

12. Loosen the upper crankcase mounting bolts. (Fig. 3-73)
13. Unscrew the lower crankcase mounting bolts and separate the lower crankcase from the upper crankcase. (Fig. 3-74)
14. Raise the transmission mainshaft and remove the primary sprocket and then remove the primary chain from the primary sprocket. (Fig. 3-75)
15. Remove the crankshaft from the upper crankcase. (Fig. 3-76)
16. Unscrew the connecting rod cap mounting bolts and remove the bearing cap from the large end, and then remove the connecting rod from the crankshaft. (Fig. 3-77)

c. Inspection

1. Measuring the bend of the crankshaft.

Support both ends of the crankshaft on V blocks and check the run-out at the center journal by rotating the crankshaft and taking a reading with a dial gauge. The amount of run-out is 1/2 of the true indicated reading (TIR) on the dial gauge. If the run-out is greater than 0.002 in. (0.05 mm), the crankshaft should be straighten with a press. (Fig. 3-78)

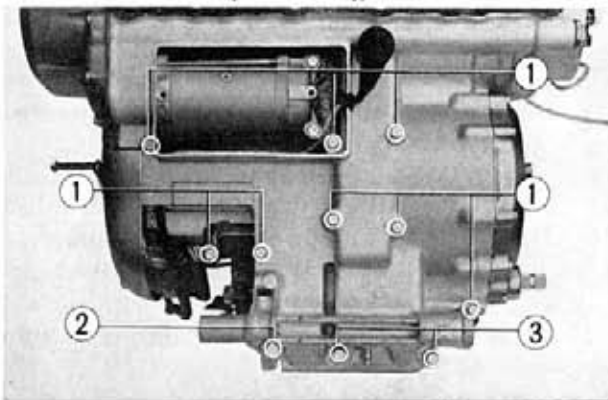


Fig. 3-73 ① 6mm bolts ② 10mm bolt ③ 8mm bolts

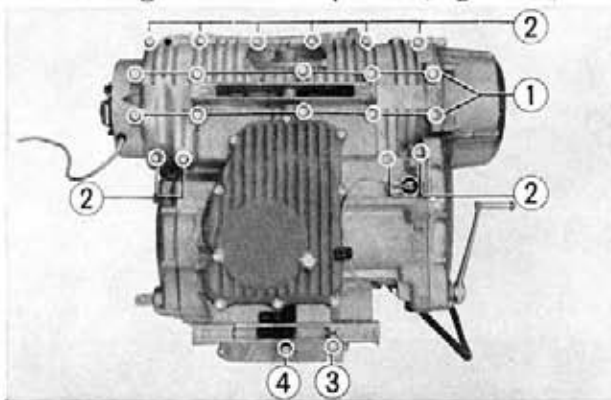


Fig. 3-74 ① 8mm bolts ② 6mm bolts ③ 10mm nut ④ 8mm nut

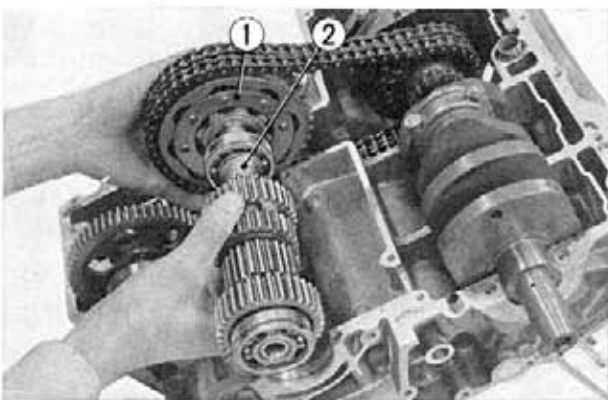


Fig. 3-75 ① Primary sprocket ② Transmission mainshaft

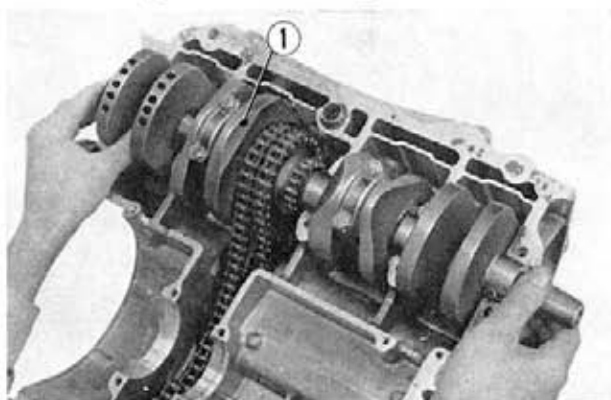


Fig. 3-76 ① Crankshaft

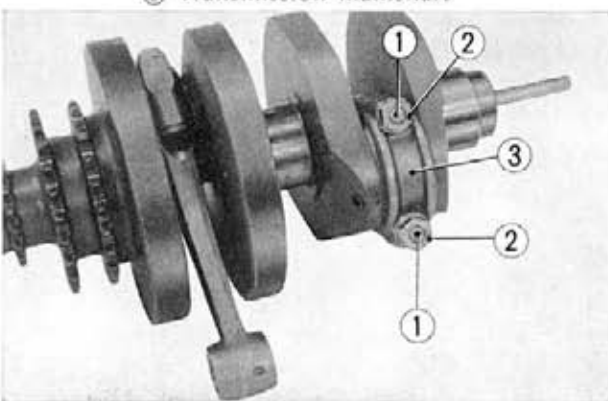


Fig. 3-77 ① Connecting rod bolts ② Connecting rod nuts ③ Connecting rod

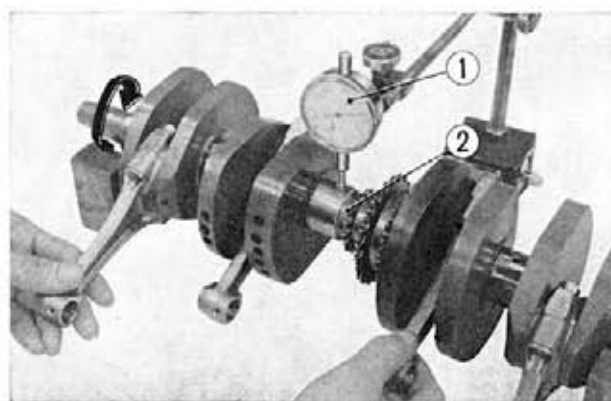


Fig. 3-78 ① Dial gauge ② Crankshaft

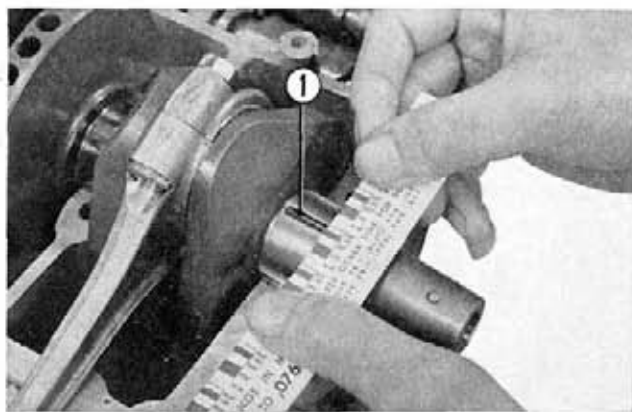


Fig. 3-79 ① Press gauge

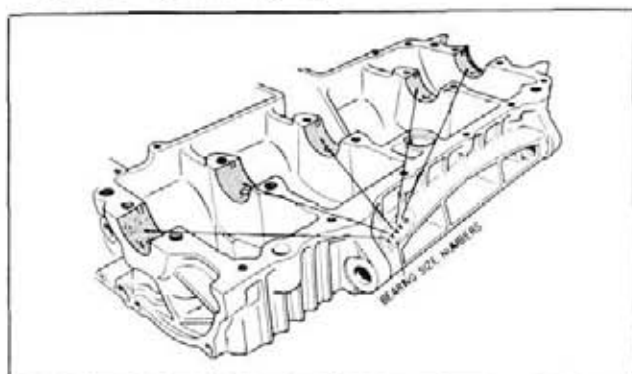


Fig. 3-80

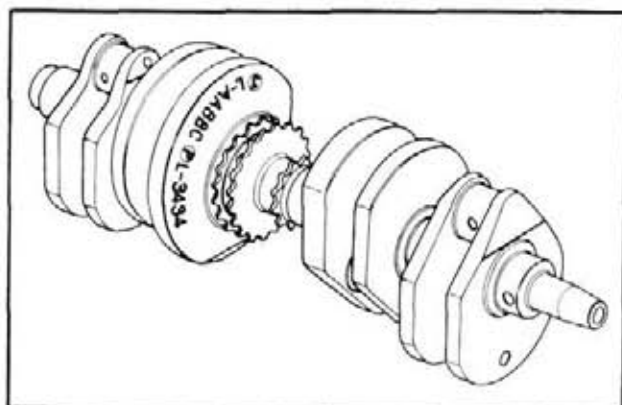


Fig. 3-81

2. Measuring the wear of the crankshaft journals

- Remove the crankshaft and clean the crankshaft journal.
- Cut the press gauge material to the length of bearing parallel to the crankshaft. Stay clear of the oil hole.
- Assemble the crankshaft, lower crankcase and torque down the mounting bolts. Next, disassemble the lower crankcase, and check the gauge which had been flattened by comparing it with the scale on the package of the press gauge. (Fig. 3-79)

Measure the gauge at the widest point; also note the different in width at both ends. If the bearing clearance is larger than 0.0032 in. (0.08 mm), the bearing should be replaced with new part.

The standard bearing clearance should be 0.0008~0.0018 in. (0.02~0.046 mm).

Note: 1. Do not turn the crankshaft while making this measurement.

2. The bearing must be replaced in set.

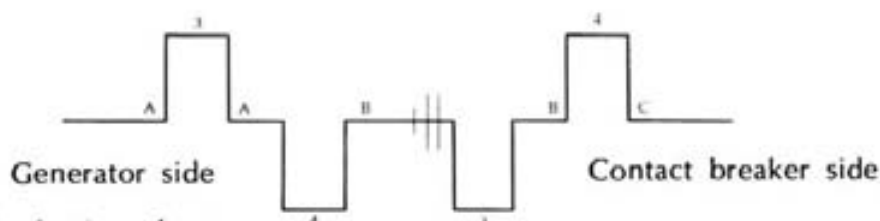
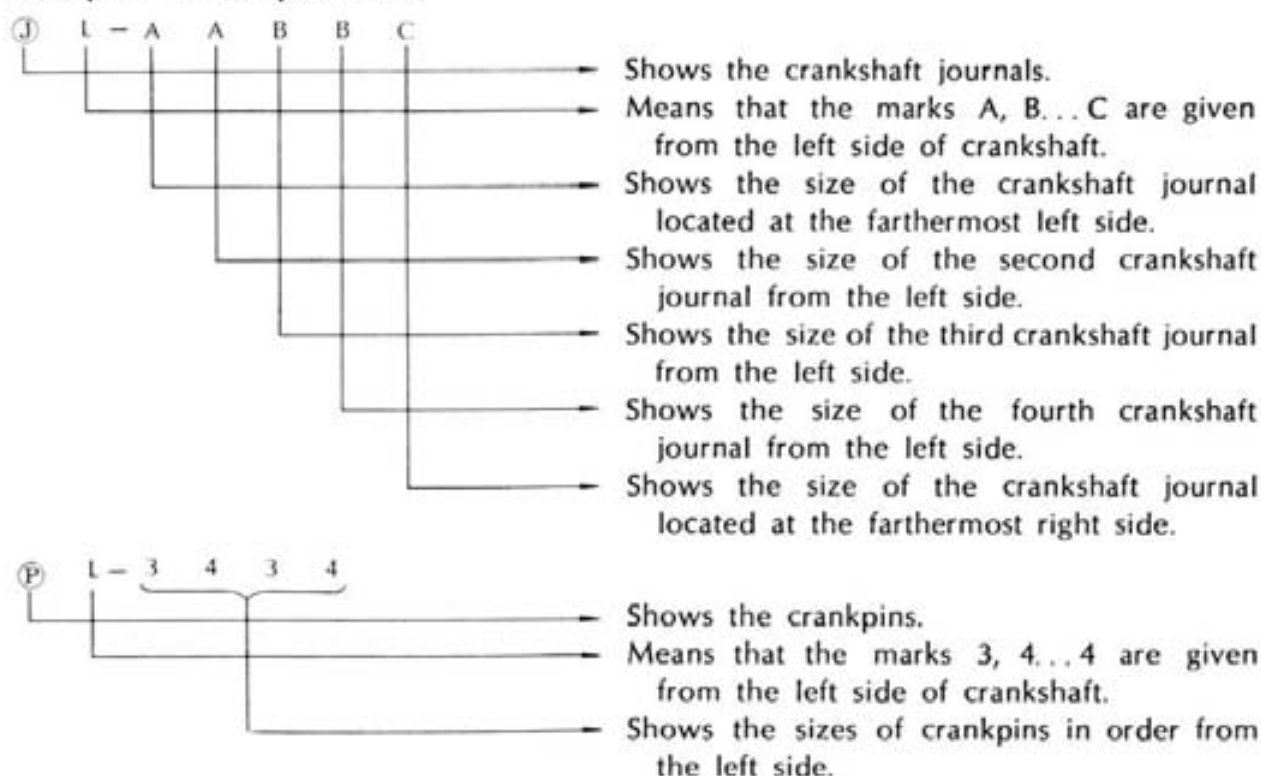
- The bearings are select fitted by the following procedures.

- There are alphabet letters stamped on the forward section of the upper crankcase hanger bolt inserts. The stamped letter indicates the bearing size. Bearings are numbered sequence, starting from the right side. (Fig. 3-80)
- Crankshaft Bearing

The type of bearings as explained here is applicable from the engine No. CB750 E1015587 and thereafter.

The size marks of crankshaft journals were changed from ㄥ (I) □ (RO) 八 (HA) and 二 (NI) to A, B and C. These marks are stamped on the side of the crank weight on the drive sprocket side together with the crankpin size marks. (Fig. 3-81)

Description of stamped marks



Bearing metal selection charts

The bearing metals of crankshaft journals and crank pins are respectively available in four selective sizes. They are selective-fitted so that a proper oil clearance can be obtained. When replacing a bearing, selecte the bearing metal of the correct size according to the bearing metal selection charts below. As a rule, use the bearing metal having the same mark put on the metal used hitherto

Crankshaft Journal Bearing Metal Selection Table

Marking	Crankcase			Crankshaft			Bearing			
	A	B	C	A	B	C	Black	Brown	Green	Yellow
Dimension (mm)	39.000	39.008	39.016	36.000	35.995	35.990	1.5002	1.4998	1.4994	1.4990
	39.008	39.016	39.024	35.995	35.990	35.985	1.4998	1.4994	1.4990	1.4986
Oil clearance (μ)										
20-41	A			A			Yellow (13318-300-013)			
22-43	A			C			Green (13317-300-013)			
25-46	A			B			Yellow (13318-300-013)			
20-41	B			A			Green (13317-300-013)			
22-43	B			B			Green (13317-300-013)			
25-46	B			C			Brown (13316-300-013)			
20-41	C			A			Brown (13316-300-013)			
22-43	C			B			Brown (13316-300-013)			
25-46	C			C			Black (13315-300-013)			

- e. Check the respective journal for damage or uneven wear. If the journal is out-of-round or tapered in excess of **0.002 in. (0.05 mm)**, the crankshaft should be replaced with new part.
- f. When a new crankshaft is used as a replacement, select the proper size bearings referring to the selection table.
- g. When the bearing is mounted into the crankcase, the top of the bearing should be extended above the case mounting flange by **0.0027~0.0039 in. (0.068~0.098 mm)**.

Caution :

The shell of the bearing is very thin, therefore, care should be exercised that it is not damaged during installation. Bearing which is deeply scored, having a poor fit or when there is a large foreign object imbedded in the bearing, it should be replaced with a new bearing. Further, repairs of the listed below should not be attempted.

- a. Adjusting with a shim
 - b. Repairing with a scraper
 - c. Use of red or bluing to check the bearing contact.
 - d. Correcting the clearance by filing the connecting rod or the connecting rod cap.
 - e. Applying emery paper on the bearing surface in an attempt to correct the bearing.
4. Measuring the connecting rod bearing
(Method using micrometer and inside dial gauge)
- a. Accurately measure the crank pin diameter with the micrometer.
Take the measurement in both vertical and horizontal direction at the front, center and rear.
 - b. Assemble the bearing into the connecting rod and torque the cap to the specified value, **14.5 ft-lbs (2 kg-m)**, and measure the bearing inside diameter parallel to the rod at the front, center and rear locations.

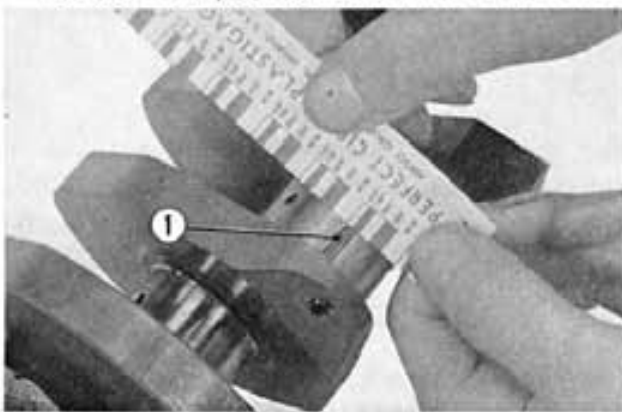


Fig. 3-82 ① Press gauge

(Press gauge method)

- a. Remove the connecting rod cap and clean all oil from the bearing and pin.
- b. Cut the press gauge to width of the bearing and place it on top and parallel to the pin, staying clear of the oil hole.
- c. Assemble the connecting rod on the crankshaft and torque the rod cap to the specified torque, **14.5 ft-lbs (2 kg-m)**.
- d. Disassemble the connecting rod bearing and measure the flattened gauge by comparing it to the scale on the package of the gauge. (Fig. 3-82)

The clearance is taken as the average value between the lowest and the highest readings. The standard bearing clearance is **0.0008~0.0018 in. (0.02~0.046 mm)**.



Fig. 3-83-1

If the clearance is beyond **0.0032 in. (0.08 mm)**, the bearing should be replaced with new part.

- Numbers (3, 4, 5) are stamped on the side surface of the crank weight, this indicates the crank pin size. (Fig. 3-81)
- The numerical figures stamped on the connecting rod indicates the size of the connecting rod large end. Select the proper size bearing by referring to the table on the next page. The bearings are color coded on the end surface.

Crank Pin Bearing Metal Selection Table

Marking	Connecting Rod			Crank Pin			Bearing			
	1	2	3	1	2	3	Black	Brown	Green	Yellow
Dimension (mm)	39.000	39.008	39.016	36.000	35.995	35.990	1.5002	1.4998	1.4994	1.4990
	39.008	39.016	39.024	35.995	35.990	35.985	1.4998	1.4994	1.4990	1.4986
Oil clearance (μ)										
20-43	1			3			Yellow (13218-300-013)			
22-43	1			5			Green (13217-300-013)			
25-46	1			4			Yellow (13218-300-013)			
20-41	2			3			Green (13217-300-013)			
22-43	2			4			Green (13217-300-013)			
25-46	2			5			Brown (13216-300-013)			
20-41	3			3			Brown (13216-300-013)			
22-43	3			4			Brown (13216-300-013)			
25-46	3			5			Black (13215-300-013)			

Connecting rods (Weight identification)

The connecting rods are carefully selected in weight to minimize the vibration of engine. The rods of the same weight should be used as a set. This marking method is applied to the engine No. E 1026594 and thereafter.

When replacing a connecting rod, select the connecting rod according to the following table, if any, on the old rod and then select the connecting rod bearing metal having the same fit mark on the old metal. The weight identification mark is as shown in Fig. 3-83-2.

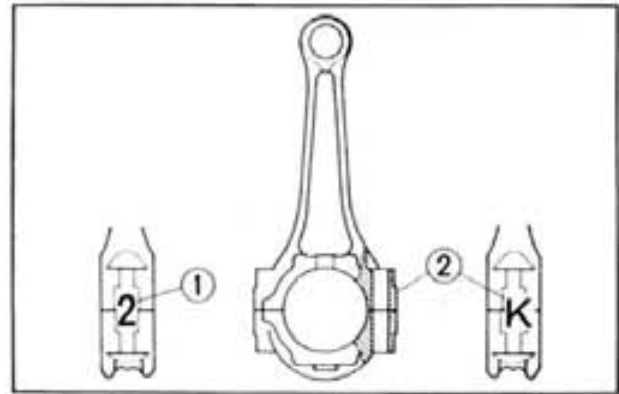


Fig. 3-83-2 ① Tolerance identification mark (Metal fit mark)
② Weight identification mark

Weight identification marks

Mark	Used parts	
	Mark	Parts No.
A B C D	D	13204-300-000
E F	F	13206-300-000
G H J K	H	12208-300-000

d. Reassembly

1. Assemble the cam chain and primary chain on the crankshaft and assemble it into the upper crankcase.
2. Assemble the primary chain on the primary sprocket and install the sprocket on the main shaft. (Fig. 3-84)
3. Install the two dowel pins, oil pass collar and an "O" ring on the upper crankcase and apply a uniform coating of liquid packing on the mating flange. (Fig. 3-85) Carefully set the lower crankcase on top, and install the mounting bolts and torque in the pattern shown in Fig. 3-86 to a value of 16.6~18.1 ft-lbs (2.3~2.5 kg-m) for 8 mm hex. bolts and next, tighten the 6 mm hex. bolts.

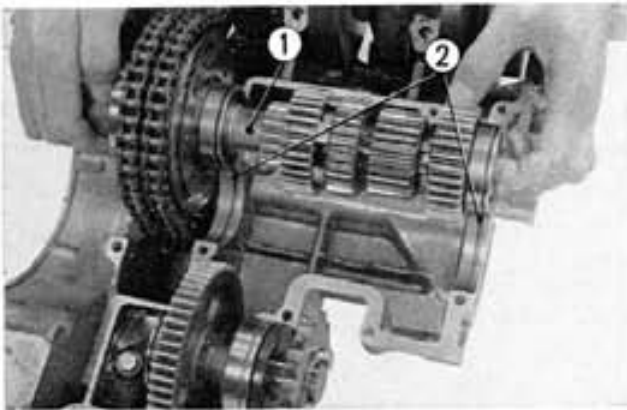


Fig. 3-84 ① Transmission mainshaft
② Bearing set rings

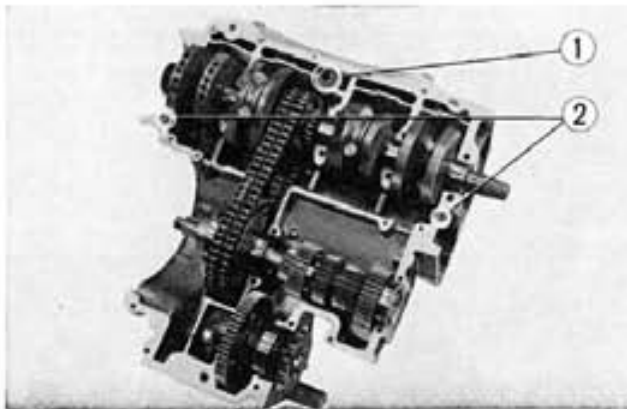


Fig. 3-85 ① Oil pass collar & "O" ring
② Dowel pins

4. Turn the crankcase assembly and torque down the upper crankcase.
5. Install the countershaft bearing and then assemble the gear change positive stopper, drum stopper and the gear shift arm (Fig. 3-70).
6. Install the clutch (refer to page 60~61).

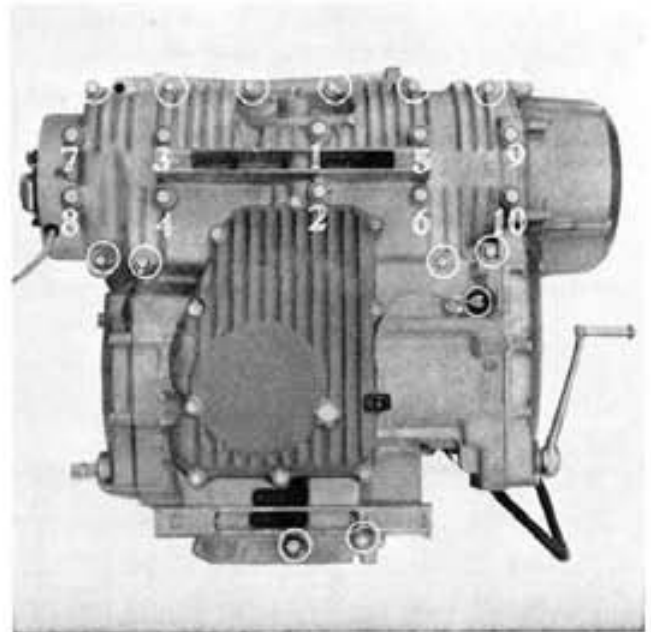


Fig. 3-86 Tightening sequence

7. Mount the spark advancer shaft and install the spark advancer.

Note: Pin on the back side of the advancer must fit into the crankshaft pin hole. (Fig. 3-87)

8. Mount the contact breaker assembly plate, special washer and tighten the 6 mm nuts.
9. Install the starting motor reduction gear, and the starting clutch gear.
10. Install the AC generator with the mounting bolt and torque to 72.3ft-lbs (10kg-m).
11. Install the cylinder and cylinder head in accordance with page 36-38.

3-7 PRIMARY DRIVE

a. Description

The power is transmitted from the crankshaft to the primary driven sprocket through the two single row chains and further transmitted to the transmission through the clutch.

The crankshaft speed is reduced to the ratio of 1.708 between crankshaft sprocket and primary driven sprocket.

The primary tensioner is incorporated to reduce chain vibration.

b. Disassembly

1. Remove the cylinder head, cylinder in accordance with section 3-3 b on page 32~35.
2. Remove the piston in accordance with section 3-5 b on page 43.
3. Remove the crankcase in accordance with section 3-6 b on page 46~47.
4. Raise the transmission mainshaft and remove the primary driven sprocket from the mainshaft and then remove the primary chain from the primary driven sprocket. (Fig. 3-88)
5. Raise the crankshaft and remove the primary drive chain from the crankshaft.
6. Remove the primary chain tensioner from the lower crankcase. (Fig. 3-89)

c. Inspection

1. Checking the primary drive chain

The check of the primary drive chain stretch can be made without disassembling the engine.

- a. Remove the drain plug and drain the oil from the crankcase.

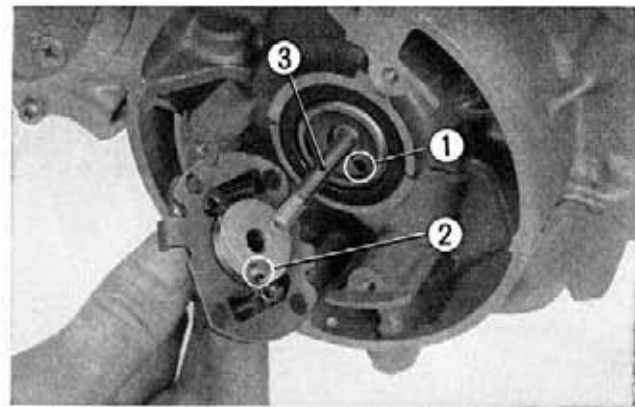


Fig. 3-87 ① Pin hole ② Spark advancer pin ③ Spark advancer shaft

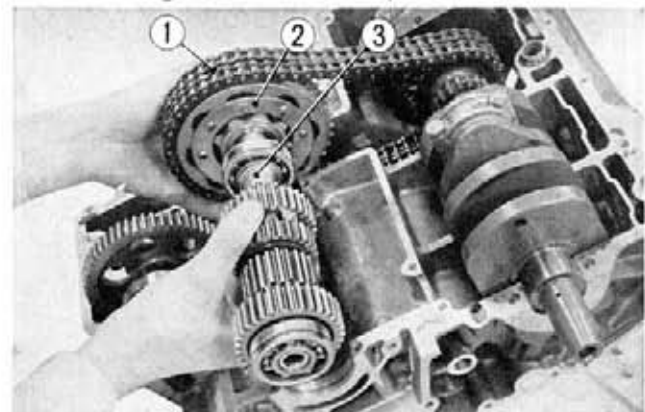


Fig. 3-88 ① Primary chain ② Primary sprocket ③ Transmission mainshaft

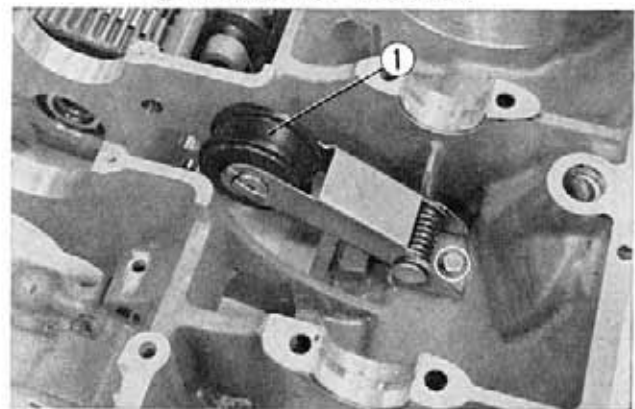


Fig. 3-89 ① Primary chain tensioner

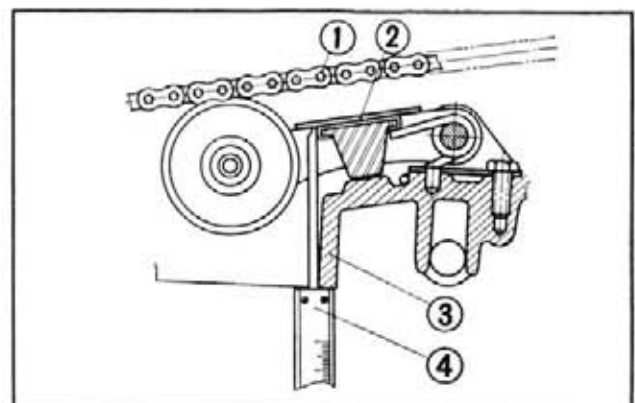


Fig. 3-90 ① Primary chain ② Primary chain tensioner ③ Lower crankcase ④ Vernier caliper

- b. Remove the ten oil pan mounting bolts and drop the oil pan.
- c. Measure the distance between the primary chain tensioner bracket and the oil pan mounting flange (Fig. 3-90) with the vernier caliper.

If the dimension is over 2.756 in. (70 mm), the chain should be replaced.

2. Check the rubber roller on the tension for wear, damage or deterioration and replace if defective.

d. Reassembly

1. Assemble the primary drive chain in the reverse procedure of disassembly.
2. Assemble the crankcase in accordance with section 3-6 d on page 51-52.
3. Assemble the piston in accordance with section 3-5 d on page 45.
4. Assemble the cylinder, cylinder head in accordance with section 3-3 d on page 36-38.

3-8 KICK STARTER

a. Description

When the kick starter pedal is operated by kicking the starter spindle, turns in the direction of the arrow as shown in the Fig. 3-91.

The kick starter flange which is mounted on the starter spindle contains the kick starter pawl which is hooked in the groove of the kick starter gear. Operating the kick starter transmits the rotary force from the spindle through the starter gear and clutch to turn the crankshaft. When the engine starts, the rotary force produced by the crankshaft is transmitted from the crankshaft to the clutch outer, and to the kick starter gear where the kick starter pawl becomes disengaged. (Fig. 3-91)

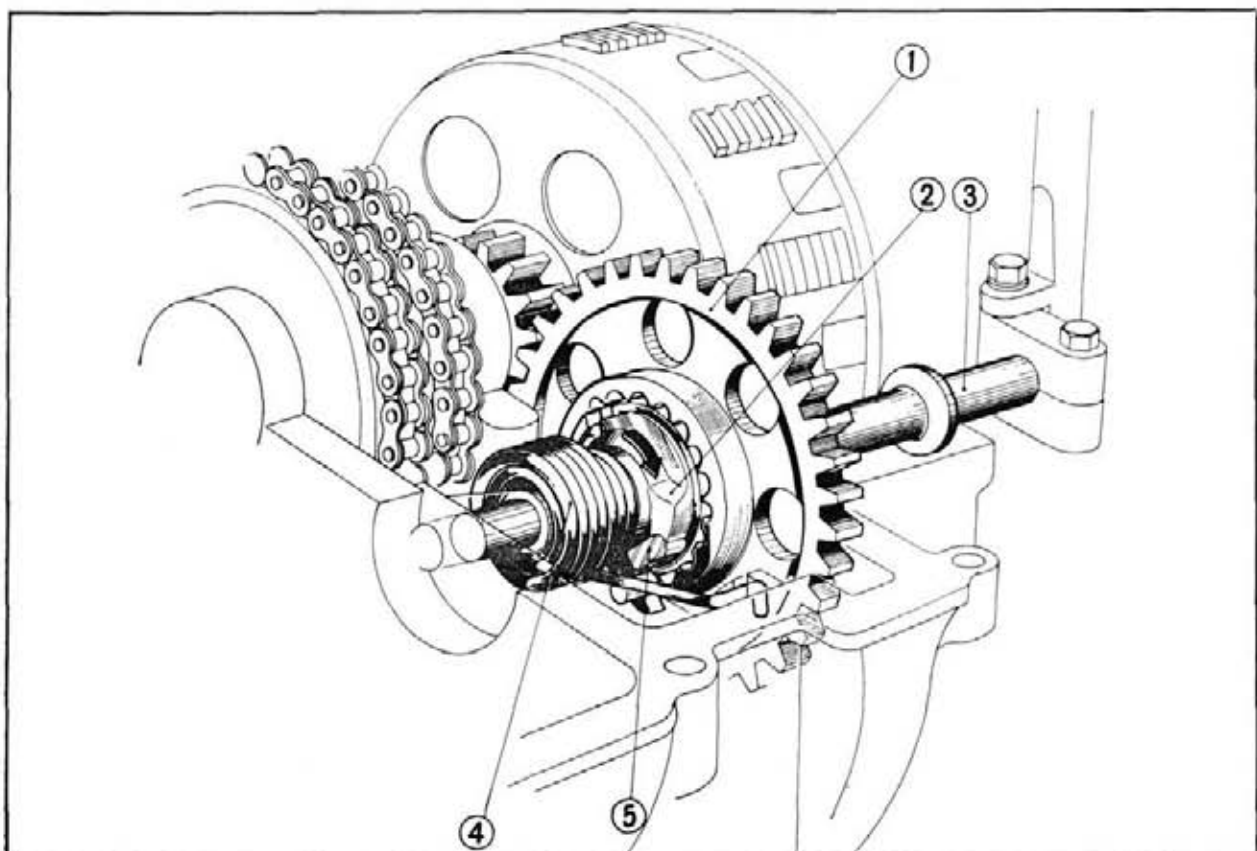


Fig. 3-91

- ① Kick starter gear
② Kick starter flange

- ③ Kick starter spindle
④ Kick starter return spring

- ⑤ Kick starter pawl

b. Disassembly

1. Disassemble the cylinder head, and cam chain tensioner in accordance with section 3-3 b on page 32~35.
2. Disassemble the crankcase in accordance with section 3-6 b on page 46~47.
3. Remove the kick starter shaft stopper pin and remove the kick starter shaft. (Fig. 3-92)
4. Remove the kick starter gear assembly. (Fig. 3-93)
5. Remove the kick starter return spring.
6. Remove the kick starter ratchet spring from the kick starter flange and then remove the kick starter pawl.

c. Inspection

1. Check to make sure that the kick gear turns smoothly in one direction and locks in the opposite direction.
2. Check the bore of the kick gear with an inside dial gauge and the starter shaft with a micrometer and if the dimension is beyond the serviceable limit shown in the table below, the parts should be replaced. (Fig. 3-94)

Item	Serviceable limit in. (mm)
Kick gear bore	0.7904 (20.075)
Starter shaft diameter	0.7847 (19.930)

d. Reassembly

1. Assemble the kick gear, kick starter flange and return spring together into the lower crankcase. (Fig. 3-95)

Note : Hook the end of the return spring on the case, force the starter flange toward the bottom with a screwdriver to hook it on the pin.

2. Install the kick starter spindle (Fig. 3-96).
3. Install the kick spindle stopper pin (Fig. 3-96)
4. Assemble the crankcase in accordance with section 3-6 d on page 51~52.
5. Assemble the cylinder, cylinder head and cam chain tensioner in accordance with section 3-3 d on page 36~38.

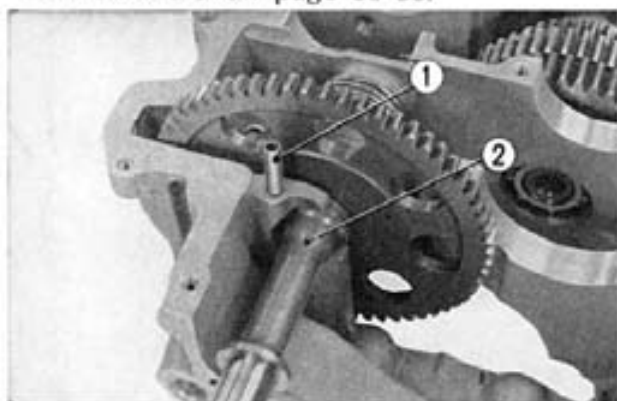


Fig. 3-96 ① Kick spindle stopper pin
② Kick starter spindle

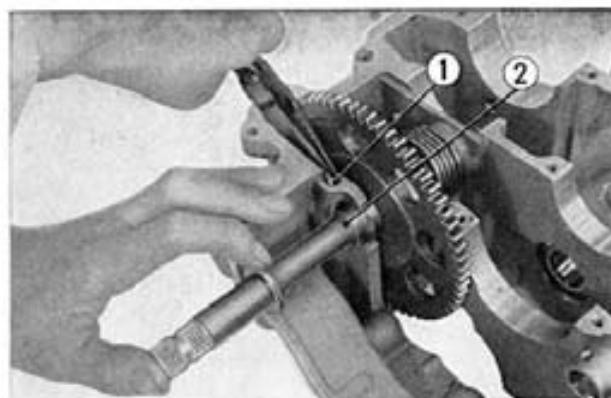


Fig. 3-92 ① Kick starter shaft stopper pin
② Kick starter shaft

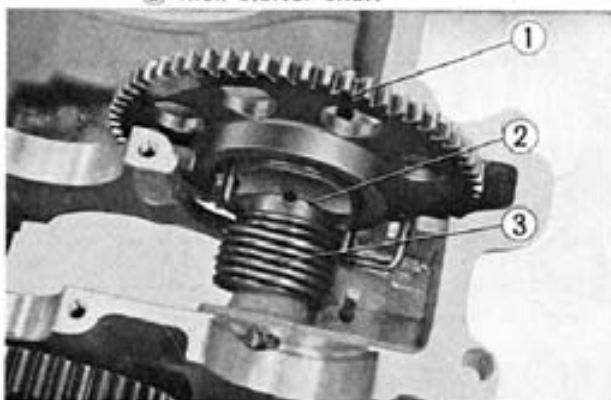


Fig. 3-93 ① Kick starter gear
② Kick starter flange
③ Kick starter return spring

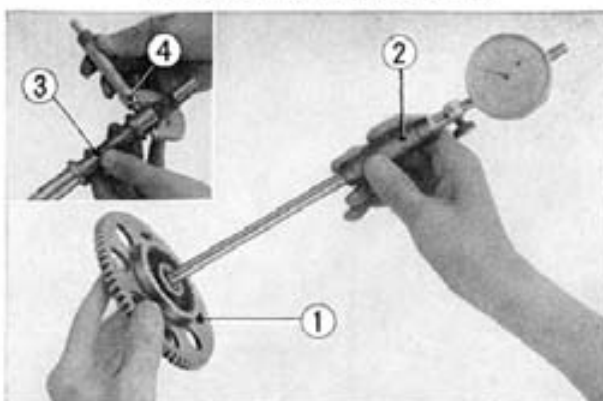


Fig. 3-94 ① Kick gear ③ Kick starter shaft
② Inside dial gauge ④ Micrometer

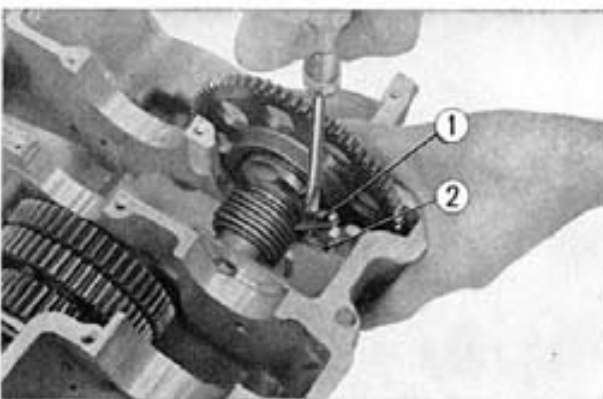


Fig. 3-95 ① Kick starter flange
② Return spring

CLUTCH

GROUP

4

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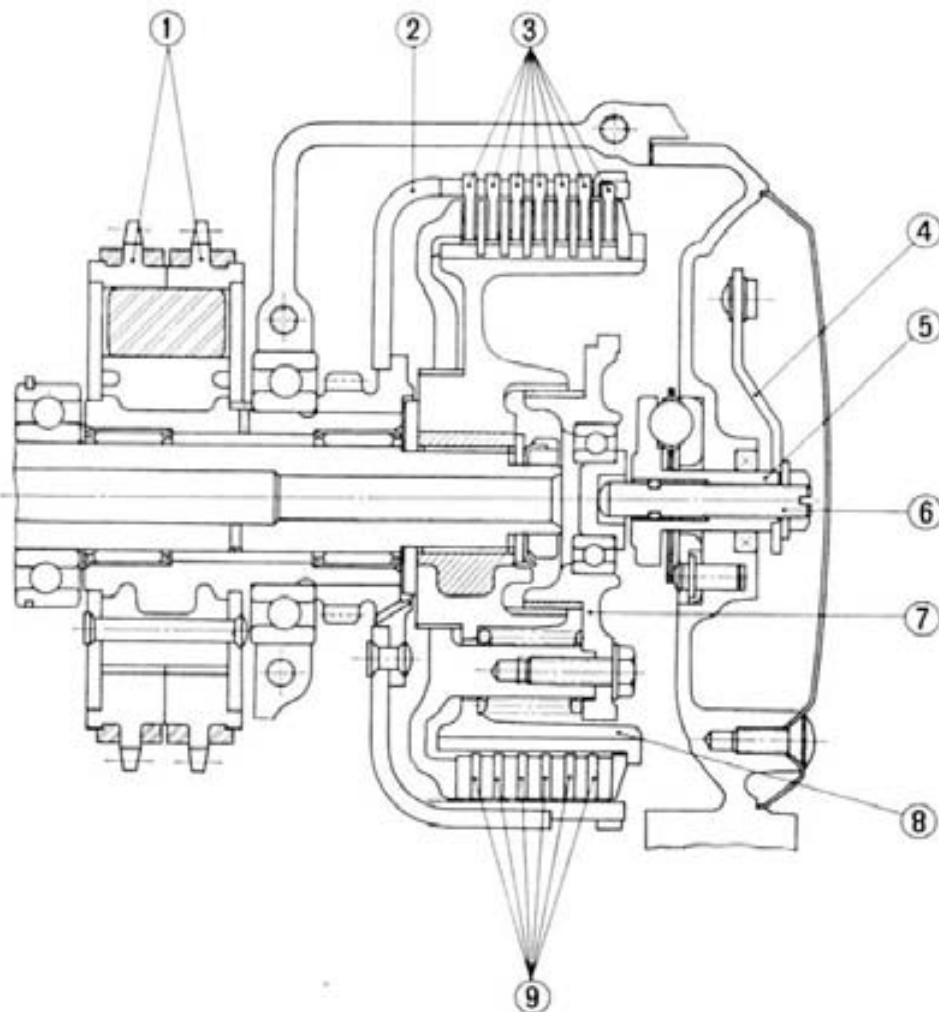


Fig. 4-1 ① Primary driven sprocket ④ Clutch lever ⑦ Clutch lifter plate
 ② Clutch outer ⑤ Clutch release lever ⑧ Clutch center
 ③ Friction disc ⑥ Clutch adjusting bolt ⑨ Clutch plate



4-1 GENERAL DESCRIPTION

DESCRIPTION

The function of the clutch is to transmit power from the crankshaft to the transmission mainshaft by the friction between the clutch friction discs and clutch plates.

The clutch is a multiple disc wet type clutch with a friction disc bonded to a core having a good heat dissipating characteristic.

The wet type clutch is lubricated by oil which also serves to dissipate the heat generated by the clutch. Friction discs have long life due to minimum of wear.

The clutch consists of seven cork mold discs, six clutch plates and four clutch springs, contained within the clutch outer. The torque applied at the clutch lever rotates the clutch release lever which moves inward to disengage the clutch. The actuation of clutch can be adjusted by the clutch adjusting bolt. (Fig. 4-1)

SPECIFICATIONS

Item	Standard value	Serviceable limit
Friction disc thickness	0.1347~0.1409 in. 3.42~3.58 mm	0.122 in. 3.1 mm
Clutch spring free length	1.2575 in. 31.94 mm	1.201 in. 30.5 mm
Clutch spring load	214.3~226.7 lbs/0.984 in. 97.2~102.8 kg/25 mm	198.5 lbs/0.984 in. 90 kg/25 mm
Clutch lever free play at the lever end	0.4~1.0 in. 10~25 mm	—

DIAGNOSIS

Trouble	Probable Causes	Remedy
Clutch slippage	1. No play in the clutch lever 2. Weak or none uniform clutch pressure plate spring 3. Worn or glazed friction disc	Adjust the clutch lever. Replace the weak spring. Replace.
Poor clutch engagement	1. Excessive clutch lever play 2. Warped friction disc 3. Warped pressure plate 4. Bent main shaft	Adjust clutch lever. Replace. Replace. Replace.

4-2 REPAIRING PROCEDURE

a. Disassembly

1. Remove the clutch cover and disconnect the clutch cable from the clutch lever. Remove the clutch case mounting screw, and remove the case. (Fig. 4-2)
2. Unscrew the four clutch lifter mounting bolts and remove the clutch lifter plate and spring. (Fig. 4-3)
3. Remove the clutch lock nut using the lock nut box wrench (Tool No. 07916-2830000) and then remove the tongued washer and spring washer, followed by the clutch center. (Fig. 4-4)

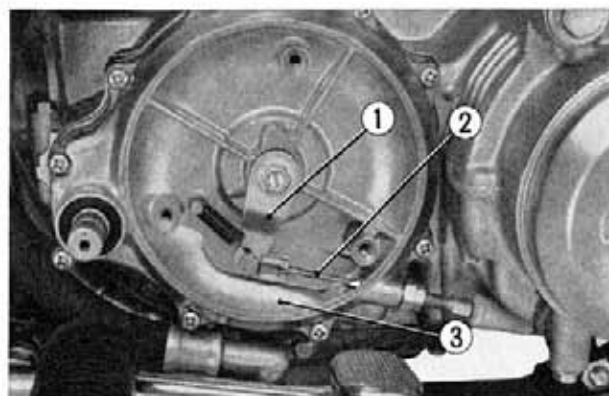


Fig. 4-2 ① Clutch lever
② Clutch cable
③ Clutch case

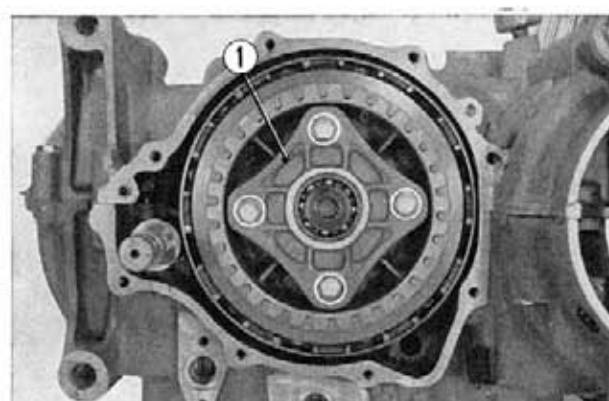


Fig. 4-3 ① Clutch lifter plate

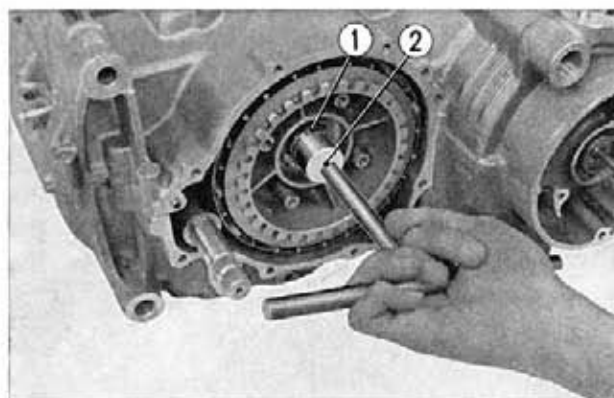


Fig. 4-4 ① Clutch lock nut
② Box wrench

4. Remove the clutch friction disc B and clutch outer ring from the clutch outer and then remove the friction discs A and clutch plates. (Fig. 4-5)
5. Remove the clutch washer, clutch pressure plate and pull off the clutch outer from the main shaft.

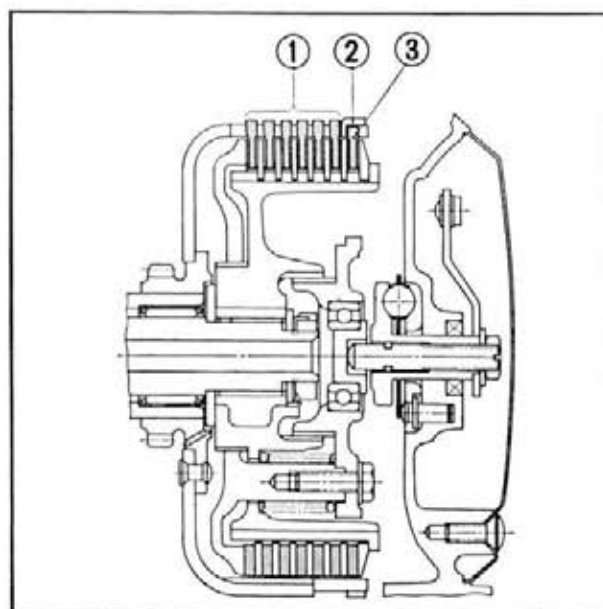


Fig. 4-5 ① Clutch friction disc A
② Clutch outer ring
③ Clutch friction disc B

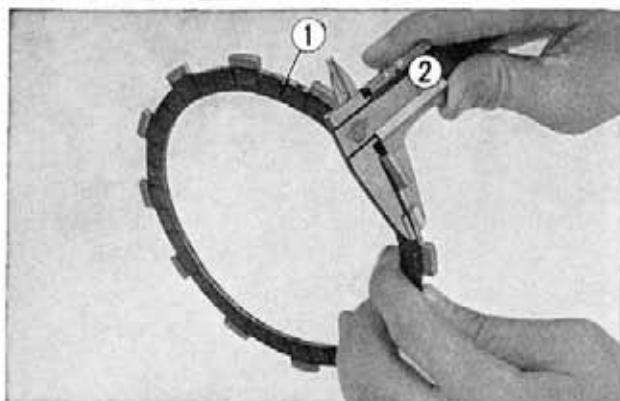


Fig. 4-6 ① Friction disc
② Vernier caliper

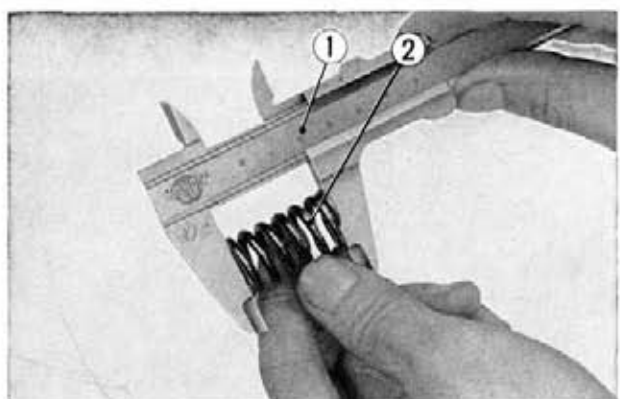


Fig. 4-7 ① Vernier caliper
② Clutch spring

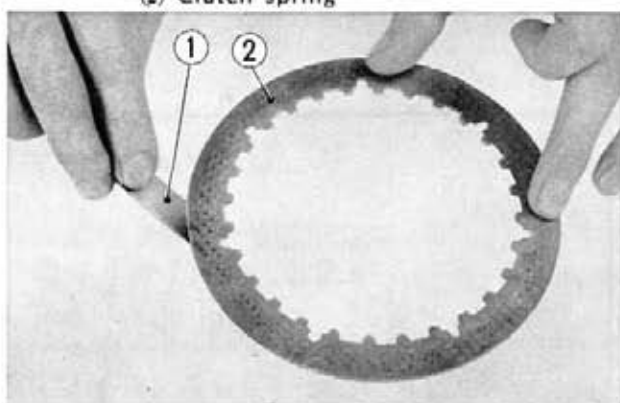


Fig. 4-8 ① Thickness gauge
② Clutch plate

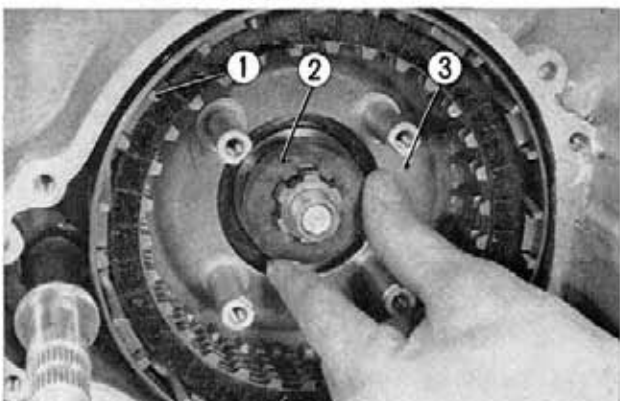


Fig. 4-9 ① Clutch outer
② 25 mm spline washer
③ Clutch pressure plate

b. Inspection

1. Clutch friction disc.

Use a vernier caliper and if the thickness is less than **0.122 in. (3.10 mm)**, replace the disc. It should also be replaced if the clutch plate is warped in excess of **0.012 in. (0.3 mm)** (Fig. 4-6)

2. Clutch spring

Measure the free length of the clutch spring and if it is less than **1.2 in. (30.5 mm)**, it should be replaced. All four springs should be of the same length. (Fig. 4-7)

3. Clutch plate warpage

Measure the warpage of the clutch plate on the surface plate using a thickness gauge. If the warpage is over **0.012 in. (0.3 mm)**, repair or replace. (Fig. 4-8)

c. Reassembly

1. Assemble the clutch outer and the 25 mm spline washer on the main shaft. Hook the washer on the spline and assemble the clutch pressure plate. (Fig. 4-9)

2. Assemble the six friction discs A (outer diameter 151 mm), clutch plates and the clutch center into the clutch outer and then install the clutch outer ring. (Fig. 4-5)

Note : Clutch outer ring tabs should be installed into the friction disc tab groove of the clutch outer.

3. Assemble the friction disc B (outer diameter 148.5 mm). (Fig. 4-5)



4. Assemble the clutch center, the spring washer (tab toward the front), lock washer and lock nut in that order. And torque with a lock nut box wrench (Tool No. 07916-2830000) to **32.5~36.2 ft-lbs (4.5~5.0 kg-m)**. Refer to Fig. 4-10 for the installation of the spring washer.
5. Assemble the four clutch springs and mount in place with the four clutch lifter bolts.
6. Refer to page 183 for clutch adjustment.

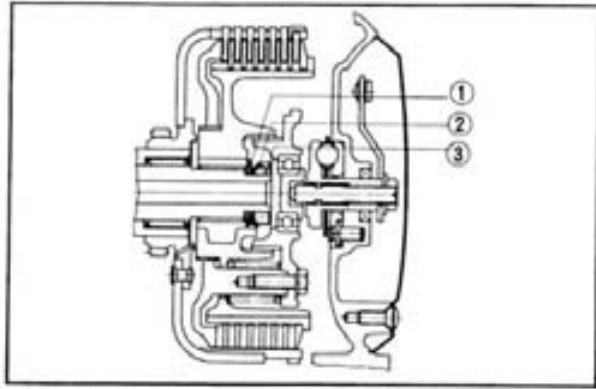


Fig. 4-10 ① Spring washer ② Lock washer ③ Lock nut

TRANSMISSION

GROUP

5

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5-1 GENERAL DESCRIPTION

DESCRIPTION

The 5-speed, constant mesh transmission is incorporated in the transmission compartment of the lower crankcase.

The relative positions of the transmission at the respective changing position are shown below. (Fig. 5-1)

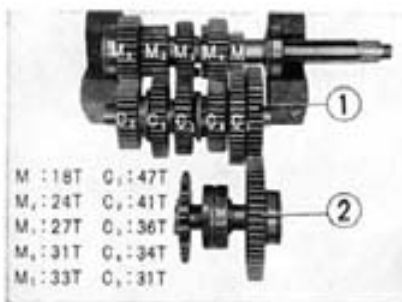


Fig. 5-1A

- ① Final drive gear (47T)
- ② Final driven gear (56T)

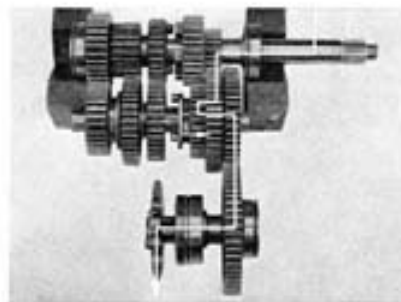


Fig. 5-1B

1st gear (C₄ gear shifted)

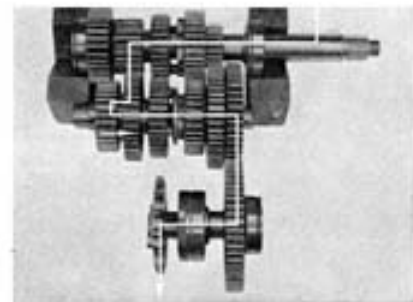


Fig. 5-1C

2nd gear (C₅ gear shifted)

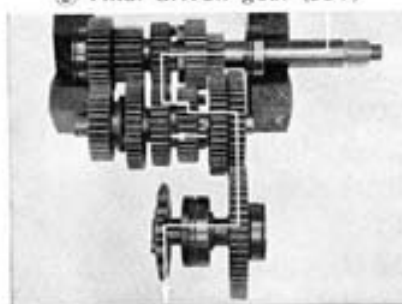


Fig. 5-1D

3rd gear (C₄ gear shifted)

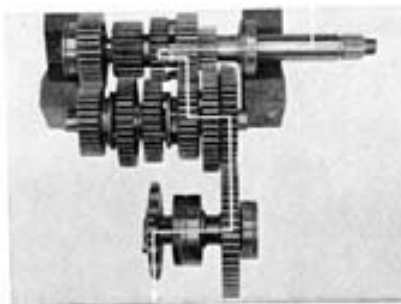


Fig. 5-1E

4th gear (M₂-M₃ gear shifted)

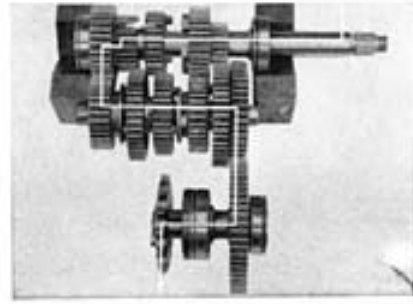


Fig. 5-1F

5th gear (M₂-M₃ gear shifted)

The gear shift mechanism consists of three gear shift forks, a gear shift drum, a gear shift arm, a shift drum stopper and a gear shift positive stopper.

When the gear change pedal is depressed the gear shift spindle rotates, causing the gear shift arm to rotate the shift drum. When the shift drum rotates, the shift forks move sideways by the cam action of groove cut on the shift drum body. (Fig. 5-2)

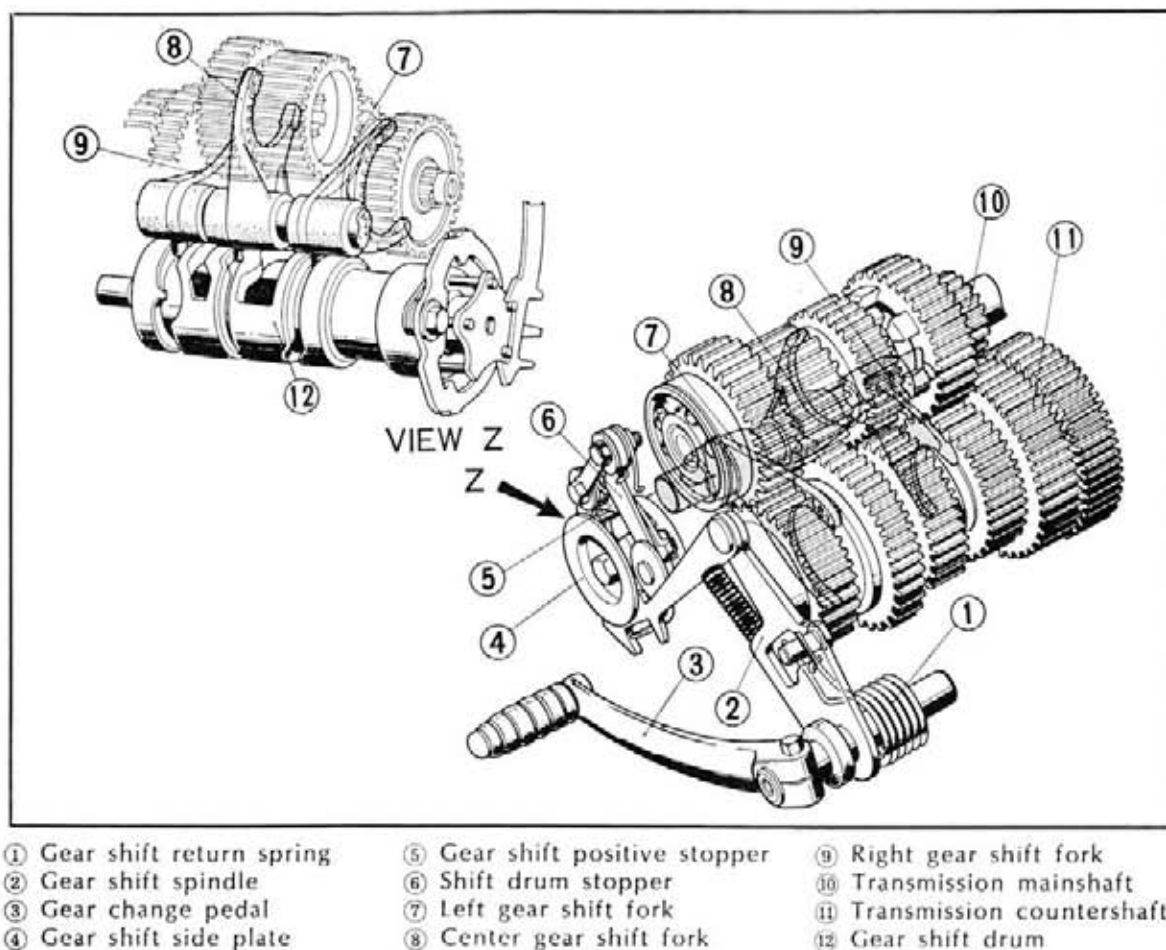


Fig. 5-2

SPECIFICATIONS

Gear ratio	
1st (low)	2.500
2nd	1.708
3rd	1.333
4th	1.097
5th (top)	0.939
Primary reduction ratio	1.708
Secondary reduction ratio	1.167
Final reduction ratio	2.812

DIAGNOSIS

Trouble	Probable Causes	Remedy
Difficult gear shifting	<ol style="list-style-type: none"> 1. Improper clutch disengagement 2. Damage gear or foreign object lodged in the gear 3. Gear shift fork inoperative 4. Improper operation of the gear shift drum stopper and change pedal 5. Mainshaft and countershaft of alignment 6. High oil viscosity 	<p>Adjust the clutch (Refer to page 183).</p> <p>Replace the defective parts.</p> <p>Repair or replace.</p> <p>Repair or replace.</p> <p>Repair or replace.</p>
Excessive high gear noise	<ol style="list-style-type: none"> 1. Excessive gear backlash 2. Worn main and countershaft bearing 	<p>Repair or replace.</p> <p>Repair or replace.</p>
Gear slip out	<ol style="list-style-type: none"> 1. Worn fingers on gear shift fork 2. Worn gear dog hole 3. Worn spline 	<p>Replace.</p> <p>Replace.</p> <p>Replace.</p>

5-2 REPAIRING PROCEDURE

a. Disassembly

1. Disassemble the cylinder head, cylinder and cam chain tensioner in accordance with section 3-3 b on page 32~35.
2. Disassemble the crankcase in accordance with section 3-6 b on page 46~47.
3. Raise the transmission mainshaft and remove the primary sprocket and then remove the mainshaft gear assembly from the upper crankcase. (Fig. 5-3)
4. Remove the final shaft oil guide and the final shaft assembly from the upper crankcase. (Fig. 5-4).

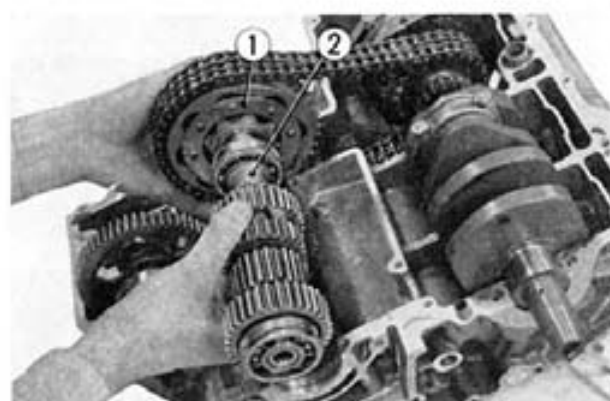


Fig. 5-3 ① Primary sprocket
② Transmission mainshaft

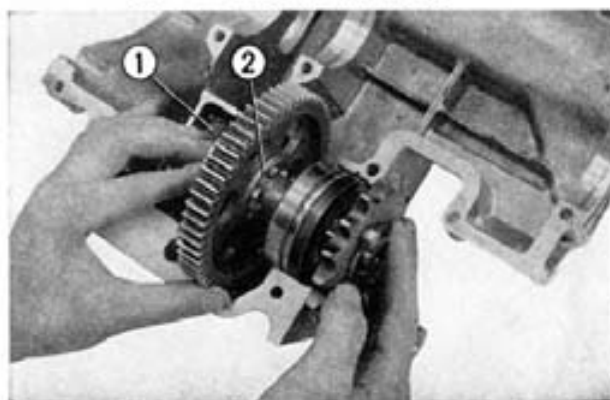


Fig. 5-4 ① Final shaft oil guide
② Final shaft assembly

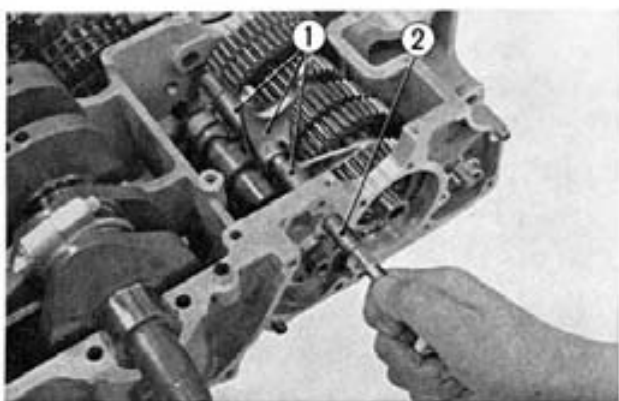


Fig. 5-5 ① Gear shift forks
② Gear shift fork shaft

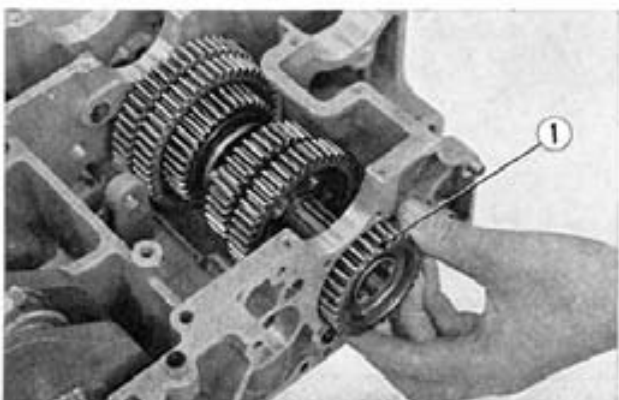


Fig. 5-6 ① Countershaft top gear

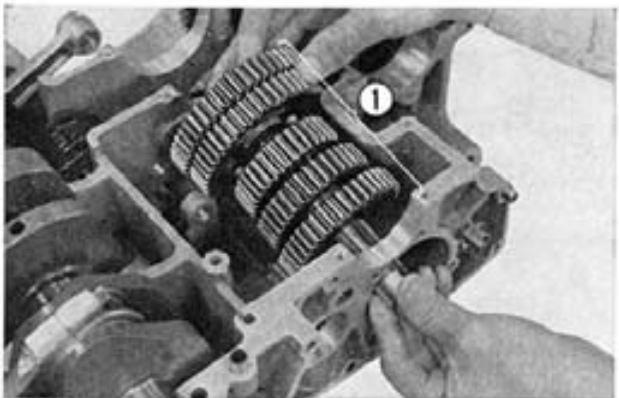


Fig. 5-7 ① Countershaft gear assembly

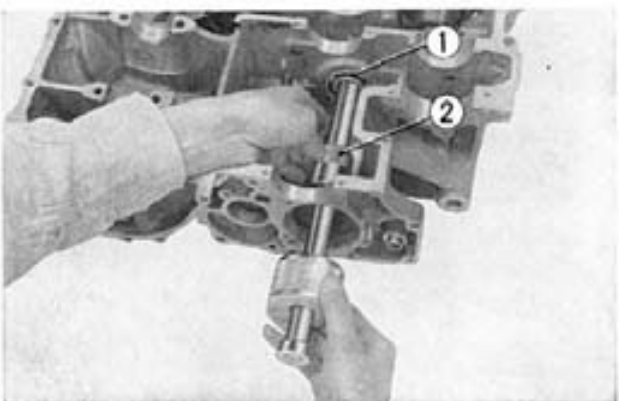


Fig. 5-8 ① Countershaft bearing
② Bearing puller

5. Pull off the gear shift fork shaft and remove the shift forks. (Fig. 5-5)
6. Unscrew the neutral stopper bolt, remove the stopper and take out the gear shift drum from the crankcase.
7. Remove the countershaft top gear. (Fig. 5-6)
8. Take out the countershaft gear assembly from the lower crankcase. (Fig. 5-7)
9. Pull out the countershaft right bearing from the lower crankcase using the bearing puller (Tool No. 07048-30025). (Fig. 5-8)
10. Disassemble gears from the respective shafts in accordance with Fig. 5-17 on page 61.

b. Inspection

1. Gear backlash (Fig. 5-9)

Using a small dial gauge and apply the pointer against the surface of the teeth. Lock the mating gear and read the dial indication as the backlash is being checked. If the backlash is beyond the tolerance shown below, the gears or the shafts should be replaced in pair.

Gear	Standard value in. (mm)	Serviceable limit in. (mm)
1st gear	0.0017~0.0052 (0.044~0.140)	0.008 (0.2)
2nd, 3rd, 4th & 5th gear	0.0018~0.0055 (0.046~0.140)	0.008 (0.2)

2. Gear locking dog

Check the dogs on the respective gears and if excessively worn or damaged, the gear should be replaced. Also check to see if the gears are sliding smoothly.

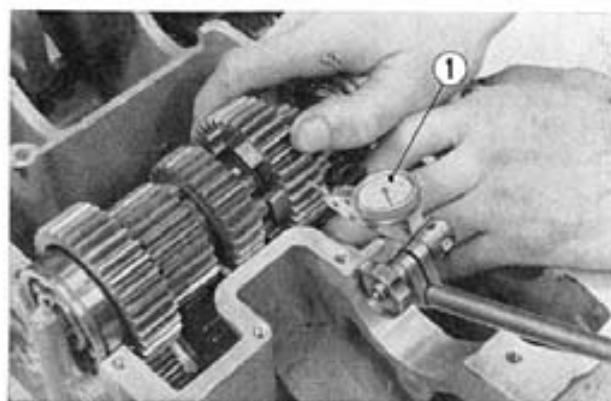


Fig. 5-9 ① Small dial gauge

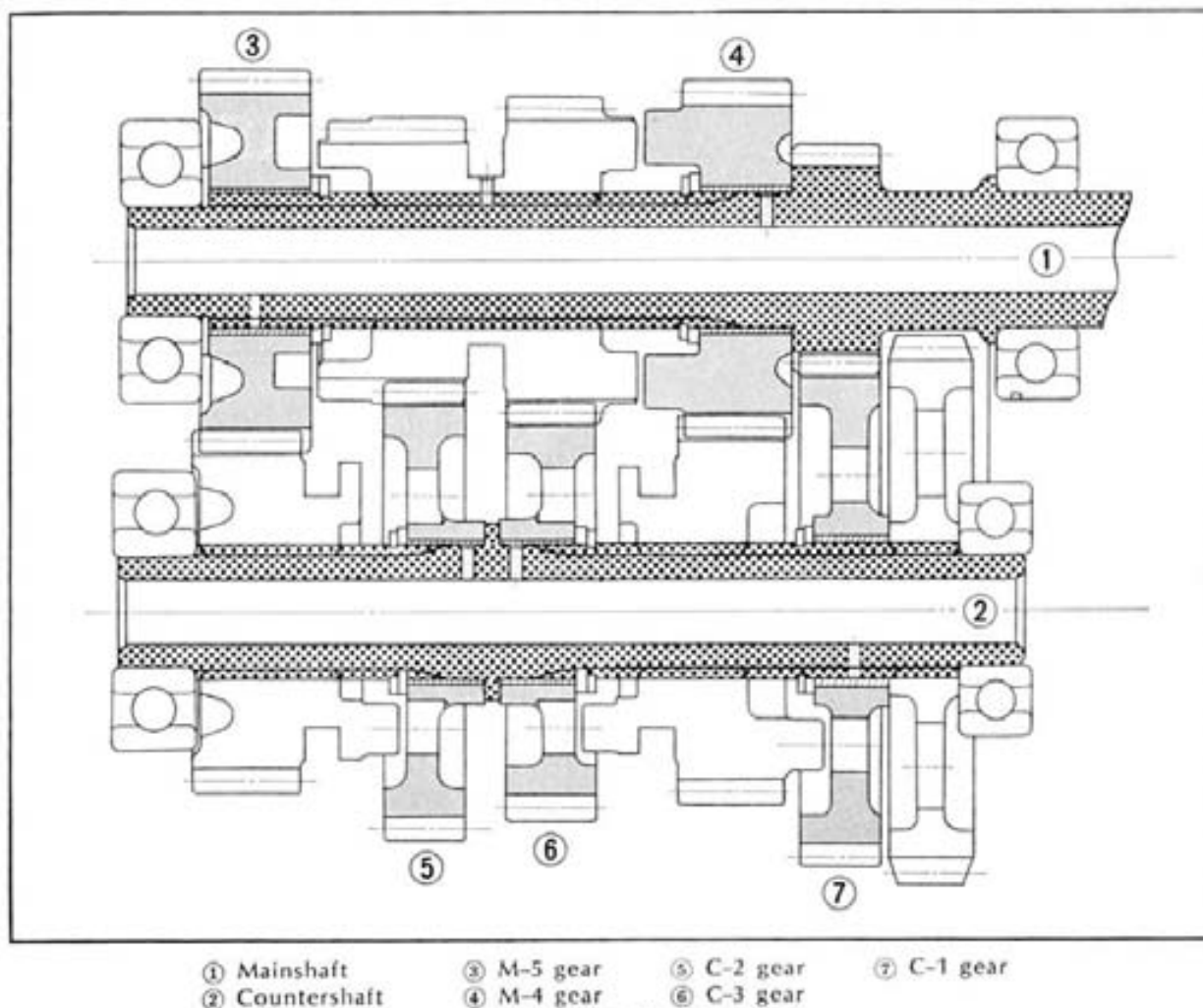


Fig. 5-10

3. Gear to shaft clearance (Fig. 5-10)

Check the gear bore with an inside micrometer or a cylinder gauge and check the shaft with a micrometer. Make sure that the measured values are within the tolerance indicated below.

Item	Standard value in. (mm)	Serviceable limit in. (mm)
C ₁ , C ₂ , C ₃ , M ₄ M ₅ gear	0.0016~0.0032 (0.04~0.082)	Replace if over 0.0072 (0.182)

4. Gear shift fork

Check the fingers on the gear shift fork using a micrometer and if worn beyond **0.240 in. (6.1 mm)**, or if the shift fork dog is worn to less than **0.260 in. (6.6 mm)** diameter, the shift fork should be replaced. (Fig. 5-11).

5. Gear shift fork inside diameter

Check the inside diameter of the gear shift fork with a inside micrometer and if it is **greater than 0.5134 in. (13.04 mm)** it should be replaced. Gear shift fork shaft is checked

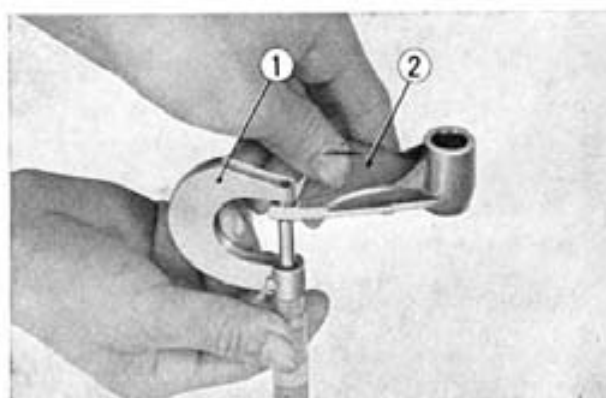


Fig. 5-11 ① Micrometer
② Gear shift fork

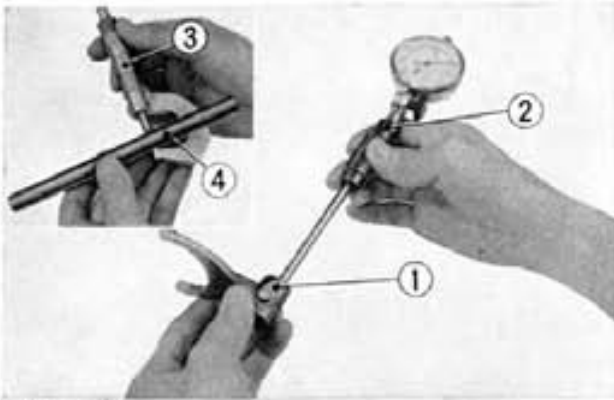


Fig. 5-12

- ① Gear shift fork ③ Micrometer
② Inside dial gauge ④ Gear shift fork shaft

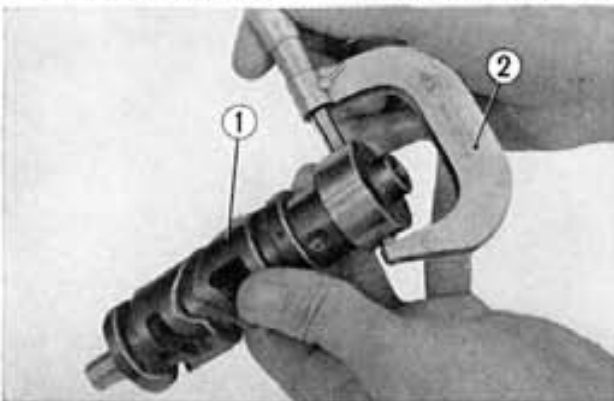
Fig. 5-13 ① Gear shift drum
② Micrometer

Fig. 5-14 ① Bearing driver tool

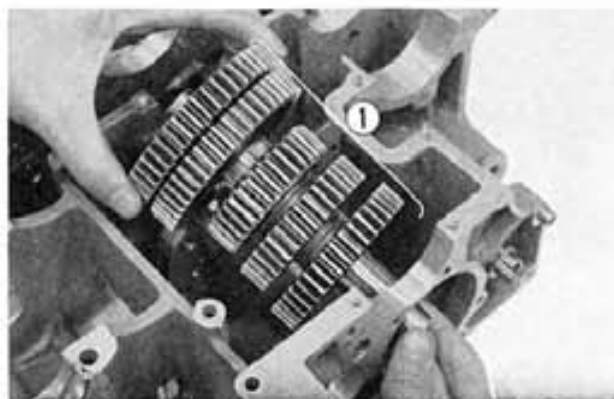


Fig. 5-15 ① Countershaft gear assembly

with a micrometer and if it is worn to less than 0.5079 in. (12.9 mm), it should be replaced. (Fig. 5-12)

6. Gear shift drum

Check the outside diameter of the gear shift drum with a micrometer and if it is worn below the values indicated below, it should be replaced. (Fig. 5-13)

Right side	0.5154 in. (11.95 mm)
Left side	1.4142 in. (35.92 mm)

c. Reassembly

1. Mount the primary chain tensioner on the lower crankcase.
2. Assemble the gears on to the respective shafts. Use all new circlips and make sure that they are seated properly in the grooves. Refer to Fig. 5-17 (next page) for the proper installation of the gears and circlips.
3. Drive the counter shaft bearing into the lower crankcase using the bearing driver (Tool No. 07949-3000000). (Fig. 5-14)
4. Mount the countershaft gear assembly into the crankcase, however, the C-5 gear must be left off and assembled later from the outside of the crankcase. (Fig. 5-15)
5. Mount the gear shift drum and install the neutral stopper with a bolt. Neutral position on the drum is at the depression on the drum.
6. Gear shift forks are stamped with the letters "R", "C" and "L" on the side. Assemble the forks as shown in Fig. 5-16. The forks stamped with "R" and "L" are for use with the countershaft, therefore, the fingers of those forks are fitted into the grooved in the C-4 and C-5 gears. The "C" stamped fork is used with M-2/3 gear. The dog located on the back side of the fork is fitted into the groove in the gear shift drum.

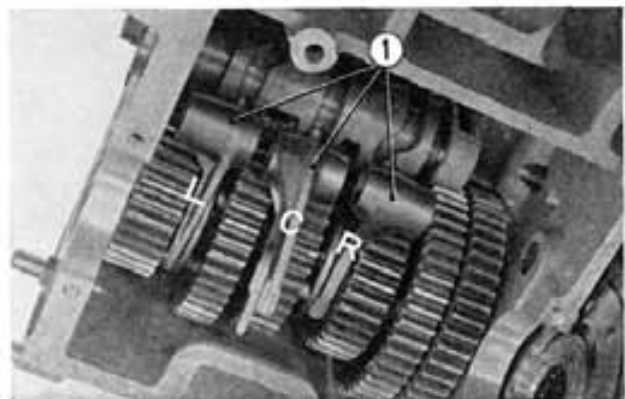
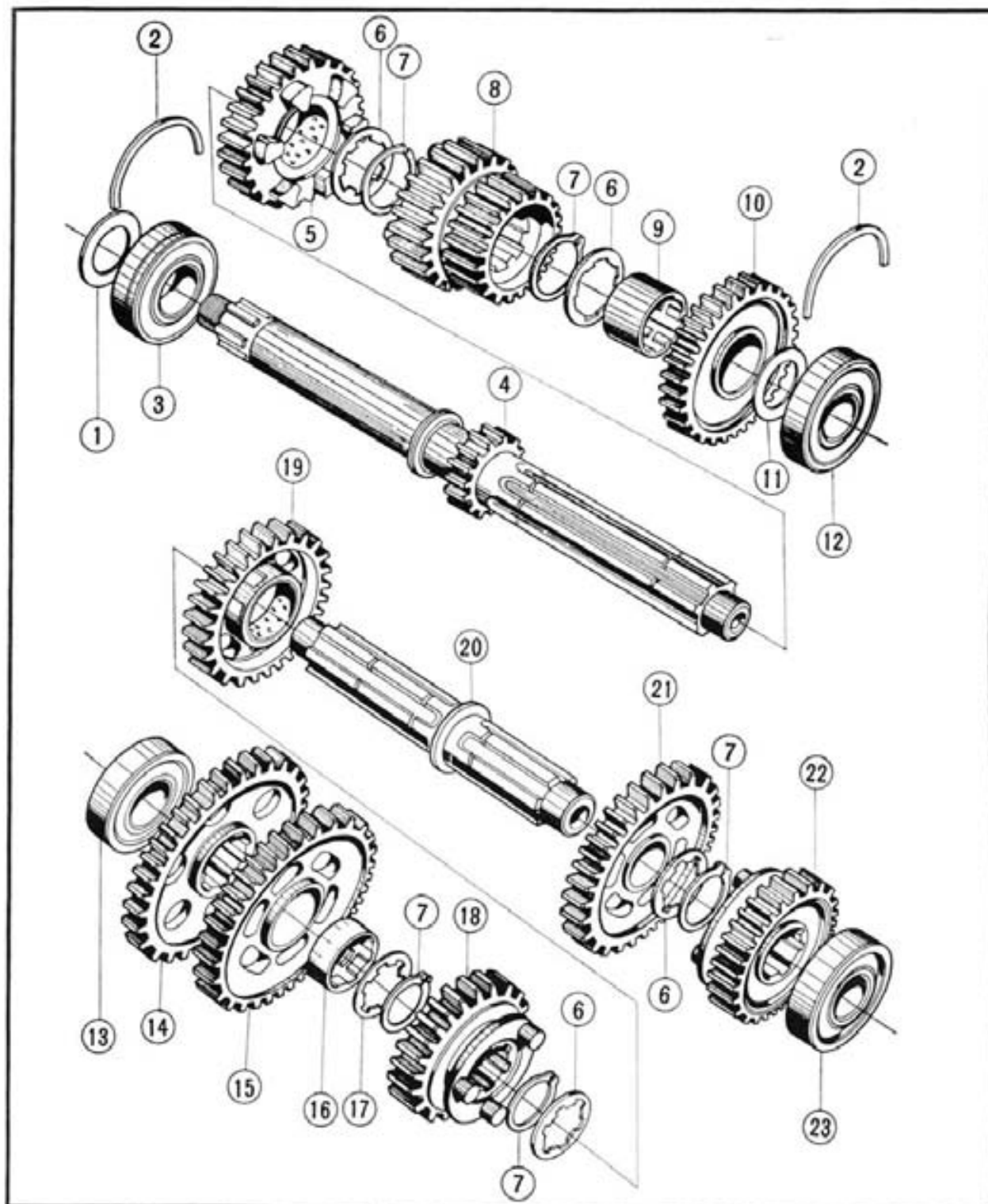


Fig. 5-16 ① Gear shift forks



- ① 25 mm thrust washer
- ② Ball bearing set ring A
- ③ 6205 special ball bearing
- ④ Transmission mainshaft
- ⑤ Mainshaft fourth gear (37 T)
- ⑥ 25 mm thrust washer
- ⑦ 25 mm cir-clip
- ⑧ Mainshaft second & third gear (24 T & 27 T)

- ⑨ 28×20.5 bush
- ⑩ Mainshaft top gear (33 T)
- ⑪ 20 mm thrust washer
- ⑫ 6304 H5 radial ball bearing
- ⑬ N-6304 radial ball bearing
- ⑭ Final drive gear (48 T)
- ⑮ Counter shaft low gear (47 T)
- ⑯ 28×14 bush
- ⑰ 25×33 thrust washer

- ⑱ Countershaft fourth gear (34 T)
- ⑲ Countershaft third gear (36 T)
- ⑳ Transmission countershaft
- ㉑ Countershaft second gear (41 T)
- ㉒ Countershaft top gear (31 T)
- ㉓ 6204 ball bearing

Fig. 5-17

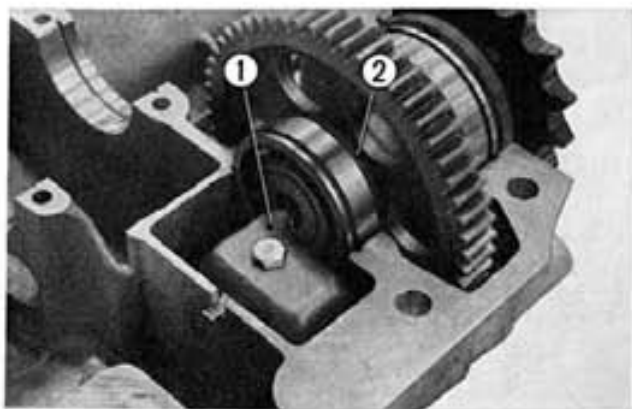


Fig. 5-18 ① Final shaft oil guide
② Final driven shaft

7. Install the final shaft assembly into the upper crankcase; do not forget the set ring and install the final shaft oil guide (Fig. 5-18).
8. Mount the primary sprocket on the transmission mainshaft assembly and install the complete unit into the upper crankcase.
9. Install the two dowel pins, oil collar and "O" ring in the upper crankcase, apply liquid packing on the mounting flange, and assemble the lower crankcase.

At this time, all the gears must be in neutral position and the center gear shift fork must be inserted into the M-2/3 gear groove.
10. Install the crankcase in accordance with 3-6 d on page 51~52.
11. Install the camchain tensioner, cylinder and cylinder head by referring to section 3-3 d on page 36-38.

FUEL SYSTEM

GROUP

6

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6-1 GENERAL DESCRIPTION

DESCRIPTION

The two fuel tubes connected to the fuel valve supply the fuel from the fuel tank to the four carburetors.

The fuel in the carburetor float chamber is sucked into the engine in the proper air-fuel mixture to conform with the engine speed. This has a great influence on the engine performance.

In an engine with four independent carburetors their precise adjustment is particularly important for smooth operation.

The fuel valve has three positions, ON, STOP and RES ; which can be selected by the lever.

SPECIFICATIONS

Fuel tank capacity	4.7 U.S gal. (18 lit)
Fuel tank reserve capacity	10.5 U.S pt. (5 lit.)

Carburetor setting table

Type		Piston valve, 4 pcs.
Main bore		1.102 in. (28 mm)
Main jet		# 120
Air jet		# 100
Air bleed	AB 1	0.035 in. (0.9 mm) × 4
	AB 2	0.035 in. (0.9 mm) × 4
	AB 3	0.024 in. (0.6 mm) × 2
	AB 4	0.024 in. (0.6 mm) × 2
Needle jet		0.102 × 0.15 in. (7.6 × 3.8 ³ mm)
Jet needle		0.098 in. (2.485 mm)
Cutaway		# 2.5 [recess 0.047 mm (1.2 mm), depth 0.008 in (0.2 mm)]
Air screw opening		1 ± 1/8
Slow jet		# 40
Valve seat		0.079 in. (2 mm)
Pilot outlet		0.047 in. (1.2 mm)
Setting mark		B 750 A



DIAGNOSIS

Trouble	Probable Causes	Remedy
Engine does not start	<ol style="list-style-type: none"> 1. Choke open to wide 2. Carburetor air screw opened too far 3. Air leaking into the cylinder head 4. Clogged carburetor slow jet 5. Clogged fuel valve or piping 6. Clogged vent hole in the fuel filler cap 7. No fuel in the tank 	<p>close choke.</p> <p>Adjust air screw.</p> <p>Retighten carburetor connecting tube.</p> <p>Check, clean and retighten.</p> <p>Disassemble and clean.</p> <p>Disassemble and clean.</p> <p>Fill tank with gasoline.</p>
Poor engine idling	<ol style="list-style-type: none"> 1. Clogged or loose carburetor slow jet 2. Improper float level 3. Improper air screw adjustment 4. Improper carburetor linkage operation 5. Air leaks 	<p>Check, clean and retighten.</p> <p>Adjust (Refer to page 68).</p> <p>Adjust (Refer to page 71~73).</p> <p>Adjust.</p> <p>Tighten all air passage connection.</p>
Improper running of engine	<ol style="list-style-type: none"> 1. Jet size too small 2. Improper float level 3. Clogged carburetor main jet 4. Improper carburetor linkage operation 5. Air leaks 	<p>Replace larger size jet.</p> <p>Adjust.</p> <p>Clean and retighten.</p> <p>Adjust.</p> <p>Tighten all air passage connection.</p>

6-2 CARBURETOR

a. Description

The quadruple piston type carburetors are mounted on the cylinder head with a stay plate. Choke lever is a link type which operates all four choke valves simultaneously.

Fig. 6-1 shows the construction details of the carburetor.

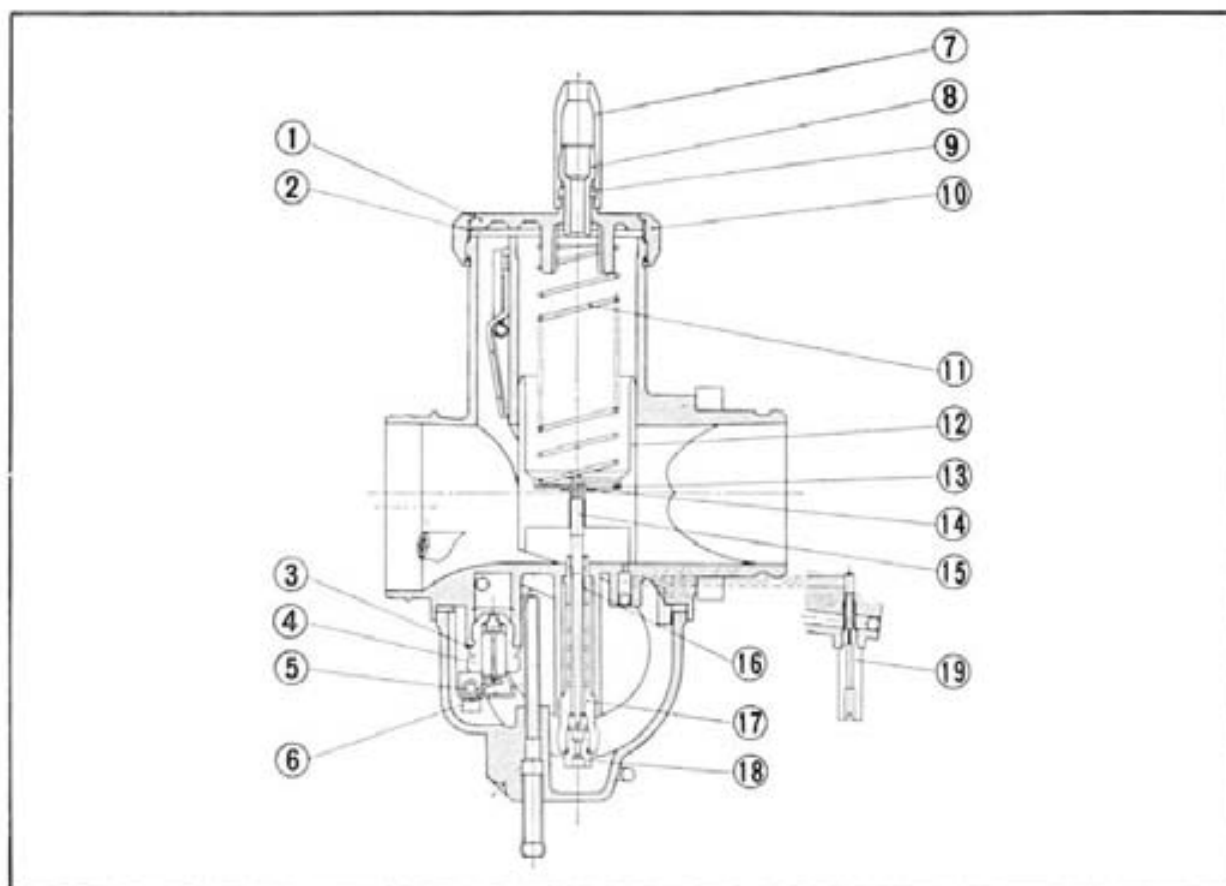


Fig. 6-1

- | | | |
|------------------|--------------------|---------------------|
| ① Carburetor top | ⑧ Cable adjuster | ⑮ Jet needle |
| ② Top washer | ⑨ Lock nut | ⑯ Needle jet |
| ③ Flat washer | ⑩ Cap | ⑰ Needle jet holder |
| ④ Valve seat | ⑪ Throttle spring | ⑱ Main jet |
| ⑤ Float arm pin | ⑫ Throttle valve | ⑲ Slow jet |
| ⑥ Float | ⑬ Needle set plate | |
| ⑦ Rubber cap | ⑭ Clip | |

As the air enters the carburetor, it passes under the throttle valve where vacuum pressure is produced due to the restriction caused by the throttle valve extending into the main air passageway. The fuel discharge outlet is located in this so-called venturi area so that the vacuum pressure can draw out the fuel. This carburetor incorporates both the main and slow system.

• Main system

The fuel passes through the main jet ⑱ and enters the needle jet holder ⑰ where it mixes with the bleed hole located around the needle jet holder. The fuel air mixture passes by the opening between the needle jet ⑯ and jet needle ⑮ and is discharged from

below the throttle valve ⑫.

It is here that the mixture is combined with the main air and after being atomized, is taken in to the engine.

• Slow system

The air which enters from the inlet passes through the outside of the air screw where it is metered and enters the slow jet bleed hole. It mixes with the fuel which enters the slow jet ⑬ to produce a full spray that is discharged from the pilot outlet at a point under the throttle valve. This mixes with the air from the air inlet to form a combustible mixture before being taken into the engine.

• Float chamber

The carburetor must provide a proper mixture of fuel at different throttle openings and engine speeds; in order to accomplish this, the fuel level in the carburetor must be maintained constant. The float chamber functions to serve this purpose. The fuel from the tank enters the float chamber through the fuel inlet passage, between the float valve seat ④ and float valve and fills the chamber to the level where the float ⑤ rises to shut off the fuel by seating the float valve against the valve seat through the action of the float arm. As the fuel is consumed, the fuel level in the float chamber, drops the float will follow the level, and the fuel will start to enter the chamber between the opening of the float valve and valve seat to maintain a constant fuel level. (Fig. 6-1)

b. Disassembly

1. Turn the fuel tank valve to the "STOP" position, remove the fuel lines from the fuel valve body, raise the seat and pull the rear tank rubber mounting away from the rear tank mount. Remove the fuel tank.
2. Remove the throttle valve from each of the carburetors. (Fig. 6-2)
3. Loosen the air cleaner connecting tube and insulator bands and remove the carburetors as an assembly. (Fig. 6-3)
4. Unscrew the two 6 mm screws and dismount the respective carburetor from the stay plate. (Fig. 6-4)

Disconnecting the individual choke rod will separate the carburetors.

5. In order to remove the needle jet from the throttle valve, first, disconnect the throttle cable from the throttle valve, and then remove the needle set plate from the throttle valve. (Fig. 6-5)

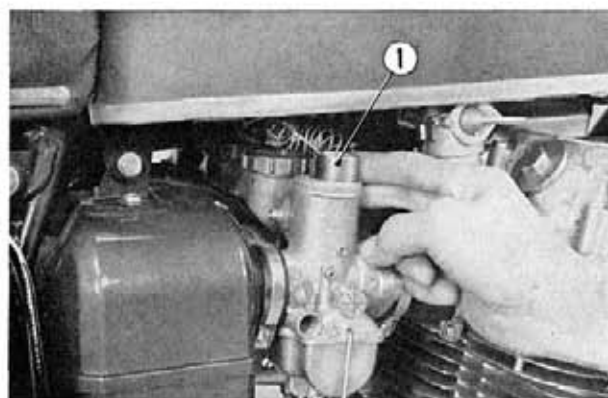


Fig. 6-2 ① Throttle valve

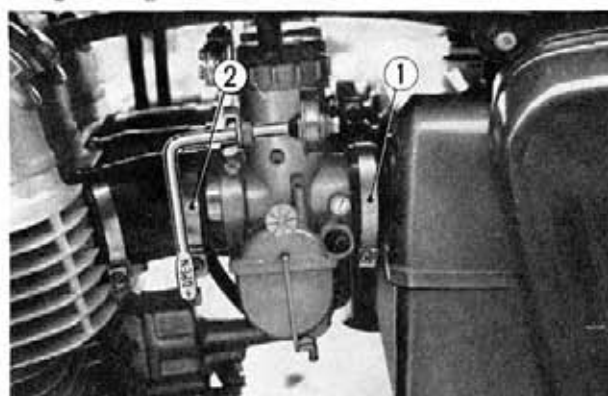


Fig. 6-3 ① Air cleaner connecting band
② Carburetor insulator band

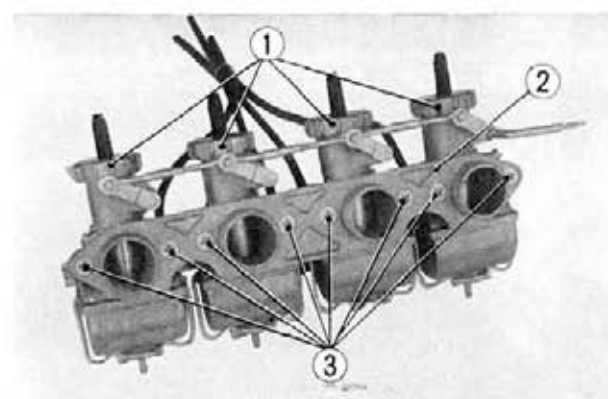


Fig. 6-4 ① Carburetor ③ Setting screws
② Carburetor stay plate

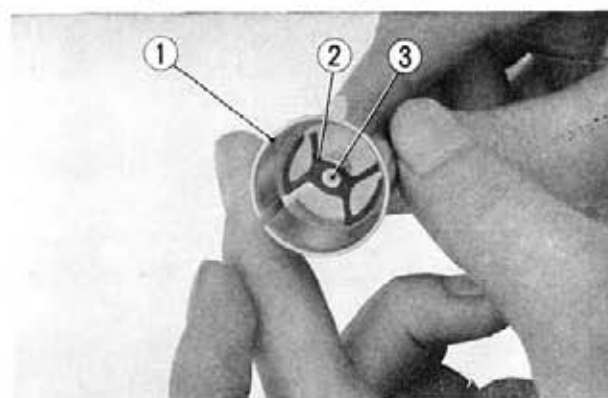


Fig. 6-5 ① Throttle valve ③ Jet needle
② Needle set plate

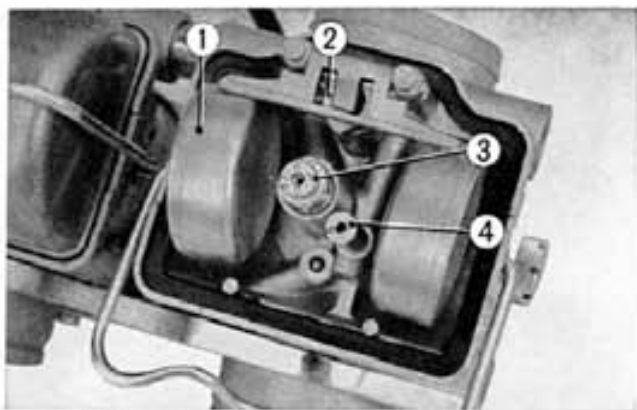


Fig. 6-6 ① Float ② Float valve set ③ Main jet ④ Slow jet

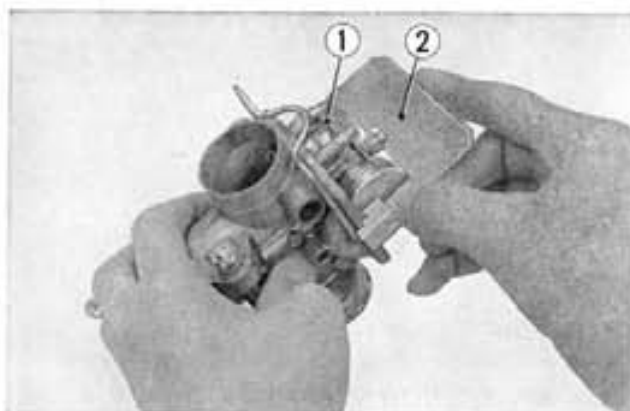


Fig. 6-7 ① Float ② Float level gauge

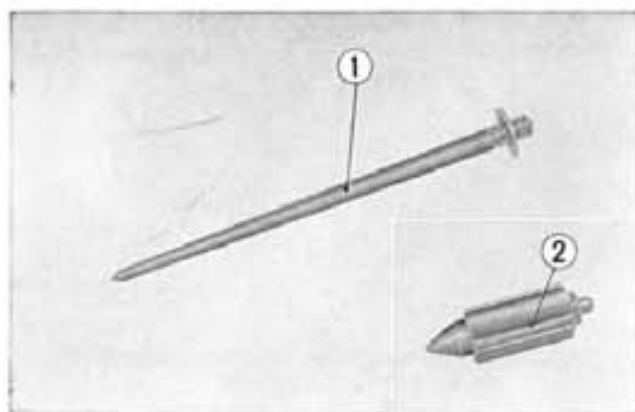


Fig. 6-8 ① Jet needle ② Float valve

6. Remove the float chamber retaining clip and the following carburetor components can be removed with a small screwdriver: slow jet, main jet, needle jet holder, float and float valve set. (Fig. 6-6)

c. Inspection

1. Carburetor adjustment should be made in accordance with the description on page 78~81.
2. Fuel level check

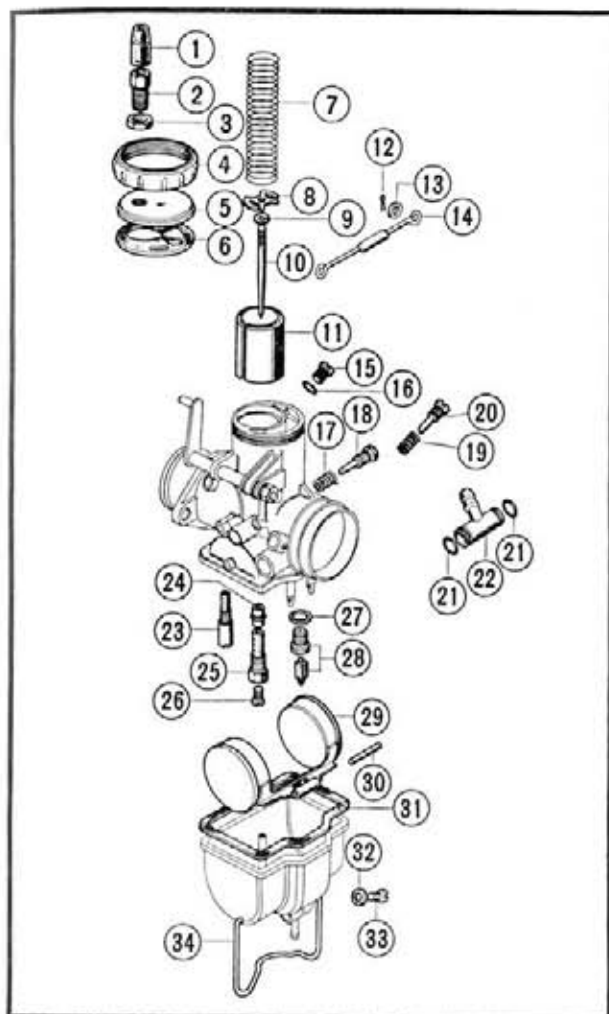
Remove the float chamber and set the float arm as shown in the Fig. 6-7 so that it just barely touches the valve and in this position, check the position of the float with the gauge set vertically. At a standard setting the float should just barely come in contact with the gauge. If there is clearance between the gauge and float or if the float is interfering with the gauge, adjustment should be made. The height of float can be adjusted by bending the float arm using a narrow screwdriver.

3. Jet needle, float valve

The jet needle is constantly moving and if it is found to be excessively worn, it should be replaced. Further, check the wear of the valve and the valve seat and if it is defective, part should be replaced. (Fig. 6-8)

4. The clogging of the respective jet should be cleaned by blowing out the jets with compressed air followed by properly torquing the jets.

d. Reassembly



- | | |
|--------------------|------------------------------|
| ① Rubber cap | ⑩ Air screw |
| ② Cable adjuster | ⑪ Throttle stop screw spring |
| ③ Lock nut | ⑫ Throttle stop screw |
| ④ Cap | ⑬ 7.9x1.9 O-ring |
| ⑤ Top | ⑭ T-type fuel tube joint |
| ⑥ Top washer | ⑮ Slow jet |
| ⑦ Throttle spring | ⑯ Needle jet |
| ⑧ Needle set plate | ⑰ Needle jet holder |
| ⑨ Clip | ⑱ Main jet |
| ⑩ Jet needle | ⑲ Flat washer |
| ⑪ Throttle valve | ⑳ Float valve set |
| ⑫ 1.0x10 split pin | ㉑ Float |
| ⑬ 5 mm flat washer | ㉒ Float arm pin |
| ⑭ Choke rod | ㉓ Float chamber washer |
| ⑮ Plug screw | ㉔ 6 mm flat washer |
| ⑯ Flat washer | ㉕ Drain plug |
| ⑰ Air screw spring | ㉖ Float chamber set clip |

Fig. 6-9

1. Wash all the parts and dry completely with compressed air before reassembly.

Assemble the main jet and slow jet on respective location. (Fig. 6-10)

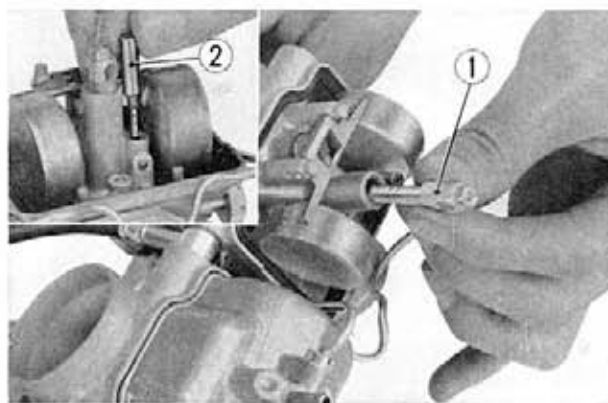


Fig. 6-10 ① Main jet ② Slow jet

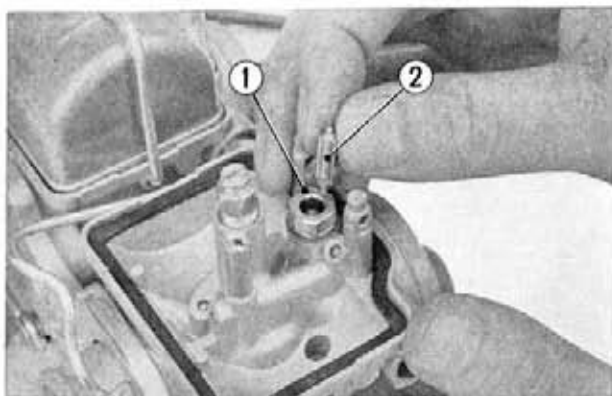
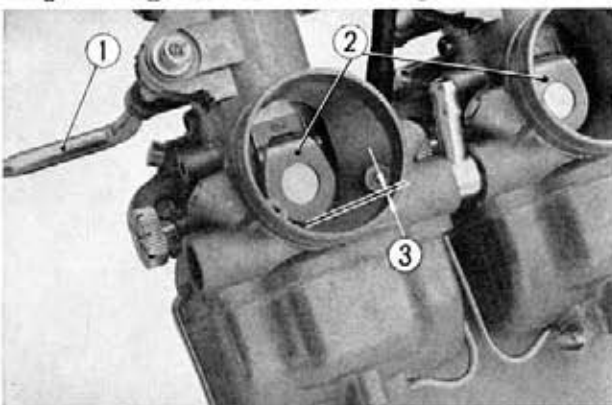
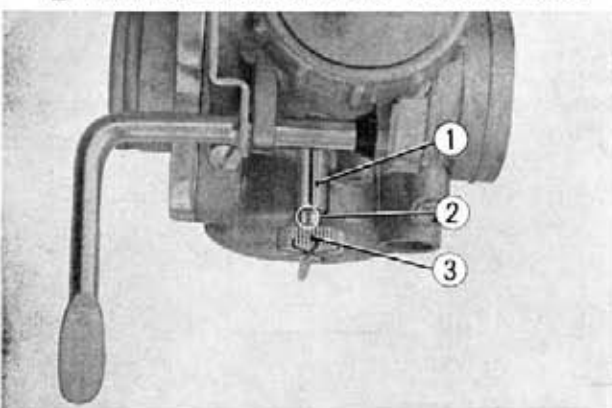
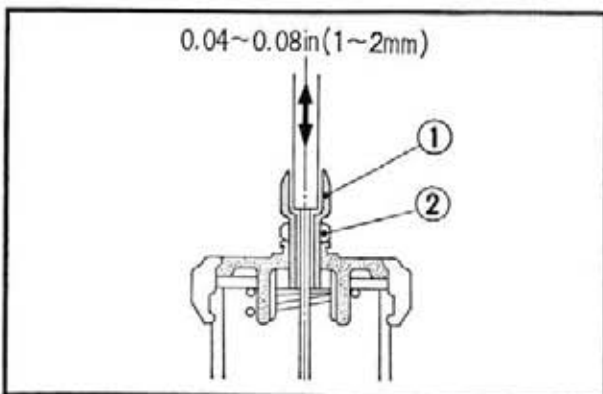


Fig. 6-11 ① Float valve seat ② Float valve

Fig. 6-12 ① Choke lever ② Choke valve
③ Clearance between choke valve and bodyFig. 6-13 ① Index mark ③ Throttle stop screw
② "T" markFig. 6-14 ① Cable adjuster
② Cable adjuster lock nut

2. When either the float valve or valve seat requires replacement, they should be replaced in set. (Fig. 6-11)

3. Install the respective carburetor on the stay plate with two mounting screws and connect the choke rod to the carburetor; make sure that the action of the choke lever is smooth.

4. Install the carburetor assembly on the cylinder head.

5. Assemble the throttle valves and cables on the carburetors and actuate the throttle grip to assure smooth movement of the cable.

6. Carburetor adjustment

Before attempting carburetor adjustment, make sure that the following adjustments have been performed properly.

- Contact breaker point gap
- Ignition timing
- Valve tappet clearance
- Spark plug gap
- Crankcase oil level

(1) Preliminary adjustment

a. To make easy of access to the throttle screws on all carburetors, the fuel tank should be removed.

b. To check the operation of the choke valves remove the air cleaner upper and lower cases. Observe the choke valves from the rear side of the carburetors whether all valves are fully closed or not, when the choke lever is operated.

If there is a clearance greater than **0.02 in. (0.5 mm)** between the choke valve and body, adjust the clearance by lengthening or shortening the choke lever adjusting rod connected to the annex carburetor. (Fig. 6-12)

c. Adjust the throttle stop screw to align the "T" mark to the index mark stamped on the carburetor body. Perform adjustments on all carburetors. (Fig. 6-13)

d. Loosen the throttle cable adjuster lock nut and turn the cable adjuster to either directions to obtain the free play of the throttle cable outer within the range of **0.04~0.08 in (1~2 mm)**. After tightening the lock nut check the movement of the outer cable.

The four throttle cables should all be adjusted uniformly. (Fig. 6-14)

e. Gently turn the air screws in until they seat, then unscrew them one full turn each. (Fig. 6-15)

f. Install the air cleaner, air cleaner upper and lower case, fuel tank and fuel lines. Fill gasoline in the fuel tank.

(2) Final adjustment

For final adjustment use the vacuum gauge. Before attaching the vacuum gauge start the engine and warm up to operating temperature of 140~175°F (60~80°C).

a. Stop the engine and remove the plug of adapter attachment hole on each carburetor bodies. Attach the adapters of vacuum gauge to all carburetors: the long adapters (A) are for inside carburetors and the short ones for outside carburetors. Fit the vacuum gauge hose securely on the adapters. (Fig. 6-16, 17)

b. Start the engine and run it at the idling speed. Check RPM on the tachometer and if the RPM is not in the range of 850~950RPM adjust all throttle valve stop screws uniformly to obtain the proper speed.

Adjustment should be done within the range of 1/8 turn in both directions while checking the vacuum gauge.

c. The standard vacuum pressure reading should be 20~22cmHG. in all four gauges. If any of these gauges indicates pressure higher or lower than the standard range adjust it with the throttle stop screw. Turning the stop screw clockwise will reduce the pressure and turning it counter-clockwise will bring the pressure higher. (Fig. 6-18)

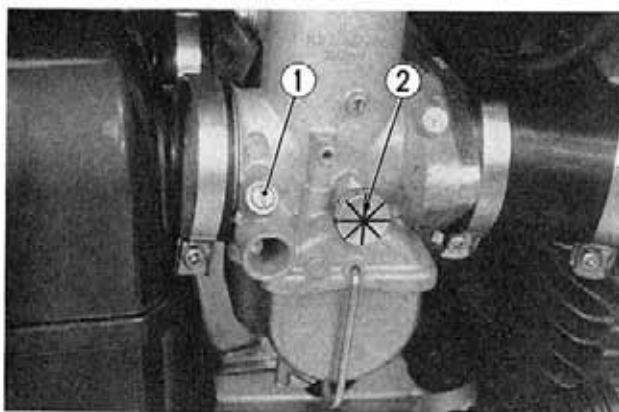


Fig. 6-15 ① Air screw
② Throttle stop screw

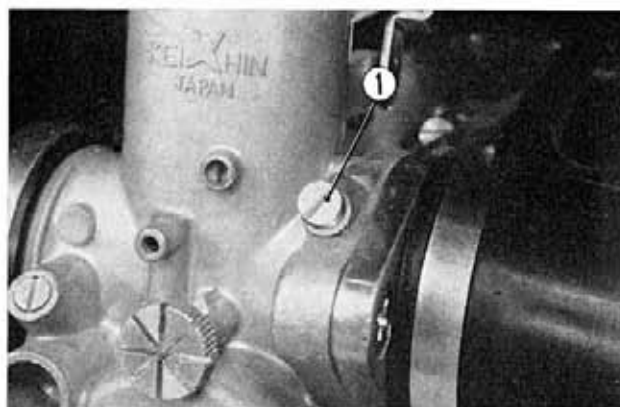


Fig. 6-16 ① plug



Fig. 6-17 ① Vacuum gauge adapter

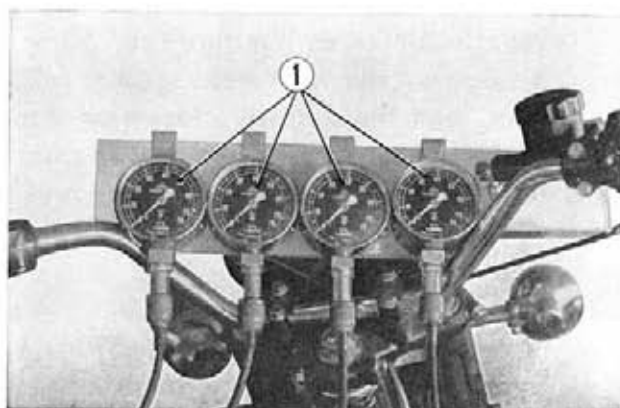


Fig. 6-18 ① Vacuum gauge

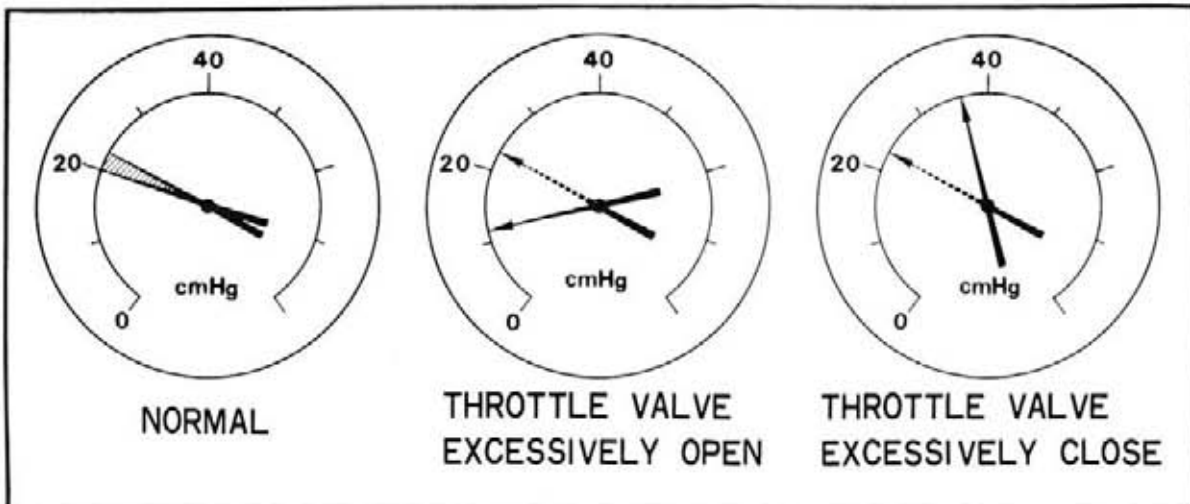


Fig. 6-19

- d. If the swing of the gauge needle is large tighten the gauge restrictor valve to reduce the needle movement within 2 cmHG.

When the indicated pressure is lower than 15 cmHg, check the following possible defects.

- Inlet or exhaust valve sticking open
- Absence of slack in the throttle cable
- Loose spark plug
- Loose clamp on the carburetor connecting tube

- e. Turn the air screw slightly at a time within 1/8 turn in both directions from the original setting, pausing for about 5 seconds to locate a point of highest engine speed by the tachometer. Perform this adjustment to all carburetors.

If it takes over a full turn more or 1/2 turn less than the original setting to change the engine speed check the following possible cause.

Air screw adjustment requires over 2 turns	Air screw adjustment requires less than 1/2 turn
Clogged air passage	Clogged slow jet
Worn air screw valve	Clogged slow jet passage
Float level too high	Float level too low
Loosened slow jet	Excessively worn air screw valve seat

- f. Open the throttle valve slowly about 1/4 turn by the throttle grip for 30 seconds. Observe the vacuum gauge and note the location where the drop of pressure is not even to the other carburetors. Slow down the engine and adjust the throttle cable adjuster on the carburetor concerned. If drop of vacuum pressure is quicker than others turn the adjuster clockwise, namely increase the free play of the throttle cable.

If the drop of pressure is slower than the others, turn the adjuster counter clockwise.

The difference of the vacuum pressure the four carburetors should be less than 2 cmHG. Tighten the lock nuts and fit the rubber caps, when the adjustment has been completed.

(3) Final adjustment without vacuum gauge

- a. Set the idling speed to 850~950 RPM with the throttle stop screws. Turn the throttle stop screws clockwise to increase the idling speed. Adjust each carburetor in the same amount.

- b. Observe the tachometer and listen to the exhaust noise and/or place a hand at the exhaust outlet to check the exhaust pressure.

Turning out or in very slowly the air screw, obtain the highest engine idle speed or the highest exhaust pressure.

Repeat the same method on all carburetors. The adjustment should not be done exceeding 1/8 turn in both directions.

If there is no change in the engine condition even the adjustment exceeds 1/2 turn in both directions, check possible cause of the defects according to the items in section (2) e.

Adjust the idling speed again by the throttle stop screws to set back to the standard RPM.

- c. Slowly twist the throttle grip 1/4 turn to open the throttle valve and allow seconds to run.

Listen to the exhaust noise and if the noise for four cylinders are not identical and random difference as the throttle opened, an adjustments is necessary. Place a hand at the exhaust outlet and check the exhaust pressure of all four cylinders. Locate one or two carburetors of which the exhaust pressures are different from the others.

Adjust them with the throttle cable adjusters. Turning the adjuster clockwise will increase the throttle cable end play and reduce the exhaust pressure. Turn the adjuster counterclockwise to increase the pressure. After completing the adjustment, tighten the adjuster lock nut and properly install the rubber seal cap.

- (4) Other inspections.

- Snap the throttle grip several times and then recheck the vacuum pressure readings or exhaust noise to assure that they are all the same.
- Turn the steering all the way to the right and left side and snap the throttle grip few times to check that the carburetors are operated smoothly.
- The air vent tube must be positioned over the air cleaner case.
- The adjustments of the throttle grip free play and the grip damping force should be referred to the group 19 (page 182)

6-3 FUEL TANK AND VALVE

a. Description

The fuel tank is mounted on the frame body directly above the engine and is installed on the frame body through the fuel tank rubber cushions. (Fig. 6-20)

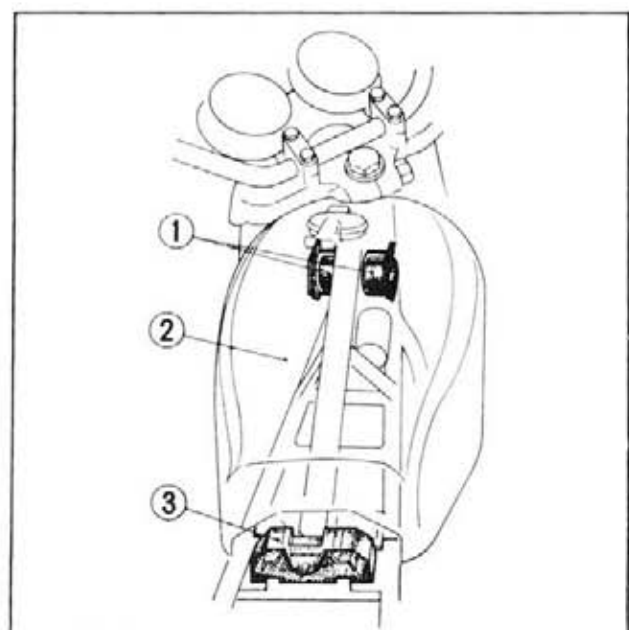


Fig. 6-20 ① Fuel tank front cushions
② Fuel tank
③ Fuel tank rear cushion

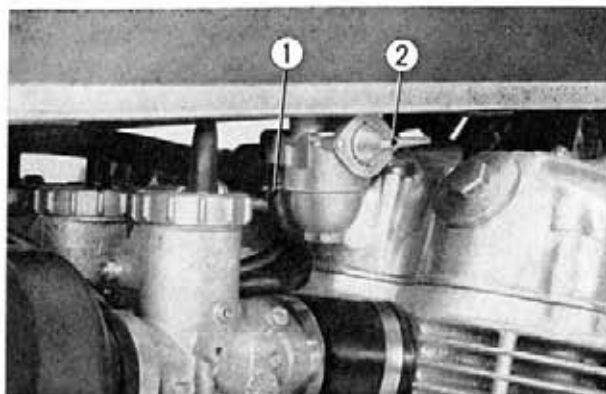


Fig. 6-21 ① Fuel tube ② Fuel valve

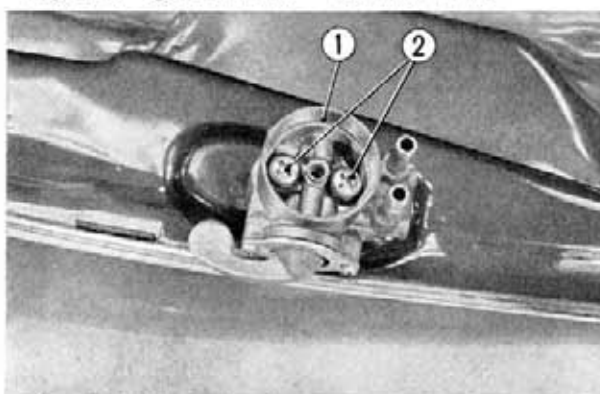
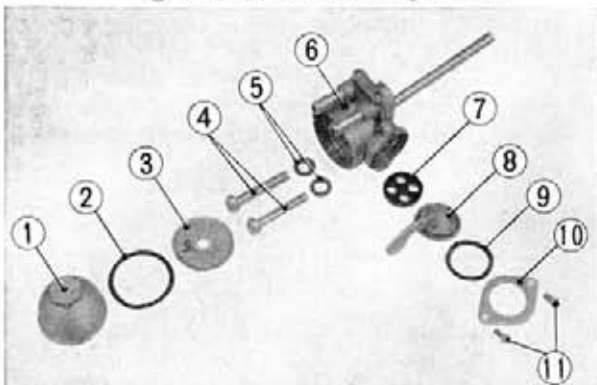
Fig. 6-22 ① Fuel valve
② Fuel valve mounting screws

Fig. 6-23 ① Fuel strainer cup ② O ring ③ Fuel strainer screen ④ 6mm cross screws ⑤ Fuel cock fixing packing ⑥ Fuel valve body ⑦ Fuel cock valve packing ⑧ Fuel cock lever ⑨ Cock lever spring ⑩ Setting plate ⑪ Cross screws

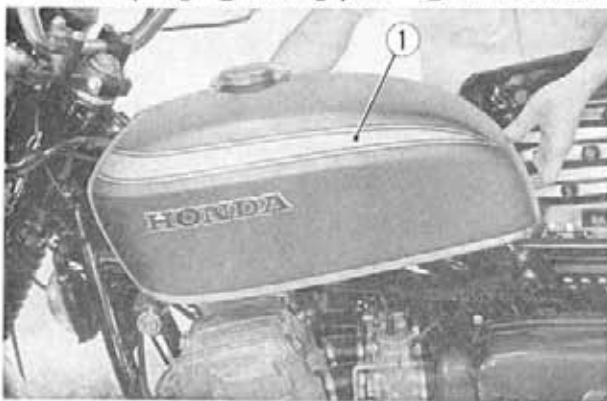


Fig. 6-24 Fuel tank

b. Disassembly

1. Switch the fuel valve to "STOP" and disconnect the fuel tube from the fuel valve. (Fig. 6-21)
2. Raise the seat, open the fuel tank rear cushion and remove the fuel tank to the rear and raise.
3. Remove the fuel strainer cap, O ring and fuel strainer screen.
4. Remove the two fuel valve mounting screws and remove the fuel valve from the tank. (Fig. 6-22)

c. Inspection

1. Inspect the fuel for leaks.
2. Inspect for clogging of the filler cap vent hole.
3. Inspect the front and rear cushion rubbers for deterioration, wear and other damages.
4. Inspect for damage to the valve cock packing and the filter screen, and then clean them with gasoline. (Fig. 6-23)
5. Inspect the fuel tube for defects.

d. Reassembly

1. Install the fuel cock assembly on the tank with two screws.
2. Fit the front and rear rubber cushions to the frame body. The front rubber cushions should be inserted by pushing the fuel tank from the rear. (Fig. 6-24)

Install the fuel tank rear bracket on the rear cushion.

Note: When installing the tank, particular attention should be given to the condition of the wires and their routing.

3. Install the fuel lines using fuel tube clips and connect the fuel tubes to the tank valve.
4. Turn the fuel valve cock to the "ON" position and check the fuel for leaks.

IGNITION SYSTEM

GROUP

7

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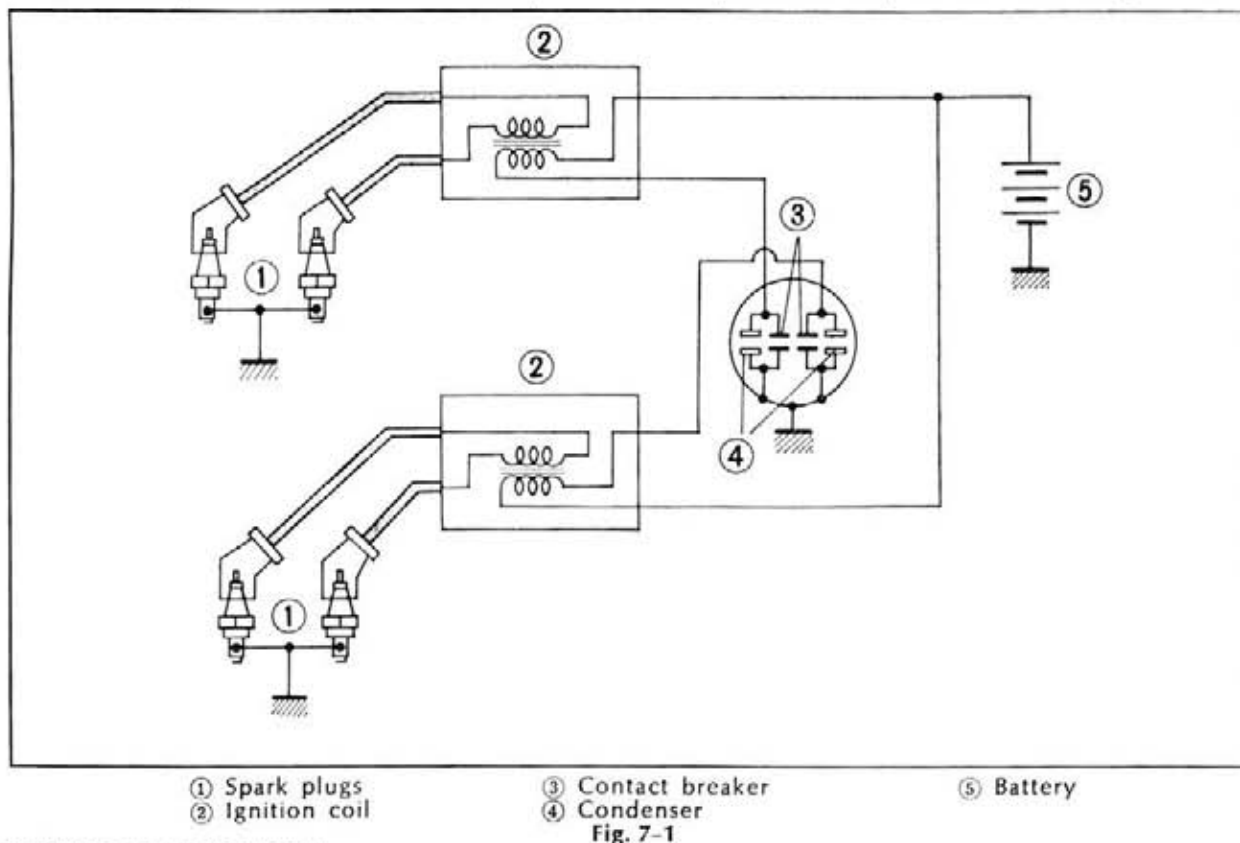
7-1 GENERAL DESCRIPTION

DESCRIPTION

The ignition system consists of two ignition coils, two contact breakers, four spark plugs, an ignition switch and a battery.

The current from the battery flows through the primary winding of the ignition coil and circuit is completed by grounding through the contact breaker. There are two contact breakers which are located 180° apart.

One of the breakers furnishes the high voltage currents to spark plugs 1 and 4; the other breaker furnishes the current to plugs 2 and 3. The contact breakers ignites the spark plugs in alternate sequence to provide a firing sequence of 1, 2, 4 and 3. Since no distributor is used, the construction is simple and the system is easy to service. (Fig. 7-1)



SPECIFICATIONS

Ignition coil make	Toyo Denso
Spark plug type	NGK D-8 ES
Standard	NGK D-7 ES, D-10E
Optional	12 mm (thread diameter), 12.7 mm (reach)
Size	0.024~0.028 in (0.6~0.7 mm)
Gap	
Contact breaker make	Hitachi
Spring force	1.43~1.87 lb (650~850 g)
Point gap	0.012~0.016 in (0.3~0.4 mm)
Condenser capacity	0.24 μ F \pm 10%
Condenser insulator resistance	Over 10 M Ω (1,000 meger)
Spark advancer	
Crankshaft speed at start of advance	1,000~1,150 rpm
Crankshaft speed at full advance	2,300~2,500 rpm
Advance angle	35°

DIAGNOSIS

Item	Probable Causes	Remedy
Engine over heat	1. Ignition timing out of adjustment	Adjust ignition timing
Spark plug does not fire	1. Defective ignition coil 2. Defective spark plug	Replace Replace
Spark at points excessive Weak spark No spark	1. Defective condenser 2. Broken or shorted ignition high tension cord 3. Dirty spark plug electrodes	Replace Replace Clean spark plug electrodes

IGNITION TIMING TEST

An accurate timing test can be made by using a strobo timing light.

Follow the procedure below for checking timing with the service tester. (Tool. No. 07308-0010000)

1. Connect the power cord to the battery and ground the black ground cable. (Fig. 7-2)
2. Set the selector knob to TIMING.
3. Plug in the timing light cable and attach the high voltage cord to the No. 1 (or No. 4) spark plug head attachment.
4. Remove the point cover on the right side of the crankcase.
5. Start the engine and with the engine idling (850~950 rpm), point the strobo timing mark.

The ignition timing is correct, if the F mark (1.4 cylinder) on the spark advancer is aligned to the timing mark. (Fig. 7-3)

6. Next, raise the engine speed above 2,500 rpm : if the timing index mark is between the two timing marks located at 23.5~26.5° ahead of the "F" mark, the timing for both idling and full advance is satisfactory.

If there is malfunction with the ignition timing even though the RPM is constant, the fault is probably with the spark advancer spring or a defect in the breaker points, therefore, the unsatisfactory parts should be repaired or replaced.

If it is necessary to make adjustment, perform the adjustment in accordance with the procedure described in service adjustment on page 91~92.

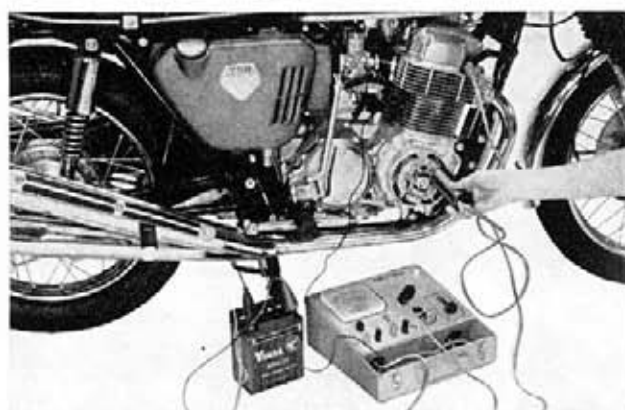


Fig. 7-2

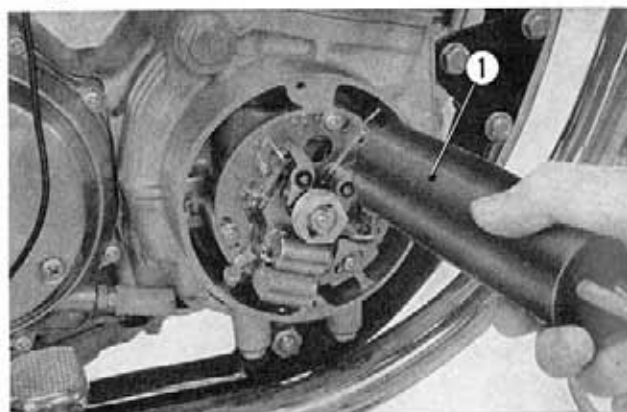


Fig. 7-3 Timing light

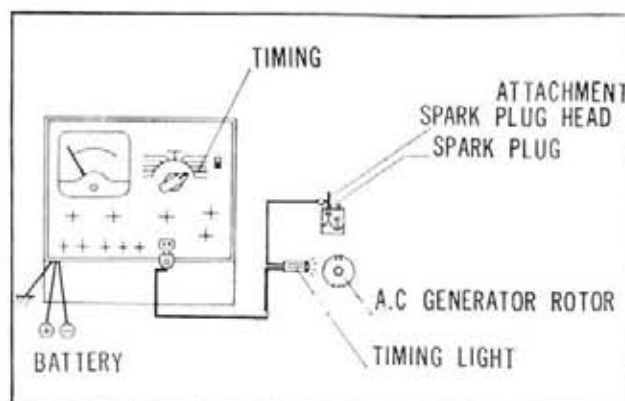


Fig. 7-4 Ignition timing test

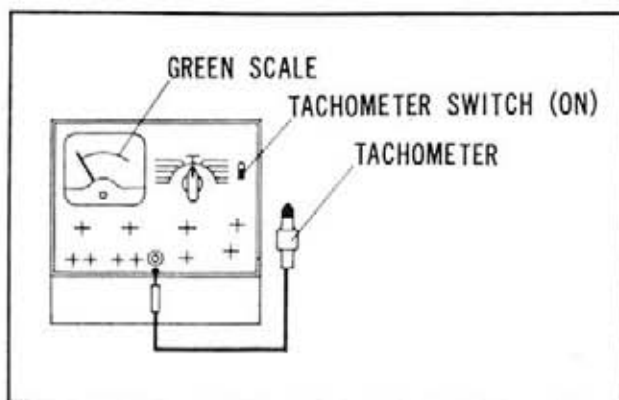


Fig. 7-5

7. The ignition timing for the No. 2 and 3 cylinders are also checked in the same manner described above.

8. The engine RPM is checked with a tachometer or a revolution counter located on the tester. Set the tachometer switch to the ON position, insert the tachometer cable, place the tachometer against the center of the spark advancer shaft and then read off the green scale.

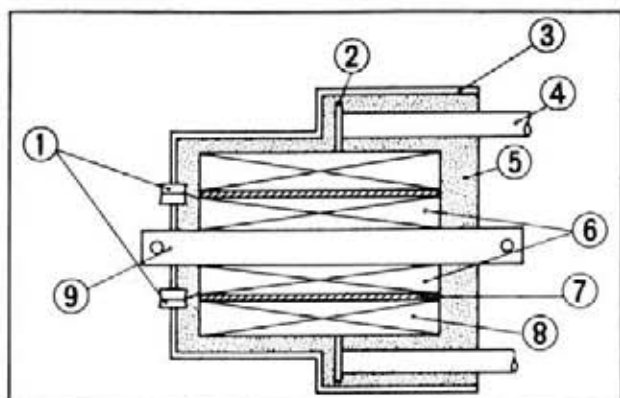


Fig. 7-6 ① Primary terminal ⑤ Synthetic resin
② High tension terminal ⑥ Primary coil
③ Case ⑦ Bobbin
④ High tension cord ⑧ Secondary coil
⑨ Iron core

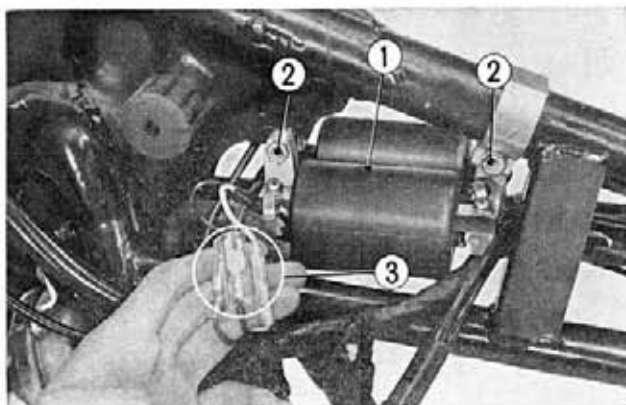


Fig. 7-7 ① Ignition coil ③ Leads connectors
② Mounting bolts

Connect the ignition primary cord plug to the tester and connect the opposite terminal end to the primary terminal of the coil. Connect red test lead to the black terminal of the ignition coil; the white lead to the yellow cord of the left coil (right coil to the blue cord).

Connect the high tension cable (red) to the secondary coil terminal.

Position the selector knob to COIL TEST. Adjust the three point spark tester to the maximum distance spark is maintained and then note this distance. The coil is satisfactory if the distance is greater than 0.28 in (7 mm).

7-2 IGNITION COIL

a. Description

The ignition coil of a primary coil with 380 turns of enameled and secondary coil with 15,000 turns wire wound around the primary coil, with an iron core of laminated silicon steel sheets in the center. Each secondary coil has two high tension cables that lead to two spark plugs. (Fig. 7-6)

b. Disassembly

1. Open the seat and remove the fuel tank in accordance with section 6-3 b on page 74.
2. Disconnect the electrical leads (yellow, blue and black/white leads).
3. Unscrew the two ignition coil mounting bolts and then the ignition coil can be removed from the frame. (Fig. 7-7)

c. Inspection

1. Bench testing ignition coil
Check the ignition coil using the service tester by following the procedure below. (Fig. 7-8, 9)

Connect the power cord to the 12V battery and ground the black ground cord.

Note :

Spark condition as shown in Fig. 7-9A is normal. Fig. 7-9B shown the spark condition when the test leads are connected in reverse at the ignition coil.



Fig. 7-8 Ignition coil test

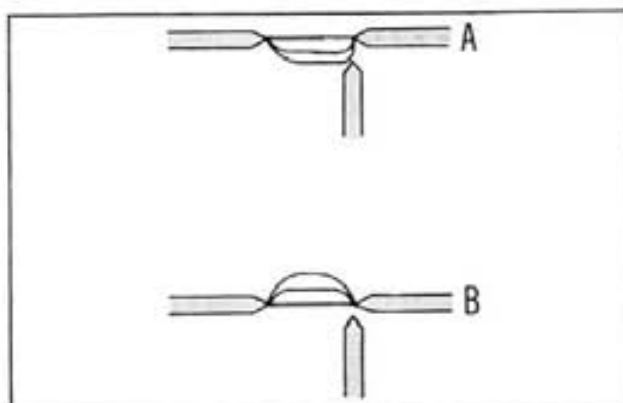


Fig. 7-9

2. Testing the coil without removing

External battery is not required. Connect the tester ground lead (black) to the motor-cycle frame. Remove the spark plug cap and install the spark plug head attachment on the spark plug. Connect high voltage tester cable to the attachment and then reinstall the spark plug cap.

Turn the ignition switch to the ON position use the kick starter or starting motor to turn over the engine and determine the maximum sparking distance of the coil.

3. Check the high tension cord for damage and deterioration, if it is found to be improper condition, replace it with new one.

d. Reassembly

1. Mount the ignition coil assembly on the frame with the two bolts.
2. Connect electrical leads (yellow, blue and black/white leads) to wire harness leads.
3. Install the fuel tank carefully not to damage the electrical leads or cables.

7-3 SPARK PLUG

a. Description

The main parts of the spark plug are the electrodes, insulator and the plug body.

Standard spark plug used is NGK D-8ES.

However, the following types are also available for different operating condition (Fig.7-10)

Hotter type	D-7 ES
Standard	D-8 ES
Colder type	D-10 E

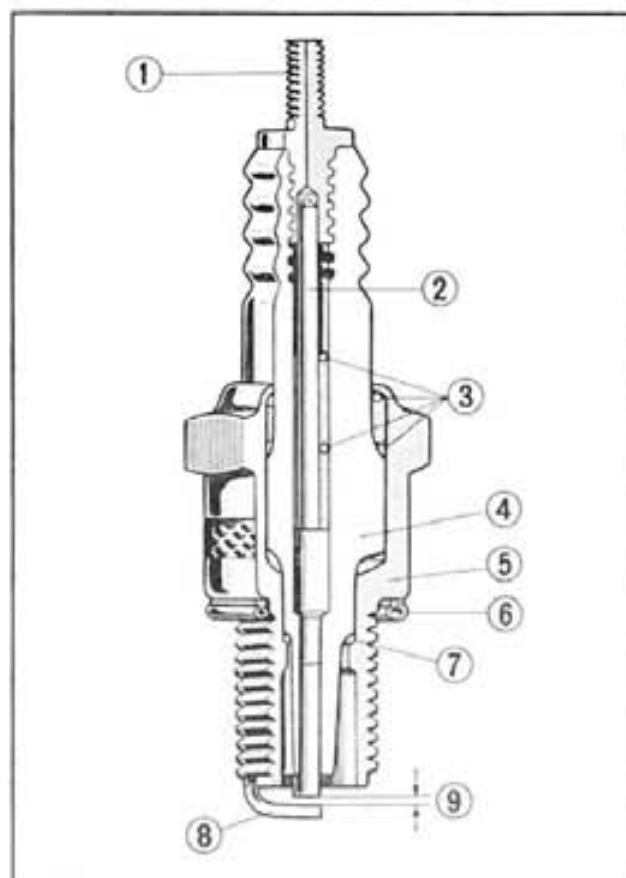





Fig. 7-10 ① Terminal ② Center electrode ③ Wire packing ④ Insulator ⑤ Shell ⑥ Gasket ⑦ Lower sealing ⑧ Ground electrode ⑨ Spark gap

b. Disassembly

1. Remove any foreign matter from around the spark plugs by blowing out with compressed air.
2. Detach the high tension cord cap and remove the spark plug with the special wrench provided in the tool kit.

c. Inspection

1. Inspect each spark plug for badly worn electrodes, broken or cracked porcelain insulator. The spark plug conditions and corrective action procedure is shown below.

Spark plug condition	Cause	Corrective action
Electrode coated with carbon deposit 	<ol style="list-style-type: none"> 1. Too rich a fuel 2. Excessive idling 3. Poor quality gasoline 4. Clogged air cleaner 5. Use of cold spark plug 	Adjust carburetor Adjust idling Use good quality gasoline Service the air cleaner Use proper heat range plug (hot type)
Electrode fouled with oil 	<ol style="list-style-type: none"> 1. Worn piston ring 2. Worn piston and cylinder 3. Excessive clearance between valve guide and valve stem 	Replace piston ring Replace piston or cylinder Replace valve guide or valve
Electrode overheated or burnt 	<ol style="list-style-type: none"> 1. Use of hot spark plug 2. Engine over heating 3. Improper ignition timing 4. Loose spark plug or damaged spark plug hole thread 5. Too lean a fuel mixture 	Use proper heat range plug Readjust ignition timing Retighten plug or replace cylinder head Adjust carburetor
Damage	Spark plug over torqued	Replace with a new spark plug

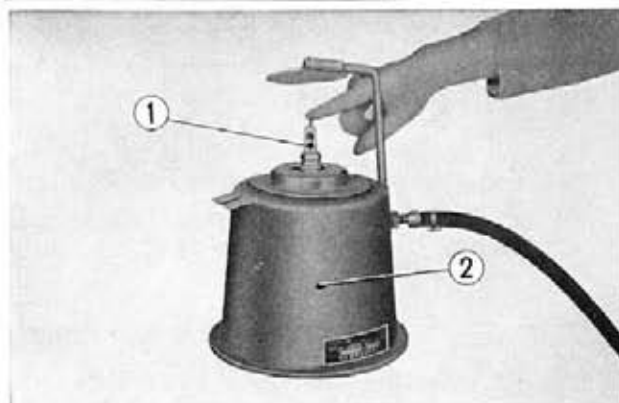


Fig. 7-11 ① Spark plug
② Spark plug cleaner

2. Plug cleaning is best performed by spark plug cleaning set, however, lacking this set, a satisfactory job can be performed by using a wire brush or stiff pin to remove the deposits and washing in gasoline. (Fig. 7-11)

3. After completing inspection of section 2 adjust spark plug gap to 0.024~0.028 in (0.6~0.7 mm). The gap can be measured by a thickness gauge. The adjustment is made by bending the negative (ground) electrode (Fig. 7-12)
4. Inspect the spark plug hole threads and clean before installing plugs. Corrosion deposits can be removed with a 12 mm × 1.25 mm pitch thread tap or by using a small wire brush.

Note :

1. Never use an improper heat range spark plug.
2. Do not attempt to dry or remove soot from the spark plug by burning.

d. Reassembly

1. Install the spark plug in the reverse order of disassembly.

Note :

1. The spark plugs in the No. 2 and No. 3 cylinders are difficult to reach and if care is not taken during the removal and installation of these spark plugs, it is possible for the plugs to be dropped and become lodged in the cylinder head cavities. (Fig. 7-13)
2. All spark plugs must be properly torqued. Loose plug will not properly dissipate heat and become very hot, causing possibly damage to the engine.

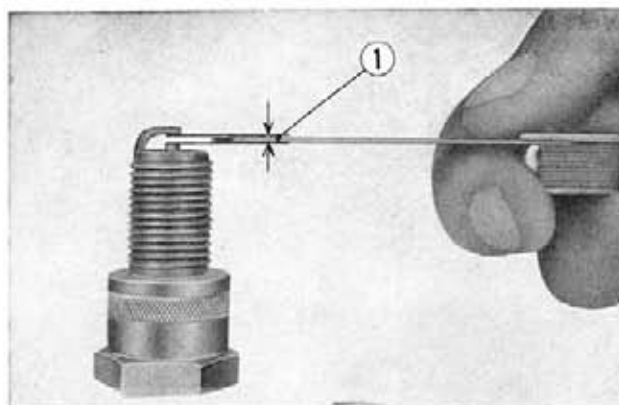


Fig. 7-12 ① Spark plug gap

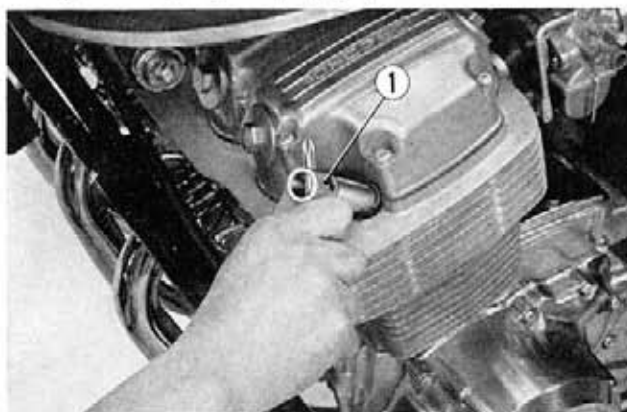


Fig. 7-13 ① Spark plug wrench

7-4 CONTACT BREAKER AND CONDENSER

a. Description

The contact breaker is mounted in the compartment which is at the right end of the crankshaft and consists of a base plate, two breaker arms, fixed and movable points, primary terminal, spring and lubricating felt.

The two condensers are also located on the contact breaker base.

The purpose of the condenser is to prevent unwanted sparking across the points. (Fig. 7-14)

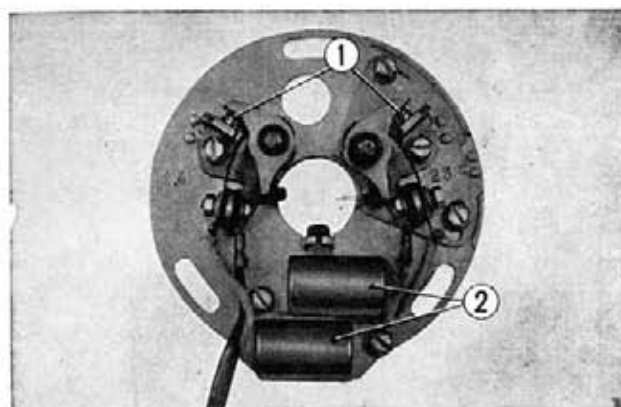


Fig. 7-14 ① Contact breaker
② Condenser

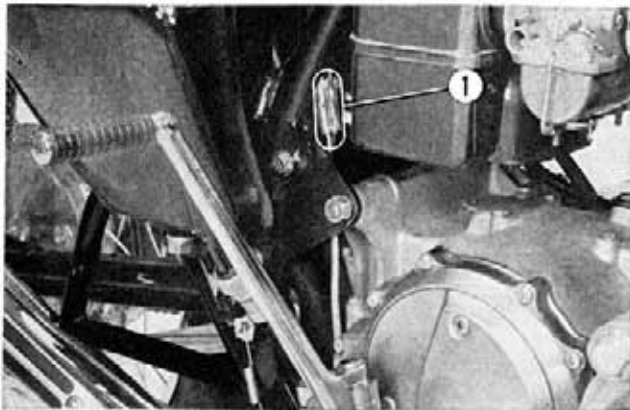


Fig. 7-15 ① Contact breaker lead

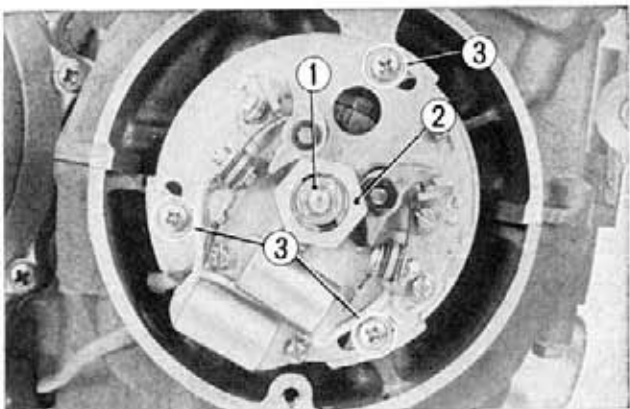


Fig. 7-16 ① 6 mm hex nut
② Special washer
③ Contact breaker setting screws

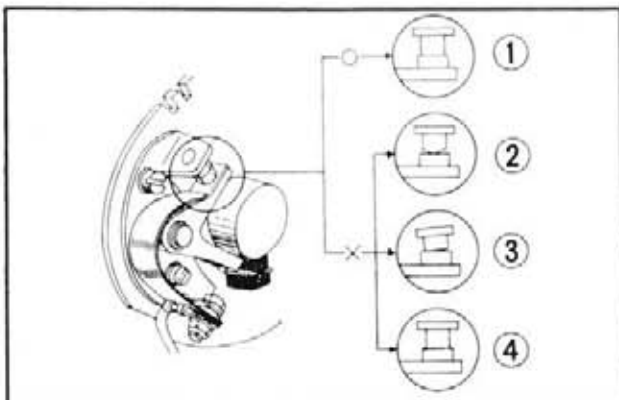


Fig. 7-17 ① Correct
② Contact is worn
③ One side contact
④ Contamination of the contact

b. Disassembly

1. Remove the point cover.
2. Disconnect the lead connectors (yellow and blue leads) at the center of the frame, right lower side. (Fig. 7-15)
3. Unscrew the 6 mm hex nut and remove the contact breaker assembly. (Fig. 7-16)
4. The condenser can be removed from the breaker base.

c. Inspection

1. Checking the contact breaker point.
If oil is left for a long time without removal, a hard film will be formed and eventually result in misfiring.
Therefore, remove oil with trichloroethylene from the contact breaker point.
 - a. Dress the pitted or dirty point with either a point file or emery paper, however, if the condition is relatively severe, remove the contact breaker arm and dress the points on both the arm and the stationary point with an oil stone, making sure that the points will have parallel contact when assembled. The point gap should be adjusted to **0.012~0.016 in (0.3~0.4 mm)**. (Fig. 7-17)
 - b. Replace the breaker arm if the pivot hole worn excessively.
 - c. Always maintain the contact breaker terminal and insulators as well as the wiring free from water, oil, and foreign matters.
 - d. After the points have been dressed, clean the surfaces with a clean rag soaked in small amount of trichloroethylene, further, oil or other foreign matters should not be permitted on the breaker assembly.
3. Condenser capacity
Measure the condenser capacity with the service tester. If the capacity is **0.22~0.26 μ F**, it is satisfactory. Refer to the service tester operating instruction leaflet for the measuring procedure.

d. Reassembly

1. Assemble the each component parts on the contact breaker base plate.
2. Install the contact breaker assembly with the three setting screws.

3. Install the advancer shaft special washer, 6mm washer and tighten 6mm hex nut. (Fig. 7-18)
4. Connect the electrical leads.
5. When attempting the ignition timing adjustment, both the ignition timing and the breaker points gap should be adjusted.

(1) Contact breaker point gap (Fig. 7-19)

Before adjusting ignition timing the breaker points must be checked.

Open the spring loaded contact breaker point by a finger and check surface condition.

If the points are erroded, pitted or burnt, dress with a point file and follow by polishing with unwaxed paper to remove any file dust.

Next, turn the crankshaft in the clockwise direction hold at the position where the point gap is at maximum opening and check the gap by inserting a filler gauge. The standard gap is between 0.012 to 0.016 in (0.3~0.4 mm).

To adjust the point gap, loosen the contact breaker plate locking screw and move the contact breaker to the right or left until the proper gap opening is obtained and then tighten the locking screw. (Fig. 7-19)

(2) Ignition timing adjustment

After testing the ignition timing with the service tester, it is found to adjust the ignition timing, perform the following manner.

- a. Start adjustment from the 1.4 breaker point indicated on the base plate.
- b. Remove the contact breaker wire terminal unscrewing the retaining nut and connect one end of continuity light to the point terminal and hook the negative terminal to the crankcase.

Rotate the crankshaft in the clockwise direction slowly to align the "F" (1.4 cylinder) timing mark to the index mark. At this moment the breaker point should just to open while the continuity light flickers or goes off.

If point opening moment is incorrect, adjustment should be made in the following manner.

- c. Loosen the three base plate setting screws (2) (Fig. 7-20) and carefully rotate the base plate until the continuity light flickers. Tighten base plate setting screws. Rotating the base

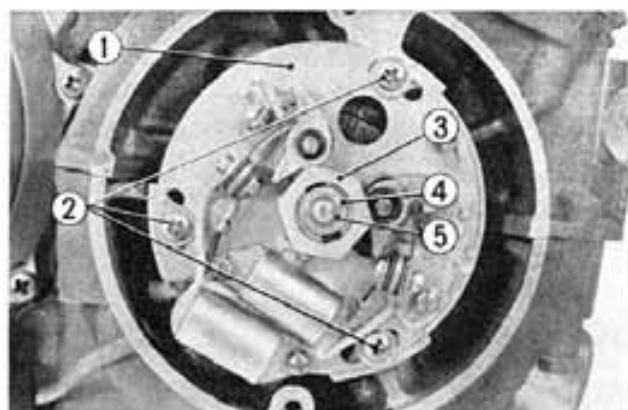


Fig. 7-18 ① Contact breaker assembly
② Contact breaker setting screws
③ Advancer shaft special washer
④ 6mm washer ⑤ 6mm hex nut

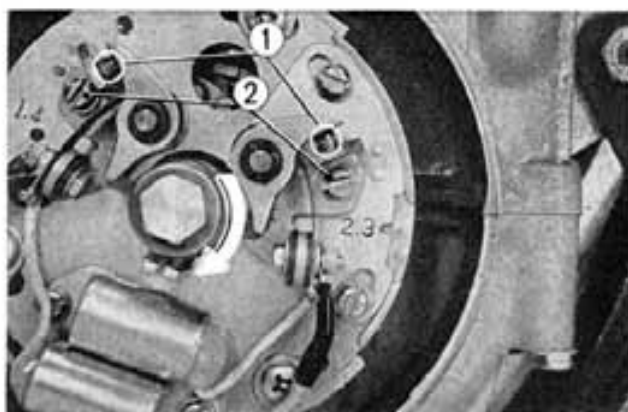


Fig. 7-19 ① Contact breaker points
② Contact breaker plate locking screw

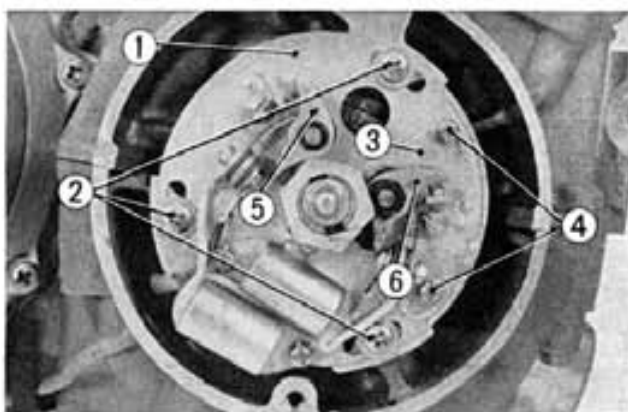


Fig. 7-20 ① Contact breaker base plate
② Base plate setting screws
③ Right base plate
④ Right base plate setting screws
⑤ 1.4 cylinder breaker points
⑥ 2.3 cylinder breaker points

plate clockwise will retard ignition timing, counterclockwise rotation will advance ignition timing.

- d. Next connect continuity light to 2.3 cylinder breaker points. Rotate the crankshaft 180° in the clockwise direction and align the "F" (2.3 cylinder) timing mark to the timing index mark.

Adjustment may be done in the same manner as mentioned in section a and b by loosening two base plate locking screws ④.

- e. Recheck the contact breaker points gaps and recheck the ignition timing with service tester on page 85~86.

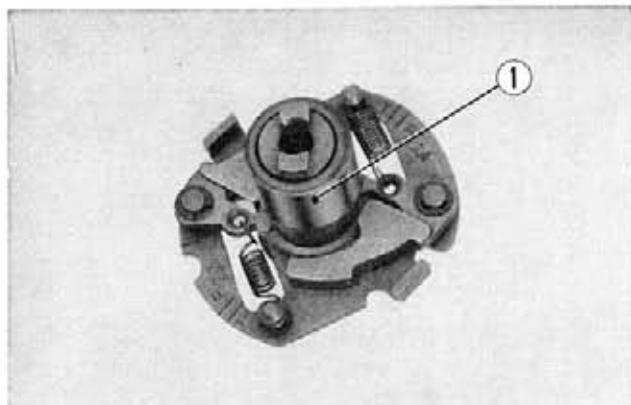


Fig. 7-21 ① Spark advancer

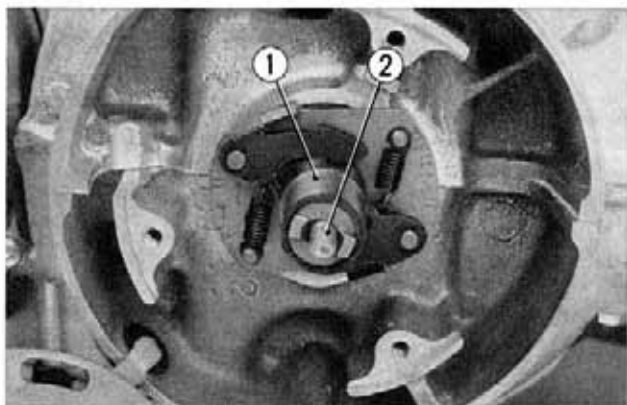


Fig. 7-22 ① Spark advancer
② Spark advancer shaft

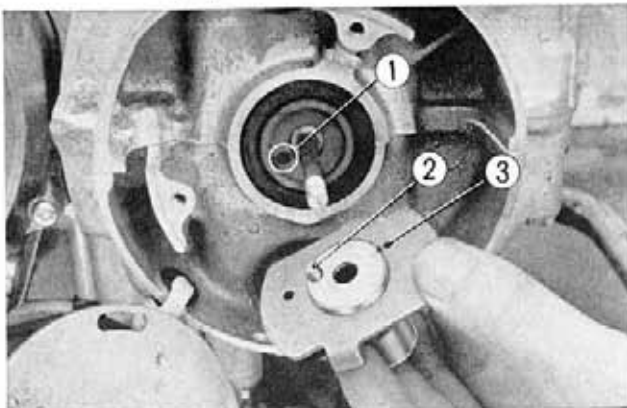


Fig. 7-23 ① Pin hole
② Spark advancer pin
③ Spark advancer

7-5 SPARK ADVANCER

a. Description

Centrifugal advance type mechanism is used to advance the spark.

As the speed of the engine increases, the centrifugal force of the advancer weight overrides the force of the spring and starts to move outward, moving the point cam in the direction of rotation, in other words, advances the point cam to produce an early ignition.

The advancer assembly is mounted on the crankshaft inboard of the contact breaker point assembly. (Fig. 7-21)

b. Disassembly

1. Remove the contact breaker in accordance with section 7-4. b on page 90.
2. Remove the spark advancer from the spark advancer shaft. (Fig. 7-22)

c. Inspection

Check the spark advancer spring for loss of tension and also the advancer pin for excessive wear; replace any part found worn excessively or defective.

d. Reassembly

1. Install the spark advancer to make sure that the pin is inserted into the pin hole at the end of the crankshaft. (Fig. 7-23)
2. Install the contact breaker assembly in the reverse procedure of disassembly.

CHARGING SYSTEM

GROUP

8

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8-1 GENERAL DESCRIPTION

DESCRIPTION

The charging system for the CB 750 is made up of the excited field 3-phase alternator, rectifier, voltage regulator and the fuse. The alternator consists of the battery excited field coil, stator coil and the rotor; it does not, however, contain a slip-ring or brushes.

In order for the stator coil to produce a constant voltage, the current from the battery to produce the exciter field is regulated to very close limits by the dual contact regulator. The output from the alternator is rectified by the silicon rectifier before being sent to re-charge the battery.

The regulator has two different types of function depending upon the charge condition of the battery.



The electrical current from the battery flows through the switch and into the regulator. When the battery voltage is lower than normal (less than 13.5V at the battery terminal), the current flowing through the armature away from the upper contact and the battery to the generator field coil. The strength of the magnetic field is depended upon the strength of the battery voltage. The current field coil is 1.6 A at a battery terminal voltage of 12V. This produces an output voltage of corresponding strength which is used to charge the battery. (Fig. 8-1)

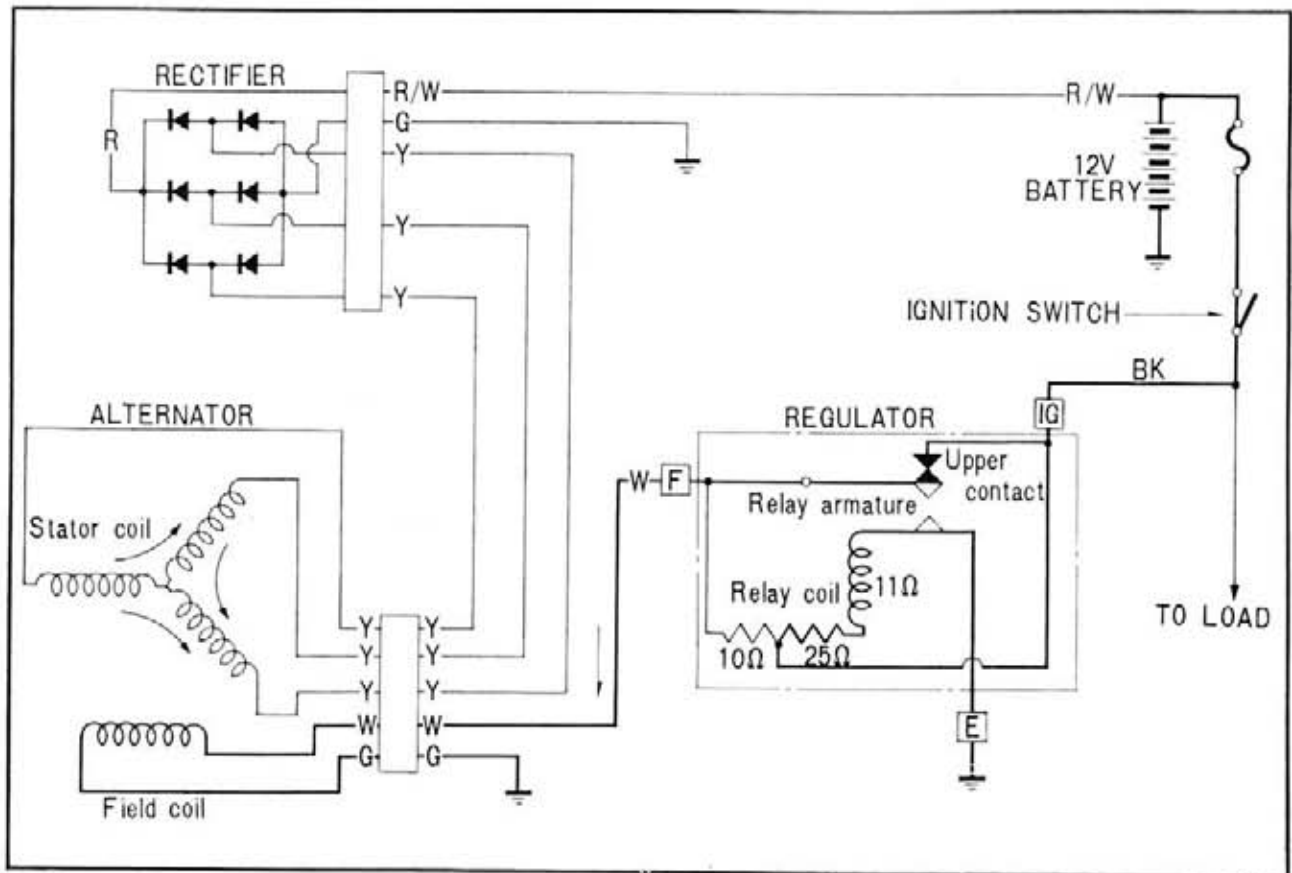


Fig. 8-1