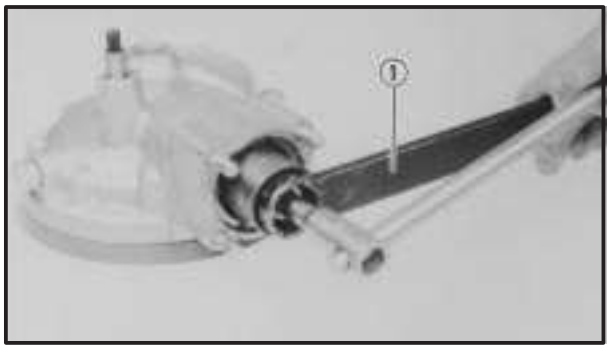
1. Remove:
   - Nuts (bearing housing)
   - Bolts (bearing housing)

NOTE:

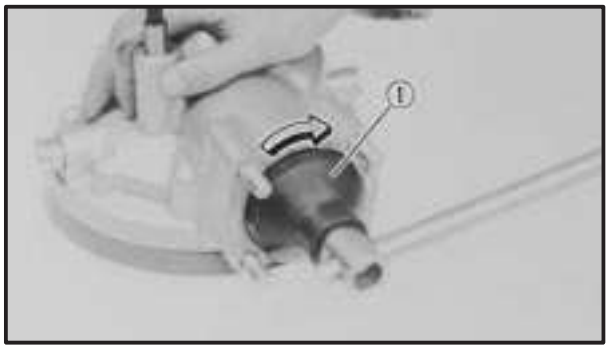
Working in a crisscross pattern, loosen nut 1/4 turn each. Remove them after all loosened.



2. Remove:
   - Bearing housing ①
   - Dust cover ②
   - Shim(s)
   - Thrust washer



3. Remove:
   - Self-locking nut (coupling gear)
     Use a Final Drive Shaft Holder ① (90890-01229).
   - Coupling gear



4. Remove:
   - Bearing retainer (final drive shaft)
     Use a Final Drive Shaft Bearing Retainer ① (90890-04050).

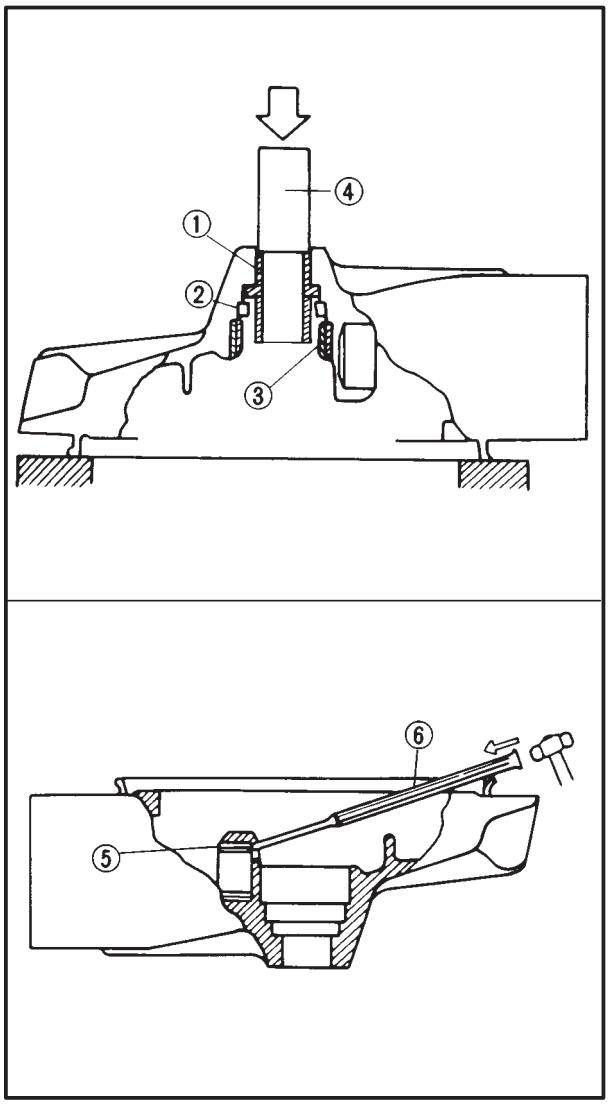
CAUTION:

Final-drive-shaft-bearing-retainer has left-hand 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 bearings or races after removal.



Bearing Removal and Reassembly

1. Remove:
   - Guide collar ①
   - Oil seal ②
   - Roller bearing ③

   Use a suitable press tool ④ and an appropriate support for the main housing.
2. Inspect:
   - Roller bearing

   Damage → Replace.

NOTE:

Reuse of roller bearing OK, but Yamaha recommends installation of new bearing. Do not reuse the oil seal.

3. Remove:
   - Final drive shaft roller bearing ⑤

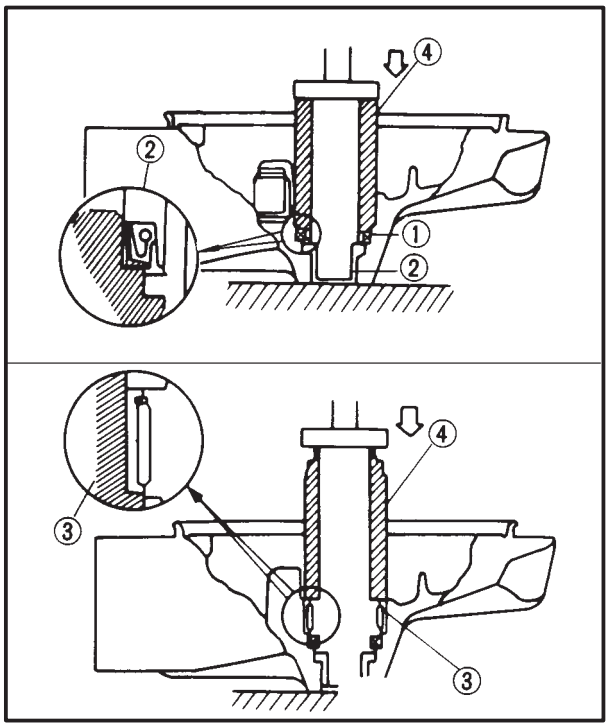
Final drive shaft roller bearing removal steps:
- Heat the bare housing to 150°C (302°F)
- Remove the roller bearing outer race with an appropriately shaped punch ⑥.
- Remove the inner race from the final drive shaft.

NOTE:

The removal of the final drive shaft roller bearing is difficult and seldom necessary.

4. Install:
   - Rear final drive shaft roller bearing (new)

Final drive shaft roller bearing installation steps:
- Heat the bare bearing to 150°C (320°F)
- Install the roller bearing outer race using the proper adapted.
- Install the inner race onto the drive shaft.



5. Install:
   - Guide collar ①
   - Oil seal (new) ②
   - Roller bearing (outer race) ③

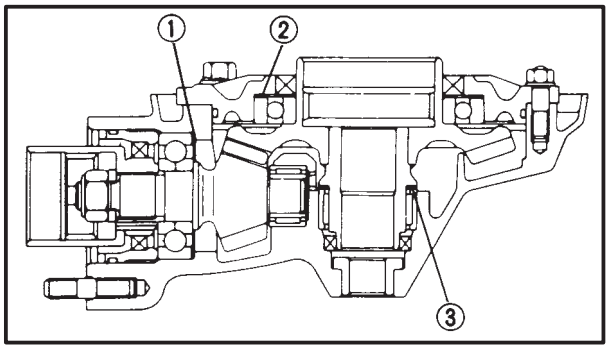
   Use a suitable press tool ④ and a press to install the above components into the main housing.

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



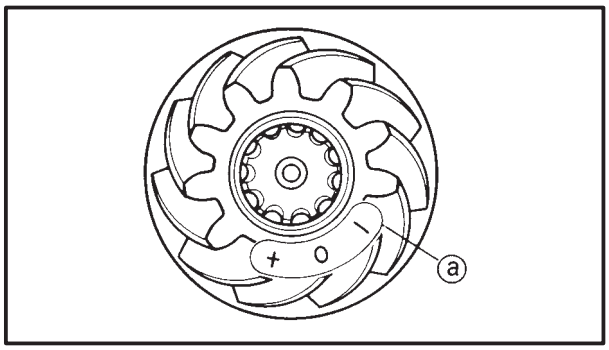
Final drive/ring gear shim selection steps:
- Position final drive shaft gear and ring gear by using shims ① and ② with their respective thicknesses calculated from information marked on final gear case and drive gear end.

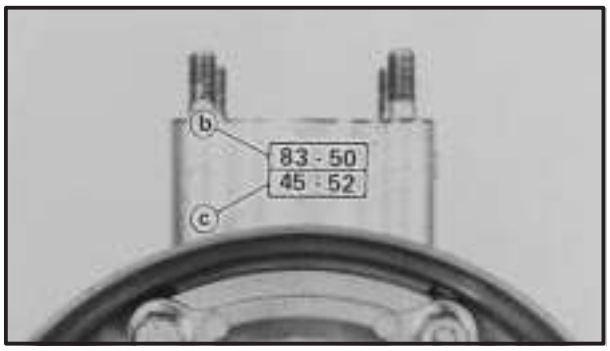
① Shim thickness “A”

② Shim thickness “B”

③ Thrust washer
- To find shim thickness “A” use following formula:

Final Drive Gear Shim Thickness:
A = a – b





Where:
a = a numeral (usually a decimal number) on the gear is either added to or subtracted from "84".
b = a numeral on the gear case (i.e. 83.50)
Example:
1) If final drive shaft gear is marked "+01" . . . "a" is 84.01.
2) If the gear case is marked "83.50" . . . "b" is 83.50.
A = 84.01 – 83.50
= 0.51
3) Therefore, shim thickness is 0.51 mm. Shim sizes are supplied in following thicknesses:

Final Drive Gear Shim

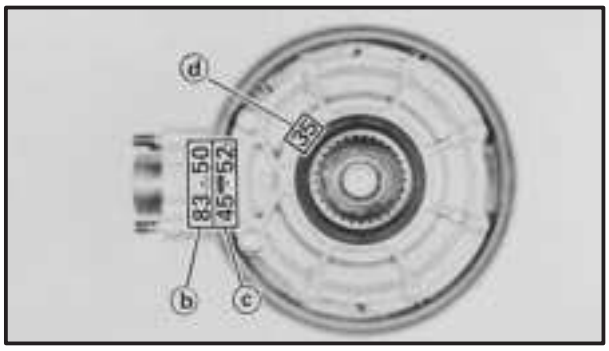
Thickness (mm)	**0.15** **0.40** **0.60**	**0.30** **0.50**

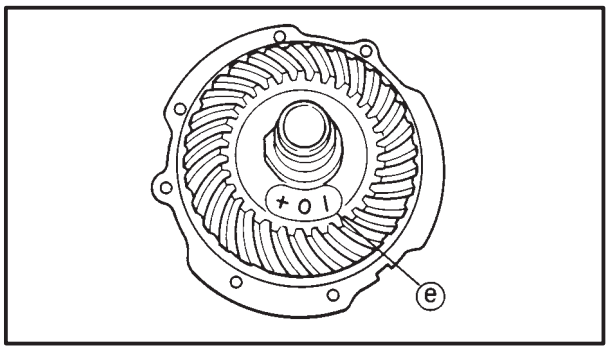
Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

Hundredths	Round value
0, 1, 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 = c + d – (e + f)





Where:
c = numeral on gear case (i.e. 45.52)
d = numeral (usually a decimal number) on outside of ring gear bearing housing and added to 3.
e = numeral (usually a decimal number) on inside of ring gear either added to or subtracted from 35.40.
f = bearing thickness (considered constant).

Bearing Thickness "f" = 13.00 mm

Example:
1) If gear case is marked "45.52" . . . "c" is 45.52.
2) If ring gear bearing housing is marked "35" . . . "d" is 0.35 + 3 = 3.35.
3) If ring gear is marked "+01" . . . "e" is 35.40 + 0.01 = 35.41.
4) "f" is 13.00.
   B = c + d – (e + f)
   = 45.52 + 3.35 – (35.41 + 13.00) = 48.87 – (48.41)
   = 0.46
5) Therefore, shim thickness is 0.46 mm. Shim sizes are supplied in following thickness:

Ring Gear Shim

Thickness (mm)	**0.25 0.30 0.35 0.40 0.45 0.50**

Because shims can only be selected in 0.05 mm increments, round off hundredths digit and select appropriate shim(s).

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

In the example above, the calculated shim thickness is 0.46 mm. The chart instructs you, however, to round off the 6 to 5.
Thus you should use a 0.45 mm shims.



2. Install:
   - Shims (proper size as calculated)
   - Final drive shaft assembly
   - Bearing retainer (final drive shaft)
     Use a Final Drive Shaft Bearing Retainer Wrench (90890-04050).

NOTE:

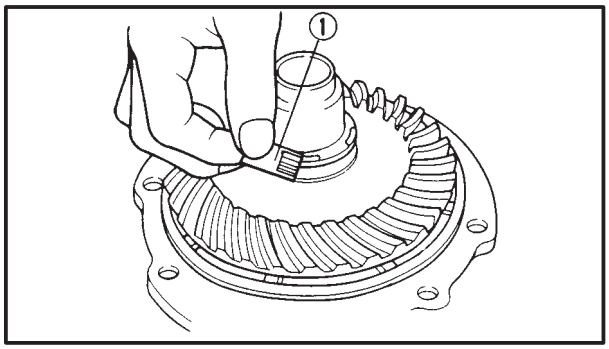
The bearing retainer has left-hand threads; turn retainer counterclockwise to tighten it.

Bearing Retainer:
110 Nm (11.0 m•kg, 80 ft•lb)

3. Install:
   - Coupling gear
   - Self-locking nut (coupling gear)
     Use a Final Drive Shaft Holder (90890-01229).

Self-locking Nut (Coupling Gear)
110 Nm (11.0 m•kg, 80 ft•lb)
LOCTITE®

4. Install:
   - Ring gear assembly (without thrust washer)
5. Adjust:
   - Gear lash
     Refer to “Gear Lash Measurement and Adjustment” section.
6. Measure/Select:
   - Ring gear thrust clearance



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):
40 Nm (4.0 m•kg, 29 ft•lb)
Nuts (Bearing Housing):
23 Nm (2.3 m•kg, 17 ft•lb)

NOTE:
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 (0.004 ~ 0.008 in)

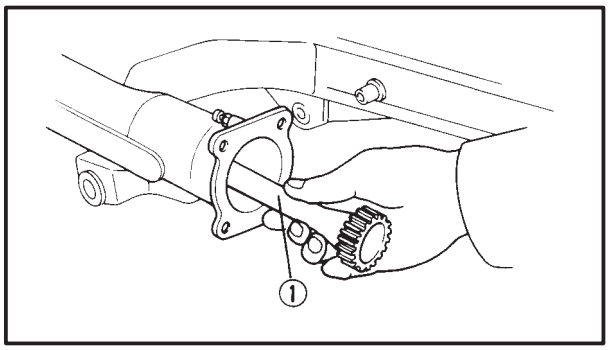
- If the clearance is correct, install the ring gear assembly.
- If the out of specification, select the correct washer.

Thrust washer selection steps:
- Select the suitable thrust washer by the following chart.

Thrust Washer	
Thickness (mm)	1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3

- Repeat measurement steps until the ring gear thrust clearance is within the specified limits.

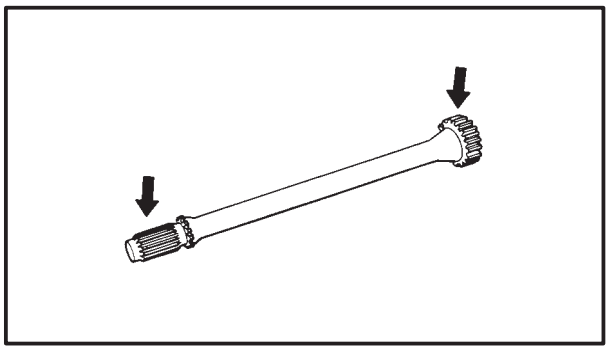
Ring Gear Thrust Clearance:
0.1 ~ 0.2 mm (0.004 ~ 0.008 in)



DRIVE SHAFT

Removal

1. Remove:
   - Rear wheel
   - Final gear assembly
   - Drive shaft ①



Inspection

1. Inspect:
   - Drive shaft splines
     Wear/Damage → Replace.

Installation

When installing the drive shaft, reverse the removal procedure. Note the following points.

1. Lubricate:
   - Shaft splines

	Molybdenum Disulfide Grease

2. Install:
   - Drive shaft

NOTE:

Before installing, first set the universal joint in place on the middle case side.

3. Apply:
   - Yamaha Bond No.1215
     (90890-85505)
     To the mating surfaces of both case halves.
4. Tighten:
   - Nuts (final gear case)

	Nuts (Final Gear Case): **42 Nm (4.2 m•kg, 30 ft•lb)**

CHAPTER 7.
ELECTRICAL

VMX12 CIRCUIT DIAGRAM 7-1

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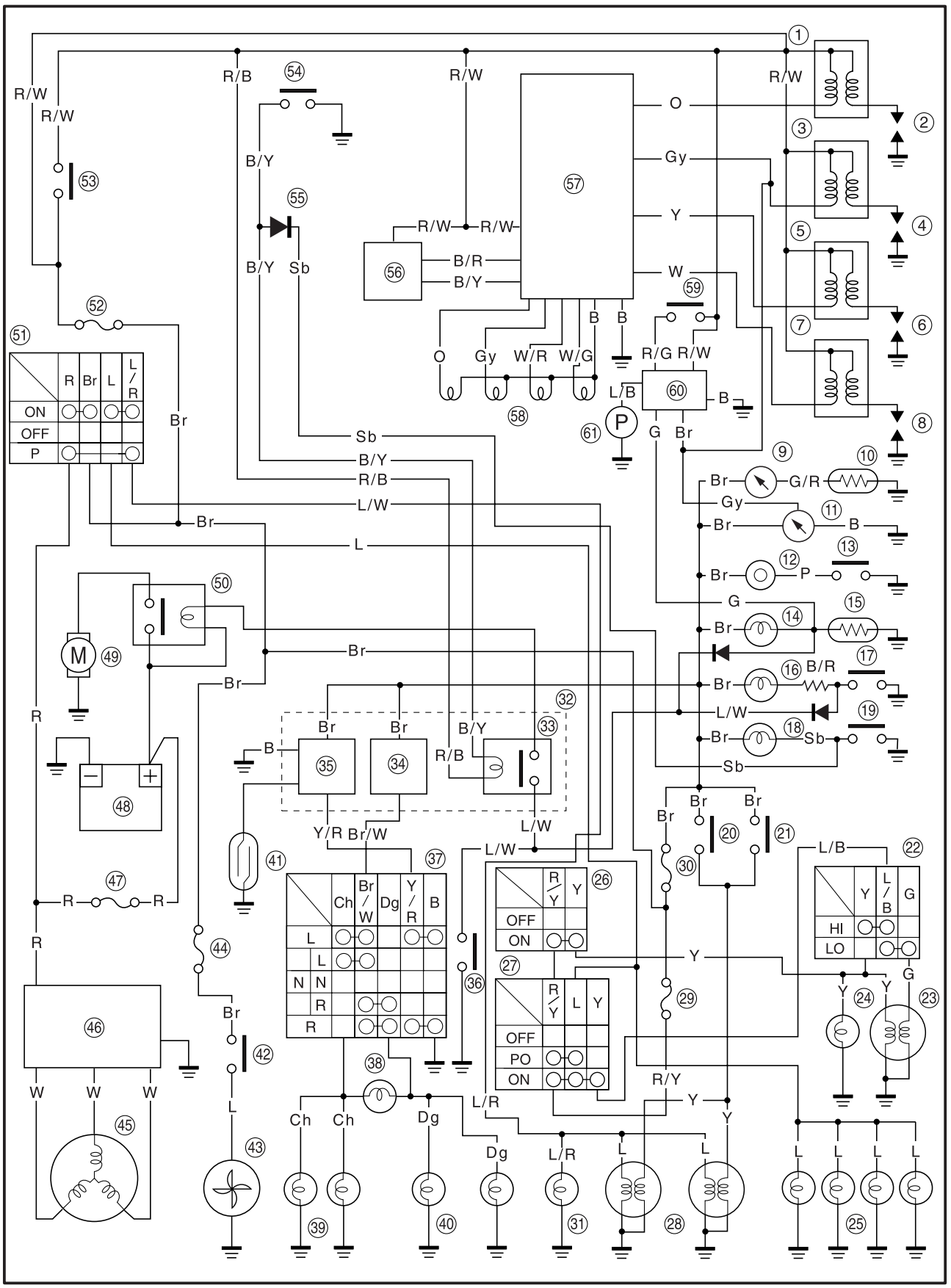
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ELECTRICAL

VMX12 CIRCUIT DIAGRAM



① Ignition coil #1
② Spark plug #1
③ Ignition coil #2
④ Spark plug #2
⑤ Ignition coil #3
⑥ Spark plug #3
⑦ Ignition coil #4
⑧ Spark plug #4
⑨ Temperature meter
⑩ Thermo-unit
⑪ Tachometer
⑫ Horn
⑬ “HORN” switch
⑭ “FUEL” indicator light
⑮ Fuel sender unit
⑯ “OIL LEVEL” warning indicator light
⑰ Oil level gauge
⑱ “NEUTRAL” indicator light
⑲ Neutral switch
⑳ Front brake switch
㉑ Rear brake switch
㉒ “LIGHTS” (Dimmer) switch
㉓ Headlight
㉔ “HIGH BEAM” indicator light
㉕ Meter light
㉖ “PASS” switch
㉗ “LIGHTS” switch
㉘ Tail/brake light
㉙ Fuse (HEAD)
㉚ Fuse (SIGNAL)
㉛ Auxiliary light
㉜ Relay unit
㉝ Starting circuit cut-off relay
㉞ Flasher relay
㉟ Cancelling unit
㊱ Starter switch
㊲ “TURN” switch
㊳ “TURN” indicator light
㊴ Flasher light (Left)
㊵ Flasher light (Right)
㊶ Reed switch
㊷ Thermo switch
㊸ Electric fan
㊹ Fuse
㊺ AC Magneto
㊻ Rectifier with regulator
㊼ Main fuse
㊽ Battery
㊾ Starter motor
㊿ Starter relay
(51) Main switch
(52) Fuse (IGNITION)
(53) “ENGINE STOP” switch
(54) Clutch switch
(55) Diode
(56) Pressure sensor
(57) Ignitor unit
(58) Pick-up coil (#1 ~ #4)
(59) “FUEL” (RESERVE) switch
(60) Fuel pump relay
(61) Fuel pump

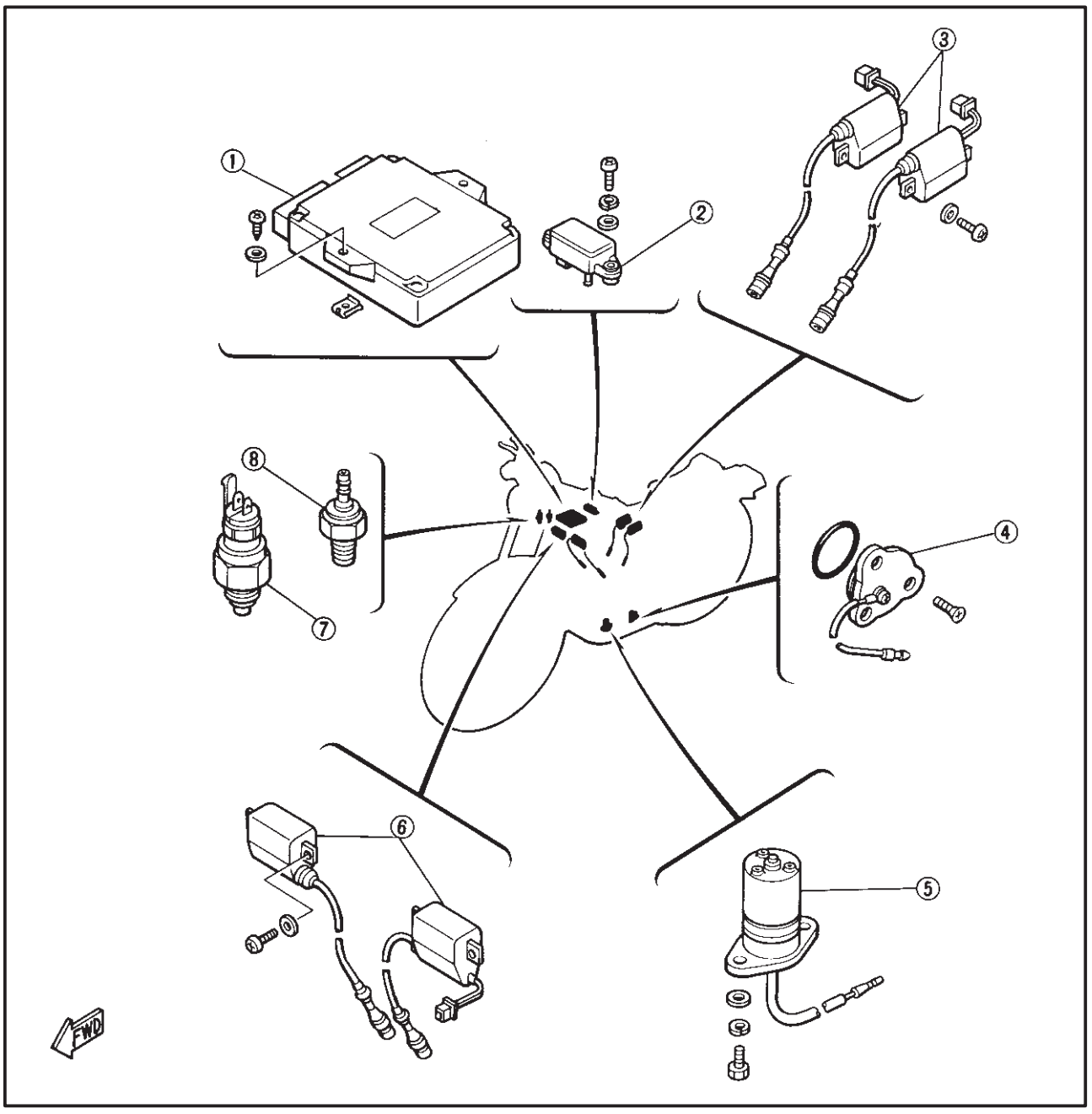
COLOR CODE

B	Black
L	Blue
O	Orange
G	Green
R	Red
P	Pink
Y	Yellow
W	White
Br	Brown
Dg	Dark green
Ch	Chocolate
Sb	Sky blue
Gy	Gray
G/R	Green/Red
G/Y	Green/Yellow
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
L/Y	Blue/Yellow
L/B	Blue/Black
L/W	Blue/White
R/W	Red/White
R/G	Red/Green
R/B	Red/Black
R/Y	Red/Yellow
W/R	White/Red
W/G	White/Green
W/B	White/Black
Y/R	Yellow/Red
Y/L	Yellow/Blue
Br/W	Brown/White

ELECTRICAL COMPONENTS (1)

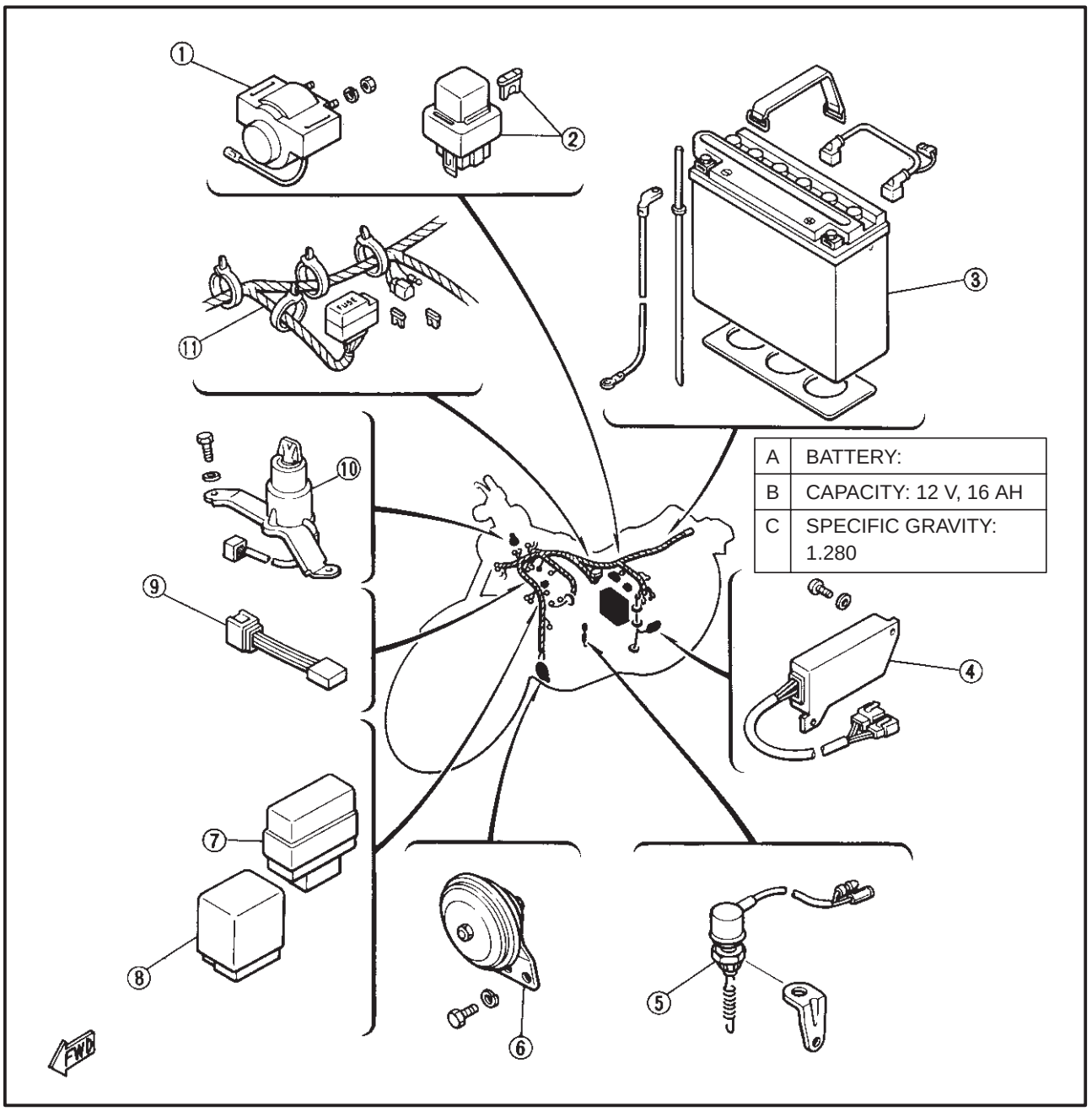
① TCI unit
② Pressure sensor
③ Ignition coil (#1 & #3)
④ Neutral switch
⑤ Oil level gauge
⑥ Ignition coil (#2 & #4)
⑦ Thermostatic switch
⑧ Thermo-unit

SPECIFICATIONS	RESISTANCE
IGNITION COIL:	
PRIMARY	2.4 ~ 3.0 Ω
SECONDARY	10.6 ~ 15.8 kΩ
PICK-UP COIL:	93.5 ~ 126.5 Ω



ELECTRICAL COMPONENTS (2)

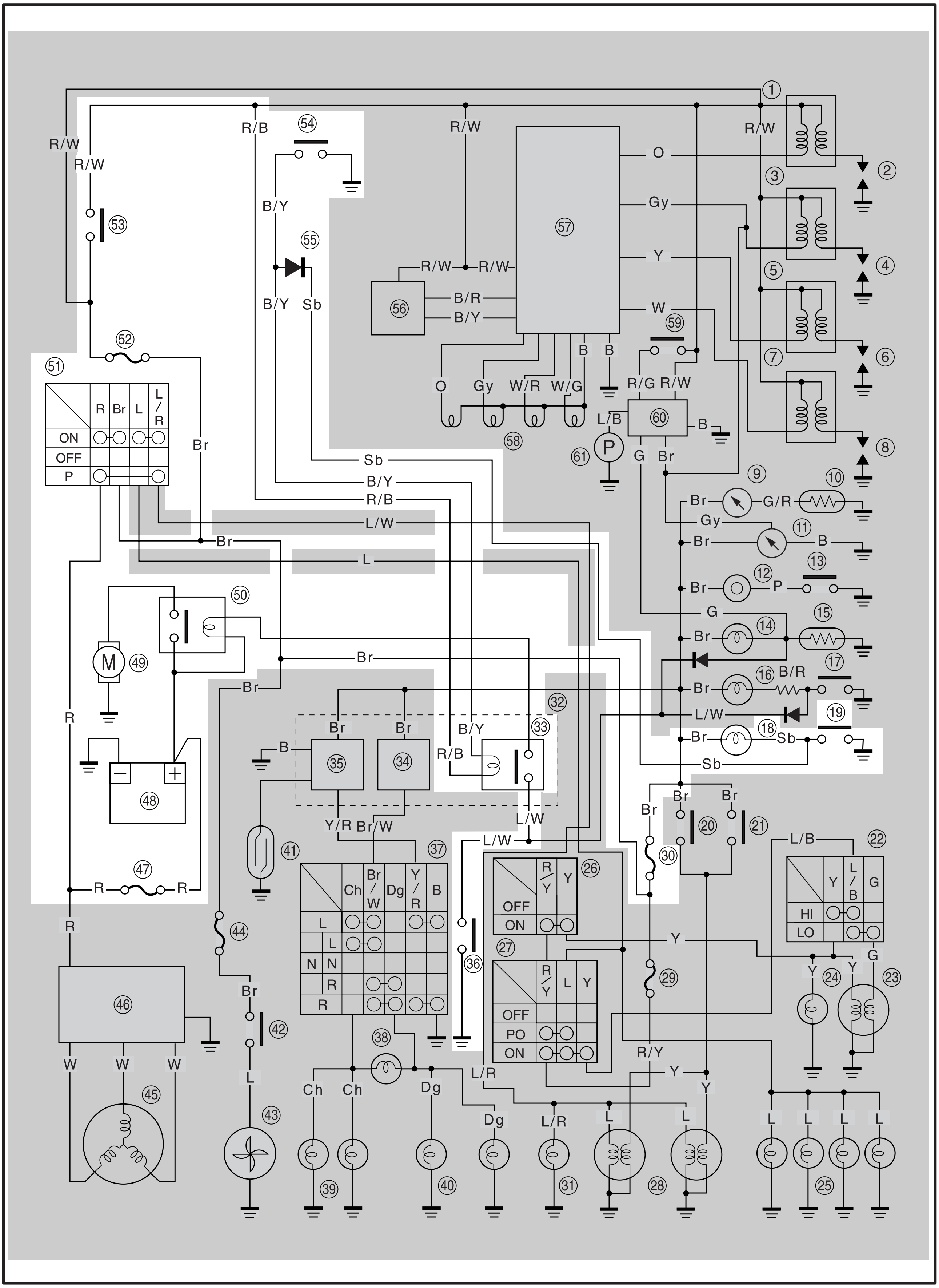
① Starter relay
② Main fuse
③ Battery
④ Rectifier with regulator
⑤ Rear brake switch
⑥ Horn
⑦ Relay unit
⑧ Fuel pump relay
⑨ Diode
⑩ Main switch
⑪ Wire harness



A	BATTERY:
B	CAPACITY: 12 V, 16 AH
C	SPECIFIC GRAVITY: 1.280

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM

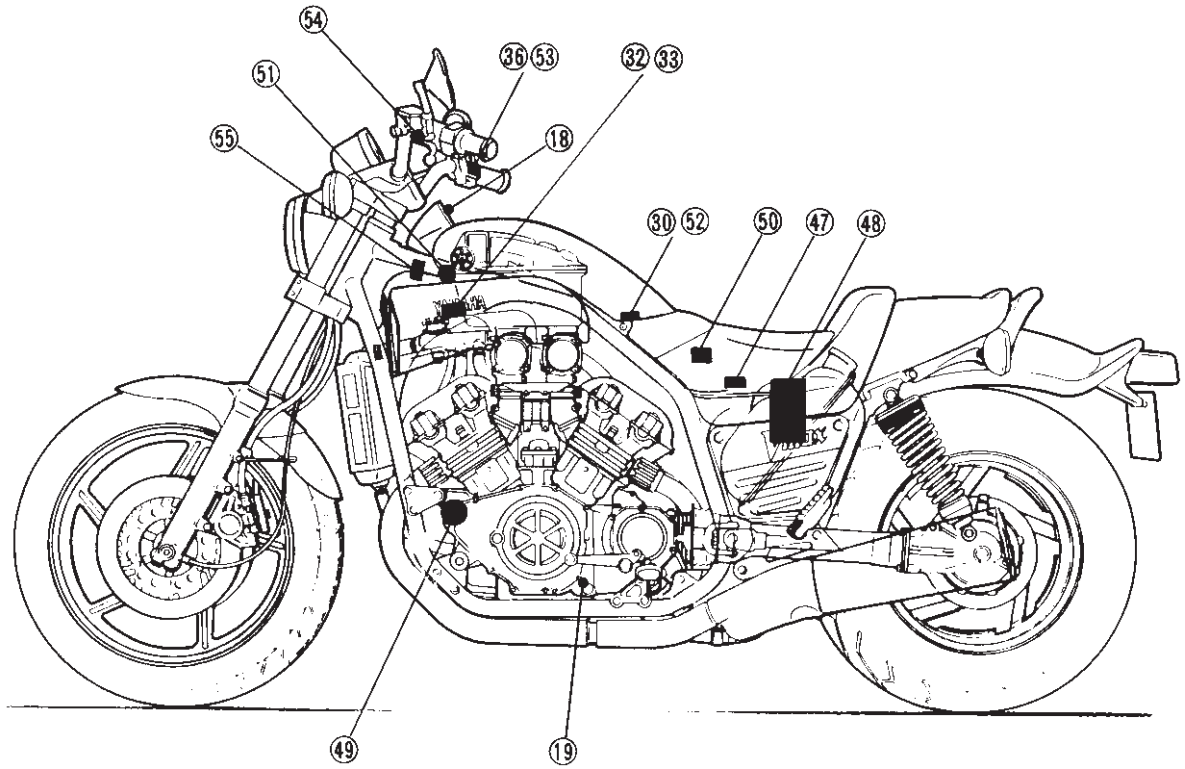


Aforementioned circuit diagram shows electrical starting circuit in wiring diagram.

NOTE:

For the encircled numbers and color cords, see page 7-2.

⑱ “NEUTRAL” indicator light
⑲ Neutral switch
㉚ Fuse (SIGNAL)
㉜ Relay unit
㉝ Starting circuit cut-off relay
㊱ Starter switch
㊼ Main fuse
㊽ Battery
㊾ Starter motor
㊿ Starter relay
(51) Main switch
(52) Fuse (IGNITION)
(53) “ENGINE STOP” switch
(54) Clutch switch
(55) Diode



TROUBLESHOOTING

Troubleshooting Chart (1)

THE STARTER MOTOR DOES NOT OPERATE.

⇩

Remove the seat.

⇩

Disconnect the “L/W” lead from the starter relay.

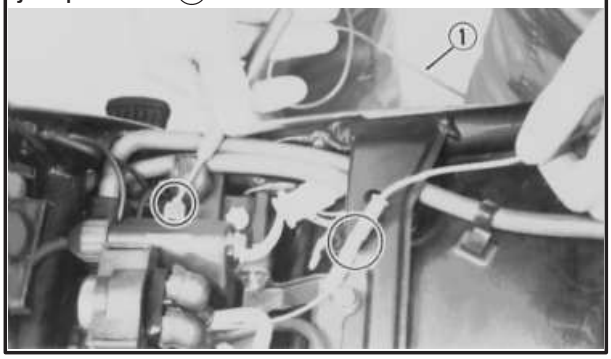
⇩

Check the battery voltage (12 V) on the “L/W” lead from the starter relay.

NO ➡ Correct the battery terminal connection.

⇩ 12 V

Connect the “L/W” lead from the starter relay to the battery negative (–) terminal; use a jumper lead ①.



➡ The engine does not operate.

⇩

If the starter relay does not click; replace the relay.

⇩

The engine does not rev smoothly.

⇩

Recharge or replace the battery.

Troubleshooting Chart (2)

THE STARTER MOTOR DOES NOT OPERATE.

⇩

Check the starter relay and starter motor; refer to CHART (1).

⇩

Remove the cover (left) and disconnect the relay unit connector.

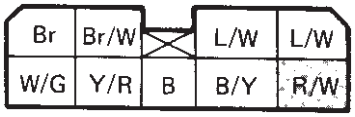
⇩

Main and engine stop switches are turned to "ON".

⇩

Check the battery voltage (12 V) on the "R/B" lead.

NO ➡ Check for an open or poor connection between the main switch and relay unit.

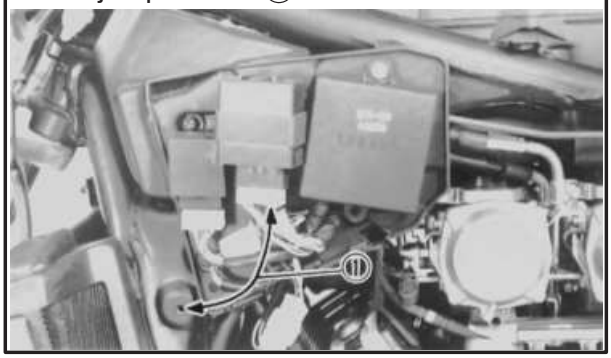


⇩ 12 V

Connect the relay unit connector.

⇩

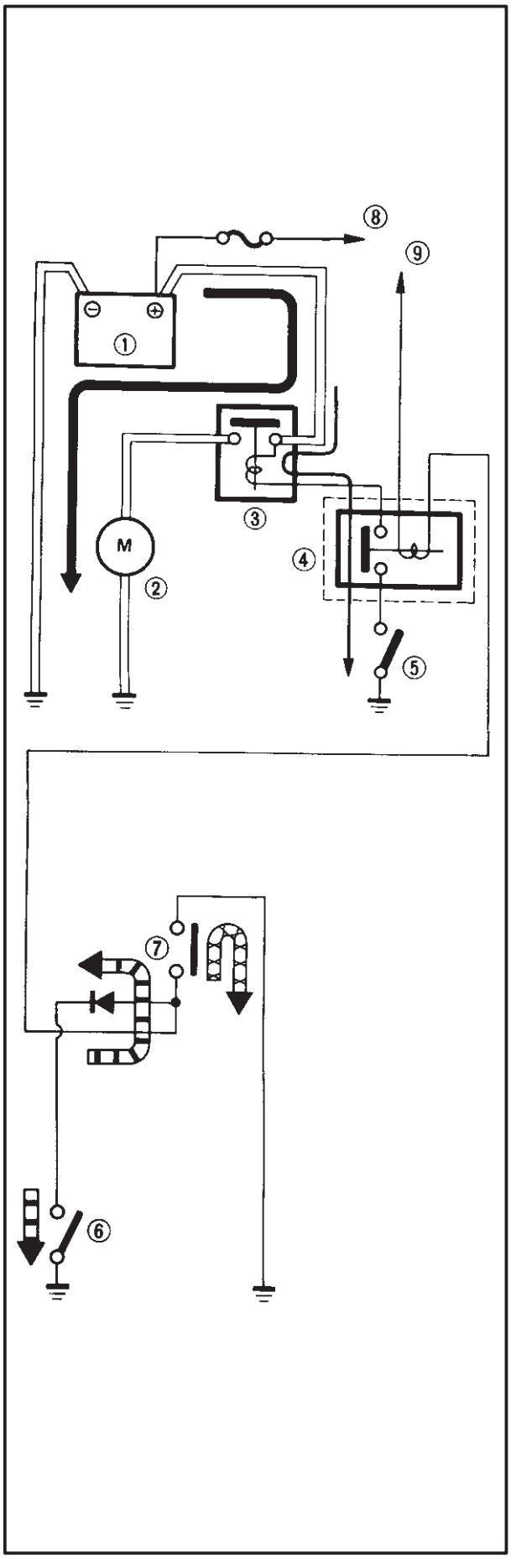
Connect "B/Y" lead to "ground" on the frame; use a jumper lead ①.



➡ If the relay unit does not click, replace the relay unit.

⇩

If the relay unit clicks, check the starter, clutch and neutral switches. Replace switch(es) if necessary.



STARTING CIRCUIT CUT-OFF SYSTEM

A starting circuit cut-off system is employed, and operates as follows:

Starting Circuit Operation

The starting circuit on this model consist of the starter motor, starter relay, and the relay unit (starting circuit cut-off relay). If the engine stop switch and the main switch are both on, the starter motor can operate only if:

The transmission is in neutral (the neutral switch is on).

or if

The clutch lever is pulled to the handlebar (the clutch switch is on).

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 off so current cannot reach the starter motor.

When one of both of the above conditions have been met, however, the starting circuit cut-off relay is on, and the engine can be started by pressing the starter switch.

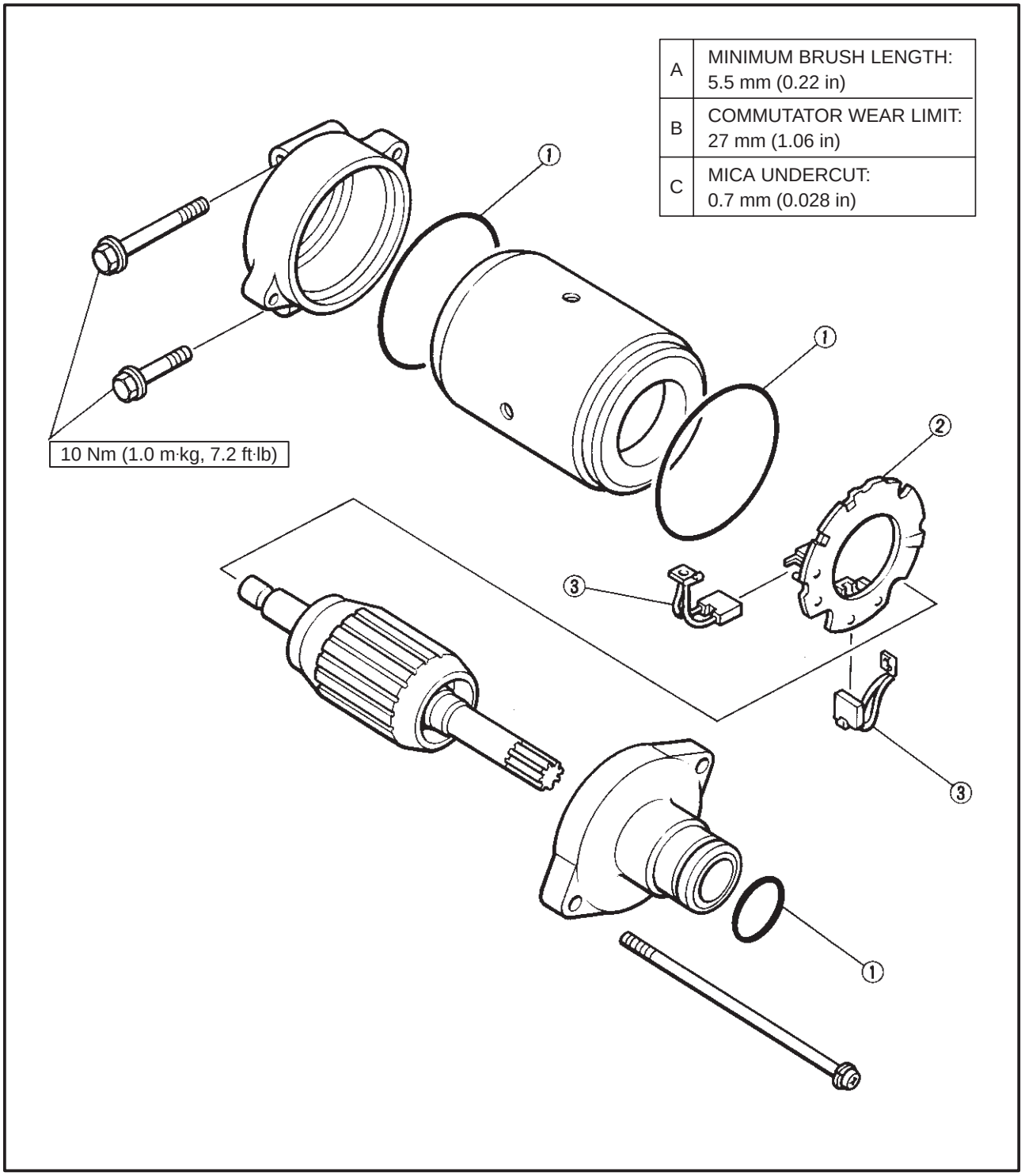
WHEN THE TRANSMISSION IS IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Starter motor
③ Starter relay
④ Starting circuit cut-off relay
⑤ Starter switch
⑥ Neutral switch
⑦ Clutch switch
⑧ To main switch
⑨ To engine stop switch

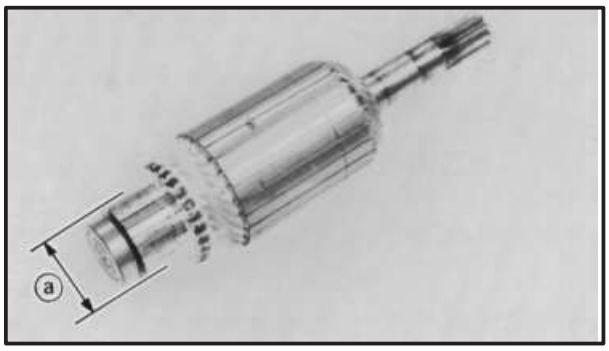
STARTER MOTOR TEST

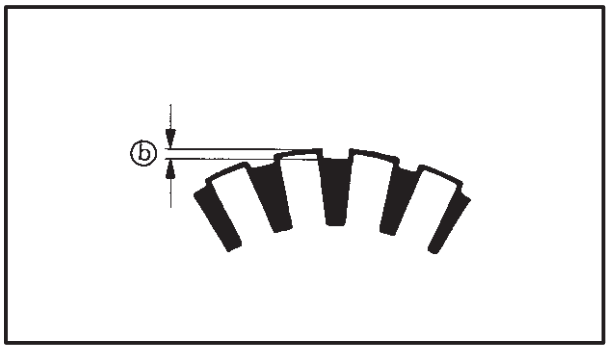
① O-ring
② Brush holder assembly
③ Brush



Removal

1. Remove:
   • Starter motor
   Refer to "CHAPTER 3. ENGINE DISASSEMBLY" section.





Inspection and Repair

1. Inspect:
   • Commutator
   Dirty → Clean with #600 grit sandpaper.
2. Measure:
   • Commutator diameter ⓐ
   Out of specification → Replace starter motor.

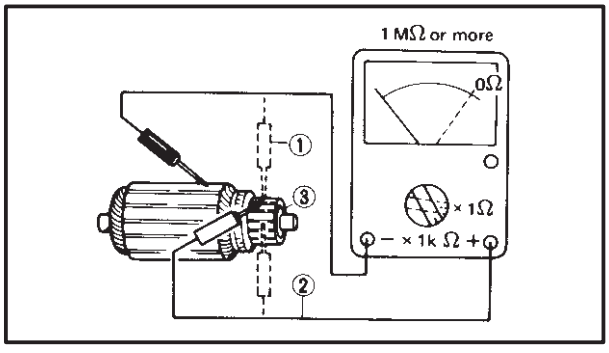
Commutator Wear Limit:
27 mm (1.06 in)

3. Measure:
   • Mica undercut ⓑ
   (between commutator segments)
   Out of specification → Scrape mica to proper valve.
   Use a hacksaw blade that is ground to fit.

Mica Undercut:
0.7 mm (0.028 in)

NOTE:

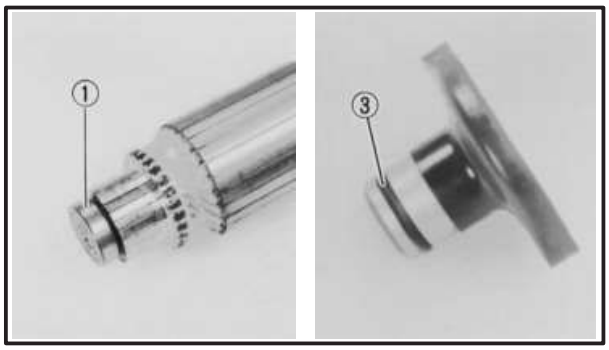
The mica insulation of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
   • Armature coil insulation/continuity
   Defect(s) → Replace starter motor.

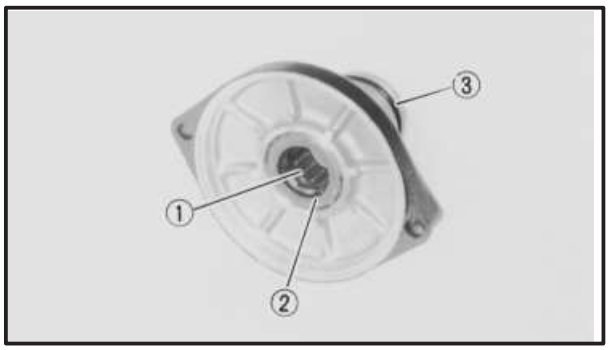
Insulation Resistance:
1 MΩ or more at 20°C (68°F)

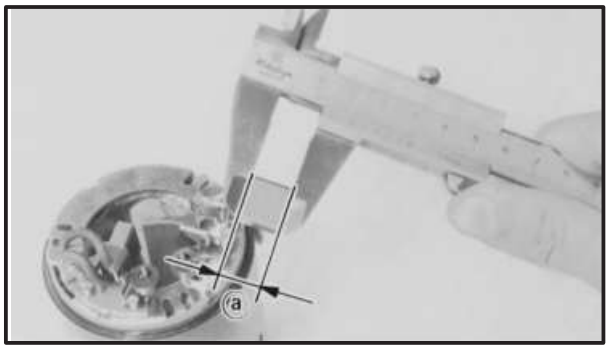
① Continuity check
② Insulation check
③ Armature coil



5. Inspect:
   - Bearings ①
   - Oil seal ②
   - O-ring ③

   Wear/Damage → Replace





6. Inspect:
   - Commutator brushes

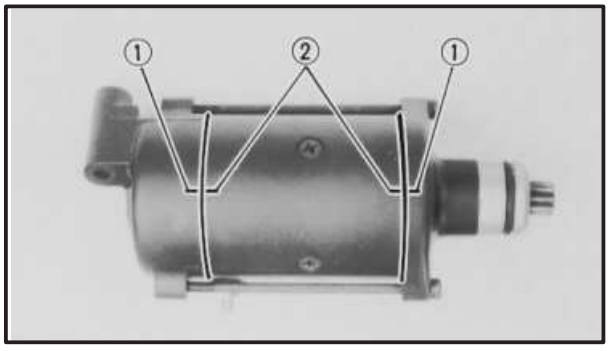
   Damage → Replace.
7. Measure:
   - Brush length ⓐ

   Out of specification → Replace.

Minimum Brush Length:
5.5 mm (0.22 in)

8. Inspect:
   - Brush springs

   Compare with new spring.
   Wear/Damage → Replace.



Installation

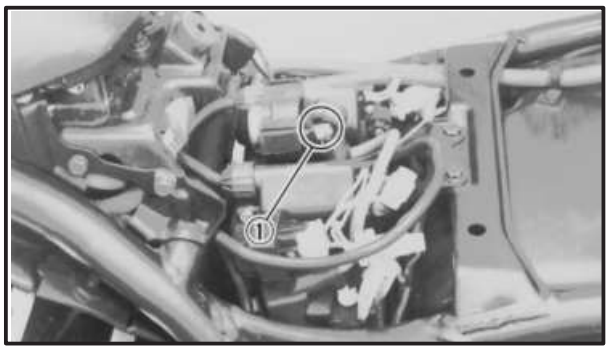
1. Install:
   - Starter motor

NOTE:

Align the match marks ① on the brackets with the match marks ② on the housing.

BATTERY INSPECTION

1. Inspect:
   • Battery
   Refer to “CHAPTER 2. BATTERY INSPECTION” section.



STARTER RELAY TEST

1. Inspect:
   • Starter relay
   Poor condition → Replace.

Starter relay inspection steps:
- Remove the seat.
- Turn ignition switch to “ON”, engine stop switch to “RUN” and shift pedal to “NEUTRAL”.
- Disconnect the starter motor lead ① from the starter motor.
- Push the starter switch and check to see if the starter relay clicks.
  Starter relay clicking → Starter relay OK.
  Starter relay not clicking → Measure coil resistance.

2. Measure:
   • Starter relay resistance
   Out of specification → Replace.

Starter relay resistance measurement steps:
- Disconnect the “L/W” lead and the battery positive lead.
- Connect the Pocket Tester (90890-03112) leads to the starter relay.

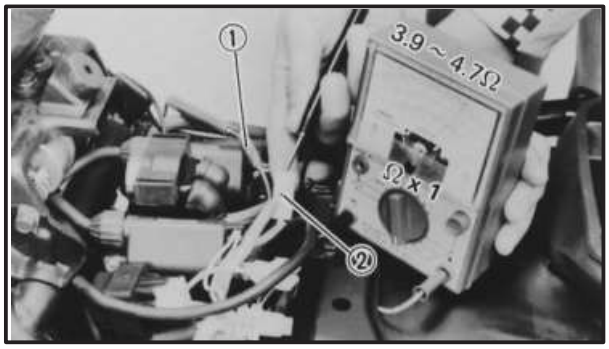
① Blue/White

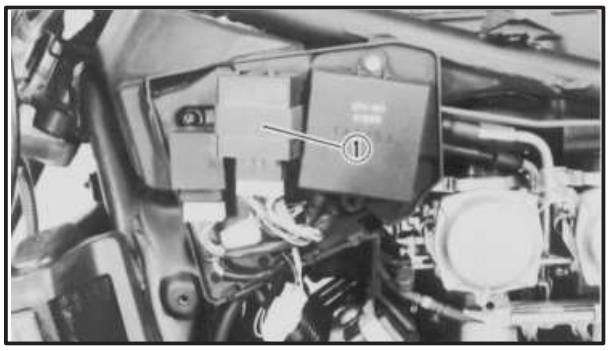
② Red

- Measure the coil resistance.

Starter Relay Resistance:
3.9 ~ 4.7 Ω at 20°C (68°F)

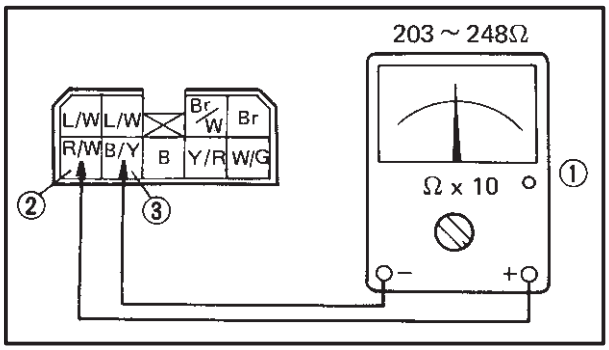
- If the resistance is not within specification, replace the starter relay.





STARTING CIRCUIT CUT-OFF RELAY TEST

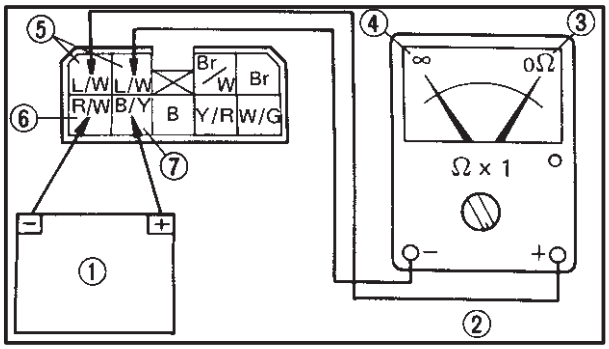
1. Remove:
   - Top cover
   - Cover (left)
   - Relay unit ①
2. Disconnect:
   - Relay unit connector



3. Measure:
   - Starting circuit out-off relay resistance
     Use the Pocket Tester ① (90890-03112).
     Out of specification → Replace.

Starting Circuit Cut-off Relay Resistance:
203 ~ 248 Ω at 20°C (68°F)

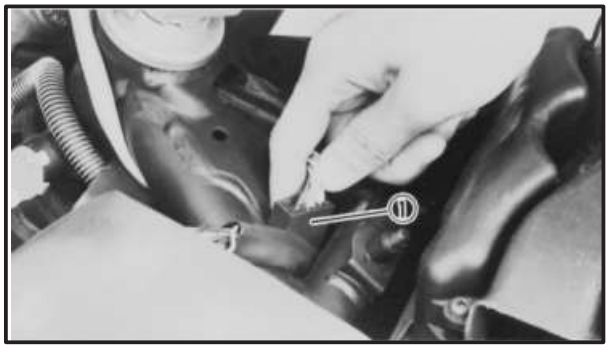
② Red/White
③ Black/Yellow



4. Check:
   - Starting circuit cut-off relay contacts
     Use 12 V battery ① and the Pocket Tester ②
     (90890-03112).
     Out of specification → Replace.

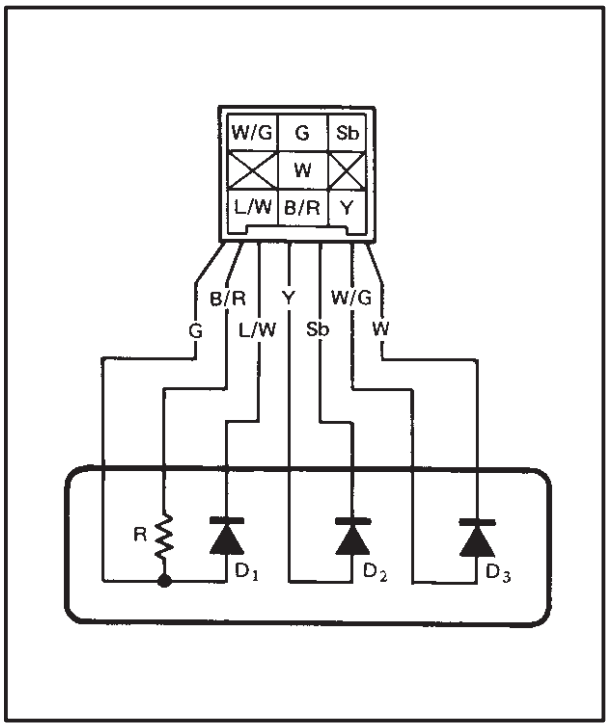
Battery Connected ③: 0 Ω
Battery Disconnected ④: ∞

⑤ Blue/White
⑥ Red/White
⑦ Black/Yellow



DIODE TEST

1. Remove:
   - Top cover
   - Meter panel
   - Diode ①



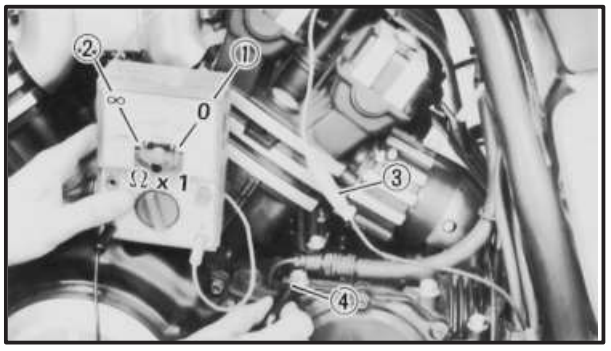
2. Check:
   • Diode continuity/discontinuity
   Defective element(s) → Replace diode.

Checking element	Pocket tester connecting point		Good
	(+) (Red)	(–) (Black)	
D_1	G	L/W	○
	L/W	G	×
D_2	Y	Sb	○
	Sb	Y	×
D_3	W/G	W	○
	W	W/G	×
R	G	B/R	8.2 Ω

○: Continuity (0 Ω) (Scale Ω × 1K)
×: Discontinuity (∞) (Scale Ω × 1)

NOTE:

The results "○" or "×" should be reversed according to the Pocket Tester polarity.



NEUTRAL SWITCH TEST

1. Disconnect:
   • One lead (Blue)
2. Check:
   • Neutral switch contact
   Out of specification → Replace switch

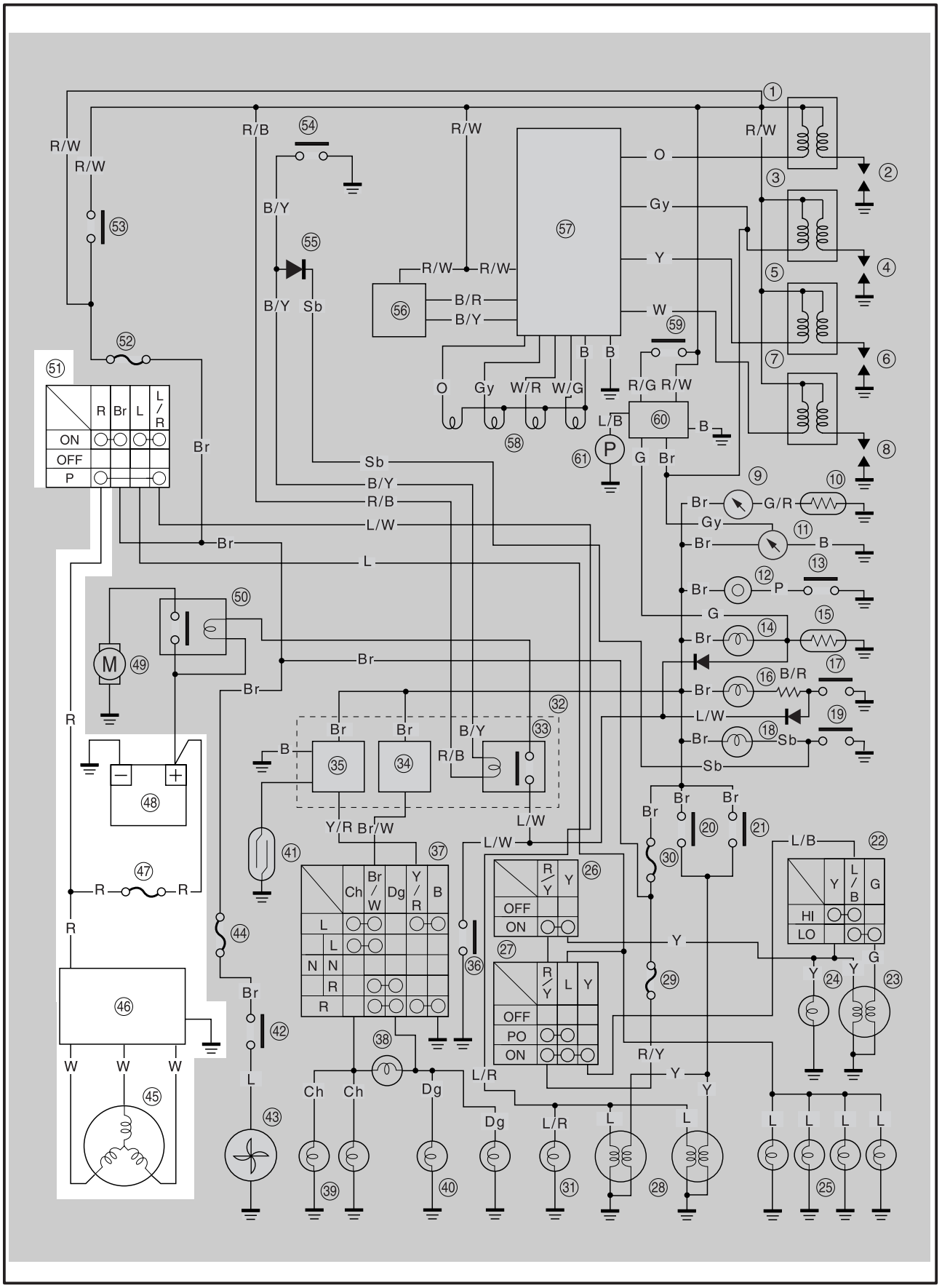
In Neutral ①: 0 Ω
In Gear ②: ∞

③ Blue
④ Ground

— MEMO —

CHARGING SYSTEM

CIRCUIT DIAGRAM

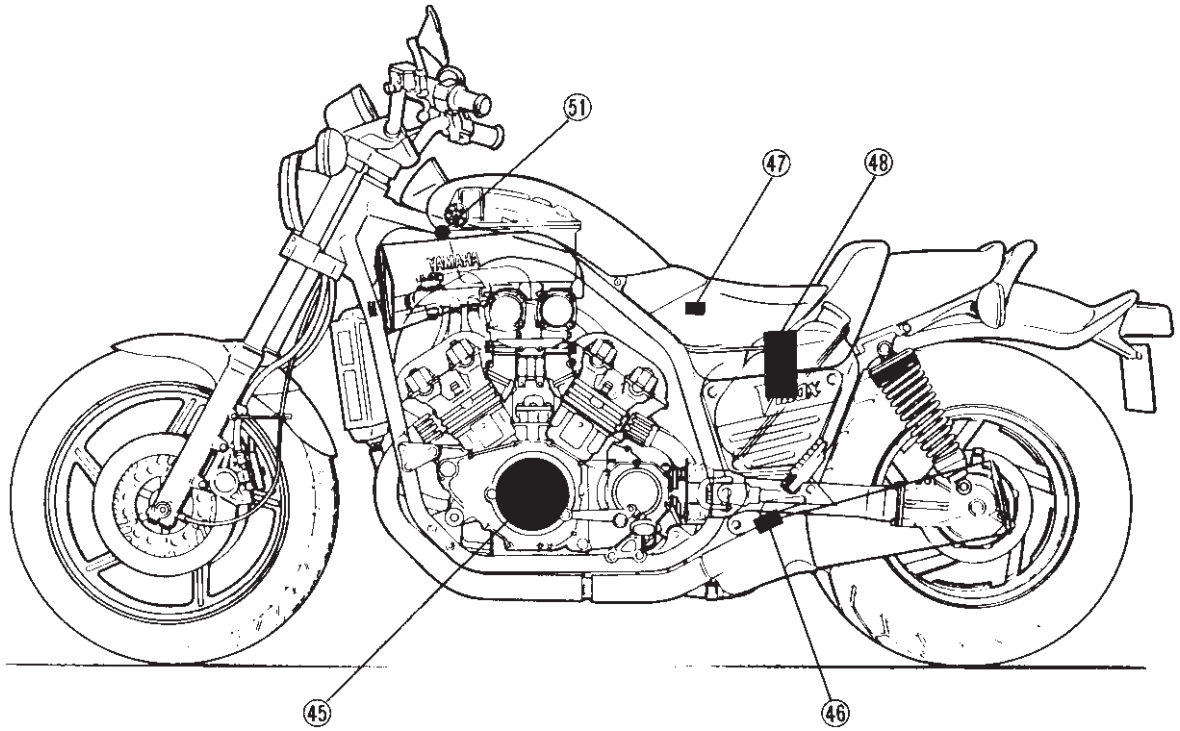


Aforementioned circuit diagram shows charging circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

㊺ AC Magneto
㊻ Rectifier with regulator
㊼ Main fuse
㊽ Battery
㊶ Main switch



TROUBLESHOOTING

THE BATTERY IS NOT CHARGED.

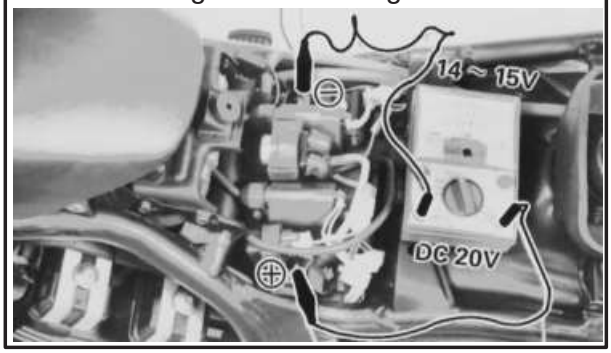
Remove the seat.

Measure the battery for voltage and specific gravity.
Battery voltage: More than 12 V
Specific gravity: 1,280

No. → Recharge the battery.

Yes

Connect the Pocket Tester to the battery to measure the generator voltage.



Start the engine and accelerate to about 2,000 r/min or more.

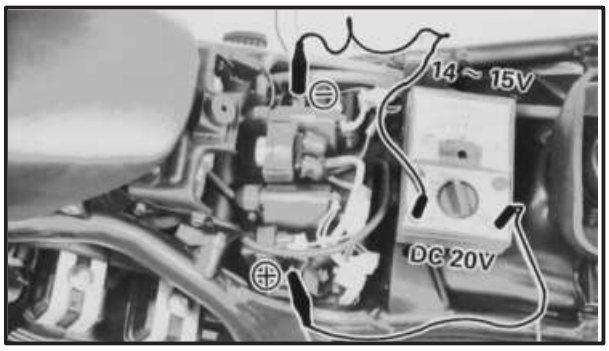
→ Generator Voltage:
More than 15 V

Replace rectifier with regulator.

Generator Voltage:
Less than 13 V

Check the stator coil resistance.
Stator coil resistance (White – White):
0.36 ~ 0.48 Ω at 20°C (68°F)

Replace the stator coil.



CHARGING VOLTAGE TEST

1. Remove:
   - Seat
2. Connect:
   - Pocket Tester (90890-03112)
     To battery terminals.
3. Start the engine and accelerate to about 2,000 r/min or more.
4. Measure:
   - Generator voltage
     Out of specification → Check battery, stator coil, and rectifier/regulator.

	Generator Voltage: 14 ~ 15 V

CAUTION:

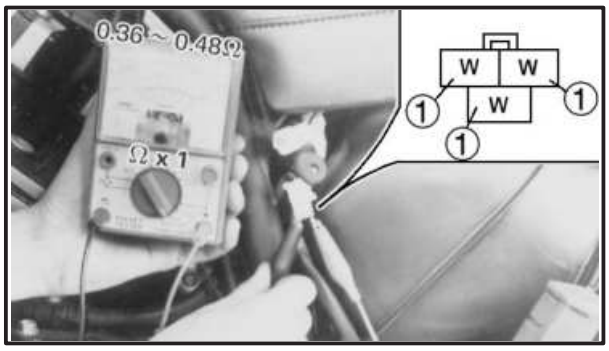
Never disconnect the wires from the battery while the generator is operating, otherwise the voltage across the generator terminals will increase and damage the semiconductors.

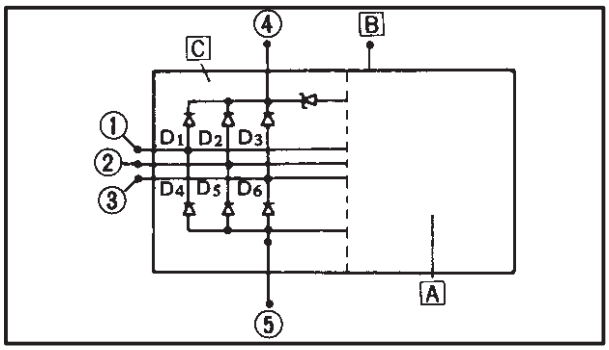
BATTERY INSPECTION

Refer to "CHAPTER 2. BATTERY INSPECTION" section.

STATOR COIL RESISTANCE TEST

1. Remove:
   - Side cover (left)
2. Disconnect:
   - 3-pin connector (White, White and White)
     From rectifier/regulator.
3. Connect:
   - Pocket Tester (90890-03112)





4. Measure:
   • Stator coil resistance
   Out of specification → Replace stator coils.

Stator Coil Resistance:
0.36 ~ 0.48 Ω at 20°C (68°F)
(White – White)

① White

RECTIFIER TEST

1. Check:
   • Defective element → Replace rectifier.

① White
② White
③ White
④ Red
⑤ Black

A IC Regulator
B Brown
C Rectifier

Checking Element	Pocket Tester Connecting Point		Good	Replace (Element shorted)	Replace (Element opened)
	(+) (Red)	(–) (Black)			
D_1	d	a	○	○	×
	a	d	×	○	×
D_2	d	b	○	○	×
	b	d	×	○	×
D_3	d	c	○	○	×
	c	d	×	○	×
D_4	a	e	○	○	×
	e	a	×	○	×
D_5	b	e	○	○	×
	e	b	×	○	×
D_6	c	e	○	○	×
	e	c	×	○	×

○: Continuity ×: Discontinuity (∞)

NOTE:

The results "○" or "×" should be reversed according to the Pocket tester polarity.

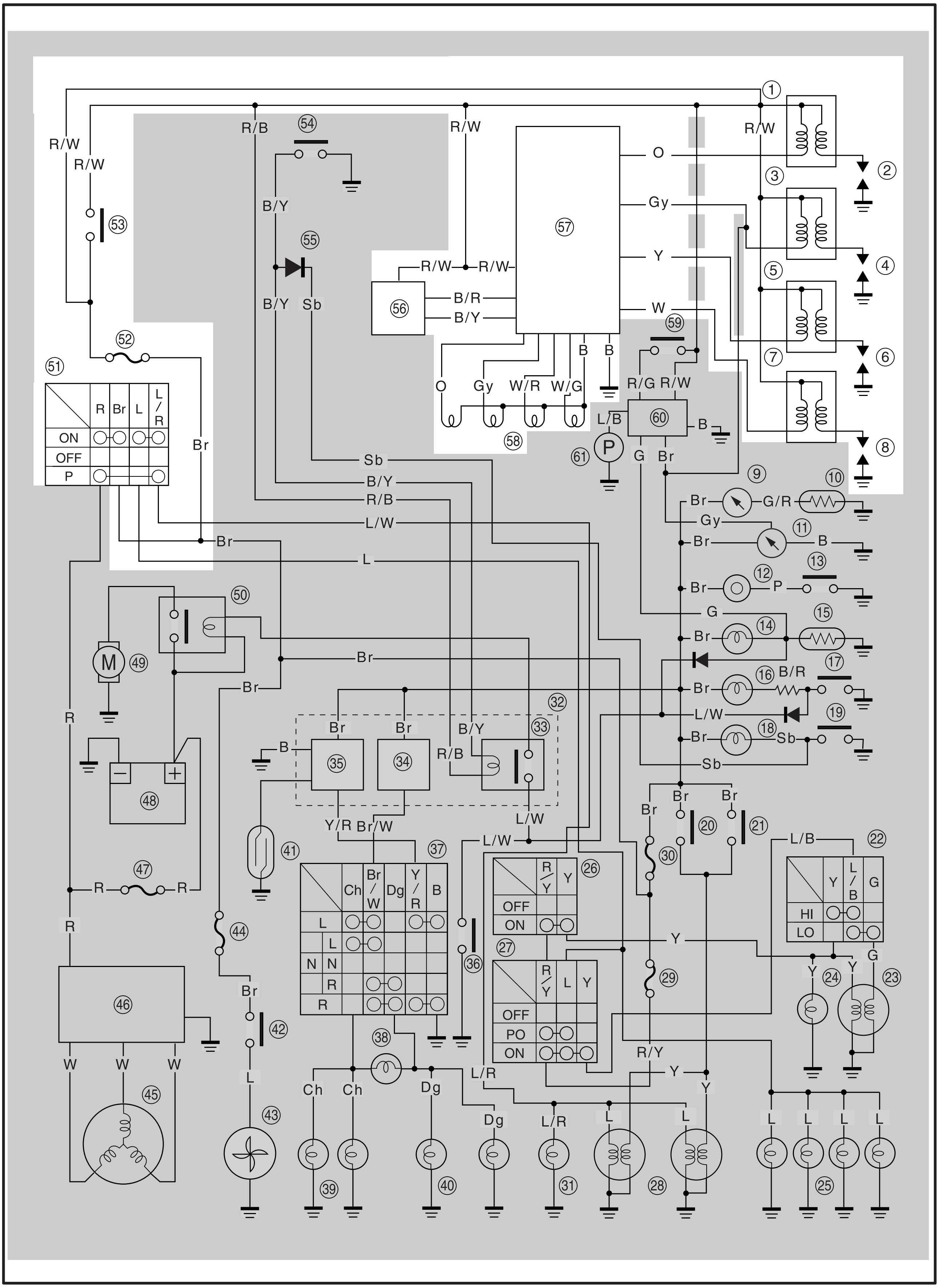
CAUTION:

Do not overcharge rectifier or damage may result.
Avoid:
- **A short circuit.**
- **Inverting + and – battery leads.**
- **Direct connection of rectifier to battery.**

— MEMO —

IGNITION SYSTEM

CIRCUIT DIAGRAM

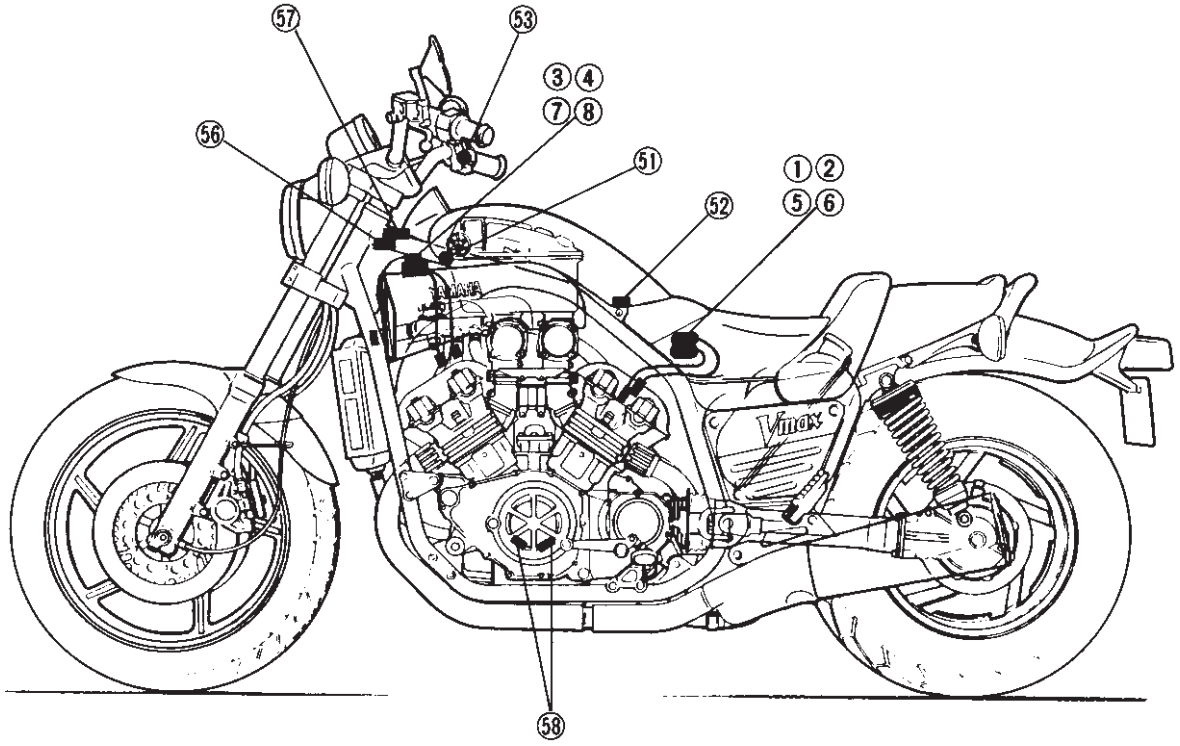


Aforementioned circuit diagram shows ignition circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

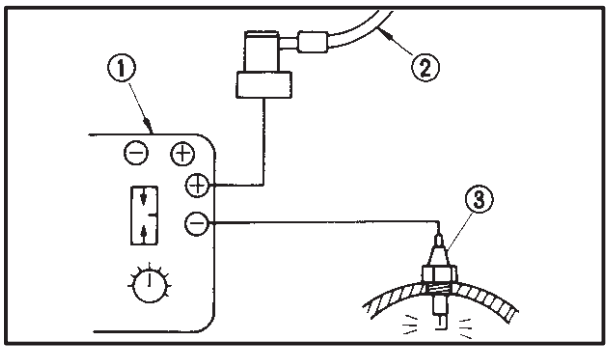
① Ignition coil #1
② Spark plug #1
③ Ignition coil #2
④ Spark plug #2
⑤ Ignition coil #3
⑥ Spark plug #3
⑦ Ignition coil #4
⑧ Spark plug #4
51 Main switch
52 Fuse (IGNITION)
53 "ENGINE STOP" switch
56 Pressure sensor
57 Ignitor unit
58 Pick-up coil (#1 ~ #4)



TROUBLESHOOTING

The entire ignition system can be checked for misfire and weak spark by using the Electro Tester.

1. Warm up the engine so that all of the electrical components are at operating temperature.



2. Connect:
   • Electro Tester (90890-03021) ①
3. Start the engine, and increase the spark gap until misfire occurs. (Test at various r/min between idle and red line.)

② Spark plug lead

③ Spark plug

CAUTION:

Do not run the engine in neutral above 6,000 r/min for more than 1 or 2 seconds.

Minimum Spark Gap:
6 mm (0.24 in)

Faulty ignition system operation (at the minimum spark gap or smaller) → Follow the troubleshooting chart until the source of the problem is located.

Troubleshooting Chart

Check the entire ignition for connections.
→ Correct.
Faulty

Measure the battery voltage and specific gravity.
Battery voltage: More than 12 V
Specific gravity: 1,280
→ Recharge the battery.
No

Main and engine stop switches are turned to "ON". Check for voltage (12 V) on the "R/W" lead at the TCI unit and ignition coils.
→ Check the fuse "IGNITION" (15 A) and wiring circuit.
No

Measure the pickup coils resistance.
Pickup coil: 93.5 ~ 126.5 Ω at 20°C (68°F)
(Black – Orange) (Black – Gray)
(Black – White/Green)
(Black – White/Red)

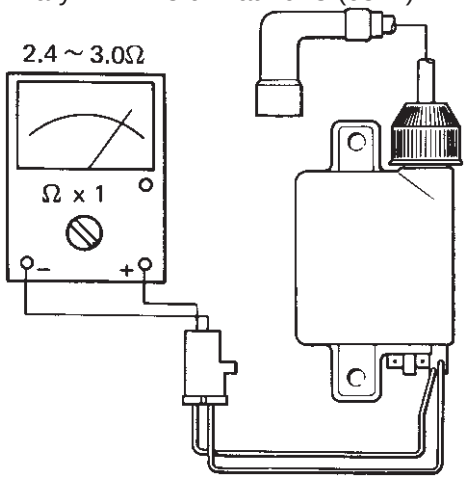


→ Replace the pickup coil assembly.
No

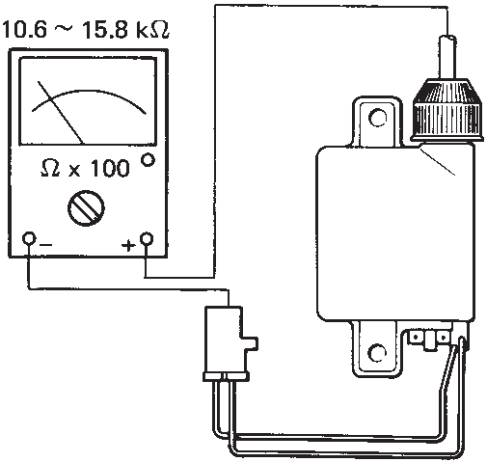
OK

Check the ignition coils for resistance (primary and secondary).

A Primary: 2.4 ~ 3.0 Ω at 20°C (68°F)



B Secondary: 10.6 ~ 15.8 kΩ at 20°C (68°F)

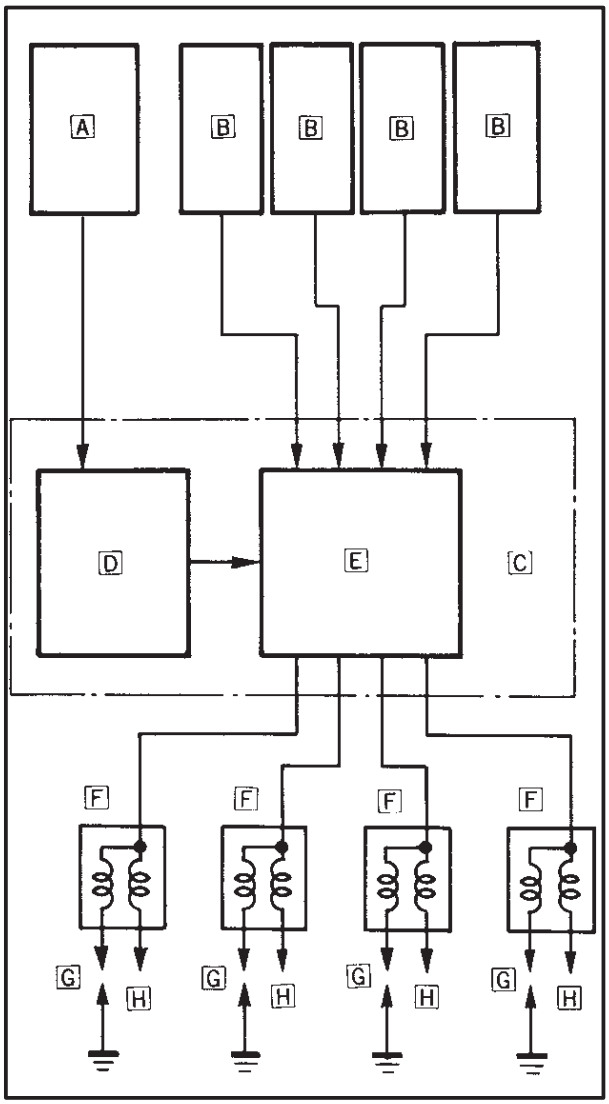


OK

TCI unit is faulty, replace the unit.

No

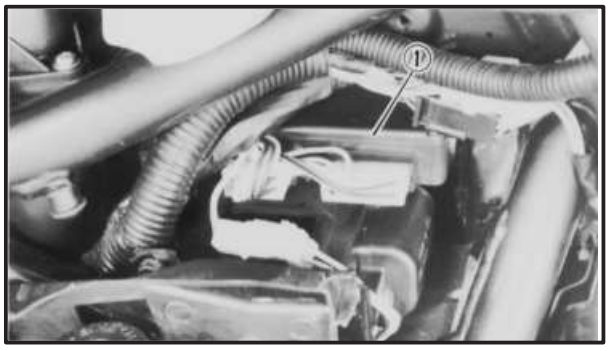
Replace the ignition coil(s).



DESCRIPTION

This model is equipped with a battery operated, fully transistorized, breakerless ignition system. By using magnetic pickup coils, the need for contact breaker points is eliminated. This adds to the dependability of the system by eliminating frequent cleaning and adjustment of points and ignition timing. The TCI (Transistor Control Ignition) unit incorporates an automatic advance circuit controlled by signals generated by the pickup coil. This adds to the dependability of the system by eliminating the mechanical advancer. This TCI system consists of two units; a pickup unit and an ignitor unit.

A Pressure sensor
B Pickup coil
C Ignitor unit
D Advance control
E Electronic advance circuit
F Ignition coil × 4
G Spark plug × 4
H Battery

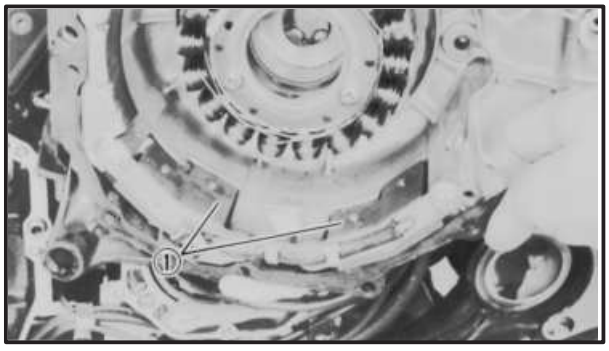


OPERATION

TCI Unit

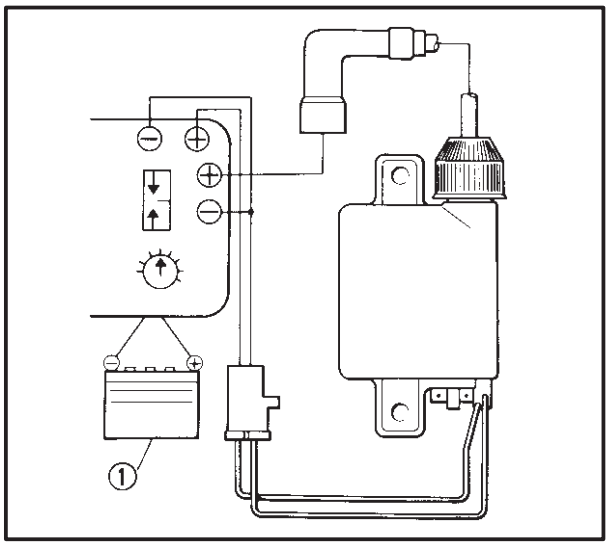
The TCI functions on the same principle as a conventional DC ignition system with the exception of using magnetic pickup coils and a transistor control box (TCI) in place of contact breaker points.

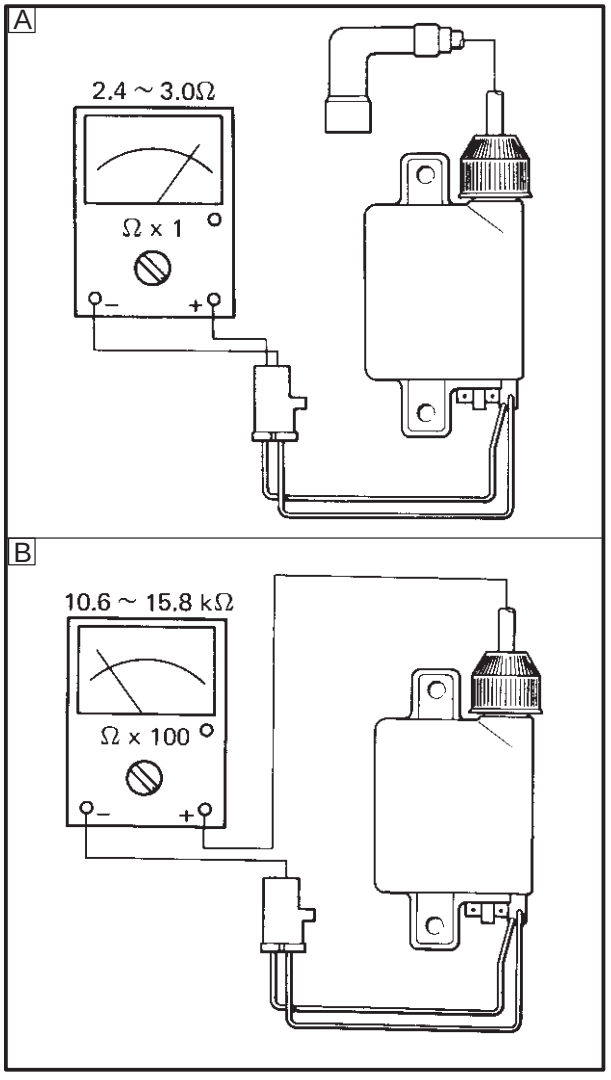
① TCI unit



Pickup Unit

The pickup unit consists of two pickup coils ① and a flywheel mounted onto the crankshaft.
When the projection on the flywheel passes a pickup coil, a signal is generated and transmitted to the ignitor unit. The width of the projection on the flywheel determines the ignition advance.
The pickup coils are located in the right crankcase cover.





IGNITION SPARK GAP TEST

1. Remove:
   - Top cover
   - Seat
   - Cover (left)
   - Electrical component board
2. Disconnect:
   - Ignition coil leads
   - Spark plug leads
3. Connect:
   - Electro Tester (90890-03021)

NOTE:

Be sure to use a fully charge 12 V battery ①.

4. Turn the spark plug gap adjuster and increase the gap to the maximum limit unless misfire occurs first.

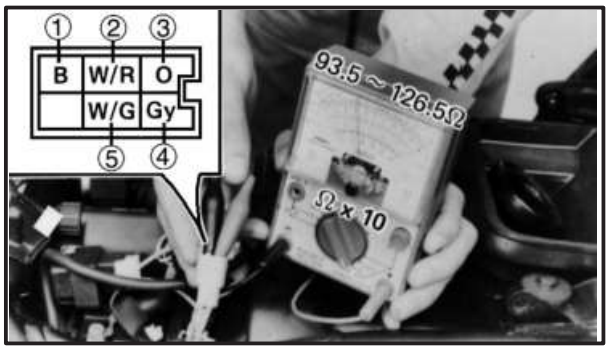
Minimum Spark Gap:
6 mm (0.24 in)

IGNITION COIL RESISTANCE TEST

1. Connect:
   - Pocket Tester (90890-03112)
2. Measure:
   - Primary coil resistance A
   - Secondary coil resistance B

   Out of specification → Replace.

Primary Coil Resistance:
2.4 ~ 3.0 Ω at 20°C (68°F)
Secondary Coil Resistance:
10.6 ~ 15.8 kΩ at 20°C (68°F)
Spark Plug Cap:
9 ~ 11 kΩ



PICKUP COIL RESISTANCE TEST

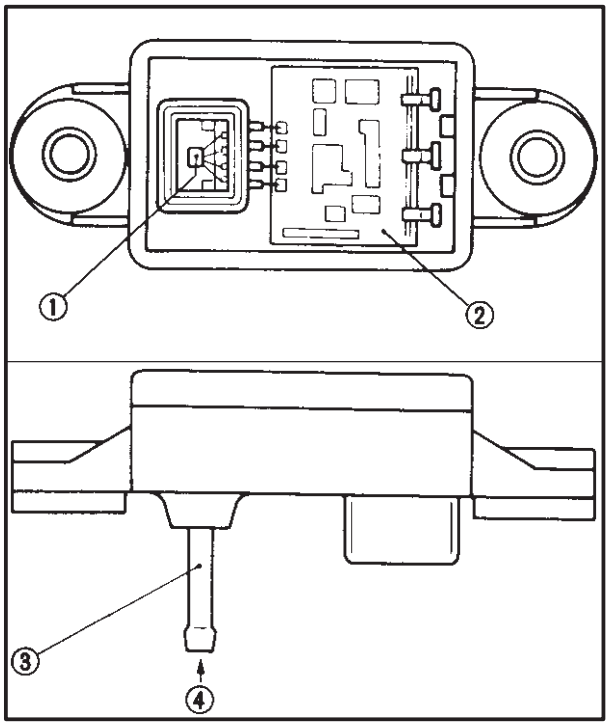
1. Remove:
   - Seat
2. Disconnect:
   - 5-pin connecter (Black, White/Red, Orange, White/Green and Gray)
3. Measure
   - Pickup coil resistance
     Use a Pocket Tester (90890-03112).
     Out of specification → Replace.

Pickup Coil Resistance:
93.5 ~ 126.5 Ω at 20°C (68°F)
(B – O), (B – Gy),
(B – W/G), (B – W/R)

① Black
② White/Red
③ Orange
④ Gray
⑤ White/Green

SPARK PLUG INSPECTION

Refer to "CHAPTER 2. SPARK PLUG INSPECTION" section.

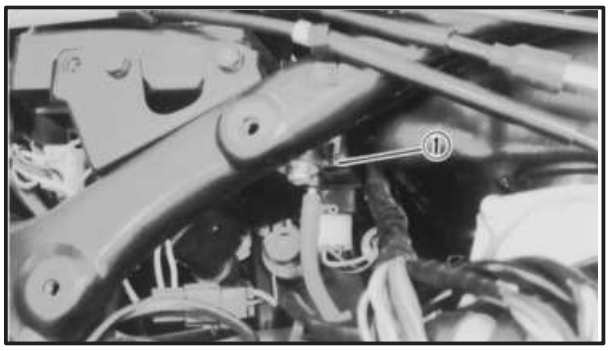


PRESSURE SENSOR

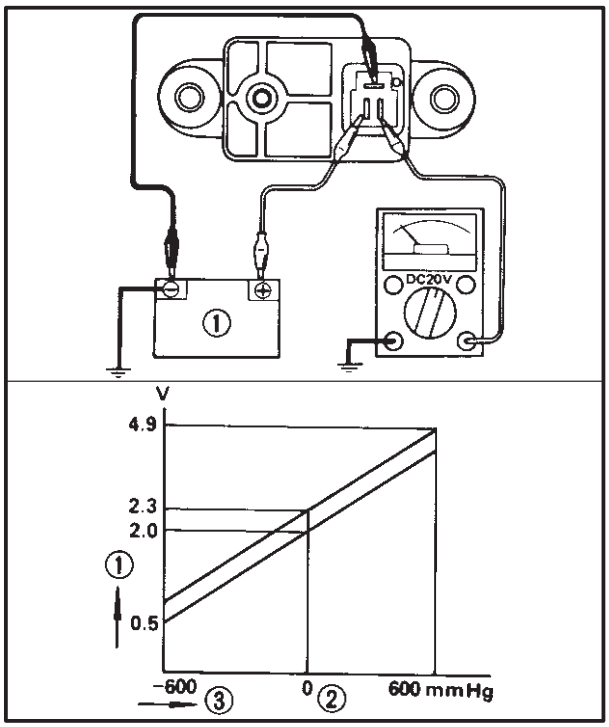
Operation

This pressure sensor unit consists of a semiconductor strain gauge and an amplifying circuit.
Pressure to the carburetor joint (venturi portion) is sensed by the strain gauge and amplified in the circuit connected with this gauge. The amplified pressure signals are then transmitted to the ignition system for the control of ignition timing advance.

① Strain gauge
② Amplifying circuit
③ Pressure intake tube
④ From carburetor joint



Removal
1. Remove:
   - Top cover
   - Cover (left)
   - Electrical component board
2. Disconnect:
   - Sensor connector
   - Vacuum hose
3. Remove:
   - Pressure sensor ①



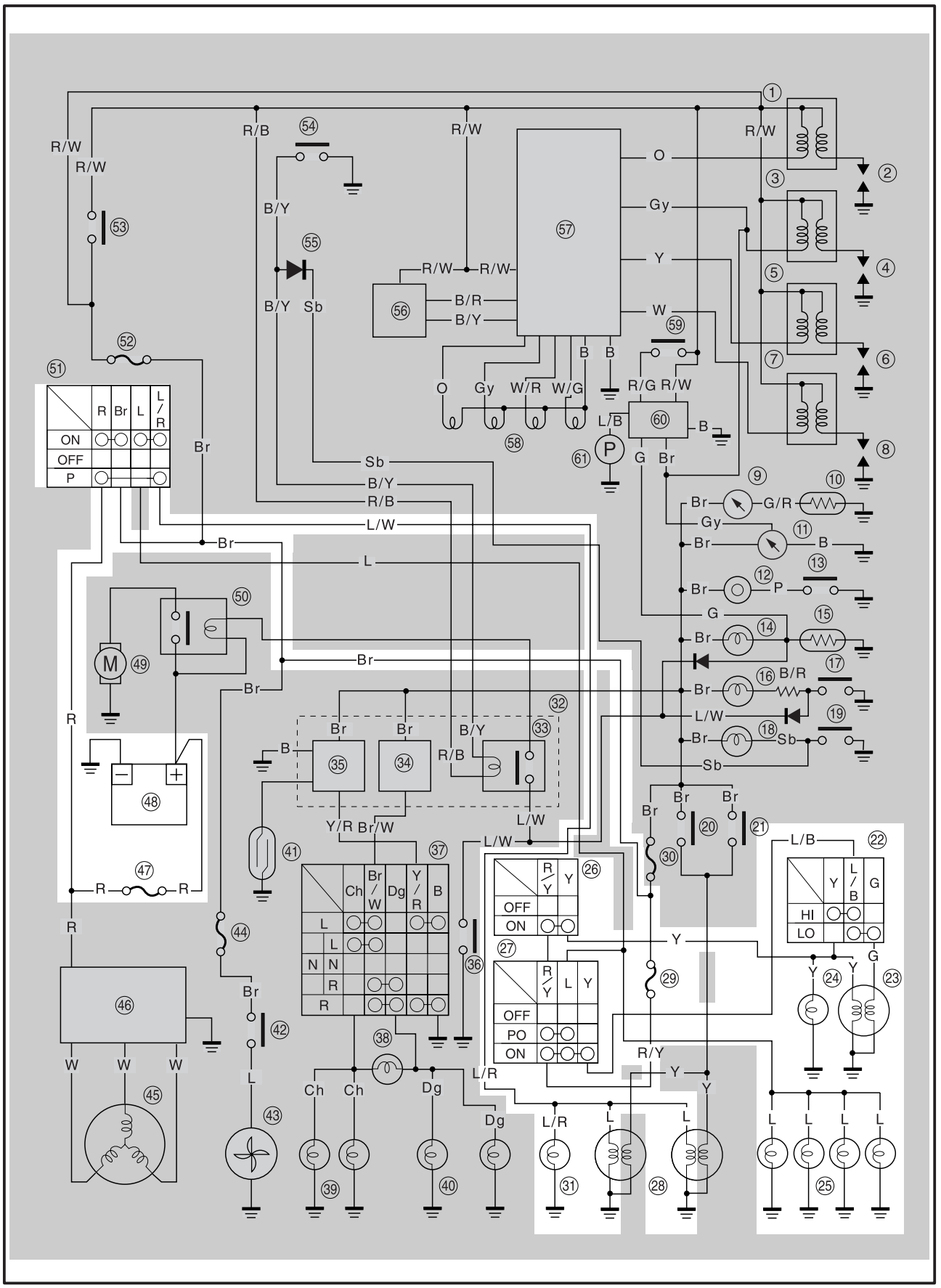
Inspection
1. Connect:
   - Pocket Tester (90890-03112)
   - Battery (12 V) ①
2. Measure:
   - Output voltage
     Out of specification → Replace.

Output Voltage:
About 2.0 DC Volt

① Output voltage
② Atmospheric pressure
③ Pressure

Installation
1. Install:
   - Pressure sensor
     Reverse the removal procedure.

LIGHTING SYSTEM
CIRCUIT DIAGRAM

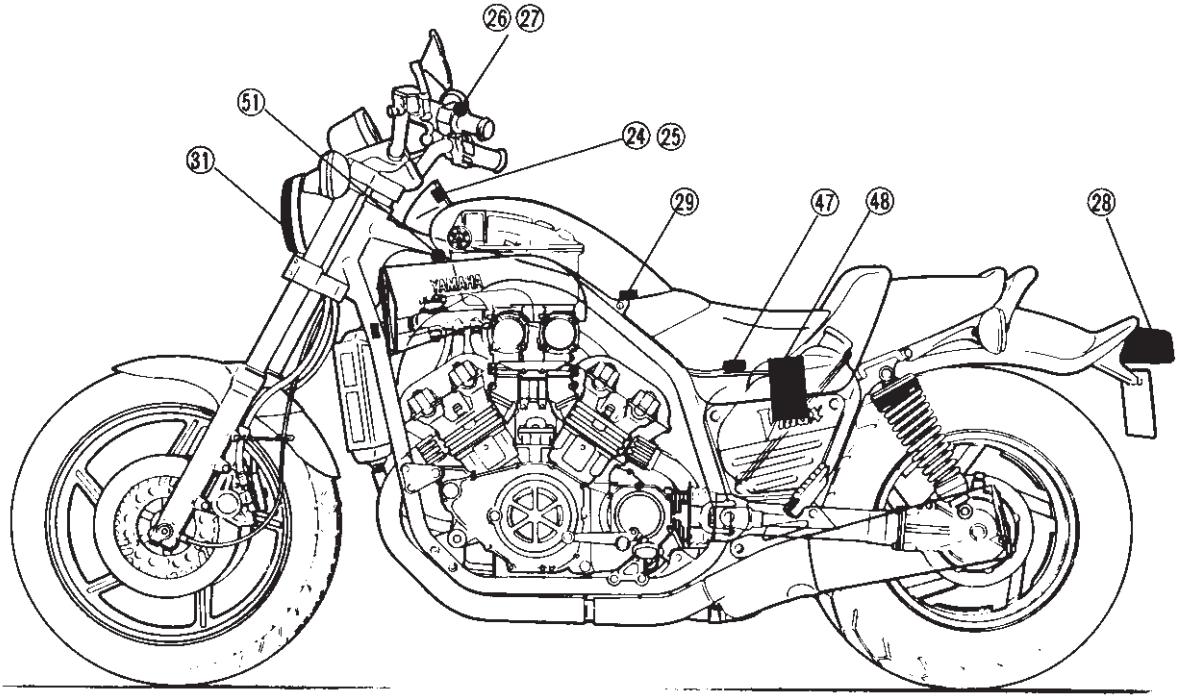


Aforementioned circuit diagram shows lighting circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

㉒ “LIGHTS” (Dimmer) switch
㉓ Headlight
㉔ “HIGH BEAM” indicator light
㉕ Meter lights
㉖ “PASS” switch
㉗ “LIGHTS” switch
㉘ Tail/brake light
㉙ Fuse (HEAD)
㉛ Auxiliary light
㊼ Main fuse
㊽ Battery
㊶ Main switch



LIGHTING TESTS AND CHECKS

The battery provides power for operation of the headlight, taillight, and meter lights. If none of the above fail to operate proceed further.

Low battery voltage indicates either a faulty battery, low battery fluid level, or a defective charging system.

Also check fuse condition. Replace any “open” fuses. There are individual fuses for various circuits (see complete Circuit Diagram).

NOTE:

Check each bulb first before performing the following check.

Headlight Troubleshooting

HEADLIGHT DOES NOT COME ON HIGH BEAM DOES NOT OPERATION.

Check headlight bulb.
- Faulty → Replace.
- OK ↓

Check fuse (HEAD).
- Faulty → Replace.
- OK ↓

Measure voltage on Brown lead from main switch (“ON” position).
- Faulty → Check main switch, replace if necessary.
- 12 V ↓

Measure voltage on Blue/Black lead from “LIGHTS” switch (“ON” position).
- No voltage → Check “LIGHTS” switch, if necessary.
- 12 V ↓

Measure voltage at “LIGHTS” (Dimmer) switch terminal.
- No voltage → Check “LIGHTS” (Dimmer) switch, replace if necessary.
- 12 V ↓

Measure voltage at headlight high beam or low beam terminal.
- No voltage → An open or poor connection between headlight and “LIGHTS” (Dimmer) switch terminal.
- 12 V ↓

Poor ground or poor connection of headlight wiring.

Taillight Troubleshooting

TAILLIGHT DOES NOT COME ON.

Check taillight bulb.
- Faulty → Replace.
- OK ↓

Check main fuse.
- Faulty → Replace.
- OK ↓

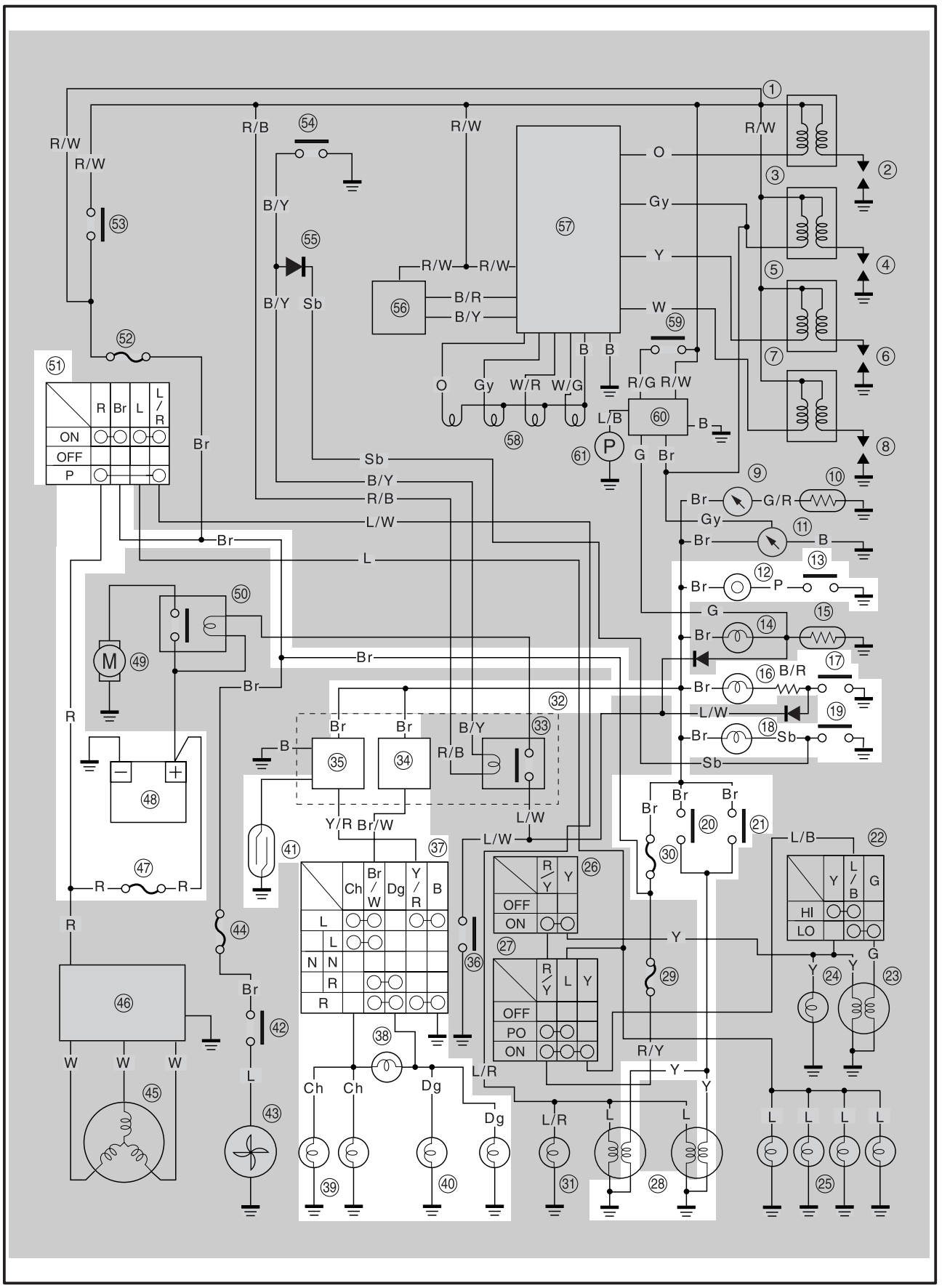
Measure voltage on Blue lead from main switch (“ON” position).
- No voltage → Check main switch, replace if necessary.
- 12 V ↓

Measure voltage at taillight terminal.
- No voltage → An open or poor connection between taillight and main switch terminal.
- 12 V ↓

Poor ground or poor connection of taillight wiring.

— MEMO —

SIGNAL SYSTEM
CIRCUIT DIAGRAM

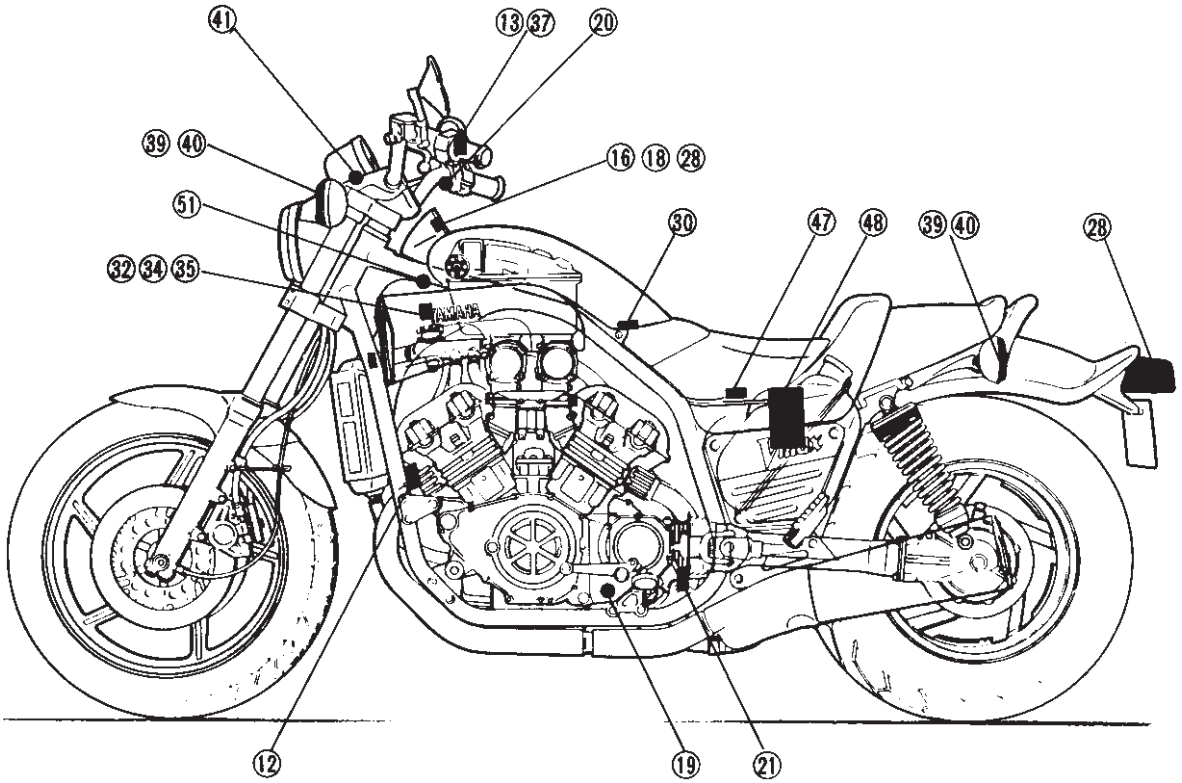


Aforementioned circuit diagram shows signal circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

⑫ Horn
⑬ “HORN” switch
⑯ “OIL LEVEL” warning indicator light
⑰ Oil level gauge
⑱ “NEUTRAL” indicator light
⑲ Neutral switch
⑳ Front brake switch
㉑ Rear brake switch
㉘ Tail/brake light
㉚ Fuse (SIGNAL)
㉜ Relay assembly
㉞ Flasher relay
㉟ Canelling unit
㊲ “TURN” switch
㊳ “TURN” indicator light
㊴ Flasher light (Left)
㊵ Flasher light (Right)
㊶ Reed switch
㊼ Main fuse
㊽ Battery
㊶ Main switch



SIGNAL SYSTEM TESTS AND CHECKS

The battery provides power for operation of the horn, brakelight, indicator lights and flasher lights. If none of the above operates, always check battery voltage before proceeding further.

Battery

1. Check:
   - Battery voltage
     Defective components → Replace.

Check for:	Faulty battery
	Low battery fluid level
	Defective charging system
	Faulty fuse(s)

Horn

1. Check:
   - Horn operation
     Defective components → Replace.

Check for:	12 V on Brown lead to horn
	Good grounding of horn (Pink lead) when horn button is pressed
	Faulty fuse

Brake Light

1. Check:
   - Brake light operation
     Defective components → Replace.

Check for:	Defective bulb
	12 V on Yellow lead to brake light
	12 V on Brown lead to each brake light switch (Front and rear brake switch)

"NEUTRAL" Indicator Light

1. Check:
   - Indicator light operation
     Defective components → Replace.

Check for:	Defective bulb
	12 V on Sky Blue lead to neutral switch
	12 V on Brown lead to indicator light

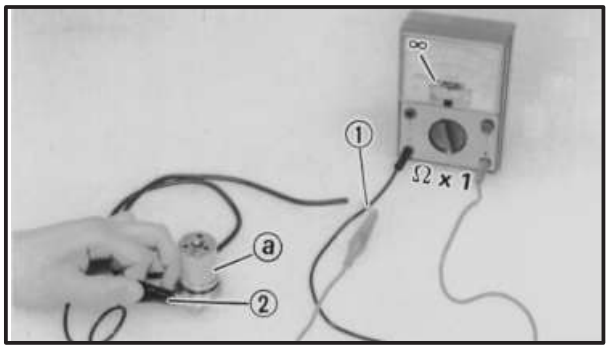
"OIL LEVEL" Warning Indicator Light

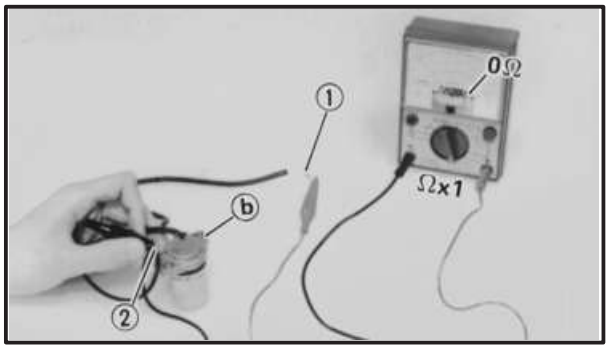
1. Check:
   - Indicator light operation
     Defective components → Replace.

Check for:	Defective bulb
	Defective oil level gauge
	12 V on Brown lead to indicator light

Flasher Light

1. Check:
   - Flasher light operation
     Refer to "SELF-CANCELLING FLASHER SYSTEM" section.





OIL LEVEL GAUGE TEST

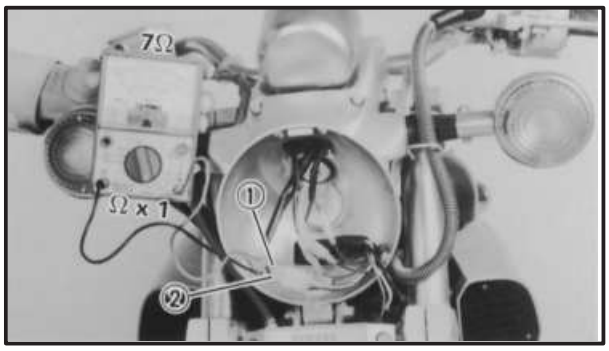
1. Drain:
   - Engine oil
2. Remove:
   - Oil level gauge
3. Measure:
   - Oil level gauge resistance
     Use the Pocket Tester (90890-03112).
     Out of specification → Replace.

Oil Level Gauge Resistance:
Float is down ⓐ → Infinity
Float is up ⓑ → Zero ohms

① Black/Red
② Ground

4. Install:
   - Oil level gauge
5. Connect:
   - Leads
6. Fill:
   - Crankcase
     Refer to "CHAPTER 2 ENGINE OIL REPLACEMENT" section.





REED SWITCH TEST

1. Remove:
   - Headlight lens unit
   - Top cover
   - Cover (left)
2. Disconnect:
   - Relay assembly coupler ①
3. Measure:
   - Reed switch resistance
     Use the Pocket Tester (90890-03112).
     Out of specification → Replace.
     Lift the front wheel and rotate the wheel by hand.

Reed Switch Resistance:
About 7 Ω
Then return back 0 Ω" or ∞ Ω
when wheel is stopped

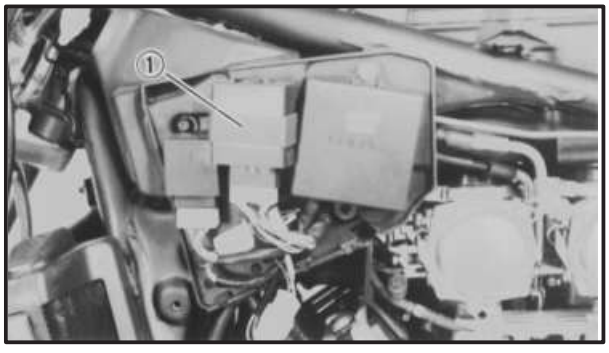
① White/Green

② Black

SELF-CANCELLING FLASHER SYSTEM TEST

Description

The self-cancelling flasher system turns off the turn signal after a period of time or distance involved in turning or changing lanes. Generally, the signal will cancel after either 10 seconds, or 150 meters (490 feet), whichever is greater.
At very low speed, the function is determined by distance; at high speed, especially when changing speeds the cancelling determination is a combination of both times and distance. The self-cancelling determination is a commechanism only operates when the motorcycle is moving; thus the signal will not self-cancel while you are stopped at an intersection.



① Cancelling unit

Operation

The handlebar switch has three positions: L (left), OFF, and R (right). The switch lever will return to the "OFF" position after being pushed to L or R, but the signal will function.

By pushing the lever in, the signal may be cancelled manually. If the flasher self-cancelling system should become inoperative, replace relay unit.

Troubleshooting

Flasher light and indicator light inoperative.

↓

Check bulb. — Faulty → Replace.

OK ↓

Left circuit:
- Check for 12 V on Chocolate lead to light.
- Check for ground on Black lead to light.

Right circuit:
- Check for 12 V on Dark green lead to light.
- Check for ground on Black lead to light.

No voltage → Correct.

OK ↓

Measure voltage at "TURN" switch as follows.
- Brown/White lead
- Yellow/Red lead

12 V → Replace switch.

No voltage ↓

No voltage on Brown/White lead:
- Check flasher relay, fuses (SIGNAL and MAIN), main switch and battery.

No voltage on Yellow/Red lead:
- Check cancelling unit, fuses (SIGNAL and MAIN), main switch and battery.

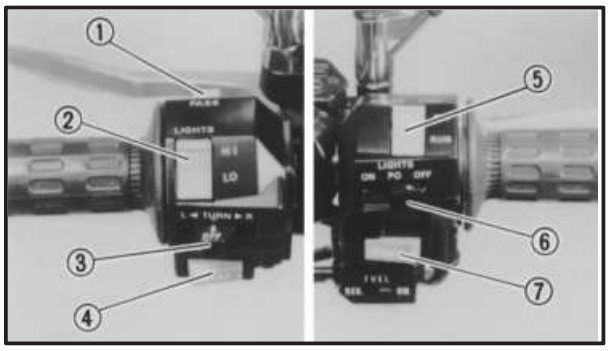
Poor condition → Replace defective component(s).

OK ↓

Check reed switch. — Poor condition → Replace switch

OK ↓

Replace cancelling unit.



SWITCHES TEST

Switches may be checked for continuity with a Pocket Tester (90890-03112) on the "Ohm × 1" position.

① "PASS" switch
② "LIGHTS" (Dimmer) switch
③ "TURN" switch
④ "HORN" switch
⑤ "ENGINE STOP" switch
⑥ "LIGHTS" switch
⑦ "START" switch

Main Switch

Switch Position	Lead Color			
	R	Br	L	L/R
P	○			○
OFF				
ON	○	○	○	○

"PASS" Switch

Switch Position	Lead Color	
	R/Y	Y
OFF		
ON	○	○

"LIGHTS" (Dimmer) Switch

Switch Position	Lead Color		
	Y	L/B	G
HI	○	○	
LO		○	○

"TURN" Switch

Switch Position		Lead Color				
		Ch	Br/W	Dg	Y/R	B
L		○	○		○	○
N	L	○	○			
	N					
	R		○	○		
R			○	○	○	○

"HORN" Switch

Switch Position	Lead Color	
	P	B
OFF		
ON	○	○

“ENGINE STOP” Switch

Switch Position	Lead Color	
	R/W	Br
OFF		
ON	○———	———○

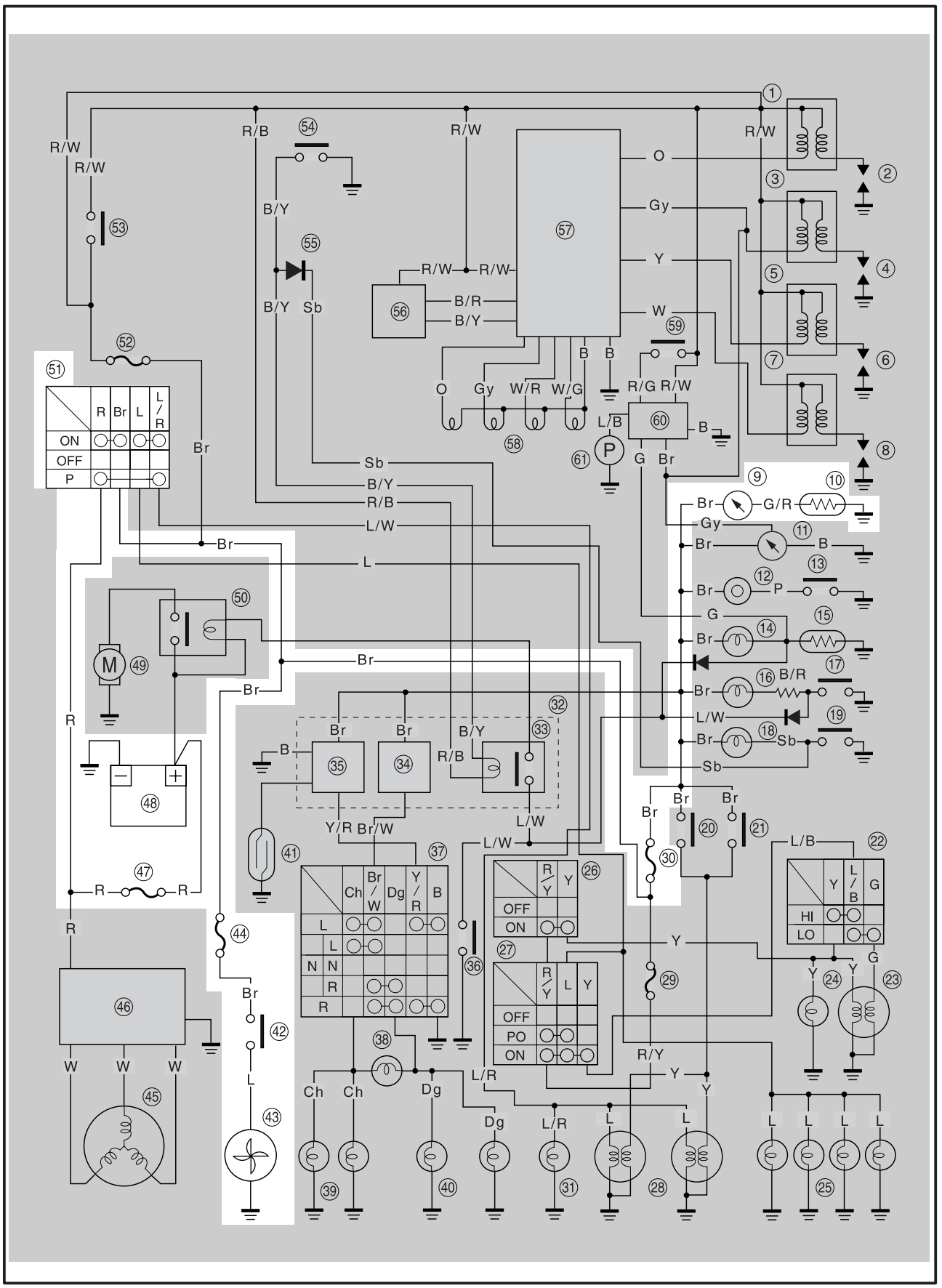
“LIGHTS” Switch

Switch Position	Lead Color		
	R/Y	L	L/B
OFF			
PO	○———	———○	
ON	○———	———○———	———○

“START” Switch

Switch Position	Lead Color	
	L/W	B
OFF		
ON	○———	———○

COOLING SYSTEM
CIRCUIT DIAGRAM

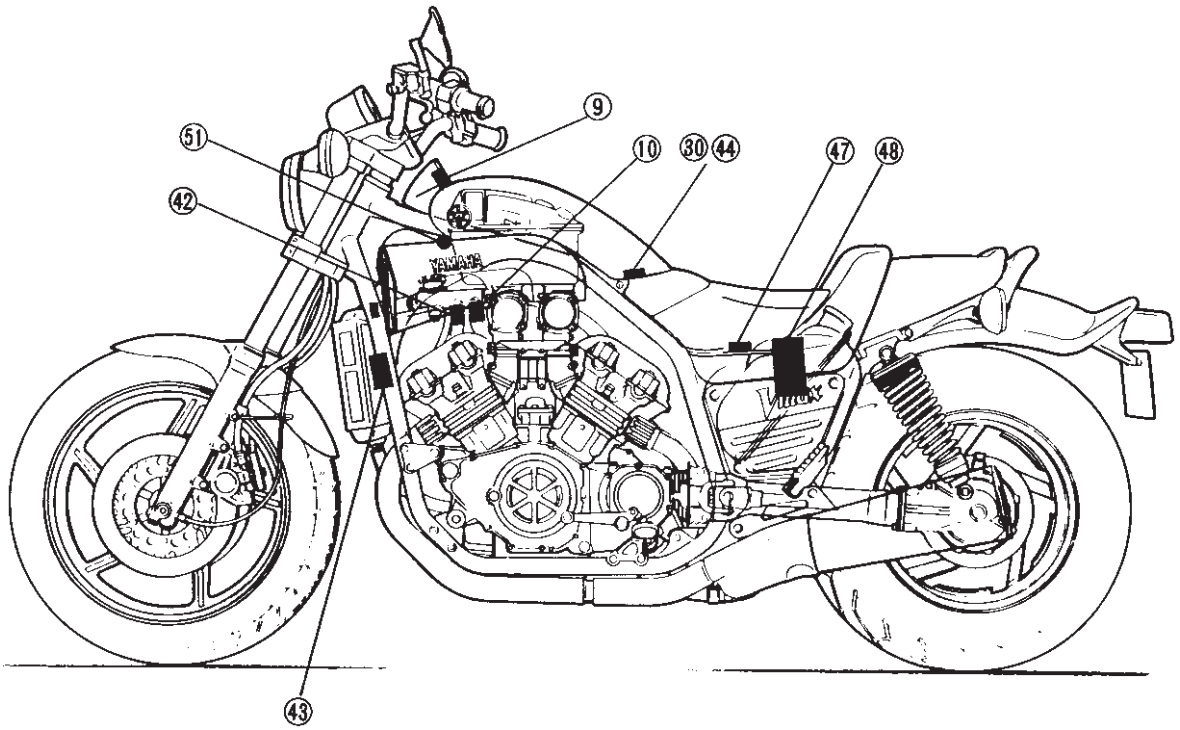


Aforementioned circuit diagram shows cooling circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

⑨ Temperature meter
⑩ Thermo-unit
㉚ Fuse (SIGNAL)
㊷ Thermostatic switch
㊸ Electric fan
㊹ Fuse
㊼ Main fuse
㊽ Battery
㊶ Main switch



TROUBLESHOOTING

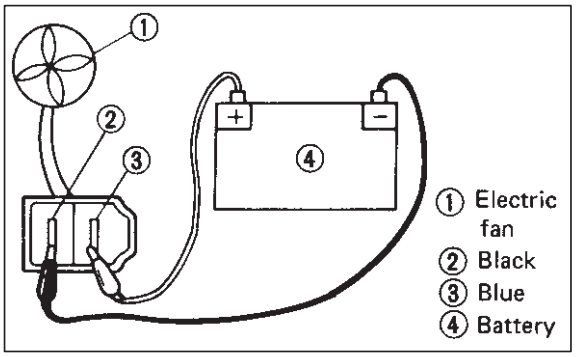
The electric fan will not turn at coolant temperatures of 105 ± 3°C (221.0 ± 5.4°F) or more:

↓

Check the connectors. → Defective → Correct.

↓ OK

Disconnect fan motor connector and connect battery as shown. → Fan inoperative → Replace fan motor assembly.



↓ Fan operative

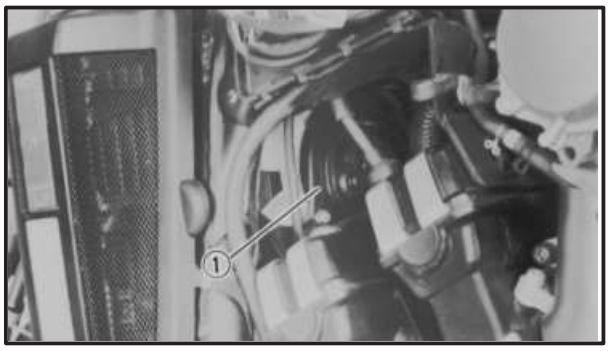
Check battery voltage on Blue leads. → No voltage → Check wiring circuit, and correct defective component(s).

↓ 12 V

Disconnect the lead of the thermostatic switch and ground it to the motor body. → Fan operative → Replace the thermostatic switch.

↓ Fan inoperative

Replace the fan motor assembly.

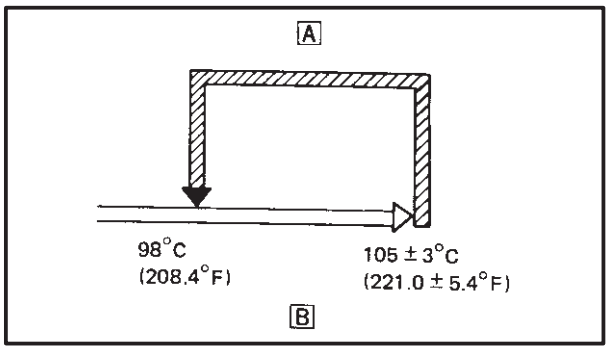


ELECTRIC FAN AND THERMOSTATIC SWITCH

Operation

The electric fan will be switched ON or OFF according to the coolant temperature in the radiator.

① Electric fan

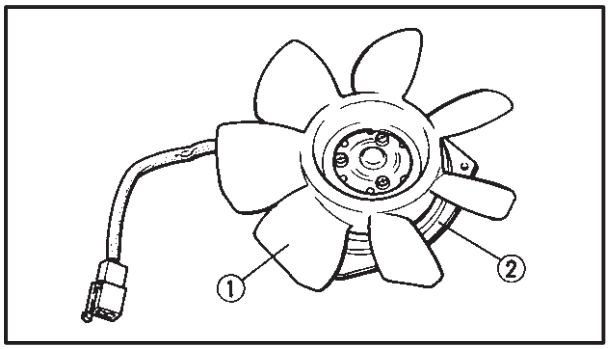


NOTE:

The electric fan is controlled by the thermostatic switch when the main switch is "ON". Thus, under certain operating conditions, this fan may continue to run until the engine temperature has cooled down to about 91°C (195.8°F).

A THERMOSTATIC SWITCH "ON"

B COOLANT TEMPERATURE

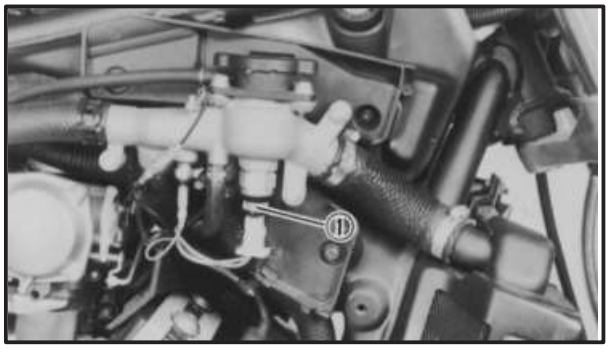


Electric Fan Inspection

The following problems may require repair or replacement of components	
Component	Condition
Fan motor	Unsmooth operation
Fan motor	Excessive vibration
Fan motor bracket	Cracks
Fan blades	Cracks
Securing bolts	Looseness

① Fan

② Electric fan motor

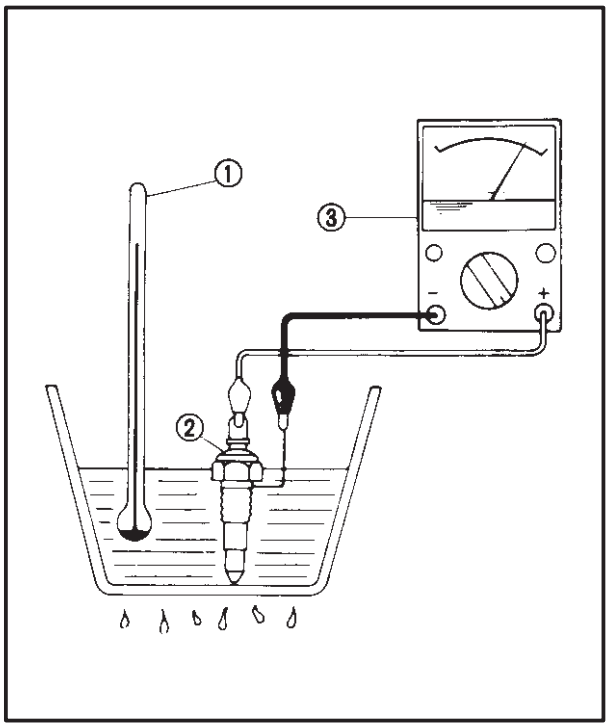


Thermostatic Switch Inspection

1. Remove:
   - Top cover
   - Cover (right)
   - Thermostatic switch ①

WARNING:

Handle the thermostatic valve very carefully. Never subject it to strong shock or allow it to be dropped. Should it be dropped, it must be replaced.



2. Inspect:
   • Thermostatic switch operation

Thermostatic switch inspection steps:
• Immerse thermostatic switch in water.

① Thermometer
② Thermostatic switch
③ Pocket Tester

• Check continuity as indicated.
Note temperatures while heating the water.
Malfunction → Replace switch.

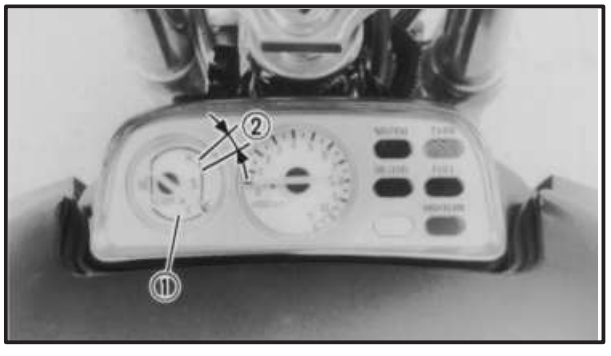
Test Step	Water Temperature	Pocket Tester (Ω × 1)
1	0 ~ 98°C (32 ~ 208.4°F)	Discontinuity
2	More than 105 ± 3°C (221.0 ± 5.4°F)	Continuity
3*	105 to 98°C (221.0 to 208.4°F)	Continuity
4*	Less than 98°C (208.4°F)	Discontinuity
Test 1 & 2; Heat-up tests Test 3* & 4*; Cool-down tests		

3. Install:
   • Thermostatic switch

Thermostatic Switch:
15 Nm (1.5 m•kg, 11 ft•lb)
Three Bond Sealock® #10

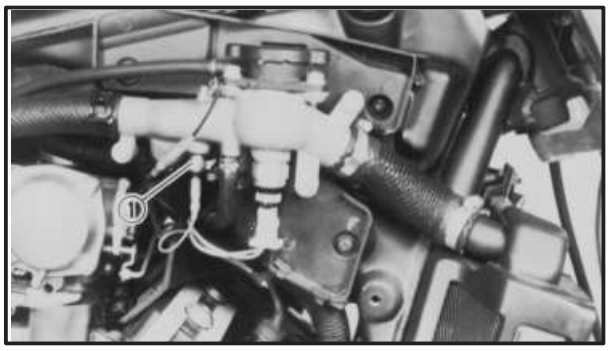
CAUTION:

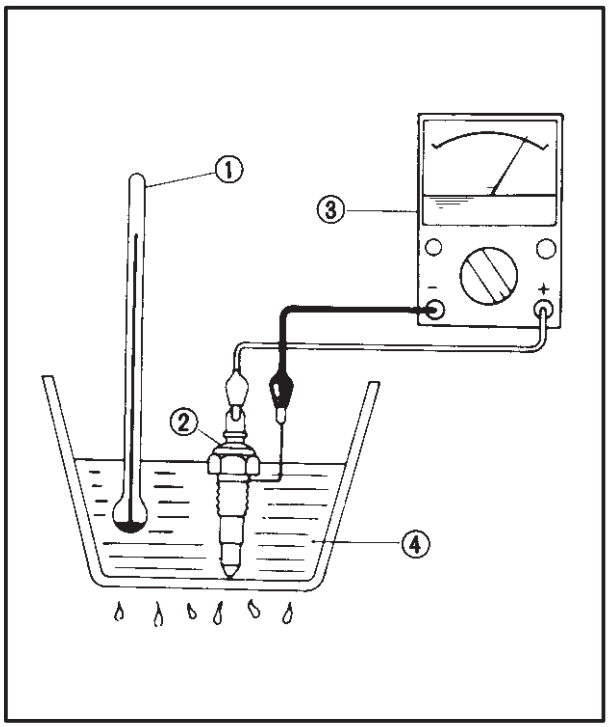
After replacing the thermostatic switch, check the coolant level in the radiator and also check for any leakage.



THERMO-UNIT AND THERMOMETER
Operation
The thermo unit has less resistance at higher temperatures and thus allows more current to pass through. When more current flows to the coil in the thermometer, the armature to which the needle is attached by the increased magnetic field. In this way, the needle indicates the temperature.

① Temperature meter
② Red zone





Thermo-unit Inspection

1. Remove:
   - Top cover
   - Cover (right)
   - Thermo-unit ①

WARNING:

Handle the thermo-unit with special care. Never subject it to strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

2. Inspect:
   - Thermo-unit operation

Thermo-unit inspection steps:
- Immerse thermo-unit in water.

① Temperature gauge
② Thermo-unit
③ Pocket Tester
④ Water

- Check continuity at indicated
  Note temperatuers while heating the water.
  Malfunction → Replace switch

Water Temperature	50°C (122°F)	80°C (176°F)	100°C (212°F)
Resistance	153.9 Ω	47.5 ~ 56.8 Ω	26.2 ~ 29.3 Ω

3. Install:
   - Thermo-unit

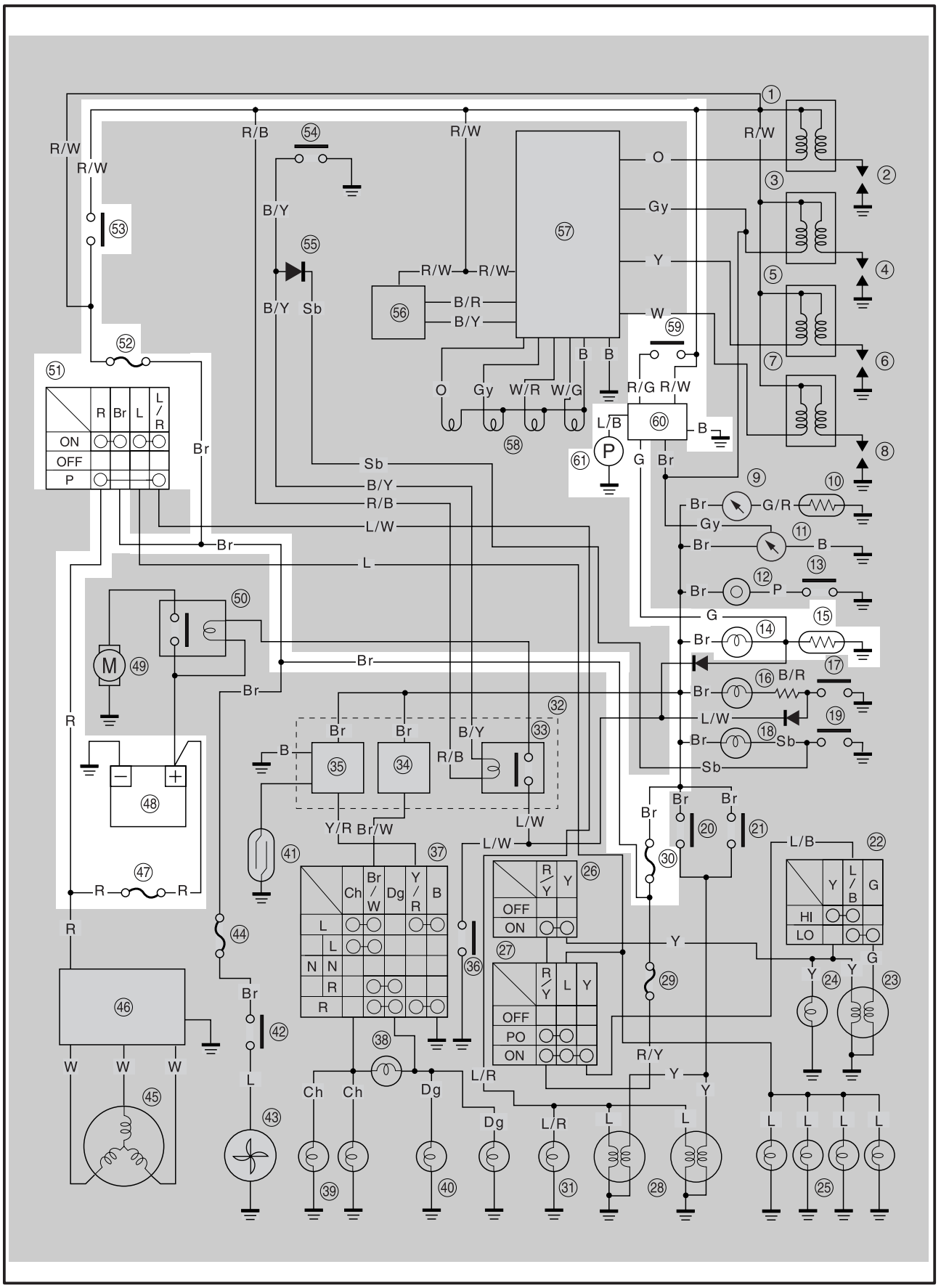
Thermo-unit:
15 Nm (1.5 m•kg, 11 ft•lb)
Three Bond Sealock® #10

CAUTION:

After replacing the thermo-unit, check the coolant level in the radiator and also check for any leakage.

FUEL PUMP SYSTEM

CIRCUIT DIAGRAM

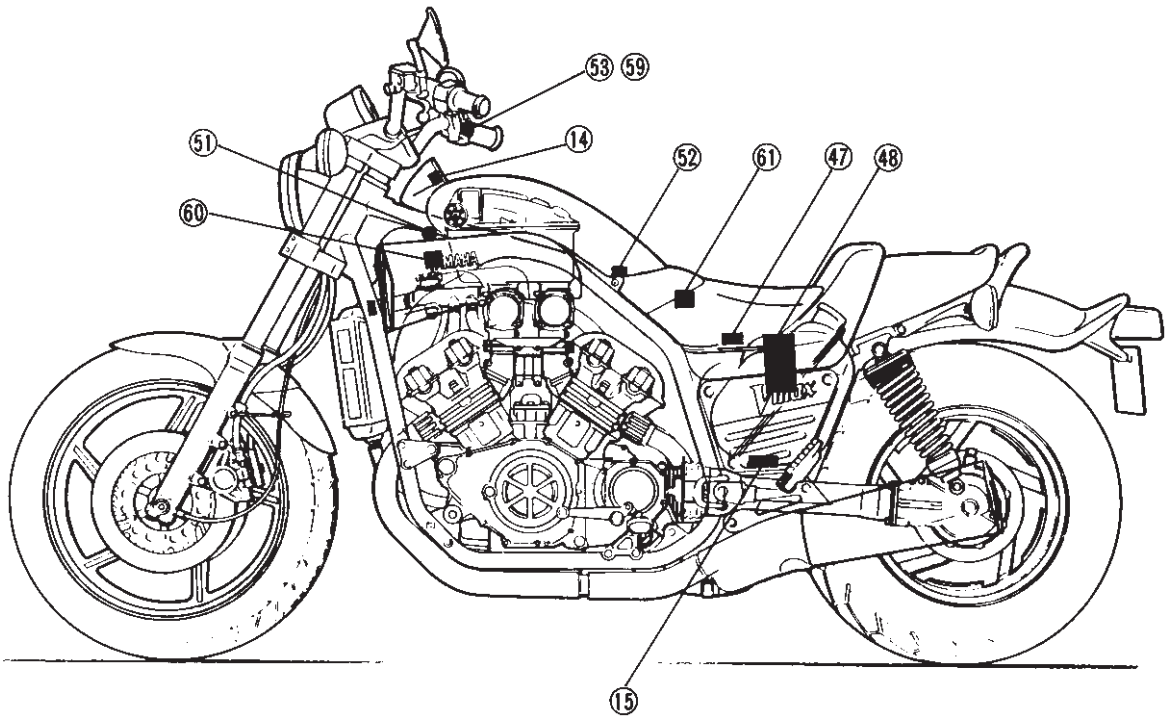


Aforementioned circuit diagram shows fuel pump circuit in wiring diagram.

NOTE:

For the encircled numbers and color codes, see page 7-2.

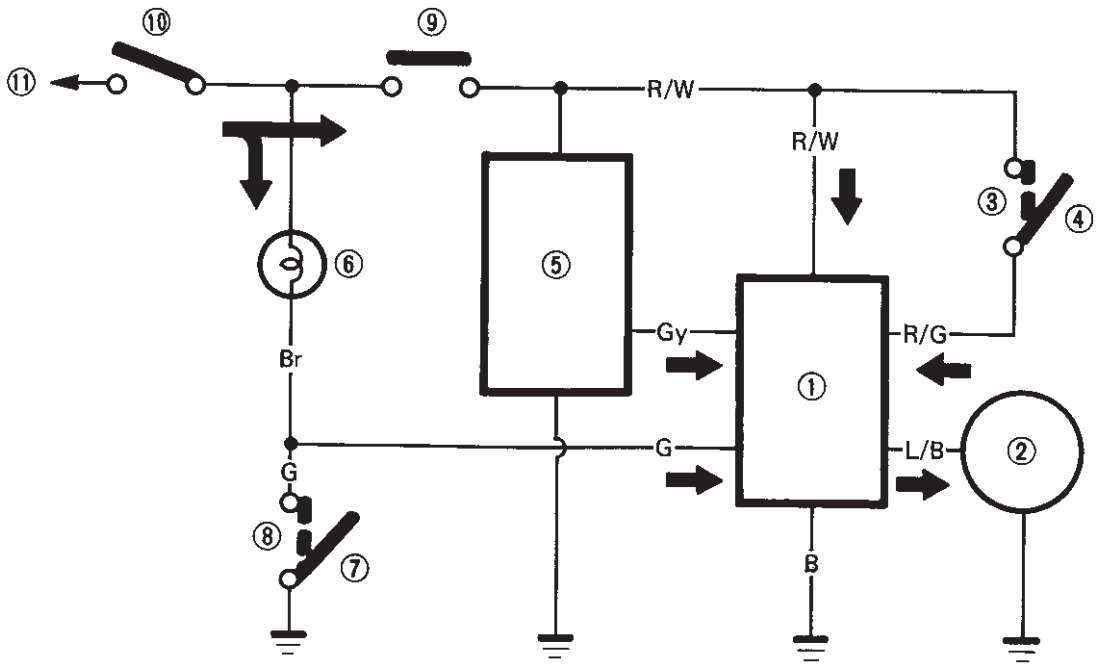
⑭ “FUEL” indicator light
⑮ Fuel sender unit
⑰ Main fuse
⑱ Battery
⑤① Main switch
⑤② Fuse (IGNITION)
⑤③ “ENGINE STOP” switch
⑤⑨ “FUEL” (RESERVE) switch
⑥⓪ Fuel pump relay
⑥① Fuel pump



FUEL PUMP CIRCUIT OPERATION

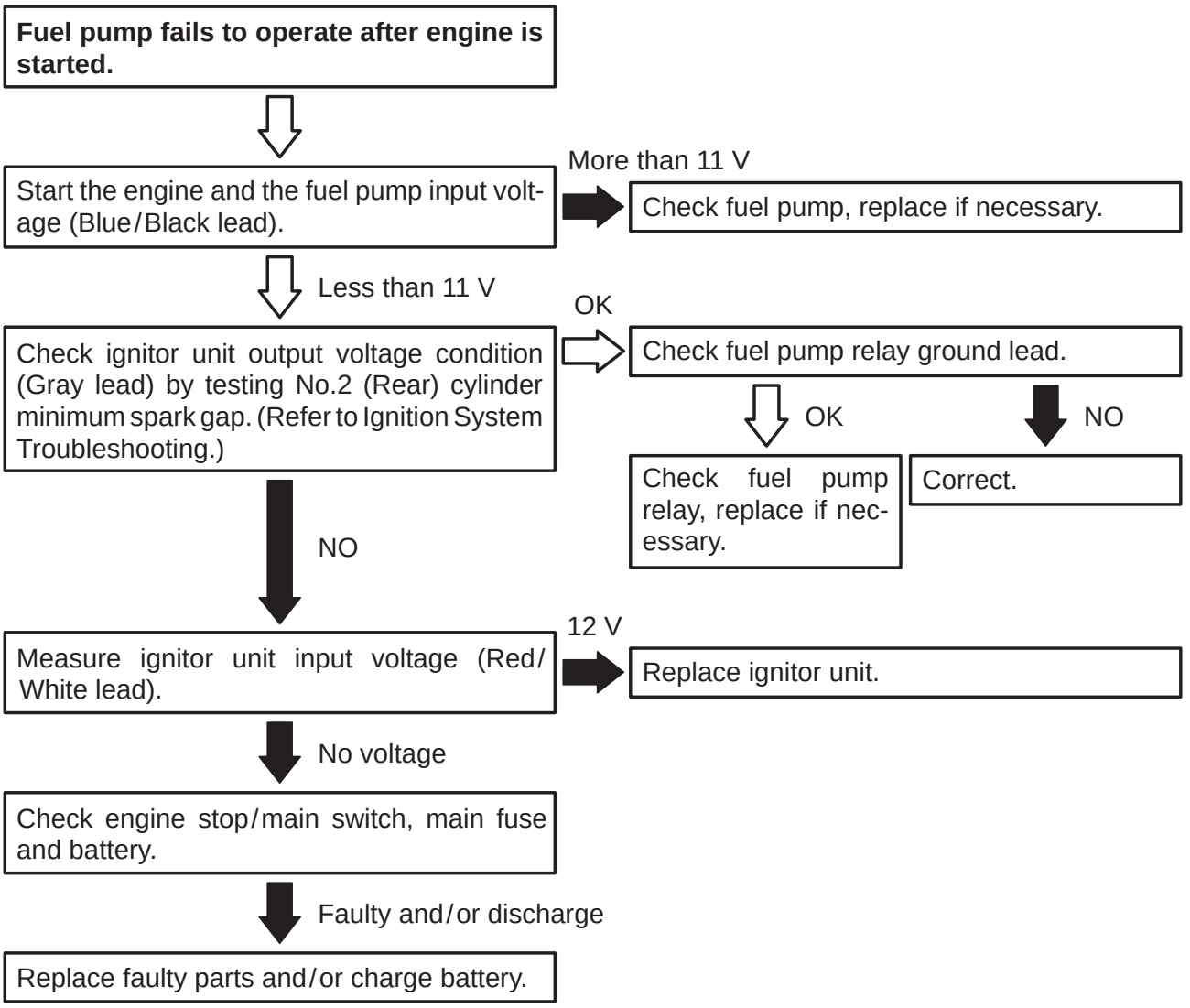
The fuel pump circuit consists of the fuel pump relay, fuel pump, and fuel reserve switch.
The fuel pump starts and stops as indicated in the chart below.

① Fuel pump relay
② Fuel pump
③ Fuel reserve switch in “RES” position
④ Fuel reserve switch in “ON” position
⑤ Ignitor unit
⑥ “FUEL” indicator light
⑦ Fuel sender in “FULL” position
⑧ Fuel sender in “EMPTY” position
⑨ Engine stop switch
⑩ Main switch
⑪ To main fuse and battery

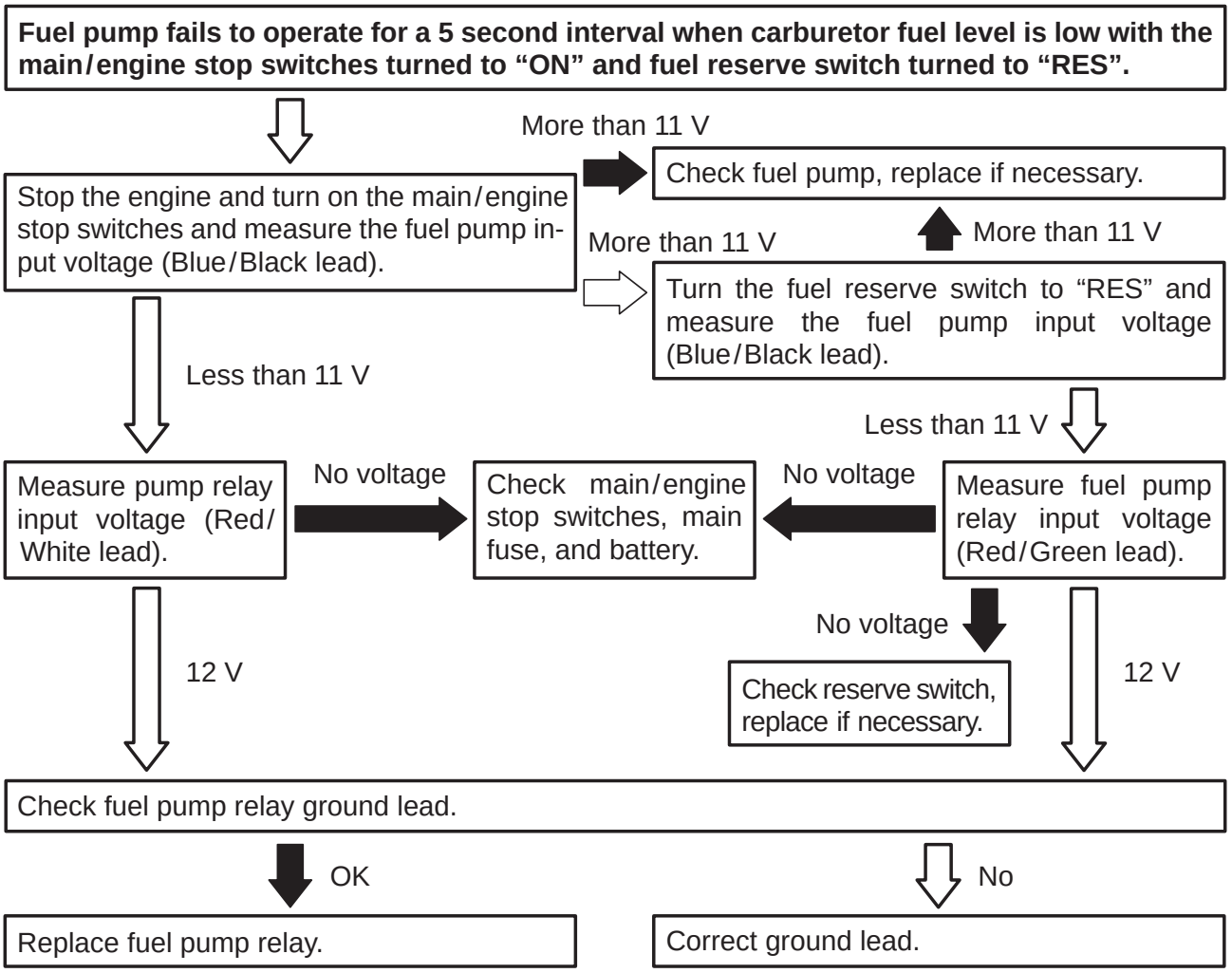


FUEL PUMP			
START		STOP	
• Main/Engine stop switch turned to “ON” • Fuel reserve switch turned to “RES”	• Engine turned on	• Fuel warning indicator light comes on	• Engine turned off
For about 5 seconds when carburetor fuel level is low	After about 0.1 second	After about 30 seconds	After about 5 seconds

TROUBLESHOOTING
Troubleshooting Chart (1)



Troubleshooting chart (2)



Troubleshooting Chart (3)

Fuel pump does not stop after 30 seconds when fuel indicater light comes on while engine is running.

↓

Start the engine and measure the fuel pump input voltage 30 seconds after fuel sender Green lead is grounded (Blue/Black lead).

→ No voltage: Check fuel pump connections correct if necessary.

↓ More than 11 V

Check fuel sender unit resistance.
Fuel sender unit resistance:
0.7 ~ 1.1 kΩ at 20°C (68°F)

→ No: Replace.

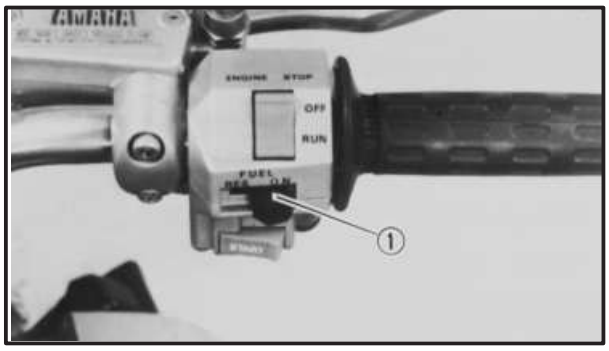
↓ OK

Check fuel pump relay ground lead.

→ No: Correct ground lead.

↓ OK

Replace fuel pump relay.



"FUEL" (RESERVE) SWITCH TEST

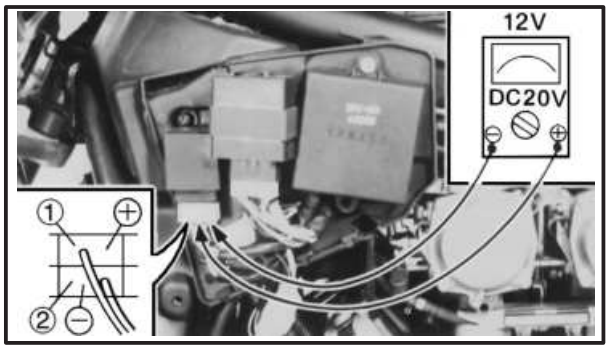
Switch ① may be checked for continuity with a Pocket Tester (90890-03112) on the "Ohm × 1" position.

Switch Position	Lead Color	
	R/W	B/G
OFF		
ON	○———	———○

FUEL PUMP RELAY TEST

1. Remove:
   - Top cover
   - Cover (left)
2. Check:
   - Fuel pump operation
     Refer to "FUEL PUMP TEST" section.
3. Measure:
   - Battery voltage
     Use the Pocket Tester (90890-03112).
     Out of specification → Replace relay.
     Main and engine stop switches are "ON" position.

Fuel Pump Relay Input Voltage: 12 V



① Red/White
② Black



FUEL PUMP TEST

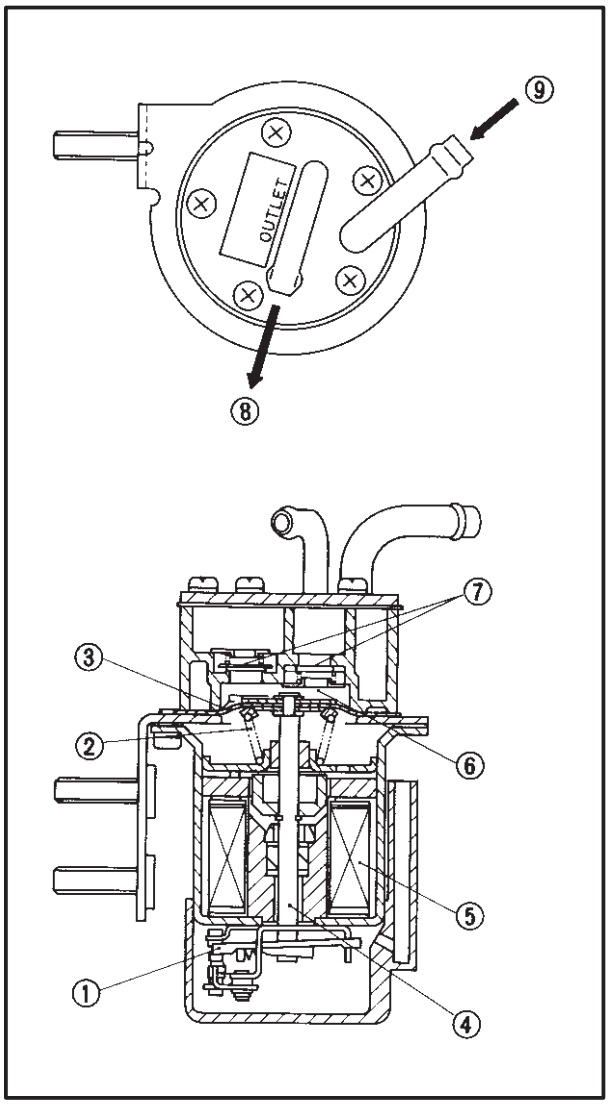
Operation

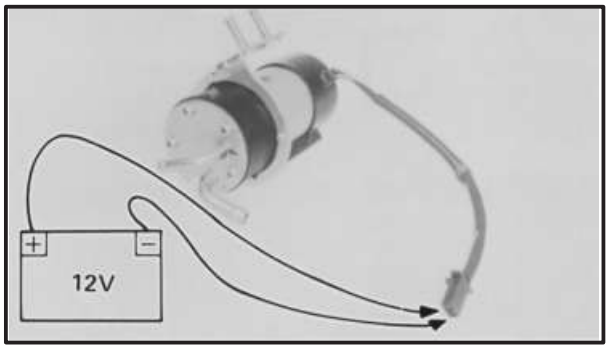
The diaphragm is pulled left by the plunger allowing fuel to be sucked into the fuel chamber. Fuel is pushed out from the pump until carb float chamber is filled with fuel, and then the cut-off switch cuts off the circuit.

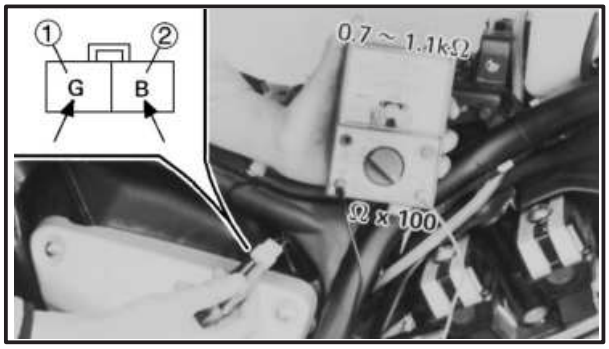
When the spring pushes the diaphragm further to the end, the cut-off switch turns on and the solenoid coil pulls the plunger with the diaphragm forcing fuel into the fuel chamber.

NOTE:

When the main and engine stop switches are ON, the fuel pump relay is activated for five (5) seconds at which time the fuel pump operates.







① Cut-out switch
② Spring
③ Diaphragm
④ Plunger
⑤ Solenoid coil
⑥ Fuel chamber
⑦ Valve
⑧ Outlet
⑨ Inlet

Inspection

1. Connect:
   • Battery (12 V)
2. Check:
   • Fuel pump operation
   Faulty operation → Replace.
3. Inspect:
   • Fuel pump
   Cracks/Damage → Replace.

FUEL SENDER UNIT TEST

1. Remove:
   • Seat
   • Top cover
2. Measure:
   • Fuel sender unit resistance
   Out of specification → Replace.

	Fuel Sender Unit Resistance: 0.7 ~ 1.1 kΩ at 20°C (68°F)

① Green ② Black

CHAPTER 8.
APPENDICES

SPECIFICATIONS 8-1
GENERAL SPECIFICATIONS 8-1
MAINTENANCE SPECIFICATIONS 8-3

GENERAL TORQUE SPECIFICATIONS 8-18

DEFINITION OF UNITS 8-18

LUBRICATION DIAGRAMS 8-19

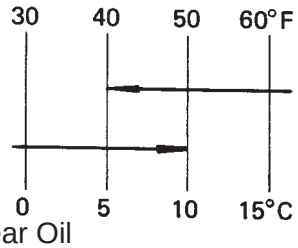
CABLE ROUTING 8-23

WIRING DIAGRAM

APPENDICES

SPECIFICATIONS

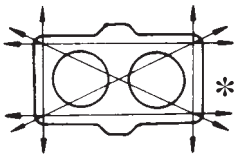
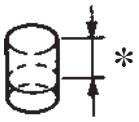
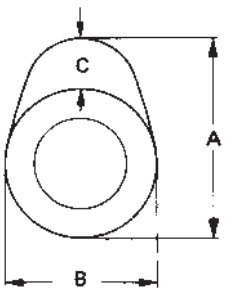
GENERAL SPECIFICATIONS

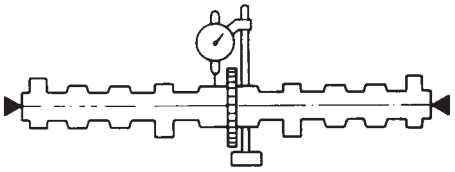
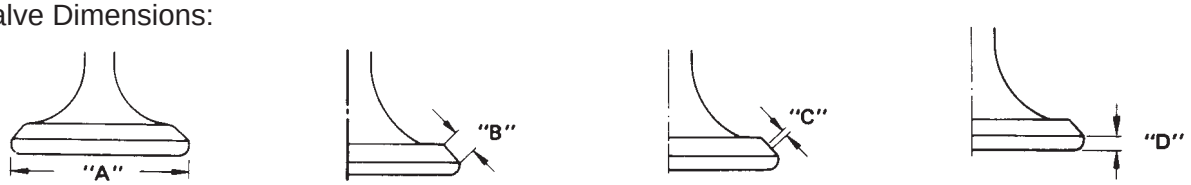
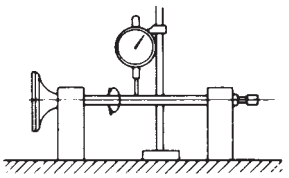
Model	VMX12
Model Code Number Engine Starting Number Frame Starting Number	2EN 2EN-000101 2EN-000101
Dimensions: Overall Length Overall Width Overall Height Seat Height Wheelbase Minimum Ground Clearance	 2,300 mm (90.6 in) 795 mm (31.3 in) 1,160 mm (45.7 in) 765 mm (30.1 in) 1,590 mm (62.6 in) 145 mm (5.7 in)
Basic Weight: Weight Oil and Full Fuel Tank	 281 kg (619 lb)
Minimum Turning Radius:	2,800 mm (110.2 in)
Engine: Engine Type Cylinder Arrangement Displacement Bore × Stroke Compression Ratio Compression Pressure Starting System	 Liquid cooled 4-stroke gasoline, DOHC V-4 cylinder 1,198 cm^3 76 × 66 mm (2.992 × 2.598 in) 10.5 : 1 1,422 kPa (14.5 kg/cm^2, 206 psi) Electric starter
Lubrication System:	Wep sump
Oil Type or Grade: Engine Oil  Final Gear Oil	 SAE 20 W 40 type SE motor oil (If temperature does not go below 5°C (40°F)) SAE 10 W 30 type SE motor oil (If temperature does not go above 15°C (60°F)) SAE 80 API “GL-4” Hypoid gear oil
Oil Capacity: Engine Oil: Periodic Oil Change With Oil Filter Replacement Total Amount Final Gear Case: Total Amount	 3.5 L (3.1 Imp qt, 3.7 US qt) 3.8 L (3.3 Imp qt, 4.0 US qt) 4.7 L (4.1 Imp qt, 5.0 US qt) 0.2 L (0.18 Imp qt, 0.21 US qt)
Radiator Capacity: (Including All routes)	 3.05 L (2.69 Imp qt, 3.22 qt)
Air Filter:	Dry type element
Fuel: Type Tank Capacity: Total Reserve	 Regular gasoline 15.0 L (3.3 Imp gal, 4.0 US gal) 3.0 L (0.66 Imp gal, 0.80 US gal)

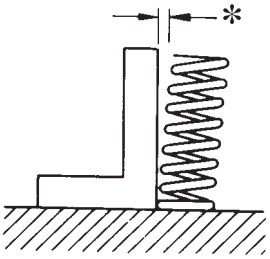
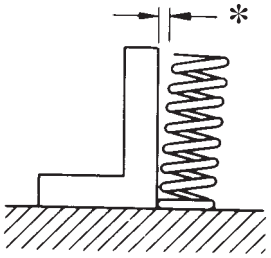
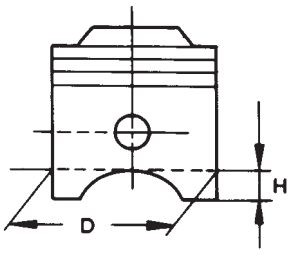
Model	VMX12	
Carburetor: Type/Manufacturer	 BDS35 × 4/MIKUNI	
Spark Plug: Type/Manufacturer Gap	 DPR8EA-9/NGK, X24EPR-U9/NIPPONDENSO 0.8 ~ 0.9 mm (0.031 ~ 0.035 in)	
Clutch Type:	Wet, multiple-disc	
Transmission: Primary Reduction System Primary Reduction Ratio Secondary Reduction System Secondary Reduction Ratio Transmission Type Operation Gear Ratio: 1st 2nd 3rd 4th 5th	 Spar gear 87/49 (1.775) Shaft drive 21/27 × 33/9 (2.851) Constant mesh, 5-speed Left foot operation 43/17 (2.529) 39/22 (1.772) 31/23 (1.347) 28/26 (1.076) 26/28 (0.928)	
Chassis: Frame Type Caster Angle Trail	 Double cradle 29° 119 mm (4.7 in)	
Tire: Type Size (F) Size (R) Wear Limit	 Tubeless 110/90 V 18 DUNLOP F20 150/90 V 15 DUNLOP K525 1.0 mm (0.04 in)	
Tire Pressure (Cold Tire): Basic Weight: With Oil and Full Fuel Tank Maximum Load* Cold Tire Pressure:	 281 kg (619 lb) 218 kg (481 lb)	
	FRONT	REAR
Up to 90 kg (198 lb) Load*	235 kPa (2.4 kg/cm^2, 34 psi)	255 kPa (2.6 kg/cm^2, 36 psi)
90 kg (198 lb)* ~ Maximum Load*	235 kPa (2.4 kg/cm^2, 34 psi)	275 kPa (2.8 kg/cm^2, 40 psi)
High Speed Riding	235 kPa (2.4 kg/cm^2, 34 psi)	255 kPa (2.6 kg/cm^2, 36 psi)
	* Load is the total weight of cargo, rider, passenger, and accessories.	
Brake: Front Operation Rear Operation	 Dual disc brake Right hand operation Single disc brake Right foot operation	
Suspension: Front Suspension Rear Suspension	 Telescopic fork Swing arm	

Model	VMX12
Shock Absorber:	
Front Shock Absorber	Air/Coil spring, Oil damper
Rear Shock Absorber	Coil spring, Oil damper
Wheel Travel:	
Front Wheel Travel	140 mm (5.5 in)
Rear Wheel Travel	100 mm (3.9 in)
Electrical:	
Ignition System	T.C.I.
Generator System	A.C. magneto generator
Battery Type or Model	YB16AL-A2
Battery Capacity	12 V 16 AH
Headlight Type:	Bulb type (Quartz bulb)
Bulb Wattage × Quantity:	
Headlight	12 V, 60 W/55 W × 1
Tail/Brake Light	12 V, 5 W/21 W × 2
Flasher Light	12 V, 21 W × 4
Auxiliary Light	12 V, 4 W × 1
Indicator Light:	
"NEUTRAL"	12 V, 3 W × 1
"HIGH BEAM"	12 V, 3 W × 1
"OIL LEVEL"	12 V, 3 W × 1
"TURN"	12 V, 3 W × 1
"FUEL"	12 V, 3 W × 1
Meter Light	12 V, 3 W × 4

MAINTENANCE SPECIFICATIONS
Engine

Model	VMX12
Cylinder Head:	
Warp Limit* 	0.03 mm (0.0012 in) * Lines indicate straightedge measurement
Cylinder:	
Bore Size/Measuring Point* 	75.967 ~ 76.016 mm (2.991 ~ 2.993 in)/ 40 mm (1.57 in)
Out of Roung Limit	0.05 mm (0.002 in)
Camshaft:	
Drive Method	Chain drive (Center)
Cam Cap Inside Dia.	25.000 ~ 25.021 mm (0.9843 ~ 0.9851 in)
Camshaft Outside Dia.	24.967 ~ 24.980 mm (0.9830 ~ 0.9835 in)
Shaft-to-Cap Clearance	0.020 ~ 0.054 mm (0.0008 ~ 0.0021 in)
Cam Dimensions 	
Intake "A"	35.75 ~ 35.85 mm (1.407 ~ 1.411 in)
<Limit>	35.65 mm (1.404 in)
Intake "B"	27.95 ~ 28.05 mm (1.100 ~ 1.104 in)
<Limit>	26.95 mm (1.061 in)
Exhaust "A"	35.75 ~ 35.85 mm (1.407 ~ 1.411 in)
<Limit>	35.65 mm (1.404 in)
Exhaust "B"	27.95 ~ 28.05 mm (1.100 ~ 1.104 in)
<Limit>	26.95 mm (1.061 in)

Model		VMX12
Camshaft Runout Limit 		0.03 mm (0.0012 in)
Cam Chain:		
Cam Chain Type/No. of Links		DID219FTS/118
Cam Chain Adjustment Method		Automatic
Valve, Valve Seat, Valve Guide:		
Valve Clearance (Cold):	IN.	0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
	EX.	0.26 ~ 0.30 mm (0.010 ~ 0.012 in)
Valve Dimensions: 		
"A" Head Dia.	IN.	30.4 ~ 30.6 mm (1.197 ~ 1.205 in)
	EX.	24.9 ~ 25.1 mm (0.980 ~ 0.988 in)
"B" Face Width	IN.	1.6 ~ 3.1 mm (0.063 ~ 0.122 in)
	EX.	1.3 ~ 2.4 mm (0.051 ~ 0.095 in)
"C" Seat Width	IN.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
	EX.	0.9 ~ 1.1 mm (0.035 ~ 0.043 in)
<Limit>	IN.	1.4 mm (0.055 in)
	EX.	1.4 mm (0.055 in)
"D" Margin Thickness	IN.	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)
	EX.	1.1 ~ 1.5 mm (0.043 ~ 0.059 in)
<Limit>	IN	0.7 mm (0.028 in)
	EX.	0.7 mm (0.028 in)
Stem Outside Dia.	IN.	5.475 ~ 5.490 mm (0.2156 ~ 0.2161 in)
	EX.	5.460 ~ 5.475 mm (0.2150 ~ 0.2156 in)
<Limit>	IN.	5.445 mm (0.214 in)
	EX.	5.420 mm (0.213 in)
Guide Inside Dia.	IN.	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in)
	EX.	5.500 ~ 5.512 mm (0.2165 ~ 0.2170 in)
<Limit>	IN.	5.550 mm (0.219 in)
	EX.	5.550 mm (0.219 in)
Stem-to-Guide Clearance	IN.	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)
	EX.	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
<Limit>	IN.	0.08 mm (0.0031 in)
	EX.	0.10 mm (0.0039 in)
Stem Runout Limit 		0.01 mm (0.0004 in)

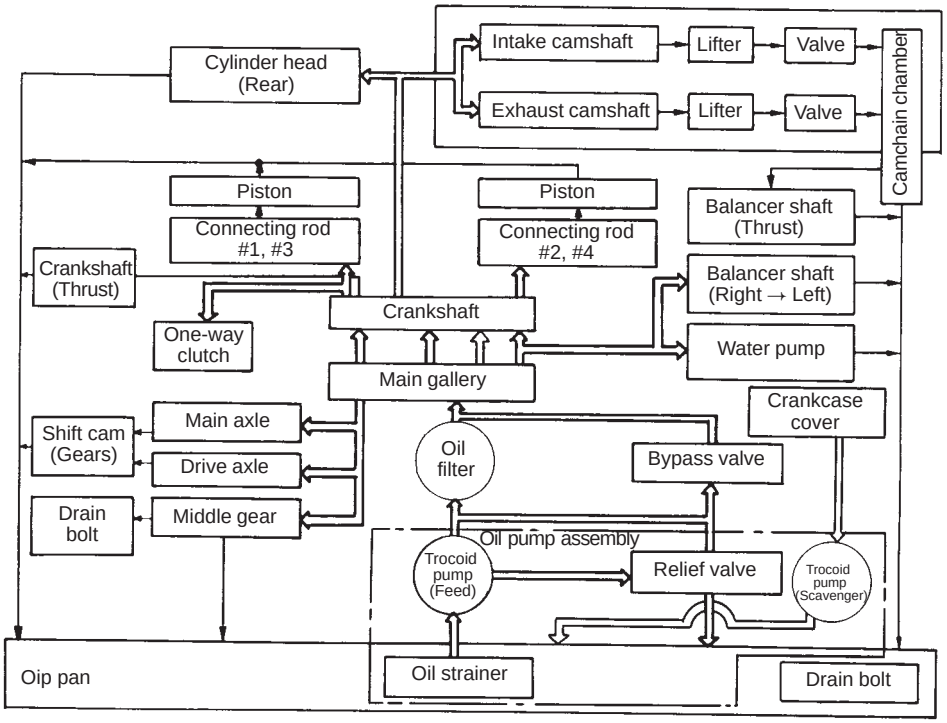
Model		VMX12
Valve Spring:		
Inner Spring:		
Free Length	IN.	39.65 mm (1.561 in)
	EX.	39.65 mm (1.561 in)
<Limit>	IN.	37.45 mm (1.474 in)
	EX.	37.45 mm (1.474 in)
Set Length (Valve Closed)	IN.	31.8 mm (1.25 in)
	EX.	31.8 mm (1.25 in)
Compressed Pressure (Installed)	IN.	6.29 ~ 7.39 kg (13.9 ~ 16.3 lb)
	EX.	6.29 ~ 7.39 kg (13.9 ~ 16.3 lb)
Tilt Limit*	IN.	2.5°/1.7 mm (0.067 in)
	EX.	2.5°/1.7 mm (0.067 in)
		
Direction of Winding	IN.	Counterclockwise
	EX.	Counterclockwise
Outer Spring:		
Free Length	IN.	41.10 mm (1.618 in)
	EX.	41.10 mm (1.618 in)
<Limit>	IN.	38.90 mm (1.531 in)
	EX.	38.90 mm (1.531 in)
Set Length (Valve Closed)	IN.	33.8 mm (1.331 in)
	EX.	33.8 mm (1.331 in)
Compressed Pressure (Installed)	IN.	13.3 ~ 15.7 kg (29.3 ~ 34.6 lb)
	EX.	13.3 ~ 15.7 kg (29.3 ~ 34.6 lb)
Tilt Limit*	IN.	2.5°/1.8 mm (0.071 in)
	EX.	2.5°/1.8 mm (0.071 in)
		
Direction of Winding	IN.	Clockwise
	EX.	Clockwise
Piston:		
Piston Clearance		0.055 ~ 0.075 mm (0.0022 ~ 0.0030 in)
<Limit>		0.15 mm (0.0059 in)
Piston Size “D”		75.905 ~ 75.955 mm (2.9884 ~ 2.9903 in)
Measuring Point “H”		6.2 mm (0.244 in)
		

Model		VMX12
Oversize:	1st 2nd	76.25 mm (3.002 in) 76.50 mm (3.012 in)
Piston Ring:		
Top ring:		
Type		Barrel
Dimensions (B × T)		3.1 × 1.0 mm (0.122 × 0.040 in)
End Gap (Installed)		0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in)
<Limit>		0.75 mm (0.0295 in)
Side Clearance (Installed)		0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)
<Limit>		0.12 mm (0.0047 in)
2nd Ring:		
Type		Taper
Dimensions (B × T)		3.1 × 1.2 mm (0.122 × 0.047 in)
End Gap (Installed)		0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in)
<Limit>		0.75 mm (0.0295 in)
Side Clearance		0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)
<Limit>		0.12 mm (0.0047 in)
Oil Ring:		
Dimensions (B × T)		3.1 × 2.5 mm (0.122 × 0.098 in)
End Gap (Installed)		0.2 ~ 0.8 mm (0.0080 ~ 0.032 in)
Connecting Rod:		
Oil Clearance		0.021 ~ 0.039 mm (0.0008 ~ 0.0015 in)
Bearing Color Code		1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink
Crankshaft:		
Runout Limit	"C"	0.03 mm (0.0012 in)
Big End Side Clearance	"D"	0.320 ~ 0.924 mm (0.0126 ~ 0.0364 in)
Journal Oil Clearance		0.020 ~ 0.038 mm (0.0008 ~ 0.0015 in)
Bearing Color Code		1. Blue 2. Black 3. Brown 4. Green 5. Yellow 6. Pink 7. Red
Clutch:		
Friction Plate:	Thickness	2.9 ~ 3.1 mm (0.114 ~ 0.122 in)
	Quantity	8 pcs.
	Wear Limit	2.8 mm (0.11 in)
Clutch Plate:	Thickness	2.2 ~ 2.4 mm (0.087 ~ 0.095 in)
	Quantity	7 pcs.
	Warp Limit	0.2 mm (0.008 in)
Clutch Spring:	Free Height	7.0 mm (0.28 in)
	Quantity	1 pc.
	Minimum Height	6.5 mm (0.26 in)
	Warp Limit	0.1 mm (0.004 in)
Push Rod Bending Limit		0.5 mm (0.02 in)
Transmission:		
Main Axle Deflection Limit		0.08 mm (0.0031 in)
Drive Axle Deflection Limit		0.08 mm (0.0031 in)

Model		VMX12
Shifter:		
Shifter Type		Guide Bar
Guide Bar Bending Limit		0.025 mm (0.001 in)
Carburetor:		
I.D. Mark		2EN00
Main Jet	(M.J.)	#1 & 3 : #152.5 #2 & 4 : #150
Main Air Jet	(M.A.J.)	ø2.0
Jet Needle	(J.N.)	5EZ47-3
Needle Jet	(N.J.)	Y-0
Pilot Jet	(P.J.)	#37.5
Pilot Air Jet	(P.A.J. 1)	#90
	(P.A.J. 2)	#160
Pilot Screw	(P.S.)	2
Pilot Outlet	(P.O.)	0.9
Bypass	(B.P. 1)	0.8
	(B.P. 2)	0.8
	(B.P. 3)	0.9
Valve Seat Size	(V.S.)	1.5
Starter Jet	(G.S. 1)	#45
	(G.S. 2)	#0.8
Fuel Level		15.5 ~ 16.5 mm (0.61 ~ 0.65 in)
Engine Idling Speed		950 ~ 1,050 r/min
Vacuum Pressure at Idling Speed		Above 170 mm Hg (6.69 in Hg)
Vacuum Synchronous Difference		Below 20 mm Hg (0.79 in Hg)
Fuel Pump:		
Type		Electrical type
Consumption Amperage (Max.)		1.0 A
Out-put Pressure		16.2 ~ 20.1 kPa (0.165 ~ 0.205 kg/cm^2, 2.35 ~ 2.92 psi)
Lubrication System:		
Oil Filter Type		Paper type
Oil Pump Type:		Trochoid type
Tip Clearance		0 ~ 0.12 mm (0 ~ 0.0047 in)
<Limit>		0.17 mm (0.0067 in)
Side Clearance		0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
<Limit>		0.08 mm (0.0031 in)
Bypass Valve Setting Pressure		167 ~ 235 kPa (1.7 ~ 2.4 kg/cm^2, 24 ~ 34 psi)
Relief Valve Operating Pressure		432 ~ 549 kPa (4.4 ~ 5.6 kg/cm^2, 63 ~ 80 psi)

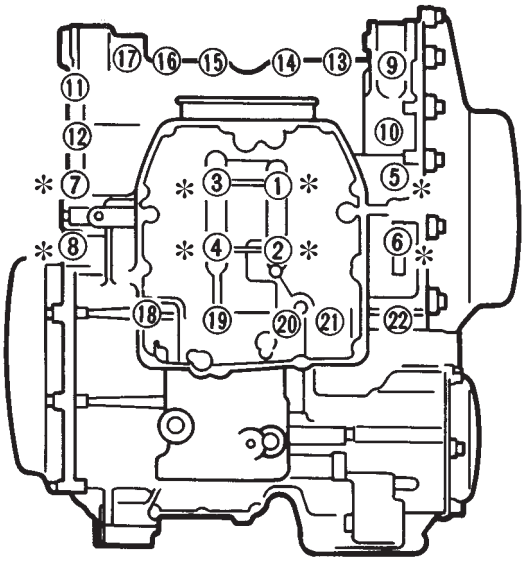
Model	VMX12

Lubrication Chart:

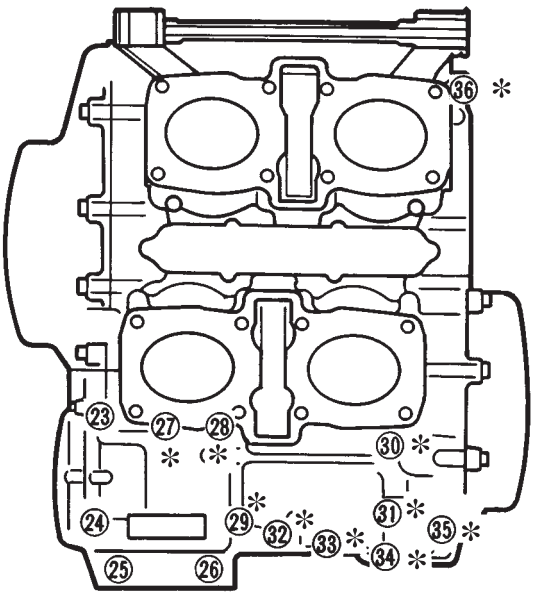


Crankcase Tightening Sequence:

Lower Case



Upper Case



✻ : With washer

Model		VMX12
Cooling System:		
Radiator Core Size:	Width	363.8 mm (14.3 in)
	Height	240 mm (9.45 in)
	Thickness	16 mm (0.63 in)
Radiator Cap Opening Pressure		73.6 ~ 103.0 kPa (0.75 ~ 1.05 kg/cm^2, 10.7 ~ 14.9 psi)
Reservoir Tank Capacity		0.3 L (0.26 Imp qt, 0.32 US qt)
<Front Low to Full Level>		0.2 L (0.18 Imp qt, 0.21 US qt)
Water Pump:		
Type		Single-suction centrifugal pump
Reduction Ratio		31/21 (1.476)
Shaft Drive:		
Middle Gear Backlash		0.05 ~ 0.12 mm (0.002 ~ 0.005 in)
<Limit>		0.3 mm (0.012 in)
Final Gear Backlash		0.1 ~ 0.2 mm (0.004 ~ 0.008 in)
<Limit>		0.3 mm (0.012 in)
Ring Gear Stopper Clearance		0.30 ~ 0.60 mm (0.012 ~ 0.024 in)

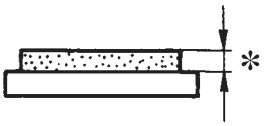
TIGHTENING TORQUE

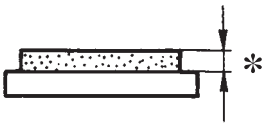
Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m•kg	ft•lb	
Camshaft Cap	Bolt	M6 × 1.0	32	10	1.0	7.2	
Spark Plug	–	M12 × 1.25	4	17.5	1.75	12.5	
Cylinder Head	Nut	M10 × 1.25	16	43	4.3	31	
Cylinder Head Cover	Bolt	M6 × 1.0	16	10	1.0	7.2	
Connecting Rod	Bolt	M8 × 0.75	8	36	3.6	25	
AC Magneto Rotor	Bolt	M12 × 1.25	1	130	13.0	94	
Cam Sprocket	Flange bolt	M7 × 1.0	8	24	2.4	17	
Plate (Damper chain)	Flange bolt	M8 × 1.25	1	24	2.4	17	
Tensioner	Bolt	M6 × 1.0	4	12	1.2	8.7	
Tensioner Stopper Bolt	Bolt	M16 × 1.0	2	20	2.0	14	
Water Pump Cover	Bolt	M6 × 1.0	6	10	1.0	7.2	
Water Pump Housing	Bolt	M6 × 1.0	3	10	1.0	7.2	
Coolant Drain Plug	Bolt	M14 × 1.5	1	43	4.3	31	
Thermostatic Valve Housing	Bolt	M6 × 1.0	2	10	1.0	7.2	
Thermostatic Valve Cover	Screw	M6 × 1.0	2	7	0.7	5.1	
Electric Fan Motor	Screw with washer	M5 × 0.8	3	4	0.4	2.9	
Electric Fan	Nut	M5 × 0.8	1	4	0.4	2.9	
Radiator Assembly	Bolt with washer	M6 × 1.0	4	7	0.7	5.1	
Breather Cover	Bolt	M6 × 1.0	10	10	1.0	7.2	
Radiator Cover	Screw	M5 × 0.8	4	4	0.4	2.9	
Cover (Left and right)	Screw	M5 × 0.8	4	4	0.4	2.9	
Conduit	Screw	M6 × 1.0	6	7	0.7	5.1	
Oil Pump Cover	Screw	M6 × 1.0	6	7	0.7	5.1	
Oil Strainer Housing	Screw	M6 × 1.0	3	7	0.7	5.1	
Oil Pump	Bolt	M6 × 1.0	3	10	1.0	7.2	
Oil Filter Cover	Union bolt	M20 × 1.5	1	32	3.2	23	
Engine Oil Drain Bolt	Bolt	M14 × 1.5	1	43	4.3	31	
Oil Pan	Bolt	M6 × 1.0	12	10	1.0	7.2	
Oil Baffle Plate	Flange bolt	M6 × 1.0	2	12	1.2	8.7	
Oil Delivery Pipe (Lower)	Union bolt	M8 × 1.25	2	18	1.8	13	
Oil Delivery Pipe (Upper)	Union bolt	M10 × 1.25	1	20	2.0	14	
Oil Delivery Pipe (4)	Flange bolt	M6 × 1.0	2	12	1.2	8.7	
Oil Pipe	Union bolt	M8 × 1.25	1	18	1.8	13	
Stay 1	Flange bolt	M6 × 1.0	1	12	1.2	8.7	
Carburator Joint	Bolt	M6 × 1.0	8	10	1.0	7.2	
Fuel Pump	Flange bolt	M6 × 1.0	2	12	1.2	8.7	
Exhaust Pipe (#1, #3) & Joint	Bolt	M6 × 1.0	2	7	0.7	5.1	
Exhaust Pipe Connection	Bolt	M8 × 1.25	1	20	2.0	14	
Exhaust Pipe Flange	Nut	M8 × 1.25	8	20	2.0	14	
	Bolt	M5 × 0.8	6	7	0.7	5.1	
Exhaust Cover	Screw	M5 × 0.8	4	4	0.4	2.9	
Muffler Stay	Bolt	M6 × 1.0	2	10	1.0	7.2	
Muffler	Bolt	M10 × 1.25	3	25	2.5	18	
Exhaust and Chamber	Bolt	M8 × 1.25	4	20	2.0	14	

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m•kg	ft•lb	
Crankcase	Bolt	M6 × 1.0	10	12	1.2	8.7	
Crankcase	Bolt	M8 × 1.25	19	24	2.4	17	
Crankcase	Bolt	M10 × 1.25	8	40	4.0	29	
Drive Axle Bearing Retainer	Torx screw	M8 × 1.25	4	25	2.5	18	Stake
Main Axle Bearing Retainer	Screw	M6 × 1.0	3	7	0.7	5.1	LT
Crankcase Cover (Left)	Bolt	M6 × 1.0	11	10	1.0	7.2	
Lead Clamp	Screw	M6 × 1.0	2	7	0.7	5.1	
Crankcase Cover (Right)	Bolt	M6 × 1.0	6	10	1.0	7.2	
Middle Gear Case Cover	Bolt	M6 × 1.0	9	10	1.0	7.2	
Middle Gear Oil Drain Bolt	Bolt	M8 × 1.25	1	38	3.8	27	
Starter One-way Clutch	Bolt	M8 × 1.25	3	24	2.4	17	LT
Clutch Boss	Nut	M20 × 1.0	1	70	7.0	50	Use lock washer
Clutch Release Cylinder	Special	M6 × 1.0	2	12	1.2	8.7	
Clutch Pressure Plate	Bolt	M6 ×1.0	6	8	0.8	5.8	
Middle Drive Gear	Nut	M44 × 1.5	1	110	11	80	Stake LT
Middle Drive Shaft	Self-lock nut	M14 × 1.5	1	90	9.0	65	LT
Middle Drive Shaft Bearing Housing	Bolt	M8 × 1.25	3	30	3.0	22	
Shift Cam Segment	Screw	M6 × 1.0	1	12	1.2	8.7	LT
Shift Cam Plate (Neutral)	Screw	M5 × 0.8	1	4	0.4	2.9	LT
Shift Calm Bearing Stopper	Screw	M6 × 1.0	3	7	0.7	5.1	LT
Change Lever Adjuster	Screw	M8 × 1.25	1	22	2.2	16	Use lock washer
Shift Cam Stopper Lever	Screw with washer	M6 × 1.0	1	8	0.8	5.8	
Change Pedal Adjuster Lock	Nut	M6 × 1.0	4	10	1.0	7.2	
Change Pedal/Linkage Pinch Bolt	Bolt	M6 × 1.0	3	10	1.0	7.2	
Thermostatic Switch	–	–	1	15	1.5	11	Apply Sealant
Thermo-unit	–	–	1	15	1.5	11	Apply Sealant
Neutral Switch	Screw	M5 × 0.8	3	4	0.4	2.9	
Starter Motor	Flange bolt	M6 × 1.0	2	10	1.0	7.2	
Oil Level Switch	Bolt with washer	M6 × 1.0	2	10	1.0	7.2	
ACM Stator	Screw	M6 × 1.0	3	7	0.7	5.1	
Pick-up Coil	Screw	M6 × 1.0	4	7	0.7	5.1	
Bearing Housing	Nut	M8 × 1.25	6	23	2.3	17	
	Flange-bolt	M10 × 1.25	2	40	4.0	29	
Bearing Retainer	Retainer	M65 × 1.5	1	110	11.0	80	
Coupling Gear	Nut	M14 × 1.5	1	110	11.0	80	LT
Final Gear Filler Bolt	Bolt	M14 × 1.5	1	23	2.3	17	
Final Gear Drain Bolt	Bolt	M14 × 1.5	1	23	2.3	17	

Chassis

Model		VMX12
Steering System:		
Steering Bearing Type		Taper roller bearing
Front Suspension:		
Front Fork Travel		140 mm (5.51 in)
Fork Spring Free Length		492.5 mm (19.4 in)
<Limit>		487.5 mm (19.2 in)
Collar Length		136 mm (5.35 in)
Spring Rate:	K1	3.92 N/mm (0.4 kg/mm, 22.4 lb/in)
	K2	4.90 N/mm (0.5 kg/mm, 28.0 lb/in)
Stroke:	K1	0 ~ 78 mm (0 ~ 3.07 in)
	K2	78 ~ 140 mm (3.07 ~ 5.51 in)
Optional Spring		No.
Oil Capacity		451 cm^3 (15.9 Imp oz, 15.3 US oz)
Oil Level		139 mm (5.5 in)
Oil Grade		Fork oil 10 wt or equivalent
Enclosed Air Pressure (Standard)		39.2 kPa (0.4 kg/cm^2, 5.7 psi)
<Min. ~ Max.>		39.2 ~ 98.1 kPa (0.4 ~ 1.0 kg/cm^2, 5.7 ~ 14.2 psi)
Rear Suspension:		
Shock Absorber Travel		85 mm (3.35 in)
Spring Free Length		245.5 mm (9.67 in)
<Limit>		240.5 mm (9.47 in)
Fitting Length		217.5 mm (8.56 in)
Spring Rate:	K1	19.1 N/mm (1.95 kg/mm, 109 lb/in)
	K2	26.5 N/mm (2.7 kg/mm, 151 lb/in)
Stroke:	K1	0 ~ 50 mm (0 ~ 1.97 in)
	K2	50 ~ 85 mm (1.97 ~ 3.35 in)
Optional Spring		No.
Rear Arm:		
Swingarm Free Play Limit:	End	Zero mm (Zero in)
	Side	Zero mm (Zero in)
Front Wheel:		
Type		Cast wheel
Rim Size		MT2.15 × 18
Rim Material		Aluminum
Rim Runout Limit:	Vertical	2 mm (0.08 in)
	Lateral	2 mm (0.08 in)
Rear Wheel:		
Type		Cast wheel
Rim Size		MT3.50 × 15
Rim Material		Aluminum
Rim Runout Limit:	Vertical	2 mm (0.08 in)
	Lateral	2 mm (0.08 in)
Front Disc Brake:		
Type		Dual
Disc Outside Diameter × Thickness		282 × 7.5 mm (11.1 × 0.30 in)
Pad Thickness	Inner	5.5 mm (0.22 in)
<Limit>*		0.5 mm (0.02 in)
Pad Thickness	Outer	5.5 mm (0.22 in)
<Limit>*		0.5 mm (0.02 in)



Model	VMX12
Master Cylinder Inside Diameter	15.87 mm (0.63 in)
Caliper Cylinder Inside Diameter	45.4 mm (1.79 in)
Brake Fluid Type	DOT #3
Rear Disc Brake:	
Type	Single
Disc Outside Diameter × Thickness	282 × 7.5 mm (11.1 × 0.30 in)
Pad Thickness Inner	5.5 mm (0.22 in)
<Limit>*	0.5 mm (0.02 in)
Pad Thickness Outer	5.5 mm (0.22 in)
<Limit>*	0.5 mm (0.02 in)
	
Master Cylinder Inside Diameter	12.7 mm (0.50 in)
Caliper Cylinder Inside Diameter	42.85 mm (1.69 in)
Brake Fluid Type	DOT #3
Clutch:	
Master Cylinder Inside Diameter	15.87 mm (0.63 in)
Release Cylinder Inside Diameter	38.1 mm (1.50 in)
Brake Fluid Type	DOT #3
Brake Lever and Brake Pedal:	
Brake Lever Free Play	2 ~ 5 mm (0.08 ~ 0.20 in)
Brake Pedal Position	20 mm (0.8 in)
Brake Pedal Free Play	Adjustment not permitted

Recommended combinations of the front fork and the rear shock absorber
Use this table as guidance to meet specific riding conditions and motorcycle load.

Front Fork	Rear Shock Absorber		Loading Condition			
Air pressure	Spring seat	Damping adjuster	Solo rider	With passenger	With accessory equipments	With accessory equipments and passenger
39.2 ~ 58.8 kPa (0.4 ~ 0.6 kg/cm^2, 5.7 ~ 8.5 psi)	1 or 2	1 or 2	○			
39.2 ~ 98.1 kPa (0.4 ~ 1.0 kg/cm^2, 5.7 ~ 14.2 psi)	3 ~ 5	2 ~ 4		○	○	
39.2 ~ 98.1 kPa (0.4 ~ 1.0 kg/cm^2, 5.7 ~ 14.2 psi)	5	4				○

TIGHTENING TORQUE

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m•kg	ft•lb	
Front Wheel Axle	M14 × 1.5	60	6.0	43	
Front Axle Pinch Bolt	M8 × 1.25	20	2.0	14	
Under Bracket & Inner Tube	M8 × 1.25	23	2.3	17	
Steering Crown & Inner Tube	M8 × 1.25	20	2.0	14	
Steering Crown & Steering Shaft	M22 × 1.0	110	11.0	80	
Steering Shaft Ring Nut (Lower)	M25 × 1.0	50	5.0	36	
Steering Shaft Ring Nut (Lower)	M25 × 1.0	3	0.3	2.2	Refer to NOTE.
Steering Shaft Ring Nut (Upper)	M25 × 1.0	–	–	–	
Caliper & Front Fork	M10 × 1.25	45	4.5	32	Front
Caliper & Bracket	M10 × 1.25	45	4.5	32	Rear
Caliper & Bleed Screw	M8 × 1.25	5	0.5	3.6	
Brake Hose Union Bolt	M10 × 1.25	25	2.5	18	
Clutch Hose Union Bolt	M10 × 1.25	25	2.5	18	
Brake Hose & Brake Pipe	M10 × 1.0	19	1.9	13	
Clutch Hose & Clutch Pipe	M10 × 1.0	19	1.9	13	
Front Master Cylinder Cap	M4 × 0.7	1	0.1	0.7	Brake & Clutch
Front Brake Master Cylinder Bracket	M6 × 1.25	9	0.9	6.5	
Clutch Master Cylinder Bracket	M6 × 1.25	9	0.9	6.5	
Rear Master Cylinder Union Bolt	M10 × 1.25	25	2.5	18	
Rear Master Cylinder & Frame	M8 × 1.25	23	2.3	17	
Pivot Shaft (Left) & Frame	M22 × 1.5	100	10.0	72	
Pivot Shaft (Right) & Frame	M25 × 1.5	6	0.6	4.3	
Pivot Shaft (Right) & Locknut	M25 × 1.5	100	10.0	72	
Front Fender & Fork Brace	M6 × 1.0	9	0.9	6.5	
Handlebar Upper Holder	M8 × 1.25	20	2.0	14	
Handlebar Lower Holder	M10 × 1.25	40	4.0	29	
Engine Bracket (Front upper)	M10 × 1.25	40	4.0	29	
Engine Bracket (Front lower)	M10 × 1.25	40	4.0	29	
Engine Bracket (Rear)	M12 × 1.25	70	7.0	50	
Engine Stay & Frame	M8 × 1.25	15	1.5	11	
Down Tube & Frame	M10 × 1.25	45	4.5	32	
Frame and Front Cross Frame	M8 × 1.25	20	2.0	14	
Muffler Bracket (Left) & Frame	M8 × 1.25	25	2.5	18	
Muffler Bracket (Left) & Back Stay	M8 × 1.25	25	2.5	18	
Back Stay & Frame	M8 × 1.25	30	3.0	22	
Rear Shock Absorber & Frame	M8 × 1.25	20	2.0	14	
Rear Shock Absorber & Swingarm	M10 × 1.25	30	3.0	22	
Rear Shock Absorber & Housing Gear	M10 × 1.25	30	3.0	22	
Swingarm & Housing Gear	M10 × 1.25	42	4.2	30	
Rear Wheel Axle & Nut	M18 × 1.5	120	12.0	85	
Footrest Bracket (Left) & Frame	M10 × 1.25	37	3.7	27	
Footrest Bracket (Right) & Frame	M8 × 1.25	23	2.3	17	

NOTE:

• Ring nut (lower):

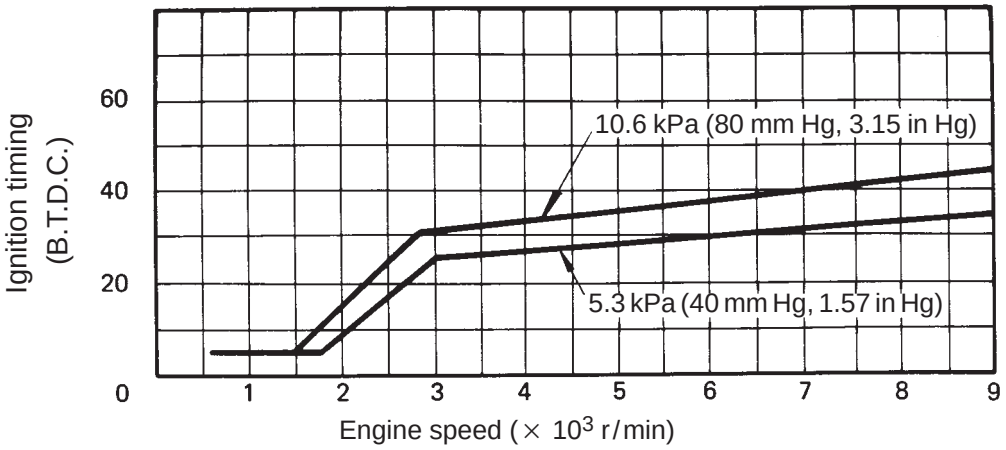
1) First, tighten the ring nut approximately 50 Nm (5.0m•kg, 36 ft•lb) by using the torque wrench, then loosen the ring nut completely.
2) Retighten the ring nut 3 Nm (0.3 m•kg, 2.2 ft•lb).

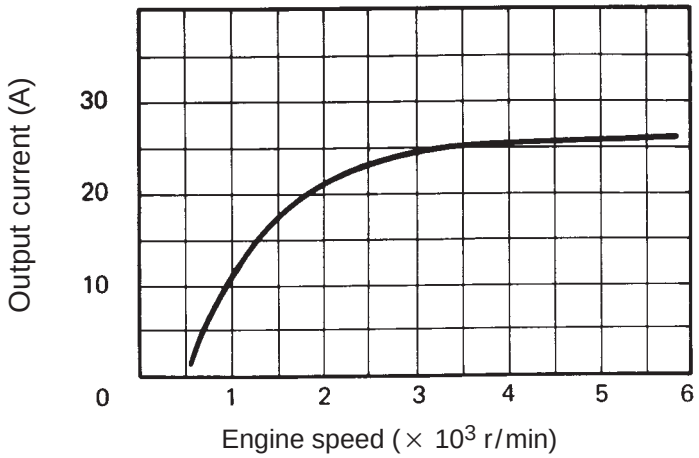
• Ring nut (upper):

1) Finger tighten the ring nut.

Electrical

Model	VMX12
Voltage:	12 V
Ignition System:	
Ignition Timing (B.T.D.C.)	3° at 1,000 r/min
Advanced Timing (B.T.D.C.)	43° at 9,000 r/min
Advancer Type	Vacuum and electrical
T.C.I.:	
Pickup Coil Resistance (Color)	93.5 ~ 126.5 Ω at 20°C (68°F) (Black – Orange) (Black – Gray) (Black – White/Green) (Black – White/Red)
T.C.I. Unit-Model/Manufacturer	TID14-43/HITACHI
Ignition Coil:	
Model/Manufacturer	CM11-61/HITACHI
Primary Winding Resistance	2.4 ~ 3.0 Ω at 20°C (68°F)
Secondary Winding Resistance	10.6 ~ 15.8 kΩ at 20°C (68°F)
Charging System/Type:	A.C. magneto generator
A.C. Generator:	
Model/Manufacturer	FL130-04/HITACHI
Nominal Output	14 V, 25 A at 5,000 r/min
Stator Coil Resistance	0.36 ~ 0.48 Ω at 20°C (68°F)





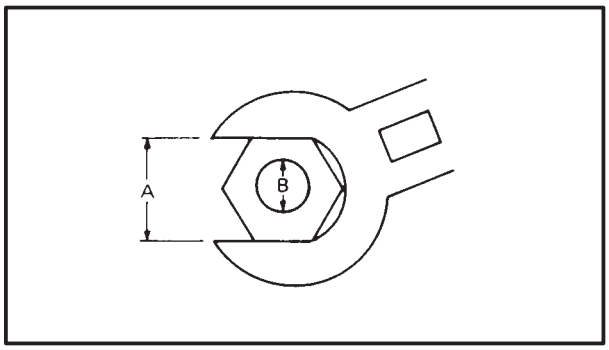
Model	VMX12
Voltage Regulator:	
Type	Short control
Model/Manufacture	SH569/SHINDENGEN
No Load Regulated Voltage	14 ~ 15 V
Rectifier:	
Model/Manufacturer	SH569/SHINDENGEN
Capacity	25 A
Withstand Voltage	200 V
Battery:	
Capacity	12 V, 16 AH
Specific Gravity	1.280
Electric Starter System:	
Type	Constant mesh type
Starter Motor:	
Model/Manufacturer	SM-229C/MITSUBA
Out put	0.6 kW
Bush:	
Overall Length	12.5 mm (0.49 in)
<Limit>	5.5 mm (0.22 in)
Spring Pressure	560 ~ 680 g (19.7 ~ 23.9 oz)
Commutator:	
Outside Diameter	28 mm (1.1 in)
<Wear Limit>	27 mm (1.06 in)
Mica Undercut	0.7 mm (0.028 in)
Starter Relay:	
Model/Manufacturer	A104-128/HITACHI
Amperage Rating	100 A
Coil Winding Resistance	3.9 ~ 4.7 Ω at 20°C (68°F)
Horn:	
Type/Quantity	Plain type × 1
Model/Manufacturer	YF-12/NIKKO
Maximum Amperage	2.5 A
Flasher Relay:	
Type	Semi transister type
Model/Manufacturer	FX257N/NIPPONDENSO
Self Cancelling Device	Yes.
Flasher Frequency	75 ~ 95 cycle/min
Wattage	21 W × 2 + 3.4 W
Self Cancelling Unit:	
Model/Manufacturer	FX257N/NIPPONDENSO
Oil Level Switch:	
Model/Manufacturer	1FK/NIPPONDENSO
Fuel Gauge:	
Model/Manufacturer	1FK/NIPPONSEIKI
Sender Unit Resistance (Full)	0.7 ~ 1.1 kΩ at 20°C (68°F)

Model	VMX12
Starting Circuit Cut-off Relay:	
Model/Manufacturer	G4MW-1121T-100-Y10/TATEISHI
Coil Winding Resistance	203 ~ 248 Ω at 20°C (68°F)
Diode	Yes.
Fuel Pump Relay:	
Model/Manufacturer	G8D-04Y/OMRON
Coil Winding Resistance	90 ~ 110 Ω at 20°C (68°F)
Electric Fan:	
Model/Manufacturer	26H/NIPPONDENSO
Thermostatic Switch:	
Model/Manufacturer	47X/NIPPON THERMOSTAT
Thermo-unit:	
Model/Manufacturer	11H/NIPPONSEIKI
Circuit Breaker:	
Type	Fuse
Amperage for Individual Circuit × Quantity:	
Main	30 A × 1
Headlight	15 A × 1
Signal	10 A × 1
Ignition	10 A × 1
Reserve	30 A × 1
	15 A × 1
	10 A × 1

GENERAL TORQUE SPECIFICATIONS

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

A (Nut)	B (Bolt)	General torque specifications		
		Nm	m•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

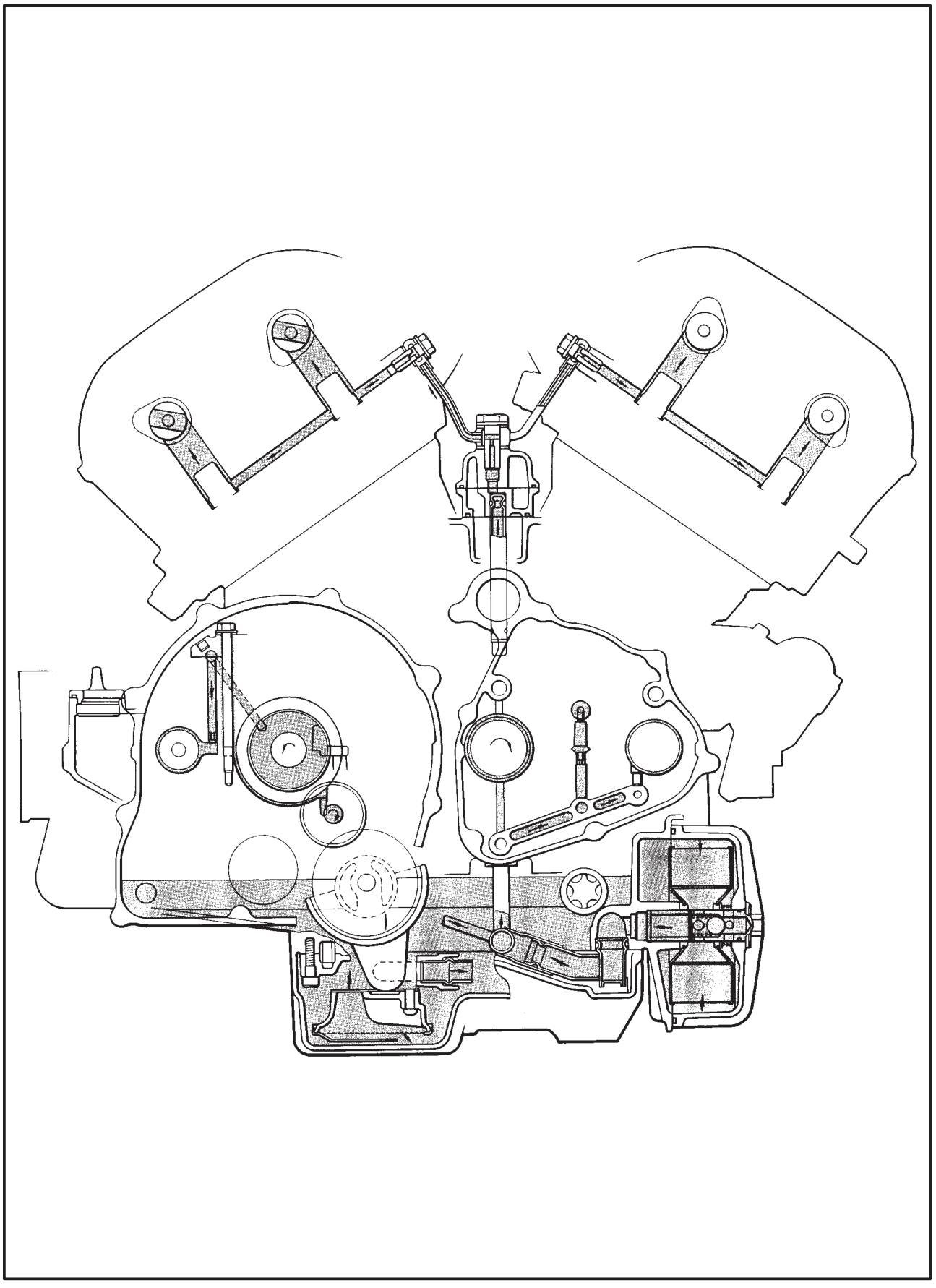


DEFINITION OF UNITS

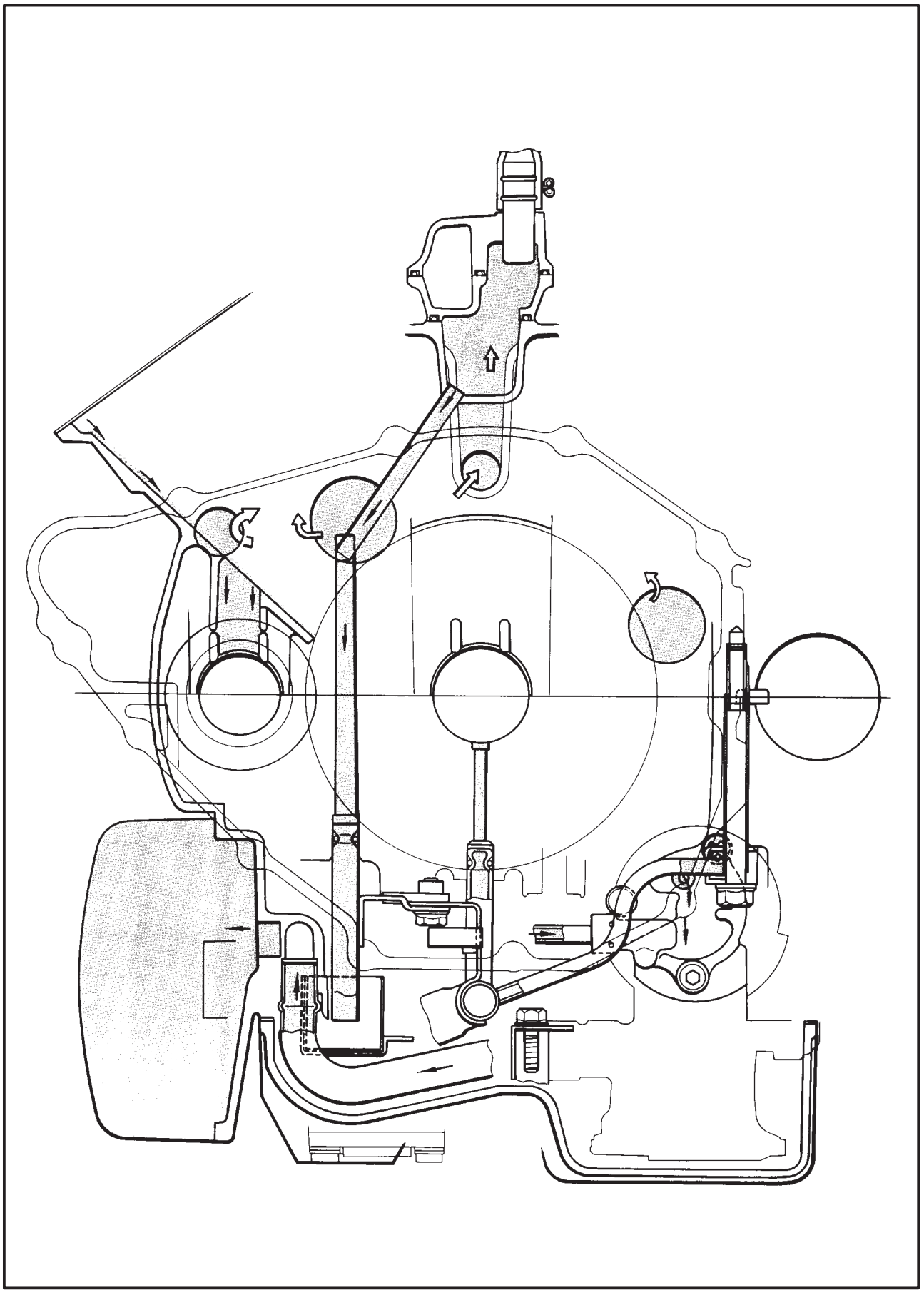
Unit	Read	Definition	Measure
mm cm	millimeter centimeter	10^{-3} meter 10^{-2} meter	Length Length
kg	kilogram	10^{3} gram	Weight
N	Newton	1 kg × m/sec^2	Force
Nm m•kg	Newton meter Meter kilogram	N × m m × kg	Torque Torque
Pa N/mm	Paskal Newton per millimeter	N/m^2 N/mm	Pressure Spring rate
L cm^3	Liter Cubic centimeter	–	volume or Capacity
r/min	Rotation per minute	–	Engine speed

LUBRICATION DIAGRAMS

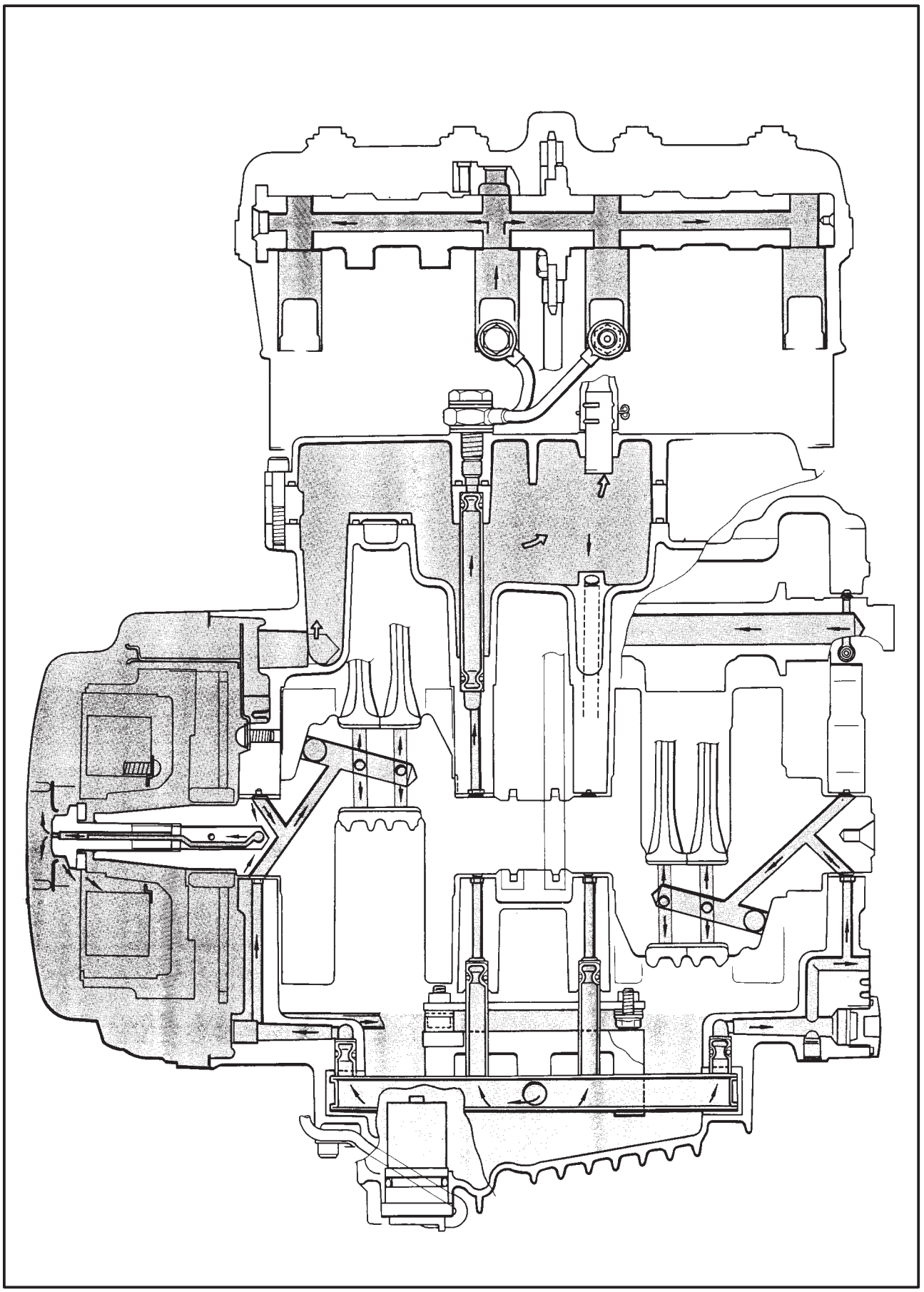
LUBRICATION DIAGRAM (1)



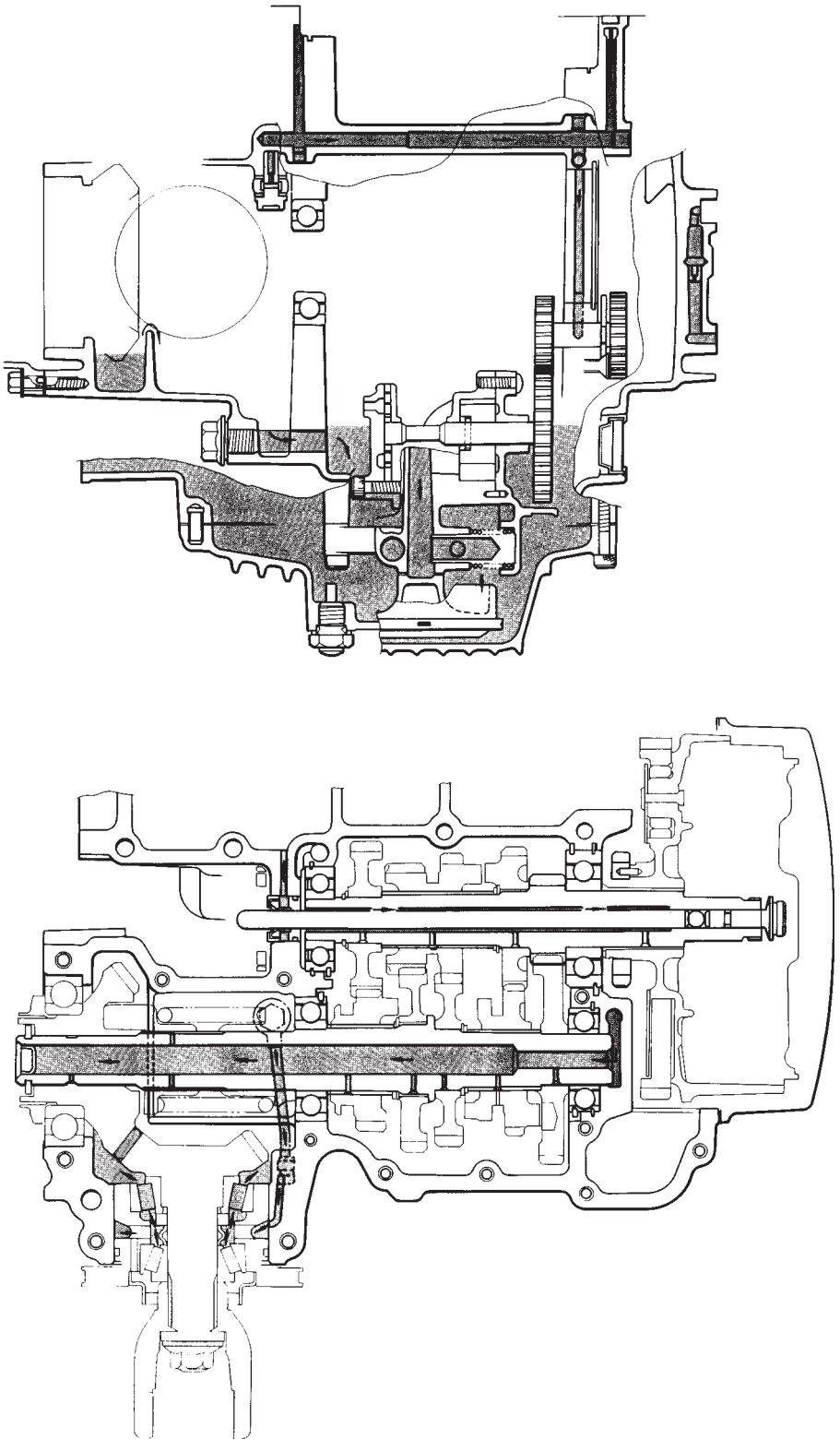
LUBRICATION DIAGRAM (2)



LUBRICATION DIAGRAM (3)

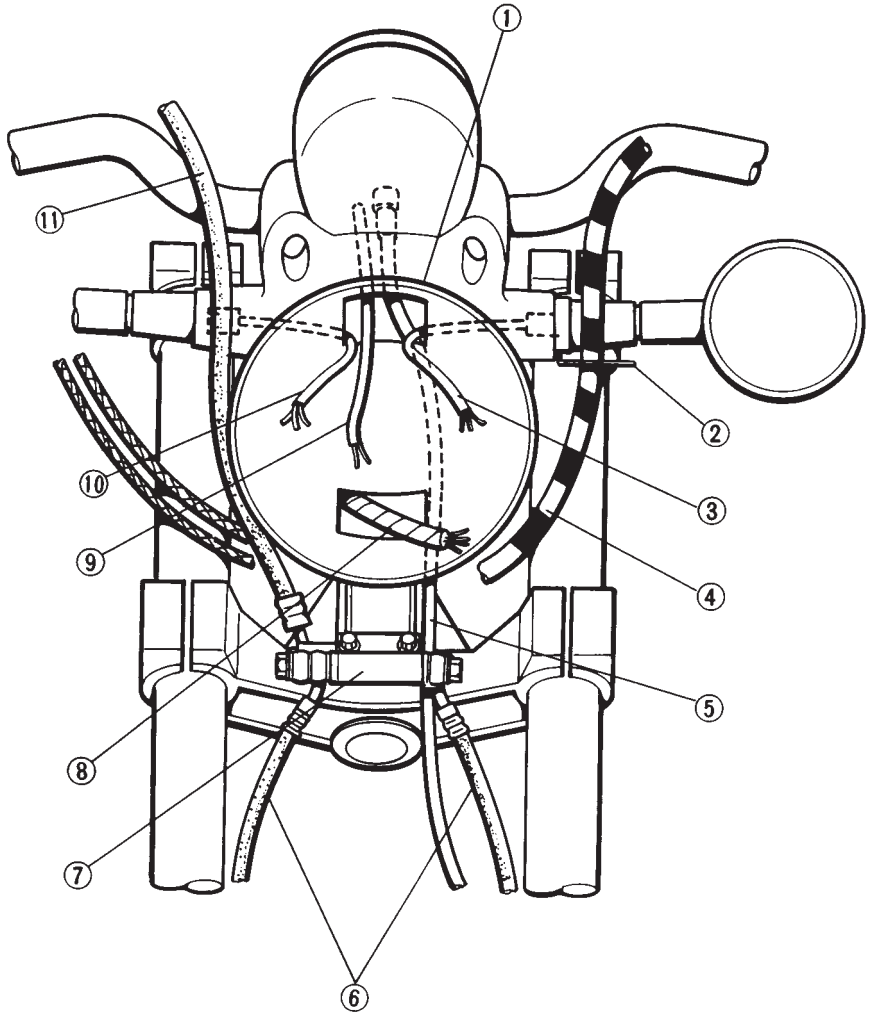


LUBRICATION DIAGRAM (4)

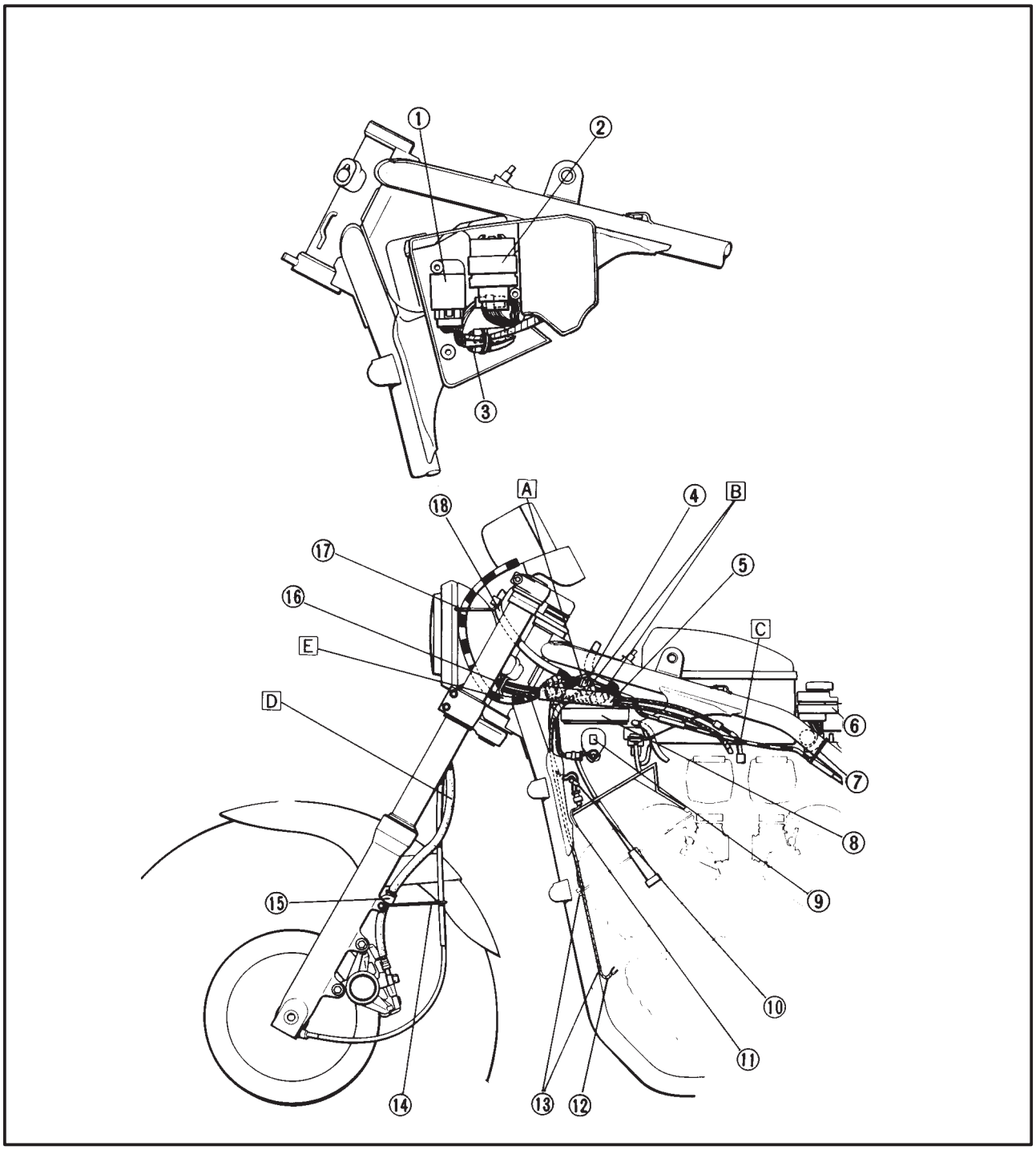


CABLE ROUTING

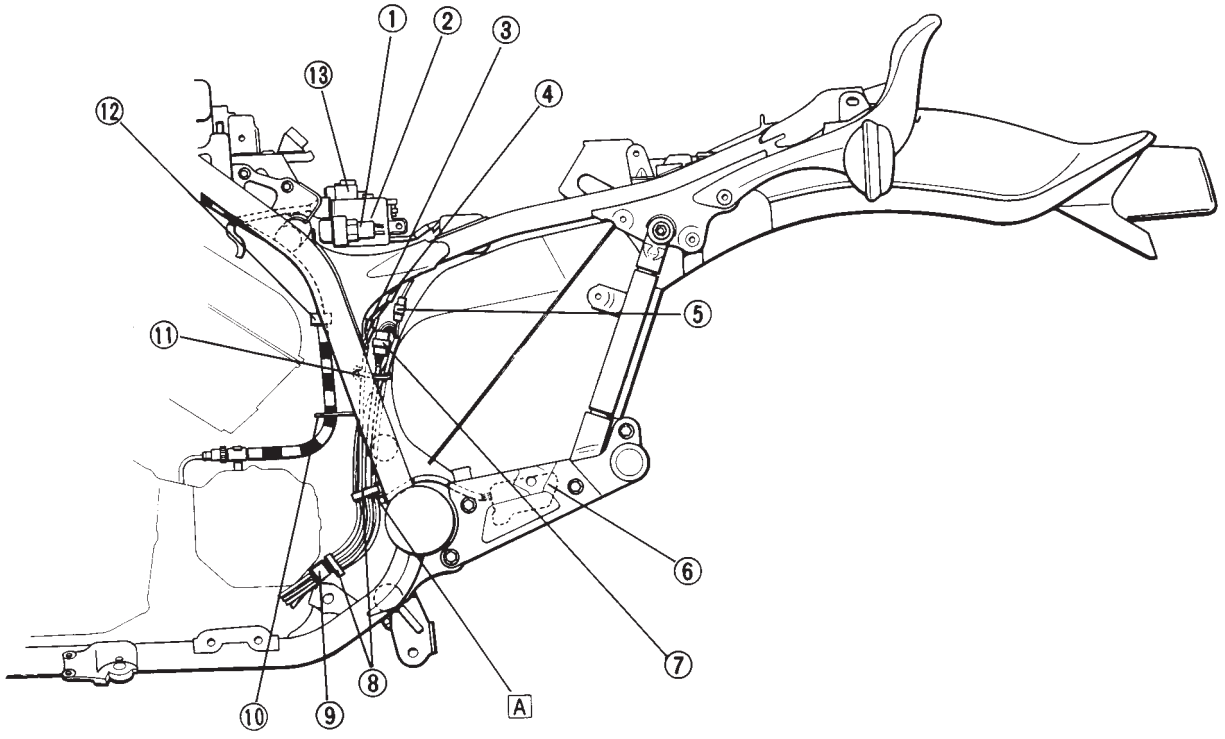
① Headlight body
② Hose guide
③ Front flasher light lead (Left)
④ Clutch hose
⑤ Speedometer cable
⑥ Front brake hose
⑦ Brake joint
⑧ Wireharness
⑨ Speedometer light lead
⑩ Front flasher light lead (Right)
⑪ Front brake hose



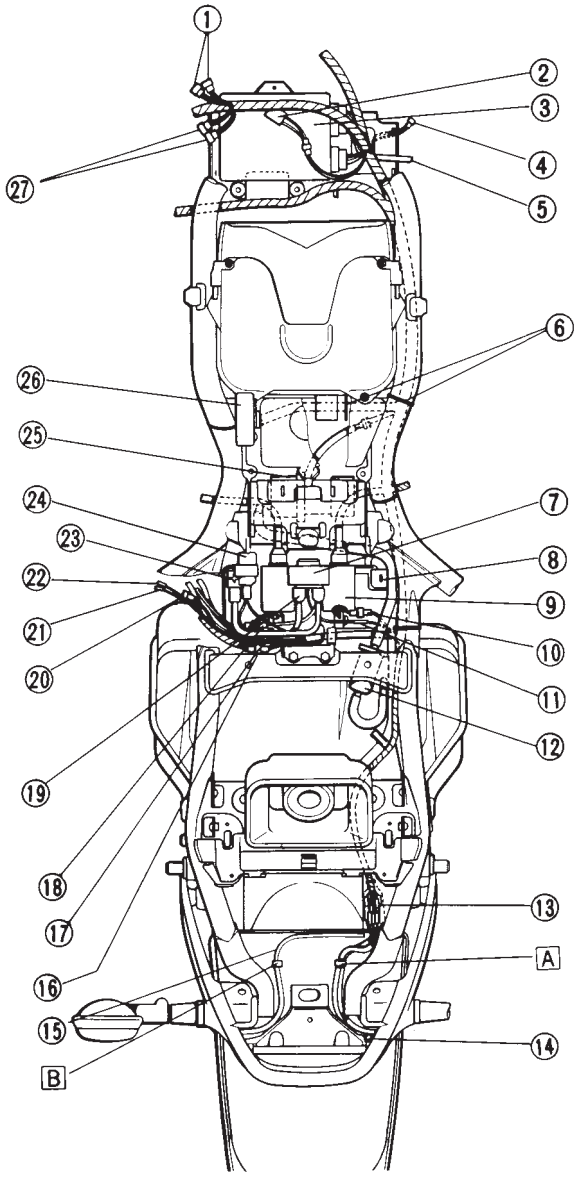
① Fuel pump control unit
② Relay unit
③ Clamp
④ Clutch hose clamp
⑤ Throttle cable joint
⑥ Fuse box
⑦ Band
⑧ Ignitor unit
⑨ Ignition coil
⑩ Clamp
⑪ Radiator fan lead
⑫ Horn lead
⑬ Clamp
⑭ Guide (For speedometer cable)
⑮ Clamp (For brake hose)
⑯ Guide (For throttle cable)
⑰ Guide (For clutch hose)
⑱ Handlebar switch lead (Left)
A Pass the handlebar switch lead inside the clutch hose
B Pass the meter lead outside the clutch hose.
C Pass the clutch hose outside the throttle cable.
D Pass the brake hose outside the speedometer cable.
E Pass the clutch hose under the throttle cable guide.



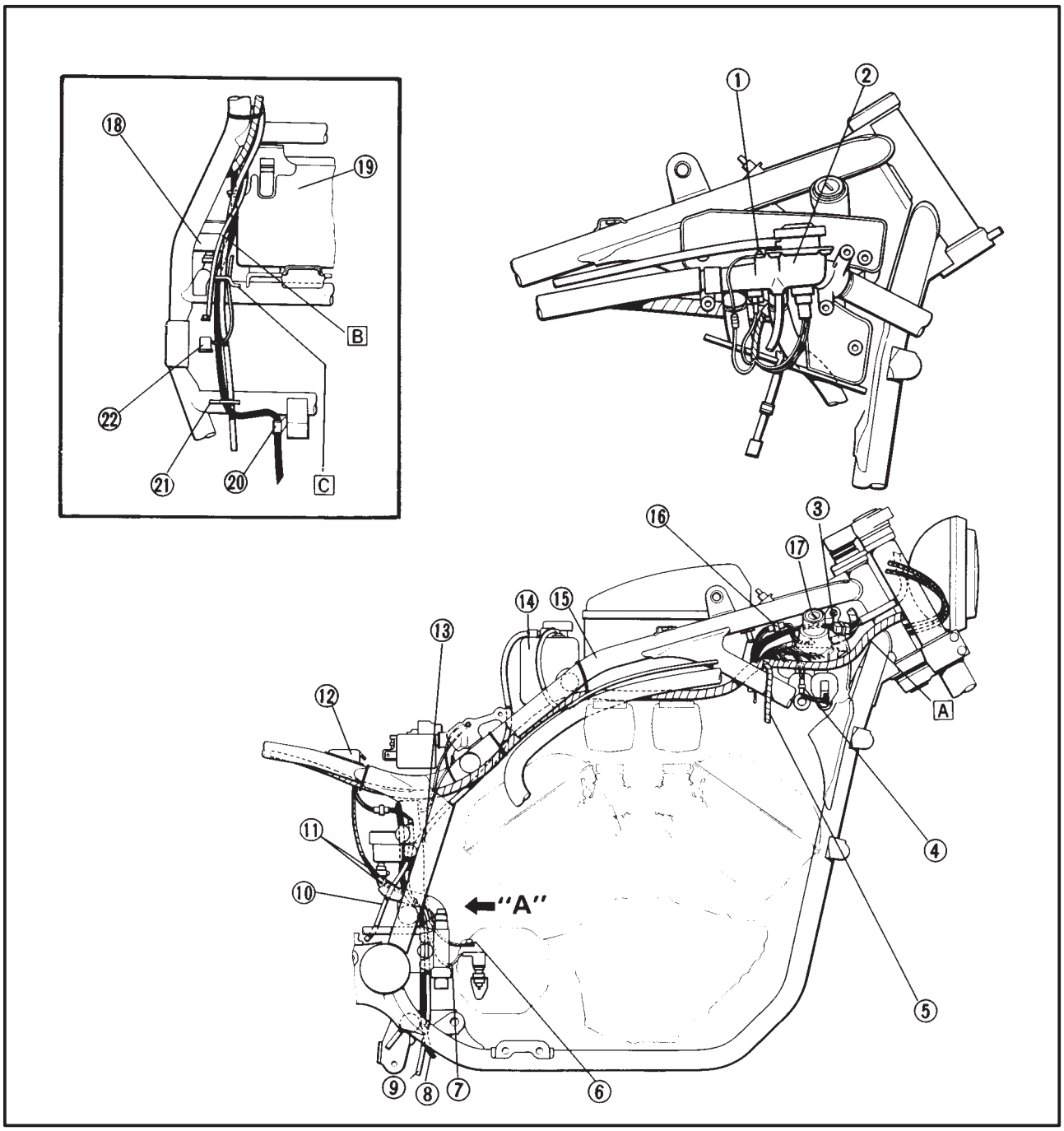
① Main fuse
② Ignition coil
③ Oil level switch lead
④ Neutral switch lead
⑤ Regulater lead
⑥ Rectifier/Regulater lead
⑦ A.C. generator lead
⑧ Band
⑨ Clamp
⑩ Guide (For clutch hose)
⑪ Clamp
⑫ Clamp (For clutch hose)
⑬ Starter relay
[A] Pass the band through the guide on frame on frame.



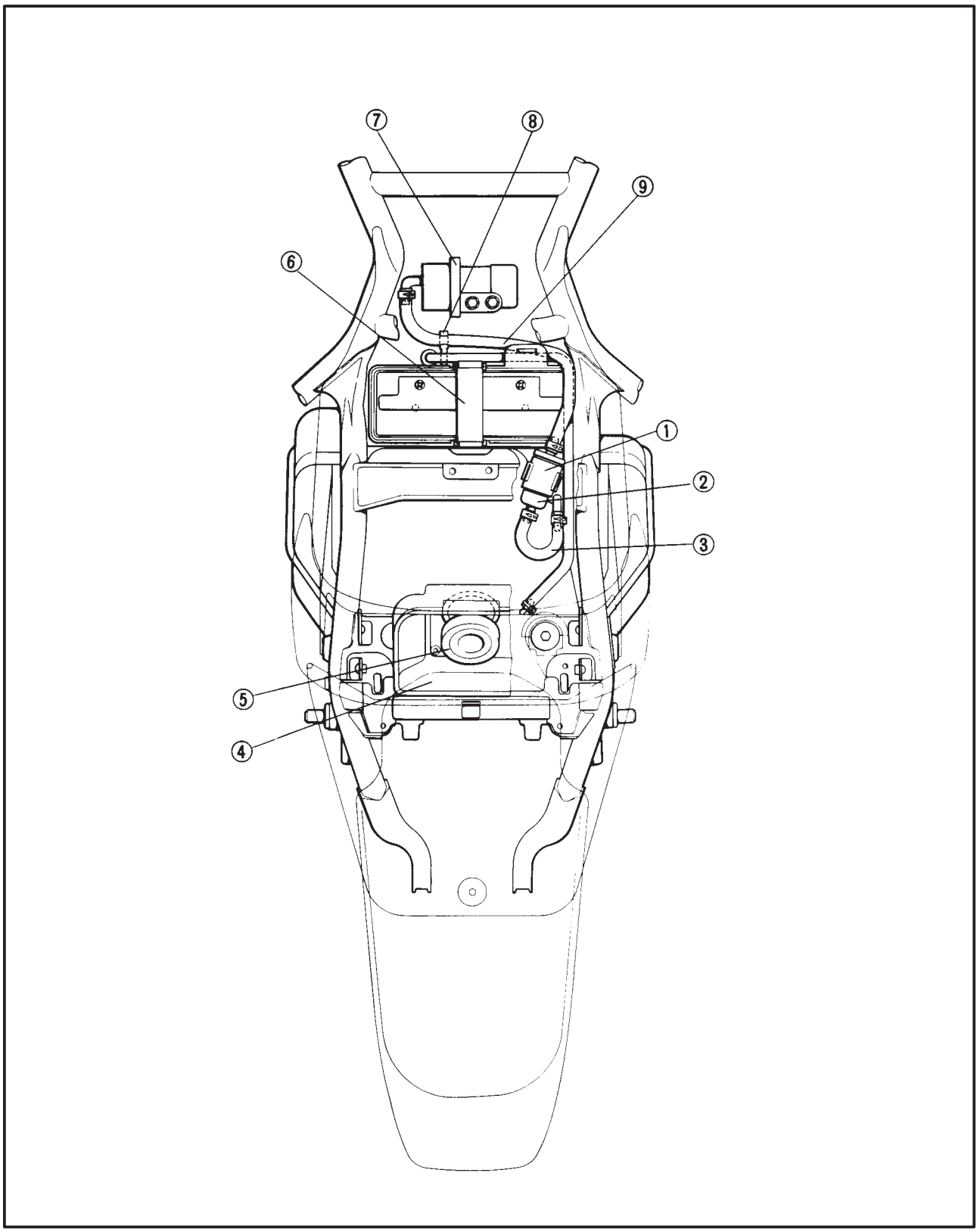
① Handlebar switch lead
② Diode
③ Ignitor unit
④ Ignition coil lead
⑤ Conduit lead
⑥ Band
⑦ Starter relay
⑧ Battery negative (–) lead
⑨ Ignition coil
⑩ Ignition coil lead
⑪ Starter relay lead
⑫ Fuel filter
⑬ Boot cover
⑭ Taillight lead
⑮ Rear flasher light lead (Left)
⑯ Ignition coil lead
⑰ Pick up coil lead
⑱ Starter relay lead
⑲ Starter motor lead
⑳ Regulater lead
㉑ Oil level switch lead
㉒ Neutral switch lead
㉓ Battery positive (+) lead
㉔ Main fuse
㉕ Fuel pump
㉖ Fuse box
㉗ Meter lead
[A] Clamp the taillight lead and rear flasher light lead (Right).
[B] Clamp the rear flasher light lead (Left).



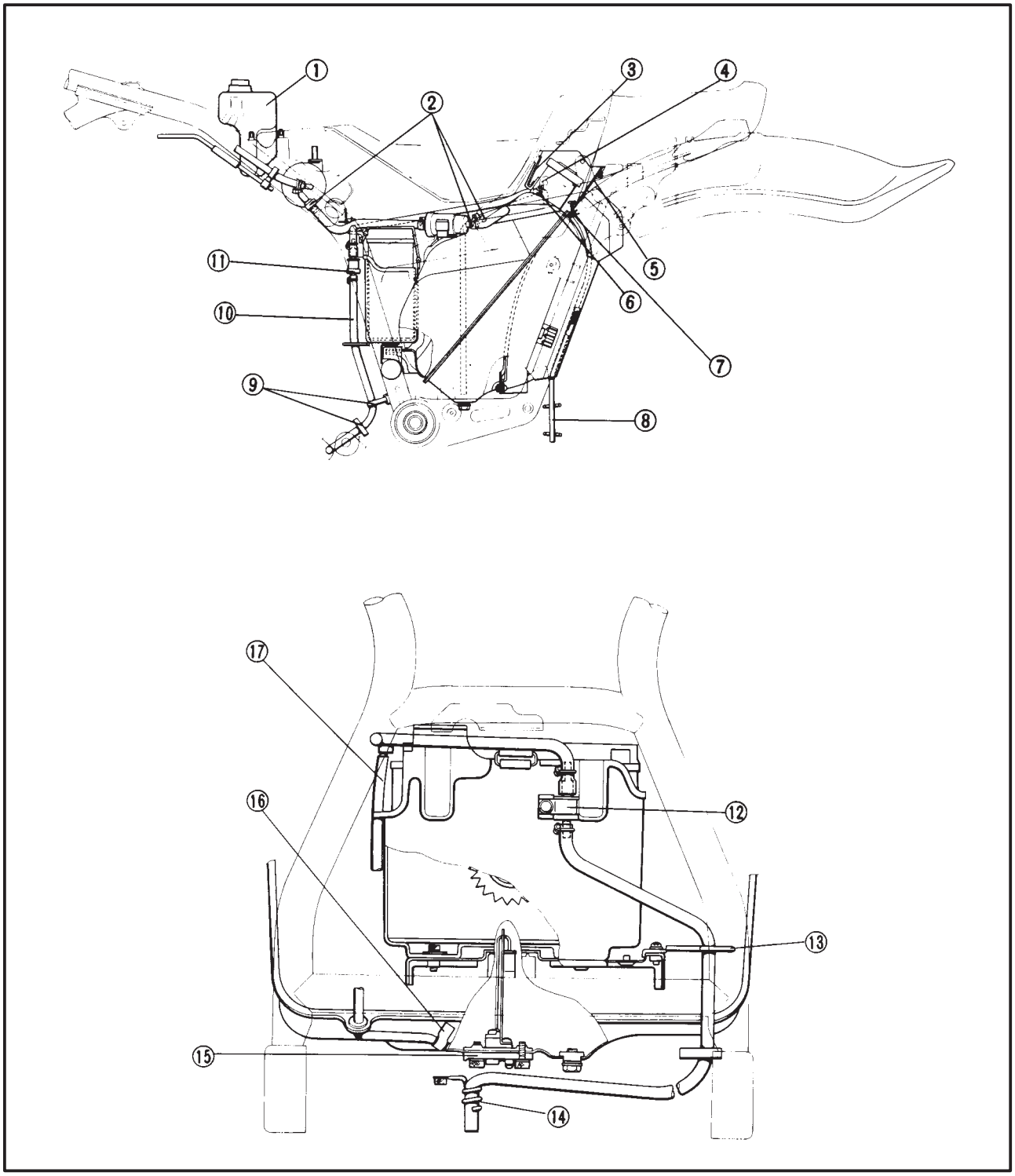
① Earth lead
② Conduit
③ Handlebar switch lead (Left)
④ Ignition coil lead
⑤ To conduit
⑥ Earth lead
⑦ Rear brake switch lead
⑧ Battery breather hose
⑨ Coolant reservoir tank breather hose
⑩ Fuel sender lead
⑪ Rear brake switch lead
⑫ Band
⑬ Battery negative (–) lead
⑭ Coolant reservoir tank
⑮ Band
⑯ Main switch lead
⑰ Main switch
⑱ Rear brake reservoir tank
⑲ Battery box
⑳ Clamp (For battery breather hose)
㉑ Guide (For reservoir tank breather hose and Battery breather hose)
㉒ Rear brake switch
A Pass the wireharness outside the main switch stay.
B Earth lead:
Pass the earth lead outside the reservoir tank breather hose.
C Guide (For battery breather hose, reservoir tank breather hose and rear brake switch lead).



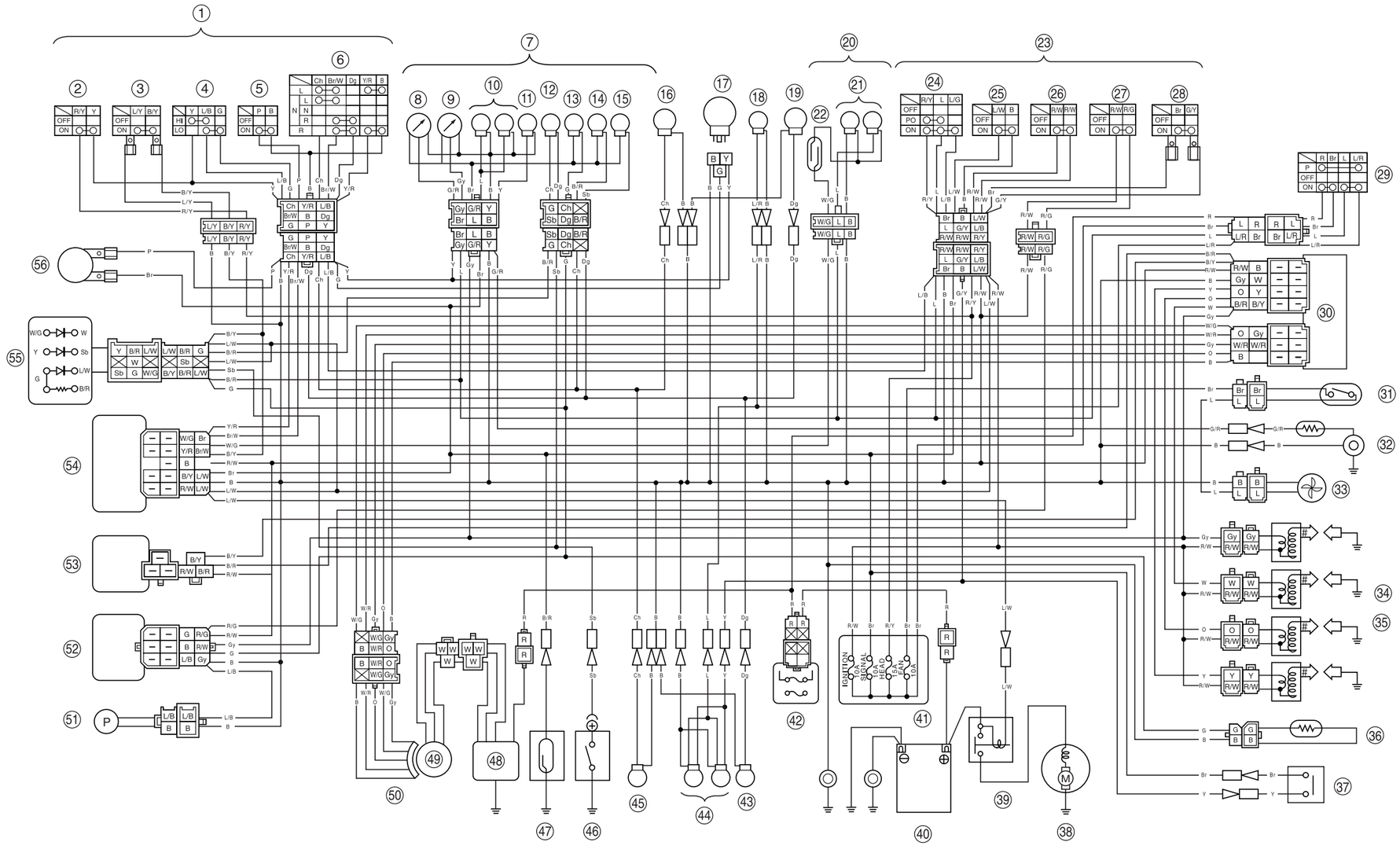
① Fuel filter bracket
② Fuel filter
③ Fuel pipe
④ Filler cover
⑤ Filler cap
⑥ Battery band
⑦ Fuel pump
⑧ Clamp
⑨ Fuel pipe



① Reservoir tank
② Clip
③ Spring
④ Clip
⑤ Filler cover
⑥ Pipe joint
⑦ Clip
⑧ Drain hose
⑨ Band
⑩ Over flow hose
⑪ Over flow valve
⑫ Clamp
⑬ Holder
⑭ Clamp
⑮ Fuel sender
⑯ Clamp
⑰ Battery breather hose



WIRING DIAGRAM



1. Handlebar switch (Left)
2. “PASS” switch
3. Clutch switch
4. “LIGHTS” (Dimmer) switch
5. “HORN” switch
6. “TURN” switch
7. Meter assembly
8. Temperature meter
9. Tachometer
10. Meter light
11. “HIGH BEAM” indicator light
12. “TURN” indicator light
13. “FUEL” warning light
14. “OIL LEVEL” indicator light
15. “NEUTRAL” indicator light
16. Front flasher light (Left)
17. Headlight
18. Auxiliary light
19. Front flasher light (Right)
20. Speedometer
21. Meter light
22. Reed switch
23. Handlebar switch (Right)
24. “LIGHTS” switch
25. “START” switch
26. “ENGINE STOP” switch
27. “FUEL” (Reserve) switch
28. Front brake switch
29. Main switch
30. Ignitor unit
31. Thermo switch
32. Thermo unit
33. Fan
34. Ignition coil
35. Spark plug
36. Fuel sender
37. Rear brake switch
38. Starter motor
39. Starter relay
40. Battery
41. Fuse
42. Main fuse
43. Rear flasher light (Right)
44. Tail/Brake light
45. Rear flasher light (Left)
46. Neutral switch
47. Oil level switch
48. Rectifier/Regulator
49. A.C. Magneto
50. Pick up coil
51. Fuel pump
52. Fuel pump control unit
53. Pressure sensor
54. Relay unit
55. Diode assembly
56. Horn

COLOR CODE

B	Black	L	Blue	Ch	Chocolate	L/Y	Blue/Yellow	B/R	Black/Red	L/R	Blue/Red	G/Y	Green/Yellow
P	Pink	R	Red	Br	Brown	B/Y	Black/Yellow	G/R	Green/Red	W/G	White/Green	R/G	Red/Green
Y	Yellow	O	Orange	Dg	Dark green	R/Y	Red/Yellow	Y/R	Yellow/Red	L/W	Blue/White	W/R	White/Red
G	Green	Gy	Gray	Sb	Sky blue	Br/W	Brown/White	L/B	Blue/Black	R/W	Red/White	W	White