YAMAHA

XZ550RJ

SERVICE MANUAL

11H-28197-10

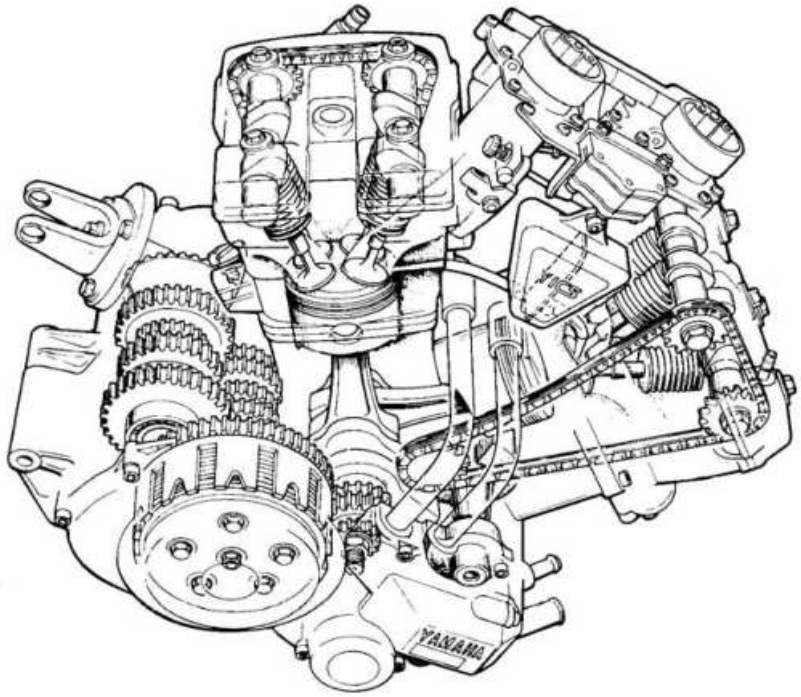
FEATURES

XZ550RJ



Liquid-cooled V-Twin

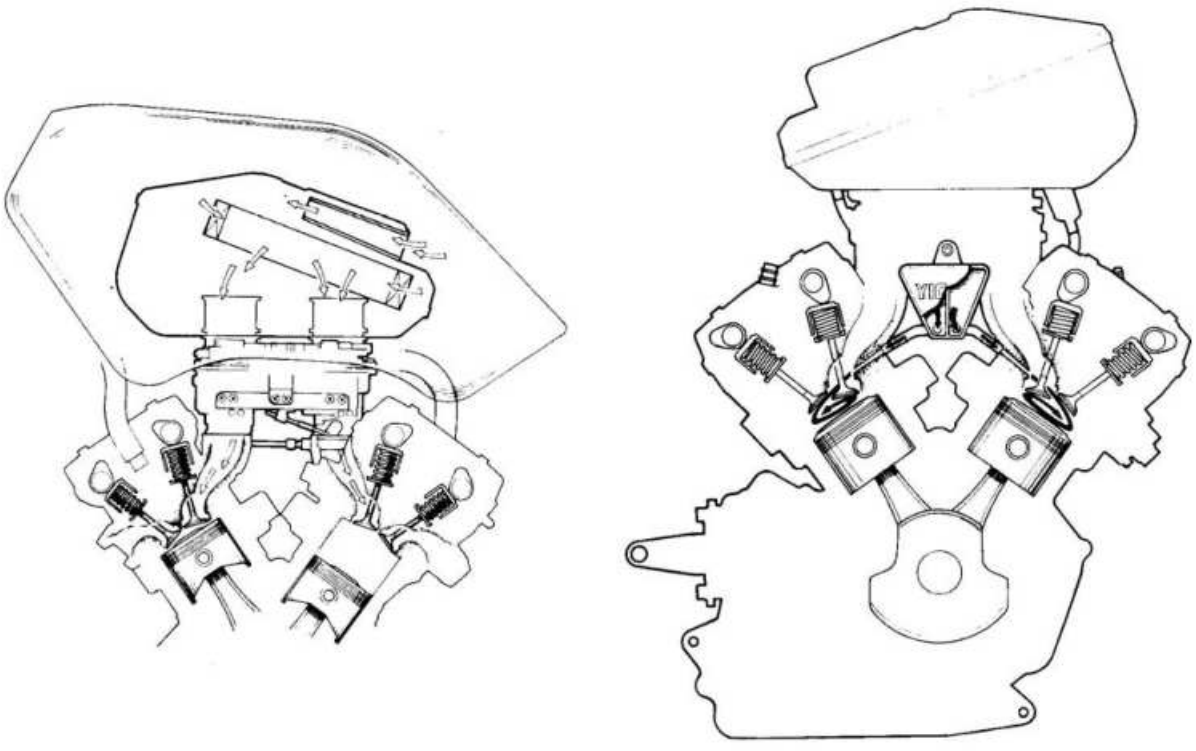
The 70° V-Twin engine is liquid-cooled to maintain the best operating temperature range. The cooling system features an aluminum-corrugate radiator which is extremely light and exhibits excellent heat-dissipating characteristics. An automatically activated electric fan pulls air through the radiator in heavy-traffic situations. The system has an automotive-type expansion and recovery tank which makes airspace in the radiator unnecessary and virtually eliminates coolant loss on even the hottest days. A thermostatic valve mounted in the engine block provides quick warmups and stable coolant temperature.



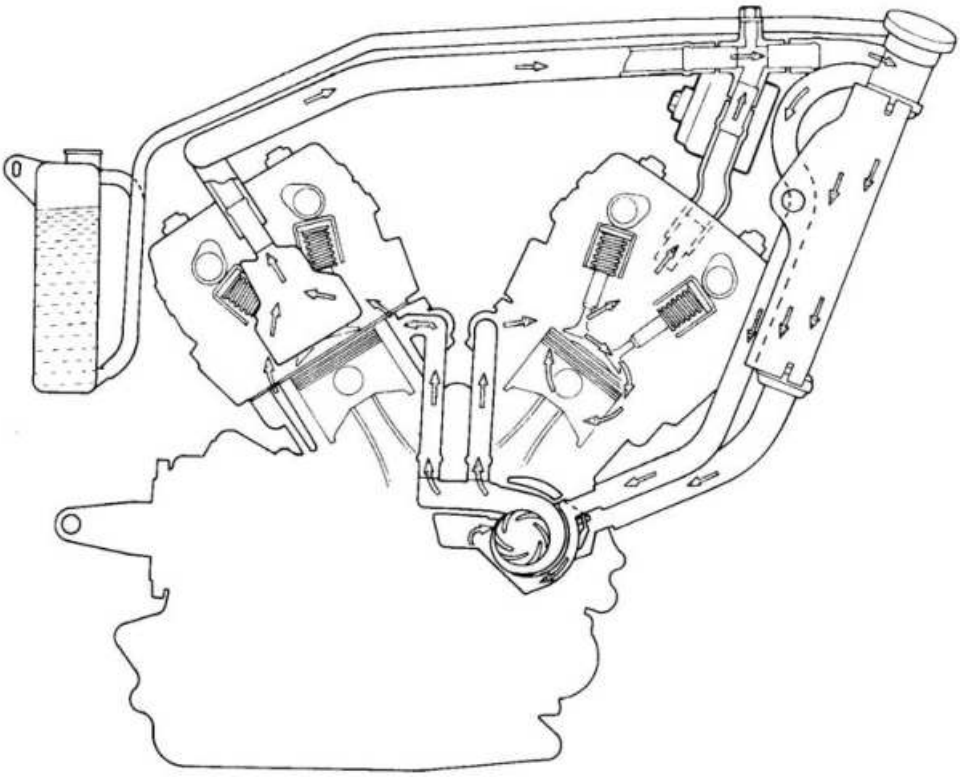
YICS

To increase fuel economy through more efficient combustion, the engine is equipped with the patented Yamaha Induction Control System (YICS). In this configuration, the YICS consists of a chamber linked to the intake manifold by a tube. Upon intake, the vacuum in the manifold creates a vacuum in the chamber; when the intake valve closes, the chamber draws in some air-fuel mixture. When the intake valve reopens, the mixture in the chamber shoots back out through the angled tube and into the cylinder, mixing with and swirling the main intake charge. The swirling charge is then compressed and ignited, burning more completely and producing more power than that of a conventional engine.

INTAKE SYSTEM AND YICS



LIQUID COOLING SYSTEM



Downdraft carb

The induction system on this motorcycle features downdraft carburetion. The 34 mm (1.34 in) Venturis are positioned so that the incoming air takes a virtually straight path through the carbs and the intake manifolds to the combustion chambers; intake efficiency is remarkably high. An accelerator pump is installed in the carburetor assembly to eliminate hesitation when the throttle is opened at low engine speeds. A fuel pump delivers gas from the tank to the float bowls, and a regulator sends excess fuel through a circuit back to the fuel pump inlet.

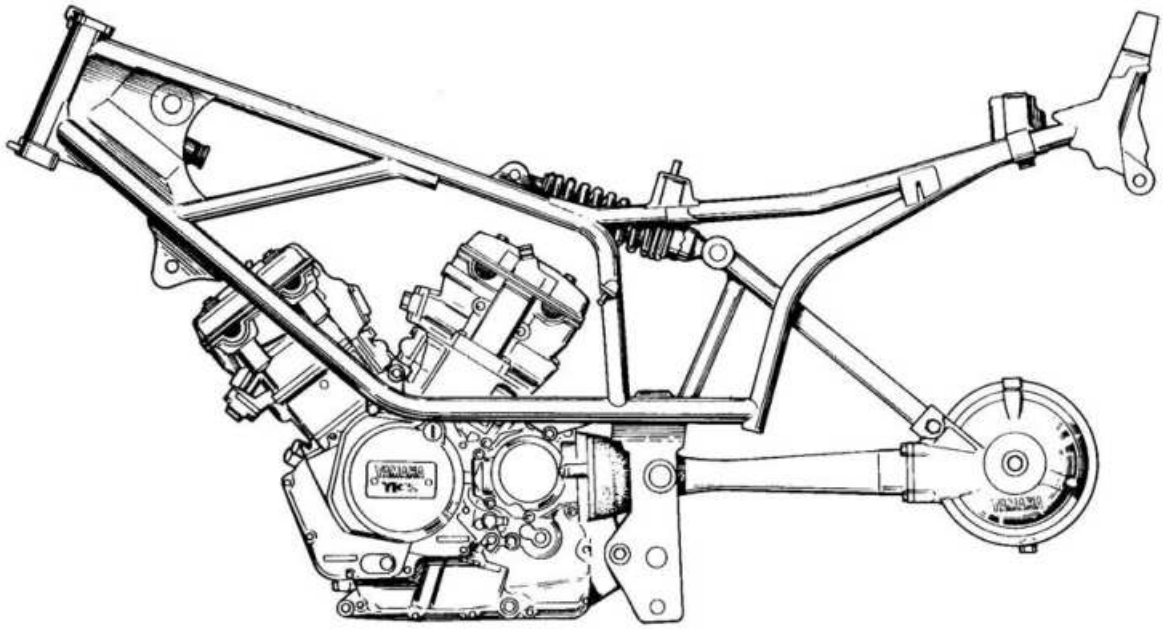
DOHC 4-valve heads

Each cylinder head has dual overhead camshafts, and each camshaft acts directly on top of the valves; there are no pushrods or rocker arms. Both heads have four valves, two intake and two exhaust, instead of one intake and one exhaust valve. By using two slightly smaller valves in place of each large valve, port area is significantly increased. This provides a much greater volume of mixture and exhaust flow. In addition, the smaller, lighter valves are easier to control at high engine speeds; the valves can follow the cam profiles more closely to resist "floating" and allow a 9,500 r/min red line.

Chassis bits

The "hang-support" frame on this motorcycle allows a lower engine placement and center of gravity while providing excellent rigidity for precise handling. Cornering clearance is also enhanced. The trailing-axle front suspension performs superbly. The axle placement helps to maintain a short wheelbase, allowing quick, sporty handling. Yamaha's proven Monoshock rear suspension provides the excellent handling and comfort characteristics for which it is famous. The spring preload is adjustable to five settings.

FRAME AND MONOCROSS SUSPENSION SYSTEM



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 hasic understanding of the mechanical concepts and procedures inherent to motorcycle repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the motorcycle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his motorcycle and to conform with federal environmental quality objectives.

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.

NOTE:

This Service Manual contains information regarding periodic maintenance to the emission control system for the XZ550RJ. Please read this material carefully.

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

SERVICE DEPT.
INTERNATIONAL DIVISION
YAMAHA MOTOR CO., LTD.

CHAPTER 1. GENERAL INFORMATION

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- **Engine serial number**..... 8
- **Vehicle identification number**..... 8

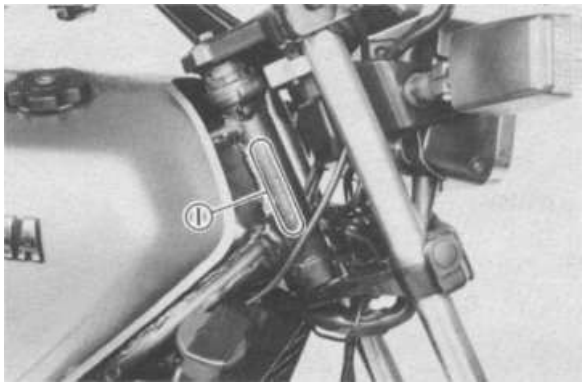
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GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

Frame serial number

The frame serial number is stamped into the right side of the steering head pipe.



1. Frame serial number

Engine serial number

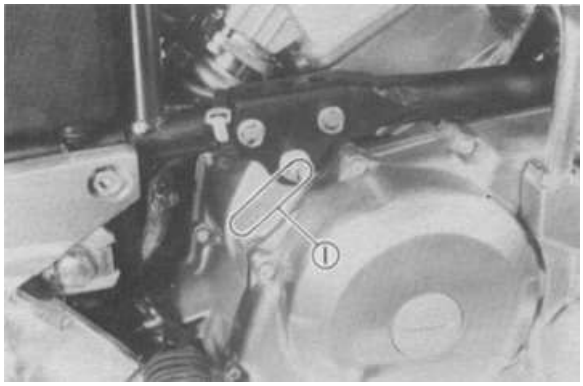
The engine serial number is stamped into the elevated part of the right rear section of the engine.

Starting serial number:

XZ550RJ	11H-000101

NOTE

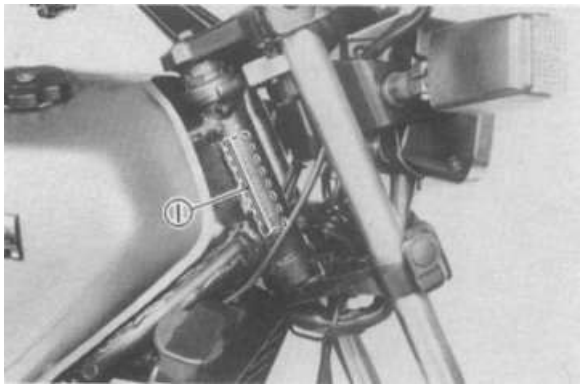
The first three digits of these numbers are for model identification; the remaining digits are the unit production number.



1. Engine serial number

Vehicle identification number

The vehicle identification number is on the left side of the steering head pipe.



1. Vehicle identification number



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

Inductive tachometer (P/N YU-08036)

Inductive timing light (P/N YU-08037)

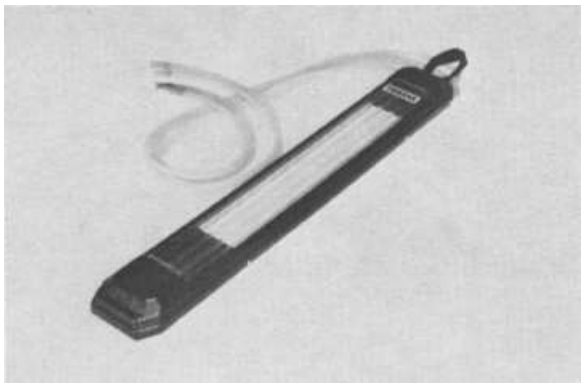
Fuel level gauge (P/N YM-01312)

Cooling system tester (P/N YU-24460)

Compression gauge (P/N YU-33223)

Compression gauge
12 mm (0.47 in) adapter (P/N YU-33223-3)

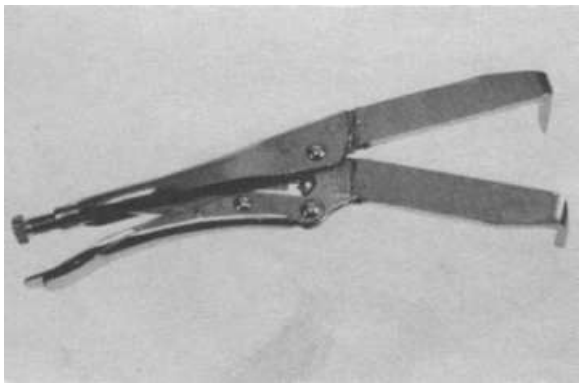
Vacuum gauge (P/N YU-08030)



This gauge is needed for carburetor synchronization

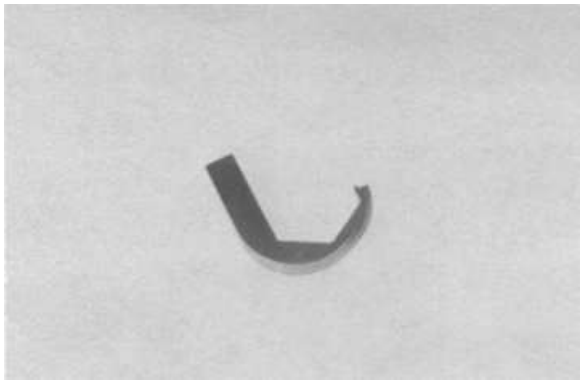
For engine service

Universal clutch holder
(P/N YM-91042)



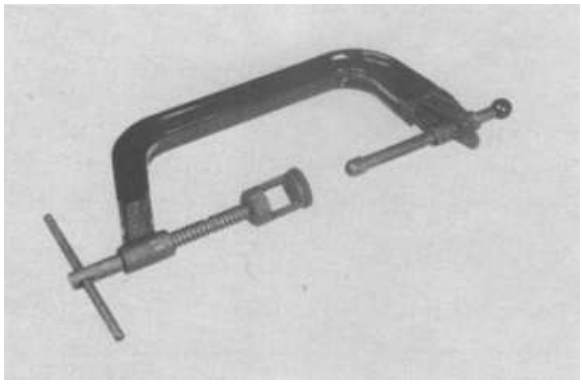
This tool is used to hold the clutch when removing or installing the clutch boss locknut

Tappet adjusting tool (P/N YM-28899)



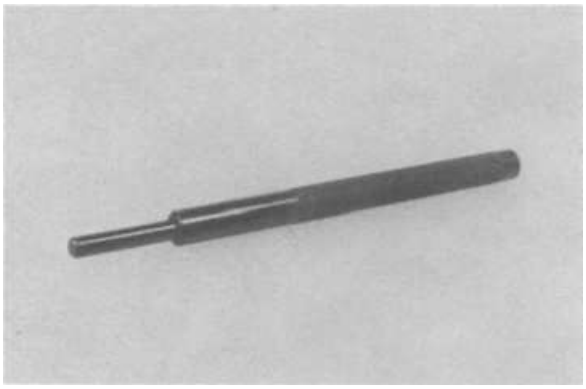
This tool is necessary to replace valve adjusting pads.

Valve spring compressor
(P/N YM-04019)



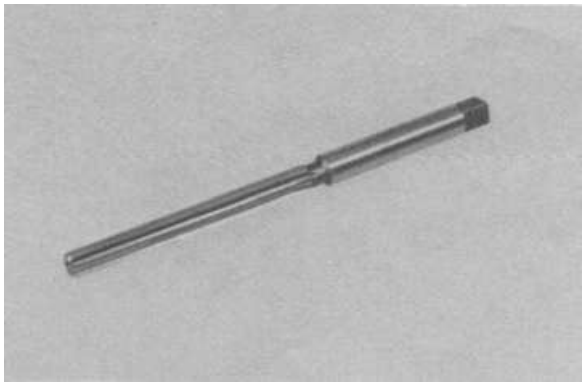
This tool must be used for removing and installing the valve assemblies

Vavle guide remover
(P/N YM-04064)



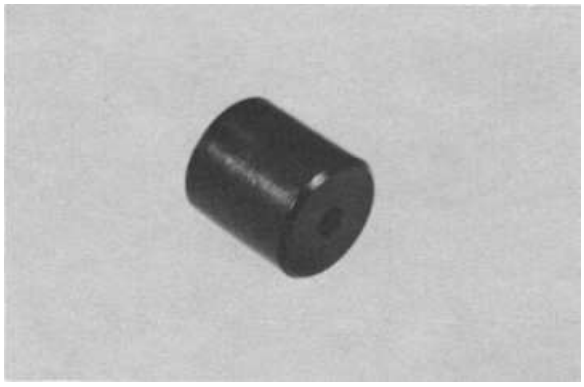
This must be used to remove the valve guides

Valve guide reamer
(P/N YM-04066)



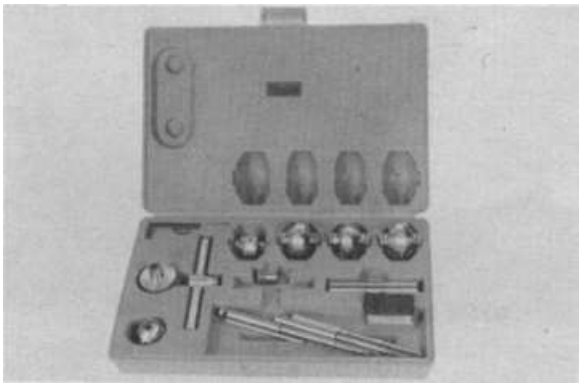
This must be used when replacing the valve guide.

Valve guide installer
(P/N YM-04065)



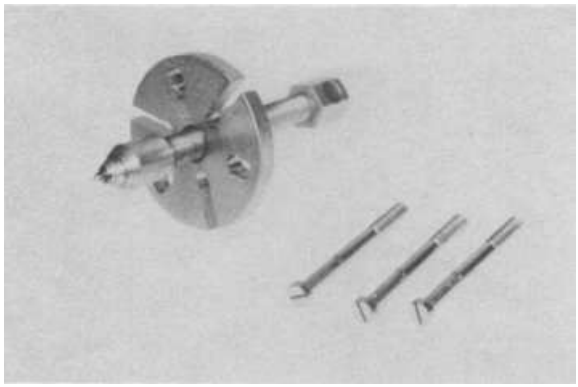
This tool is needed for proper installation of the valve guides.

Valve seat cutter set
(P/N YM-91043)



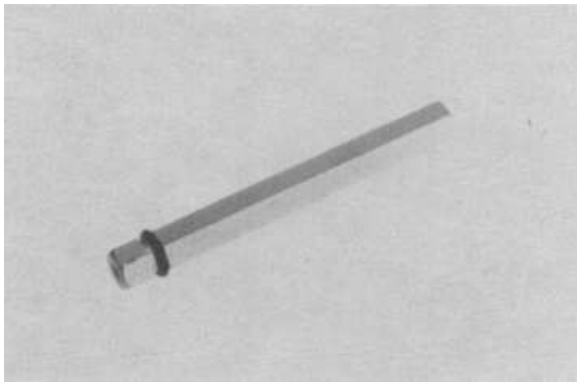
This tool is needed to resurface the valve seat.

Flywheel puller
(P/N YU-33270)



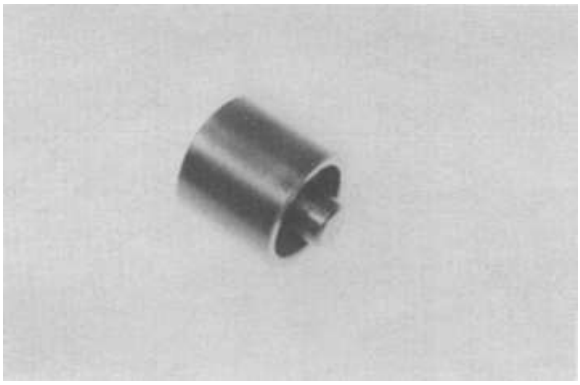
This tool is used for removing the flywheel

8mm (0,3 in) wrench adapter
(P/N YM-28897)



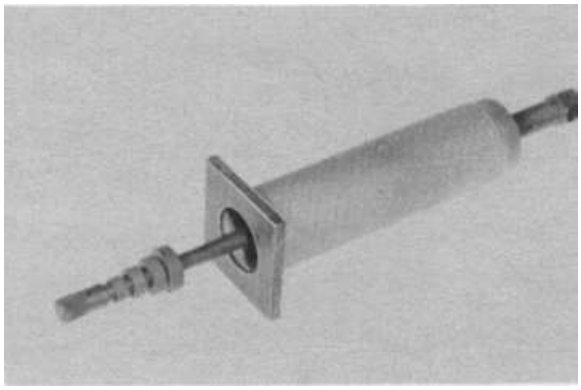
This tool is used to loosen or tighten the cylinder head securing nut.

Water pump seal installer
(P/N YM-33221)



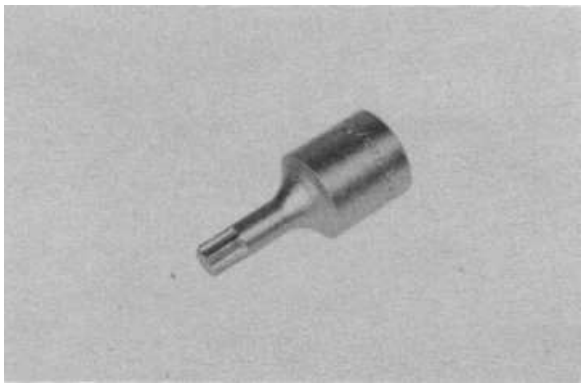
This tool is needed for proper installation of the water pump seal.

Piston pin puller
(P/N YU-01304)



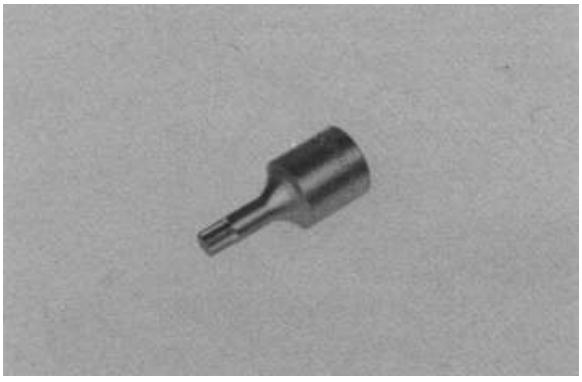
This tool is used to remove the piston pin.

#30 Torx driver
(P/N YU-29843-6)



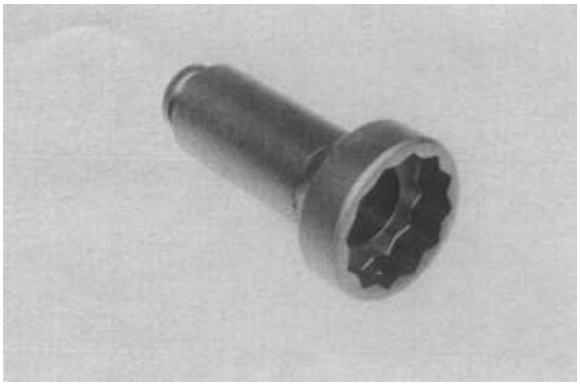
This tool is used to loosen or tighten the drive axle bearing stopper bolt

#25 Torx driver
(P/N YU-29843-4)



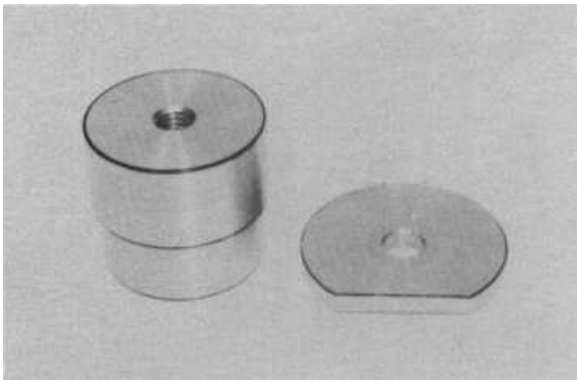
This tool is used to loosen or tighten the shift cam segment securing bolt

46 mm (1.8 in) offset wrench
(P/N YM-04045A)

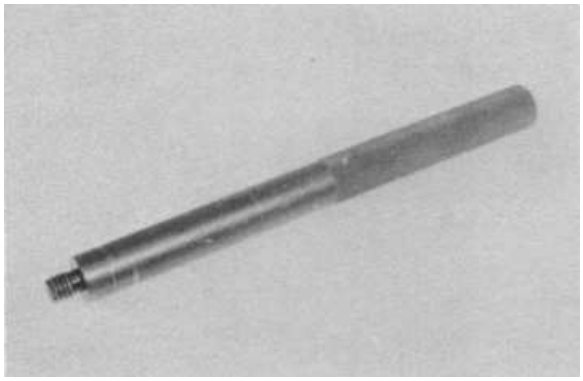


This tool is used to loosen and tighten the primary drive gear/balancer drive gear securing nut.

Plain bearing driver/installer
(P/N YM-28898)

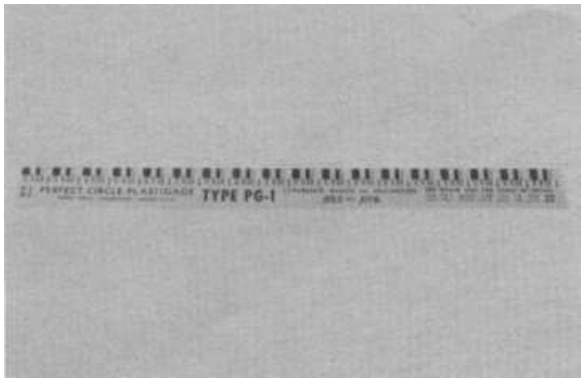


Handle (P/N YM-04058-1)



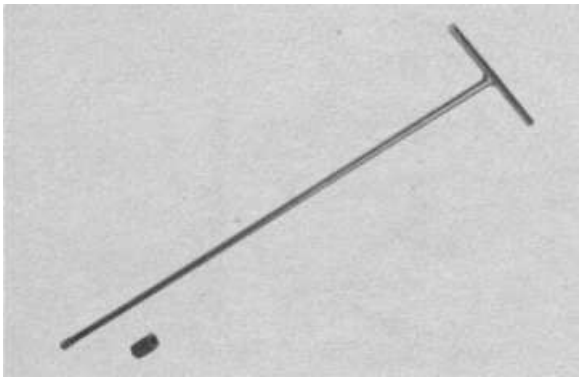
These tools are used for removing and installing the crankshaft plain bearing.

Plastigauge set “Green”
(P/N YU-33210)



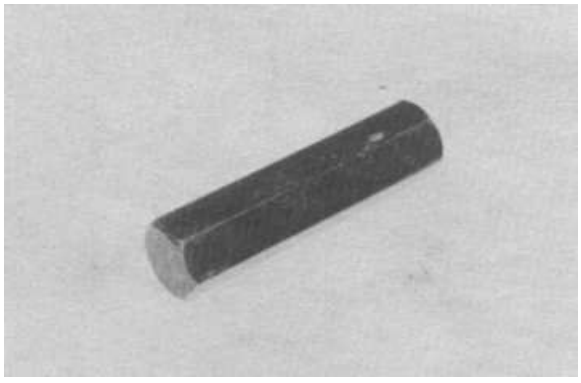
This gauge is needed when measuring clearance for connecting rod bearing.

For chassis service
T-handle (P/N YU-01268) and damper rod holder (P/N YM-33256)



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

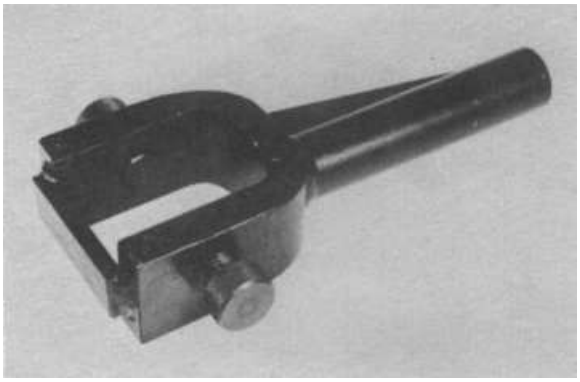
Front fork cap socket (19mm) (0.75 in))
(P/N YM-01298)



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

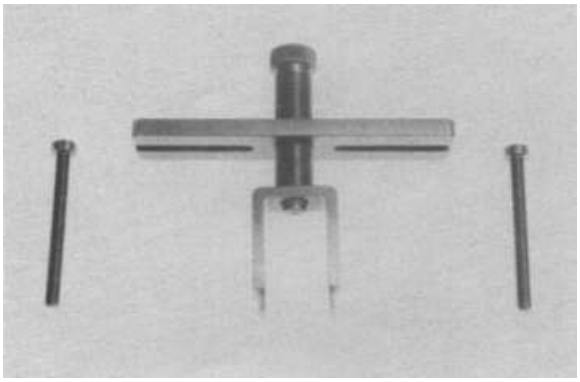
For middle gear service

Universal joint holder
(P/N YM-04062)



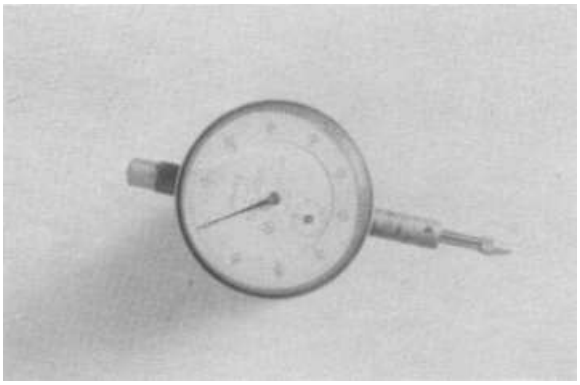
This tool is used when adjusting gear lash, in the middle gear.

Middle drive gear holder
(P/N YM-33222)



This tool is needed when measuring gear back lash.

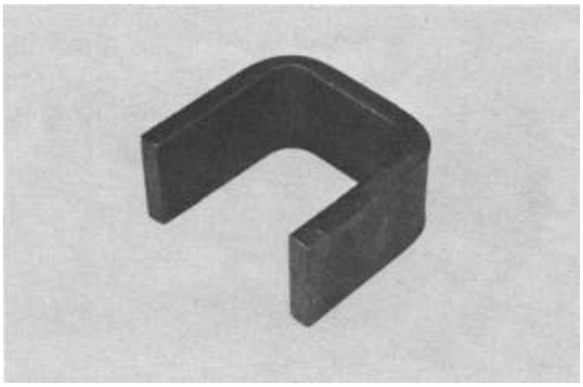
Dial indicator
(P/N YU-03097)



These tools are used when measuring gear lash for middle gear.

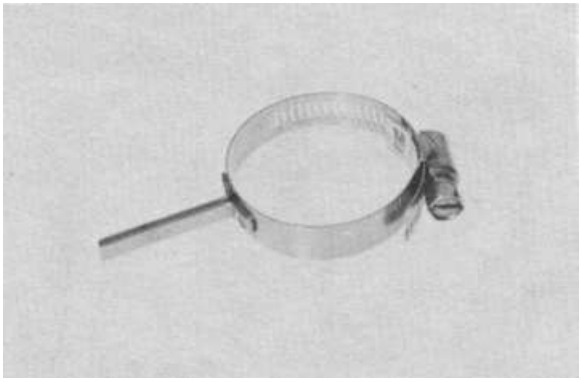
For shaft drive service

Damper spring compressor
(P/N YM-04011)



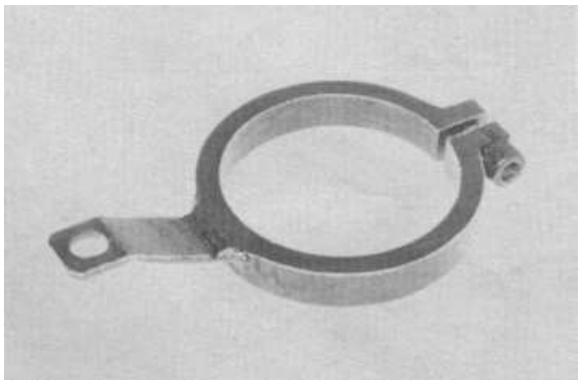
This tool is needed to disassemble and reassemble the middle gear damper.

Final drive gear lash tool
(P/N YM-01230)



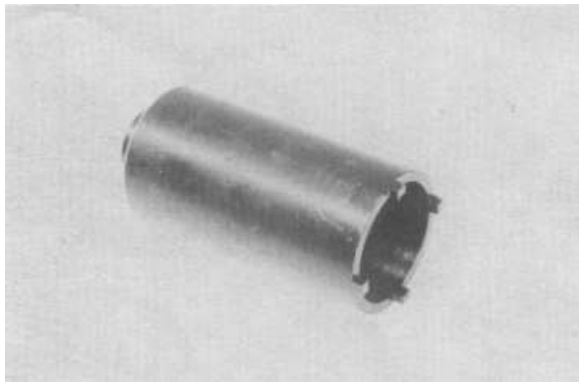
This tool is needed when measuring gear lash for final gear.

Ring gear holder
(P/N YM-01254)



This tool is needed when measuring gear lash.

Bearing retainer wrench
(P/N YM-33214)

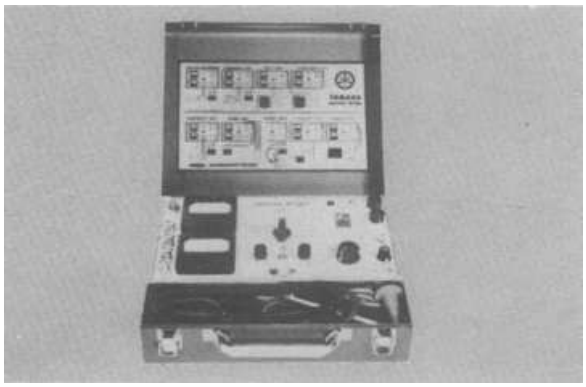


This tool is used to loosen or tighten the bearing retainer.

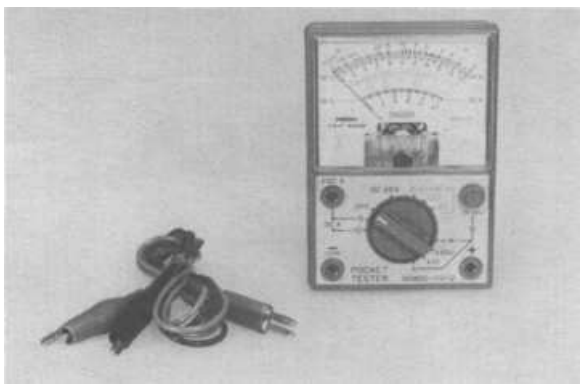
For electrical components

The uses of these tools are described in Chapter 6.

Electro tester
(P/N YU-03021)



Pocket tester
(P/N YU-03112)



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

MAINTENANCE INTERVALS CHARTS

Proper periodic maintenance is important. Especially important are the maintenance services related to emissions control. These controls not only function to ensure cleaner air but are also vital to proper engine operation and maximum performance. In the following maintenance tables, the services related to emissions control are grouped separately.

PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

No.	Item	Remarks	Initial break-in		Thereafter every	
			1,000 km (600 mi) or 1 month	5,000 km (3,000 mi) or 7 months	4,000 km (2,500 mi) or 6 months	8,000 km (5,000 mi) or 12 months
1*	Valve clearance	Check and adjust valve clearance when engine is cold.		○		○
2	Spark Plugs	Check condition. Adjust gap/ Clean. Replace after initial 13,000 km (8,000 mi) or 18 months and thereafter every 12,000 km (7,500 mi) or 18 months.		○	○	Replace every 12,000 km (7,500 mi) or 18 months
3*	Crankcase ventilation system	Check ventilation hose for cracks or damage. Replace if necessary.		○		○
4*	Fuel line	Check fuel hose and vacuum pipe for cracks or damage. Replace if necessary.		○		○
5*	Exhaust system	Check for leakage. Retighten as necessary. Replace gasket(s) if necessary.		○	○	
6*	Carburetor synchronization	Adjust synchronization of carburetors.		○	○	
7*	Idle speed	Check and adjust engine idle speed. Adjust cable free play if necessary.		○	○	

*It is recommended that these items be serviced by a Yamaha dealer or other qualified mechanic.

GENERAL MAINTENANCE/LUBRICATION

No.	Item	Remarks	Type	Initial break-in		Thereafter every		
				1,000 km (600 mi) or 1 month	5,000 km (3,000 mi) or 7 months	4,000 km (2,500 mi) or 6 months	8,000 km (5,000 mi) or 12 months	16,000 km (10,000 mi) or 24 months
1	Engine oil	Warm up engine before draining.	Refer to page 2-10	○	○	○		
2	Oil filter	Replace	—	○	○		○	
3	Air filter	Clean with compressed air.	—	○	○		○	
4	Cooling system	Check hoses for cracks or damage, replace if necessary. Replace coolant every 24 months.	Ethylene glycol anti-freeze coolant					○
5*	Brake system	Adjust free play. Replace pads if necessary (front). Replace shoes if necessary (rear).	—	○	○	○		
6*	Clutch	Adjust free play.	—	○	○	○		
7	Final gear oil	Replace	SAE80 API GL—4 Hypoid gear oil	○			○	
8*	Control and meter cable	Apply chain lube thoroughly.	Yamaha chain and cable lube or SAE 10W 30 motor oil	○	○	○		
9	Change/ Brake pedal shaft pivot	Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W 30 motor oil		○	○		
10	Center and sidestand pivots	Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W 30 motor oil		○	○		
11*	Steering bearing and races	Check bearings assembly for looseness. Moderately repack every 16,000 km (10,000 mi).	Medium weight wheel bearing grease		○	○		Repack
12*	Front fork oil	Drain completely. Refill to specification.	Yamaha fork oil 15wt or equivalent					○
13*	Wheel bearings	Check bearings for smooth rotation. Replace if necessary.	—		○	○		
14	Battery	Check specific gravity. Check breather pipe for proper operation.	—		○	○		
15	Brake/ Clutch lever pivot shaft	Apply chain lube lightly.	Yamaha chain and cable lube or SAE 10W 30 motor oil		○	○		

*It is recommended that these items be serviced by a Yamaha dealer or other qualified mechanic.

ENGINE

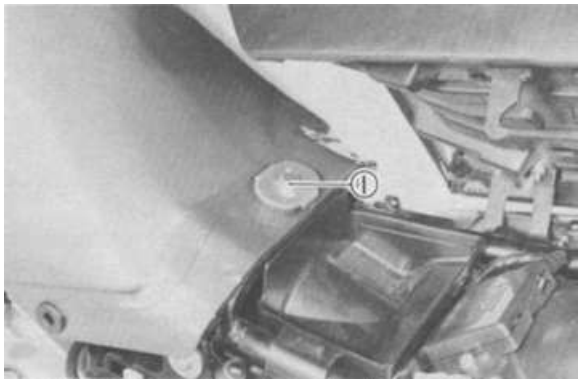
Valve clearance adjustment

Adjust the valve clearance as follows:

NOTE:

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

1. Remove the seat, and remove the side covers, fuel tank, air filter assembly, and crankcase ventilation pipes.



1. Fuel tank holding bolt

CAUTION:

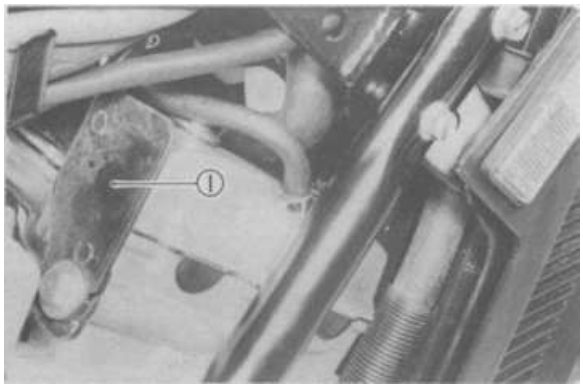
After removing the air filter assembly, cover the carburetors with a clean rag to prevent dust or any foreign materials from entering.

2. Remove the radiator cover and the radiator securing bolts. Gently and firmly push the left side of the radiator assembly towards the front wheel. The right side of the radiator and connected pipes should remain in place.

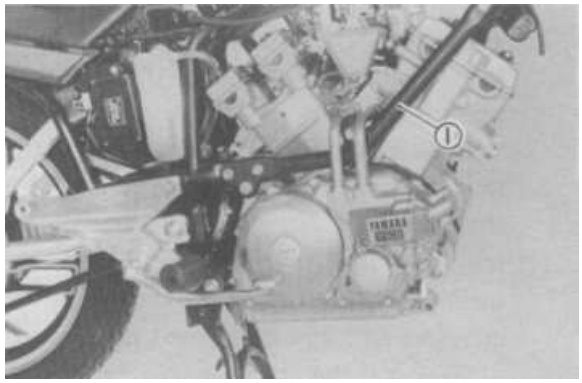
NOTE:

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

3. Remove the air baffle plate from behind the front cylinder and remove the right side frame tube.



1. Air baffle plate

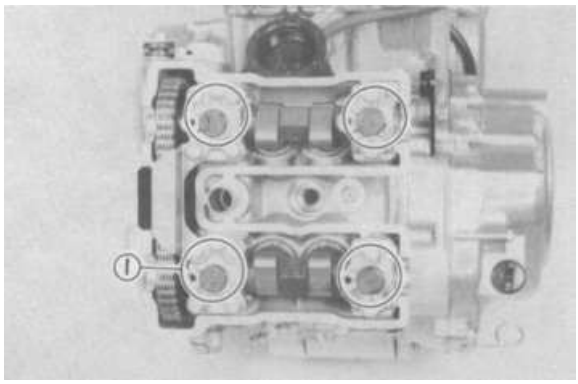


1. Down tube frame

4. Disconnect the spark plug cap from each cylinder head.
5. Remove the cylinder head covers.

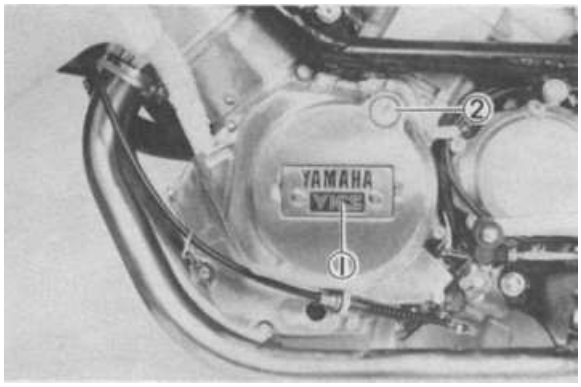
NOTE:

Be careful so that the oil plugs on the camshaft caps are not lost.



1. Oil plug

6. Remove the emblem plate and timing plug from the left-side crankcase.

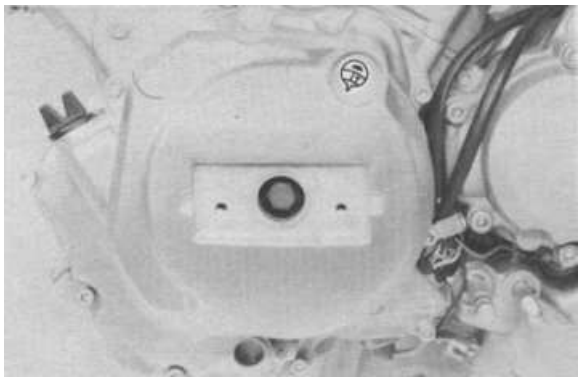


1. Emblem plate 2. Timing plug

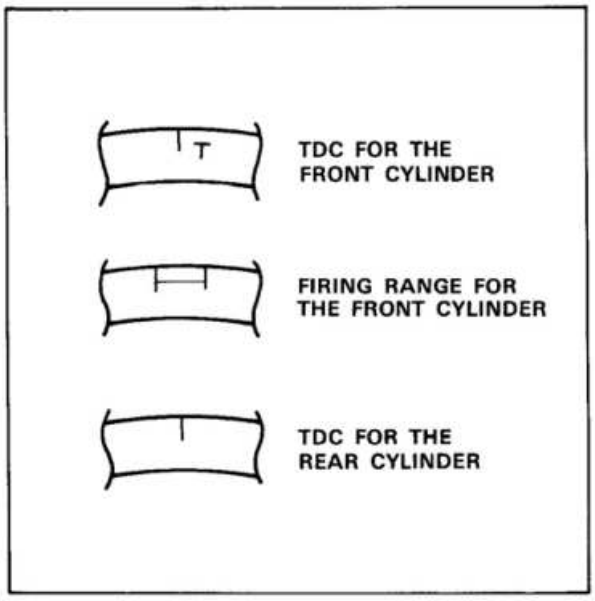
7. Align the "T" mark (for the front cylin-der)Vpn the flywheel with the stationary pointer on the crankcase cover. The pointer can be viewed through the timing window in the crankcase cover. When the "T" mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC). Valve clearance should be checked and adjusted when the piston is at TDC on the compression stroke. The piston is at TDC on compression when there is free play in both valve adjusters.

NOTE:

The crankshaft should be turned counterclockwise, as viewed from the left side of the motorcycle.

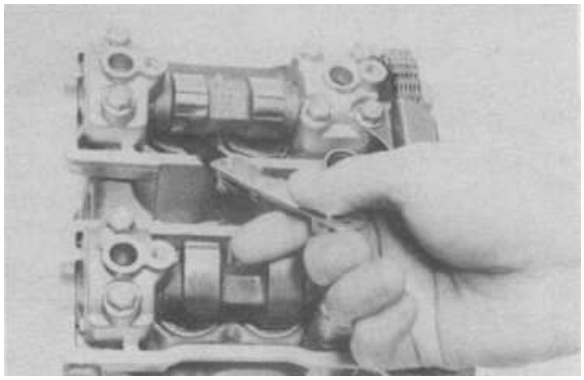


The flywheel is marked as follows:



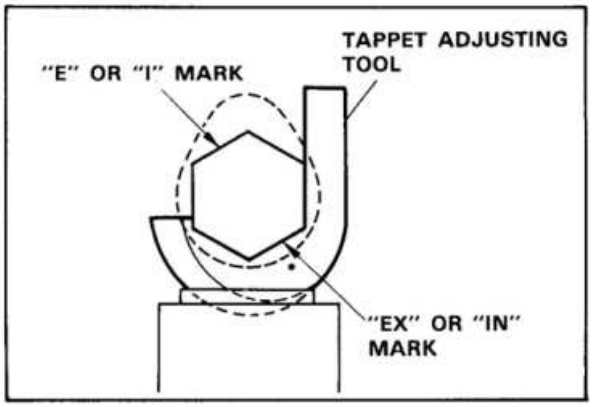
8. Use a feeler gauge to determine the clearance. If clearance is incorrect, record the measured amount of clearance. This must be measured carefully.

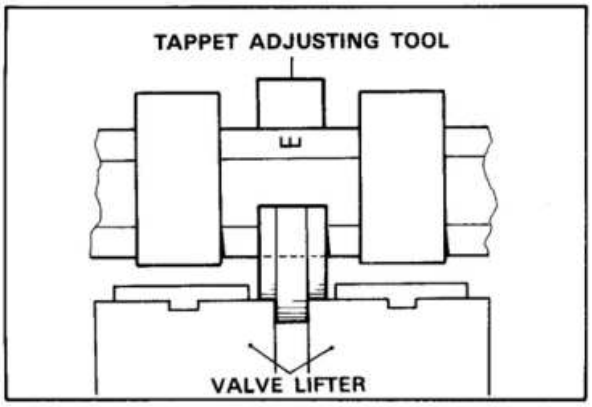
Intake valve (cold): 0.11 ~0.15mm (0.0043 -0.0059 in) Exhaust valve (cold): 0.16 ~ 0.20mm (0.0063 ~ 0.0079 in)



9. Valve clearance is adjusted by replacing the adjusting pad on the top of the valve lifter. Adjusting pads are available in 25 thicknesses, ranging from No. 200 (2.00 mm (0.079 in)) to No. 320 (3.20 mm (0.130 in) > in steps of 0.05 mm (0.002 in). The thickness of each pad is marked on the pad face that contacts the valve lifter (not the cam). Adjustment of the valve clearance is accomplished as follows:

a. There is a slot in each valve lifter. The slots must be positioned opposite of each other on the exhaust and intake side before the tappet adjusting tool is installed.
b. Turn the crankshaft until the camshaft identification mark (IN or EX) faces upward. Place the tappet adjusting tool under the camshaft with the tool match mark (•) and camshaft I.D. mark aligned.
c. Turn the crankshaft until the lobe of the tool depresses the valve lifters.





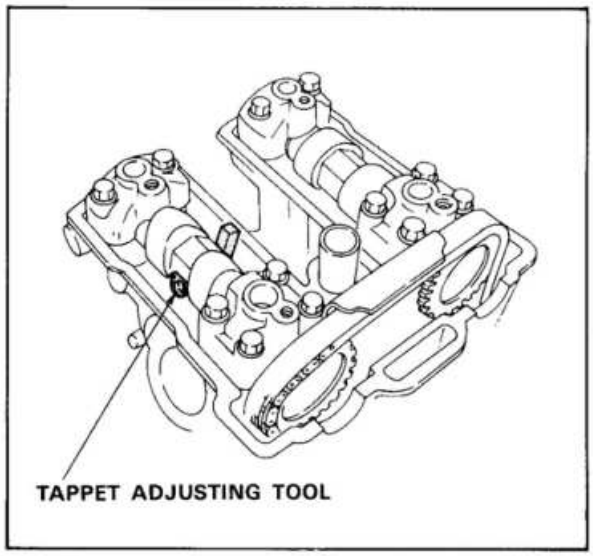
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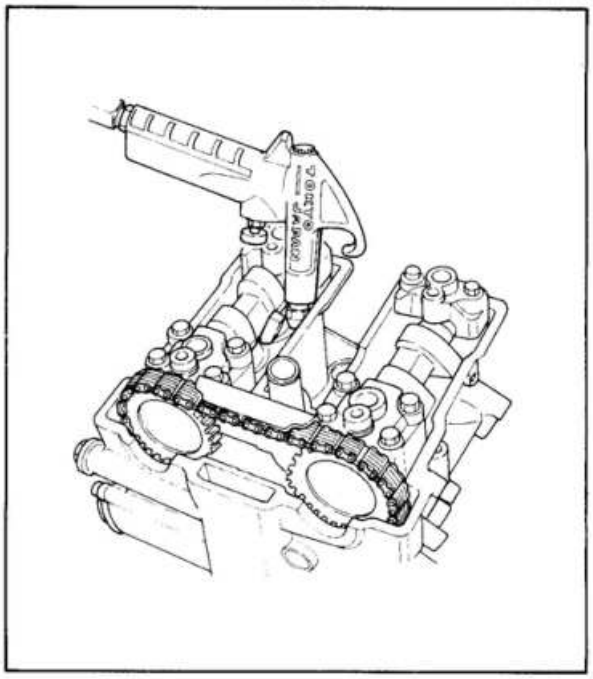
When turning the crankshaft, exercise care so that the tappet adjusting tool does not contact the mating surface of the cylinder head and the cylinder head cover.

NOTE:

When installing the tappet adjusting tool onto the camshaft, be careful so that the lobe of the tool does not ride on the pad.

d. Remove the pads from the lifters. There is a slot in each lifter. Use an air gun or a small screwdriver and a magnetic rod to remove the pads. Note the numbers on the pads.





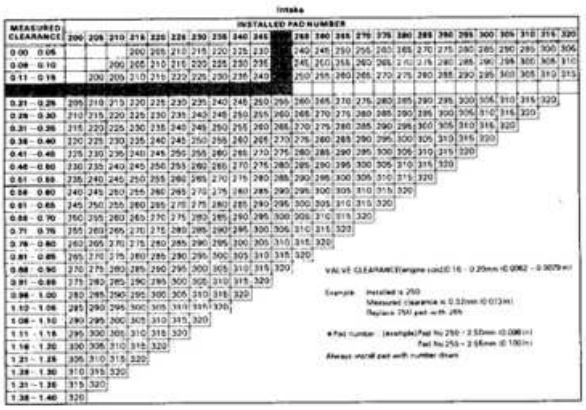
e. Proper pad selection is made as follows: (Use appropriate chart for exhaust or intake valves.)
   1) Find number of original (installed) pad number on chart. Read down on chart.
   2) Find measured valve clearance (from step 1) on chart. Read across.

NOTE:

The new pad number is to be used as a guide only. Verify the correctness of this choice in the following step(s).

3) At the intersection of installed pad number (down) and measured clearance (across) is a new pad number.

EXAMPLE:
Intake valve, installed pad:
No.250 (read down)
Measured clearance:
0.32mm (0.013 in) (read across)
New pad number: No.270
(intersection of down & across)



Intake

MEASURED CLEARANCE	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(engine cold)0.16~0.20mm (0.0062 ~ 0.0079 in)

Example Installed is 250
Measured clearance is 0.32mm (0.013 in)
Replace 250 pad with 265

*Pad number : (example)Pad No.250 = 2.50mm (0.098 in)
Pad No.255 = 2.55mm (0.100 in)

Always install pad with number down

Exhaust

MEASURED CLEARANCE	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
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
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
0.16~0.20		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315
0.21~0.25																									
0.26~0.30	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.31~0.35	210	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	215	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	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.46~0.50	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.51~0.55	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.56~0.60	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.61~0.65	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.66~0.70	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.71~0.75	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.76~0.80	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.81~0.85	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.86~0.90	265	270	275	280	285	290	295	300	305	310	315	320													
0.91~0.95	270	275	280	285	290	295	300	305	310	315	320														
0.96~1.00	275	280	285	290	295	300	305	310	315	320															
1.10~1.05	280	285	290	295	300	305	310	315	320																
1.06~1.10	285	290	295	300	305	310	315	320																	
1.11~1.15	290	295	300	305	310	315	320																		
1.16~1.20	295	300	305	310	315	320																			
1.21~1.25	300	305	310	315	320																				
1.26~1.30	305	310	315	320																					
1.31~1.35	310	315	320																						
1.36~1.40	315	320																							
1.41~1.45	320																								

VALVE CLEARANCE (engine cold) 0.21~0.25 mm (0.0083 ~ 0.0098 in)

Example Installed is 250
Measured clearance is 0.32 mm (0.013 in)
Replace 250 pad with 260

*Pad number : (example) Pad No.250 = 2.50 mm (0.098 in)
Pad No.255 = 2.55 mm (0.100 in)

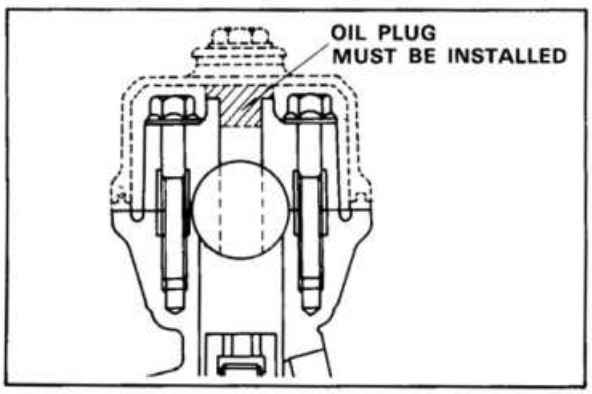
Always install pad with number down.

10. Install the new pad in the lifter. Install the pad with the number down.
11. Turn the crankshaft to remove the adjusting tool from the camshaft.
12. Turn the crankshaft to rotate cam several rotations. This will set the pad in the lifter.
13. Recheck the valve clearance. If the clearance is incorrect, repeat the proceeding steps until the proper clearance is obtained.
14. To assemble the motorcycle, reverse the disassembly procedures. Pay close attention to installation of the cylinder head cover.
15. Rotate the crankshaft approximately 290 degrees counterclockwise to TDC for the rear cylinder. Repeat the steps above, and check/adjust the valve clearance.
    Inspect the head cover gasket. If damaged, replace the gasket.
16. Install the head covers, and torque the bolts to specification.

Tightening torque: 10 Nm (1.0 m-kg, 7.2ft-lb)

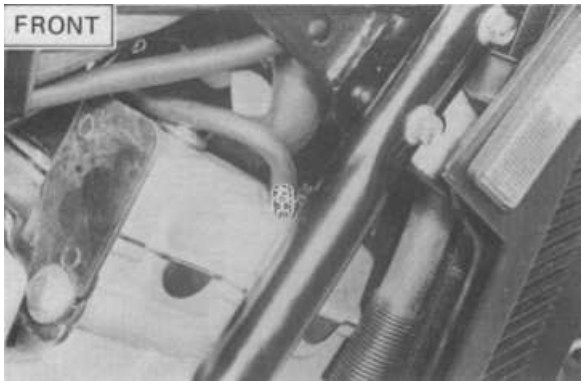
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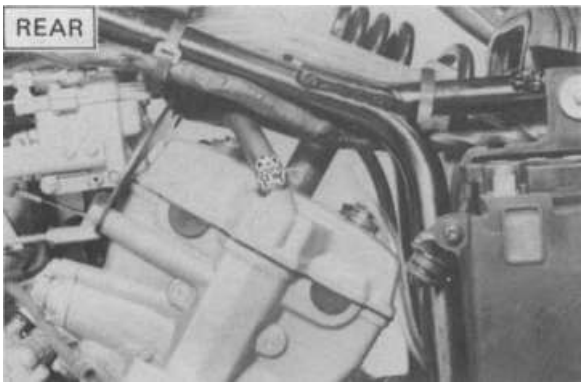
When installing the cylinder head cover, make sure all cam caps are covered with oil plugs.



NOTE:

The cylinder head cover should be so installed that the smaller crankcase ventilation pipe fitting hole is toward the front cylinder, and the larger one is toward the rear side.





17. Install the air baffle plate and radiator. Tighten the radiator securing bolts to specification.

Tightening torque: 7 Nm (0.7m-kg, 5.1 ft-lb)

18. Install the radiator cover and air filter assembly. Connect the crankcase ventilation pipes.
19. Install the fuel tank and connect the fuel and vacuum pipe lines. Tighten the fuel tank holding bolt to specification.

Tightening torque: 15 Nm (1.5m-kg, 11 ft-lb)

Spark plug

1. Check electrode condition and wear, insulator color, and electrode gap.
2. Clean the spark plug with spark plug cleaner if necessary. Use a wire gauge to adjust the plug gap to specification.
3. If the electrode becomes too worn, replace the spark plug.
4. When installing the plug, always clean the gasket surface, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
D8EA (NGK) or
X24ES-U(NIPPON DENSO)
Spark plug gap:
0.6-0.7 mm (0.024-0.028 in)
Spark plug tightening torque:
20 Nm (2.0 m-kg, 14 ft-lb)

Crankcase ventilation system

Check the ventilation pipe from the cylinder head cover on the each cylinder to the air filter assembly for cracks or damage; replace if necessary.

Fuel line

Check the fuel hoses and vacuum lines for cracks or damage; replace if necessary.

Exhaust system

1. Retighten the exhaust pipe flange bolts and muffler clamp bolts.

Tightening torque:
Exhaust pipe flange bolt
10 Nm (1.0 m-kg, 7.2 ft-lb)
Muffler clamp bolt
20 Nm (2.0 m-kg, 14 ft-lb)

2. Replace the exhaust pipe gasket(s) and/ or muffler gasket(s) if necessary.

Carburetor synchronization

Carburetors must be adjusted to open and close simultaneously. Adjust as follows:

NOTE:

Valve clearance must be set properly before synchronizing the carburetors.

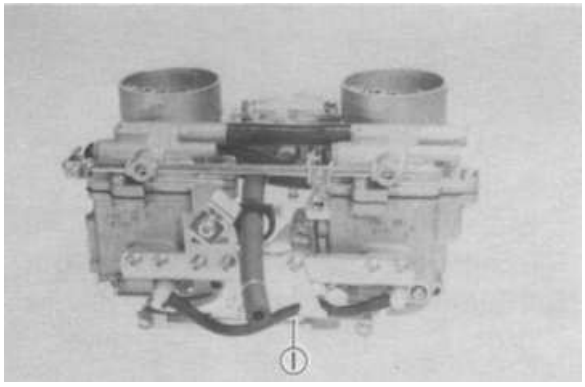
1. Remove the vacuum lines from each carburetor joint, and install the vacuum gauge lines to each carburetor joint.

NOTE:

The front cylinder carburetor joint has two vacuum lines coming out of it. Disconnect the smaller diameter line, and leave the larger line in place on the carburetor joint.



2. Turn the fuel cock to the "PRI" position.
3. Start the engine, and let it warm up.
4. Read the vacuum gauge. The readings for each carburetor should be the same. If not, adjust the synchronizing rod until the readings are the same.



1. Synchronizing rod

5. Reconnect the vacuum lines.

Idle speed

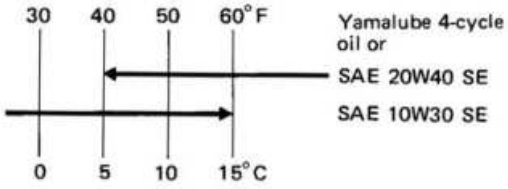
1. Start the engine, and warm it up for a few minutes.
2. Set the engine idle speed to the specified level by adjusting the throttle stop screw on the rear cylinder carburetor. Turning the throttle stop screw in (clockwise) increases the engine speed; turning it out (counter-clockwise) decreases the engine speed. Use a tachometer for checking and adjusting the engine speed.

Engine idle: 1,300 ± 50 r/min

Engine oil

Recommended oil

Use Yamalube 4-cycle oil or SAE 20W40 SE motor oil if the temperature does not go below 5°C (40°F). Use SAE 10W30SE motor oil if the temperature does not go above 15°C (60° F).



Oil level measurement

1. Place the motorcycle on its center-stand. Warm up the engine for several minutes.

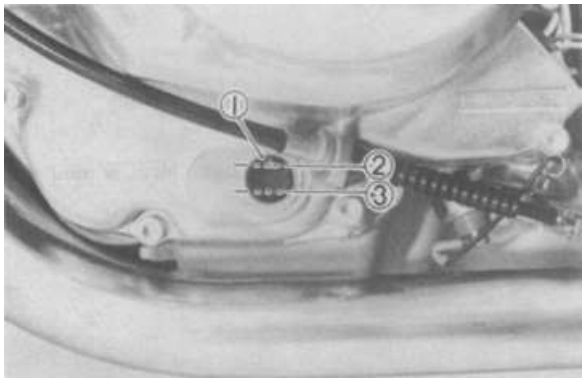
NOTE:

Be sure the motorcycle is positioned straight up when checking the oil level; a slight tilt toward the side can produce false readings.

2. With the engine stopped, check the oil level through the level window located at the lower part of the left side crankcase cover.

NOTE:

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

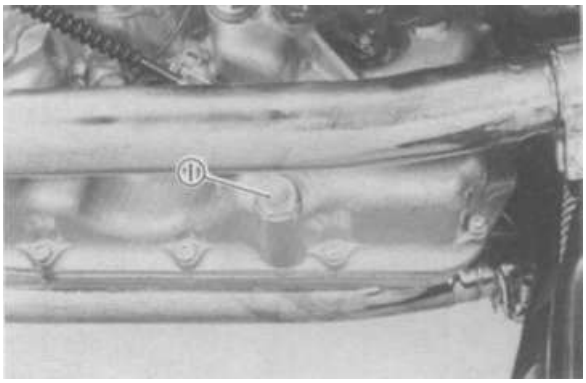


1. Level window 2. Maximum mark 3. Minimum mark

3. The oil level should be between the maximum and minimum marks. If the level is lower, add sufficient oil to raise it to the proper level.

Oil change (without changing the filter)

1. Start the engine and stop after a few minutes of warm-up.
2. Place an oil pan under the engine and remove the oil filler cap.
3. Remove the drain plug and drain the oil.

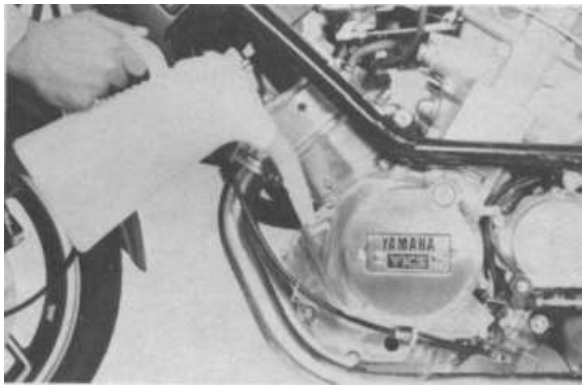


1. Engine drain plug

4. Reinstall the drain plug (make sure it is tight).

Drain plug torque: 43 Nm (4.3 m-kg, 31.0 ft-lb)

5. Add 2.4 L (2.1 Imp qt, 2.5 US qt) of engine oil through the oil filler hole. Reinstall the oil filler cap.



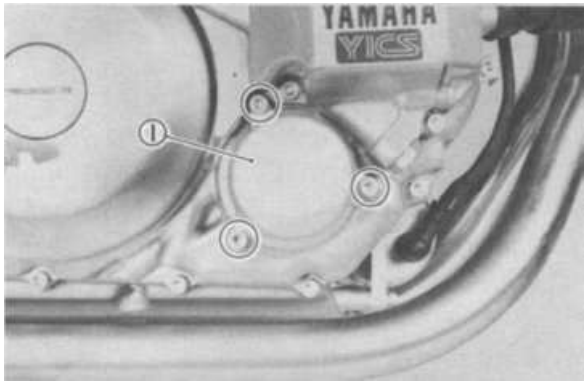
CAUTION:

Take care not to allow foreign material to enter the crankcase.

6. Start the engine, and let it warm up. During warm-up, check for oil leakage. If oil leaks, stop the engine immediately, and check for the cause.
7. Stop the engine and check the oil level.

Oil and filter change

1. Remove the drain plug and drain the oil.
2. Remove the oil filter bolt and filter element



1. Oil filter cover

3. Reinstall the drain plug (make sure it is tight).

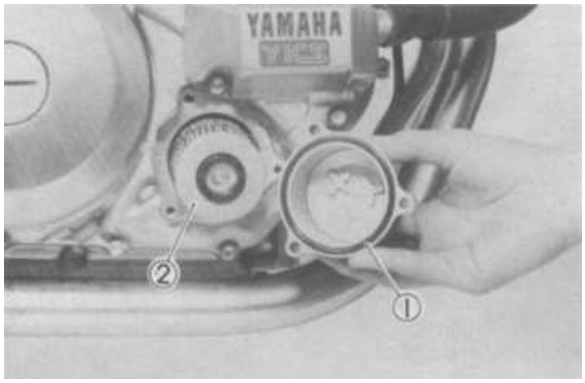
Drain plug torque:
43 Nm (4.3 m-kg, 31.0 ft-lb)

4. Install the new oil filter element, new O-ring, and filter cover; tighten the oil filter bolt.

Oil filter bolt:
10 Nm 1.0 m-kg, 7.2ft-lb)

NOTE:

Make sure the O-ring is positioned properly.

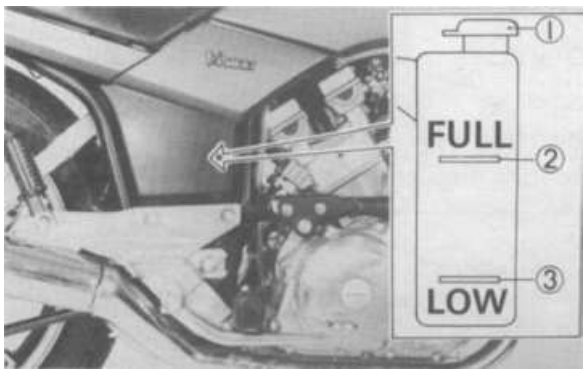


1. Proper O-ring position 2. Oil filter element

5. Add. 2.7 L (2.4 Imp qt, 2.9 US qt) of engine oil through the oil filler. Reinstall the oil filler cap.
6. After the replacement of engine oil and/or oil filter, be sure to check for the oil level and any oil leakage. The oil level indicator light should go off after the oil is filled.

Coolant

Check the coolant level in the reservoir tank when the engine is cold. The coolant level is satisfactory if it is between the FULL and LOW level on the tank. The coolant level will vary with engine temperature. However, if the level is on or below the LOW level, add tap water (soft water) until the "FULL" level is reached. Change the coolant every two years. (See "COOLING SYSTEM" for more detail.)



1. Coolant reservoir tank cap 2. Full level 3. Low level

WARNING:

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

CAUTION:

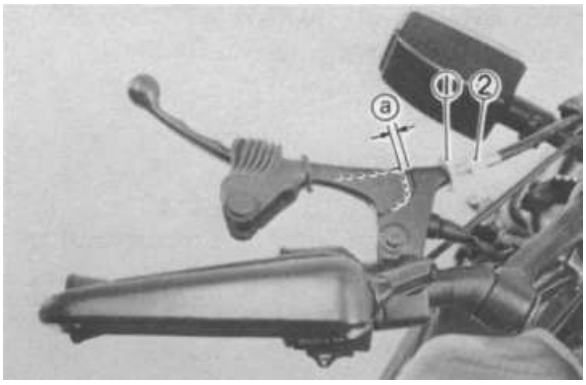
Hard water or salt water is harmful to the engine parts.
You may use boiled water or distilled water if you can't get soft water.

Reservoir tank capacity:
Total:
0.35 L(0.3 Impqt, 0.4 US qt)
From LOW to FULL level:
0.25 L(0.2 Impqt, 0.3 US qt)

Clutch adjustment

Free play adjustment

1. Loosen the clutch lever adjuster lock-nut.
2. Turn the cable adjuster either in or out until proper lever free play is attained. Tighten the locknut.



1. Locknut 2. Adjuster a. 2~3 mm (0.08-0.12 in)

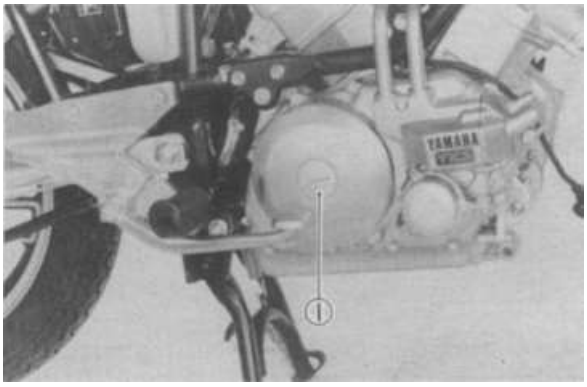
Clutch lever free play:
2 ~3 mm (0.08 ~0.12 in)

NOTE:

The above procedure provides for maximum cable free play to allow for proper clutch actuating mechanism adjustment.

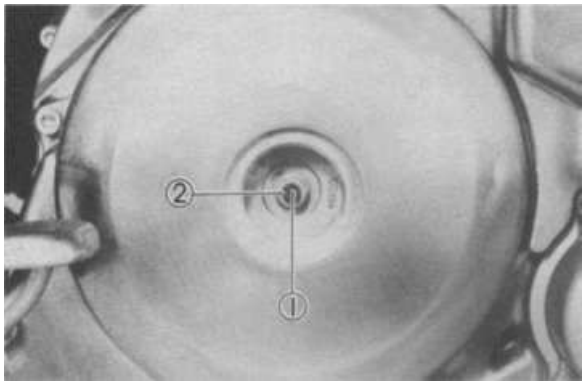
Mechanism adjustment

1. Fully loosen the cable inner wire length-adjuster locknut and screw in the adjuster until tight.
2. Turn the handle lever adjuster in.
3. Remove the clutch adjuster plug from the right side crankcase cover.



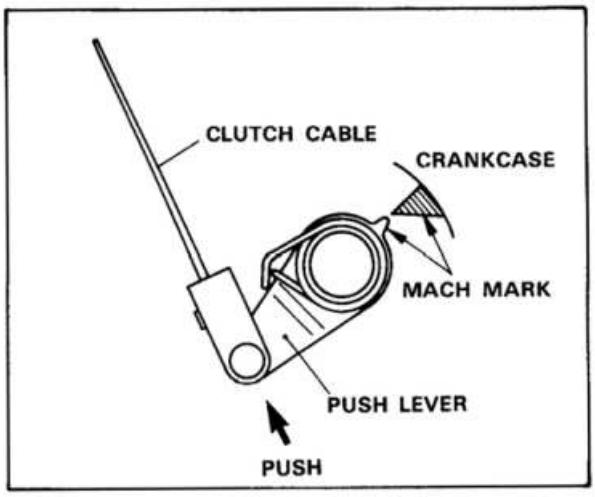
1. Clutch adjuster plug

4. Loosen the adjuster lock nut on the pressure plate.



1. Adjuster 2. Locknut

5. Move the push lever toward the front with your finger until it stops. With the push lever in this position, back out the adjusting screw, and as illustrated, align the mark on the end of the push lever with the mark (protuberance) on the crankcase.



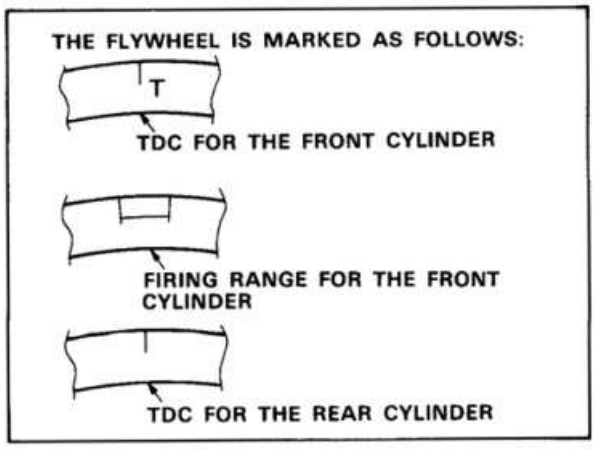
6. Tighten the adjuster lockout.

Tightening torque:
8 Nm (0.8 m-kg, 5.8ft-lb)

7. Adjust the clutch lever free play.

Checking ignition timing

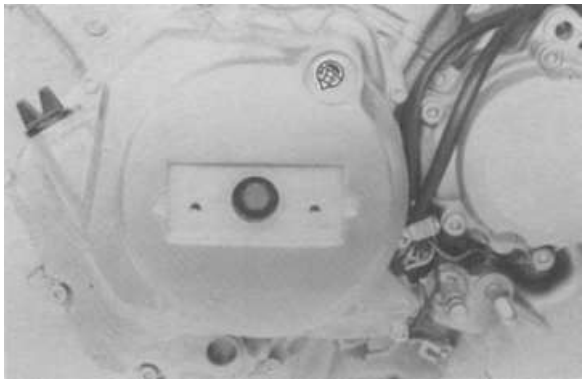
Check the ignition timing with a timing light by observing the stationary pointer and the marks stamped on the flywheel.



1. Remove the emblem plate and timing plug from the left side crankcase cover.
2. Connect the timing light to the front *(#1)* cylinder spark plug wire.
3. Start the engine, and keep the engine running at the specified speed. Use a tachometer to check the engine speed.

Engine Speed: 1,300 ± 50 r/min

4. The stationary pointer (in the timing window) should be within the firing range shown on the flywheel. If the pointer is not within the range or if it is not steady, check the flywheel and/or pickup assembly for tightness and/or damage. (See Chapter 7, "ELECTRICAL" for further information.)



5. Reinstall the generator cover.

Compression pressure measurement

Insufficient compression pressure will result in performance loss and may indicate leaking valves or worn or damaged piston rings.

1. Make sure the valve clearance is correct.
2. Warm up the engine for 2 ~ 3 minutes; stop the engine.
3. Remove both spark plugs.
4. Install a compression gauge.
5. Turn over the engine with the electric starter (make sure the battery is fully charged) with the throttle wide open until the pressure indicated on the gauge does not increase further. The compression should be within the specified levels.

Compression pressure (at seal level):

Standard:	980 kPa (10 kg/cm^2, 142 psi)
Minimum:	882 kPa (9 kg/cm^2, 128 psi)
Maximum:	1,079 kPa (11 kg/cm^2,156 psi)

WARNING:

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



6. If the pressure is too low, squirt a few drops of oil into the cylinder being measured. Measure compression again. If there is a higher reading than before (without oil), the piston rings may be worn or damaged. If the pressure remains the same after measuring with the oil, one or both rings and valves may be the source of the problem.
7. Check both cylinders. Compression pressure should not vary more than the specified value from one cylinder to the other.

Difference between each cylinder:
Less than 98 kPa (1.0 kg/cm^2, 14 psi)

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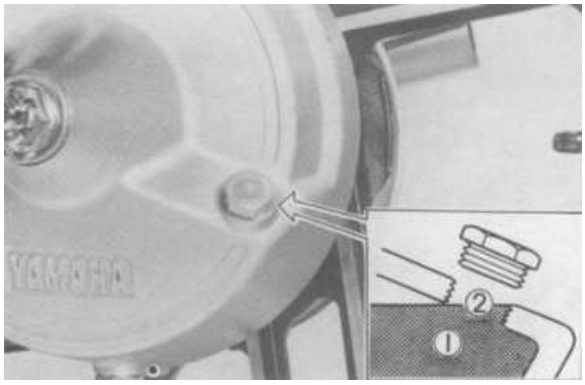
Final gear oil

Oil level measurement

1. Place the motorcycle on a level place, and place it on its centerstand. The engine should be cool (at atmospheric temperature).
2. Remove the oil filler cap and check the oil level. If it is not up to the brim of the filler hole, add oil.

CAUTION:

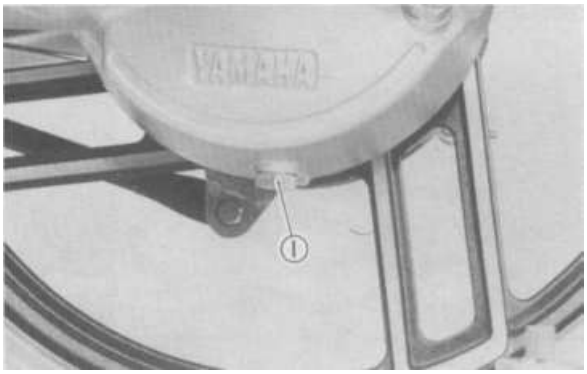
Take care not to allow foreign material to enter the final gear case.



1. Final gear oil 2. Correct oil level

Gear oil replacement

1. Place an oil pan under the final gear case.
2. Remove the final gear oil filler cap and the drain plug; drain the oil.



1. Final gear drain plug

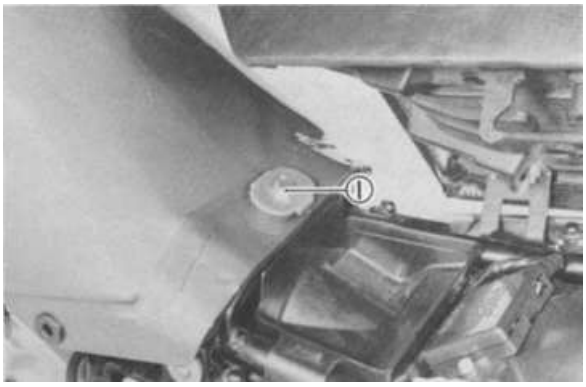
3. Reinstall and tighten the final gear drain plug.
4. Fill the gear case to the specified level.

Oil capacity:	0.20 L (0.18 Imp qt, 0.21 US qt)
Recommended oil:	SAE 80 API "GL-4" Hypoid gear oil
If desired, an SAE 80W90 Hypoid gear oil may be used for all conditions.	

5. Reinstall the filler cap securely.

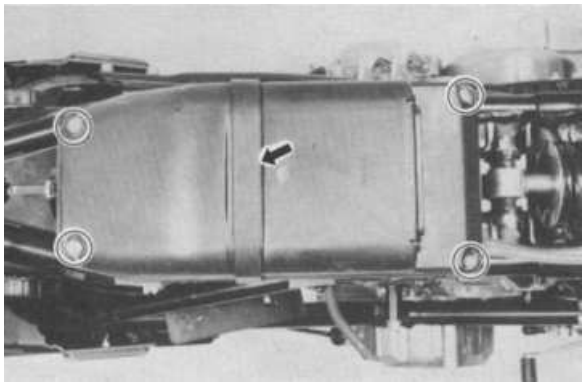
Air filter

1. Turn the fuel cock lever to "RES". Remove the fuel pipes from the fuel cock.
2. Remove the sidecovers.
3. Open the seat and remove the fuel tank holding bolt.

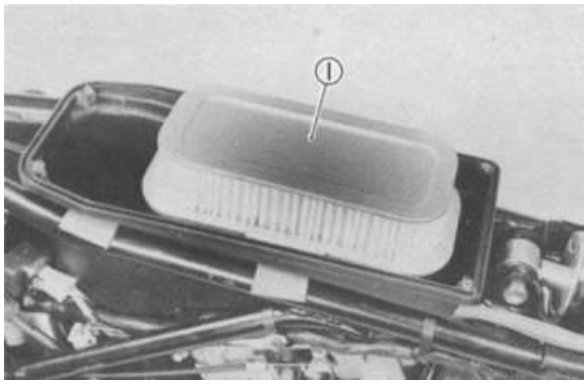


1. Fuel tank holding bolt

4. Remove the band and air filter case cover by removing the four screws.

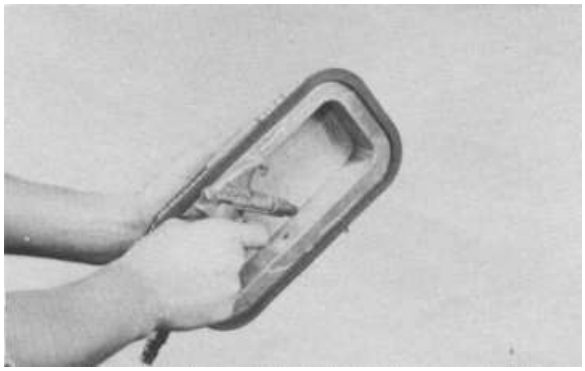


5. Pull out the element.



1. Air filter element

6. Tap the element lightly to remove most of the dust and dirt; then blow out the remaining dirt with compressed air from the inner surface of the element. If element is damaged, replace it.



7. Reassemble by reversing the removal procedure. Check whether the element is seated completely against the case.
8. The air filter element should be cleaned at the specified intervals.

CAUTION:

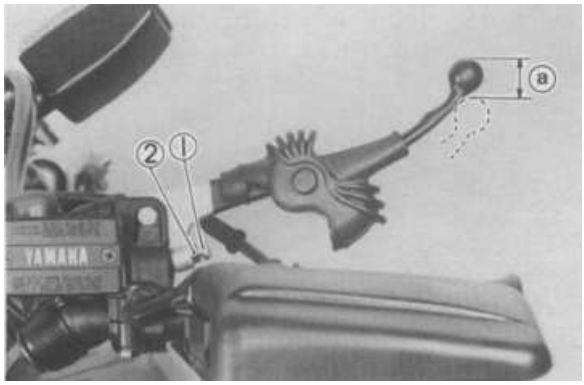
The engine should never be run without the air cleaner element installed; excessive piston and/or cylinder wear may result.

Front and rear brake

Front brake lever free play adjustment. The brake can be adjusted by simply adjusting the free play of the brake lever. The piston in the caliper moves forward as a brake pad wears out, automatically adjusting the clearance between the brake pads and brake disc.

CAUTION:

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

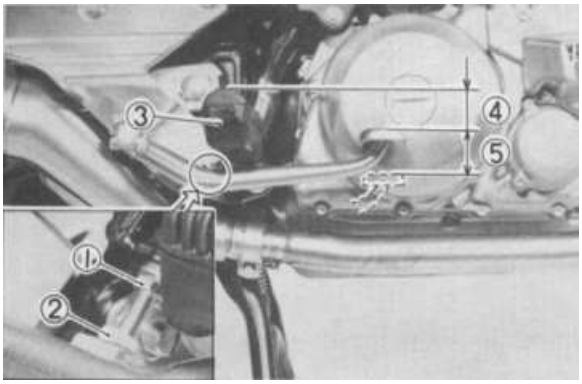


1. Adjuster 2. Locknut @ 5~8mm (0.2~0.3 in)

1. Loosen the adjuster locknut on the brake lever.
2. Turn the adjuster so that the brake lever movement at the lever end is 5 ~ 8mm (0.2 ~ 0.3 in) before the adjuster contacts the master cylinder piston.
3. After adjusting, tighten the locknut.

Rear brake pedal height adjustment

1. Loosen the adjuster locknut (for pedal height).
2. By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal position so that its top end is flush with the top of the footrest.
3. Secure the adjuster locknut.



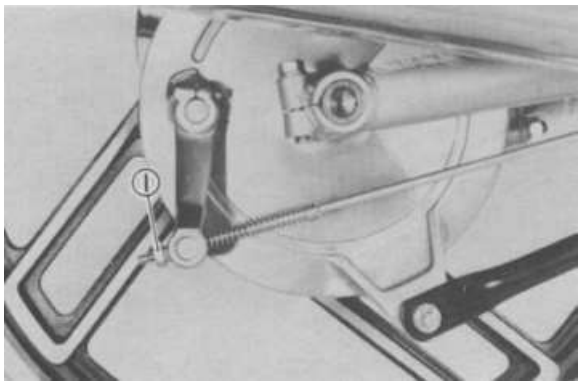
1. Adjuster bolt (for pedal height)
2. Locknut
3. Footrest
4. Pedal height 20mm (0.8 in)
5. Free play 15 -25 mm (0.6 ~1.0 in)

WARNING:

After adjusting the pedal height, the brake-pedal free play should be adjusted.

Free play

1. The rear brake should be adjusted to suit the rider's preference, but free play at the end of the brake pedal should be 15 ~25mm (0.6 ~ 1.0 in). To adjust, turn the adjuster on the brake rod clockwise to reduce play; turn the adjuster counterclockwise to increase play.



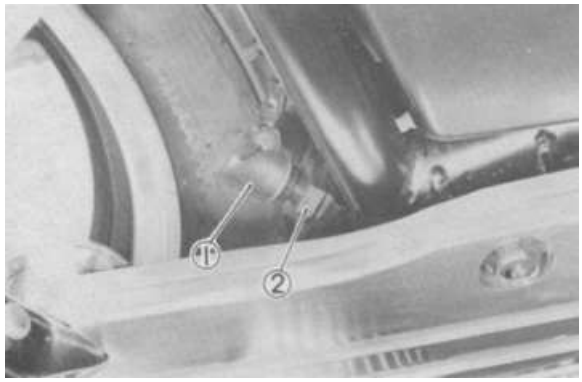
1. Adjuster

WARNING:

Check the operation of the brake light after adjusting the rear brake.

Brake light switch adjustment

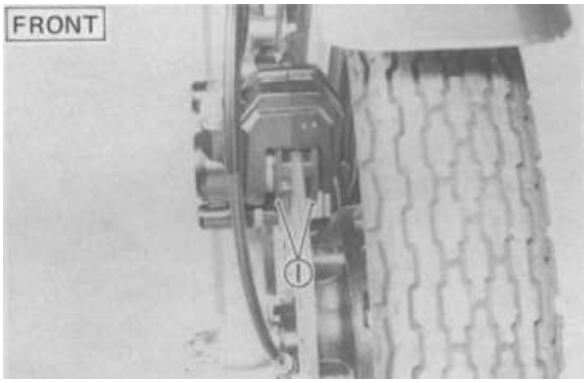
The brake light switch is operated by the movement of the brake pedal. To adjust, hold the switch body with your hand so it does not rotate and turn the adjusting nut. Proper adjustment is achieved when the brake light comes on slightly before the brake begins to take effect.



1. Main body
2. Adjusting nut

Front brake pad

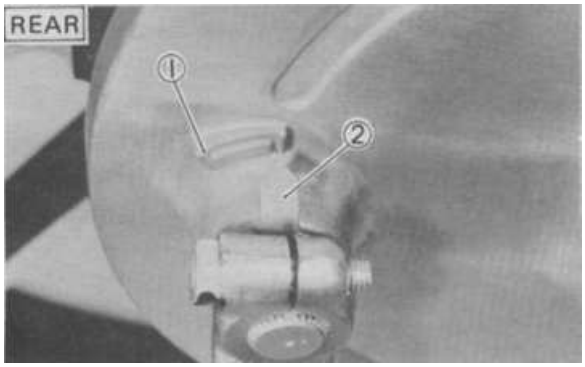
To check, examine the pads in the front brake. If any pad is worn to the wear limit, replace both pads in the caliper.



1. Wear indicator

Rear brake shoe

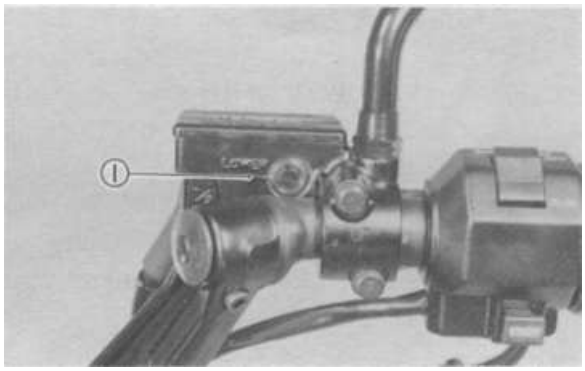
To check, examine the wear indicator position while depressing the brake pedal. If the indicator reaches to the wear limit line, replace the shoes.



1. Wear limit 2. Wear indicator

Brake fluid

Insufficient brake fluid may allow air to enter the brake system, possibly causing the brake to become ineffective. Check the brake fluid level and replenish when necessary, observing these precautions:



1. Lower level

- Use only the designated quality brake fluid; otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.

Recommended brake fluid: DOT #3

- Refill with the same type and brand of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.
- Be careful that water or other contaminants do not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.
- Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

Cable Inspection and lubrication

The throttle twist grip assembly should be greased when the cable is lubricated since the grip must be removed to get at the end of the throttle cable. Two screws clamp the throttle housing to the handlebar. Once these two are removed, the end of the cable can be held high to pour in several drops of lubricant. With the throttle grip disassembled, coat the metal surface of the grip assembly with a suitable all-purpose grease to cut down friction.

1. Damage to the outer housing of the various cables may cause corrosion. Often free movement will be obstructed. An unsafe condition may result. Replace such cables as soon as possible.
2. If the inner cables do not operate smoothly, lubricate or replace them.

Recommended lubricant: Yamaha chain and cable lube or 10W30 motor oil.

Brake and change pedals/brake and clutch levers

Lubricate the pivoting parts of each lever and pedal.

Recommended lubricant: Yamaha chain and cable lube or 10W30 motor oil

Centerstand and sidestand

Lubricate the centerstand and sidestand at their pivot points.

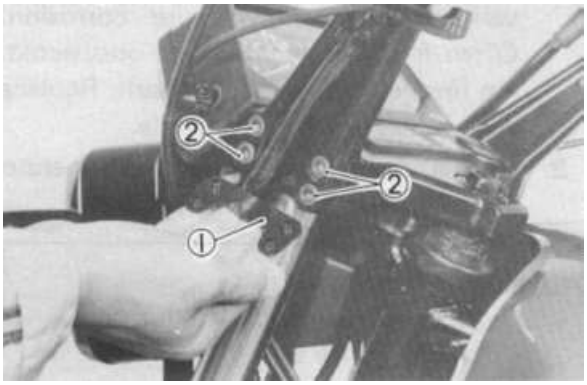
Recommended lubricant: Yamaha chain and cable lube or 10W30 motor oil

Front fork oil change

WARNING:

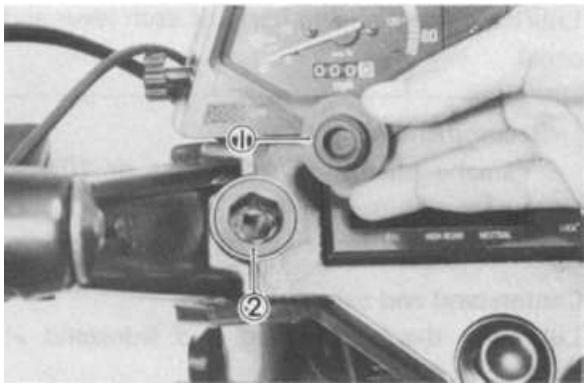
Securely support the motorcycle so there is no danger of it falling over.

1. Raise the motorcycle so that there is no weight on the front end of the motorcycle. Remove the handlebar if necessary.
2. Remove the wire holders and loosen the front fork pinch bolts.

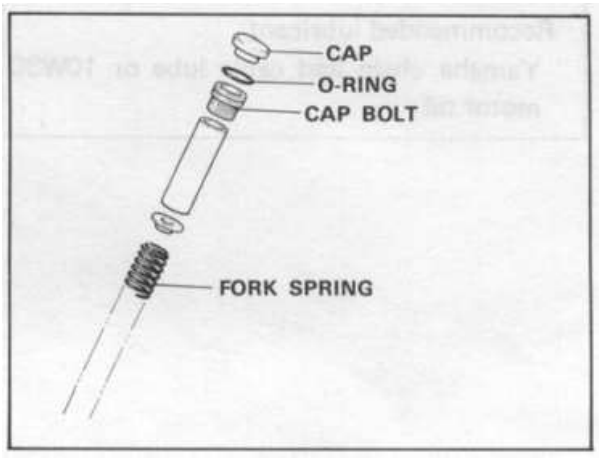


1. Wire holder 2. Pinch bolt

3. Remove the caps and fork cap bolts from the inner fork tubes.



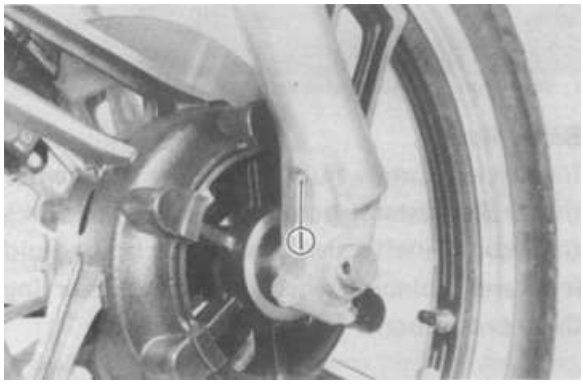
1. Cap 2. Fork cap bolt



4. Place an open container under each drain hole. Remove the drain screw from each outer tube.

WARNING:

Do not let oil contact the disc brake components. If any oil should contact the brake components, it must be removed before the motorcycle is operated. Oil will cause diminished braking capacity and will damage the rubber components of the brake assembly.



1. Drain screw

5. When most of the oil has drained, slowly raise and lower the outer tubes to pump out the remaining oil.
6. Inspect the drain screw gasket. Replace if damaged. Reinstall the drain screw.
7. Pour the specified amount of oil into the fork inner tube.

Front fork oil (each fork):
257 cm^3 (9.0 Imp oz, 8.7 US oz)
Yamaha fork oil 15 wt or equivalent

8. After filling, slowly pump the forks up and down to distribute the oil.
9. Inspect the 0-ring on the fork cap bolt. Replace O-ring if damaged.
10. Reinstall the fork cap bolts, and tighten the front fork pinch bolts.

Tightening torque:
Fork cap bolt:
20 Nm (2.0m-kg, 14ft-lb)
Front fork pinch bolt:
20 Nm (2.0m-kg, 14ft-lb)

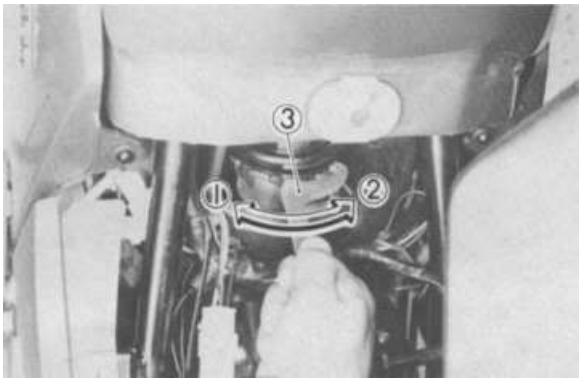
11. Reinstall the wire holders and caps.

Rear shock absorber adjustment.

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

1. Open the seat.
2. To increase preload, raise the spring seat. To decrease preload, lower the spring seat.

	Hard			STD	Soft
Adjusting Position	5	4	3	2	1



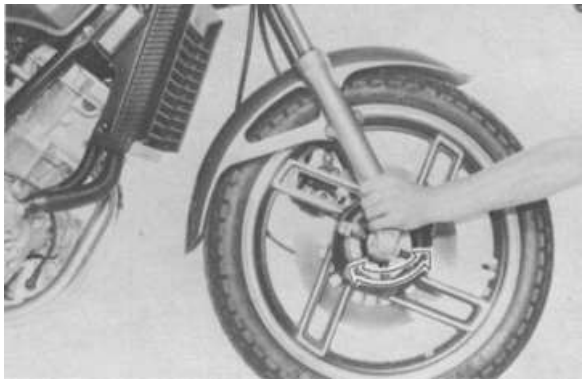
1. Stiffer 2. Softer 3. Special nut wrench

3. Replace the seat in the original position.

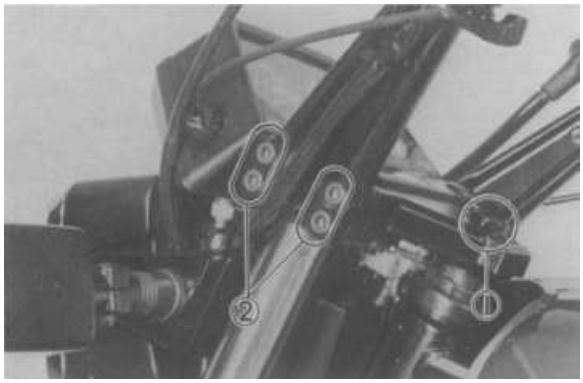
Steering head adjustment

The steering assembly should be checked periodically for looseness.

1. Raise the front end of the motorcycle so that there is no weight on the front wheel.
2. Grasp the bottom of the forks and gently rock the fork assembly backward and forward, checking for looseness in the steering assembly bearings.

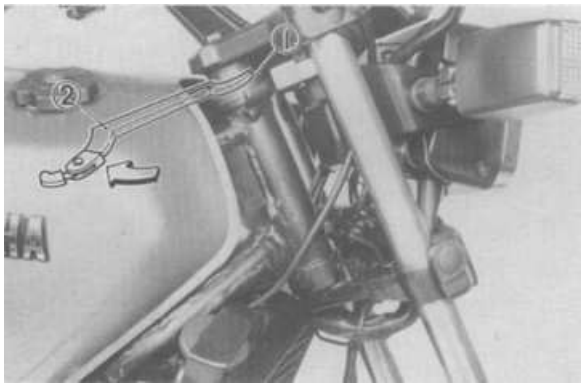


3. If the steering head is loose, adjust it. Loosen the front fork pinch bolts and steering stem bolt.



1. Steering stem bolt 2. Pinch bolt

4. Use a steering nut wrench to loosen the top steering ring nut. The top nut serves as a locknut.
5. Tighten the lower steering ring nut until the steering head is tight but does not bind when the forks are turned.



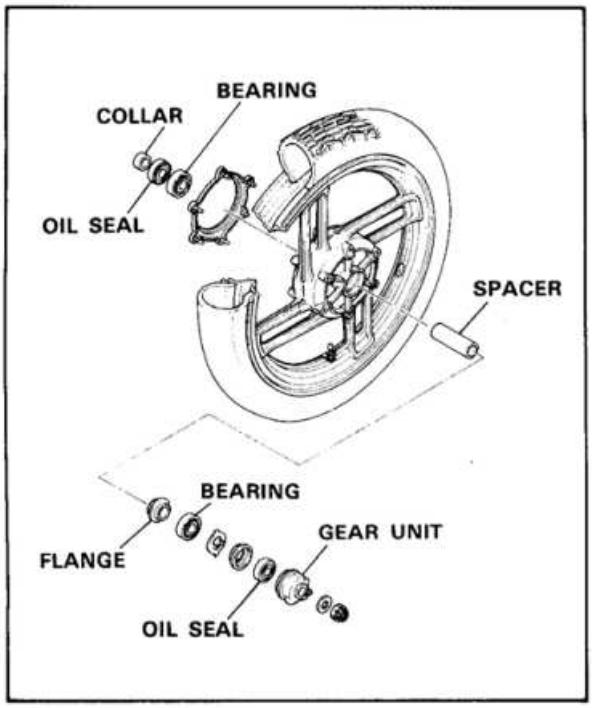
1. Steering ring nut 2. Steering nut wrench

6. Retighten the top steering ring nut, steering stem bolt, and the front fork pinch bolts in that order.
7. Recheck steering adjustment to make sure there is no binding when the forks are moved from lock to lock. If necessary, repeat the adjustment procedure.

Wheel bearings

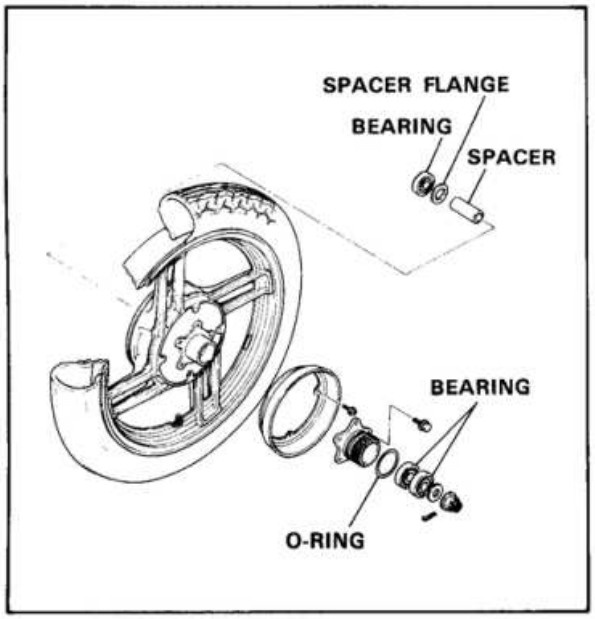
If a rolling rumble is noticed and increases with increasing wheel speed (not engine or transmission speed), the wheel bearings may be worn. Check the wheel bearings for both the front and rear wheels.

Front wheel



1. Raise the front end of the motorcycle, and spin the wheel by hand. Touch the axle or front fender while spinning the wheel. If you feel any excessive vibration, the bearings are rough and should be replaced.

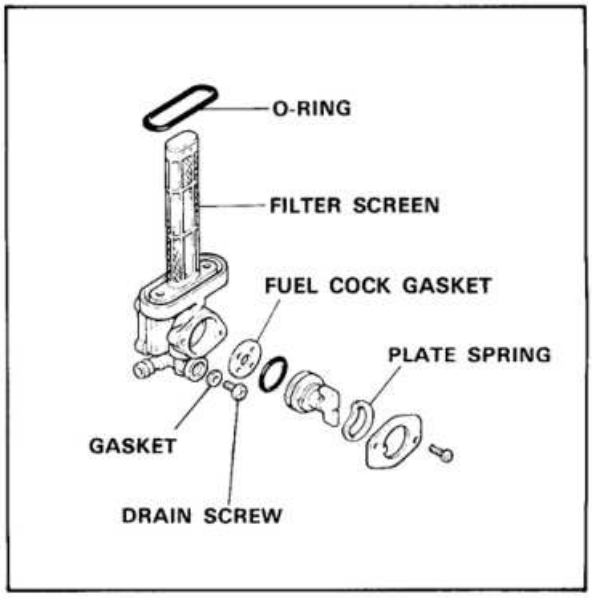
Rear wheel



1. Remove the rear wheel, and check the bearing movement with your finger. Replace the bearings if they are rough or worn.

Fuel cock

If either fuel cock is leaking or is excessively contaminated, it should be removed from the fuel tank and inspected.



1. Remove the fuel tank and position it so that fuel will not spill when the fuel cock is removed.
2. Remove the fuel cock and inspect the filter screen. Replace the filter if it is seriously contaminated.
3. Remove the screws on the front and rear of the fuel cock; remove the plate, gaskets, lever, and diaphragm.
4. Inspect all components, and replace any that are damaged. If the diaphragm is damaged in any way or if the fuel cock gasket surfaces are scratched or corroded, the fuel cock assembly must be replaced. If there is abrasive damage to any components, the fuel tank must be drained and flushed.
5. Reassemble the fuel cock, and install it on the fuel tank.

Tubeless tires and aluminum wheels

This motorcycle is equipped with aluminum wheels designed to be compatible with either tube or tubeless tires. Tubeless tires are installed as standard equipment.

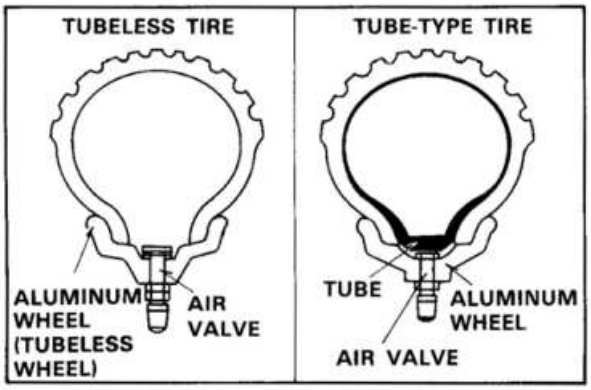
WARNING:

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

Tube-type wheel — Tube-type tires only

Tubeless-type wheel — Tube-type or tubeless tires

When using tube-type tires, be sure to install the proper tube.



To insure maximum performance, long service, and safe operation, note the following precautions:

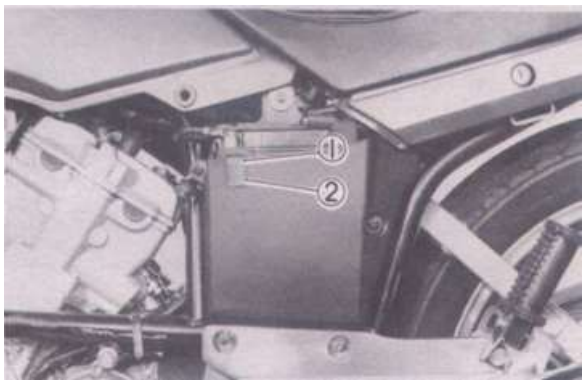
1. Check tire pressure before riding; adjust as necessary.
2. Before operation, always check the tire surfaces for wear and/or damage; look for cracks, glass, nails, metal fragments, stones, etc. Correct any such hazard before riding.
3. Always inspect the aluminum wheels before a ride. Place the motorcycle on its centerstand and check for cracks, bends or warpage of the wheels. Do not attempt even small repairs to the wheel. If a wheel is deformed or cracked, it must be replaced.
4. Tires and wheels should be balanced whenever either one is changed or replaced. Failure to have a wheel assembly balanced can result in poor performance, adverse handling characteristics, and shortened tire life.
5. After installing a tire, ride conservatively to allow the tire to seat itself on the rim properly. Failure to allow proper seating may cause tire failure resulting in damage to the motorcycle and injury to the rider.
6. After repairing or replacing a tire, check to be sure the valve stem lock nut is securely fastened. If not, torque it as specified.

Tightening torque:
2 Nm (0.2m - kg, 1,4ft-lb)

ELECTRICAL

Battery

1. The fluid level should be between the upper and lower level marks. Use only distilled water if refilling is necessary.

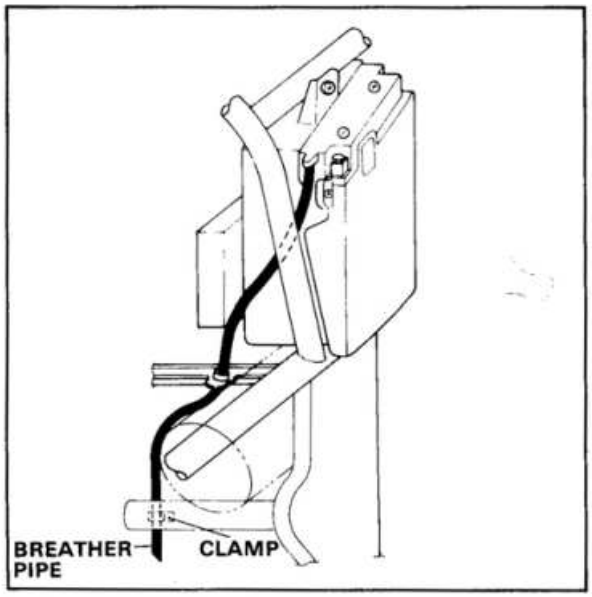


1. Upper level 2. Lower level

CAUTION:

Normal tap water contains minerals which are harmful to a battery; therefore, refill only with distilled water.

2. Always make sure the connections are correct when installing the battery. Make sure the breather pipe is properly connected, properly routed, and is not damaged or obstructed.



CAUTION:

The battery must be charged before using to ensure maximum performance. Failure to charge the battery properly before first use or a low electrolyte level will cause premature failure of the battery. Charging current: 1.6 amps/10 hrs. or until the specific gravity reaches 1.280 at 20°C (68°F)

WARNING:

Battery electrolyte is poisonous and dangerous, causing severe burns, etc. It contains sulfuric acid. Avoid contact with skin, eyes, or clothing.

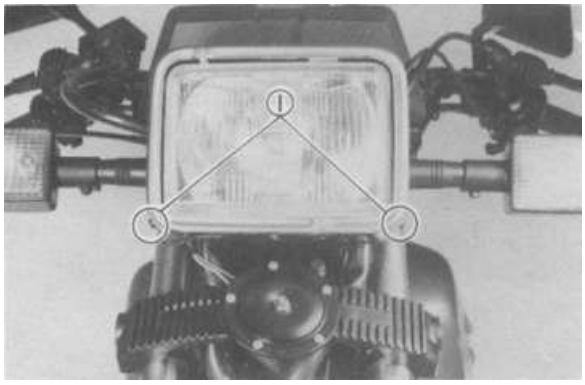
Antidote: EXTERNAL - Flush with water. INTERNAL — Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention. Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in closed space. Always shield eyes when working near batteries.
KEEP OUT OF REACH OF CHILDREN

Headlight

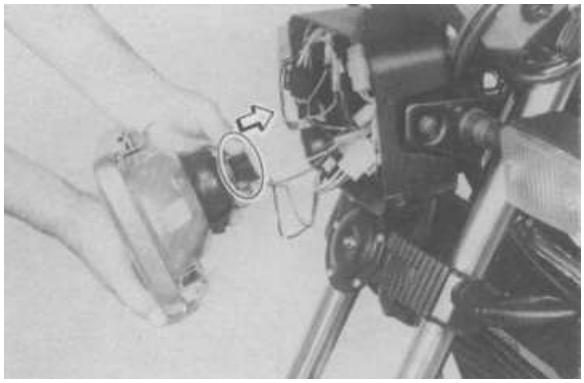
Headlight bulb replacement

1. Remove the two screws holding the light unit assembly to the headlight body.



1. Holding screw

2. Disconnect the lead wires and remove the light unit assembly.



3. Turn the bulb holder counterclockwise and remove the defective bulb.



4. Slip a new bulb into position and secure it with the bulb holder.

CAUTION:

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

WARNING:

Keep flammable products or your hand away from the bulb while it is on; it gets hot. Do not touch the bulb until it cools down.

5. Reinstall the light unit assembly to the headlight body. Adjust the headlight beam if necessary.

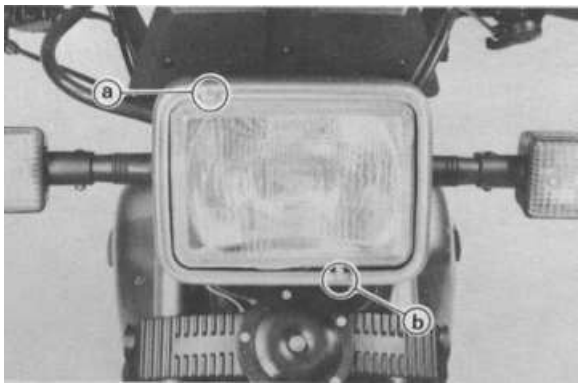
Headlight beam adjustment

1. Horizontal adjustment:

To adjust the beam to the right (as you're sitting on the bike), turn the adjusting screw clockwise. To adjust the beam to the left, turn the screw counterclockwise.

2. Vertical adjustment:

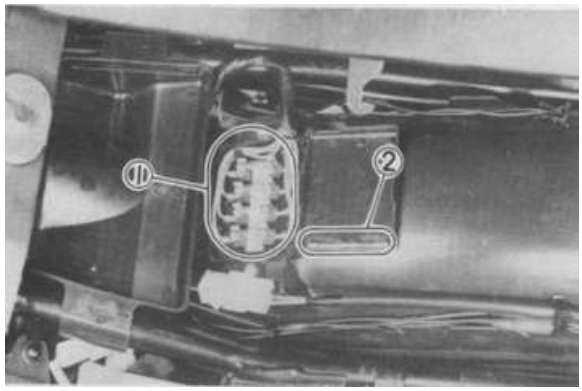
Loosen the adjusting screw under the headlight body. Adjust vertically by moving the headlight body. When proper adjustment is attained, retighten the adjusting screw.



a. Horizontal adjusting screw b. Vertical adjusting screw

Fuse

1. The fuse block is located under the seat.



1. Fuse 2. Spare fuse

2. If any fuse is blown, turn off the ignition switch and the switch in the circuit in question; install a new fuse of proper amperage. Turn on the switches, and see if the electrical device operates. If the fuse immediately blows again, check the circuit in question (refer to Chapter 6, "ELECTRICAL").

WARNING:

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

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ENGINE OVERHAUL

ENGINE REMOVAL

NOTE:

It is not necessary to remove the engine in order to remove the front cylinder, clutch and/or the AC magneto.

Preparation for removal

1. All dirt, mud, dust, and foreign material must be cleaned from the engine before the engine is removed and disassembled. This will help keep foreign material out of the engine oil.
2. Before engine removal and disassembly, be sure that you have the proper tools and cleaning equipment. With them you can perform a clean and efficient job.

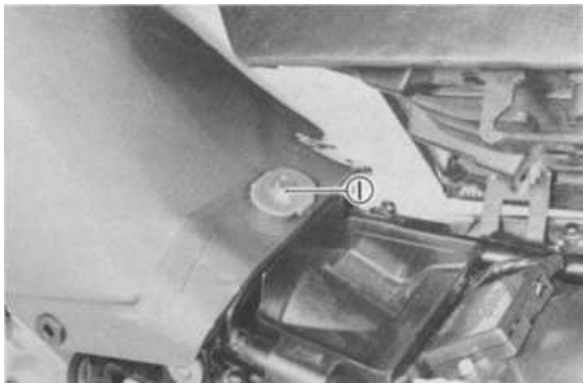
NOTE:

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 their order of disassembly. This will speed up assembly and help assure that all parts are correctly reinstalled in the engine.
4. Place the motorcycle on its centerstand. Start the engine and let it warm-up. Stop the engine and drain the engine oil.
5. Remove the three (3) drain bolts and thermostatic valve cover to drain the coolant completely.
6. Remove the left and right sidecovers.

Fuel tank

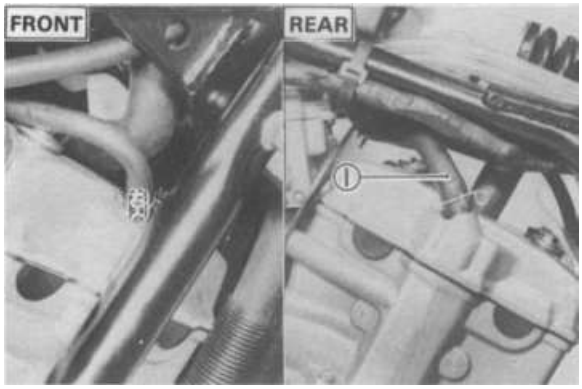
1. Turn the fuel cock to "ON".
2. Disconnect the fuel and vacuum lines from the fuel cock.
3. Open the seat and remove the fuel tank holding bolt.



1. Fuel tank holding bolt

Air filter and air baffle plate

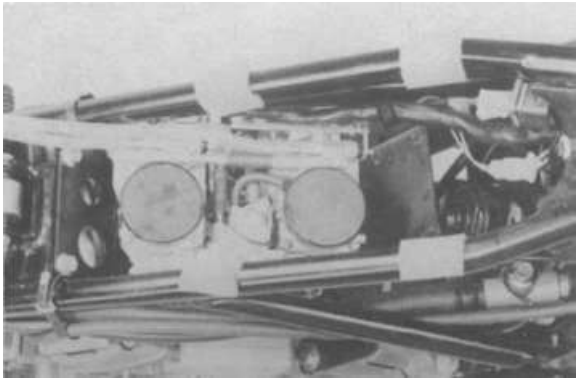
1. Remove the air filter assembly holding band.
2. Loosen the two air filter assembly holding screws.
3. Disconnect the crankcase ventilation pipe from each cylinder head cover.



1. Crankcase ventilation pipe

NOTE:

After removing the air filter assembly, cover the carburetor with a clean cloth to keep dust and dirt out of it.



Battery

1. Disconnect the battery leads.

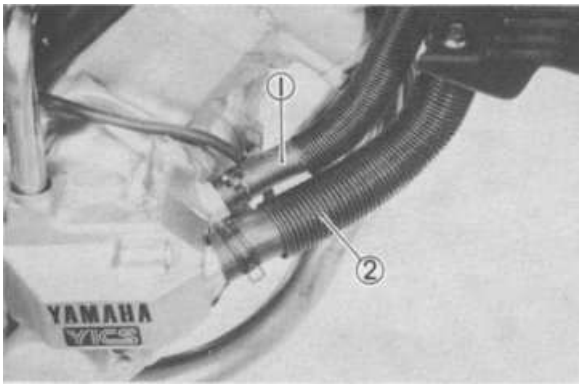
NOTE:

Disconnect the negative lead first.



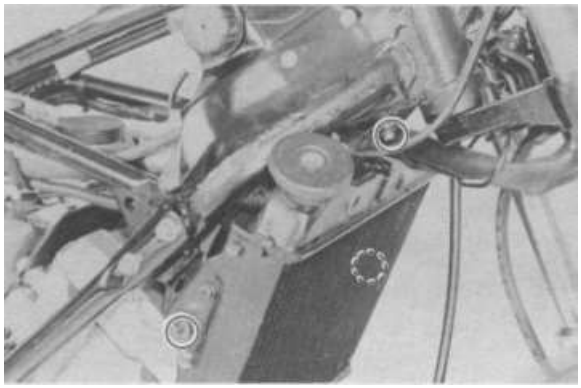
Radiator

1. Disconnect the bypass pipe and outlet pipe from the right-side crankcase cover.



1. Bypass pipe 2. Outlet pipe

2. Disconnect the inlet pipe and reservoir pipe from the radiator.
3. Disconnect the electric fan lead.
4. Remove the radiator holding bolts and remove the radiator.



Radiator holding bolt

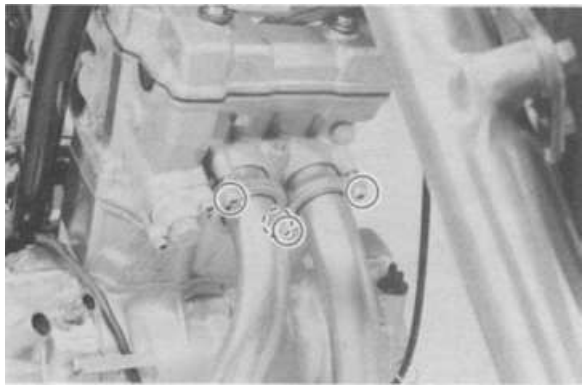
5. Drain the cooling system: First, remove the air breather bolt in the hose junction. Then remove the two cylinder drain plugs, the main drain plug, and finally, remove the thermostatic cover. This will ensure that the coolant is completely drained.

WARNING:

Do not bend or damage any of the radiator fins when removing the radiator from the motorcycle or when storing it.

Exhaust pipes and mufflers

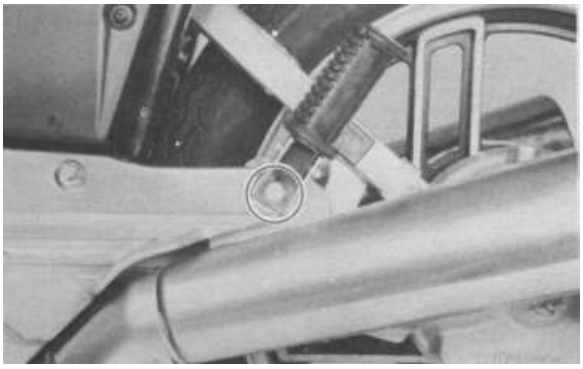
1. Remove the exhaust pipe flange bolts from the front cylinder head.



2. Loosen the muffler clamp bolts and remove the exhaust pipes.
3. Loosen the muffler clamp bolt at the rear cylinder.

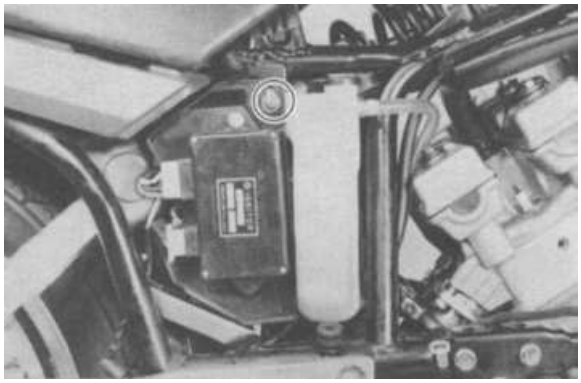


4. Remove the muffler and passenger foot-rest securing bolt from each muffler bracket. Remove the muffler assembly and the passenger footrests.



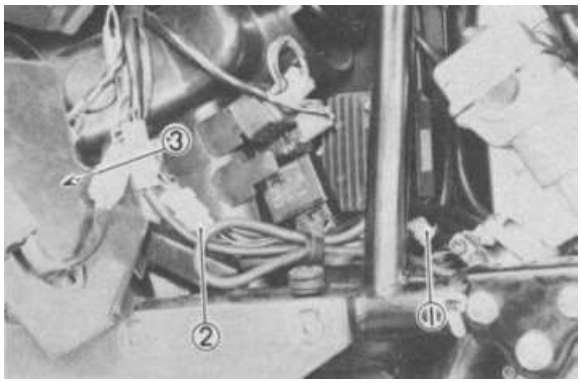
Leads and couplers

1. Remove the T.C.I, unit bracket and reservoir tank securing screw. Then remove the T.C.I, unit and reservoir tank from the frame.



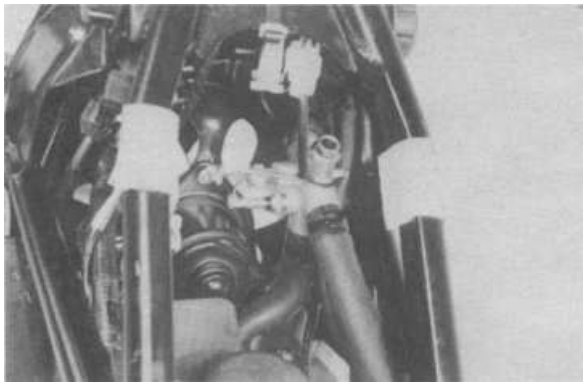
2. Disconnect the following couplers and leads.

- A.C. magneto lead
- Sidestand switch lead
- Pickup coil lead



1. AC magneto lead 2. Sidestand switch lead
3. Pickup coil lead

- Thermo-unit lead
- Thermostatic switch
- Starter motor lead
- Negative (—) lead

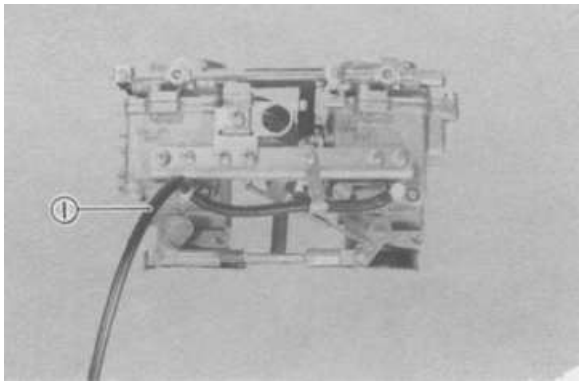


1. Thermostatic switch

Cables and pipes

1. Disconnect the following cables.
    - Clutch cable
    - Choke cable
    - Throttle cable

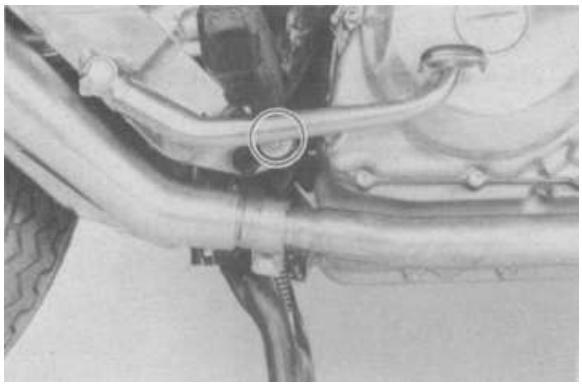
2. Disconnect the carburetor breather pipe from the front carburetor.



1. Breather pipe

Footrests and sidestand

1. Remove the lower engine mounting nuts, and remove the front footrests.



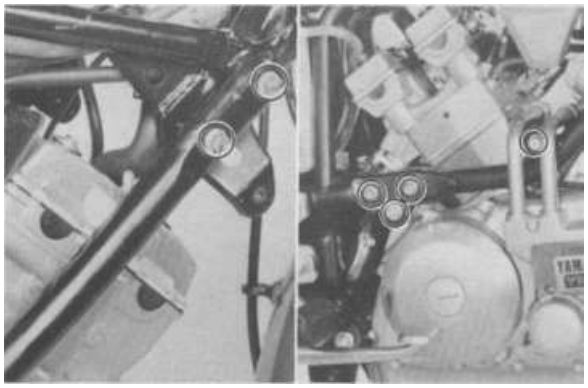
2. Remove the change rod pinch bolt and sidestand securing nut.
3. Remove the sidestand with the change pedal assembly.

Engine removal

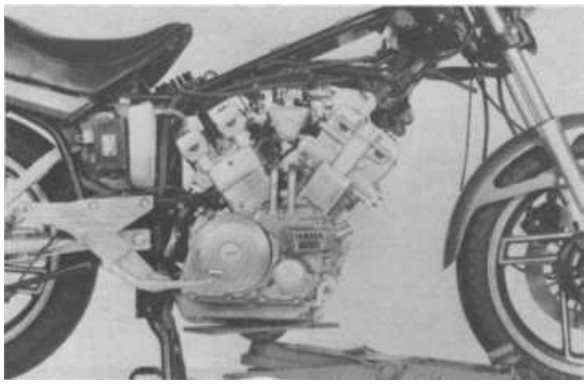
NOTE:

In addition to the engine mounting bracket cylinder, four mounting bolts hold the engine in place: a thru-bolt, a large threaded stud, and one bolt on each side of the engine.

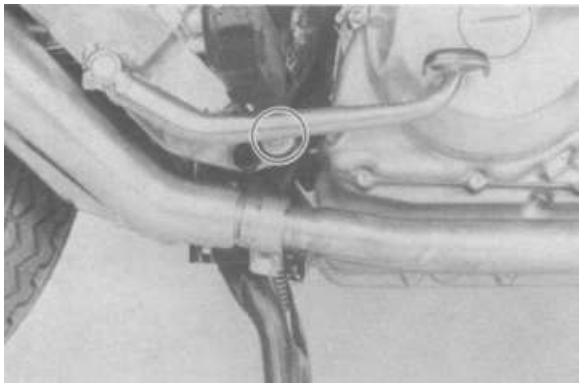
1. First, remove the right side frame tube and the engine mounting bracket.



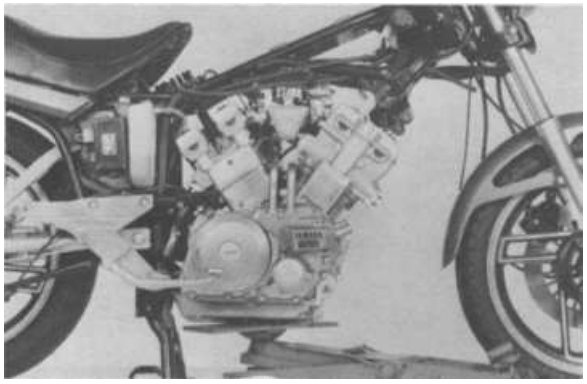
2. Place a suitable stand under the engine, and remove the last three mounting bolts.



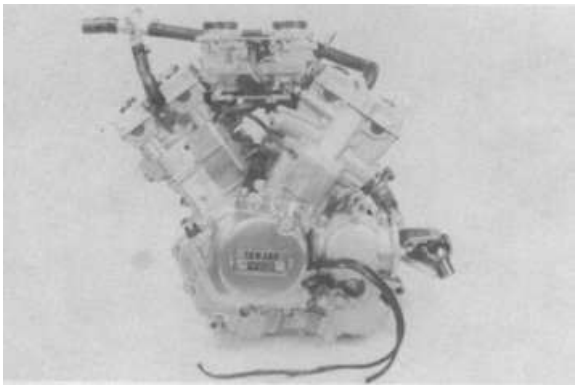
3. With the engine mounting bolt removed from the left side frame tube, remove the thru-bolt. The engine should pivot forward and down onto the stand, and the #2 cylinder exhaust pipes should separate from their manifolds.



4. Finally, push the threaded stud through the frame and pull the engine forward. This will disengage the engine from the drive shaft, and the engine can be removed from the right side of the frame.



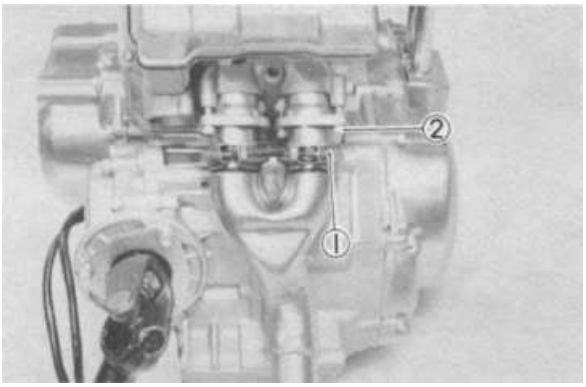
ENGINE DISASSEMBLY



Carburetors, rear exhaust pipes, and inlet pipe

1. Disconnect Y.I.C.S. pipe from each cylinder and disconnect the fuel pump pipe from the carburetor joint.
2. Loosen the carburetor outlet joint clamp on each carburetor, and remove the carburetors.

3. Remove the carburetor joint from each cylinder.
4. Remove the exhaust pipe clamp and flange bolts from the rear cylinder. Remove the exhaust pipes.

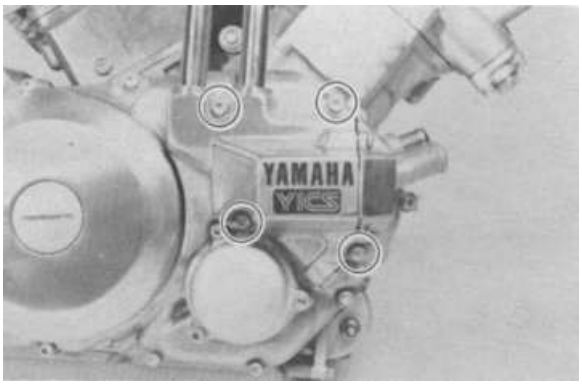


1. Clamp bolt 2. Flange bolt

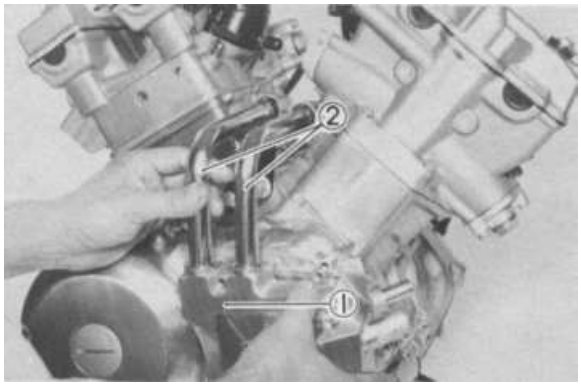
5. Disconnect the inlet pipe from each cylinder head.

Water pump cover and pipe joints

1. Remove the water pump cover securing bolts.



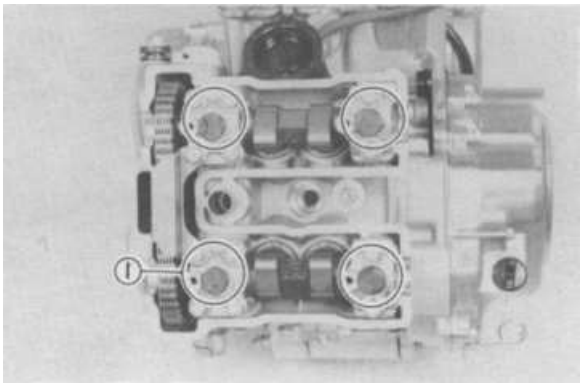
2. Pull off the water pump cover and joint pipes toward you as a single unit.



1. Water pump cover 2. Joint pipe

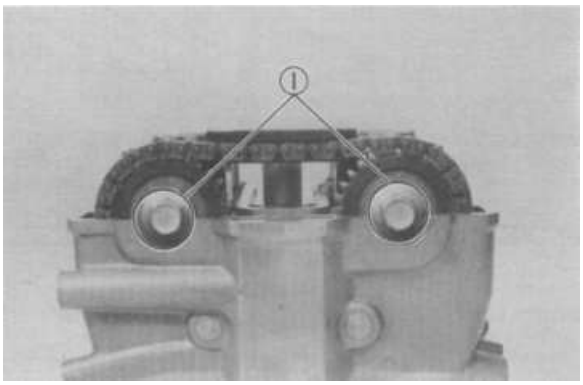
Cylinder head covers, cylinder heads, and cylinders.

1. Remove the spark plug from each cylinder.
2. Remove the engine mounting bracket bolts on the rear cylinder.
3. Remove the cylinder head cover and four oil plugs from each cylinder head.
4. Rotate the #1 cylinder piston so that it is at TDC of the compression stroke.



1. Oil plug

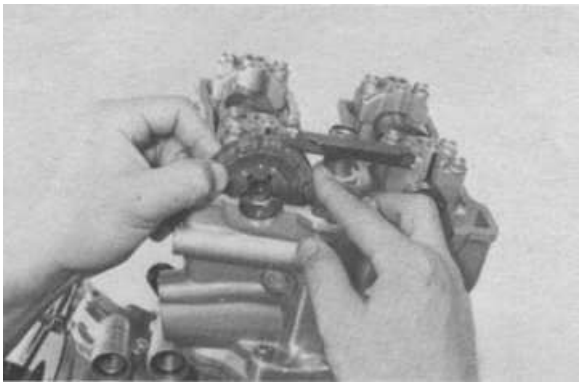
5. Remove the cam sprocket securing bolt from each camshaft.



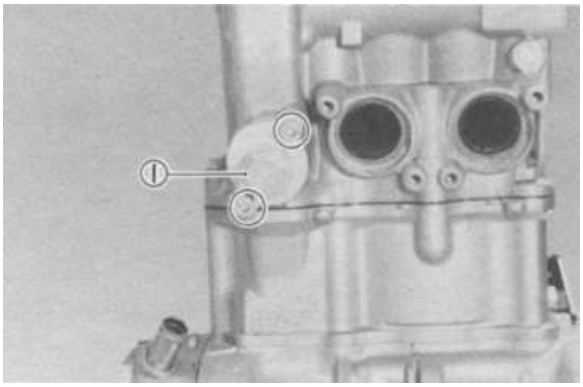
1. Cam sprocket

NOTE:

When loosening the cam sprocket securing bolt, the hexagonal portion at the center of the camshaft should be held with a 22 mm (0.87 in) spanner.



6. Remove the cam chain tensioner from each cylinder head and remove the cam sprockets.

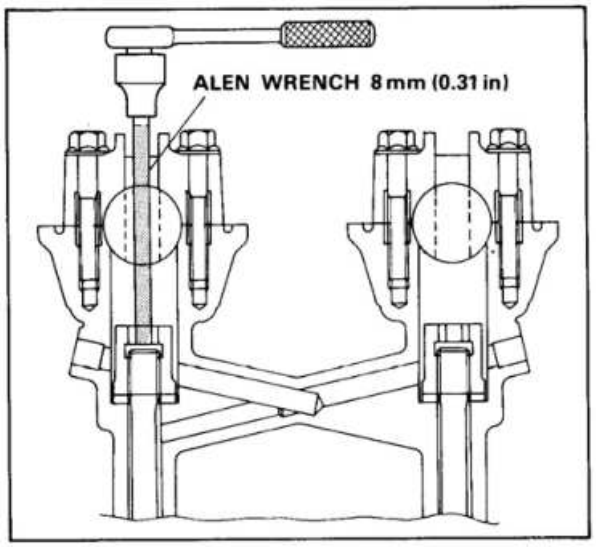


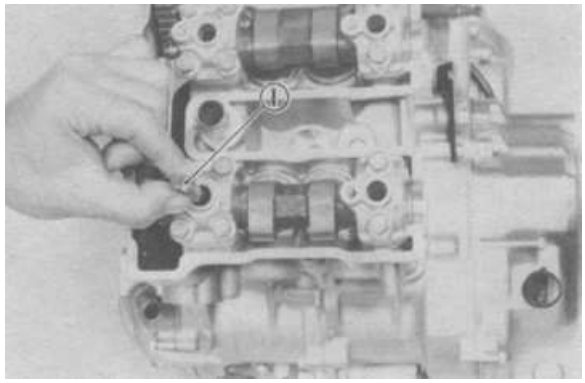
1. Cam chain tensioner

7. Remove each cylinder head. Loosen all the cylinder head nuts and bolts first. Each nut and bolt must be loose before any one is removed.

NOTE:

To loosen the cylinder head nuts, align the holes in the camshaft with the oil plug hole in the cam cap. Insert an Allen wrench (8 mm (0.31 in)) into the holes. Using an 8 mm (0.31 in) socket wrench, loosen the nuts.





1. Allen wrench

8. Remove the three dowels and 0-ring from each cylinder.
9. Remove the rear cam chain guide from each cylinder.



1. Rear cam chain guide

10. Remove each cylinder.
11. Remove the three dowels and O-ring from each crankcase.

Piston pin and piston

1. Mark each piston so it can be reinstalled in the appropriate cylinder.
2. Remove the piston pin clip from the piston.

NOTE:

Before removing the piston pin clip, cover the crankcase with a clean rag so you will not accidentally drop the clip into the crankcase.

3. Remove the piston pin clip from the opposite side, then pull it out; use the special tool.

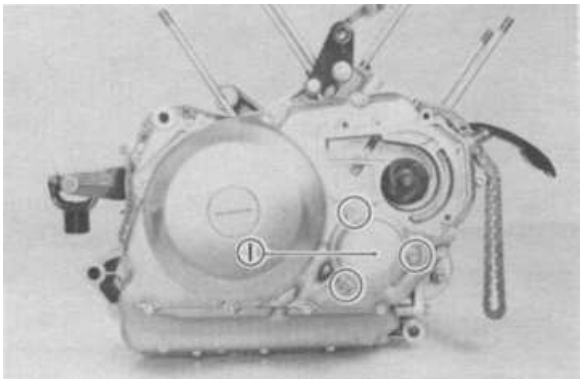
NOTE:

Before removing the piston pin, deburr the clip groove and pin hole.



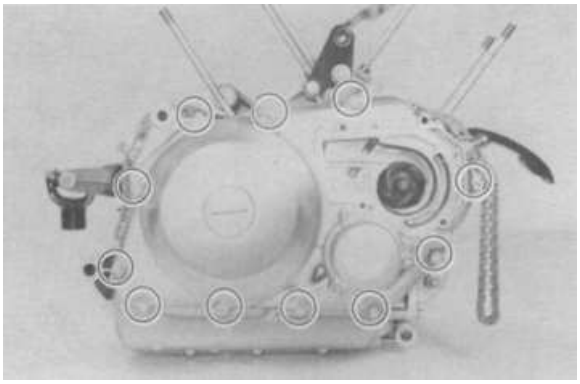
Crankcase covers, starter motor, and oil pump

1. Remove the oil filter cover bolts and remove the cover.

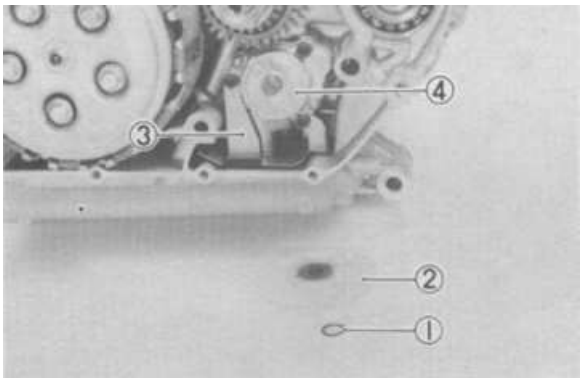


1. Oil filter cover

2. Remove the oil filter element.
3. Remove the right side crankcase cover bolts, and remove the crankcase cover.

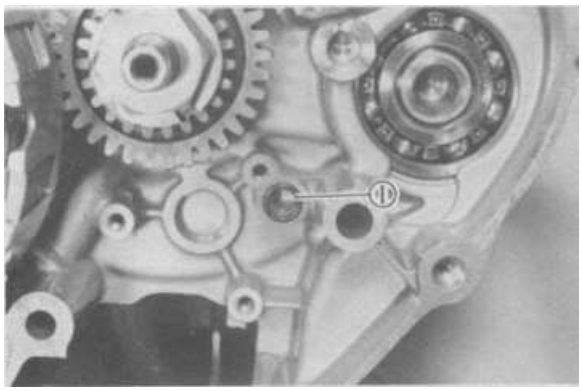


4. Remove the two dowels from the right side crankcase.
5. Remove the oil pump circlip and remove the driven sprocket.



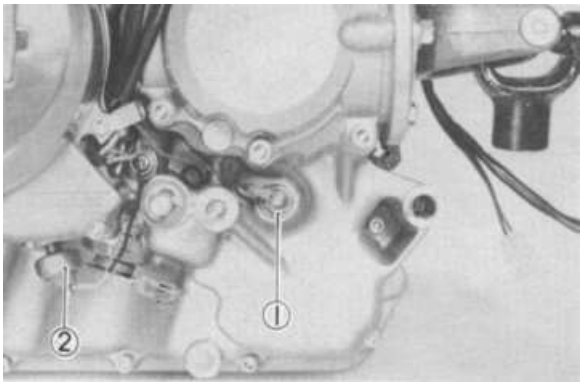
1. Circlip 2. Driven sprocket 3. Baffle plate
4. Oil pump assembly

6. Remove the oil pump assembly.
7. Remove the 0-ring from the crankcase.



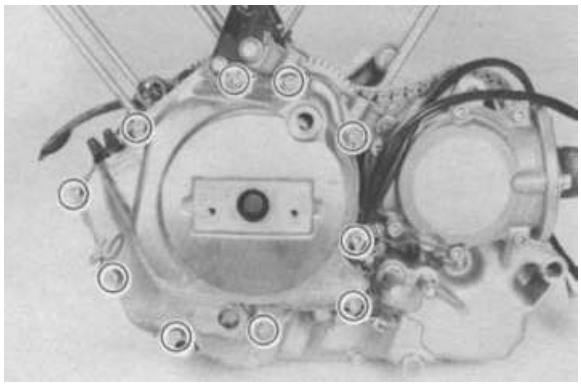
1. O-ring

8. Disconnect the neutral switch and oil pressure switch leads.

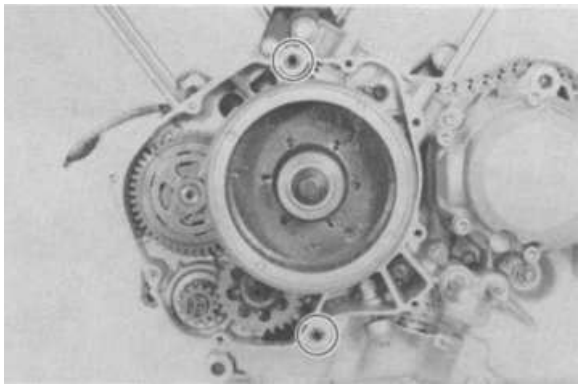


1. Oil pressure switch 2. Neutral switch

9. Remove the left side crankcase cover bolts and remove the cover.



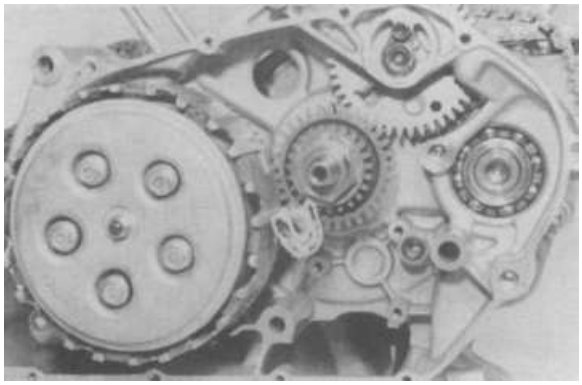
10. Remove the two dowels from the crankcase.



11. Remove the starter motor.
12. Remove the starter idle gear #1 and remove the idle gear shaft.

Flywheel

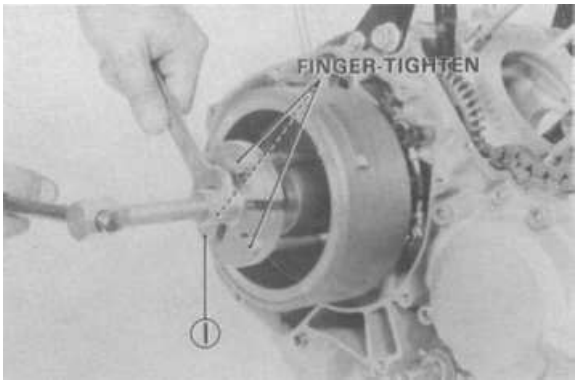
1. Place a piece of rolled rag or a piece of lead between the primary gears, and remove the flywheel securing nut.



2. Remove the flywheel. Place the flywheel magneto puller attachment on the crankshaft, and remove the flywheel and starter idle gear #2 with the flywheel puller.

CAUTION:

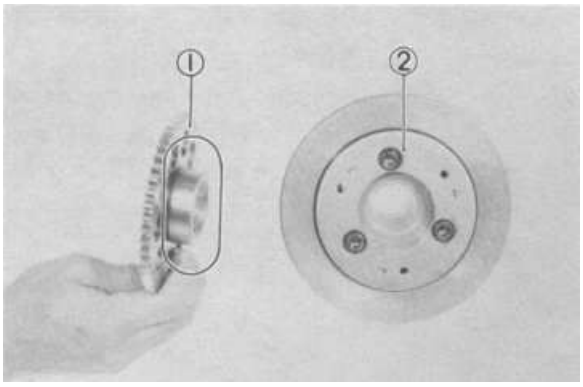
The starter clutch assembly can become severely distorted if the flywheel-magneto-puller bolts are inserted too far.



1. Flywheel magneto puller attachment

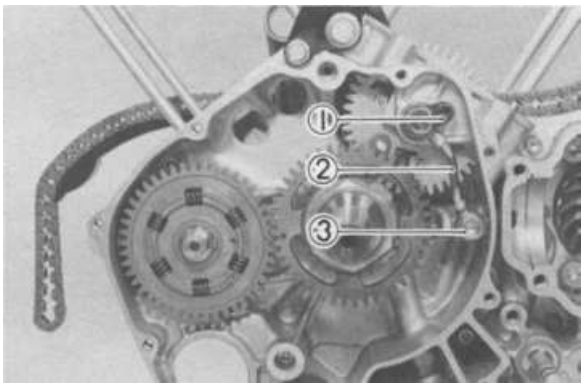
NOTE:

The starter clutch has three rollers, three springs, and three spring caps. Use care so that they don't fall out when removing the flywheel.



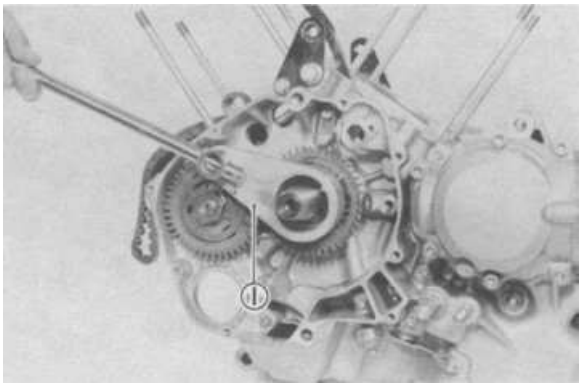
1. Idle gear #2 2. Electric starter switch

3. Remove the woodruff key from the crankshaft key way.
4. Remove the union bolt with the two copper washers and timing gear shaft stopper bolt from the crankcase.



1. Stopper bolt 2. Delivery pipe 3. Union bolt

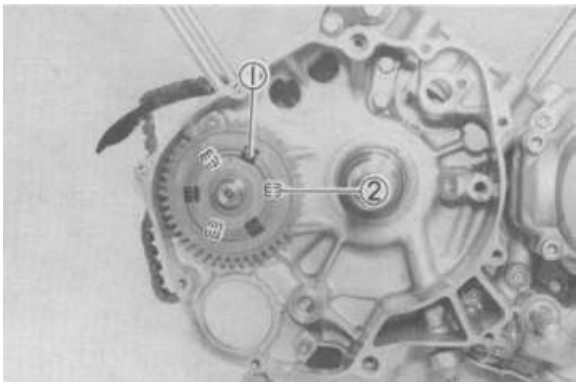
5. Pull out the timing gear shaft. Then remove the cam chain and timing gear.
6. Flatten the lock tabs on the balancer shaft and drive gear securing nuts.
7. Place a piece of rolled rag or a piece of lead between the primary gears, and remove the securing nuts, lock washers, washers, gears, and woodruff keys.



1. Special wrench (46 mm (1.81 in))

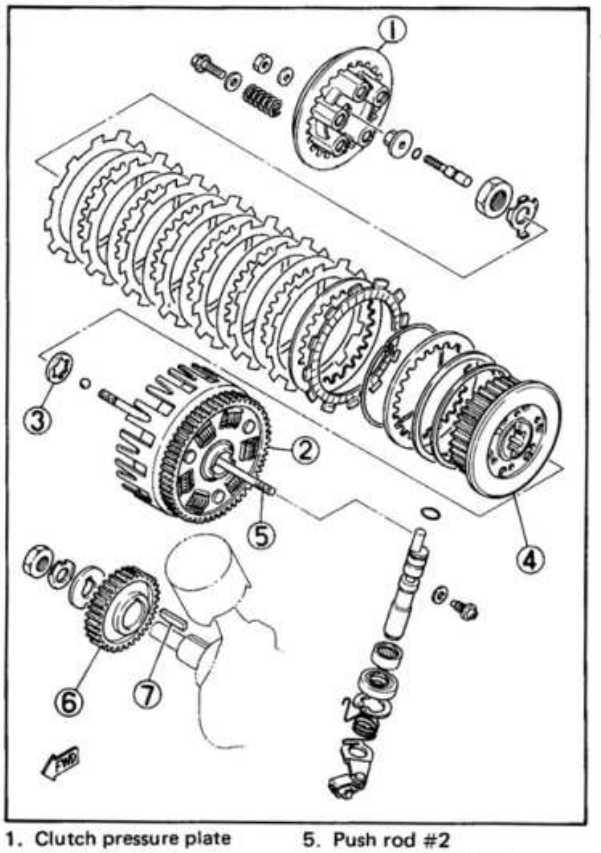
NOTE:

The balancer drive gear has six springs and three pins. Use care so that they don't fall out when removing the balancer drive gear.



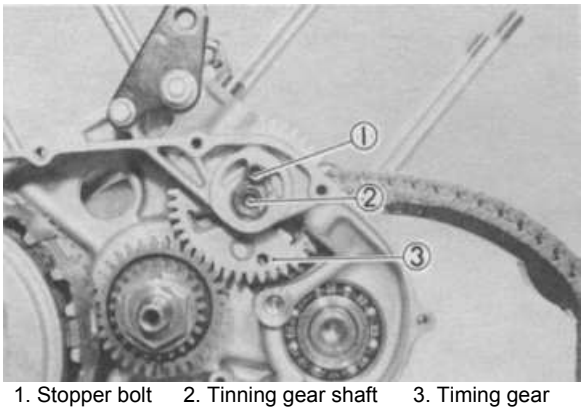
1. Spring 2. Pin

Clutch and primary gears



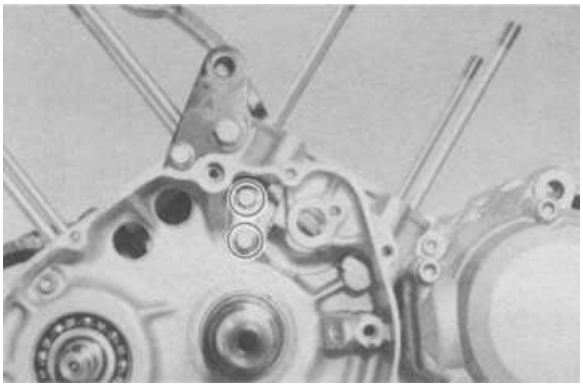
1. Clutch pressure plate
2. Clutch housing
3. Thrust washer
4. Clutch boss
5. Push rod #2
6. Primary drive gear
7. Key

1. Remove the timing gear stopper bolt, then remove the shaft.

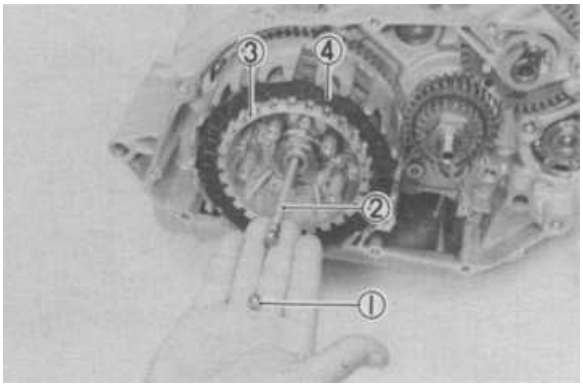


1. Stopper bolt 2. Tinning gear shaft 3. Timing gear

2. Remove the timing gear and the cam chain.
3. Remove the cam chain guide securing bolts and the cam chain guide.

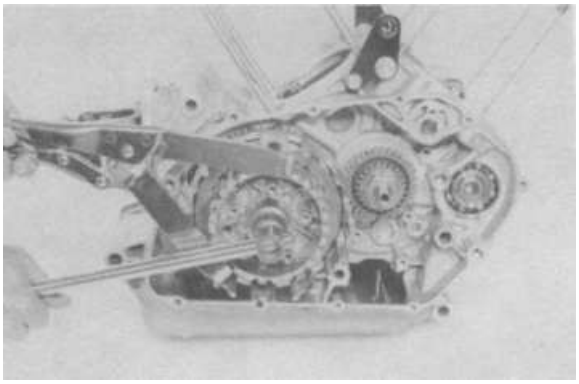


4. Remove the five clutch springs, then remove the clutch pressure plate, friction plates, and clutch plates.
5. Remove the ball and push rod #2 from the transmission main shaft.



1. Ball 2. Push rod #2 3. Friction plate
4. Clutch plate

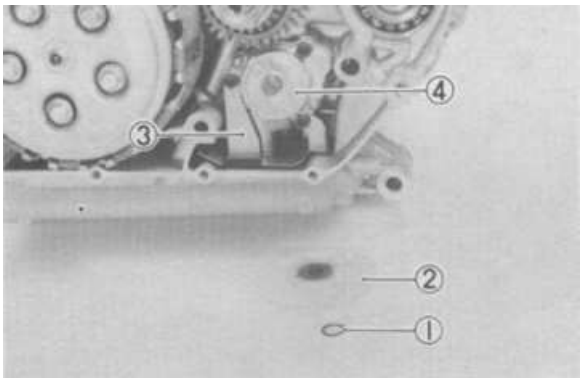
6. Flatten the lock tab on the primary-drive gear securing nut.
7. Place a small piece of rolled rag or a small piece of lead between the primary gears, and remove the primary drive gear securing nut, lock washer, washer and key.
8. Flatten the lock tab, and remove the clutch boss securing nut; use the clutch hub holder.



9. Remove the lock washer, clutch boss, thrust washer, and the clutch housing from the transmission main shaft.
10. Remove the key and cam chain drive gear from the crankshaft.

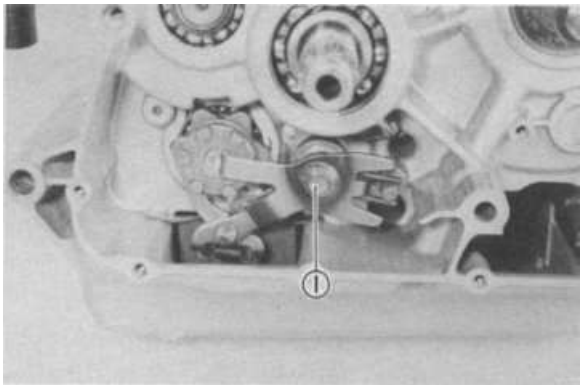
Shifter

1. Remove the shifter shaft circlip and washer from the left side crankcase.



1. Circlip 2. Washer

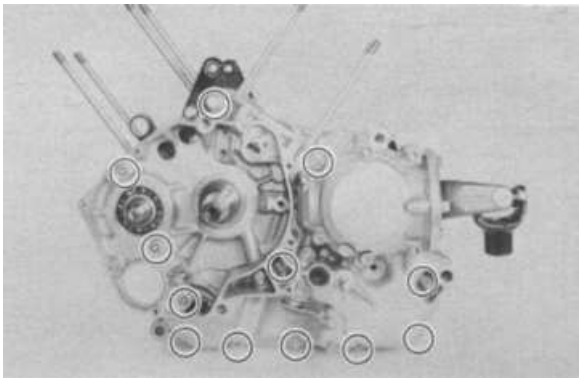
2. Disengage the shift lever from the shift drum pins, and remove the shift shaft assembly.

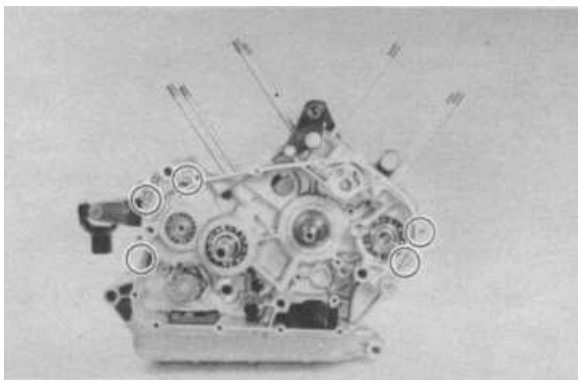


1. Shift shaft assembly.

Crankcase

1. Remove all the crankcase bolts.



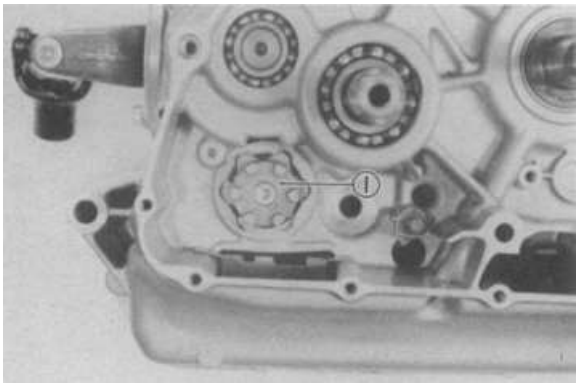


Crankcase bolt:
From left crankcase to right
6mm (0.24 in) .....11 pcs.
10mm (0.39 in)..... 1 pc.
From right crankcase the left
6mm (0.24 in) .....5 pcs.

2. Remove the rightside crankcase from the leftside, and remove the three dowels.

CAUTION:

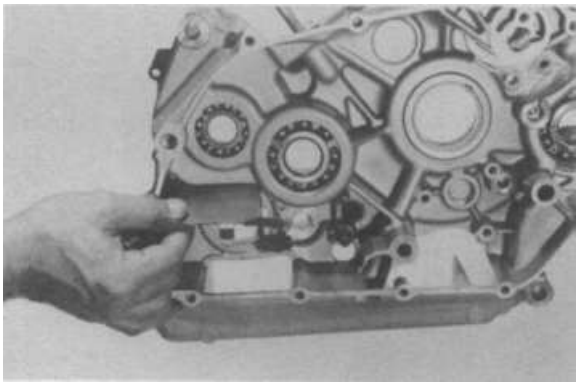
When separating the crankcase, be sure the shiftdrum star aligns with its corresponding contours in the crankcase.



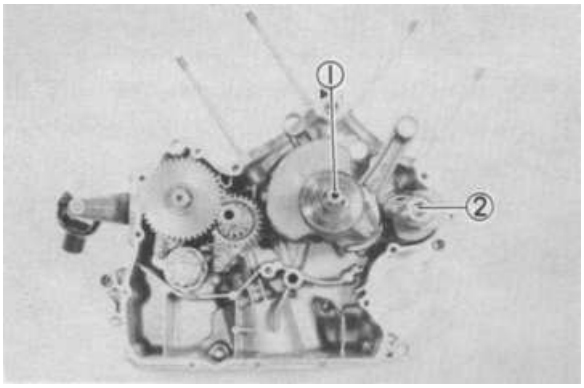
1. Segment

NOTE:

If the right crankcase has to be replaced, remove the oil baffle; otherwise, the removal of the oil baffle is unnecessary.

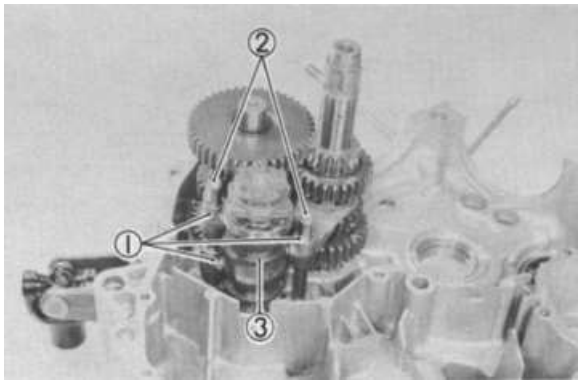


3. Remove the crankshaft and the balancer shaft from the left side crankcase.



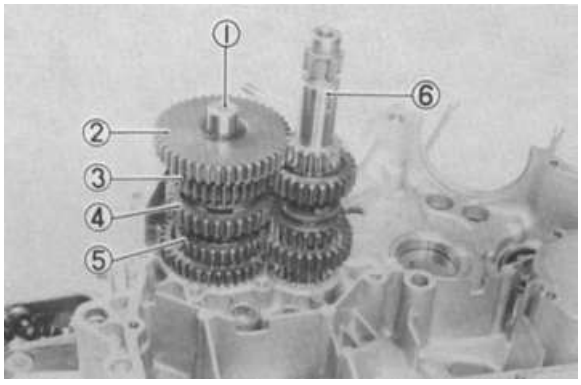
1. Crankshaft 2. Balancer shaft

4. Remove the shift fork guide bars first; then remove the shift levers and shift cam.



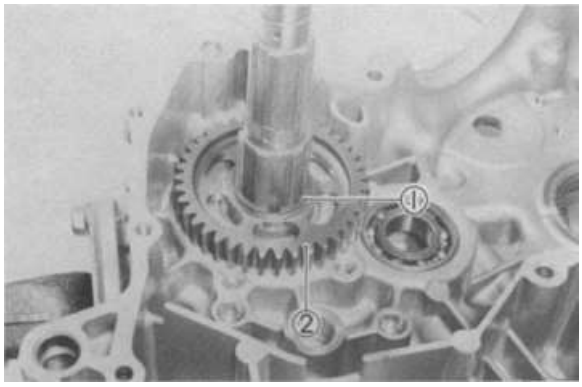
1. Shift fork 2. Shift fork guide 3. Shift cam

5. Remove the circlips, washers, 1st, 4th, 3rd, and 5th wheels from the drive axle.



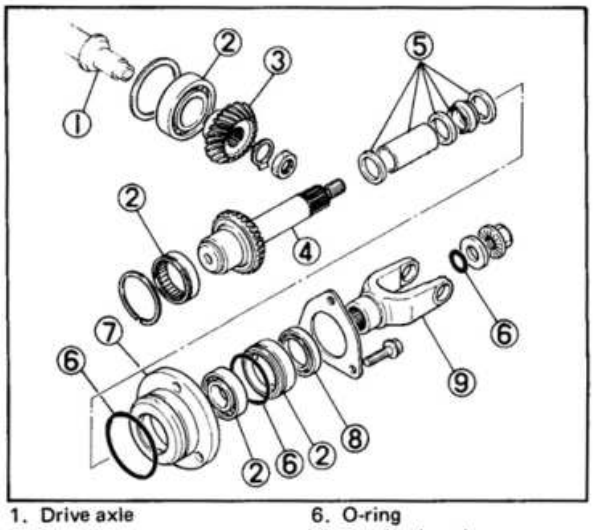
1. Drive axle 2. 1st wheel 3. 4th wheel
4. 3rd wheel 5. 5th wheel 6. Main axle

6. Remove the main axle assembly from the crankcase.
7. Remove the circlip, washer, and 2nd wheel from the drive axle.



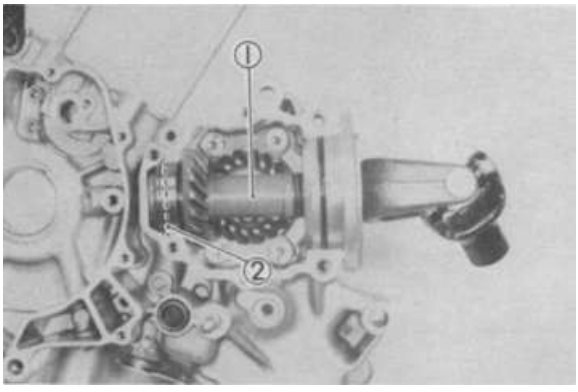
1. Circlip 2. 2nd wheel

The following steps are necessary only if you must service the middle gear or replace the crankcase.



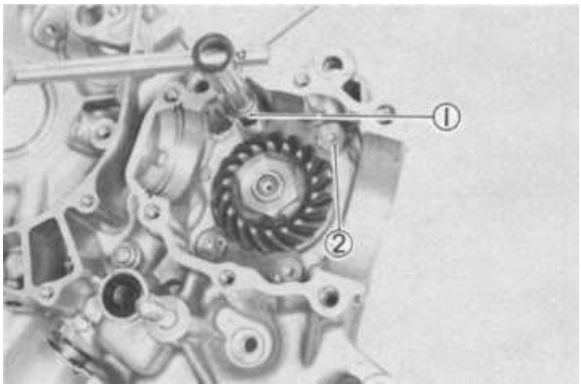
1. Drive axle
2. Bearing
3. Middle drive pinion gear
4. Middle drive shaft
5. Spacer
6. O-ring
7. Bearing housing
8. Oil seal
9. Universal joint

8. Remove the middle drive shaft cover securing bolts and middle-drive-shaft bearing-housing securing bolts.
9. Remove the middle-drive-shaft assembly and bearing circlip from the left side crankcase.



1. Middle drive shaft assembly 2. Bearing circlip

10. emove the drive axle bearing stopper bolts; use the torx driver.



1. Torx driver 2. Stopper bolt

11. Remove the bearing stopper plates, drive axle, and shims.

INSPECTION AND REPAIR

Cylinder head cover

Place the head cover on a surface plate. There should be no warpage. Correct by resurfacing as follows:

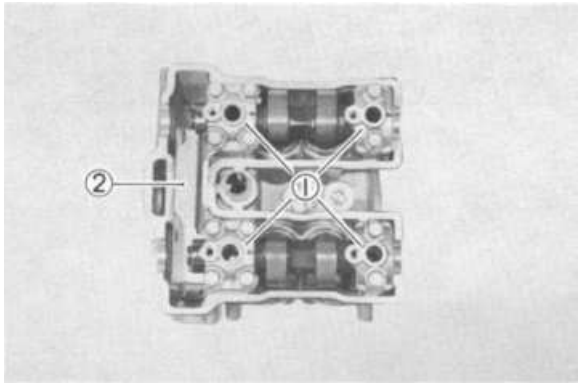
Place No. 400 or No. 600 grit wet sandpaper on surface plate and resurface the head cover using a figure-eignt sanding pattern. Rotate head cover several times to avoid removing too much material from one side.

Cylinder head

1. Remove the cam shaft caps, cam chain damper, cam shafts, cylinder head nuts, and washers.

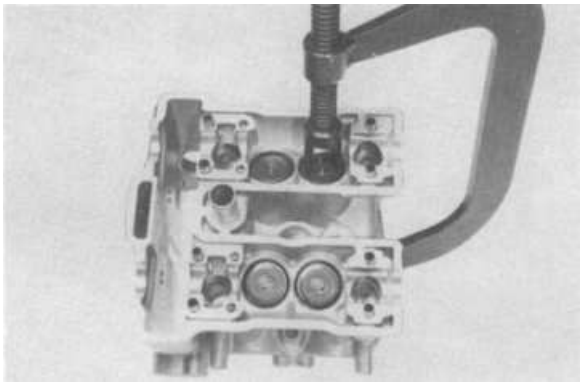
NOTE:

Keep the front cylinder camshaft caps and rear cylinder camshaft caps separately so they can be reinstalled in the same cylinder head.



1. Cam shaft cap 2. Cam chain damper

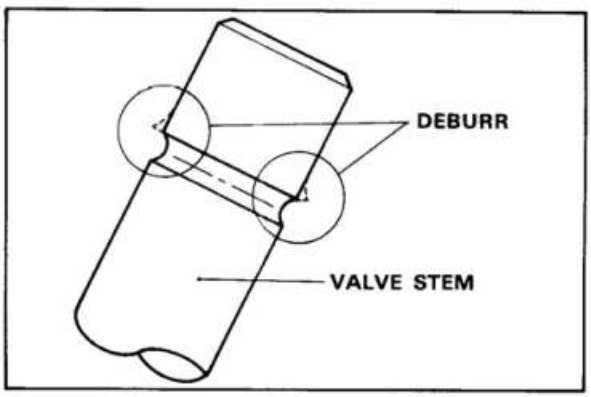
2. Mount the valve spring compressor on the head and depress each valve spring. Remove the valve retainers with a magnet or tweezers, and remove the valve springs.



3. Remove the valves. Mark each valve so it can be reinstalled in the same cylinder head.

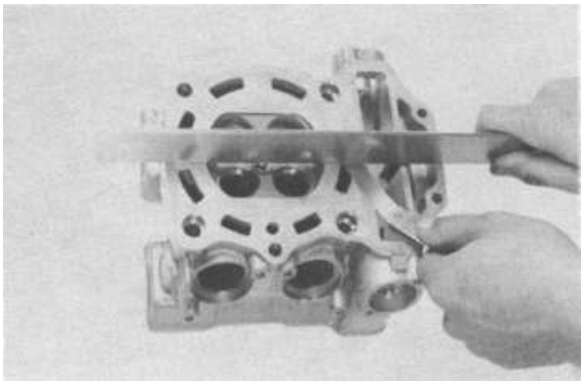
NOTE:

Deburr any deformed valve stem ends. Use an oil stone to smooth the stem end. This will help prevent damage to the valve guide during valve removal.



4. Using a rounded scraper, remove the carbon deposits from the combustion chamber. Take care to avoid damaging the spark plug threads and valve seats. Do not use a sharp instrument. Avoid scratching the aluminum.
5. Check the cylinder head warpage with a straightedge as shown.
   The warpage should not exceed the specified limit; if necessary, resurface the cylinder head. If the warpage exceeds the allowable limit, the cylinder head should be replaced with a new one.

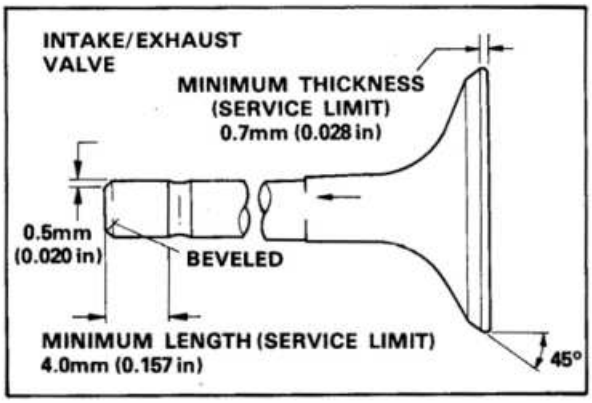
Cylinder head warpage:
less than 0.03mm (0.0012 in)



Valves, valve guides, valve seats, and valve springs

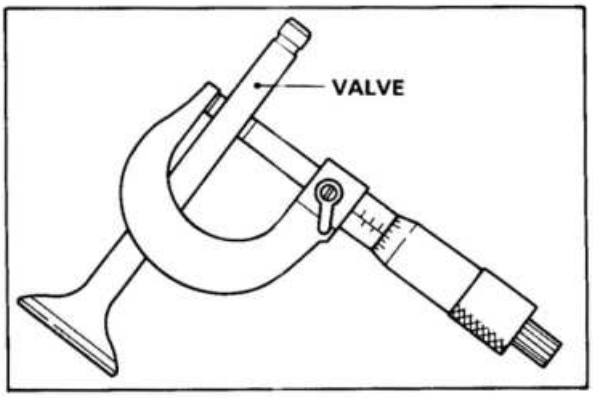
Valves

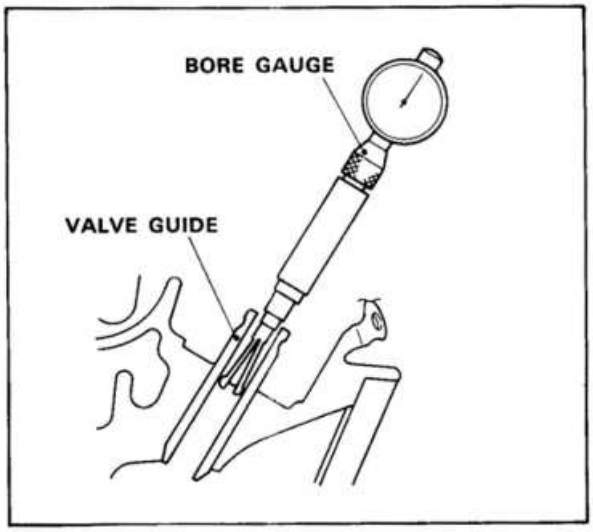
1. Check the valve face and the stem end for wear. If the valve face and/or the stem end are pitted or worn, regrind the valve with a valve refacer. Replace the valve if any dimension exceeds the specifications in the illustration.



2. Valve stem wear must be measured and then combined with valve guide measurements to obtain guide clearance. This clearance must be within tolerances. If it exceeds the maximum limit, then replace either or both valve and guide, as necessary.

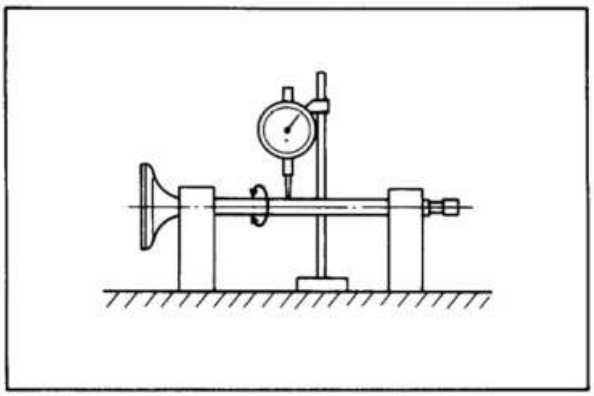
	Valve stem clearance	Maximum
Intake	0.11~ 0.15 mm (0.0043 ~ 0.0059 in)	0.10 mm (0.004 in)
Exhaust	0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in)	0.12 mm (0.005 in)

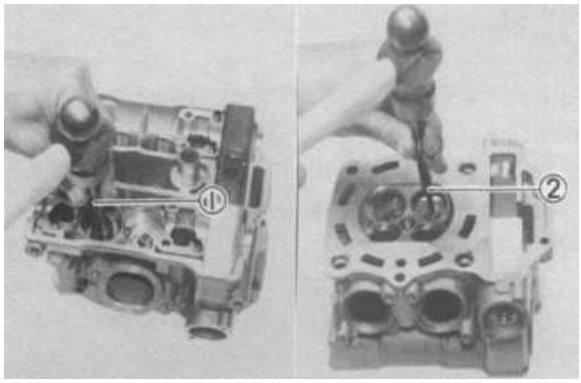




3. Inspect the end of the valve stem. If the end appears to be "mushroomed" or has a larger diameter than the rest of the stem, the valve, valve guide, and oil seal should be replaced.
4. Place the valve on V-blocks, and measure the amount of stem runout with a dial gauge. If it exceeds the maximum limit, replace the valve.

Maximum valve stem runout:
0.01mm (0.0004 in)





1. Valve guide installer 2. Valve guide remover

Valve guides

If oil leaks into the cylinder through a valve due to a worn valve guide or if a valve is replaced, the valve guide should also be replaced.

NOTE:

The valve oil seal should be replaced whenever a valve is removed or replaced.

1. Measure the valve guide inside diameter with a small bore gauge. If it exceeds the limit, replace it with an oversize valve guide.

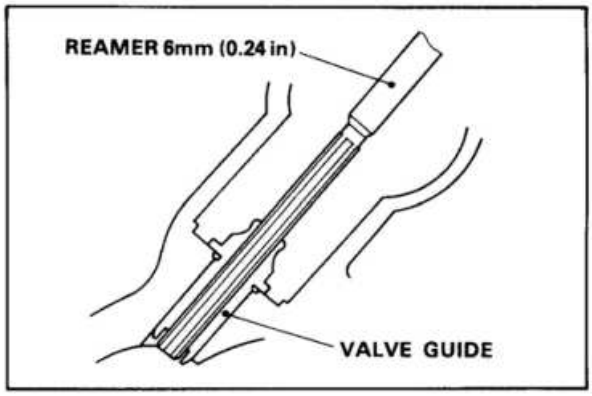
Guide diameter (I.D.):
Limit: 6.10mm (0.24 in)

2. To ease guide removal and reinstallation and to maintain the correct interference fit, heat the head td 100°C (212°F). Use an oven to avoid any possibility of head warpage due to uneven heating.
3. Use the valve guide remover and valve guide installer to drive the old guide out and drive the new guide in.

NOTE:

The valve guide oil seal should be replaced whenever a valve is removed or replaced.

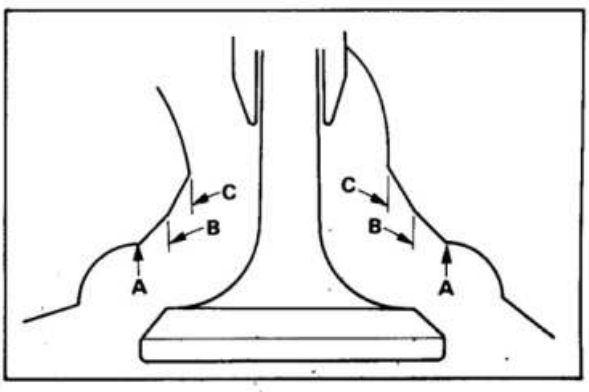
4. After installing the valve guide, use the 6mm (0.24 in) reamer (special tool) to obtain the proper valve guide-to-valve stem clearance.



5. After installing the valve guide in the cylinder head, the valve seat must be recut. The valve should be lapped to the new seat.

Valve seat

1. The valve seat is subject to severe wear. Whenever the valve is replaced or the valve face is resurfaced (see CAUTION), the valve seat should be resurfaced at a 45° angle. If a new valve guide has been installed, the valve seat must be recut to guarantee complete sealing between the valve face and seat.



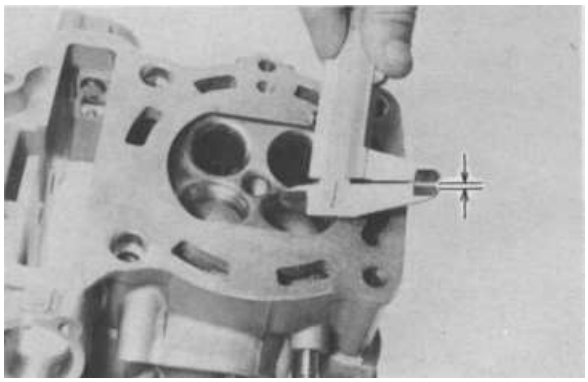
CAUTION:

If the valve seat is obviously pitted or worn, it should be cleaned with a valve seat cutter. Use the 45° cutter. When twisting the cutter, keep an even downward pressure to prevent chatter marks.

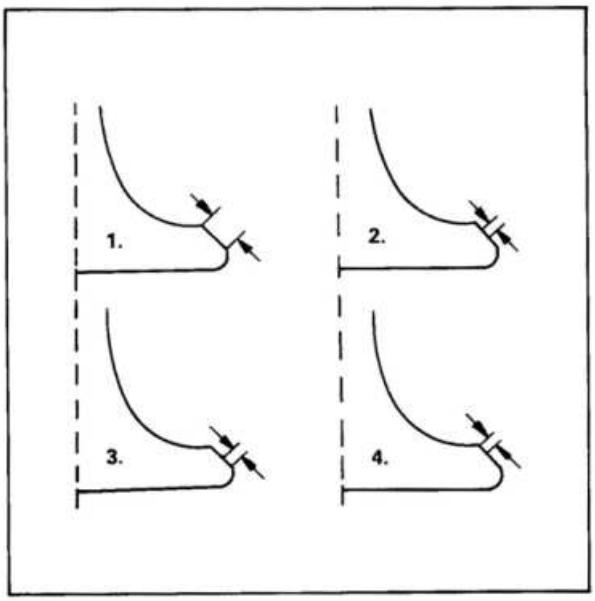
If cutting section A of the valve seat, use a 30° cutter. If cutting section B, use the 45° cutter. If cutting section C, use the 60° cutter.

2. Measure the valve seat width. Apply mechanic's bluing dye (such as Dykem) to the valve face and valve seat, apply a very small amount of fine grinding compound around the surface of the valve face, insert the valve into position, and spin the valve quickly back and forth. Lift the valve, clean off all grinding compound, and check the valve seat width. The valve seat and valve face will have removed the bluing wherever they contacted each other. Measure the seat width with vernier calipers. It should measure approximately 1.0mm (0.039 in). The valve-seat contact area should be one uniform width. If the valve seat width varies or if pits still exist, further cutting will be necessary. Remove just enough material to achieve a satisfactory seat.

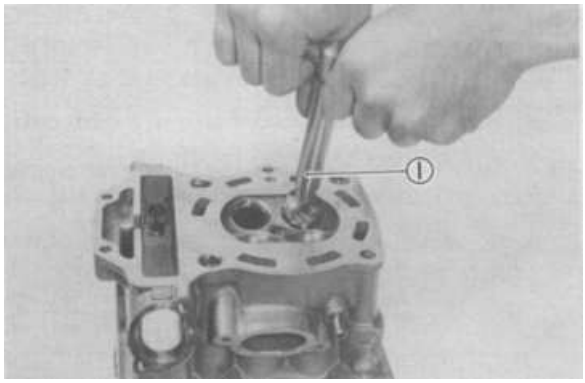
	Standard width	Wear limit
Seat width	1.0 ± 0.1 mm (0.039 ± 0.0039 in)	1.7 mm (0.067 in)



3. If the valve seat is uniform around the perimeter of the valve face but is too wide or not centered on the valve face, it must be altered. Use either the 30°, 45°, or 60° cutters to correct the improper seat location in the manner described below:



- If the valve face shows that the valve seat is centered on the valve face but is too wide, then lightly use both the 30° and the 60° cutters to reduce the seat width to 1.0mm (0.039 in).



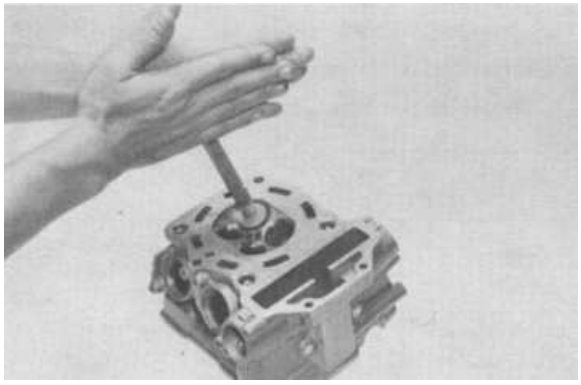
- If the seat shows to be in the middle of the valve face but to narrow, use the 45° cutter until the width equals 1.0mm (0.039 in).
- If the seat is too narrow and right up near the valve margin, then first use the 30° cutter and then the 45° cutter to get the correct seat width.

- If the seat is too narrow and down near the bottom edge of the valve face, then first use the 60° cutter and then the 45° cutter.

Lapping

The valve/valve seat assembly should be lapped if neither the seat nor the valve face is severely worn.

1. Apply a small amount of coarse lapping compound to the valve face. Insert the valve into the head. Rotate the valve until the valve and valve seat are evenly polished. Clean off the coarse compound, then follow the same procedure with fine compound. Continue lapping until the valve face shows a complete and smooth surface all the way around. Clean off the compound material. Apply bluing dye to the valve face and seat, and rotate the valve. Check for full seat contact which is indicated by a grey surface all around the valve face where the bluing has been rubbed away.

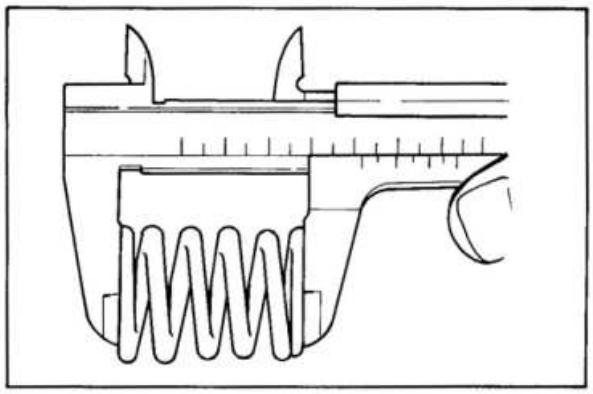


2. After all work has been performed on the valve and valve seat and all head parts have been assembled, check for proper valve/valve seat sealing by pouring solvent into each of the intake ports, then the exhaust ports. There should be no leakage past the seat. If fluid leaks, disassemble and continue to lap with fine lapping compound. Clean all parts thoroughly; reassemble and check again with solvent. Repeat this procedure as often as necessary to obtain a satisfactory seal.

Valve springs

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

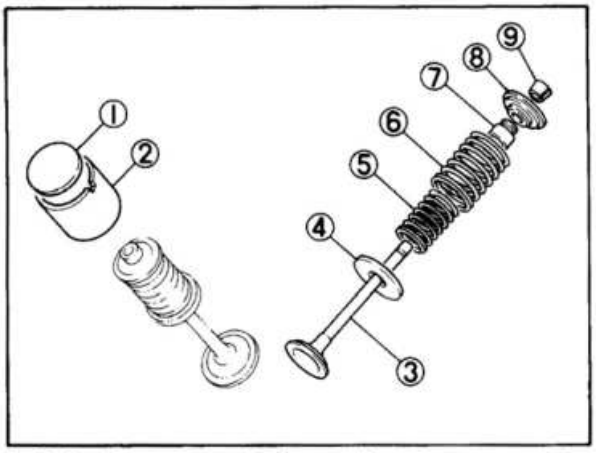
1. Even though the spring is constructed of durable spring steel, it gradually loses some of its tension. This is evidenced by a gradual shortening of free length. Use a vernier caliper to measure spring free length. If the free length of any spring has decreased more than 2mm (0.080 in) from its specification, replace it.



2. Another symptom of spring fatigue is insufficient spring pressure. This can be checked with a valve-spring-compression-rate gauge. Test each spring individually. Place a spring in the gauge and note the spring pressure when the spring is compressed to the installed length (valve closed). If the pressure does not equal the specified value, replace the spring.

Valve spring specifications		
	Outer spring	Inner spring
Free length	36.63 mm (1.442 in)	36.17 mm (1.424 in)
Installed length (valve closed)	32.0 mm (1.26 in)	30.5 mm (1.20 in)
Installed pressure (valve closed)	14.6kg (32.2 lb)	8.5kg (18.7 lb)
Allowable tilt from vertical	2.5°	←

Valve installation

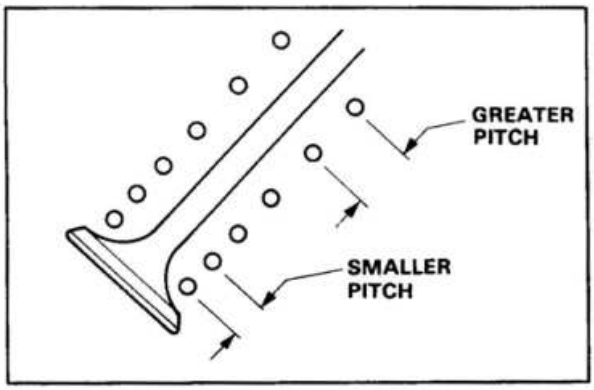


1. Pad
2. Valve lifter
3. Valve
4. Valve seat
5. Inner spring
6. Outer spring
7. Oil seal
8. Spring seat
9. Valve retainer

1. Lubricate the valve stem and the oil seal with a high-quality molybdenum disul-fide motor oil or molybdenum disulfide grease.
2. Insert the valve in the cylinder head, and install the spring seat.
3. Install the oil seal. Carefully fit the oil seal over the valve stem and push it into position on top of the valve guide.
4. Install both valve springs.

NOTE:

All valve springs must be installed with the greater pitch upward as shown.



5. Install the collar. Be sure it is properly seated on the valve springs.
6. Install the valve spring compressor, and compress the springs.
7. Install the valve retainers. Be sure the retainers properly engage the valve stem.
8. Carefully remove the valve spring compressor.

WARNING:

Proceed slowly. If a retainer has not been properly installed, it could be ejected from the cylinder head.

9. Gently tap the end of the valve stem with a plastic mallet. This will ensure that the retainers are properly seated in the collar.

Camshafts, cam chains, and cam sprockets

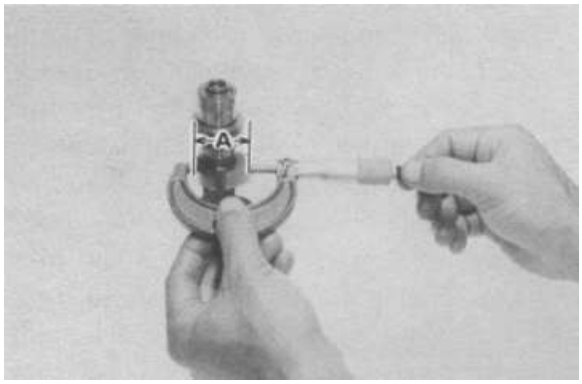
Camshaft

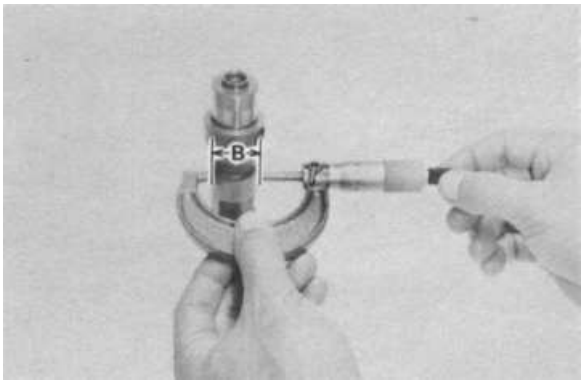
The cam lobe metal surface may have a blue discoloration due to excessive friction. The metal surface could also start to flake off or become pitted.

a) If any of the above wear conditions are readily visible, the camshaft should be replaced.

b) Even though the cam lobe surface appears to be in satisfactory condition, the lobe should be measured with a micrometer. Cam lobe wear can occur without scarring the surface. If this wear exceeds the wear limit, valve timing and lift are affected. Replace the camshaft if wear exceeds the limit.

Wear limit	A	B
Intake	36.65 mm (1.443 in)	28.19 mm (1.110 in)
Exhaust	36.15 mm (1.423 in)	28.17 mm (1.109 in)



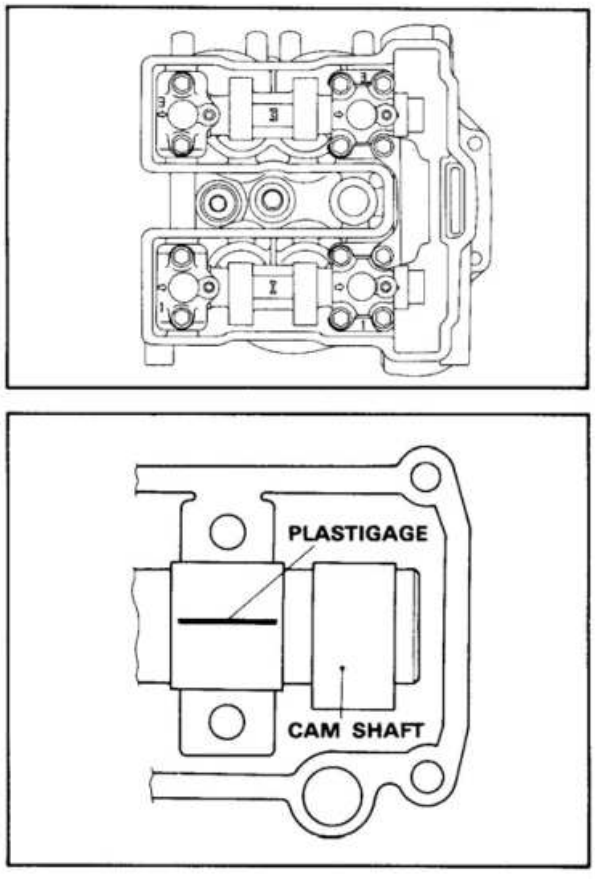


c) Install the camshaft on the cylinder head. Place a strip of Plastigage between the camshaft and camshaft cap as illustrated (lengthwise along camshaft). Tighten the nuts with specified torque. Remove the camshaft cap and determine the clearance by measuring the width of the flattened Plastigauge.

Cap nut tightening torque:
8 Mm (0.8m-kg, 5.8ft-lb)

NOTE:

Be careful so that the camshaft cap is installed in the correct position.



NOTE:

Do not turn camshaft when measuring clearance with Plastigage.

Camshaft-to-cap clearance:	
Standard:	0.020 ~ 0.061 mm (0.0008-0.0024 in)
Maximum:	0.160 mm (0.006 in)

d) If the camshaft-to-cap clearance exceeds specification, measure the camshaft bearing surface diameter.

Bearing surface diameter:	
Standard:	24.96 ~ 24.98 mm (0.9830 ~ 0.9835 in)

a) If the camshaft diameter is less than specification, causing excessive clearance, replace the camshaft.

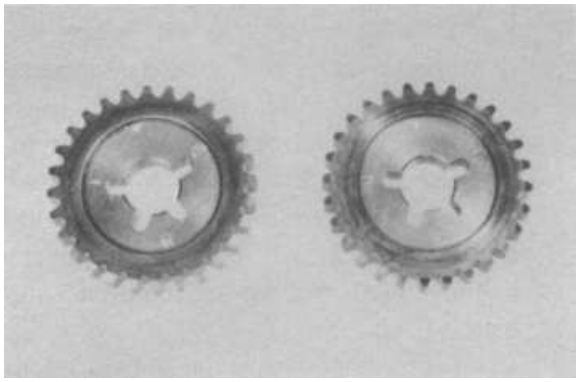
b) If the camshaft diameter is within specification and cam shaft-to-cap clearance is excessive, replace the cylinder head.

e) Cam chain

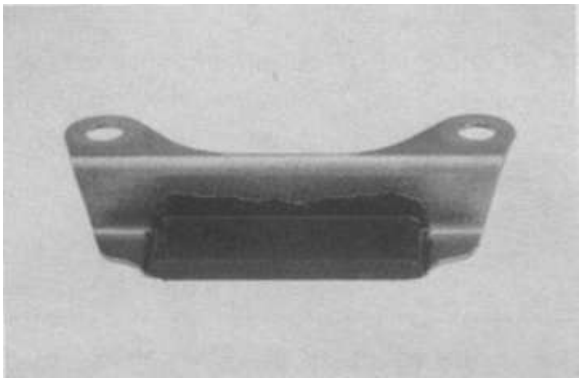
Except in cases of oil starvation, the cam chain wears very little. If the cam chain has stretched excessively and it is difficult to keep the proper cam chain tension, the chain should be replaced.

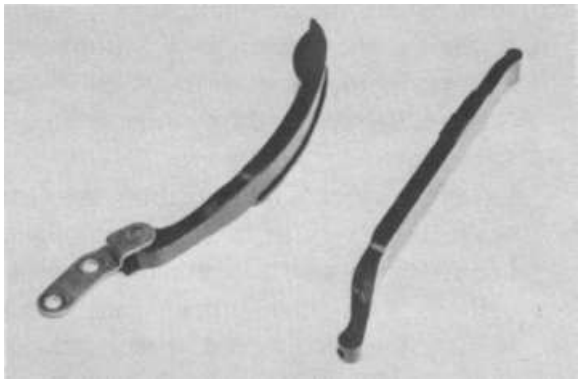
f) Cam sprocket and cam drive sprocket

a) Check the cam sprocket and cam drive sprocket for wear.



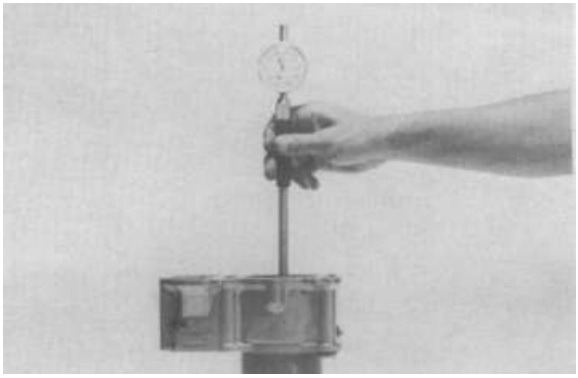
6. Cam chain dampers
   Inspect the top cam chain damper (stopper guide) and two (2) vertical (slipper-type) dampers for excessive wear. Any that shows excessive wear should be replaced. Worn dampers may indicate an improperly adjusted or worn-out cam chain.

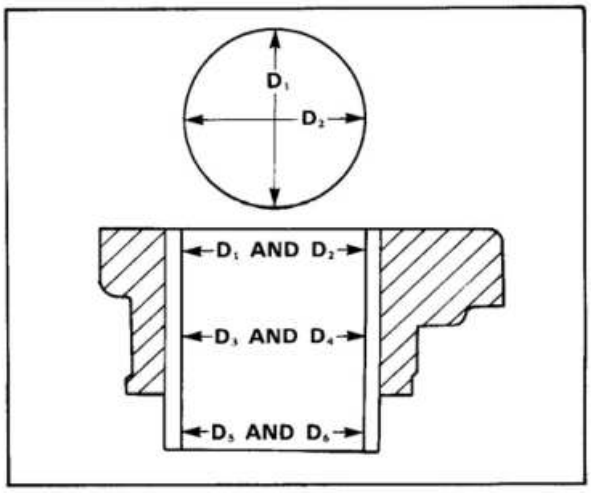




Cylinder

1. Visually check the cylinder walls for scratches. If vertical scratches are evident, the cylinder wall should be rebored or the cylinder should be replaced.
2. Measure cylinder wall wear in the manner as shown. If wear is excessive, compression pressure will decrease, and engine trouble will occur. Rebore the cylinder wall, and replace the piston and piston rings.
   Cylinder wear should be measured at three depths by placing the measuring instrument parallel to and at right angles to the crankshaft. (See the illustration.) If the cylinder wall is worn beyond the wear limit, it should be rebored.





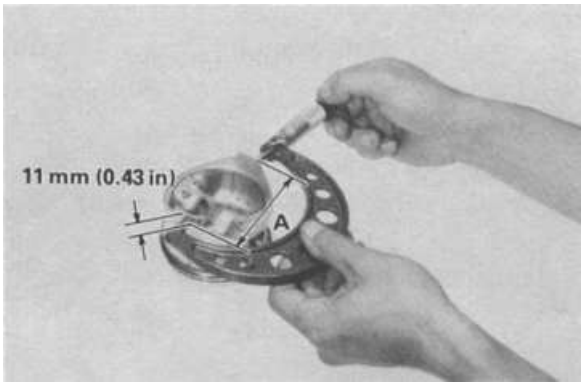
	Standard	Wear limit
Cylinder bore	80 mm (3.150 in)	80.1 mm (3.154 in)
Cylinder taper	–	0.05 mm (0.002 in)

Piston and piston rings

Piston

1. Using the micrometer, measure the outside diameter of the piston at the piston skirt. Measurement should be made at a point 11mm (0.43in) above the bottom edge of the piston by placing the micrometer parallel to and at right angles to the piston pin.

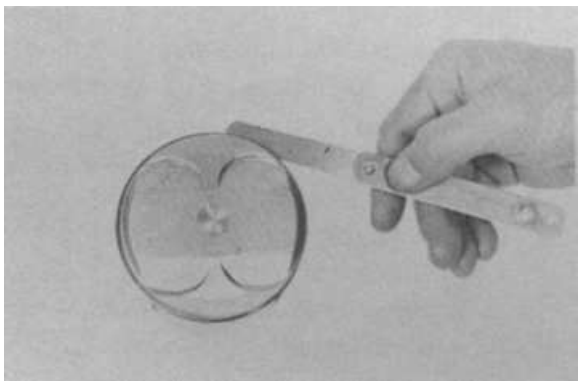
Piston clearance:
0.050 ~ 0.070 mm
(0.0020 ~ 0.0028 in)



	Size A
Standard	80.00 mm (3.150 in)
Oversize 1	80.25 mm (3.159 in)
Oversize 2	80.50 mm (3.169 in)
Oversize 3	80.75 mm (3.179 in)
Oversize 4	81.00 mm (3.189 in)

2. Piston ring/ring groove fit must have correct clearance. If the piston and ring have already been used in the engine, the ring must be removed, the ring groove cleaned of carbon, then the ring should be reinstalled. Use a feeler gauge to measure the gap between the ring and the land.

Side clearance	Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)
	2nd	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)



Piston ring

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)
Oversize 3	0.75 mm (0.0295 in)
Oversize 4	1.00 mm (0.0394 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.

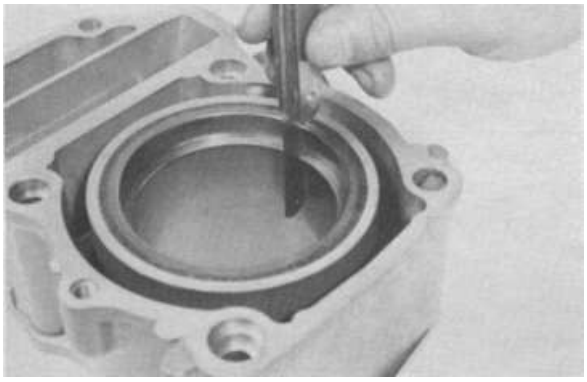
Size	Color
Oversize 1	Brown
Oversize 2	Blue
Oversize 3	Black
Oversize 4	Yellow

1. Measure the end gap of each piston ring. Insert a ring into the cylinder, and push it approximately 20mm (0.8 in) into the cylinder. Push the ring with the piston crown so the ring will be at a right angle to the cylinder bore.
2. Measure the ring end gap with a feeler gauge. If the end gap exceeds tolerance, replace the whole set of rings.

NOTE:

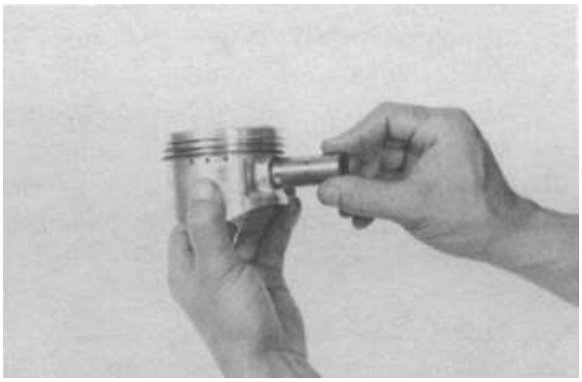
You cannot measure the end gap on the expander spacer of the oil control ring. If the oil-control-ring rails show excessive gap, replace all three rings.

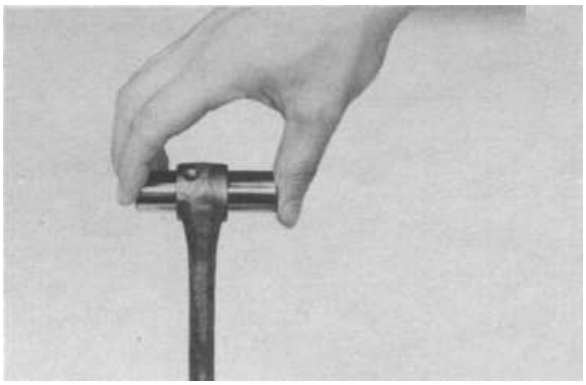
	Standard	Limit
Top ring	0.3 ~ 0.5 mm (0.012 ~ 0.020 in)	0.80 mm (0.0315 in)
2nd ring	0.3 ~ 0.5 mm (0.0118 ~ 0.0197 in)	0.80 mm (0.0315 in)
Oil control (Rails)	0.3 ~ 0.9 mm (0.0118 ~ 0.0354 in)	–



Piston pin

1. Lightly oil the piston pin, and install it in the small end of the connecting rod.
2. Check the free play. There should be no noticeable vertical play. If any free play exists, check the connecting rod for wear. Replace the pin and connecting rod as required.
3. Insert the piston pin in the piston, and check the free play. There should be no noticeable free play when the pin is in place in the piston. If the piston pin is loose, replace the pin and/or the piston as required.

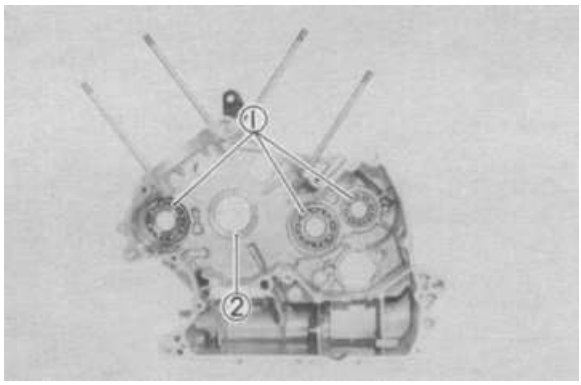




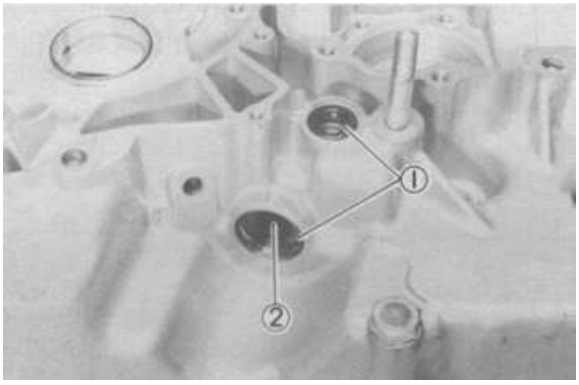
Crankcase

1. Thoroughly wash the case halves in a mild solvent.
2. Clean all gasket mating surfaces and crankcase mating surfaces thoroughly.
3. Visually inspect the case halves for any cracks, road damage, etc. Replace the crankcase as required.
4. Check the oil-delivery passage for signs of blockage.

Bearings and oil seals



1. Ballbearing 2. Main bearing



1. Oil seal 2. Needle bearing

1. After cleaning and lubricating the ball bearings, rotate the inner race with a finger. If rough spots are noticed, replace the ball bearing(s).
2. Check the needle bearing for damage. If damaged, replace it.
3. Check the oil seal lips for damage or wear. Replace as required.
4. If bearings have been removed, check their seats for signs of damage (such as the bearing spinning in the seat, etc.)

Removal

1. Pry oil seal(s) out of place with a screwdriver. Replace all oil .seals when overhauling the engine.

NOTE:

Place a piece of wood under the screwdriver to prevent damage to the case.

2. Drive out the bearing(s) with the appropriate special tool.

NOTE:

Bearing(s) are most easily removed or installed if the cases are first heated to approximately 95° ~ 125°C (205° ~ 257°F). Bring the case up to proper temperature slowly. Use an oven.

Crankshaft and connecting rod

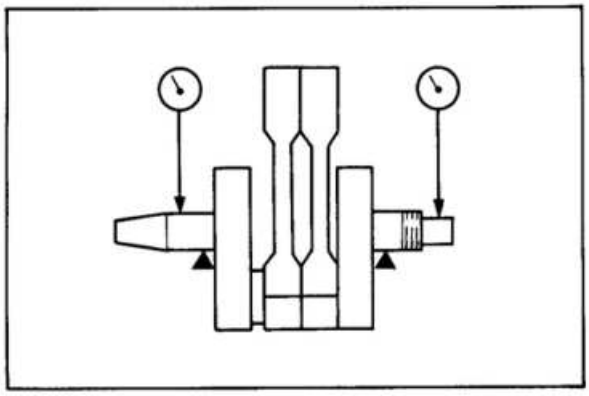
Crankshaft runout

1. Support the crankshaft at both ends on V-blocks. Rotate the crankshaft in the V-blocks, and measure the runout at the main bearing journals. Use a dial gauge.

Limit: 0.02mm (0.0007 in)

2. If runout exceeds the specification, replace the crankshaft.

Maximum crankshaft runout: 0.02mm (0.007 in)



Crankshaft main bearings (Main bearing)

Visually check the main bearings.

If the bearing surface is burned, flaked, rough, scratched, or worn, the bearings should be replaced.

NOTE:

If either of the right- or left-side main bearings is worn or scratched, both bearings should be replaced as a set.

Crankshaft bearing clearance

1. Thoroughly clean all parts.
2. Measure the wear of each main bearing journal at two places, and if wear is more than the specified limit, replace the crankshaft.

Crankshaft wear limit: 44.968mm (1,770 in)

3. Measure the inner diameter of the main bearing at two places, and calculate the oil clearance.

Oil clearance: 0.020 ~ 0.062mm (0.0008 ~ 0.0024 in)

Oil Clearance = crankshaft journal outside diameter — main bearings inside diameter.

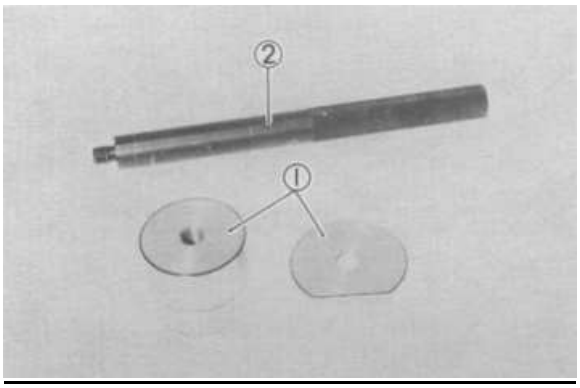
CAUTION:

On the journal, the larger measurement is used as a basis for calculation of the oil clearance, and on the main bearing, the smaller value is used.

Main bearing removal and selection

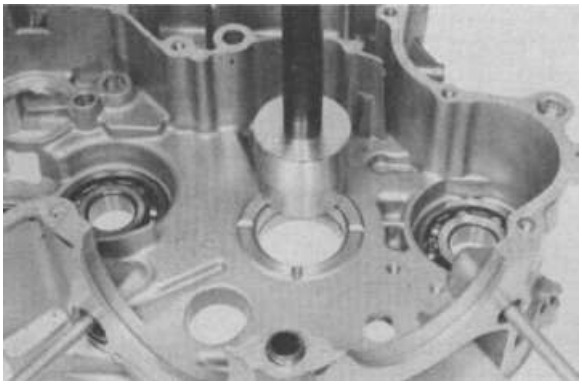
NOTE:

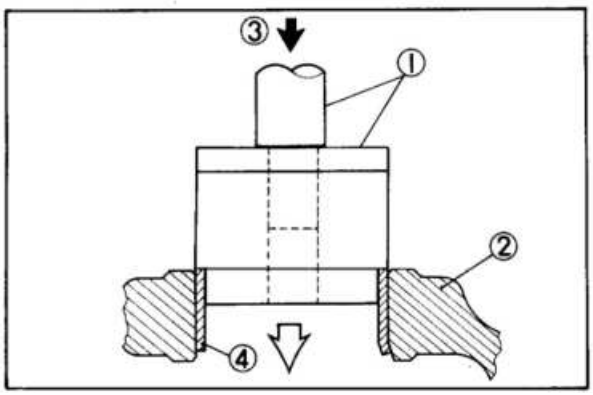
To remove or force-fit the main bearings, be sure to use the special tool set and a hydraulic press.



1. Plain bearing driver/installer 2. Handle

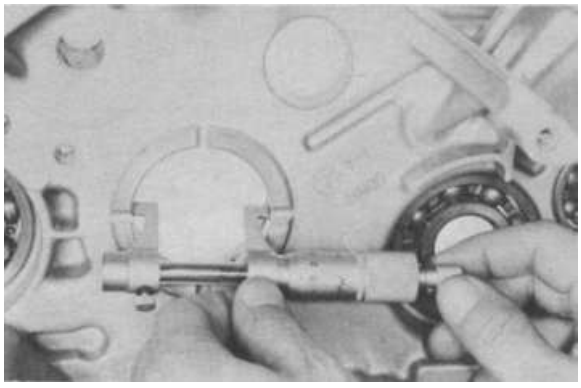
1. As shown in the photo, set the special tool set, and using a hydraulic press, pull the main bearing out to the outside of the crankcase.





1. Special tool 2. Crankcase 3. Hydraulic press
4. Main bearing

2. Clean the counterbore in the crankcase where the main bearing is fitted, and measure the diameter of the counter-bore. By referring to the table below, choose the proper over-size main bearing.



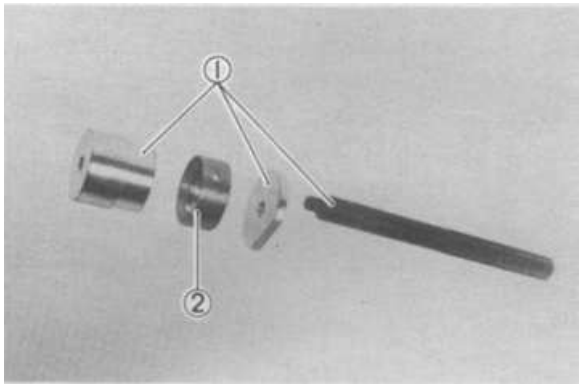
CAUTION:

The diameter of counterbore should be measured at two places, and the average of the two measurements should be used to choose the bearing.

NOTE:

If the diameter of the counterbore in the crankcase exceeds 49.020mm (1.9299 in), the crankcase should be replaced with a new one. The new crankcase is already fitted with main bearings, and their inside diameters are normally 45.000 to 45.012mm (1.77147 -1.7721 in).

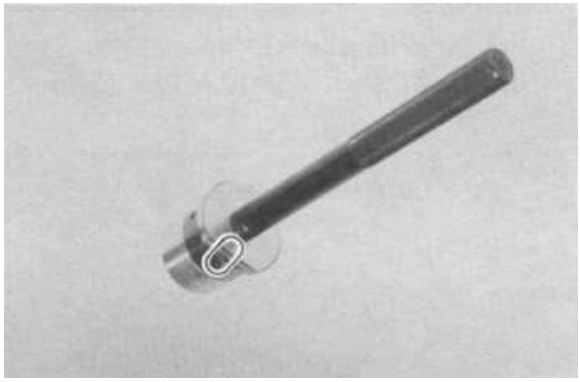
3. As shown in the photo, fit an over-size bearing over the special tool.



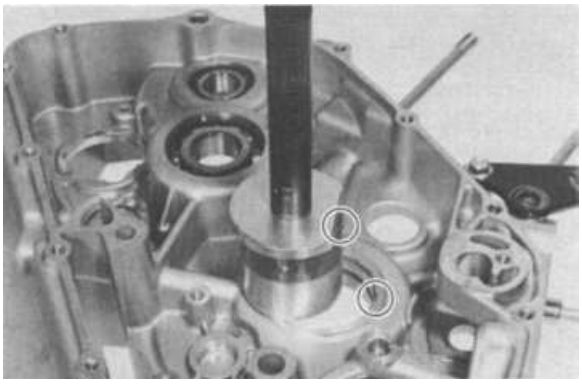
1. Special tool 2. Main bearing

NOTE:

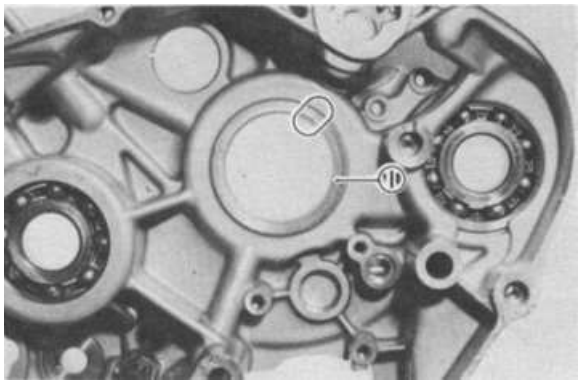
As shown in the photo, fit the key vertically to the bearing, and align the straight cutaway of the plate (special tool) with the key, then grip the bearing with the tool set.



4. Align the key with the keyway in the crankcase, and using *a* hydraulic press, force-fit the bearing.



5. Remove the special tool set and make sure the bearing is in place.



1. main bearing

Connecting rod bearings Check the bearings. If the inner or outer surface is burned, flaked, rough, scratched, or worn, the bearings should be replaced.
Connecting-rod-bearing clearance

1. Thoroughly clean all parts.
2. Install the connecting rod bearing upper half into the connecting rod.
3. Place Plastigage® on the crankpin.
4. Install the rod bearing lower half in the connecting rod cap, and install the rod cap onto the crankshaft.
5. Apply molybdenum disulfide grease to the bolt threads, and torque both ends of the rod cap evenly. Do not move the connecting rod until the clearance check is completed.

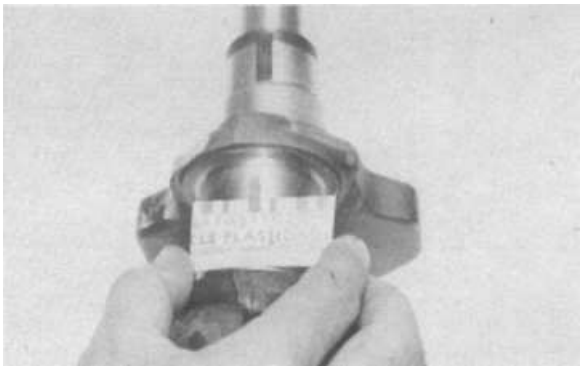
CAUTION:

When tightening the rod cap, apply continuous torque between 3.4 and 3.8m- kg. Once you reach 3.4m-kg of torque, DO NOT STOP tightening until final torque is reached. If tightening is interrupted between 3.4 and 3.8m-kg, loosen the nut to less than 3.4m*kg and start again. Tighten to full-torque specification without pausing.

Tightening torque:
38 Nm (3.8m-kg, 27ft-lb)

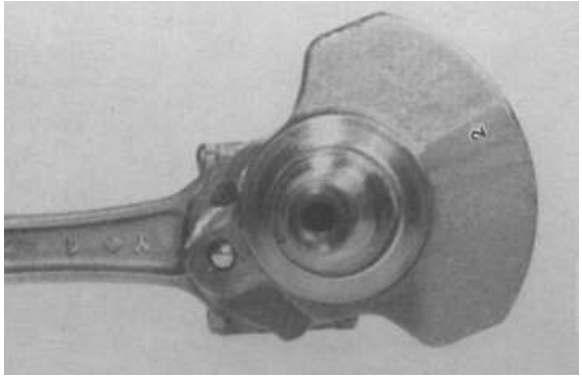
6. Carefully remove the connecting rod cap, and measure the width of the Plastigage®.

Connecting-rod-bearing clearance:
0.035 ~ 0.054mm (0.0014-0.0021 in)

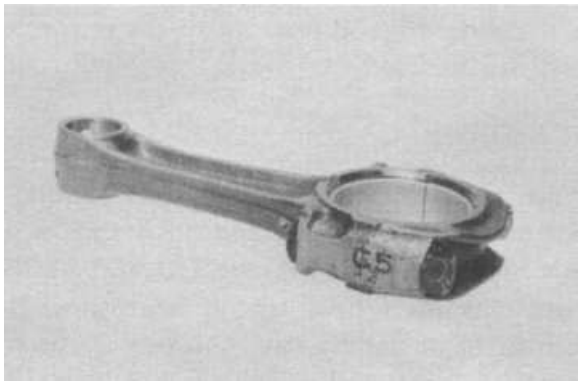


Connecting rod bearing selection

The numbers used to indicate the crankpin size are stamped on the L.H. crank web.



The connecting rod numbers are stamped in ink on the rod.



Proper bearing selection is made by subtracting the crankpin number from the rod size number. Use the color code to choose the proper bearing.

Example:

Rod No. - Crankpin No.
= Bearing No.
4 -1=3

No. 3 bearing is brown. Use brown bearing inserts.

Bearing color code	
No. 1	Blue
No. 2	Black
No. 3	Brown
No. 4	Green
No. 5	Yellow

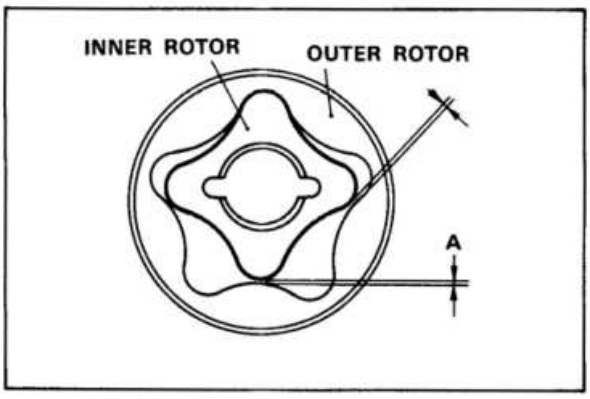
Oil pump

1. Measure the rotor width on both troch-oid gears. If the measurement exceeds specification, replace the pump.

Rotor width:	
Crankshaft pump:	6mm (0.236 in)
Transmission pump:	4mm (0.157 in)

2. Measure the clearance between the rotor and housing. Replace the pump assembly if the clearance exceeds specifications.

Rotor-to-housing clearance:
0.03 ~ 0.09mm (0.0012 ~ 0.0035 in)



Primary drive

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

Primary reduction ratio		
No. of teeth		Ratio
Drive	Driven	
33	73	2.212

1. Check the drive gear and the driven gear for obvious signs of wear or damage from foreign material within the primary case.
2. If the primary drive is excessively noisy during operation, replace both the drive and the driven gears.

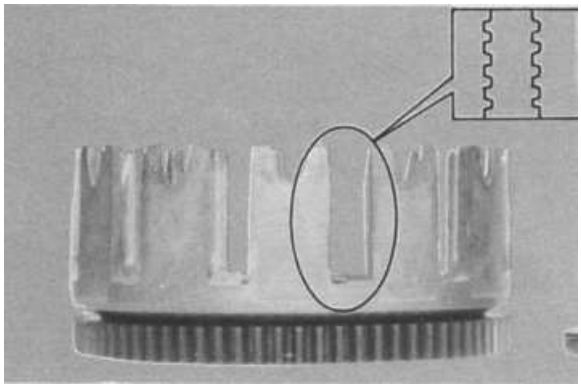
Clutch

Clutch housing

1. Check the dogs on the clutch housing. Look for cracks and signs of galling on the edges. If damage is moderate, deburr; if severe, replace the clutch housing.

NOTE:

Galling on the clutch plate splines will cause erratic operation.



2. Check the clutch housing bearing for damage. If damaged, replace the bearing.

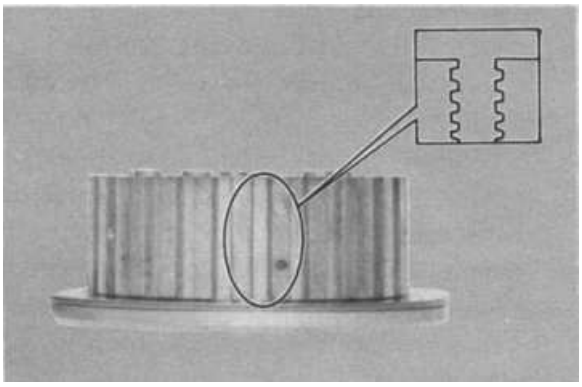
Clutch boss

The clutch boss contains a built-in damper beneath the first clutch plate (clutch plate 2). It is not normally necessary to remove the circlip and disassemble the built-in damper unless there is serious clutch chattering.

1. Check the splines on the clutch boss for galling. If damage is slight to moderate, deburr; if it is severe, replace the clutch boss.

NOTE:

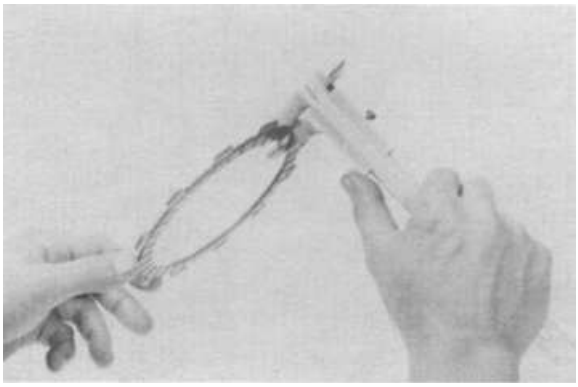
Galling on clutch plate splines will cause erratic operation.

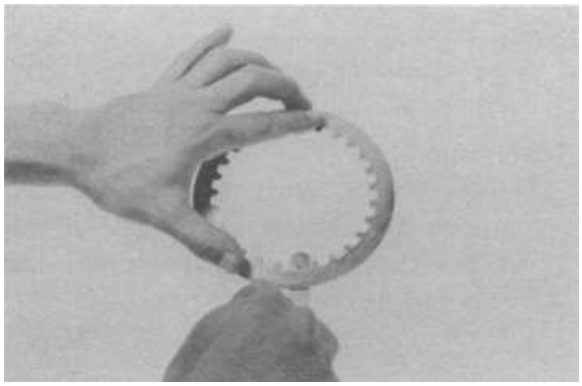


Friction and clutch plates

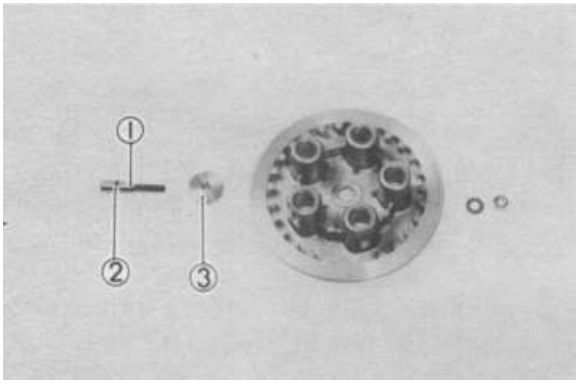
1. Check the clutch plates and friction plates for heat damage. Measure the friction plate thickness at 3 or 4 points. Measure the clutch plates for warpage with a feeler gauge and surface plate. Replace clutch plates or beyond the wear limit.

	Standard	Wear limit
Friction plate thickness	2.8 mm (0.11 in)	2.6 mm (0.10 in)
Clutch plate warp limit	—	0.2 mm (0.008 in)





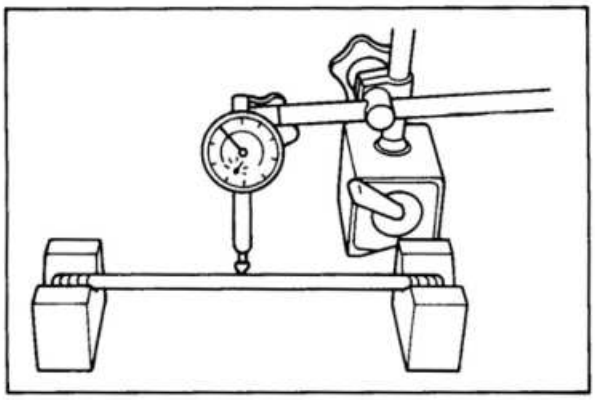
Clutch actuating mechanism



1. Push rod #1 2. 0-ring 3. Washer

1. Check the short push rod #1 for wear or damage, replace if damaged.
2. Check the 0-ring in the short push rod *#1* for damage- replace if damaged.
3. Roll the long push rod on the V-blocks, and check for bends. If any bend is found, replace the push rod.

Bend limit: 0.5mm (0.02 in)



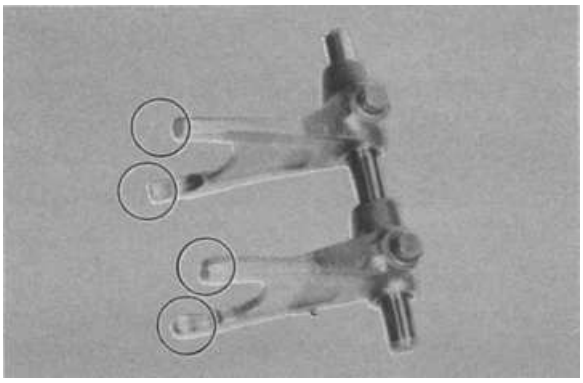
Clutch springs

1. Measure the clutch spring free length. Replace the springs as a set if any is less than the minimum free length.

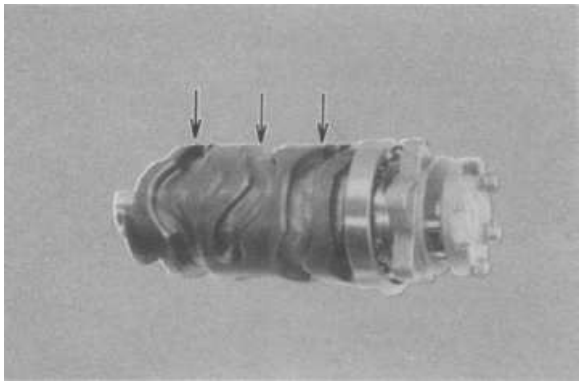
Clutch spring minimum length: 40.2mm (1.583 in)

Transmission

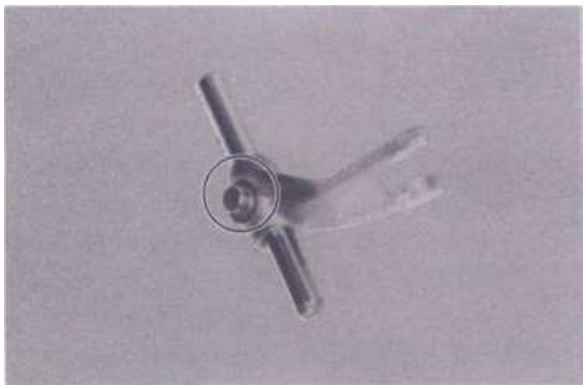
1. Inspect each shift fork for signs of galling on the gear contact surfaces. Check for bending. Make sure each fork slides freely on its guide bar.



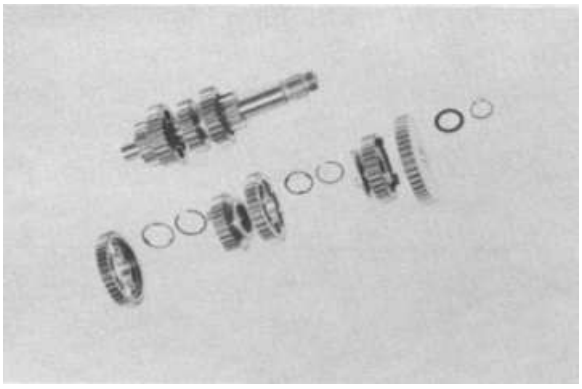
2. Roll the guide bar across a surface place. If the bar is bent, replace it.
3. Check the shift cam grooves for signs of wear or damage. If any profile has excessive wear and/or damage, replace the cam.



4. Check the cam followers on each shift fork for wear. Check the ends that ride in the grooves in the shift cam. If they are worn or damaged, replace the shift fork.

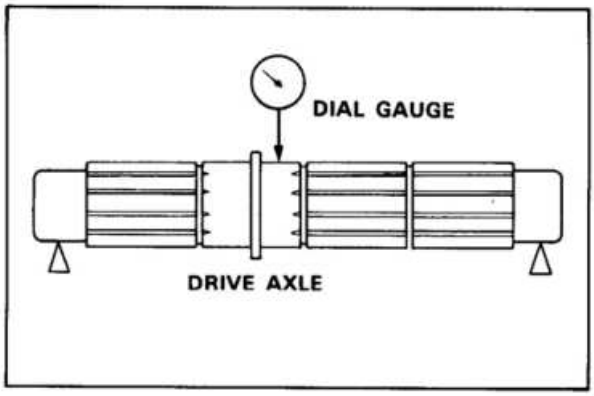


5. Check the shift cam dowel and side plate for looseness, damage, or wear. Replace as required.
6. Check the shift-cam stopper plate, cir-clip, and stopper for wear. Replace as required.
7. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the gear teeth for signs of pitting, galling, or other extreme wear. Replace as required.
8. Check to see that each gear moves freely on its shaft.
9. Check to see that all washers and clips are properly installed and undamaged. Replace bent or loose clips and bent washers.
10. Check to see that each gear properly engages its counterpart on the shaft. Check the mating dogs for rounded edges, cracks, or missing portions. Replace as required.

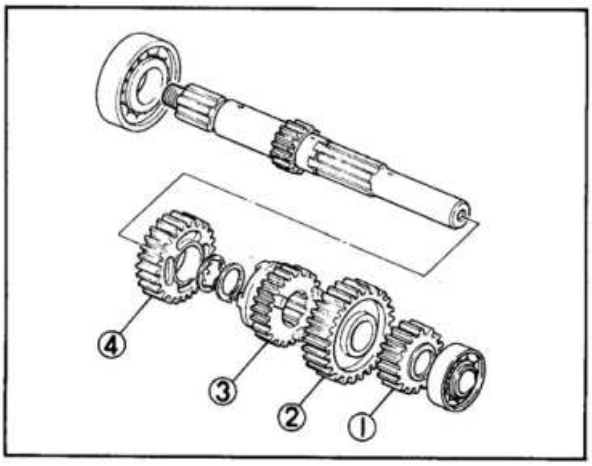


11. Check the transmission shafts using a centering device and dial gauge. If any shaft is bent beyond specified limit, replace the shaft.

Maximum runout:	0.08mm (0.0031 in)

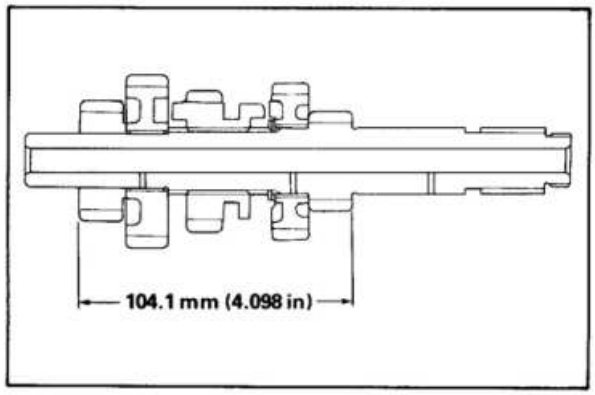


12. When replacing the main axle or pinions, take the following steps:



1. 2nd pinion 2. 5th pinion 3. 3rd pinion 4. 4th pinion

a) Apply molybdenum oil to the 4th and 5th pinion bosses.
b) Using a hydraulic press, force-fit the 2nd pinion to the position specified below.

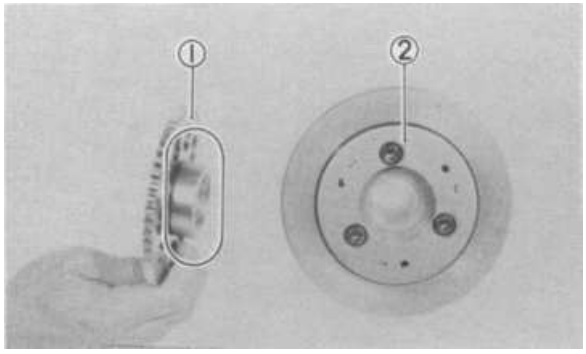


c) After installing the pinions onto the main axle, make sure the 4th and 5th pinions turn freely around the main axle.

Starter drives

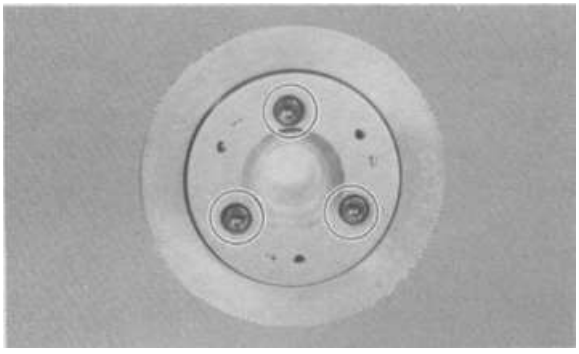
Electric starter clutch and gears

1. Check the surface of the idle gear #2 for pitting or other damage. If severe, replace the gear.



1. Idle gear #2 2. Electric stater clutch

2. Check the spring caps and the springs for deformation or damage. If severe, replace as necessary.
3. Check the starter clutch bolt (alien screw) for looseness. If loose, remove the bolt and replace with a new bolt. Apply Loctite® to threads and tighten to specified torque. Clinch the end of the bolts.



Starter clutch bolt tightening torque: 20Nm (2.0 m - kg, 14ft-lb)

ENGINE ASSEMBLY AND ADJUSTMENT

Important information

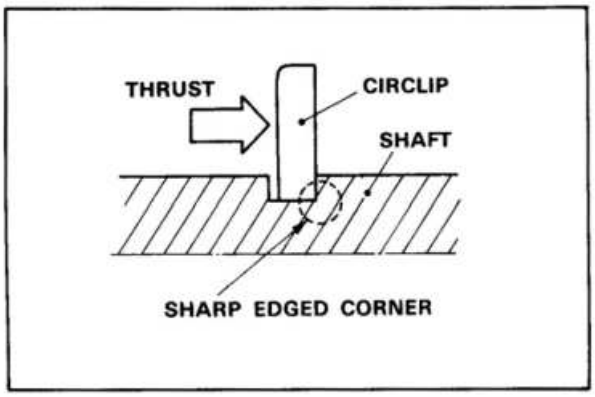
Gaskets and seals

1. All gaskets and seals should be replaced when an engine is overhauled. All gasket surfaces and oil seal lips must be cleaned.
2. Properly oil all mating parts and bearings during reassembly.

Circlips

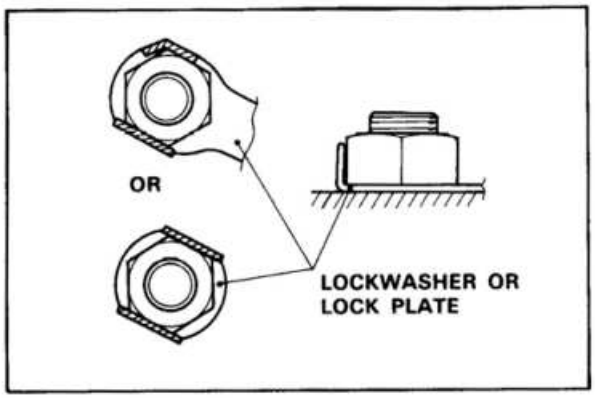
1. All circlips should be inspected carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips.

   When installing a circlip, make sure that the sharp edged corner is positioned opposite to the thrust it reveives. See the sectional view below.



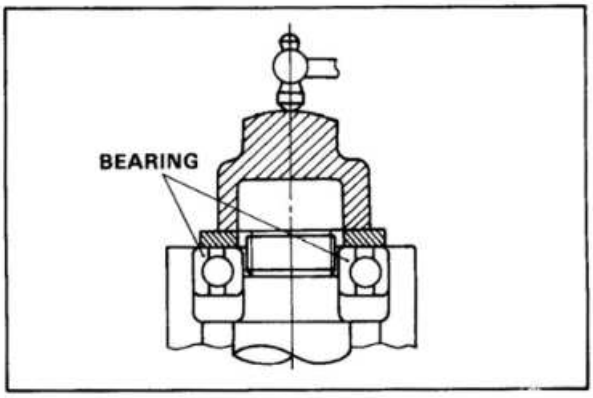
Lock washers/plates and cotter pins

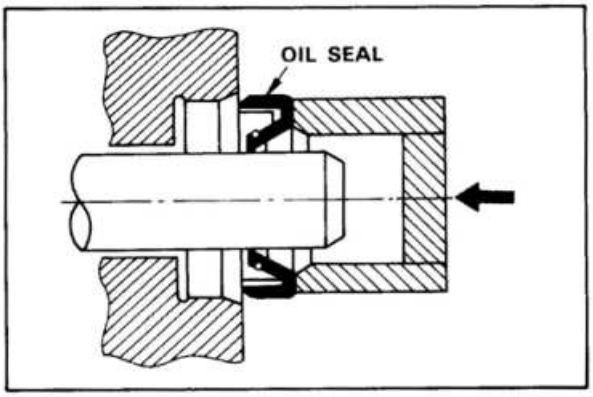
1. All lock washers/plates and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



Bearings and oil seals

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

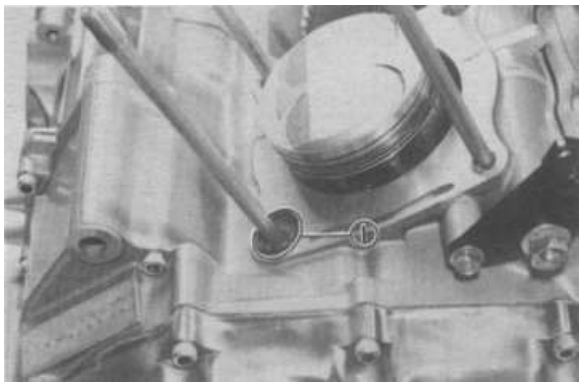




IMPORTANT NOTE:

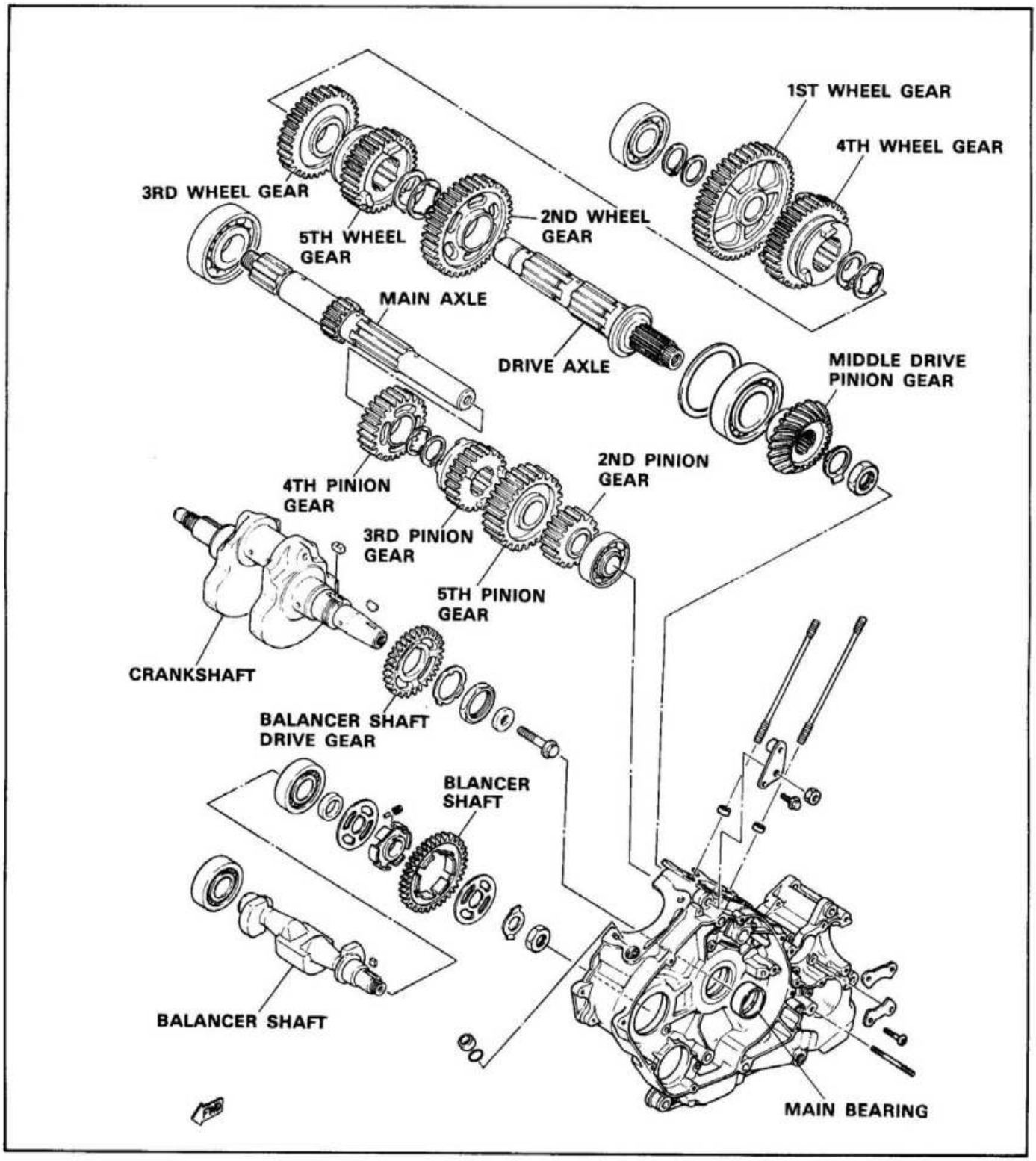
Before assembling the engine, thoroughly clean the crankcases using fresh cleaning solvent.

Blow all oil passages clean and dry using compressed air. If the engine uses any plugs to restrict oil flow (i.e., to the top end) and they can be removed, they should be cleaned before the engine is assembled.



1. Oil jet

Left-side crankcase



1. Press the crankshaft bearing, balancer shaft bearing, and transmission bearing into the left side crankcase. Liberally oil the bearings before installation. The bearing i.d. marks should face the inside of the crankcase. Push the outer, not the inner race.

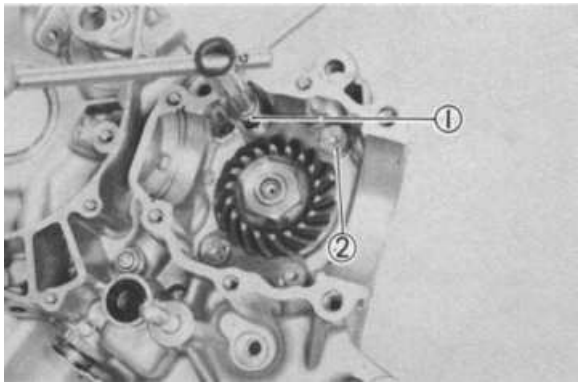
proper shims (refer to page 3-56). Be sure that the bearing is properly seated against the crankcase.

CAUTION:

The drive axle bearing is a slip-fit. If the bearing cocks during installation, remove the drive axle assembly and start again. The bearing must go in smoothly.

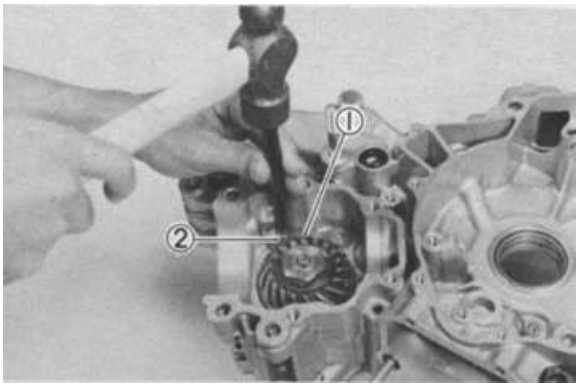
3. Install the bearing stopper plates and tighten the bearing stopper bolts. Use the Torx driver and torque the bolts to specification.

Tightening torque:
25 Nm (2.5m-kg, 18ft-lb)



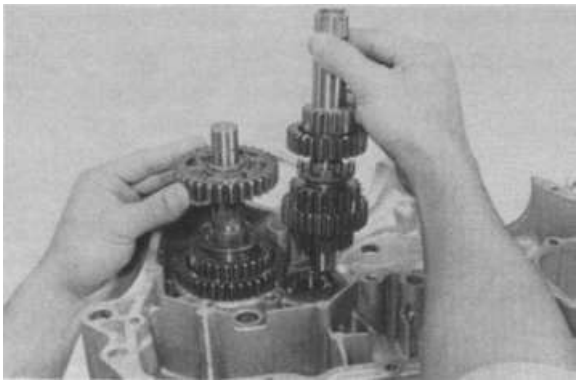
1. Torx driver

4. Place a punch on the part of the stopper bolt head which covers the recess in the stopper plate and punch the head.



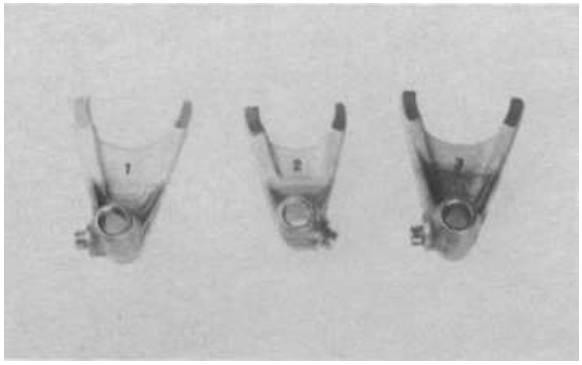
1. Bearing stopper plate 2. Bearing stopper bolt

5. Install the second and fifth wheels onto the drive axle, and install the main axle subassembly into the left side crankcase.



6. Install the third, fourth, and first wheels onto the drive axle

7. Install the shift cam into the left side crankcase.
8. Install the shift fork *#2* onto the third pinion. Then insert the guide bar (short one) into the crankcase through the shift fork.



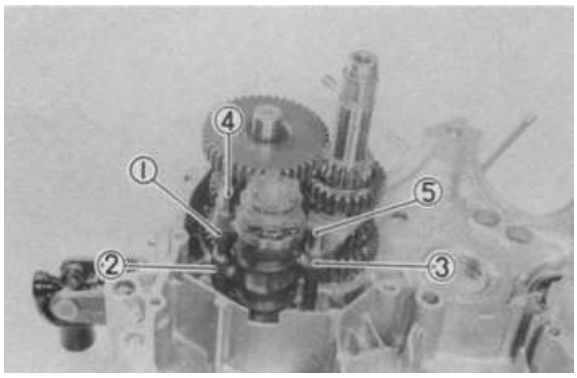
NOTE:

Each shift fork has an embossed number. The fork should be installed so that the number faces toward the left side of the crankcase.

9. Install the shift fork *#1* onto the fifth wheel and shift fork #3 onto the fourth wheel. Then insert the guide bar (long one) through the shift forks.

CAUTION:

Before assembling the crankcases, ensure that the transmission is in neutral and that the gears turn freely.



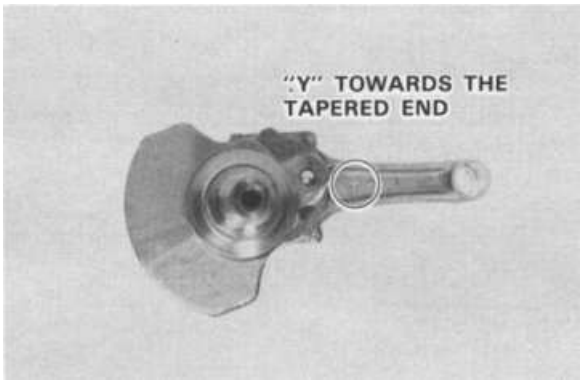
1. Shift fork #3 2. Shift fork #1 3. Shift fork *#2*
4. Guide bar (Long one) 5. Guide bar (Short one)

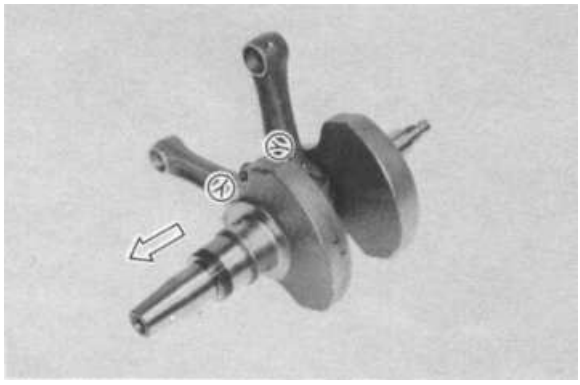
10. Install the connecting rods, with the proper bearings, onto the crankshaft. The letter "Y" on each rod must face the tapered end of the crankshaft. Align the location marks on each rod with the mark on its rod cap. Apply molybdenum disulfide grease to the bolt threads. Torque both ends of the rod cap evenly.

CAUTION:

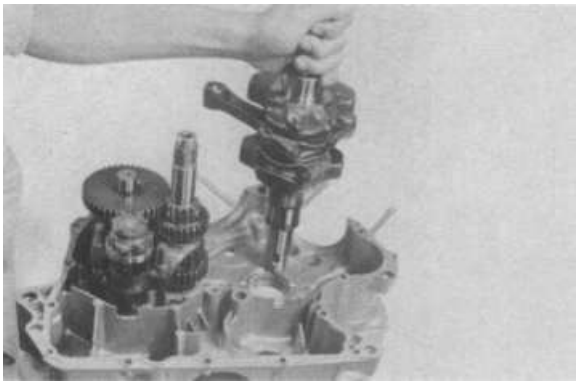
When tightening the rod cap, apply continuous torque between 3.4 and 3.8 m-kg. Once you reach 3.8 rtrkgof torque, DO NOT STOP tightening until final torque is reached. If tightening is interrupted between 3.4 and 3.8 m-kg,loosen the nut to less than 3.4nvkg and start again. Tighten to full-torque specification without pausing.

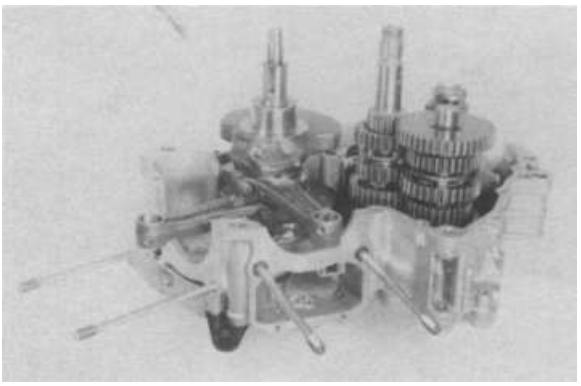
Rod cap torque:
38 Nm (3.8 m-kg, 27 ft-lb)



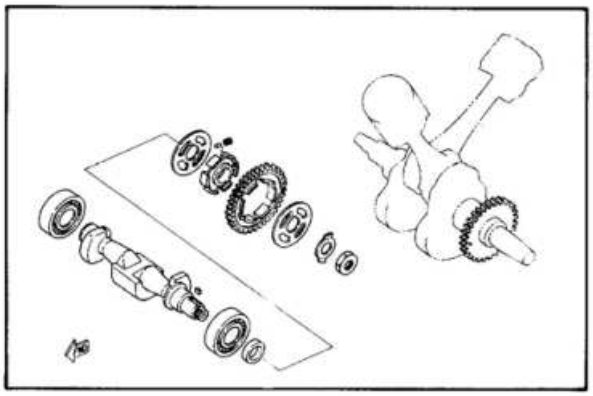


11. Install the crankshaft, with the tapered end on the left side of the crankcase. Place the left connecting rod into the front-cylinder bore. The rod must be in this bore when the crankshaft is installed.





12. Install the balancer shaft with the threaded end installed through the left side of the crankcase.

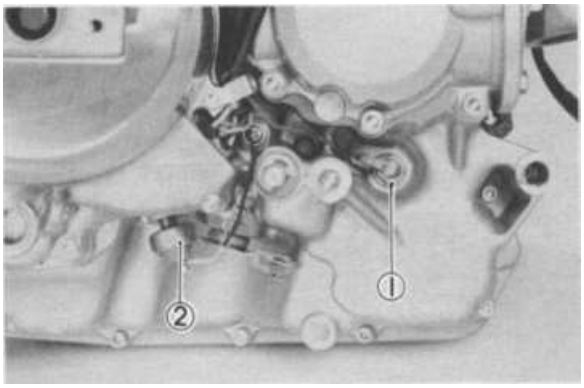


13. Install the neutral switch into the leftside crankcase. Use a copper washer, and torque the switch to specification.

Tightening torque:
20 Nm (2.0m-kg, 14ft-lb)

14. Install the oil pressure switch into the left-side crankcase. Torque the switch to specification.

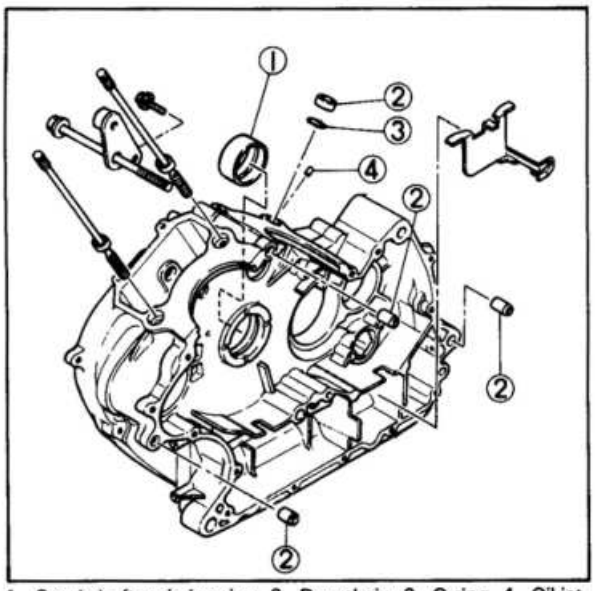
Tightening torque:
20 Nm (2.0m - kg, 14ft-lb)



1. Neutral switch 2. Oil pressure switch

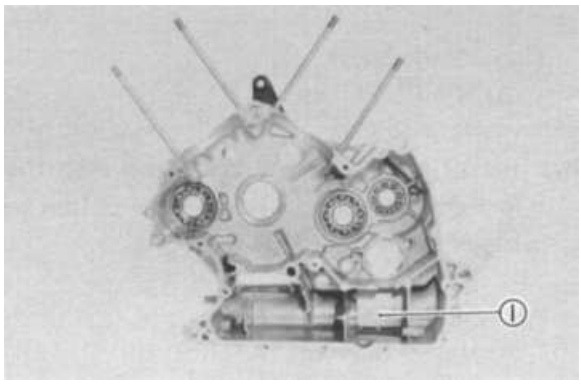
Right-side crankcase

1. Press the balancer shaft bearing, crankshaft bearing, and both transmission bearings into the right-side crankcase. Apply a liberal amount of oil to each bearing prior to installation. Apply pressure to the outer race of the bearing.



1. Crankshaft wain bearing 2. Dowel pin 3. O-ring 4. Oil jet

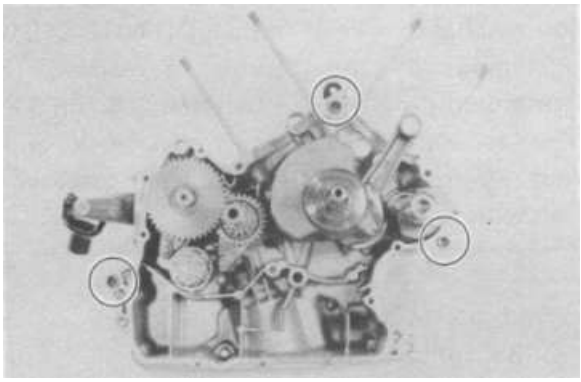
2. Install the oil baffle into the crankcase.



1. Oil baffle

Crankcase assembly

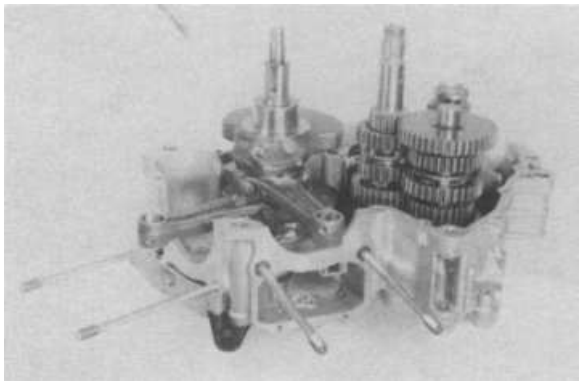
1. Install the three dowels into the left-side crankcase as shown in the photograph.



2. Install the right-side crankcase onto the left-side crankcase. Note the position of the left-hand connecting rod. It must be in the front cylinder bore as shown in the photograph.

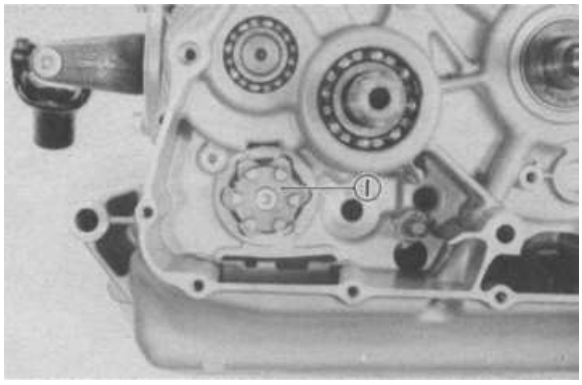
NOTE:

Use Yamaha bond #4 to seal the cases.



CAUTION:

First align the shift cam segment key with the keyway in the crankcase, and install the right side crankcase.



1. Segment

3. Install the crankcase bolts. Tighten the bolts in the tightening sequence shown in the illustration. After all the bolts are tight, torque them to specification. Torque the bolts in the torquing sequence also shown in the illustration.

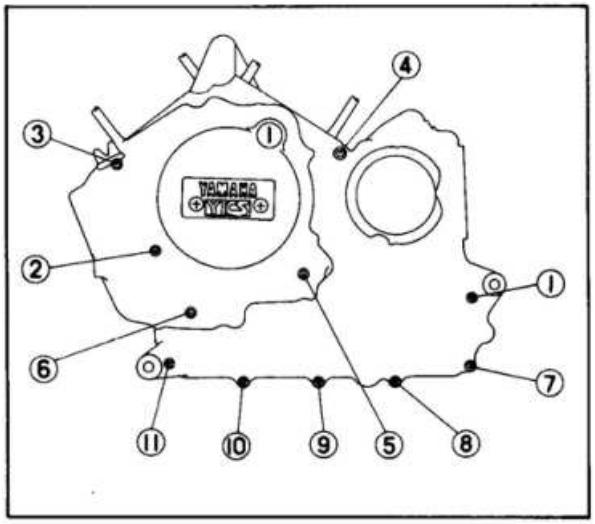
Tightening torque:
Bolts #1 ~16(M6x1.0)
10 Nm (1.0m.kg, 7.2ft-lb)
Bolt/nut #17 (M10x 1.25)
30 Nm (3.0m-kg, 22ft-lb)

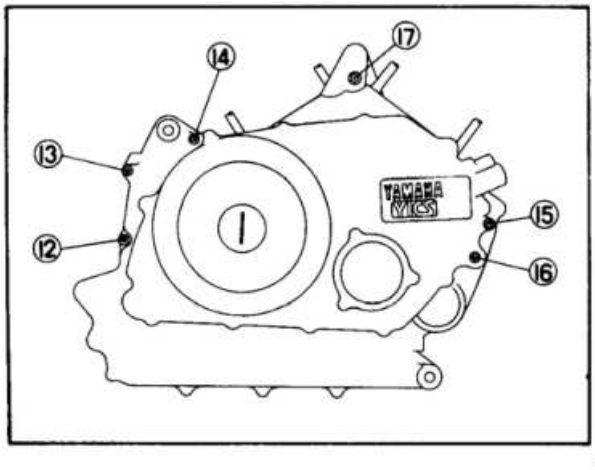
4. Tighten the engine-mounting-bracket securing bolts (#18, #19). Torque the bolts to specification.

Tightening torque:
10 Nm (1.0m-kg, 7.2 ft-lb)

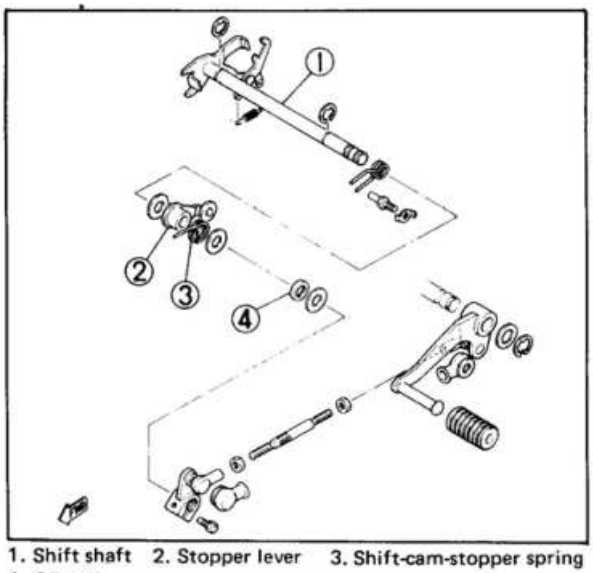
NOTE:

Apply Yamaha bond #4 to bracket securing bolts



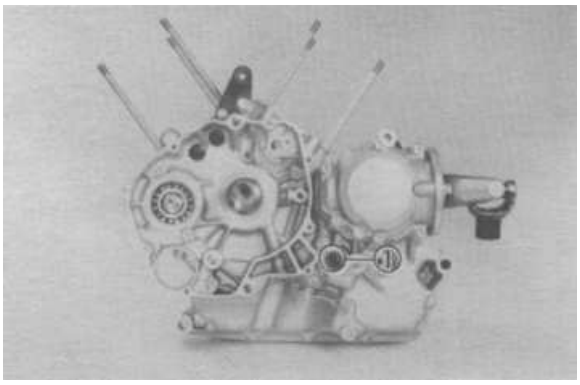


Shifter



1. Shift shaft 2. Stopper lever 3. Shift-cam-stopper spring
4. Oil seal

1. Lightly grease then lips of the shift shaft oil seal at the leftside crankcase.

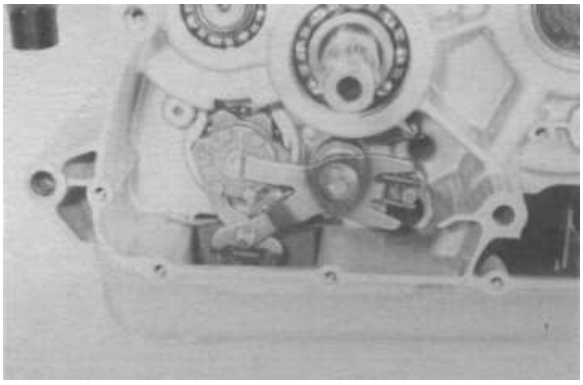


1. Shift shaft oil seal

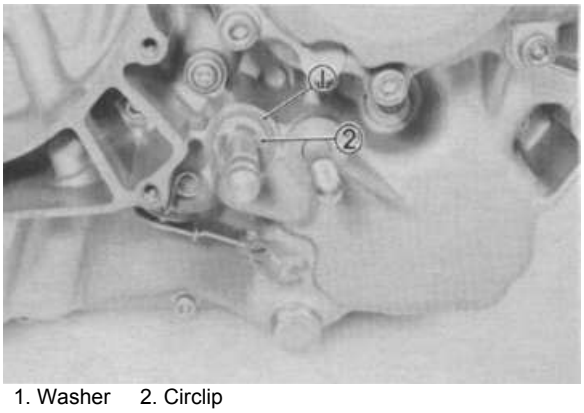
2. Install the shifter into the right side crankcase. Hook the shift-cam-stopper spring beneath the projection in the crankcase. Be sure the shift lever correctly engages the shift drum pins.

NOTE:

Open the shift lever and the shift drum stopper so they can clear the shift drum during installation.

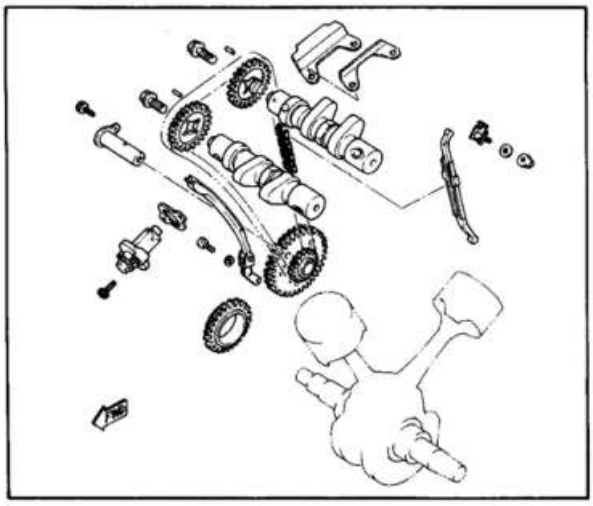


3. Install the washer and circlip onto the shift shaft.



1. Washer 2. Circlip

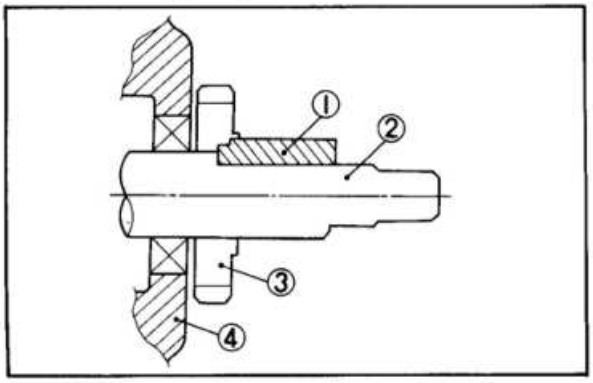
Front-cylinder chain guide and drive gears.



1. Install the front cam chain guide in the right side crankcase. Torque the bolt to specification.

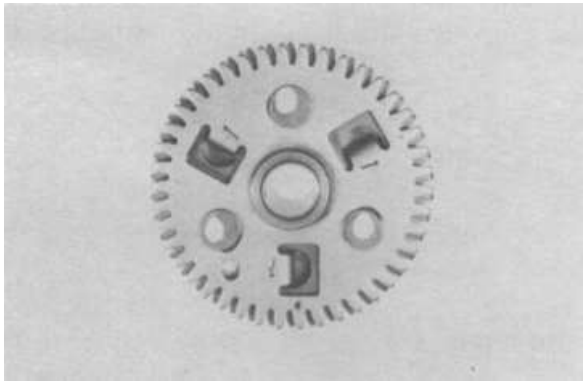
Tightening torque:
8 Mm (0,8 m-kg, 5.8ft • lb)

2. Slip the cam chain drive gear (28T) over the right side of the crankshaft. By rotating the gear, align the key ways in the crankshaft and gear, and fit the key in the key ways.



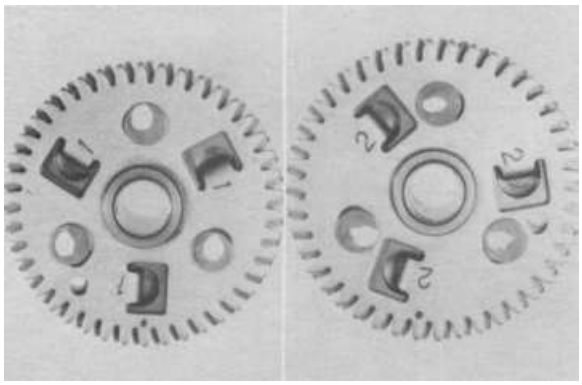
1. Key 2. Crankshaft 3. Cam chain drive gear
4. Crankcase

3. Study the zero-lash timing gear. Note that it has two sets of gear teeth. One set is spring loaded and moves relative to the other set.

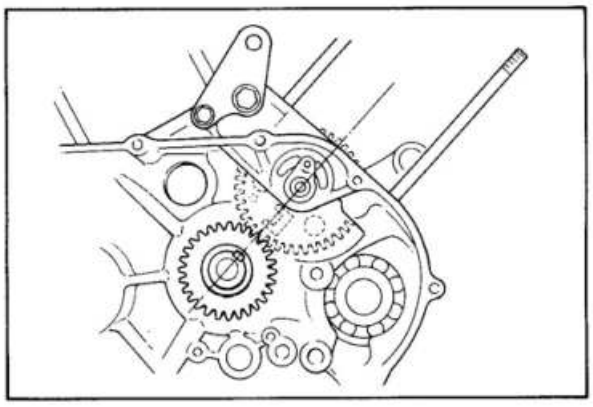


NOTE:

Each timing gear has an engraved number 1 or 2 on its side. Install the No. 1 gear on the front cylinder side and the No. 2 on the rear side.

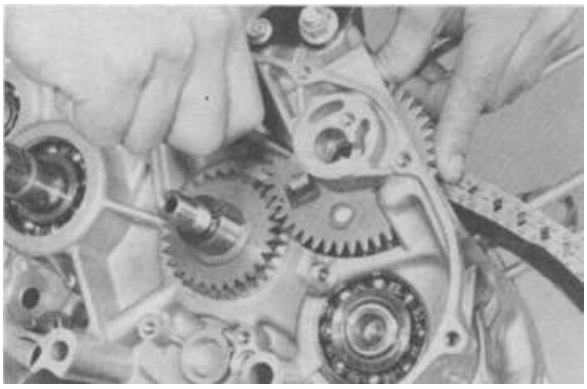


4. By rotating the crankshaft by hand, bring the key position to align with the center of the front cylinder bore.



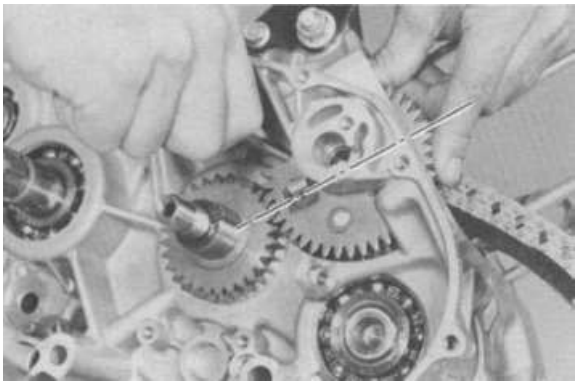
5. Attach a proper length of wire to the cam chain and place the cam chain on the timing gear sprocket.

6. Lower the timing gear into the cam chain journal.



7. The punch mark on the timing gear should align with the keyway in the crankshaft. The procedure is as follows:

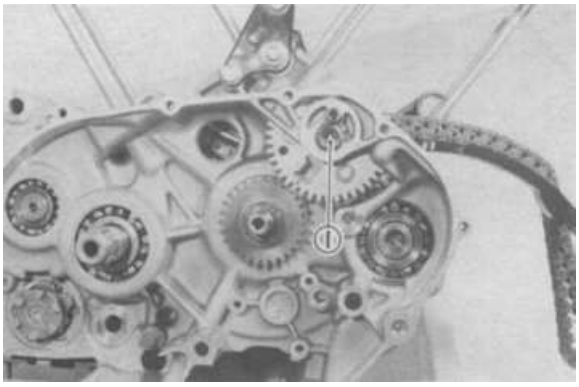
b) Insert an appropriately-sized punch in the gear alignment hole on the timing gear. Apply a prying motion to the punch and rotate the gears until both sets of teeth on the timing gear align with one another.



c) While aligning the teeth, insert the timing gear further into the cam chain journal until the timing gear engages the cam chain drive gear on the crankshaft. Make sure that the punch mark on the timing gear aligns with the key positioned on the crankshaft.

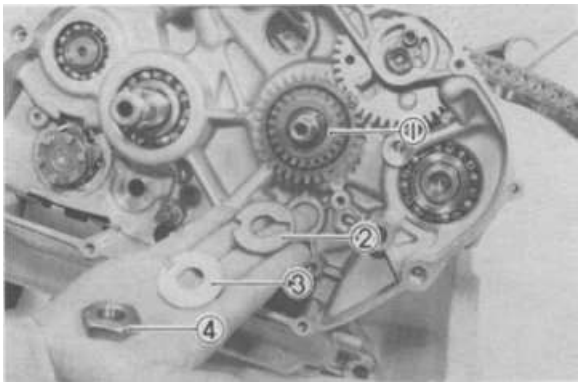
8. Install the timing gear shaft and secure it in place with the stopper plate. Bolt the stopper plate to the crankcase. Torque the securing bolt to specification.

Tightening torque:
12 Nm (1.2m-kg, 8.7ft-lb)



1. Timing gear shaft

9. Install the primary drive gear (33T), oil pump drive gear (23T), plate washer, lock washer, and nut. Finger-tighten the securing nut, do not torque it at this point.

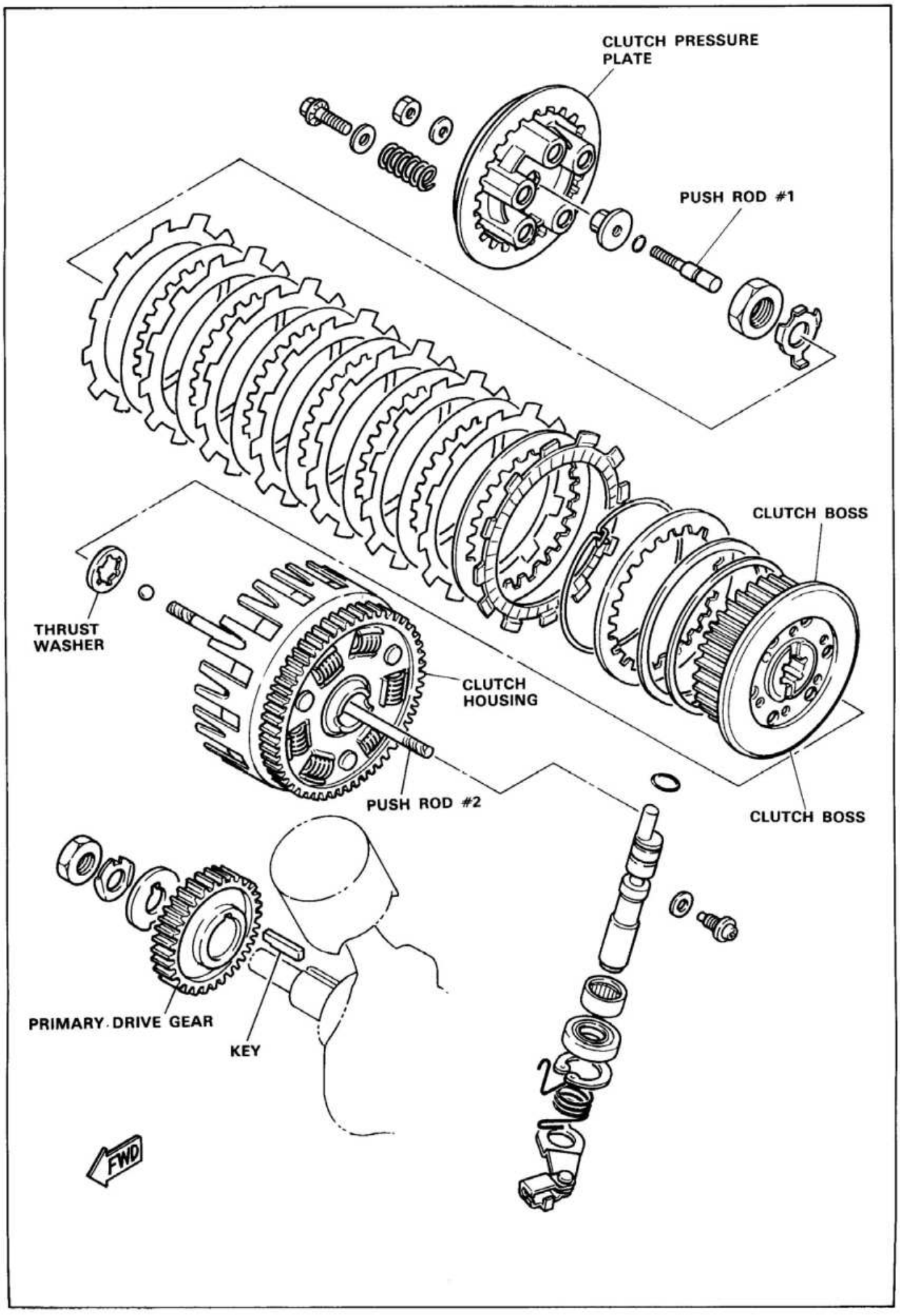


1. Oil pump drive gear
2. Plate washer
3. Lock washer
4. nut

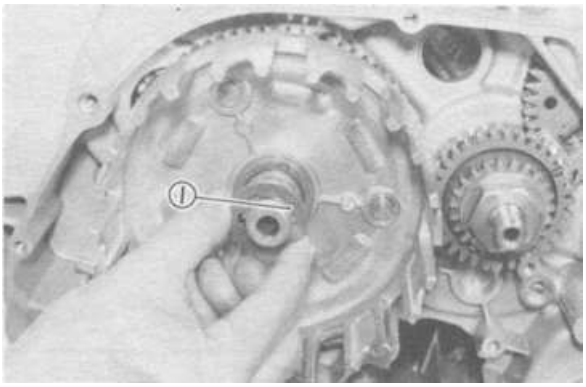
NOTE:

Be sure the tab of the lock washer engages the slots in the plate washer.

Clutch


CLUTCH PRESSURE PLATE
PUSH ROD #1
CLUTCH BOSS
THRUST WASHER
CLUTCH HOUSING
PUSH ROD #2
CLUTCH BOSS
PRIMARY DRIVE GEAR
KEY
FWD

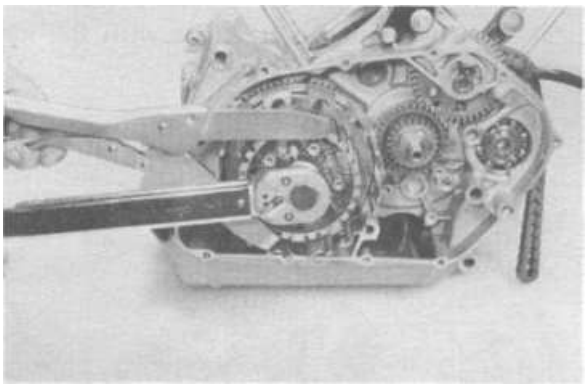
1. Install the clutch housing onto the transmission main axle.
2. Install the thrust washer and the clutch boss onto the transmission main axle.



1. Thrust washer

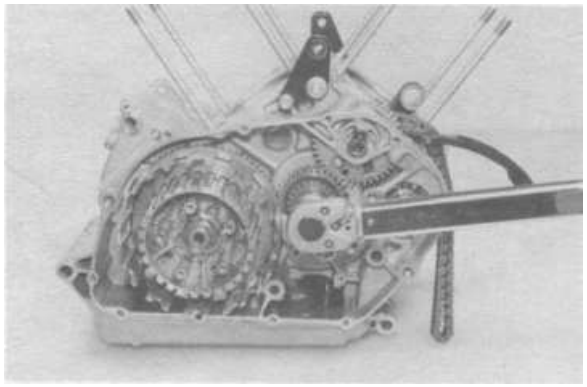
3. Install a new lock washer onto the transmission main axle. Be sure the tab of the washer engages the slots in the clutch boss.
4. Install the clutch boss securing nut. Using the clutch hub holder, tighten the clutch-boss nut and torque it to specification. Bend a lock tab against a nut flat.

Tightening torque:
70 Nm (7.0m-kg, 50ft-lb)

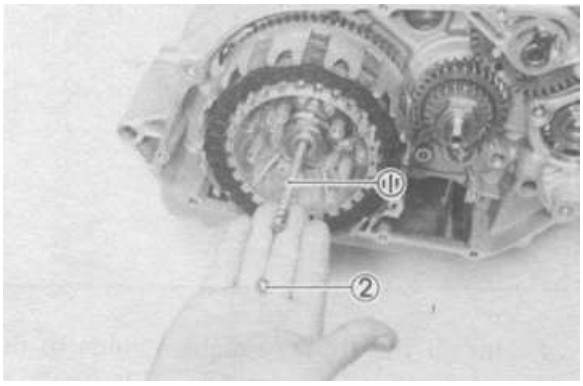


5. Place a small piece of rolled rag or a piece of lead between the drive gears. This will hold the primary drive gear so you can tighten the primary drive gear and oil pump drive gear securing nut. Torque it to specification. Bend a lock tab against a nut flat.

Tightening torque:
70Nm(7.0m-kg, 50ft-lb)



6. Install the friction and clutch plates. Begin with a friction plate and alternate clutch and friction plates until all of the plates are in the clutch boss.
7. Insert push rod #2 into the transmission main axle. Insert the ball into the shaft.



1. Push rod #2 2. Ball

8. Install the new 0-ring onto the push rod #1.
9. Install the clutch pressure plate and the six clutch springs. Torque the clutch plate bolts to specification. Bend a lock tab against a nut flat.

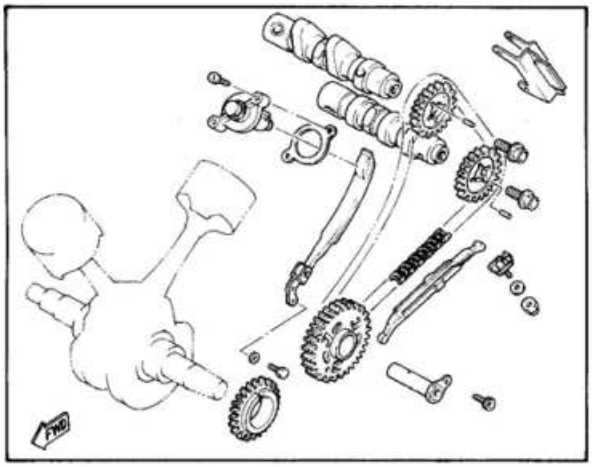
Tightening torque:
8 Mm (0.8m-kg, 5.8ft-lb)

NOTE:

When installing the clutch pressure plate, align the marks on the clutch boss and pressure plate.



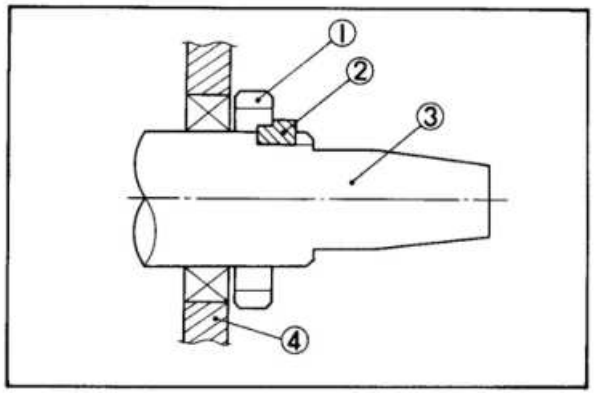
Rear-cylinder chain guide and drive gears



1. Install the front cam chain guide to the left side crankcase. Torque the bolt to specification.

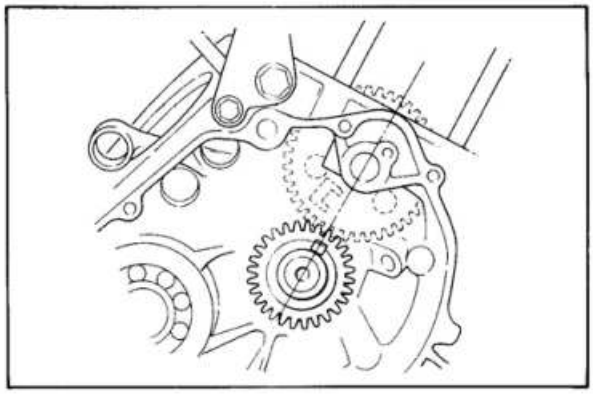
Tightening torque:
8Nm (0.8 m-kg, 5.8ft-lb)

2. Mount the cam chain drive gear (28T) on the left side of the crankshaft. By rotating the gear by hand, align the keyways in the crankshaft and gear, and fit the key into the key ways.



1. Cam chain drive gear (28T) 2. Key 3. Crankshaft
4. Crankcase

3. By turning the crankshaft by hand, bring the key position with the center of the rear cylinder bore.



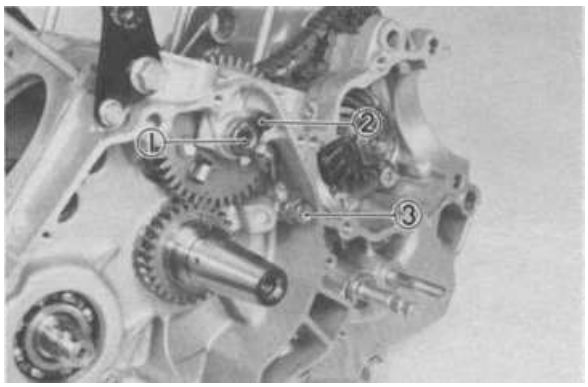
4. Attach a proper length of wire to the cam chain, and place the cam chain around the timing-gear sprocket *(#2).*
5. Lower the timing gear into the cam chain journal.
6. Insert an appropriately sized punch into the gear-alignment hole on the timing gear. Apply a prying motion to the punch, and rotate the gears until both sets of teeth on the timing gear align with one another.
7. Further lower the timing gear until it engages the cam chain drive gear on the crankshaft. Make sure the punch mark on the timing gear aligns with the key position on the crankshaft.



1. Timing gear 2. Cam chain drive gear 3. Key

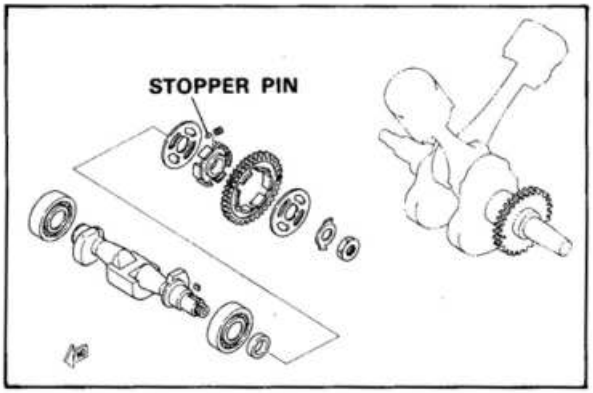
8. Install the timing gear shaft with the oil delivery pipe, and secure the shaft and pipe in place with the stopper plate. Bolt the stopper plate to the crankcase. Use new copper washers, and torque the stopper bolt and union bolt to specification.

Tightening torque:	
Stopper bolt:	12 Nm (1.2 m-kg, 8.7 ft-lb)
Union bolt:	18 Nm (1.8 m-kg,13 ft-lb)

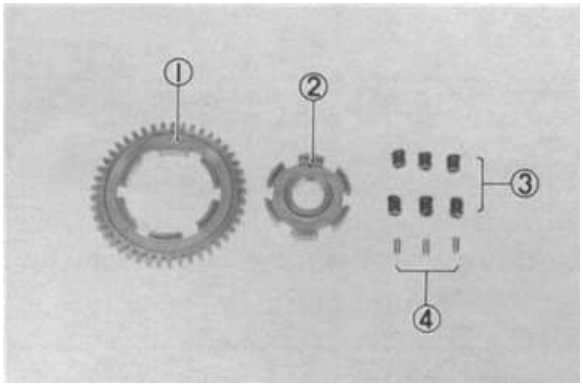


1. Timing gear shaft 2. Stopper bolt 3. Union bolt

Balancer gear and flywheel

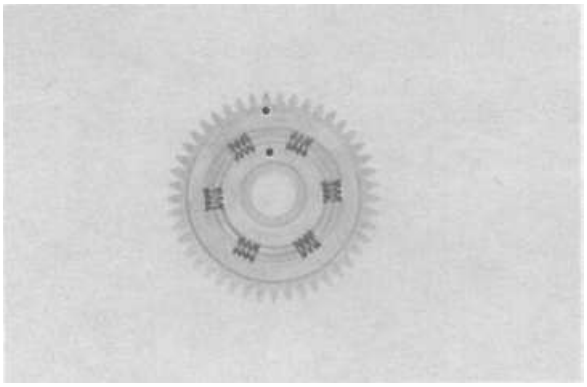


1. Install the balancer drive gear (45T), lock washer, and finger-tighten the securing nut; do not torque it at this point.
2. Install the balancer driven gear in the following way:

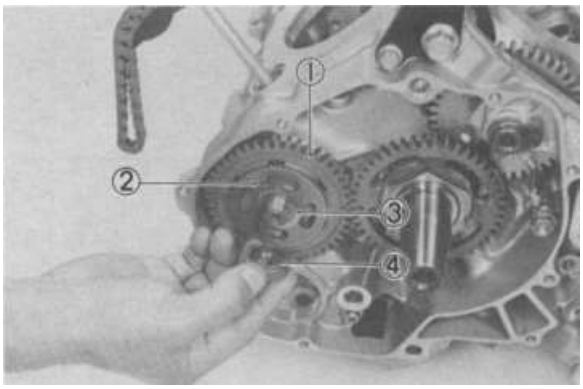


1. Driven gear 2. Boss 3. Spring (6 pcs)
4. Pin (3 pcs)

a) The balancer driven gear damper assembly is composed of 6 springs and 3 pins. Insert the balancer gear boss into the balancer gear, aligning the punch marks. Then install the damper springs; install first a spring and then install a spring with a pin in it.
b) Align the punch marks on the boss and gear, and mount the gear on the boss.



3. Install the washer and plate washer onto the balancer shaft. The install the key onto the balancer shaft.
4. Install the balancer driven gear, plate washer, lock washer, and nut.



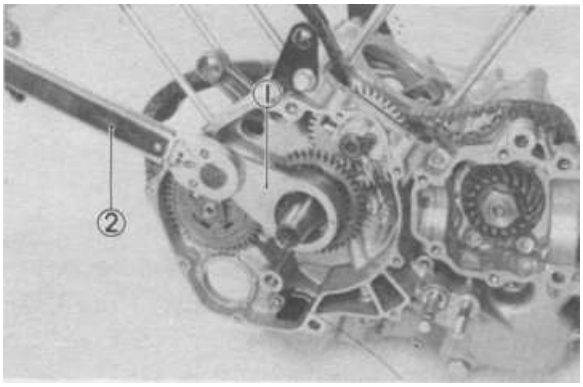
1. Driven gear 2. Plate washer 3. Lock washer 4. Nut

NOTE:

- Be sure the tab of the lock washer engages the slots in the balancer shaft.
- Position the nut so that its slots face the lock washer.
- When installing the balancer drive gear, don't push the gear, or the springs and pins will come off. Push the boss instead.

5. Place a small piece of rolled rag or a piece of lead between the primary gears. This will hold the balancer drive gear so you can tighten the securing nuts. Torque the securing nuts to specification. Bend a lock tab against a nut flat.

Tightening torque:
Balancer drive gear nut:
100 Nm (10.8m-kg, 72ft-lb)
Balancer driven gear nut:
60 Nm (6m-kg, 43 ft-lb)

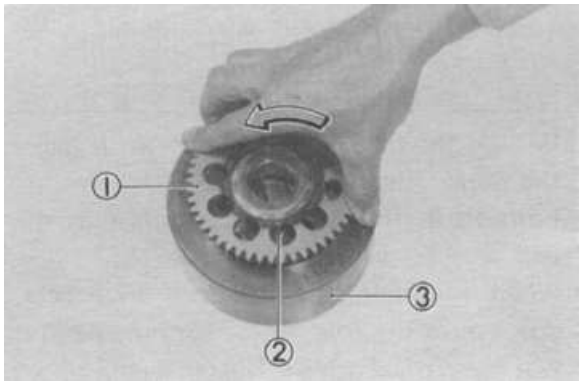


1. Box wrench (Special tool) 2. Torque wrench

6. Install the woodruff key into the crankshaft keyway.
7. Install the starter idle gear #2 in the starter clutch attached to the flywheel.

NOTE:

To install the starter idle gear #2 in the starter clutch, first place the idle gear on the starter clutch and turn it counterclockwise slowly so it moves into the starter clutch.

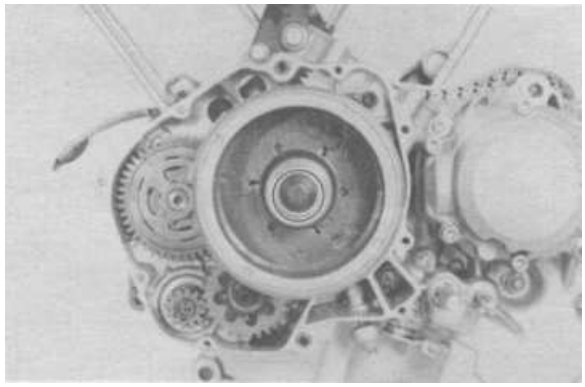


1. Starter idle gear 2. Starter clutch 3. Flywheel

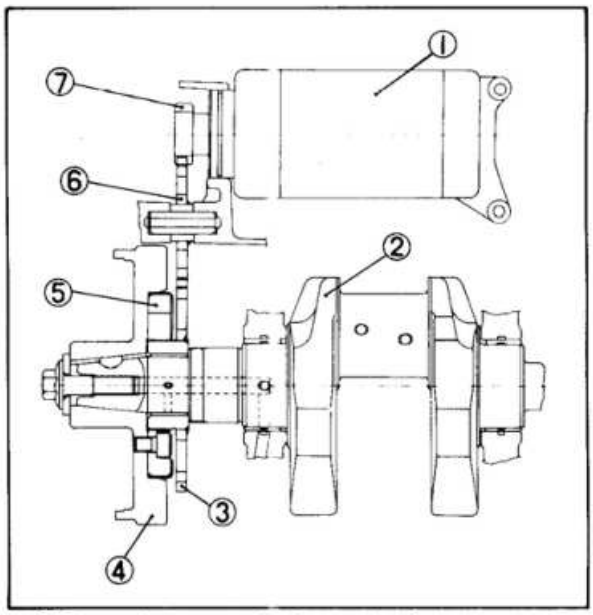
8. Install the flywheel assembly with the starter idle gear #2 onto the crankshaft. The key in the crankshaft should engage the keyway in the flywheel.

9. Install the washer and the flywheel securing bolt onto the crankshaft. Place a small piece of rolled rag or a piece of lead between the primary gears. This will hold the flywheel so you can tighten the securing bolt. Torque the flywheel securing bolt to specification.

Tightening torque:
80 Nm (8 m-kg, 58ft-lb)



Starter motor and starter idler gear #1

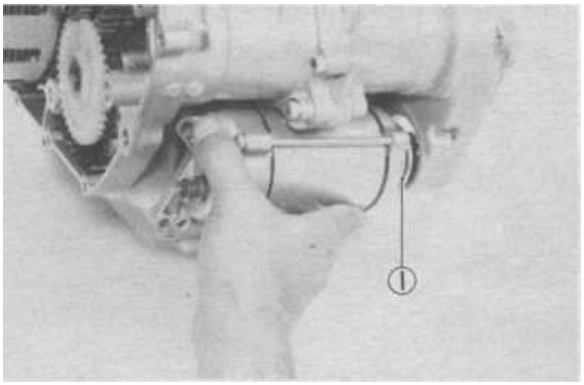


1. Starter motor
2. Crankshaft
3. Idler gear #2
4. Plywheel
5. Starter clutch
6. Idler gear #1
7. Drive gear

1. Install the starter motor. Grease the 0-ring and insert the starter into the crankcase.

NOTE:

Be careful not to damage the O-ring during installation.

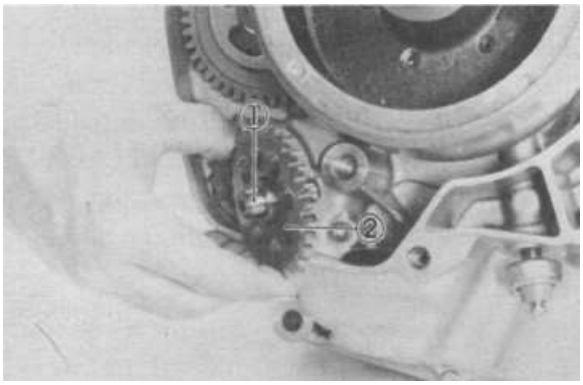


1. 0-ring

2. Secure the starter motor in place with the two securing bolts. Torque them to specification.

Tightening torque:
10 Nm (1.0m - kg,7.2ft-lb)

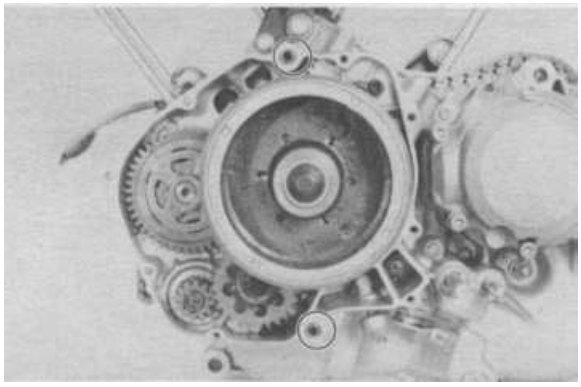
3. Insert the idle gear #1 shaft into the idel gear #1.
4. Install the idle gear shaft into the crankcase.



1. Idle gear shaft 2. Idle gear #1

Crankcase covers, oil pump, and oil filter

1. Install the two dowels in the left-side crankcase as shown in the photograph.

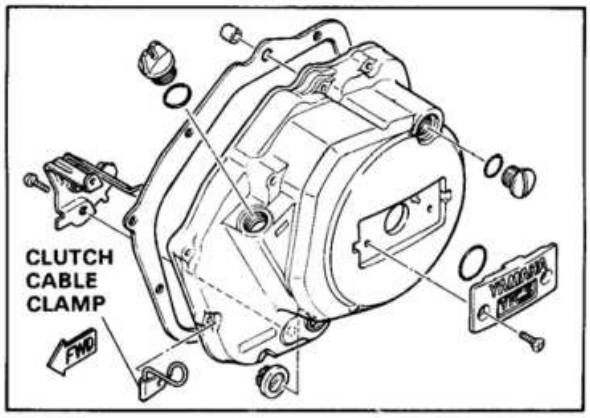


2. Install the left side crankcase cover. Use a new gasket and torque the securing bolts to specification.

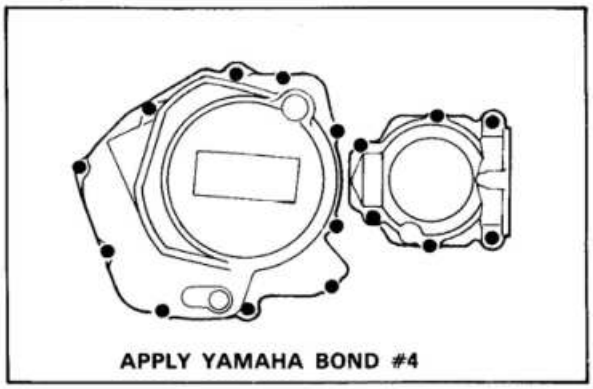
NOTE:

Install the bolt with the clutch cable clamp as shown in the illustration.

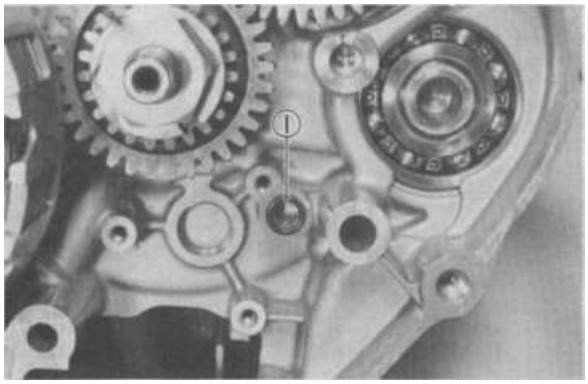
Tightening torque:
10 Nm (1m - kg, 7.2ft-lb)



3. Connect the blue color lead to the neutral switch and black/red lead to the oil pressure switch.



4. Reassemble the oil pump.
5. Place the engine on the bench with the right side facing up.
6. Install the dowel and 0-ring into the right side crankcase as shown in the photograph.

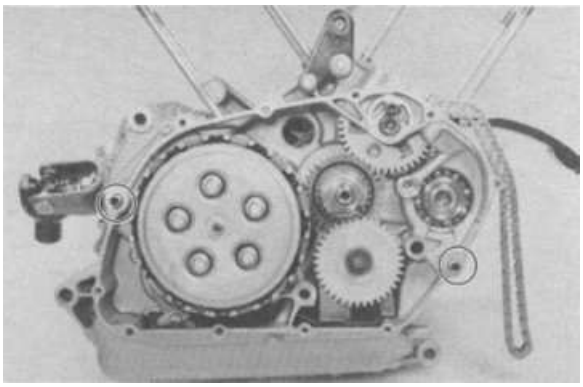


1. O-ring

7. Install the oil pump assembly and oil baffle into the right side crankcase. Torque the bolts to specification.

Tightening torque:
10 Nm (1.0m-kg, 7.2ft-lb)

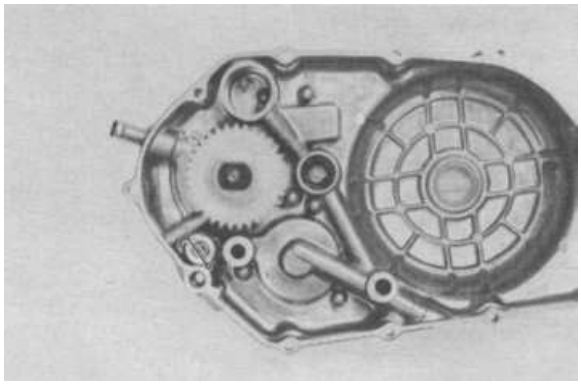
8. Install the two dowels in the right side crankcase as shown in the photograph.



9. Install a new 0-ring onto the oil-pressure relief valve, and install the valve into the right side crankcase cover.

NOTE:

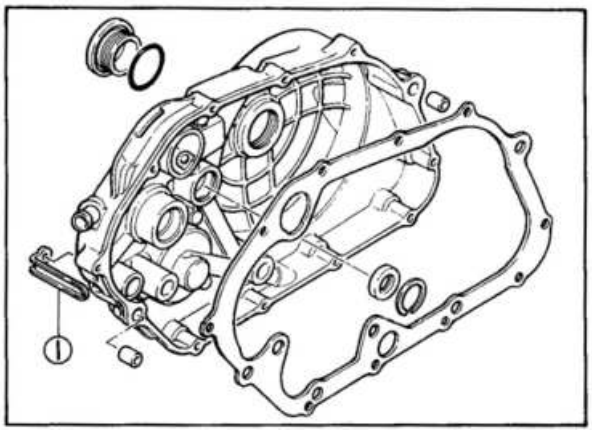
Rotate the valve so no part of the cotter pin interferes with any crankcase mating surface.



10. Install the right side crankcase cover. Use a new gasket and torque the securing bolts to specification.

NOTE:

Place the bolt with the starter motor lead clamp as shown in the illustration.



1. Starter motor lead clamp

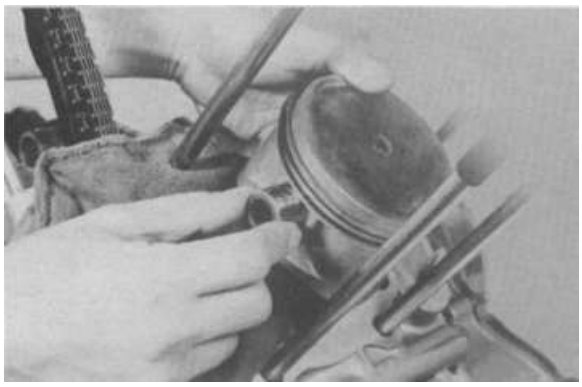
Tightening torque:
10 Nm (1.0m-kg, 7.2ft-lb)

Pistons, cam chain guides, and cylinders

1. Install the pistons on the rods. The "EX" on the front piston should face the front of the engine, and the "EX" on the rear piston should face the rear of the engine. Use new piston-pin clips.

NOTE:

If the engine has been run prior to disassembly, be sure to assemble the #1 piston with the front (#1) cylinder. They have been mated through wear.
Before installing the piston pin clips, cover the crankcase with a clean rag so you will not accidentally drop the clip into the crankcase.



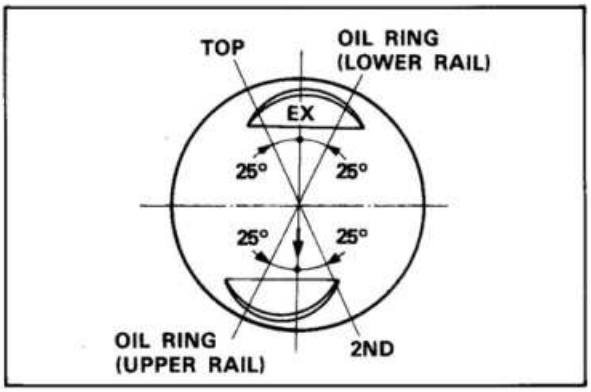
2. Align the piston rings as shown.

CAUTION:

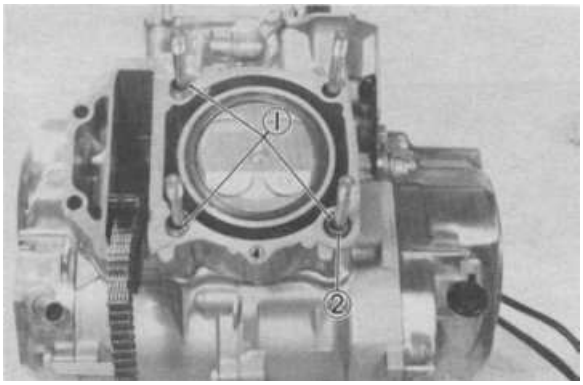
Be sure the ends of the oil ring expanders do not overlap.

NOTE:

The manufacturer's marks or numbers stamped on the rings should be on the top of the rings.



3. Liberally coat the pistons with oil, and install the dowels and 0-ring onto the crankcase as shown in the photograph.



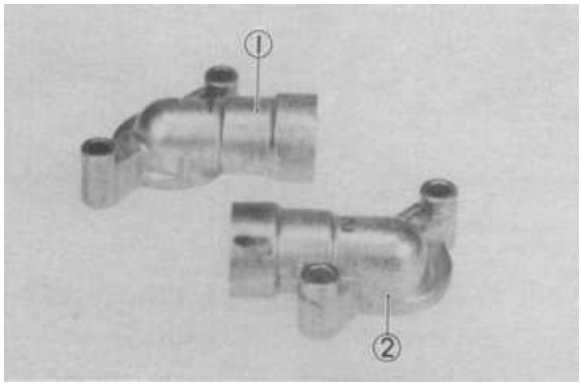
1. Dowel 2. O-ring

4. Install the pipe joint bracket and new O-ring to each cylinder. Torque the bolts to specification.

NOTE:

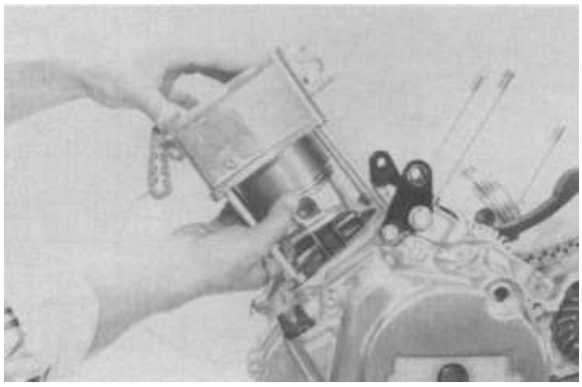
The pipe joint bracket has an embossed number 1 or 2. The No. 1 bracket should be installed on the front cylinder side, and the No. 2 on the rear.
When reusing the cylinders, note the marks which were put on them in disassembly and install the joint pipe brackets correctly.

Tightening torque:
10 Nm (1.0m-kg, 7.2ft-lb)

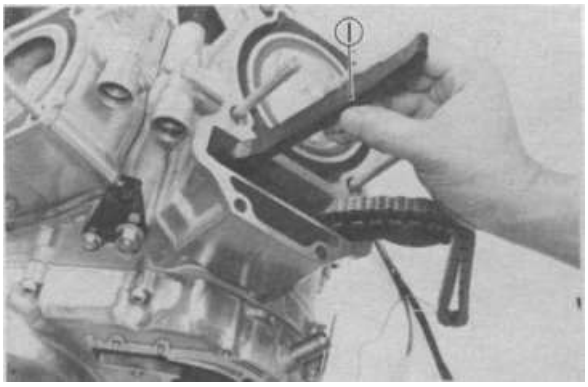


1. For front cylinder 2. For rear cylinder

5. Install a new cylinder base gasket to each cylinder, and install a new O-ring around each cylinder liner.
6. Install the cylinders: Route the cam chain and the cam chain guide through the cam chain journal in each cylinder. You do not need piston ring compressors to install the cylinders. This model has tapered cylinder liners. Simply compress the piston rings with your fingers.

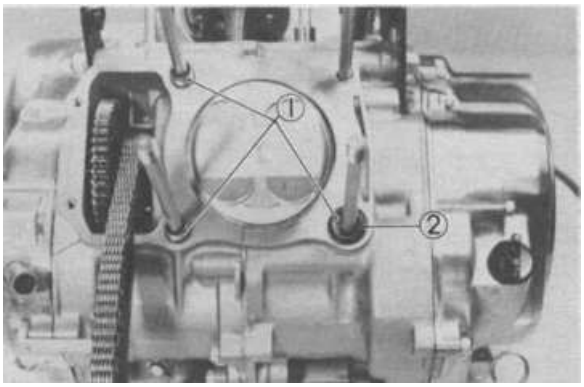


7. Insert the rear cam chain guides in each cylinder. The lower end of each guide must rest in the cam chain guide slots in the crankcase.

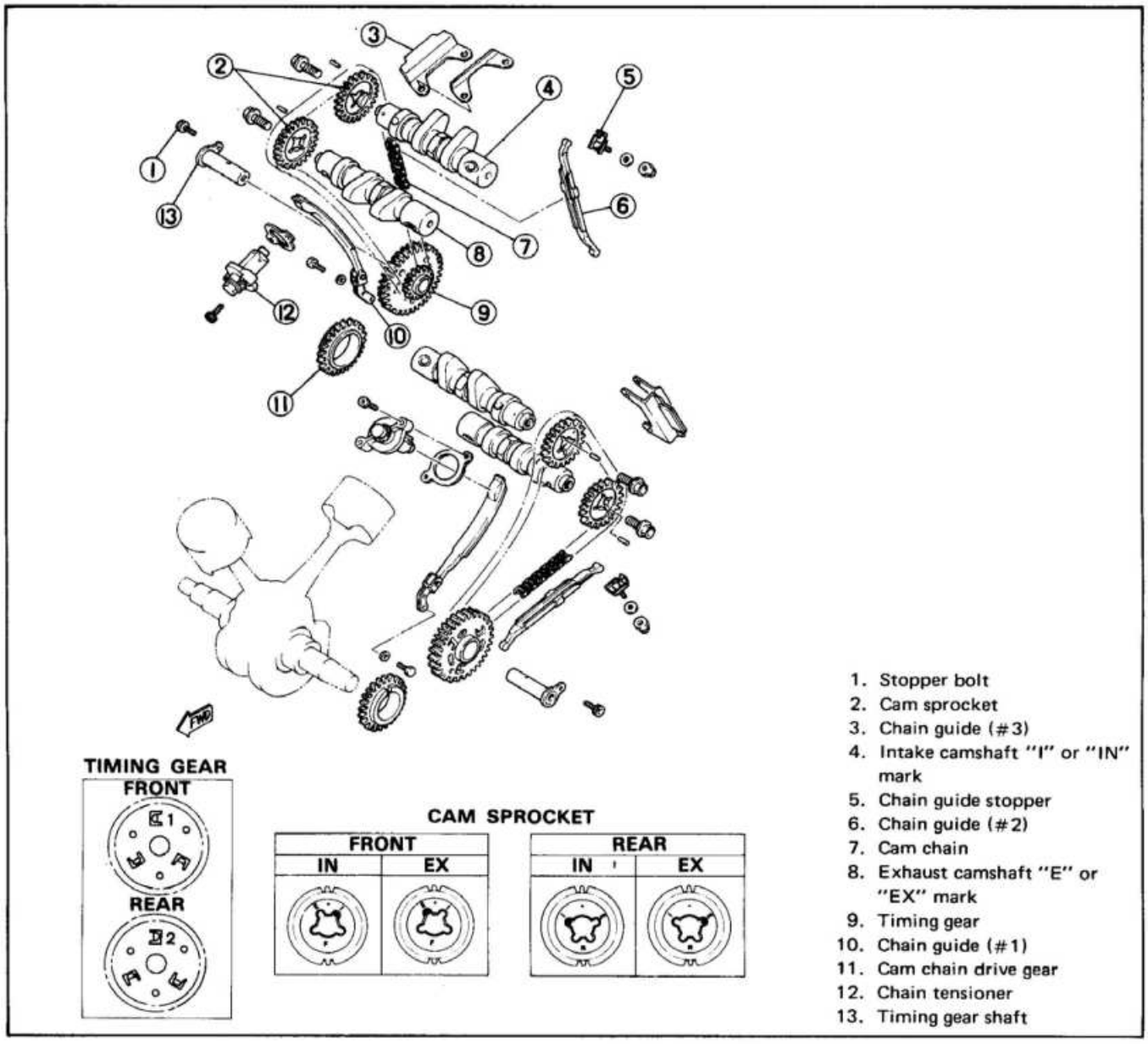


1. Rear cam chain guide

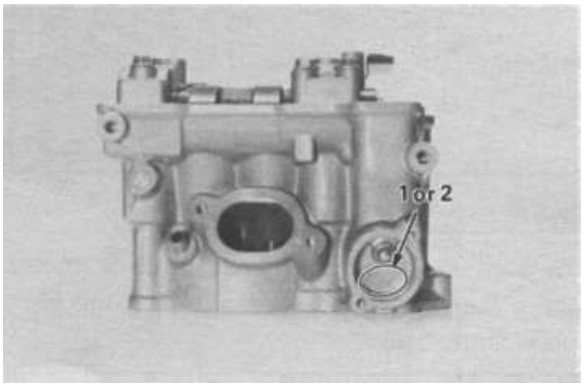
8. Install the cylinder head gasket, 0-ring and three dowels onto each cylinder.



1. Dowel 2. O-ring



1. The rear cam chain guide securing bolts in the cylinder head have embossed numbers 1 and 2. Install the No. 1 cylinder head on the front cylinder side and the No. 2 on the rear cylinder side.



2. Install the cylinder head on the front (#1) cylinder. Route the cam chain through the cam chain journal in the head.

WARNING:

The rear cam chain guide must be fit in the cam chain guide stopper in the head. If the chain guide does not fit the chain guide stopper, take the following steps:

a) Remove the cam chain guide stopper nut cover from the front cylinder.
b) Loosen the cam chain guide stopper securing nut on each cylinder head.
c) Fit the top and of the chain guide into the chain guide stopper.

d) Tighten the stopper securing nut to specification

Tightening torque:
7 Nm (0.7m-kg, 5.1 ft-lb)

e) Reinstall the stopper bolt cover, and torque the bolts to specification.

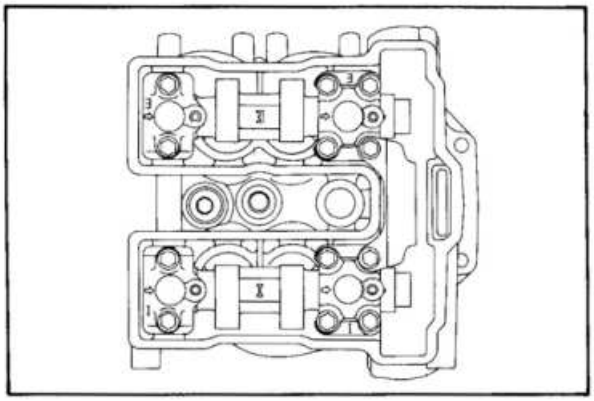
Tighten torque:
6Nm(0.6m - kg, 4.3 ft-lb)

3. Tighten the four nuts and two bolts evenly, then torque them in the sequence shown below.

NOTE:

Turn the intake and exhaust camshafts so that their cam lobes face outward, and align the holes in the cam caps and the camshafts, then insert an 8 mm (0.31 in) Allen wrench into the holes.

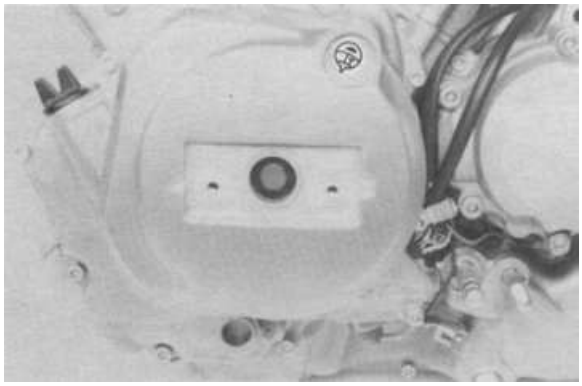
Tightening torque:
Cylinder head bolts:
10 Nm (1.0m-kg, 7.2 ft-lb)
Cylinder head nut:
50 Nm (5.0 m-kg, 36 ft-lb)



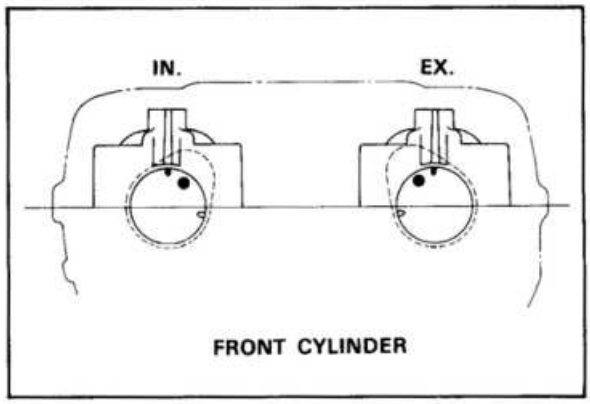
4. Turn the crankshaft counterclockwise, and align the T mark on the flywheel with the stationary pointer. This places the front (#1) piston at top dead center.

NOTE:

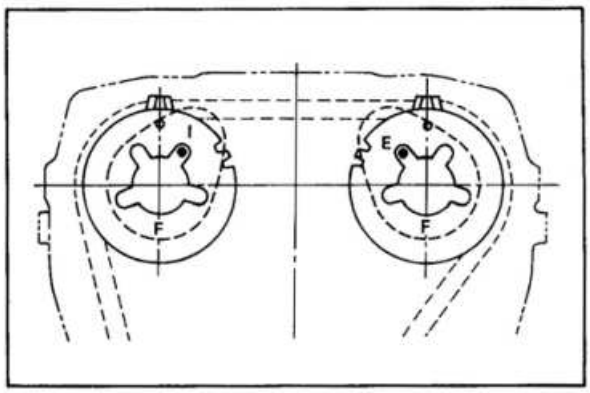
Pull the cam chains, and keep them taut when turning the crankshaft.



5. Turn the front cylinder intake and exhaust camshafts by hand so that the cam lobes face each other and the punch marks on the end of each camshaft align with the marks on the camshaft caps.

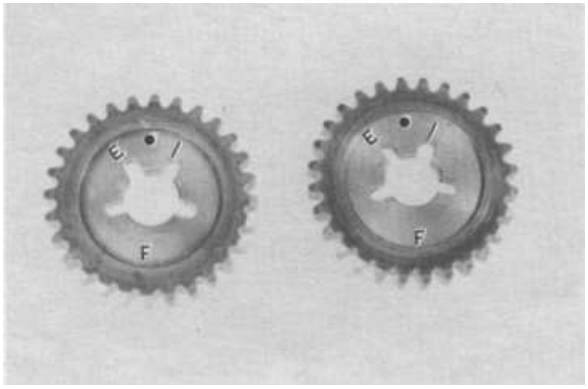


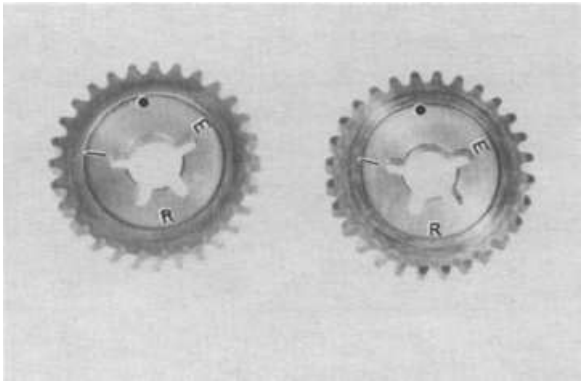
6. Position the cam sprocket so that the mark F is exposed to view and faces upward at the same time, and place the cam chain around the sprocket.



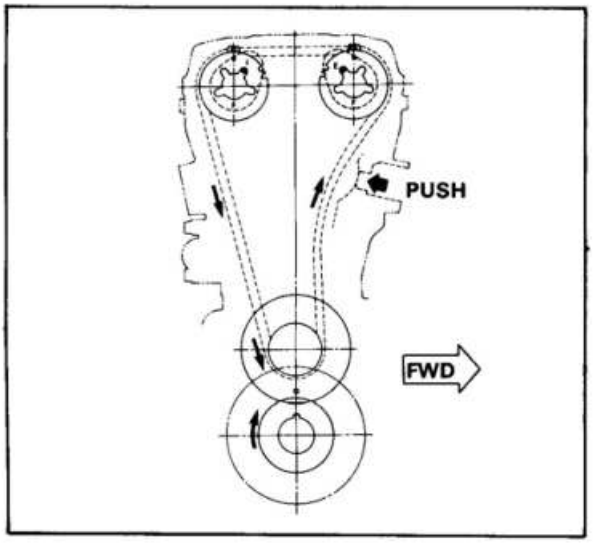
NOTE:

The cam chain sprocket has three stamped marks F, I and E on its front face and R, I and E on its back.

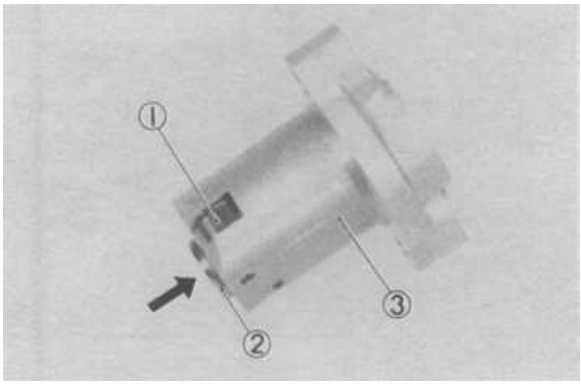




7. Slide the sprocket so that the channel (marked with I) in the sprocket fits over the locating pin on the intake camshaft. Likewise, fit the channel (marked with E) in the sprocket over the locating pin on the exhaust camshaft.
8. Insert your finger into the hole in the cam chain tensioner and push the cam chain guide inward. While pushing it, make sure the punch marks on the camshafts align with the marks on the caps. Also make sure that the cam lobes face each other.



9. If the marks are not aligned, remove the sprockets from the camshafts, and change the position at which the sprockets mesh with the cam chain, then mount the sprockets on the camshafts.
10. Release the cam chain tensioner oneway, cam, and insert the tension rod into the tension body.



I. One-way cam 2. Tension rod 3. Tension body

11. Install the tension body into the front cylinder head. Use a new gasket and, torque the bolts to specification.

Tightening torque:
12Nm(1.2m - kg, 8.7ft-lb)

12. Install the tension spring into the tension body. Torque the end plug to specification.

Tightening torque:
20Nm(2.0mkg, 14ft-lb)

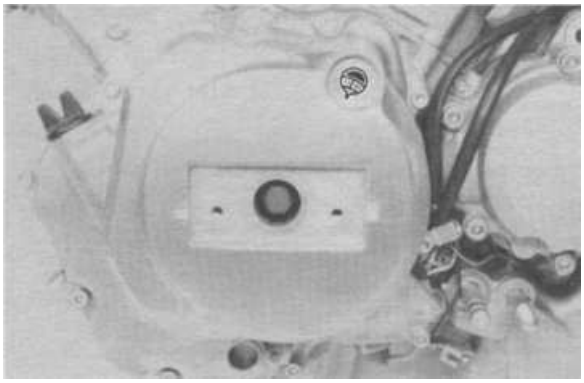
13. Hold the center of the camshaft with a 22mm (0.87 in) open-end wrench, and torque the cam sprocket securing bolt to specification.

Tightening torque:
70 Nm (7.0m-kg, 5.0ft-lb)

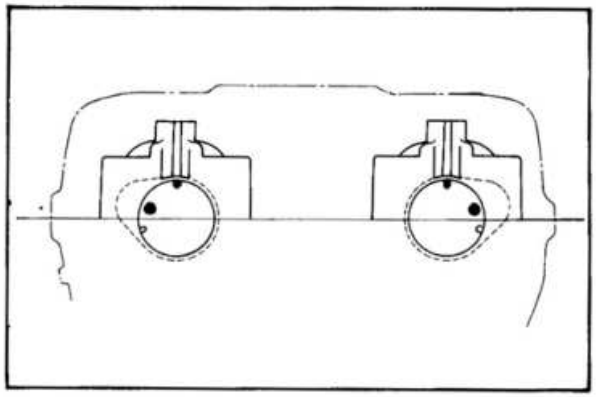
14. Turn the crankshaft 290 degrees counter clockwise, and align the I mark on the flywheel with the stationary pointer. This places the rear *(#2)* piston at top dead center.

NOTE:

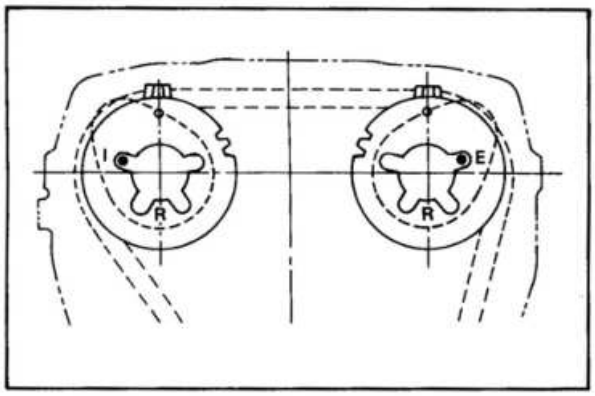
Be sure to keep the cam chain taut while turning the crankshaft.



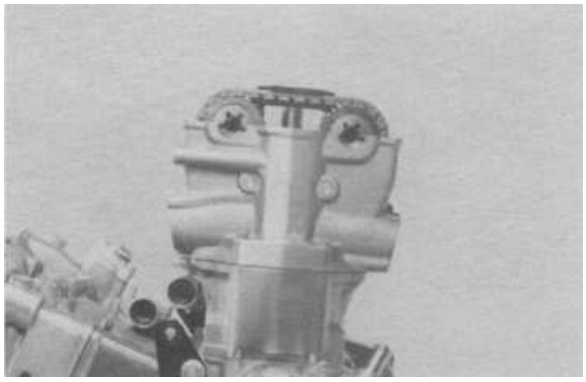
15. Rotate the rear cylinder intake and exhaust camshafts by hand so that the cam lobes face outward, the punch marks on the ends of the camshafts should be aligned with the marks on the cam caps.



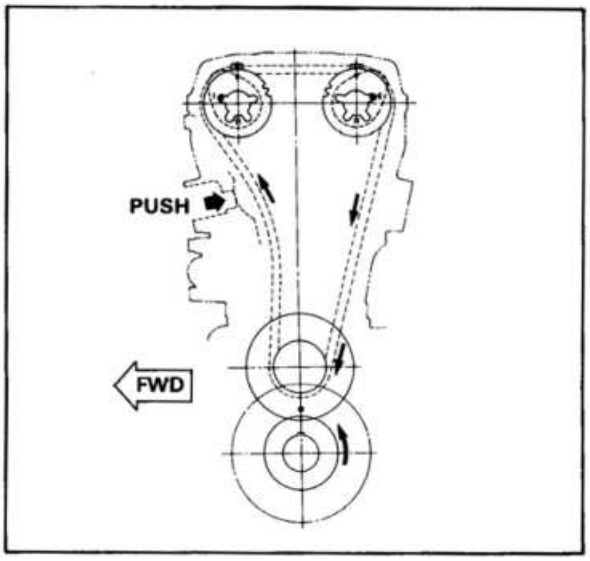
16. Position the cam sprocket so that the mark R is exposed to view and faces upward at the same time. Place the can chain around the sprocket.



17. Slide the sprocket so that the channel (marked with I) in the sprocket fits over the locating pin on the intake camshaft. Likewise, fit the channel (marked with E) in the sprocket over the locating pin on the exhaust camshaft.



18. Insert your finger into the hole in the cam chain tensioner and push the cam chain guide inward. While pushing it, make sure the punch marks on the camshafts align with the marks on the caps. Also make sure the cam lobes of both the intake and exhausts camshaft face each other.



19. If the marks are not aligned, remove the sprockets from the camshafts, and change the position at which the sprockets mesh with the cam chain; then mount the sprockets on the camshafts.
20. Install the cam chain tensioner onto the rear cylinder. The procedure for installation is the same as the front cylinder.

Tightening torque.
Tension body securing bolt:
12Nm(1.2m-kg, 8.7frlb)
End plug:
20Nm(2.0m-kg, 14ft-lb)

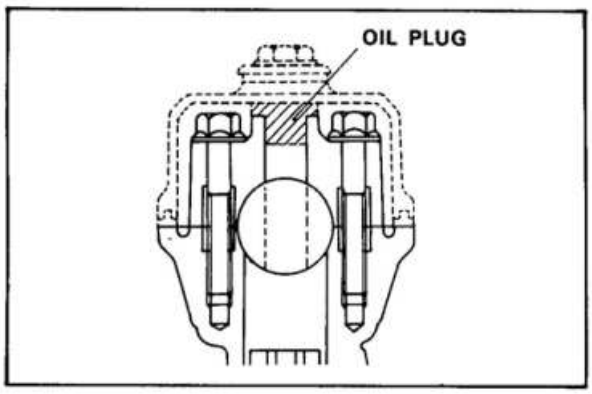
21. Apply engine oil to the camshafts, valves, cam sprockets, and timing chain. Also turn the crankshaft counterclockwise a few turns to check that it turns smoothly.

Cylinder head covers

1. Adjust all the valves as described in the "VALVE CLEARANCE" on page 3-14.
2. Install the oil plug into each camshaft cap.

CAUTION:

The oil plugs must be installed in each camshaft hole to ensure that an adequate supply of oil will be distributed along the camshafts.



3. Install the cylinder head cover with a new gasket. Torque the bolt to specification.

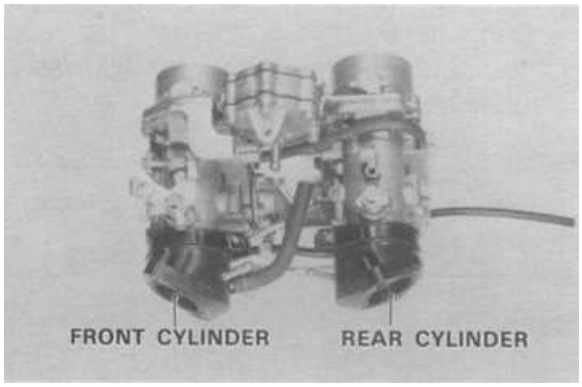
Tightening torque:
10 Nm (1.0 m-kg, 7.2ft-lb)

NOTE:

The cylinder head cover has a nozzle to which the crankcase ventilation pipe is connected. The cover should be installed so that the smaller size nozzle is on the front cylinder and the larger size nozzle is on the rear cylinder.

4. Install the carburetor joint onto each cylinder. The carburetor joint for the front cylinder has two vacuum pipes; the joint for the rear cylinder has only one. Torque the securing bolts to specification.

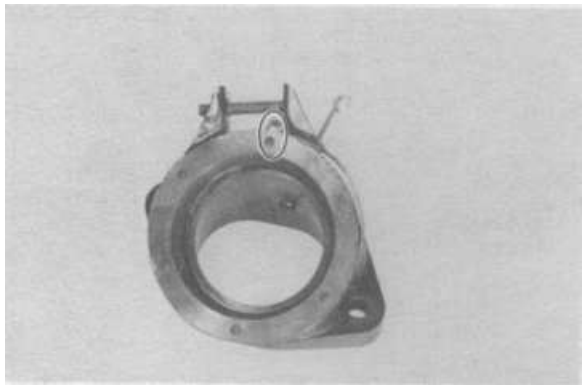
Tightening torque:
12Nm(1.2m-kg,8.7ft-lb)



5. Install the carburetors and tighten the clamp screws.

NOTE:

Install the hose clamps onto the carburetor joints (both clamp stopper should fit together). The clamp screw heads should face toward the right side of the motorcycle.



6. Install the upper engine mounting bracket onto the rear cylinder head. Torque the securing bolts to specification.

Tightening torque:
20 Nm (2.0 m-kg, 14ft - lb)

7. Install the spark plugs, and torque them to specification.

Tightening torque:
20 Nm (2.0m-kg, 14ft-lb)

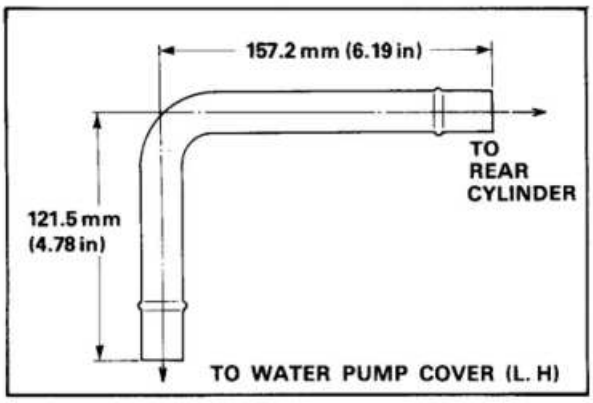
8. Install the coolant pipes to the cylinder heads.

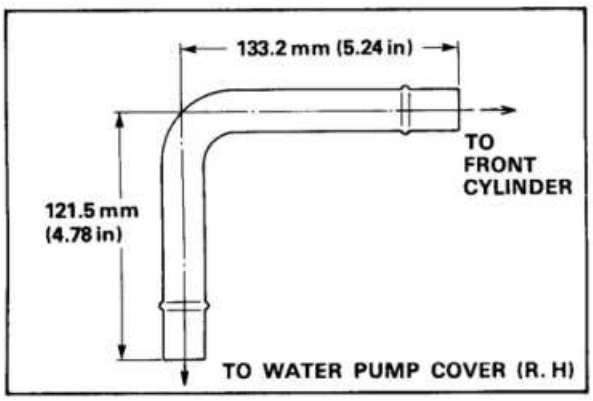
Water pump cover, joint pipes, and oil filter

1. Install the water pump cover O-ring and install the 0-rings on the joint pipes.
2. Sparingly apply rubber grease to the joint pipe 0-rings.
3. Install the joint pipes into the water pump cover.

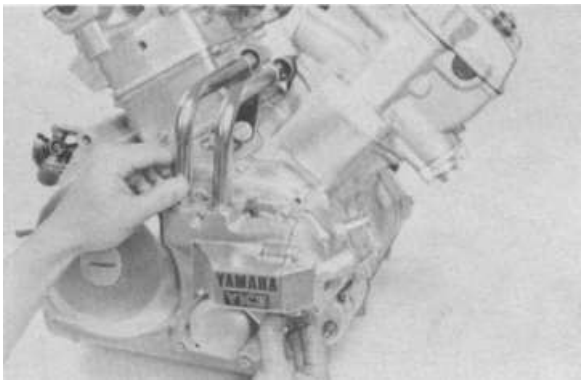
NOTE:

The joint pipes should be positioned as shown below:





4. Install the water pump cover and joint pipes onto the engine at the same time and torque the bolts to specification.



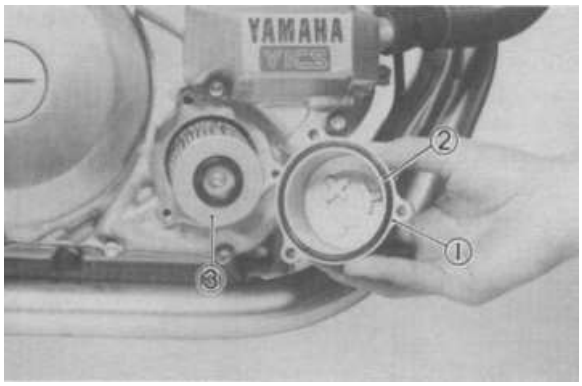
Tightening torque:
10 Nm (1.0m-kg, 7.2ft-lb)

5. Install the new oil filter element and O-ring. Tighten the oil filter bolts to specification.

Tightening torque:
10 Nm (1.0m-kg, 7.2ft-lb)

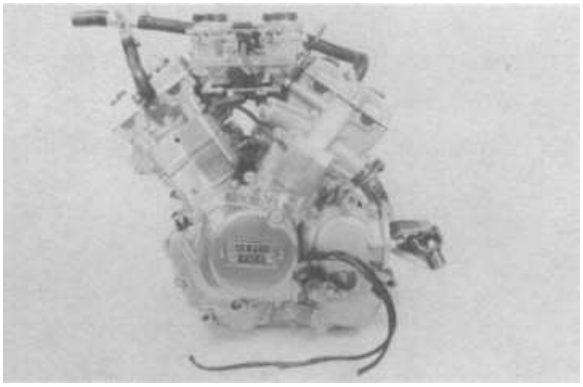
NOTE:

Make sure the O-ring is positioned properly.



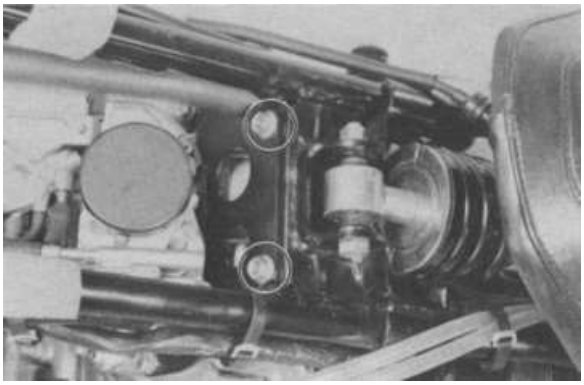
1. Oil filter cover 2. O-ring 3. Oil filter element

Mounting the engine

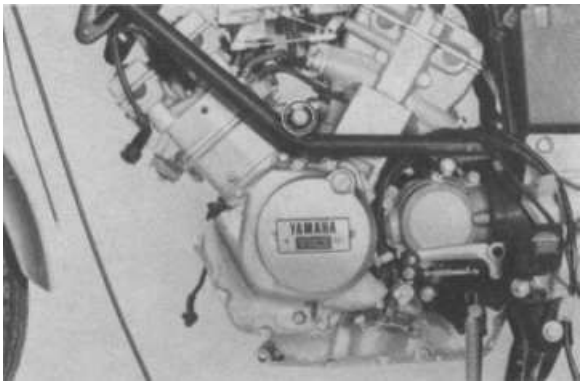


1. Place the engine on a block or other suitable engine stand. It is easier if you approach the engine from the right side.
2. Align the splines of the U-joint with those of the drive shaft; then move the engine into place in the frame.

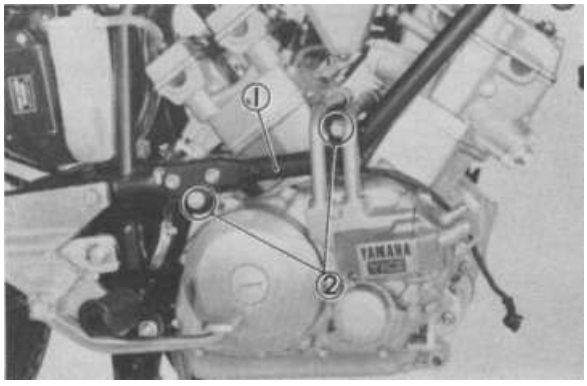
3. Install the upper engine mounting bracket bolts.



4. Install the rear engine mounting stud and bolt.



5. Install the right side frame tube. Partially tighten the frame securing bolts and two engine mounting bolts.
6. Evenly tighten the four frame tube securing bolts and engine mounting bolt.



1. Frame tube 2. Engine mounting bolt

Tightening torque:
Down tube frame & frame
26 Nm (2.6m-kg, 19ft-lb)
Engine mounting bracket & frame
20Nm(2.0m-kg, 14ft-lb)
Engine & down tube frame (center)
58Nm(5.8m-kg, 42ft-lb)
Engine & down tube frame (rear)
48 Nm (4.8m-kg, 35ft-lb)

NOTE:
The rear lower mount will be secured when the front footrests are installed.

7. Pull the U-joint boot over the U-joint and around the lip on the bearing housing of the middle driven gear.
8. Place the sidestand with the change pedal assembly on the motorcycle. Install its forward-mounting nut, and torque it to specification.

Tightening torque:
Sidestand bracket & engine 55 Nm
(5.5m-kg, 40fflb)

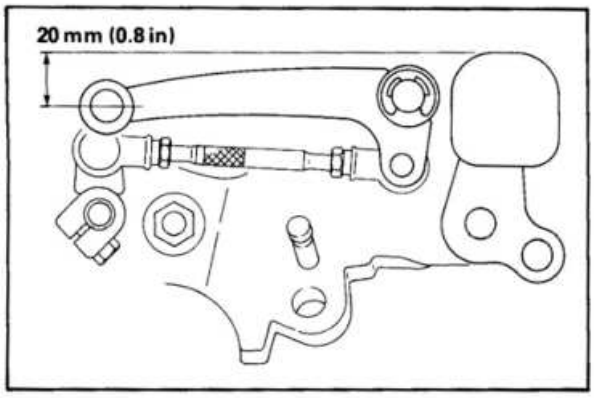
WARNING:

When installing the sidestand onto the motorcycle, use care so that the neutral switch is not pinched between the sidestand bracket and engine.

9. Install the front footrests on each side of the motorcycle. Tighten each nut evenly. This will center the engine mounting stud. When the side stud is centered, torque the nuts to specification.

Tightening torque:
70Nm(7.0m-kg, 50ft-lb)

10. Install the change rod and torque the pinch bolt to specification.



Tightening torque:
10 Nm (1.0 m-kg, 7.2ft-lb)

11. Connect the rear exhaust pipe to the muffler, and install the muffler to the muffler brackets. The passenger footrest bolt secures both the footrest and the muffler to the muffler bracket. Install the passenger footpegs, and torque the bolt to specification.

Tightening torque:
42 Nm (4.2 m-kg, 31 ft-lb)

12. Install the exhaust pipes on the front cylinder. Use a new gaskets, and finger-tighten the exhaust pipe flange bolts.
13. Tighten the muffler clamps, and torque the exhaust pipe flange bolts.

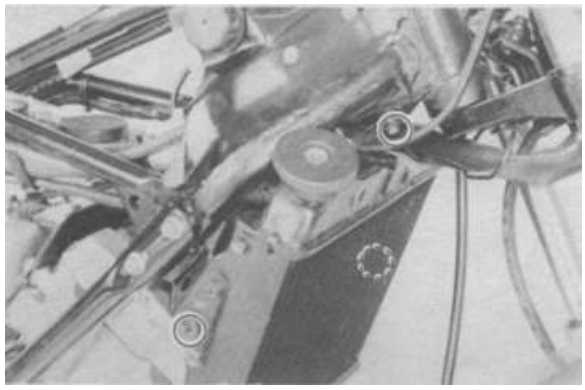
Tightening torque:
Flange bolt:
10 Nm (1.0 m-kg, 7.2ft-lb)
Muffler clamp bolt:
20 Nm (2.0 m-kg, 14 ft-lb)

14. Install the radiator onto the frame. Connect the inlet pipe and return pipe first, then tighten the radiator securing bolts.

Tightening torque:
7Nm (0.7 m-kg, 5.1 ft-lb)

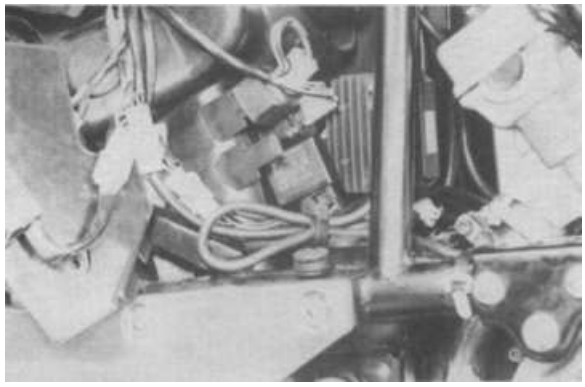
NOTE:

Route the clutch cable behind the radiator on the left-side.



Radiator holding bolt

15. Route the wires listed below through the wire clip, and secure the clip to the crankcase as shown in the photograph. Connect the wires.
Pickup coil leads, AC magneto leads, and sidestand-switch lead



16. Clamp the lead wires so that they do not contact the rear cylinder exhaust pipe.
17. Install the T.C.I, unit bracket and reservoir tank onto the frame, and tighten the securing screw.
18. Connect the control cables, breather pipes, and all leads.
19. Install the air filter assembly and tighten the air filter assembly holding screws. Install the air filter assembly holding band.
20. Connect the crankcase ventilation pipe to each cylinder head.
21. Adjust the clutch cable. See page 2-12. Install the fuel tank. Connect the fuel and vacuum lines to the fuel cock first. Then tighten the fuel tank holding bolt to specification.

Tightening torque:
15Nm(1.5m-kg, 11 ft-lb)

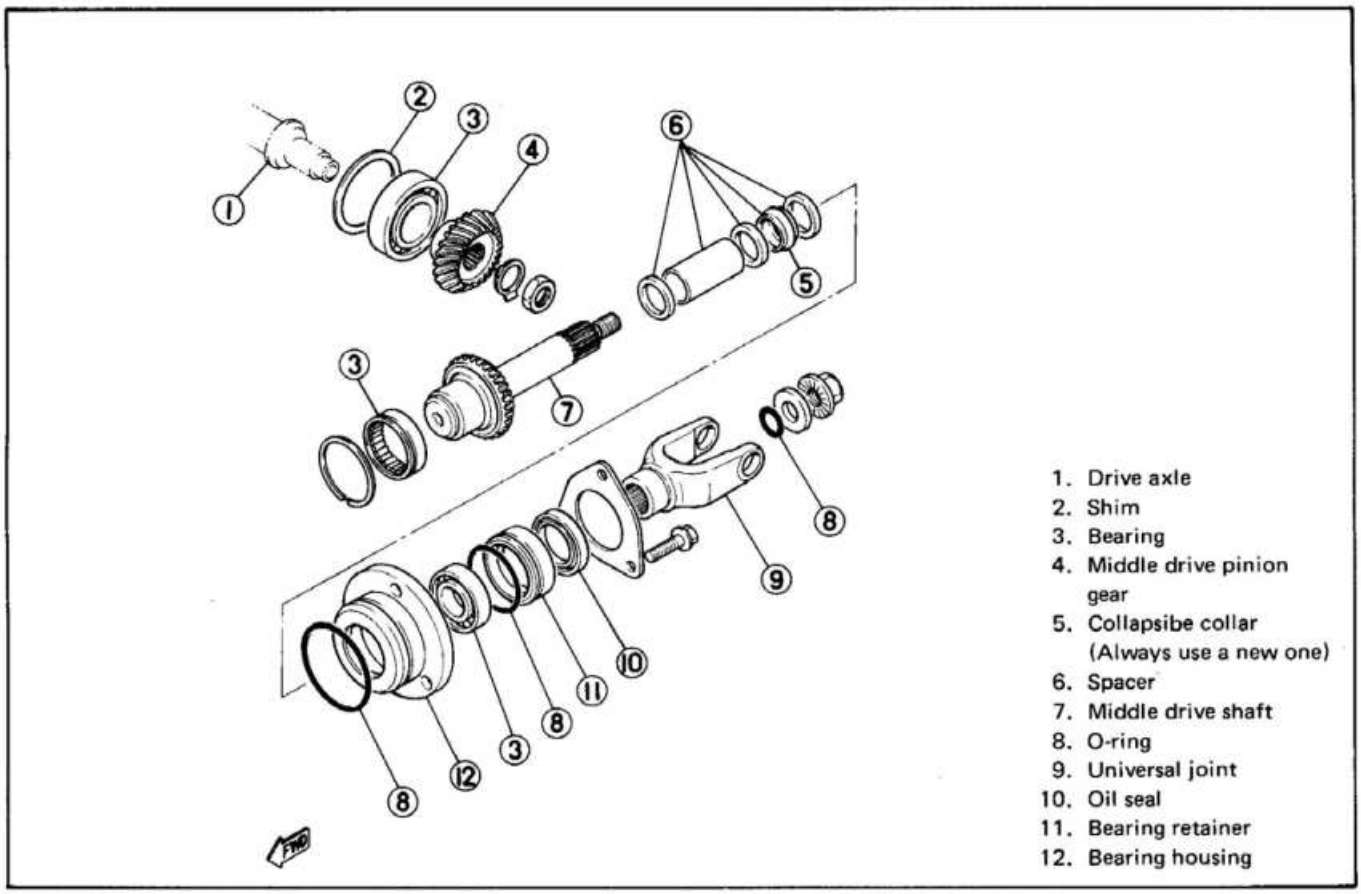
22. Install the side covers.
23. Add. the engine oil into the engine.

Oil capacity:
2.7 L (2.4 Imp qt, 2.9 US qt)

24. Pour the coolant into the radiator and reservoir tank.

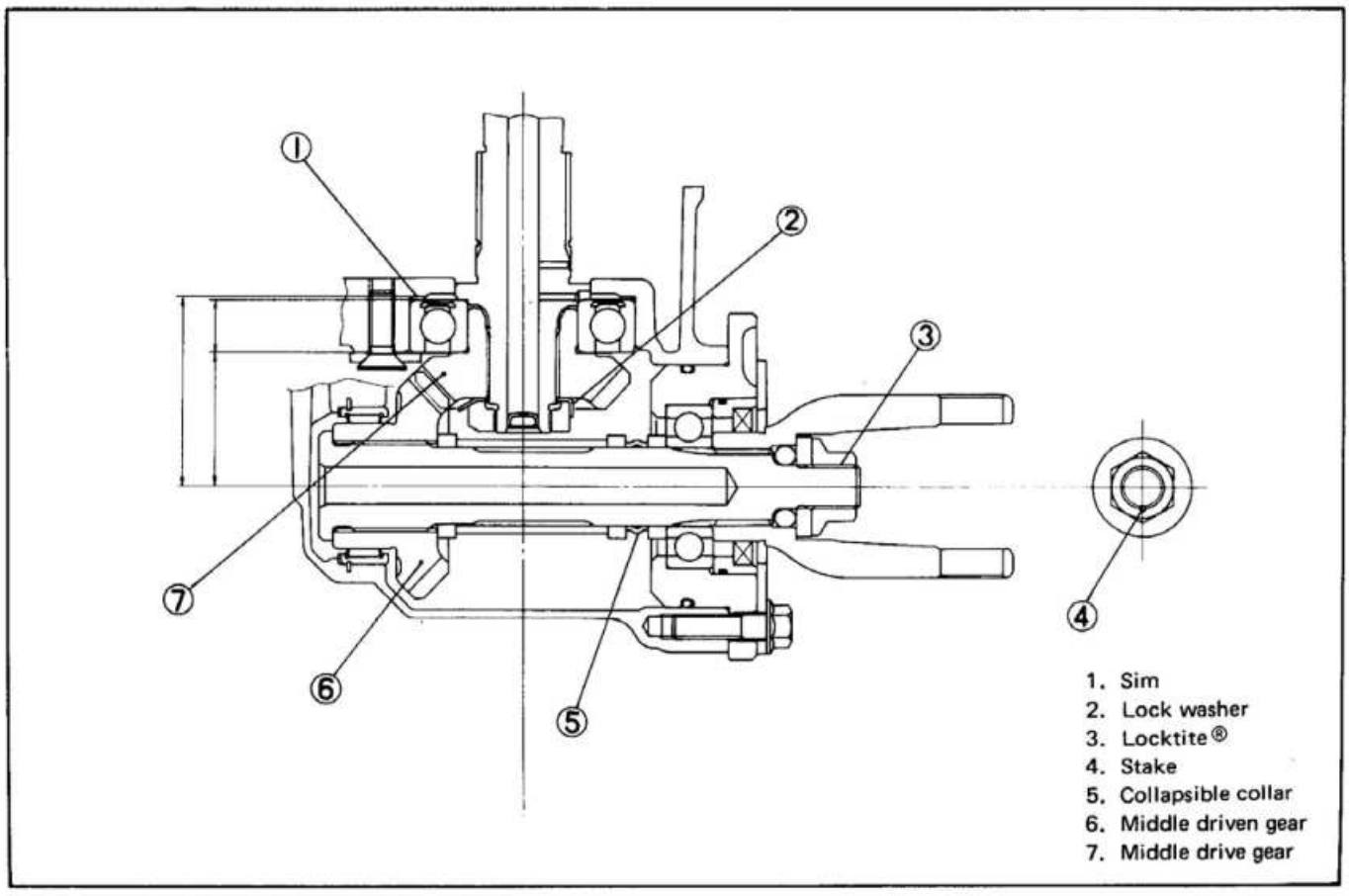
Coolant capacity:
2.3L(2.0 Imp qt, 2.4 US qt)

25. Connect the battery leads to the battery. Connect the positive lead first; then connect the negative lead.

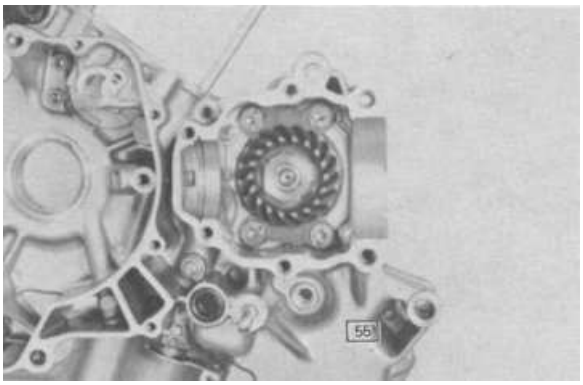


Drive axle positioning

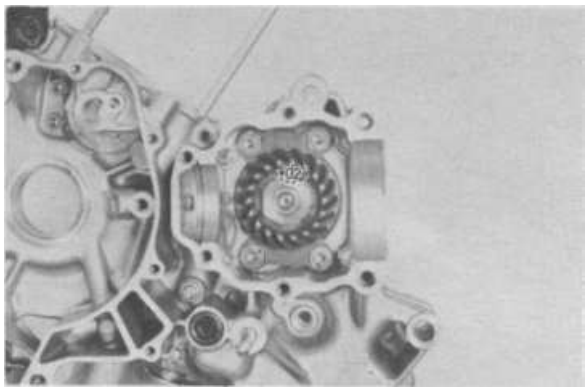
When the left side crankcase and/or the drive axle are replaced, you must position the drive axle in place



1. Calculate the shim thickness using the formula shown below.
   Shim thickness (A) = a - b - c
   a = 59 plus the number printed on the crankcase.
   b = 42 plus or minus the number found on the middle drive gear,
   c = 16.94 (bearing width)
   For example: If the crankcase is marked "55",
   a = 59 + 0.55
   a = 59.55



If the middle drive gear is stampled "+02",
b = 42 + 0.02
b = 42.02



A = a-b-c
A = 59.55 - 16.94 - 42.02
A = 0.59
The shim thickness is 0.59 mm (0.023 in)

2. Shims are supplied in the following thicknesses:
   0.15mm (0.00059 in), 0.30mm (0.0118 in), 0.40mm (0.0157 in) and 0.50mm (0.0197 in)
3. Because shims can only be selected in 0.05 mm (0.0020 in) increments, use the following chart to round off the hun-dredths digit of the calculated thickness and select the appropriate shim.

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

   In the example from above, the calculated shim thickness is 0.59 mm (0.0232 in). The chart instructs you, however, to round off the 9 to 10. Thus you should use two 0.30 mm (0.0118 in) shims. 4.
4. Install a new drive axle bearing and middle-pinion-drive gear onto the drive axle. Install the lock washer and securing nut and torque it to specification. Bend a lock tab against a nut flat.

Tightening torque:
110 Nm (11.0m-kg, ft - lb)

NOTE:
Check the middle drive gear first for signs of pitting, galling, or other extreme wear. Replace the middle drive gear and middle drive shaft as a set.

5. Install the drive axle subassembly with the proper shims into the crankcase.

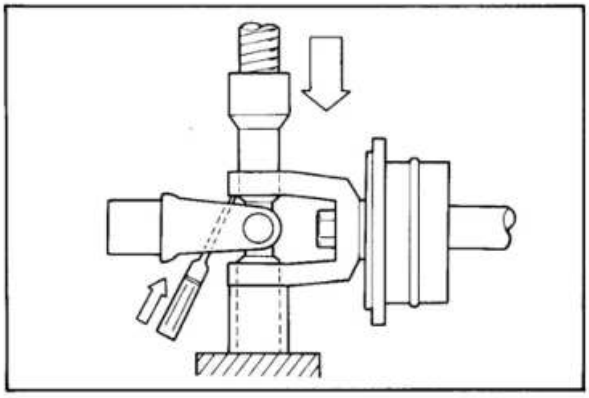
Middle drive shaft removal
Refer to page 3-12 for removing the middle drive shaft from the engine.

Disassembly

1. Remove the clips from the bearings in the middle gear yoke.
2. Place the U-joint in a press. With a suitable diameter pipe beneath the yoke, press the bearing into the pipe as shown in the illustration.

NOTE:

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



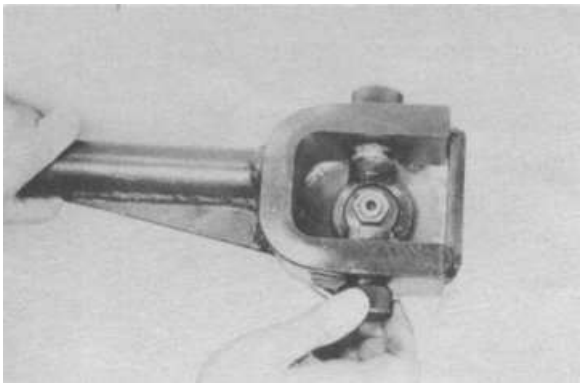
3. Repeat the procedure for the opposite bearing, and remove the yoke.

NOTE:

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

The following procedures should be performed only if the middle-drive-shaft bearing or the middle-drive-shaft gear must be replaced.

4. Install the universal joint holder onto the middle-drive-shaft U-joint, and remove the drive shaft nut.



5. Remove the U-joint, bearing-housing plate, the bearing housing, and the washers and spacers from the middle drive shaft.

CAUTION:

Discard the collapsible collar. It must be replaced whenever the middle gear is disassembled.

Inspection

Middle gears

1. Inspect the gear teeth on all the gears. If discoloration, galling, pitting, or excessive wear is found on any gear, replace all the middle gears as a set.

Bearings

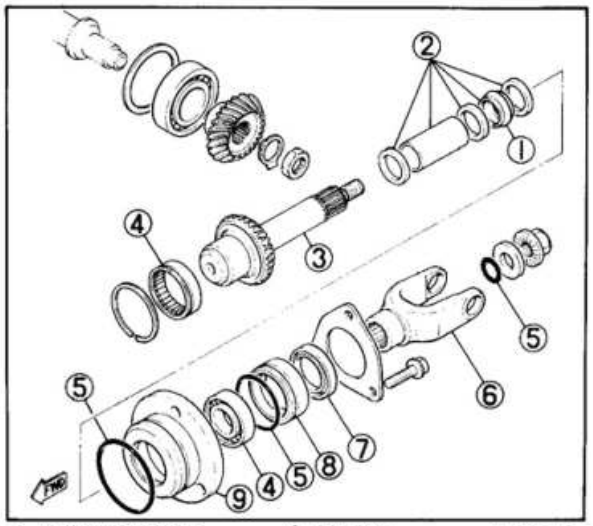
1. Put your finger on the race, and check the bearing movement. If any bearing is rough, replace it.

U-joint

1. Install the bearings onto the yoke, and check the bearing movement. If there is any noticeable play in the bearings, replace the universal joint assembly (yoke, bearings, and final-drive half of the U-joint).

Assembly

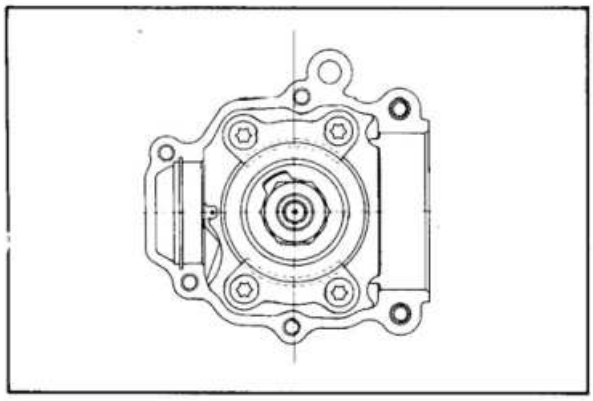
1. Install the needle bearing inner race onto the middle drive shaft and install the ball bearing into the bearing housing.
2. Assemble the middle drive shaft as shown in the illustration. Finger-tighten the securing nut.



1. Collapsible collar (Always use a new one)
2. Spacer
3. Middle drive shaft
4. Bearing
5. O-ring
6. Universal – joint
7. Oil seal
8. Bearing retainer
9. Bearing housing

Gear lash measurement and adjustment

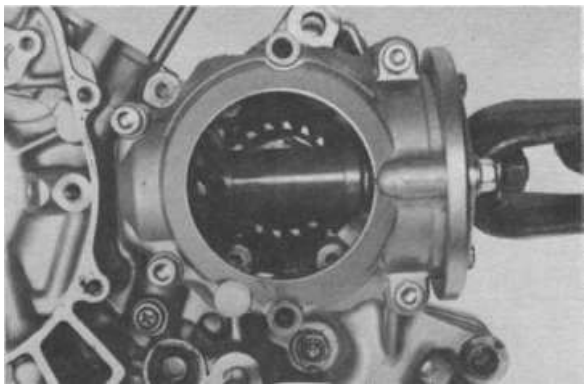
1. Insert the semi circular clip into the crankcase.

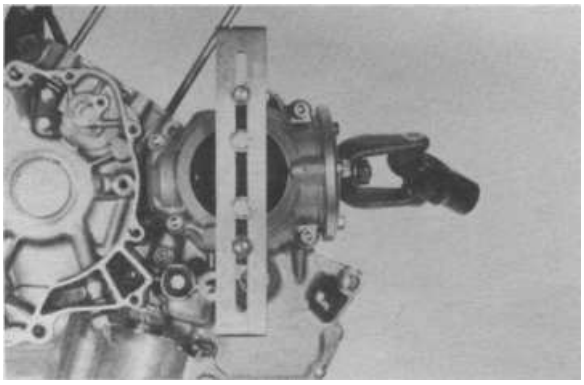


2. Install the middle drive shaft assembly onto the crankcase.
3. Install the middle gear cover #1 and tighten the three bearing housing securing bolts and four cover bolts to specification.

Tightening torque:
Bearing housing bolt:
25 Nm (2.5m-kg, 18fflb)
Gear cover *#1* bolt:
24 Nm (2.4m-kg, 17fflb)

4. Install the middle-drive-gear holder onto the middle gear cover.

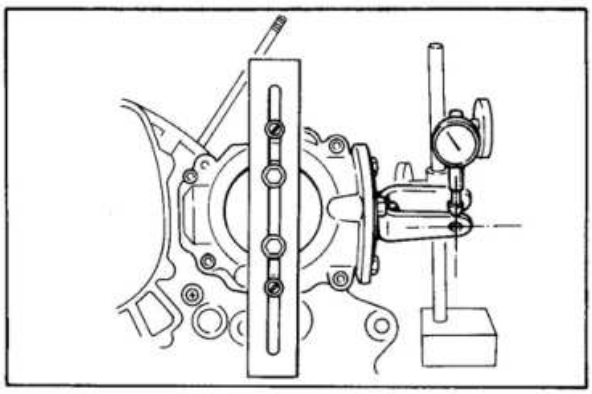




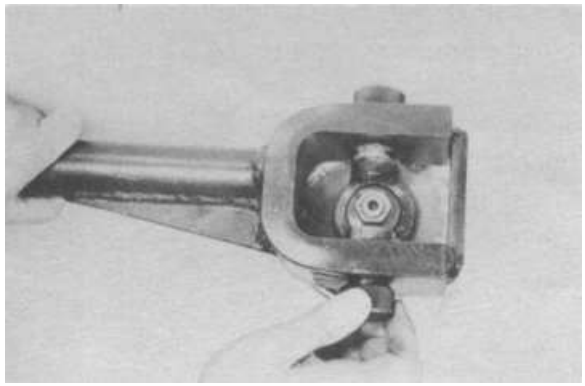
5. Tighten the holder bolts as tight as necessary to keep the middle gear from turning.
6. Set the dial gauge on the outside edge of yoke so that it is positioned over the centerline of the yoke bearing hole. Gently rotate the drive yoke back and forth. Note the lash measurement on the dial gauge.

Middle gear lash:
0.1 ~0.2 mm (0.004 ~ 0.008 in)

7. Check the gear lash at four positions. Rotate the yoke 90 degrees each time, and repeat the gear lash check.



8. If the measurement exceeds the specified gear lash at any of the four points, the gear lash must be adjusted.
9. Place the universal joint tool (with both adapters) on the U-joint on the middle drive shaft.



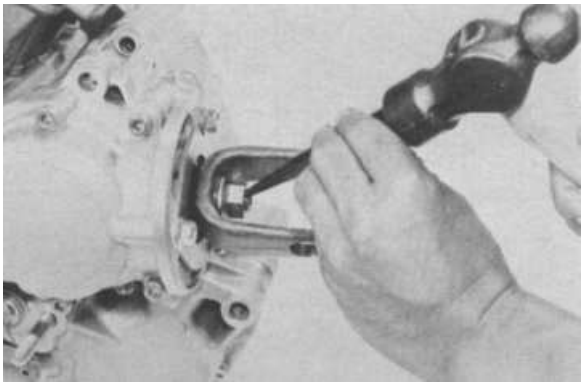
10. Install the securing nut onto the middle drive shaft, and apply Loctite® Stud N'bearing Mount to the threads. Carefully tighten the securing nut, then check the gear lash. Tighten the nut a little more, and check the gear lash. Repeat this tighten-and-check procedure until

the gear lash measurement is within specification. You must proceed slowly, however, so the collapsible collar will not be damaged. If you tighten the securing nut so that gear lash is less than 0.1 mm (0.004 in), you will have to disassemble the middle driven shaft and replace the collapsible collar.

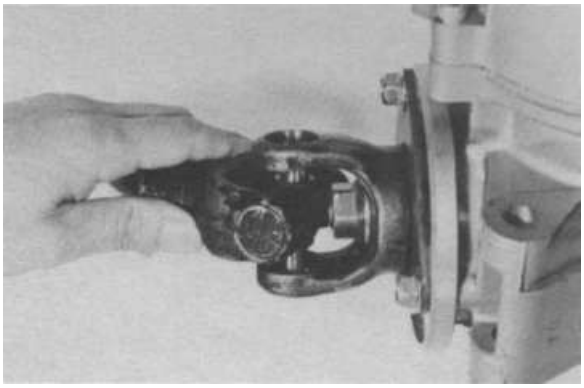
CAUTION:

Never loosen the securing nut when adjusting gear lash. There will be insufficient pressure on the collapsible collar. Gear lash adjustment must be completed within five minutes, otherwise, the Loctite® will harden and inhibit gear lash adjustment.

11. With a center punch, lock the threads on the securing nut.



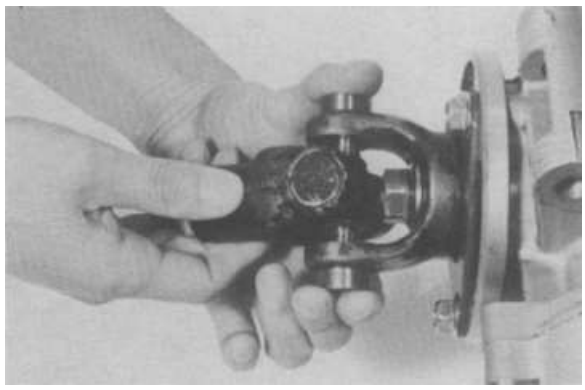
12. Place the yoke into the u-joint.



13. Grease the bearings, and insert them onto the yoke.

CAUTION:

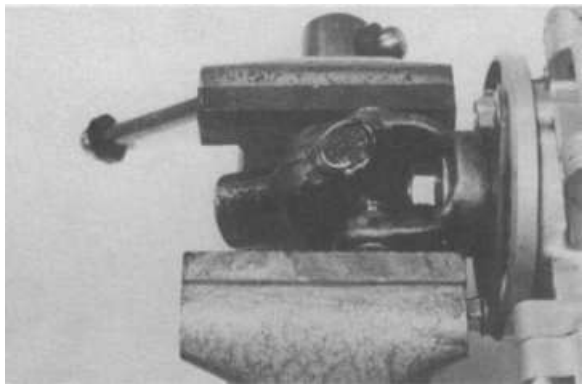
Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth in the bearings. The yoke will not go all the way into a bearing if a needle is out of place.



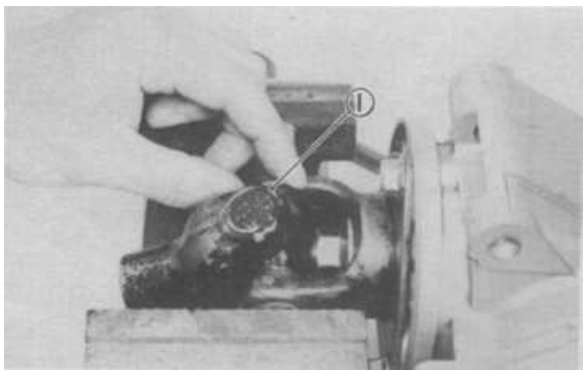
14. Press the bearings into the u-joint with a vise.

NOTE:

It may be helpful to tap the u-joint with a drift punch.



15. Using a suitable socket/further press each bearing into the u-joint until the retainer can be installed onto each bearing. The retainer fits in the slot on each bearing.



1. Clip

CHAPTER 4. CARBURATION

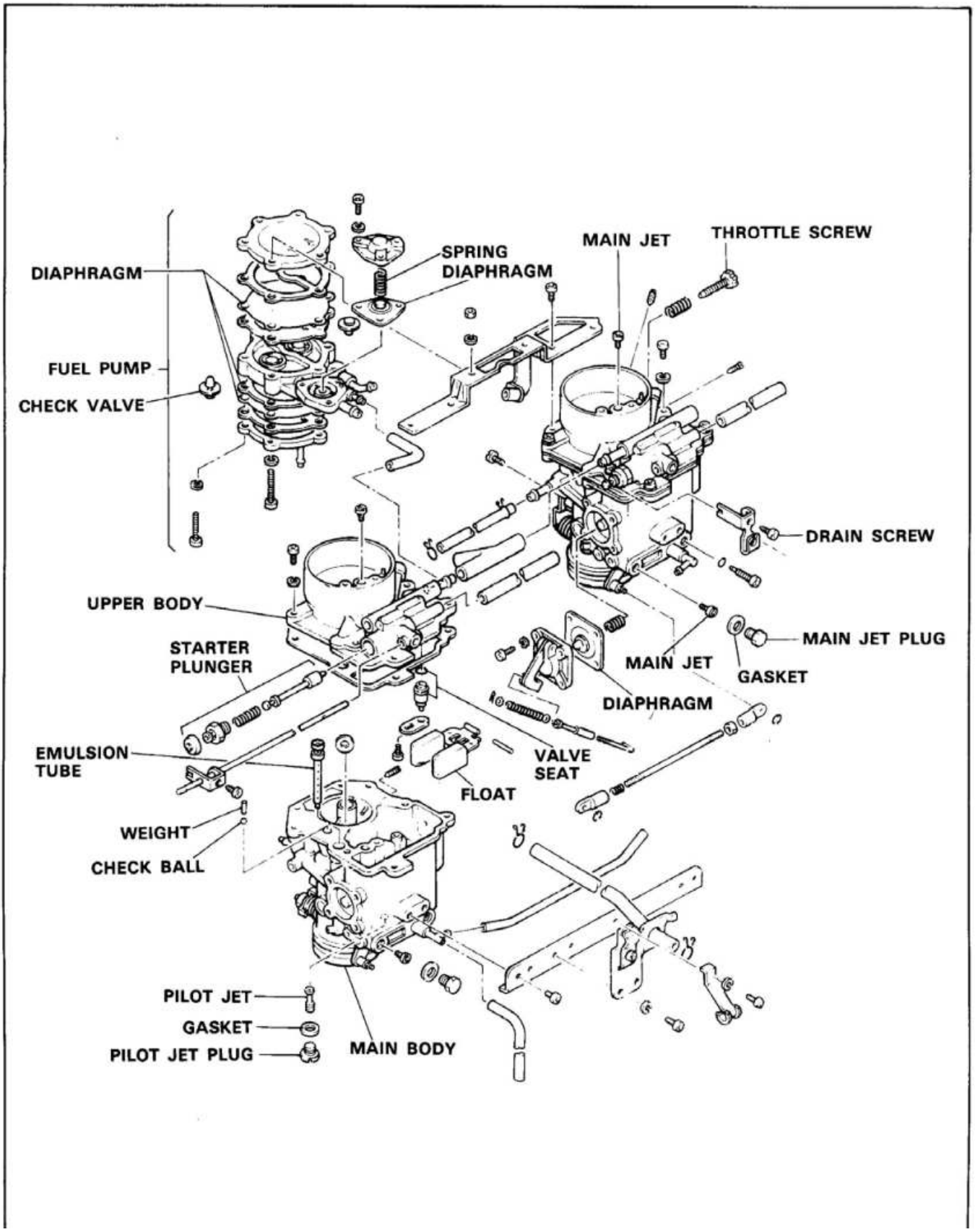
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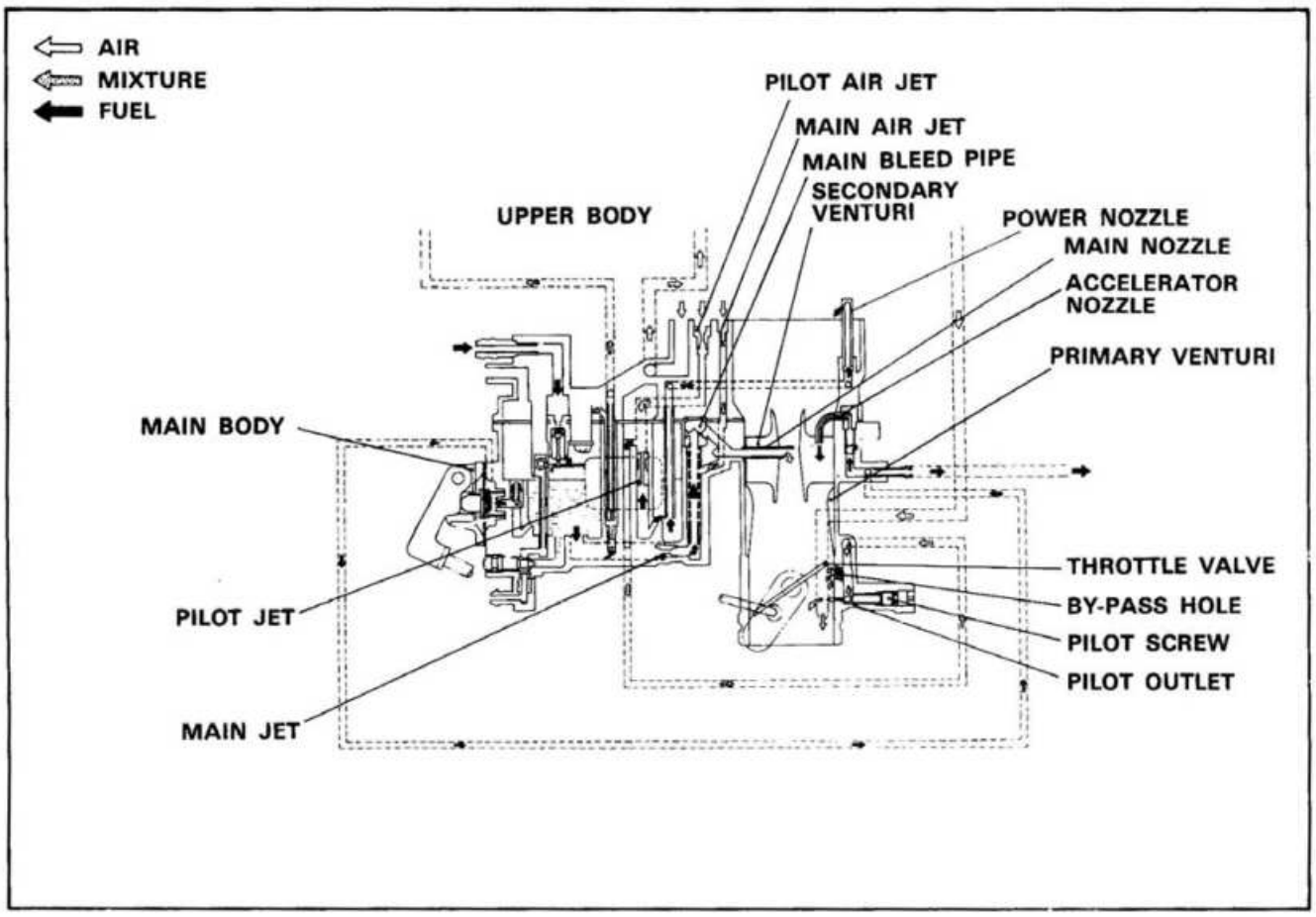
AIR CLEANER AND CRANKCASE VENTILATION SYSTEM…… 110

CARBURETION

CARBURETOR



SECTION VIEW



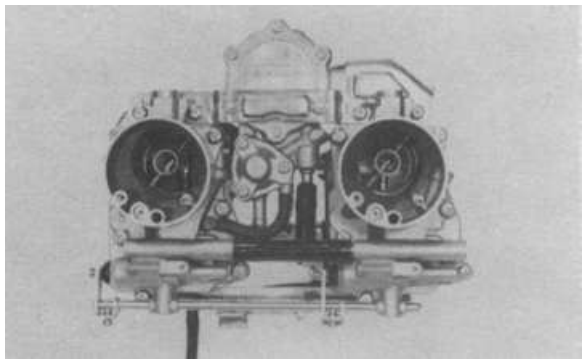
Specifications

Main jet	(Front) #122.5 (Rear) #127.5
Pilot jet	#60
Pilot air jet	#130
Pilot screw	Preset
Float valve seat	01.8
Engine idle speed	1,300 ±50 r/min.

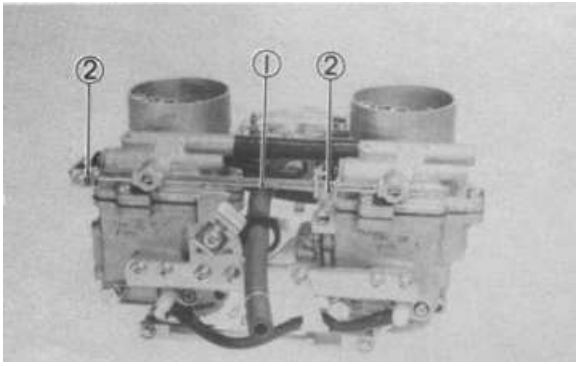
WARNING:

The pilot screw settings are adjusted for maximum performance at the factory with special equipment. DO NOT attempt to change these settings. If all other engine systems are functioning correctly, any changes will decrease performance and cause increased exhaust emissions.

Disassembly

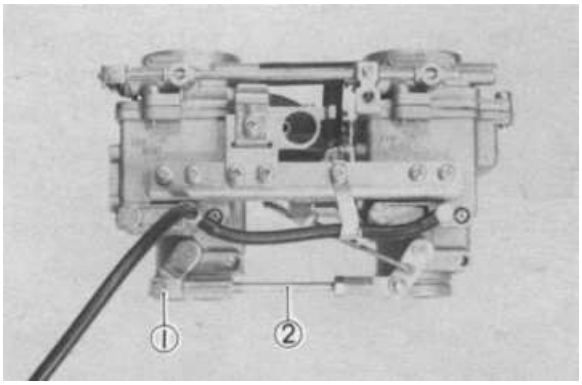


1. Remove the two starter link securing screws, and remove the starter link and starter levers from the carburators.



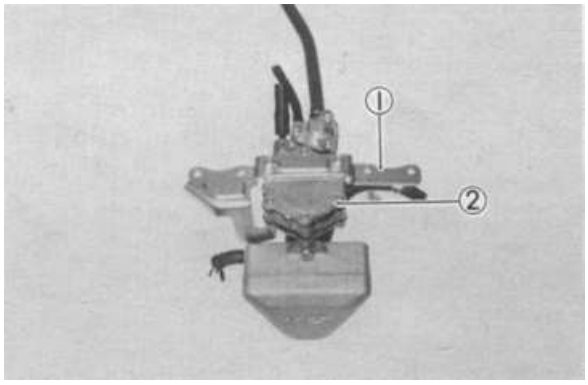
1. Starter link 2. Starter lever

2. Remove the synchronizing rod circlips and remove the synchronizing rod.



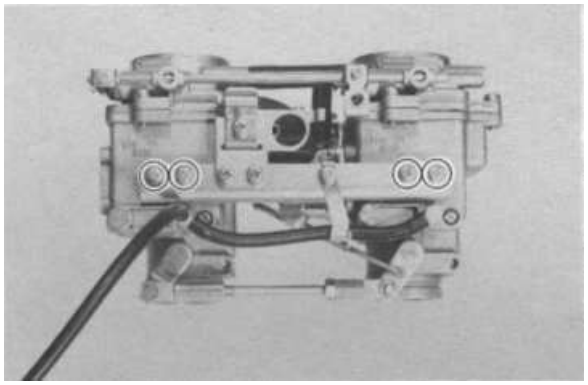
1. Circlip 2. Synchronizing rod

3. Remove the upper bracket securing screws and remove the upper bracket with vacuum pump.



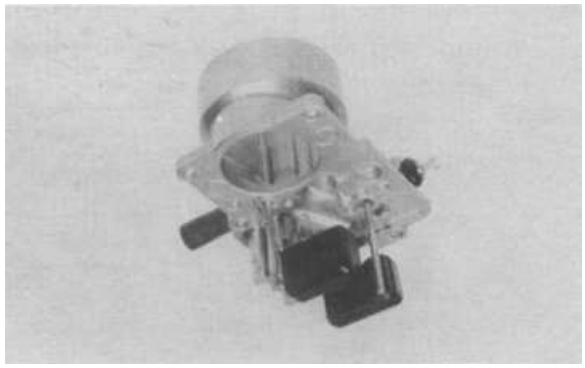
1. Upper bracket 2. Vacuum pump

4. Remove the lower brackets from the carburetors and separate the carburetors.

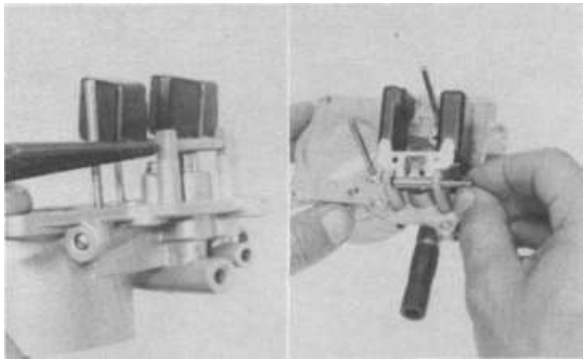


1. Lower bracket

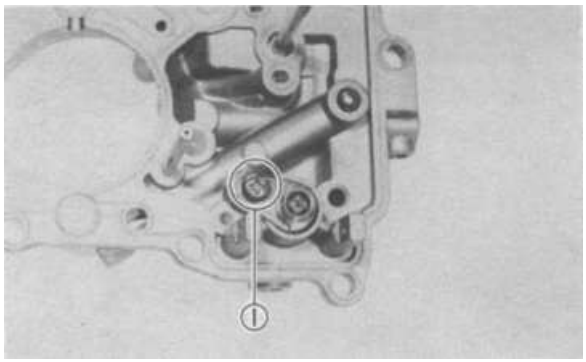
5. Remove the carburetor upper body from the main bodv.



6. Gently tap the float pivot pin and remove the float pivot pin and float assembly. Be careful not to close the float valve which is under the float arm.

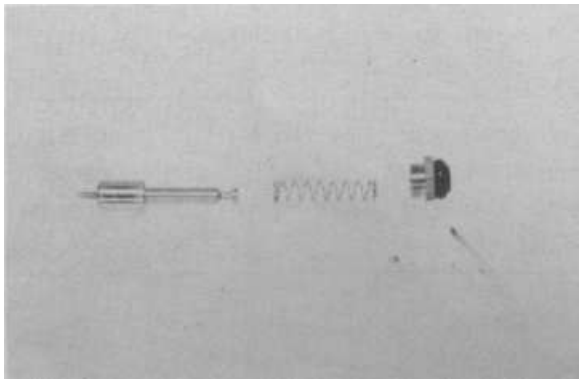


7. Remove the float valve seat securing screw and remove the valve seat.

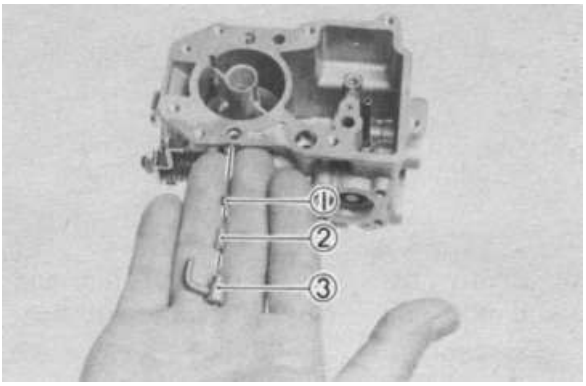


1. Float valve seat securing screw

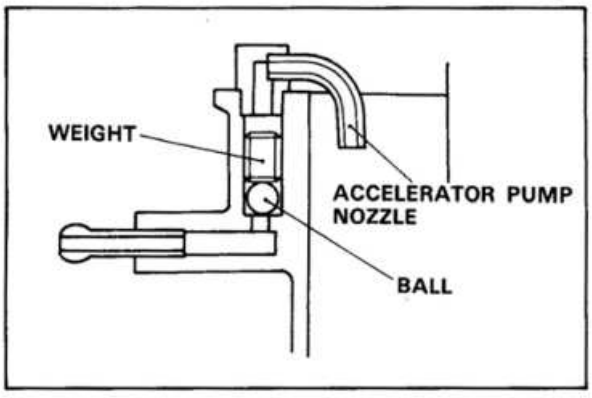
8. Remove the starter plunger from each carburetor upper body.



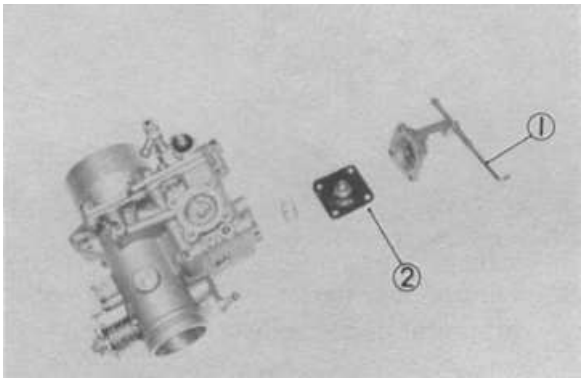
9. Remove the jet plugs, jets, secondary venturi, and accelerator pump nozzle as necessary.



1. Accelerator pump nozzle 2. Weight 3. Ball



10. Remove the accelerator relay rod from the throttle valve lever. Remove the accelerator pump cover, and remove the spring and diaphragm.



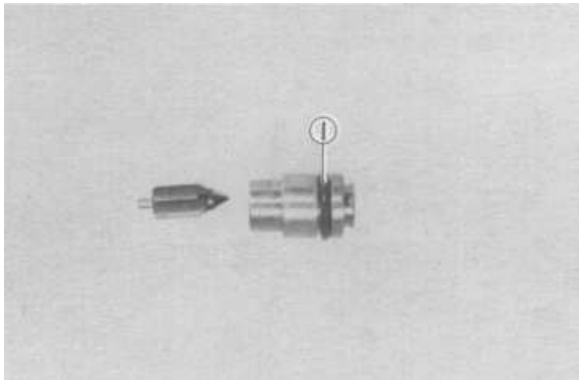
1. Accelerator relay rod 2. Diaphragm

NOTE:

The accelerator relay rod is properly adjusted and locked with LOCTITE® at the Yamaha factory. Never attempt to disassemble or adjust it.

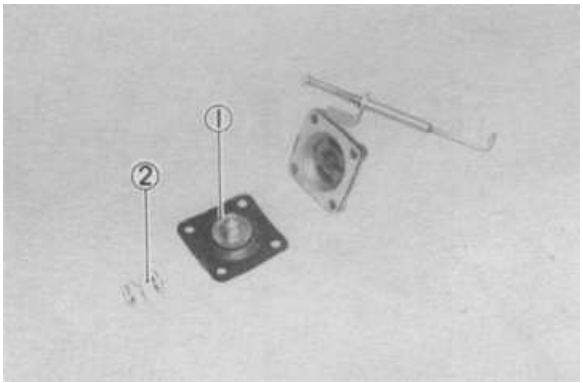
Inspection

1. Examine the carburetor body and fuel passages. If they are contaminated, wash the carburetor in a petroleum-based solvent. Do not use any caustic carburetor cleaning solutions. Blow out all passages and jets with compressed air.
2. Examine the condition of the floats. If the floats are damaged, they should be replaced.
3. Inspect the float needle valve and seat for wear or contamination. Replace these components as a set. Inspect the O-ring for damage, and replace if damaged.



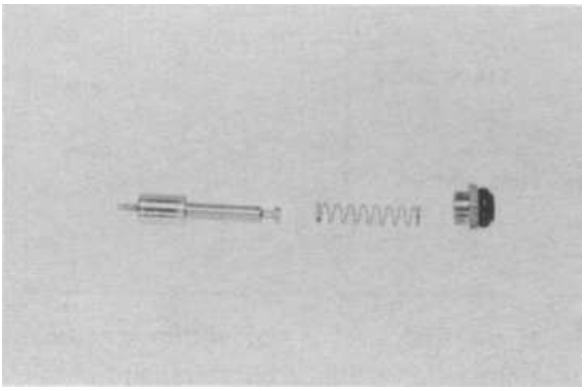
1. O-ring

4. Inspect the rubber diaphragm and spring. If the diaphragm is torn or spring is damaged, replace these components as a set.

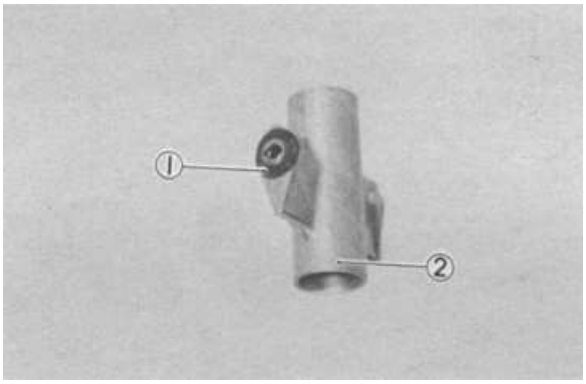


1. Diaphragm 2. Spring

5. Inspect the starter plunger. If it is worn or damaged, replace it.



6. Inspect the secondary venturi gasket for damage. If the gasket is damaged, replace it.



1. Gasket 2. Secondary venturi

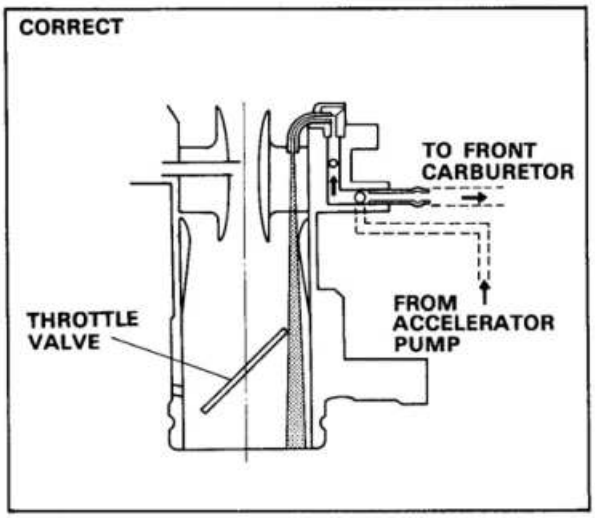
7. Inspect the carburetor gasket for damage, and replace it, as necessary.

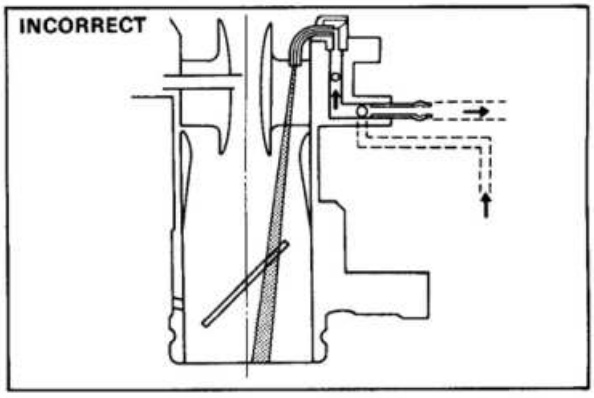
Assembly

1. Install the jets, jet plugs, and secondary venturi into the main body.
2. Install the accelerator pump spring, diaphragm, and cover onto the main body. Install the accelerator relay rod end into the throttle valve lever.
3. Install the upper bracket, lower bracket and synchronizing rod onto the main body. Connect the accelerator pump connecting pipe to the carburetors.
4. Fill the rear carburetor float chamber with fuel, and while turning the throttle lever, check the spray of fuel from the accelerating pumps in both front and rear carburetors. Also check the injection angle of fuel.

a) Checking fuel sprays

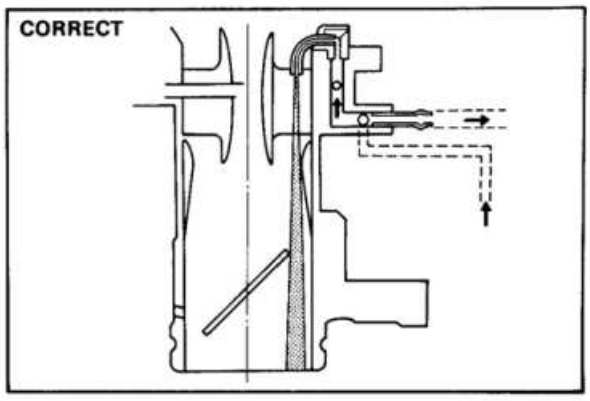
As shown below, the fuel spray should be shaped conically. If not, pull out the accelerator pump nozzle and clean the nozzle with compressed air.





b) Injection angle of fuel

Turn the throttle lever until the accelerator pump lever stops; and if the fuel spray is directed between the main body of the accelerator pump and the throttle valve, the injection angle of fuel is correct. If it hits the main body or the throttle valve, adjust the direction by bending the accelerator pump nozzle.



5. Install the pilot air jet, float valve seat, float valve, and float into the carburetor upper body.
6. Install the upper body assembly onto the carburetor main body, and tighten the screws.

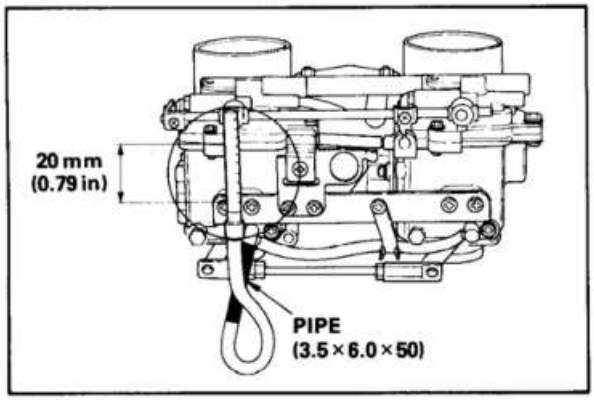
Adjustment

Fuel level

NOTE:

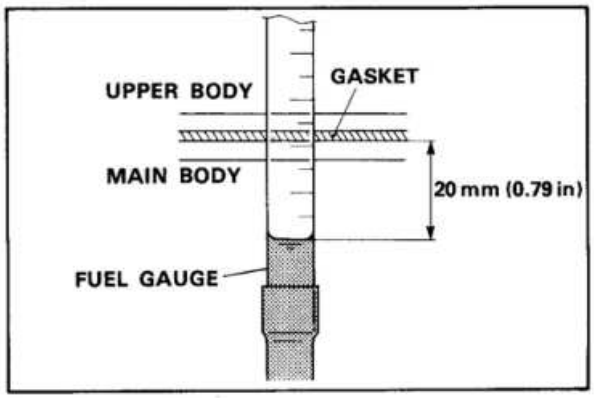
Before checking the fuel level, place the motorcycle on a level surface.

1. Place the motorcycle on its centerstand. Disconnect the drain pipe from the front carburetor.
2. Insert one end of a pipe, 3.5mm (0.14 in) in inside diameter, 6 mm (0.24 in) in outside diameter, and 50 mm (2.00 in) in length about 10 mm (0.39 in) into the fuel level gauge pipe, and insert the other end into the drain nozzle.

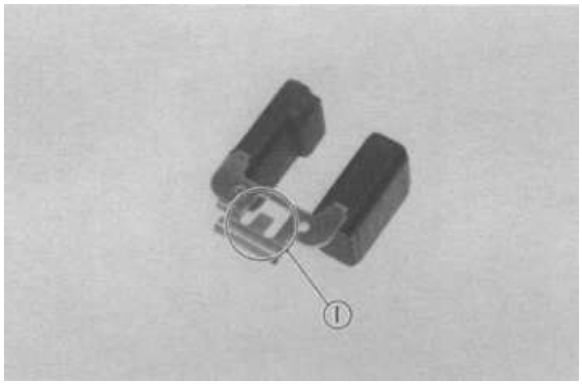


3. As shown above, hold the fuel level gauge vertically, and loosen the front carburetor drain screw.
4. Set the fuel cock to "ON" and start the engine. Stop it after a few minutes.
5. Check the fuel level. It should be within the specified range.

Fuel level: 20 ± 1 mm (0.79 ± 0.04 in) Float height: 36 ± 1 mm (1.72 ±0.04 in)



6. If the fuel level is not within specification, remove the carburetors, and check the fuel valve and float assembly.
7. If no damage is found in these parts, adjust the float level by slightly bending the tang on the float. Recheck the fuel level.



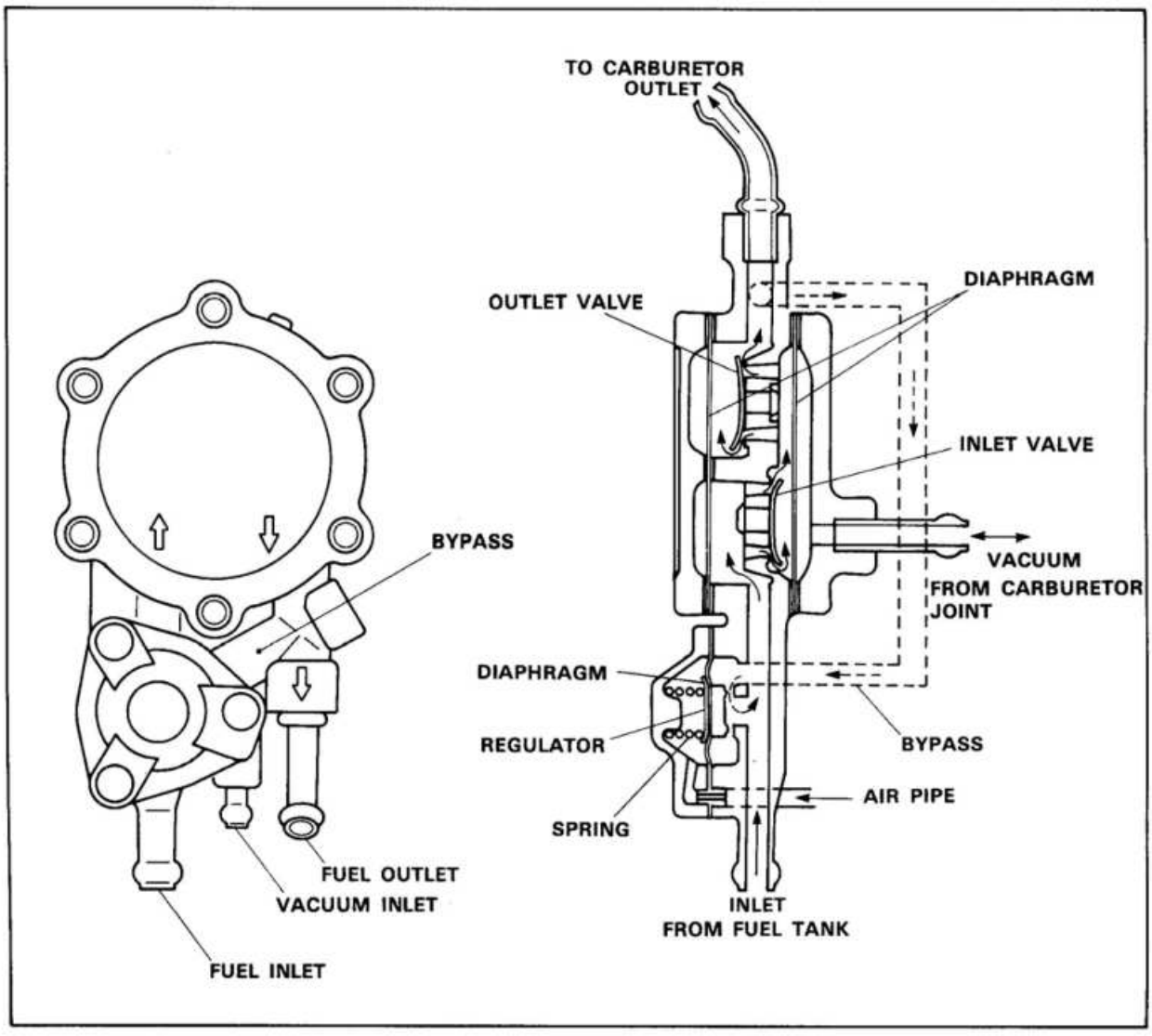
1. Tang

8. Repeat the procedure for the other carburetor.

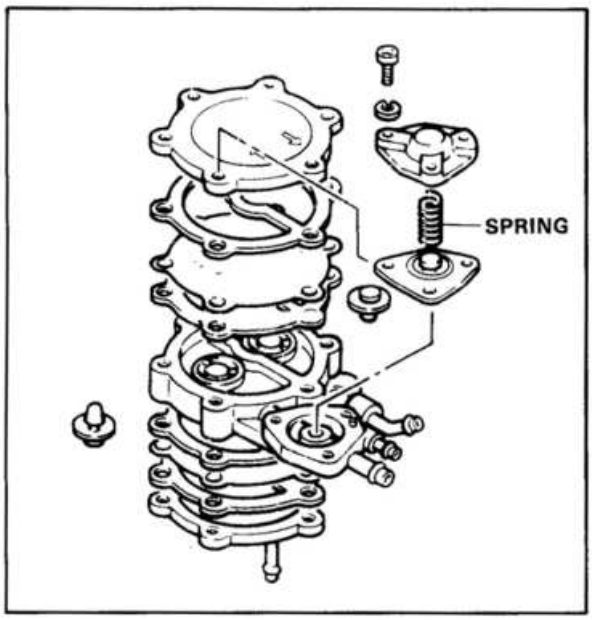
FUEL PUMP AND FUEL REGULATOR

Operation

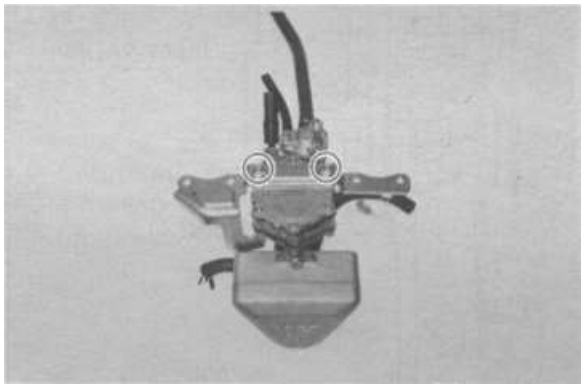
The fuel pump diaphragm is operated by variations in the pressure in the carburetor joint and thus produces a pumping action that pumps fuel from the fuel tank to the carburetor. Fuel is drawn through the inlet and, as indicated by -», it flows through the inlet and outlet valves and is discharged from outlet. Then, fuel flows into the carburetor float chamber, and when the fuel level reaches the specified level, the float valve is closed. When the fuel pressure exceeds a specific level, it forces the regulator valve to open so that excess fuel flows out into the return circuit, as indicated by - - >, leading to the inlet side of the pump. In this way, a constant fuel pressure is maintained.



Disassembly



1. Remove the Y.I.C.S. chamber from the fuel pump.
2. Remove the fuel pump from the carburetor upper bracket.



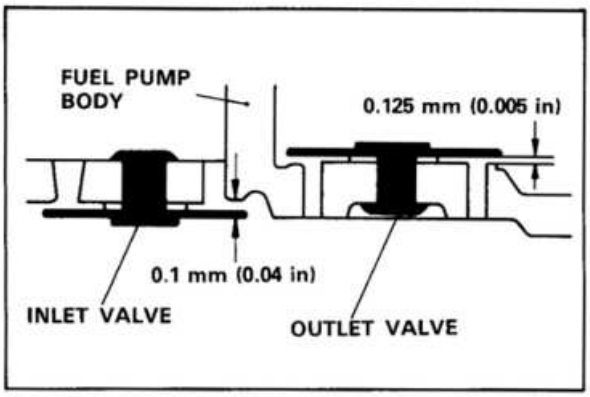
3. Remove the six screws, and remove the fuel pump covers, gaskets, diaphragms, and valves from the fuel pump body.
4. Remove the three screws and remove the regulator cover, spring, and diaphragm-from the fuel pump body.

Inspection

1. Examine the fuel pump body and fuel passage. If they are contaminated, wash the fuel pump body in a petroleum-based solvent. Blow out all passages with compressed air.
2. Inspect the fuel pump diaphragm, valve, and gasket for damage. If damaged, replace these components as a set.

NOTE:

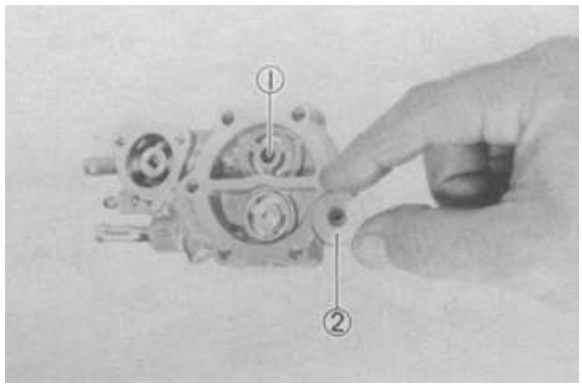
As shown below, a gap of 0.125 mm (0.005 in) is provided between the valve seat and the fuel pump body on both inlet and outlet valves.



3. Inspect the regulator rubber diaphragm and spring. If the diaphragm is torn or the spring is damaged, they should be replaced.

Assembly

1. Install the valves into the fuel pump body as shown.



1. Inlet valve 2. Outlet valve

2. Install the diaphragm, gaskets and covers onto the fuel pump body. Tighten the screws to specification.

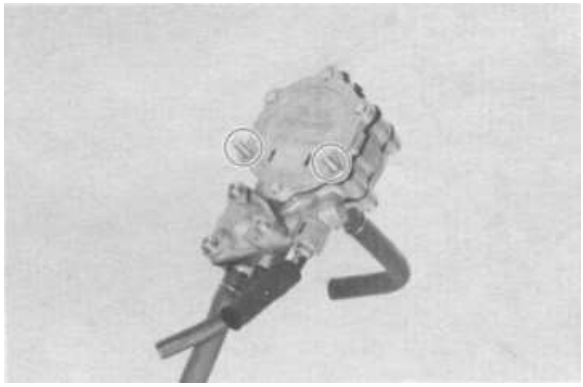
Tightening torque:
3 Mm (0.3 m-kg., 2.2ft-lb.)

CAUTION:

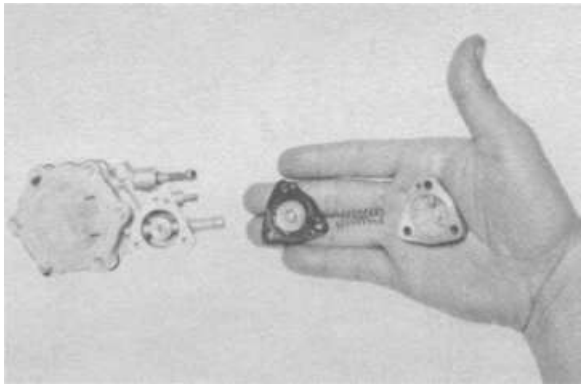
Avoid tightening the screws too hard, or the gasket could be deformed or broken.

NOTE:

For the 40 mm (1.57 in) long bolt position, refer to the photo.



3. Install the fuel pressure regulator onto the fuel pump body. The valve seat positioned at the center of the diaphragm should be fitted to the fuel pump body. Bring the diaphragm and fuel pressure regulator cover to align with the air nozzle attached to the fuel pump body, and install them.

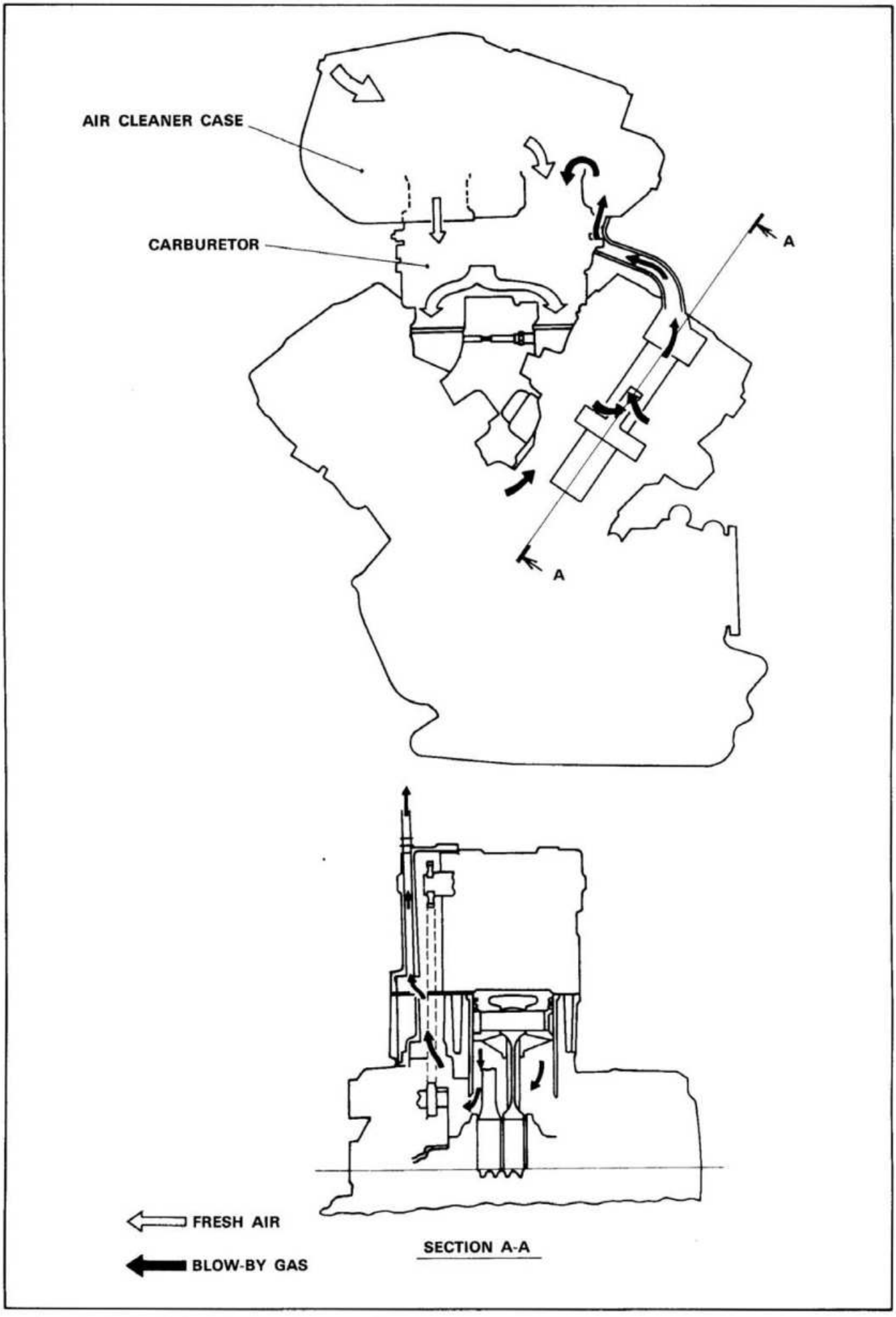


4. Tighten the screws to specification.

Tightening torque:
2 Nm (0.2m-kg, 1.4ft-lb)

5. Install the fuel pump assembly to the carburetor upper bracket, and connect the fuel and vacuum lines.

AIR CLEANER AND CRANKCASE VENTILATION SYSTEM



Refer to Chapter 2 for the air cleaner maintenance.

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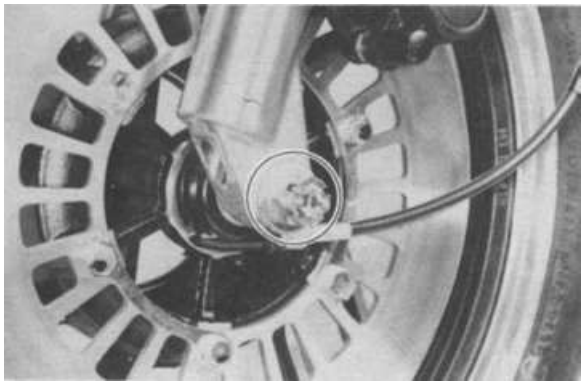
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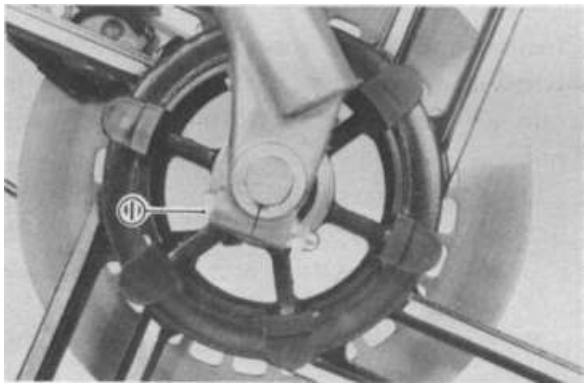
FRONT WHEEL

Removal

1. Place the motorcycle on its center stand.
2. Remove the cotter pin and wheel axle nut.



3. Loosen the pinch bolt securing the axle.

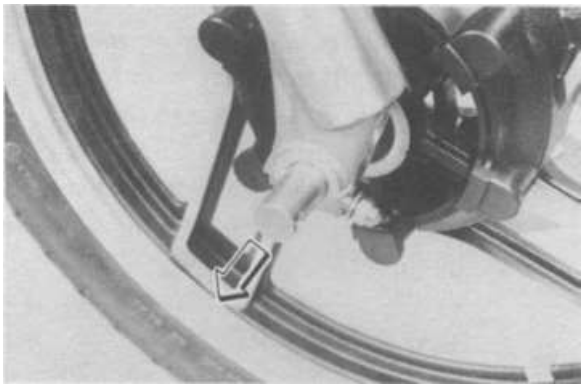


1. Pinch bolt

4. Remove the axle shaft and the front wheel. In this case, make sure the motorcycle is properly supported.

NOTE:

Do not depress the brake lever when the wheel is off the motorcycle as the brake pads will be forced shut.



Front axle inspection

Remove any corrosion from the axle with fine emery cloth. Place the axle on a surface plate, and check for bends. If bent, replace the axle. Do not attempt to straighten a bent axle.

Front wheel inspection

This motorcycle is equipped with aluminum wheels designed to be compatible with either tube or tubeless tires.

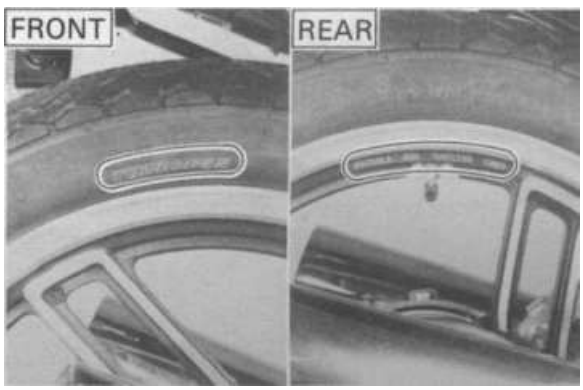
WARNING:

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

Tube-type wheel →	Tube-type Tires only
Tubeless-type wheel →	Tube-type or Tubeless tires

WARNING:

When using tube-type tires, be sure to install the proper tube also.



Refer to the Tubeless Tire and Aluminum Wheel Manual for proper tubeless and aluminum wheel service.

1. Check for cracks, bends, or warpage of the wheels. If a wheel is deformed or cracked, it must be replaced.
2. Check wheel run-out. If the deflection exceeds the tolerance below, check the wheel bearings or replace the wheel as required.

Rim run-out limits:
Vertical: 2mm (0.079 in)
Lateral: 2mm (0.079 in)

3. Check the wheel balance. Rotate the wheel lightly several times and note where the wheel comes to rest. If the wheel is not statically balanced, it will come to rest at the same point each time. Install an appropriate balance weight at the lightest point (at top).

NOTE:

The wheel should be balanced with the brake disc installed.

4. After installing a tire, ride conservatively to allow the tire to seat itself properly on the rim. Failure to allow proper seating may cause tire failure, resulting damage to the motorcycle and injury to the rider.
5. After repairing or replacing a tire, check to be sure the valve-stem locknut is securely fastened. If not, torque it as specified.

Tightening torque:
2 Mm (0.2m-kg, 1.4fflb)

Replacing the wheel bearings

If the bearings allow pay in the wheel hub or if the wheel does not turn smoothly, replace the bearings as follows:

1. Clean the outside of the wheel hub.
2. Drive the bearing out by pushing the spacer aside and tapping around the perimeter of the bearing inner race with a soft metal drift punch and hammer. The spacer "floats" between the bearings. Both bearings can be removed in this manner.

WARNING:

Eye protection is recommended when using striking tools.

3. To install the wheel bearing, reverse the above sequence. Use a socket that matches the outside diameter of the race of the bearing to drive in the bearing.

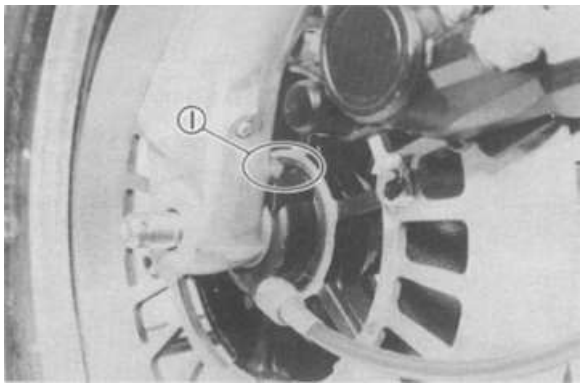
CAUTION:

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

Installing the front wheel

When installing the front wheel, reverse the removal procedure. Note the following points:

1. Lightly grease the lips of the front wheel oil seals and the gear teeth of the speedometer drive and driven gears. Use lightweight lithium base grease.
2. Install the speedometer-cable-holder securing bolt.
3. Make sure the projecting portion (torque stopper) of the speedometer housing is positioned correctly.



1. Torque stopper

4. Tighten the axle nut and install a new cotter pin.

Tightening torque:
110 Nm (11 m-kg, 80ft-lb)

5. Install the front fender.
6. Before tightening the pinch bolt, compress the front forks several times to check for proper fork operation.
7. Tighten the axle pinch bolt and a new cotter pin.

Tightening torque:
20 Nm (2.0 m-kg, 14ft-lb)

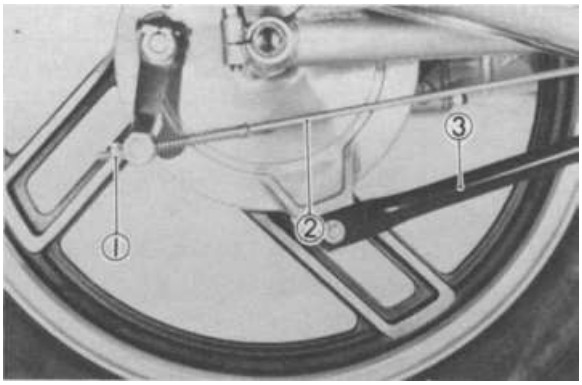
WARNING:

Always use a new cotter pin on the axle nut.

REAR WHEEL

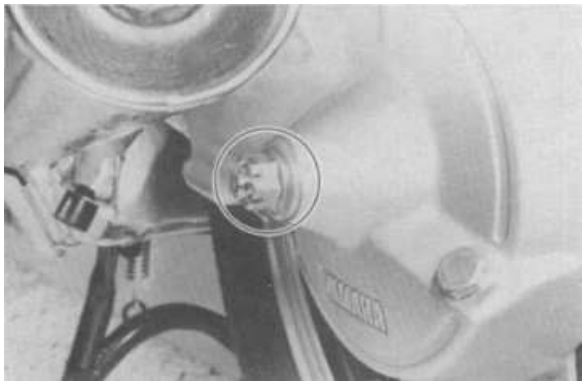
Removal

1. Place the motorcycle on its centerstand.
2. Remove the tension bar and the brake rod from the brake shoe plate. The tension bar can be removed by removing the cotter pin and nut from the tension bar bolt. The brake rod can be removed by removing the adjuster.

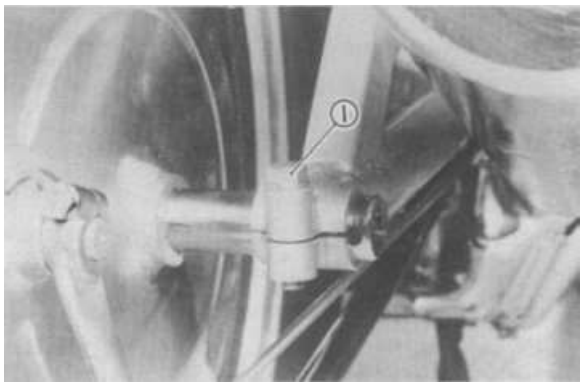


1. Adjuster 2. Brake rod 3. Tension bar

3. Remove the axle nut cotter pin and axle nut. Discard the old pin.

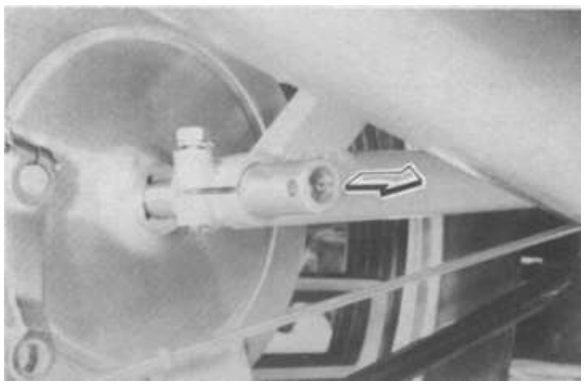


4. Loosen the rear axle pinch bolt and pull out the rear axle.



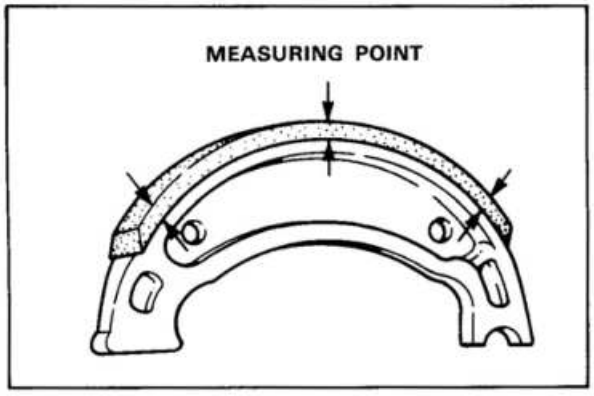
1. Pinch bolt

5. Move the wheel to the right side to separate it from the final gear case and remove the rear wheel.



Checking brake shoe wear

1. Check the brake linings for damage and wear. If the thickness is less than the specified value, replace the brake shoe as a set.



Wear limit: 2mm (0.08 in)

2. Remove any glazing from the brake shoes with coarse sandpaper.

Brake drum

Oil or scratches on the inner surface of the brake drum will impair braking performance or result in abnormal noises. Remove oil by wiping the brake drum with a rag soaked in lacquer thinner or solvent. Remove scratches by lightly and evenly polishing the brake drum with emery cloth.

Brake shoe plate

Remove the camshaft, and grease it. If the cam face is worn, replace the camshaft.

NOTE:

Before removing the cam lever, put alignment marks on the cam lever and camshaft to indicate their relative positions for easy assembly.

Rear axle inspection

Refer to "Front axle inspection" on page 5-1.

Replaceing the wheel bearings

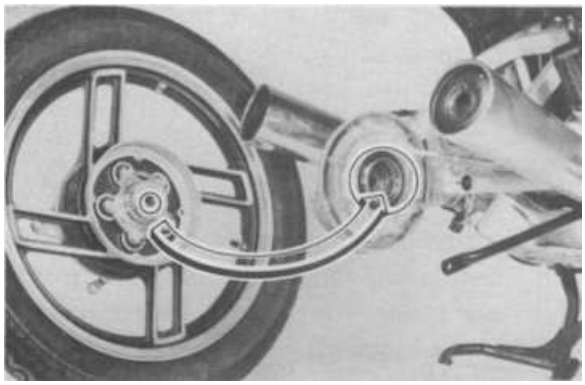
Rear wheel bearing replacement is similar to the procedure for the front wheel bearings.

Rear wheel inspection

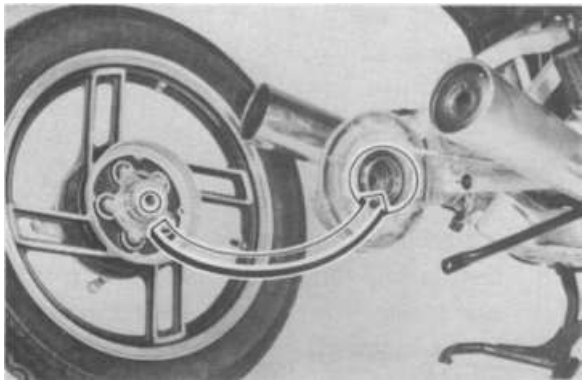
See "Front wheel inspection" on page 5-1.

Installing the rear wheel

1. Install the spacer in the final drive coupling as shown in the photograph.



2. Lightly grease the lips of the rear wheel oil seals.



3. Install the wheel assembly and axle.

NOTE:

When installing the rear wheel, be sure the splines on the wheel hub fit into the final gear case. Lightly apply grease to the gear teeth.

WARNING:

Always use a new cotter pin on the axle nut.

Tightening torque:
Axle nut:
110 Mm (11 m-kg, 80 ft-lb)
Axle pinch bolt:
6 Nm (0.6 m-kg, 4.3 ft-lb)

FRONT BRAKE

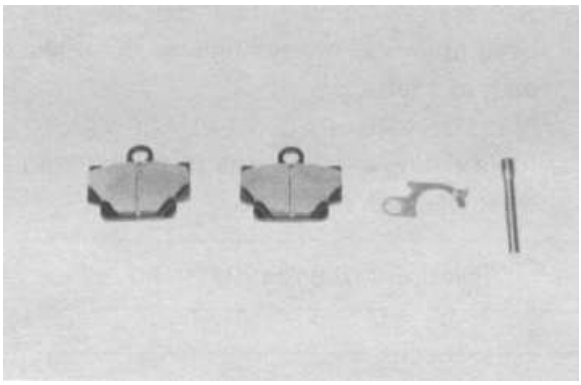
CAUTION:

Disc brake components rarely require disassembly. Do not disassemble components unless absolutely necessary. If any hydraulic connection in the system is opened, the entire system should be disassembled, drained, cleaned, and then properly filled and bled upon reassembly. Do not use solvents on brake internal components. Solvents will cause seals to swell and distort. Use only clean brake fluid for cleaning. Use care with brake fluid. Brake fluid can injure your eyes, and it will damage painted surfaces and plastic parts.

Brake pad replacement /

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Remove the retaining bolt from the caliper cylinder. Then remove the pads and pad shim.

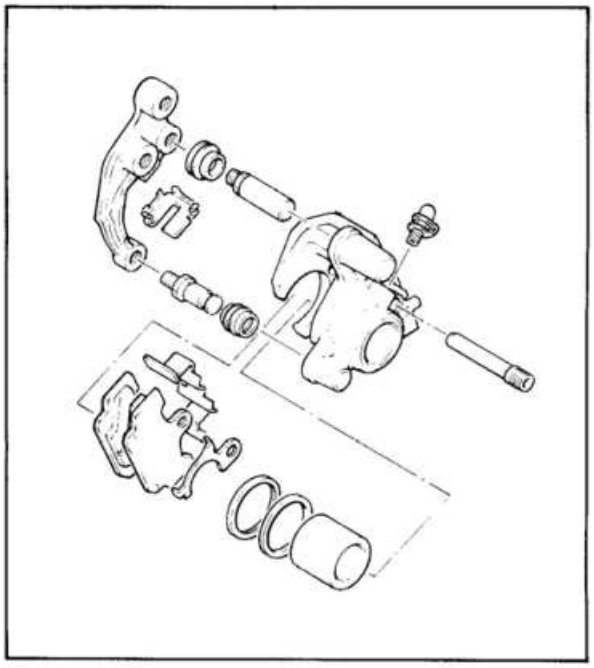


2. Install the new brake pads. Replace the following parts if pad replacement is required.
   - Pads
   - Pad shim

NOTE:

Replace the pads as a set if either is found to be worn to the wear limit.

CALIPER DISASSEMBLY



1. Remove the brake hose from the caliper. Allow the caliper assembly to drain into a container.
2. Place the open hose end into the container and pump the old fluid out of the master cylinder.
3. Remove the retaining spring, retaining bolt, and the pads.
4. Remove the caliper cylinder securing bolts from the front fork.
5. Carefully force the piston out of the caliper cylinder with compressed air. Never try to pry out the piston.

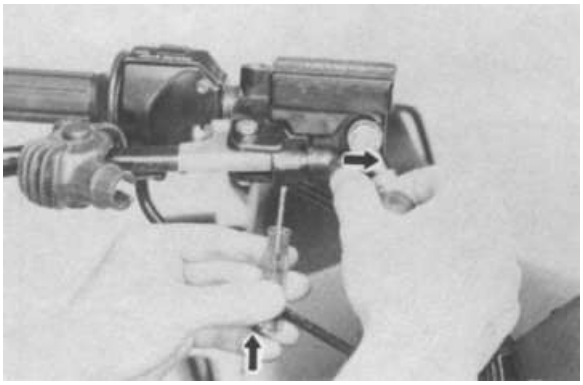
WARNING:

Cover the piston with a rag. Use care so that the piston does not cause injury as it is expelled from the cylinder.

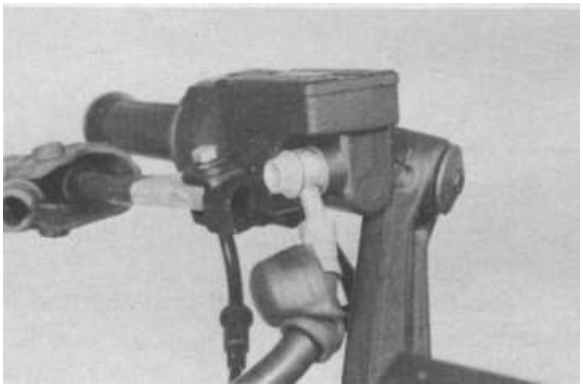
6. Remove the piston seals.

Master cylinder disassembly

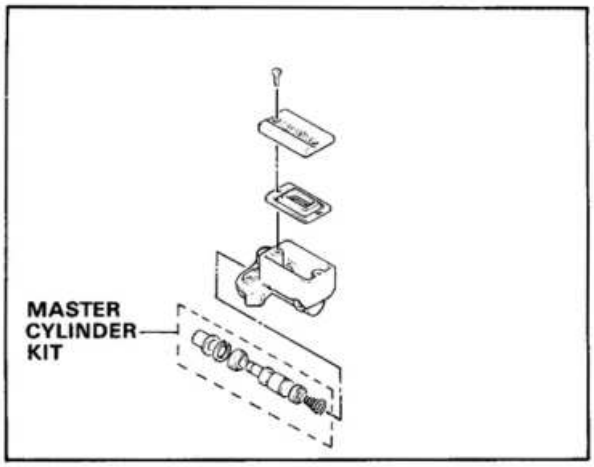
1. Remove the brake light switch.



2. Remove the brake hose.



3. Remove the brake lever and spring.
4. Remove the master cylinder from the handlebar. Remove the cap, and drain the remaining fluid.
5. Remove the master cylinder dust boot.
6. Remove the snap ring.

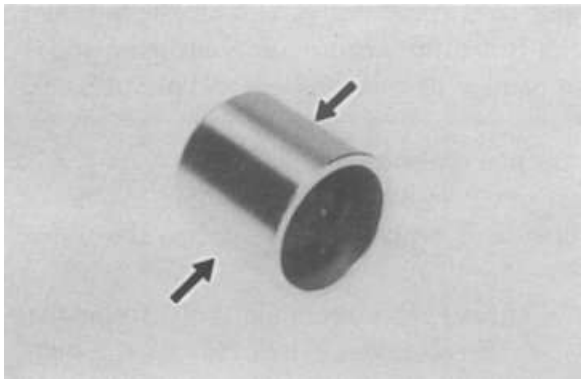


7. Remove the master cylinder cup assembly. Note that the cylinder cups are installed with the larger diameter (lips) inserted first.

Brake inspection and repair

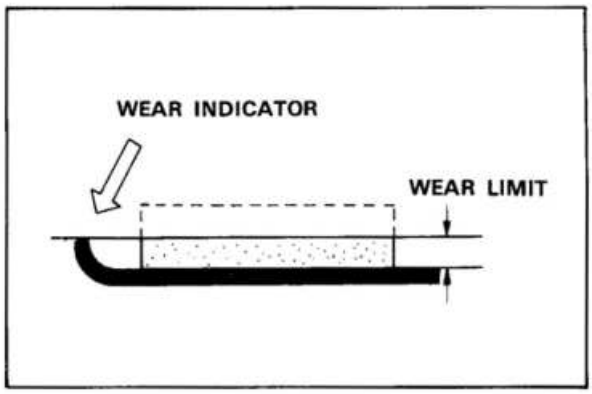
Recommended brake component Replacement schedule:
Brake pads: As required
Piston seal, dust seal: Every two years
Brake hoses: Every four years
Brake fluid: Replace only when brakes are disassembled

1. Replace the caliper piston if it is scratched.



2. Replace any brake pad that is worn beyond limits. Always replace the brake pads as a set.
   See "BRAKE PAD REPLACEMENT" for a listing of the parts to be replaced when pads are replaced.

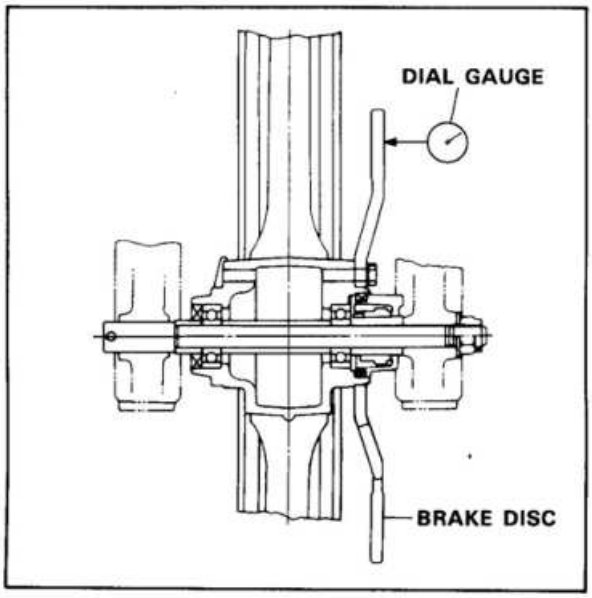
Wear limit: 0.8mm (0.031 in)



3. Replace the piston seals if damaged. Replace the seals every two years.
4. Inspect the master cylinder body; replace if scratched. Clean all the passages with new brake fluid.

5. Inspect the brake hoses. Repalce the hoses every four years or immediately if cracked, frayed, or damaged.
6. Check for wear and deflection of the disc. If the disc is worn beyond minimum thickness or if deflection exceeds the specified amount, replace the disc.

Maximum deflection: 0.15mm (0.006 in) Minimum disc thickness: 4.5mm (0.18 in)

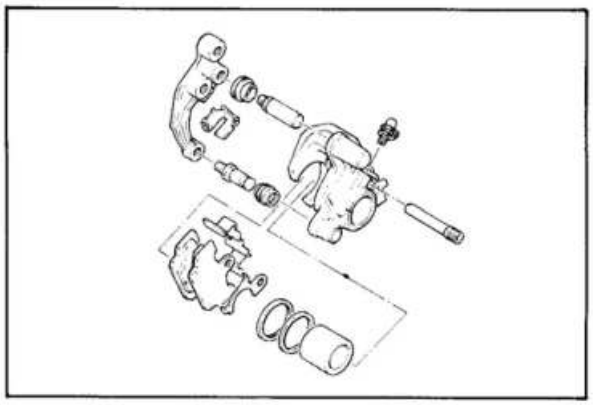


Brake assembly

Caliper

All internal parts should be cleaned in new brake fluid only. Internal parts should be lubricated with brake fluid when installed. Replace the following parts whenever a caliper is disassembled:

- Piston seals
- Retaining ring
- Pad shim

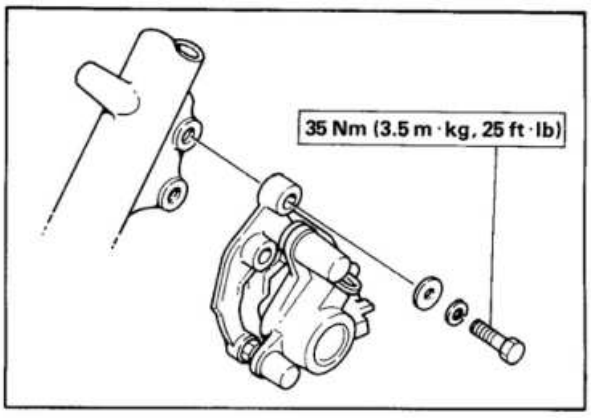


1. Install the piston seals and the piston.
2. Install the retaining spring, pads, and retaining bolt into the caliper cylinder. Torque the retaining bolt to specification.

Tightening torque: 23 Nm (2.3 m-kg, 17 ft-lb)

3. Apply rubber grease to the piston seals, caliper cylinder, and piston.
4. Install the caliper assembly on the front fork. Torque the bolts to specification.

Tightening torque: 35 Nm (3.5 m-kg, 25 ft-lb)



5. Attach the brake hoses.

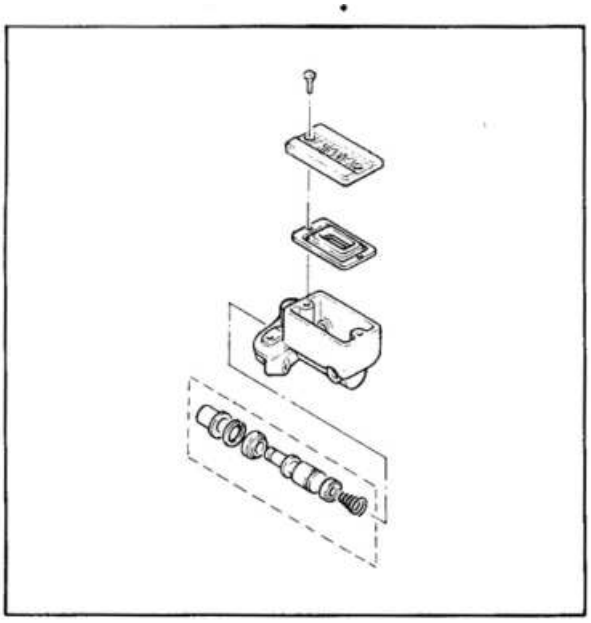
Tightening torque: 20 Nm (2.0 m-kg, 14 ft-lb)

6. If the brake disc has been removed from the hub or is loose, tighten the bolts. Use new lock plates, and bend the lock tabs against a bolt flat after the bolts are torqued to specification.

Tightening torque:
20 Nm (2.0 m-kg, 14.5 ft-lb)

7. Reassemble the master cylinder as shown in the illustration.

Tightening torque:
(all brake union bolts)
26 Nm (2.6 m-kg, 19 ft-lb)

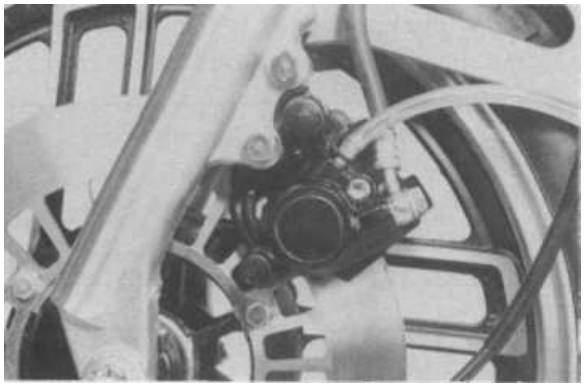


Bleeding the brakes

WARNING:

If the brake system is disassembled or if any brake hose has been loosened or removed, the brake system must be bled to remove air from the brake fluid. If the brake fluid level is very low or brake operation is incorrect, bleed the brake system. Failure to bleed the brake system properly can result in a dangerous loss of braking performance.

1. Add proper brake fluid to the reservoir. Install the diaphragm, being careful not to spill or overflow the reservoir.
2. Connect a clear plastic tube, 4.5mm (3/16 in) inside diameter, tightly to the caliper bleed screw. Put the other end of the tube into a container.



3. Slowly apply the brake lever several times. Pull in the lever. Hold the lever in this "on" position. Loosen the bleed screw. Allow the lever to travel slowly toward its limit. When the limit is reached, tighten the bleed screw. Then release the lever.

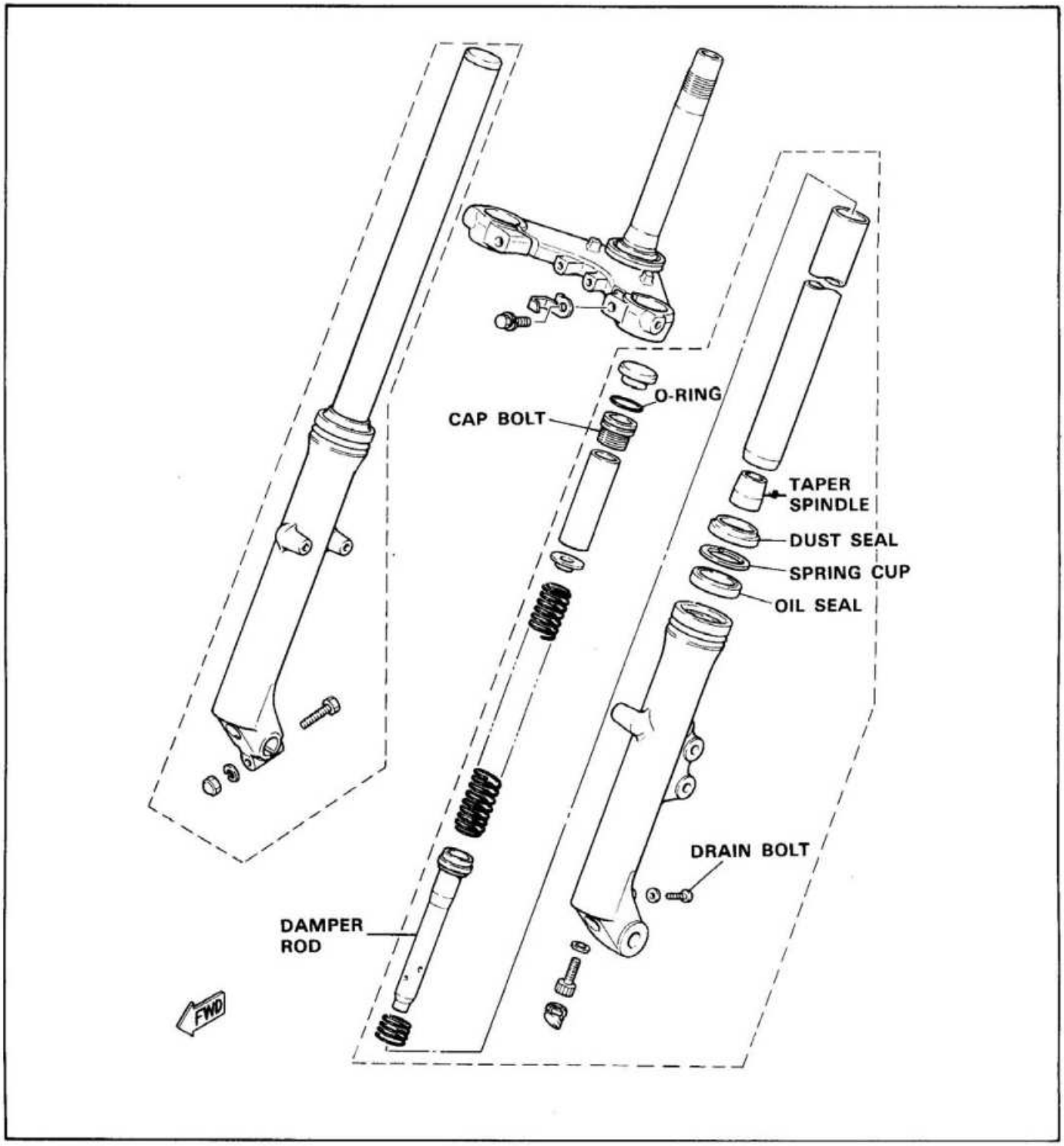
Bleed screw tightening torque:
6 Nm (0.6 m-kg, 4.3 ft-lb)

4. Repeat the above procedure until all air bubbles are 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 settled out.

FRONT FORK

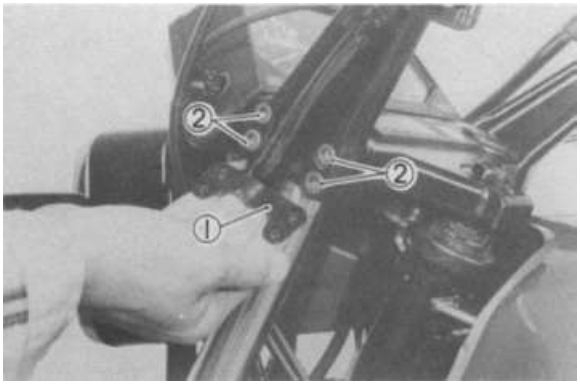


Removal and disassembly

WARNING:

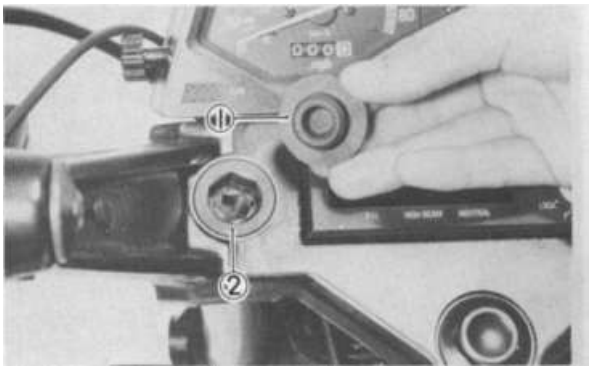
Securely support the motorcycle so there is no danger of it falling over.

1. Disconnect the speedometer cable. Remove the brake caliper and the front wheel. Remove the front fender.



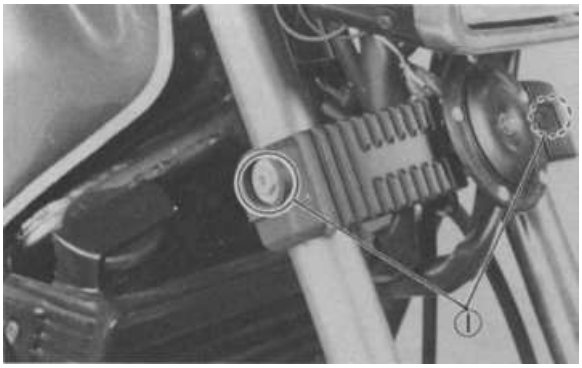
1. Wire holder 2. Pich bolt

3. Remove the caps and fork cap bolts from the inner fork tubes.



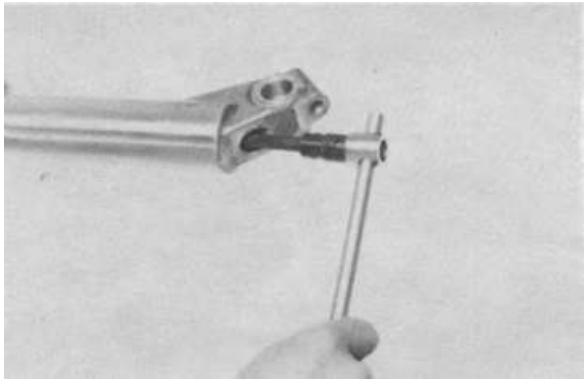
1. Cap 2. Fork cap bolt

4. Place an open container under each drain hole. Remove the drain screw from each outer tube.
5. Remove the horn cover from the under bracket.

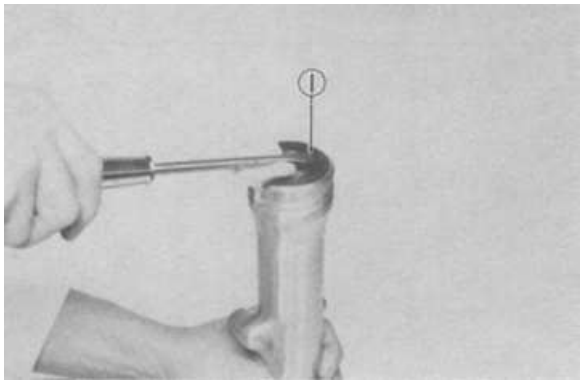


1. Horn cover

6. Loosen the pinch bolts on the under bracket, and remove the forks.
7. Remove the fork spring and remove the cylinder securing bolt from the bottom of the fork assembly. Hold the damper rod with the front-fork-cylinder holder. Remove the damper rod assembly and inner fork tube.

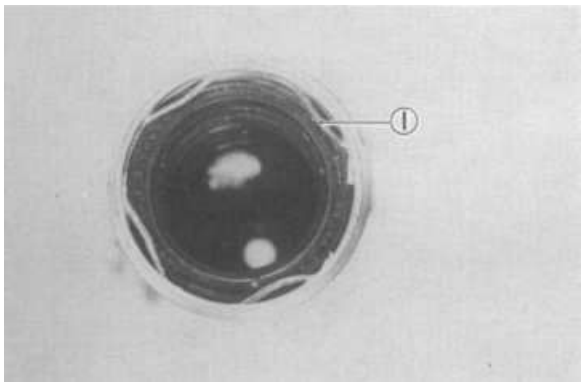


8. Remove the dust seal from the outer fork tube with a screwdriver. Be careful not to scratch the inner fork tube surface.

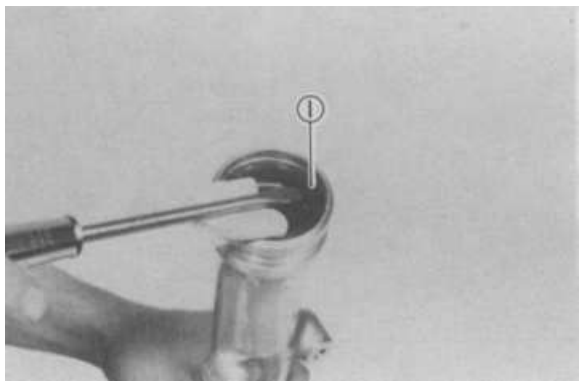


1. Dust seal

9. Remove the retaining clip from the outer fork tube, and pry out the fork seal. Be careful not to damage the fork tube surface.



1. Retaining clip



1. Oil seal

Inspection

1. Examine the inner fork tube. If the tube is severely scratched or bent, it should be replaced.

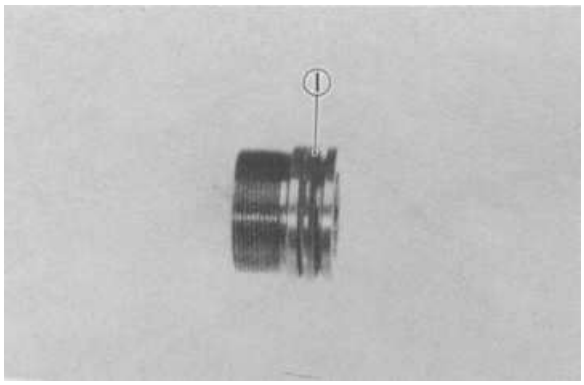
WARNING:

Do not attempt to straighten a bent fork tube; this may dangerously weaken the tube.

2. Inspect the outer surface of the fork seal seat in the outer fork tube. If this surface is damaged, replace the outer fork tube. If it is not damaged, replace the fork seal.
3. Check the outer fork tubes for dents. Replace the tube if it is dented.
4. Check the free length of the springs.

Fork spring free length:
461 mm (22.1 in)

5. Check the 0-ring on the cap bolt. If it's damaged, replace it.



1. O-ring

Assembly

1. Make sure all components are clean before assembly. Always install a new fork seal. Do not reuse a seal.
2. Apply oil to the fork seal, and install the fork seal by pressing it in with a large socket. Install the retaining clip.
3. Install the dust seal into the outer fork tube.
4. Install the damper rod assembly into the inner fork tube. Hold the damper rod with the front fork cylinder holder.
5. Put the taper spindle on the damper rod.
6. Hold the inner fork tube, and carefully install the outer fork tube over the taper spindle.
7. Apply Loctite® (red) to the cylinder securing bolt, and install the bolt and a copper washer into the outer fork tube. Torque the bolt to specification.

Tightening torque:
26 Nm (2.6m-kg, 19ffIb)

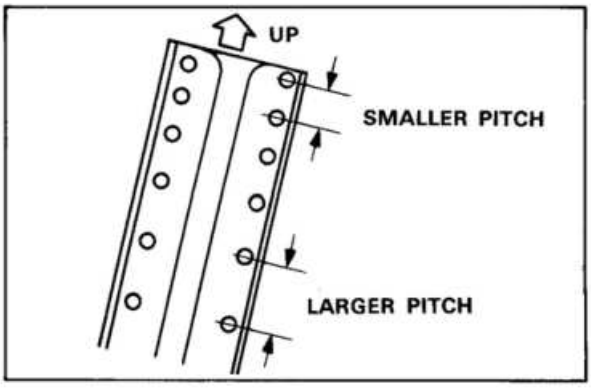
8. Pour the specified amount of fork oil into the inner fork tube.

Fork oil capacity:
257cm^3 (9.0 Imp oz, 8.7 US oz)
Fork oil level:
152mm (6.0 in)
(From top of inner tube fully compressed without spring.)
Recommended oil:
Yamaha fork oil 15 wt or equivalent

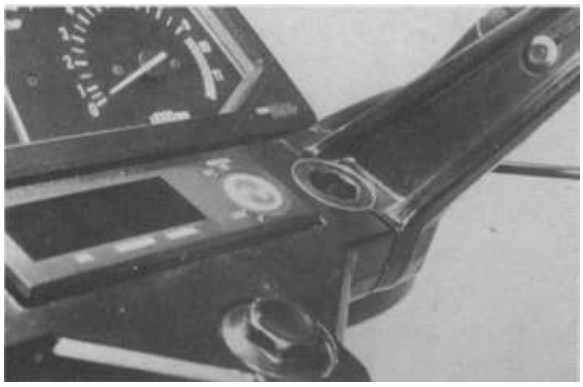
9. Install the fork spring and cap bolt with a new 0-ring into the inner fork tube. Finger tighten the cap bolt.

NOTE:

The fork spring must be installed with the smaller pitch side facing upward as shown.

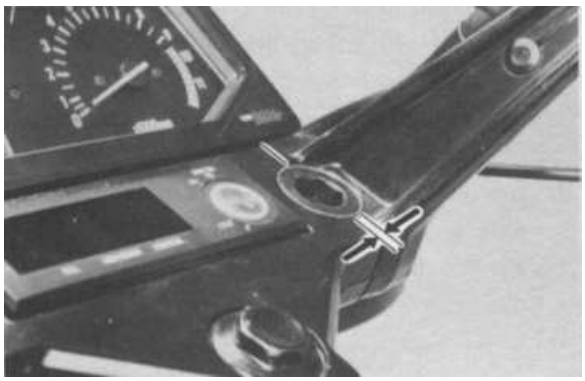


10. Install the fork into the brackets. Make the top of the inner fork tube level with the top of the handle crown.



11. Tighten the pinch bolt at the under bracket. Torque the bolt to specification.

Tightening torque
38 Nm (3.8 m-kg,27 ft-lb)



12. Tighten the cap bolt to specification, use the special tool.

Tightening torque:
20 Nm (2.0 m-kg, 14 ft-lb)

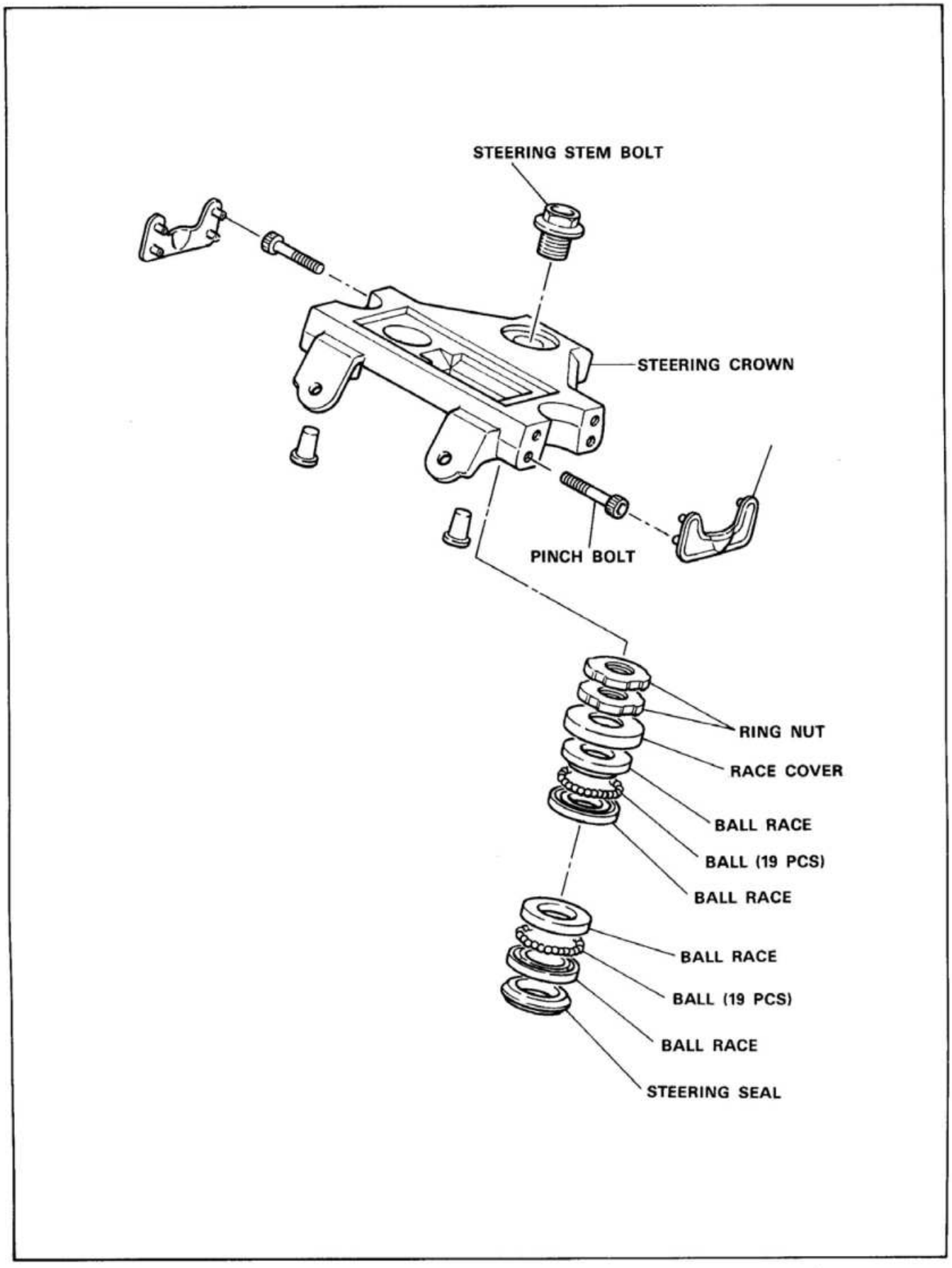


13. Tighten the pinch bolts at the handle crown. Torque the bolts to specification.

Tightening torque.
20 Nm (2.0 m-kg, 14 ft-lb)

14. Install the horn cover onto the under bracket.
15. To install the front wheel, reverse the removal procedure.
    Refer to "FRONT WHEEL" on page 5-1.

STEERING HEAD

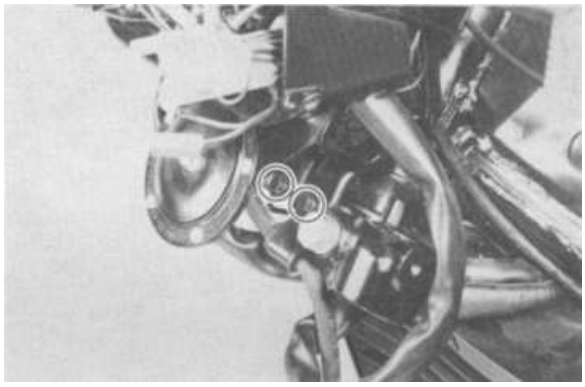


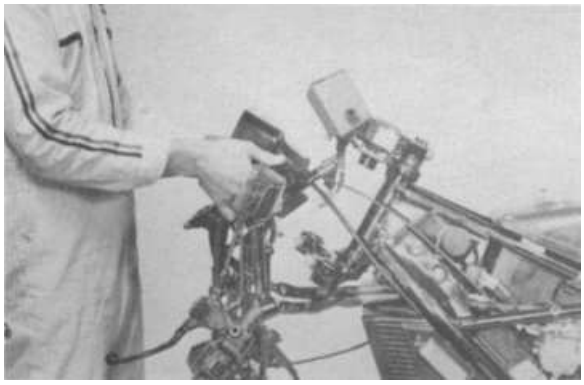
Adjustment

Refer to "ASSEMBLY" for steering head adjustment procedures.

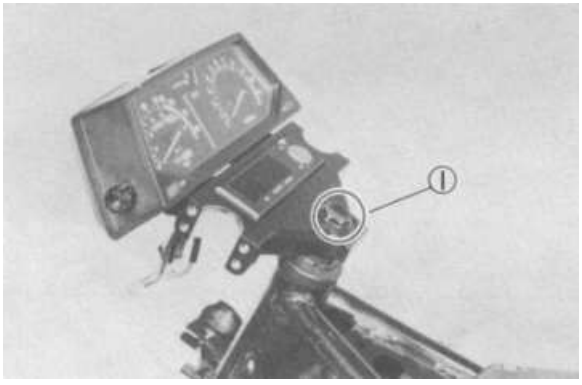
Removal

1. Remove sidecovers and the fuel the tank.
2. Remove the headlight lens unit, and disconnect all wiring connectors in the headlight shell.
3. Remove the handlebars from the steering crown.
4. Remove the front wheel and front forks.
5. Remove the headlight body bracket securing bolts and remove the headlight body, flasher light, and horn together.



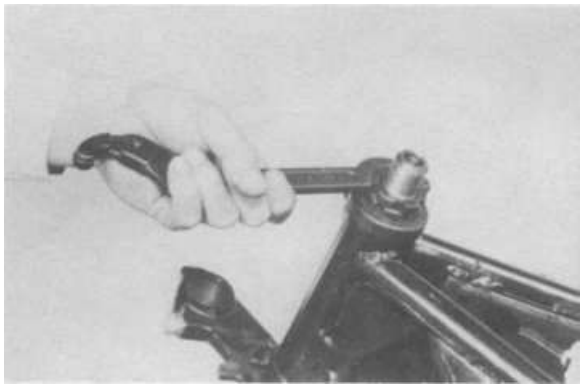


6. Remove the steering stem bolt, and remove the steering crown.



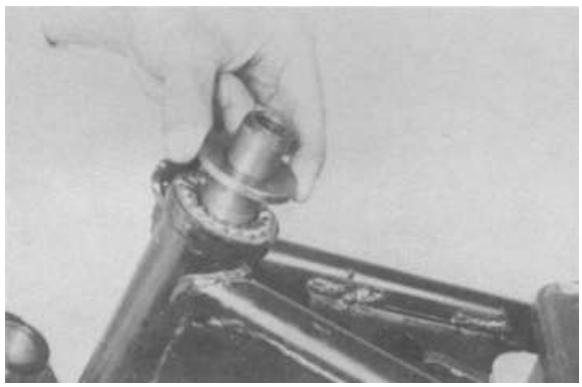
1. Steering stem nut

7. Remove the top ring nut.



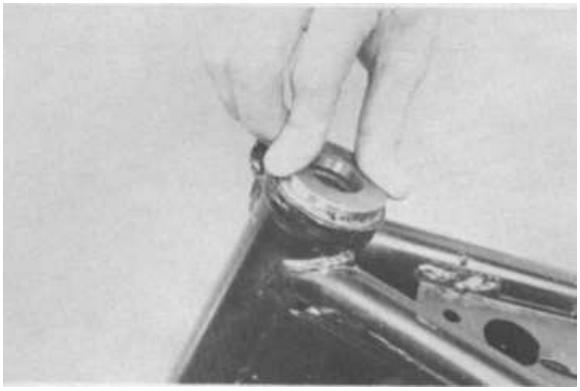
8. Support the steering stem, and remove the lower ring nut.
9. Remove the top bearing race and all of the balls from the upper bearing.

Ball quantity (upper and lower): 38 PCS.



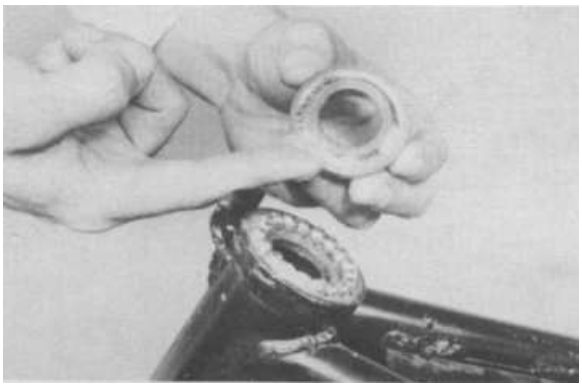
Inspection

1. Wash the bearings in solvent.
2. Inspect the bearings for pitting or other damage. Replace the bearings if pitted or damaged. Replace the races when the balls are replaced.
3. Clean and inspect the bearing races. Spin the bearings by hand. If the bearings are not smooth in their operation, replace balls and races.



Assembly

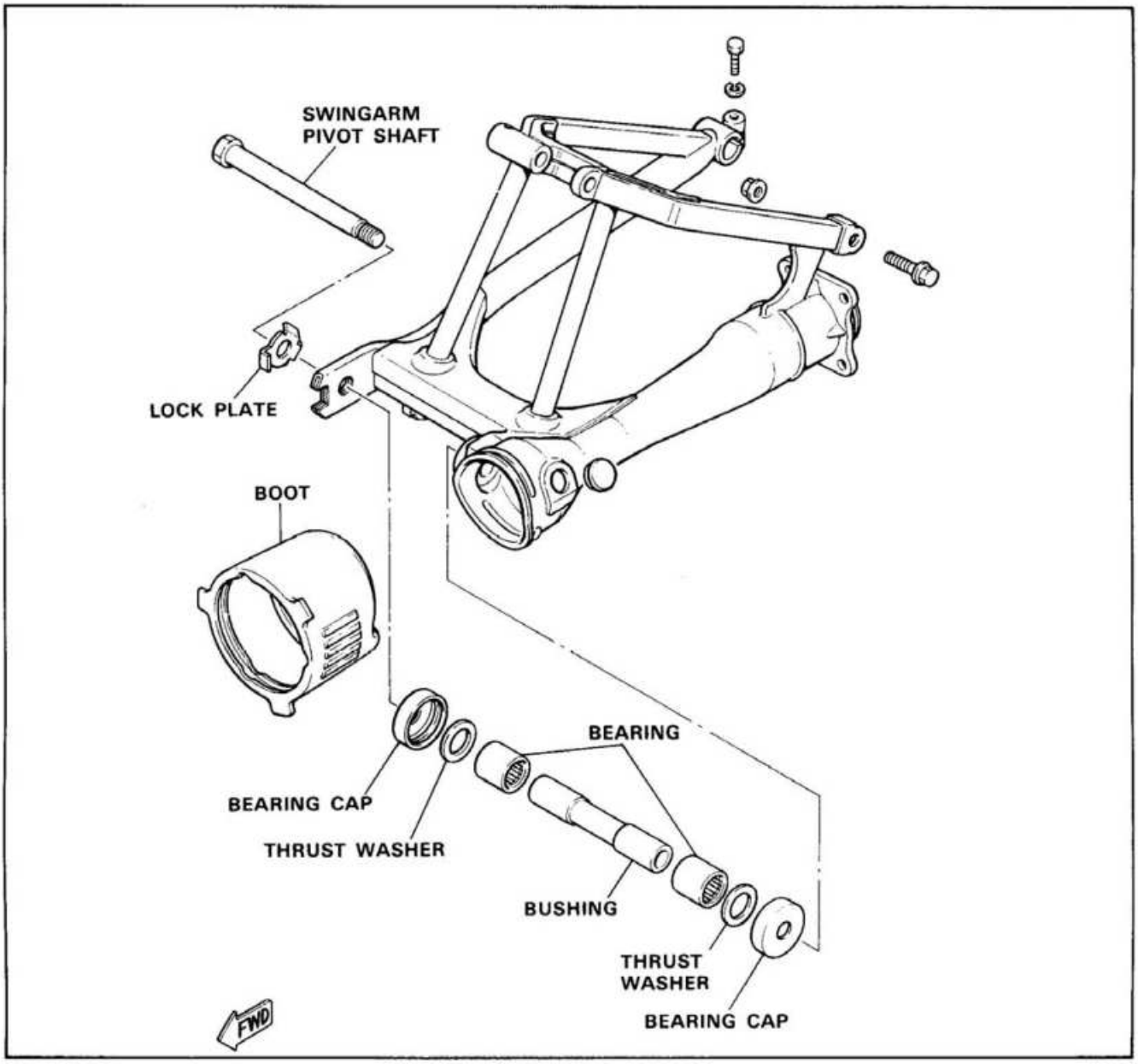
1. Grease the bearings and races with wheel bearing grease.



2. Install the steering stem, balls, and races.
3. Install the lower ring nut. Tighten it to approximately 20 Nm (2.0 rrrkg, 14 fflb) and loosen it approximately 1/4 turn.
4. While holding the lower ring nut with the ring nut wrench, tighten the top ring nut securely.
5. Continue assembly; reverse the disassembly procedure.
6. When assembly is complete, check the steering stem by turning it from lock to lock. If there is any binding or looseness, readjust the tightness of the steering stem.

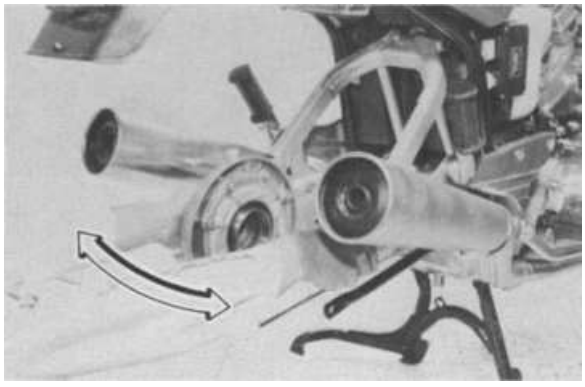
Tightening torque:
Steering crown pinch bolt:
20 Nm (2.0 m-kg, 14 ft-lb)
Under bracket pinch bolt:
38 Nm (3.8 m-kg, 27 ft-lb)
Steering stem bolt:
54 Nm (5.4 m-kg, 39 ft-lb)

SWINGARM

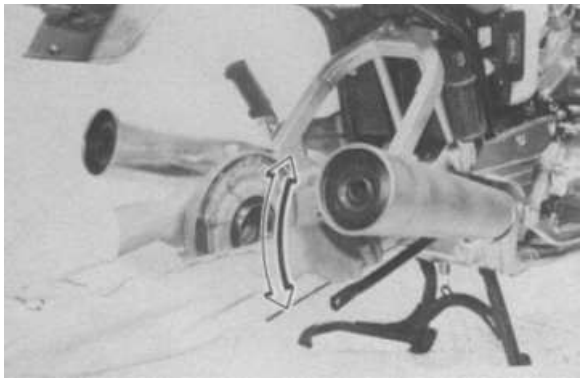


Free play inspection

1. Remove the rear wheel and the shock absorber. Grasp the swingarm and try to move it from side to side as shown. There should be no noticeable side play.

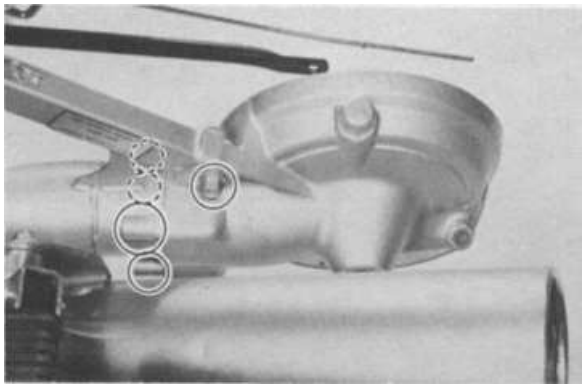


2. The swingarm is mounted on needle bearings. Move the swingarm up and down as shown. The swingarm should move smoothly, without tightness, binding, or rough spots that could indicate damaged bearings.

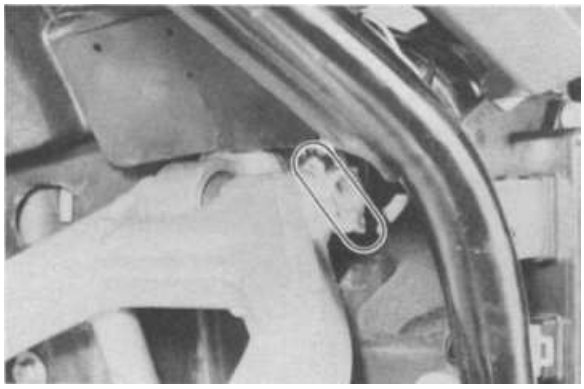


Removal

1. Remove the rear wheel, sidecovers, starter relay and rubber plugs.
2. Remove the final gear assembly and the drive shaft from the swingarm.



3. Remove the cotter pin from the swing-arm, drive out the shock absorber pivot shaft, and disconnect the shock absorber from the swingarm.

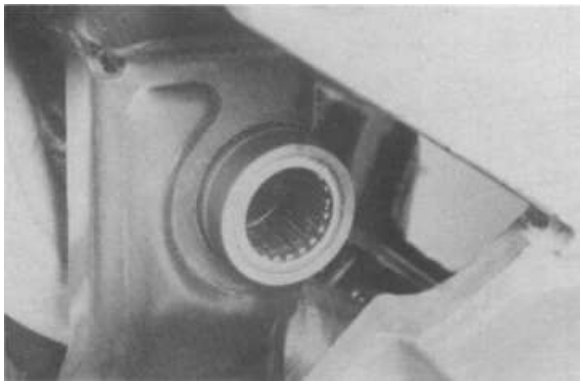


4. Remove the swingarm pivot bolt, and remove the swingarm.



Inspection and lubrication

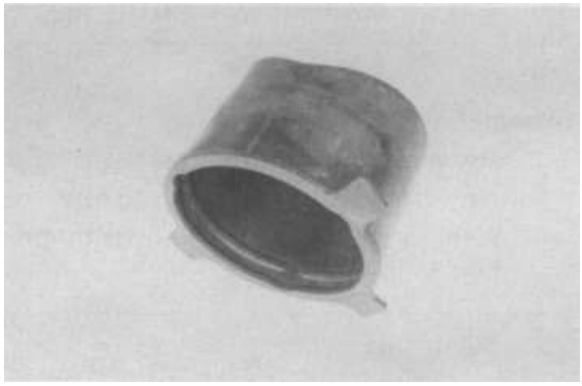
1. Remove the bearing caps. Inspect the bearings for pitting or other damage. Make sure that the bearings roll freely. If a bearing is damaged, it should be replaced.



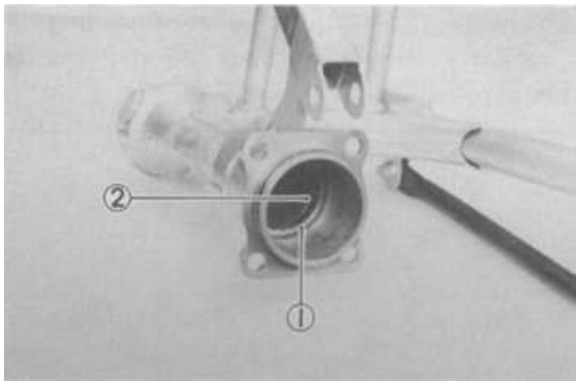
NOTE:

When installing new bearings, grease them liberally with lithium-base, waterproof wheel-bearing grease.

2. If the inner seals of the bearing caps are damaged, replace the bearing caps.
3. Examine the rubber boot for damage. Replace it if it's damaged.

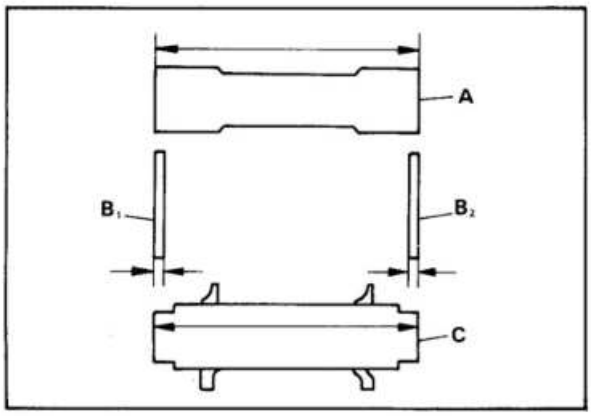


4. Check the needle bearing and oil seal in the rear arm for damage or wear. Replace as required.



1. Bearing 2. Oil seal

5. Measure the length of the bushing (A), the thickness of each thrust washer (Bi and B_2), and the length of the swingarm mounting bracket (C) in the lower frame member.



6. Calculate the swingarm side clearance by using the formula given below:
   Side clearance = A - (Bj + B_2 + C)
7. f the side clearance is not within specification, adjust the clearance by installing a new thrust washer(s) of appropriate thickness. Recheck the side clearance.

Swingarm side clearance:
0.1 ~ 0.3mm (0.004 ~ 0.012 in)

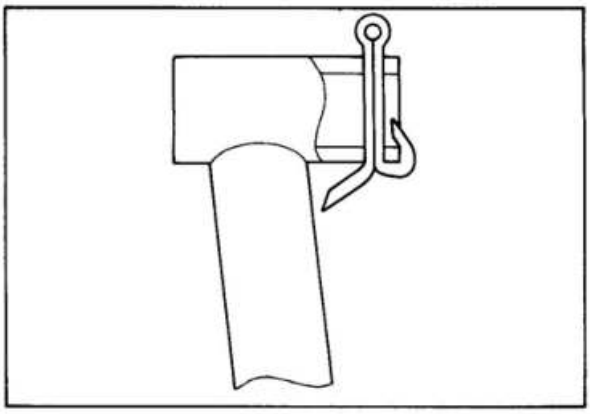
Assembly

1. Assemble the swingarm by reversing the removal procedures. Use a new lock plate, and torque the swingarm pivot bolt to specification.

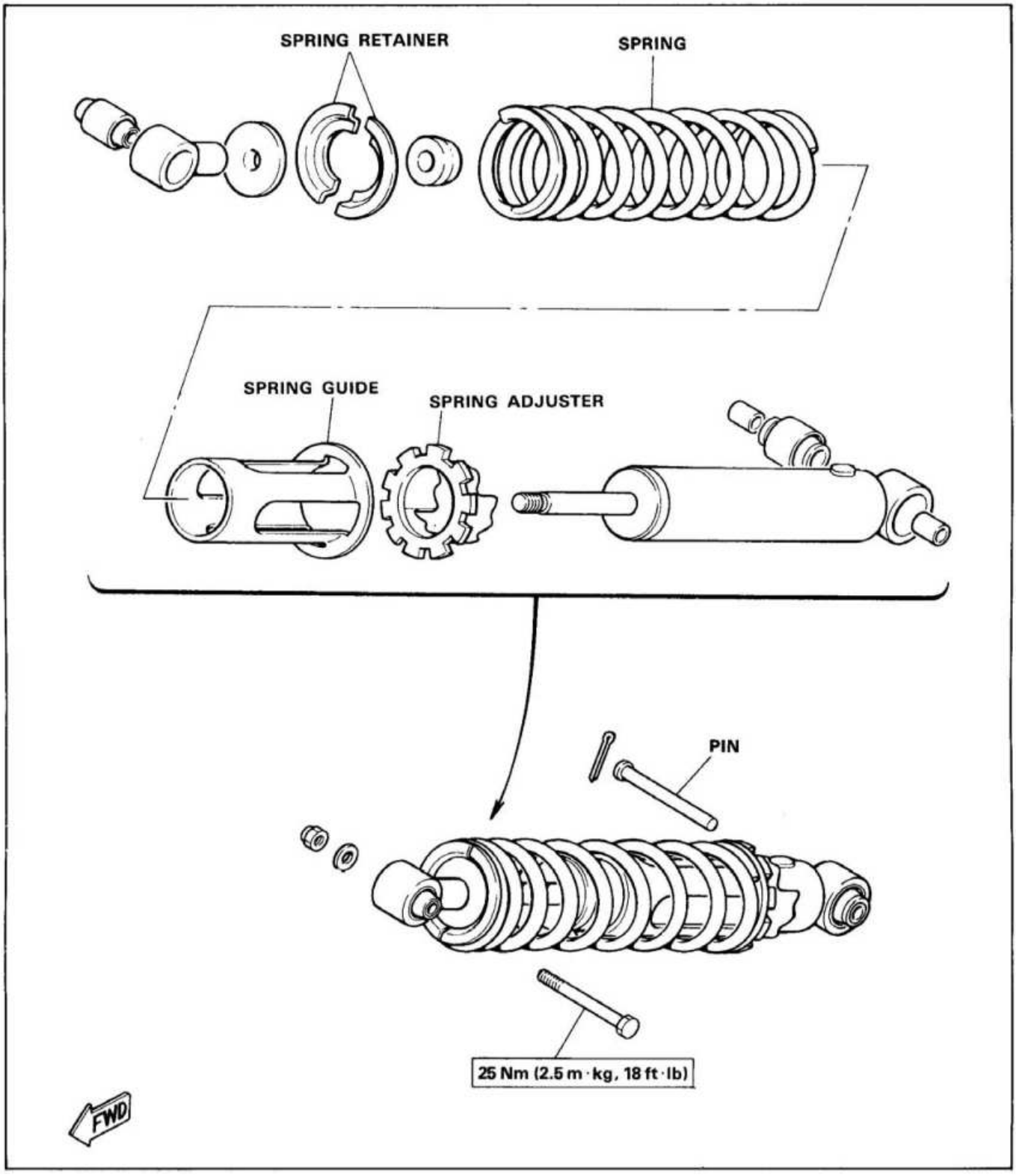
Tightening torque:
78Nm (7.8 m-kg, 56ft-lb)

CAUTION:

Use a new cotter pin when installing the shock absorber pivot shaft. Bend the cotter pin as shown in the illustration.



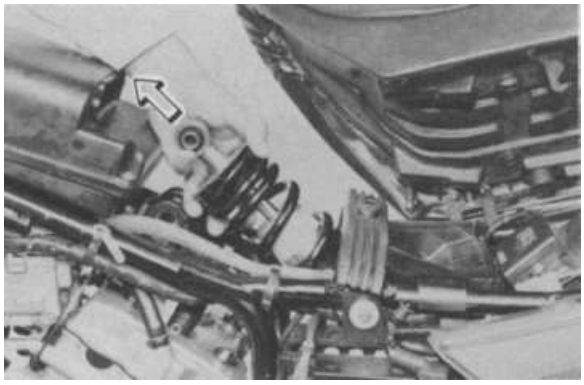
REAR SHOCK ABSORBER



Removal

1. Remove the fuel tank.
2. Remove the rear wheel. Refer to "REAR WHEEL REMOVAL".
3. Remove the cotter pin from the swing-arm, drive out the shock absorber pivot shaft, and disconnect the shock absorber from the swingarm.

4. Remove the shock absorber mounting bolt, and remove the shock absorber from the frame by carefully pulling it towards the front of the motorcycle.



5. Compress the spring and remove the spring seats.

NOTE:

The spring should be compressed as little as possible and handled with special care.

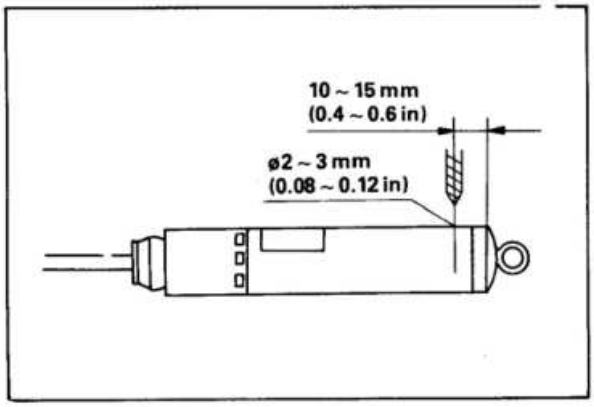
6. Remove the spring, spring guide, spring adjuster, and damper sub-assemblies from the shock absorber.

Inspection

Visually inspect the shock absorber for oil leaks. If you notice any signs of an oil leak, replace the entire shock absorber.

Notes on disposal

Gas pressure must be released before disposing of the shock absorber. To do so, drill a 2 ~ 3 mm (0.08 ~ 0.12 in) hole through the cylinder wall at a point 10 ~ 15 mm (0.4 ~ 0.6 in) above the bottom of the cylinder.



CAUTION:

Always wear a proper eye protection to prevent eye damage from escaping gas and/or metal chips.

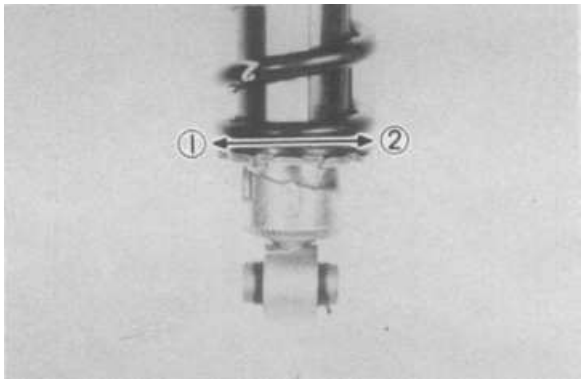
Installation and adjustment

1. To install the shock absorber in the motorcycle, reverse the removal procedures.

Tightening torque:
Pivot shaft:
25 Nm (2.5m-kg, 18fflb)

2. Turn the adjuster to the standard setting (the setting with the slot).

	Hard			S.T.D	Soft
Adjusting position	5	4	3	2	1



1. Stiffen 2. Softer

CABLES AND FITTINGS

Cable maintenance

NOTE:

See "MAINTENANCE AND LUBRICATION" interval charts. Cable maintenance is primarily concerned with preventing deterioration and providing proper lubrication to allow the cable to move freely within its housing. Cable removal is straight forward and uncomplicated. Removal is not discussed within this section.

WARNING:

Cable routing is very important. For details of cable routing, see the "CABLE ROUTING" at the end of this manual. Improperly routed or adjusted cables may make the motorcycle unsafe for operation.

1. Remove the cable.
2. Check for free movement of the cable within its housing. If movement is obstructed, check for frayed strands or kinking of the cable. If damage is evident, replace the cable.
3. To lubricate the cable, hold it in a vertical position. Apply lubricant to the uppermost end of the cable. Leave it in the vertical position until the lubricant appears at the bottom. Allow any excess to drain, and reinstall the cable.

NOTE:

Choice of a lubricant depends upon conditions and preferences. However, a semi-drying chain and cable lubricant will perform adequately under most conditions.

Throttle maintenance

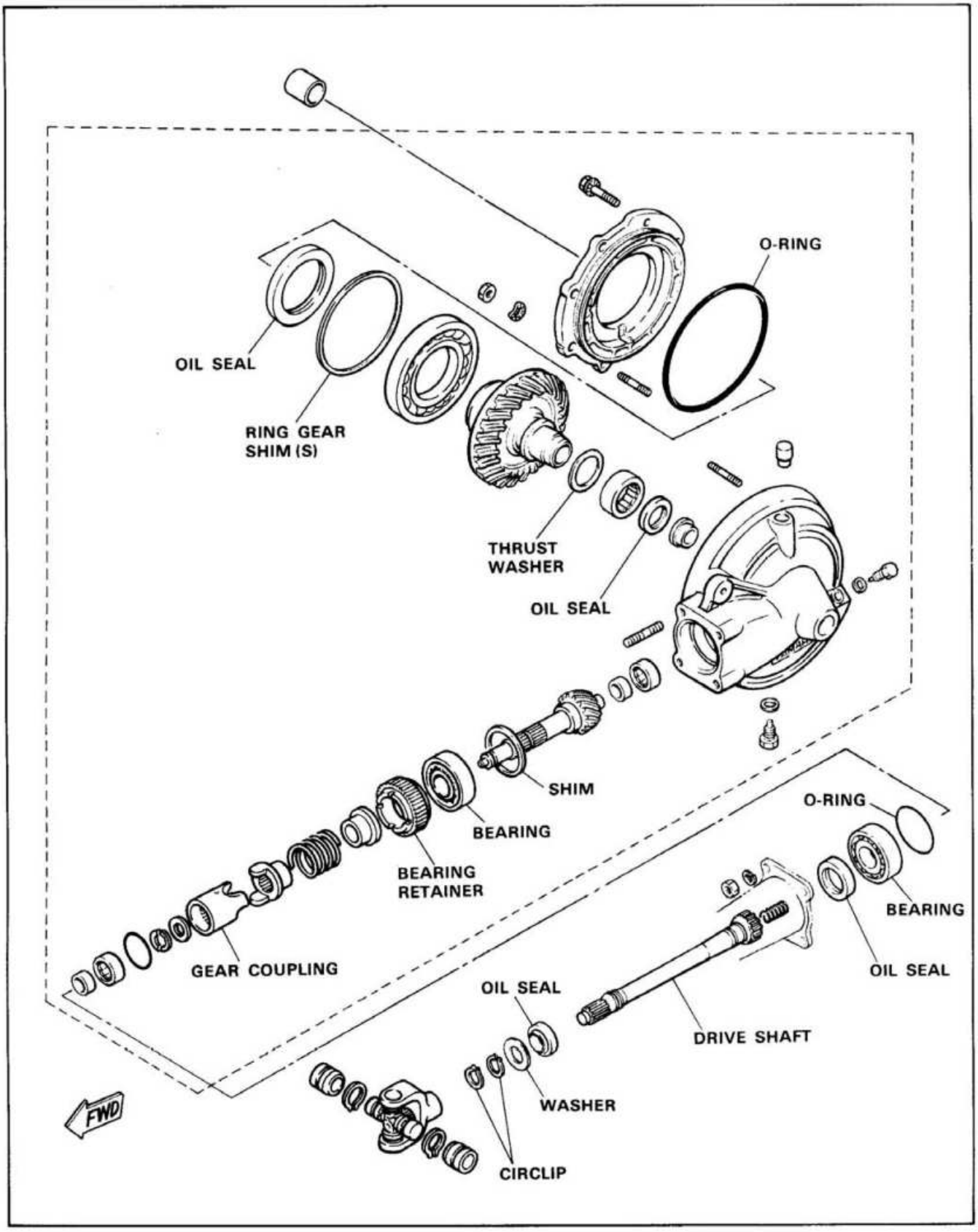
1. Remove the phillips head screws from the throttle housing assembly and separate the two halves of housing.
2. Disconnect the cable end from the throttle grip assembly, and remove the grip assembly.
3. Wash all parts in a mild solvent, and check all contact surfaces for burrs or other damage. (Also clean and inspect the right-hand end of the handlebar.)
4. Lubricate all contact surfaces with a light coat of lithium-base grease and reassemble.

NOTE:

Tighten the housing screws evenly to maintain an even gap between the two halves.

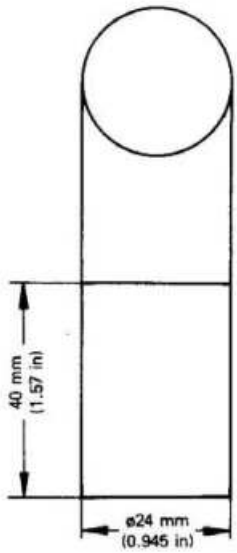
5. Check for smooth throttle operation and quick spring return. Make certain that the housing does not rotate on the handlebar.

SHAFT DRIVE

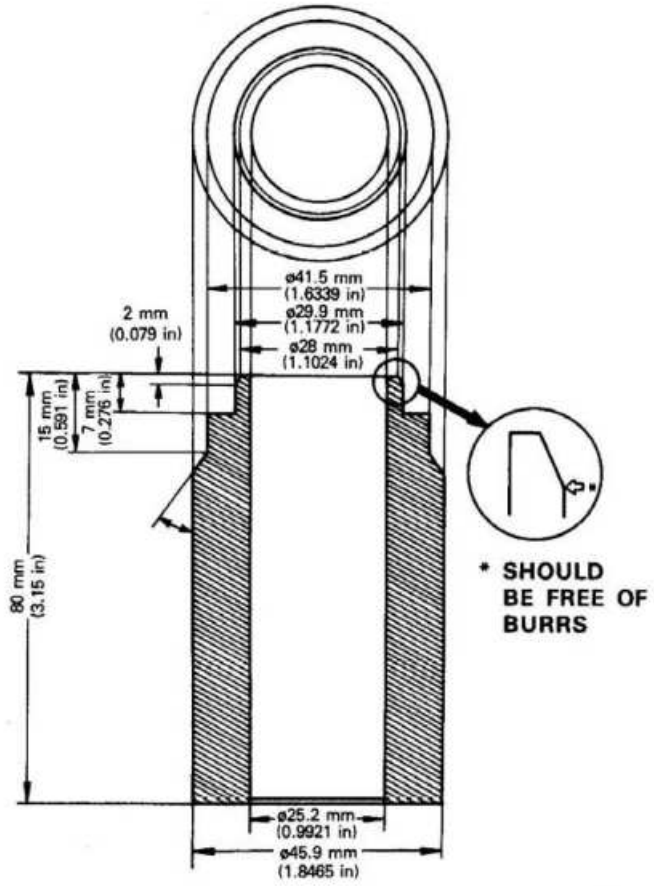

O-RING
OIL SEAL
RING GEAR
SHIM (S)
THRUST
WASHER
OIL SEAL
SHIM
BEARING
BEARING
RETAINER
GEAR COUPLING
O-RING
BEARING
OIL SEAL
OIL SEAL
DRIVE SHAFT
WASHER
CIRCLIP
FWD

The following special tools are not available but can be constructed for the final gear disassembly and assembly:

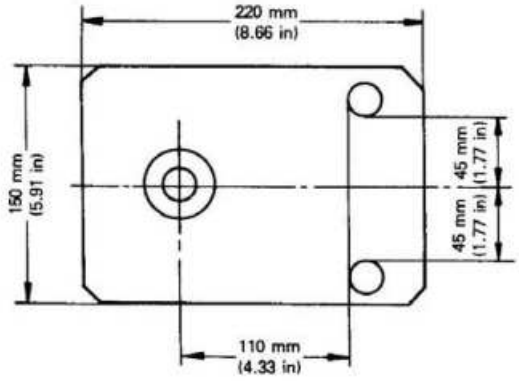
PRESS TOOL NO. 1

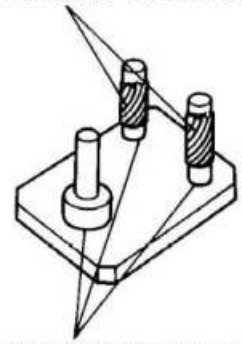


PRESS TOOL NO. 2



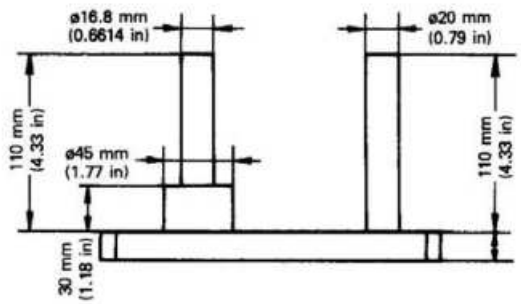
GEAR CASE HOLDING TOOL





TAPE VINYL TUBES TO
PREVENT HOUSING DAMAGE

WELDED OR SCREW SECURED



Troubleshooting

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible damaged areas
1. A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A "rolling rumble" noticeable at low speed; a high-pitched whine; a "clunk" from a shaft drive component or area.	A. Damage to bearings. B. Improper gear lash. C. Gear tooth damage. D. Cam damper damage.
3. A locked-up condition of the shaft drive mechanism; no power transmitted from engine to rear wheel.	E. Broken drive-shaft. F. Broken gear teeth. G. Seizure due to lack of lubrication. H. Small foreign object lodged between moving parts.

NOTE:

Damage areas A, B, C, and D 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. During coasting, accelerating, or decelerating, the "rolling rumble" will increase with rear wheel speed, not engine or transmission gear speeds. However, such noise may also be due to damaged wheel bearings.
2. Noise that varies with acceleration and deceleration: following incorrect reassembly, a condition of too-little gear lash may produce a whine during deceleration.

CAUTION:

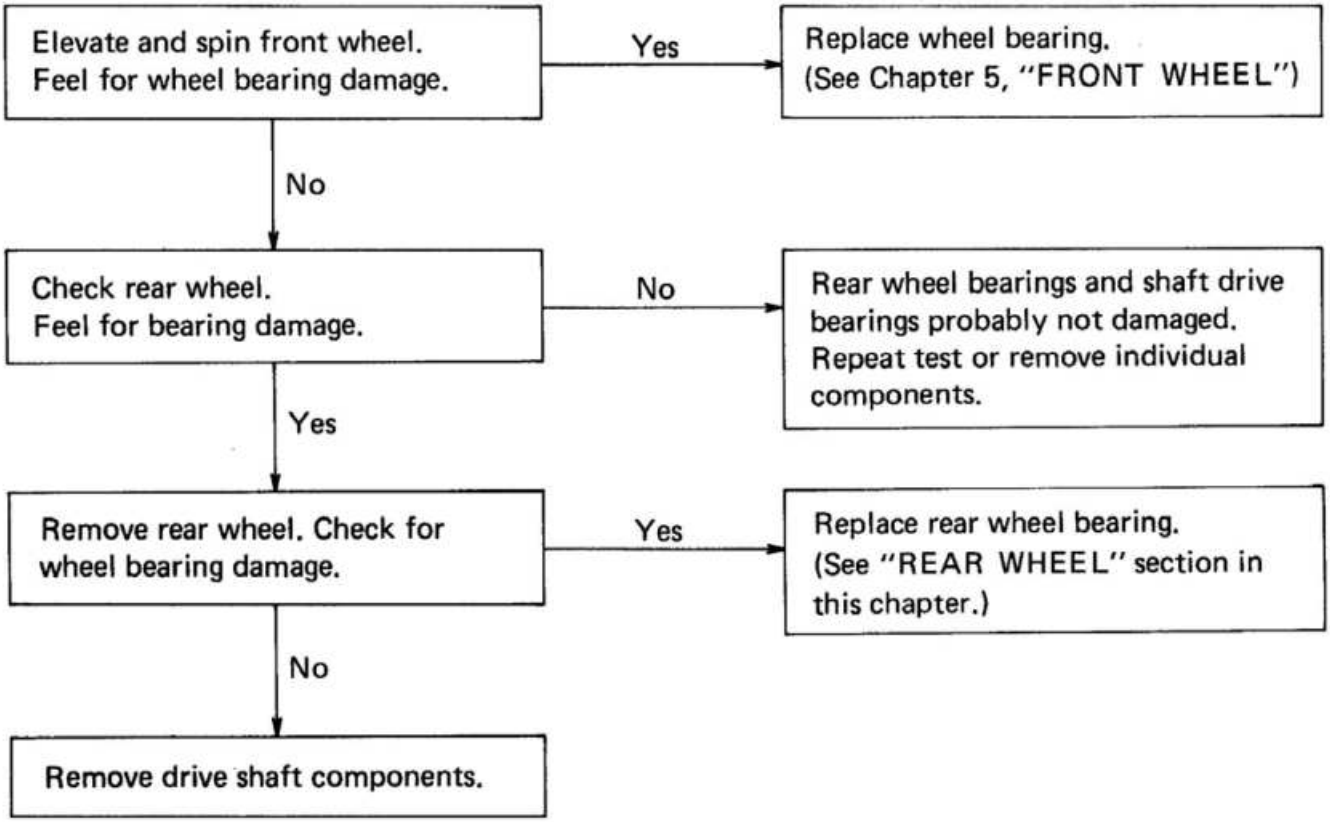
Too-little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize damage to the gears.

3. A slight "thunk" must be distinguished from normal motorcycle operation. It will be most noticeable at low speed and could indicate broken gear teeth.

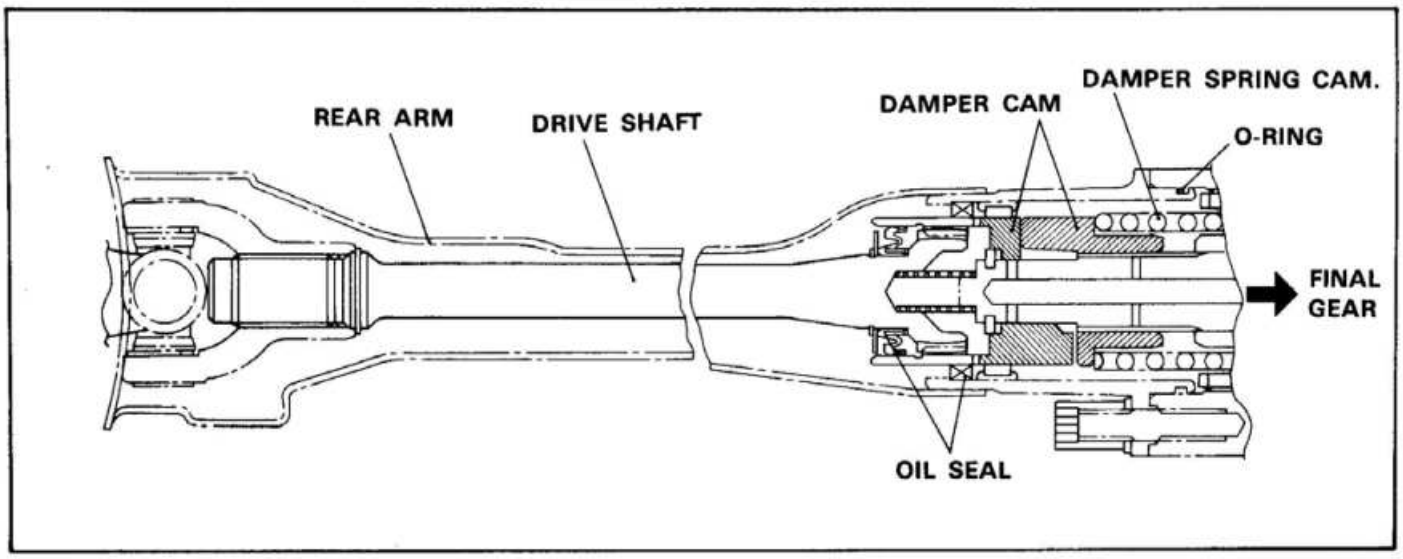
WARNING:

If broken gear teeth are suspected, stop riding immediately. This condition could lead to locking-up of the shaft drive assembly and result in harm to a rider.

4. Troubleshooting chart
   Where basic conditions "1" and "2" above exist, consider the following chart:



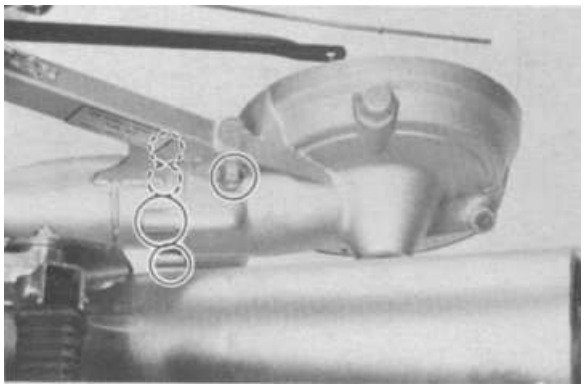
5. Oil leak inspection
   If a shaft drive component is suspected of leaking oil, first thoroughly clean the entire motorcycle. The apparent location of an oil leak on a dusty motorcycle may be misleading. Dry the motorcycle and apply a leak-localizing compound or a dry-powder spray that will limit the flow of any leaking oil. Operate the motorcycle prepared in this way for the distance necessary to locate precisely the leak. There is the possibility that a component housing may have been damaged by road debris or an accident, or a gasket or a seal may be cracked or broken. However, on a new or nearly new motorcycle, an apparent oil leak may be the result of a rust-preventive coating or excessive assembly lubrication of the seals. Always clean the motorcycle and recheck the suspected location of any apparent leakage.



6. Checking drained oil
   Whenever a problem is suspected in either the middle or final gear assemblies, drain and inspect the oil. Metal particles on the drain plug or in the oil could indicate a bearing seizure or other problem. However, a small amount of metal particles in the oil is normal.

Final gear removal

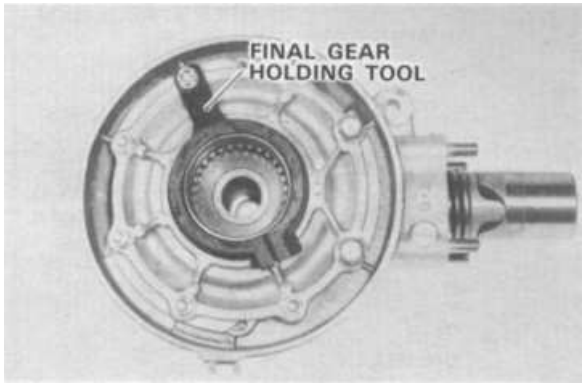
1. Remove the rear axle and the rear wheel (see "REAR WHEEL" section in this Chapter).
2. Remove the four nuts and one bolt holding the final drive unit to the swing arm.



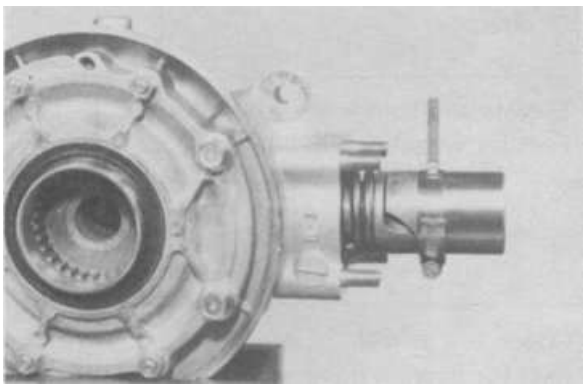
3. Remove the final gear assembly.

Gear lash check and adjustment

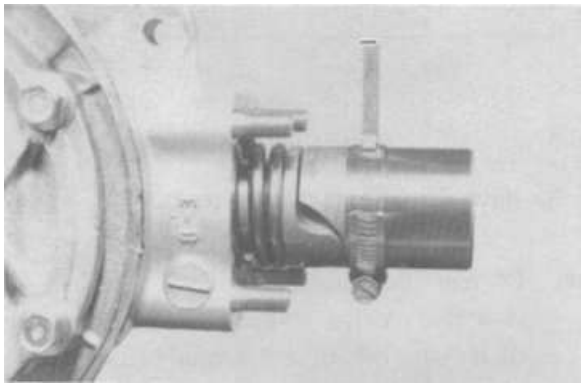
4. Secure the gear case in a vise or other support.
5. Remove one nut from the final gear case stud. Install the final gear holding tool over the ring gear surface and stud. Tighten the holder to the stud with a nut.



6. Install the final gear lash measurement tool on the gear coupling.

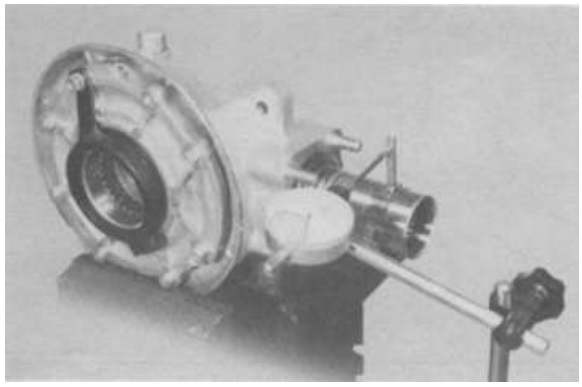


7. Mount a dial gauge against the lash measurement tool at the scribed mark (60mm [2.36 in] from the center of the shaft).



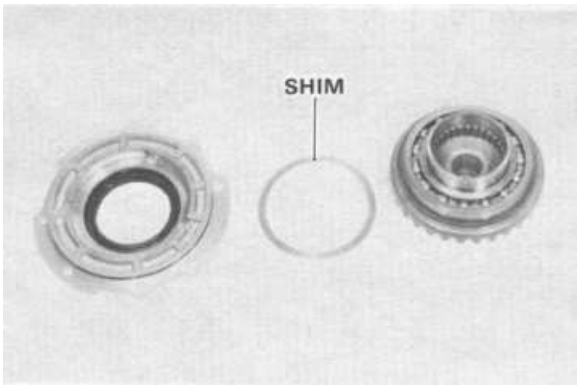
8. Gently rotate the gear coupling back and forth. Note the lash measurement on the dial gauge.

Final gear lash:
0.25 ~ 0.50mm (0.010 ~ 0.020 in):
When using the measurement tool.
0.1. ~ 0.2mm (0.004 ~ 0.008 in):
Actual gear lash on the final gear teeth.



6. If the gear lash exceeds the specified limits, adjust as follows:

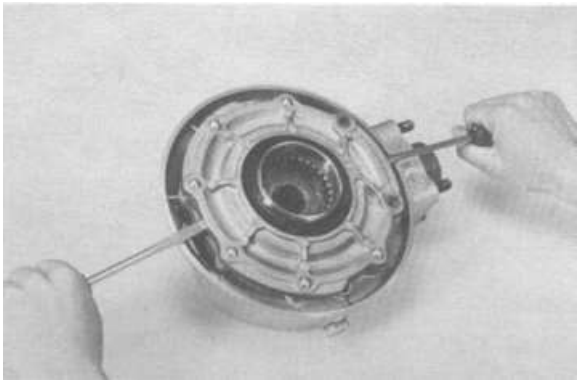
- To reduce gear lash, increase the ring gear shim.
- To increase gear lash, reduce the ring gear shim.



- If it is necessary to increase the ring gear shim by more than 0.1mm (0.004 in), reduce the thrust washer thickness by 0.1mm (0.004 in) for each 0.1mm (0.004 in) of ring-gear-shim increase. If it is necessary to reduce the shim by more than 0.1mm (0.004 in), reverse the above procedure.

Final gear disassembly

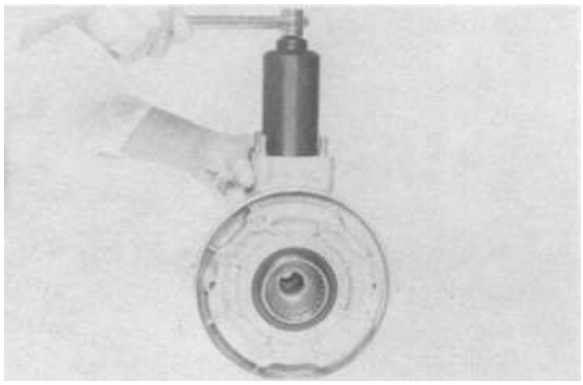
1. Remove the nuts and bolts holding the bearing housing.
2. Remove the ring gear assembly and thrust washer from the final gear case.



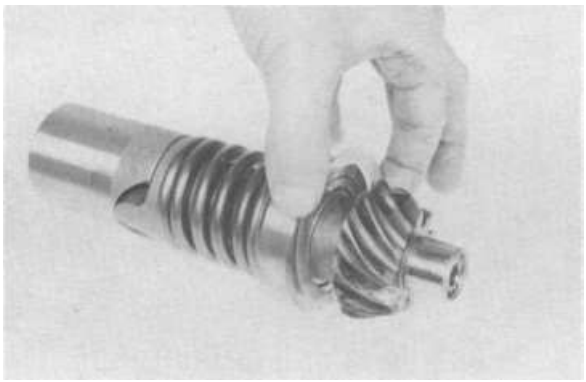
3. Remove the final-drive-shaft-bearing retainer with the final-drive-shaft-bearing-retainer wrench.

CAUTION:

The final-drive-shaft-bearing-retainer nut has left-hand threads. Turn the retainer nut clockwise to loosen it.



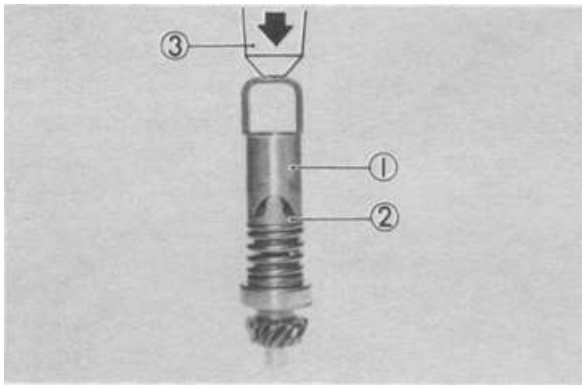
4. Remove final drive shaft assembly from the final gear case.



CAUTION:

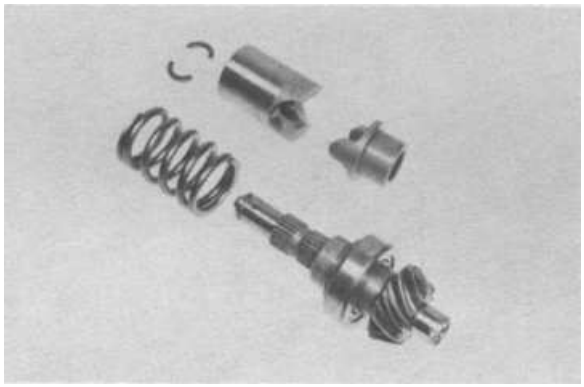
Final drive shaft removal should be performed only if the gearing or damper cam replacement is necessary. Do not reuse the bearings or races after removal.

5. Place the final drive shaft in a hydraulic press with the damper compressor in place as shown in the photograph.

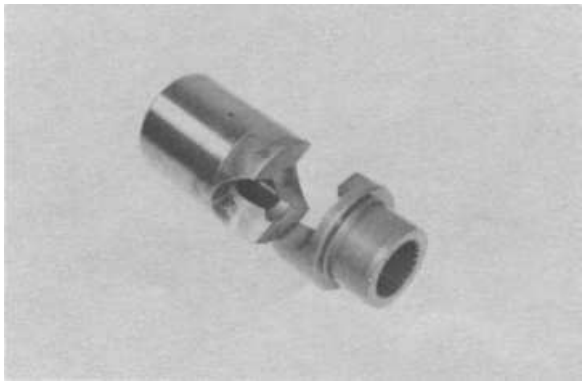


1. Damper compressor 2. Cam damper
3. Hydraulic press

6. Press the damper cam, and remove the spring retainers.
7. Remove the retainer washer, spring, spring seat, and the damper cams from the drive shaft.

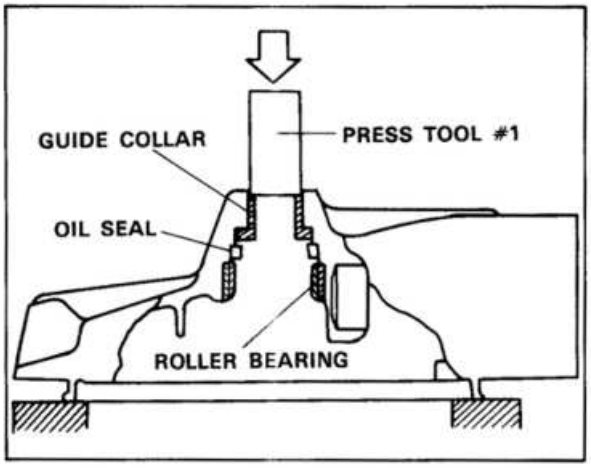


8. Inspect the damper cam surfaces. Check for smooth cam action and excessive wear on the cam surface. If cam surface is severely worn, replace damper assembly.

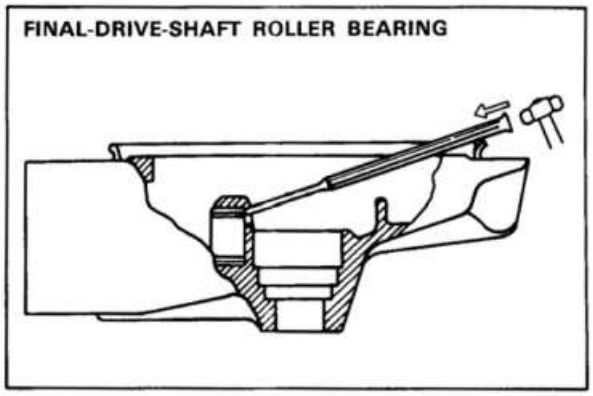


9. Inspect the damper springs for fatigue, wear, and damage. Replace as necessary.

10. Remove the guide collar, oil seal, and roller bearing from the main housing by using the press tool No. 1 and a press. Use the appropriate supports for the main housing during this operation. The roller bearing may be reused if undamaged. Do not reuse the oil seal.



11. Final-drive-shaft roller bearing; removal of this bearing is difficult and seldom necessary. Heat the bare housing to 150°C (302°F). Use an appropriately-shaped punch to remove the roller bearing outer race. Remove the inner race from the final drive shaft.

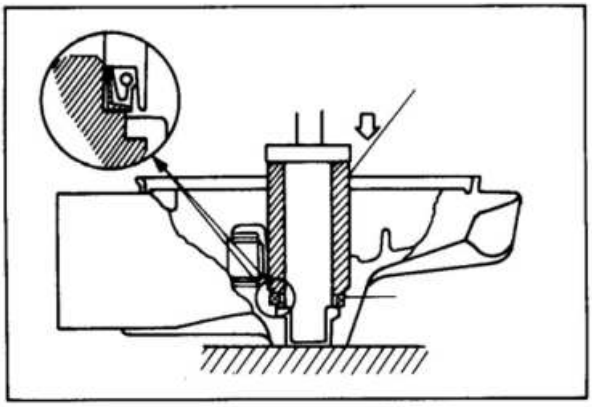


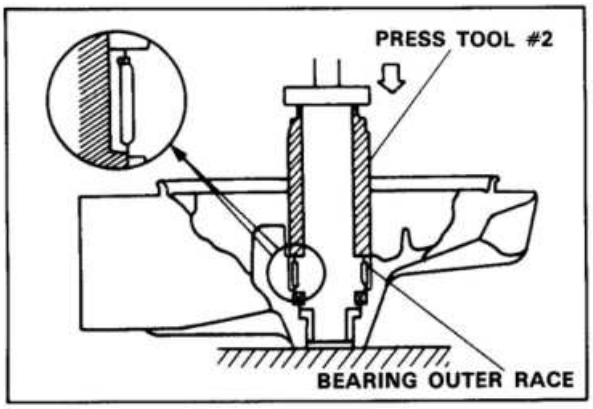
Final gear assembly

1. Install the new rear final drive shaft roller bearing. Heat the bearing housing to 150°C (302°F) and use an appropriate adapter to install the roller bearing outer race. Install the inner race onto the final drive shaft.
2. Using the press tool No. 2 and a press, install the guide collar, new oil seal, and roller bearing into the main housing in that order.

NOTE:

The removed roller bearing can be used if undamaged; however, we recommend replacement with a new one.



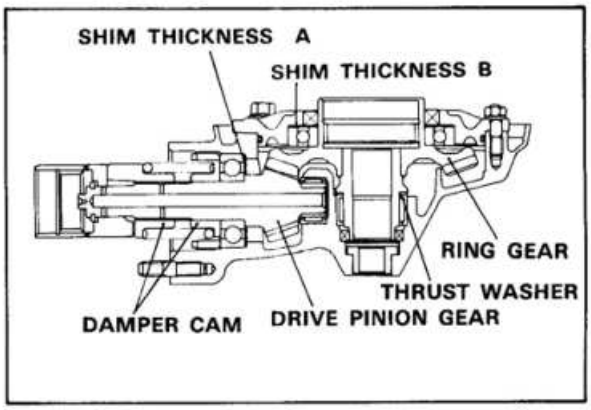


3. Install the ball bearing onto the final drive shaft.
4. Install the spring seat, spring damper cams, and retainer washer onto the final drive shaft.
5. Place the final drive shaft on a hydraulic press with the damper compressor.
6. Slowly press the damper cam and install the spring retainer.
7. Final drive/ring gear positioning.

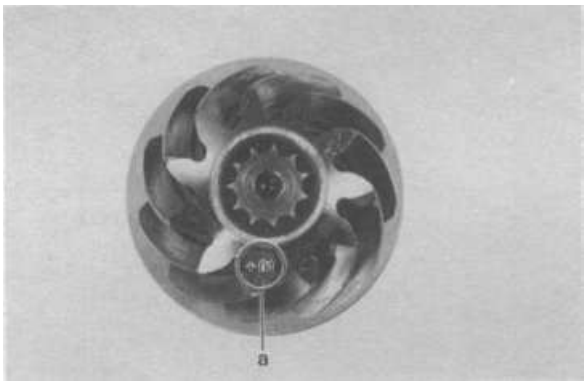
NOTE:

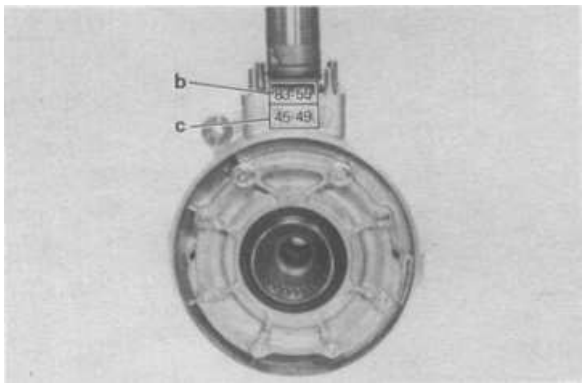
When any of the following parts are replaced, gear positioning is necessary:

- Final gear case
- Ring gear bearing housing
- Bearing(s)



a) The shim thickness, A, necessary for the final-drive-shaft gear positioning, can be calculated from the information found on the final gear case and on the drive gear end.





To find shim thickness, A,use the following formula:

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:
If the final-drive-shaft gear is marked "+01"....."a" is 84.01. If the gear case is marked "83.50" "b" is 83.50.

A =84.01 -83.50
A = 0.51 (0.020 in)

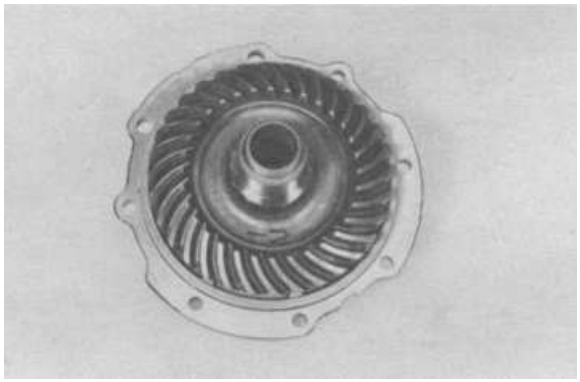
Then the necessary shim thickness is 0.51mm (0.020 in).
Shim sizes are supplied in the following thicknesses:
0.15mm (0.006 in), 0.30mm, (0.012 in), 0.40mm, (0.016 in), 0.50mm (0.020 in), 0.60mm (0.024 in)

Because the shims can only be selected in 0.05mm (0.002 in) increments, round off the hundredths digit and select the 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 thicknesss is 0.51mm (0.0201 in). The chart instructs you, however, to round off the 1 to 0. Thus you should use a 0.50mm (0.0197 in) shim,

b) The shim thickness, B, necessary for the ring gear positioning, can be calculated from the information found on the final gear case, ring gear, and bearing.



To find shim thickness, B, use the following formula:

B = c + d-(e + f)

Where:

c = the numeral on the gear case (i.e. 45.52)
d = a numeral (usually a decimal number) on the outside of the ring gear bearing housing and added to 3.
e = a numeral (usually a decimal number) on the inside of the ring gear either added to or subtracted from 35.40.
f = a bearing thickness (considered constant).

Bearing thickness f = 13.00mm (0.512 in)

Example:

- If the gear case is marked 45.52 ,,, c is 45.52.
- If the ring gear bearing housing is marked 35.....d is 0.35 + 3 = 3.35.
- If the ring gear is marked +01.....e is 35.40+ 0.01 =35.41.
- f is 13.00.
  B = c + d- (e + f)
  B = 45.52 + 3.35 - (35.41 + 13.00)
  B = 48.87-(48.41)
  B = 0.46
  Then the necessary shim thickness is 0.46mm (0.018 in).

NOTE:

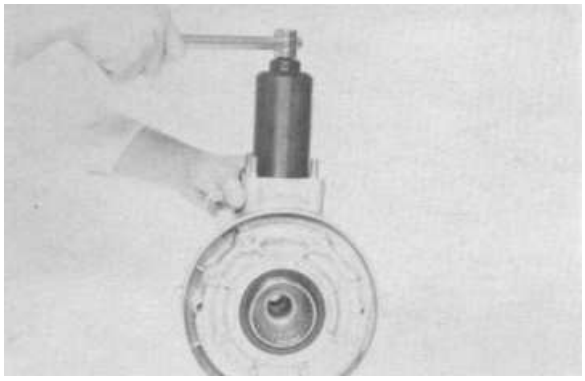
Use the chart for the final drive shaft shim to select the ring gear shim size.

4. Install the final drive shaft gear with the proper size shim(s), and secure it with the bearing retainer nut. Use the final-drive-shaft-bearing-retainer wrench.

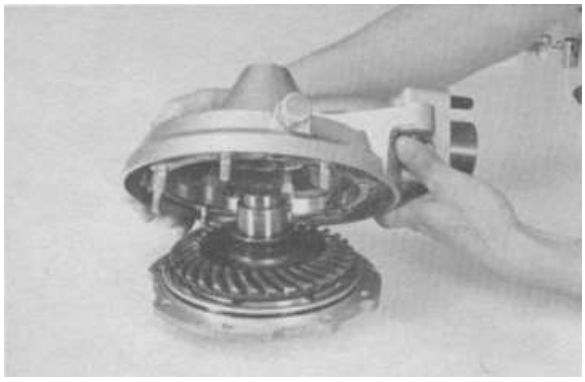
NOTE:

The bearing retainer nut has left-hand threads; turn the nut counterclockwise to tighten it.

Tightening torque:
110 Nm (11 m-kg, 80 ft -lb)



5. Install the ring gear assembly without the thrust washer. Adjust the gear lash (refer to "GEAR LASH CHECK AND ADJUSTMENT").
6. Place four pieces of Plastigage between the originally fitted thrust washer and the ring gear.
7. Install the gear case onto the ring gear assembly, and tighten the nuts and bolts with the specified torque.



Tightening torque:
Bolt/Nut: 23 Nm (2.3 m-kg, 16.6 ft-lb)

NOTE:

Do not turn the drive pinion/ring gear when measuring clearance with Plastigage®.

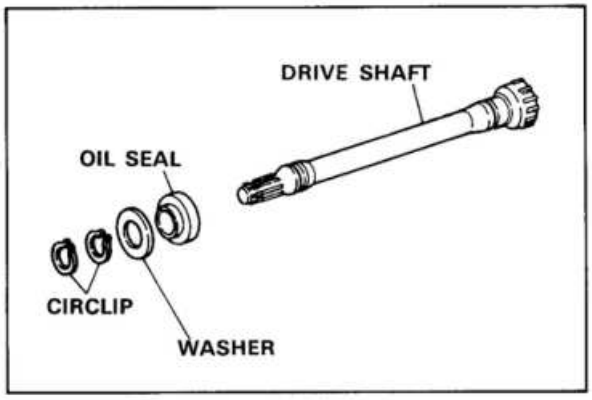
8. Remove the ring gear assembly and determine the clearance by measuring the width of the flattened Plastigage®.



Ring gear thrust clearance:
0.1 ~ 0.2mm (0.004 ~ 0.008 in)

9. If the clearance exceeds the specified value, replace the thrust washer to obtain the proper clearance.

DRIVE SHAFT



Removal

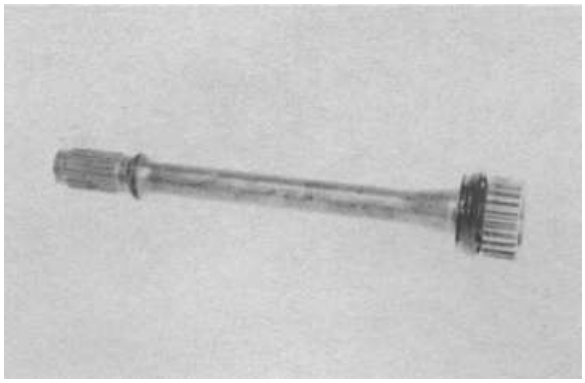
1. Remove the rear wheel. See "REAR WHEEL" in this chapter.
2. Remove the final gear case assembly.
3. Remove the drive shaft. See "SWING-ARM" in this chapter.

Inspection

1. Drive shaft
   Inspect the shaft splines for wear and/or damage. If wear is excessive, replace the drive shaft.

NOTE:

When installing the drive shaft, lubricate the splines with molybdenum disulfide grease.



Installation

When installing the drive shaft, reverse the removal procedure. Note the following points:

- Lubricate the shaft splines with moly-bdenum disulfide grease.
- Torque the final gear case nuts and bolts to specification.

Tightening torque:
Bolts/Nuts: 42 Mm (4.2 m-kg, 18 ft-lb)

CHAPTER 6. COOLING SYSTEM

COOLING SYSTEM…… 147

HANDLING NOTES…… 148

COOLANT REPLACEMENT…… 148

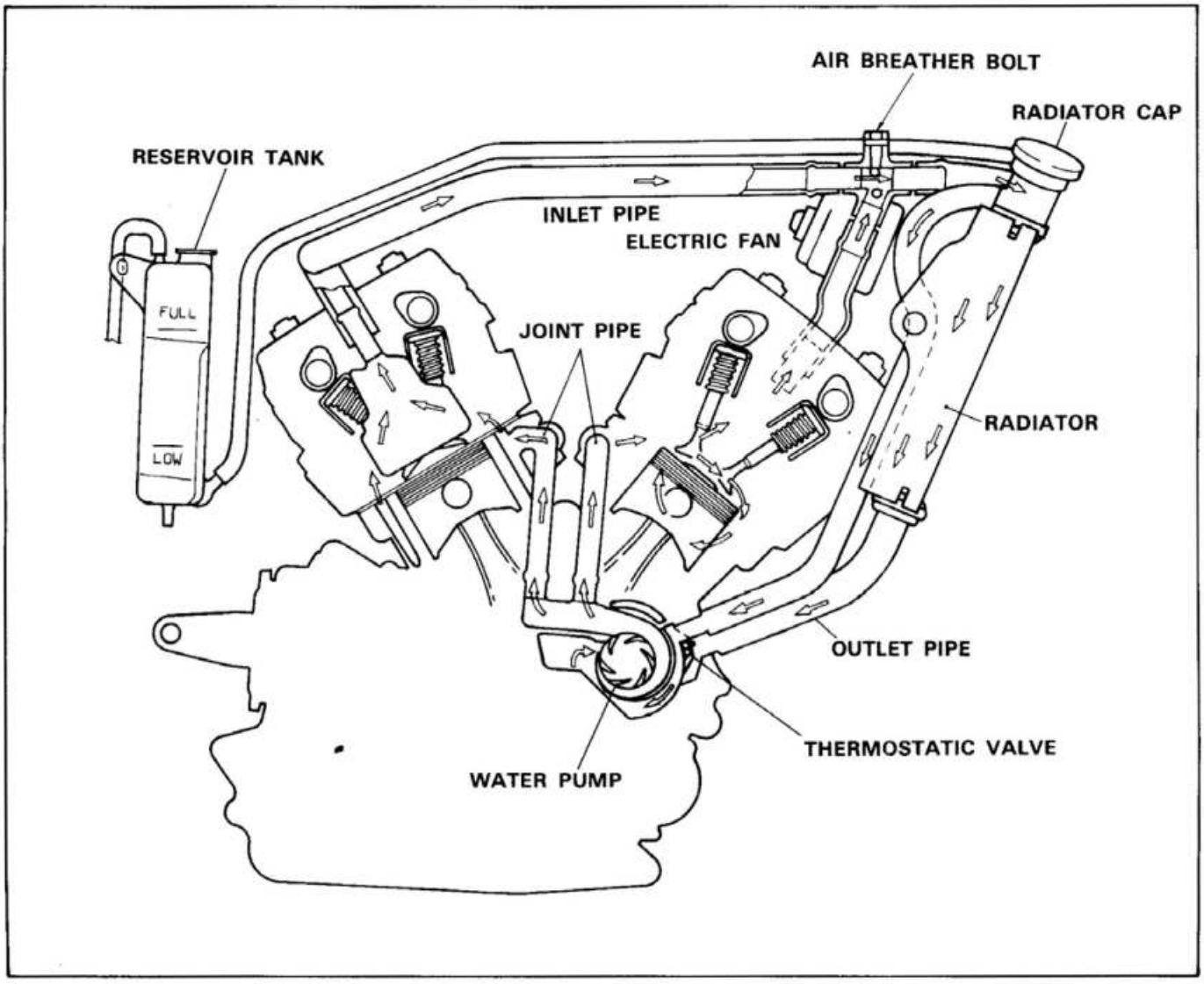
RADIATOR…… 150
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THERMOSTATIC VALVE…… 154
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COOLING SYSTEM

The coolant is circulated by an impeller-type pump mounted on the right-hand crankcase and driven by a gear. The coolant is drawn by the pump from the bottom tank of the radiator, through the outlet pipe, and discharged into the cylinder and cylinder head through the joint pipe. The coolant passes from the cylinder to the cylinder head through coolantways, and after circulating around combustion chamber jacketing, enters the radiator upper tank via the inlet pipe. The heated coolant from the engine then passes down through the finned tubes to the bottom tank of the radiator. These finned tubes present a large surface area to the air and dissipate the heat.



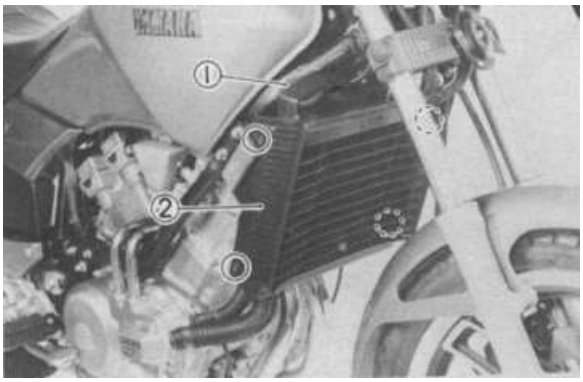
HANDLING NOTES

WARNING:

Do not remove the radiator cap, especially when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause a serious injury.
To open the radiator cap, remove the radiator cover by removing the four screws. When the engine has cooled, 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.

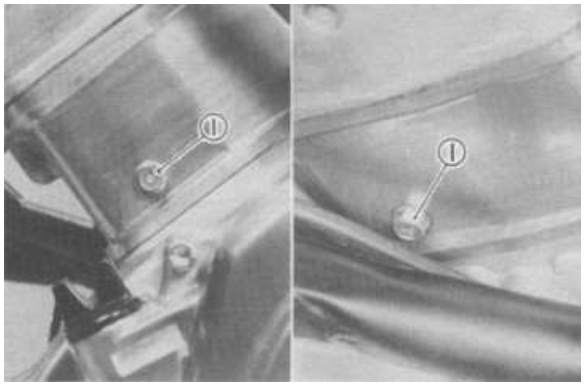
COOLANT REPLACEMENT

1. Draining the coolant,
   a) ENGINE
      1) Place an open container under the engine.
      2) Remove the radiator cover and radiator cap.

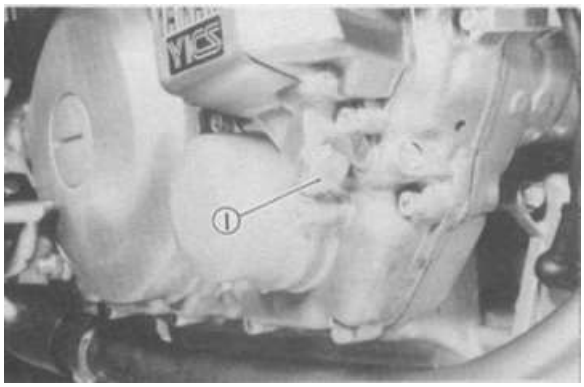


1. Radiator cap 2. Radiator cover

      3) Remove the drain bolts (two) from each cylinder and the bottom of the water pump cover. Drain the coolant.



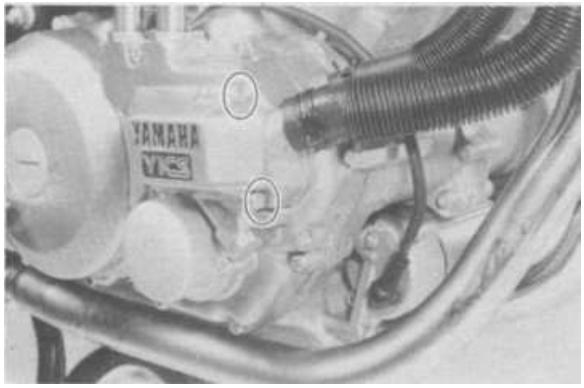
1. Drain bolt



1. Drain bolt

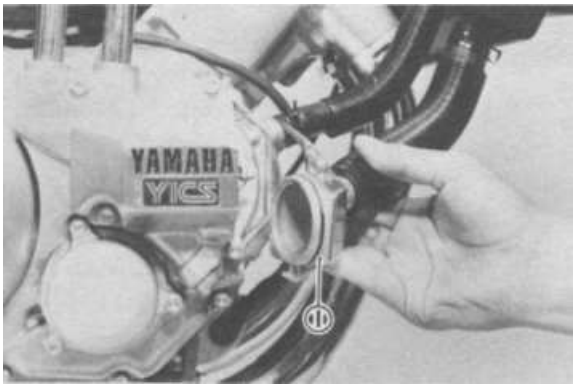
HANDLING NOTES

   b) RADIATOR
   The coolant in the radiator cannot be drained from the water pump cover drain hole. To drain the radiator, proceed as follows:
      1) Remove the screws (two) securing the thermostatic valve cover and remove the cover. The coolant will rush out.



      2) Thoroughly flush the cooling system with clean tap water.

2. Filling with the coolant.
   1) Check the drain bolt gaskets and 0-ring in the thermostatic valve cover for damage. If damaged, replace as necessary.



1. O-ring

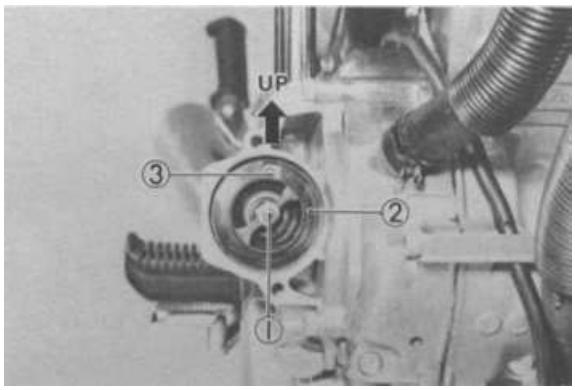
   2) Install the drain bolts with the gakset and torque the bolt to specification.

Tightening torque:
Drain bolt — cylinder:
7 Nm (0.7 m-kg, 5.1 ft-lb)
Drain bolt — Water pump cover:
10 Nm (1.0 m-kg, 7.2 ft-lb)

   3) Lightly apply grease to the 0-ring, and install the thermostatic valve cover.

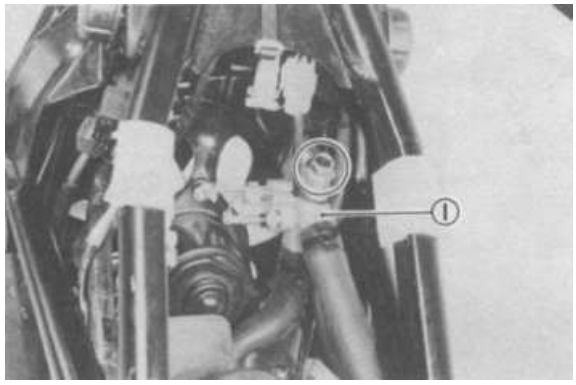
CAUTION:

Check the thermostatic valve and rubber gasket position before installing the thermostatic valve cover.



1. Thermostatic valve 2. Rubber gasket 3. Breather

   4) Remove the sidecovers and fuel tank.
   5) Remove the air breather bolt from the T-joint as shown.



1. T-joint

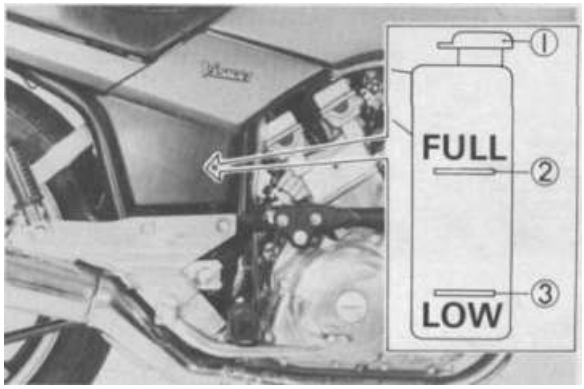
   6) Pour the recommended coolant, and soft water into the radiator until the radiator is full.

Recommended coolant:
High-quality ethylene glycol anti-freeze containing anti-corrosion inhibitors for aluminum engines.
Coolant and soft water mix ratio:
50%/50%
Total amount:
2.3 L (2.0 Imp qt, 2.4 US qt)
Reservoir tank capacity:
0.35 L (0.3 Imp qt, 0.4 US qt)
From LOW to FULL level:
0.25 L (0.2 Imp qt, 0.3 US qt)

CAUTION:

Hard water or salt water is harmful to the engine parts. You may use boiled water or distilled water, if no soft water is available.

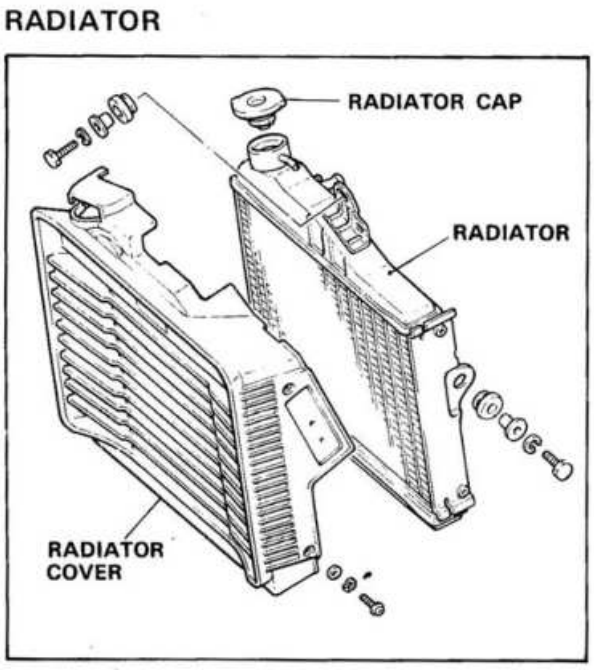
   7) Reinstall the air breather bolt, radiator cap, sidecovers, and fuel tank.
   8) Run the engine several minutes to recheck the coolant level in the radiator. If it is low, add more coolant until it reaches the top of the radiator.
   9) Fill the reservoir tank with coolant up to the "FULL" level.



1. Coolant reservoir tank cap 2. Full level 3. Low level

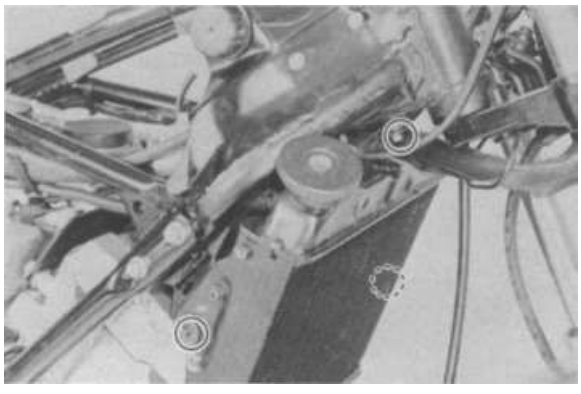
10) Reinstall the radiator cover and check for coolant leakage.

RADIATOR



Removal

1. Remove the radiator cover.
2. Drain off the coolant.
3. Remove the radiator mounting bolts.

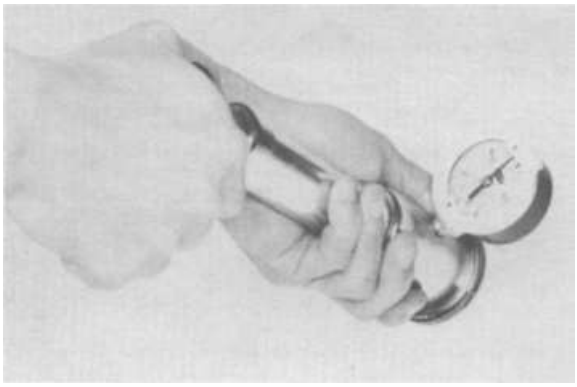


4. Remove the coolant pipes
5. Remove the radiator.

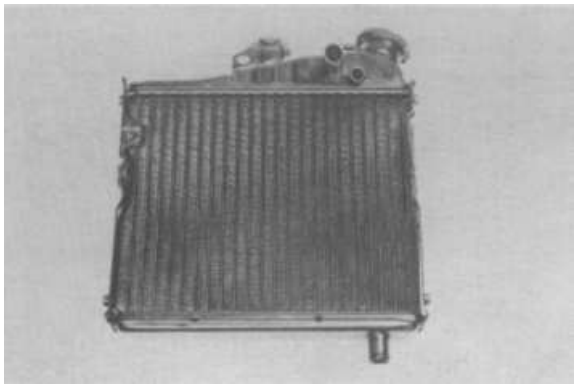
Inspection

1. Using the cap radiator tester, check that the radiator cap vacuum valve and pressure valve operate correctly. Measuring with a tester, apply the specified pressure for 10 seconds, and make sure there is no pressure drop.

Valve opening pressure:
88 kPa (0.9 kg/cm^2, 13psi)



2. Check the radiator core for clogged or flattened fins. If more than 20% of the radiator core area is flattened, repair or replace the radiator core. If the radiator is clogged with-dirtordust, clean it by blowing it from its rear (engine side) with compressed air.



3. Check the coolant hoses for cracks or damage. Replace as required.

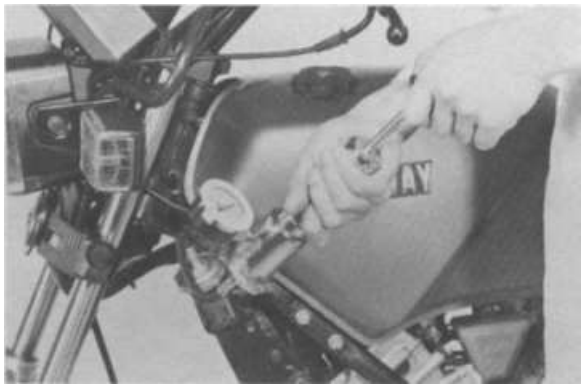
Installation

1. Install the radiator and coolant pipes. Torque the radiator mounting bolts to specification.

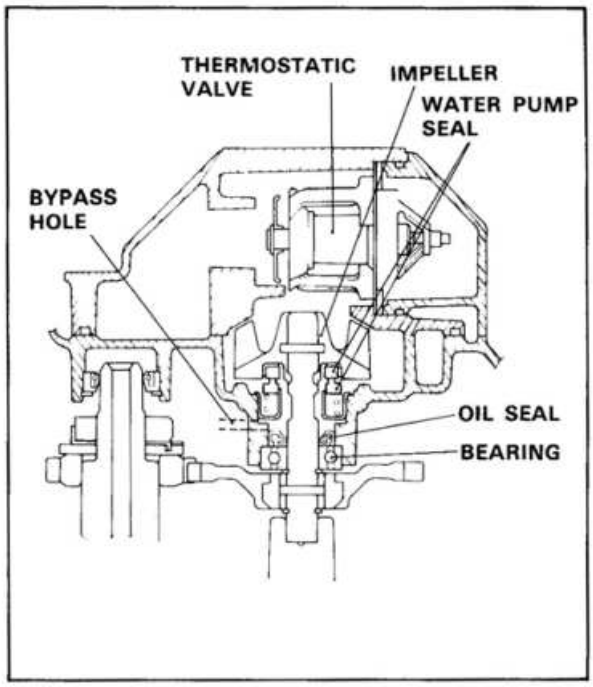
Tightening torque: 7 Nm (0.7 m-kg, 5.1 ft-lb)

2. Fill with the coolant.
3. Inspect the cooling system for leaks. Attach the cap tester to the radiator and pump it to the specified pressure. If the pressure gauge drops, inspect all pipes fittings and radiator for leaks. If leakage is found, repair or replace defective parts.

Pressure: 98 kPa (1.0 kg/cm^2, 14 psi);



WATER PUMP

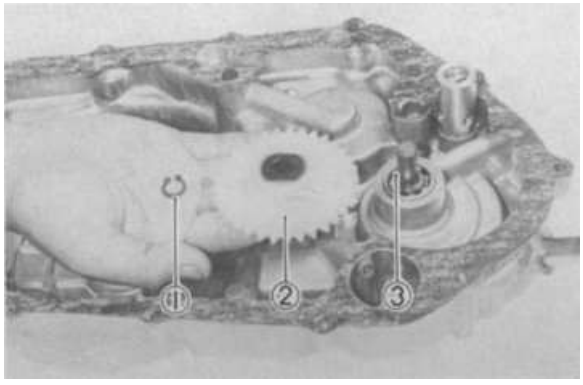


Disassembly

NOTE:

It is unnecessary to disassemble the water pump, except when there is excessive change in coolant temperature and/or the coolant comes out of the small hole in the right crankcase cover.

1. Drain off the coolant completely.
2. Drain off the engine oil.
3. Disconnect the outlet pipe and bypass pipe.
4. Remove the water pump cover together with joint pipes.
5. Remove the right-side crankcase cover.
6. Remove the circlip, water pump driven gear, and gear stopper pin from the impeller shaft.

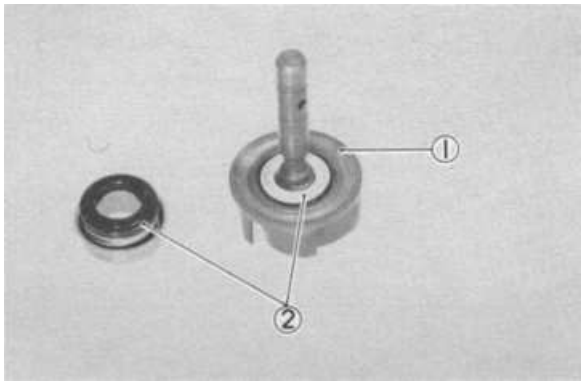


1. Circlip 2. Water pump driven gear 3. gear stopper pin

7. Remove the impeller shaft from the crankcase cover.

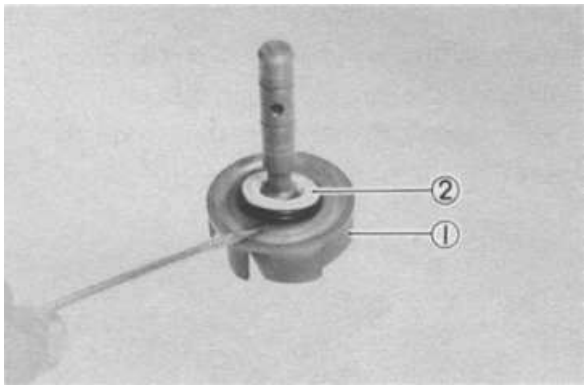
Inspection

1. Remove the deposits from the impeller and water pump housing.
2. Check the impeller for cracks, wear, or damage. Replace if necessary.
3. Check the water pump seal set for wear and damage. If damaged or worn, it should be replaced.



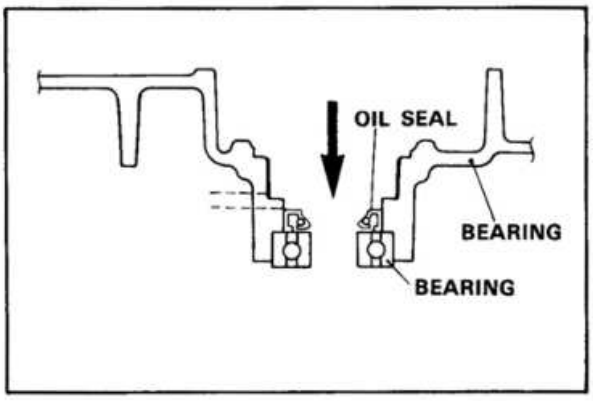
1. Impeller 2. Water pump seal

4. Check the oil seal and bearing for damage and wear. If damaged or worn excessively, it is advisable to replace the oil seal, water pump seal set, and bearing as a set.
5. Check the O-rings for damage. Replace if necessary.
6. Replace the bearing, oil seal, and water pump seal set in the following manner:
   a) Remove the water pump seal #2 from the case by tapping the seal body.

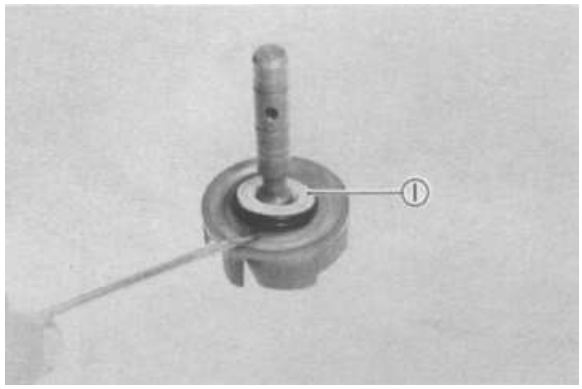


1. Impeller 2. Water pump seal #1

   b) Remove the bearing and oil seal from the case by taping them away from the water pump seal side.

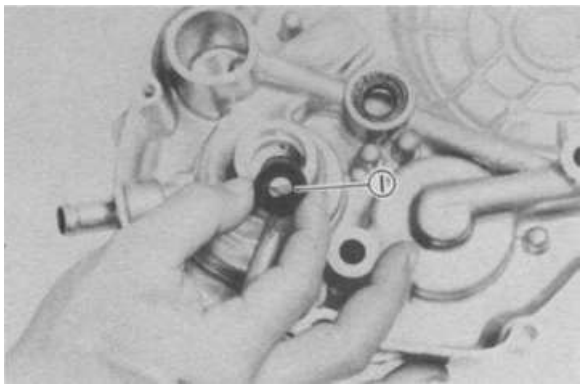


   c) Remove the water pump seal #1 from the impeller by carefully prying out seal with a small screwdriver.

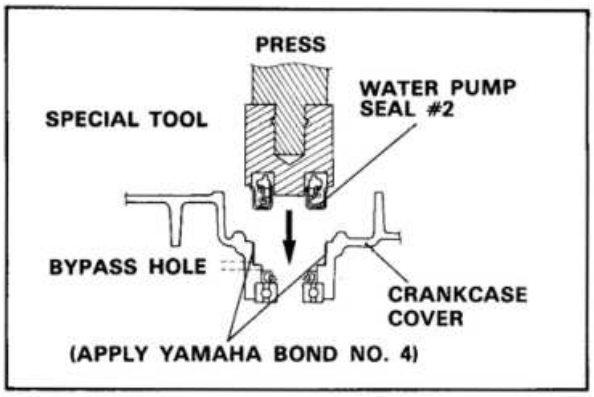


Assembly

1. Apply grease to oil seal lip. Install the oil seal into the crankcase cover.



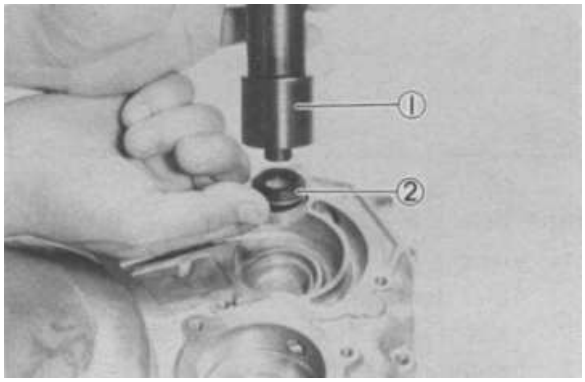
1. Oil seal



NOTE:

Install the oil seal, with the manufacturer's marks or numbers facing inward. Take care so that the oil seal lip is not damaged or the spring does not slip off its position.

2. Install the bearing into the crankcase cover.
3. Apply Yamaha Bond #4 to the pump seal #2 body. Install the pump seal #2 into the crankcase cover. Use the water pump seal installer with a hydraulic press.

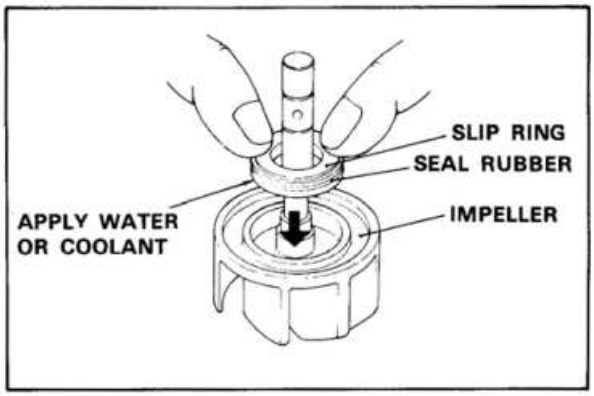


1. Water pump seal installer 2. Water pump seal (#2)

4. Install the water pump seal (#1) into the impeller.

NOTE:

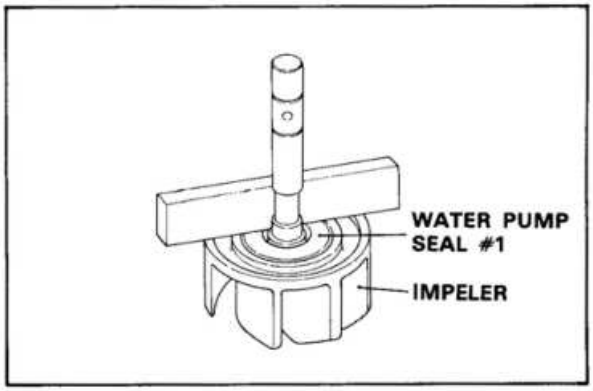
When fitting water pump seal #1 to the impeller, apply water or coolant to the outer surface of the damper rubber and impeller hub. Put the seal and damper rubber together, and fit them to the impeller hub.



CAUTION:

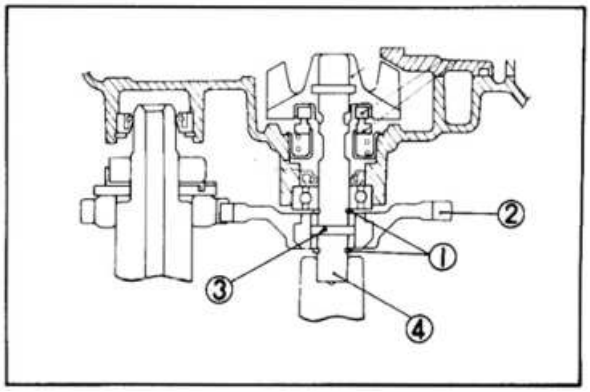
Never apply oil or grease to water pump seal surfaces.

5. After installing water pump seal #1, make sure it fits squarely.



Tilt Limit:
0.15mm (0.006 in)

6. Install the impeller shaft into the crank-case cover. Lightly apply grease to the impeller shaft.
7. Install the gear stopper pin, driven gear and circlip into the impeller shaft as illustrated.

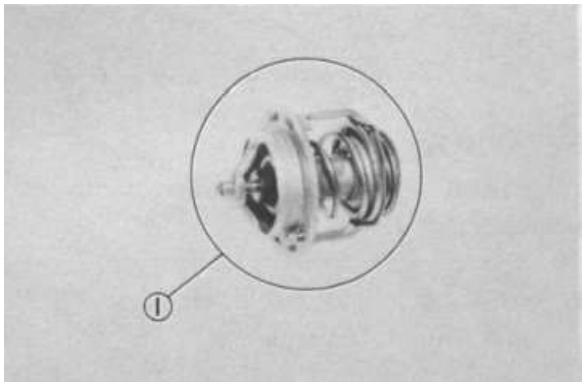


1. Circlip 2. Water pump driven gear
3. Stopper Pin 4. Impeller shaft

CATION:

Take special care so that water pump seals #1 and #2 are not scratched when installing them. Replace any scratched seal.

THERMOSTATIC VALVE

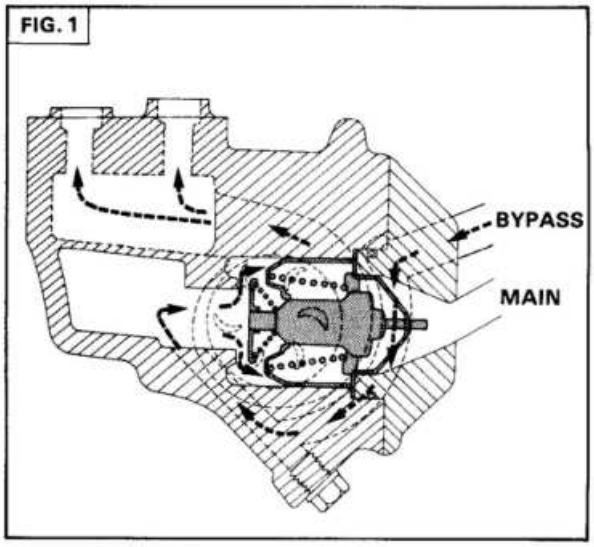


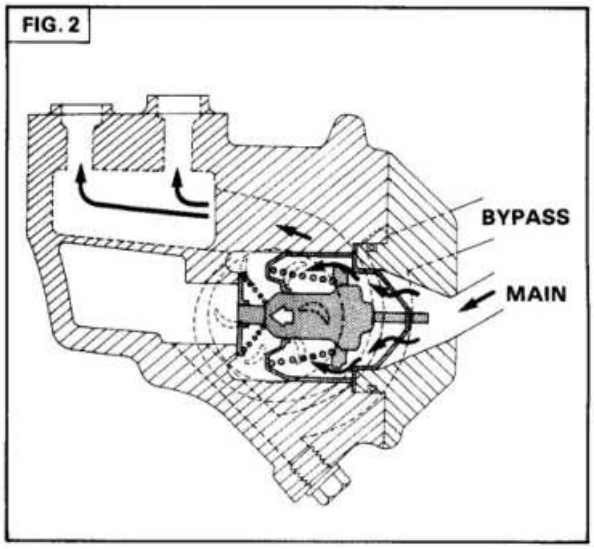
1. Thermostatic valve

Operation

The thermostatic valve is installed in the water pump cover and automatically opens and closes the cooling circuit to regulate the coolant flow depending on the engine temperature. When the engine is cool, the thermostatic valve main valve is closed, but the bypass valve is open. Therefore, the coolant does not flow into the radiator but flows through the bypass hose. Further, it flows through the bypass valve into the water pump, by which the coolant is pumped to the engine cylinder water jackets. (Fig. 1)

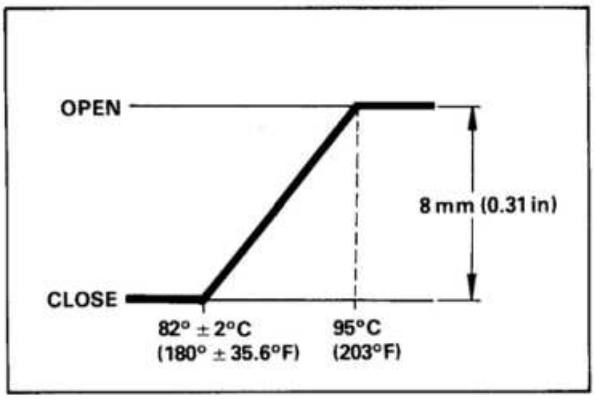
When the engine is warm, the thermostatic valve main valve is open and the bypass valve is closed. Therefore, the coolant flows to the radiator where it is cooled. After cooling, the coolant flows through the outlet pipe and thermostatic valve main valve to the water pump, by which it is pumped to the engine cylinder water jackets. (Fig. 2)





Inspection

1. Inspect the valve face for scratches or other damage. Replace the thermostatic valve if scratched or damaged.
2. Immerse the thermostatic valve in the water as shown. While heating the water, check the thermostatic valve movement at each temperature as tabulated. If the thermostatic valve does not move or is out of specification, it should be replaced.



Assembly

For installing the thermostatic valve, reverse the removal procedure. Refer to "COOLANT REPLACEMENT" on page 6-2.

CHAPTER 7. ELECTRICAL

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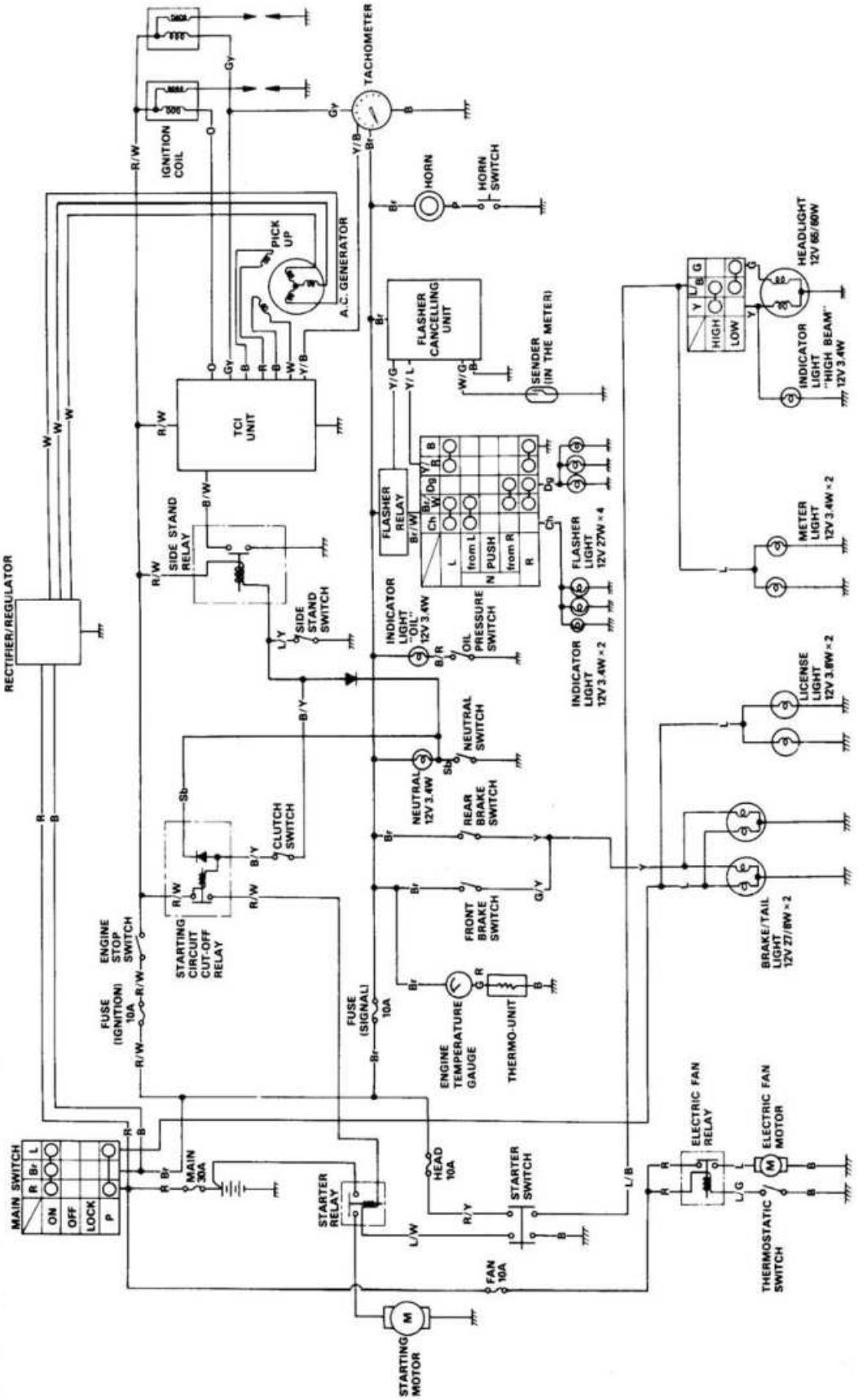
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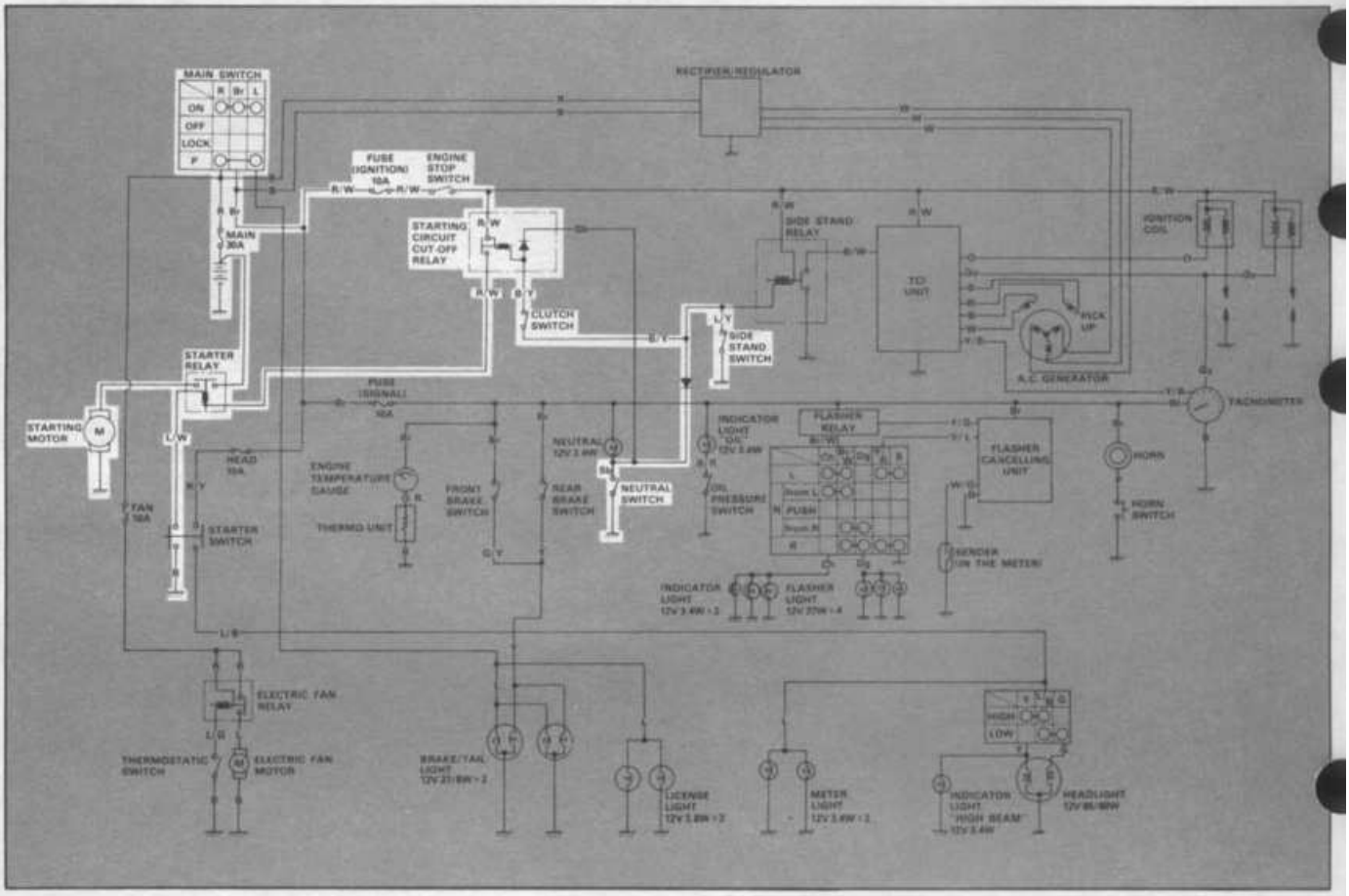
XZ550RJ CIRCUIT DIAGRAM



COLOR CODE

Dg	Dark green	Sb	Sky blue	L/Y	Blue/Yellow
B	Black	Ch	Chocolate	B/W	Black/White
Br	Brown	G	Green	B/R	Black/Red
O	Orange	Gy	Gray	Br/W	Brown/White
L	Blue	L/G	Blue/Green	Y/R	Yellow/Red
Y	Yellow	L/W	Blue/White	G/Y	Green/Yellow
R	Red	R/W	Red/White	B/Y	Black/Yellow
W	White	L/B	Blue/Black	R/Y	Red/Yellow
				G/R	Green/Red
				W/G	White/Green
				Y/B	Yellow/Black
				Y/G	Yellow/Green
				Y/L	Yellow/Blue

ELECTRIC STARTING SYSTEM



This circuit diagram shows the starter circuit in the wiring diagram.



STARTING CIRCUIT CUT-OFF SYSTEM

The starting circuit cut-off system is employed. Hence, the following description.

Starting circuit operation

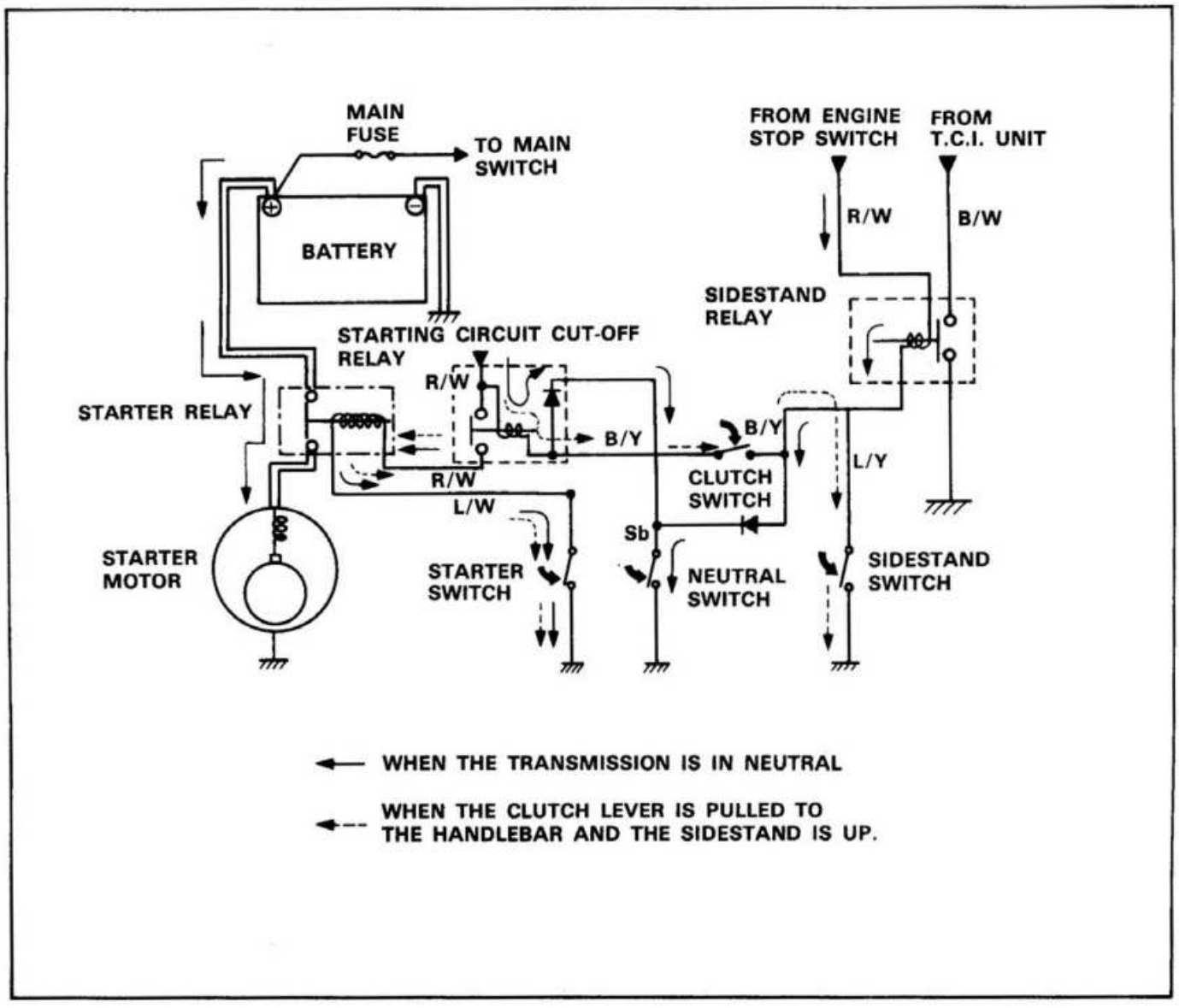
The starting circuit on this model consists of the starter motor, starter relay, and the starting circuit cut-off relay. If the engine stop switch and the main switch are both on, the starter motor can operate only if:

The transmission is in neutral (the neutral switch is on).

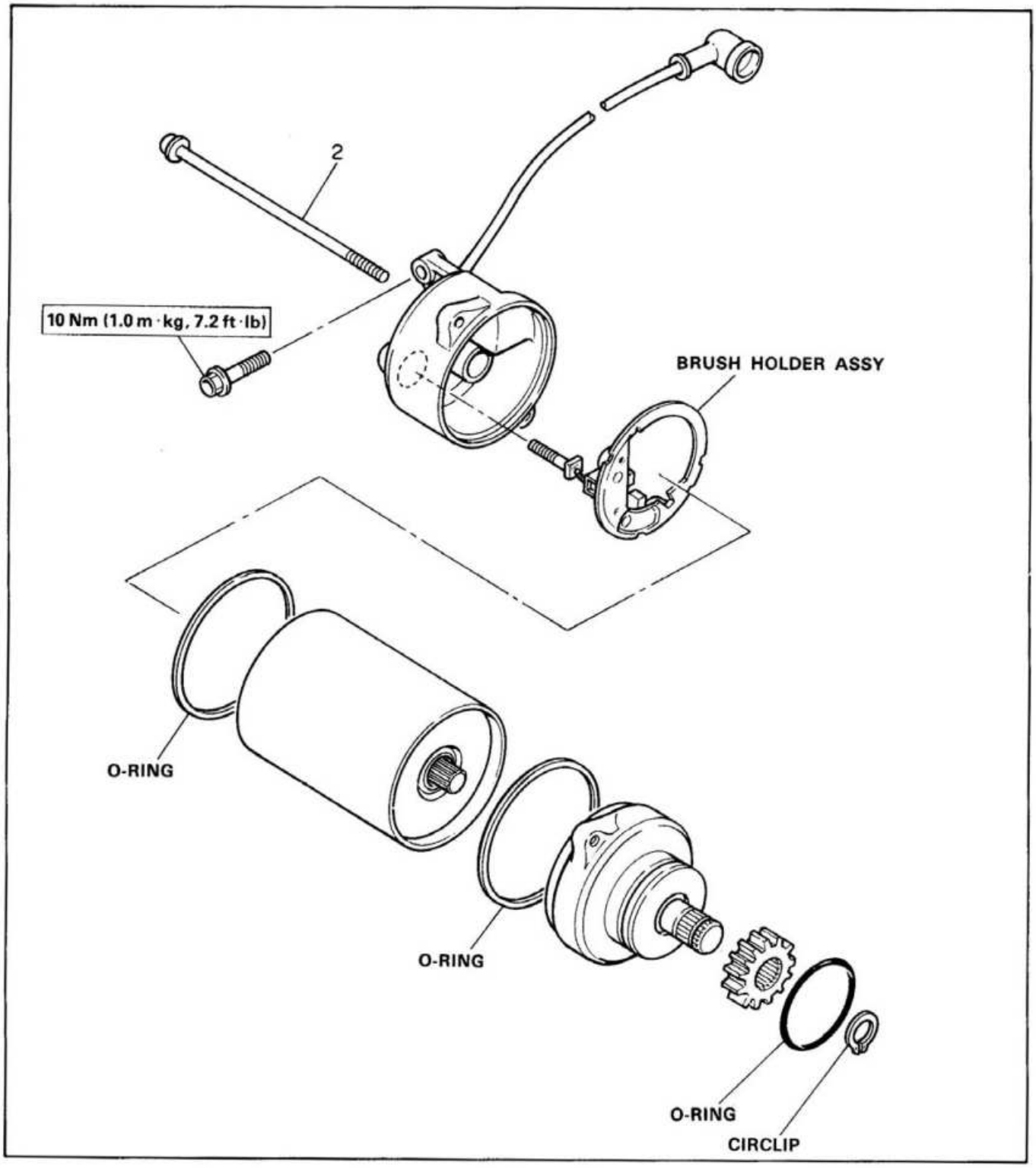
or if

The clutch lever is pulled to the handlebar (the clutch switch is on) and the sidestand is up (the sidestand 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 or 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.



STARTER MOTOR



Removal

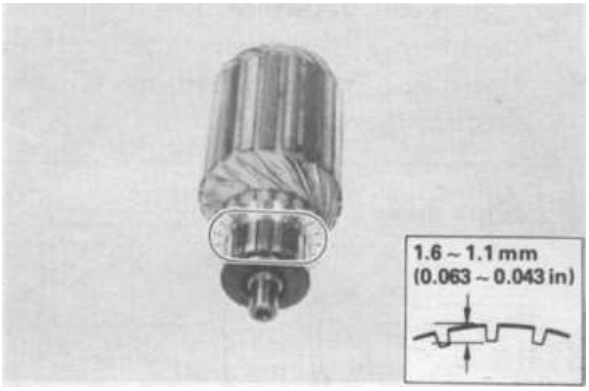
1. See Chapter 3. "ENGINE DISASSEMBLY."

Inspection and repair

1. Check the outer surface of the commutator. If its surface is dirty, clean it with #600 grit sandpaper.
2. The mica insulation between the commutator segments should be 1.1 ~ 1.6 mm (0.04 ~ 0.06 in) below the segment level. If not, scrape the mica to proper limits with an appropriately shaped tool. (A hacksaw blade can be ground to fit.)

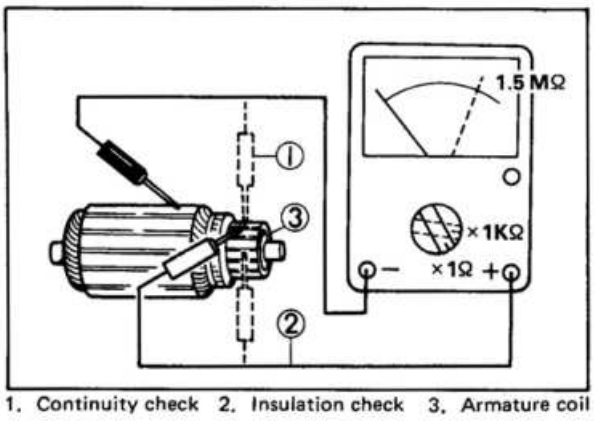
NOTE:

The mica insulation of the commutator must be undercut to ensure proper operation of commutator.



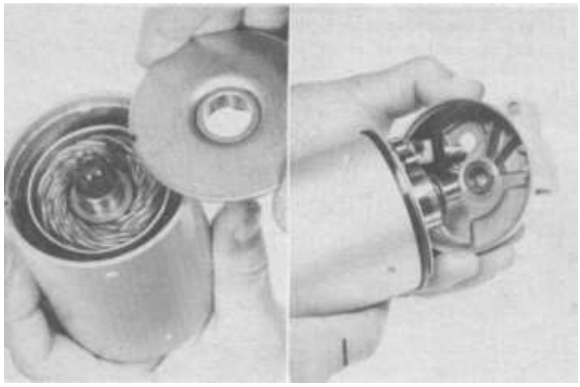
3. The armature coil should be checked for insulation breakdown (shorting to each other or to ground) and for continuity. Use a pocket tester.

Coil resistance: Armature coil:11.5Mn±10% at 20°C(68°F)



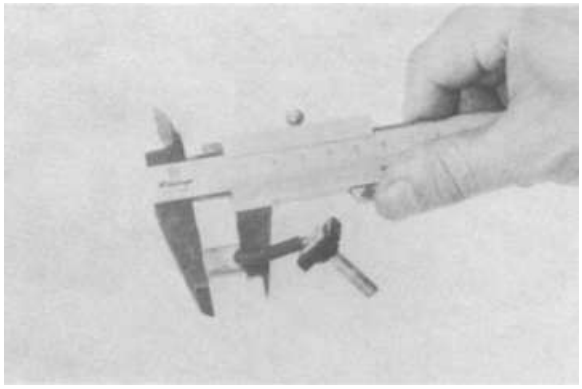
1. Continuity check 2. Insulation check 3. Armature coil

4. Check the front and rear cover bushings for damage. If either is damaged, the starter motor must be replaced.



5. Check the brush length. Replace the brush if it's at or near its limits.

Minimum brush length: 4.5mm (0.18 in)

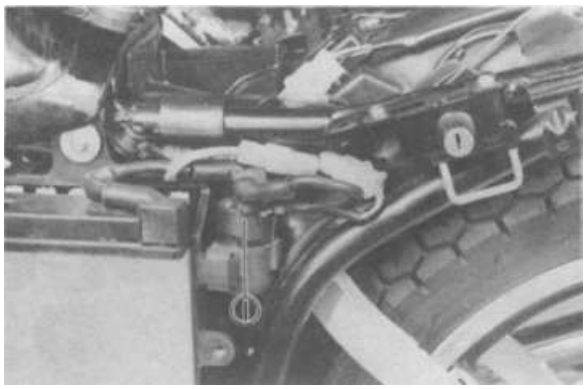


6. Check the brush spring pressure. Compare it with a new spring. Replace the old spring if it is weak.

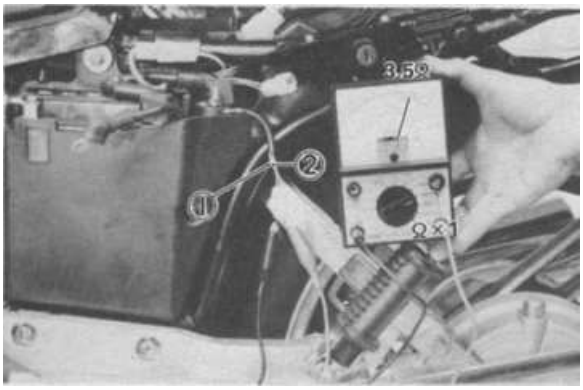
STARTER RELAY

Inspection

1. Remove the left sidecovers.


1. Starter relay

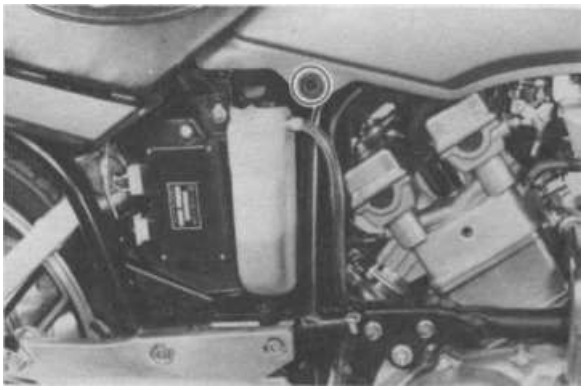
2. Turn the ignition to the ON the engine stop switch to RUN and the shift lever to NEUTRAL.
3. Push the starter switch. If the relay does not click, check the wires from the starter switch and from the starting circuit cut-off relay (red/white — blue/white). Turn the ignition off. Use the scale (ohms x 1) on the tester. The resistance between these wires should be no more than 3.5 ohms. If there is more resistance, the relay should be replaced.



STARTING CIRCUIT CUT-OFF RELAY

Inspection

1. Lift the seat, and remove the right side-cover.
2. Remove the TCI unit/reservoir tank holding screw.

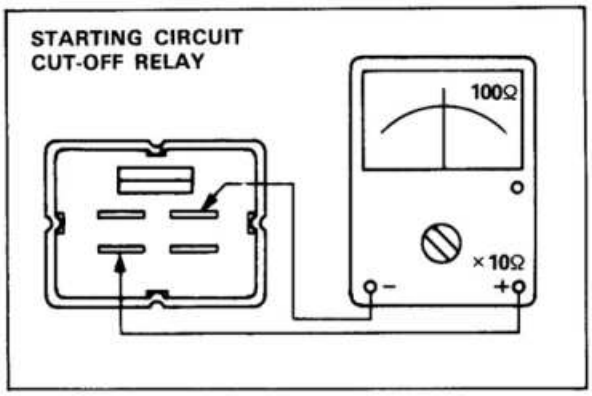


3. Remove the TCI unit/reservoir tank from the frame.
4. Remove the starting circuit cut-off relay from the frame, and disconnect the connector.

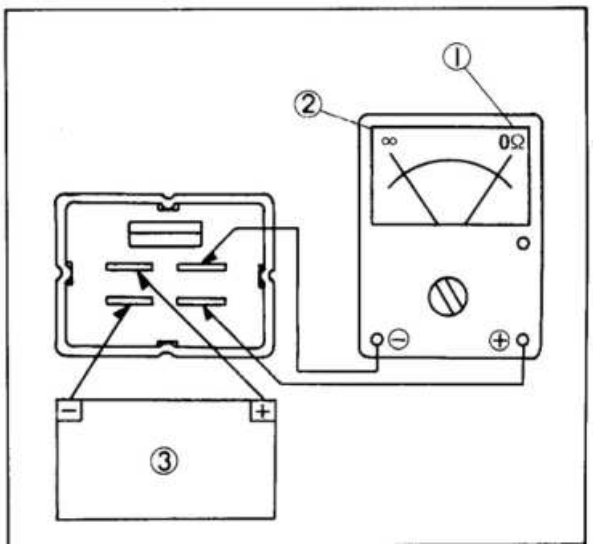


1. Starting circuit cut-off relay

5. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.

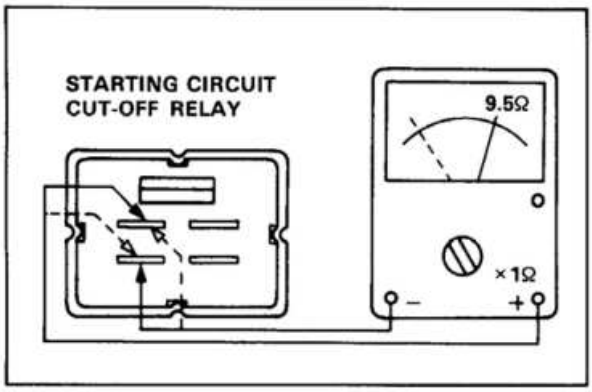


6. Check the relay function with a 12 volt battery and the pocket tester. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.



1. When the battery is connected
2. When the battery is disconnected
3. 12 volt battery

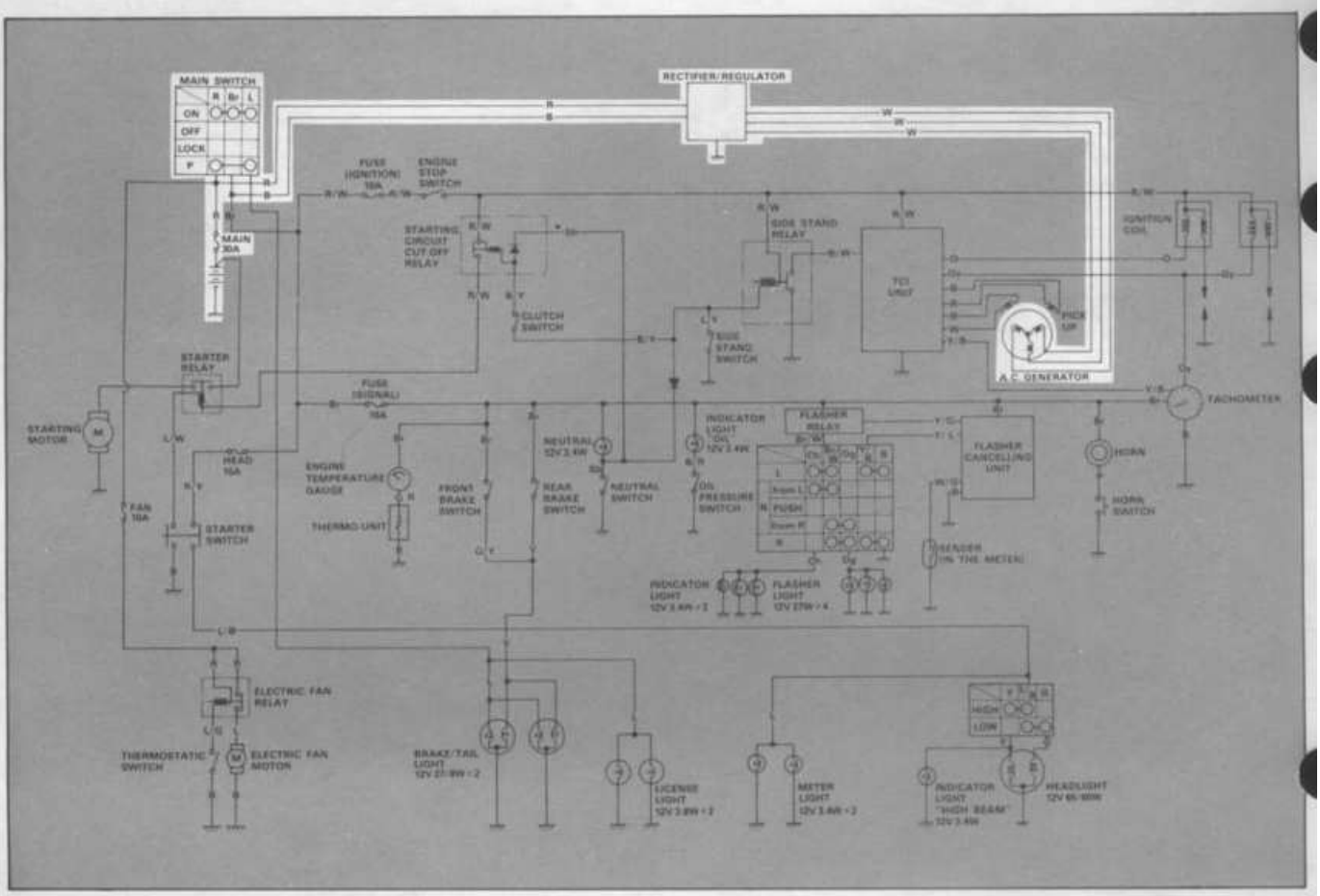
7. Check the diode in the starting circuit cut-off relay with the pocket tester as shown in the illustration. Replace the relay if the diode is damaged.



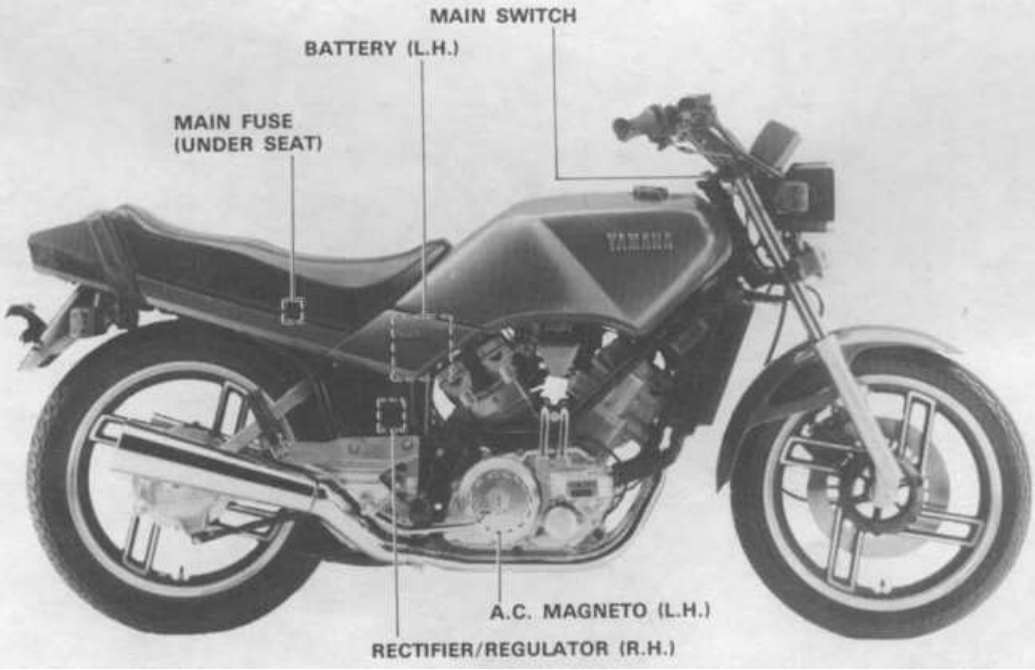
NOTE:

Only the Yamaha Pocket Tester will give a 9.5Ω reading when testing continuity. The particular characteristics of other testers will vary the continuity test readings.

CHARGING SYSTEM



This circuit diagram shows the charging circuit in the wiring diagram.

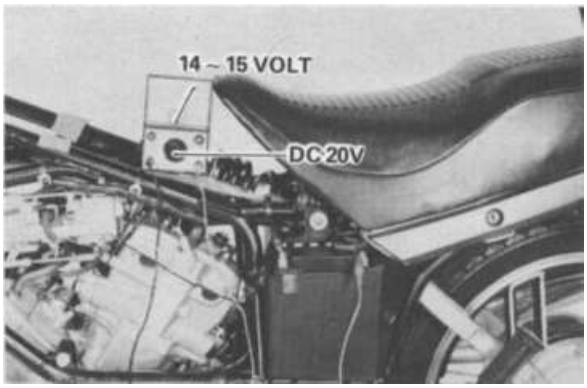


AC GENERATOR AND VOLTAGE REGULATOR

Inspection

1. Connect the pocket tester to the battery terminals.
2. Start the engine.
3. Accelerate the engine to approximately 2,000 r/min or more, and check the generator voltage.

Generator voltage: 14.5 ± 0.5V



4. If the indicated voltage cannot be reached, check all connections. If the 1connections are all good, check the battery, stator coil, and the regulator/rectifier. If both the battery and stator coil are in working order, the regulator is defective and should be replaced.

CAUTION:

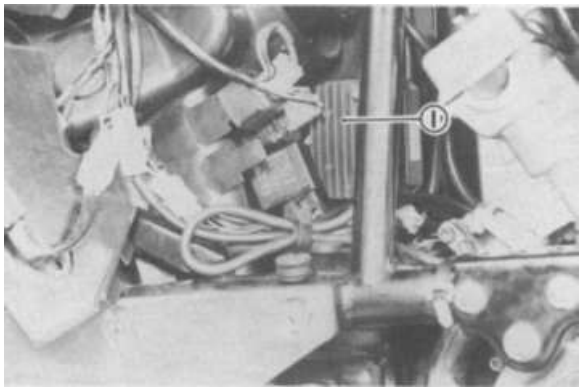
Never disconnect the wires from the battery while the generator is operating. If the battery is disconnected, the voltage across the generator terminals will increase and damage the semiconductors.

Battery inspection

1. Check the battery terminals and couplers. They should be tight.
2. Measure the specific gravity of the battery. If it is less than 1.260, remove and charge the battery, until the specific gravity is greater than 1.260.

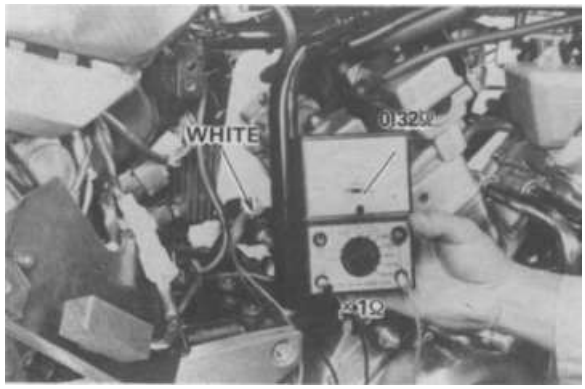
Stator coil inspection

1. Remove the right sidecover, TCI unit, and reservoir tank from the frame.



1. Rectifier/Regulator

2. Disconnect the stator coil leads from the voltage regulator, and connect the pocket tester as shown. If the resistance does not equal the specified value, the stator coil is defective and should be replaced.

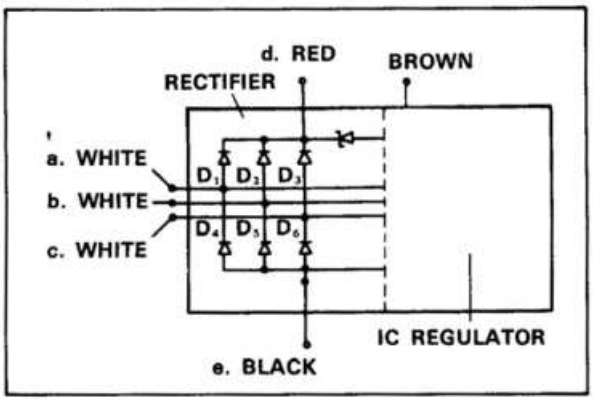


Starter coil resistance: 0.32Ω±10% of 20°C(68°F) Color: White-White

3. If the resistance in each coil is correct, check the stator for a short to ground. Connect one lead of the ohmmeter to a white lead, the other lead to ground. With the selector knob set at X1Ω, the reading should be infinity (∞). If it is not, the stator is defective and should be replaced.

Checking the silicon rectifier

1. Check the silicon rectifier as specified using the pocket tester.



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	×	○	×

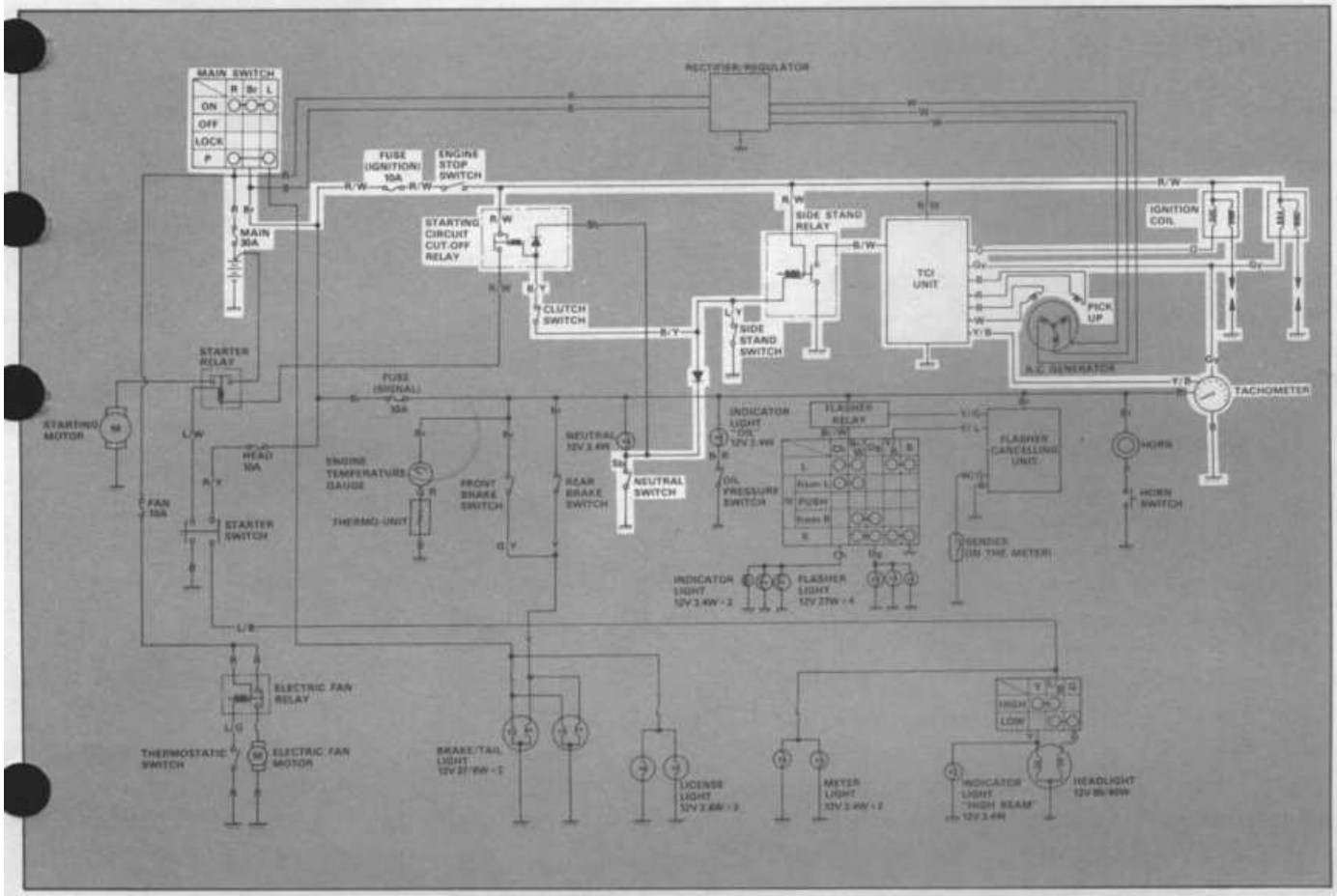
○ : Continuity
× : Discontinuity (∞)

2. If any element is broken, replace the entire unit.

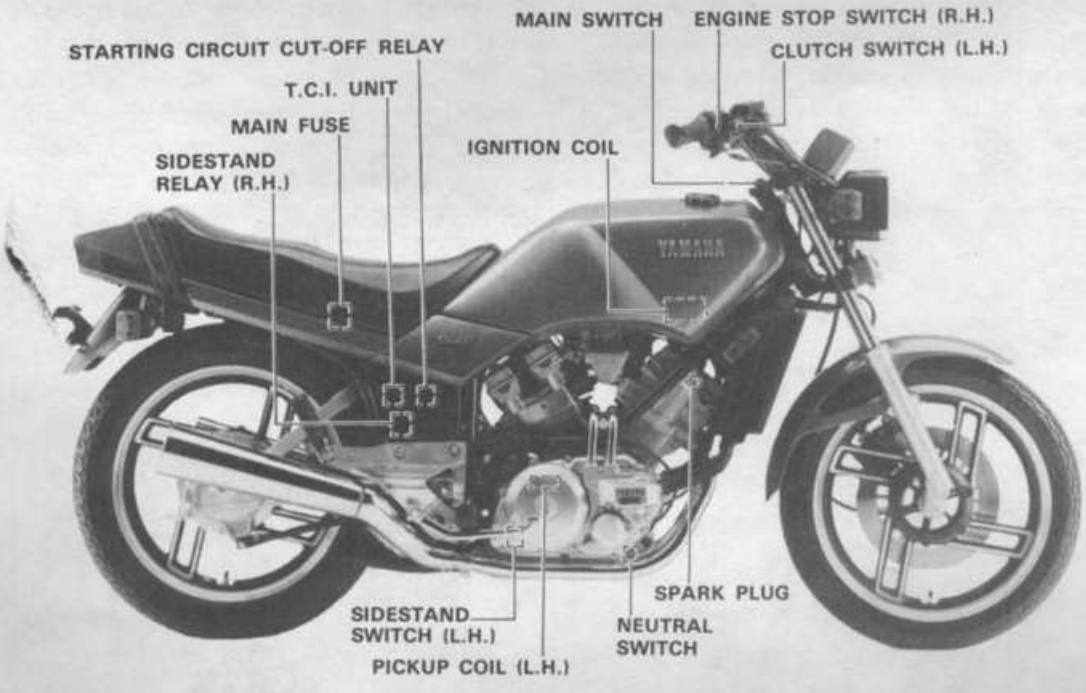
CAUTION:

The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a continuity check.

IGNITION SYSTEM



This circuit diagram shows the ignition circuit in the wiring diagram.



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.

NOTE:

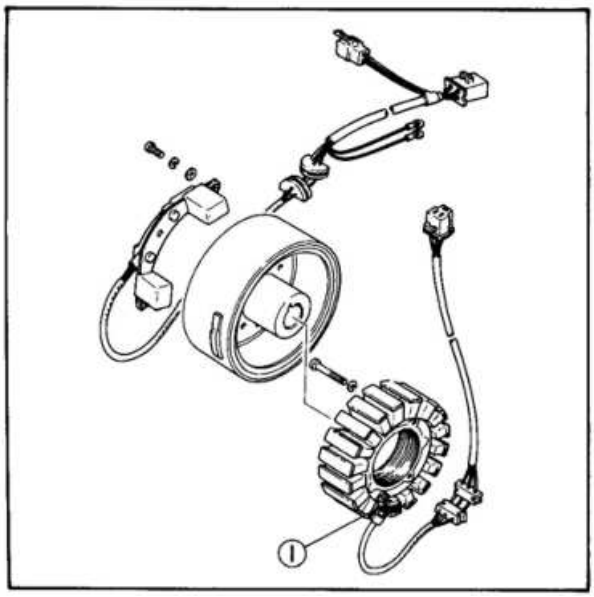
The ignition circuit can be operated only when the sidestand is up (the sidestand switch is on) or the transmission is in neutral.

Operation

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. Pickup unit

   The pickup unit consists of two pickup coils 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.

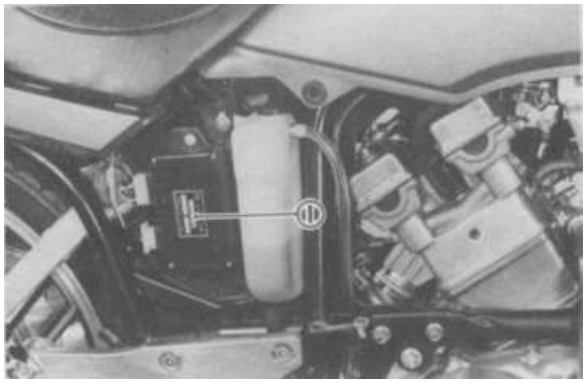


1. Pickup coils

2. Ignitor unit

   This unit controls wave form, duty control, switching, electronic ignition advance, etc. The duty control circuit reduces electrical consumption by controlling the duration of the primary ignition current.

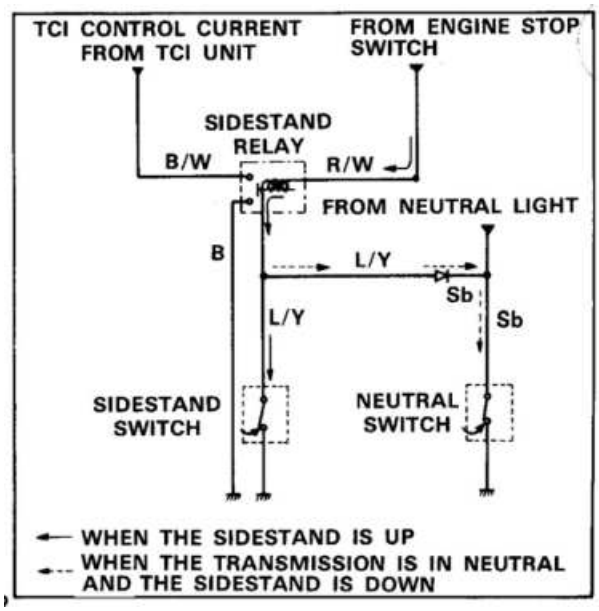
   The ignitor unit also has a protective circuit for the ignition coil. If the ignition switch is on and the crankshaft is not turning, the protective circuit interrupts the current flow to the primary coil after a few seconds. When the crankshaft is turning, however, the ignitor unit sends current to the primary coil.



1. TCI Unit

Sidestand relay operation

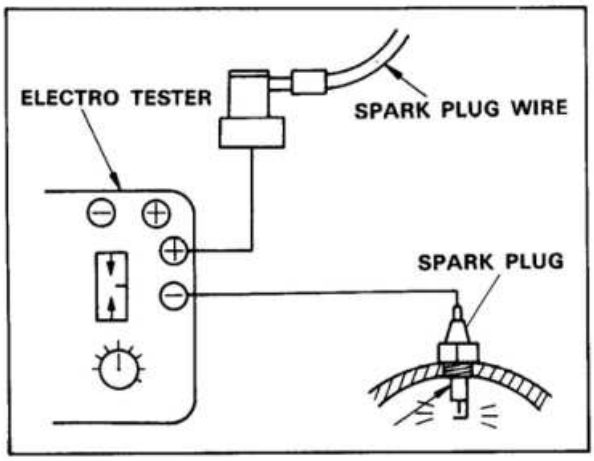
The sidestand relay operates by shorting the TCI control current. When the sidestand is down, the sidestand relay is closed, and the TCI control current is grounded through the sidestand relay. Thus, the engine will not run with the sidestand down unless the transmission is in neutral.



Troubleshooting

The entire ignition system can be checked for misfire and weak spark by using the Electro Tester. If the ignition system will fire across a specified gap, the entire ignition system is good. If it will not fire across the gap, proceed with the individual component tests until the source of the problem is located.

1. Warm up the engine thoroughly so all electrical components are at operating temperature.
2. Stop the engine, and connect the tester as shown.



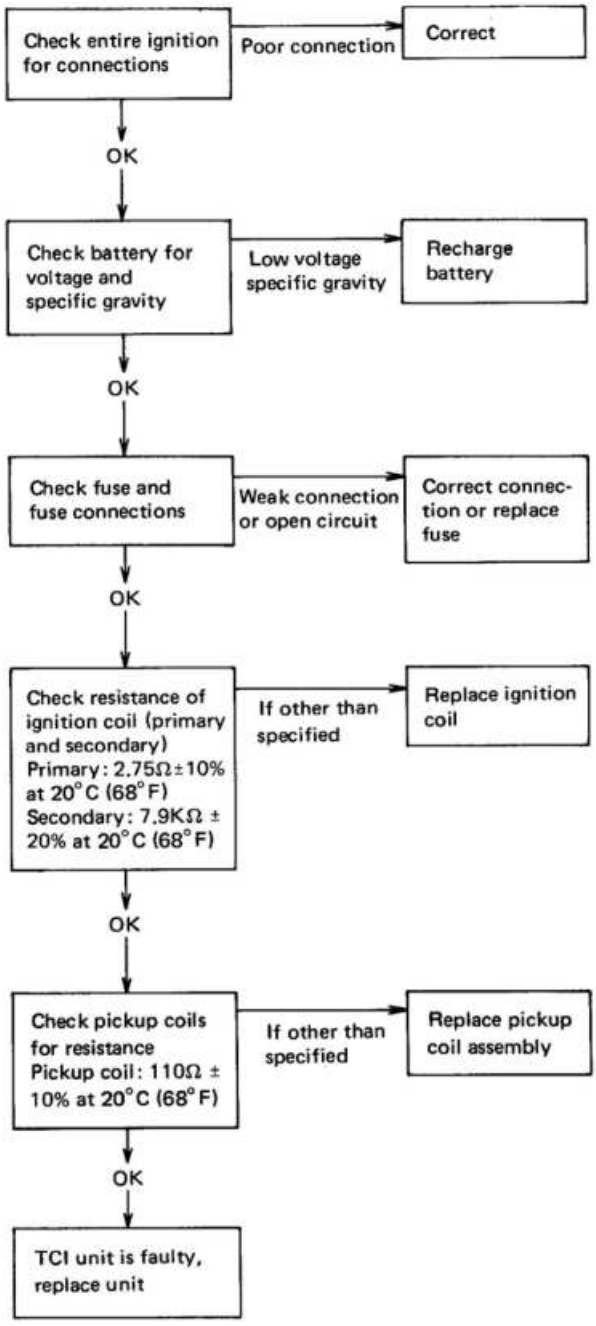
3. Start the engine, and increase the spark gap until misfire occurs. (Test at various r/min between idle and red line.)

Minimum spark gap: 6mm (0.24 in)

CAUTION:

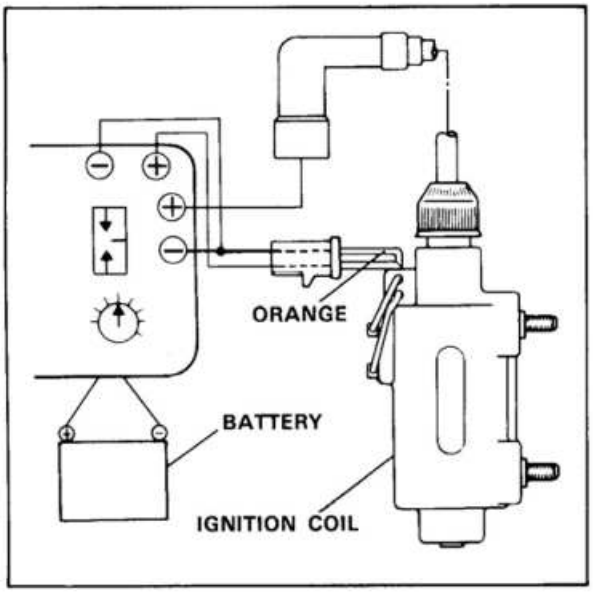
Do not run the engine in neutral above 6000 r/min for more than 1 or 2 seconds.

If the ignition system becomes inoperative or if the engine misfires at the minimum spark gap or at a smaller gap, there is a problem in the ignition system. Follow the troubleshooting chart until the source of the problem is located.



Ignition spark gap test

1. Remove the sidecovers and fuel tank, and disconnect the ignition coil leads from the wiring harness and from the spark plugs.
2. Connect the Electro Tester as shown.

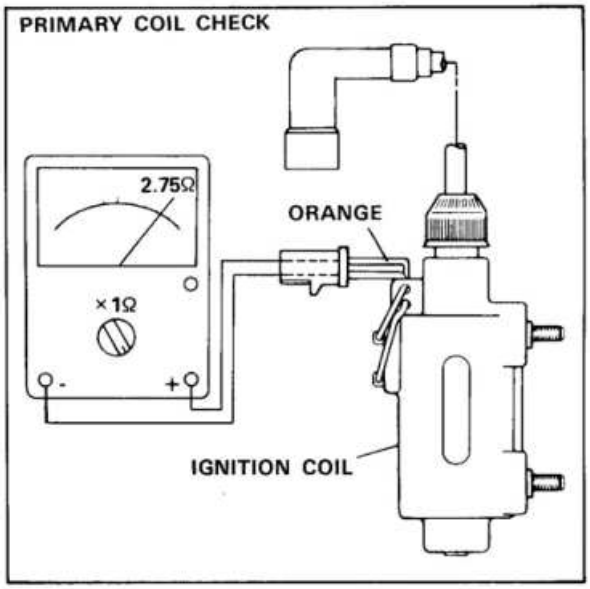


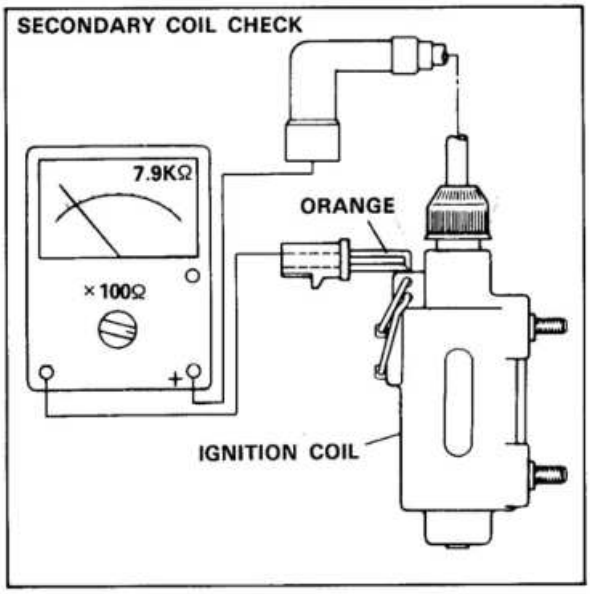
3. Connect a fully charged battery to the tester.
4. Turn on the spark gap switch, and increase the gap to maximum unless misfire occurs first.

Minimum spark gap: 6mm (0.24 in)

Direct current resistance test.
Use the pocket tester to determine resistance and continuity of primary and secondary coil windings.

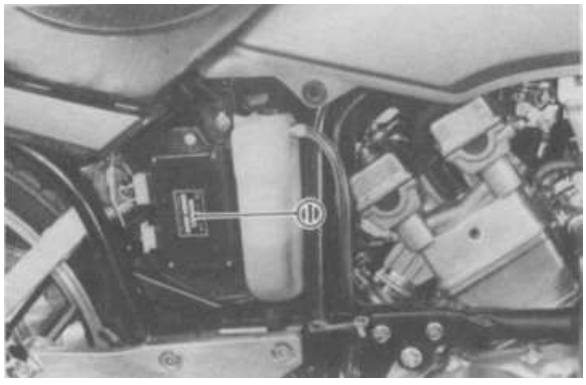
Standard value: Primary coil resistance:
2.75Ω ± 10% a t20°C (68°F)
Secondary coil resistance:
7.9KΩ ± 20% at 20°C (68°F)



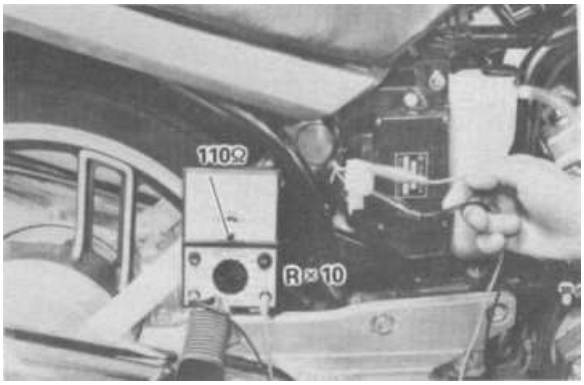


Pickup coil

1. Remove the right sidecover.
2. Disconnect the pickup coil connector from the TCI unit.



3. Check the resistance of the pickup coil windings with the pocket tester. If the resistance is not within specification, replace the pickup coil assembly.



Pickup coil resistance:
110Ω ± 10% at 20°C (68°F)
(Red- Black, White- Black)

Spark plug

The life of a spark plug and its coloring vary according to the habits of the rider. At each periodic inspection, replace burned or fouled plugs with new ones of the specified type. It is actually economical to install new plugs often since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

1. Inspect and clean the spark plug every 4000 km (2500 mi), and replace after initial 13,000 km (8000 mi).
2. Clean the electrodes of carbon, and adjust the electrode gap to the specification. Be sure to use the proper reach, type, and electrode gap plug (s) as a replacement to avoid overheating, fouling, or piston damage.

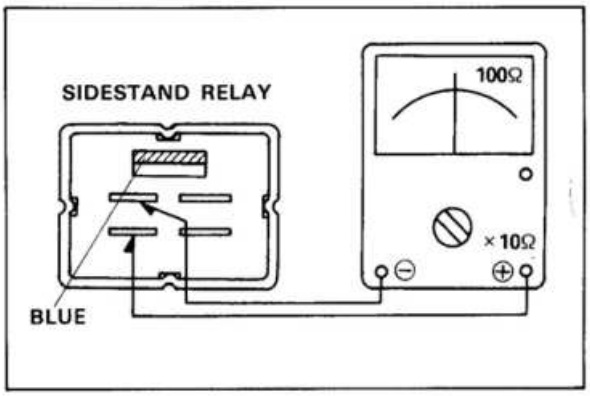
Type:
D8EA(NGK) or X24ES-U
(NIPPON DENSO)
Electrode gap:
0.6 ~ 0.7 mm (0.024 ~0.028 in)
Tightening torque:
20 Nm (2.0m-kg, 14.5ft-lb)

Sidestand relay

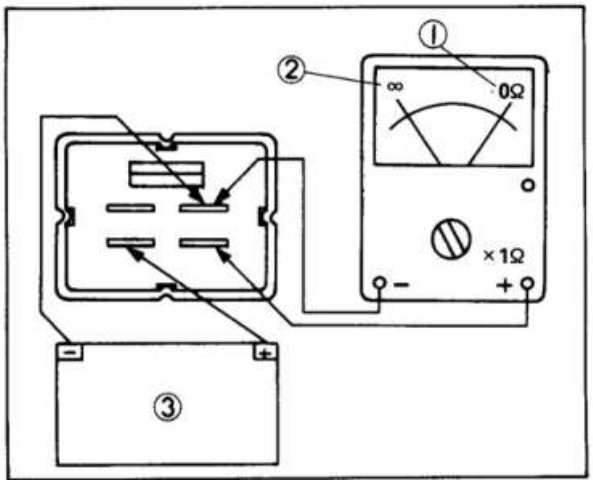
1. Remove the right sidecover, TCI unit, and reservoir tank from the frame.



2. Check the resistance of the relay coil windings with the pocket tester. If the resistance is not within specification, replace the relay.



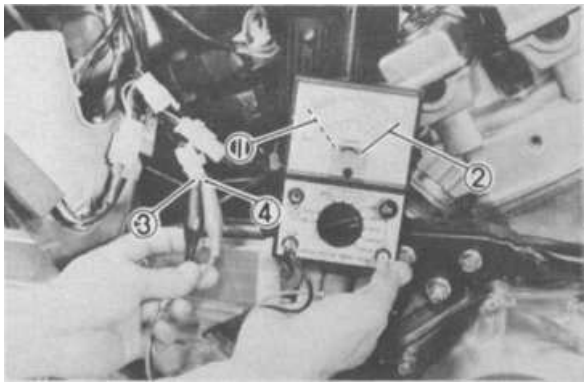
3. Check the relay contact breaker points with the pocket tester and a 12 volt battery. Connect the leads as shown in the illustration. If the resistance readings do not equal those shown in the illustration, replace the relay.



1. When the battery is connected
2. When the battery is disconnected
3. 12 volt battery

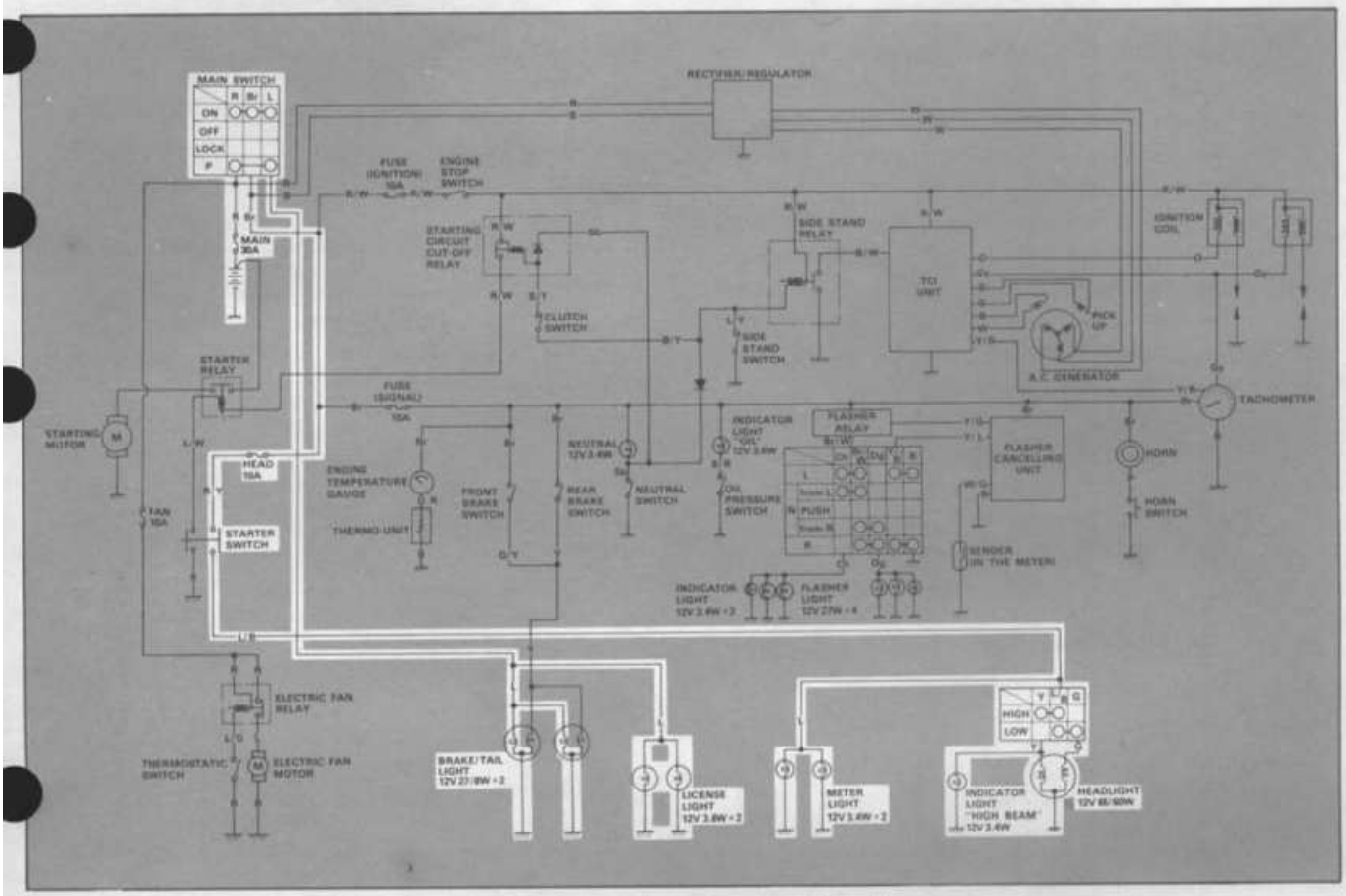
Sidestand switch

1. Remove the right sidecover, TCI unit, and reservoir tank from the frame.
2. Disconnect the connector from the wiring harness.
3. Connect the pocket tester leads as shown, and set the tester selector to ohm x 1. When the sidestand is up, the tester should read zero ohms. When the sidestand is down, the tester should read infinity.

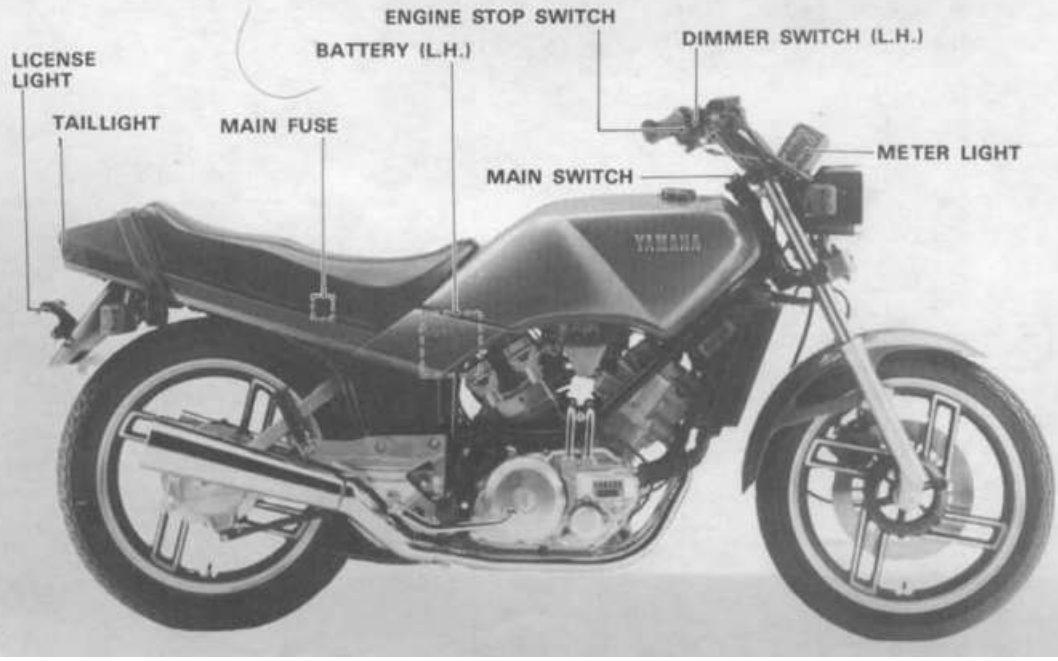


1. Sidestand is down
2. Sidestand is up
3. Black
4. Blue/Yellow

LIGHTING SYSTEM



This circuit diagram shows only the lighting circuit in the wiring diagram.



Lighting tests and checks

The battery provides power for operation of the headlight, taillight, license light, and meter lights. If none of the above operates, always check battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery electrolyte, or a defective charging system. See CHARGING SYSTEM for checks of the battery and charging system. Also check fuse condition. Replace any "open" fuses. There are individual fuses for various circuits (see the complete circuit diagram).

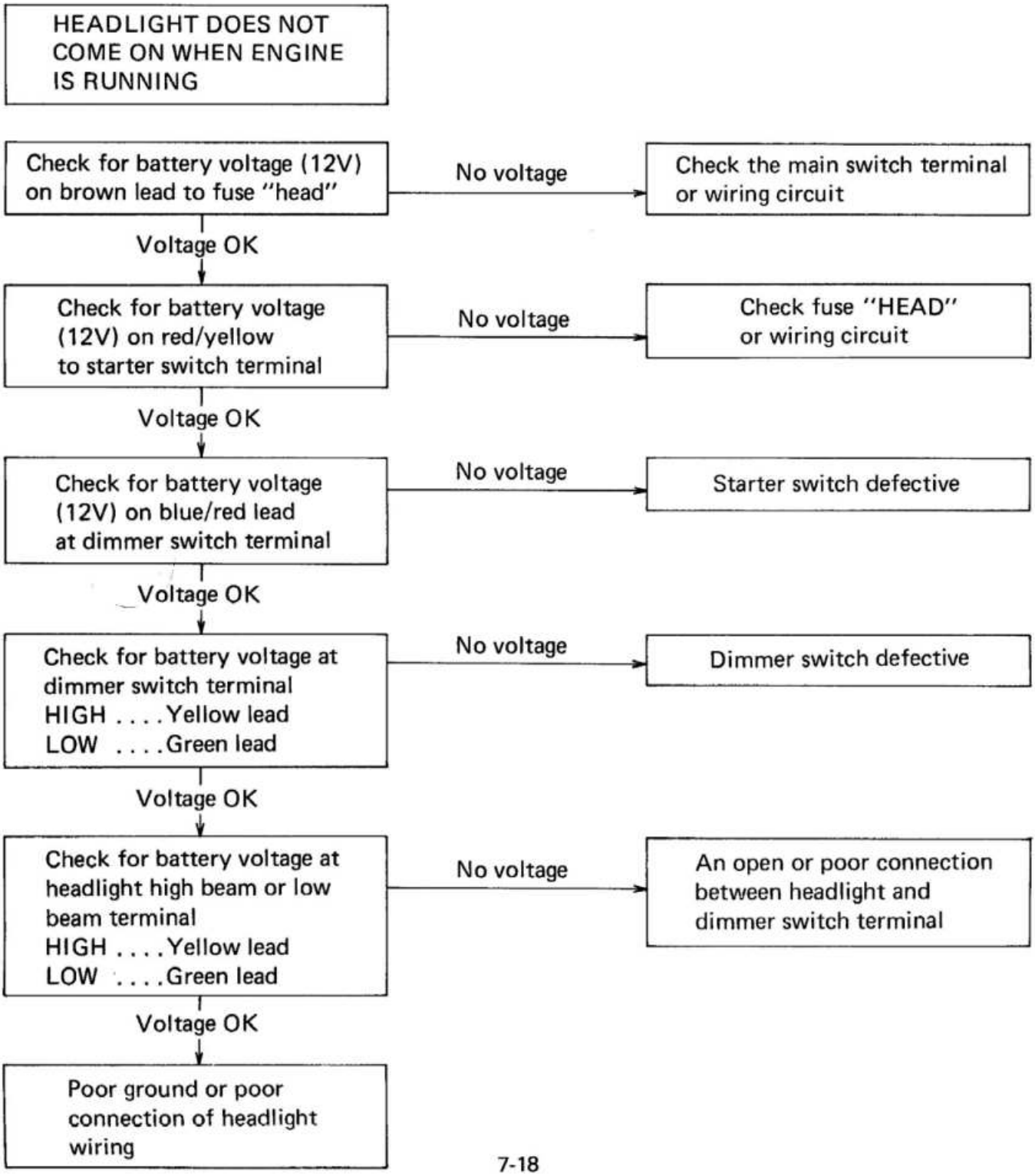
1. Headlight check.

NOTE:

When the main switch is turned "ON" the headlight, meter light, taillight, and license light come on. But when the starter switch is depressed, the headlight and meter light come off.

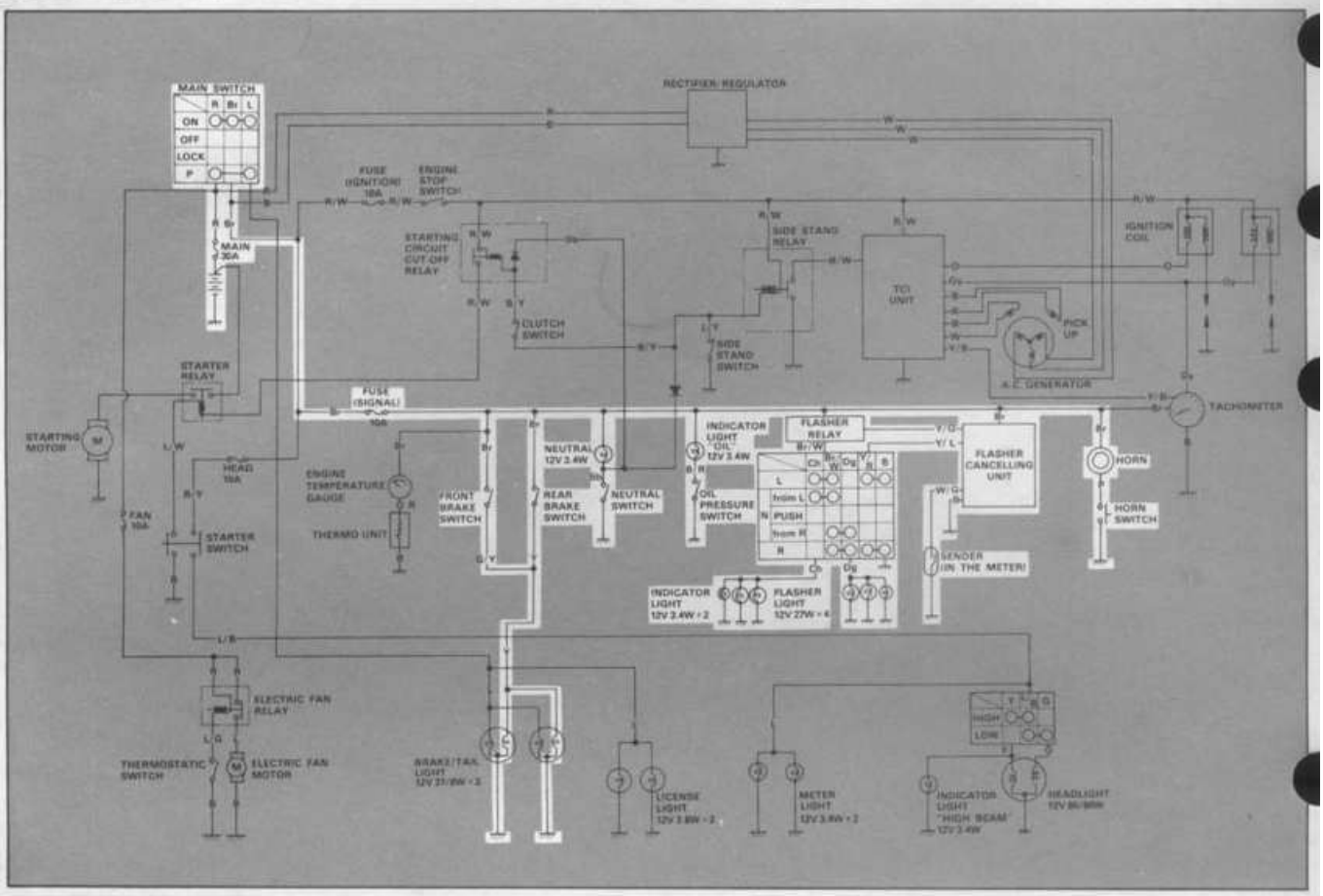
NOTE:

Check the headlight bulb first before performing the following check.

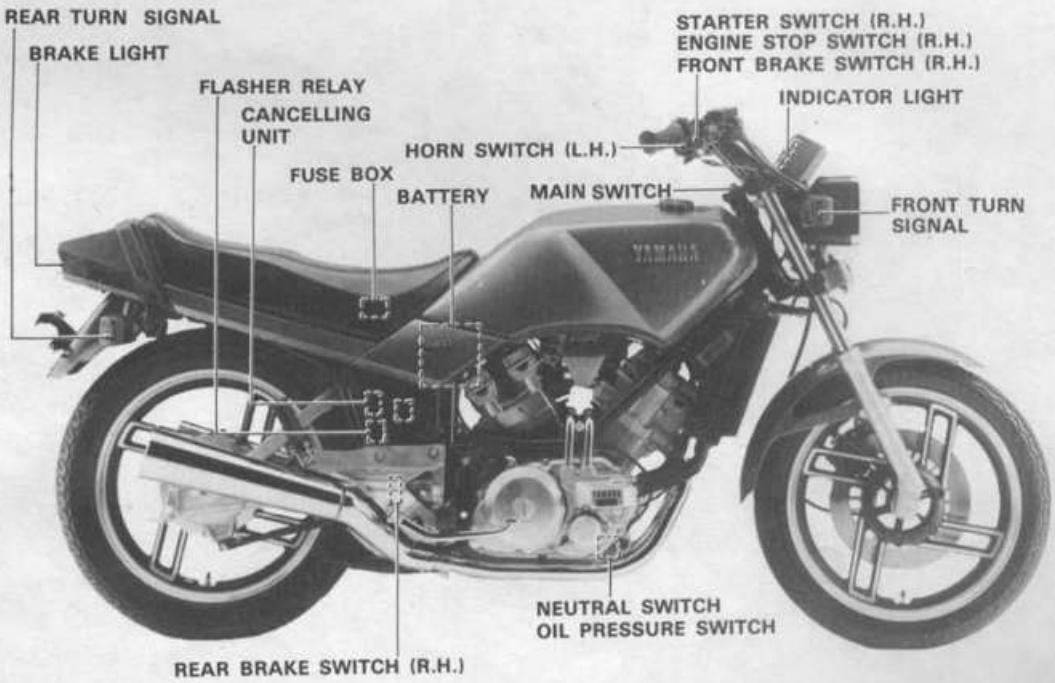


2. Taillight and license light does not work:
    - Check the bulb.
    - Check for 12V on the blue wire.
    - Check for ground on black wire to tail/ brake light and/or license light assembly.

SIGNAL SYSTEM



Circuit diagram shows only the signal circuit in the wiring diagram.



Signal system tests and check

The battery provides power for operation of the horn, brake light, indicator lights, and flasher light. If none of the above operates, always check the battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery electrolyte, or a defective charging system. See page 7-8 CHARGING SYSTEM for checks of the battery and charging system. Also check the fuse condition. Replace any "open" fuses. There are individual fuses for various circuits (see the complete circuit diagram).

Horn does not work:

1. Check for 12V on the brown wire to the horn.
2. Check for good grounding of the horn (pink wire) when the horn button is pressed.

Brake light does not work:

1. Check the bulb.
2. Check for 12V on the yellow wire to the brake light with brake pedal depressed.
3. Check for 12V on the brown wire to each brake light switch (front brake and rear brake switches).

Flasher light(s) do not work:

1. Check the bulb.
2. Right circuit:
    a) Check for 12V on the dark green wire to the light.
    b) Check for ground on the black wire to the light assembly.
3. Left circuit:
    a) Check for 12V on the dark brown wire to the light.
    b) Check for ground on the black wire to the light assembly.
    c)
4. Right and left circuits do not work:
    a) Check for 12V on the brown/white wire to the flasher switch on the left handlebar.
    b) Check for 12V on the brown wire to the flasher relay.
    c) Replace the flasher relay.
    d) Replace the flasher switch.
5. Check the self-cancelling unit. (Refer to Flasher Self-Cancelling Unit.)

The neutral light does not work:

1. Check the bulb.
2. Check for 12V on the sky blue wire to the neutral switch.
3. Replace the neutral switch.

Oil level warning light does not work:

1. Connect the oil level switch (black/red wire) to ground. If the light comes on, check for proper oil level.
2. If the oil level is correct, replace the oil level switch.

Flasher self-cancelling unit

The self-cancelling unit turns off the flashers. Generally, the signal will cancel after either 10 seconds of operation or after the motorcycle has traveled 150 meters (490 feet), whichever is greater. At low speed, the cancelling is a function of distance; at high speeds, it's a function of both time and distance. 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. Inspection

If the flasher self-cancelling unit should become inoperative, proceed as follows:

1. Pull off the 6-pin connector from the flasher self-cancelling unit, and connect the yellow/green lead to ground. Operate the handlebar switch. If the signal operates normally in L, R, and OFF, the following are in good condition:
    a. Flasher unit
    b. Bulb
    c. Lighting circuit
    d. Handlebar switch light circuit

If (a) and (b) are in good condition, the following may be faulty:

- Flasher cancelling unit.
- Handlebar switch reset circuit.
- Speedometer sensor circuit.

2. Pull off the 6-pin connector from the flasher self-cancelling unit, and connect a tester (ohms x 100 range) across the white/green and the black leads on the wiring harness side. Turn the speedo-

meter shaft. If the tester needle swings back and forth between 0 and oo, the speedometer sensor circuit is in good condition. If not, the sensor-to-wiring harness may be inoperative.

3. Pull the 6-pin connector from the flasher self-cancelling unit. Check if there is continuity between the yellow/red lead wire on the wiring harness side and the chassis.

Flasher switch OFF: ∞ Flasher switch L or R: 0 ohms

If the tester needle does not swing as indicated above, check the handlebar switch circuit and wiring harness.

4. If no defect is found with the above three checks and the flasher cancelling system is still inoperative, replace the flasher cancelling unit.
5. If the signal flashes only when the handlebar switch lever is turned to L or R and it turns off immediately when the handlebar switch lever returns to center, replace the flasher cancelling unit.

Switches

Switches may be checked for continuity with a pocket tester on the ohm x 1 scale.

1. Main switch.

Switch position	Wire color		
	R	Br	L/Y
ON	○——	——○	——○
OFF			
LOCK			
P (parking)	○——		——○

2. Engine stop switch.

Switch position	Wire color	
	R/W	R/W
RUN	○——	——○
OFF		

3. Start switch.

Switch position	Wire color	
	L/W	Ground
PUSH	○——	——○
OFF		

4. Lights (dimmer) switch.

Switch position	Wire color		
	Y	L/Y	G
HI	○——	——○	
LO		○——	——○

5. Turn switch.

Switch position	Wire color				
	Ch	Br/W	Dg	Y/R	Ground
L	○——	——○		○——	——○
L → N	○——	——○			
N → Push					
R → N		○——	——○		
R		○——	——○	○——	——○

6. Horn switch.

Switch position	Wire color	
	P	Ground
PUSH	○——	——○
OFF		

Battery

If the battery shows the following defects, it should be replaced:

1. The battery voltage will not rise to a specific value nor will bubbles rise in any cell, even after many hours of charging.
2. Sulfation of one or more cells is indicated by the plates turning white or an accumulation of material in the bottom of the cell.

3. Specific gravity readings after a long, slow charge indicate a cell to be lower than any others.
4. Warpage or buckling of plates or insulators is evident.

WARNING:

Battery fluid is poisonous and dangerous, causing severe burns, etc. It contains sulfuric acid. Avoid contact with the skin, eyes, or clothing.
Antidote: EXTERNAL - Flush with water. INTERNAL — Drink large quantities of water or milk. Follow with milk of magnesia, beaten eggs, or vegetable oil. Call physician immediately.
Eyes: Flush with water for 15 minutes, and get prompt medical attention. Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space. Always shield your eyes when working near batteries.
KEEP OUT OF REACH OF CHILDREN.

The service life of a battery is usually two to three years. Lack of care, as described below, will shorten the life of the battery:

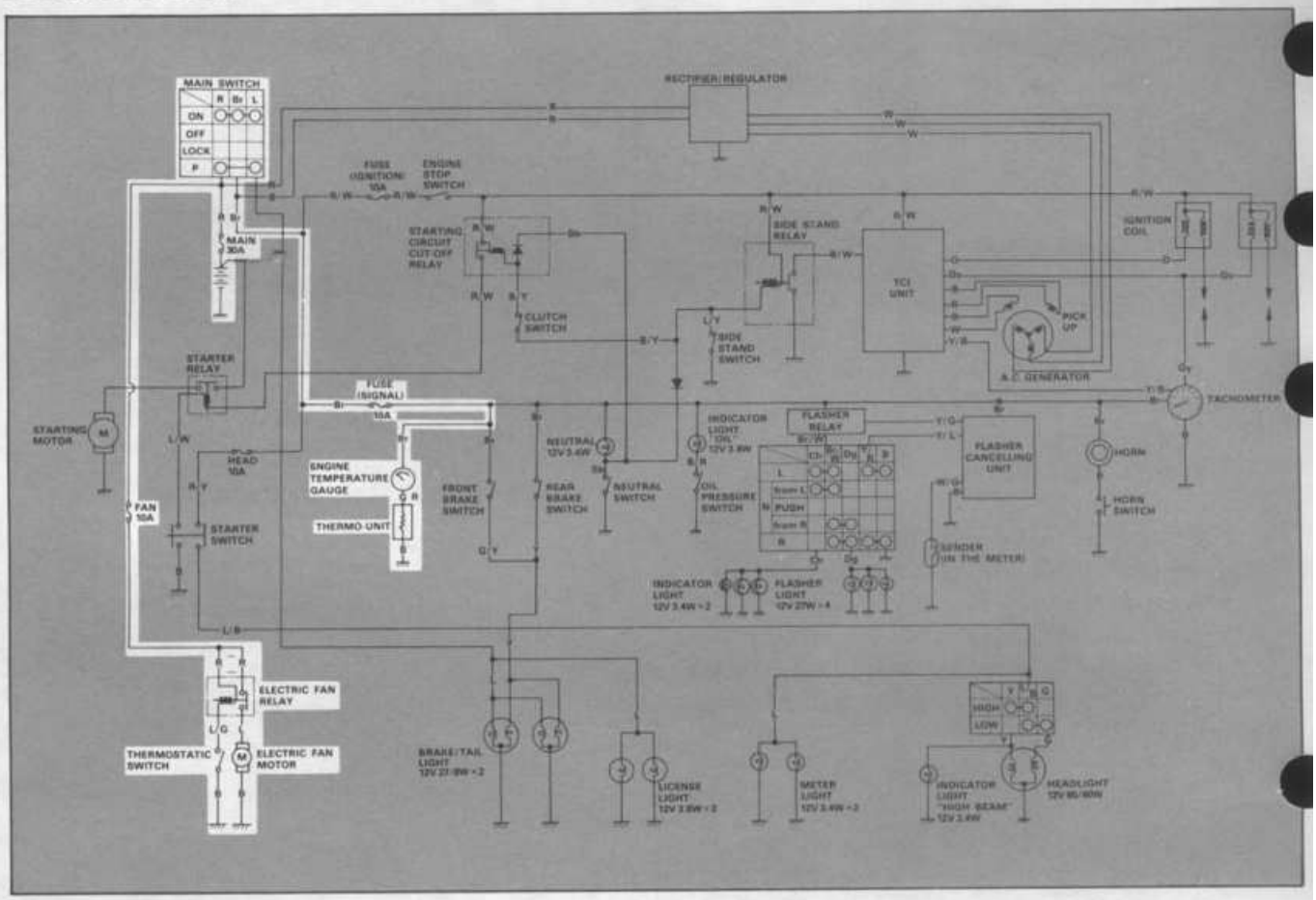
- Negligence in keeping battery topped off with distilled water;
- Battery left discharged;
- Over-charging with heavy charge;
- Freezing;
- Filling with tap water or sulfuric acid containing impurities;
- Improper charging voltage or current on new battery;

If the motorcycle is not to be used for a long time, remove the battery and have it stored. The following instructions should be observed:

1. Recharge the battery periodically
2. Store the battery in a cool, dry place.
3. Recharge the battery before reinstallation.

Battery	YB16AL
Electrolyte	Specific gravity: 1.280
Initial charging current	1.6 amp for 10 hours (new battery)
Recharging current	10 hours (or until specific gravity reaches 1.280)
Refill fluid	Distilled water (to maximum level line)
Refill period	Check once per month (or more often, as required)

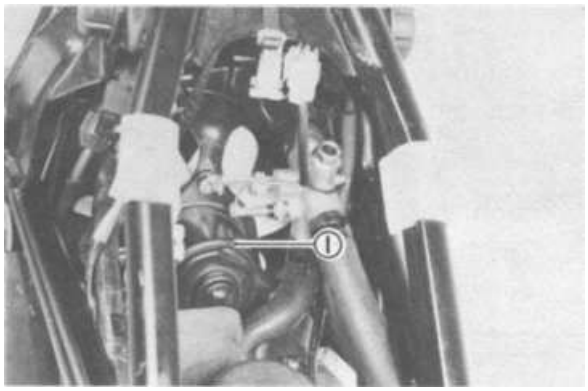
COOLING SYSTEM



This circuit diagram shows only the cooling circuit in the wiring diagram.



Electric fan and thermostatic switch



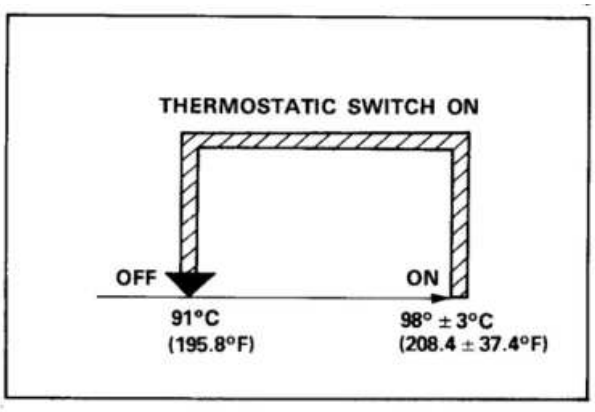
1. Electric fan

Operation

The electric fan operation is completely automatic. It will be switched ON or OFF according to the coolant temperature in the radiator.

NOTE:

The electric fan is controlled by the thermostatic switch irrespective of the main switch. Thus, under certain operating conditions, this fan may not stop turning for some minutes until the engine temperature is approximately 91°C (195.8°F) even after the engine is stopped.

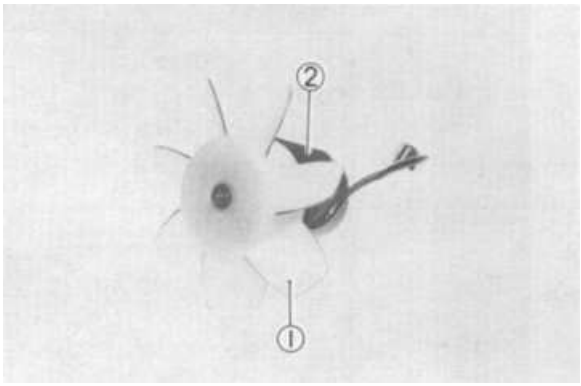


Electric fan inspection

NOTE:

Checking of the electric fan should be made without removing it from the motorcycle.

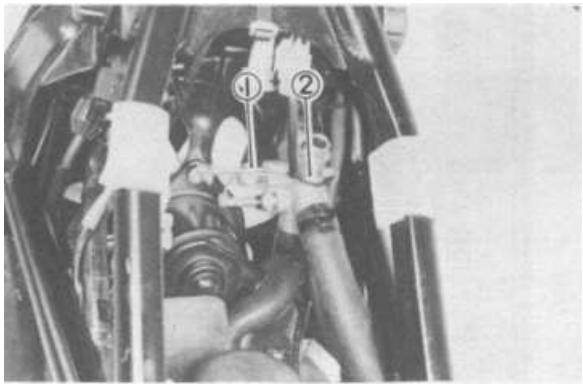
1. Check the electric fan with a 12 volt battery. Connect the leads as shown in the illustration. If the electric fan does not operate, replace the electric fan motor assembly. If the electric fan operates, check the following points. Replace or/and repair as necessary:
   a) Smooth operation of the fan motor;
   b) Excessive vibration of the fan motor;
   c) Cracks in the fan motor bracket;
   d) Cracks in fan blades;
   e) Loose bolts securing the fan motor bracket and radiator mounting bolts



1. Thermostatic switch 2. T-joint

Thermostatic switch inspection

1. Remove the thermostatic switch from the T-joint



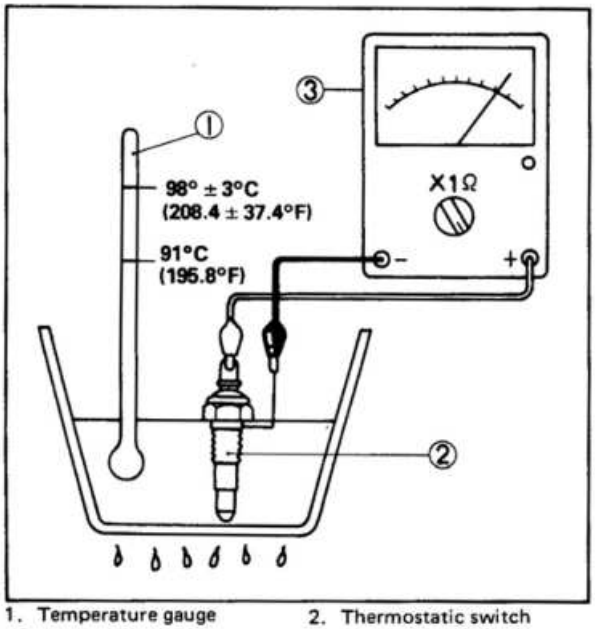
WARNING:

Handle the thermostatic valve very carefully. Never let it drop or give it a strong shock. Should it be dropped, it must be replaced.

2. Immerse the thermostatic switch in the water as shown. While heating the water, check the continuity at each temperature. If the thermostatic switch will not operate as shown in the table below, the thermostatic switch is faulty. It should be replaced.

Test step	Water temperature	Pocket tester (Ω x 1)
1	0 ~ 94°C (32 ~ 201.2°F)	Discontinuity
2	more than 95°C (more than 203°F)	Continuity
3*	100 to 91°C (212 to 195.8°F)	Continuity
4*	less than 90°C (less than 194°F)	Discontinuity

*When the water begins boiling in tests 3 and 4, stop heating the water and allow it to cool down, then start the test again.

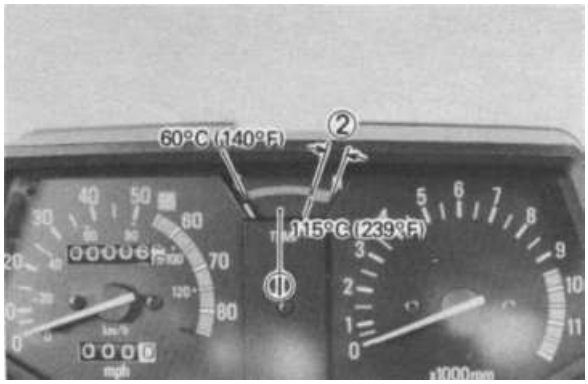


1. Temperature gauge 2. Thermostatic switch
3. Pocket tester

3. Install the thermostatic switch, and torque the switch to specification.

Tightening torque:
15NM (1.5 m-kg, 11 ft-lb)

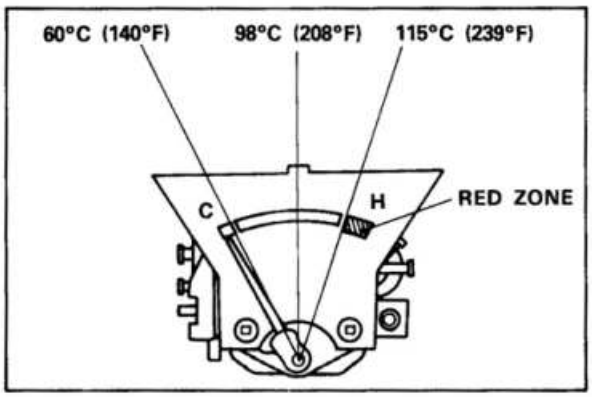
Engine temperature gauge



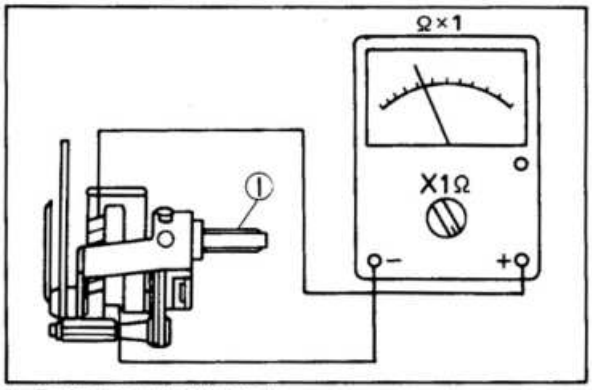
An electronic temperature gauge is equipped to indicate the engine operating temperature. This engine temperature gauge consists of a temperature indicator, a thermo-unit, and an indicator unit mounted on the T-joint.

Inspection

1. The meter reading and the temperature show the following relationship:



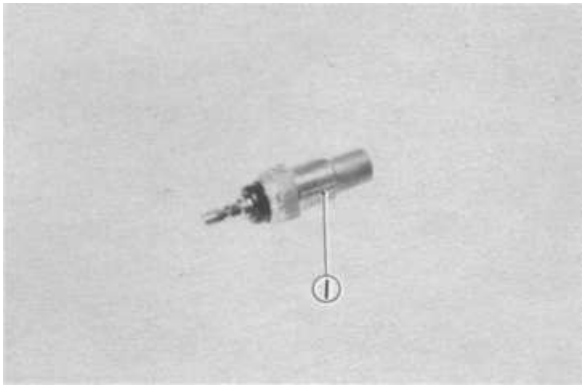
2. Remove the engine temperature gauge from the instrument panel and measure the resistance of the heat coil. If the resistance measured is out of specification, replace the engine temperature gauge.



1. Engine temperature gauge

Heat coil resistance:
55±2nat20°C(68°F)

Thermo-unit

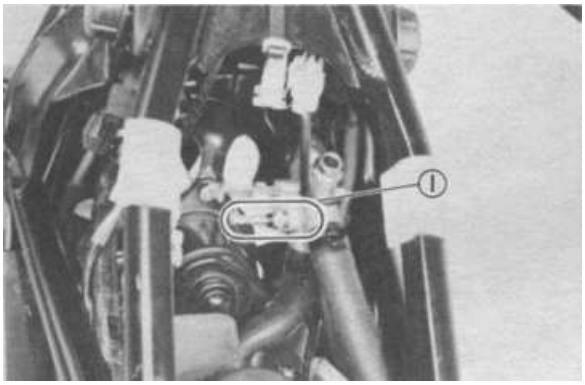


1. Thermo-unit

Thermo-unit changes its resistance in a way that at higher temperatures, it has less resistance and thus passes more current. When more current flows to the coil in the engine temperature gauge, the armature to which the needle is attached is attracted by the increased magnetic field. In this way, the needle indicates the temperature.

Inspection

1. Remove the thermo-unit from the T-joint.



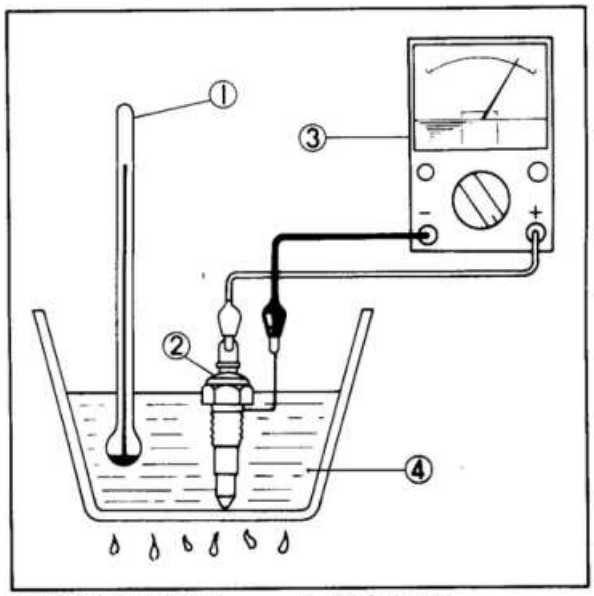
1.Thermo-unit

2. Immerse the thermo-unit in the water as shown. While heating the water and check the resistance at each temperature as tabulated. If the resistance measured is out of specification, the thermo-unit is faulty. It should be replaced.

WARNING:

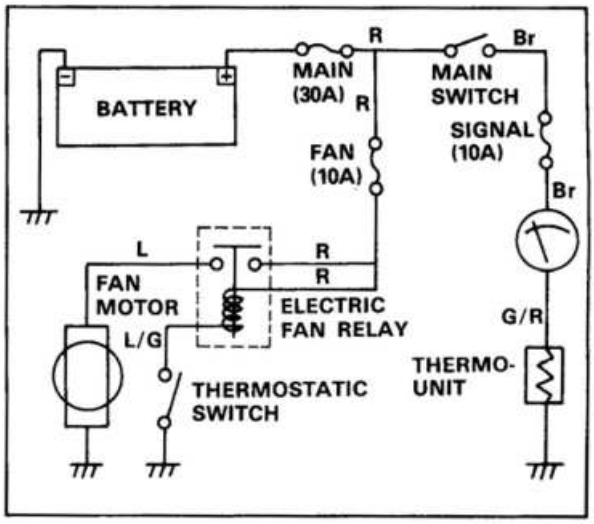
Handle the thermo-unit with special care. Never let it drop or give it a strong shock. Should it be dropped, it must be replaced.

Water Temperature	50°C (122°F)	80°C (176°F)	100°C (212°F)
Resistance	153.9Ω	47.5 ~ 56.8Ω	26.2 ~ 29.3Ω



1. Temperature gauge
2. Thermo-unit
3. Pocket tester
4. Water

Troubleshooting

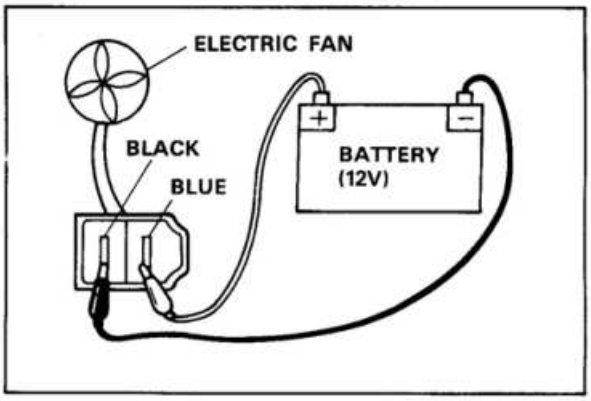


Electric fan

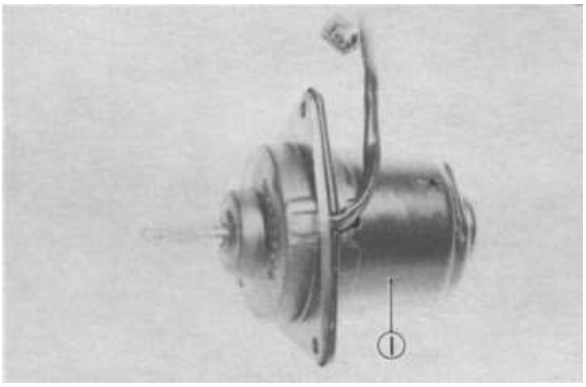
NOTE:

If the electric fan will not turn at coolant temperatures of 91°C (195.8°F) to 101°C (213.8°F):

1. Check the wire connections. Repair if necessary.
2. Disconnect the electric fan connector, and connect the battery (12V) to the electric fan connector as shown.



3. If the electric fan operates, the electric fan is in good condition and if not, replace the electric fan motor assembly.



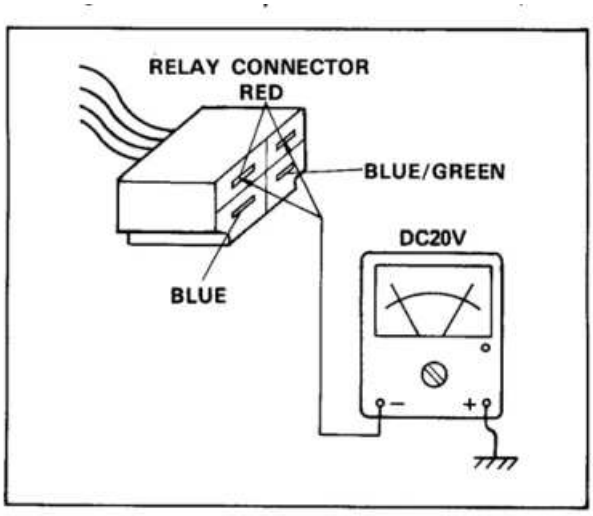
1. Motor assembly

Thermostatic switch and electric fan relay

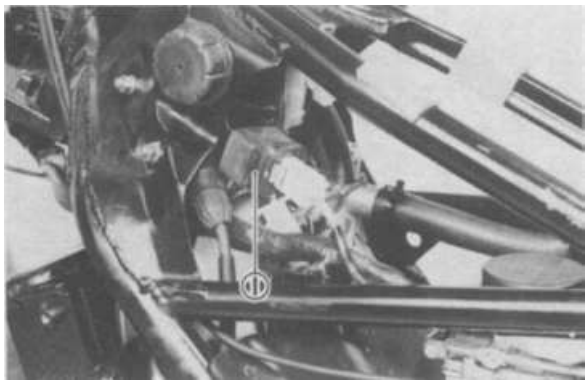
NOTE:

The electric fan is in good condition, but it does not turn when the coolant temperature rises:

1. Disconnect the electric fan relay connector, and check the voltage (12V) of the red leads as shown below. If no voltage is measured, check the red leads.



2. Disconnect the blue/green lead of the thermostatic switch and ground it to the motor body.
   If the electric fan turns, it is in good condition and instead, the thermostatic switch is considered to be faulty. Replace it and check that the fan rotates.
3. If the fan does not turn with the thermostatic switch lead being grounded to the engine body, check if the fan relay clicks when the relay lead is grounded.
   If not, replace the relay and make a check again before replacing the thermostatic switch.



1. Electric fan relay

4. Replace the thermostatic switch with a new one, as necessary, and tighten it to specification.

Tightening torque:
15 Nm (1.5m-kg, 11.0ft-lb)

CAUTION:

After replacing the thermostatic switch,check the coolant level in the radiator and also check for any leakage.

Engine temperature gauge and thermo-unit

1. Turn on the main switch.
2. Disconnect the lead (green/red) of the thermostatic switch and ground it to the engine body. Check if the engine temperature gauge needle swings from 0 to the red zone when the lead is grounded.

WARNING:

When the engine temperature gauge needle swings into the red zone, stop grounding of the lead (green/red) immediately.)

3. When the engine temperature gauge needle swings to the red zone, the engine temperature gauge is in good condition but the thermo-unit is considered to be faulty. Replace the thermo-unit. If the needle fails to swing to the red zone, replace the engine temperature gauge.
4. After replacing the thermo-unit, tighten it to specification.

Tightening torque:
15 Nm (1.5m-kg, 11.0ft-lb)

CAUTION:

After replacing the thermo-unit, check the coolant level in the radiator and also check for any leakage.

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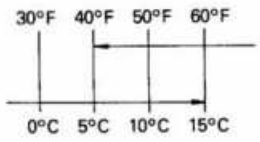
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APPENDICES

SPECIFICATIONS

1. GENERAL SPECIFICATIONS

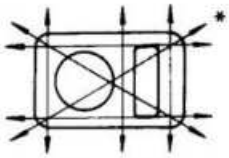
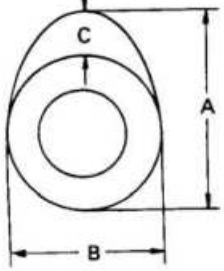
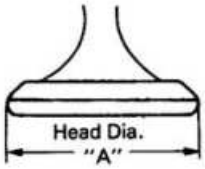
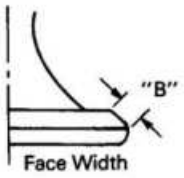
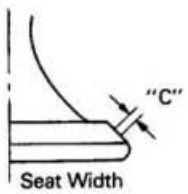
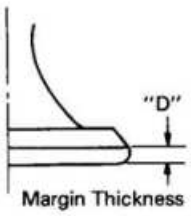
Model	XZ550RJ
Model Code Number	11H
Federal V.I.N. Number	JYA11H00 * CA000-101
Frame Starting Number	11H-000101
Engine Starting Number	11H-000101
Dimensions:	
Overall Length	2,120 mm (83.5 in)
Overall Width	845 mm (33.3 in)
Overall Height	1,110 mm (43.7 in)
Seat Height	780 mm (30.7 in)
Wheelbase	1,445 mm (56.9 in)
Minimum Ground Clearance	135 mm (5.3 in)
Basic Weight:	
With Oil and Full Fuel Tank	212 kg (467 lb)
Minimum Turning Radius	2,700 mm (106.3 in)
Engine:	
Engine Type	Liquid cooled, 4-stroke, gasoline, DOHC
Cylinder Arrangement	V-2 cylinder
Displacement	552 cm^3
Bore × Stroke	80.0 × 55.0 mm (3.150 × 2.165 in)
Compression Ratio	10.5 : 1
Compression Pressure	980.7 kPa (10 kg/cm^2, 142.2 psi) at 300 r/min
Starting System	Electric starter
Lubrication System	Wet sump
Oil Type or Grade	
Engine oil	 Yamalube 4-cycle oil or SAE 20W40 type SE motor oil (If temperature does not go below 5°C (40°F)) SAE 10W30 type SE motor oil (If temperature does not go above 15°C (60°F))
Middle/Final Gear Oil	SAE 80 API "GL-4" Hypoid gear oil
Oil Capacity	
Engine oil	
Periodic Oil Change	2.4 L (2.1 Imp qt, 2.5 US qt)
With Oil Filter Replacement	2.7 L (2.4 Imp qt, 2.9 US qt)
Total Amount	3.4 L (3.0 Imp qt, 3.6 US qt)
Final Gear Case Oil Amount	0.2 L (0.18 Imp qt, 0.21 US qt)
Coolant Capacity (Including All Routes)	2.3 L (2.0 Imp qt, 2.4 US qt)
Air Filter	Dry type element

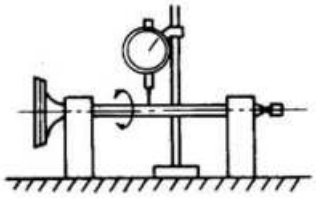
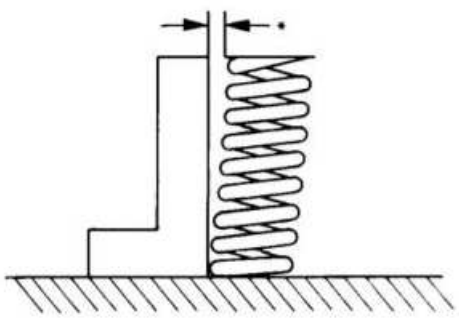
Model	XZ550RJ	
Fuel		
Type	Regular gasoline	
Tank Capacity	17 L (3.7 Imp gal, 4.5 US gal)	
Reserve Amount	2.7 L (0.6 Imp gal, 0.7 US gal)	
Carburetor		
Type/Manufacturer/Quantity	BD34/MIKUNI/2	
Spark Plug		
Type/Manufacturer	D8EA (NGK), or X24ES-U (NIPPON DENSO)	
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in)	
Clutch Type	Wet, multiple-disc	
Transmission:		
Primary Reduction System	Gear	
Primary Reduction Ratio	73/33 (2.212)	
Secondary Reduction System	Shaft drive	
Secondary Reduction Ratio	19/18 × 32/11 (3.070)	
Transmission Type	Constant mesh, 5-speed	
Operation	Left foot operation	
Gear Ratio		
1st	43/15 (2.866)	
2nd	39/20 (1.950)	
3rd	31/21 (1.476)	
4th	32/27 (1.185)	
5th	29/30 (0.966)	
Chassis:		
Frame Type	Steel tube backbone	
Caster Angle	26° 20′	
Trail	116 mm (4.57 in)	
Tire		
Type	Tubeless	
Size (F)	90/90-18 51H	
Size (R)	110/90-18 61H	
Tire Pressure: (cold tire)	FRONT	REAR
Maximum load limit*	160 kg (350 lb)	257 kg (565 lb)
Up to 90 kg (198 lb) load**	177 kPa (1.8 kg/cm², 26 psi)	196 kPa (2.0 kg/cm², 28 psi)
90 kg (198 lb) load ~ 140 kg (308 lb) load**	196 kPa (2.0 kg/cm², 28 psi)	225 kPa (2.3 kg/cm², 32 psi)
140 kg (308 lb) load ~ 195 kg (429 lb) load** (Maximum load)	225 kPa (2.3 kg/cm², 32 psi)	275 kPa (2.8 kg/cm², 40 psi)
High speed riding	196 kPa (2.0 kg/cm², 28 psi)	225 kPa (2.3 kg/cm², 32 psi)
Minimum tire tread depth	0.8 mm (0.03 in)	0.8 mm (0.03 in)
*Total weight of the motorcycle with accessories, etc. **Total weight of accessory, etc. excepting motorcycle.		
Brake		
Front Brake Type	Single disc brake	
Operation	Right hand operation	
Rear Brake Type	Drum brake	

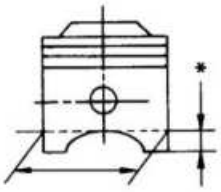
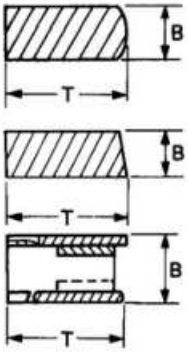
Model	XZ550RJ
Operation	Right foot operation
Suspension	
Front Suspension	Telescopic fork
Rear Suspension	Swingarm (Monocross suspension)
Shock Absorber	
Front Shock Absorber	Coil spring, Oil damper
Rear Shock Absorber	Gas, Coil spring, Oil damper
Wheel Travel	
Front Wheel Travel	140 mm (5.5 in)
Rear Wheel Travel	90 mm (3.5 in)
Electrical:	
Ignition System	T.C.I.
Generator System	A.C. generator
Battery Type or Model	YB14L
Battery Capacity	12V 14AH
Headlight Type	Semi-sealed beam (Quartz bulb)
Bulb Wattage/Quantity	
Headlight	65W/60W
Tail/Brake Light	8W/27W×2
Flasher Light	27W×4
License Light	3.8W×2
Indicator light Wattage/Quantity	
"METER LIGHT"	3.4W×2
"NEUTRAL"	3.4W×1
"HIGH BEAM"	3.4W×1
"OIL"	3.4W×1
"TURN"	3.4W×2

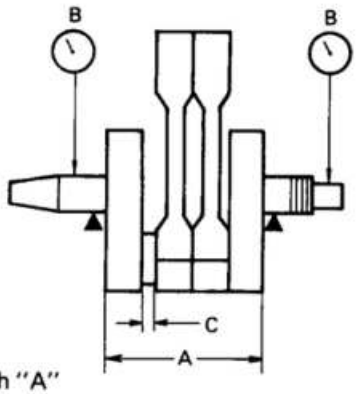
II. MAINTENANCE SPECIFICATIONS

ENGINE

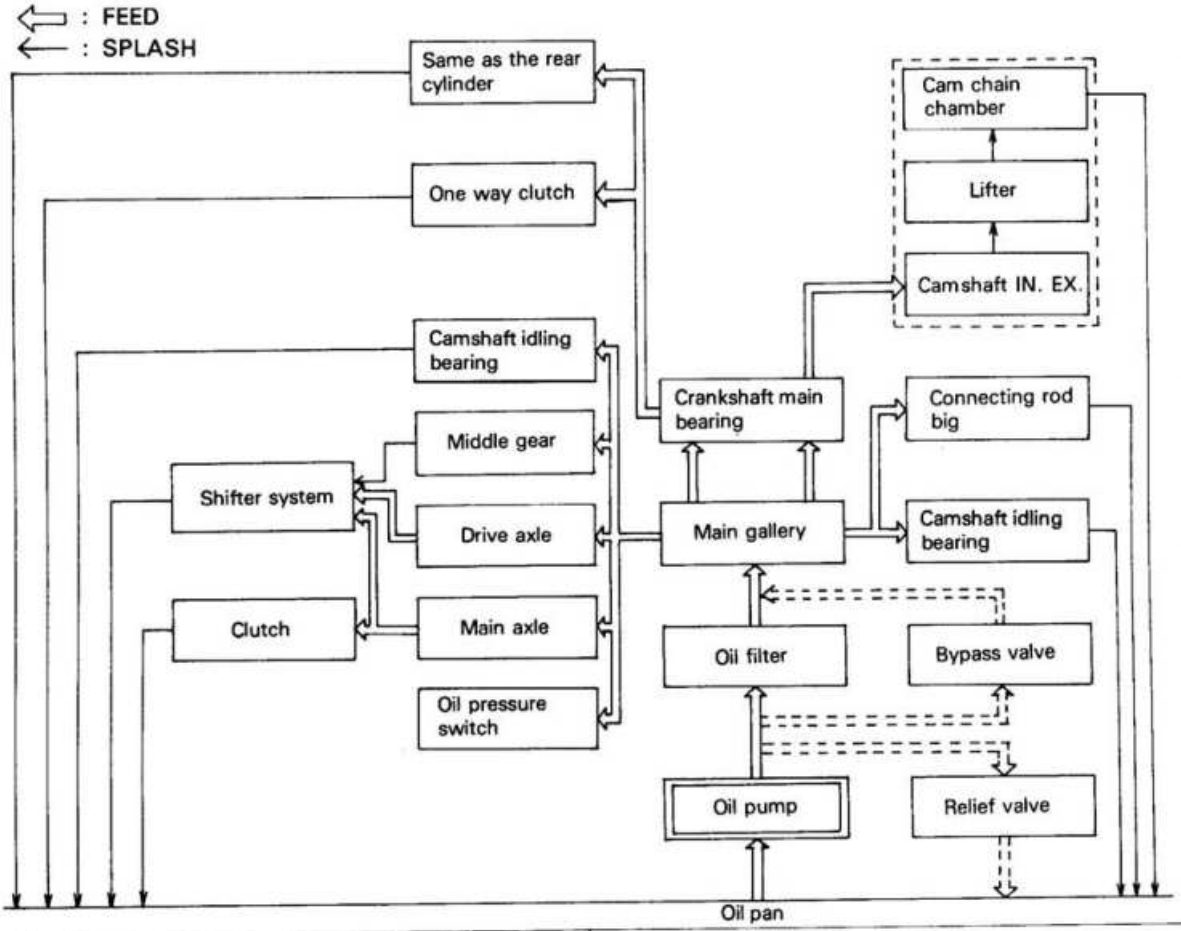
Model		XZ550RJ
Cylinder Head Warp Limit		<0.03 mm (0.0012 in)> *Lines indicate straightedge measurement
Cylinder Bore Size Taper Limit Out-of-round Limit		80 mm (3.150 in) <0.005 mm (0.0002 in)> <0.01 mm (0.0004 in)>
Camshaft Drive Method Cam Cap Inside Diameter Camshaft Outside Diameter Shaft-to-cap Clearance Cam Dimensions		Chain drive $25^{+0.021}_{0}$ mm ($0.984^{+0.0008}_{0}$ in) $25^{-0.020}_{-0.040}$ mm ($0.984^{-0.0008}_{-0.0016}$ in) 0.020 ~ 0.061 mm (0.0008 ~ 0.0024 in)
Intake	"A"	36.80 ± 0.05 mm (1.449 ± 0.002 in)
	"B"	28.341 ± 0.05 mm (1.116 ± 0.002 in)
	"C"	8.80 mm (0.346 in)
Exhaust	"A"	36.30 ± 0.05 mm (1.429 ± 0.002 in)
	"B"	28.319 ± 0.05 mm (1.115 ± 0.002 in)
	"C"	8.3 mm (0.327 in)
Camshaft Runout Limit		<0.03 mm (0.0012 in)>
Cam Chain Type/Number of Links		7.9-010/112 Links
Cam Chain Adjustment Method		Automatic
Valve, Valve Seat, Valve Guide Valve Clearance (Cold)		
	IN.	0.11 ~ 0.15 mm (0.0043 ~ 0.0059 in)
	EX.	0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in)
Valve Dimensions		
		
		
"A" Head Dia.	IN.	31 mm (1.22 in)
	EX.	26 mm (1.02 in)
"B" Face Width	IN.	2.3 mm (0.09 in)
	EX.	2.3 mm (0.09 in)
"C" Seat Limit Width	IN.	1 ± 0.1 mm (0.04 ± 0.004 in)
	EX.	1 ± 0.1 mm (0.04 ± 0.004 in)

Model		XZ550RJ
"D" Margin Thickness Limit		
	IN.	1 ± 0.2 mm (0.04 ± 0.008 in)
	EX.	1 ± 0.2 mm (0.04 ± 0.008 in)
Stem Outside Diameter		
	IN.	$6^{-0.010}_{-0.025}$ mm ($0.24^{-0.0004}_{-0.0010}$ in)
	EX.	$6^{-0.025}_{-0.040}$ mm ($0.24^{-0.0010}_{-0.0016}$ in)
Guide Inside Diameter		
	IN.	$6^{+0.012}_{0}$ mm ($0.24^{+0.0005}_{0}$ in)
	EX.	$6^{+0.012}_{0}$ mm ($0.24^{+0.0005}_{0}$ in)
Stem-to-guide Clearance		
	IN.	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)
	EX.	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)
Stem Runout Limit		<0.01 mm (0.0004 in)>
		
Valve Seat Width Standard		1 ± 0.1 mm (0.039 ± 0.0039 in)
Valve Spring		
Free Length		
Inner Spring	IN.	36.17 mm (1.424 in)
	EX.	36.17 mm (1.424 in)
Outer Spring	IN.	36.63 mm (1.442 in)
	EX.	36.63 mm (1.442 in)
Compressed Length (Valve Closed)		
Inner Spring	IN.	30.5 mm (1.20 in)
	EX.	30.5 mm (1.20 in)
Outer Spring	IN.	32.0 mm (1.26 in)
	EX.	32.0 mm (1.26 in)
Tilt Limit*		
Inner Spring	IN. & EX.	2.5° or 1.6 mm (0.063 in)
Outer Spring	IN. & EX.	2.5° or 1.6 mm (0.063 in)
		

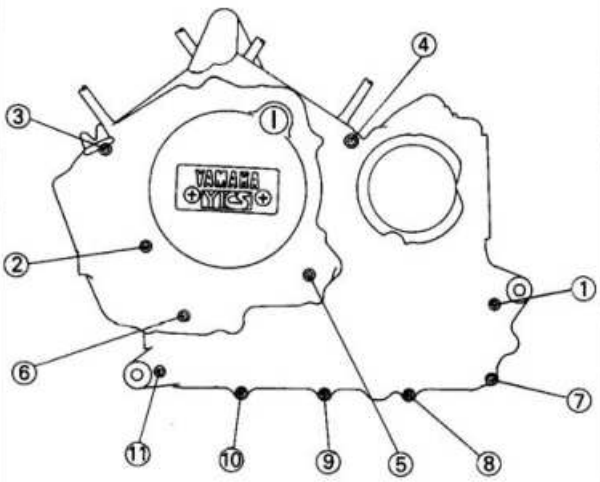
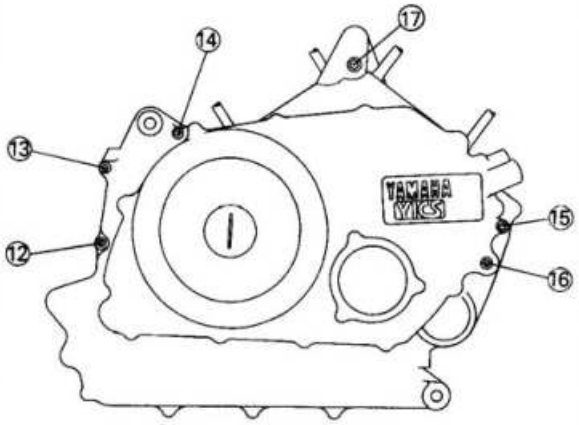
Model	XZ550RJ	
Direction of Winding (Top view)	Intake	Exhaust
	Outer Spring 	Outer Spring 
Piston Piston Size/ Measuring Point*  Piston Clearance Oversize 1st 2nd 3rd 4th	$80^{-0.040}_{-0.060}$ mm ($3.15^{-0.0016}_{-0.0024}$ in)/ *11 mm (0.43 in) (From bottom line of piston skirt) 0.050 ~ 0.070 mm (0.0020 ~ 0.0028 in) 80.25 mm (3.159 in) 80.50 mm (3.169 in) 80.75 mm (3.179 in) 81.00 mm (3.189 in)	
Piston Ring Sectional Sketch  Top Ring 2nd Ring Oil Ring with expander End Gap (Installed) Top Ring 2nd Ring Oil Ring Side Clearance Top Ring 2nd Ring Oil Ring	Barrel $B = 1.2^{-0.01}_{-0.03}$ mm ($0.047^{-0.0004}_{-0.0012}$ in) T = 3.3 ± 0.1 mm (0.130 ± 0.0039 in) Taper $B = 1.5^{-0.01}_{-0.03}$ mm ($0.059^{-0.0004}_{-0.0012}$ in) T = 3.6 ± 0.1 mm (0.142 ± 0.0039 in) $B = 2.8^{+0.03}_{+0.01}$ mm ($0.110^{+0.0012}_{+0.0004}$ in) T = 3.4 ± 0.2 mm (0.134 ± 0.0079 in) 0.3 ~ 0.5 mm (0.012 ~ 0.020 in) 0.3 ~ 0.5 mm (0.012 ~ 0.020 in) 0.3 ~ 0.9 mm (0.012 ~ 0.035 in) 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in) 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in) 0 mm (0 in)	
Connecting Rod Oil Clearance Color Code (Corresponding Size)	0.035 ~ 0.054 mm (0.0014 ~ 0.0021 in) 1. Blue ($1.5^{+0.001}_{-0.003}$) 2. Black ($1.5^{-0.003}_{-0.007}$) 3. Brown ($1.5^{-0.007}_{-0.011}$) 4. Green ($1.5^{-0.011}_{-0.015}$) 5. Yellow ($1.5^{-0.015}_{-0.019}$)	

Model	XZ550RJ
Crankshaft	
	
Crank Width "A"	104 mm (4.1 in)
Runout Limit "B"	<0.002 mm (0.0008 in)>
Big end side clearance "C"	0.32 ~ 0.424 mm (0.013 ~ 0.017 in)
Oil clearance (Journal)	0.020 ~ 0.062 mm (0.0008 ~ 0.0024 in)
Main bearing over size	
Color Code (Corresponding Size)	1. Red 2. Black $(49^{+0.010}_{0})$ $(49^{+0.020}_{+0.010})$
Position of Thrust Bearing	No
Balancer Drive Method	Gear
Clutch	
Friction Plate Thickness/Quantity	2.8 ± 0.08 mm (0.11 ± 0.003 in)/8
Wear Limit	<2.6 mm (0.10 in)>
Clutch Plate Thickness/Quantity	1.6 mm (0.06 in)/7
Warp Limit	<0.2 mm (0.008 in)>
Clutch Spring Free Length/Quantity	41.2 mm (1.62 in)/5
Clutch Spring Minimum Length	<41.2 mm (1.62 in)>
Primary Reduction Gear	0.009 ~ 0.073 mm (0.0004 ~ 0.0029 in)
Backlash Tolerance	
Clutch Release Method	Inner push (Cam push)
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)>
Shifter	
Shifter Type	Guide bar
Carburetor	
Type/Manufacturer/Quantity	BD34/MIKUNI/2
I.D. Mark	11H-01
Main Jet (M.J.)	Front: 122.5 Rear: 127.5
Main Air Jet (M.A.J.)	ø1.8
Throttle valve (T.V.)	#120
Pilot Jet (P.J.)	#60
Pilot Air Jet (P.A.J.)	#130
Pilot Screw (P.S.)	Preset

Model	XZ550RJ
Valve Seat (V.S.)	ø1.8
Starter Jet ($G.S._1$)	#55
Starter Jet ($G.S._2$)	ø0.8
Fuel Level (F.L.)	20 ± 1 mm (0.79 ± 0.04 in)
Float Height (F.H.)	36 ± 1 mm (1.72 ± 0.04 in)
Engine Idling Speed	1,300 ± 50 r/min
Vacuum Pressure at Idling Speed	Above 180 mm Hg (7.09 in Hg)
Vacuum Synchronous Difference	Below 10 mm Hg (0.39 in Hg)
Lubrication System:	
Oil Filter Type	Paper mesh
Oil Pump Type	Trochoid pump
Tip Clearance	0.12 mm (0.0047 in)
Side Clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Bypass Valve Setting Pressure	98.07 ± 19.61 kPa (1.0 ± 0.2 kg/cm², 14.2 ± 2.8 psi)
Relief Valve Operating Pressure	392.3 ± 49 kPa (4.0 ± 0.5 kg/cm², 56.9 ± 7.1 psi)
Lubrication Chart	



Middle Gear Backlash <Limit>	0.10 ~ 0.20 mm (0.004 ~ 0.008 in) <0.25 mm (0.010 in)>
Final Gear Backlash <Limit>	0.10 ~ 0.20 mm (0.004 ~ 0.008 in) <0.25 mm (0.010 in)>

Model	XZ550RJ
Crankcase Tightening Sequence Left case 	Right case 

Tightening torque		Thread Size	Q'ty	Nm	m·kg	ft·lb	Remarks
Cylinder nut	Nut	M10×1.25	4	50	5.0	36.2	Apply oil
head nut	Nut	M8×1.25	1	20	2.0	14.5	
head bolt	Stud bolt	M8×1.25	2	10	1.0	7.2	
Spark plug	—	M12×1.25	2	20	2.0	14.5	
Camshaft cap	Bolt	M6	12	10	1.0	7.2	
Cylinder head cover	Bolt	M6	4	10	1.0	7.2	
Cap	Screw	M6	2	6	0.6	4.3	
Cylinder head	Stud bolt	M8	1	15	1.5	11.0	Apply oil
Hose joint	Bolt	M6	4	10	1.0	7.2	
Drain bolt	Plug	M6	2	7	0.7	5.1	
YICS chamber	Screw	M6	1	10	1.0	7.2	
Connecting rod, big end	Nut	M8×0.75	4	38	3.8	27.0	Apply bolybdenum disulfide grease
Balancer drive gear	Nut	M40×1.0	1	100	10.0	72.0	Use lock washer
Primary drive gear	Nut	M16×1.0	1	60	6.0	43.0	Use lock washer
ACG roter	Bolt	M10×1.25	1	80	8.0	58.0	
Cam sprocket	Bolt	M10×1.25	4	70	7.0	50.0	
Timing gear shaft stopper	Bolt	M6	2	12	1.2	8.7	
Tensioner assembly	Bolt	M6	4	12	1.2	8.7	
Chain guide #2 (Upper)	Cap nut	M6	2	7	0.7	5.1	
Chain guide #2 (Lower)	Bolt	M6	4	8	0.8	5.8	
Water pump cover	Bolt	M6	4	10	1.0	7.2	
Drain bolt	Plug	M14×1.5	1	10	1.0	7.2	
Thermostatic valve cover	Screw	M6	2	7	0.7	5.1	
Radiator assembly	Bolt	M6	3	7	0.7	5.1	
Radiator cover	Screw	M5	4	5	0.5	3.6	
Oil pump assembly	Screw	M6	1	7	0.7	5.1	
	Bolt	M6	3	10	1.0	7.2	
Strainer housing	Bolt	M6	2	10	1.0	7.2	
Air filter cover	Bolt	M6	3	10	1.0	7.2	
Oil delivery pipe	Union bolt	M8×1.25	1	18	1.8	13.0	
Oil drain plug	Plug	M14×1.5	1	43	4.3	31.0	
Carburetor joint		M6	4	12	1.2	8.7	
Exhaust pipe flange	Bolt	M6	8	10	1.0	7.2	
Exhaust pipe & muffler	Bolt	M8×1.25	3	20	2.0	14.0	
Exhaust pipe clamp	Bolt	M6	2	10	1.0	7.2	
Crankcase	Bolt	M6×1.0	16	10	1.0	7.2	
	Nut	M10×1.25	1	30	3.0	22.0	From left side
Bearing cover plate	Screw	M8	4	25	2.5	18.0	
Cylinder stud bolt	Stud bolt	M10×1.25	8	20	2.0	14.0	Apply oil
Crankcase cover (Left)	Bolt	M6	10	10	1.0	7.2	
Middle gear cover	Bolt	M8	6	24	2.4	17.0	

Tightening torque		Thread Size	Q'ty	Nm	m·kg	ft·lb	Remarks
Crankcase cover (Right)	Bolt	M6	11	10	1.0	7.2	
Engine mounting bracket	Flange bolt	M6	2	10	1.0	7.2	
Starter one way clutch	Bolt	M8×1.25	3	20	2.0	14.0	Apply LOCTITE
Primary drive gear	Nut	M16×1.0	1	70	7.0	50.0	Use lock washer
Clutch plate	Flange bolt	M6	5	8	0.8	5.8	
Clutch boss	Nut	M20×1.0	1	70	7.0	50.0	Use lock washer
Middle gear (Drive pinion)	Nut	M18×1.0	1	110	11.0	80.0	
Bearing housing	Flange bolt	M8×1.25	3	25	2.5	18.0	
Joint yoke	Nut	M14×1.5	1	100	10.0	72.0	Gear lash adjustment
Segment	Screw	M6	1	12	1.2	8.7	Apply LOCTITE
Change pedal	Bolt	M6	1	10	1.0	7.2	
Startor motor assembly	Bolt	M6	2	10	1.0	7.2	
Stator assembly	Screw	M6	3	7	0.7	5.1	
Pickup assembly	Screw	M6	3	7	0.7	5.1	
Thermostatic switch	—	—	1	15	1.5	11.0	
Thermo-unit	—	—	1	15	1.5	11.0	

CHASSIS

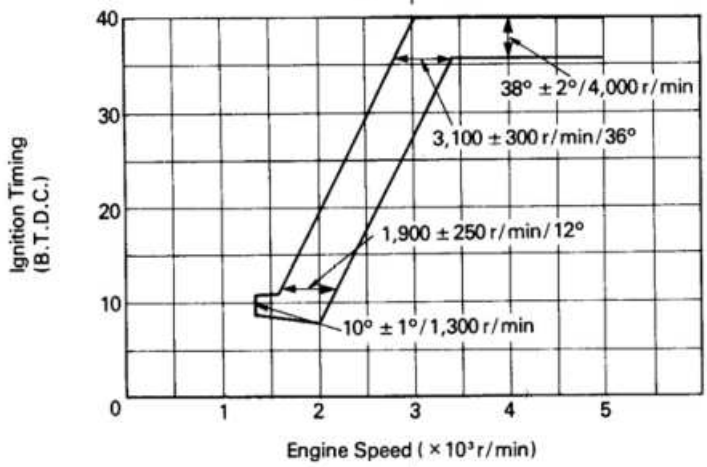
Model	XZ550RJ
Steering System	
Steering Bearing Type	Ball Bearing
No./Size of Steel Balls	
Upper	19 pcs/1/4 in
Lower	19 pcs/1/4 in
Front Suspension	
Front Fork Travel	140 mm (5.5 in)
Fork Spring Free Length	461 mm (22.1 in)
Spring Rate/Stroke	K_1 = 49 N/mm (0.5 kg/mm, 28.0 lb/in) 0 ~ 140 mm (0 ~ 5.5 in)
Optional Spring	No.
Oil Capacity or	257 cm³ (9.01 Imp oz, 8.7 US oz)
Oil Level	152 mm (6.0 in) (From top of inner tube fully compressed without spring.)
Oil Grade	Yamaha fork oil 15wt
Rear Suspension	
Shock Absorber Travel	55 mm (2.2 in)
Spring Free Length	219 mm (8.6 in)
Spring Rate/Stroke	K_1 = 73.6 N/mm (7.5 kg/mm, 420.0 lb/in) 0 ~ 27.5 mm (0 ~ 1.1 in) K_2 = 105.9 N/mm (10.8 kg/mm, 604.6 lb/in) 27.5 ~ 55 mm (1.1 ~ 2.2 in)
Optional Spring	No.
Spring preload STD position	2
Enclosed Gas Pressure	1,471 kPa (15 kg/cm², 213 psi)
Max. ~ Min.	<1,569 ~ 1,373 kPa (16 ~ 14 kg/cm², 228 ~ 199 psi)>
Rear Arm	
Swing Arm Free Play Limit	
Side	0.1 ~ 0.3 mm (0.004 ~ 0.012 in)
Wheel	
Front Wheel Type	Cast Wheel
Rear Wheel Type	Cast Wheel
Front Rim Size/Material	1.85 × 18/Aluminum
Rear Rim Size/Material	2.15 × 18/Aluminum
Rim Runout Limit	
Vertical	<2.0 mm (0.08 in)>
Lateral	<2.0 mm (0.08 in)>
Disc Brake	
Type Front	Single disc
Outside Dia × Thickness	
Front	298 × 5 mm (11.7 × 0.2 in)
Pad Thickness	
<Limit> Inner	6.8 mm (0.27 in) <0.8 mm (0.03 in)>
Outer	6.8 mm (0.27 in) <0.8 mm (0.03 in)>
Master Cylinder Inside Dia.	
Front	12.7 mm (0.47 in)
Caliper Cylinder Inside Dia.	
Front	38.1 mm (1.5 in)
Brake Fluid Type	DOT #3

Model	XZ550RJ
Drum Brake	
Type	
Rear	Leading and trailing
Drum Inside Dia.	
<Limit>	
Rear	180 mm (7.09 in) <181 mm (7.13 in)>
Brake Lever & Brake Pedal	
Brake Lever Free Play/position	5 ~ 8 mm (0.2 ~ 0.3 in)/at lever end
Brake Pedal Position	15 ~ 20 mm (0.60 ~ 0.79 in) (Vertical height below footrest top)
Brake Pedal Free Play	15 ~ 20 mm (0.60 ~ 0.98 in)
Clutch Lever Free Play/position	2 ~ 3 mm (0.08 ~ 0.12 in)/at lever pivot

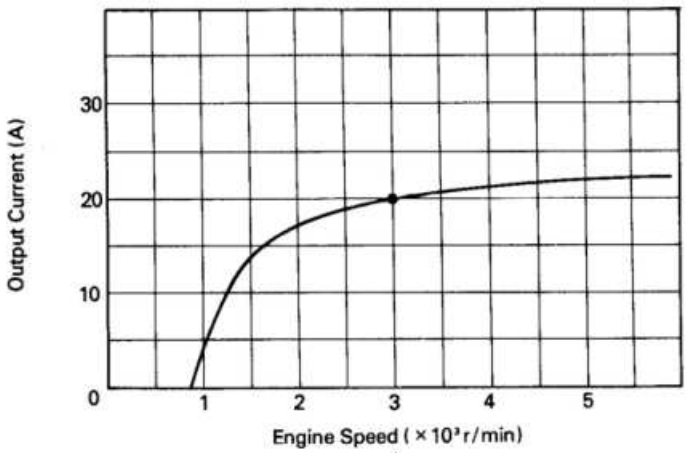
Tightening torque		Thread Size	Q'ty	Nm	m·kg	ft·lb	Remarks
Front axle shaft	Nut	M14×1.5	1	110	11.0	80.0	
Front fender & front fork	Bolt	M8×1.25	4	10	1.0	7.2	
Under bracket pinch bolt	Bolt	M12×1.25	2	38	3.8	27.0	
Handle crown pinch bolt	Bolt	M8×1.25	4	20	2.0	14.0	
Steering shaft	Bolt	M14×1.25	1	54	5.4	39.0	
Caliper glinder	Bolt	M10×1.25	2	35	3.5	25.0	
Front axle shaft pinch bolt	Bolt	M8×1.25	1	20	2.0	14.0	
Handle & handlebar (center)	Bolt	M8×1.25	2	20	2.0	14.0	
(side)	Special bolt	M6×1.0	2	13	1.3	9.4	
Front fork cylinder securing bolt	Bolt	M8×1.25	2	26	2.6	19.0	Apply LOCTITE
Front brake hose	Union bolt	M10×1.25	2	26	2.6	19.0	
Caliper air bleed	Screw	M8×1.25	2	6	0.6	4.3	
Engine mounting crankcase center	Bolt	M10×1.25	2	50	5.0	37.0	
crankcase rear upper	Nut	M10×1.25	2	48	4.8	35.0	
crankcase rear under	Nut	M12×1.25	2	70	7.0	50.0	
upper bracket	Bolt	M8×1.25	2	20	2.0	14.0	
Down tube frame	Bolt	M8×1.25	4	26	2.6	19.0	
Rear shock absorber	Bolt	M10×1.25	1	25	2.5	18.0	
Muffler bracket & frame	Bolt	M10×1.25	4	42	4.2	30.0	
Pivot shaft	Bolt	M16×1.5	1	78	7.8	56.0	Use lock washer
Final gear case & rear arm (side)	Nut	M10×1.25	1	42	4.2	18.0	
	Nut	M10×1.25	4	42	4.2	18.0	
Rear axle shaft	Nut	M14×1.5	1	110	11.0	80.0	
Bracket sidestand	Nut	M10×1.25	1	55	5.5	40.0	
Tension bar & rear arm	Nut	M8×1.25	1	20	2.0	14.0	
Tension bar & brake shoe plate	Nut	M8×1.25	1	20	2.0	14.0	
Master cylinder cap	Screw	M4×0.7	4	1	0.1	0.7	
Master cylinder bracket	Bolt	M6×1.0	2	9	0.9	65.0	
Rear fender frame	Bolt	M8×1.25	2	20	2.0	14.0	
Muffler bracket & passenger footrest	Nut	M10×1.25	2	42	4.2	18.0	
Grab bar (upper)		M6×1.25	2	11	1.1	8.0	
(under)		M8×1.25	2	26	2.6	19.0	

ELECTRICAL

Model	XZ550RJ
Voltage	12V
Ignition System Ignition Timing (B.T.D.C.) Advanced Timing (B.T.D.C.) Advancer Type	 10° at 1,300 r/min 38° at 4,000 r/min Electrical
T.C.I. Pickup Coil Resistance (Color) T.C.I. Unit-Model/Manufacturer	 110 Ω ± 10% at 20°C (68°F) (Red-Black, White-Black) TID12-06/HITACHI
Ignition Coil -Model/Manufacturer Primary Winding Resistance Secondary Winding Resistance	 CM11-55/HITACHI 2.75 Ω ± 10% at 20°C (68°F) 7.9 KΩ ± 20% at 20°C (68°F)
Charging System/Type	A.C. Magneto



Model	XZ550RJ
A.C. Generator Manufacturer Nominal Output	 HITACHI 14V, 20A at 3,000 r/min
Voltage Regulator -Type -Model/ Manufacture -No Load Regulated Voltage	 Semi Conductor SH238-12B/ SHINDENGEN 14.5 ± 0.5V
Rectifier -Model/ Manufacturer	 SH238-12B/ SHINDENGEN
Battery Capacity Specific Gravity	 12V 14AH 1.280
Electric Starter System Type Starter Motor-Model/ Manufacturer -ID. Number -Output Armature Coil Resistance Brush-Overall Length <Limit> -Spring Pressure Commutator Dia. <Wear Limit> -Mica Undercut depth Starter switch Manufacturer Amperage Rating	 Constant mesh type SM-8209/ MITSUBA 0.6 kw 11.5 MΩ ± 10% at 20°C (68 °F) 10 mm (0.4 in) <4.5 mm (0.18 in)> 900 ± 90 g (31.7 ± 3.2 oz) 28 mm (1.10 in) <27 mm (1.06 in)> 1.6 mm (0.06 in) HONDA LOCK 150A



Model	XZ550RJ
Horn	
Type/Quantity	Plain type × 1 pc
Model/Manufacturer	CF-12/NIKKO
Maximum Amperage	2.5A
Flasher Relay	
Type	Condenser type
Model/Manufacturer	FU257CD/NIPPON DENSO
Self Cancelling Device	Yes
Flasher Frequency	85 ± 10 cycle/min
Wattage	27W × 2 + 3.4W
Self Cancelling Unit	
Manufacturer	MATSUSHITA
Oil Pressure Switch	
Model/Manufacturer	KIDFD/NIPPON DENSO
Switch Operating Pressure	29.4 ± 9.8 kPa (0.3 ± 0.1 kg/cm², 4.3 ± 1.4 psi)
Side Stand Relay	Yes
Model/Manufacturer	G2MW-D-3626 (4U8)/TATEISHI
Coil Winding Resistance	100 Ω ± 10% at 20°C (68°F)
Color Code	Blue
Starter Cut-off Relay	Yes
Model/Manufacturer	G2MW-D-3601 (4H7)/TATEISHI
Coil Winding Resistance	100 Ω ± 10% at 20°C (68°F)
Color Code	NO
Electric fan	Yes
Model/Manufacturer	11H/DENSO
Running r/min	2,950 ± 250 r/min
Fan Motor Relay	Yes
Model/Manufacturer	G2MW-D-3660 (5A8)/TATEISHI
Coil Winding Resistance	100 Ω ± 10% at 20°C (68°F)
Coil Code	Red
Thermostatic switch	Yes
Model/Manufacturer	11H/DENSO
Thermo-unit	Yes
Model/Manufacturer	11H/YAMAHA
Amperage for Individual Circuit/Quantity	
Main	20A × 1 pc.
Headlight	10A × 1 pc.
Signal	10A × 1 pc.
Ignition	10A × 1 pc.
Electric fan	10A × 1 pc.

CONSUMER INFORMATION

NOTICE

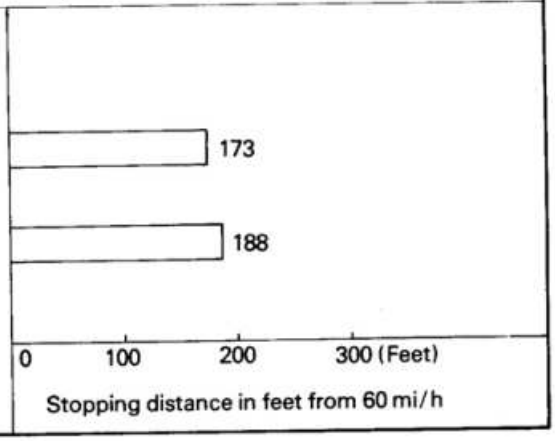
The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions, and the information may not be correct under other conditions.

Stopping distance

These figures indicate braking performance that can be met or exceeded by the vehicles to which they apply, without locking the wheels, under different conditions of loading and with partial failures of the braking system. The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions and the information may not be correct under other conditions.

Description of vehicles to which this table applies.: Yamaha motorcycle XZ550RJ

A. Fully Operational Service Brake

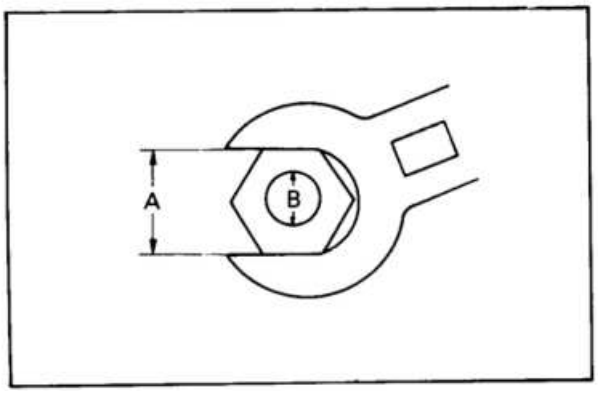


NOTE:
The statement above is required by U.S. Federal law. "Partial failures" of the braking system do not apply to this chart.

GENERAL TORQUE SPECIFICATIONS

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

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

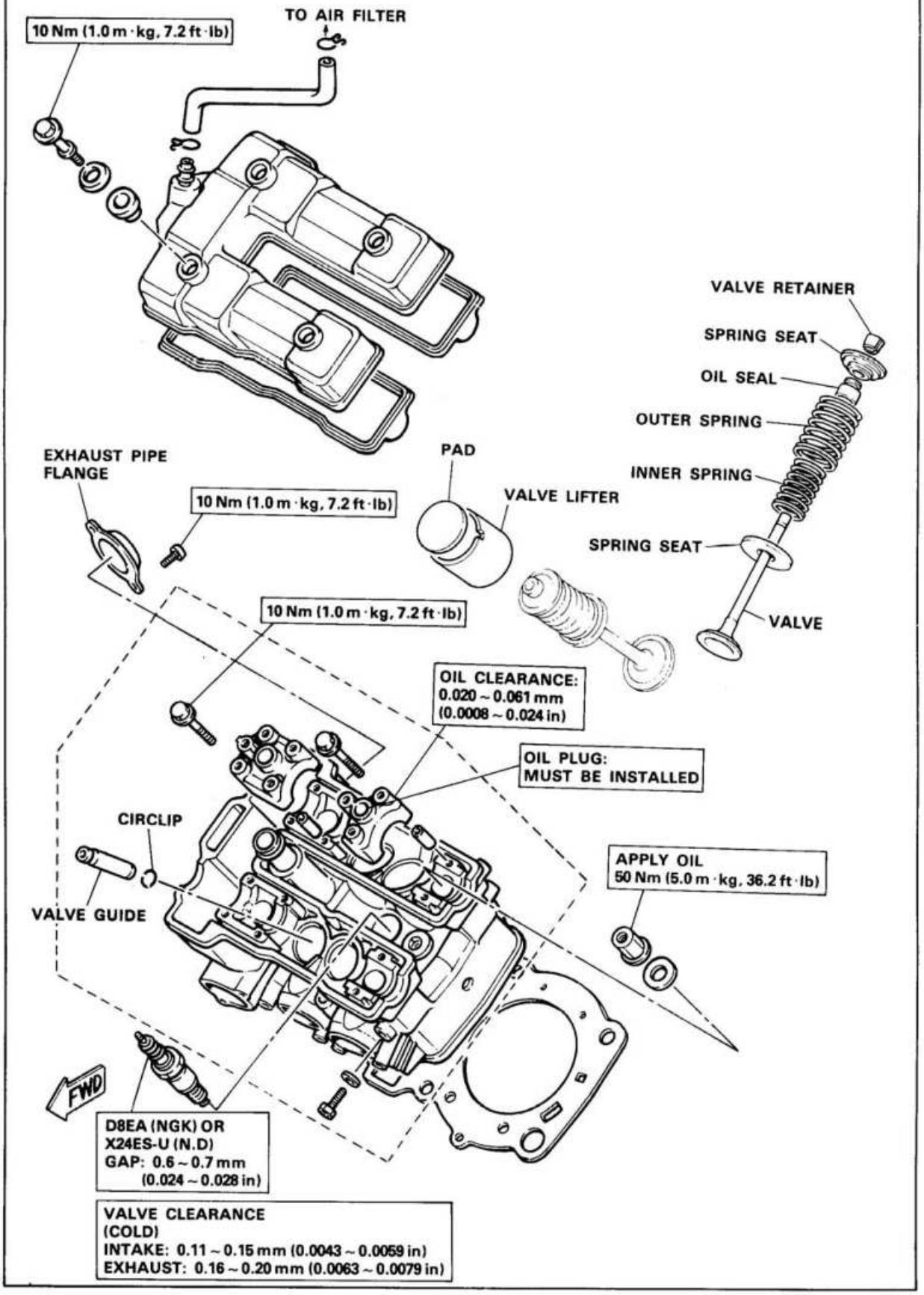
CONVERSION TABLES

Metric to inch system		
Known	Multiplier	Result
m·kg	7.233	ft·lb
m·kg	86.80	in·lb
cm·kg	0.0723	ft·lb
cm·kg	0.8680	in·lb
kg	2.205	lb
g	0.03527	oz
km/lit	2.352	mpg
km/hr	0.6214	mph
km	0.6214	mi
m	3.281	ft
m	1.094	yd
cm	0.3937	in
mm	0.03937	in
cc (cm^{3})	0.03382	oz (US liq)
cc (cm^{3})	0.06102	cu in
lit (liter)	2.1134	pt (US liq)
lit (liter)	1.057	qt (US liq)
lit (liter)	0.2642	gal (US liq)
kg/mm	56.007	lb/in
kg/cm^{2}	14.2234	psi (lb/in^{2})
Centigrade (°C)	9/5 (°C) + 32	Fahrenheit (°F)

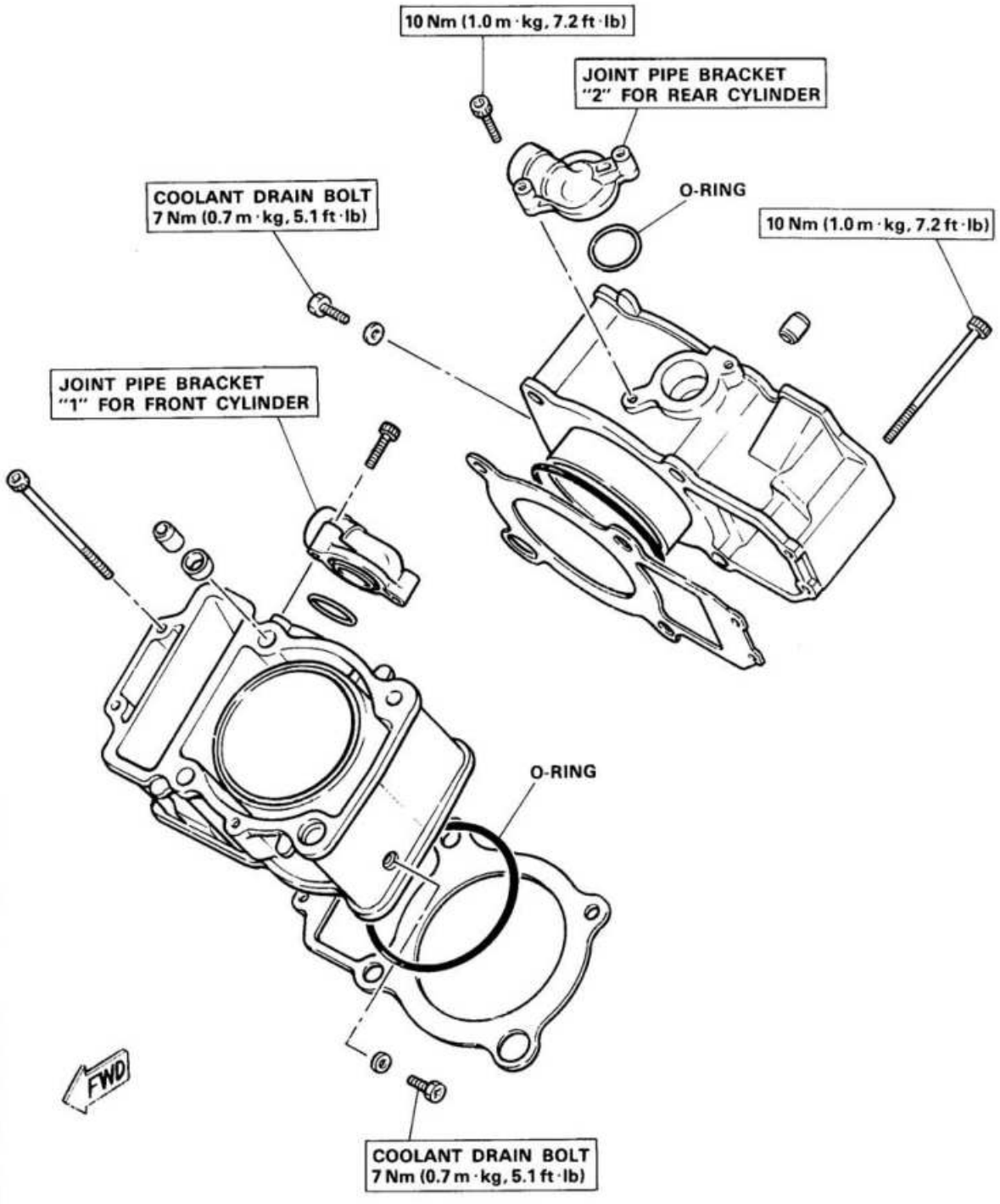
Inch to metric system		
Known	Multiplier	Result
ft·lb	0.13826	m·kg
in·lb	0.01152	m·kg
ft·lb	13.831	cm·kg
in·lb	1.1521	cm·kg
lb	0.4535	kg
oz	28.352	g
mpg	0.4252	km/lit
mph	1.609	km/hr
mi	1.609	km
ft	0.3048	m
yd	0.9141	m
in	2.54	cm
in	25.4	mm
oz (US liq)	29.57	cc (cm^{3})
cu in	16.387	cc (cm^{3})
pt (US liq)	0.4732	lit (liter)
qt (US liq)	0.9461	lit (liter)
gal (US liq)	3.785	lit (liter)
lb/in	0.017855	kg/mm
psi (lb/in^{2})	0.07031	kg/cm^{2}
Fahrenheit (°C)	5/9 (°F − 32)	Centigrade (°F)

EXPLODED DIAGRAMS

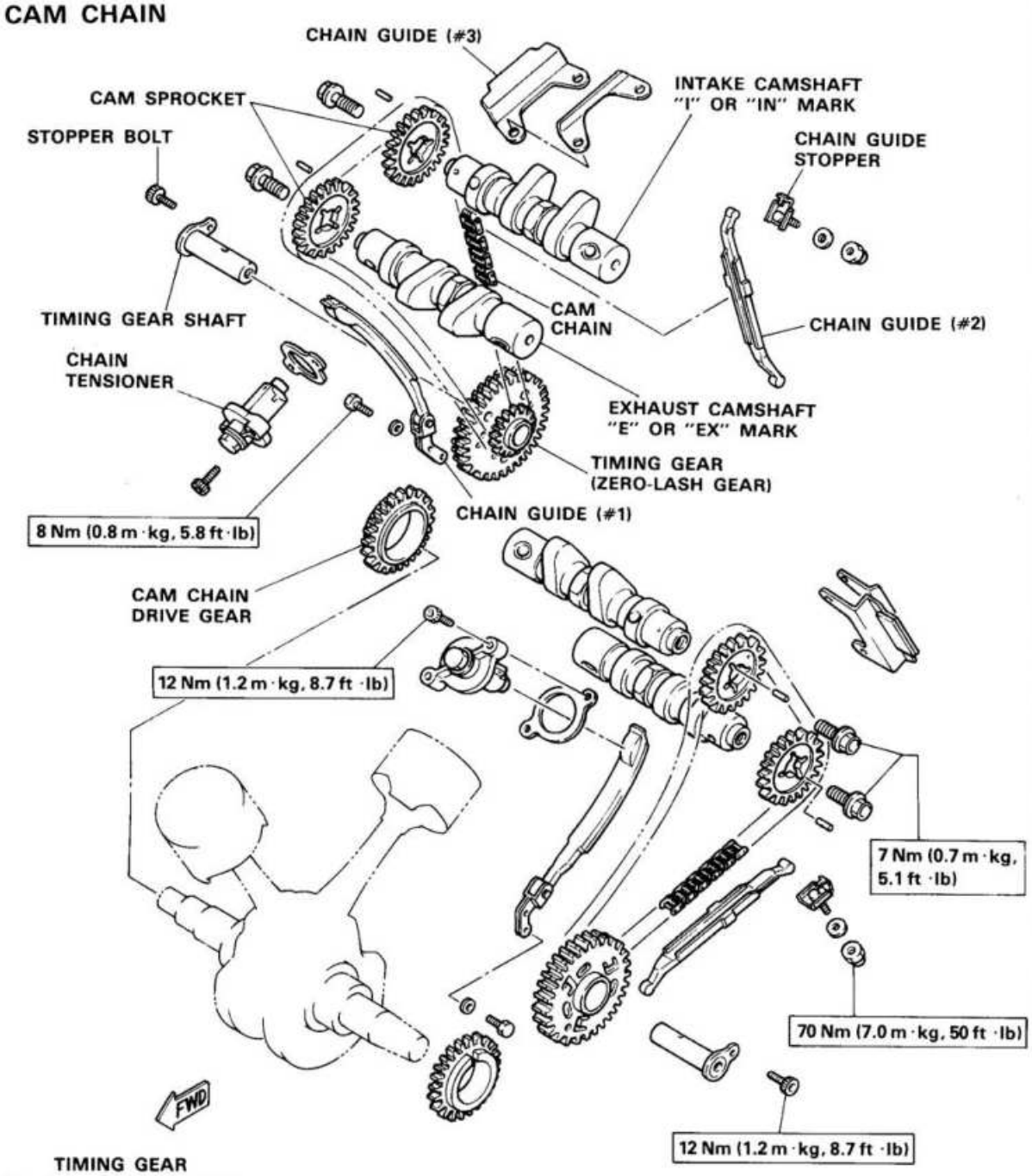
CYLINDER HEAD/VALVE



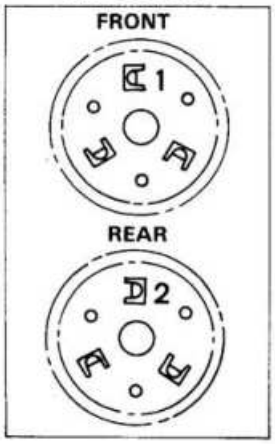
CYLINDER


10 Nm (1.0 m · kg, 7.2 ft · lb)
JOINT PIPE BRACKET "2" FOR REAR CYLINDER
O-RING
COOLANT DRAIN BOLT 7 Nm (0.7 m · kg, 5.1 ft · lb)
10 Nm (1.0 m · kg, 7.2 ft · lb)
JOINT PIPE BRACKET "1" FOR FRONT CYLINDER
O-RING
FWD
COOLANT DRAIN BOLT 7 Nm (0.7 m · kg, 5.1 ft · lb)

CAM CHAIN



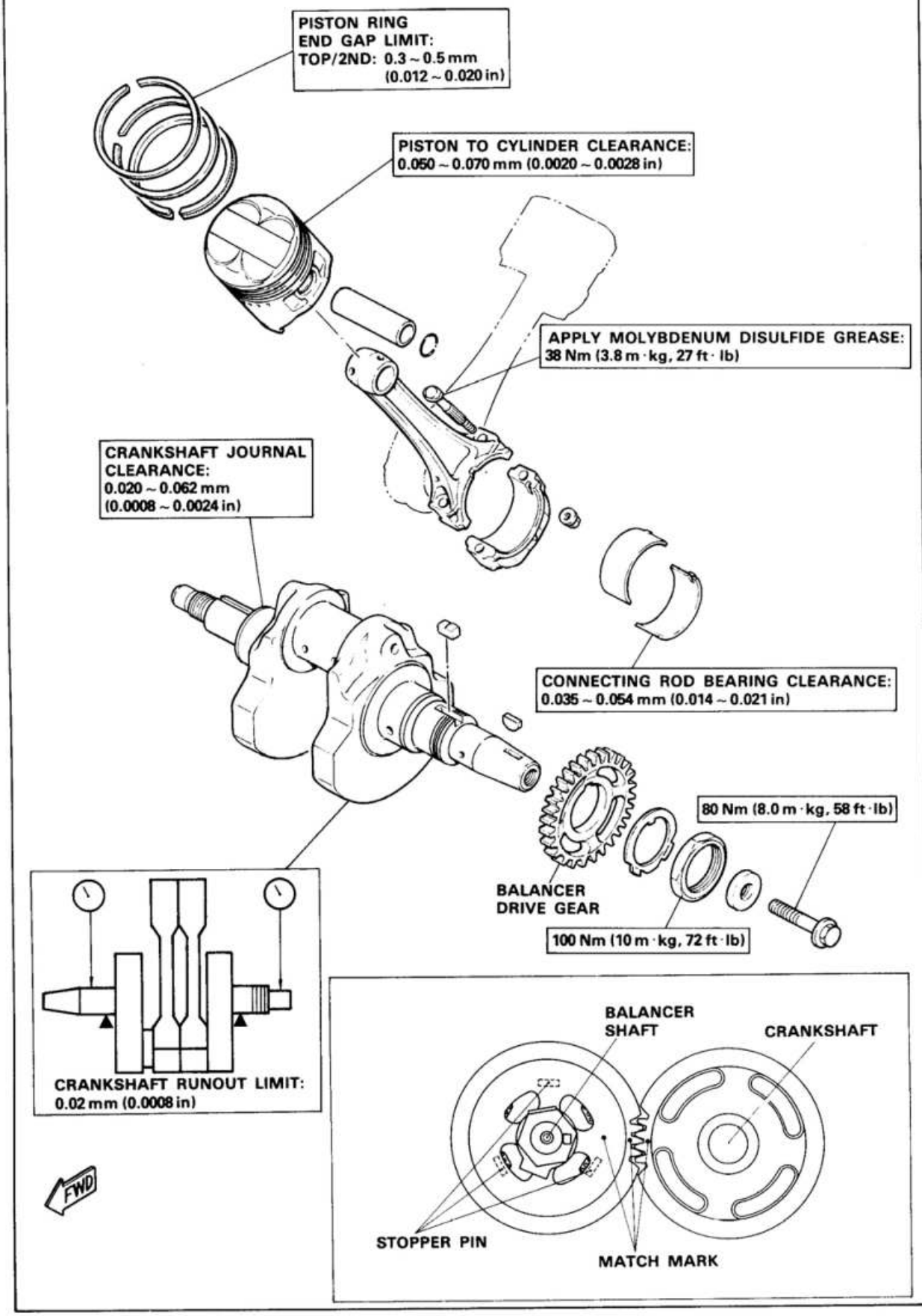
TIMING GEAR



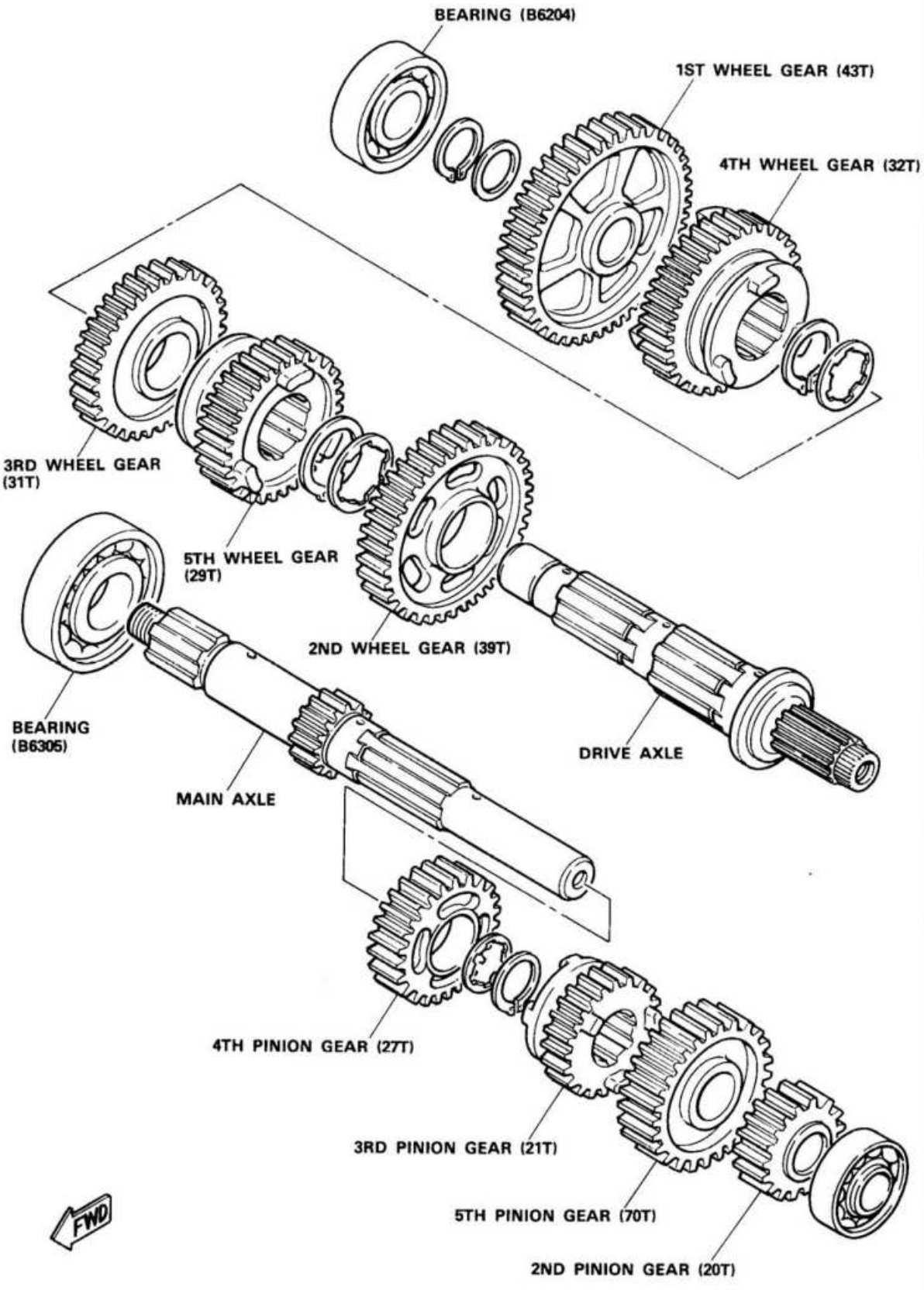
CAM SPROCKET

FRONT		REAR	
IN	EX	IN	EX
			

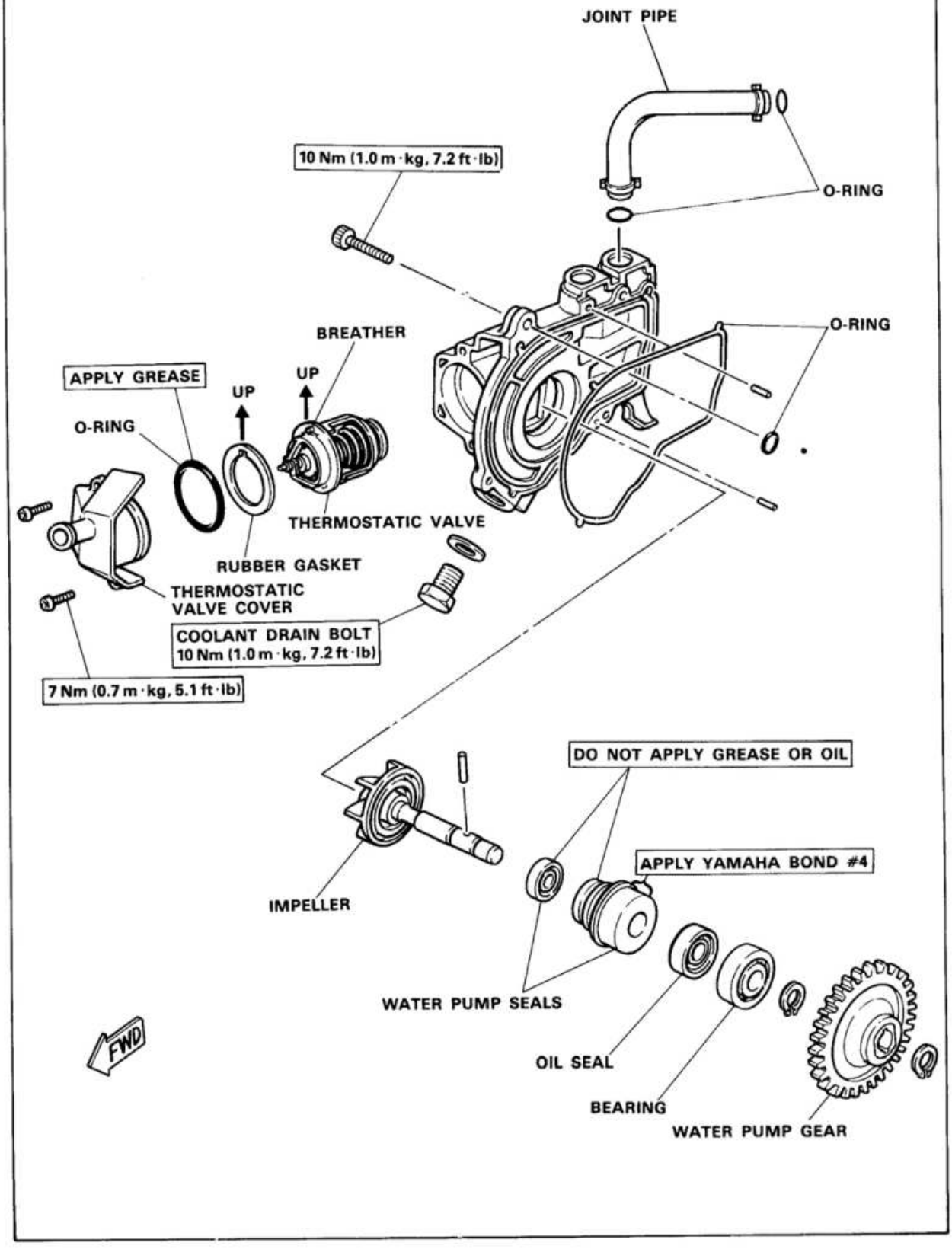
CRANKSHAFT/CONNECTING ROD/PISTON



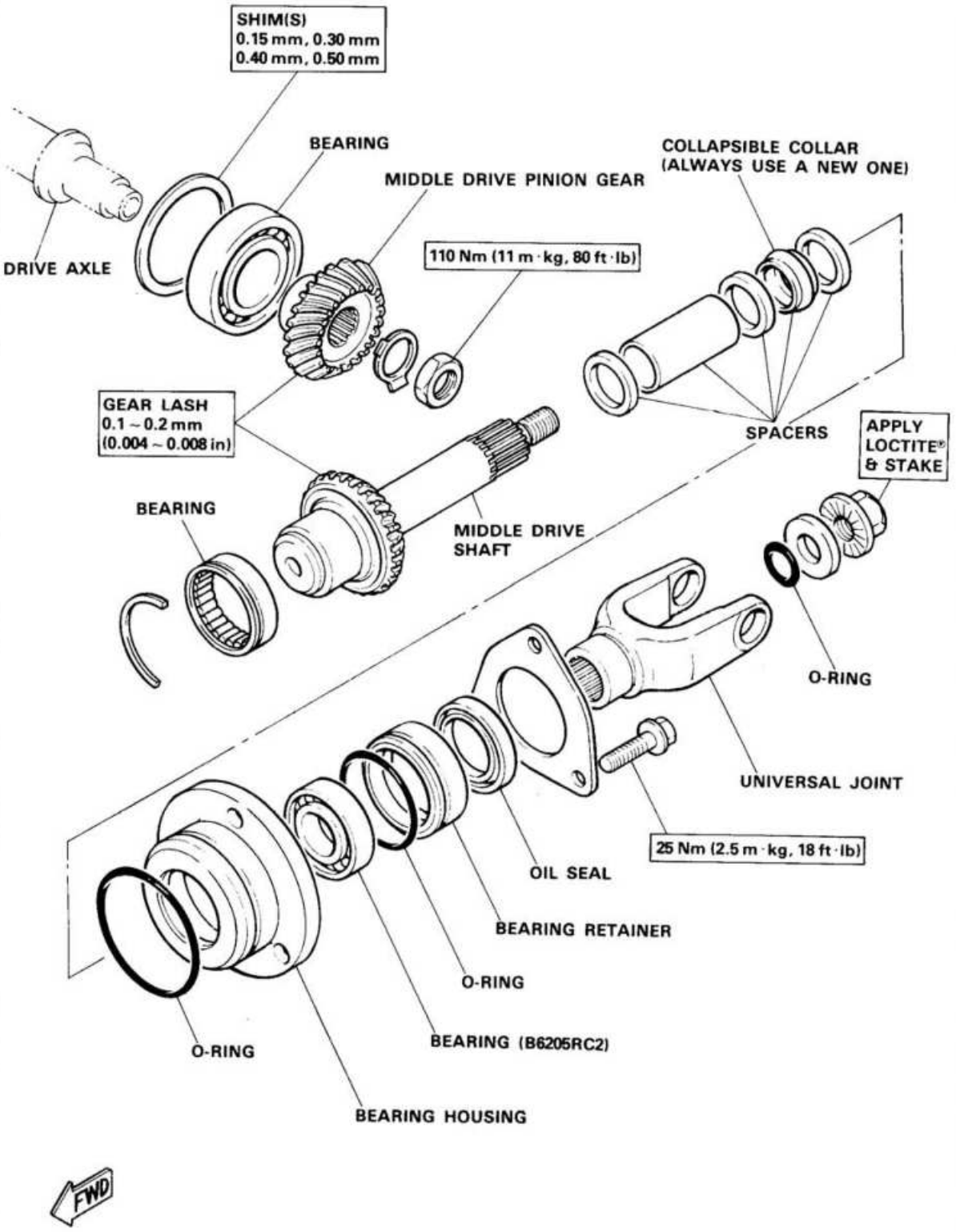
TRANSMISSION



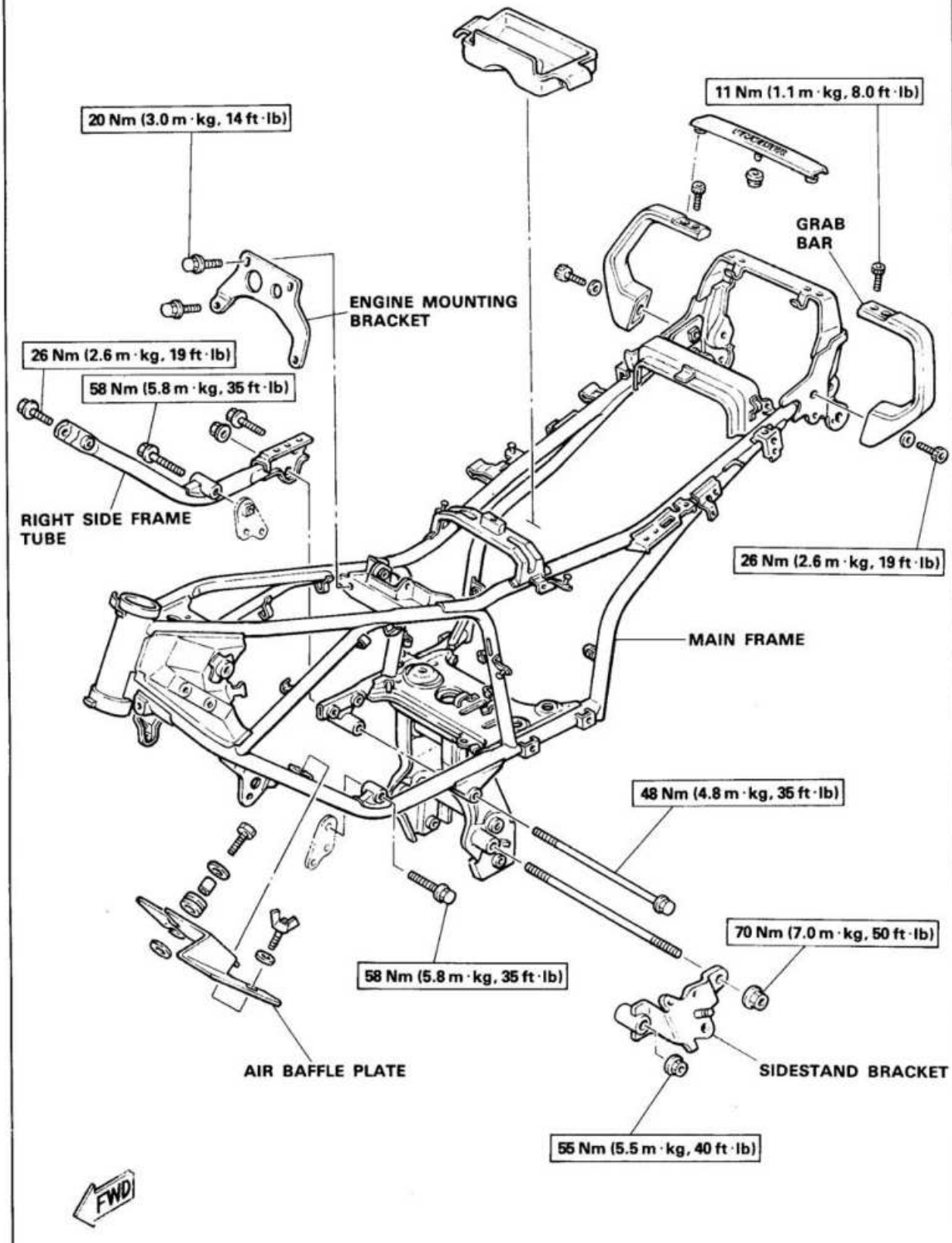
WATER PUMP/THERMOSTATIC VALVE



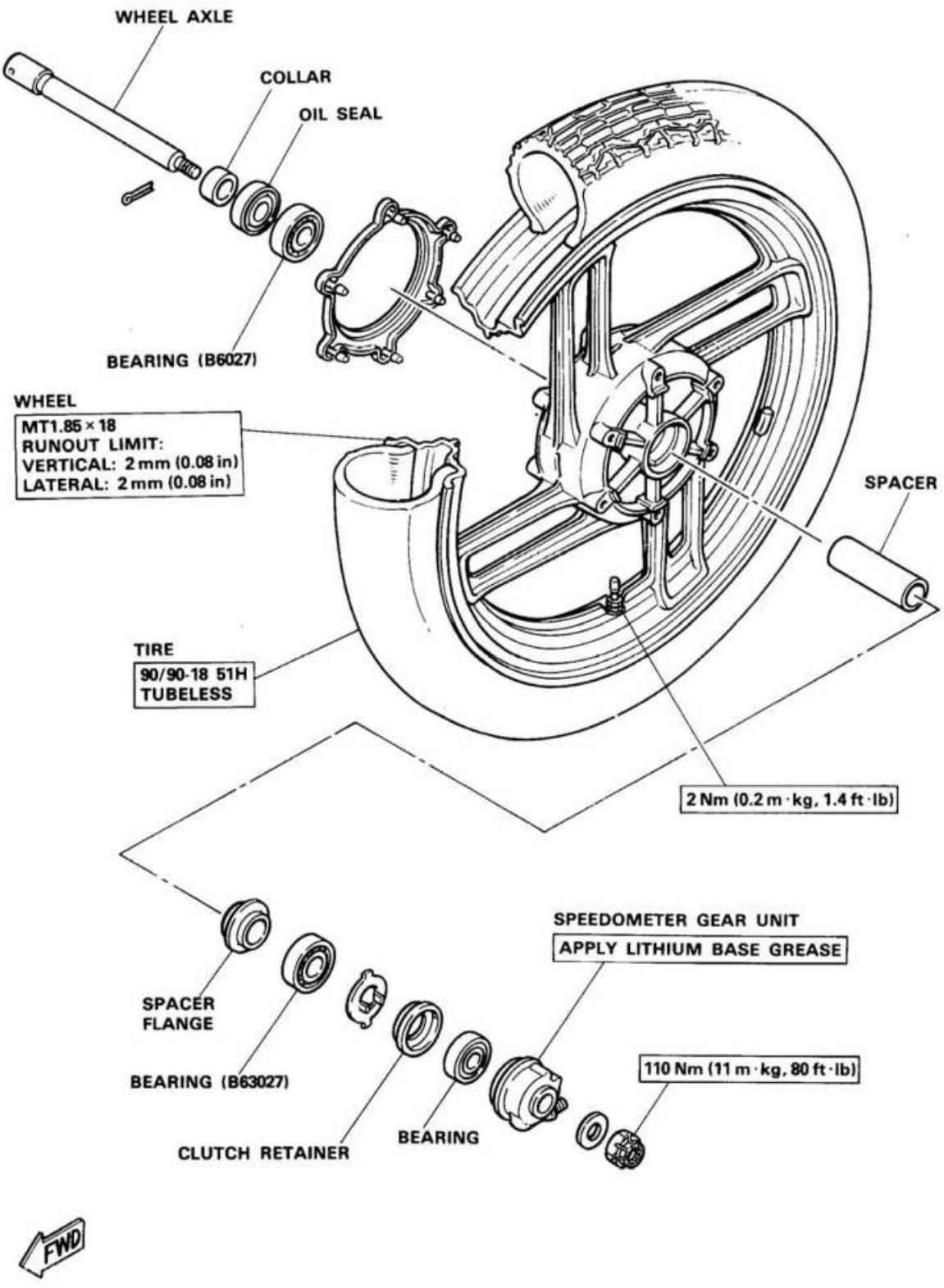
MIDDLE GEAR


SHIM(S)
0.15 mm, 0.30 mm
0.40 mm, 0.50 mm
BEARING
MIDDLE DRIVE PINION GEAR
COLLAPSIBLE COLLAR
(ALWAYS USE A NEW ONE)
DRIVE AXLE
110 Nm (11 m·kg, 80 ft·lb)
GEAR LASH
0.1 ~ 0.2 mm
(0.004 ~ 0.008 in)
SPACERS
APPLY
LOCTITE®
& STAKE
BEARING
MIDDLE DRIVE
SHAFT
O-RING
UNIVERSAL JOINT
25 Nm (2.5 m·kg, 18 ft·lb)
OIL SEAL
BEARING RETAINER
O-RING
O-RING
BEARING (B6205RC2)
BEARING HOUSING
FWD

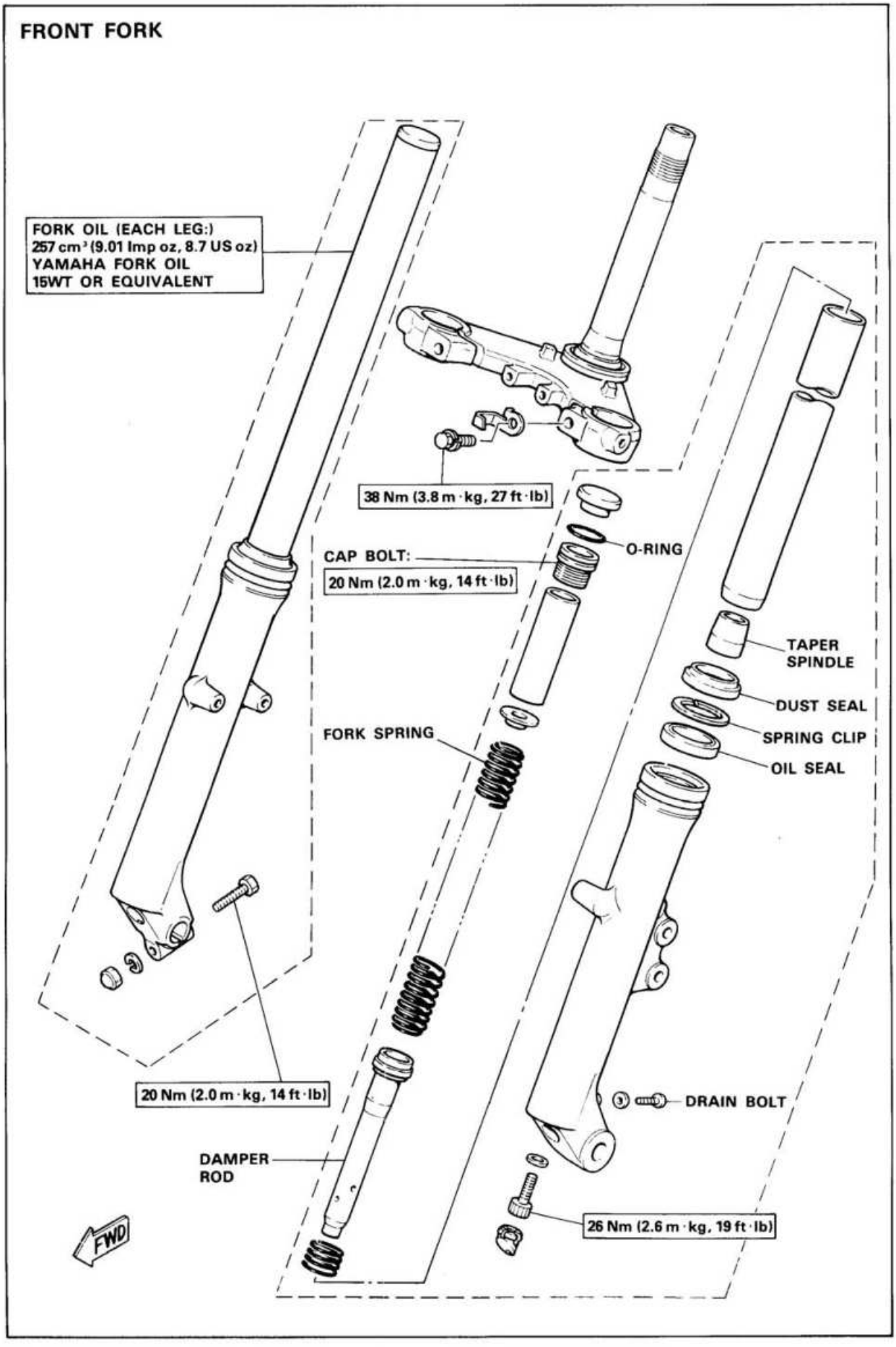
FRAME


20 Nm (3.0 m · kg, 14 ft · lb)
11 Nm (1.1 m · kg, 8.0 ft · lb)
GRAB BAR
ENGINE MOUNTING BRACKET
26 Nm (2.6 m · kg, 19 ft · lb)
58 Nm (5.8 m · kg, 35 ft · lb)
RIGHT SIDE FRAME TUBE
26 Nm (2.6 m · kg, 19 ft · lb)
MAIN FRAME
48 Nm (4.8 m · kg, 35 ft · lb)
70 Nm (7.0 m · kg, 50 ft · lb)
58 Nm (5.8 m · kg, 35 ft · lb)
AIR BAFFLE PLATE
SIDESTAND BRACKET
55 Nm (5.5 m · kg, 40 ft · lb)
FWD

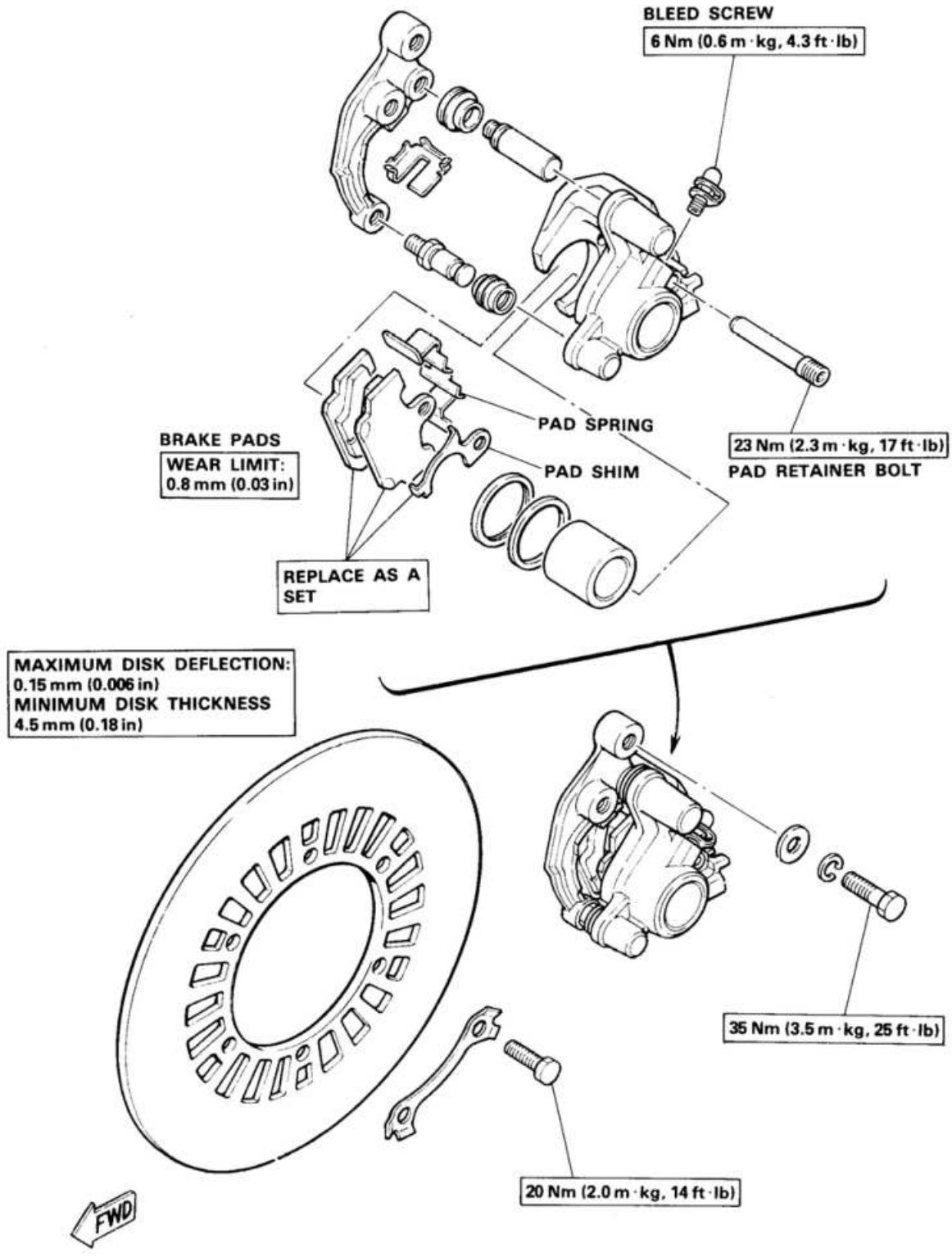
FRONT WHEEL


WHEEL AXLE
COLLAR
OIL SEAL
BEARING (B6027)
WHEEL
MT1.85 × 18
RUNOUT LIMIT:
VERTICAL: 2 mm (0.08 in)
LATERAL: 2 mm (0.08 in)
SPACER
TIRE
90/90-18 51H
TUBELESS
2 Nm (0.2 m · kg, 1.4 ft · lb)
SPEEDOMETER GEAR UNIT
APPLY LITHIUM BASE GREASE
SPACER
FLANGE
BEARING (B63027)
CLUTCH RETAINER
BEARING
110 Nm (11 m · kg, 80 ft · lb)
FWD

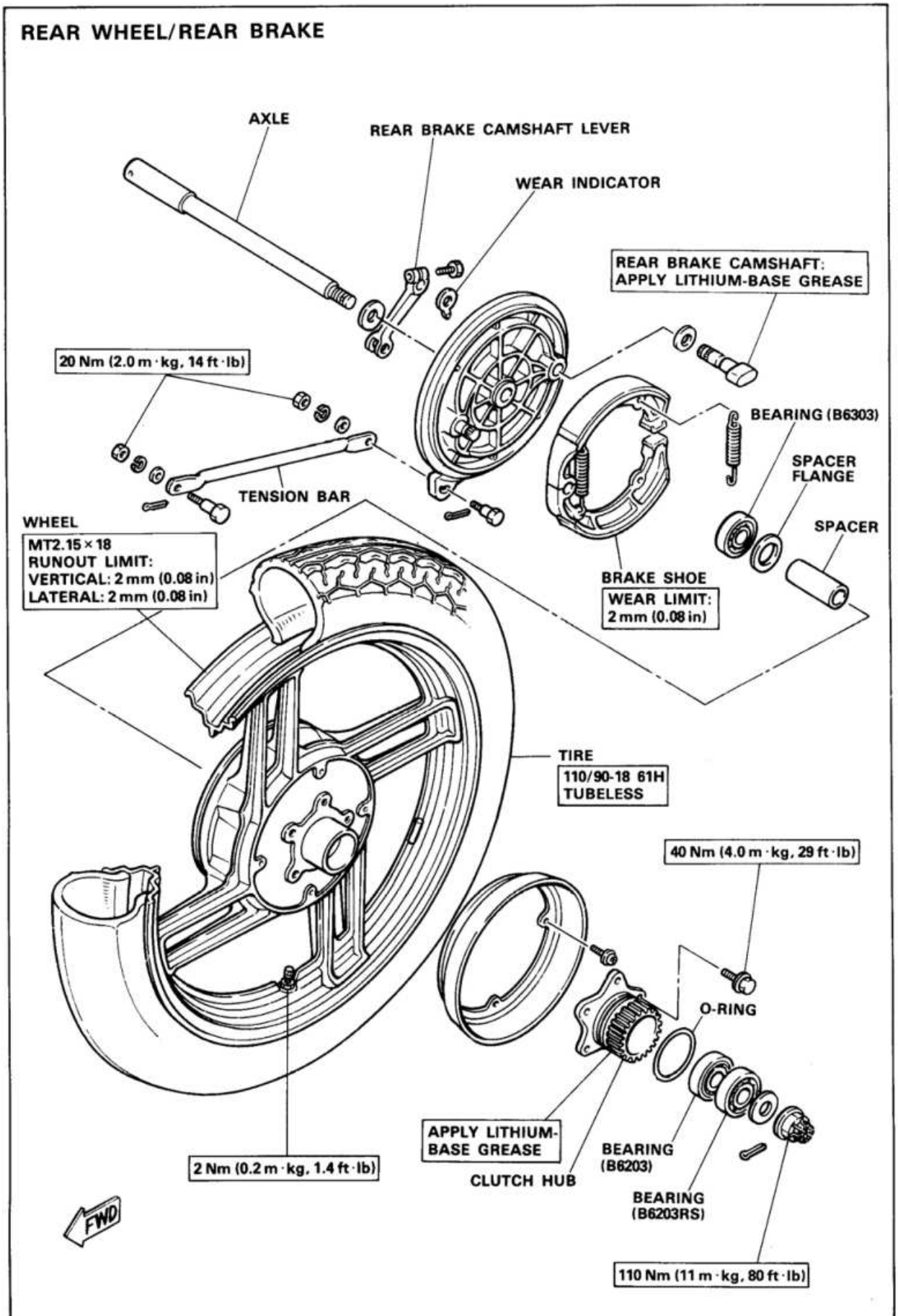
FRONT FORK


FORK OIL (EACH LEG:)
257 cm³ (9.01 Imp oz, 8.7 US oz)
YAMAHA FORK OIL
15WT OR EQUIVALENT
38 Nm (3.8 m · kg, 27 ft · lb)
CAP BOLT:
20 Nm (2.0 m · kg, 14 ft · lb)
O-RING
TAPER SPINDLE
DUST SEAL
SPRING CLIP
OIL SEAL
FORK SPRING
DRAIN BOLT
20 Nm (2.0 m · kg, 14 ft · lb)
DAMPER ROD
26 Nm (2.6 m · kg, 19 ft · lb)
FWD

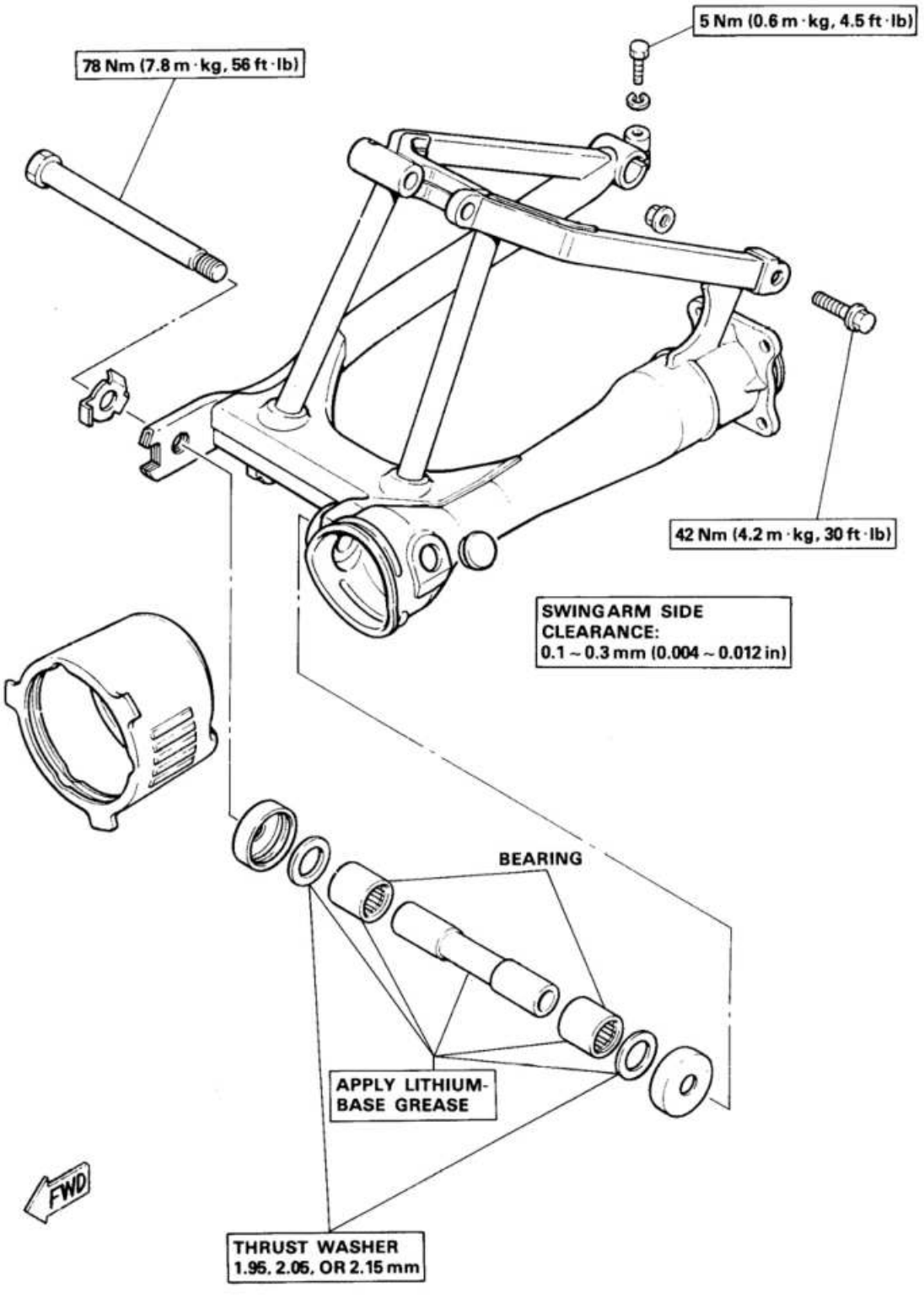
FRONT BRAKE CALIPER



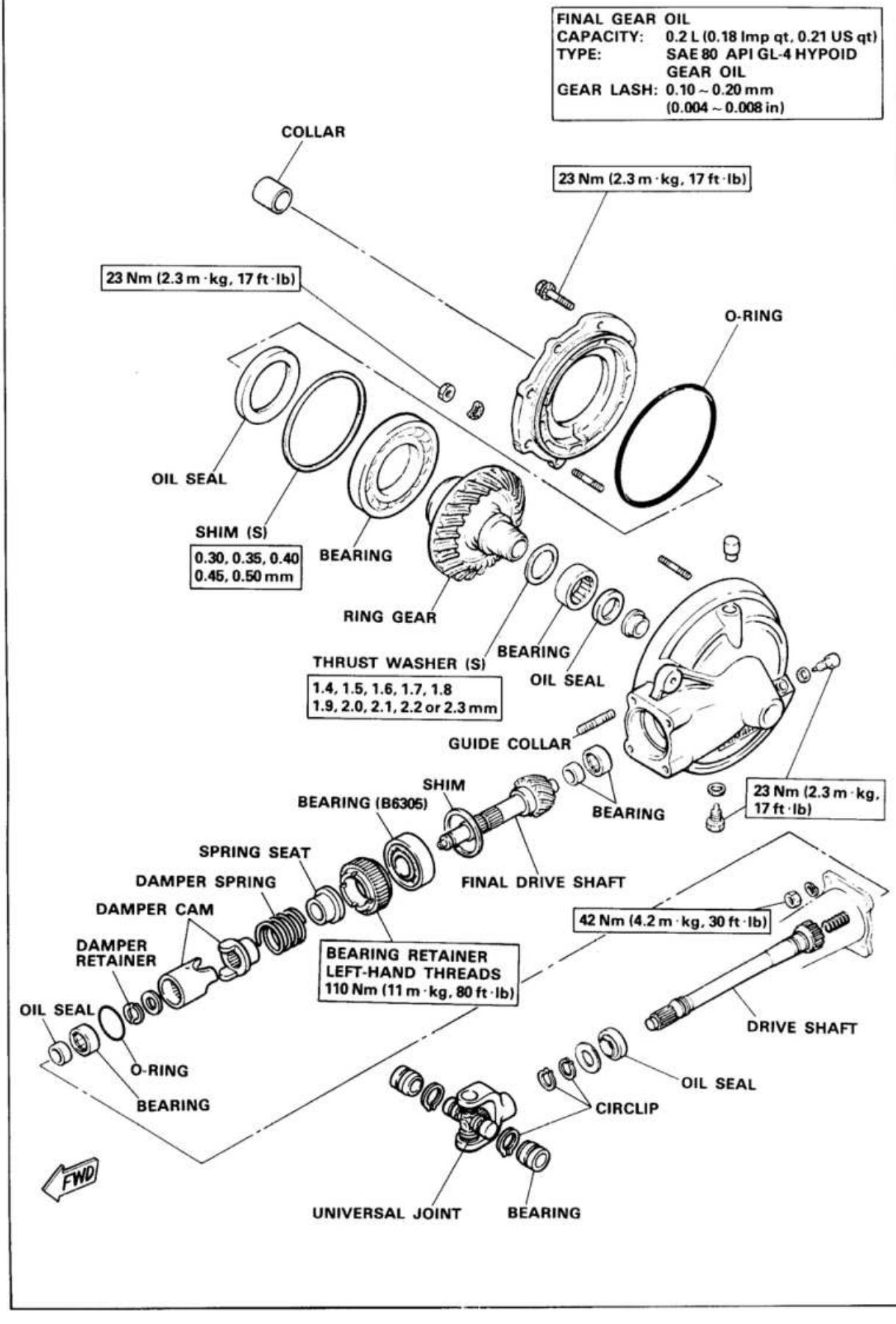
REAR WHEEL/REAR BRAKE



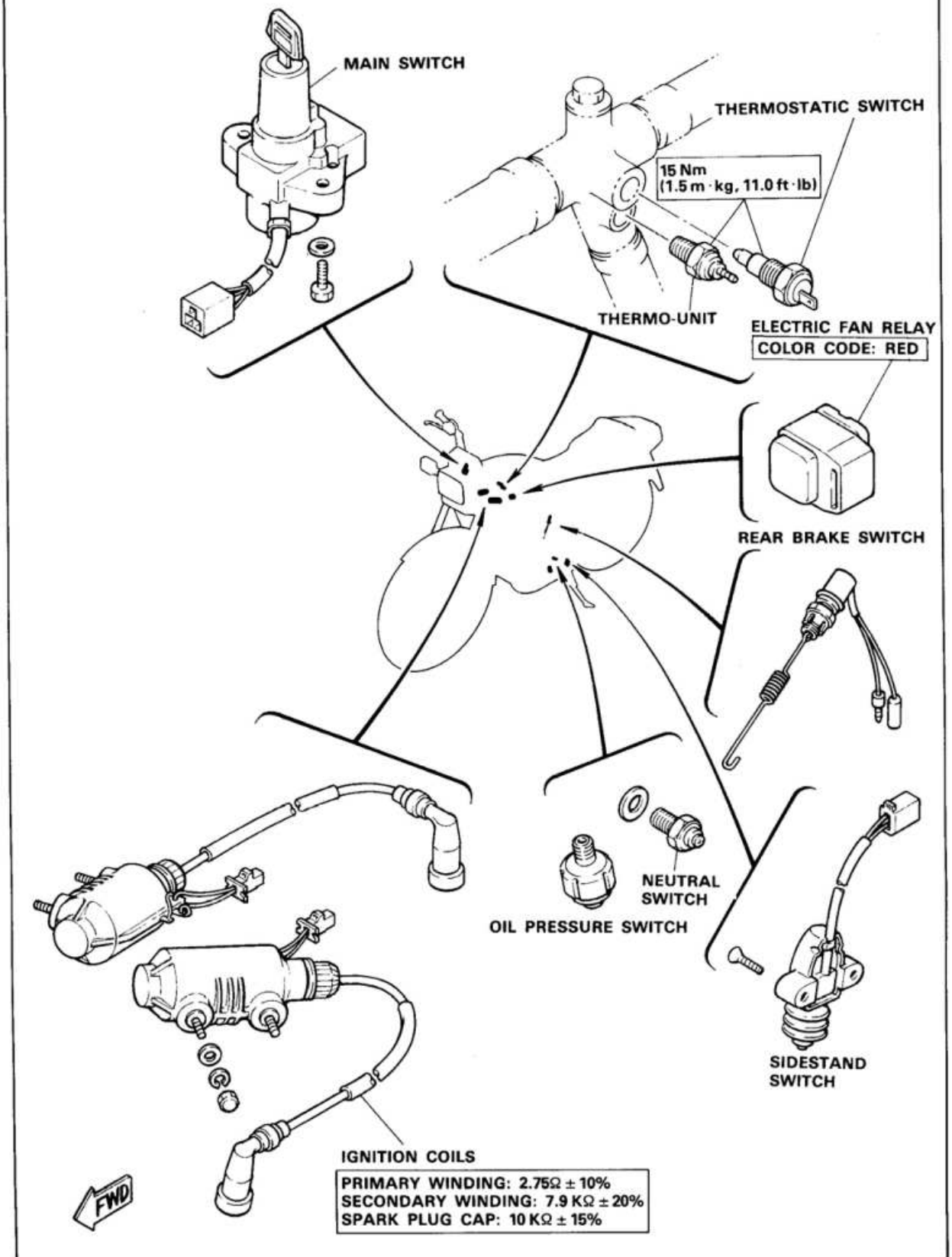
SWINGARM


5 Nm (0.6 m · kg, 4.5 ft · lb)
78 Nm (7.8 m · kg, 56 ft · lb)
42 Nm (4.2 m · kg, 30 ft · lb)
SWINGARM SIDE CLEARANCE:
0.1 ~ 0.3 mm (0.004 ~ 0.012 in)
BEARING
APPLY LITHIUM-BASE GREASE
FWD
THRUST WASHER
1.95, 2.05, OR 2.15 mm

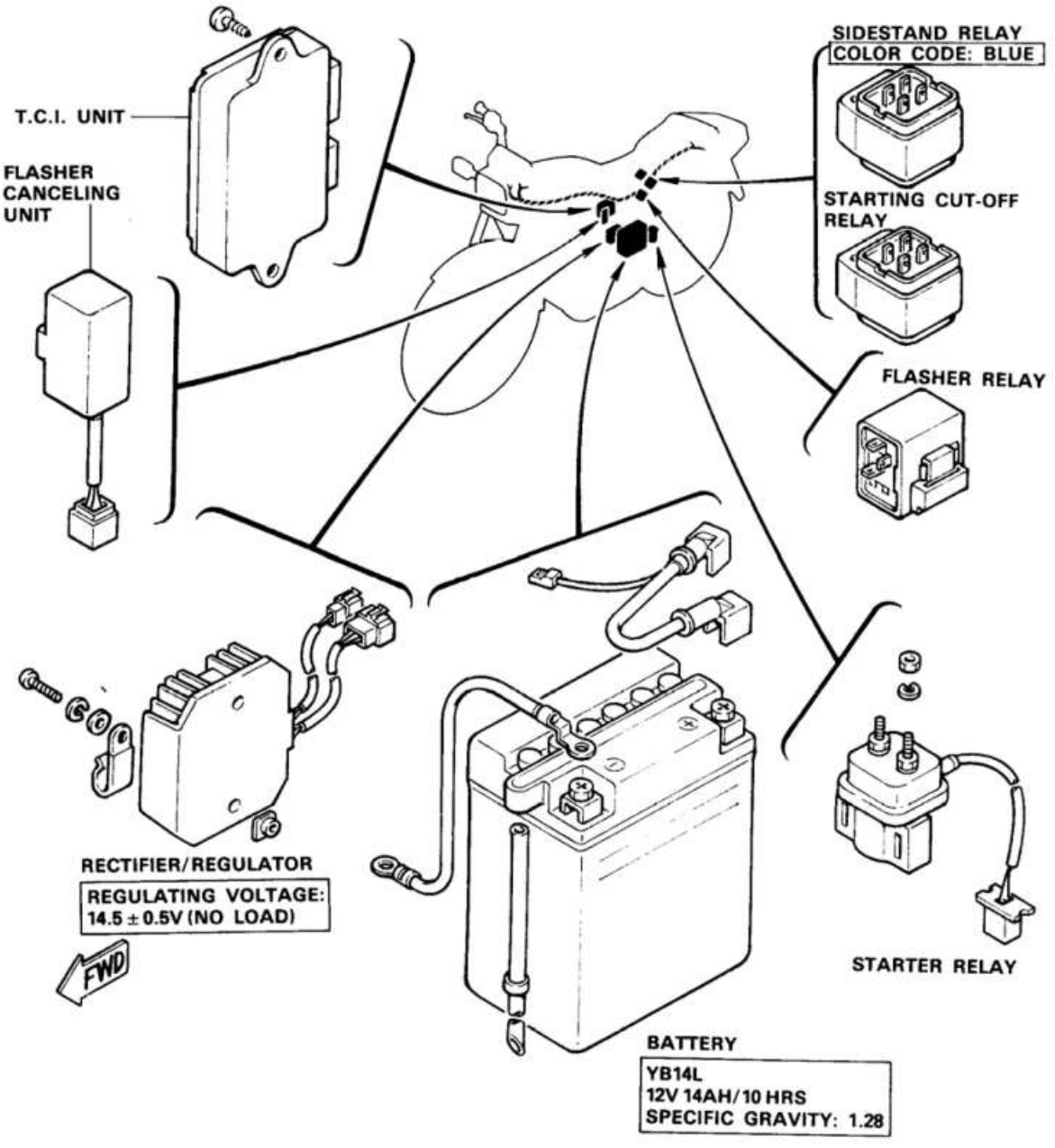
FINAL GEAR/DRIVE SHAFT



ELECTRICAL COMPONENTS

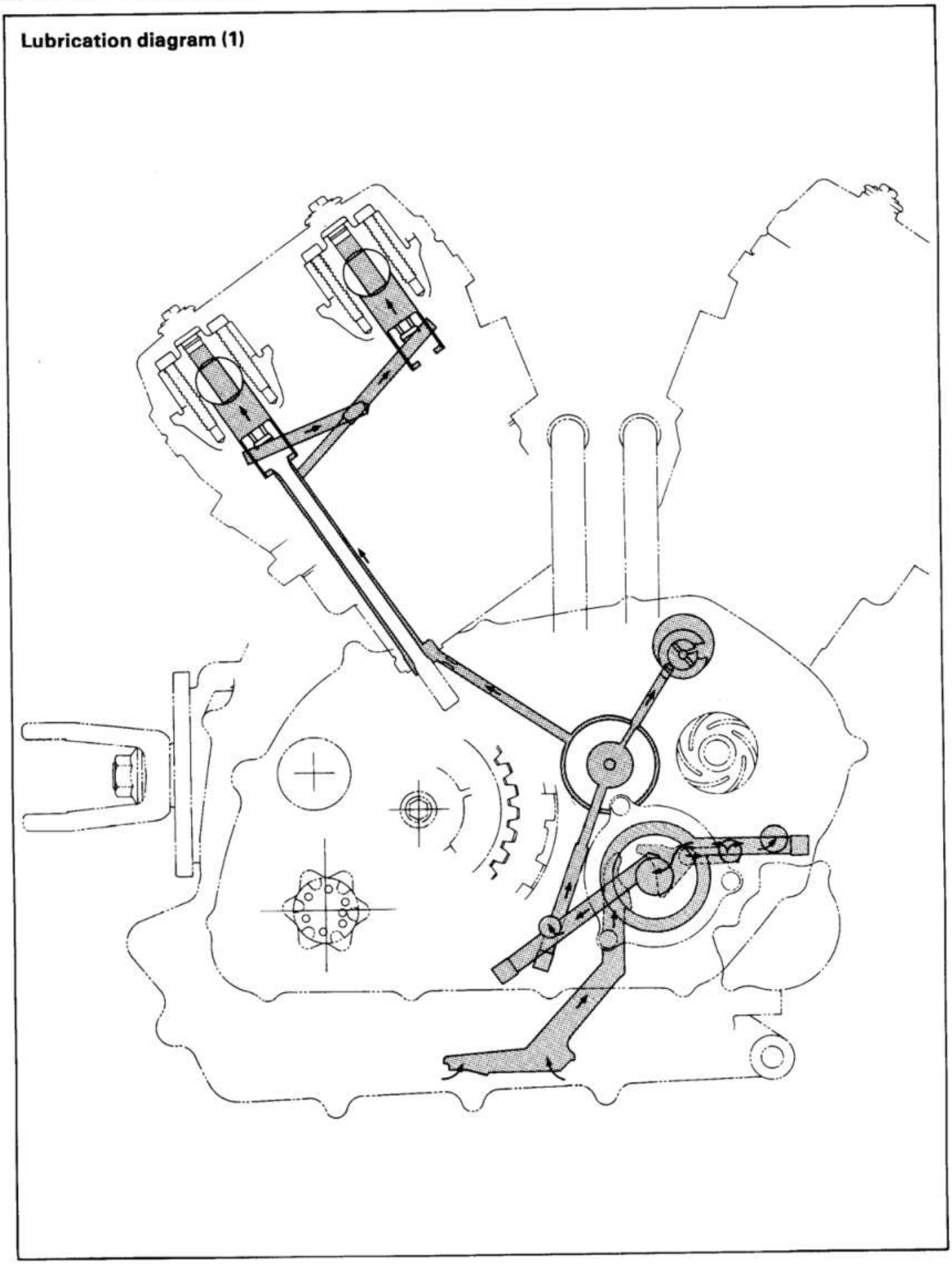


ELECTRICAL COMPONENTS

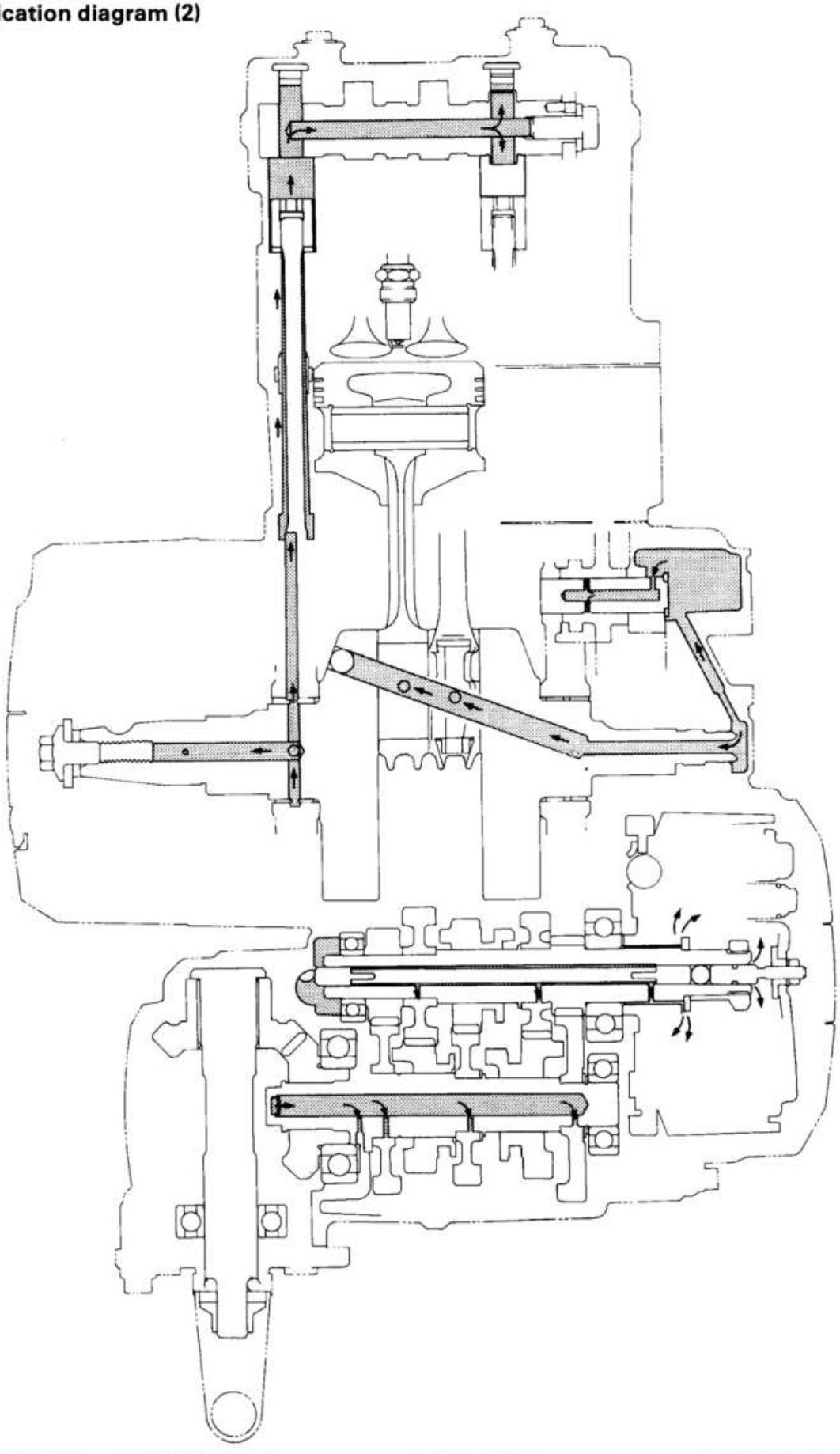


LUBRICATION DIAGRAMS

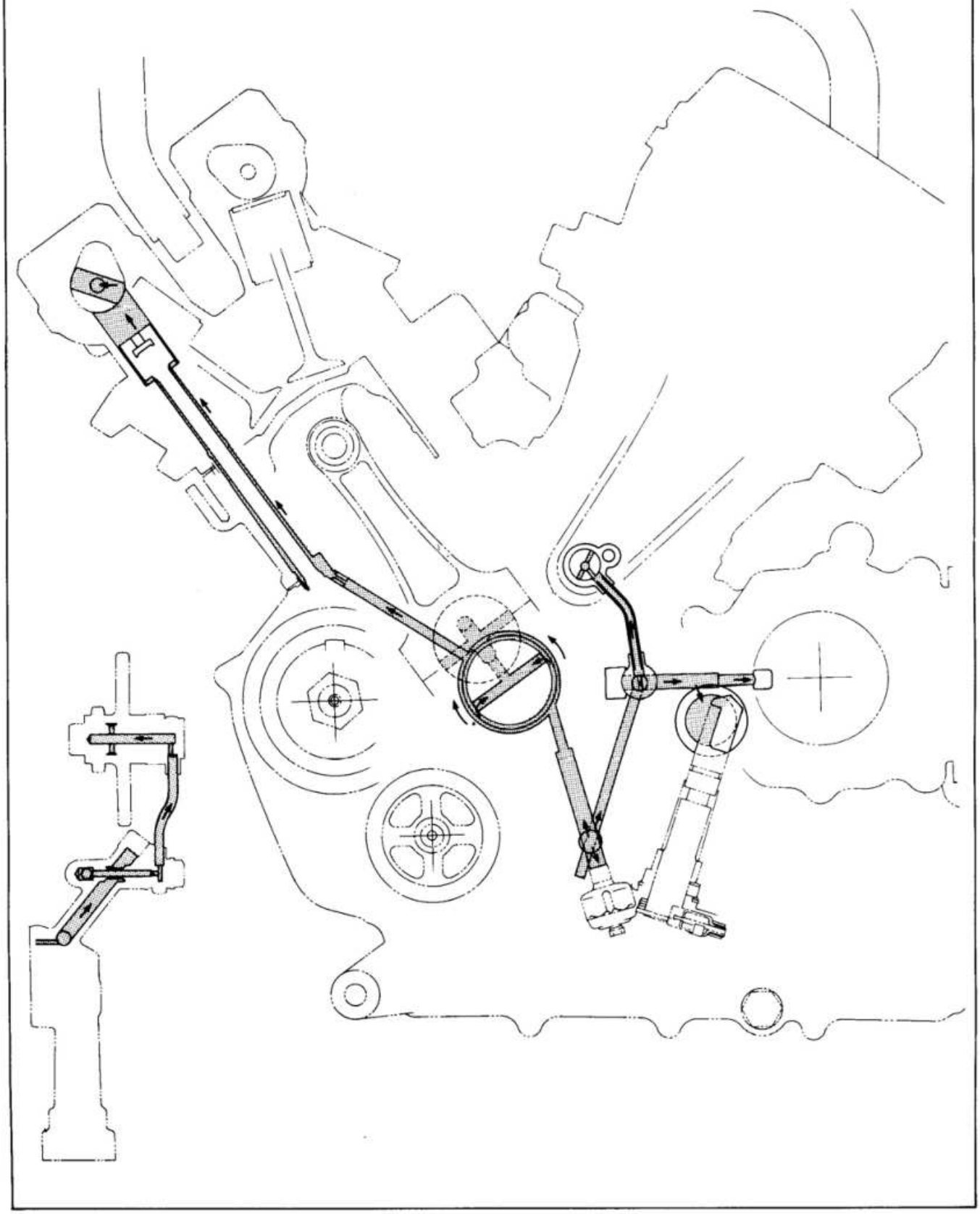
Lubrication diagram (1)



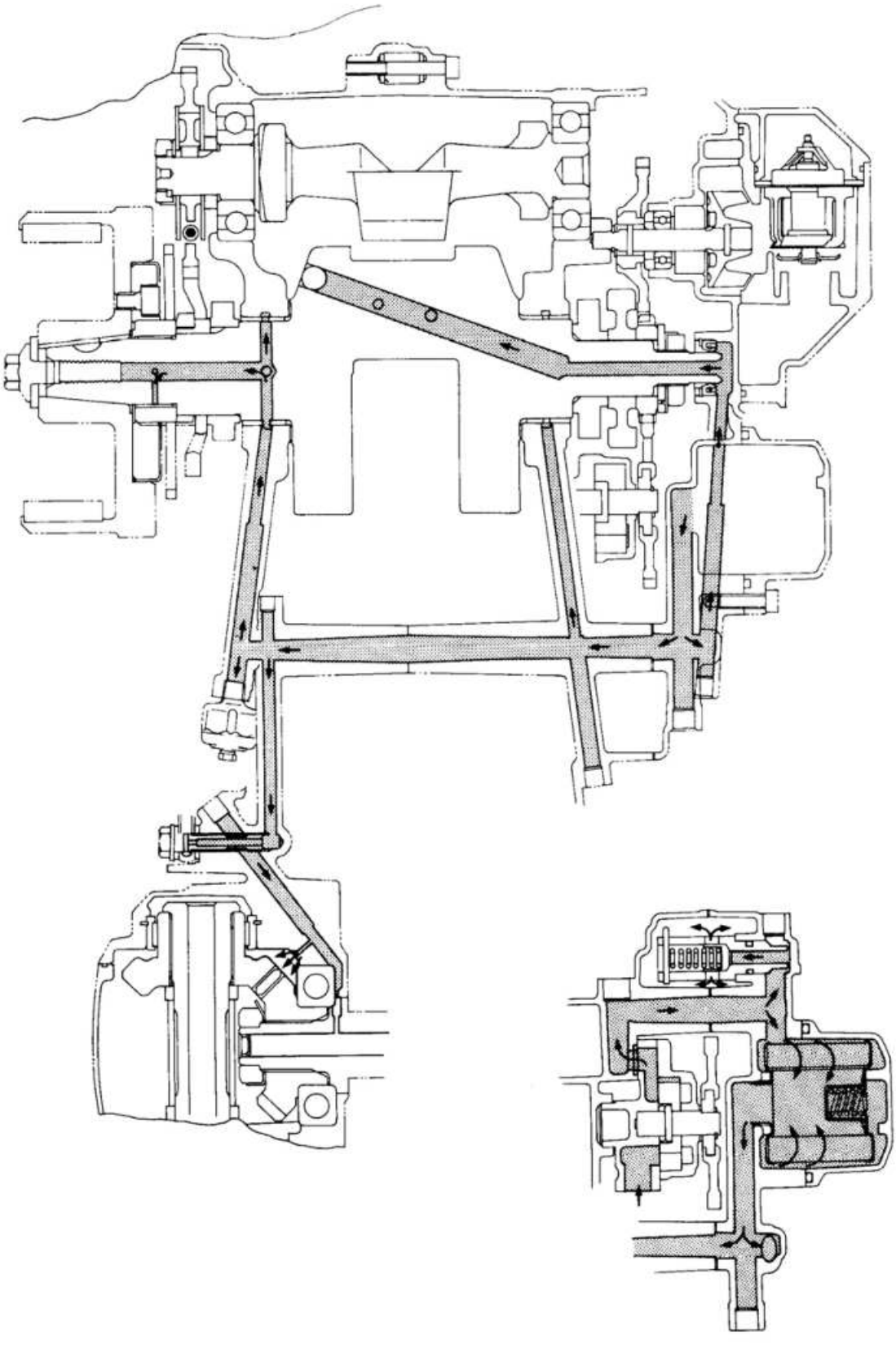
Lubrication diagram (2)



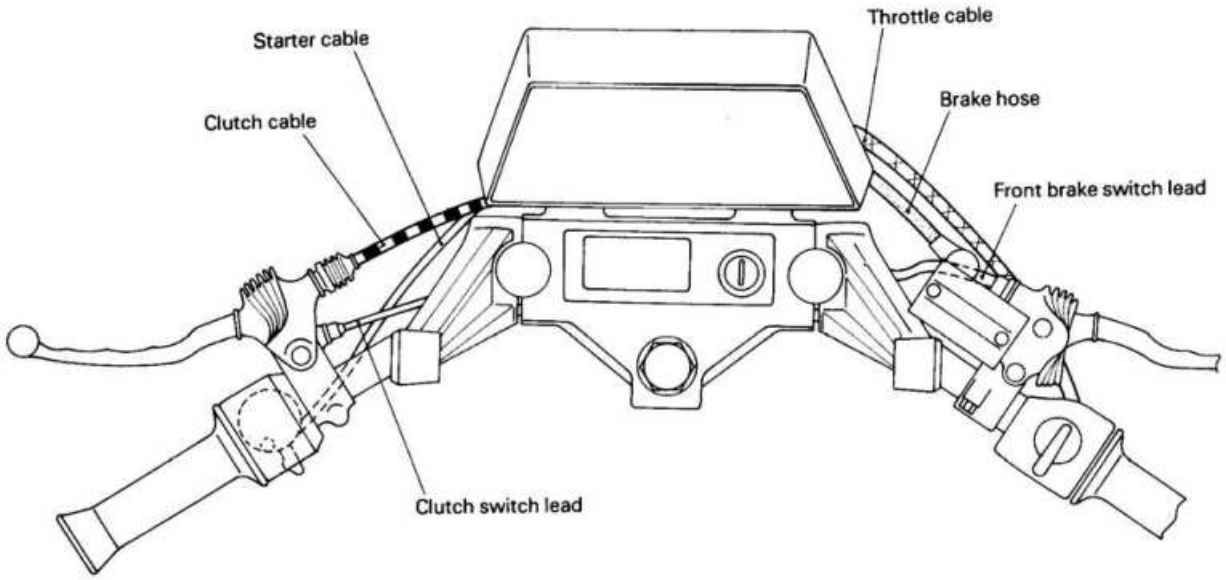
Lubrication diagram (3)

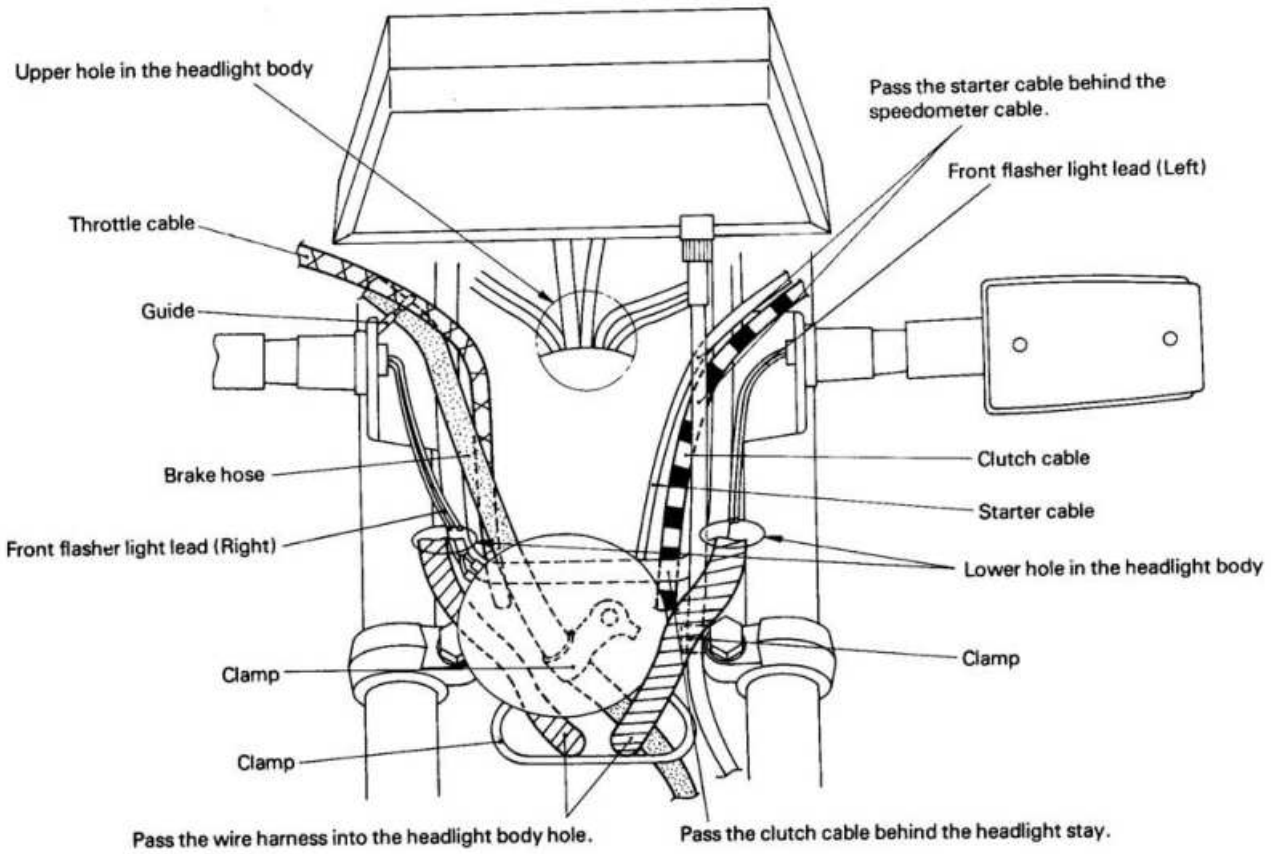


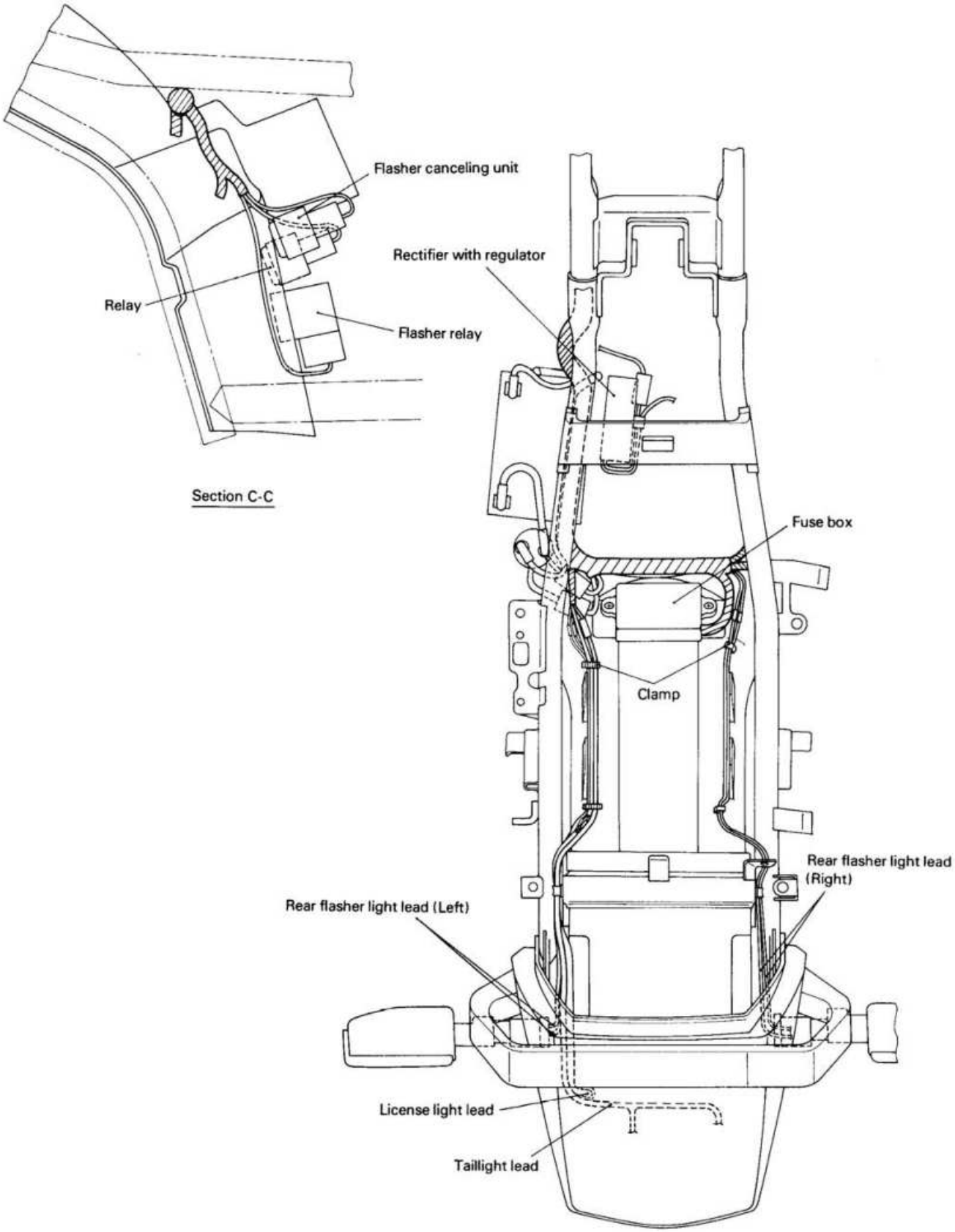
Lubrication diagram (4)

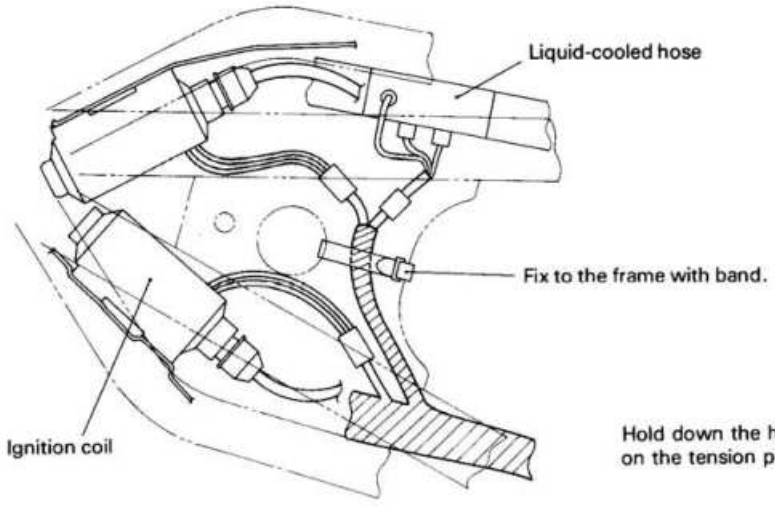


CABLE ROUTING

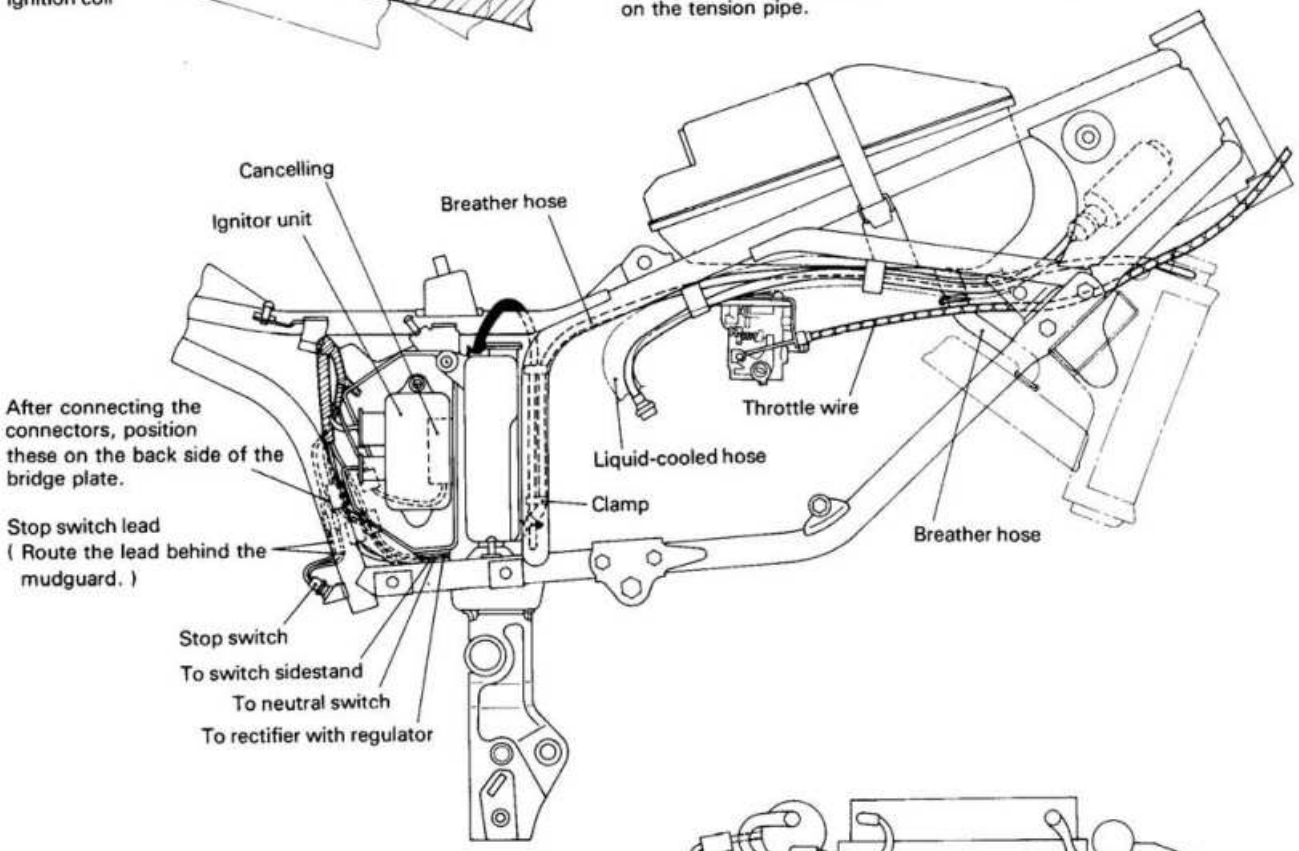


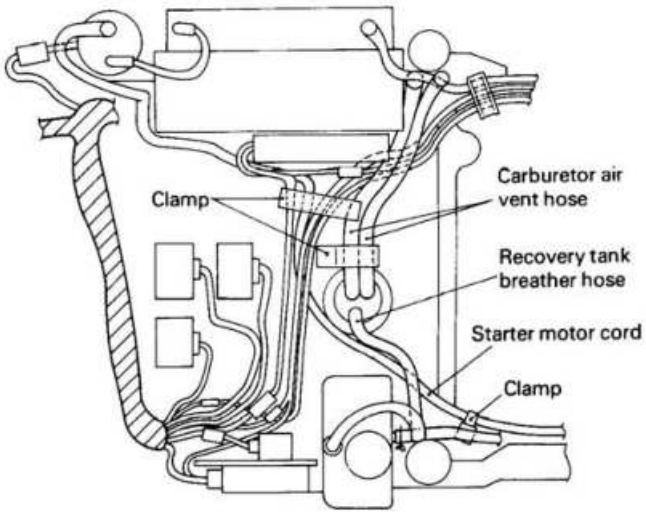


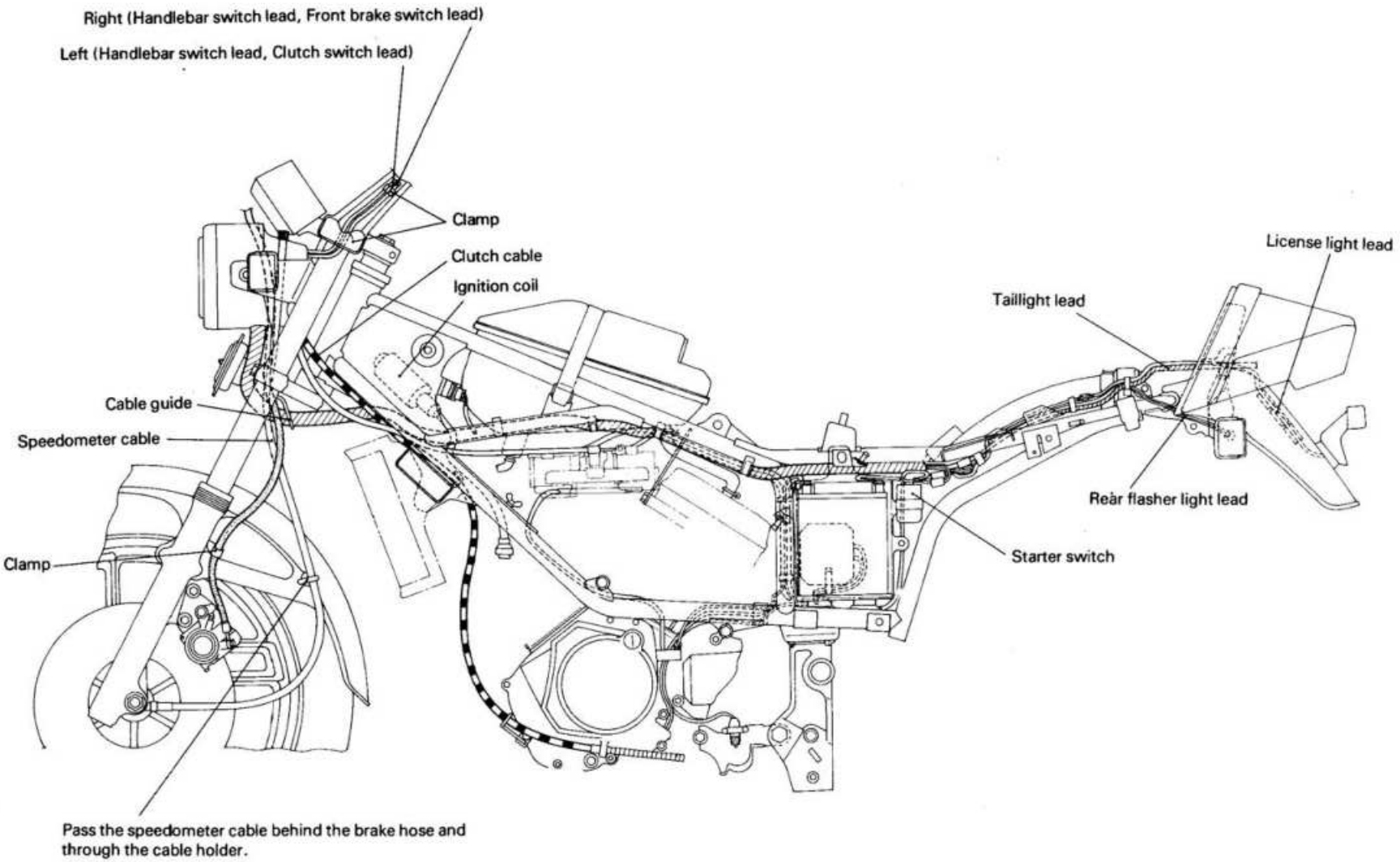

Flasher canceling unit
Relay
Flasher relay
Section C-C
Rectifier with regulator
Fuse box
Clamp
Rear flasher light lead (Right)
Rear flasher light lead (Left)
License light lead
Taillight lead



Hold down the high-tension wire with the clamp on the tension pipe.






Right (Handlebar switch lead, Front brake switch lead)
Left (Handlebar switch lead, Clutch switch lead)
Clamp
Clutch cable
Ignition coil
License light lead
Taillight lead
Cable guide
Speedometer cable
Rear flasher light lead
Starter switch
Clamp
Pass the speedometer cable behind the brake hose and through the cable holder.



YAMAHA MOTOR CO.,LTD.

IWATA, JAPAN