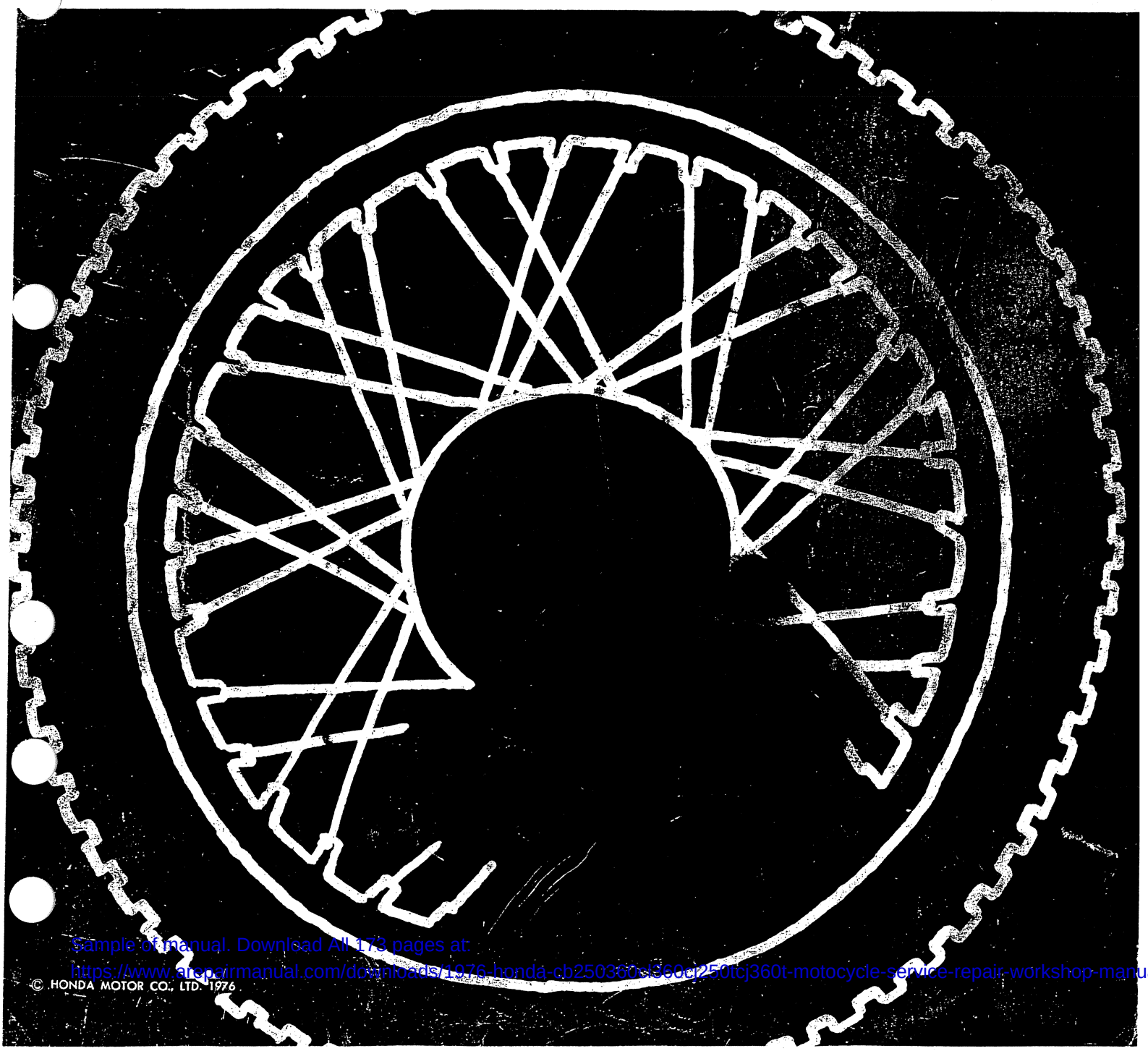
SHOP MANUAL

HONDA

CB250·360·CL360·CJ250T·CJ360T



PREFACE

This SERVICE MANUAL has been prepared as a "SERVICE GUIDANCE" for the mechanic responsible for the upkeep of the HONDA CB250, CB360, CL360 and CJ250T/CJ360T.

It is compiled into seven sections and summarizes the procedures for disassembling, inspecting, and reassembling the components of the machine.

Strict adherence to the instructions given herein will result in better, safer service work.

HONDA MOTOR CO., LTD.
Service Publications Office

CONTENTS

I. GENERAL SERVICE PRECAUTIONS

1. Always replace gaskets, O-rings, cotter pins, etc with new ones when reassembling.
2. When tightening bolts, nuts or screws, begin on larger-diameter or inner one first and tighten them to specified torque in a criss-cross pattern.
3. Use genuine Honda or Honda-recommended parts and lubricants when servicing.
4. Be sure to use a special tool or tools where so specified.
5. A joint work of more than two persons must be carried out with mutual safety attention paid.
6. Wash clean engine parts upon disassembly. Coat their sliding surfaces with high-quality lubricant when reassembling.
7. Coat or pack grease where so specified.
8. After reassembling, check to be sure each part is tightened properly. Also check for proper operation.
9. Be sure to retain fuel and oil pipes with clips.

Electrical System

1. When tracing electrical system problems, refer to the wiring diagram at the end of this manual.
2. Check cables and wires for disconnection, open circuit, binding or breakage of coverings, and grommets and covers for removal or breakage. Repair or replace them if necessary.
3. Check if fuse failures are due to blow-out or to mechanical open circuit. If a fuse is blown, locate the cause before installing a new fuse. Always use a specifically rated fuse.
4. Route the battery breather tube as shown on the label.

NOTE:
It is advisable to check the electrical parts at a temperature of about 20° C/68° F (room temperature).

II. CONSTRUCTION

1. CAMSHAFT AND VALVE MECHANISM

Cylinder head

The cylinder head is so designed that the rocker arm shafts and rocker arms are incorporated into the cylinder head cover.
It can be removed or installed with the engine mounted on the frame to enable the cylinder and pistons to be replaced easily.

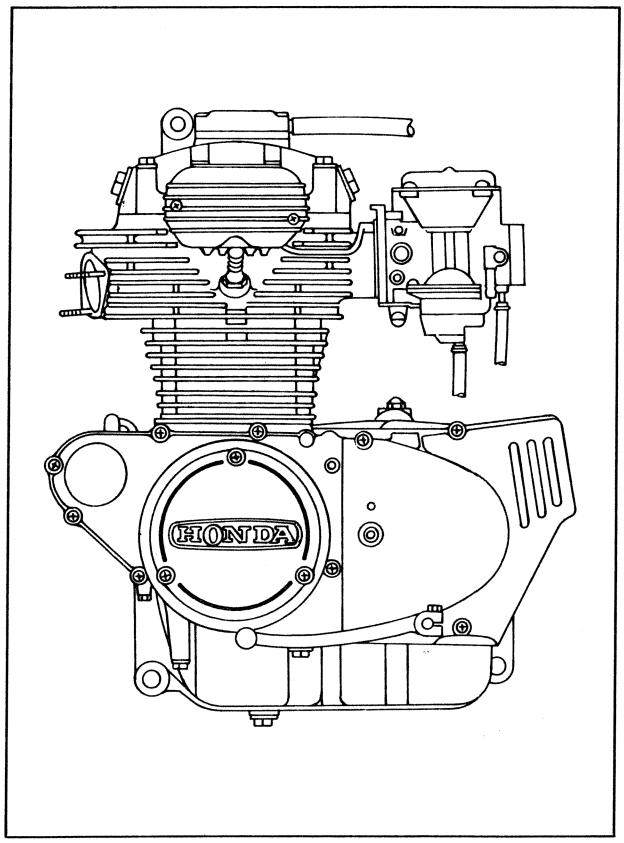


Fig. 2–1

Valve guides

Each valve guide is securely supported by the spring seats as shown at right. It is also provided with the stem seals to prevent oil from leaking into the combustion chamber.
When disassembling the valve guide, take care not to compress the valve compressor (Tool No. 07957–3290000) more than necessary; otherwise the stem seals may be damaged.

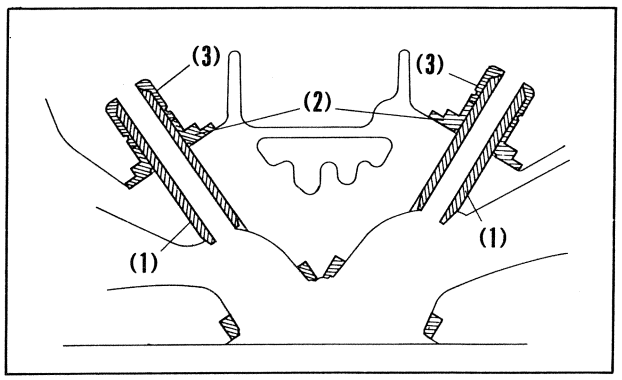


Fig. 2–2 (1) Valve guide
(2) Spring seat
(3) Stem seal

Cylinder

The cylinder is an aluminum die casting which is light-weight and has great cooling efficiency. Two special cast iron sleeves are pressed into the cylinder.
Eight stud bolt holes are provided in the cylinder and the two holes at the rear outside act as oil passages to the cylinder head. In the two holes O-rings are inserted to prevent oil leakage.

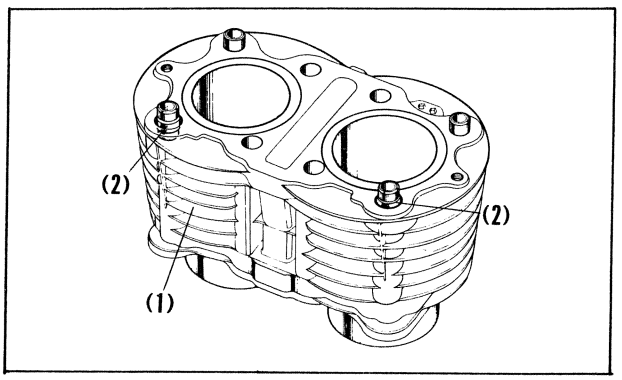


Fig. 2–3 (1) Cylinder
(2) Cylinder stud bolt gasket

Pistons

The pistons are made of aluminum alloy. They are three-stage tapered as shown to provide for unequal expansion that occurs at operating temperature.

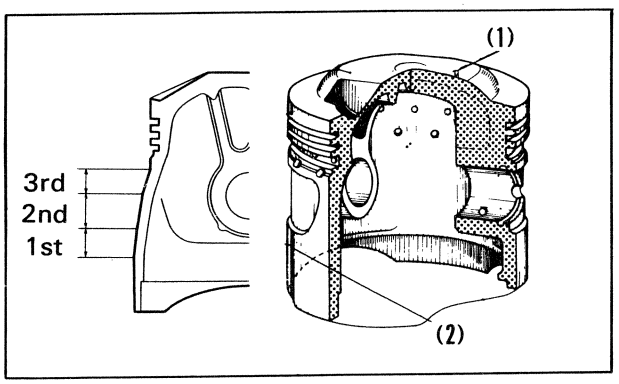


Fig. 2–4 Sectional view of piston
(1) Piston head
(2) Piston skirt

Piston pins

Each piston pin is full floating in both the connecting rod and piston with snap rings in both piston bosses. It is **1 mm** offset **(0.039 in.)** to the intake side with respect to the center of the piston. The reason for this is that since the pressure on the piston on the explosion stroke rises to the maximum after the top dead center position, the side thrust on the piston is moved before the top dead center position to avoid rapid movement of the side thrust on the explosion stroke, preventing the piston from slapping the cylinder sleeve. The head of each piston is marked to make it easier to install it correctly.

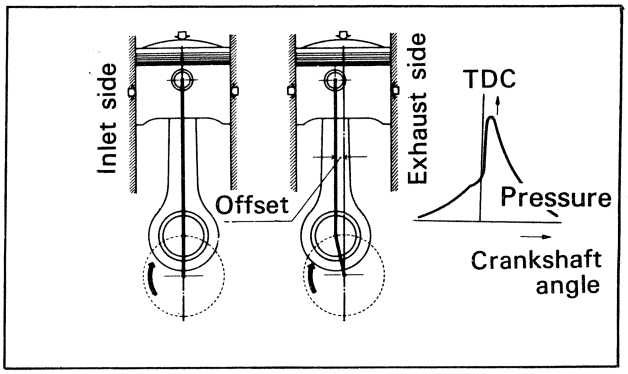


Fig. 2–5 Piston pin offset

2. CAM CHAIN TENSIONER MECHANISM

1. The cam chain tensioner is made of spring steel on which heat-resistant rubber is lined by paking and then heatresistant teflon having less frictional resistance is coated, minimizing chain noise and improving durability.
2. The chain tension can be easily adjusted by loosening the adjusting bolt and then retightening it.

Cam chain slipper

1. The cam chain slipper installed to the cylinder block prevents chain vibrations often developed due to temporalily disturbed engine speed during deceleration.
2. The cam chain slipper is so constructed that the synthetic rubber is attached to the steel plate and it has great durability.

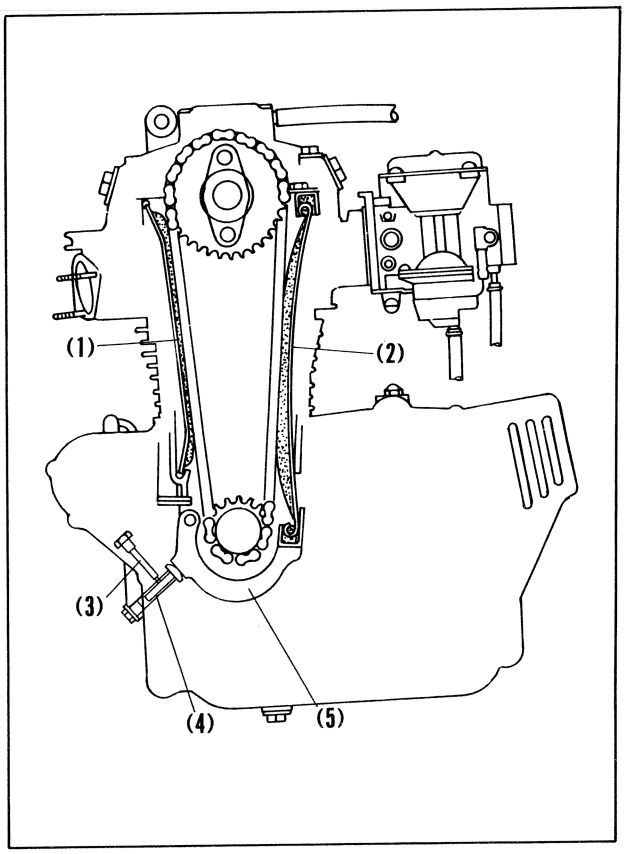


Fig. 2–6 (1) Cam chain slipper
(2) Cam chain tensioner
(3) Adjusting bolt
(4) Tensioner push bar
(5) Tensioner arm

3. LUBRICATING SYSTEM

The models CB250, CB360 and CL360 are continuously pressure-lubricated with a trochoid oil pump.

Lubricating oil is fed to the engine parts through the centrifugal oil filter coupled directly to the crankshaft and the oil filter screen located at the suction port of the oil pump.

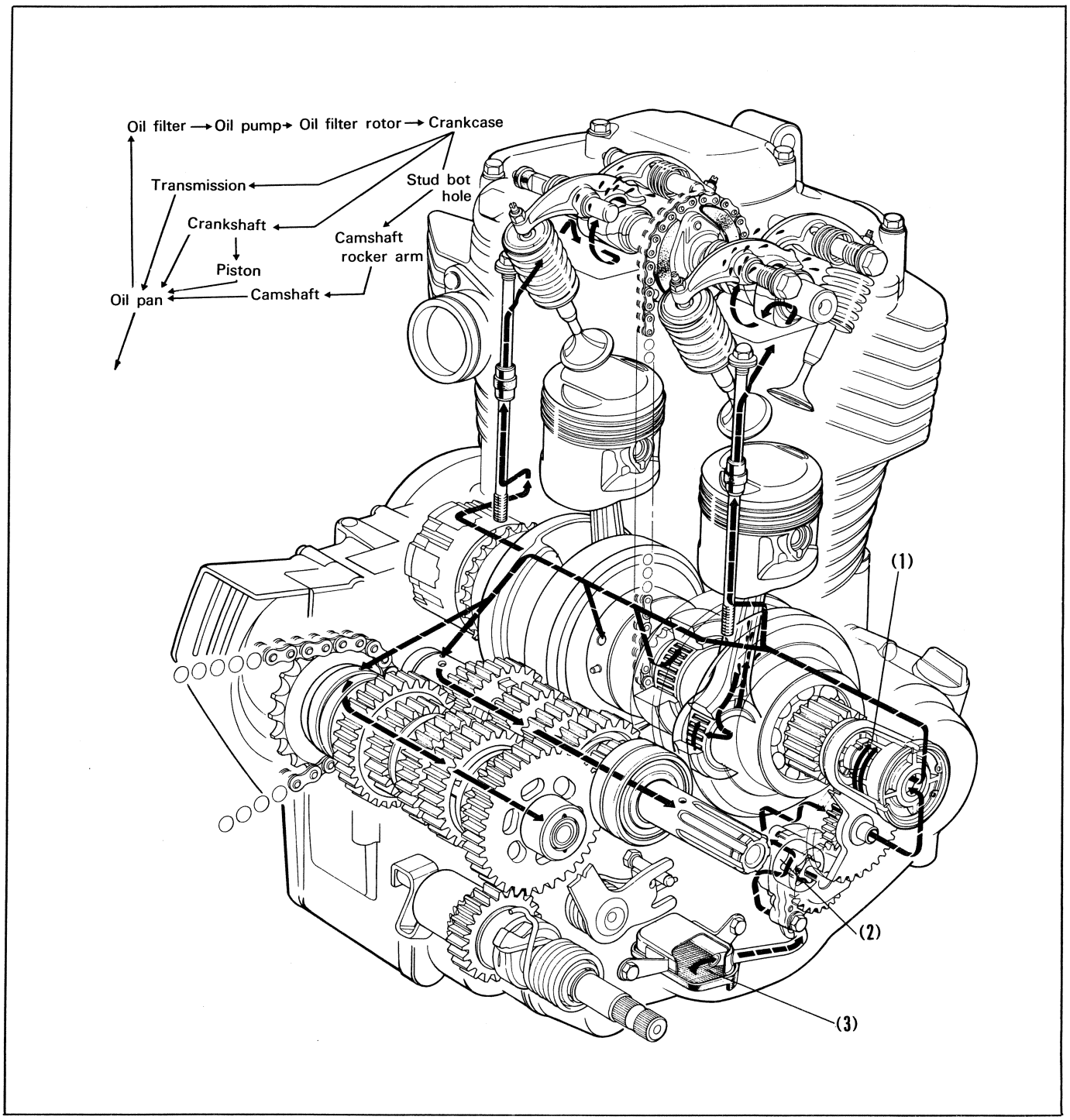


Fig. 2–7 Lubricating oil circuit

(1) Oil filter rotor (2) Trochoid oil pump (3) Oil filter screen

Trochoid oil pump

The trochoid oil pump is driven by the crankshaft through the pump idle gear and drive gear.

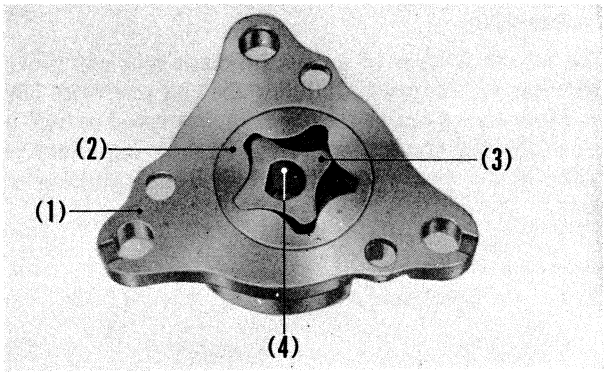


Fig. 2–8 (1) Oil pump body
(2) Outer rotor
(3) Inner rotor
(4) Drive gear

Centrifugal oil filter

As the oil from the pump enters the filter rotor through the guide metal and is picked up by the spinning vanes of the filter cap, foreign materials such as metallic dust and carbon particles are separated from the oil by centrifugal force and are attached to the inner wall of the rotor. The oil cleaned in this manner is fed to the engine parts through the outlet port in the center section of the filter cap.

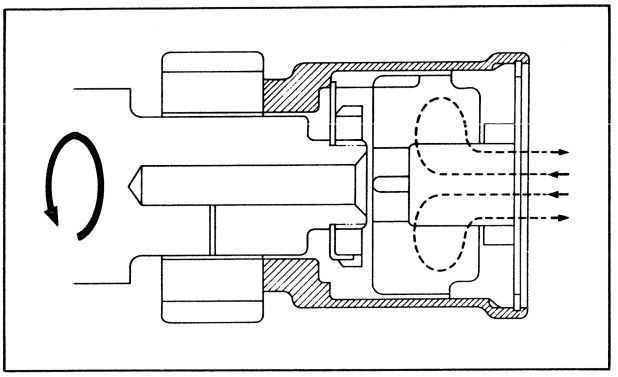


Fig. 2–9 Oil flow in oil filter

4. POWER TRANSMITTING SYSTEM

Clutch

The clutch is provided to transmit engine power to the transmission mainshaft or disconnect it from the shaft through friction between the clutch friction discs (3) and clutch plates (4).

When the clutch is engaged, the friction discs and plates are "sandwiched" between the clutch pressure plate (7) and clutch center (5) by means of the clutch spring (6), thereby causing the clutch outer (2) and clutch center to be pressed together. Under this condition, engine power is transmitted from the crankshaft to the main shaft through the primary drive gear, clutch outer, friction discs, plates and clutch center.

As the clutch lever is squeezed, the clutch lifter cam (11) connected to the clutch cable is rotated and then is pushed out by means of the # 10 steel ball (12) located between the lifter cam and clutch adjusting cam. Then the force is transmitted to the steel ball (10), lifter rod, lifter joint piece and pressure plate to cause the clutch springs to be compressed. Now the friction discs are separated from the plates, resulting in disengagement.

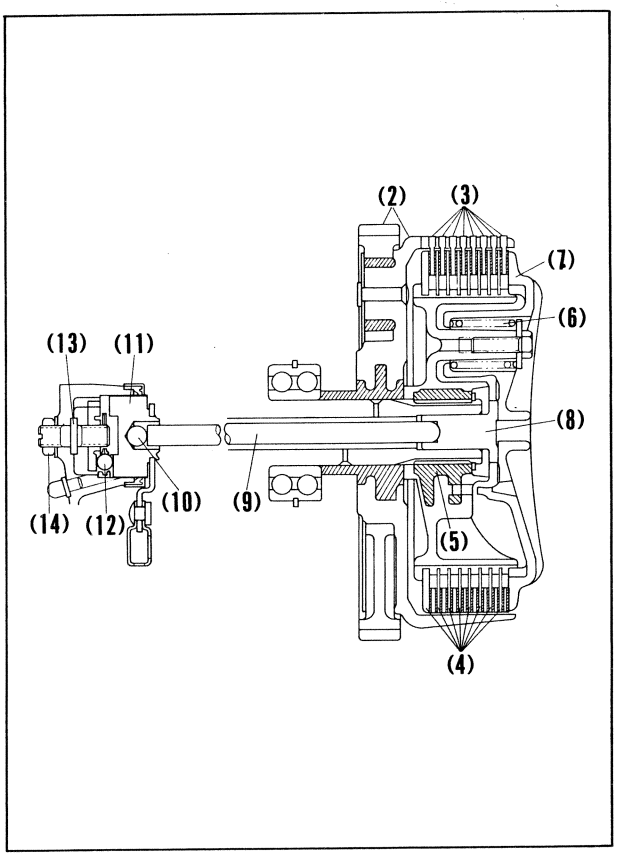
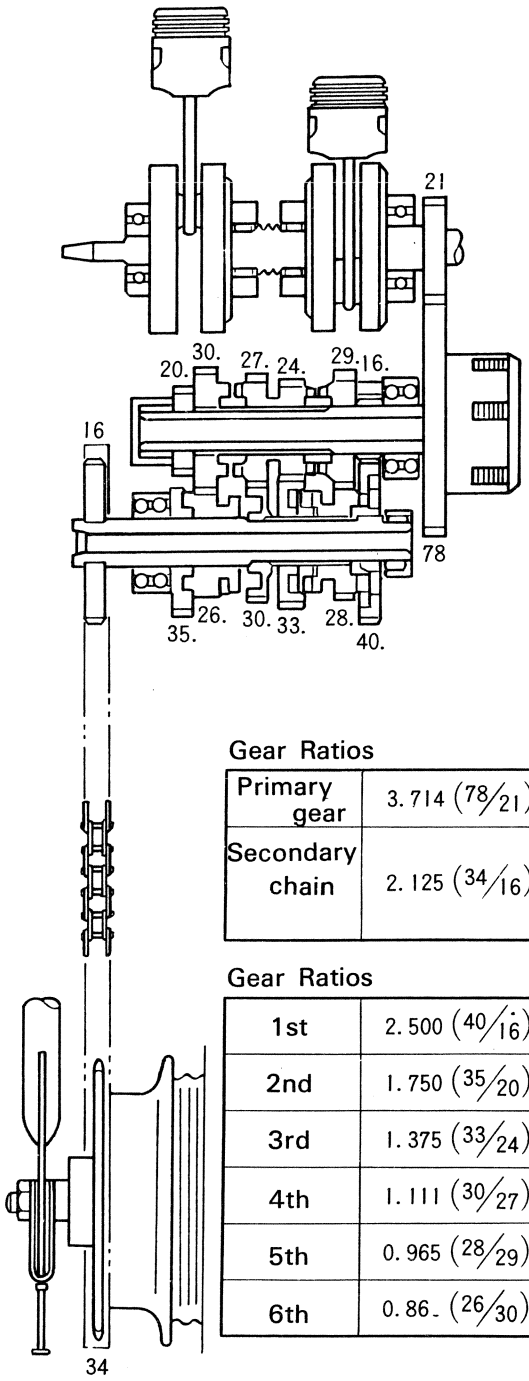


Fig. 2–10

Transmission

The transmission is of a constant-mesh type and provides a selection of six speeds, fulfilling the characteristics inherent to a four-stroke engine ranging from low speed to high speed. Especially the transmission plays its most important role in riding at the overtop (sixth) speed. Return shifting type is used.

The engine power, transmitted from the crankshaft to the mainshaft through the clutch, is changed in speed and torque by gearing. It is then transmitted from the drive sprocket to the rear wheel through the drive chain.



Gear Ratios

Primary gear	3.714 (78/21)
Secondary chain	2.125 (34/16)

Gear Ratios

1st	2.500 (40/16)
2nd	1.750 (35/20)
3rd	1.375 (33/24)
4th	1.111 (30/27)
5th	0.965 (28/29)
6th	0.86. (26/30)

Fig. 2–11

Gearshift mechanism

The gearshift mechanism is a linkage between the gear change pedal and the shift forks and includes a shift arm, a shift drum, a neutral stop, a drum stop, etc.
When the pedal is depressed for shifting, the shift spindle rotates, causing the arm to push the drum pins to rotate the drum. As the drum is so rotated, the fork is moved by the cam action of a groove cut in the drum to shift a gear. After shifting, the arm is returned to its original position by means of the return spring. The drum stop is provided to prevent unintentional gear engagement, shifting the gears smoothly. The drum is pressed by the # 10 steel ball to make it possible to shift into the neutral position properly.

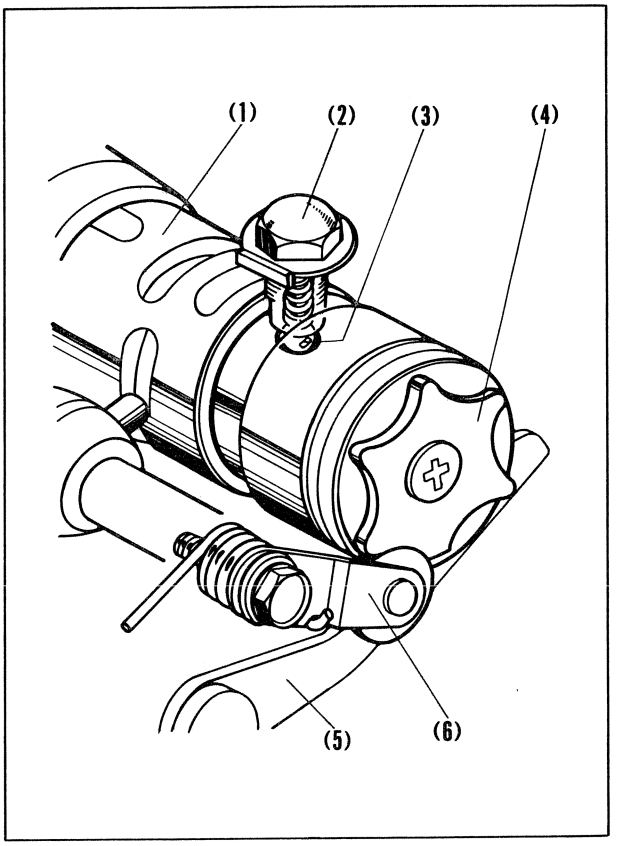


Fig. 2–12 (1) Gearshift drum (4) Drum stop cam plate
(2) Neutral stop (5) Gearshift spindle arm
(3) #10 steel ball (6) Shift drum stop

Crankshaft

The crankshaft serves to change the reciprocating motion of the piston into rotary motion in connection with the connecting rod. It also serves as a flywheel limiting the torque fluctuation. The crankshaft is supported at four places by antifriction bearings–two needle roller bearings on the inside and two ball bearings on the outside, increasing the load capacity and improving the strength and durability at high speeds.

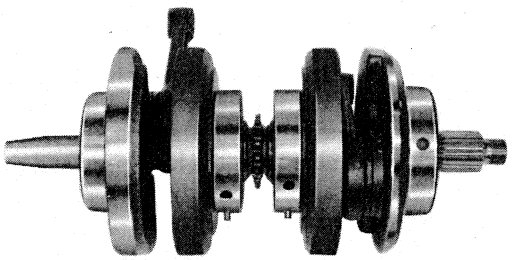


Fig. 2–13 Crankshaft

The crankshaft bearings are lubricated by oil from the oil pump. The oil enters from the upper crankcase, passes through the oil holes in the center bearing outer rings and lubricates the bearings. Then the oil collects into the notches in the sides of the crank weights and enters the crankpins to lubricate the big ends of the connecting rods.

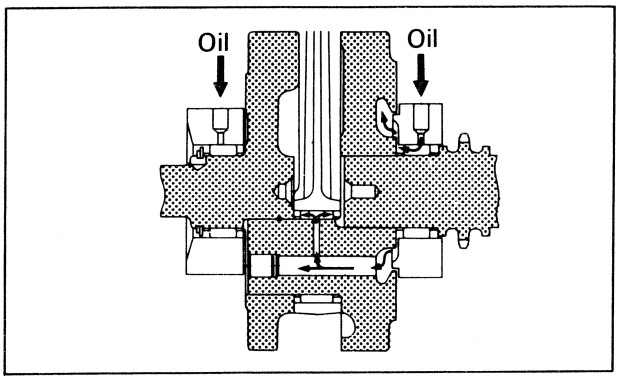


Fig. 2–14 Lubrication to crankshaft

5. CARBURETORS

Two sets of carburetors, one for each cylinder, are equipped. They are of a single-barrel, CV (Constant Vacuum type, the venturi area is automatically changed by the negative pressure created by air to be drawn into the cylinder) type. Following are the remarkable features:

(1) Because of a variable-venture type, smooth power transition between low-speed and high-speed operations is provided.
(2) The construction is simple.
(3) Acceleration is good and fuel consumption is less.

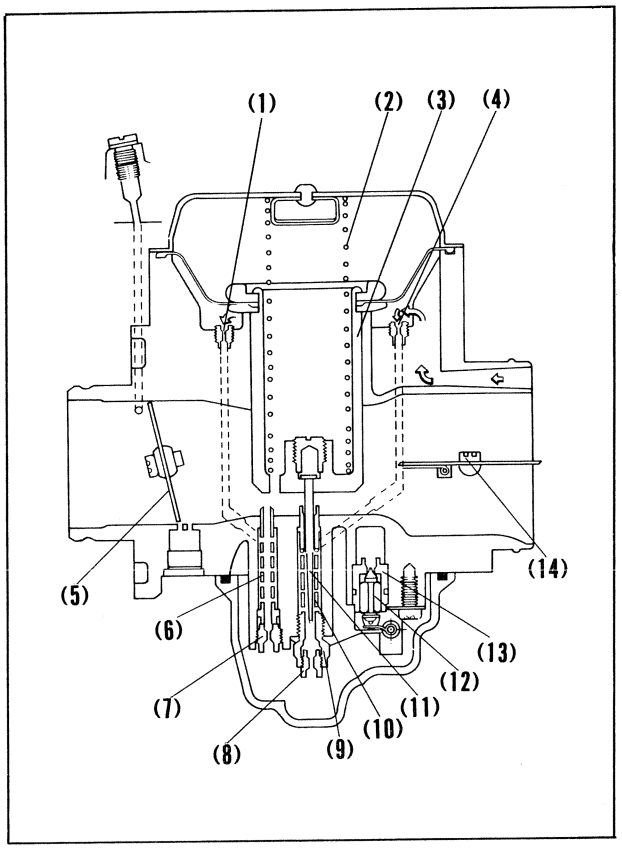


Fig. 2–15
(1) Primary air jet
(2) Vacuum piston spring
(3) Vacuum piston
(4) Secondary air jet
(5) Throttle valve
(6) Main nozzle
(7) Primary main jet
(8) Secondary main jet
(9) Needle jet holder
(10) Needle jet
(11) Jet needle
(12) Float valve
(13) Valve seat
(14) Choke valve

1. Starting circuit

When the engine is started while it is cold, a richer fuel-air mixture is required.
When the choke lever is raised, the choke valve is closed to cause the amount of incoming air to be reduced, resulting in an increased negative pressure within the main bore. Now fuel is fed to the bore from the low-speed and main circuits. The choke valve is controlled by the relief valve depending on vacuum created by air to be drawn into the main bore.

2. Low-speed circuit

The low-speed circuit is provided to supply the proper amount of mixture to the engine at idle and low speeds.

Fuel passes through the primary main jet and slow jet and is mixed with the air bled by the slow air jet here. Then the mixture is squirted from the bypass and pilot outlet. The mixture to be squirted from the pilot outlet is regulated by the pilot screw.

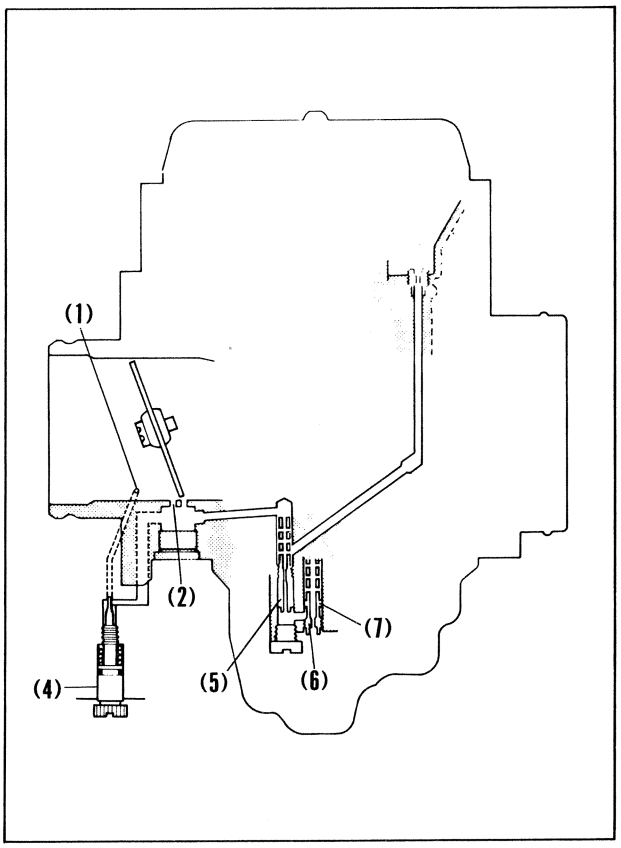


Fig. 2–16 (1) Pilot outlet
(2) Bypass
(3) Slow air jet
(4) Pilot screw
(5) Slow jet
(6) Primary main jet
(7) Main nozzle

3. Main circuits

Primary circuit

The primary main circuit is provided chiefly for the low speed engine operation. Fuel flows into the main nozzle through the primary main jet and is mixed with the air bled by the primary air jet in the main nozzle. Then the mixture is squirted from the tip of the main nozzle.

Secondary circuit

The secondary main circuit is provided chiefly for the normal and high speed engine operations.
Fuel flows into the needle jet through the secondary main jet and is mixed with the air bled by the secondary air jet in the needle jet. Then the mixture passes between the jet needle and needle jet and is spurted from the tip of the needle jet.

Operation of vacuum piston

The vacuum piston is operated by the vacuum within the venturi. When the negative pressure is low, the piston is pushed down by the spring pressure. As the vacuum rises, the piston overcomes the spring pressure and moves up. The jet needle built in the piston is used to supply a charge of optimum fuel-air mixture to the engine.

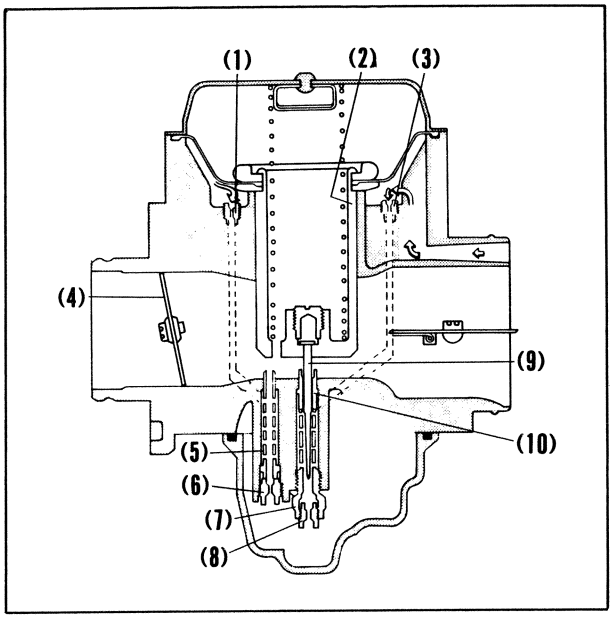


Fig. 2–17 (1) Primary air jet
(2) Vacuum piston
(3) Secondary air jet
(4) Throttle valve
(5) Main nozzle
(6) Primary main jet
(7) Needle jet holder
(8) Secondary main jet
(9) Jet needle
(10) Needle jet

4. Float circuit

Fuel flows into the float chamber from the fuel tank through the pipe adapter and the clearance between the float valve and seat. When the fuel level exceeds the specified height, the float moves up on the fuel to cause the float valve to be closed, shutting off the supply of fuel. As the level drops below the specified height, the float valve is opened to permit fuel to flow into the float chamber. By repeating this process, the level of the fuel in the float chamber is always maintained at the same level.

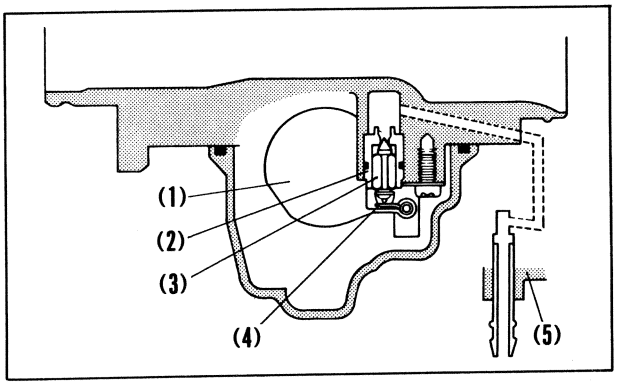


Fig. 2–18 (1) Float
(2) Valve seat
(3) Float valve
(4) Special clip
(5) Pipe adapter

The float valve is provided with a spring at the area where the valve comes in contact with the arm. The spring prevents the float valve from vibrating when the float moves abnormally due to riding and road conditions, maintaining the fuel level constant. The float valve is also provided with a special clip at the tip, which is hooked over the arm, to cause the float valve to be operated together with the float.

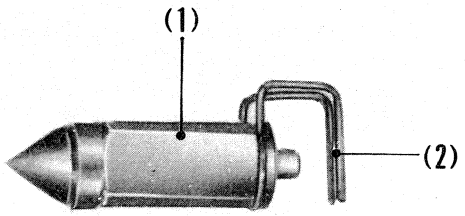


Fig. 2–19 (1) Float valve
(2) Special clip

5. Linkage

The opening and closing of the throttle valves are controlled by the two cables, one for opening the valves and the other for closing them.
The linkage mechanism, which operates the opening and closing of the two carburetor throttles at the same time, which are respectively coupled to the link arm, by means of the adjusting holder.
The throttle stop screw is of a flexible type and the right and left carburetors can be adjusted at the same time.

Each pilot screw is provided with the idle limiter to obtain the constant CO content (%) in exhaust gases at engine idle speed.

Idle limiters

The CO content in exhaust gases varies excessively with the adjustment by the pilot screw. This is why each pilot screw is equipped with the idle limiter to limit the adjustment range.

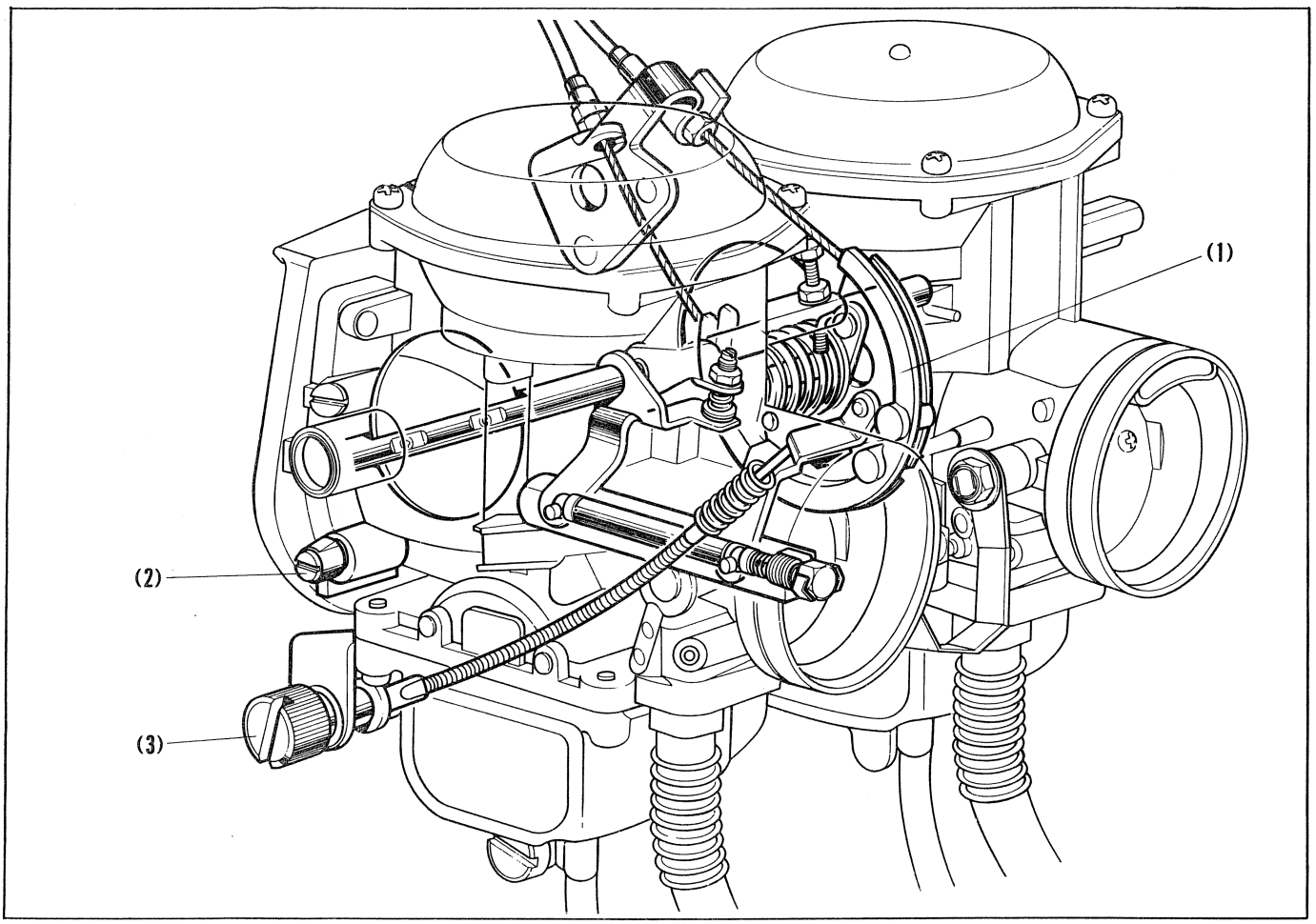


Fig. 2–20 (1) Throttle lever (2) Idle limiter (3) Throttle stop screw

6. FRAME

Front disc brake

The front disc brake consists mainly of a brake lever on the right side of the handlebar, a master cylinder, calipers installed to the left front fork and a brake disc installed to the wheel hub, increasing safety in the operation of the motorcycle. The brake disc is provided with the cover not to allow mud and dust to come in contact with the disc, resulting in a longer life of the pads.

Operation

1. As the brake lever (1) is squeezed, the cam (2) at the bottom of the lever moves the piston (3) within the master cylinder.
2. The piston so moved causes the primary cup (4) to cover up the oil passage to force the brake fluid in the chamber A.
3. The brake fluid so forced throughout the chamber A passes through the brake hose (6) to cause the stop switch (8) to operate at the joint (7). Then the brake fluid passes through the brake hose (9) and enters the chamber B of the caliper A (12).
4. The brake fluid moves the piston (10) within the chamber B to force the pad A against the disc.
5. Since the calipers A and B are "free-joined" with the holder, the reaction of the pad A is exerted on the pad B (13) through the calipers A and B to cause the disc to be "sandwiched" between the pads A and B.

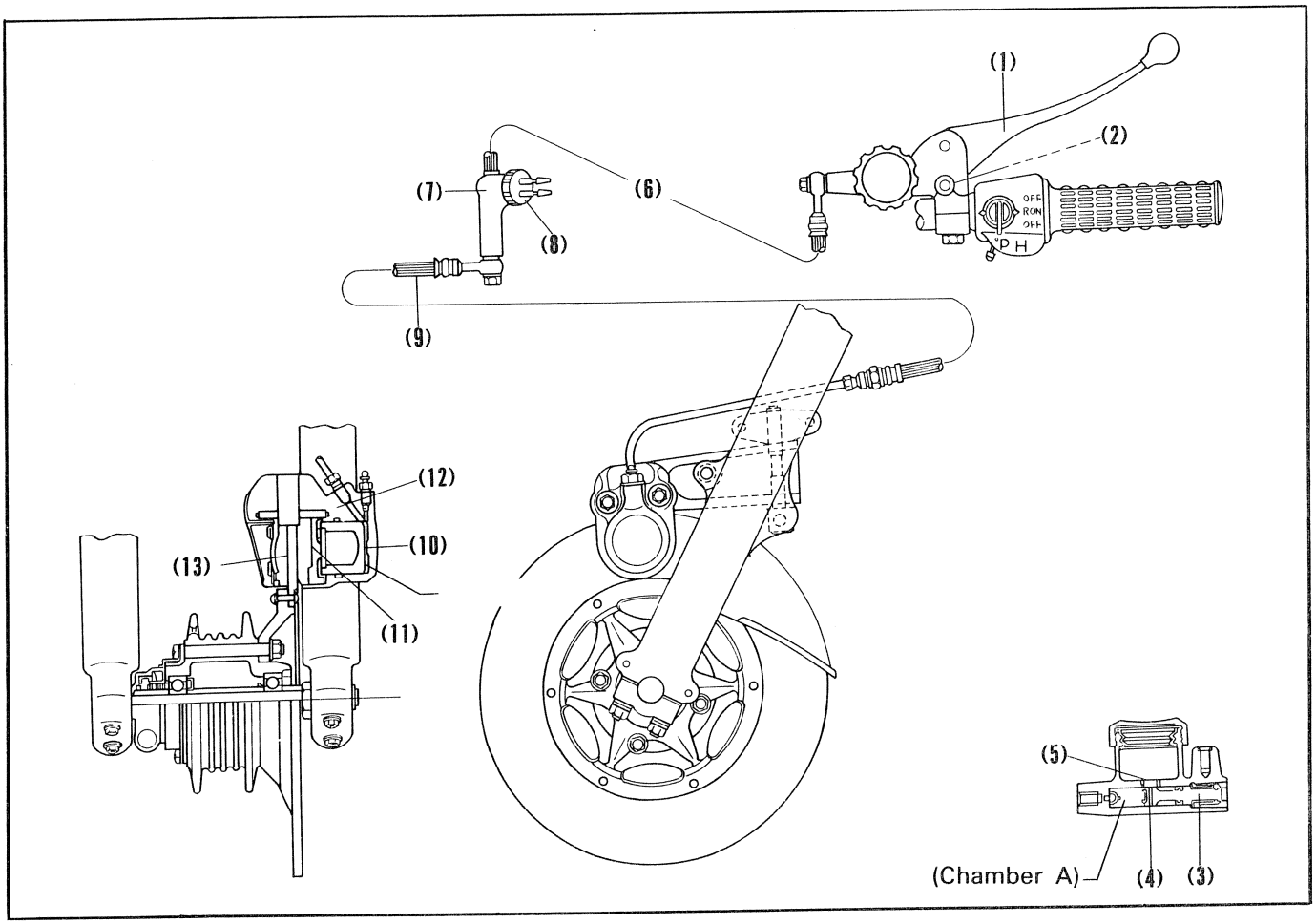


Fig. 2–21

Rear brake

The rear brake is of a drum type **(drum dia.: 160 mm or 6.30 in.)** and uses the leading and trailing type shoes. The brake linings are specifically molded and, therefore, the coefficient of friction hardly varies with high temperature and pressure.
The rear brake is equipped with the brake indicator to make it possible find wear of the brake shoes and drum earlier.

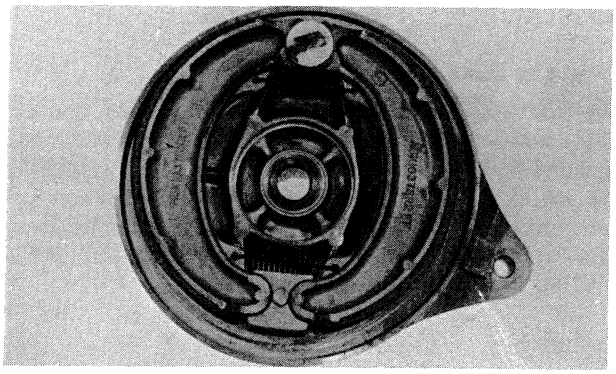


Fig. 2–22

Brake indicator

The brake panel is provided with the index mark, and the brake arm is installed on the brake cam shaft with the brake indicator plate in between.
If the index marks on the panel and on the indicator are not aligned when the brake pedal is depressed, it indicates that the brake shoes and drum are in good condition. As the brake shoes wear, the brake cam moves as shown and, therefore, the index marks reach alignment. Check the brake shoes and drum for wear and replace if the service limit is exceeded.

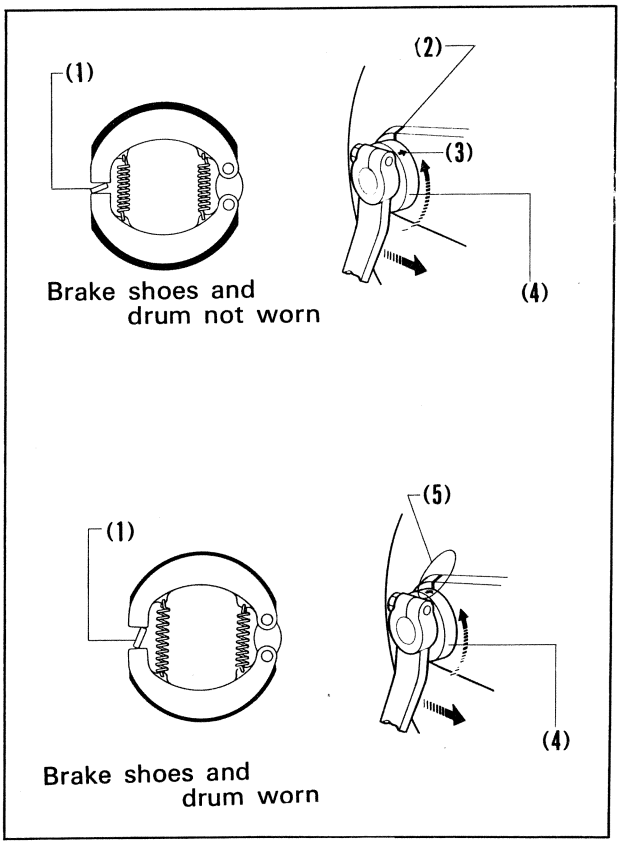


Fig. 2–23 (1) Brake cam
(2) Index mark
(3) Arrow mark
(4) Brake indicator plate
(5) Wear limits

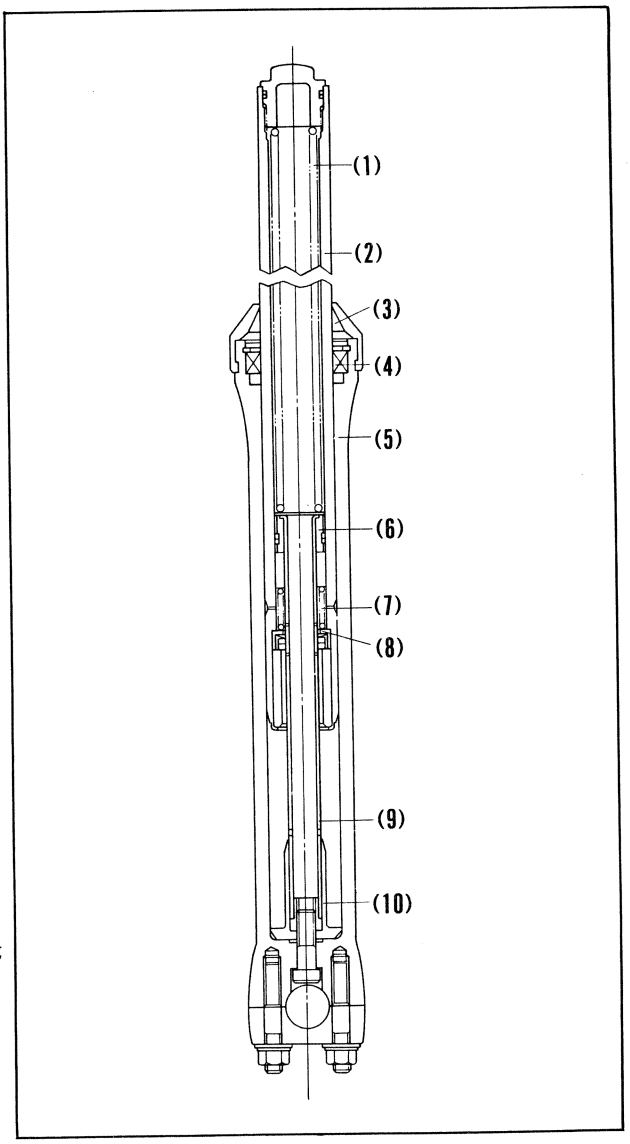
Front shock absorber assemblies

The front forks are of a hydraulically-damped telescopic type using a free valve. Each front fork consists mainly of a fork pipe, a fork bottom case and a shock absorber spring. The shock absorber having a long stroke absorbs shocks very well. The fork bottom cases are made of aluminum-alloy which is light in weight and has high rigidity.
Travel of front shock absorber:
Compression side: **90 mm (3.54 in.)**
Extension side: **24.5 mm (0.96 in.)**

Operation

(On compression stroke)
Shocks from a road are transmitted to the fork bottom case through the front wheel and are absorbed by the rebound spring at the upper end of the bottom pipe in one piece with the case. At this time the oil in the chamber B lifts the free valve off its seat and flows into the chamber A smoothly. At the same time the oil in the chamber B also flows by the amount of oil entered the fork pipe into the chamber C through the orifice in the lower part of the spring under seat.

(On extension stroke)
The spring, now compressed, exerts a reaction to extend the fork bottom case, together with the unspriung weight of the front axle. At this time the oil in the chamber A is trapped because the free valve is closed and then flows into the chamber C through the orifice in the wall between the spring under seat and bottom pipe. By the resisting force of this oil, the damping action is provided.



(1) Front shock absorber spring
(2) Front fork pipe
(3) Front fork dust seal
(4) Oil seal
(5) Front fork bottom case
(6) Piston ring
(7) Rebound stop spring
(8) Free valve
(9) Bottom pipe
(10) Oil lock piece

Fig. 2–24

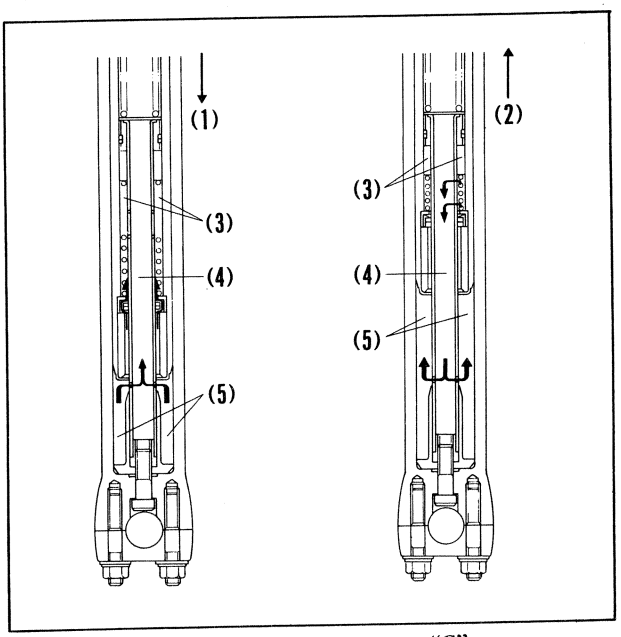


Fig. 2–25 (1) Compression (4) Chamber "C"
(2) Extension (5) Chamber "B"
(3) Chamber "A"

Rear shock absorber assemblies

The rear shock absorber assemblies feature the telescopic type oil dampers with bottom valve to give an optimum damping performance under all bumping and rebounding conditions. The damping performance on the extension side is well matched with that on the compression side, providing maximum damping.

Stroke of rear shock absorber: **77.6 mm (3.06 in.)**

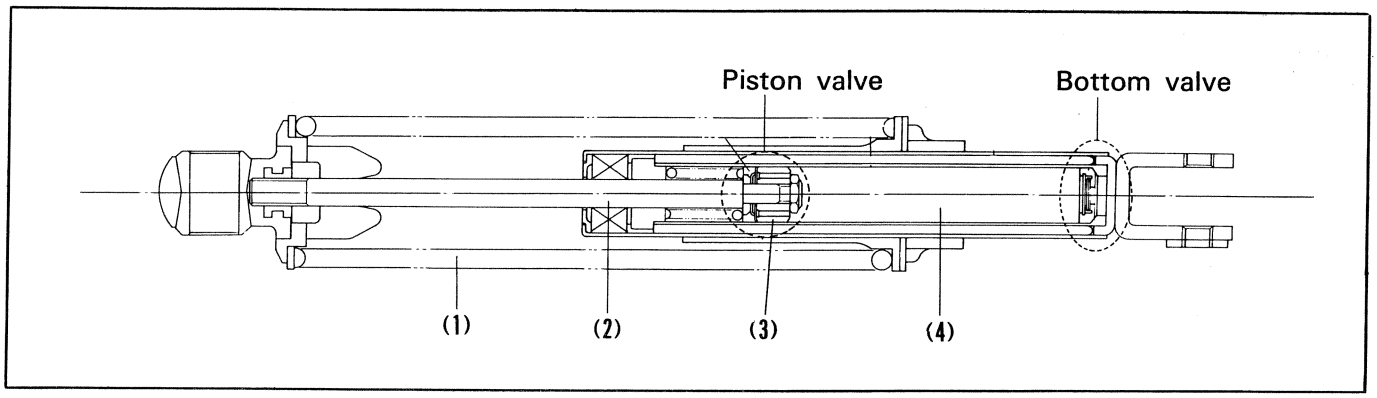


Fig. 2–26 (1) Rear shock absorber spring
(2) Damper rod
(3) Damper piston
(4) Damper cylinder

Operation

Each oil damper is equipped with the piston valves A and B and bottom valve. On the extension side, the damping action is provided by means of the piston valves. While, on the compression side, the damping action is provided by means of the bottom valve.

On extension side:
The oil in the chamber [a] flows into the chamber [b] through the orifice (I) in the valve A (sheet metal). By the resisting force of this oil, the damping action is provided. The valve A is overlapped with the valve B (leaf spring) which covers the half of the orifice. The damping action is regulated by the deflection of the valve B. Under such a condition, the bottom valve is opened and the oil in the chamber [c] flows into the chamber [b] smoothly to prevent air bubbles from being produced.

On compression side:
The oil in the chamber [b] flows by amount of oil equivalent to the volume of damper rod into the chamber [c] through the orifice in the bottom valve. By the resisting force of this oil, the damping action is provided. At this time the piston valves are opened and the oil flows from the chamber [b] into the chamber [a] smoothly.

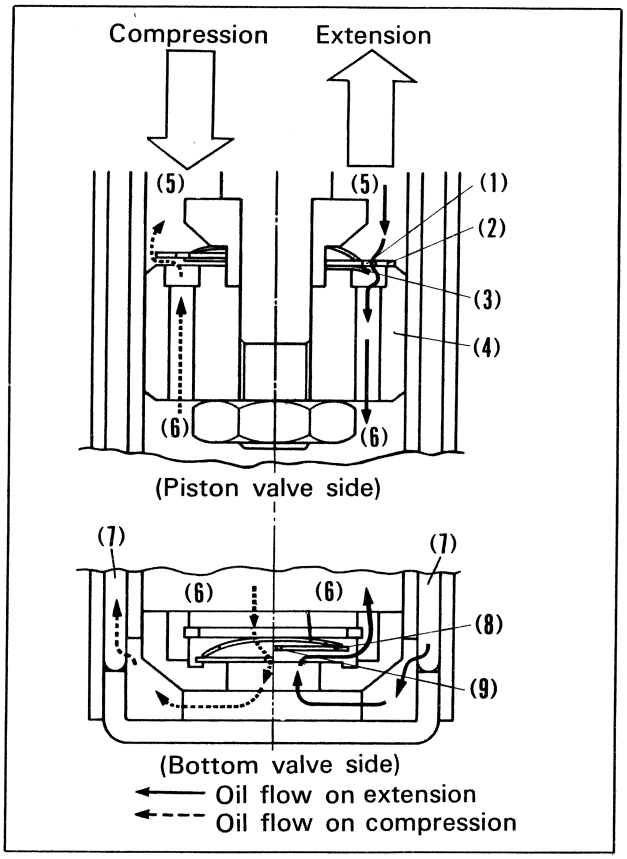


Fig. 2–27 (1) Orifice (I) (4) Piston (7) Chamber "c"
(2) Valve "A" (5) Chamber "a" (8) Bottom valve
(3) Valve "B" (6) Chamber "b" (9) Orifice (II)

Air cleaners

Air that is taken into the carburetor (cylinder) and mixed with fuel must be as free from dust as possible. If this is not done, the dust acts as an abrasive and under extreme conditions, the resulting wear will reach such proportions that it soon becomes necessary to recondition the engine. To reduce the amount of dust entering the carburetor, two air cleaners, one for each carburetor, are installed at the air entrance so all air is screened and filtered. In addition to filtering the air, the air cleaner is also designed to act as a silencer to reduce air suction noise.

Each air cleaner uses a replaceable, bellows type paper element. Both air cleaners are connected with each other by a central air passage to assure constant supply of clean air to the engine even if any one of the elements is clogged, resulting in a high efficiency. A clogged element reduces the amount of air to be taken into the carburetor, resulting in excessive fuel consumption and poor acceleration. The elements should, therefore, be cleaned periodically.

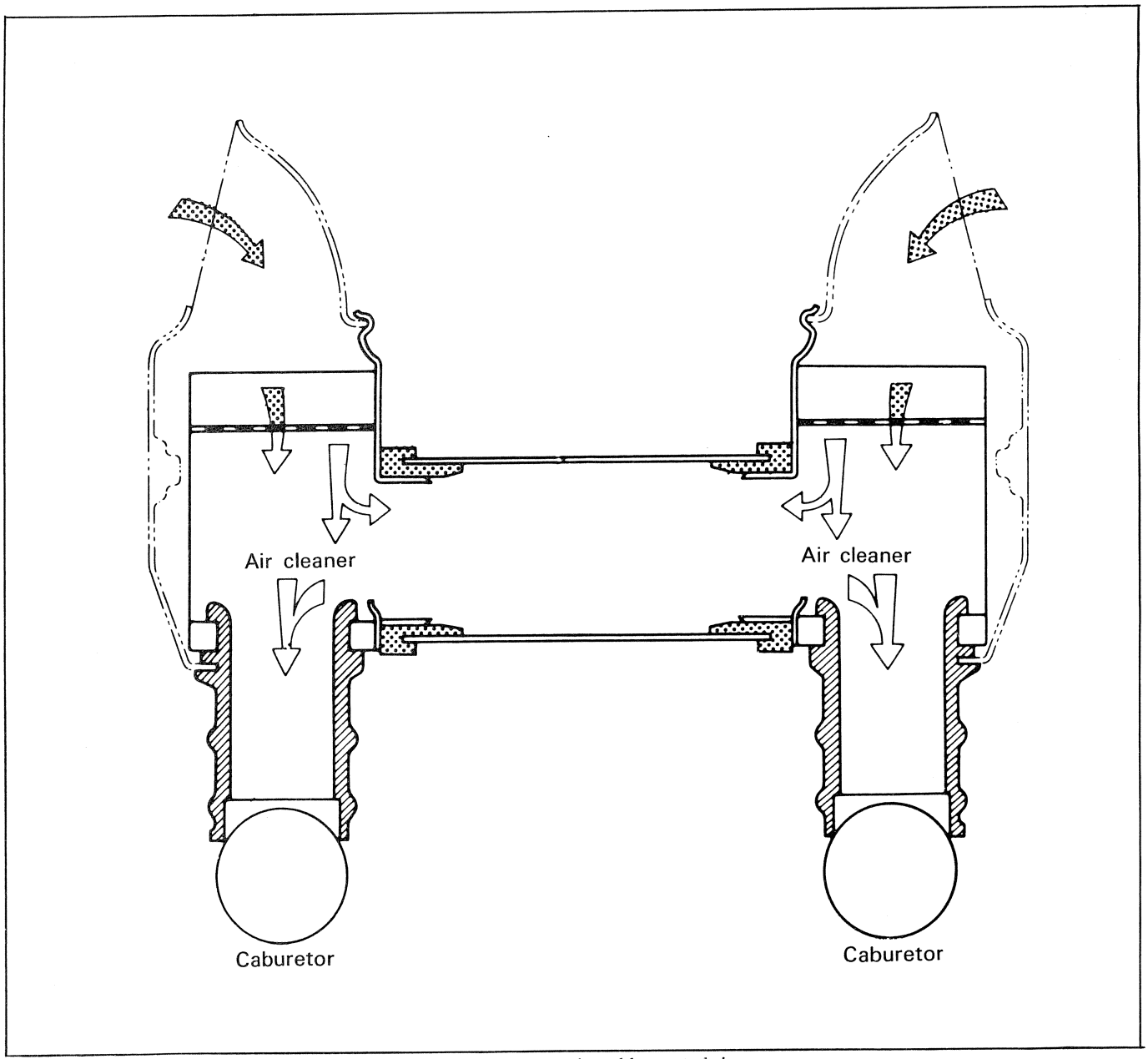


Fig. 2–28 Air cleaners communicated by central air passage

7. ELECTRICAL SYSTEM

Fuses

Three fuses are placed in the fuse box and they are easily checked by opening the seat. The main fuse is 15A fuse and the sub-fuses are 7A fuses, one for the headlight and the other for the position lamp, taillight and meter lamp, to make it easier to find circuit failure. Even if the 7A fuses are burnt down, as long as the 15A fuse is normal, the horn, turn signals, ignition switch and stop switches are operated properly. However, it is recommended that the cause be located before the damaged fuses is replaced.

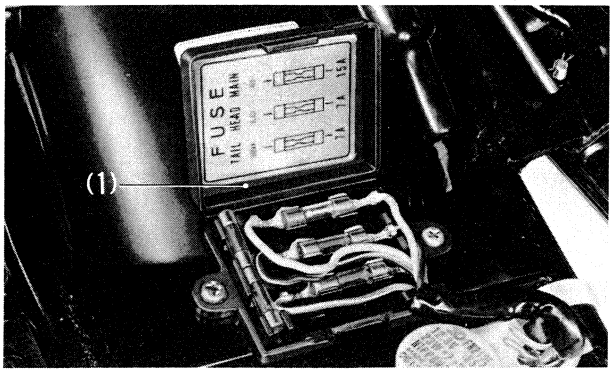


Fig. 2–29 (1) Fuse box

MEMO

III. INSPECTION AND ADJUSTMENT

This section covers the inspection and adjustment of important ones of the items involved in the MAINTENANCE SCHEDULE on page 110. For other items, see the paragraph for "Inspection" of each group.

1. TAPPETS

The tappet clearance must be adjusted when the engine is cold. For ease of service, open the seat and pull the rear fuel tank rubber mounting away from the rear tank mount. Raise the back of the fuel tank slightly.

1. Remove the tappet adjusting hole caps.
2. Remove the generator cover.
3. While slowly rotating the generator rotor counterclockwise watch the left (L) cylinder inlet valve tappet. When this tappet goes down all the way and then starts to lift, then watch for alignment of the index mark and "LT" mark. In this position, the piston in left cylinder will be at T.D.C. (top dead center) of the compression stroke, and the inlet and exhaust valves in that cylinder should be fully closed.

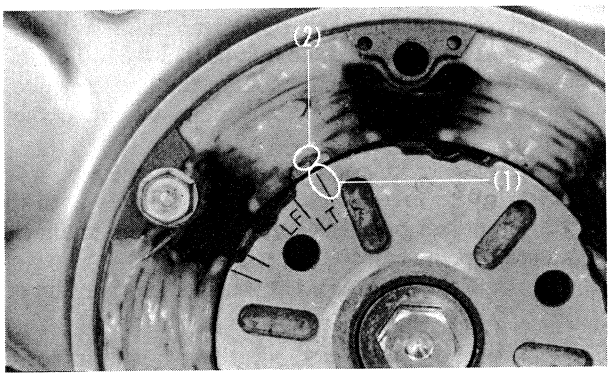


Fig. 3–1 Place piston at T.D.C. position on compression stroke
(1) "LT" mark (2) Index mark on stator

4. Check the clearance of both valves by inserting the feeler gauge between the tappet adjusting screw and the valve stem. If clearance is correct there will be slight drag or resistance as the gauge is inserted. If clearance is too close or loose, adjustment is necessary.
   The standard tappet clearance is
   In. 0.05 mm (0.002 in.)
   Ex. 0.08 mm (0.003 in.)

5. Adjustment is made by loosening the adjusting screw lock nut and turning the adjusting screw until there is slight drag on the feeler gauge. Hold the tappet adjusting screw in this position and tighten the lock nut.
   Recheck the clearance with the gauge.

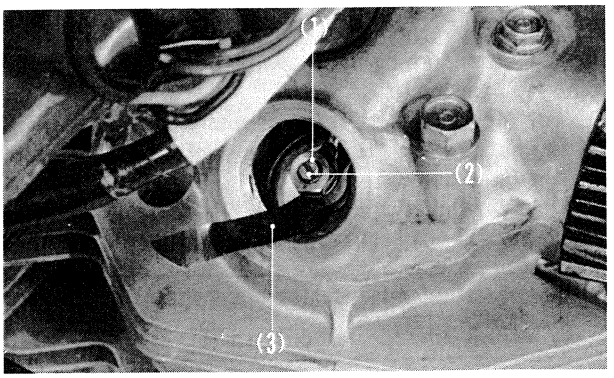


Fig. 3–2 (1) Lock nut
(2) Adjusting screw
(3) Feeler gauge

6. Turn the generator rotor 180° counterclockwise to position the right piston at top dead center. In this position the "T" mark will be aligned with the index mark.
7. Check right cylinder valve tappet clearance. The adjustment procedure is the same as described in step 5.
8. Reinstall the fuel tank.

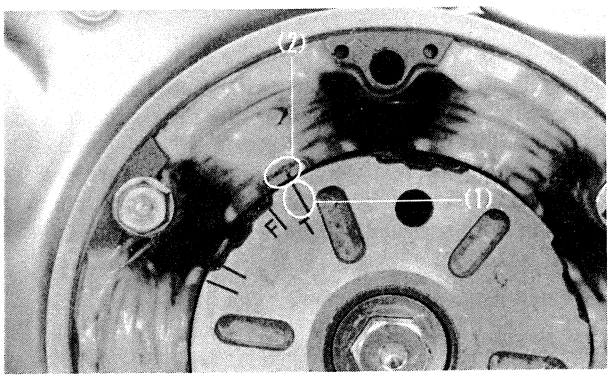


Fig. 3–3 (1) "T" mark
(2) Index mark on stator

2. CONTACT BREAKER POINT GAP AND IGNITION TIMING

Contact Breaker Point Gap Adjustment

1. Remove the contact breaker point cover and generator cover.
2. Clean and inspect the contact breaker points. Replace if worn or badly pitted. Light pitting may be removed with an ignition point file.
3. Turn the generator rotor counterclockwise until one set of contact breaker points opens to maximum clearance.

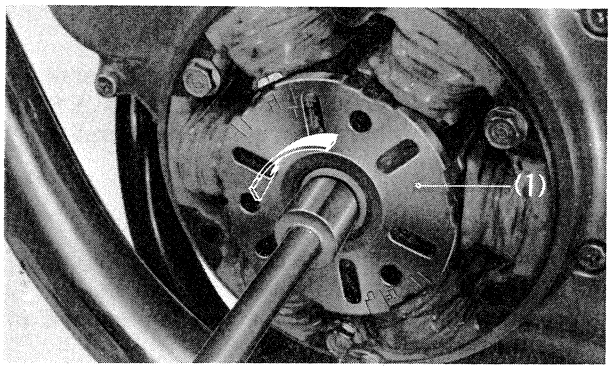


Fig. 3–4 (1) Generator rotor

4. Check contact breaker point gap with a feeler gauge. The correct gap is **0.3-0.4 mm (0.012-0.016 in.)**. If the gap is not within these limits, loosen the breaker plate locking screws and move the breaker plate to obtain the correct gap.
   Tighten the locking screws and recheck the gap.
5. Turn the generator rotor counterclockwise until the other set of contact breaker points opens to maximum clearance. Check gap and adjust if necessary.
6. Lubricate the breaker point cam with a thin film of grease.

NOTE:
Contact breaker point gap adjustment will affect ignition timing. Ignition timing must be checked after contact breaker point gap adjustment.

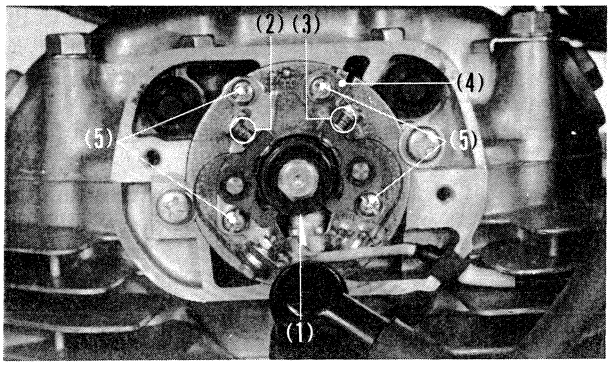


Fig. 3–5 (1) Point cam (5) Contact breaker plate locking screw
(2) L/H contact breaker point
(3) R/H contact breaker point
(4) Contact breaker plates

Ignition Timing

Check ignition timing upon completion of the contact breaker point gap adjustment.

1. Turn the generator rotor counterclockwise until the "LF" timing mark on the rotor aligns with the index mark on the generator stator.
   If left cylinder ignition timing is correct, the left breaker points will just begin to open as these marks align.

Start of advance (at crankshaft)	1,800 rpm
Full advance (at crankshaft)	3,400 rpm
Advance angle	0–12.5

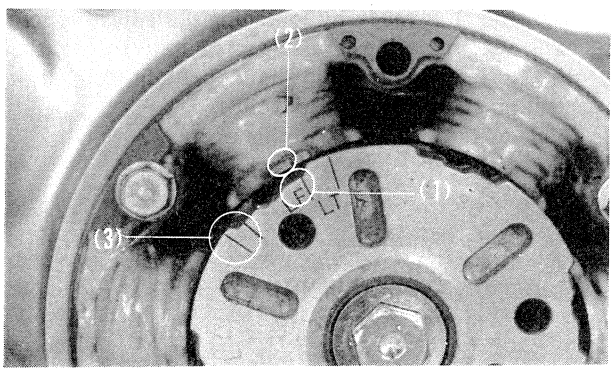


Fig. 3–6 (1) "LF" mark
(2) Index mark on stator
(3) Index marks at full advance

NOTE:
Static ignition timing may be checked with a 12V-3W continuity light. When connected as illustrated in Fig. 3-7, with the main switch in the ON position, the light will come on as the breaker points open.
Static timing is relatively accurate, but for best results a stroboscopic timing light should be used to check ignition timing in both retarded and full advanced positions.

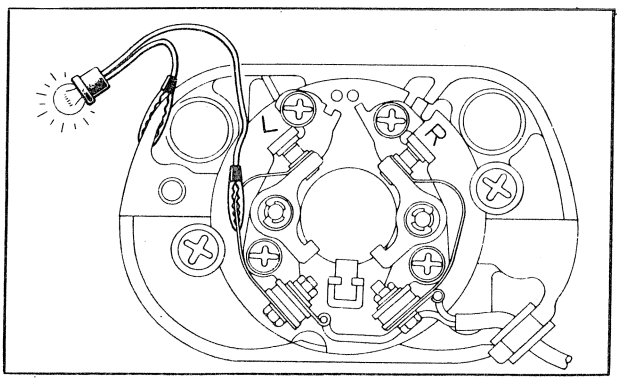


Fig. 3–7

2. If left cylinder ignition timing is incorrect, loosen the base plate locking screws and rotate the base plate to obtain correct timing. Rotate the base plate clockwise to advance timing, or counterclockwise to retard timing. Tighten the base plate locking screws and recheck left breaker point gap.
3. Turn the generator rotor counterclockwise until the "F" timing mark on the rotor aligns with the index mark on the generator stator. If right cylinder ignition timing is correct, the right breaker points will just begin to open as these marks align.
4. If right cylinder timing is incorrect, loosen the right breaker plate locking screws and increase or decrease point gap to obtain correct timing. Do not loosen the base plate locking screws. Increasing the point gap advances ignition timing. Decreasing the point gap retards ignition timing.

NOTE:
Ignition point gap must remain within limits of 0.3-0.4 mm (0.012-0.016 in.) after ignition timing has been set. If correct timing results in a point gap which is outside these limits, increase or decrease both point gaps equally to bring gaps within limits, then retime by rotating base plate.
e.g. If left point gap is set at 0.35 mm (0.014 in.) and right point gap produces correct timing at 0.42 mm (0.017 in.), and rotate base plate to time ignition.
If both point gaps cannot be adjusted within limits, replace point assemblies.

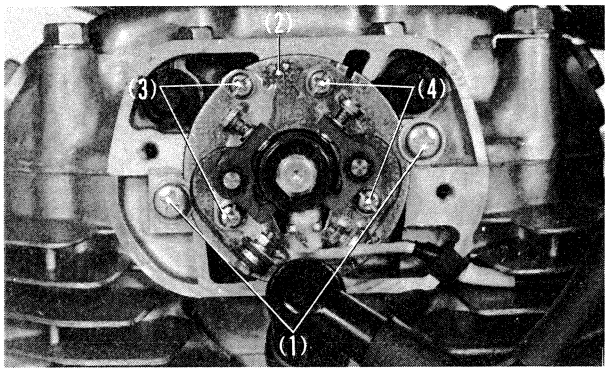


Fig. 3–8 (1) Base plate locking screws
(2) Base plate
(3) L/H contact breaker plate locking screws
(4) R/H contact breaker plate locking screws

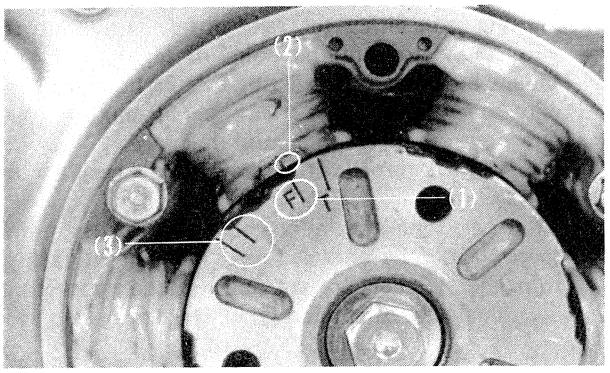


Fig. 3–9 (1) "F" mark
(2) Index mark on stator
(3) Index mark at full advance

MEMO

3. CARBURETOR

Carburetor adjustment should only be made when the engine is at operating temperature.

Checking idle speed

1. Set the idle speed to 1,200 rpm with the throttle stop screw.
   Turning the screw clockwise will increase engine speed.

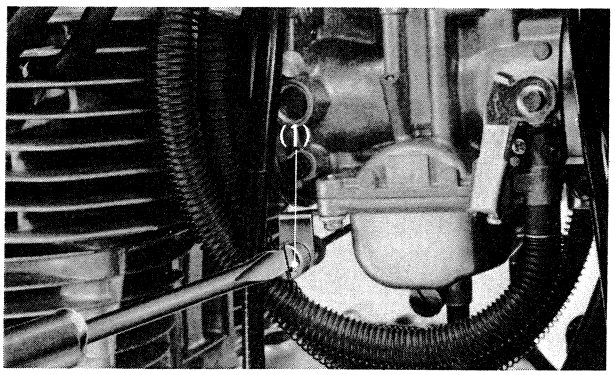


Fig. 3–10 (1) Throttle stop screw

2. Starting with either the right or left carburetor, turn each pilot screw to find the point of highest rpm; the same should be done with the opposite carburetor. Turning the pilot screw in produces a lean fuel air mixture, turning the screw out produces a rich mixture.
3. Readjust the throttle stop screw if it is necessary to rest the idle speed.
   After performing the adjustment above if the proper idling speed cannot be obtained or if the exhaust back pressures from the cylinders are not uniform, the carburetors require individual adjustment and synchronization.

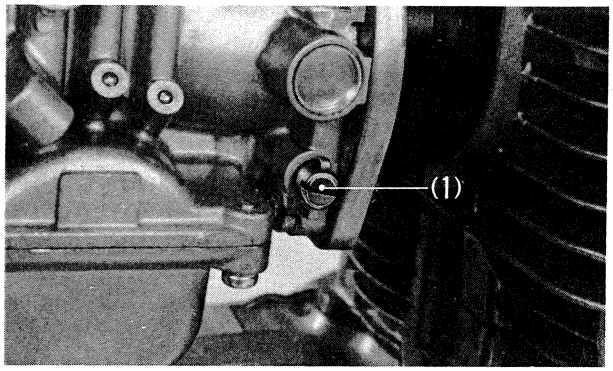


Fig. 3–11 (1) Pilot screw

Checking synchronization

1. Remove the fuel tank and connect it to the right and left carburetors by the longer fuel tubes provided for this purpose. Hold the fuel tank higher than the carburetors.
2. Remove the plugs from the right and left carburetors and attach vacuum gauges. (Tool No. 07504–3000100).

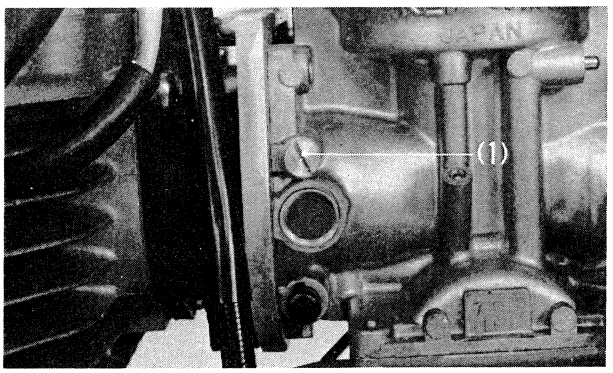


Fig. 3–12 (1) Plug

3. Start the engine and check if the pointers of the two vacuum gauges remain between **16** and **24 cmHg.** If necessary, loosen the lock nut and turn the adjusting screw. The difference in the negative pressure between the two carburetors should be within **2.0 cmHg.**

NOTE:
If each pointer fluctuate excessively, adjust it with the vacuum gauge adjuster.

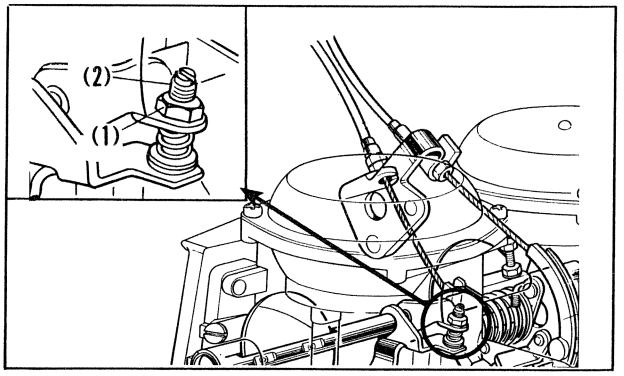


Fig. 3–13 (1) Lock nut
(2) Adjusting screw

4. Upon noting that the pointers of two vacuum gauges remain between **16** and **24 cmHg**, snap the engine two or three times.
   If the pointers come outside the specification, repeat the step 3 above.
   * If the pointers are below 15 cmHg, check the following items.
   (1) Ignition timing (see page 18)
   (2) Tappet clearance (see page 17)
   (3) Spark plug gap (see page 102)
   (4) Compression pressure (see page 30)

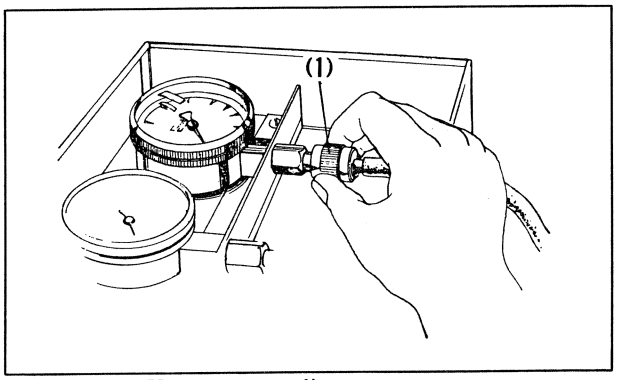


Fig. 3–14 (1) Vacuum gauge adjuster

5. Upon noting that the vacuum of the two carburetors reach the specified value, turn the throttle stop screw to obtain the standard idle speed.
6. Adjust each carburetor with the pilot screw.
7. Trun the throttle stop screw to again adjust the idle speed to **1,200 rpm**

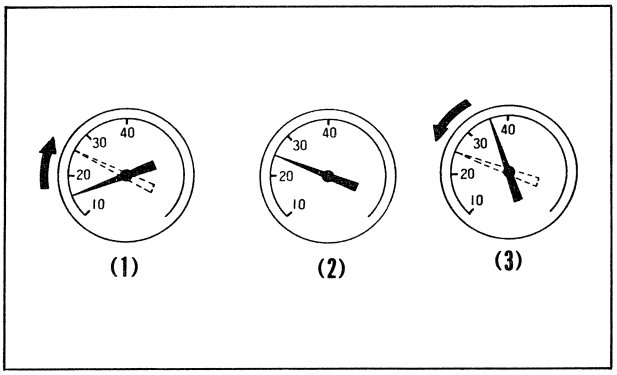


Fig. 3–15 (1) High speed (throttle too open)
(2) Standard
(3) Low speed (throttle too closed)

4. THROTTLE CABLE

Two control cables connect the throttle grip to a linkage on the carburetor operating bar. One cable opens the throttle valves, while the other cable ensures positive closure.
Standard throttle grip play is approximately 10-15° of grip rotation. This play can be adjusted at the grip play adjuster and also with the cable adjuster at the lower end of the opening cable at the throttle crank. To adjust, loosen the lock nut and turn the adjuster. Tighten the lock nut upon completion of adjustment and check for smooth operation of throttle grip through the engine range from full open to full close with the handlebar set to the extreme right and left steering positions.

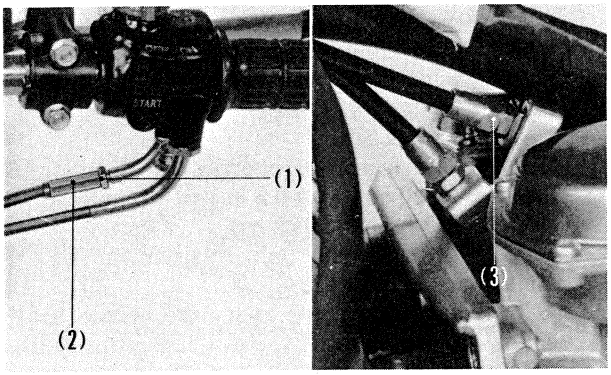


Fig. 3–16 (1) Lock nut
(2) Grip play adjuster
(3) Cable adjuster

5. CLUTCH

The normal clutch lever free play is **10-20 mm (0.4-0.8 in.)** at the lever tip.
To adjust the clutch, perform the following steps.

1. Loosen the lock nut and turn the clutch cable upper adjuster located at the clutch lever, all the way into the clutch lever bracket.

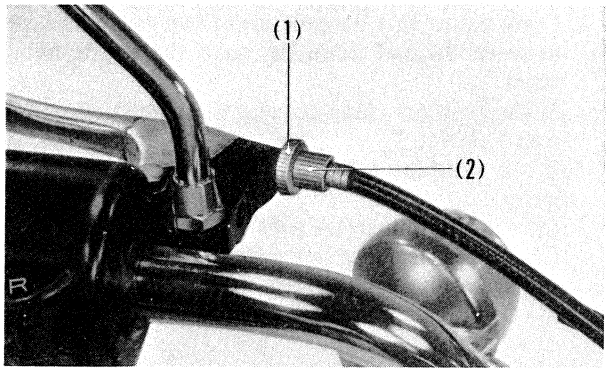


Fig. 3–17 (1) Lock nut
(2) Clutch cable upper adjuster

2. Turn the clutch cable lower adjuster located at the clutch housing, in direction (A) to loosen the clutch cable.

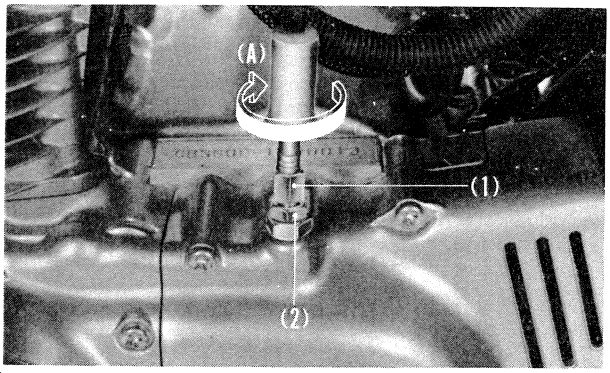


Fig. 3–18 (1) Clutch cable lower adjuster
(2) Lock nut

3. Loosen the clutch adjuster lock nut, turn the clutch adjuster in direction (B) until a slight resistance is felt.
   From this position, turn the adjuster in direction (A) ¼ turn.
   Tighten the lock nut.
4. Turn the clutch cable lower adjuster in direction (B) so that there is **10-20 mm (0.4-0.8 in.)** of the play at the clutch lever, then tighten the lock nut.
   Perform any subsequent minor adjustment with the clutch cable upper adjuster.
5. After the adjustment has been made, ensure that the clutch is not slipping and that the clutch is properly disengaging. After the engine starts, pull in the clutch lever and shift into gear, and ensure that the engine does not stall, nor the motorcycle start to creep. Gradually release the clutch lever and open the throttle. The motorcycle should start smoothly and accelerate gradually.

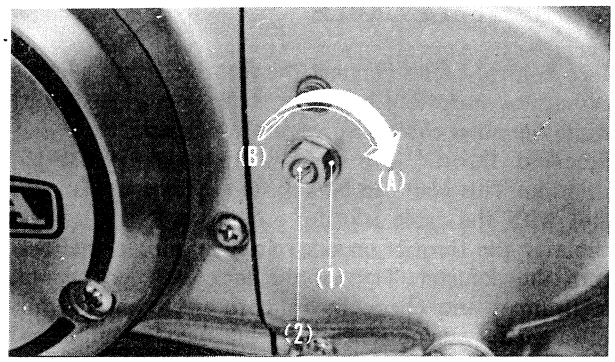


Fig. 3–19 (1) Clutch adjuster lock nut
(2) Clutch adjuster

6. CAM CHAIN

A loose cam chain will cause the valve timing to change, resulting in poor performance. It will also cause excessive engine noise.

1. Adjustment must be made when the four valves are closed completely and the tappets are free. This position occurs at 90° A.T.D.C. on the compression stroke of the left side cylinder. Rotate the generator roter counterclockwise until index mark on the stator is 90° A.T.D.C. (after 90° "LT" mark). If the valves are still lifted, rotate the rotor 360° and repeat realignment above.
2. Loosen the tensioner lock nut and the tensioner bolt. When these are loosened, the cam chain tensioner will automatically position itself to provide the correct cam chain tension.
3. Retighten the tensioner bolt and lock nut.

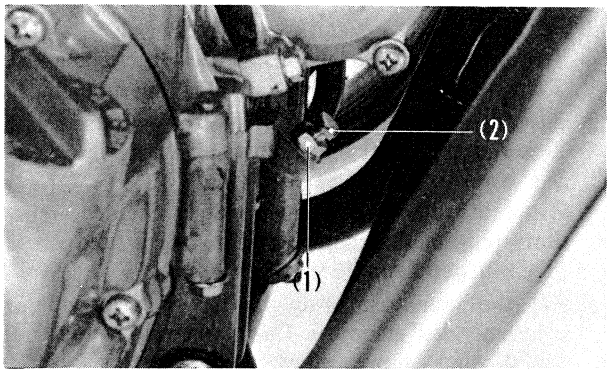


Fig. 3–20 (1) Lock nut
(2) Tensioner bolt

7. ENGINE OIL

Checking oil level and refilling

1. Remove the oil filler cap and check the oil level using the oil level gauge with the motorcycle in the up-right position.
2. The oil level should be between the upper and lower level marks. Do not screw the level gauge in.
3. If necessary, refill the crankcase with the recommended oil through the oil filler hole.
4. Again check the oil level.

* Excessive oil may cause abnormal noise and inoperative clutch.

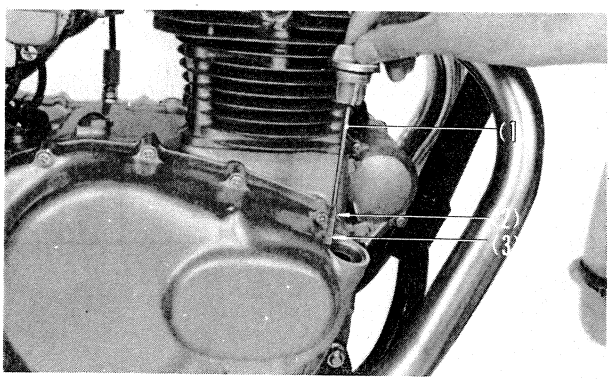


Fig. 3–21 (1) Oil level gauge
(2) Upper level mark
(3) Lower level mark

Oil Recommendation

Use only high detergent, premium quality engine oil.
The regular use of special oil additives is unnecessary and will only increase operating expenses.

NOTE:
Non-detergent and low quality oils are specifically not recommended.

Viscosity

Viscosity selection should be based on the average atmospheric temperature in riding area. Change to the proper viscosity oil whenever the changes in average atmospheric temperature require it.

Recommended oil viscosity:

General, all temperatures
SAE 10W-30 or **SAE 10W-40**

Alternate:

Above 59°F (15°C)	**SAE 30**
32° (0°) to 59°F (15°C)	**SAE 20** or **20W**
Below 32°F (0°C)	**SAE 10W**

Changing Oil

1. Remove the oil filler cap from the right crankcase cover.
2. Remove the oil drain plug with a 17 mm wrench.
3. After the oil stops draining from the crankcase, operate the kick starter several times to drain any oil which may be left in the recesses of the engine.
4. When the oil has been completely drained, reinstall the drain plug making sure that the O-ring used on the drain plug is in good condition.
5. Fill the crankcase through the oil filler opening with recommended grade oil. Check the oil level with the filler cap dipstick, however, when making this check, do not screw in the cap. Oil level should be between the upper and lower level marks on the dipstick. When checking the oil make certain that the motorcycle is in upright and level position.

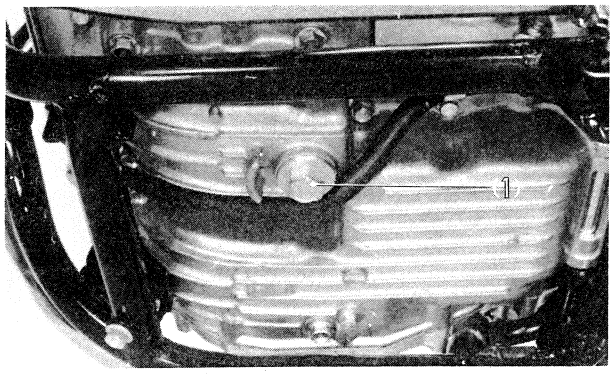


Fig. 3–22 (1) Drain plug

Unit: liter (U.S. qt.)

Amount of oil to be filled	When changing oil	**1.5 (1.6), approx.**
	When separating crankcase	**2.0 (2.1), approx.**

8. OIL FILTER SCREEN AND ROTOR

A dual system of metal screening and centrifugal oil filtering is utilized to provide engine components with highly purified oil to minimize wear and improve engine cooling. The oil filters are serviced in the following manner.

1. Drain the engine oil.
2. Remove the foot rest, the muffler and the kick starter pedal.
3. Loosen the right crankcase cover mounting screws and remove the crankcase cover and cover gasket.
4. Remove the snap ring and disassemble the oil filter cap from the oil filter rotor.

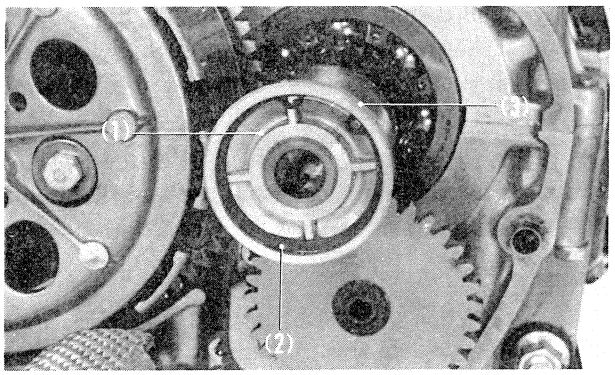


Fig. 3–23 (1) Oil filter cap
(2) Snap ring
(3) Oil filter rotor

5. Clean any sludge from the center of the oil filter rotor.

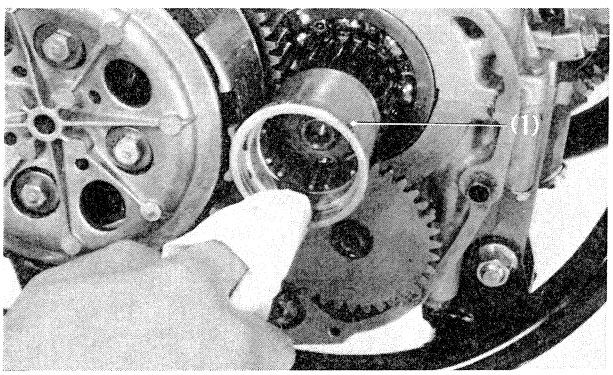


Fig. 3–24 (1) Oil filter rotor

6. Remove the screen filter for cleaning. Wash the screen filter in clean solvent and then install.
7. Reassemble all parts removed in the proper order. If the crankcase cover gasket is damaged, replace it with a new gasket.

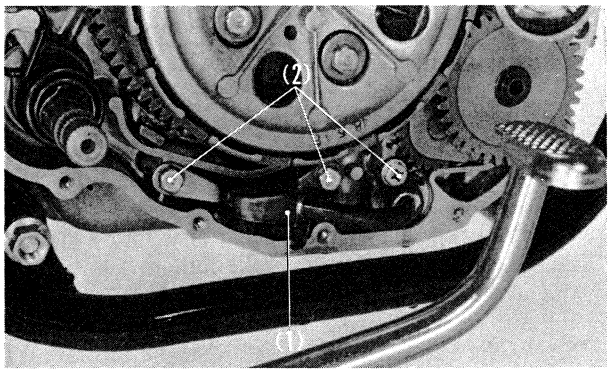


Fig. 3–25 (1) Screen filter
(2) Screen filter attaching bolts

NOTE:
* **When assembling the oil filter cap and the oil filter rotor ensure that either of the cap ribs is aligned with the rotor index marks.**

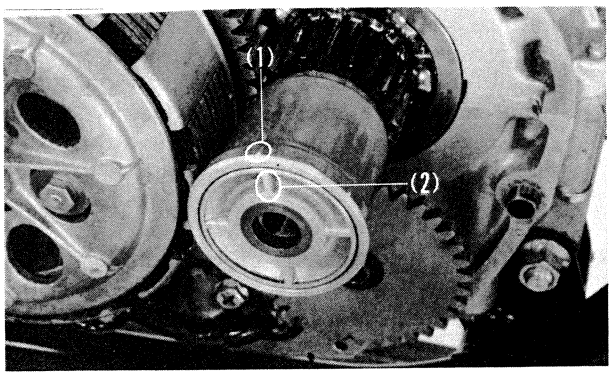


Fig. 3–26 (1) Index mark
(2) Rib

9. FRONT BRAKE

(Disc Type)

Replenishing brake fluid

Remove the reservoir cap, washer and diaphragm, and whenever the level is lower than the level mark engraved inside the reservoir, fill the reservoir with **DOT 3 BRAKE FLUID** up to the level mark. Reinstall the diaphragm and washer, and tighten the reservoir cap securely.

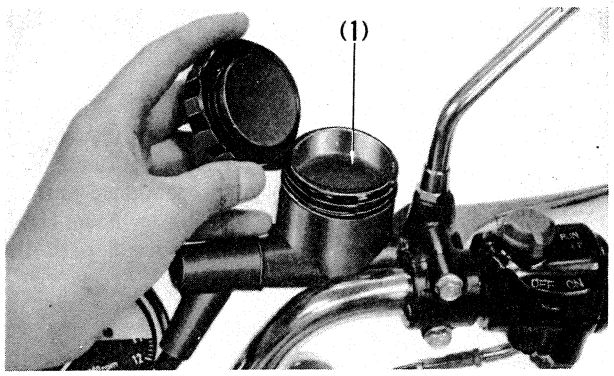


Fig. 3–27 (1) Level mark

Adjusting brake caliper

Whenever the brake pads are replaced, the brake caliper must be adjusted. This adjustment is made in the following manner, so that there is a small clearance between the fixed friction pad and the brake disc.

1. Raise the front wheel off the ground using a suitable prop.
2. Loosen the caliper stopper bolt lock nut.
3. Using a suitable screw driver, turn the stopper bolt in direction (A) until the friction pad contacts the brake disc. When the wheel is rotated, slight drag should be noticed.
4. While rotating the front wheel, turn the stopper bolt in direction (B) until the front wheel rotates freely.
5. Turn the stopper bolt ½ turn in direction (B) further and tighten the lock nut.

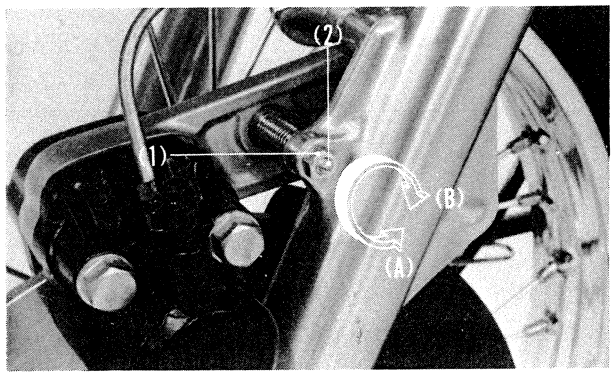


Fig. 3–28 (1) Stopper bolt lock nut
(2) Stopper bolt

Bleeding the brake system

The brakes must be bled with great care subsequent to work performed on the brake system, when the lever becomes soft or spongy, or when lever travel is excessive. The procedure is best performed by two mechanics.

1. Remove the dust cap from the bleeder valve and attach bleeder hose.
2. Place the free end of the bleeder hose into a glass container which has some hydraulic brake fluid in it so that the end of the hose can be submerged.
3. Fill the reservoir using only the recommended brake fluid. Screw the cap partially on the reservoir to prevent entry of dust.
4. As shown at right (Fig. 3–30B), attach a rubber of about 15 mm thick to the end of the handle grip to decrease the stroke as measured at the tip of the handle lever.
5. Pump the brake lever several times until pressure can be felt, holding the lever tight, open the bleeder valve by about one-half turn and squeeze the lever all the way down.
   Do not release the lever until the bleeder valve has been closed again. Repeat this procedure until bubbles cease to appear in the fluid at the end of the hose.
6. Remove the bleeder hose, tighten the bleeder valve and install the bleeder valve dust cap.
7. Do not allow the fluid reservoir to become empty during the bleeding operation as this will allow air to enter the system again. Replenish the fluid as often as necessary while bleeding.
8. Check for proper effect of bleeding and absence of leaks in the front brake lines while holding pressure against the brake lever. Replenish fluid in the reservoir when bleeding is completed. Reinstall the diaphragm, washer and reservoir cap and tighten.

When the hydrulic brake system has been drained, it should be first filled as outlined below.

1. Fill the fluid reservoir.
2. Open the bleeder valve by one-half turn, squeeze the brake lever, close the valve and release the brake lever. This procedure must be repeated in this sequence until hydraulic fluid begins to flow through the bleeder hose. Having filled the hydraulic system with fluid, proceed with the actual bleeding operation.

NOTES:

* **Brake fluid which has been pumped out of the system must not be used again.**
* **Care must be taken, as brake fluid will damage the paint finish and instrument lenses.**

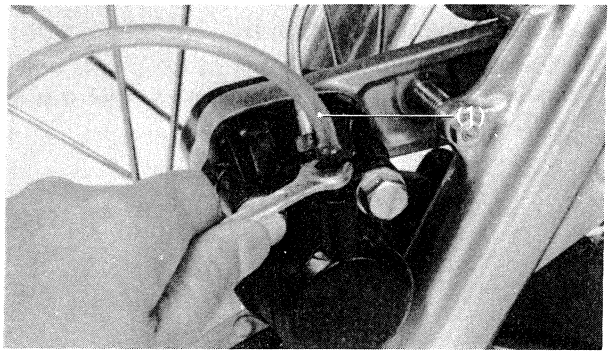


Fig. 3–29 (1) Bleeder hose

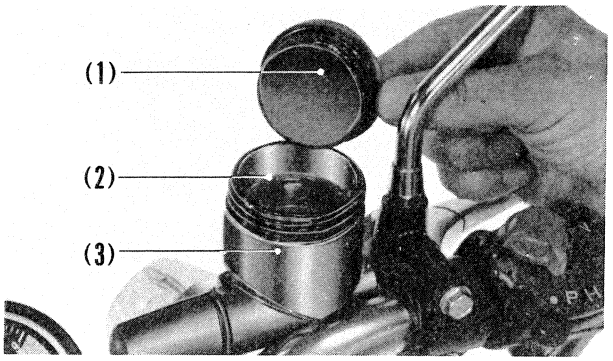


Fig. 3–30A (1) Diaphragm
(2) Level mark
(3) Reservoir

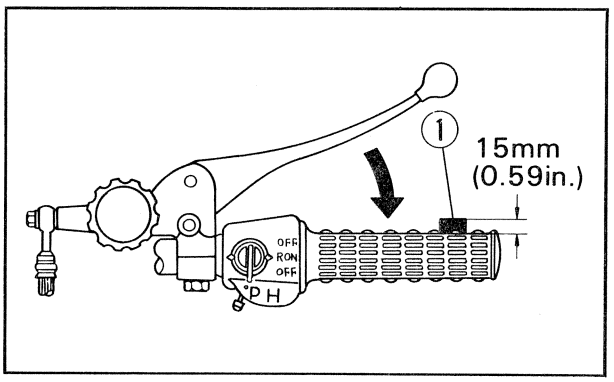


Fig. 3–30B (1) Rubber

(Drum Type)

1. Raise the front wheel off the ground by placing a support block under the engine, spin the front wheel by hand and measure the travel the front brake lever must be moved before the brake starts to take hold. The lever free play should be **20–30 mm (0.8–1.2 in)** at the end of the brake lever.

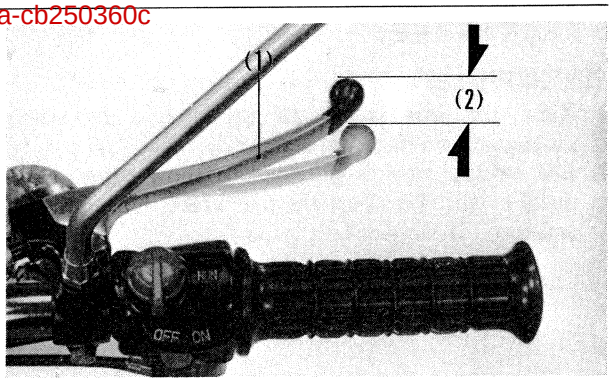


Fig. 3–31 (1) Front brake lever
(2) Lever free play

2. Normally the adjustment can be made at the front brake arm on the front brake panel.
First loosen the lock nut and then turn the front brake adjusting nut. Turning the nut in the clockwise direction (A) will decrease the brake lever play and turning in the counterclockwise direction (B) will increase the play.

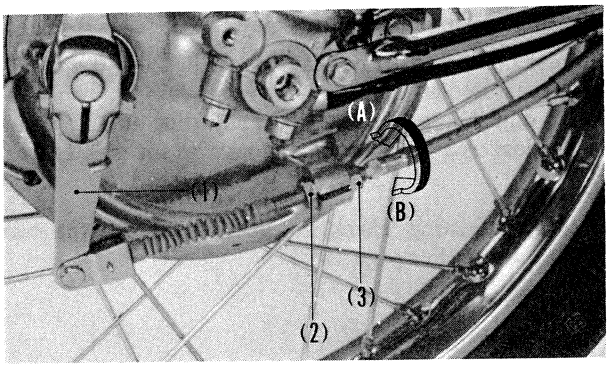


Fig. 3–32 (1) Front brake arm
(2) Lock nut
(3) Adjusting nut

3. Minor adjustment can also be made with front brake cable adjuster on the front brake lever by turning in the same direction as above.

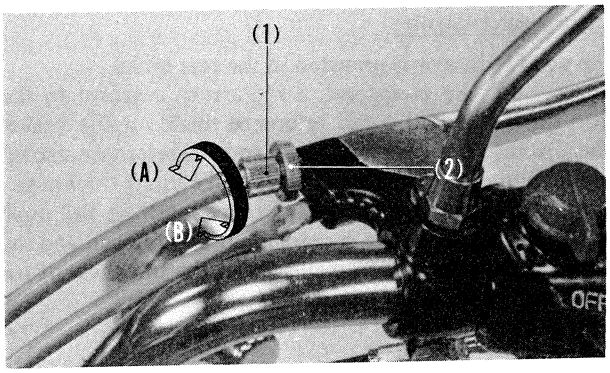


Fig. 3–33 (1) Front brake cable adjuster
(2) Lock nut

Brake wear indicator

The wear indicator is provided in the front brake.
When the brake is applied, a red arrow, adjacent to the brake arm, moves toward a red reference mark on the brake panel. The distance between the arrow and the reference mark, on full application of the brake, indicates brake lining thickness.
If the arrow aligns with the reference mark on full application of the brake, the brake shoes should be removed and inspected for wear. Replace the brake shoes, if the thickness of the lining is **2.0 mm (0.08 in)** or less.

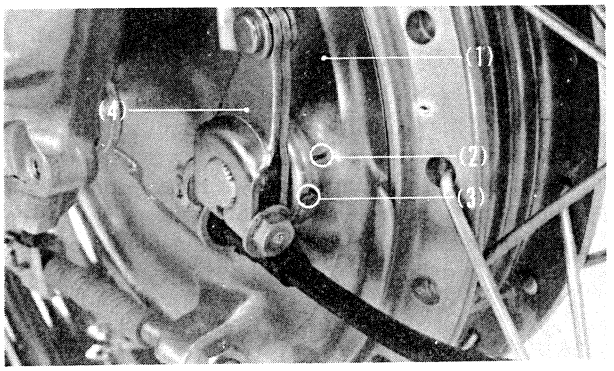


Fig. 3–34 (1) Front brake panel
(2) Reference mark
(3) Arrow mark
(4) Front brake arm