YAMAHA

TT250G

Service Manual

LIT-11616-01-92

3Y0-28197-10

TT250G
SERVICE MANUAL
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NOTICE

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha motorcycles have a basic understanding of the mechanical concepts and procedures inherent 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.

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 procedure 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.

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

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CHAPTER 1. GENERAL INFORMATION

MACHINE IDENTIFICATION

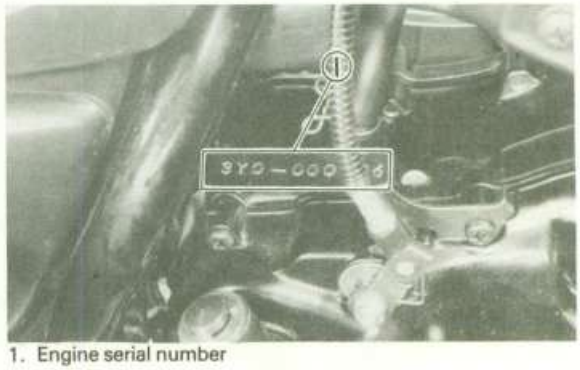
The frame serial number is located on the right-hand side of the headstock assembly. The first three digits identify the model. This is following by a dash. The remaining digits identify the production number of the unit. The engine serial number is located on a raised boss on the upper rear, right-hand side of the engine. Engine identification follows the same code as frame identification.

Starting Serial Number

TT250G	3Y0-000101



1. Frame serial number



1. Engine serial number

EXTERNAL VIEW



SPECIAL TOOLS

1. Timing light
2. Pocket tester (P/No. 90890-03112-00)
3. Electro tester (P/No. 90890-03021-00)
4. Dial gauge (P/No. 90890-03097-00)
5. Rotar holding tool (P/No. 90890-01235-00)
6. Flywheel puller (P/No. 90890-01189-00)
7. Clutch holding tool (P/No. TLM-90910-42-00)
8. Crankcase separating tool (P/No. 90890-01135-00)
9. Tappet adjusting tool (P/No. 90890-01311-00)
10. Front fork cylinder complete holder (P/No. 90890-01294-00)
11. T type handle (P/No. 90890-01301-00)
12. Ring nut wrench (P/No. 90890-01266-00)
13. Spoke wrench (P/No. 90890-05087-00)
14. Valve seat cutter set (P/No. TLM-90910-43-20)
15. Valve guide installer (P/No. 90890-04017-00)
16. Valve guide remover (P/No. 90890-01225-00)
17. Compression gauge
18. Valve spring compresser (P/No. 90890-01253-00)
19. Hand reamer (P/No. 90890-01227-00)
20. Drive chain cutter (P/No. 90890-01286-00)
21. Fuel level gauge (P/No. 90890-01312-00)

EXTERNAL VIEW
(For Optional Lighting Kit)



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PERIODIC INSPECTIONS AND ADJUSTMENTS

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CHAPTER 2.
PERIODIC INSPECTIONS AND ADJUSTMENTS

MAINTENANCE AND LUBRICATION CHART

The following charts should be considered strictly as a guide to general maintenance and lubrication intervals. You must take into consideration that weather, terrain, geographical location and a variety of individual uses all tend to demand that each owner alter this time schedule to match his environment. For example, if the motorcycle is continually operated in an area of high humidity, then all parts must be lubricated much more frequently than shown on the chart to avoid damage caused by water to metal parts.

PERIODIC MAINTENANCE

Unit: km (miles)

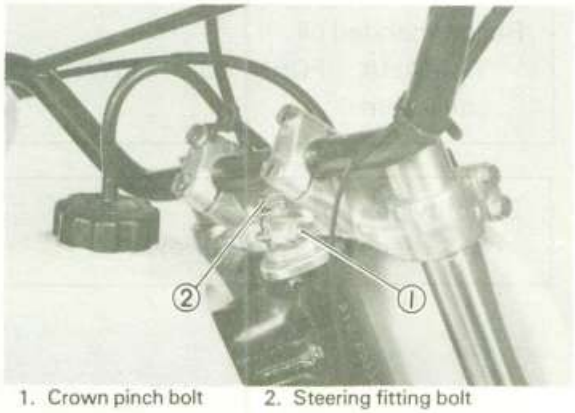
Item	Remarks		Initial	Thereafter every		As required
			500 (300)	3,000 (2,000)	6,000 (4,000)	
Cylinder	Check compression		O		O	O
Valve(s)	Check/Adjust valve clearance		O	O		O
Cam chain	Check/Adjust chain tension		O	O		O
Spark plug	Inspect/Clean or replace as required		O	O		O
Carburetor	Check operation/Adjust as required		O	O		O
Brake system (complete)	Check/Adjust as required — Repair as required		O	O		O
Wheels and tires	Check pressure/Wear/Balance/Runout		O		O	O
Fuel cock	Clean/Flush tank as required					O
Ignition timing	Check/Adjust as required				O	O
Fittings/Fasteners	Tighten before each trip and/or		O	O		O
Drive chain	Check tension/Alignment		every 500 (300)			O
Clutch	Check/Adjust		O	O		O
Decompression system	Check/Adjust as required			O		O
Steering bearings and races	Inspect thoroughly/ Pack moderately.	Medium weight wheel bearing grease			O	O
Wheel gearings	Check bearings for smooth rotation. Replace if necessary.	—		O		O

Suspension, Steering and Swing Arm

1. Steering head adjustment
   a. Block the motorcycle up so that front wheel is off the ground.
   b. Grasp the bottom of the forks and gently rock fork assembly backward and forward, checking for any looseness in the steering assembly bearing.



   c. If the steering head needs adjustment, loosen the crown pinch bolt and steering fitting bolt.

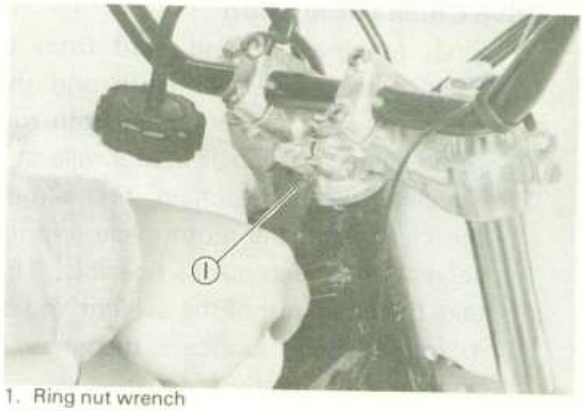


1. Crown pinch bolt 2. Steering fitting bolt

   d. Using the ring nut wrench, adjust the steering head fitting nut until steering head is tight without binding when the forks are turned.

NOTE:

Excessive tightening of this nut will cause rapid wear of the ball bearings and races.
Re-check for loosseness and freedom of movement.



1. Ring nut wrench

   e. Tighten the steering fitting bolt and crown pinch bolt in that order.

NOTE:

After completing the steering adjustment, make certain forks pivot from stop to stop without binding. If binding is noticed, repeat adjustment.

2. Suspension
   a. Check the all suspension components for proper operation.
   b. Check the all suspension fittings for proper tightness.
3. Swing Arm
   a. Check for freedom of up and down movement.
   b. Check side to side freeplay.

Swing Arm Freeplay:
1.0 mm (0.04 in) at the end of swing arm

   c. Check the all securing bolts for proper tightness.
   d. Grease the swing arm periodically.

Rear Shock Absorber Adjustment

1. The spring preload can be adjusted by turning the spring seat.
   (See Chapter 5, "Rear Shock Absorber")

Drive Chain Lubrication

1. First, remove dirt and mud from the chain with a brush or cloth and then spray the lubricant between both rows of side plates and on all center rollers.
2. To clean the entire chain, first remove the chain from the motorcycle, dip it in solvent and clean out as possible. Then take the chain out of the solvent and dry it. Immediately, lubricate the chain to prevent the formation of rust.

Recommended lubricant:
Yamaha chain and cable lube or
SAE 10W/30 motor oil

Front Fork Oil Change

WARNING:

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

1. Loosen the cap bolts on both forks.



2. 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.
3. Remove the cap bolt carefully.

CAUTION:

While unscrewing the cap bolt, take care to apply some pressure to it so that the spacer may not be forced out of the inner tube with possible injury to the operator.

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

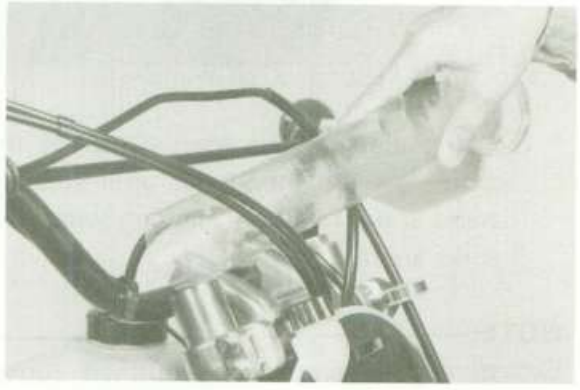


1. Drain screw

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.

Recommended oil
YAMAHA FORK OIL 10Wt or equivalent

Quantity per leg:
318 ± 2 cc (10.75 ± 0.07 oz)

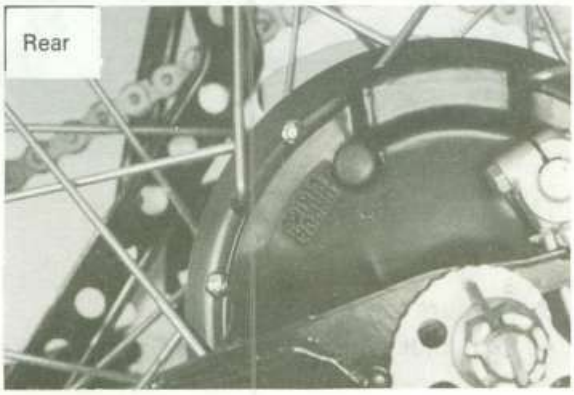


8. After filling, slowly pump the forks up and down to distribute the oil.
9. Inspect the "O-ring" on the cap bolt.
10. Reinstall the spring, spring seat, spacer and cap bolt.

Brake lining inspection

The specified thickness of the brake lining is 4 mm (0.16 in). The lining should be replaced when it wears to less than 2 mm (0.08 in).

To inspect, remove the plug from the inspection hole on the brake shoe plate and check the thickness of the lining. If worn out, install a new set. Be sure to replace the plug carefully so water cannot enter the shoe plate.



Spoke adjustment and tension

Adjust rear wheel spoke tension per front wheel instruction.

Rear axle

Check axle nut.

Rear Axle Nut Torque:
10.6 m-kg (76.7 ft-lb)

Tire pressure

Rear Tire Pressure: (Normal Riding)
1.5 kg/cm² (21 psi)

Drive chain tension check and adjustment

NOTE:

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

1. Loosen the rear brake wing nut.
2. Remove the cotter pin.
3. Loosen the rear wheel axle nut.
4. Turn the chain puller both left and right, until axle is situated in same puller slot position on each side.
   And check the tension at the position shown in the photo. The normal vertical deflection is 50 to 60 mm (2.0 ~ 2.4 in). If the deflection is out of the above range, adjust the chain tension.

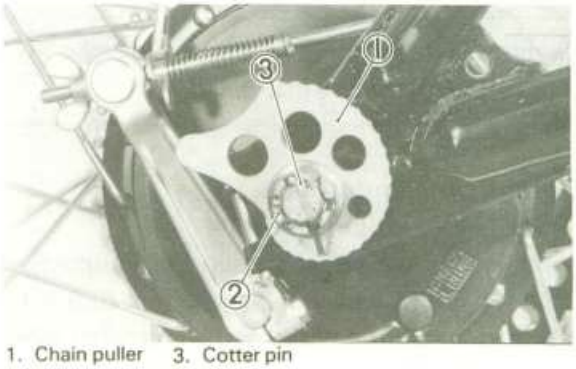


a. 50 ~ 60 mm (2.0 ~ 2.4 in)

5. Tighten the rear axle nut.

Axle nut torque:
10.6 m-kg (76.7 ft-lb)

6. Insert the cotter pin into the rear wheel axle nut and bend the end of the cotter pin as shown in the photo (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).



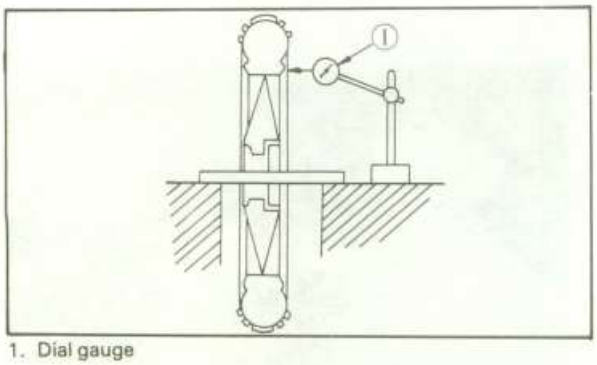
1. Chain puller
2. Axle nut
3. Cotter pin

7. In the final step, adjust the play in the brake pedal, as shown in page 2-10.

Spoke adjustment and torque

a. Raise the wheel off the ground.
Spin wheel.
Check rim run out as shown in illustration.

Rim Runout Limits:
Vertical: 2 mm (0.08 in)
Lateral: 2 mm (0.08 in)



1. Dial gauge

b. Check each spoke for tightness.

Spoke Torque:
Front Wheel:
0.3 m-kg (2.2 ft-lb)
Rear Wheel:
0.3 m-kg (2.2 ft-lb)

Front axle

Check axle nut.

Front Axle Nut Torque:
10.6 m-kg (76.7 ft-lb)

Tire pressure

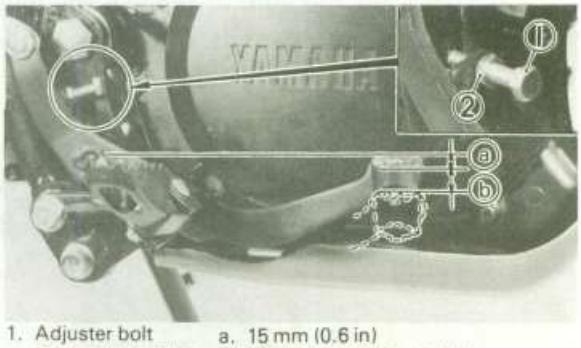
Front Tire Pressure: (Normal Riding)
1.3 kg/cm² (18 psi)

Rear Brake and Wheel

Rear brake adjustment

The rear brake pedal should be adjusted so that it has a free play of 20 ~ 30 mm (0.8 ~ 1.1 in) from when the brake pedal is trod to when the brake begins to be effected.

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 approx. 15 mm (0.6 in) below the footrest top end.



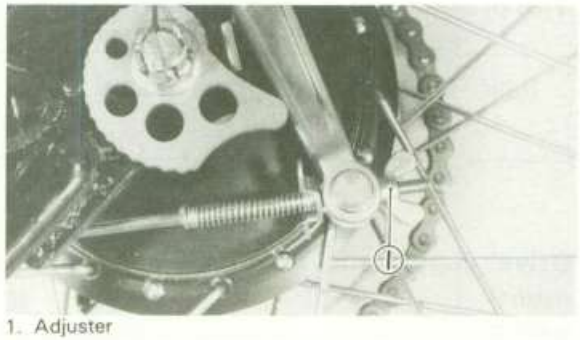
1. Adjuster bolt (For pedal height)
2. Lock nut

a. 15 mm (0.6 in)
b. 20 ~ 30 mm (0.8 ~ 1.1 in)

3. Secure the adjuster lock nut.
4. To adjust, turn the adjuster on the brake rod clockwise to reduce play; turn the adjuster counterclockwise to increase play.

NOTE:

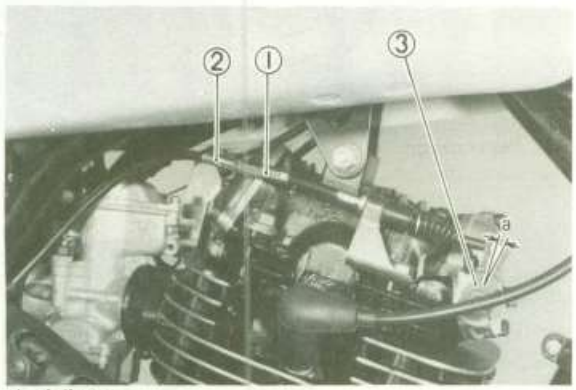
The rear brake pedal adjustment must be checked anytime chain is adjusted or rear wheel is removed and then reinstalled.



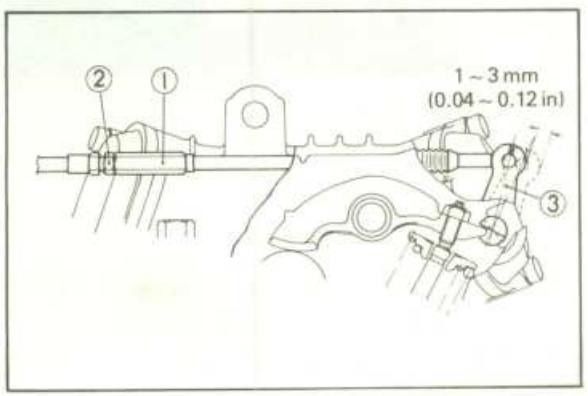
1. Adjuster

NOTE:

The play of the decompression wire should be adjusted by turning the wire adjuster with the piston positioned at T.D.C. on the compression stroke.



1. Adjuster
2. Lock nut
3. Decompression lever
a. Free Play 1 ~ 3 mm (0.04 ~ 0.12 in) (Adjust at compression T.D.C.)



CHASSIS

Fuel cock

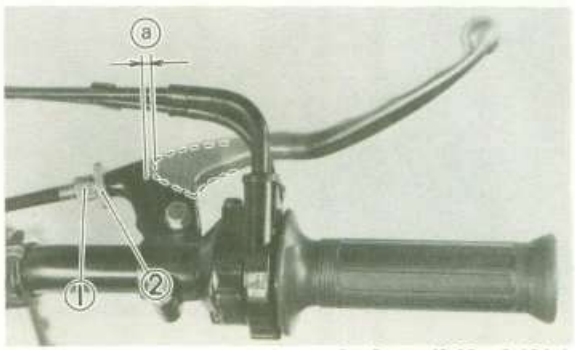
1. First, drain out the fuel tank and remove the fuel pipe.
2. Loosen the fuel cock securing nut and remove the fuel cock assembly from fuel tank.
3. Clean the attached filter with solvent. Examine the filter and replace if damaged.
4. Inspect the gasket, replace if damaged and install the outlet fitting.

Front Brake and Wheel

Front brake adjustment

The front brake should be adjusted to suit rider preference with a minimum cable slack of 5 ~ 8 mm (0.2 ~ 0.3 in) play at the brake lever pivot point. Adjustment is accomplished at one of two places; either the handlebar lever holder or the front brake hub.

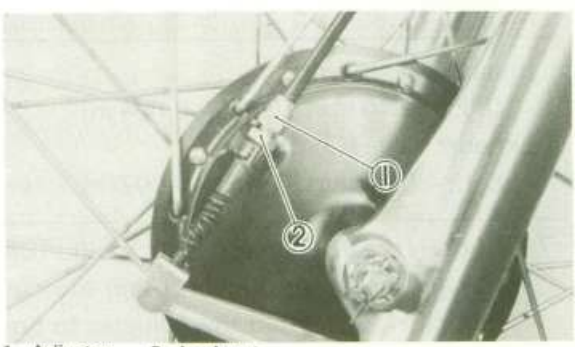
1. Loosen the lock nut.
2. Turn the cable length adjuster in or out until adjustment is suitable.



1. Adjuster
2. Lock nut

a. 5 ~ 8 mm (0.08 ~ 0.12 in)

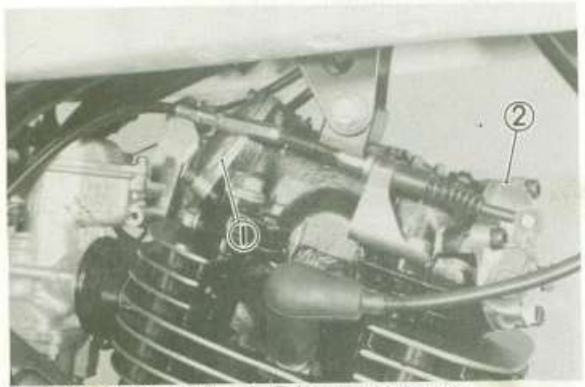
3. Tighten the lock nut.
4. If proper adjustment can not be obtained at the handlebar lever holder, make a brake hub adjustment.



1. Adjuster
2. Lock nut

Valve Clearance Adjustment

1. Remove the bolts (2) securing the seat to the frame. Remove the seat.
2. Turn the fuel petcock to "OFF" and disconnect the fuel pipe.
3. Remove the bolts securing the fuel tank to the frame and remove the fuel tank.
4. Remove intake and exhaust tappet covers and left crankcase cover.



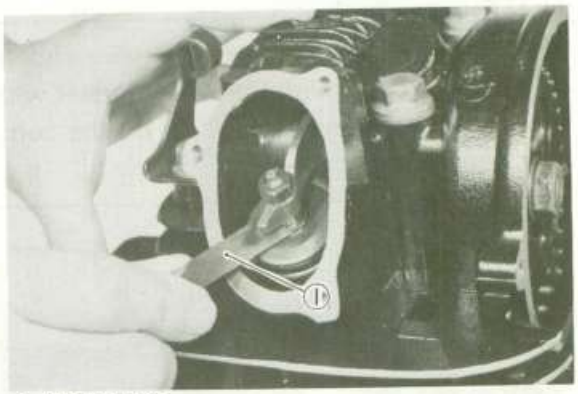
1. Intake tappet cover 2. Exhaust tappet cover

5. Align the "T" mark on the flywheel with the timing mark on the crankcase.
   This places the piston at the top dead center and the valve clearance should be checked and adjusted at T.D.C. on the compression stroke by observing when the valve adjusters have clearance.
6. Use a feeler gauge to determine the clearance.

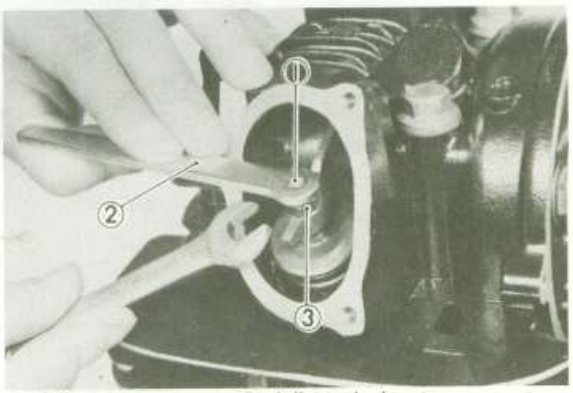
Intake valve (Cold): 0.05 ~ 0.10 mm (0.002 ~ 0.004 in) Exhaust valve (Cold): 0.12 ~ 0.17 mm (0.005 ~ 0.007 in)

7. Loosen the valve adjuster lock nut. Turn the adjuster in or out to obtain the correct clearance. Hold the adjuster to prevent it from moving and thoroughly tighten the lock nut.
   Recheck the clearance after tightening.

NOTE:
Valve clearance check and adjustment should be done when the engine is cold.



1. Feeler gauge



1. Adjuster
2. Valve adjust wrench
3. Adjuster lock nut

8. Install the intake and exhaust tappet covers and left crankcase cover.
9. Install the fuel tank and seat.
10. Connect the fuel pipe.

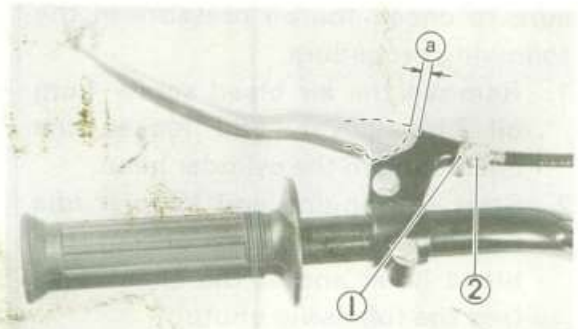
Decompression Wire Adjustment

1. Loosen adjuster lock nut.
2. Adjust the play of decompression wire by turning the adjuster.

Decompression wire free play: 1 ~ 3 mm (0.04 ~ 0.12 in) at the end of decompression cam lever

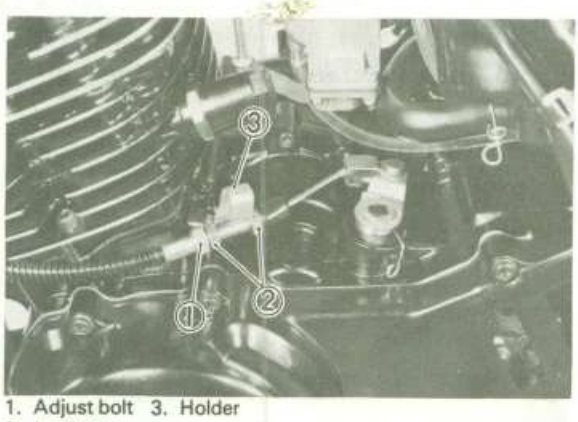
Freeplay Adjustment

Loosen either the handle lever adjuster lock nut or the cable holder lock nut. Next, turn the length adjuster either in or out until proper lever free play is achieved.



1. Adjuster
2. Lock nut

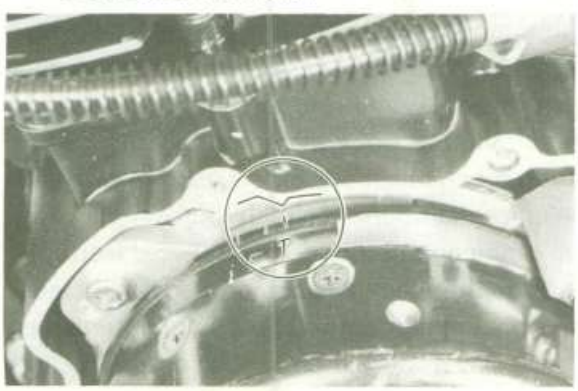
a. 2 ~ 3 mm (0.08 ~ 0.12 in)



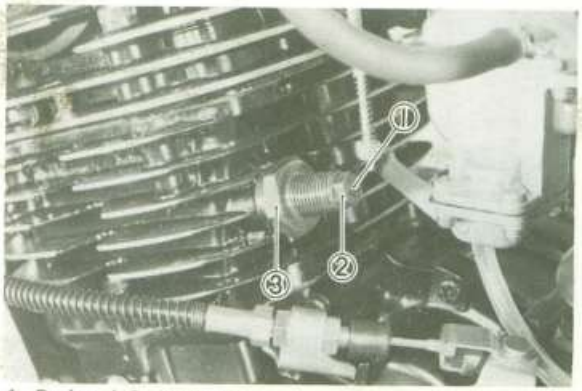
1. Adjust bolt
2. Lock nut
3. Holder

Cam Chain Adjustment

1. Remove the left crankcase cover.
2. Rotate crank shaft in a counterclockwise direction (viewed from the left side of the engine) to place all slack in the area of the chain tensioner.
   Align the "T" mark on the flywheel with the timing mark on the crankcase at the compression stroke.



3. Remove the adjuster cap.
4. Loosen the adjuster lock nut.
5. Turn the adjuster in until the push rod (inside the adjuster) is flush with the end of the adjuster.



1. Push rod
2. Adjuster
3. Lock nut

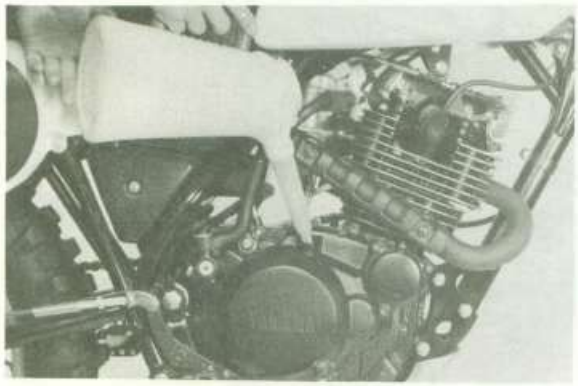
NOTE:

Start the engine. While keeping it idling, check the movement of the push rod. If it moves slightly, the adjustment is correct. If it does not move at all, the adjuster is too tight. Loosen the adjuster so the push rod moves slightly.

6. Tighten the adjuster lock nut.
7. Install the adjuster cap and the left crankcase cover.

Adjuster cap tightening torque: 0.5 m-kg (3.6 ft-lb)

e. Install the drain bolt, air bleeder screw, oil filter and oil filter cover.
f. Add 1.3 liters of engine oil. Install the oil filler cap and tighten. Use Yamalube 4-cycle oil or SAE 20W/40 type "SE" oil.



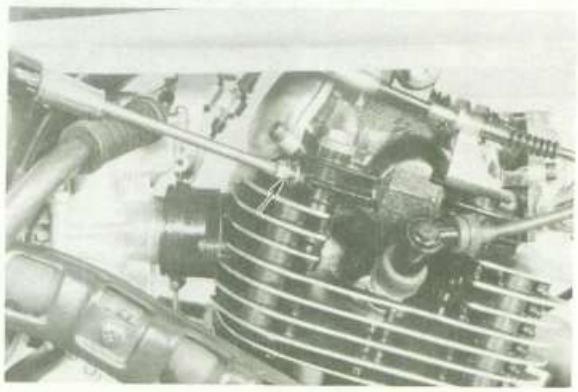
g. Start the engine and allow a few minutes of warm up. While warming up, check for oil leakage. If oil leaks, stop the engine immediately, and check for the cause.
h. After warm up, stop the engine and check the oil level. (Refer to page 2-4, **"Engine Oil"**.)

2. Regular oil replacement (without replacing filter)
a. Start the engine and stop after a few minutes of warm-up.
b. Place an oil receiver under the engine.
c. Remove the oil filler cap, drain plug, and air bleed screw attached to the oil filter cover.

NOTE:
The oil filter cover is secured by three screws. The lower one should be removed so that the filter cavity will drain.

d. Check each O-ring. If damaged replace.
e. Install the drain bolt and the bleed screw.
f. Add 1.3 liters of engine oil. Install the oil filler cap and tighten.
g. Start the engine and allow a few minutes of warm-up.
While warming up, check for oil leakage. If oil leaks, stop the engine immediately, and check for the cause.
h. Stop the engine and check the oil level. (Refer to page 2-4, **"Engine Oil"**.)

CAUTION:
After replacement of engine oil, be sure to check the oil pressure in the following procedure.
1. **Remove the air bleed screw from oil filter cover, and loosen the check bolt in the cylinder head.**
2. **Start the engine and keep it idle running till oil flows out of the bleed hole, and at the check bolt (see the following photo).**
The check bolt has a slit for checking oil.
If no oil comes out even after a lapse of over one minute, cut the engine immediately for fear of seizure.
Restart the engine after solving the problem(s) and recheck the oil pressure.



Clutch Adjustment
This model has two clutch cable length adjusters and a clutch mechanism adjuster. Cable length adjusters are used to take up slack from cable stretch and to provide sufficient free play for proper clutch operation under various operating conditions. The clutch mechanism adjuster is used to provide the correct amount of clutch "throw" for proper disengagement (see page 3-25). Normally, once the mechanism is properly adjusted, the only adjustment required is maintenance of free play at the clutch handle lever.

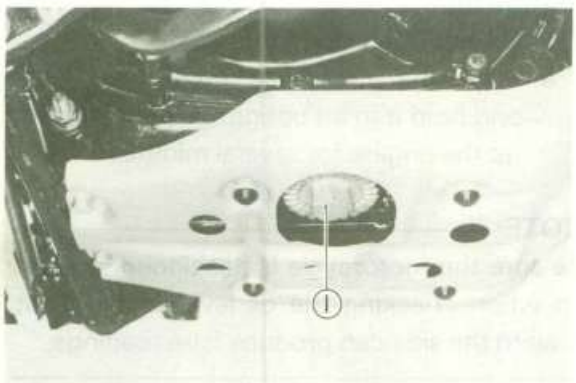
Engine Oil and Oil Filter Replacement

1. Oil filter replacement

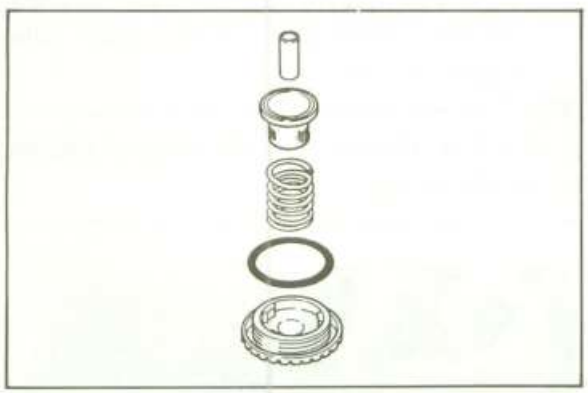
NOTE:

When replacing the engine oil after the break-in period, clean the oil strainer at the bottom of the engine.

a. Start the engine. After a few minutes of warm-up, stop the engine.
b. Place an oil pan under the engine.



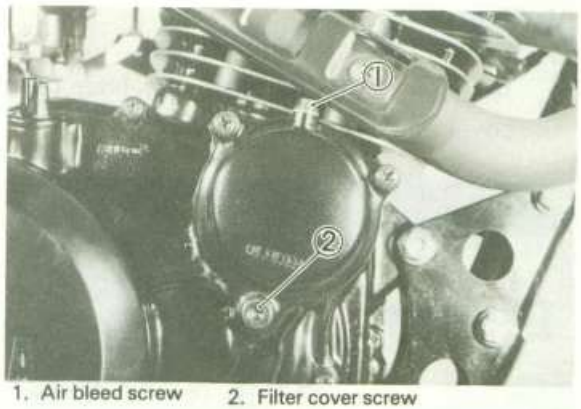
1. Drain plug



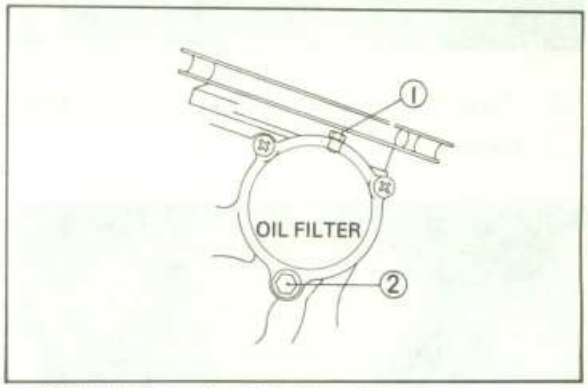
c. Remove the oil filler cap, drain plug and air bleed screw attached to the oil filter cover, and drain the engine oil.

NOTE:

The oil filter cover is secured by three screws. The lower one should be loosened until the threaded portion comes out completely.



1. Air bleed screw 2. Filter cover screw

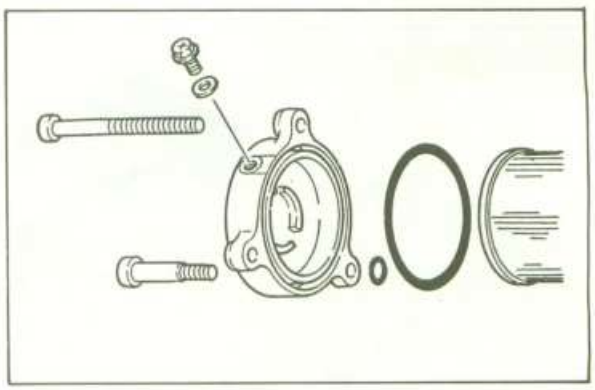


1. Air bleed screw 2. Filter cover screw

d. Remove the oil filter cover, and replace the filter element.

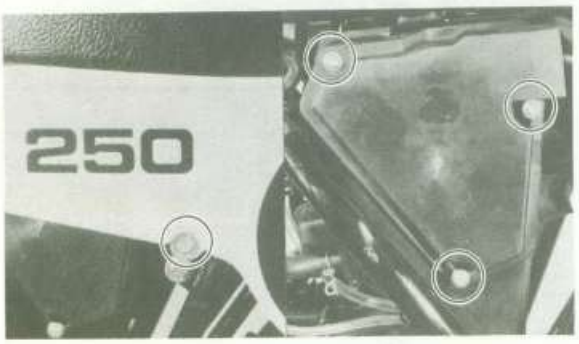


1. Filter element 2. "O" ring

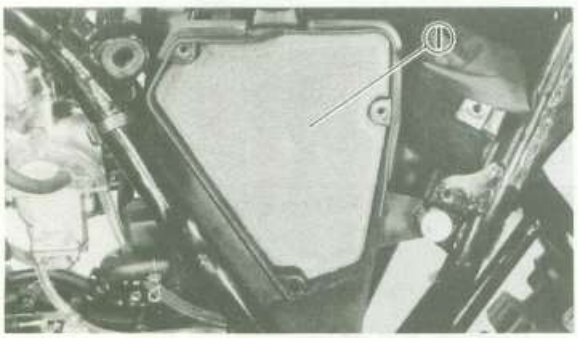


Air Filter

1. Remove the left number plate.
2. Remove the screw from the filter case cover and remove the cover.



3. Remove the filter element from the filter case.

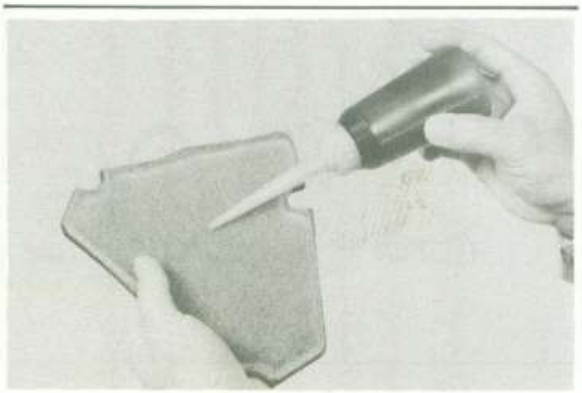


1. Air filter element

4. Wash the element gently but thoroughly in solvent.
5. Squeeze the excess solvent out of the element and let dry.
6. Pour a small quantity of 2-stroke engine oil onto the filter element and work thoroughly into the porous foam material.

NOTE:

In order to function properly, the element must be damp with oil at all time, but not "dripping" with oil.



7. Install the filter element into the case.
8. Install the case cover.

NOTE:

When installing the filter element into the case, take care that its fuggy foam side faces outside.

Engine oil

1. Oil level measurement
   a. Place the motorcycle on a level place and hold it in an upright position. Warm up the engine for several minutes.

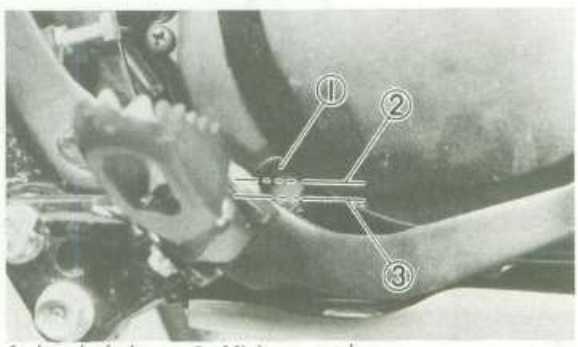
NOTE:

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. Level window
2. Maximum mark
3. Minimum mark

2. Oil capacity

After engine overhaul:	1,600 cc (1.69 US. qt)
After oil filter replacement:	1,300 cc (1.37 US. qt)

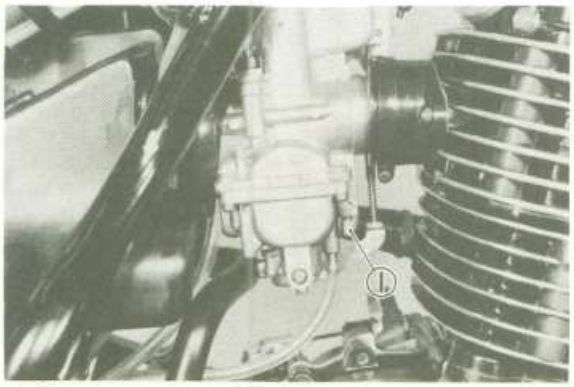
ENGINE

Carburetor

1. Idle mixture and idle speed adjustment.
   a. Turn the pilot screw in until lightly seated.
   b. Back out turns.
   c. Turn the throttle stop screw until idle speed is at desired rpm.
   d. Turn the pilot screw in or out until speed is at highest rpm.
   e. Turn the throttle stop screw in or out until idle speed is at desired rpm.

NOTE:
The engine must be warmed up before setting idle speed.
Pilot screw and throttle stop screws should be adjusted so that engine responds from idle position without hesitation.

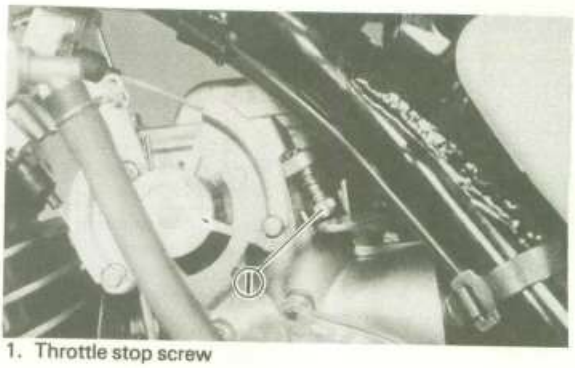
Pilot screw:
Back out 2 turns
Idle speed: 1,200 r/min



1. Pilot screw

2. Throttle cable adjustment

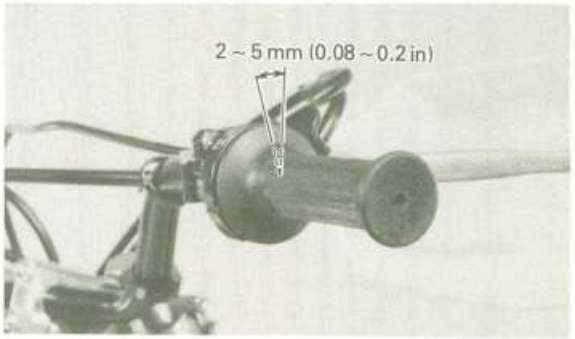
NOTE:
Idle speed should be set before making this adjustment.

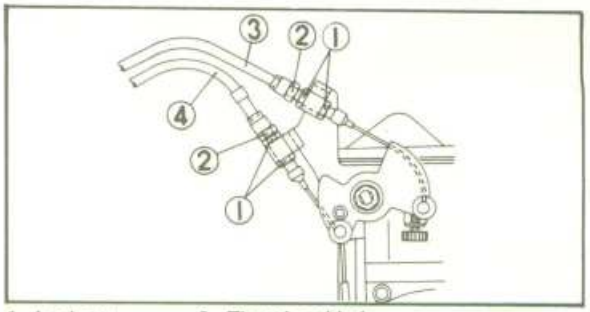


1. Throttle stop screw

The throttle grip should have a play of 2 ~ 5 mm (0.08 ~ 0.2 in) in the turning direction at the grip flange. If the play is not this range, take the following steps for adjustment:

a. Loosen the adjuster lock nut on the carburetor side of throttle cable 1, and turn the adjuster in or out so the play is correct. After the adjustment, tighten the lock nut.
b. If the play is still incorrect after the adjuster is loosened 5 mm (0.2 in) remove the rubber cap on the throttle grip side and make an adjustment with the adjuster on the grip side.





1. Lock nut
2. Adjuster
3. Throttle cable 1
4. Throttle cable 2

LUBRICATION INTERVALS

Unit: km (miles)

Item	Remarks	Type (Recommended lubricants)	Initial	Thereafter every		As required
			500 (300)	3,000 (2,000)	6,000 (4,000)	
Engine oil	Replace/Warm engine before draining.	Yamalube 4-cycle oil or SEA 20W/40 type "SE" motor oil	○	○		
Oil filter/Oil strainer	Replace filter element and clean oil strainer/ After installing start engine check oil leaks.	—	○		○	
Air filter	Wet-type filter must be washed and damp with oil.	Yamalube 2 cycle oil or equivalent	○	○		○
Drive chain	Apply chain lube thoroughly. Check chain tensioner slipper, replace if necessary.	Yamaha chain and cable lube or 10W/30 motor oil	Every 500 (300)			○
Control cable	Apply chain lube thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○		○
Rear arm pivot shaft	Apply grease lightly.	Lithium soap base grease			○	○
Brake pedal shaft	Apply chain lube thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○		○
Brake/clutch lever pivot shafts	Apply chain lube lightly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○		○
Side stand pivot and kick crank boss	Apply chain lube lightly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○		○
Front fork oil	Drain completely. Refill to specification.	Yamaha fork oil 10 Wt. or equivalent			○	○

NOTE:

1. Distances in the table indicate approximate inspection intervals.
2. The air filter should be cleaned more often than specified intervals if the motorcycle is operated in extremely dusty areas.

2. Gas pressure can be adjusted at the bottom valve of the shock absorber.
   (See Monocross Suspension Service Manual P/NO 90894-09039 for adjusting procedures.)

Adjustable range of gas pressure: 13 ~ 20 bar (13 ~ 20 kg/cm², 185 ~ 284 psi) Normal gas pressure: 16 bar (16 kg/cm², 228psi)

Cable Inspection and Lubrication

1. Damage to the outer housing of the various cables, may cause corrosion and often free movement will be impaired. An unsafe condition may result so replace 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 SAE 10W/30 motor oil

Throttle Cables and Grip Lubrication

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

Lubrication of Levers, Pedals, etc.

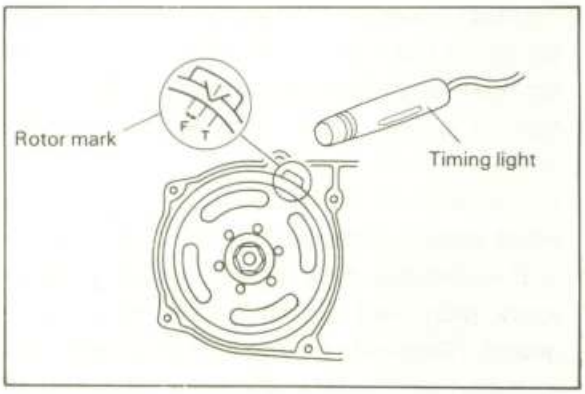
1. Lubricate the pivoting parts of the brake and clutch levers with motor oil (10W/30).
2. Lubricate the shaft of the brake pedal with lithium soap grease.

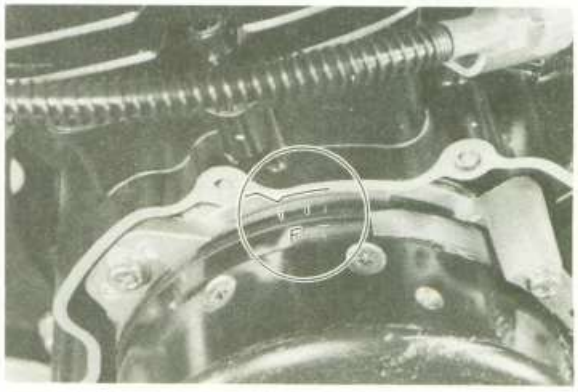
ELECTRICAL

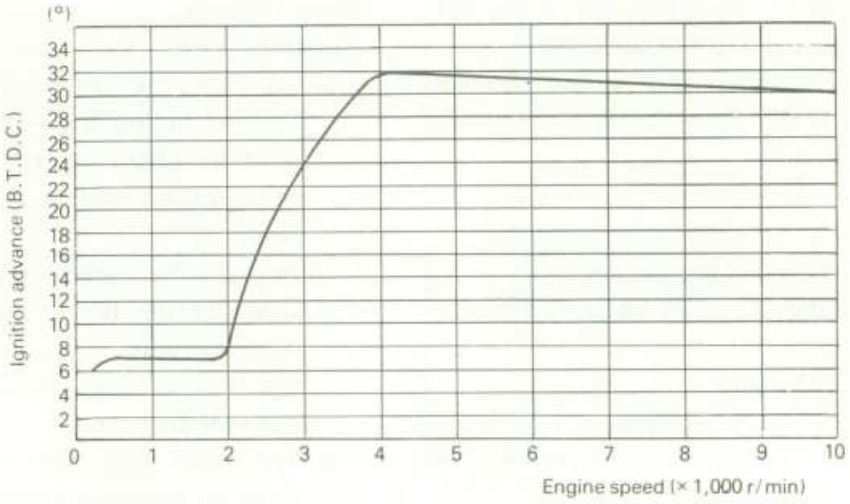
Ignition Timing

1. Checking the ignition timing
   Ignition timing is checked with a timing light by observing the position of the mark on the case and the marks on the rotor.
   a. Remove the crankcase cover (L).
   b. Connect the timing light to the spark plug lead wire.
   c. Start the engine and keep it running at the specified speed.
   d. The index projection on the crankcase must be between the two marks for firing on the rotor.
   If not, refer to Chapter 6 "Ignition System"

Specified Speed: 1,200 r/min (Idling r.p.m.)







Spark Plug

The spark plug indicates how the engine is operating. If the engine is operating correctly, and the machine is being ridden correctly, then the tip of the white insulator around the positive electrode of the spark plug will be a medium tan color. If the insulator is very dark brown or black color, then a plug with a hotter heat range might be required. This situation is quite common during the engine break-in period.

If the insulator tip shows a very light tan or white color is actually pure white and glazed or if electrodes show signs of melting, then a spark plug with a colder heat range is required. Remember, the insulator area surrounding the positive electrode of the spark plug must be a medium tan color. if it is not, check carburetion and ignition timing.

The spark plug must be removed and checked. Check electrode wear, insulator color, and electrode gap.

Spark Plug Gap:
0.7 ~ 0.8 mm (0.028 ~ 0.032 in)

Engine heat and combustion chamber deposits will cause any spark plug to slowly break down and erode.

If the electrodes finally become too worn, or if any reason you believe the spark plug is not functioning correctly, replace it.

When installing the plug, always clean the gasket surface, use a new gasket, wipe off any grime that might be present on the surface of the spark plug, torque the spark plug properly.

Standard Spark Plug: BP-7ES (NGK) or W22EP (ND)
Tightening torque: 2.0 m-kg (14.5 ft-lb)

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CHAPTER 3.
ENGINE OVERHAUL

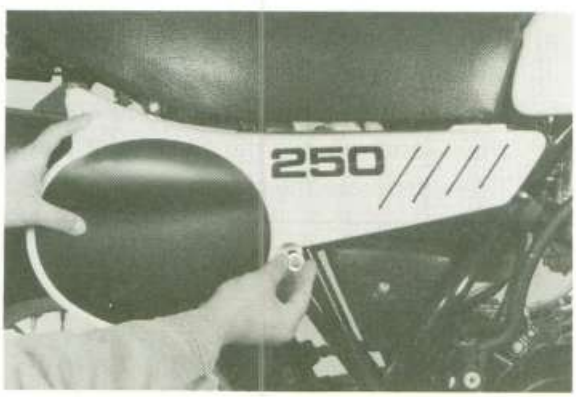
REMOVAL

Preparation for Removal

1. All dirt, mud, dust and foreign material should be thoroughly removed from the exterior of the before removal and disassembly. This will prevent any harmful foreign material from entering the interior of engine assembly.
2. Before engine removal and disassembly, be sure you have proper tools and cleaning equipment so you can perform a clean and efficient job.
3. During disassembly of the engine, clean and place all parts in trays in order of disassembly. This will ease and speed assembly time and insure correct reinstallation of all engine parts.
4. Start the engine and warm it for a few minutes; turn off the drain plug and drain engine oil.

Fuel Tank

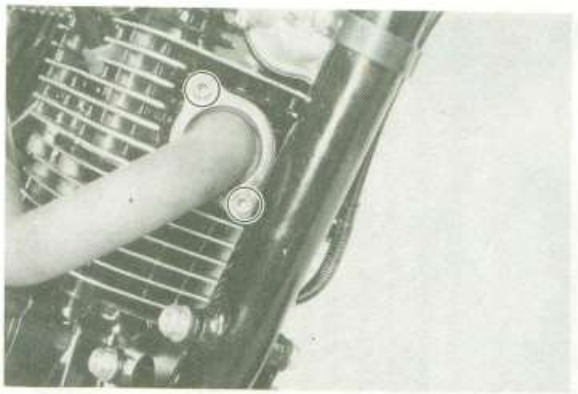
1. Remove the right and left side cover.



2. Remove the seat and fuel tank.

Muffler, Footrest and Brake Pedal

1. Remove the bolts holding the exhaust pipe to the cylinder head.



2. Remove the bolts holding the exhaust pipe to the frame.



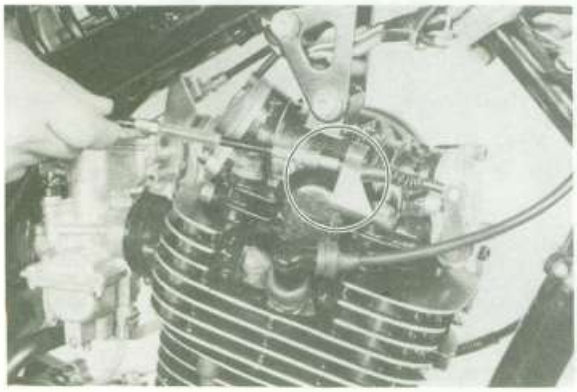
3. Remove the exhaust pipe assembly.
4. Remove the left side footrest.
5. Remove the brake rod wing nut and the return spring.

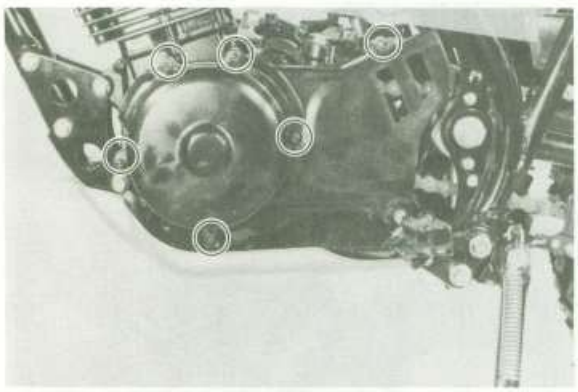
Wiring and Cables

1. Remove the spark plug cap.
2. Remove the decompression wire with brackets and holders.



3. Remove the change pedal.
4. Remove the left crankcase cover.
5. Disconnect the magneto lead wire coupler and the band.



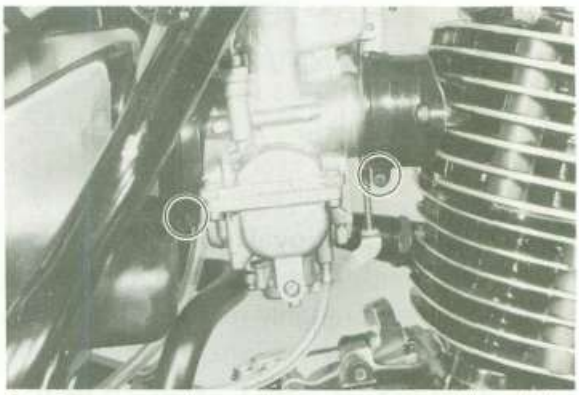


6. Remove the clutch wire at the handle lever first and then at clutch push lever. Next, remove the breather pipe.



Carburetor

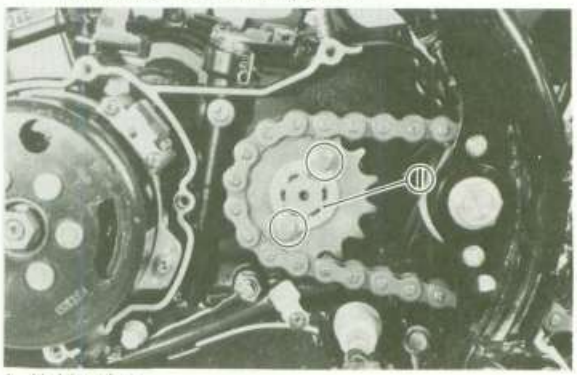
1. Loosen the carburetor hose clamps as shown in the photo.



2. Remove the carburetor assembly while pulling the carburetor body backward.

Drive Chain

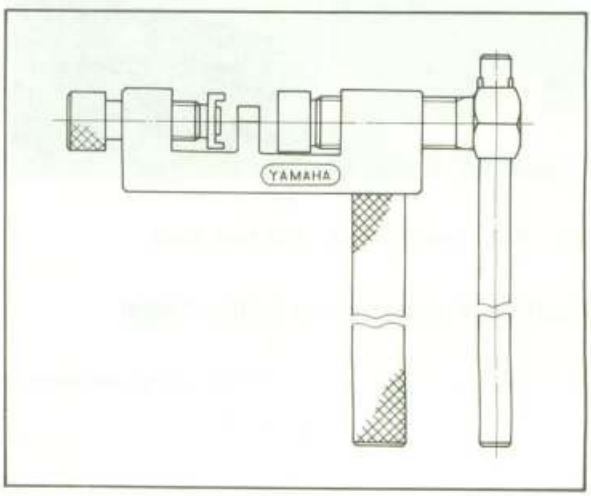
1. Loosen the sprocket securing bolts and remove the holder plate.



1. Holder plate
2. Remove the drive sprocket.

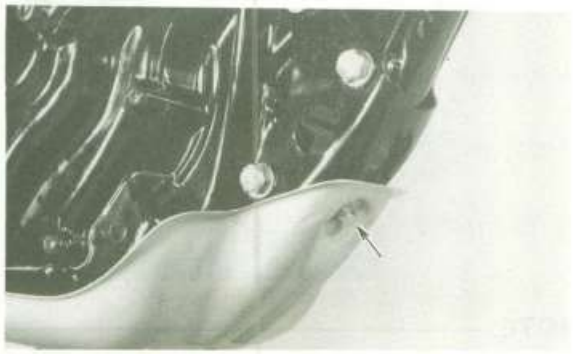
The following procedure gives an alternative way to remove the chain from the engine.

a. Bring the master link clip slightly before the sprocket wheel, and remove the clip.
b. Set the chain cutter (special tool) on the chain, and remove the chain joint plate. Then, separate the chain.



Engine Removal

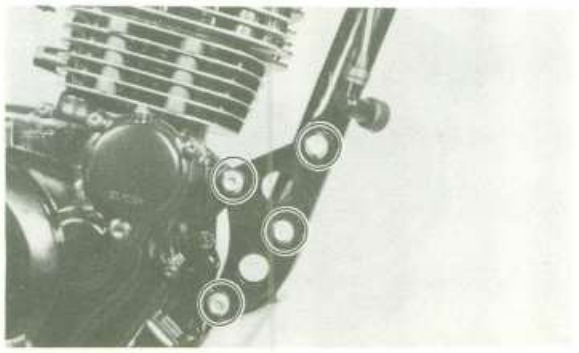
1. Remove the engine protector securing bolts.

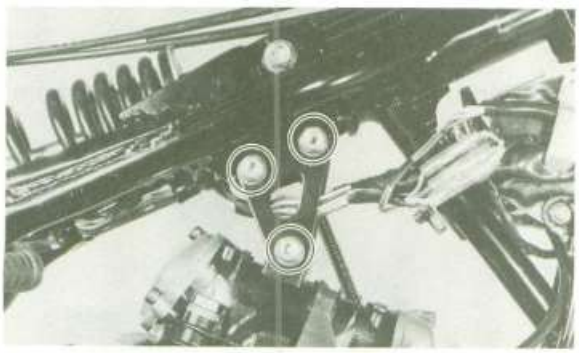


2. Remove the left hand footrest securing bolts.



3. Remove the engine mounting bolts.





4. Remove the engine from the right side of frame.

NOTE:

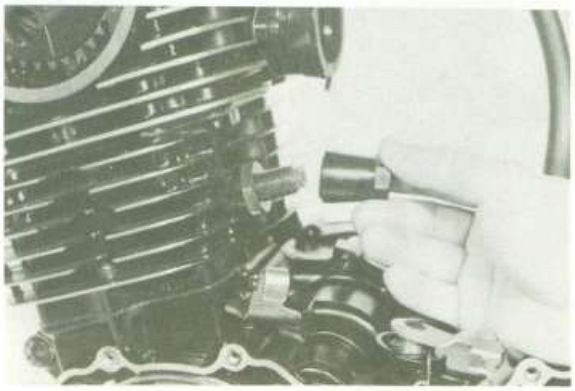
The engine and rear arm are installed using the same pivot shaft. Therefore take care so that the pivot shaft is pulled, not entirely out but further enough to set the engine free.



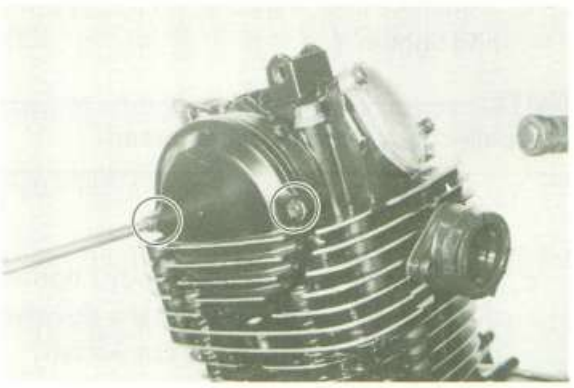
DISASSEMBLY

Cylinder Head and Cylinder

1. Remove the cam chain tensioner cap.
2. Loosen the tensioner lock nut.
3. Remove the chain tensioner assembly. Note the location of each part.

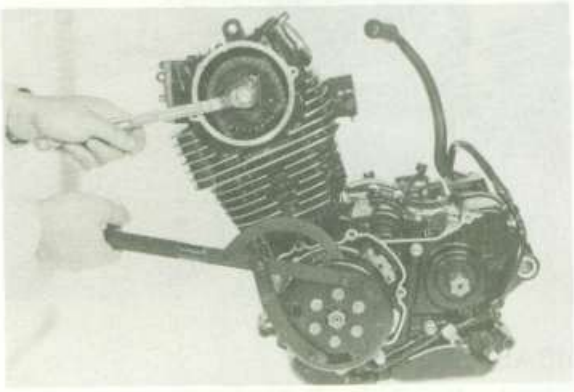


4. Loosen the side cover securing bolts and remove the side cover.

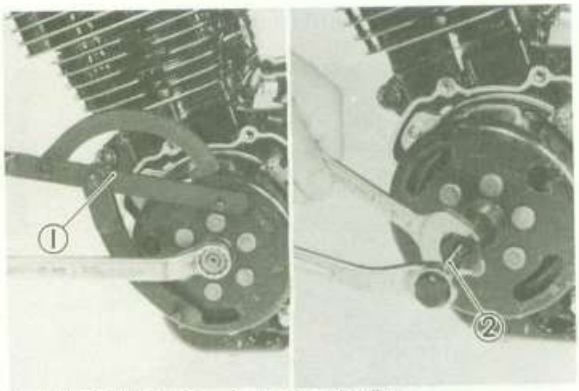


5. Remove the cam sprocket securing bolt (see the following photo). Then remove the flywheel magneto.

NOTE:
When removing the cam sprocket, it is not necessary to separate the cam chain.



6. Flywheel magneto removal
   a. Remove the flywheel securing nut using the rotor holding tool.

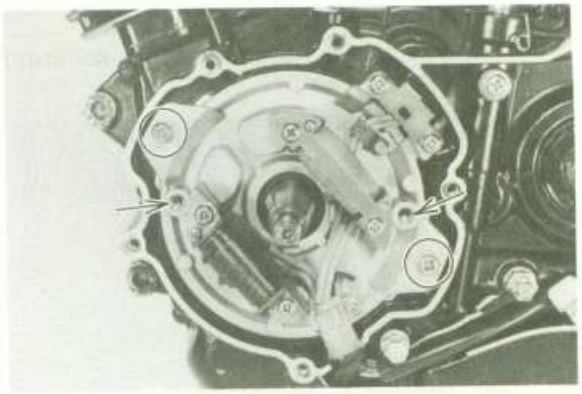


1. Rotor holding tool 2. Flywheel puller

   b. Install the flywheel puller on the flywheel and tighten it.

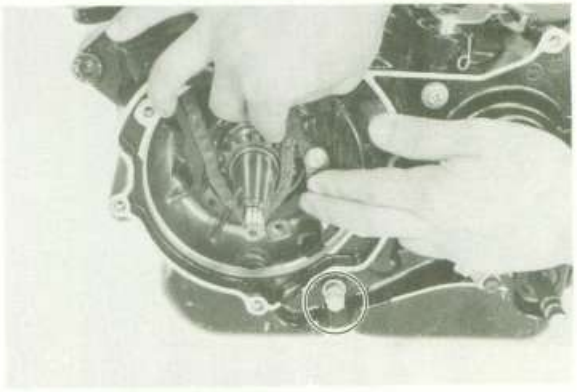
NOTE:
The puller body has a lefthand thread.

   c. While holding the puller body, tighten the push bolt. This will pull the flywheel off the tapered end of the crankshaft.
   d. Remove the magneto base assembly with the lead wire.



NOTE:
1. Pay careful attention to the "O-ring" fitted along the outer circle of the magneto base because this ring is made of silicon rubber and is susceptible to damage.
2. If the magneto base is difficult to remove, screw bolts (M8) into the holes indicated by an arrow to pull out the base with.

7. Loosen the guide stopper locking nut and bolt.

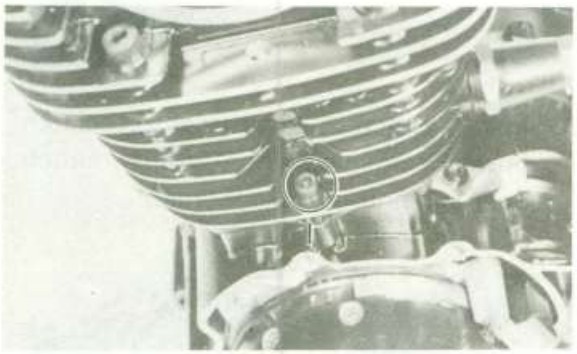


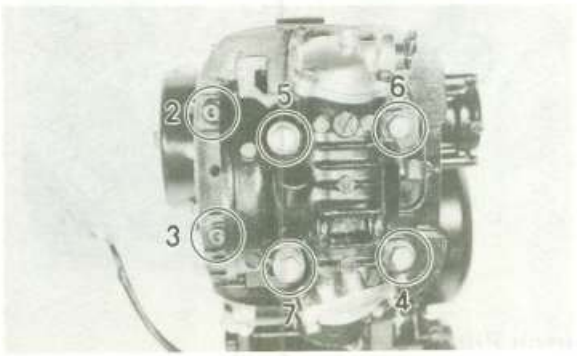
8. Remove the cam chain and cam chain sprocket.



9. Remove the six cylinder head retaining bolts (2 of which are internal hexagon bolts) and the cylinder retaining bolt.

NOTE:
Loosen the bolts in the order indicated in the following photo.





10. Remove the cylinder head and cylinder.
11. Remove the guide stoppers.

Piston Pin and Piston

1. Remove the piston pin clip (1) 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.



2. Push the piston pin from the opposite side, then pull out.

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

Kick Crank

Remove the kick crank securing bolt and kick crank.

NOTE:
The bolt must be completely removed from the kick crank.

Crankcase Cover (Right)

1. Remove the oil filter cover holding bolts (3) and the cover.
2. Remove the oil filter element.
3. Remove the crankcase cover holding bolts and the cover.

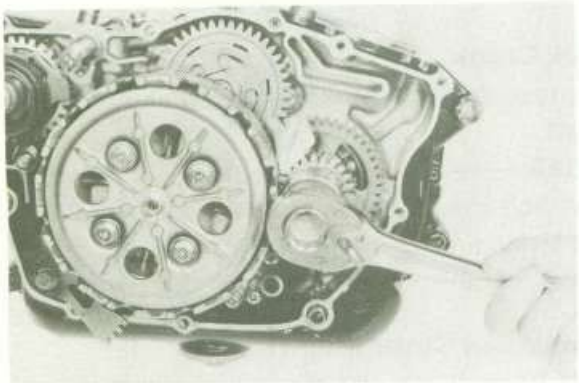


NOTE:
For this removal, slits in the crankcase can be used as shown in the photo.

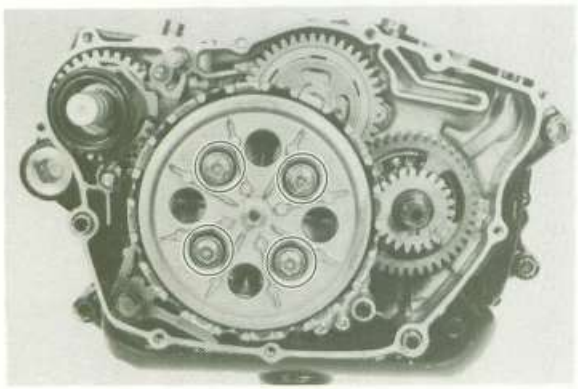


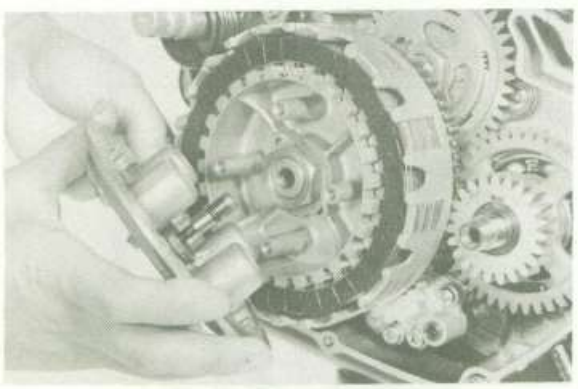
Clutch Assembly and Drive Gear

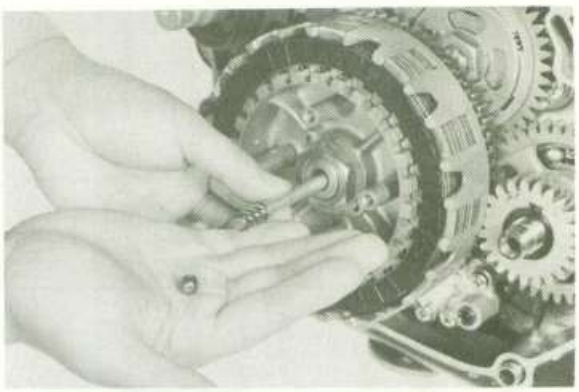
1. Loosen primary drive gear by first placing a folded rag between the teeth of the primary gears to lock them as shown in the photo. Then loosen drive gear nut. Remove the nut and washer.



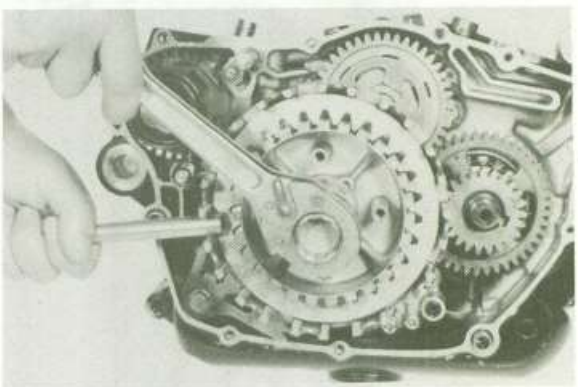
2. Remove the four clutch spring holding screws, pressure plates, clutch plates, friction plates, ball and push rod 2.





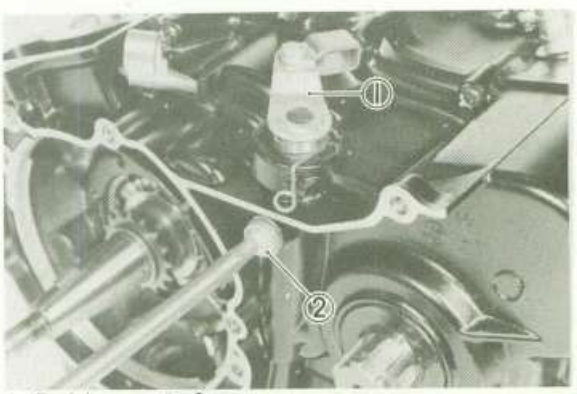


3. Install clutch holding tool on clutch boss. Remove lock nut, washer, clutch boss and housing in that order.



Clutch Push Lever Axle

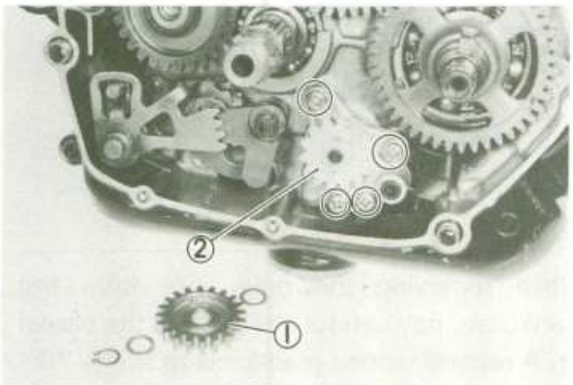
Loosen and remove the set screw, then remove the push lever axle by pulling it up.



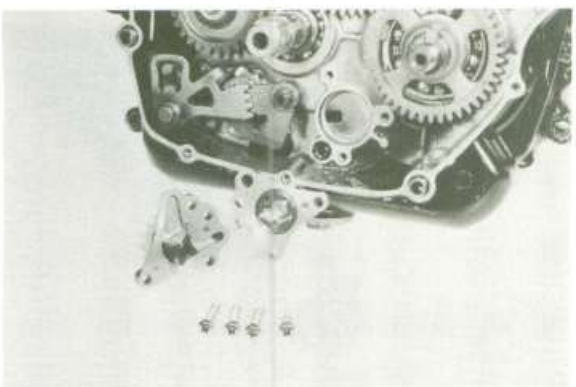
1. Push lever 2. Set screw

Oil Pump Assembly

Remove the pump idle gear clip and then loosen the pump cover securing bolts and remove the oil pump assembly.



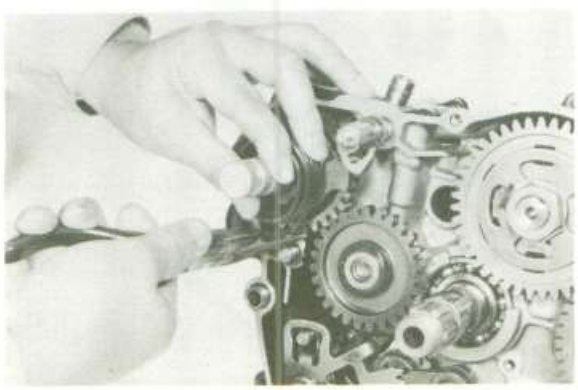
1. Pump idle gear 2. Pump driven gear



Pump Assembly

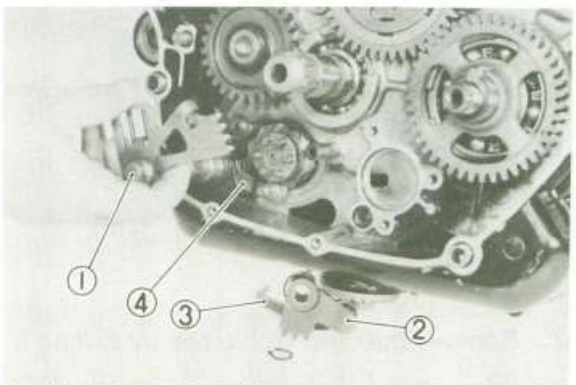
Kick Axle Assembly

1. Remove the kick axle assembly by pulling toward you.
2. Remove the kick idle gear.
3. Remove the decompression lever assembly.



Change Shaft Assembly

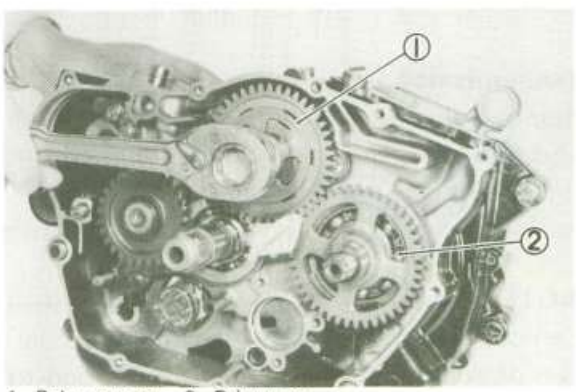
1. Pull the shift shaft out from the right hand side.
2. Remove the shift lever 2 with the shift lever 3 as an assembly, and then remove the stopper lever assembly with the torsion spring.



1. Shift shaft 3. Shift lever 3
2. Shift lever 2 4. Stopper lever assembly

Balancer Gear

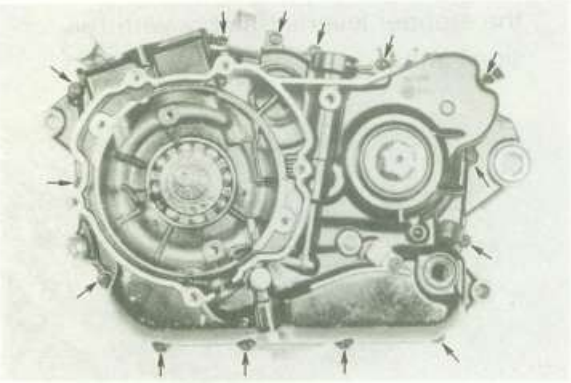
1. Flatten the lock washer.
2. First place a folded rag between the teeth of the drive gear and balancer gear to lock them. Then loosen the balancer gear securing nut.
3. Remove the balancer gear, the washers and the key.
4. Remove the drive gear and key.



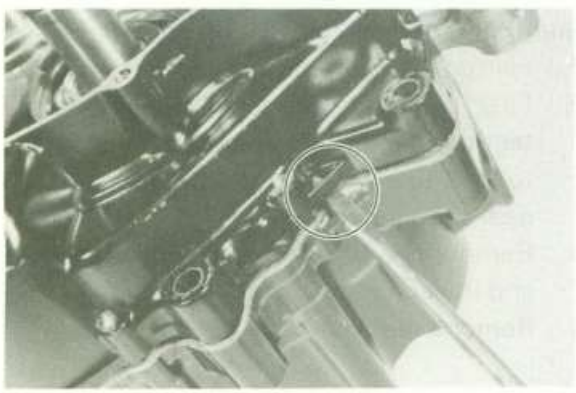
1. Balancer gear 2. Drive gear

Crankcase

1. Working in a crisscros pattern, loosen 14 hexagon bolts 1/4 turn each. Remove them after all area loosened.



2. Remove the right crankcase by pulling it up.
   For this removal, slits in the crankcase can be used as shown in the photo.

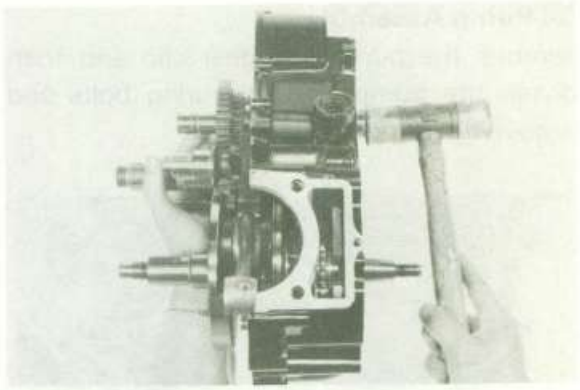


Transmission

Remove the transmission shaft, shift forks and shift cam. Tap lightly on the transmission drive shaft with a soft hammer to remove.

NOTE:

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



NOTE:

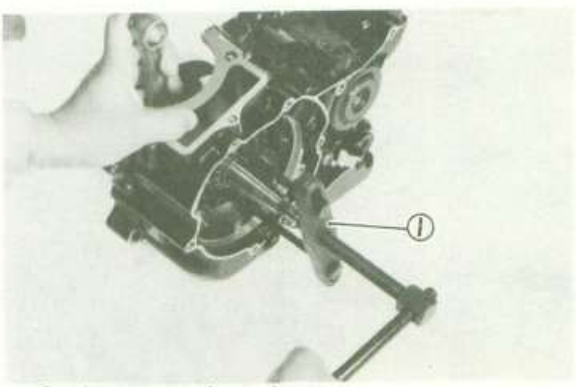
While removing the drive axle from the crankcase, pay careful attention to the oilseal lip. A recommended practice is to fit the "O" ring and to apply grease over the fitted area.



"O" ring

Crankshaft

Remove crankshaft assembly with the crankcase separation tool (Special tool).



1. Crankcase separation tool

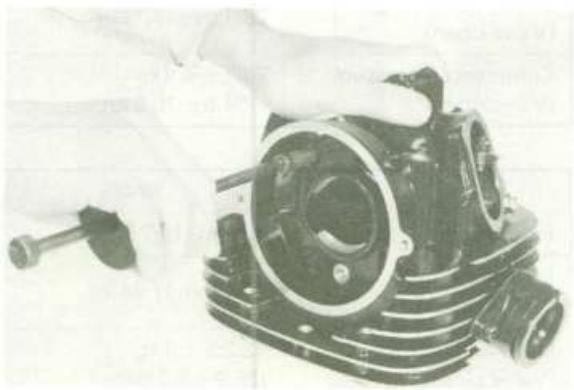
INSPECTION AND REPAIRING

Cylinder Head

1. Remove the intake and exhaust tappet covers.
2. Insert a 6 mm screw into the rocker shaft, and withdraw the rocker shaft. It should be slide out easily.

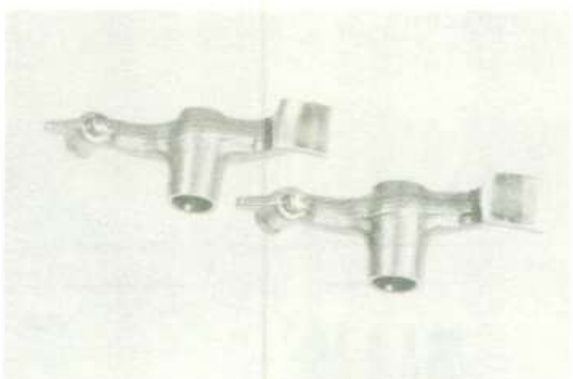
NOTE:

If does not slide out easily, use the special tool as shown.



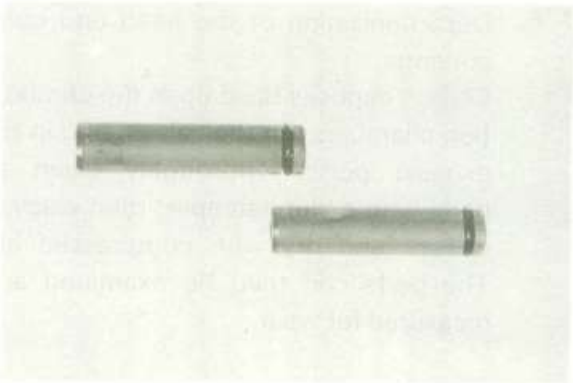
3. Rocker arm and rocker shaft
   a. The rocker arm usually wears at two locations: (1) at the rocker shaft hole, (2) at the cam lobe contacting surface.
   b. Measure the rocker arm inside diameter.

Standard size:
12.000 ~ 12.018 mm (0.472 ~ 0.473 in)



   c. The shaft has been hardened and it should not wear excessively. If a groove has developed in this surface that can be felt, or if it shows a blue discoloration, then the shaft should be replaced and the lubrication system (pump and passages) checked.

Standard shaft diameter:
11.975 ~ 11.990 mm (0.471 ~ 0.472 in)

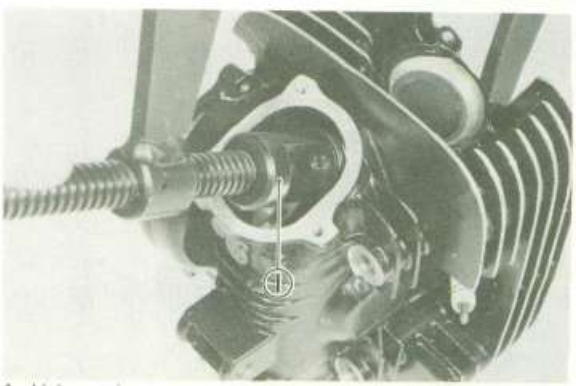


   d. Standard clearance between the rocker shaft and hole should be 0.010 ~ 0.043 mm (0.0004 ~ 0.0017 in). If measurement shows more than 0.1 mm clearance, replace either or both parts as necessary.

4. Compress the valve spring and then remove both retainer locks.
   Remove the compressor and lift off the retainer and springs.

NOTE:

The retainer locks might be partially stuck in the retainer. Use a rubber hammer to tap the edge of the retainer a few times to loosen the retainer locks.



1. Valve spring compressor

5. Pull the valve out. If the stem tip or retainer lock groove edges are slightly expanded, causing difficult removal, the surface might be damaged. First, use a fine file to remove any lip that exists on the stem and then remove the valve.

NOTE:
Be sure to remove the valve stem seal before removing the valve. Otherwise the seal could be damaged.

6. Decarbonization of the head and components:
Carbon deposits build up in the combustion chambers, on the valves, and in the exhaust ports. Thoroughly clean all parts with a blunt scraper, then wash in solvent and dry with compressed air. The parts can then be examined and measured for wear.

Valves, Valve Springs, Valve Guides and Valve Seats

1. Check the intake and exhaust valve stems for bending and grooved wear. And check the stem ends for wear. Measurements should be done in three positions, upper, middle, and lower.

Intake valve stem diameter: 6.975 ~ 6.990 mm (0.2746 ~ 0.2752 in) Exhaust valve stem diameter: 6.955 ~ 6.970 mm (0.2529 ~ 0.2744 in)

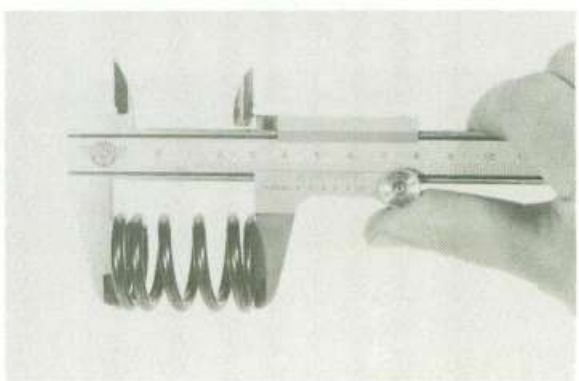


2. Checking the valve springs
   a. This engine use two springs of different sizes to prevent valve float or surging. The chart below shows the basic value characteristics.

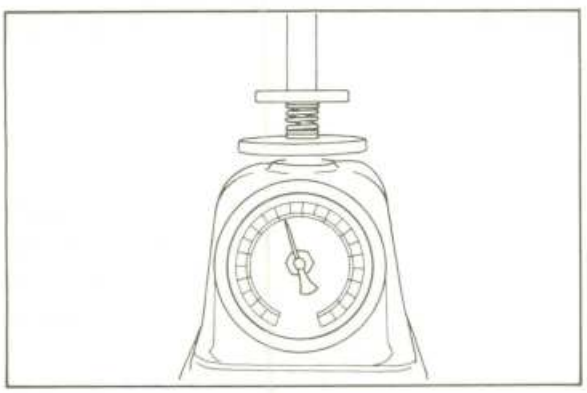
	Outer
Free length	43.2 mm (1.70 in)
Installed length (Valve closed)	37.1 mm (1.46 in)
Installed pressure (Valve closed)	23.7 ± 1.9 kg (52.3 ± 4.2 lb)
Compressed length (Valve open)	28.1 mm (1.11 in)
Compressed pressure (Valve open)	70.1 ± 4.9 kg (154.6 ± 10.8 lb)

	Inner
Free length	40 mm (1.57 in)
Installed length (Valve closed)	34.1 mm (1.34 in)
Installed pressure (Valve closed)	12.2 ± 1.0 kg (26.9 ± 2.2 lb)
Compressed length (Valve open)	25.1 mm (0.99 in)
Compressed pressure (Valve open)	36.6 ± 2.6 kg (80.7 ± 5.7 lb)

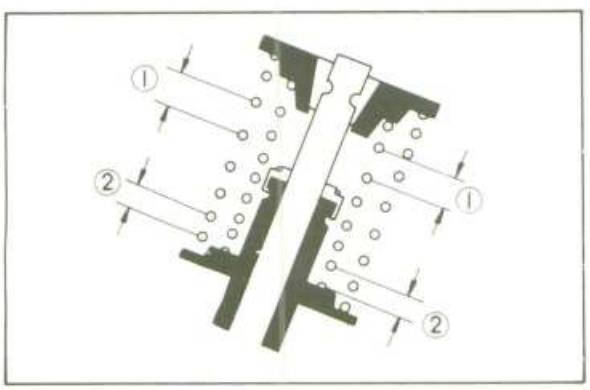
   b. Even though the spring is constructed of durable spring steel, it gradually loses some of its tension. This is evidenced one way by a gradual shortening of free length. Use a vernier caliper to measure spring free length. If the free length of any spring has decreased more than 2 mm (0.08 in) from its specification, replace it.



c. Another symptom of a fatigued spring is insufficient spring pressure when compressed. This can be checked using a valve spring compression rate gauge.
Test each spring individually. Place it in the gauge and compress the spring first to the specified compressed length with the valve closed (all spring specifications can be found in previous section, Valve Spring) then to the length with the valve open. Note the poundage indicated on the scale at each setting. Use this procedure on the outer springs, then the inner springs.



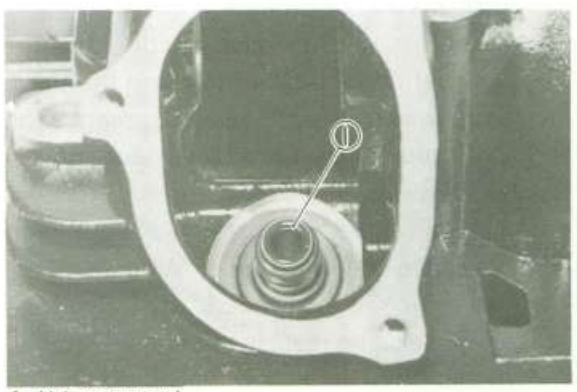
NOTE:
All valve springs must be installed with larger pitch upward as shown below.



1. Larger pitch 2. Smaller pitch

3. Valve Leakage Check
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 by the seat. If this fluid leaks, disassemble and continue to lap with fine tapping compound. Clean all parts thoroughly, reassemble and check again with solvent. Repeat this procedure as often as necessary to obtain a satisfactory seal.

4. Valve Stem Seal
This seal slips down over the valve stem to prevent excessive amounts of oil from passing down stem and into the combustion chamber. If this seal is cracked, split, or hardened, replace it.



1. Valve stem seal

5. Valve Guide
a. If the valve guide inside diameter is beyond serviceable limits, replace with an oversize valve guide.

	Standard	Limit
Guide diameter (I.D.)	7.000 ~ 7.012 mm (0.2755 ~ 0.2761 in)	7.05 mm (0.278 in)

b. To ease guide removal and reinstallation, and to maintain the correct interference fit, heat the head to 100°C (212°F).
If possible, use an oven to avoid any possibility of head warpage due to uneven heating.

c. Use the appropriate shouldered drive (special tool) to drive the old guide out and the new guide in.



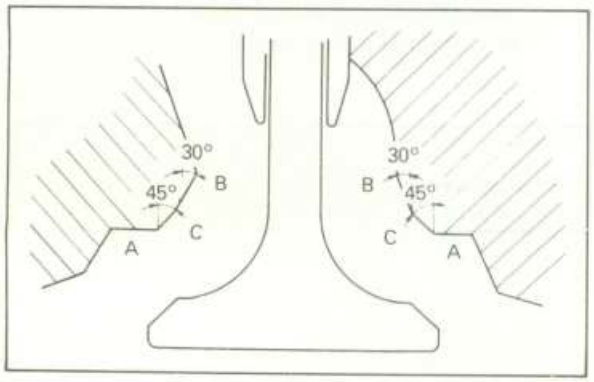
1. Valve guide remover

d. After installing the valve guide, use 7 mm reamer (special tool) to obtain the proper valve clearance.

e. After fitting the valve guide into the cylinder head, be sure to grind the valve seat, and perform valve lapping. The valve must be replaced by a new one.

6. Grinding the Valve Seat

a. The valve seat is subject to severe wear similar to the valve face. Whenever the valve face is resurfaced, the valve seat should also be resurfaced at a 45° angle. In addition, if a new valve guide has been installed (without any valve repair), the valve seat should be checked to guarantee complete sealing between the valve face and seat.



CAUTION:

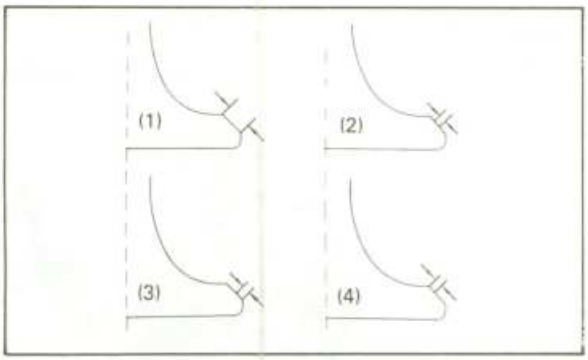
If the valve seat is obviously pitted or worn, it should be cleaned with a valve seat cutter. Use the 45° cutter, and when twisting the cutter, keep an even downward pressure to prevent chatter marks.

If cutting section "A" of the intake valve seat, use "FLAT" cutter (radius cutter).
If cutting section "A" of the exhaust valve seat, use "FLAT" cutter (also radiused).
If cutting section "B", use the 30° cutter.
If cutting section "C", use the 45° cutter.

b. Measure valve seat width. Apply mechanic's bluing dye (such as Dykem) to the valve face, apply a very small amount of fine grinding compound around the surface of the valve seat, insert the valve into position, and spin the valve quickly back and forth. Lift the valve, clean off all grinding compound, and check valve seat width. The valve seat will have removed the blueing wherever it contacted the valve face.
Measure the seat width with vernier calipers. It should measure approximately 1.1 mm (0.043 in). Also, the seat should be uniform in contact area. If valve seat width varies, or if pits still exist, then continue to cut with the 45° cutter. Remove just enough material to achieve a satisfactory seat.

	Standard width	Wear limit
Seat width	1.1 mm (0.043 in)	1.8 mm (0.071 in)

c. 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 "FLAT", 45°, or 30° cutters to correct the improper seat location in the manner described below:



(1) If the valve face shows that the valve seat is centered on the valve face, but too wide, then lightly use both the "FLAT" and the 30° cutters to reduce the seat width to 1.1 mm (0.043 in).

(2) If the seat shows to be in the middle of the valve face, but too narrow, use the 45° cutter until the width equals 1.1 mm (0.043 in).

(3) If the seat is too narrow, and right up near the valve margin, then first use the "FLAT" cutter and then the 45° cutter to get the correct seat width.

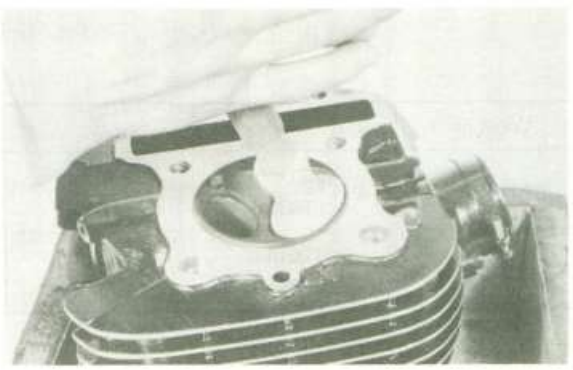
(4) If the seat is too narrow and down near to bottom edge of the valve face, then first use the 30° cutter and then the 45° cutter.

7. Lapping the Valve/Valve Seat Assembly

a. The valve/valve seat assembly should be lapped if, (1) neither the seat nor the valve face are severely worn, or: (2) if the valve face and valve seat have been resurfaced and now require a final light grinding operation for perfect sealing.

b. Apply a small amount of coarse lapping compound to the valve face. Insert the valve into the head. Rotate the valve until there is a burnished spot all the way around the valve face. 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 all compound material.

Apply bluing dye to the valve face and rotate the valve face for full seat contact which is indicated by a shiny surface all around the valve face where the bluing has been rubbed away.



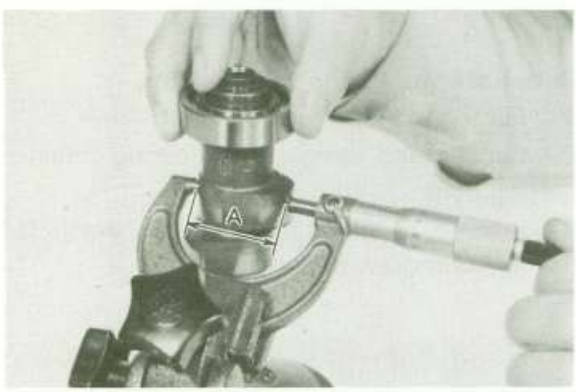
Camshaft and Camshaft Bearing

1. Flatten the lock washer.
2. Loosen and remove the bearing retaining bolts.
3. Insert a 10 mm screw into the camshaft and withdraw the camshaft.



4. Camshaft
   a. 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. This is due to poor lubrication, incorrect clearances, or normal wear.
   b. If any of the above wear conditions are readily visible, the camshaft should be replaced.
   c. Even though the cam lobe surface appears to be in satisfactory condition, the lobes should be measured with a micrometer. Cam lobe wear can occur without scarring the surface. If this wear exceeds a predetermined amount, valve timing and lift are affected. Replace the camshaft if wear exceeds the limits.

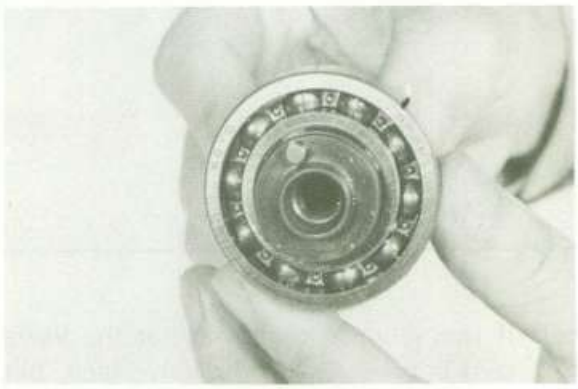
Wear limit	A	B
Intake	40.21 mm (1.583 in)	32.10 mm (1.264 in)
Exhaust	40.26 mm (1.585 in)	32.19 mm (1.267 in)



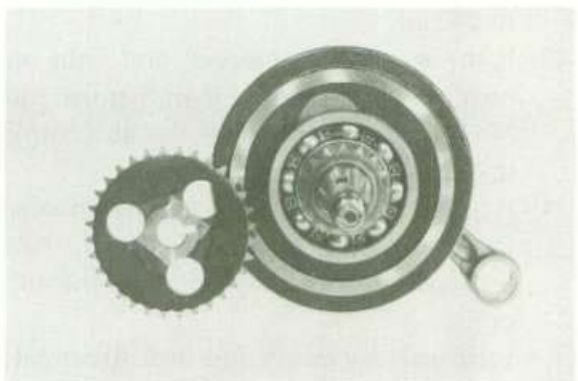


5. Camshaft bearing
   Bearings should be cleaned, dried, and the races visually checked for pits, rust spots or chatter marks where the balls have dragged. If any of these conditions exists the bearings should be replaced.

NOTE:
Lubricate the bearings immediately after examining them to prevent rust formation.



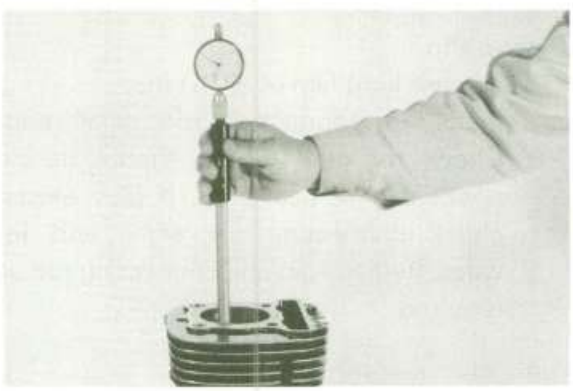
6. Cam sprocket and cam drive sprocket
   Check the cam sprocket and cam drive sprocket for wear.

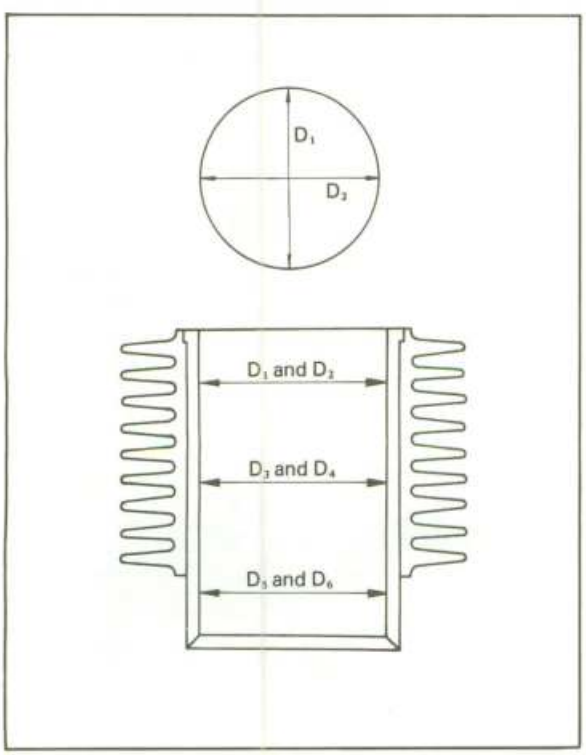


Cylinder

1. Visually check the cylinder walls for scratches. If vertical scratched 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 in parallel to, and at right angles to, the crankshaft. (See the illustration.)
   If the cylinder wall is worn more than wear limit, it should be rebored.





	Standard	Wear limit
Cylinder bore	75.00 ~ 75.02 mm (2.953 ~ 2.954 in)	75.1 mm (2.957 in)
Cylinder taper	—	0.05 mm (0.002 in)

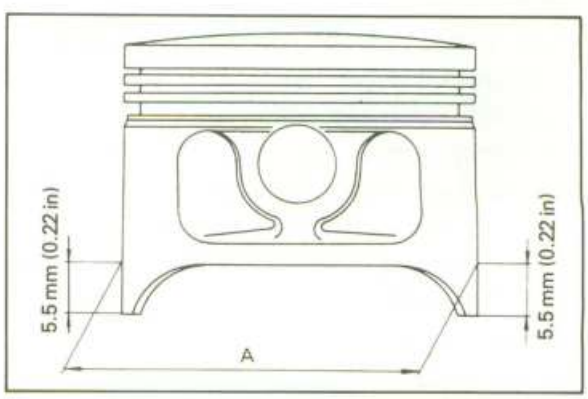
Piston and Piston Rings

1. Piston
   a. Using the micrometer, measure the outside diameter of the piston at the piston skirt.
      Measurement should be made at a point 5.5 mm (0.22 in) above the bottom edge of the piston by placing the micrometer in parallel to, and at right angles to, the piston pin.

Piston clearance:
0.035 ~ 0.055 mm (0.0014 ~ 0.0022 in)

   b. 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. And then the ring should be reinstalled. Use a feeler gauge to measure the gap between the ring and the land.

Side clearance	Top	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)
	2nd	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)





	Size A
Standard	75.00 mm (2.953 in)
Oversize 1	75.25 mm (2.963 in)
Oversize 2	75.50 mm (2.972 in)
Oversize 3	75.75 mm (2.982 in)
Oversize 4	76.00 mm (2.992 in)

2. Piston ring
   a. 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)

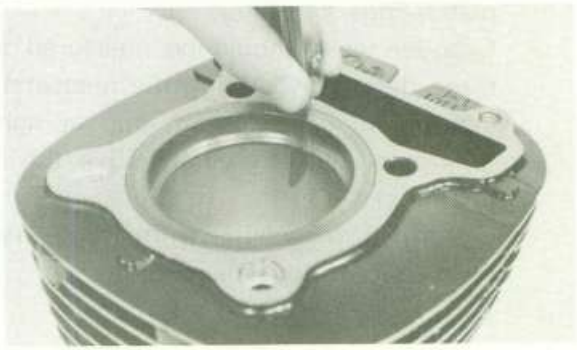
   b. Expander spacer of the bottom ring (oil control ring) is color-coded to identify sizes. The color mark is painted on the expander spacer.

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

   c. Insert each ring into the cylinder and push it down approximately 20 mm (0.8 in), using the piston crown so that the ring forms the right angles to the cylinder bore. Measure the end gap of the ring with a feeler gauge.
   If the gap is beyond telerance, replace the whole set of rings.

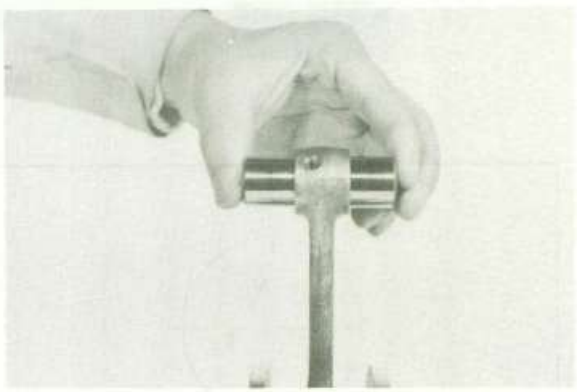
NOTE:
The end gap on the expander spacer of the oil control ring is unmeasureable. If the oil control ring rails show excessive gap all three components should be replaced.

	Standard	Limit
Top/2nd ring	0.2 ~ 0.4 mm (0.0079 ~ 0.0157 in)	0.80 mm (0.0315 in)
Oil control (Rails)	0.3 ~ 0.9 mm (0.0118 ~ 0.0354 in)	–



Piston Pin

1. Apply a light film of oil to pin.
   Install in connecting rod small end. Check for play. There should be no noticeable vertical play. If play exists, check connecting rod small end for wear. Replace pin and connecting rod as required.



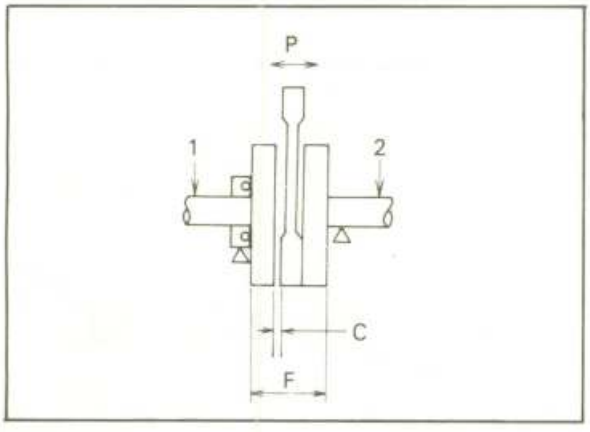
2. The piston pin should have no noticeable freeplay in piston. If the piston pin is loose, replace the pin and/or the piston.



Crankshaft

1. Check crankshaft components per chart.

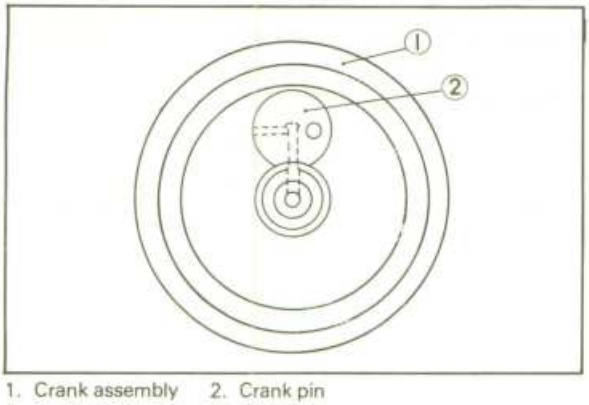
Check connecting-rod axial play at small end (to determine the amount of wear of crank pin and bearing at big end).	Small end play should not exceed 2 mm (0.079 in).	If small end play exceeds 2 mm (0.079 in) disassemble crankshaft, check connecting rod, crank pin and big end bearing. Replace defective parts. Play after reassembly should be within 0.8 ~ 1.0 mm (0.031 ~ 0.039 in).
Check the connecting rod side clearance at big end.	Move the connecting rod to one side and insert a feeler gauge. Big end axial play should be within 0.35 ~ 0.65 mm (0.014 ~ 0.026 in).	If excessive axial play is present, 0.7 mm (0.028 in) or more, disassemble the crankshaft and replace any worn parts.
Check crankshaft assembly runout. (Misalignment of crankshaft parts.)	Dial gauge readings should be within 0.03 mm (0.00118 in).	Correct any misalignment by tapping the flywheel with a brass hammer and by using a wedge.



2. In disassembling and reassembling the crank, follow the illustrated below.

NOTE:

Make sure oil passages of crank and crank pin are lined up during assembly.



1. Crank assembly 2. Crank pin

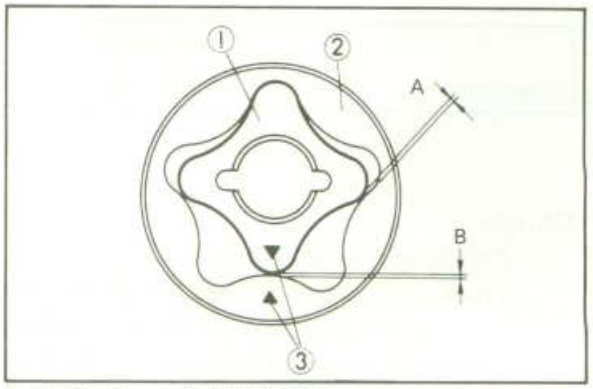
Oil Pump

1. Trochoidal Pump Rotor Width

Delivery pump: 12 mm (0.47 in)

2. Rotor Dimensions-Inner and Outer

Clearance between A and B
Standard: 0.03 ~ 0.09 mm
(0.0012 ~ 0.0035 in)



1. Inner rotor 3. Match marks
2. Outer rotor

Primary Drive

The drive gear is mounted on the crankshaft and the driven gear is integral with the clutch assembly and mounted on the transmission main shaft.

Primary reduction ratio		
No. of teeth		Ratio
Drive	Driven	
23	72	3.130

1. Check the drive gear and driven gear for obvious signs of wear or damage from foreign material within the primary case.
2. If primary drive gears exhibit excessive noise during operation, gear lash may be incorrect.
   Numbers are scribed on the side of each gear. Add these numbers. If their total exceed tolerance, replace with a numbered gear that will bring total within specification.

NOTE:

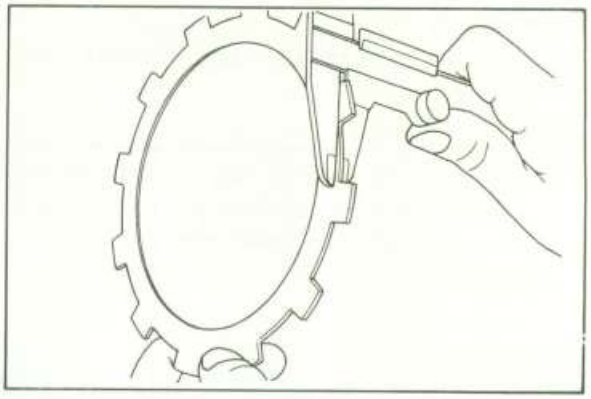
This procedure is rarely required. However, if a gear must be replaced due to damage, it is always advisable to pay strict attention to the lash numbers during replacement.

	Lash numbers
Lash tolerance	183 ~ 185

Clutch

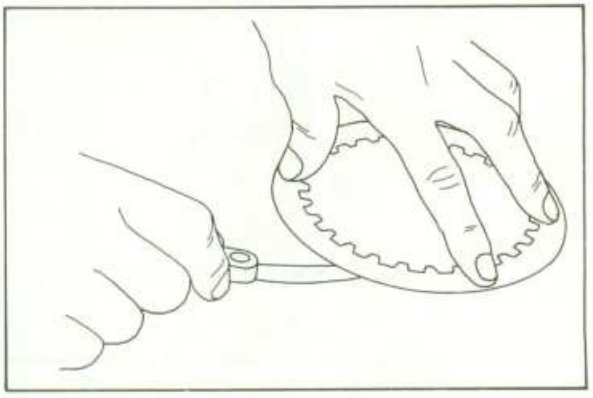
1. Checking friction plates
   The friction plates are liable to wear. The standard thickness of the friction plate is 2.8 mm (0.11 in). If it is worn more than 0.3 mm (0.012 in) or has uneven wear, it should be replaced.

Friction plate wear limit:
2.5 mm (0.10 in)



2. Measure clutch plates
   Check clutch plate warpage, and if warpage is more than specified, the clutch plate should be replaced.

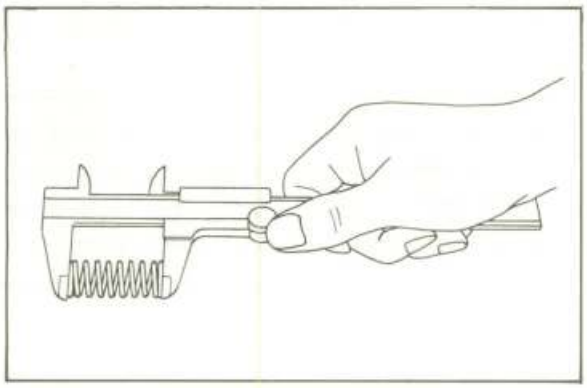
Clutch plate warpage limit:
0.05 mm (0.0020 in)



3. Checking clutch springs
   Using the vernier caliper, measure the free length of each spring. If it measures 1.0 mm (0.04 in) less than specified, it should be replaced.

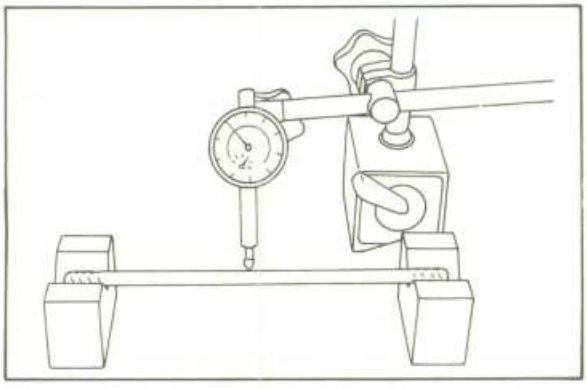
Clutch spring specifications:

Number of springs	4
Free length	34.6 mm (1.36 in)
Spring rate	2.6 kg/mm (145.6 lb/in)



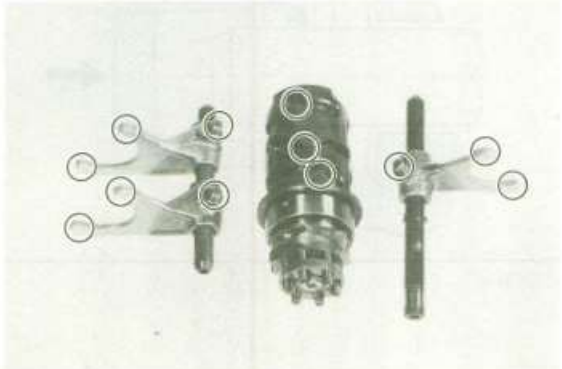
4. Checking the push rod
   By rolling the push rod over the "V" block, and check for bends. If any bend is found, replace the push rod.

Bend Limit: 0.5 mm (0.02 in)



Transmission

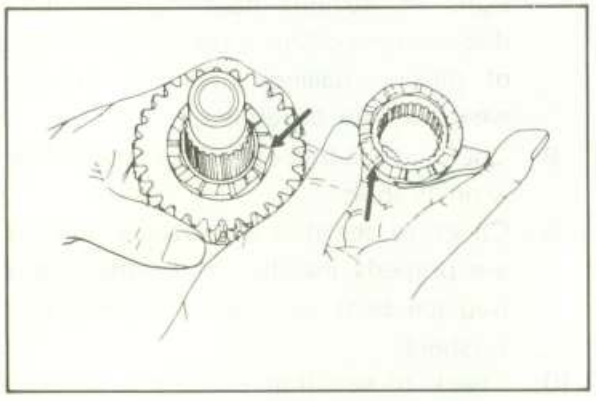
1. Inspect each shift fork for signs of galling on gear contact surfaces. Check for bending. Make sure each fork slides freely on its guide bar.



2. Roll the guide bars across a surface plate. If any bar is bent, replace.
3. Check the shift cam grooves for signs of wear or damage. If any profile has excessive wear and/or any damage, replace cam.
4. Check the cam followers on each shift fork wear. The follower should fit snugly into its seat in the shift fork, but not over-tight.
   Check the ends that ride in the grooves in the shift cam. If they are worn or damaged, replace.
5. Check shift cam dowel pins and side plate for looseness, damage, or wear. Repair as required.
6. Check the transmission shafts using a centering device and dial gauge. If any shaft is bent, replace.
7. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the 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 clip 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.

Kick Starter

1. Check the ratchet teeth on the kick gear and ratchet wheel. The mating edges should fit flush against each other. If there is severe rounding off, replace as set.
2. Check to see that the kick gear spins freely on the kick axle. If not, replace either or both as required. Replace if any signs of galling are found.
3. Check to see that the ratchet wheel (splined) slides freely on the kick axle. Check for burrs or other damage. Replace as required.
4. Check axle and wheel splines for wear. The ratchet wheel is a fairly loose fit on splines. However, if wheel is so loose it catches on shaft keeping ratchet wheel spring from forcing it out, replace.



Bearings and Oil Seals

1. Inspection
   a. After cleaning and lubrication bearings, rotate inner race with a finger. If rough spots are noticed, replace the bearing.
   b. Check oil seal lips for damage and wear. Replace as required.
2. Removal
   a. Pry oil seal(s) out of place using a slot head screwdriver.
      Always replace all oil seals when overhauling engine.

NOTE:

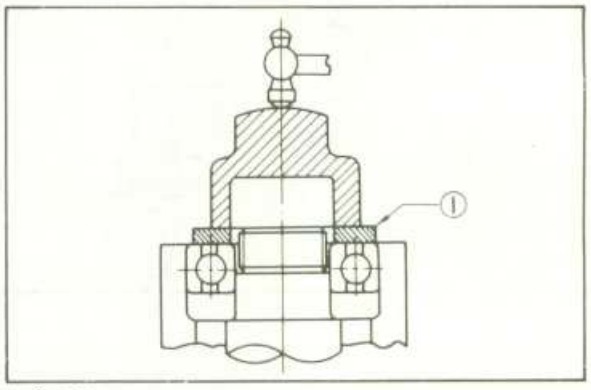
Place a piece of wood under the slot head screwdriver to prevent damage to case.

   b. Drive out bearing(s) with socket and hammer.

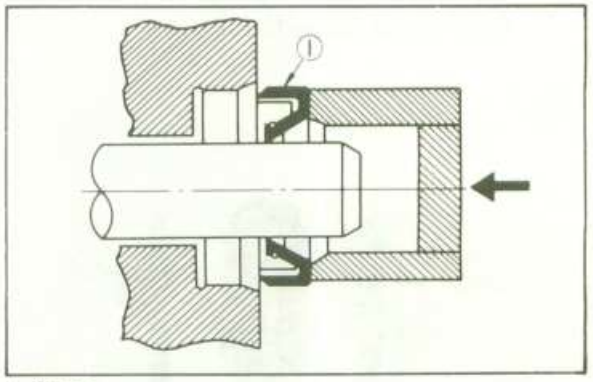
NOTE:

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

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



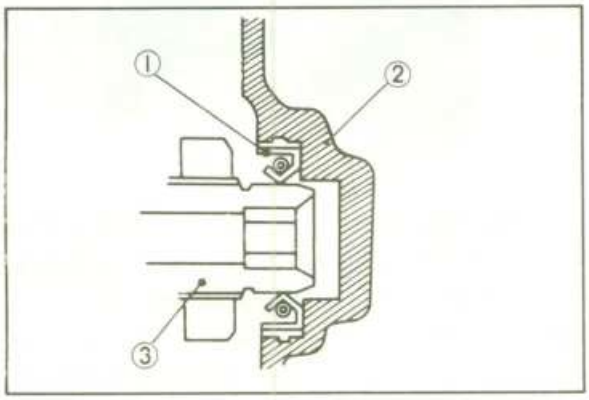
1. Spacer



1. Oil seal

CAUTION:

The crankshaft oil seal (right side) on the crankcase cover right, should be installed in a way reverse to the normal direction as shown.



1. Oil seal
2. Crankcase cover
3. Crankshaft

Crankcase

1. Thoroughly wash the case halves in mild solvent.
2. Clean all gasket mating surfaces and crankcase mating surface thoroughly.
3. Visually inspect case halves for any cracks, road damage, etc.
4. Check all fittings not previously removed for signs of loosening or damage.
5. If bearings have been removed, check their seats for signs of damage (such as the bearing spinning in the seat, etc.).
6. Check oil delivery passages for signs of blockage.
7. If bearings have not been removed, oil them thoroughly immediately after washing and drying. Rotate the bearing checking for roughness indicating damaged races or balls.
8. Check needle bearing(s) in transmission for damage. Replace as required.

ENGINE ASSEMBLING AND ADJUSTMENT

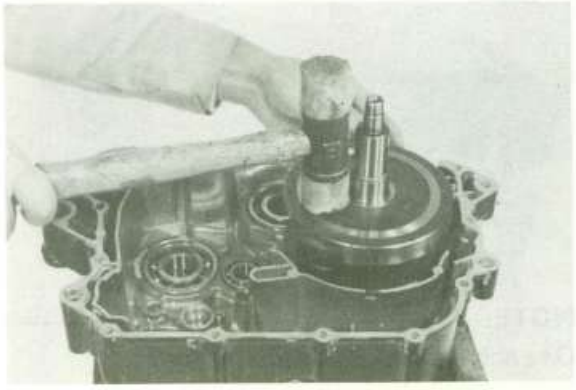
Crankshaft Installation

After all Bearings and seals have been installed in both crankcase halves, install crankshaft as follows:

1. Place the left crankcase underside.
2. Fit the crankshaft onto the left case half by tapping the crankpin area with a soft head hammer while turning the crankshaft. Work slowly and carefully. Make sure the crankshaft is set evenly.

NOTE:

Pay attention to the parallelism between the crankweb and the crankcase surface.

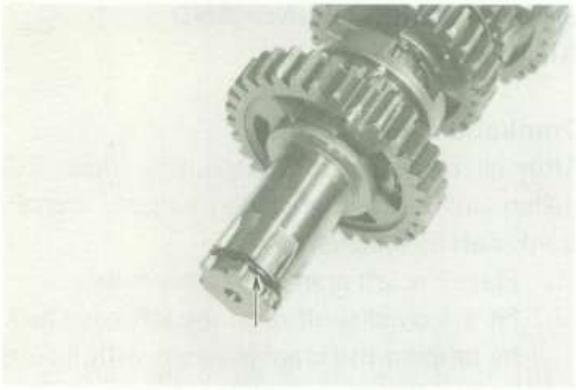


3. Install the drive axle and main axle.

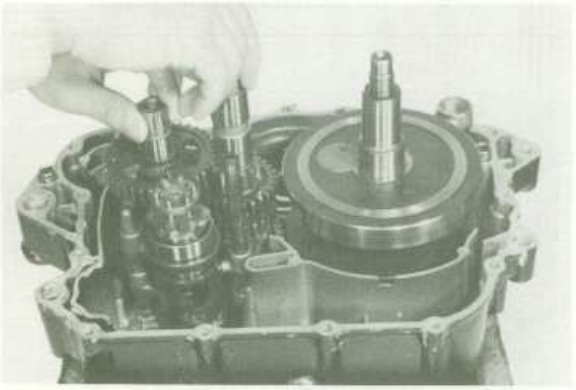
NOTE:

While installing the drive axle into the crankcase, pay careful attention to the oilseal lip.

It is recommended to set a suitable "O-ring" into the drive axle groove.

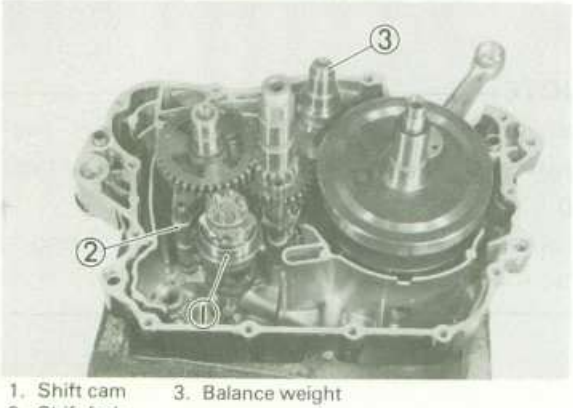


4. Install the shift cam.
5. Install the shift fork 1 and 2.
6. Check to see that all parts move freely prior to installing right case half.
   Check for correct transmission operation and make certain that all loose shims are in place.



NOTE:
Oil each gear and bearing throughly.

7. Install the balance weight.



1. Shift cam
2. Shift fork
3. Balance weight

8. Apply Yamaha Bond No.4 to the mating surfaces of both case halves.
   Apply thoroughly, over all mating surfaces.



1. Yamaha Bond No. 4

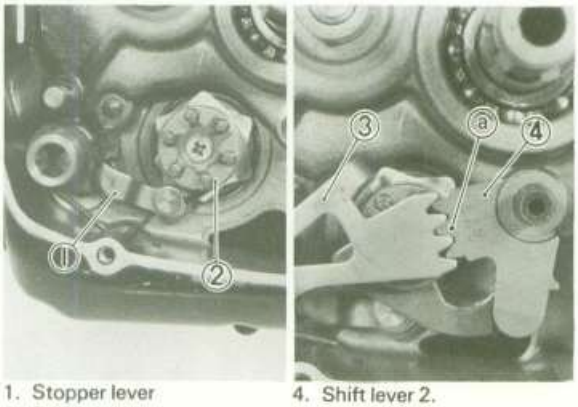
9. Set the crankcase right half onto the shafts and tap lightly on the case with a soft head hammer to assemble.

NOTE:
Do not tap on machined surface or end of crankshaft.

10. Install all crankcase bolts and tighten in stages, using a crisscross pattern.
11. After reassembly, apply a liberal coating of 4-stroke engine oil to the crank pin and bearing.
12. Check crankshaft and transmission shafts for proper operation and freedom of movement.

Shifter

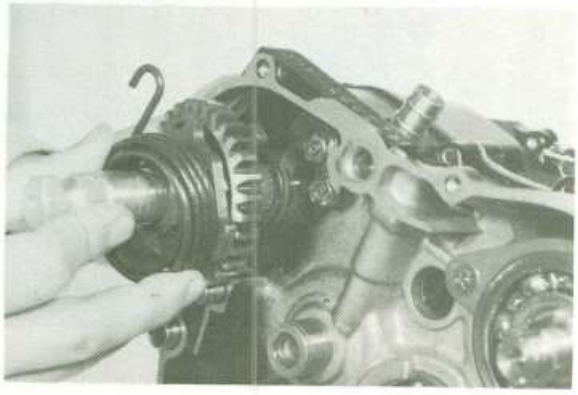
1. Set the stopper lever.
2. During installation, note the index mark on change lever 2 and center of change lever 1. Align.



1. Stopper lever
2. Shift cam
3. Shift lever 1.
4. Shift lever 2.
a. Align the mark.

Kick Starter

1. While pushing the kick starter assembly straight in, rotate kick axle counter-clockwise slightly from its home position and engage the stopper to the ratchet wheel guide.



2. Hook the spring to the spring hook.
3. Install the kick idle gear.



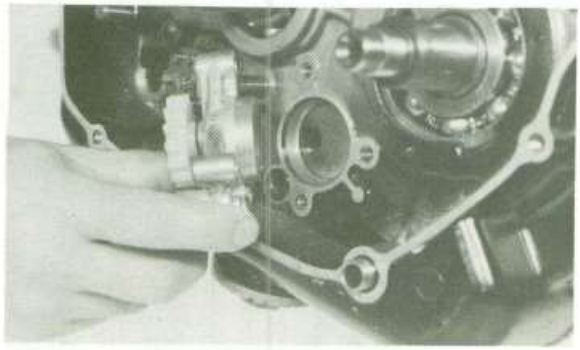
4. Install the decompression lever assembly.

Oil Pump

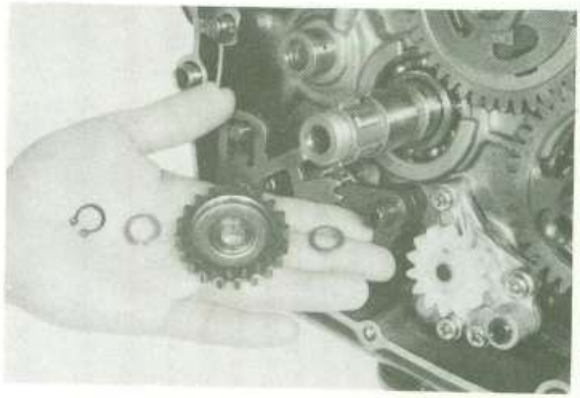
1. Install the delivery pump rotor assembly.

NOTE:

Apply a liberal coating of 4-stroke engine oil to the oil pump rotor.

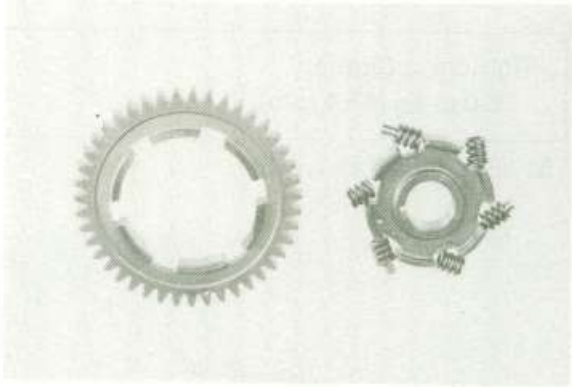


2. Install the pump cover with driven gear.
3. Install the oil pump idle gear.

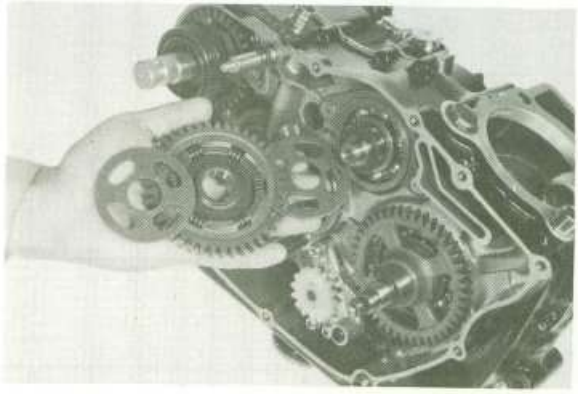


Balancer Drive Gear and Driven Gear

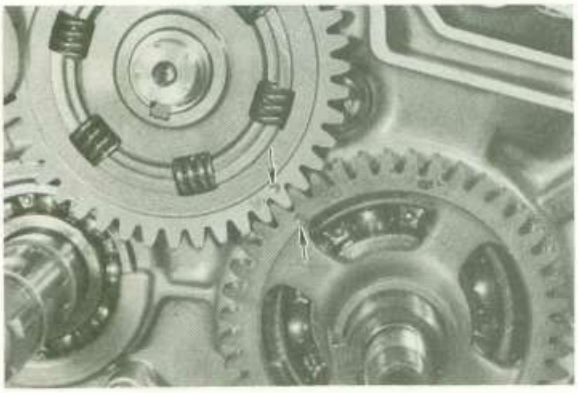
1. Fit into the balancer gear the buffer boss with dowel pins set every other interval.



2. Place bearing covers on both sides of the balancer gear and install.



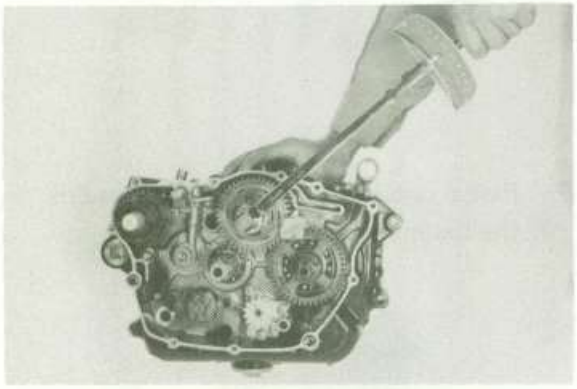
3. Install the keys for the balancer drive and driven gears with the marks in alignment.



4. Tighten the balancer gear lock nut by first placing a folded rag between the teeth of the balancer gears to lock them as shown in the photo.

Tightening torque:
6.0 m-kg (43.4 ft-lb)

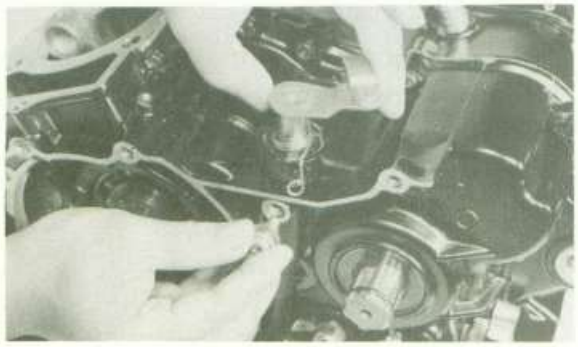
5. Bend the lock washer.



Push Lever Assembly

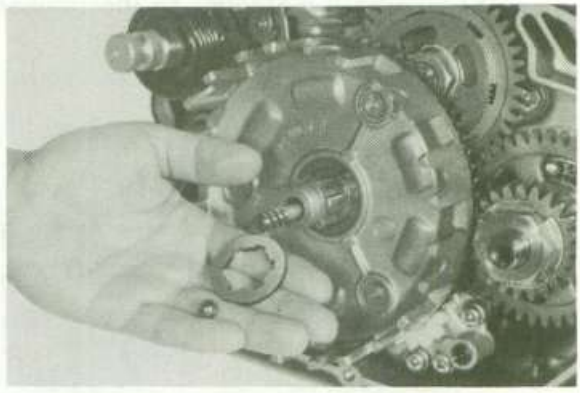
1. Install the push lever assembly.
2. Tighten the set screw.

Set screw torque:
1.2 m-kg (8.7 ft-lb)



Clutch

1. First install the primary drive gear.
2. Install the clutch housing, thrust plate and clutch boss in that order.

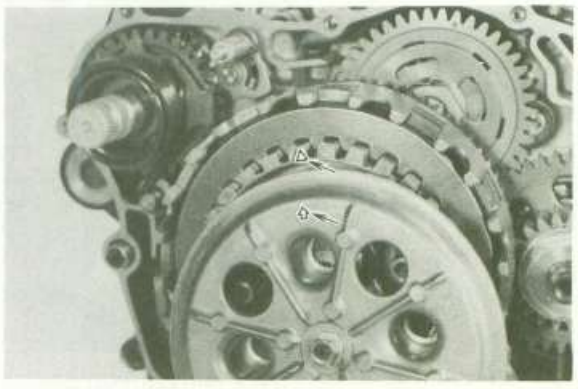


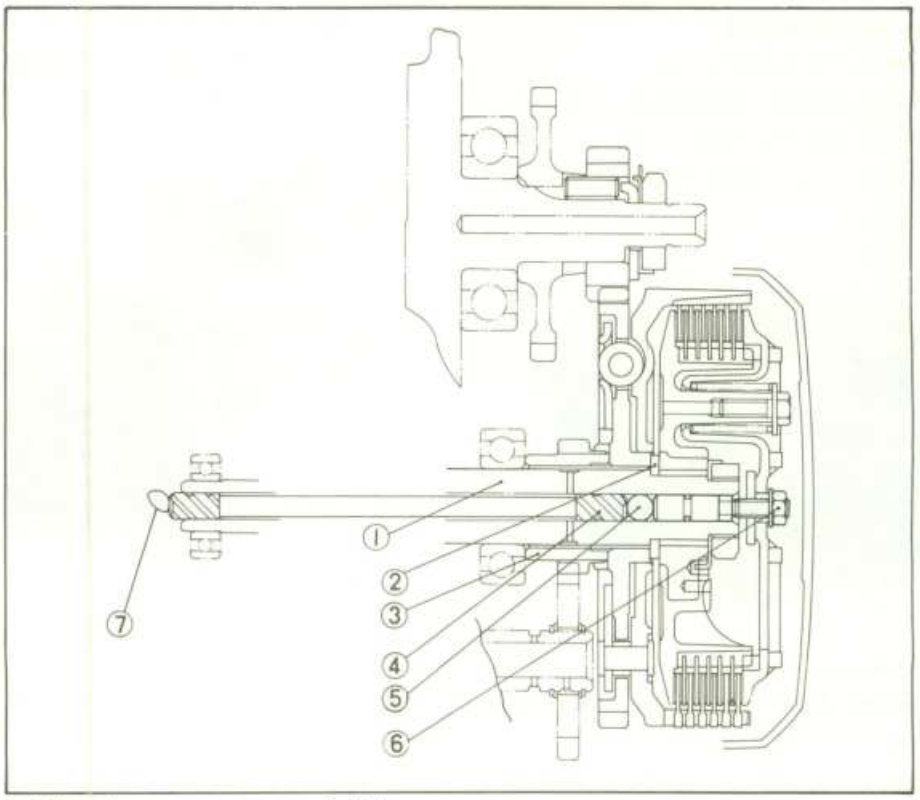
3. Install the clutch holding tool on the clutch boss and tighten the lock nut.

Clutch lock nut torque:
7.0 m-kg (50.6 ft-lb)

4. Install the push rod 2 and ball into main axle.
5. Install clutch plate and friction plate.
6. Install clutch pressure plate.
7. Continue installation of clutch and friction plates.

NOTE:
Align the arrow mark on the clutch boss and pressure plate mark.

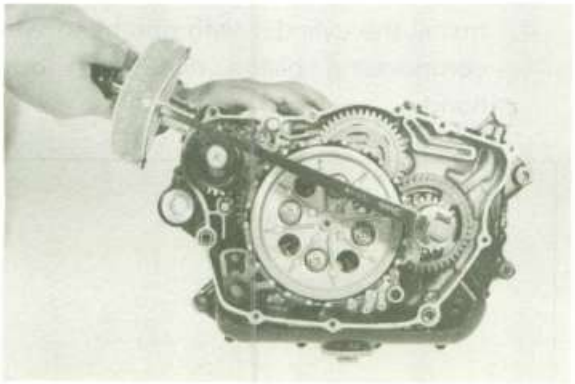




1. Main axle
2. Thrust plate
3. Kick pinion gear
4. Pushrod 2
5. Ball
6. Pushrod 1 lock nut
7. Push lever

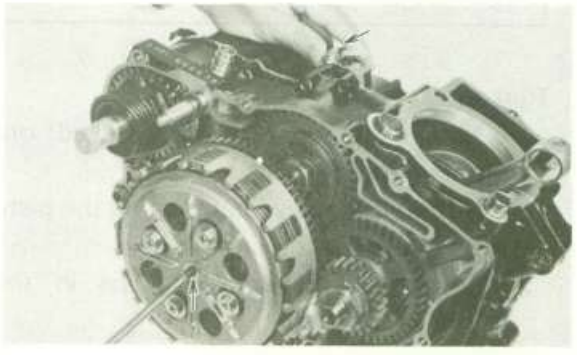
8. Tighten the primary drive lock nut by first placing a folded rag between the teeth of the primary gears to lock them as shown in the photo.

Primary drive lock nut torque:
7.0 m-kg (50.6 ft-lb)



Clutch Adjustment

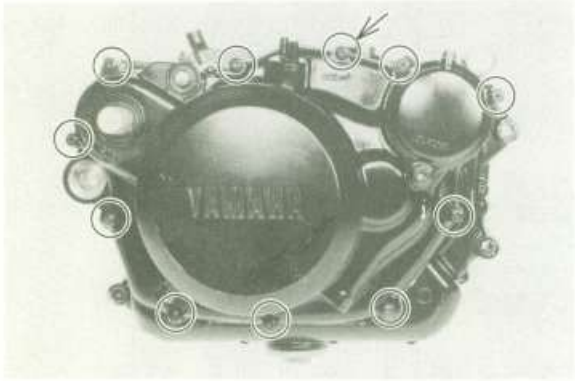
With the crankcase index mark and the pointed end of the push lever in line with each other, adjust the pushrod and then secure it with the lock nut.





Crankcase Cover Right

1. Install the crankcase cover.
2. Install the oil filter element and cover.
3. Check to see the decompression lever assembly move freely prior to tightening the bolts.



NOTE:

Apply Yamaha Bond No. 4 to the bolt indicated by an arrow.
Tighten the screws using crisscross pattern.

4. After tightening, recheck to see the decompression lever moves freely.

CAUTION:

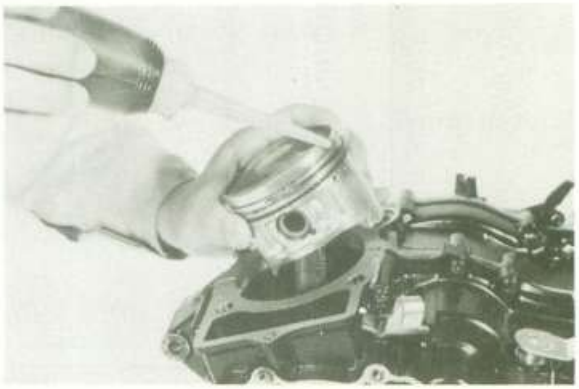
If the decomp lever does not move freely, compression gas may be released from the exhaust valve and the engine may not be started.

Piston

1. Mount the piston (rings installed) onto the connecting rod.
   Be sure the arrow stamped on the piston crown points forward.
2. Install new piston pin clips in their grooves.



3. During reassembly, coat the piston ring grooves, piston skirt areas, and piston pin with 4-stroke engine oil.



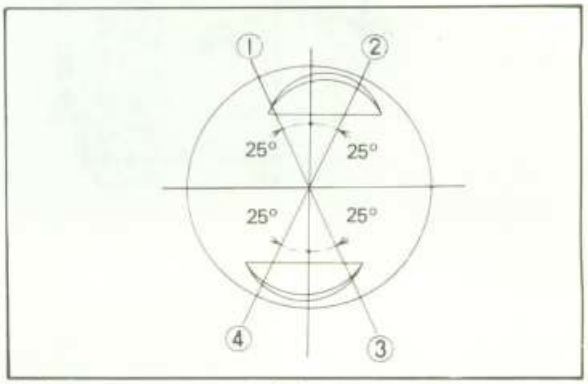
Cylinder

1. Install the cam chain guide to the crank case.
2. Install the new "O-ring" and cylinder base gasket.



1. O-ring

3. Off-set the three ring end gaps as shown.
4. Install the cylinder with one hand while compressing piston rings with other hand.



1. Top
2. Oil ring (Lower rail)
3. 2nd
4. Oil ring (Upper rail)

5. Install the cylinder holding bolt.

Cylinder Head

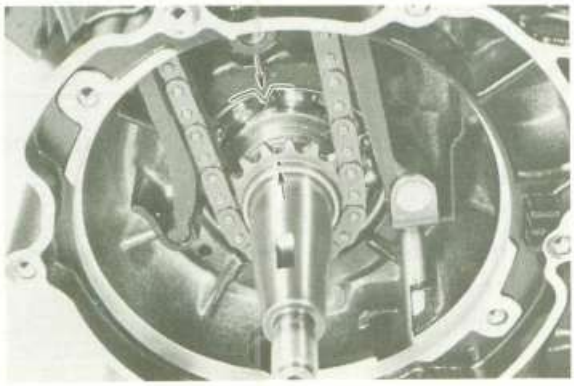
1. Install the cylinder head gasket and cylinder head.
2. Tighten the cylinder head temporarily. (final tightening to follow)

Tightening torque:
10 mm bolt
3.7 m-kg (26.8 ft-lb)
8 mm bolt
2.0 m-kg (14.5 ft-lb)
6 mm bolt
0.7 m-kg (5.1 ft-lb)

Cam Shaft, Cam Shaft Driven Sprocket, Cam Chain

1. Install the cam shaft, bearing plate and lockwasher.
2. Tighten the bolt and bend the lockwasher.
3. Install the chain while aligning the markes on the sprocket and cylinder head and also the marks on the crankshaft and crankcase, as shown in the following photos.

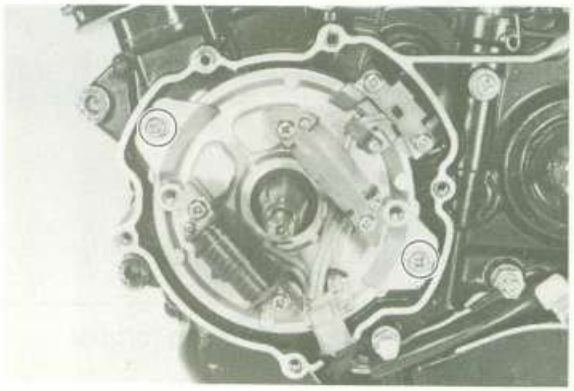




4. Install the flywheel magneto base to left side of crankcase.

NOTE:

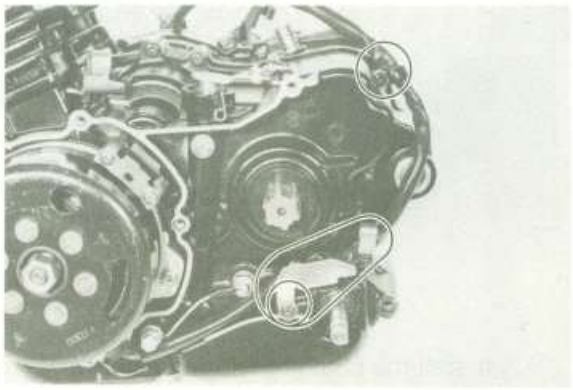
1. If the "O-ring" is defective, swollen or deteriorated, replace it.
2. Apply a thin coat of grease over the "O-ring" and then put the magneto plate in the crank case.
   Pay attention to the parallelism between the plate and the crankcase surface.
3. Install the lead wire grommet properly.



5. Clamp the lead wire to the crankcase.

NOTE:

Be sure the lead wire will not become loosen.



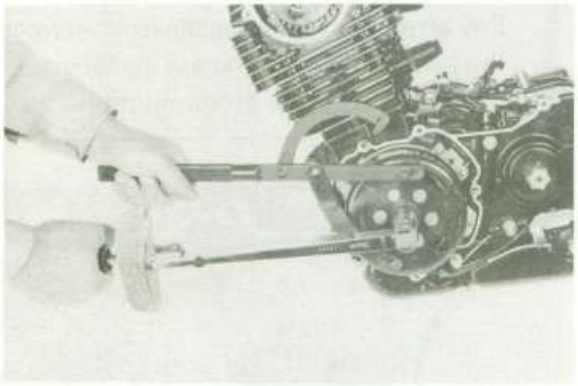
6. Install the flywheel.

NOTE:

When installing flywheel, make sure woodruff key is properly seated in keyway of crankshaft. Carefully install flywheel taking care to align with woodruff key.

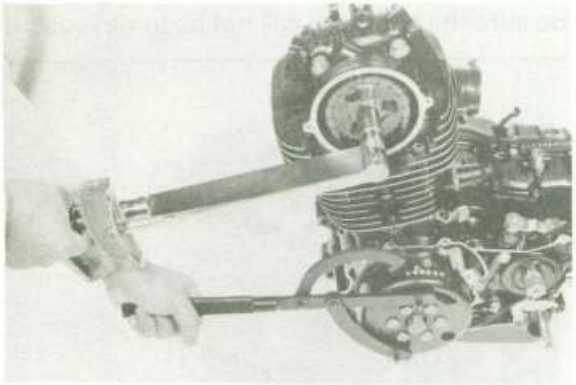
7. Install plate washer, spring washer and lock nut.

Tightening torque:
8.0 m-kg (57.8 ft-lb)



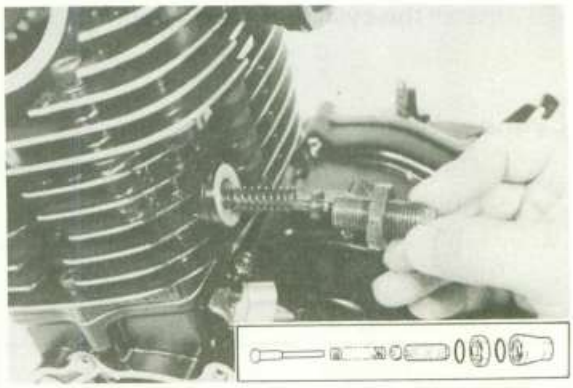
8. Tighten the cam sprocket bolt.

Cam sprocket bolt tightening torque:
5.5 m-kg (39.8 ft-lb)



9. Install the chain tensioner assembly. Adjust the tensioner. (Refer to the Chapter 2. "Cam chain adjustment".)
10. Install the adjuster cap and tighten the cap.

Tightening torque:
0.5 m-kg (3.6 ft-lb)



Kick Crank

Install the kick crank assembly and tighten the securing bolt.

Tightening torque:
2.0 m-kg (14.4 ft-lb)

Drain Plug

Install and tighten the drain plug before filling engine oil.

Tightening torque:
3.2 m-kg (23.1 ft-lb)

MOUNTING

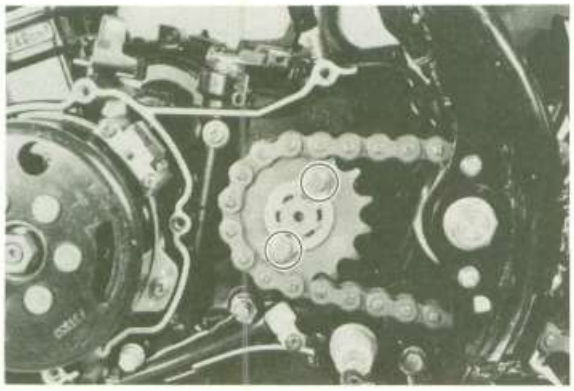
Refer to Chapter 3. "Removal" and mount the engine in the frame as follows:

1. Place the engine in the frame from right side.
2. Install engine mounting bolts and nuts with proper tightening torque.

Tightening torque		
Bolt size	m-kg	ft-lb
14 mm (Pivot shaft)	6.5	47.0
8 mm	3.2	23.1
8 mm (Adjusting plate)	2.0	14.5
6 mm	1.0	7.2

3. Install the lead wire, plug cap and breather pipe.
4. Install carburetor assembly.
5. Install the drive sprocket with the drive chain and the sprocket holder.
   Tighten the two bolts.

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



6. Install the plate washer and spacer over the shift shaft.
7. Install the left crankcase cover and tighten bolts.
8. Install the shift pedal and tighten the bolt.
9. Install the engine protector.
10. Install and adjust the clutch and decompression wire as shown in "Chapter 2".
11. Install the exhaust pipe assembly.
12. Install the fuel tank and seat.
13. Install the brake rod wing nut and the return spring.
14. Start the engine and check oil pressure, oil leakage and cam chain adjustment. See Engine oil checking procedure in Chapter 2, "Periodic Inspections and Adjustments".

CHAPTER 4. CARBURETION

AIR FILTER 4-1
CARBURETOR 4-1
Disassembly 4-1
Fuel Level 4-3
Reassembly and Installation 4-4

CHAPTER 4.
CARBURETION

AIR FILTER

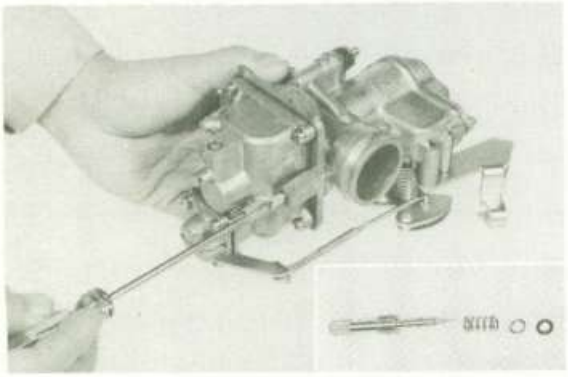
1. The air filter is housed within a case below the seat.
2. The filter is made of polyurethane foam with a stiff bristle covering.
3. For carburetor to function properly, the filter must be in place and it must be damp with oil to provide adequate protection for vital engine parts.
4. For air filter maintenance see Chapter 2. "Air Filter".

CARBURETOR

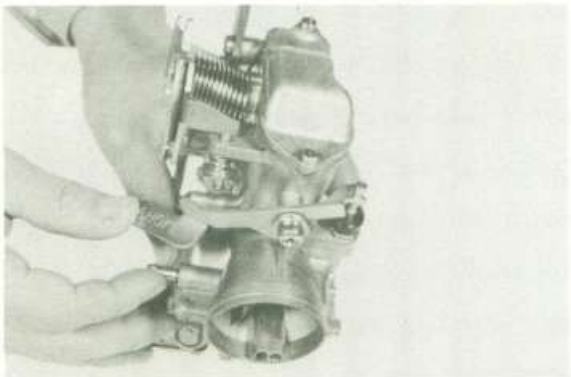
Disassembly

Remove the following parts as shown.

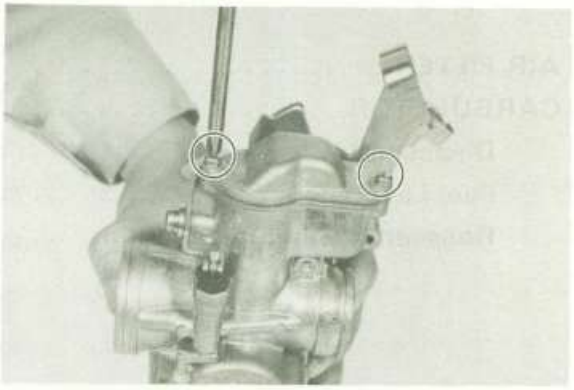
1. Pilot screw



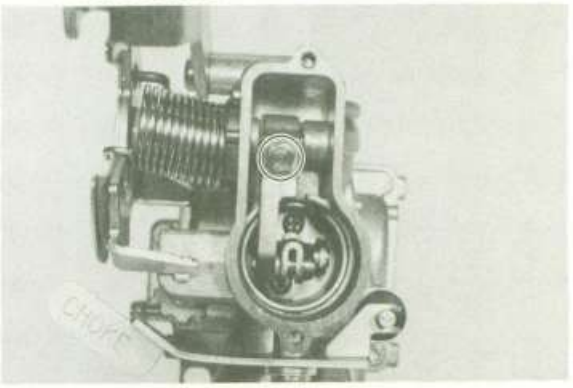
2. Starter (Choke) lever

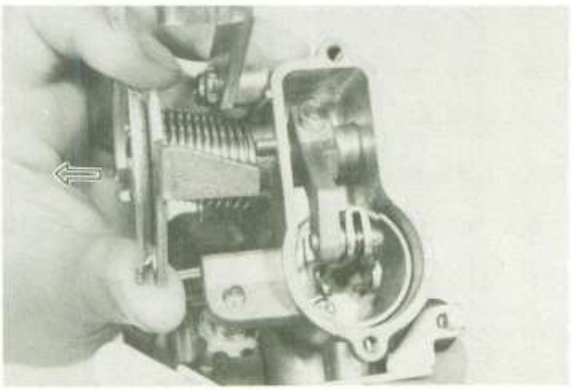


3. Mixing chamber top

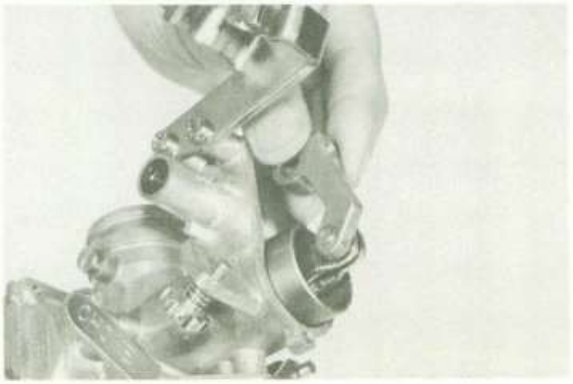


4. Throttle shaft



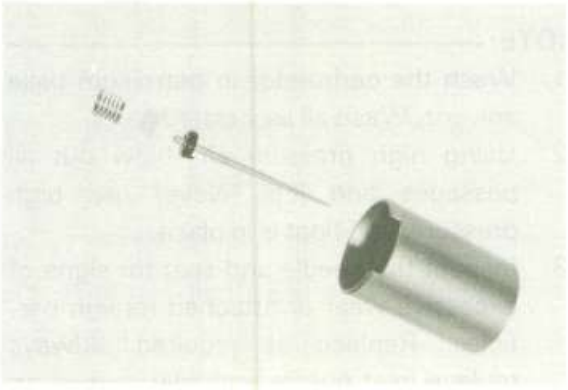


5. Throttle valve
6. Throttle lever assembly

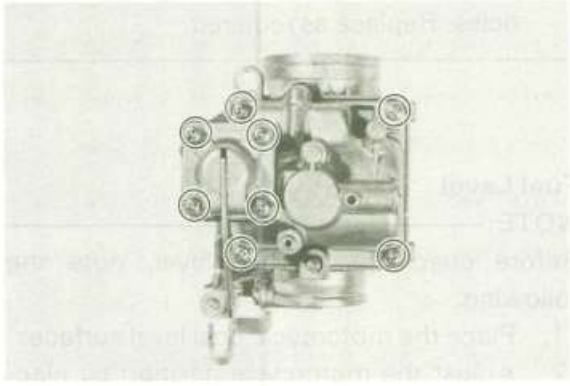


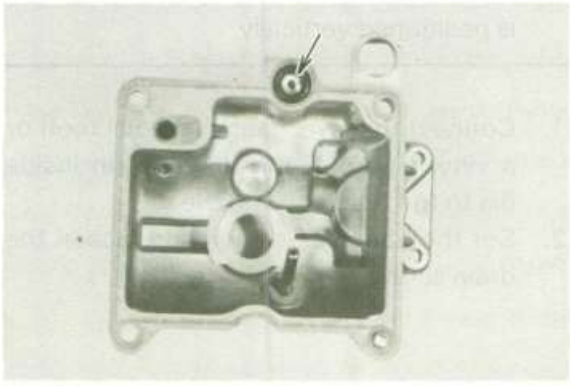


7. Jet needle



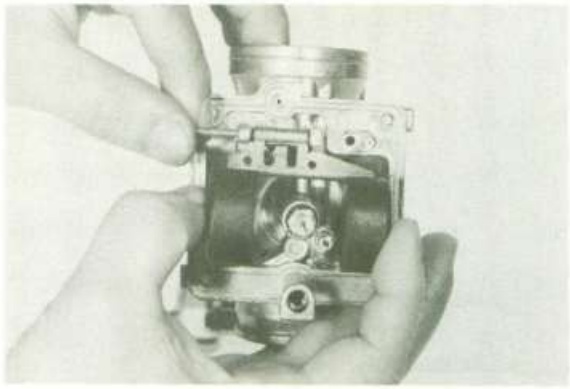
8. Float chamber

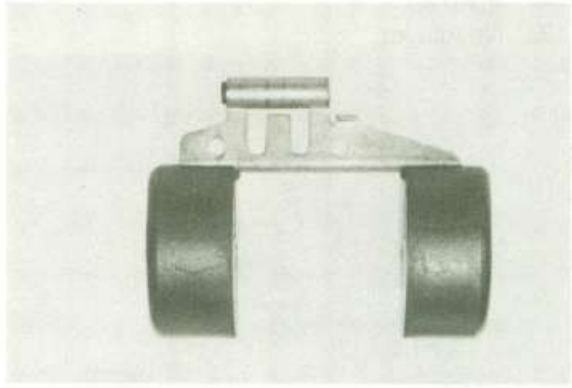




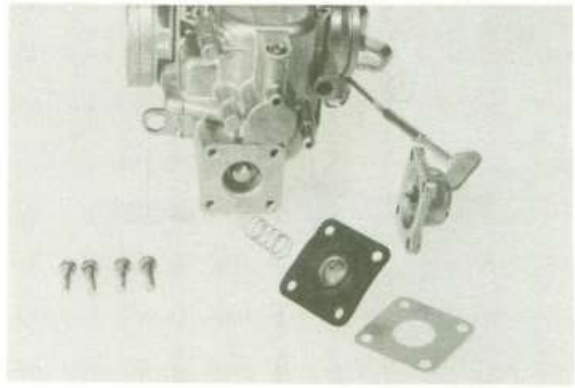
"O" ring

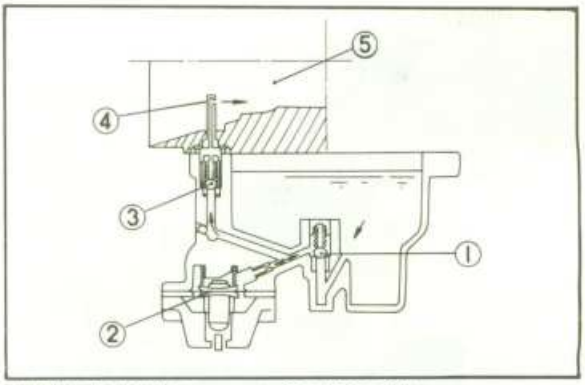
9. Float





10. Accelerator pump



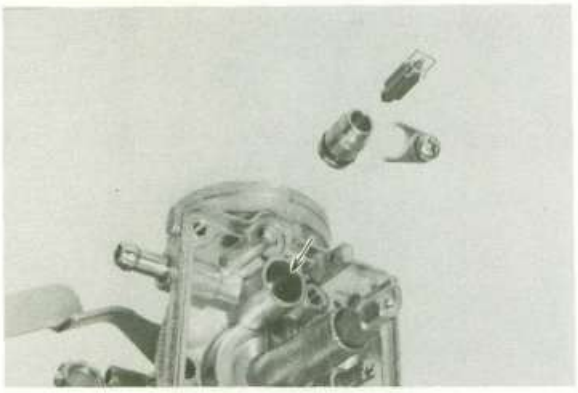


1. Inlet check valve
2. Diaphragm assembly
3. Outlet check valve
4. Pump nozzle

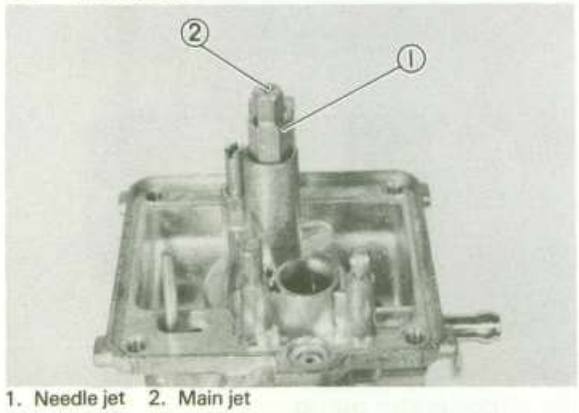
→ Gasoline route (Arrow mark)

5. Ventury

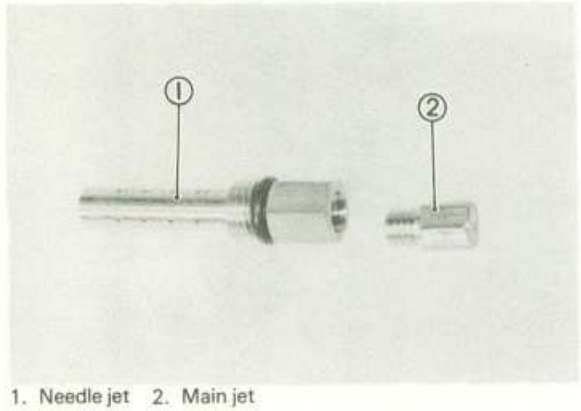
11. Needle valve



12. Main jet
13. Needle jet

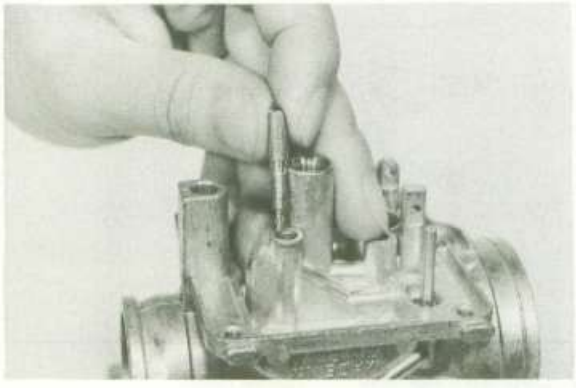


1. Needle jet 2. Main jet



1. Needle jet 2. Main jet

14. Pilot jet



15. Starter plunger



NOTE:

1. Wash the carburetor in petroleum base solvent. Wash all associated parts.
2. Using high pressure air, blow out all passages and jets. Never use high pressure air if float is in place.
3. Inspect the needle and seat for signs of excessive wear or attached foreign particles. Replace as required. Always replace inlet needle and inlet seat as an assembly.
4. Inspect pilot air screw for signs of excessive wear or attached foreign particles. Replace as required.

Fuel Level

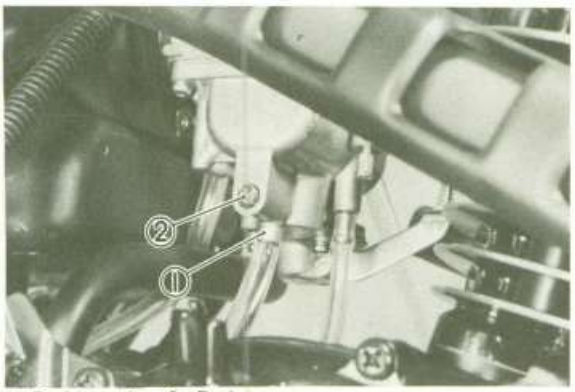
NOTE:

Before checking the fuel level, note the following:

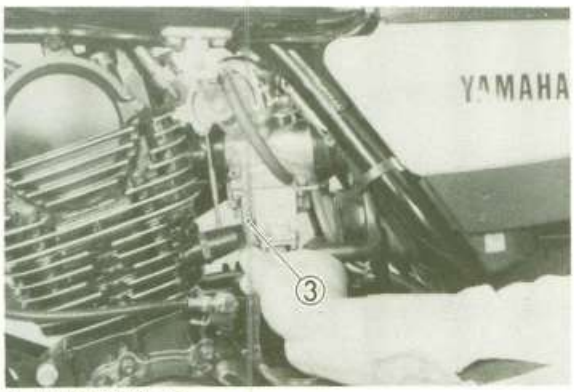
1. Place the motorcycle on a level surface.
2. Adjust the motorcycle position by placing a suitable stand or a garage jack under the engine so that the carburetor is positioned vertically.

---

1. Connect the level gauge (special tool) or a vinyl pipe of 6 mm (0.24 in) in inside dia to the float bowl nozzle.
2. Set the gauge as shown and loosen the drain screw.



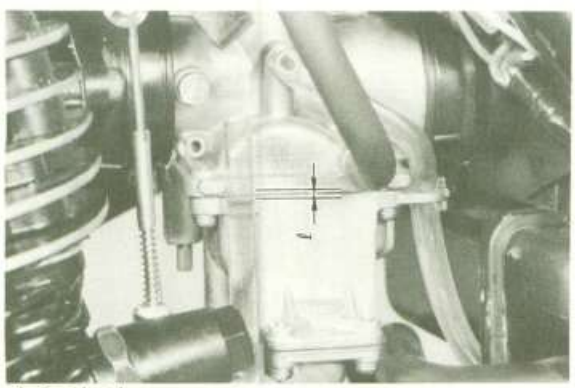
1. Drain nozzle 2. Drain screw

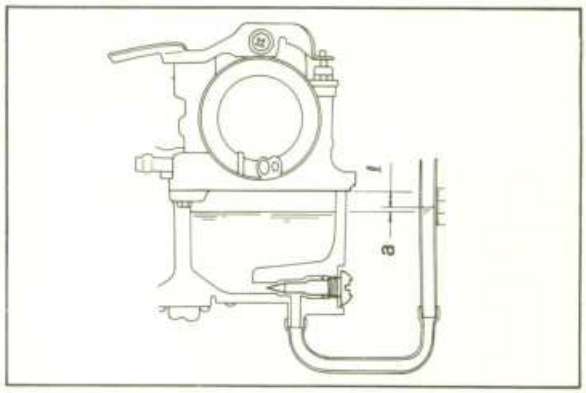


3. Fuel level gauge

3. Start the engine and stop it after a few minutes of run. This procedure is necessary to obtain the correct fuel level. Make sure the fuel petcock is the "ON" position.
4. The fuel level should be in the specified range.

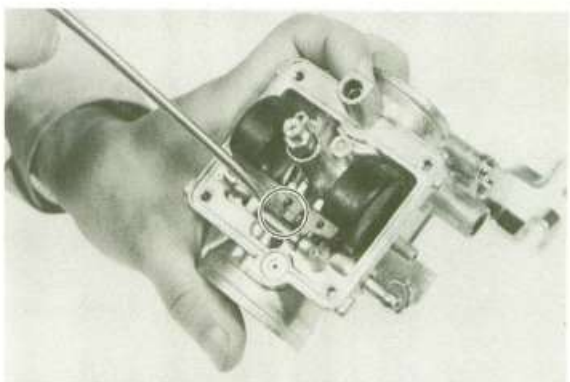
Specified range:
3 to 5 mm (0.12 to 0.20 in)
below the carb body edge


l: Fuel level



a = 2 mm (0.08 in)

5. If the fuel level is incorrect, remove the carburetor from the motorcycle and check the fuel valve and float assembly for damage. Replace if damaged.
6. If no damage is found, correct the fuel level by slightly bending the float arm tang. Recheck the fuel level.



Reassembly and Installation

1. Reverse the disassembly procedure for reassembly and installation.
2. After installation, re-adjust throttle cables, pilot screw and engine idling speed (see Chapter 2. "Carburetor Adjustment").

CHAPTER 5. CHASSIS

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Replacing Wheel Bearings 5-1
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CHAPTER 5. CHASSIS

FRONT WHEEL

Removal

1. Disconnect the brake cable at the front brake lever.
2. Remove cotter pin from front axle.
3. Remove the front axle nut.
4. Remove the front wheel axle by simultaneously twisting and pulling out on the axle. Then remove the wheel assembly.

NOTE:

Raise the front of the motorcycle by placing a suitable stand under the engine.

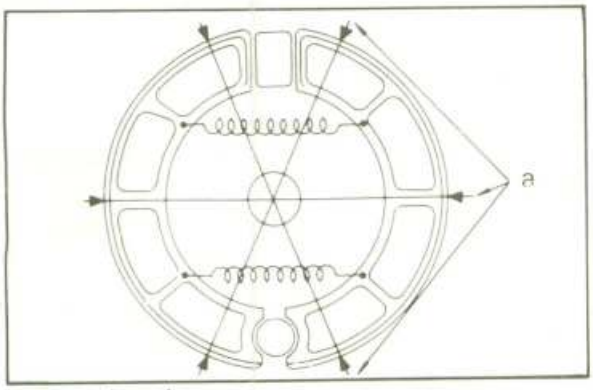
Front Axle

Remove any corrosion from axle with emery cloth. Then place it on a surface plate and check for bending. If bent, replace.

Checking Brake Shoe Wear

1. Measure the outside diameter at the brake shoes with slide calipers.

Front brake shoe diameter:
130 mm (5.12 in)
Replacement limit:
126 mm min. (4.96 in)



a. Measuring points

2. Remove any glazed areas from brake shoes using coarse sand paper.

Brake Drum

Oil or scratches on the inner surface or the brake drum will impair braking performance or result in abnormal noises.

Remove oil by wiping with a rag soaked in lacquer thinner or solvent.

Remove scratches by lightly and evenly polishing with emery cloth.

Brake Shoe Plate

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

NOTE:

Before removing the cam lever, put a match mark on the cam lever and camshaft to indicate their positions for easy assembly.

Replacing Wheel Bearings

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

1. First clean the outside of the wheel hub.
2. Drive the bearing out by pushing the spacer aside (the spacer "floats" between the bearings) and tapping around the perimeter of the bearing inner race with a soft metal drift pin and hammer. Either or both bearings can be removed in this manner.
3. To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation. Use a socket that matches the outside race of the bearing as a tool to drive in the bearing.

Front Wheel Installation

When installing front wheel, reverse the removal procedure taking care of the following points:

1. Check for proper engagement of the boss on the outer fork tube with the locating slot on the brake shoe plate.
2. Always secure the front wheel axle as follows:
   a. Torque the axle nut.

Axle nut torque:
10.6 m-kg (76.7 ft-lb)

   b. Install a new cotter pin; discard old pin.

REAR WHEEL

Removing the Rear Wheel

1. 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 adjust nut.
2. Remove the cotter pin from the rear axle and loosen the rear axle nut.
3. Remove the drive chain.
   To remove, use the chain cutter (special tool). See Chapter 3. "Engine Overhaul".
   But, the rear wheel can be removed without cutting chain.

NOTE:
The chain joint should be replaced each time the chain is cut.

4. Remove the rear wheel axle nut.
5. The rear wheel assembly, the collar, the chain puller(s), etc., can be removed from the motorcycle by pulling the axle.

Checking Brake Shoe Wear

See front wheel section, paragraph.

Rear brake shoe diameter:
130 mm (5.12 in)
Replacement limit:
126 mm min. (4.96 in)

Brake Drum

See front wheel section, "Brake Drum".

Replacing Wheel Bearings

See front wheel section, "Replacing Wheel Bearings".

Installing Rear Wheel

1. Install wheel and axle, and tighten axle nut.

Axle nut torque:
10.6 m-kg (76.7 ft-lb)

2. Connect drive chain, brake rod and tension bar.
3. Adjust drive chain.
   (See chapter 2, "Drive chain tension adjustment".)
4. Adjust rear brake. (See chapter 2, "Rear brake and wheel".)

RIMS AND SPOKES (FRONT AND REAR WHEELS)

Checking for Loose Spokes

Loose spokes can be checked by bracing the machine off the ground so that the wheel can spin freely.
Slowly rotate the wheel and at the same time let the metal shaft of a fairly heavy screwdriver bounce off each spoke. If all the spokes are tightened approximately the same, then the sound given off by the screwdriver hitting the spokes should sound the same. If one spoke makes a dull flat sound, then check it for looseness. (See chapter 2, "Front brake and wheel".)

Checking Rim "Run-Out"

See chapter 2, "Front brake and wheel".

TIRES AND TUBES

Removal

1. Remove the valve cap, valve core, and valve stem lock nut. Loosen the bead spacer (rim locks).
2. When all air is out of the tube, separate the tire bead from the rim (both sides) by stepping on the tire with your foot.
3. Use two tire removal irons (with rounded edges) to work the tire bead over the edge of the rim, starting 180° opposite the tube stem. Take care to avoid pinching the tube as you do this.
4. After you have worked one side of the tire completely off the rim, then you can slip the tube out. Be very careful not to damage the stem while pushing it back out of the rim hole.
5. For tire removal, work the other bead off the rim.

Installation

Reinstalling the tire and tube can be accomplished by reversing the disassembly procedure. The only difference in procedure would be right after the tubes has been installed, but before the tire has been completely slipped onto the rim, momentarily inflate the tube. This removes any creases that might exist. Release the air and continue with reassembly. Also, right after the tire has been completely slipped onto the rim, check to make sure that the stem comes out of the hole in the rim at a right angle to the rim.
Finally, inflate the tire.

Tire Pressure (Normal Riding)
Front: 0.9 kg/cm² (12.8 psi)
Rear: 1.1 kg/cm² (15.6 psi)

DRIVE CHAIN AND SPROCKETS

NOTE:

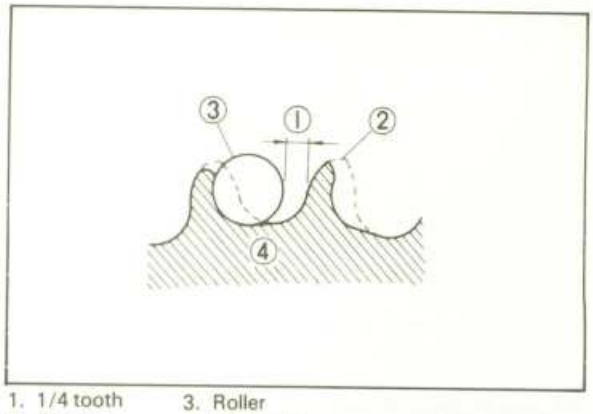
Please refer to Maintenance Intervals and Lubrication Intervals charts for additional information.

Drive Sprocket

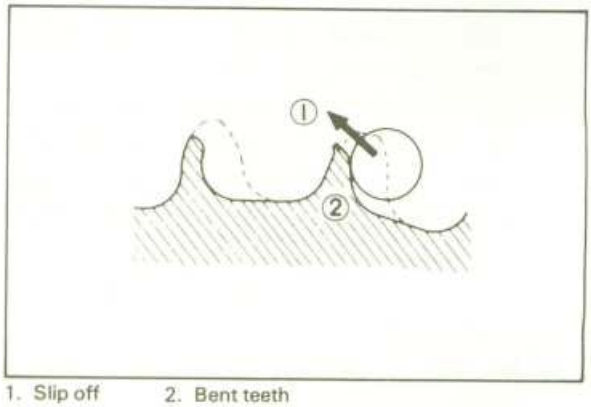
With the left crankcase cover removed proceed as follows:

1. Remove the sprocket securing bolts. Remove the holder plate and drive sprocket.
2. Check sprocket wear. Replace if wear decreases tooth width as shown.
3. Replace if tooth wear shows a pattern such as that in the illustration, or as precaution and common sense dictate.
4. Tighten the securing bolts.

Drive Sprocket
Securing bolt torque:
1.0 m-kg (7.2 ft-lb)



1. 1/4 tooth
2. Correct
3. Roller
4. Sprocket



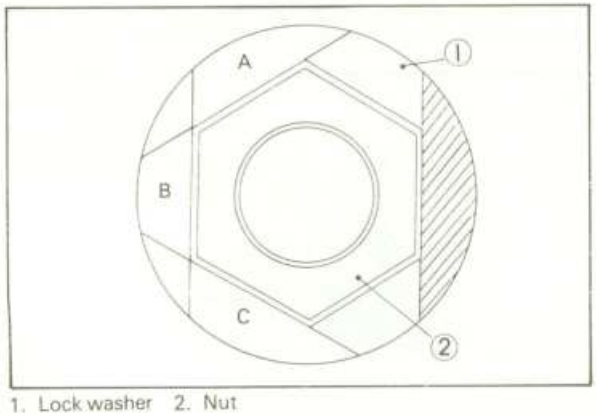
1. Slip off
2. Bent teeth

Driven Sprocket

With the rear wheel removed, proceed as follows:

1. Using a blunt chisel, flatten the securing nuts lock washer tabs.
   Remove the securing nuts. Remove the lock washers and sprocket.
2. Check the sprocket wear using procedures for the drive sprocket.
3. Check the sprocket to see that it runs true. If bent, replace.
4. During reassembly, make sure that sprocket and sprocket seat are clean.
   Tighten the securing nuts in a crisscross pattern.
   Bend the tabs of the lock washers fully against the securing nut flats.

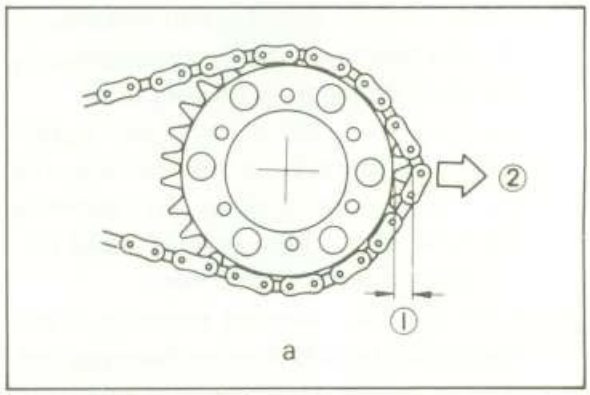
Drive Sprocket Securing bolt torque: 3.0 m-kg (21.7 ft-lb)



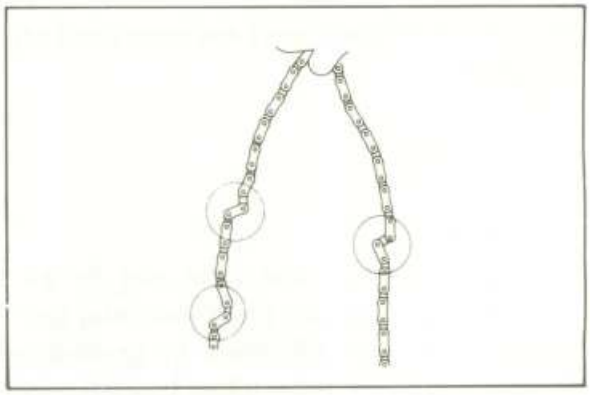
1. Lock washer 2. Nut

Chain Inspection

1. With the chain installed on the machine, excessive wear may be roughly determined by attempting to pull the chain away from the rear sprocket. If the chain will lift away more than one-half the length of the sprocket teeth, remove and inspect. (See page 3-2 for chain removal.)
   If any portion of the chain shows signs of damage, or if either sprocket shows signs of excessive wear, remove and inspect.
2. Check the chain for stiffness. Hold as illustrated. If stiff, soak in solvent solution, clean with wire brush, dry with high pressure air. Oil chain thoroughly and attempt to work out kinks. If still stiff, replace, chain.
3. Check the side plate for damage. Check to see if excessive play exists in pins and rollers. Check for damaged rollers. Replace as required.



a. Checking for excessively worn chain
1. 1/2 tooth
2. Pull



Chain Maintenance

The chain should be lubricated according to the recommendations given in the Maintenance and Lubrication Intervals charts, or more often if possible. (Preferably after every use.) See "Chassis and Suspension, Swing Arm", for additional information regarding chain guide.

1. Wipe off dirt with shop rag. If accumulation is severe, use wire brush, then rag.
2. Apply lubricant between roller and side plates on both inside and outside of chain. Don't skip a portion as this will cause uneven wear. Apply thoroughly. Wipe off excess.

Recommended lubricant:
YAMAHA CHAIN AND CABLE LUBE, or SAE 10W/30 motor oil

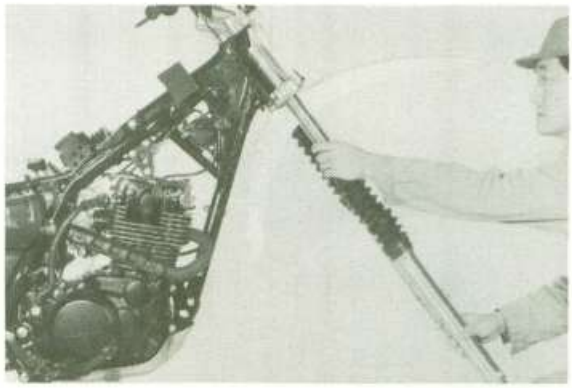
3. Periodically, remove the chain. Wipe and/or brush excess dirt off. Blow off with high pressure air.
4. Soak chain in solvent, brushing off remaining dirt. Dry with high pressure air. Lubricate thoroughly to make sure lubricant penetrates. Wipe off excess. Reinstall.

FRONT FORKS

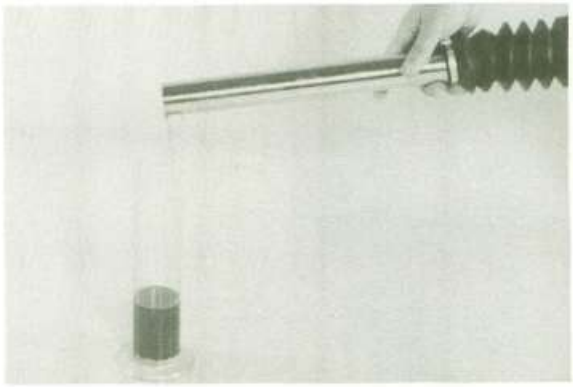
Disassembly

1. With the front wheel and front brake cable removed, the fork legs can be removed from the upper and lower brackets by loosening upper and lower pinch bolts.

NOTE:
Before loosening the upper and lower pinch bolts, loosen the front fork cap bolts.



2. Remove the caps and drain the oil from both fork tubes.



3. Remove the special bolt from bottom of outer tubes.
4. Remove inner tube and damper assembly from outer tube.
5. Pull out damper assembly. Inspect and replace if damaged.



6. To replace fork seal, remove wire clip from outer tube.



7. Carefully pry out old seal without damaging fork tube.



8. Insert new seal "open" side down using large socket and steel hammer.

Inspection

Inspect the inner tube for bends or scratches. If the bend is slight, it can be corrected with a press. It is recommended, however, to replace the tube.

Assembly

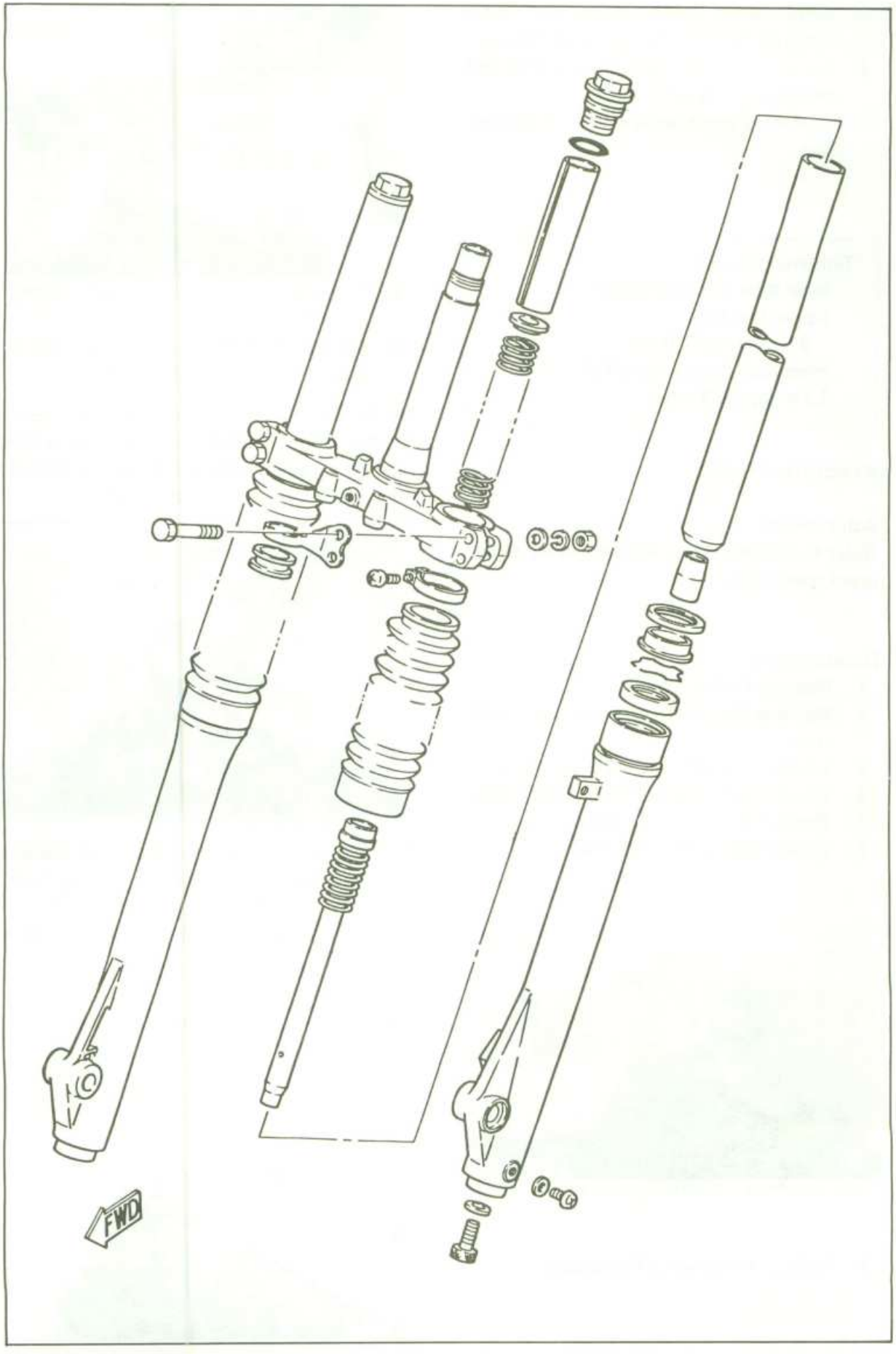
1. When assembling the front fork, reverse the order of disassembly.
2. Installing the front forks
   a. Bring up the front fork to the correct position and partially tighten the under-bracket mounting bolt.
   b. Measure correct amount of oil and pour into each leg.

Recommended oil:
Yamaha fork oil 10Wt or equivalent

Quantity per leg:
318 ± 2 cc (10.75 ± 0.07 oz)

NOTE:

Select the weight oil that suits local conditions and your preference (lighter for less damping; heavier for more damping).


FWD

3. After filling, slowly pump the outer tubes up and down to distribute the oil.
4. Inspect "O" ring on fork cap bolts and replace if damaged.
5. Tighten all pinch bolts with specified torque.

Tightening torque:
Inner tube to handle crown (upper bracket):
2.0 m-kg (14.4 ft-lb)
Inner tube to under bracket:
3.7 m-kg (26.8 ft-lb)

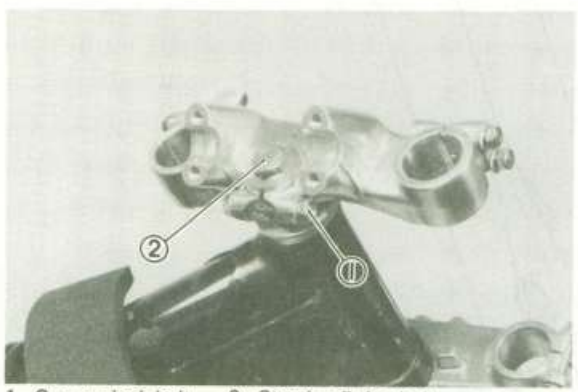
STEERING HEAD

Adjustment

Refer to Chapter 2, for steering head adjustment procedure.

Disassembly

1. Remove the front forks.
2. Remove the water tank and the guide stay.
3. Loosen the handlebar securing bolts.
4. Remove the cable holder securing bolts.
5. Remove the handlebar and put aside.
6. Loosen the crown pinch bolt.



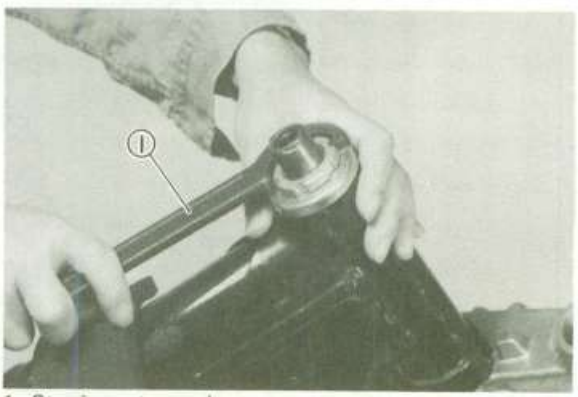
1. Crown pinch bolt 2. Steering fitting bolt

7. Remove the steering fitting bolt.



8. Remove the handle crown (upper bracket).
9. Loosen and remove the steering nut by using the steering nut wrench.

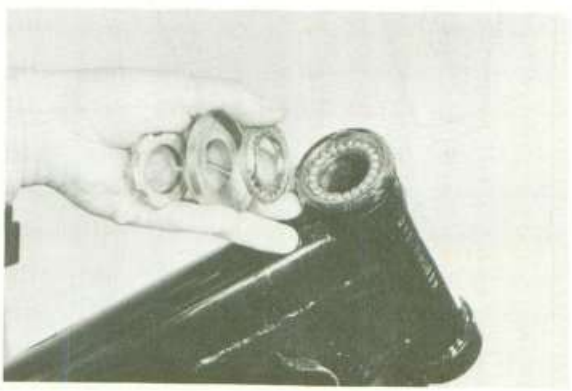
NOTE:
Support under bracket with one hand to hold the bracket up into the headstock so that the loose ball bearings will not fall out.



1. Steering nut wrench

10. While still supporting the under bracket, carefully lift off the upper bearing cover.
11. Lift off the top bearing race and remove all of the ball bearings from the upper bearing assembly.

Ball quantity/size: 22 pcs., 3/16 in



12. Remove bracket while being very careful not to lose any ball bearings from the lower assembly.

Ball quantity/size: 19 pcs., 1/4 in.

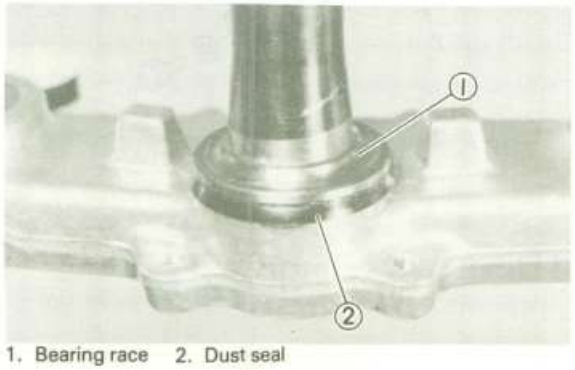


13. Remove races from head pipe using drift punch and hammer as shown. Work the race out gradually by tapping lightly around its complete diameter.



14. Remove the bearing race from the lower bracket by tapping around its diameter with a drift punch and hammer.

NOTE:
Remove dust seal.



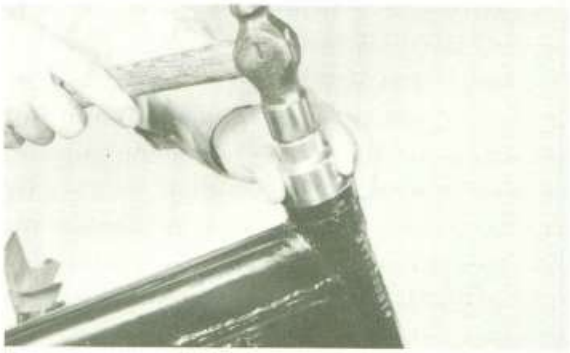
1. Bearing race 2. Dust seal

Inspection

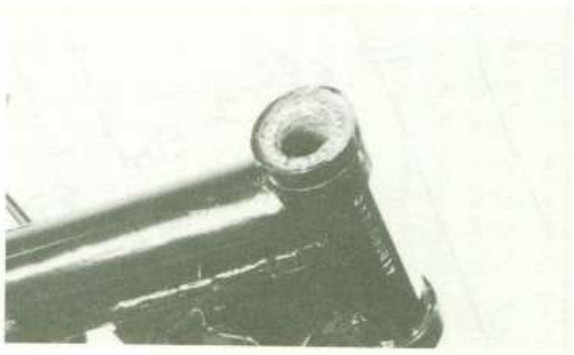
1. Examine all the balls for pits or partial flatness. If any one is found defective, the entire set (including both races) should be replaced. If either race is pitted, shows rust spots, or is damaged in any way, replace both races and all balls.
2. Examine dust seal under lowest race and replace if damaged.

Installation

1. If pressed-in races have been removed, tap in new races.

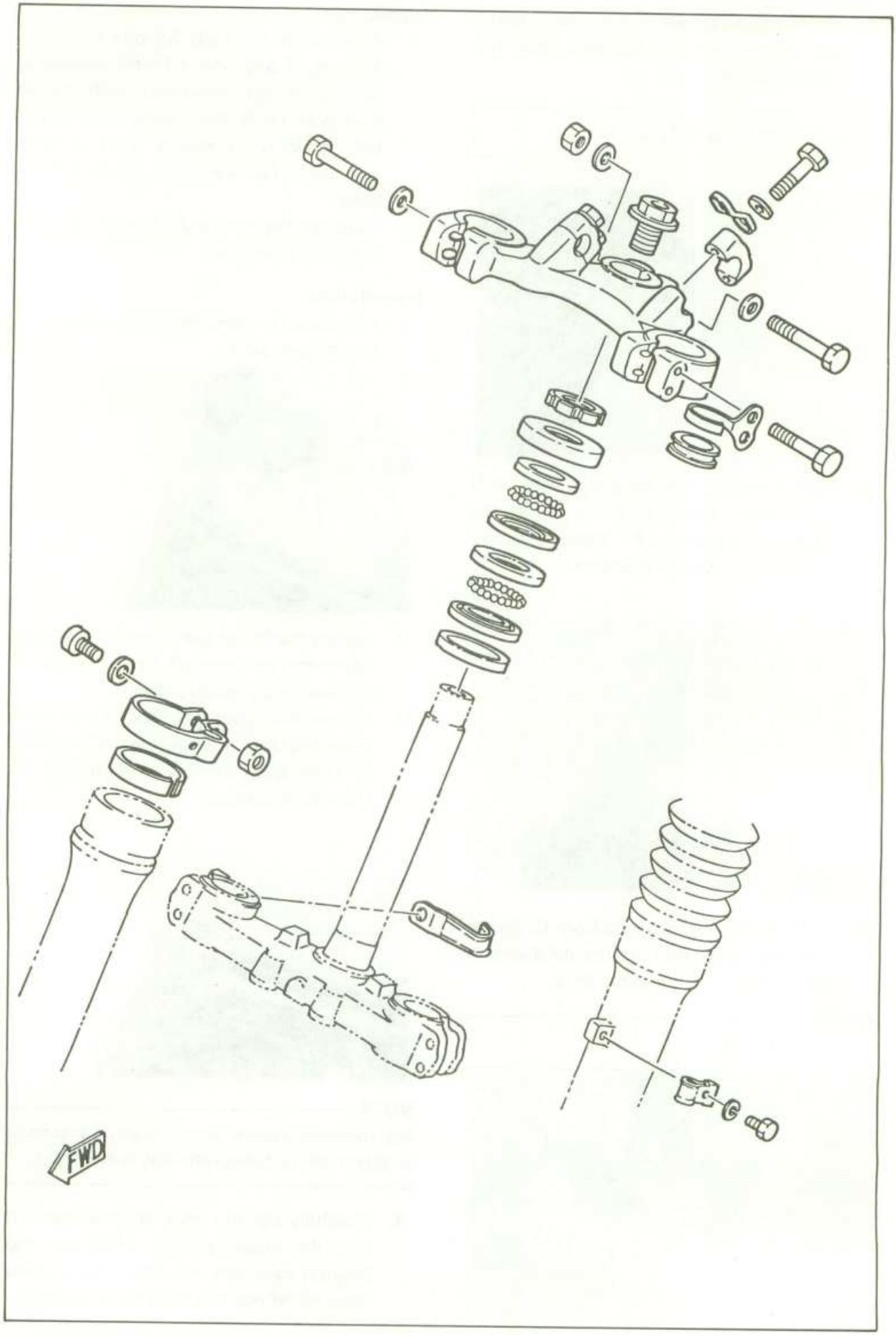


2. Grease the lower ball race of the bottom assembly and arrange the balls around it. Then apply more grease.
3. Grease the lower ball race of the upper assembly and arrange the balls around it. Then apply more grease and set the top race into place.



NOTE:
Use medium-weight wheel bearing grease of quality manufacture preferably waterproof.

4. Carefully slip the underbracket stem up into the steering head. Hold the top bearing assembly in place so the stem does not knock any balls out of position.


FWD

5. Set the upper bearing cover on and install the ring nut. Tighten the ring nut so that all freeplay is taken up, but so the bracket can still pivot freely from lock to lock. Recheck for freeplay after the entire fork unit has been installed. (Refer to Chapter 2. "Steering head adjustment".)
6. Install the fork tubes into the underbracket.
7. Install the upper fork bracket. Tighten steering fitting bolt, then tighten stem pinch bolt. Torque to specification.

Tightening torque:
Steering fitting bolt;
5.3 m-kg (38.3 ft-lb)
Stem pinch bolt;
2.0 m-kg, (14.4 ft-lb)

8. Tighten upper fork tube pinch bolts and torque to specification.

Upper fork tube pinch bolt torque:
2.0 m-kg (14.4 ft-lb)

NOTE:
Make certain that tops of fork tubes are adjusted to the same level. If necessary, loosen underbracket pinch bolts and adjust.

9. Install handlebars and torque to specification.

Handlebar mounting bolt torque:
2.0 m-kg (14.4 ft-lb)

10. Install front wheel.
11. Reconnect clutch, front brake and check operation.

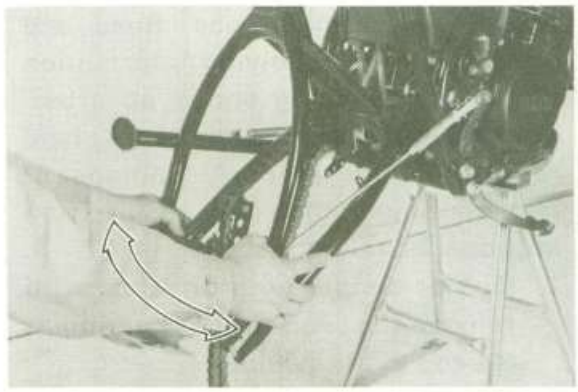
SWING ARM

Inspection

1. With rear wheel and shock absorber removed, grasp the ends of the arm and move from right to left to check for freeplay.

Swing arm freeplay: 1.0 mm (0.04 in)

2. If freeplay is excessive, remove swing arm and replace swing arm bushings.



Lubrication

1. Apply grease to grease fitting on top of pivot with low pressure hand operated gun. Apply until fresh grease appears at both ends of pivot shaft.

Recommended lubricant:
Smooth chassis lube grease

2. Wipe off excess grease.

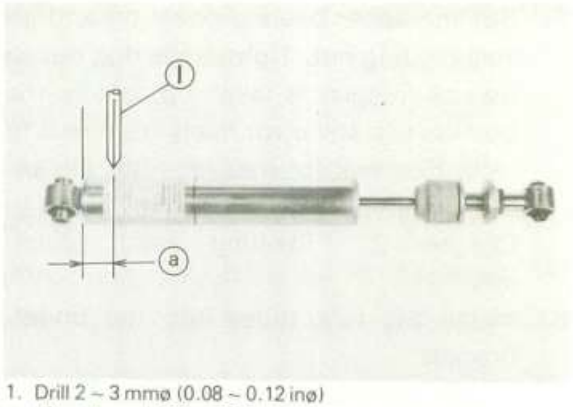
Removal

1. Remove nut on swing arm pivot shaft and tap out shaft with a long aluminum or brass rod.

NOTE:
Carefully remove the arm while noting the location of bushes, oil seals and plate washers.

Pivot shaft torque:
6.5 m-kg (47.0 ft-lb)

2. Tap out old bushing from each side of pivot using the long rod.
3. Install new bushing using a press.



1. Drill 2 ~ 3 mmø (0.08 ~ 0.12 inø)
a. 10 ~ 15 mm (0.39 ~ 0.59 in)

REAR CHOCK ABSORBER

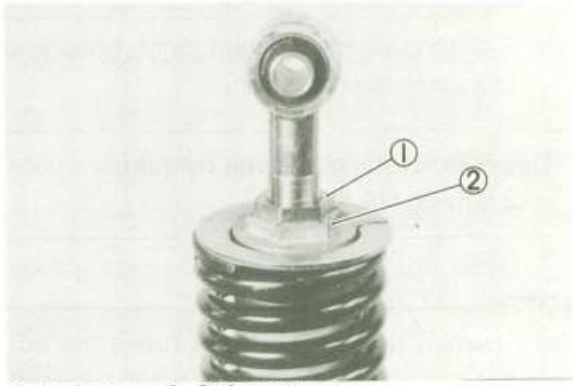
WARNING:

This shock absorber contains highly pressurized nitrogen gas. Read and understand the following information before handling the shock absorber. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling.

1. **Do not tamper with or attempt to remove the snap ring or bearing at the top of the cylinder.**
2. **Do not subject shock absorber to an open flame or other highheat. This may cause the unit to explode due to excessive gas pressure.**
3. **Do not deform or damage the cylinder in any way.**
   Cylinder damage will result in poor damping performance.
4. **Gas pressure must be released before disposing of the shock absorber. To do so, drill a 2 ~ 3 mmø hole through the cylinder wall at a point 10 ~ 15 mm above the bottom of the cylinder.**
5. **Wear eye protection to prevent eye damage from escaping gas and/or metal chips.**

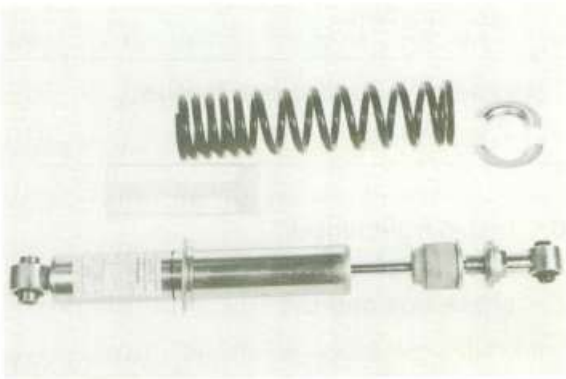
Inspection

1. Remove the rear shock absorber from the motorcycle.
2. Loosen the lock nut and turn to loosen the spring seat. This procedure make ease to remove the spring.



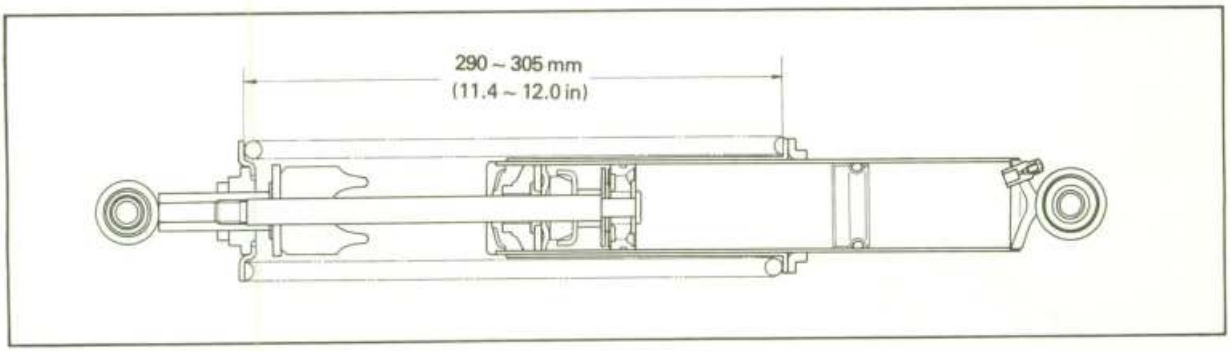
1. Lock nut 2. Spring seat

3. Push down the spring, remove the spring retainer, and remove the spring.



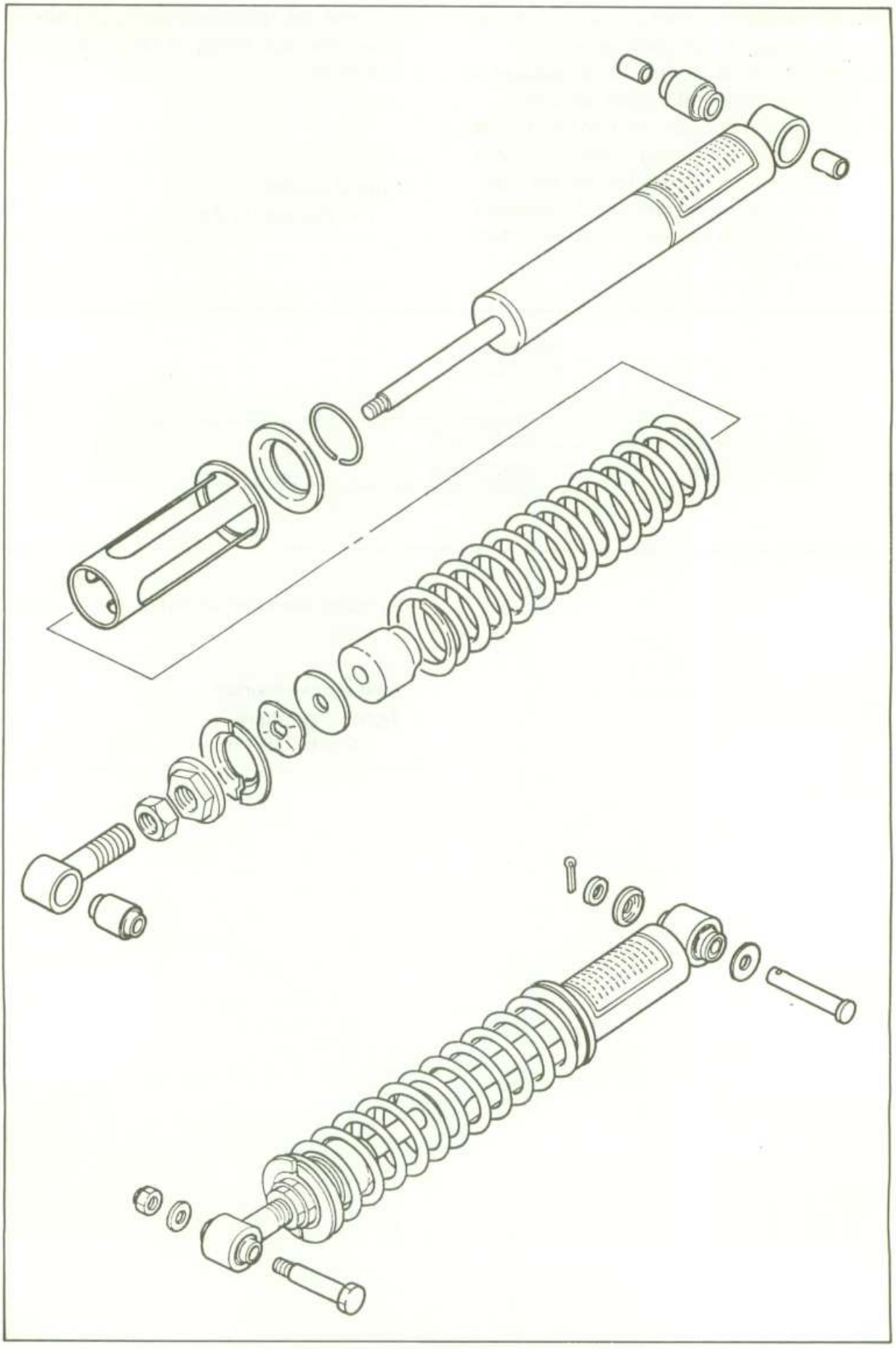
4. Check the rod, and if it is bent or damaged, replace the shock absorber.
5. Check for oil leakage. If oil leakage is evident, replace the shock absorber.
6. By moving the rod, check to see if it has a proper damping effect. Slight resistance should be felt on the compression (down) stroke and considerable resistance should be felt on the return (up) stroke.
7. Install the spring and guide, and turn to set the seat spring as shown in the illustration.

Normal position
ℓ = 299 mm (11.8 in)



8. Install the shock absorber on the motorcycle.

Rear shock absorber
Tightening torque:
2.5 m-kg (18.1 ft-lb)



CABLES AND FITTINGS

Cable Maintenance

NOTE:

See Maintenance and Lubrication Intervals Charts for additional information.

Cable maintenance is primarily concerned with preventing deterioration through rust and weathering and providing for proper lubrication to allow the cable to move freely within its housing.

Cable removal is straightforward and uncomplicated. Removal will not be discussed within this section. For details, see the individual maintenance section for which the cable is an integral part.

Cable routing is of paramount importance, however, for details of cable routing, see the cable routing diagrams at the end of this manual.

1. Remove the cable.
2. Check for free movement of cable within its housing. If movement is obstructed, check for fraying or kinking of the cable strands. If damage is evident, replace the cable assembly.
3. To lubricate cable, hold in vertical position. Apply lubricant to uppermost end of cable. Leave in vertical position until lubricant appears at bottom end. Allow excess to drain and re-install.

Recommended lubricant:
YAMAHA CHAIN AND CABLE LUBE, or SAE 10W/30 motor oil

Throttle Maintenance

1. Remove two Phillips head screws from throttle housing assembly and separate two halves of housing.
2. Disconnect cable end from throttle grip assembly and remove grip assembly.
3. Wash all parts in mild solvent and check contact surfaces for burrs or other damage. (Also clean and inspect right-hand end of handlebar.)
4. Lubricate contact surfaces with light coat of lithium soap base grease and reassemble.

NOTE:

Tighten housing screws evenly to maintain an even gap between the two halves.

5. Check for smooth throttle operation and quick spring return when released and make certain that housing does not rotate on handlebar.

Lubrication of levers, pedals, etc.

1. Lubricate the pivoting parts of the brake and clutch levers with motor oil (10W/30).
2. Lubricate the shaft of the brake pedal with lithium soap grease.

WATER BOTTLE

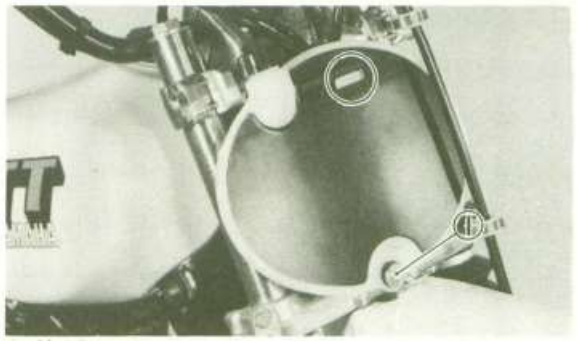
The water bottle is located on the steering head pipe front.

To remove the water bottle, loosen the holding screw.

To reinstall the bottle, make sure the bottle is securely seated on the hinge hook, then tighten the holding screw.

WARNING:

This bottle is only for drinking water.



1. Holding screw

CHAPTER 6. ELECTRICAL SYSTEM

IGNITION SYSTEM 6-1
- Ignition Timing 6-1
- C.D.I. Unit Test 6-1
- Magneto Coil Winding Resistance Test. 6-1
- Replacing Procedure of Pick up Coil 6-1
- Spark Gap Test 6-2
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SPARK PLUG 6-3
- How to "Read" Spark Plug (Condition) 6-3
- Inspection 6-4

SWITCHES 6-4

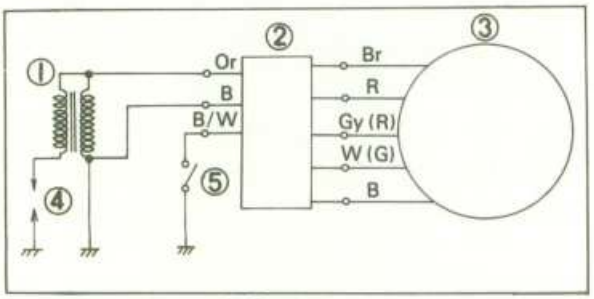
6

CHAPTER 6.
ELECTRICAL SYSTEM

IGNITION SYSTEM

Description

This model employs an outer type pickup for C.D.I.



1. Ignition coil
2. C.D.I. unit
3. Flywheel magneto
4. Spark plug
5. Engine stop switch

Ignition Timing

Refer to Chapter 2. "Ignition Timing"
If the ignition timing is not correct, replace the defective part.

C.D.I. Unit Test

1. The C.D.I. unit can be checked for misfire and weak sparks by using a "Yamaha Pocket Tester".
2. The table shows representative figures obtained by tester check. These figures may vary to some extent with the tester and C.D.I. unit employed because of the internal resistance inherent in the tester or of the internal characteristic of the C.D.I. unit.

C.D.I. Unit Test by Yamaha Pocket Tester

× 1 KΩ range

Tester lead wire ⊖ \ Tester lead wire ⊕	Br	W/G	W/R	R	B	B/W	O	B
Br		Hundreds of KΩ →∞	Hundreds of KΩ →∞	Hundreds of KΩ →∞	Hundreds of KΩ →∞	0	Hundreds of KΩ →∞	Hundreds of KΩ →∞
W/G	130 KΩ		130 KΩ	130 KΩ	75 KΩ	130 KΩ	Hundreds of KΩ →∞	75 KΩ
W/R	130 KΩ	130 KΩ		130 KΩ	75 KΩ	130 KΩ	Hundreds of KΩ →∞	75 KΩ
R	Tens of KΩ Hundreds of KΩ	Tens of KΩ Hundreds of KΩ	Tens of KΩ Hundreds of KΩ		Tens of KΩ →100 KΩ	Tens of KΩ Hundreds of KΩ	Hundreds of KΩ →∞	Tens of KΩ →100 KΩ
B	5 KΩ	5 KΩ	5 KΩ	5 KΩ		5 KΩ	Hundreds of KΩ →∞	0
B/W	0	Hundreds of KΩ →∞	Hundreds of KΩ →∞	Hundreds of KΩ →∞	Hundreds of KΩ →∞		Hundreds of KΩ →∞	Hundreds of KΩ →∞
O	15 KΩ	15 KΩ	15 KΩ	15 KΩ	5 KΩ	15 KΩ		5 KΩ
B	5 KΩ	5 KΩ	5 KΩ	5 KΩ	0	5 KΩ	Hundreds of KΩ →∞	

NOTE:

1. Ignition-timing control circuit can not be checked by this procedure.
2. In the table, an interval of more than 30 minutes is needed for measuring "Hundreds of KΩ → ∞" and an interval of more than one minute for measuring "Tens of KΩ → Hundreds of KΩ"

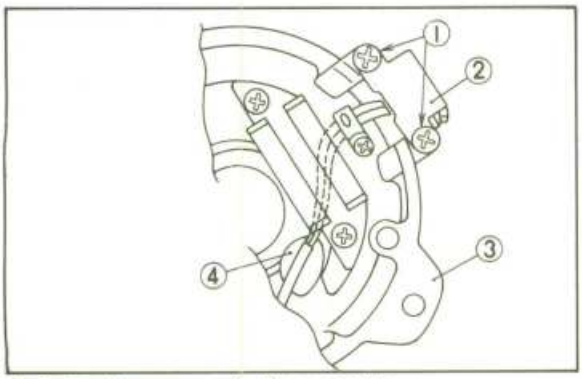
Magneto Coil Winding Resistance Tests

Use a pocket tester or equivalent ohmmeter to determine resistance and continuity of charge coil and pulser coil windings.

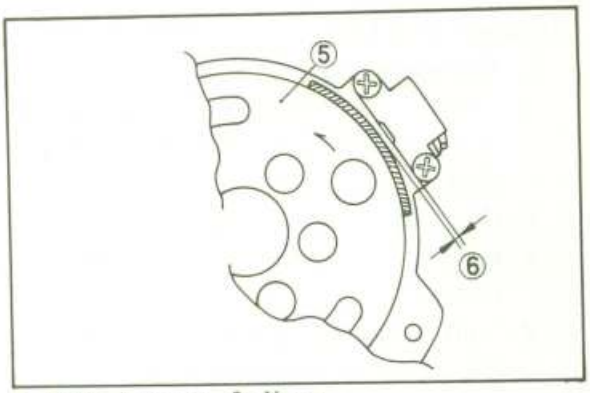
Charge Coil resistance (Br — R)	Pulser Coil (W/R — W/G)
490Ω ± 10% at 20°C (68°F)	215Ω ± 10% at 20°C (68°F)

Replacing Procedure of Pickup Coil

1. Take apart a defective pickup by removing the two holding panhead screws.
2. Move the protector tube to expose the solder connected part. Melt the solder to separate the connection.
3. Solder the leads from a new pickup to the above connection part.
4. Temporarily install the new pickup in its location but as far outward of the rotor as possible.
5. Set the rotor so that the projection on it faces the pickup. Supply an air gap of 0.8 mm between the projection and the pickup, using a feeler gauge. Then tighten up the pickup in place.



1. Panhead screw
2. Pickup coil
3. Base assembly
4. Solder connected part



5. Flywheel magneto 6. Air gap

CAUTION:

The air gap must not be less than 0.8 mm (0.03 in)

Spark Gap Test

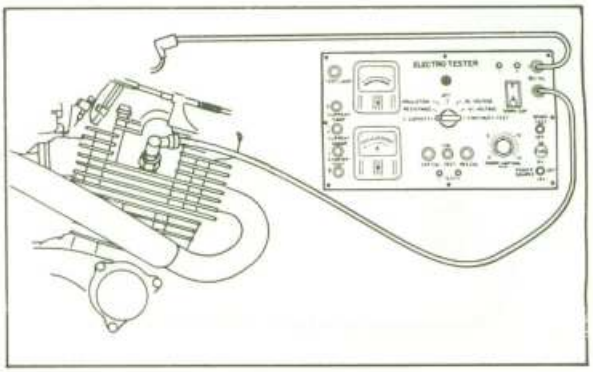
The entire ignition system can be checked for misfire and weak spark using the "Electro Tester".

If the ignition system will fire across a sufficient gap, the entire ignition system can be considered good.

If not, proceed with individual component tests until the problem is found.

1. Warm-up engine thoroughly so that all electrical components are at operating temperature.
2. Stop engine and connect tester as shown.
3. Start engine and increase spark gap until misfire occurs. (Test at various rpm's between idle and red line.)

Minimum Spark Gap: 5 mm (0.20 in)



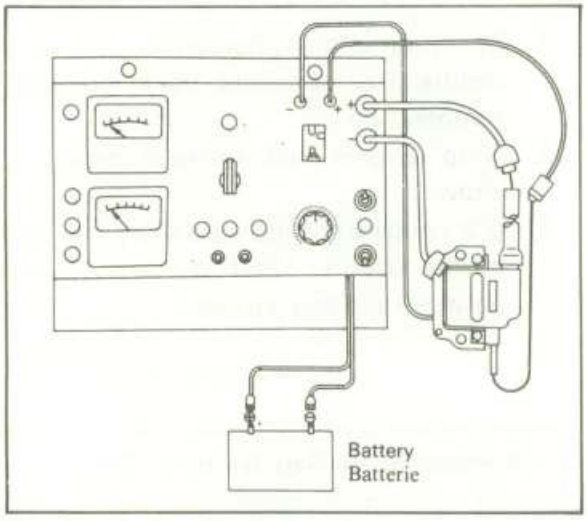
Ignition Coil Test

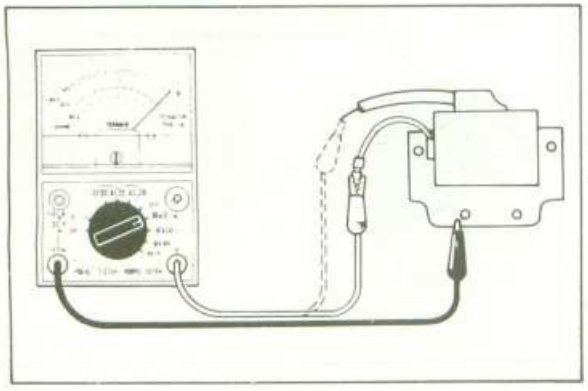
1. Coil spark gap test
   a. Remove fuel tank and disconnect ignition coil from wire harness and spark plug.
   b. Connect Electro Tester as shown.
   c. Connect fully charged 6V battery to tester.
   d. Turn on spark gap switch and increase gap until misfire occurs.

Minimum Spark Gap: 6 mm (0.24 in)

2. Coil winding resistance tests
   Use a pocket tester or equivalent ohmmeter to determine resistance and continuity of primary and secondary coil windings.

Primary Coil resistance Use (Ω × 1) scale	Secondary Coil resistance
1.0Ω ± 15% at 20°C	5.9kΩ ± 15% at 20°C





SPARK PLUG

How to "Read" Spark Plug (Condition)

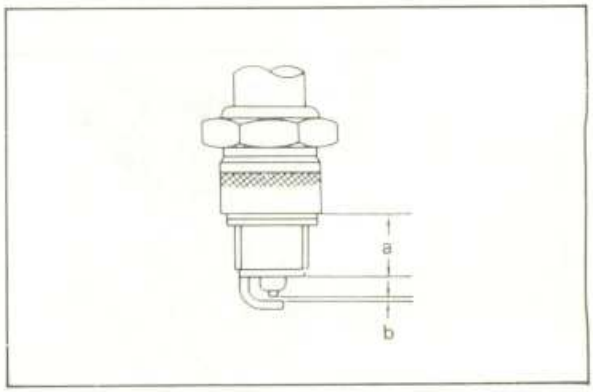
1. Best ... When the porcelain around the center electrode is a light tan color.
2. If the electrodes and porcelain are black and somewhat oily, replace the plug with a hotter-type for low speed riding.
3. If the porcelain is burned white and/or the electrodes are partially burned away, replace the plug with a colder-type for high speed riding.

Inspection

1. Inspect and clean the spark plug at least once per month.
2. Clean the electrodes of carbon and adjust the electrode gap.
3. Be sure to use the proper reach plug as a replacement to avoid overheating, fouling or piston damage.

Spark Plug Type: BP-7ES (NGK) or W22EP (ND) Gap: 0.7 ~ 0.8 mm (0.027 ~ 0.031 in)

NOTE:
Use only BP spark plugs. Use of conventional spark plug will result in significant power loss.



a. 19 mm (0.75 in) b. 0.7 ~ 0.8 mm (0.027 ~ 0.031 in)

SWITCHES

The switches may be checked for continuity or shorts with a Pocket Tester on the (Ω — 1) scale.

1. Engine stop switch

	B/W	Ground
OFF	○———	———○
RUN		

2. Lighting switch (For optional lighting kit)

	R/Y	L
ON	○———	———○
OFF		

3. Dimmer switch (For optional lighting kit)

	G	L	Y
High		○———	———○
Low	○———	———○	

CHAPTER 7. APPENDICES

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Maintenance Specifications 7-4
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General Torque Specification 7-9
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CHAPTER 7. APPENDICES

SPECIFICATIONS

General specifications

Model	TT250G
Dimensions:	
Overall length	2,090 mm (82.3 in)
Overall width	900 mm (35.4 in)
Overall height	1,205 mm (47.4 in)
Wheelbase	1,400 mm (55.1 in)
Minimum ground clearance	280 mm (11.0 in)
Weight:	
Net	107 kg (235.9 lb)
Performance:	
Minimum turning radius	2,100 mm (82.7 in)
Engine:	
Type	4 stroke, single overhead cam, gasoline
Engine model	3Y0
Cylinder	Single cylinder
Bore and stroke	75 mm × 56.5 mm (2.95 in × 2.22 in)
Displacement	249 cc (15.2 cu. in.)
Compression ratio	9.7 : 1
Comression pressure	10 ~ 13 kg/cm², (142 ~ 185 psi) at kick starting
Valve timing	Intake BTDC 32° (open) ABDC 72° (close)
	Exhaust BBDC 68° (open) ATDC 36° (close)
Valve clearance (cold)	Intake 0.05 ~ 0.10 mm (0.0028 ~ 0.0039 in)
	Exhaust 0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in)
Lubrication:	
Lubrication system	Pressure lubricated, wet sump
Delivery pump type	Trochoid pump
Recommended lubricant	SAE20W/40 "SE" motor oil
Carburetor:	
Type	VM30SS
Manufacturer	MIKUNI
Main jet	#165
Needle jet	O-4
Pilot jet	#17.5
Starter jet	#50
Jet needle/Clip position	5DL75-3
Fuel level	4.0 ± 1 mm (0.16 ± 0.04 in)
Pilot screw	2 turns out
Main air jet	#50
Pilot air jet	#250
Throttle valve	#2.0
Idling engine speed	1,200 r/min
Air cleaner:	Oiled, foam rubber
Clutch:	
Type	Wet, multi-disc
Clutch spring free length	34.6 mm (1.36 in)
Fatigue limit	33.6 mm (1.32 in)
Spring rate	2.6 kg/mm (145.6 lb/in)

Model	TT250G
Friction plate, thickness	2.8 mm (0.11 in)
wear limit	2.5 mm (0.10 in)
Clutch plate, warp limit	0.05 mm (0.002 in)
Primary drive:	
Type	Spur gear
Reduction ratio	72/23 (3.130)
Transmission:	
Type	Constant mesh, five speed
Reduction ratio, 1st	37/14 (2.642)
2nd	32/19 (1.684)
3rd	29/23 (1.260)
4th	26/26 (1.000)
5th	23/28 (0.821)
Secondary drive:	
Type	Single row chain
No. of links	100L
Size/Manufacturer	520DS
Reduction ratio	51/15 (3.400)
Chassis:	
Frame type	Tubular steel diamond frame
Fuel tank capacity	7.2 lit (1.9 US gal)
Front suspension system	Telescopic fork
Fork travel	230 mm (9.1 in)
Fork oil quantity per leg	318 ± 2 cc (10.75 ± 0.07 oz)
Fork oil grade	SAE 10W, 20W, 30W, G-10 (Kayaba)
Fork dimensions, caster	28°30′
trail	120 mm (4.7 in)
Rear suspension system	Swing arm (Monocross Suspension)
Shock absorber travel	118 mm (4.6 in)
Front wheel, rim size	1.60—21
tire size	3.00—21—4PR
inflation pressure	0.9 kg/cm² (12.8 psi)
Rear wheel, rim size	2.15-17
tire size	5.10—17—4PR
inflation pressure	1.1 kg/cm² (15.6 psi)
Braking system:	
Operation system, front	Right hand operation
Brake type	Drum brake
Operation system, rear	Right foot operation
Brake type	Drum brake
Ignition system:	
Type	Magneto ignition CDI system
Model/Manufacturer	3Y0/MITSUBISHI ELECTRIC CO.,
Charge Coil Resistance (Br—R)	490Ω ± 10% at 20°C
Pulser Coil Resistance (W/R—W/G)	215Ω ± 10% at 20°C
Ignition timing	B.T.D.C. 7° (1,200 r/min)

Model	TT250G
Ignition coil, manufacturer	MITSUBISHI ELECTRIC CO.
model number	F6T41
primary resistance	1.0Ω ± 15% at 20°C
secondary resistance	5.9Ω ± 15% at 20°C
Spark plug, manufacturer	NGK or ND
heat range	BP-7ES or W22EP
gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in)
Lighting system:*	
Lighting output	5.5V (A.C.)or more/2,500 r/min
	9.0V (A.C.) or less/8,000 r/min
Headlight	6V, 25W/25W
Taillight	6V, 5.3W
Lighting coil resistance(Y-B)	0.49Ω ± 10% at 20°C

*Optional lighting kit

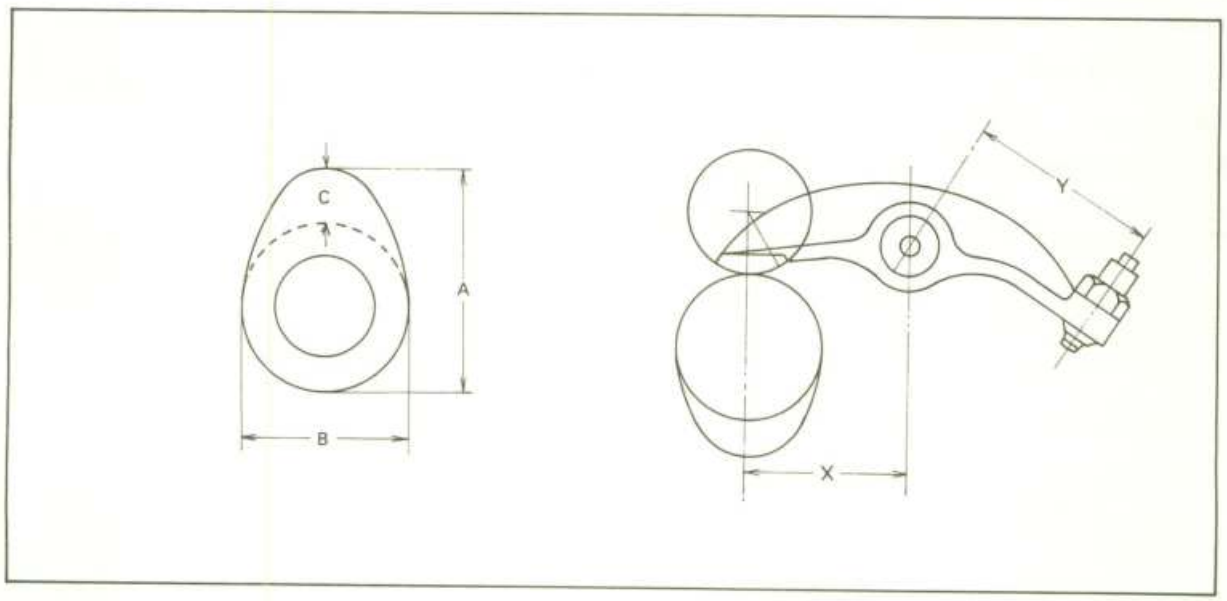
Maintenance specifications

Camshaft

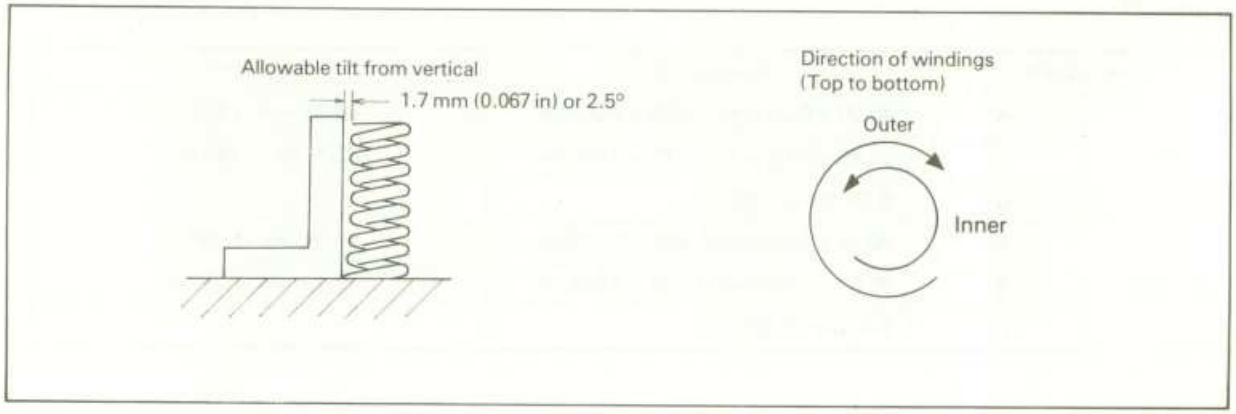
Dimensions		Standard size	Wear limit
Intake	A	40.36 ± 0.05 mm (1.589 ± 0.002 in)	40.21 mm (1.583 in)
	B	32.25 ± 0.05 mm (1.270 ± 0.002 in)	32.1 mm (1.264 in)
	C	8.36 mm (0.329 in)	—
Exhaust	A	40.41 ± 0.05 mm (1.591 ± 0.002 in)	40.26 mm (1.585 in)
	B	32.34 ± 0.05 mm (1.273 ± 0.002 in)	32.19 mm (1.267 in)
	C	8.41 mm (0.331 in)	—

Rocker arms

Dimensions	Standard size	Wear limit
D_1: Arm I.D.	$12\ ^{+0.018}_{-0}$ mm ($0.472\ ^{+0.0007}_{-0}$ in)	—
D_2: Shaft O.D.	$12\ ^{-0.010}_{-0.025}$ mm ($0.472\ ^{-0.0004}_{-0.001}$ in)	—
Clearance	0.010 ~ 0.043 mm (0.0004 ~ 0.0017 in)	0.1 mm (0.004 in)
Lift ratio	$\frac{Y}{X} = \frac{32\text{ mm}}{30.39\text{ mm}} = 1.05$	

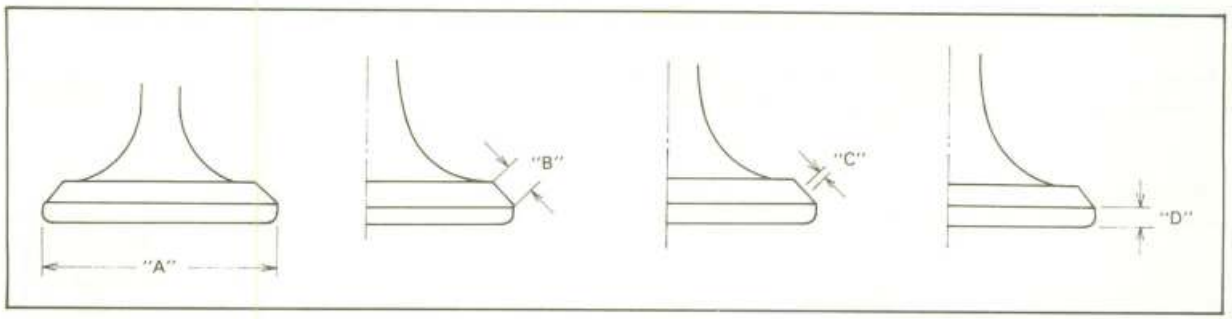


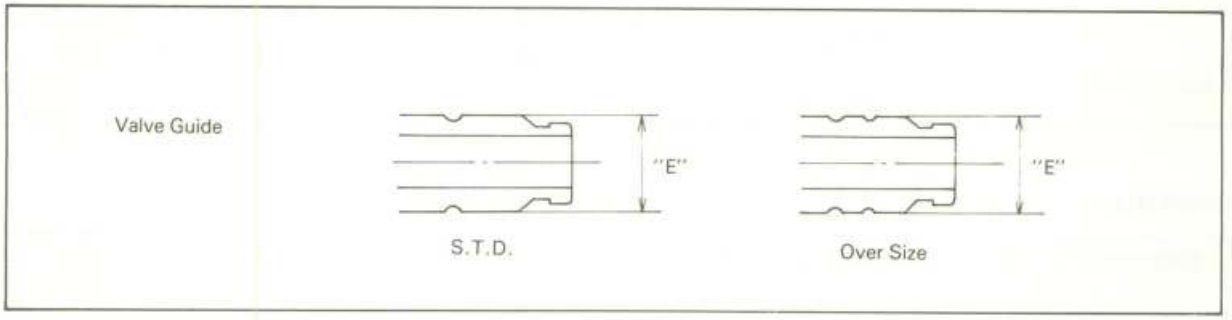
Valve springs



	Inner	Outer
	Intake & Exhaust	Intake & Exhaust
Free length	40 mm (1.57 in)	43.2 mm (1.70 in)
Spring rate	K_1 = 2.07 kg/mm (115.9 lb/in) K_2 = 2.71 kg/mm (151.8 lb/in)	K_1 = 3.90 kg/mm (218.4 lb/in) K_2 = 5.16 kg/mm (288.9 lb/in)
Installed length (Valve closed)	34.1 mm (1.34 in)	37.1 mm (1.46 in)
Installed pressure (Valve closed)	12.19 ± 1.0 kg (26.88 ± 2.20 lb)	23.72 ± 1.9 kg (52.30 ± 4.85 lb)
Compressed length (Valve open)	25.1 mm (0.988 in)	28.1 mm (1.11 in)
Compressed pressure	36.57 ± 2.6 kg (80.64 ± 5.73 lb)	70.13 ± 4.9 kg (154.64 ± 10.80 lb)
Wire diameter	3.0 mm (0.118 in)	4.2 mm (0.165 in)
Number of windings	7.9 turns	6.1 turns
Winding O.D.	21.8 mm (0.858 in)	31.1 mm (1.224 in)

Valves and Valve Guide





	Dimensions	
	Intake	Exhaust
Clearance (Cold engine)	0.05 ~ 0.10 mm (0.0020 ~ 0.0039 in)	0.12 ~ 0.17 mm (0.0047 ~ 0.0067 in)
"A" head diameter	38 mm (1.496 in)	32 mm (1.260 in)
"B" face width	2.26 mm (0.089 in)	2.26 mm (0.089 in)
"C" seat width	1.1 mm (0.043 in)	1.1 mm (0.043 in)
"D" margin thickness	1.2 mm (0.047 in)	1.0 mm (0.039 in)
Stem diameter (O.D.)	$7\ ^{-0.010}_{-0.025}$ mm ($0.276\ ^{-0.0004}_{-0.0010}$ in)	$7\ ^{-0.030}_{-0.045}$ mm ($0.276\ ^{-0.0012}_{-0.0018}$ in)
Guide diameter (I.D.)	$7\ ^{+0.012}_{0}$ mm ($0.276\ ^{+0.0005}_{0}$ in)	$7\ ^{+0.012}_{0}$ mm ($0.276\ ^{+0.0005}_{0}$ in)
Stem-to-guide clearance	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in)
"E" Guide diameter (O.D.)	(S.T.D.) $12.5\ ^{+0.052}_{+0.040}$ mm ($0.492\ ^{+0.0020}_{+0.0016}$ in)	(O.S.) $12.5\ ^{+0.090}_{+0.078}$ mm ($0.492\ ^{+0.0035}_{+0.0031}$ in)

Cylinder and Piston

Cylinder	Standard bore size	$75\ ^{+0.02}_{0}$ mm ($2.953\ ^{+0.0008}_{0}$ in)
	Wear limit	75.1 mm (2.992 in)
	Taper limit	0.05 mm (0.0020 in)
Piston	Nominal clearance	0.035 ~ 0.055 mm (0.0014 ~ 0.0022 in)
	Wear limit	0.1 mm (0.0039 in)

Ring groove width

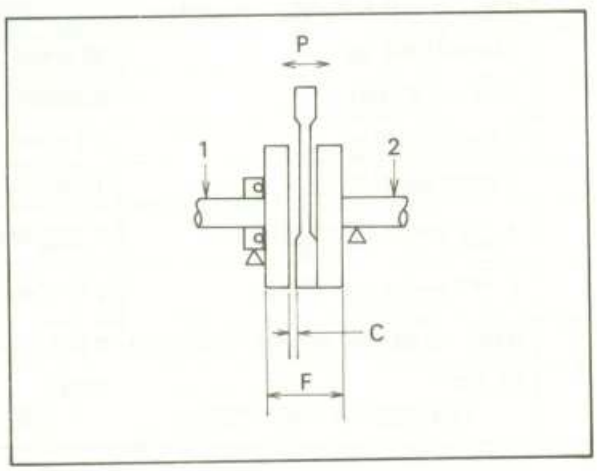
	1st	2nd	3rd
Nominal	1.2 $^{+0.05}_{+0.03}$ mm (0.047 $^{+0.0020}_{+0.0012}$ in)	1.5 $^{+0.04}_{+0.02}$ mm (0.059 $^{+0.0016}_{+0.0008}$ in)	2.8 $^{+0.035}_{+0.010}$ mm (0.110 $^{+0.0014}_{+0.0004}$ in)

Piston ring

		1st	2nd	3rd
Ring end gap, installed	Nominal	0.2 ~ 0.4 mm (0.0079 ~ 0.0157 in)	0.2 ~ 0.4 mm (0.0079 ~ 0.0157 in)	0.3 ~ 0.9 mm (0.012 ~ 0.035 in)
	Wear limit	—	—	—
Side clearance	Nominal	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	−0.03 ~ 0.015 mm (−0.0012 ~ 0.0006 in)
	Wear limit	—	—	—

Crankshaft

Deflection tolerance		Flywheel width	Rod clearance			
			Side "C"		Axial "P"	
1.	2.	"F"	Max.	Min.	New	Max.
0.03 mm (0.0012 in)	0.03 mm (0.0012 in)	59 $^{0}_{-0.05}$ mm (2.323 $^{0}_{-0.0020}$ in)	0.65 mm (0.0256 in)	0.35 mm (0.0138 in)	0.8 ~ 1.0 mm (0.031 ~ 0.039 in)	2.0 mm (0.079 in)



Suspension

	Front	Rear
Type	Telescopic fork	Mono-cross suspension
Travel	230 mm (9.06 in)	205 mm (8.07 in)
Spring length free	604 mm (23.78 in)	313 mm (12.32 in)
Spring length installed	589 mm (23.19 in)	299 mm (11.77 in)
Spring constant	K_1 = 0.277 kg/mm (15.51 lb/in) K_2 = 0.539 kg/mm (30.18 lb/in)	K_1 = 2.036 kg/mm (114.0 lb/in) K_2 = 3.385 kg/mm (189.5 lb/in)
Number of coils	77.25 turns	15.3 turns
Diameter of coil	29.0 mm (1.14 in)	73.4 mm (2.89 in)
Diameter of wire	4.2 mm (0.17 in)	9.2 mm (0.36 in)
Caster	28°30′ Trail 120 mm (4.72 in)	
Rear swing arm nominal length	430 mm (16.93 in)	

Wheels/Tires

	Front	Rear
Size/Mfr/Tread type	3.00—21—4PR/BS M-21 or /RC 45X	5.10—17—4PR/BS M20 or /IRC45ZI
Tire pressure	0.9 kg/cm² (12.8 psi)	1.1 kg/cm² (15.6 psi)
Rim size/Material/Type	1.60—21/Aluminum/E5 section	2.15—17/Aluminum/E5 section
Spoke diameter	3.5 ~ 4.0 mm (0.14 ~ 0.16 in)	3.5 ~ 4.0 mm (0.14 ~ 0.16 in)
Spoke length (Inside)	L: 226 mm (8.90 in) R: 238.5 mm (9.39 in)	154.5 mm (6.08 in) 160.5 mm (6.32 in)
Spoke length (Outside)	L: 225.5 mm (8.88 in) R: 241 mm (9.49 in)	154 mm (6.06 in) 160 mm (6.30 in)
Runout limit (Vertical)	2.0 mm (0.08 in)	2.0 mm (0.08 in)
Runout limit (Horizontal)	2.0 mm (0.08 in)	2.0 mm (0.08 in)

Brakes

	Front	Rear
Type	Drum brake	←
Actuating method	Wire	Link rod
Brake drum I.D.	130 mm (5.12 in)	←
Lining length × width = area	124 mm × 22 mm = 2,728 mm² (4.88 in × 0.87 in = 4.25 in²)	124 mm × 28 mm = 3,472 mm² (4.88 in × 1.10 in = 5.37 in)
Quant.	2 pcs	←
Lining thickness/Wear limit	4.0 mm/2.0 mm (0.157 in/0.079 in)	←

Torque Specifications

Part to be tightened	Thread and Part name	Tightening torque	
		m-kg	ft-lb
Engine:			
Cylinder head, Cylinder	M10 Hex bolt	3.75	27.1
	M8 Internal hex bolt	2.0	14.5
	M6 Internal hex bolt	1.0	7.2
Cylinder head cover	M6 Internal hex bolt	1.0	7.2
	M6 Pan head screw	0.7	5.1
Camshaft bearing plate	M6 Hex bolt	0.8	5.8
Oil checking screw	M6 Hex bolt	0.7	5.1
Spark plug	M14 Hex nut	2.0	14.5
Balancer boss	M16 Hex nut	6.0	43.4
Flywheel magneto	M12 Hex nut	8.0	57.9
Valve clearance	M6 Hex nut	1.35	9.8
Cam sprocket	M10 Bolt	5.5	39.8
Chain tensioner	M6 Bolt	0.8	5.8
	M6 Nut	1.2	8.7
Oil pump	M6 Pan head screw	0.7	5.1
Drain plug	M40	3.2	23.1
Filter cover	M6 Internal hex bolt	1.0	7.2
	M6 Pan head screw	0.7	5.1
Bleeder bolt	M5 Hex bolt	0.5	3.6
Carburetor manifold	M6 Internal hex bolt	1.2	8.7
Carburetor clamp hose	M5 Pan head screw	0.2	1.5
Air cleaner case cover	M6 Pan head screw	0.5	3.6
Air cleaner case	M6 Hex bolt	0.7	5.1
Exhaust pipe assembly	M6 Internal hex bolt	1.2	8.7
	M8 Hex bolt	2.0	14.5
Protector muffler	M6 Hex bolt	0.7	5.1
Crankcase, Casecover	M6 Pan head screw	0.7	5.1
Balancer bearing plate	M6 Flat head screw	0.7	5.1
Chain tensioner plug	M10 Hex bolt	3.0	21.7
Crank boss	M8 Hex bolt	2.0	14.5
Ratchet wheel guide	M6 Hex bolt	1.0	7.2
Clutch spring	M6 Hex bolt	0.8	5.8
Clutch boss	M20 Hex nut	0.7	5.1
Primary drive gear	M16 Hex nut	0.7	5.1
Push lever stopper	M8 Hex bolt	1.2	8.7
Push rod adjustment	M6 Hex nut	0.8	5.8
Drive sprocket	M6 Hex bolt	1.0	7.2
Shift cam	M5 Flat head screw	0.37	2.7
Shift pedal	M6 Hex bolt	0.8	5.8
Magneto base	M6 Pan head screw	0.7	5.1
Neutral switch	M10	2.0	14.5
Decompression cam stopper	M6 Hex bolt	0.8	5.8
Decompression lever	M6 Hex nut	0.8	5.8
Tappet cover positioning bolt	M6 Internal hex bolt	1.0	7.2

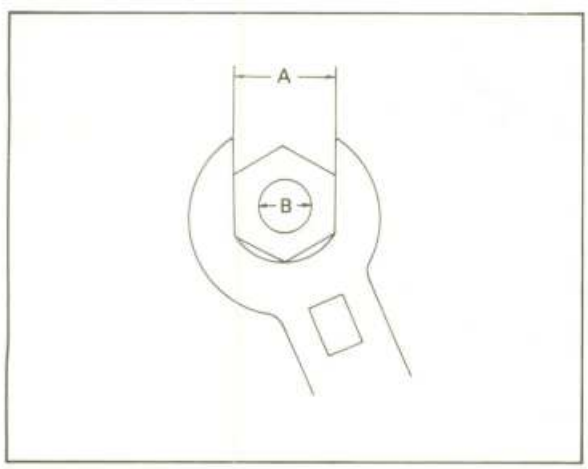
Part to be tightened	Thread and Part name	Tightening torque	
		m-kg	ft-lb
Chassis:			
Engine mounting	M8 Hex bolt, nut	3.2	23.1
Engine adjusting plate	M8 Hex bolt, nut	2.0	14.5
Handle crown and Inner tube	M8 Hex bolt, nut	2.0	14.5
Handle crown and Handle holder	M8 Hex bolt	2.0	14.5
Front fork cap bolt	M30 Hex bolt	2.2	15.9
Under bracket and Inner tube	M12 Hex bolt	3.7	26.8
Front wheel shaft	M14 Shaft, nut	10.6	76.7
Pivot shaft	M14 Shaft, nut	6.5	47.0
Rear wheel shaft	M16 Shaft, nut	10.6	76.7
Sprocket wheel	M8 Hex bolt	3.0	21.7
Rear shock absorber	M10 Hex bolt	2.5	18.1
Foot rest	M10 Hex bolt	4.5	32.5
Camshaft lever	M6 Hex bolt, nut	0.8	5.8
Front fork cylinder and Outer tube	M10 Socket head bolt	2.3	16.6

General Torque Specification

The following torque specifications must be adhered to on every machine. When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing should always be done to the nut, never the bolt head.

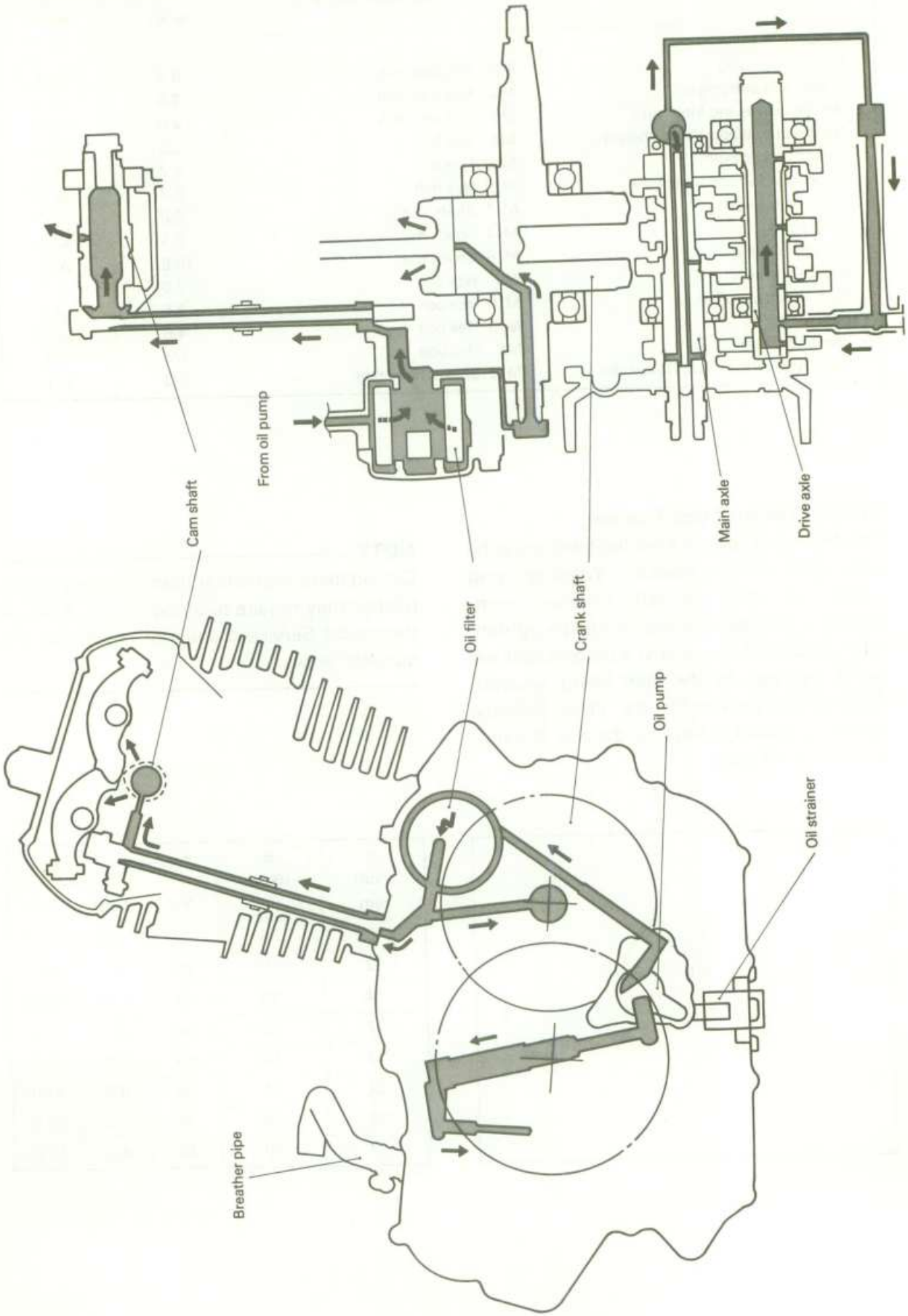
NOTE:

Certain items with other than standard thread pitches may require differing torque. Consult the model Service Manual or distributor if a question arises.

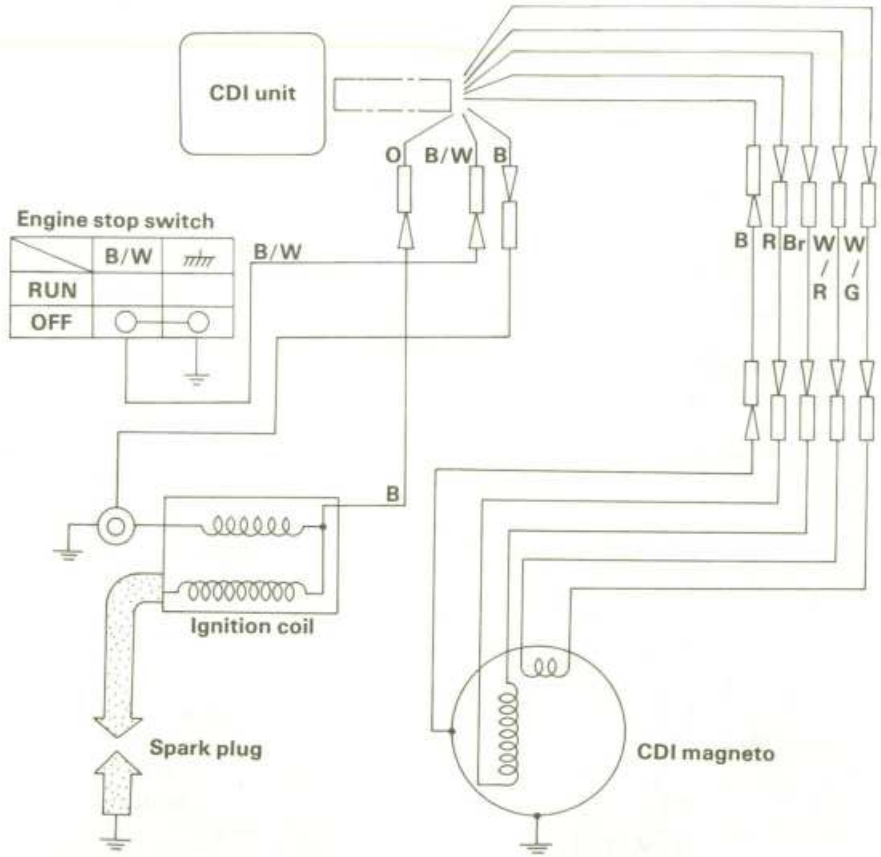


A (Nut) mm	B (Bolt) mm	Torque specifications		
		Nm	m-kg	ft-lb
10	6	10	1.0	7.2
12	8	20	2.0	14.5
14	10	40	4.0	28.9
17	12	45	4.5	32.5
19	14	50	5.0	36.2
22	16	65	6.5	47.0
24	18	70	7.0	50.6
27	20	80	8.0	57.8

LUBRICATION CHART



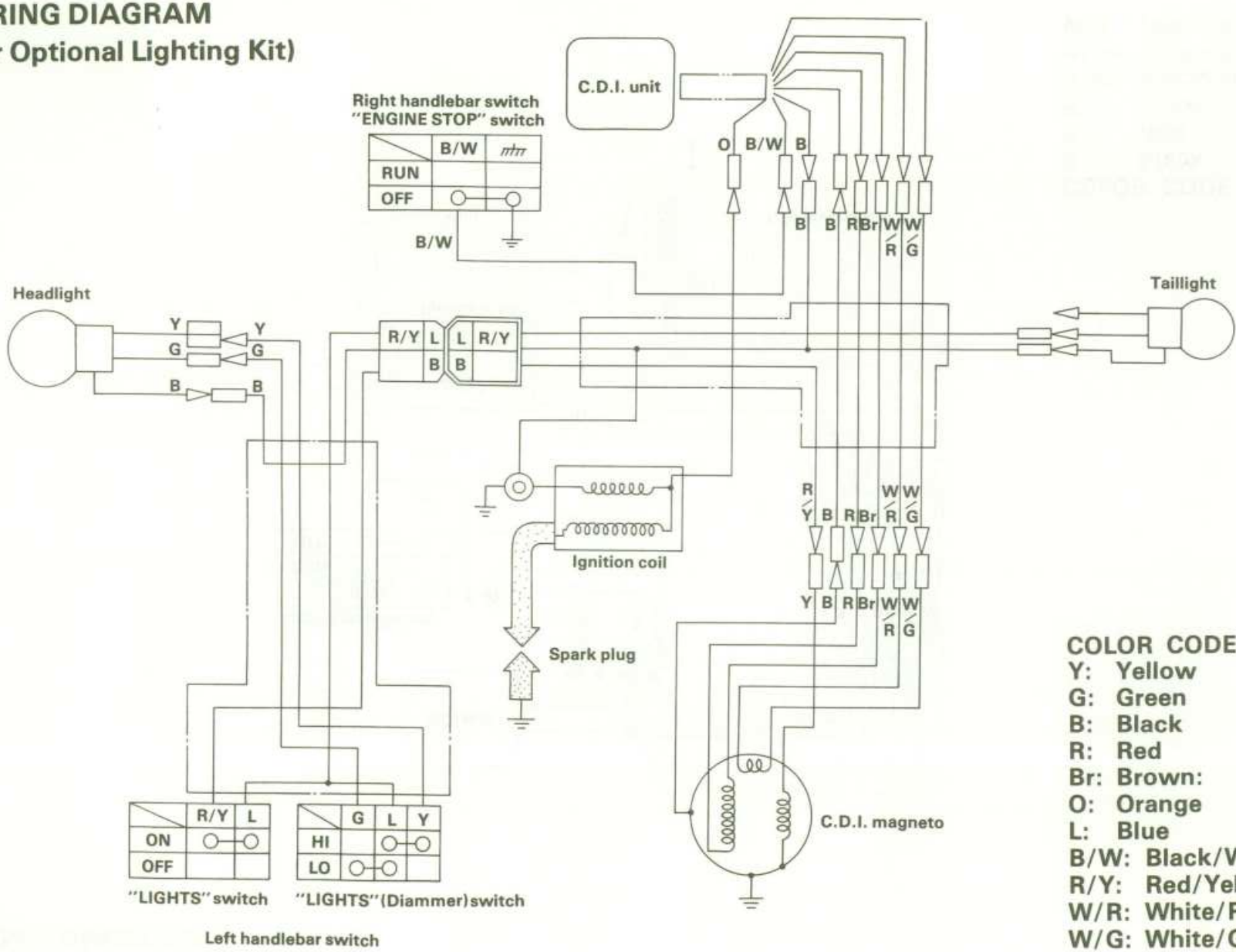
WIRING DIAGRAM



COLOR CODE

B:	Black
R:	Red
Br:	Brown
B/W:	Black/White
W/R:	White/Red
W/G:	White/Green

WIRING DIAGRAM
(For Optional Lighting Kit)



COLOR CODE
- Y: Yellow
- G: Green
- B: Black
- R: Red
- Br: Brown:
- O: Orange
- L: Blue
- B/W: Black/White
- R/Y: Red/Yellow
- W/R: White/Red
- W/G: White/Green