CHAPTER 1. GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

A. Frame serial number

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

B. Engine serial number

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

NOTE:

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

Starting serial number:	
XJ550RH	4U8-000101

C. Vehicle identification number

The vehicle identification number is stamped on the label attached on the right side of the steering head pipe.

NOTE:

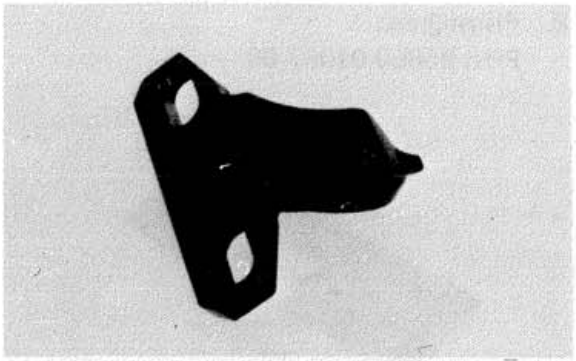
The vehicle identification number is used to identify your motorcycle and may be used to register your motorcycle with the licensing authority in your state.

SPECIAL TOOLS

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

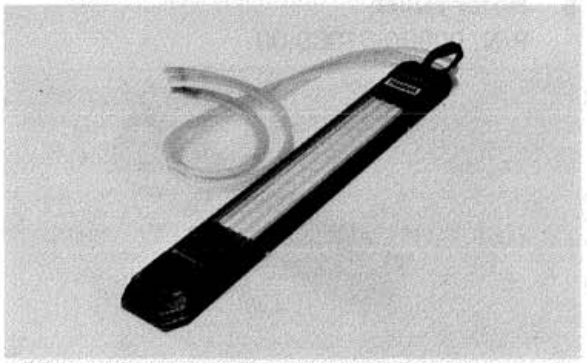
A. For tune-up

1. Compression gauge
2. Timing light
3. Tachometer
4. Tappet adjusting tool
   P/N. 90890-01245-00



This tool is necessary to replace valve adjusting pads. This can also be used for the XS750, XS850, XS1100 and XJ650.

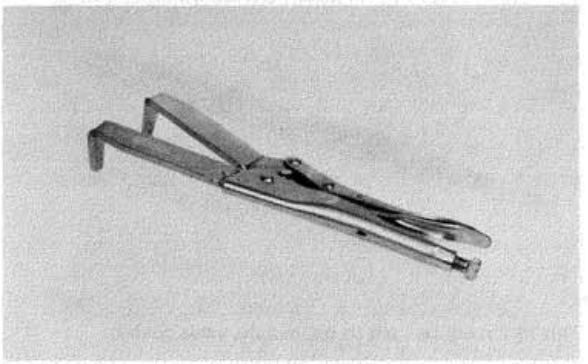
5. Vacuum gauge
   P/N. TLU-11080-30-02



This gauge is needed for carburetor synchronization.

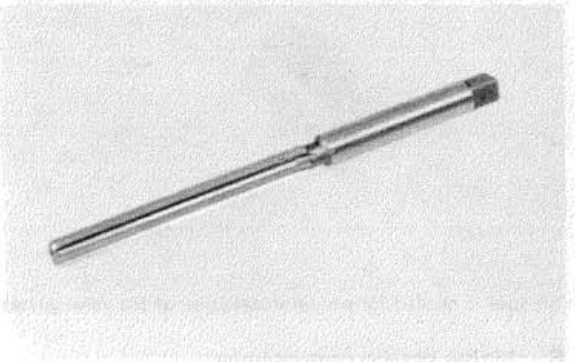
B. For engine service

1. Clutch hub holder
   P/N. TLM-90910-42-00



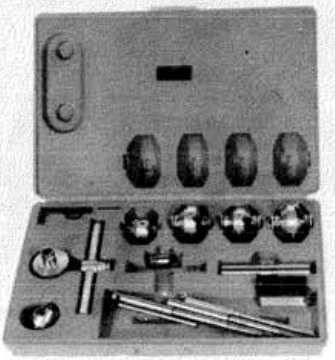
This tool is used to hold the clutch when removing or installing the clutch boss lock nut.

2. Valve guide reamer
   P/N. P/N. 90890-04066-00



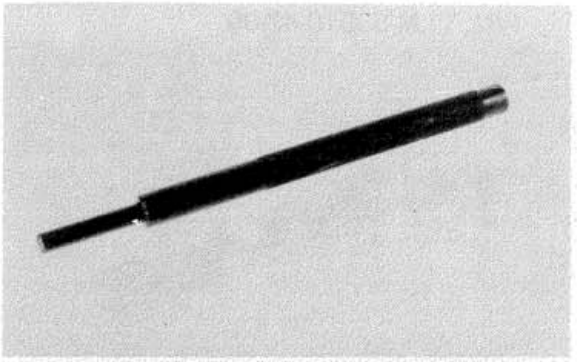
This tool must be used when replacing the valve guide.

3. Valve seat cutter
   P/N. TLM-90910-43-20



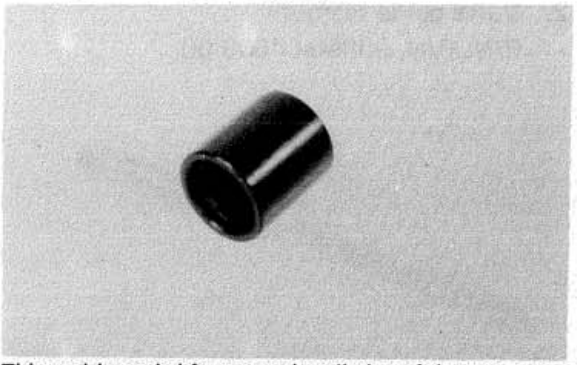
This tool is needed to re-surface the valve seat.

4. Valve guide remover
P/N. 90890-04064-00



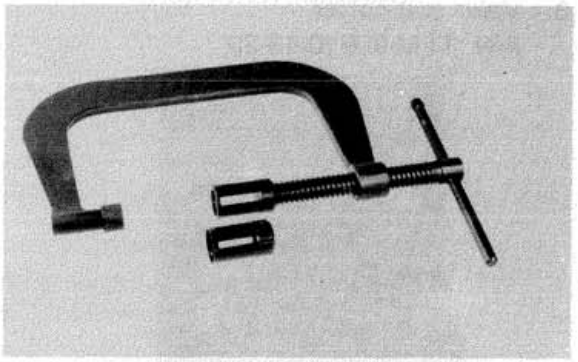
This tool must be used to remove the valve guides.

5. Valve guide installer
P/N. 90890-04065-00



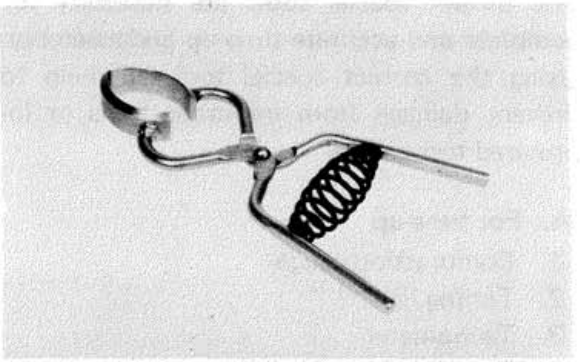
This tool is needed for proper installation of the valve guides.

6. Valve spring compressor
P/N. 90890-01253-00



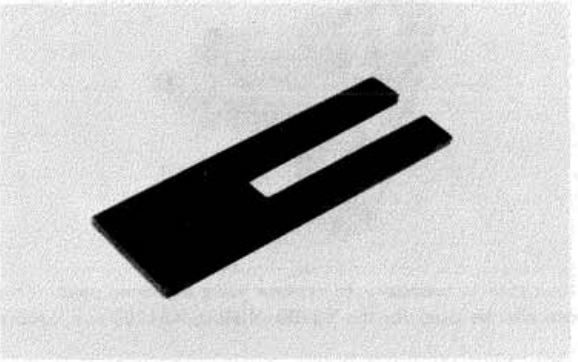
This tool must be used for removing and installing the valve assemblies.

7. Piston ring compressor
P/N. 90890-04047-00



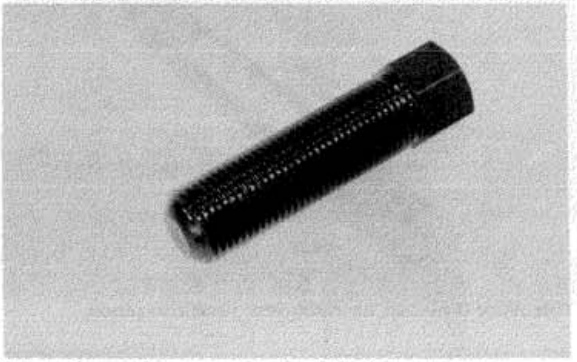
This tool is used to compress piston rings when installing the cylinder.

8. Piston base
P/N. 90890-01067-00



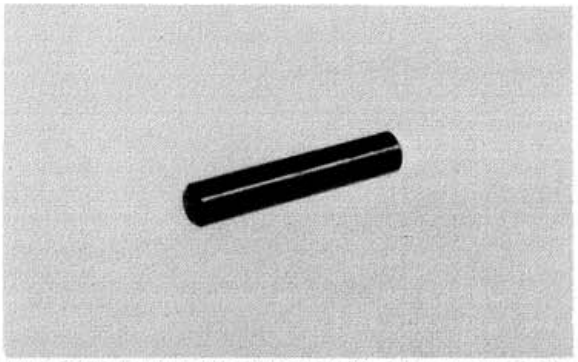
Use 4 of these to hold the pistons during cylinder installation.

9. Rotor puller
P/N. 90890-01080-00



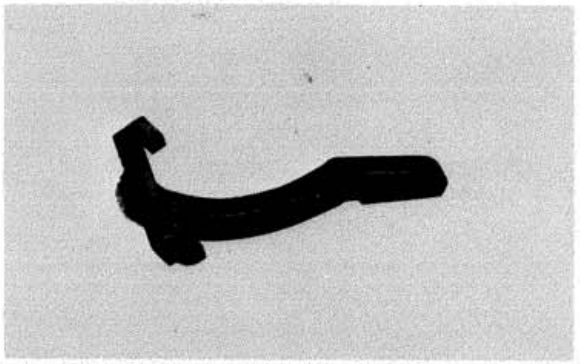
This tool is needed to remove the A.C. Generator rotor.

10. Rotor puller attachment
P/N. 90890-04052-00



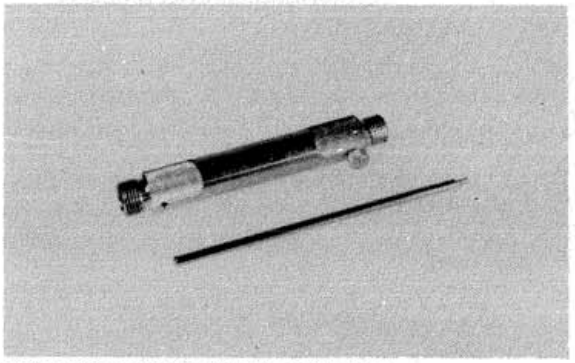
This tool is needed when removing the A.C. Generator rotor together with the rotor puller.

11. Rotor holding tool
P/N. 90890-04067-00



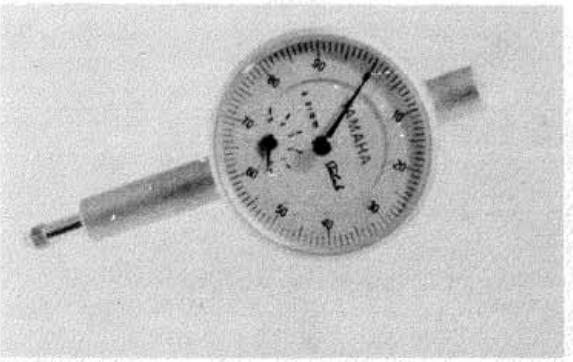
This tool is used to hold the A.C. Generator rotor during removal and installation.

12. Dial gauge stand
P/N. 90890-01258-00



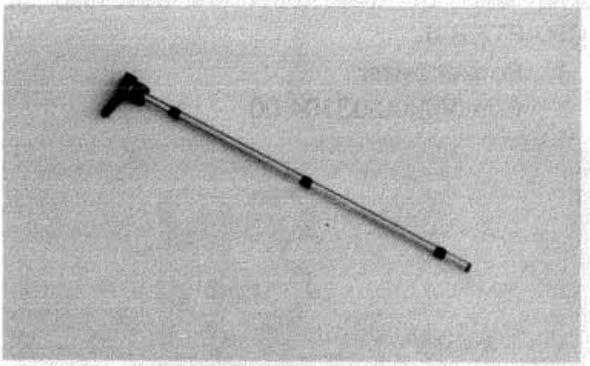
This tool is needed to hold the dial gauge.

13. Dial gauge
P/N. 90890-03097-00



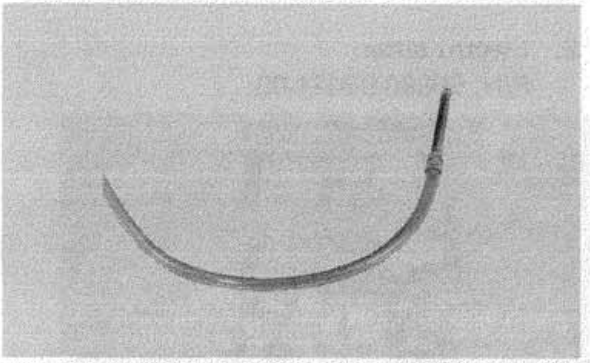
This dial gauge is used to determine piston position for correct timing.

14. YICS shutoff tool
P/N. TLM-11080-25-00



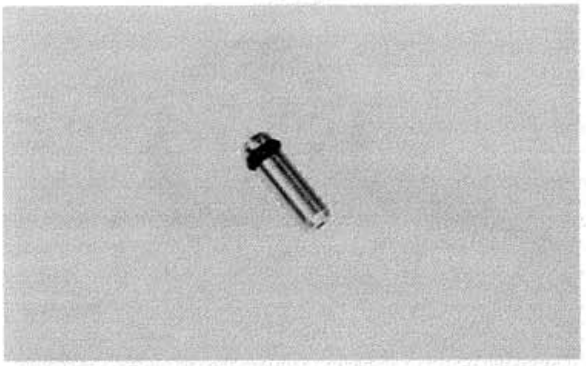
This tool is needed for carburetor synchronization.

15. Fuel level gauge
P/N. 90890-01312-00



This tool is needed to measure the carburetor fuel level.

16. Fuel level gauge adapter
P/N. 90890-01329-00

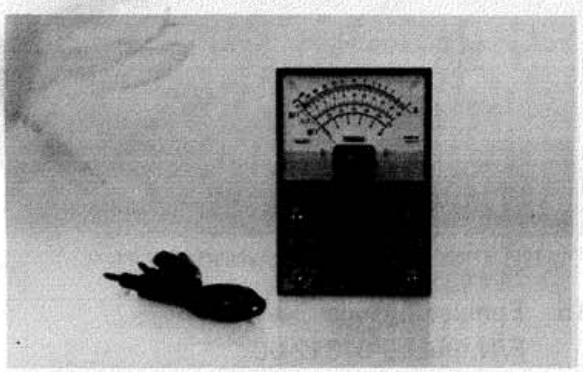


This tool is needed when measuring the carburetor fuel level together with fuel level gauge.

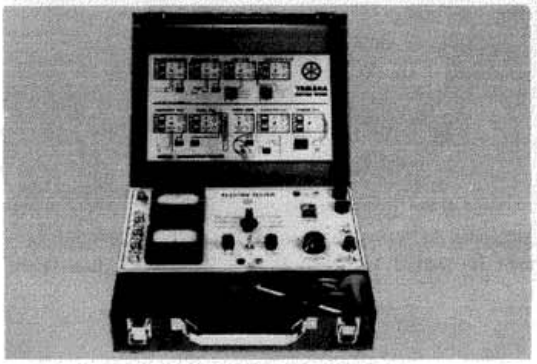
C. For electrical components

The uses of thee tools are described in CHAPTER 6.

1. Pocket tester
P/N. 90890-03104-00



2. Electro tester
P/N. 90890-03021-00



CHAPTER 2.
PERIODIC INSPECTIONS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended inspection and adjustments. These preventative maintenance procedures, if followed, will insure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies not only to vehicles already in service, but also to new vehicles that are being prepared for sale. Any service technician performing preparation work 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 tables of periodic maintenance, 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*	Cam chain	Adjust chain tension.	O	O		O
2*	Valve clearance	Check and adjust valve clearance when engine is cold.		O		O
3	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.		O	O	Replace every 12,000 km (7,500 mi) or 18 months
4*	Crankcase ventilation system	Check ventilation hose for cracks or damage. Replace if necessary.		O		O
5*	Fuel line	Check fuel hose and vacuum pipe for cracks or damage. Replace if necessary.		O		O
6*	Exhaust system	Check for leakage. Retighten as necessary. Replace gasket(s) if necessary.		O	O	
7*	Carburetor synchronization	Adjust synchronization of carburetors.		O	O	
8*	Idle speed	Check and adjust engine idle speed. Adjust cable free play if necessary.		O	O	

*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 km) or 12 months	16,000 km (10,000 mi) or 24 months
1	Engine oil	Warm-up engine before draining.	Refer to page 2-9.	○	○	○		
2	Oil filter	Replace.	–	○	○		○	
3	Air filter	Clean with compressed air.	–		○		○	
4*	Brake system	Adjust free play Front: Replace pads if necessary. Rear: Replace shoes if necessary.	–	○	○	○		
5*	Clutch	Adjust free play	–	○	○	○		
6	Drive chain	Check chain condition. Adjust and lubricate chain thoroughly.	Yamaha chain and cable lube or SAE 10W/30 motor oil	CHECK CHAIN TENSION AND LUBE EVERY 500 km (300 mi).				
7*	Control and meter cable	Apply chain lube thoroughly.	Yamaha chain and cable lube or SAE 10W/30 motor oil	○	○	○		
8	A.C. generator	Replace generator brushes. Replace at initial 13,000 km (8,000 mi) and thereafter every 16,000 km (10,000 mi)	–					Replace
9	Brake/clutch lever pivot shaft	Apply chain lube lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
10	Change/Brake pedal shaft pivot	Apply chain lube lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
11	Center and side stand pivots	Apply chain lube lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
12	Front fork oil	Drain completely. Refill to specification.	Yamaha fork oil 10 wt or equivalent					○
13	Steering Ball Bearing and races	Check bearings assembly for looseness. Moderately repack every 16,000 km (10,000 mi).	Medium weight wheel bearing grease		○	○		Repack
14	Wheel bearings	Check bearings for smooth rotation, Replace if necessary.	–		○	○		
15	Battery	Check specific gravity. Check breather pipe for proper operation.	–		○	○		

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

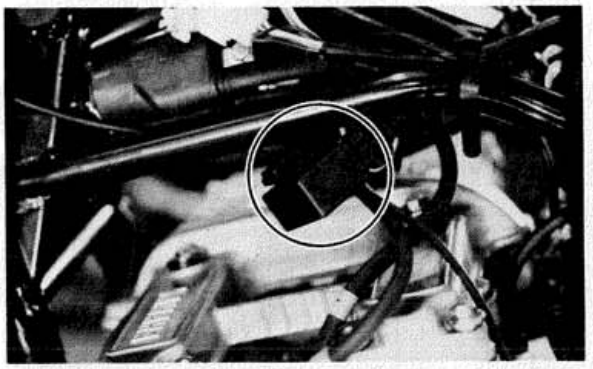
ENGINE

A. Valve clearance adjustment

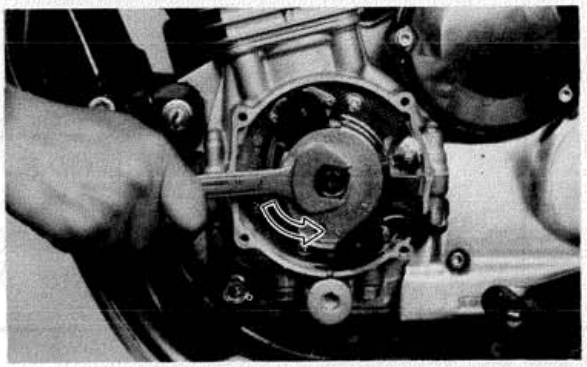
NOTE:

Valve clearance must be measured with the engine and at room temperature.

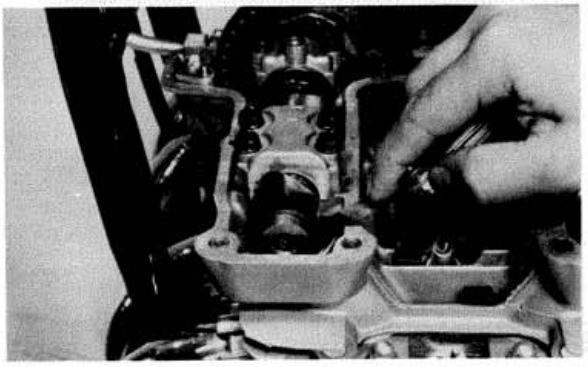
1. Open the seat and remove the fuel tank.
2. Remove the flasher relay and spark plug lead wires.



3. Remove the cylinder head cover and left crankcase cover (pick-up base cover). Care should be taken to not scratch or damage the gasket sealing surfaces.
4. Turn the crankshaft with the nut on the left end of the crankshaft to turn the cams. The proper position of the cam when measuring the valve clearance is with the cam lobe directly opposite the valve lifter.



5. Insert a feeler gauge between the valve lifter and the camshaft base circle.



Intake valve clearance (cold):
0.11 ~ 0.15 mm (0.004 ~ 0.006 in)
Exhaust valve clearance (cold):
0.16 ~ 0.20 mm (0.006 ~ 0.008 in)

Adjustment

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) to No. 320 (3.20 mm) in steps of 0.05 mm. 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:

1. Determine valve clearance (feeler gauge measurement.)
2. Remove adjusting pad and note number.
3. Select proper pad from appropriate chart (intake or exhaust chart).
4. Install new pad and check installed clearance.

Procedure

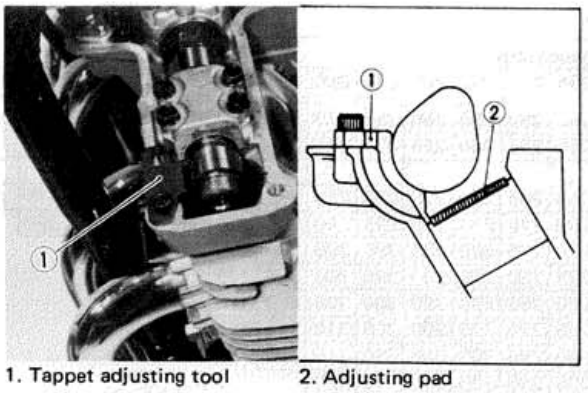
1. Measure valve clearance. If clearance is incorrect, record the measured amount of clearance. This must be measured carefully.
2. There is a slot in the valve lifter. This slot must be positioned opposite the blade of the tappet adjusting tool before the tool is installed.
3. Turn the cam until the lobe fully depresses the valve lifter and opens the valve. Install the tappet adjusting tool as shown to hold the lifter in this depressed position.

NOTE:

The tappet adjusting tool is fastened to the cylinder head securely using an allen screw. Make sure that the tool contacts the lifter only, and not the pad.

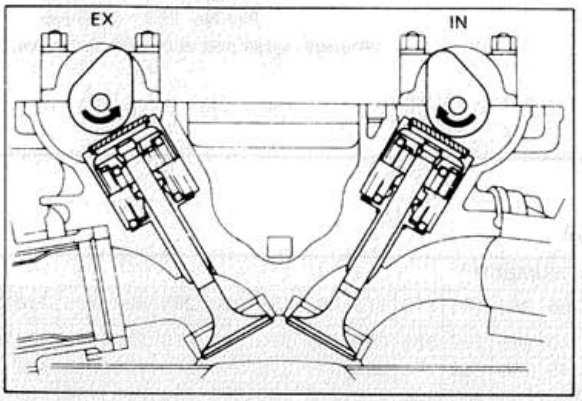
CAUTION:

If the cam lobe touches the tappet adjusting tool, the stress may fracture the cylinder head. DO NOT ALLOW THE CAM LOBE TO CONTACT THE TAPPET ADJUSTING TOOL.

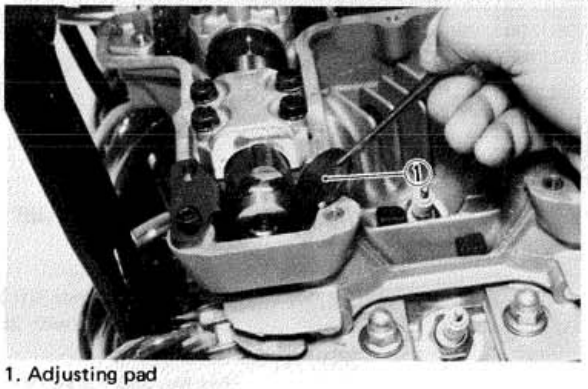


1. Tappet adjusting tool 2. Adjusting pad

4. Carefully rotate the cam so that the pad can be removed. To avoid cam touching the adjusting tool, turn cams as follows: (view from left side of the motorcycle) Intake: Carefully rotate CLOCKWISE. Exhaust: Carefully rotate COUNTER-CLOCKWISE.



5. Remove the pad from the lifter. There is a slot in the lifter. Use a small screwdriver or other blade and tweezers or a magnetic rod to remove the pad. Note the number on the pad.



1. Adjusting pad

6. Proper pad selection is made as follows: (Use appropriate chart for exhaust or intake valves.)
   a. Find number of original (installed) pad number on chart. Read down on chart.
   b. Find measured valve clearance (from step 1) on chart. Read across.
   c. 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:
0.32 mm (read across)
New pad number: No. 270
(intersection of down & 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).

7. Install the new pad in the lifter. Install the pad with the number down.
8. Remove tappet adjusting tool.
9. Turn crankshaft to rotate cam several rotations. This will set the pad in the lifter.
10. Check valve clearance (step 3). If clearance is incorrect, repeat preceding steps until proper clearance is obtained.
11. Inspect head cover gasket. If bent or torn, replace gasket.
12. Reinstall removed parts in reverse order.

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	310
0.06 ~ 0.10		200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315
0.11 ~ 0.15																									
0.16 ~ 0.20	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	
0.21 ~ 0.25	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320		
0.26 ~ 0.30	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320			
0.31 ~ 0.35	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320				
0.36 ~ 0.40	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320					
0.41 ~ 0.45	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320						
0.46 ~ 0.50	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320							
0.51 ~ 0.55	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320								
0.56 ~ 0.60	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320									
0.61 ~ 0.65	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320										
0.66 ~ 0.70	255	260	265	270	275	280	285	290	295	300	305	310	315	320											
0.71 ~ 0.75	260	265	270	275	280	285	290	295	300	305	310	315	320												
0.76 ~ 0.80	265	270	275	280	285	290	295	300	305	310	315	320													
0.81 ~ 0.85	270	275	280	285	290	295	300	305	310	315	320														
0.86 ~ 0.90	275	280	285	290	295	300	305	310	315	320															
0.91 ~ 0.95	280	285	290	295	300	305	310	315	320																
0.96 ~ 1.00	285	290	295	300	305	310	315	320																	
1.01 ~ 1.05	290	295	300	305	310	315	320																		
1.06 ~ 1.10	295	300	305	310	315	320																			
1.11 ~ 1.15	300	305	310	315	320																				
1.16 ~ 1.20	305	310	315	320																					
1.21 ~ 1.25	310	315	320																						
1.26 ~ 1.30	315	320																							
1.31 ~ 1.35	320																								

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

Exhaust

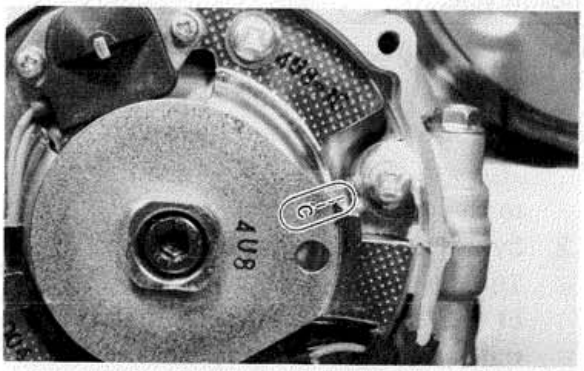
MEASURED CLEARANCE	INSTALLED PAD NUMBER*																								
	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
0.00 ~ 0.05				200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305
0.06 ~ 0.10			220	205	210	215	220	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																
1.01 ~ 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 ~ 0.20 mm
Example: Installed is 250
Measured clearance is 0.32 mm
Replace 250 pad with 265
*Pad number (example):
Pad No. 250 = 2.50 mm
Pad No. 255 = 2.55 mm
Always install pad with number down.

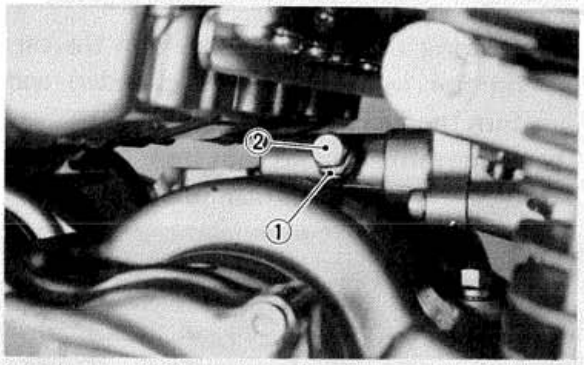
B. Cam chain adjustment

The cam chain becomes stretched with use, resulting in improper valve timing and engine noise. To prevent this, the cam chain tensioner must be adjusted regularly.

1. Remove the timing plate cover.
2. Slowly rotate the crankshaft counterclockwise until the "C" mark on the timing plate aligns with the stationary pointer.



3. Loosen the tensioner lock nut and then loosen the stopper bolt. This releases the cam chain tensioner with the proper tension.



1. Lock nut 2. Stopper bolt

4. Tighten the stopper bolt and lock nut.

Stopper bolt torque:	0.6 m-kg (4.3 ft-lb)
Lock nut torque:	0.9 m-kg (6.5 ft-lb)

5. Reinstall the timing plate cover.

C. Ignition timing

1. Ignition timing is checked with a timing light by observing the position of the stationary pointer and the marks stamped on the timing plate.

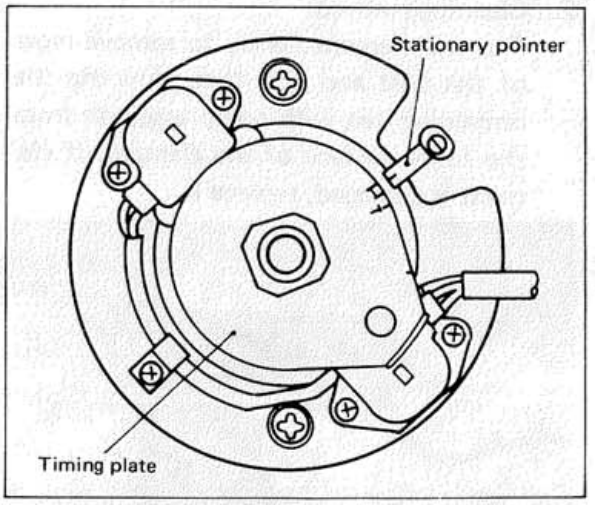
The timing plate is marked as follows:
"⊓"....Firing range for No. 1 (L.H.) cylinder
"T" .... Top Dead Center for No. 1 (L.H.) and No. 4 (R.H.) cylinders.

2. Connect the timing light to No. 1 (L.H.) spark plug lead wire.
3. Start the engine and keep the engine speed as specified. Use a tachometer to check the engine speed.

Specified engine speed: 1,200 r/min

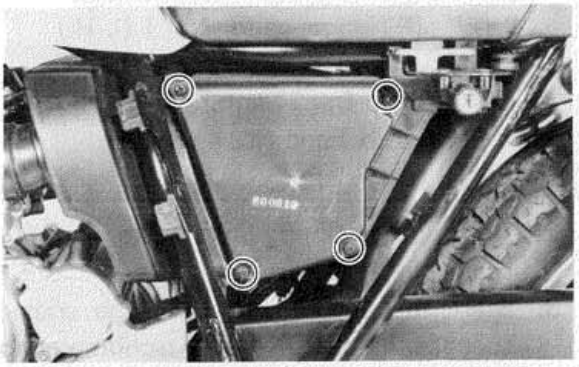
4. The stationary pointer should be within the limits of "⊓" on the timing plate. If it exceeds the limits or does not steady, check the timing plate for tightness and/or ignition system for damage. (See "CHAPTER 6. ELECTRICAL)

CAUTION:
Never bend the stationary pointer.

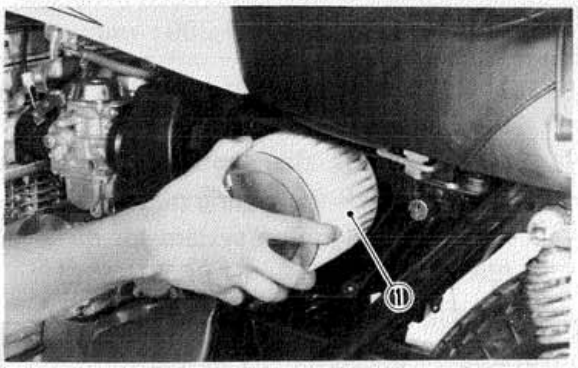


D. Air cleaner

1. Removal
   a. Open the seat.
   b. Remove the side cover (left).
   c. Remove the air cleaner case cover by removing the four screws.

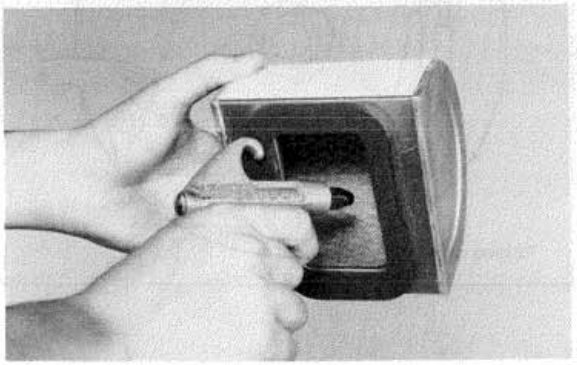


   d. Pull out the element.



1. Air filter element

2. Cleaning method
   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.



3. Reassemble by reversing the removal procedure. Check whether the element is seated completely against the case.
4. The air cleaner 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.

E. Carburetor

NOTE:

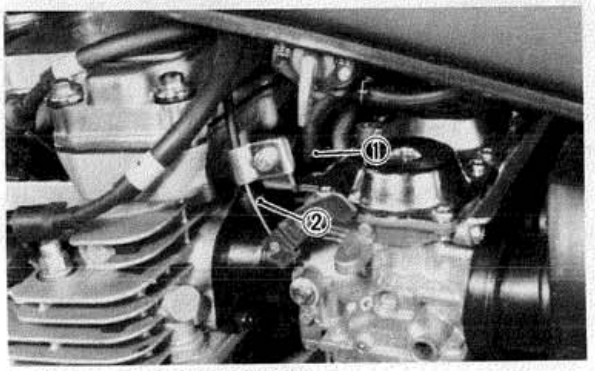
The carburetors are numbered 1, 2, 3, and 4 from the left when viewed from astride the motorcycle.

1. Idle mixture
   The idle mixture is set at the factory by the use of special equipment. No attempt should be made by the dealer to change this adjustment.
2. Synchronization
   The seat must be opened and the rear of the tank elevated to gain access to the vacuum connections and synchronizing screw of the carburetors.

NOTE:

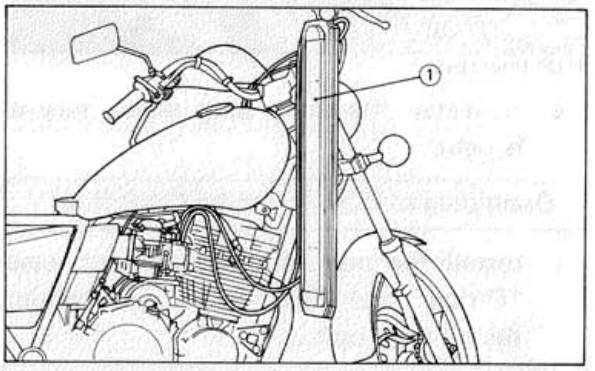
The valve clearances must be set properly before synchronizing the carburetors.

   a. Remove the vacuum pipe from the carburetor manifold (No. 2 cylinder) and turn the fuel petcock to "PRI".
   b. Remove the rubber caps from the No. 1, 3, and 4 carburetor manifolds.



1. Vacuum pipe 2. Rubber cap

c. Remove either the left or right (but not both) blind plug at the end of the YICS (Yamaha Induction Control System) passage in the cylinder.
d. Insert the YICS shutoff tool (special tool) fully and flip the locking lever.
e. Connect each vacuum gauge hose to its proper carburetor.

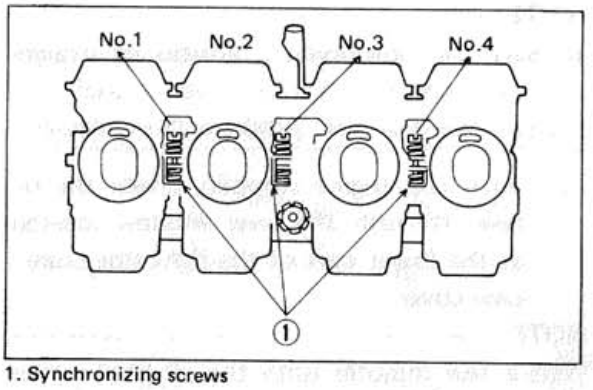


1. Vacuum gauge

f. Start the engine allow it to warm-up for a few minutes. The warm-up is complete when engine responds normally to the throttle opening.
g. Make sure the engine idle speed is 1,000 ~ 1,100 r/min. If it does not, adjust the idle speed with the throttle stop screw.

NOTE:
With the YICS shutoff tool fitted, the engine speed generally drops a little. Thus, continue with the following steps at idle speed of 1,000 ~ 1,100 r/min.

h. Each gauge reading will indicate the same if the carburetors are synchronized. The No. 3 carburetor has no synchronizing screw and the other carburetors are to be synchronized to it in order, one at a time.
First, synchronize carburetor No. 1 to carburetor No. 2 by turning the No. 1 synchronizing screw until both gauges read the same.
Second, in the same way synchronize carburetor No. 4 to carburetor No. 3.
Third, by adjusting No. 2 screw to watch No. 3 carburetor reading, No. 1 and No.2 carburetors will both change to match No. 3 carburetor.



1. Synchronizing screws

i. Make sure that the engine now develops an idle engine speed of 1,000 ~ 1,100 r/min. If it does not, adjust the idle speed with the throttle stop screw and repeat the steps starting with g.
j. Remove the YICS shutoff tool and reinstall the blind plug.

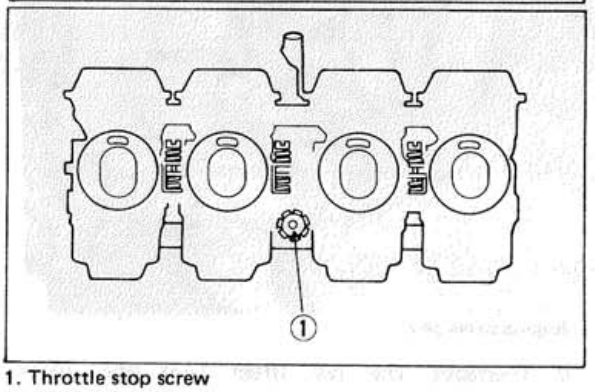
Tightening torque:
2.2 m-kg (16.0 ft-lb)

3. Idle speed adjustment

NOTE:
Carburetors must be synchronized before setting final idle speed. The idle speed adjustment is made by turning only one throttle stop screw.

a. The engine must be warmed up before setting idle speed.
b. Set the engine idle speed by turning the throttle stop screw in (to increase engine speed) or out (to decrease engine speed).

Standard idle speed: 1,200 r/min



1. Throttle stop screw

F. Engine oil

1. Oil level measurement
a. Place the motorcycle on the center stand. Warm up the engine for several minutes.

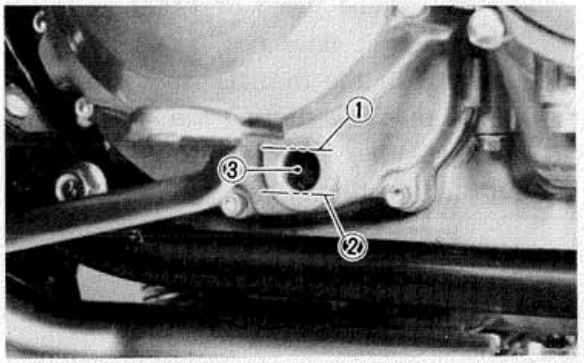
NOTE:

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

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

NOTE:

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



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

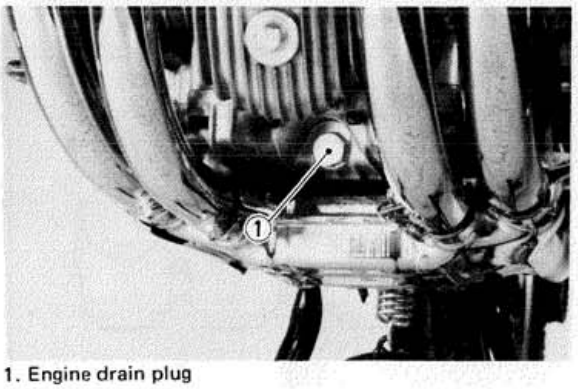
c. The oil level should be between maximum and minimum marks. If the level is lower add sufficient oil to raise it to the proper level.

2. Engine oil and oil filter replacement

a. Start the engine and stop it after a few minutes of warm-up.

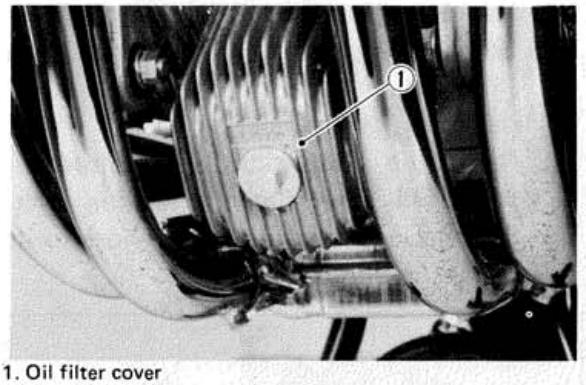
b. Place an oil pan under the engine and remove the oil filler cap.

c. Remove the engine drain plug and drain the oil.



1. Engine drain plug

d. Remove the oil filter bolt and filter element.



1. Oil filter cover

e. Re-install the drain plug (make sure it is tight).

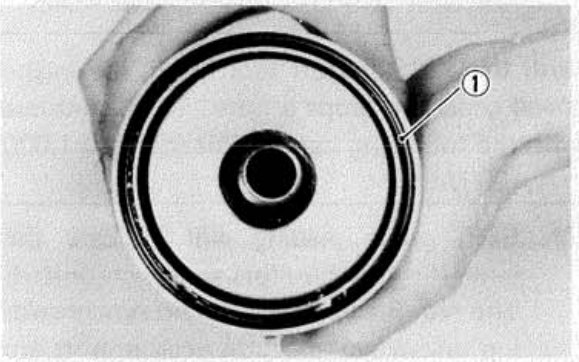
Drain plug torque: 4.3 m-kg (31.0 ft-lb)

f. Install the new oil filter element, new "O-ring" and filter cover, and tighten the oil filter bolt.

Oil filter bolt torque: 1.5 m-kg (11.0 ft-lb)

NOTE:

When installing the filter cover, make sure the "O-ring" is positioned properly and insert the locating projection on it into the corresponding guides on the crankcase.



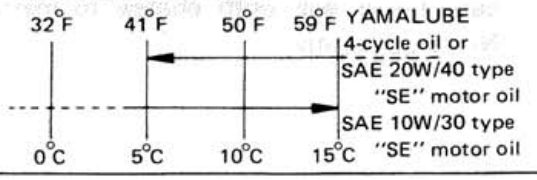
1. Proper O-ring position

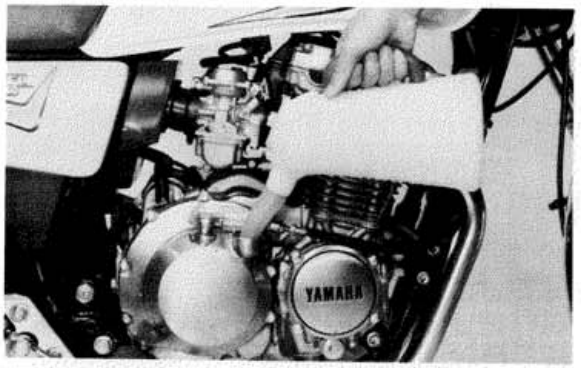
g. Add oil through the oil filler hole.

CAUTION:

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

Periodic oil change:
2.2 lit (2.3 US qt.)
With oil filler replacement:
2.5 lit (2.6 US qt.)
Recommended oil:





h. After replacement of the engine oil and/or oil filter, be sure to check for oil leakage. The oil level indicator light should go off after the engine has started.

CAUTION:

If the indicator light flickers or remains on, the oil level switch may be damaged. Refer to "CHAPTER 6" for corrective action.

G. Compression pressure measurement

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

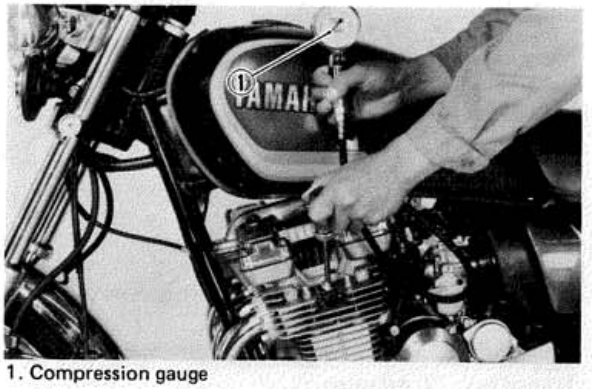
Procedure:

1. Make sure the valve clearance is correct.
2. Warm up the engine 2 ~ 3 minutes.
3. Remove all the spark plugs.
4. Install a compression check 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.

Compression pressure (at sea level):	
Standard	8.5 kg/cm² (121 psi)
Minimum	7.0 kg/cm² (100 psi)
Maximum	9.5 kg/cm² (135 psi)

WARNING:

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



1. Compression gauge

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, either or both the rings and valves may be the cause.
7. Check each cylinder. Compression pressure should not vary more than specified value from one cylinder to any other cylinder.

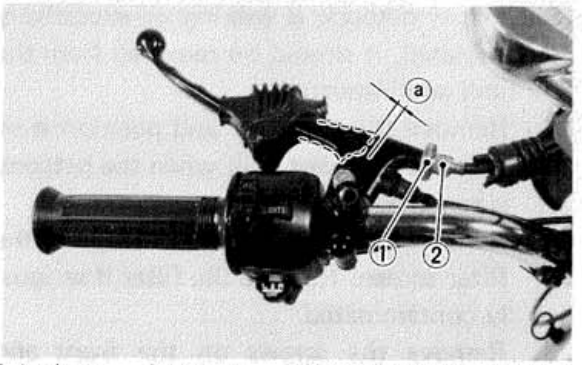
Difference in gauge reading:
Less than 1 kg/cm² (14 psi)

H. Clutch adjustment

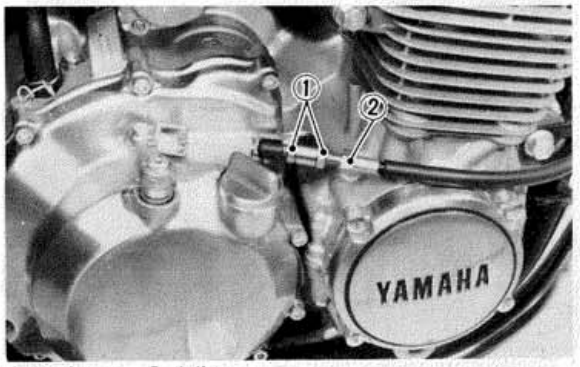
Free play adjustment

a. Loosen either the handlebar lever adjuster lock nut or the cable length adjuster lock nut.
b. Turn the cable length adjuster either in or out until proper lever free play is achieved.

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



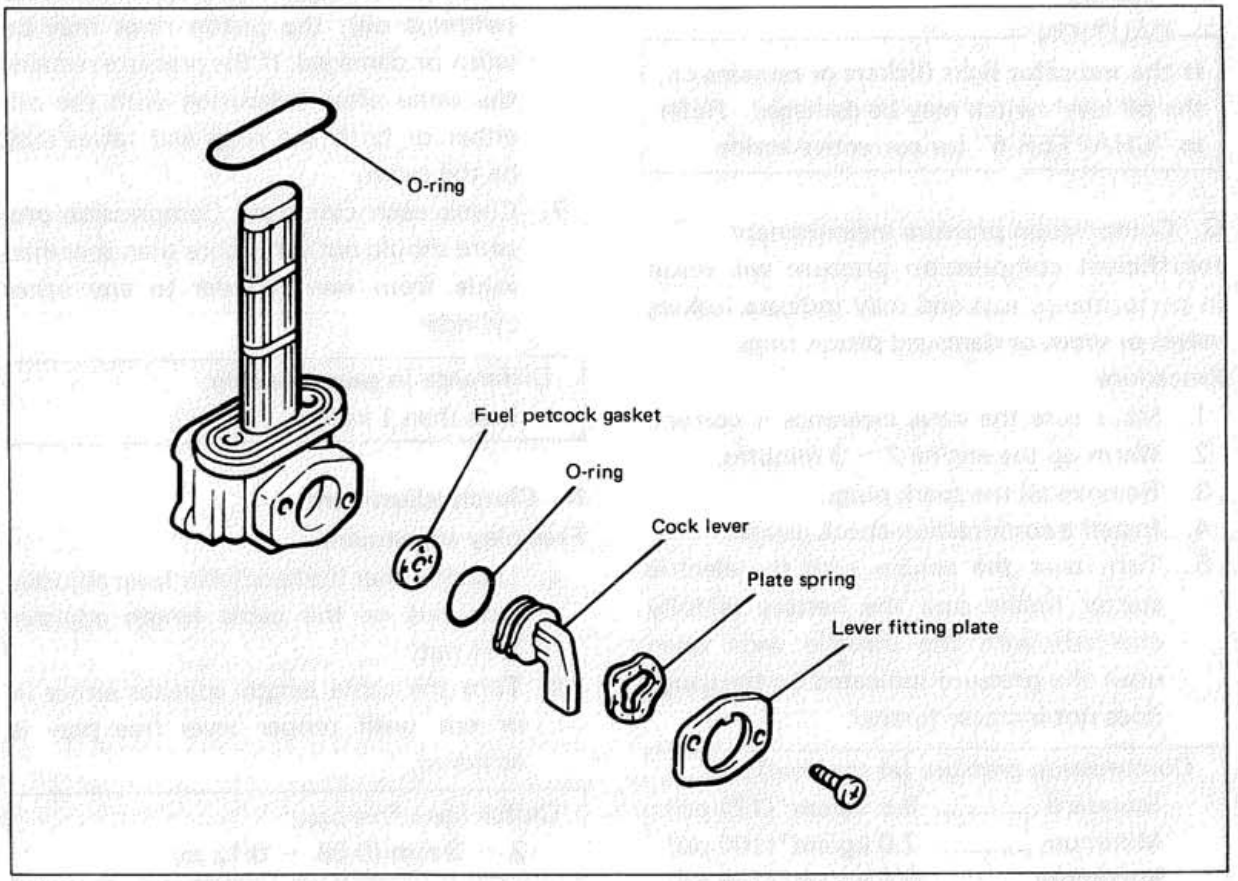
1. Lock nut 2. Adjuster a. 2 ~ 3 mm (0.08 ~ 0.12 in)



1. Lock nut 2. Adjuster

CHASSIS

A. Fuel petcock



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

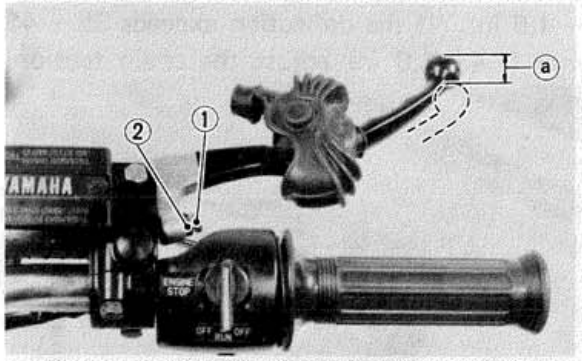
1. Remove the fuel tank and position it so that fuel will not spill when the petcock is removed.
2. Remove the petcock and inspect the filter screen. Replace the filter if seriously contaminated.
3. Remove the screws on the front and rear of the petcock and remove the plate, gasket, lever, and diaphragm.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

B. Front and rear brake

1. Brake adjustment

a. 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 the 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.



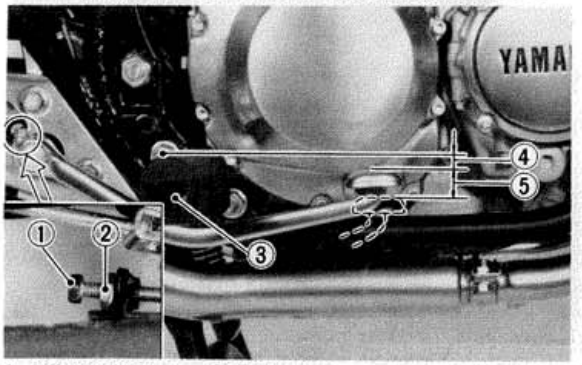
1. Adjuster 2. Lock nut a. 5 ~ 8 mm (0.2 ~ 0.3 in)

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

b. Rear brake pedal height adjustment
1) Loosen the adjuster lock nut (for pedal height).
2) By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal position so that its top end is approximately 20 mm (0.78 in) below the footrest top end.
3) Secure the adjuster lock nut.

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

c. Rear brake pedal free play adjustment



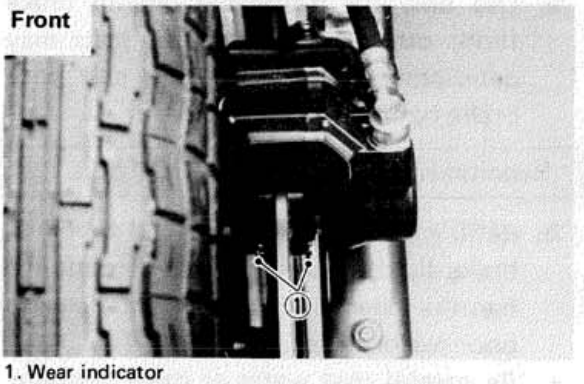
1. Adjuster bolt (for pedal height)
2. Lock nut
3. Footrest
4. Pedal height 20 mm (0.8 in)
5. Free play 20 ~ 30 mm (0.8 ~ 1.2 in)

Turn the adjuster on the brake rod clockwise or counterclockwise to provide the brake pedal end with a free play of 20~30 mm (0.8 ~ 1.2 in).

NOTE:
Check to see whether or not the brake light operates correctly after adjusting.

2. Front brake pad and rear brake shoe check

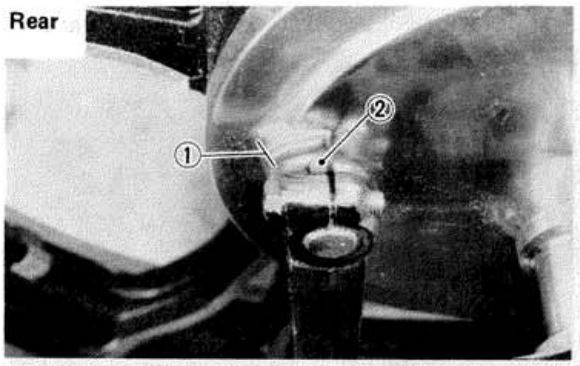
a. Front brake pad
To check, look at the pad wear indicator in back of the caliper. If any pad is worn to the wear limit, replace both the pads in the caliper.



1. Wear indicator

b. Rear brake shoe
To check, see the wear indicator position while depressing the brake pedal. If the indicator reaches to the wear limit line, replace the shoes.

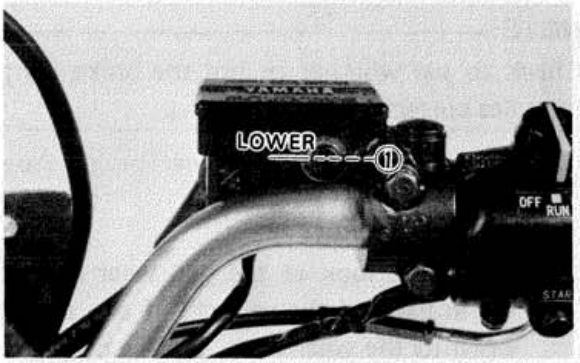
Rear



1. Wear limit 2. Wear indicator

3. 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

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

Recommended brake fluid: DOT#3

b. Refill with the same type and brand of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.

c. Be careful that water or other contamination does not enter the master cylinder when refilling. Water will significantly lower the boiling point and may result in vapor lock.

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

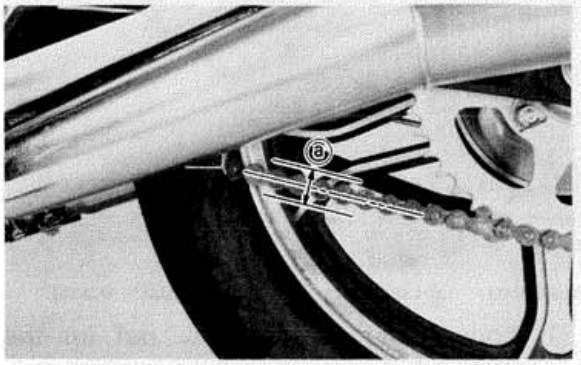
C. Drive chain

1. Drive chain tension check

NOTE:

Before checking and/or adjusting, rotate the rear wheel through several revolutions and check the tension several times to find the tightest point. Check and/or adjust chain tension with rear wheel in this "tight chain" position.

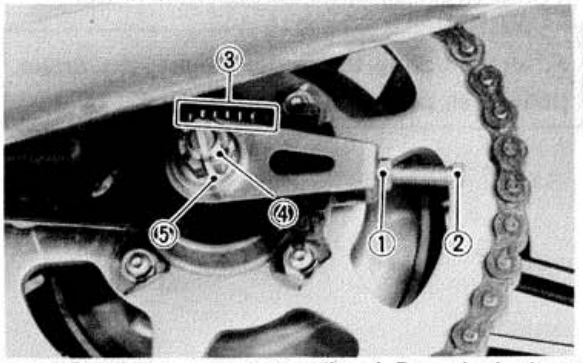
Inspect the drive chain with the center stand put up. Check the tension at the position shown in the illustration. The normal vertical deflection is approximately 35 ~ 40 mm (1.4 ~ 1.6 in). If the deflection exceeds 35 ~ 40 mm (1.4 ~ 1.6 in) adjust the chain tension.



a. 35~ 40 mm (1.4~ 1.6 in)

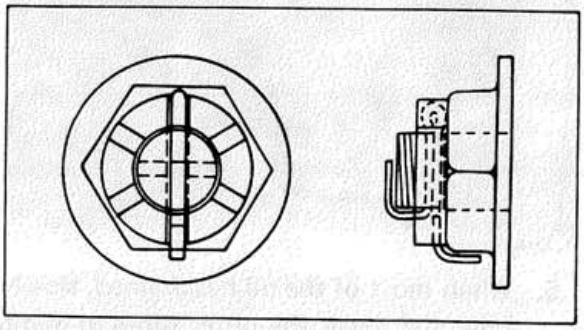
2. Drive chain tension adjustment

1. Loosen the rear brake adjuster.
2. Remove the cotter pin of the rear wheel axle nut with pliers.
3. Loosen the rear wheel axle nut.
4. Loosen the adjust bolt lock nuts on each side. To tighten the chain turn chain puller adjust bolts clockwise. To loosen the chain turn adjust bolts counterclockwise and push wheel forward. Turn each bolt exactly the same amount to maintain correct axle alignment (There are marks on each side of rear arm and on each chain puller; use them to check for proper alignment).



1. Lock nut 2. Adjuster 3. Marks for align 4. Rear wheel axle nut 5. Cotter pin

5. After adjusting, be sure to tighten the lock nuts and the rear wheel axle nut.
6. Insert the cotter pin into the rear wheel axle nut and bend the end of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match tighten the nut slightly to match).



CAUTION:
Always use a new cotter pin on the rear axle nut.

NOTE:
Excessive chain tension will overload the engine and other vital parts; keep the tension within the specified limits.

7. In the final step, adjust the play in the brake pedal.

3. Drive chain lubrication

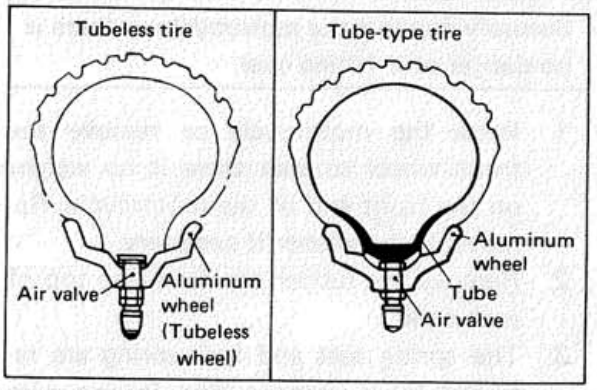
The chain consists of many parts which work against each other. If the chain is not maintained properly, it will wear out rapidly. Without lubrication the chain could wear out within 500 km (300 mi), therefore, form the habit of periodically servicing the chain. This service is especially necessary when riding in dusty conditions.

1. Use YAMAHA CHAIN/CABLE LUBE or any of the many brands of spray type chain lubricant. First, remove dirt and mud from the chain with a brush or cloth and the spray the lubricant between both rows of side plates and on all center rollers. This should be performed every 500 km (300 mi).
2. To clean the entire chain, first remove the chain from the motorcycle, dip it in solvent and clean out as much dirt as possible. Then take the chain out of the solvent and dry it. After drying lubricate the chain to prevent the formation of rust.

D. 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 results 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 also.



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 the center stand 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.

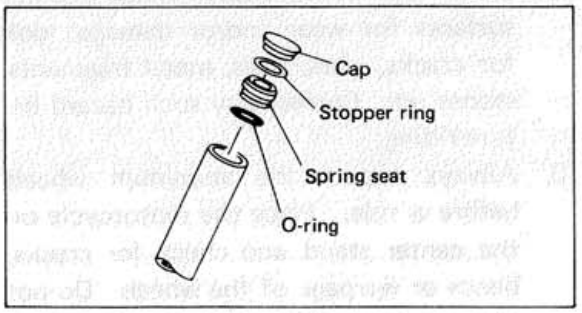
5. After installing a tire, ride conservatively to allow the tire to seat itself on the rim properly. Failure to allow proper seating may cause tire failure resulting in damage to the motorcycle and injury to the rider.
6. After repairing or replacing a tire, check to be sure the valve stem lock nut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

Tightening torque:
0.15 m-kg (1.1 ft-lb)

E. Front fork oil change

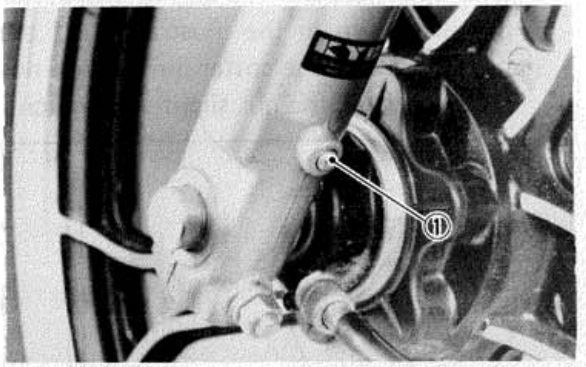
WARNING:
Securely support the motorcycle so there is no danger of it falling over.

1. Raise the motorcycle or remove the front wheel so that there is no weight on the front end of the motorcycle. Remove the handlebar if necessary.
2. Remove the rubber cap from the top of each fork.
3. The spring seat and fork spring are retained by a stopper ring (spring wire circlip). It is necessary to depress the spring seat and fork spring to remove the stopper ring. Remove the stopper ring by carefully prying out one end with a small screwdriver.



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

WARNING:
Do not allow oil to 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):
230 cc (7.78 oz)
Recommended oil:
Yamaha Fork Oil 10 wt or equivalent

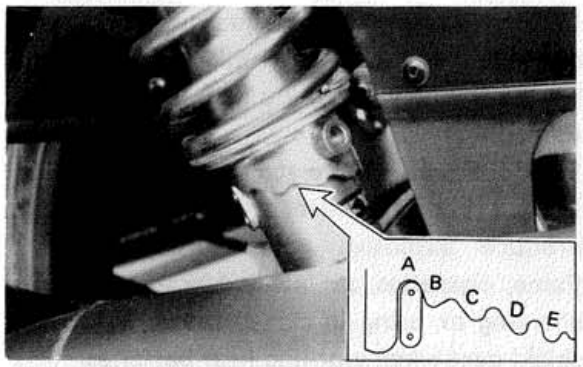
8. After filling, slowly pump the forks up and down to distribute the oil.
9. Inspect the "O-ring" on the spring seat. Replace "O-ring" if damaged.
10. Reinstall the spring seat, stopper ring and rubber cap.

CAUTION:
Always use a new stopper ring (spring wire circlip).

F. Rear shock absorber

If the spring seat is raised, the spring becomes stiffer and if lowered, it becomes softer.

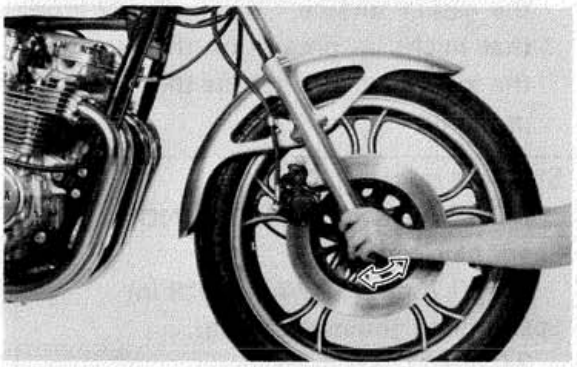
Standard position	A
A. position	Softest
E. position	Stiffest



G. 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 there is looseness in the steering head, loosen the steering stem and front fork pinch bolts and steering fitting bolt.
4. Use a steering nut wrench to loosen steering fitting nut.
5. Tighten the steering fitting nut until the steering head is tight, but does not bind when forks are turned.
6. Retighten the steering fitting nut, steering fitting bolt and steering stem and 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 adjustment procedure.

H. Cable inspection and lubrication

WARNING:

Damage to the outer housing of the various cables, may cause corrosion and often free movement will be obstructed. An unsafe condition may result so replace such cables as soon as possible.

1. If the inner cables do not operate smoothly, lubricate or replace them.

Recommended lubricant:
Yamaha Chain and Cable Lube or
SAE 10W/30 motor oil

I. Throttle cable and grip 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.

J. Brake and change pedal/brake and clutch levers

Lubricate the pivoting parts of each lever and pedal.

Recommended lubricant:
Yamaha Chain and Cable Lube or
SAE 10W/30 motor oil

K. Center and side stand pivots

Lubricate the center and side stands at their pivot points.

Recommended lubricants:
Yamaha Chain and Cable Lube or
SAE 10W/30 motor oil

ELECTRICAL

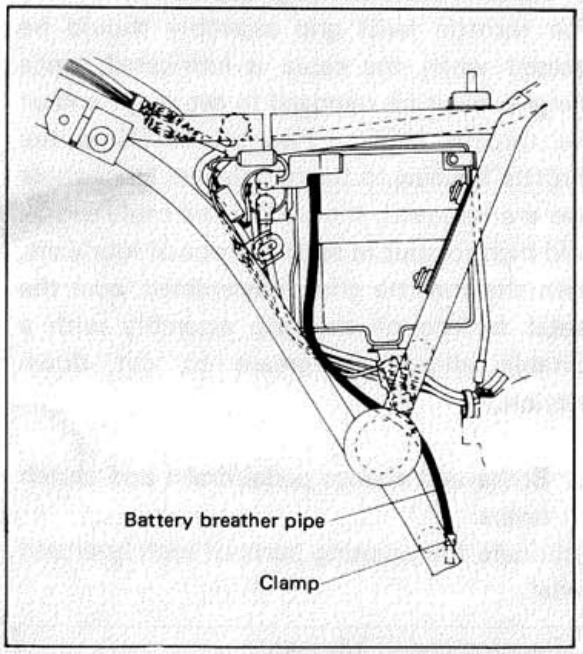
A. Battery

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

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 correst 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 insure maximum performance. Failure to properly charge the battery before first use, or low electrolyte level will cause premature failure of the battery.
Charging current: 1.2 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.

B. Spark plug

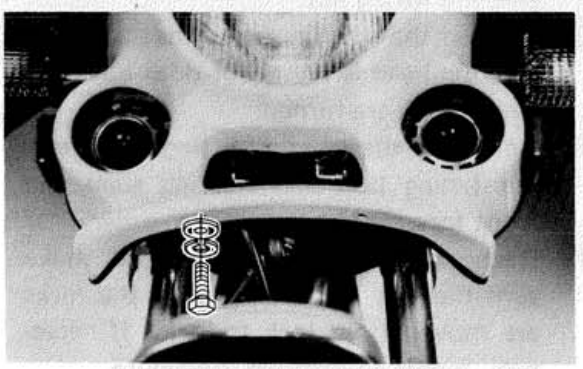
1. Check the electrode condition and wear, insulator color and electrode gap.
2. Use a wire gauge for measuring the plug gap.
3. If the electrodes become too worn, replace the spark plug.
4. When installing the plug, always clean the gasket surface. Wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

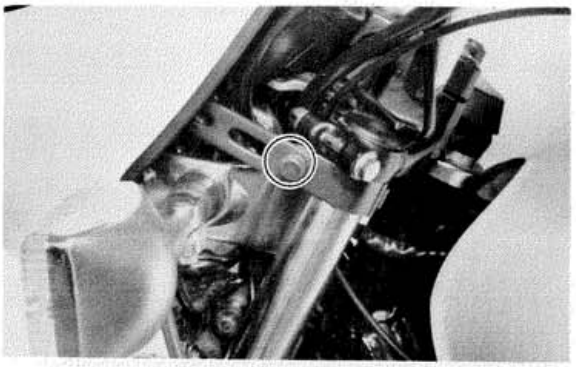
Standard spark plug:
D8EA (NGK) or X24ES-U (ND)
Spark plug gap:
0.6~0.7 mm (0.024 ~ 0.028 in)
Spark plug tightening torque:
2.0 m-kg (14.5 ft-lb)

C. Headlight

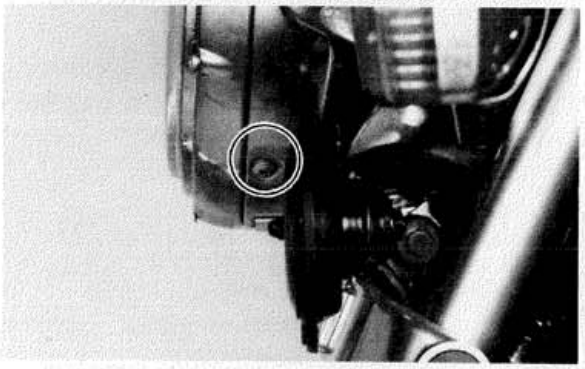
1. Headlight bulb replacement

a. Remove the cowling assembly.



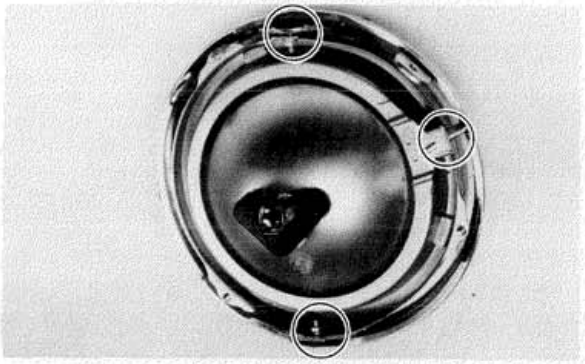


b. Remove the 2 screws holding the light unit assembly to the headlight body.

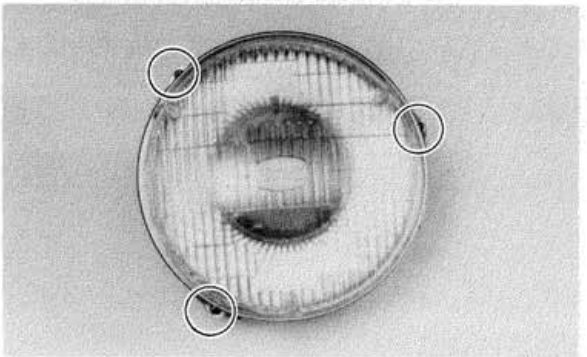


c. Disconnect the lead wires and remove the light unit assembly.

d. Remove the top and bottom fitting screws and the horizontal adjusting screw. Remove the light unit assembly from the headlight rim.



e. Remove the sealed beam unit holding screws. Remove the unit retaining ring and the defective unit.



f. Slip a new sealed beam unit into position and secure it with the retaining ring and install it into the headlight rim.

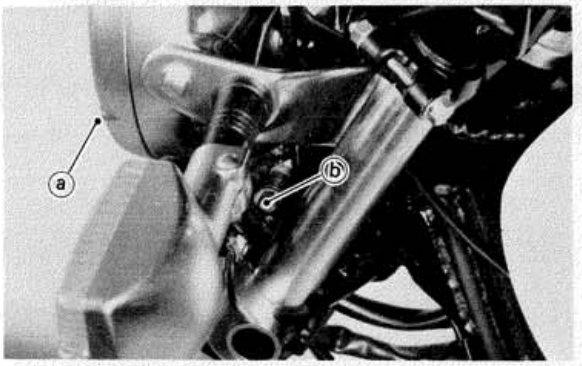
g. Reinstall the light unit assembly to the headlight body. Adjust the hedalight beam.

h. Reinstall the cowling assembly.

2. Headlight beam adjustment

a. Horizontal the beam to the right, turn the adjusting screw clockwise.
To adjust the beam to the left, turn the screw counterclockwise.

b. Vertical adjustment:
Loosen the adjusting screw under the headlight body. Adjust vertically by moving the headlight body. When proper adjustment is determined, retighten the adjusting screw.



a. Horizontal adjusting screw
b. Vertical adjusting screw

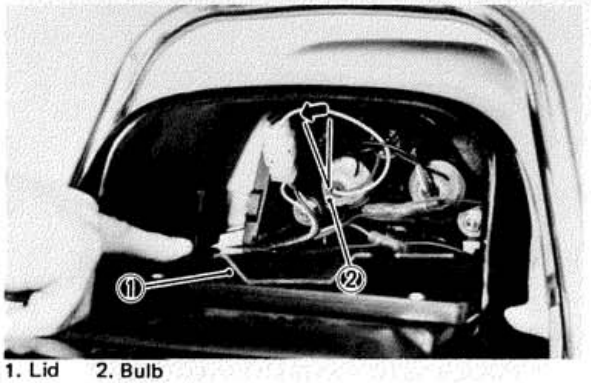
D. Taillight

1. Taillight bulb replacement

a. Open the seat.

b. Pull open the lid in the seat cowl.

c. To remove the bulb, turn it approximately 30° counterclockwise.



1. Lid 2. Bulb

d. To install the bulb, reverse the removal procedure.

E. Fuse

The fuse block is located under the seat. If any fuse is blown, turn off the ignition switch and the switch in the circuit in question and install a new fuse of proper amperage. Then 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 possible fire.

CHAPTER 3. ENGINE OVERHAULING

ENGINE REMOVAL

NOTE:

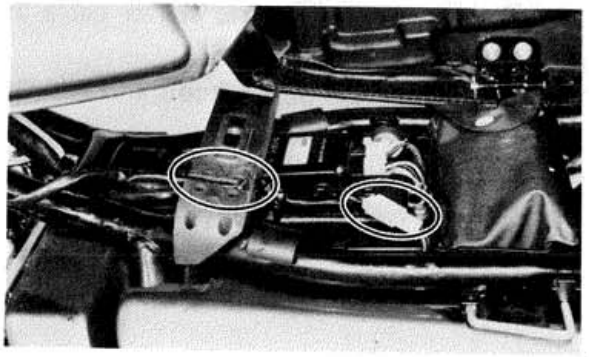
It is not necessary to remove the engine in order to remove the cylinder head, cylinder, or pistons.

A. Preparation for removal

1. All dirt, mud, dust and foreign material should be thoroughly removed from the exterior of the engine before removal and disassembly. This will help prevent and harmful foreign material from engine oil.
2. Before the engine removal and disassembly, be sure that you have the proper tools and cleaning equipment so that you can perform a clean and efficient job.
3. During disassembly of the engine, clean and place all of the parts in trays in order of disassembly. This will speed up assembly time and help insure correct reinstall-action of all the engine parts.
4. Place the motorcycle on its center stand. Start the engine and allow it to warm up. Stop the engine and drain the engine oil.
5. Remove the oil filter cover from the crankcase.
6. Remove the left and right side covers.

B. Seat and fuel tank

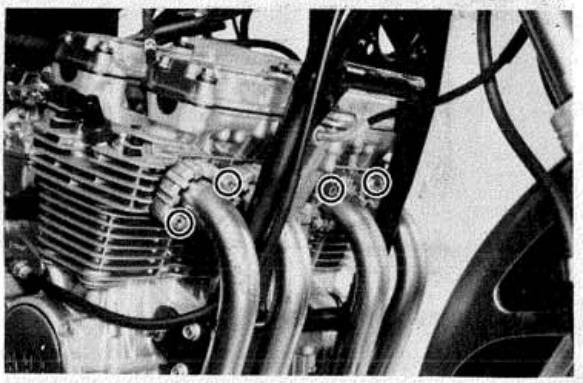
1. Turn the fuel petcock to "ON".
2. Open the seat and the fuel tank holding bolt. Lift the rear end of the fuel tank and disconnect the fuel pipes and vacuum pipe from the petcock.
3. Disconnect the fuel level switch lead wire.



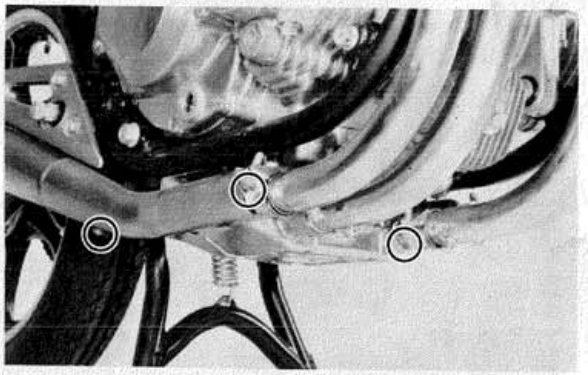
4. Remove the tool tray.

C. Mufflers

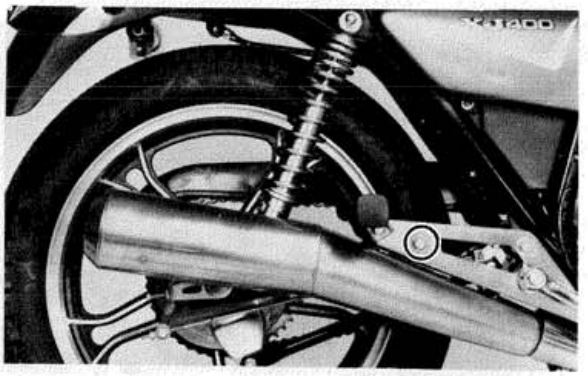
1. Remove the rear brake pedal and footrests (left and right).
2. Remove the exhaust pipe holding nuts from the cylinder head.



3. Loosen the clamp bolts securing the muffler joints.



4. Remove the bolts holding the right and left mufflers to the muffler bracket and remove the left and right mufflers.



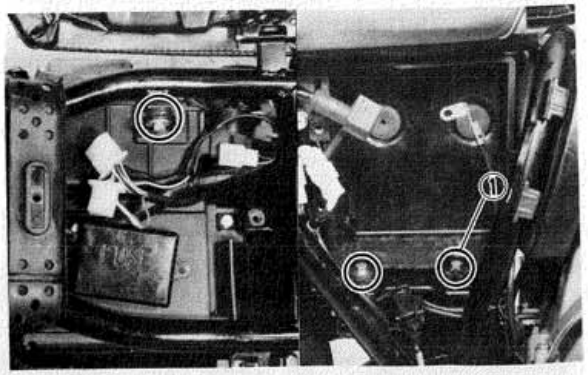
D. Battery case

1. Remove the battery cover then remove the negative battery cable from the battery terminal. Remove the battery.

2. Remove the battery case holding bolts and remove the battery case.

NOTE:

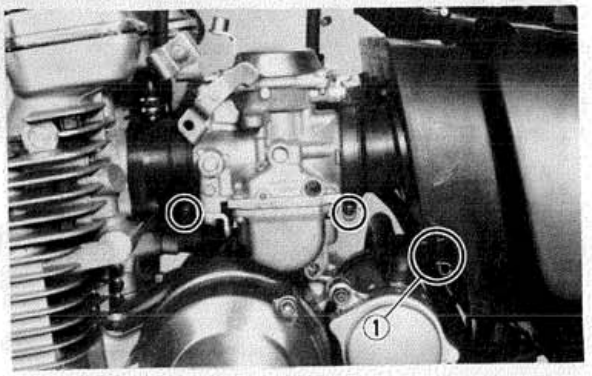
The engine ground wire is secured together with left side holding bolt.



1. Engine ground wire

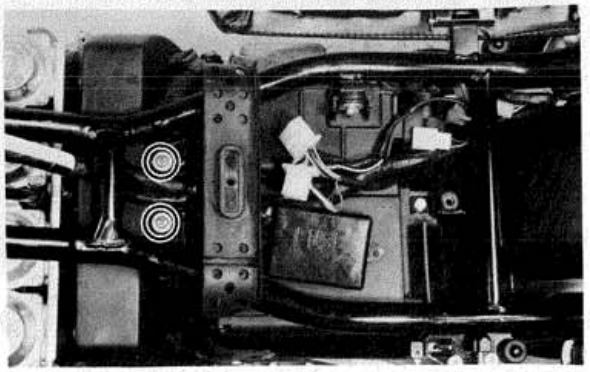
E. Air cleaner case

1. Remove the clamps holding the carburetors to the air cleaner case and intake manifolds. Remove the crankcase ventilation hose at the right crankcase cover.

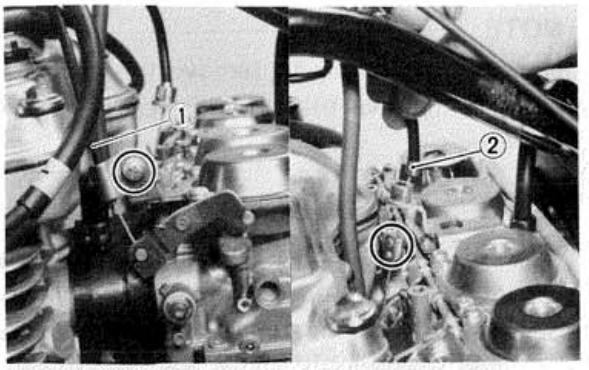


1. Crankcase ventilation hose

2. Remove the bolts holding the air cleaner case to the frame.



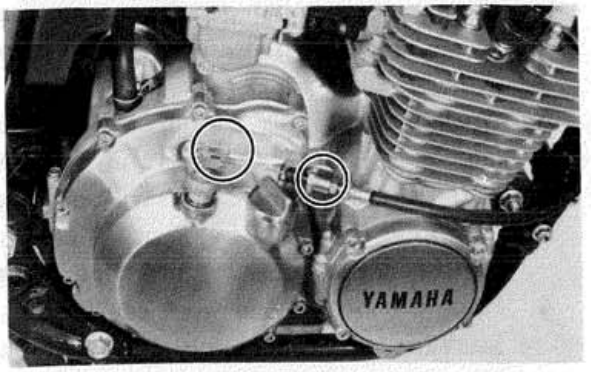
3. Remove the starter (CHOKE) cable from the carburetor.
4. Remove the air cleaner joint rubbers and pull the carburetor assembly to the rear.
5. Disconnect the throttle cable from the carburetor throttle lever and remove the carburetor assembly to the right.



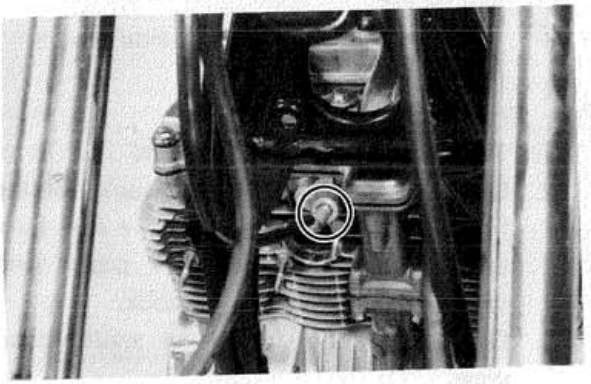
1. Starter (CHOKE) cable 2. Throttle cable

F. Wiring and cables

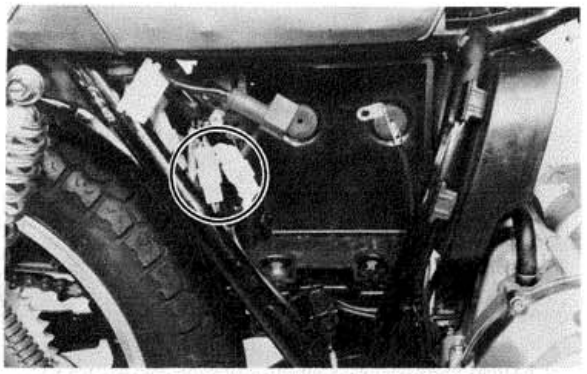
1. Disconnect the clutch cable at the crankcase side.



2. Remove the spark plug lead wires and the tachometer cable.



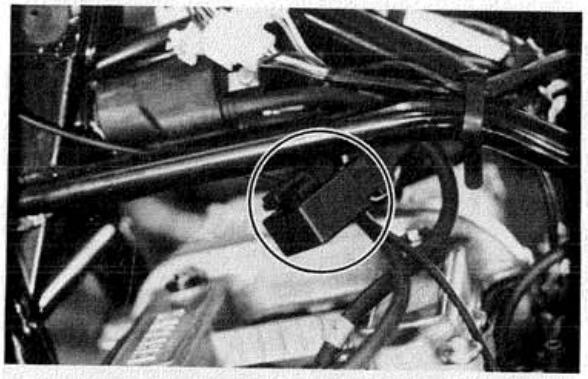
3. Disconnect the electric starter cable at the starter relay switch.
4. Disconnect the pick-up coil and A.C.G. lead wire couplers.
   Position the disconnect lead wires so that they can be safely removed. See page 3-29.



CAUTION:

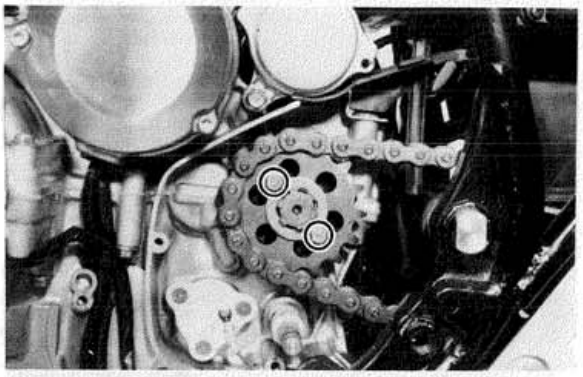
The A.C.G. lead, starter cable, and pick-up lead are clamped at the lower cross tube of the frame. Do not forget the remove this clamp before removing the engine.

5. Remove the flasher relay.



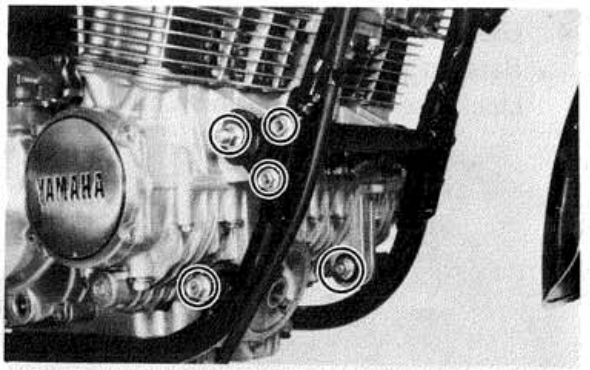
G. Change pedal and drive sprocket

1. Remove the change pedal and left crankcase cover.
2. Loosen the drive sprocket securing bolts and remove the sprocket holder.
3. Remove the drive sprocket.



H. Engine removal

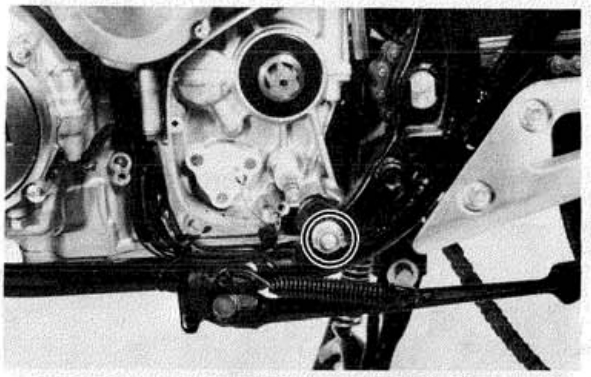
1. Remove the front engine mounting bolts and nuts. Remove the brackets.



NOTE:

It is advisable to hold the engine with a suitable garage jack before removing the engine mounting bolts and nuts.

2. Remove the rear engine mounting bolt.



3. Slide the engine forward slightly and remove the engine to the right.

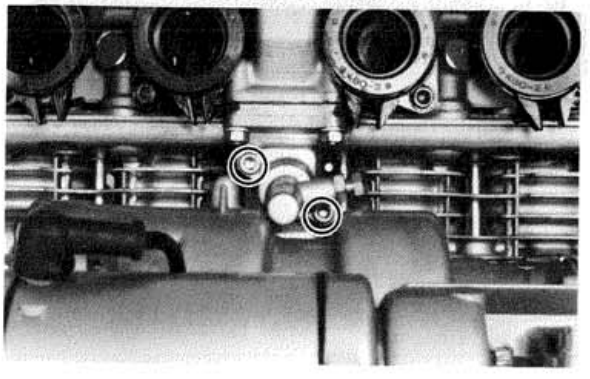
NOTE:

Position a box or other support to the right side of the motorcycle for the assistance when removing the engine.

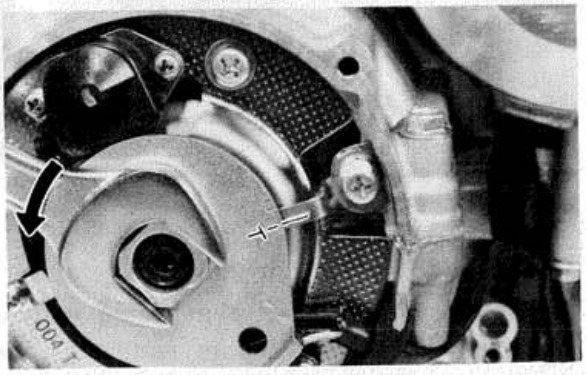
ENGINE OVERHAUL

A. Cylinder head and cylinder

1. Remove the cylinder head cover.
2. Remove the left crankcase cover (pick-up coil cover).
3. Remove the cam chain tensioner.



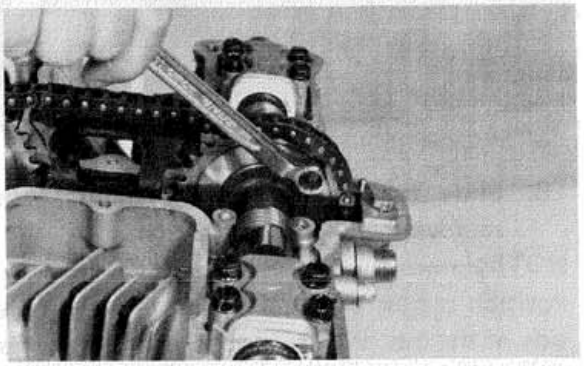
4. Use a 19 mm wrench on the timing plate flats to rotate the crankshaft counterclockwise until the engine is at T.D.C.



CAUTION:

Never use an allen wrench to rotate the crankshaft. Always use the 19 mm flats provided on the timing plate to rotate this engine.

5. Remove the center cam shaft caps. Next, remove the four cam sprocket bolts.

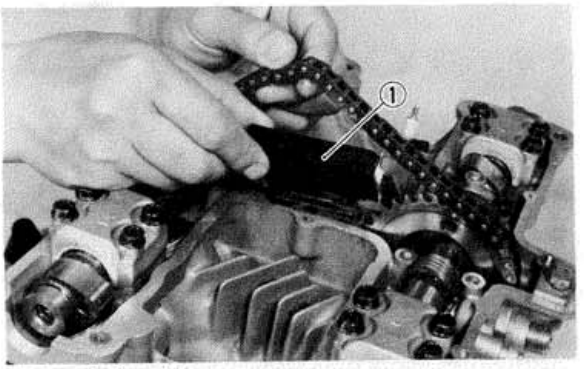


6. Slip each sprocket off its mounting boss on the cam.

CAUTION:

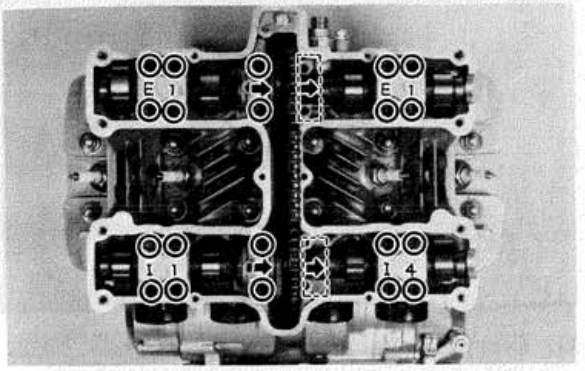
From this point on, do not rotate the cam shaft or valve damage may occur. On this, it is not necessary to break the cam chain. However, it can be broken if so desired. It is easier to disassemble the engine without separating the chain.

7. Remove the cam chain guide.

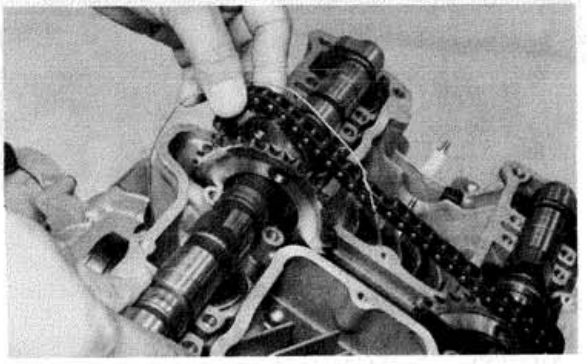


1. Cam chain guide

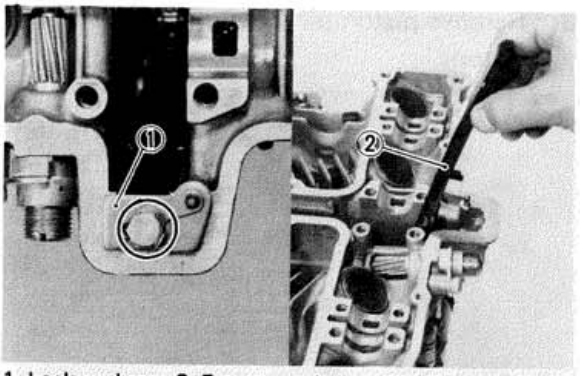
8. Remove the cam caps. Note the location of the cam caps. The caps for the intake cam shaft are identified I-1 through I-4. The exhaust cam caps are identified E-1 through E-4. Directional arrows are cast on each cap and point toward the clutch side.



9. Fasten safety wire to the cam chain to prevent its falling into the crankcase cavity.
   Slide the cams and sprockets from under the chain and remove the cams and sprockets.

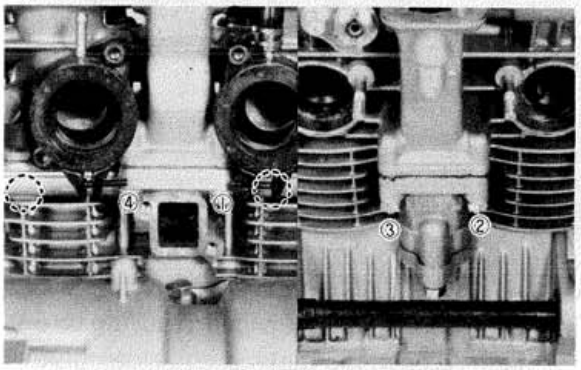


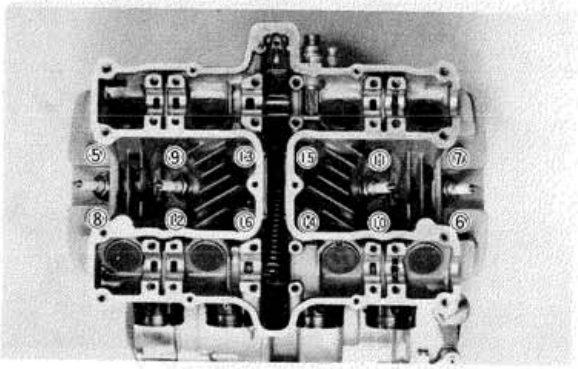
10. Remove the cam chain guide securing bolt and lock nut. Remove the front cam chain guide.



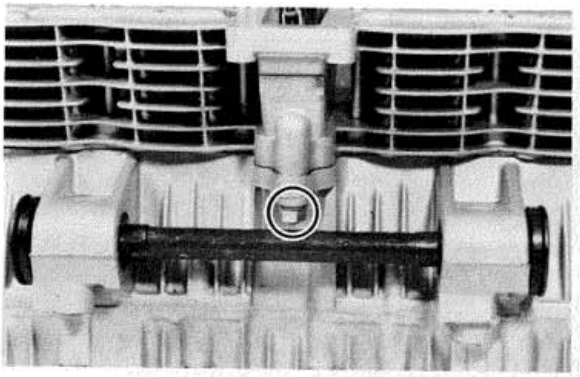
1. Lock washer 2. Front cam chain guide

11. Remove the spark plugs.
12. Remove the cylinder head bolts and nuts in the numerical order as shown. Start by loosening each nut 1/2 turn until all of the nuts are loose. Remove the cylinder head.

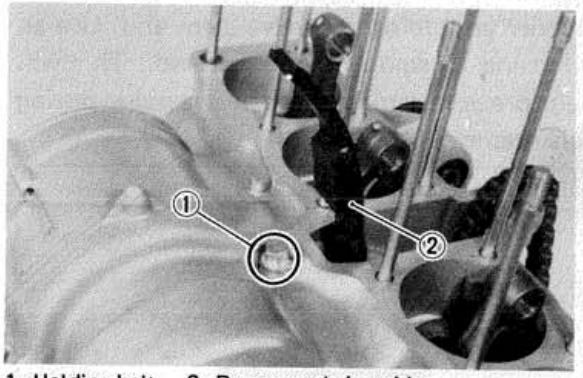




13. Remove the front cylinder holding nut and remove the cylinder assembly. It may be necessary to tap the cylinder lightly to loosen it from the base gasket.



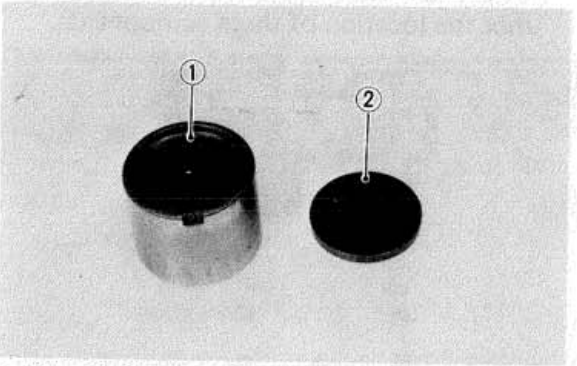
14. Remove the rear cam chain guide by loosening the holding bolt.



1. Holding bolt 2. Rear cam chain guide

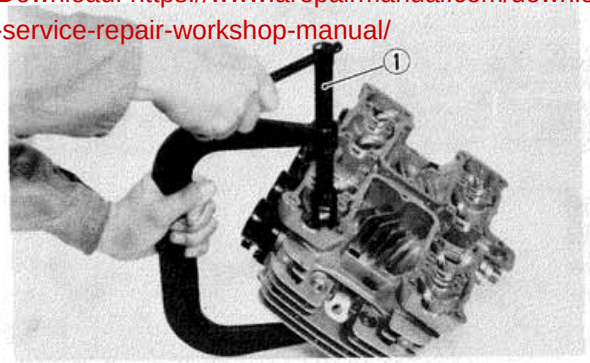
B. Cylinder head disassembly

1. Remove the valve lifters and pads. Be careful not to scratch the lifter bodies or lifter bores in the cylinder head.
   Be very careful to identify each lifters position so that it may be returned to its original place.



1. Valve filter 2. Adjusting pad

2. Mount the valve spring compressor on the head and depress each valve spring. Take out the retainer and valve spring with tweezers.

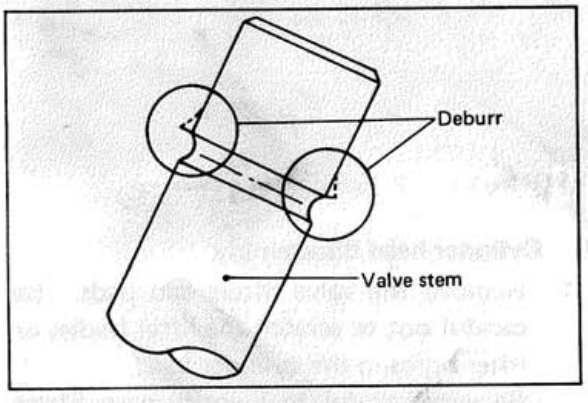


1. Valve spring compressor

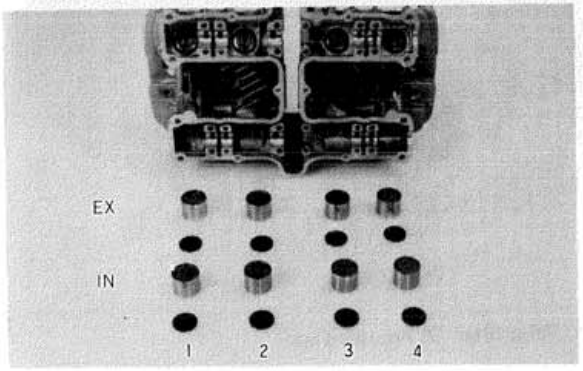
3. Remove valves.

NOTE:

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

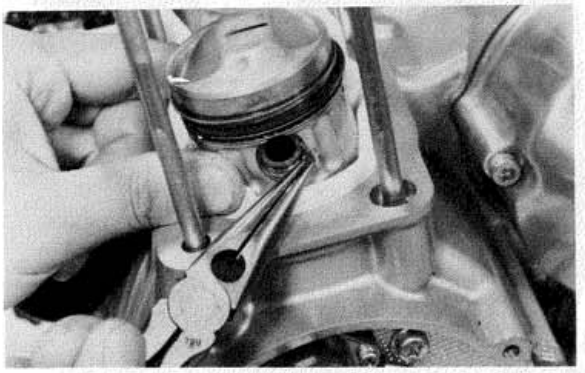


4. Use a small box to hold the parts and identify the original position of each lifter and valve. Be very careful not to mix the location of these components.



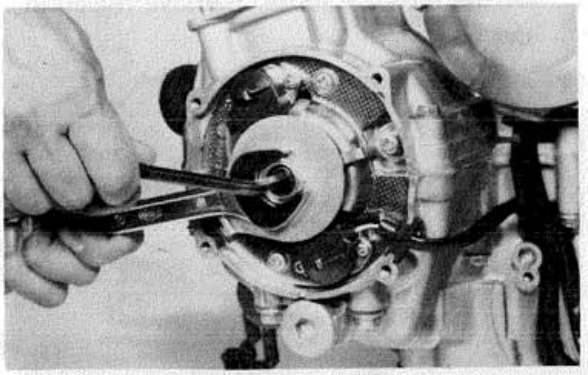
C. Piston

1. Make each piston to aid in reassembly.
2. Place a clean towel or rag into the crankcase to keep circlips and material from falling into the engine.
3. Remove piston pin clips, piston pins, and pistons.

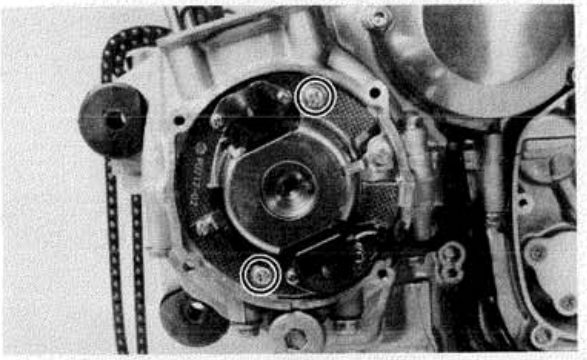


D. Pick-up coil assembly

1. Remove the allen bolt that holds the timing plate.



2. Remove the pick-up coil securing screws and remove the pick-up coil assembly.



E. Generator and starter motor

1. Remove the generator cover and stator coil assembly.