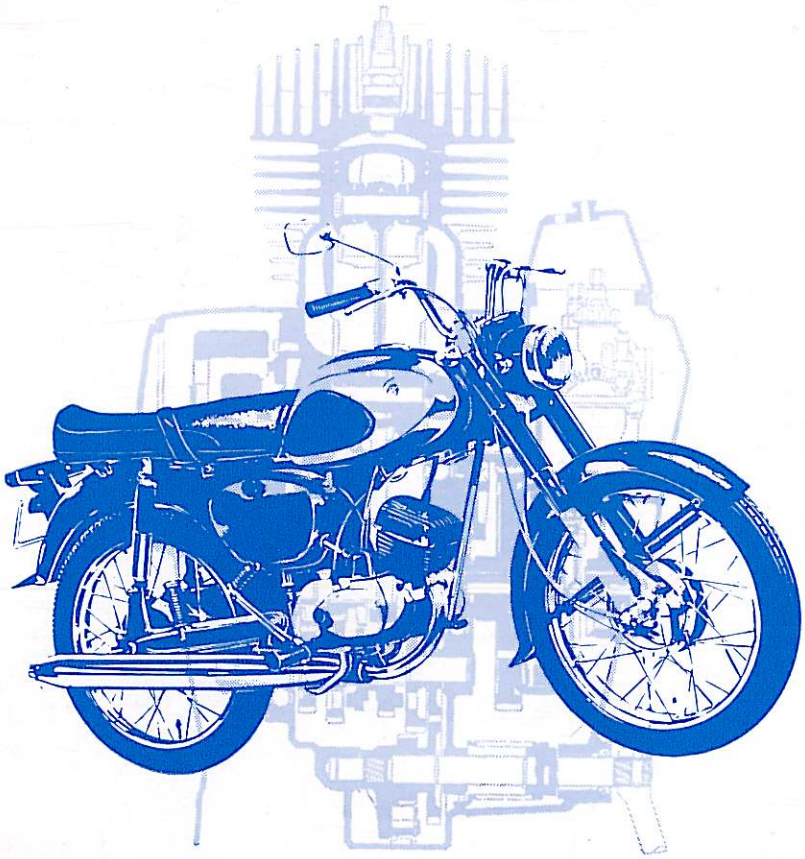
BRIDGESTONE 90



TECHNICAL HANDBOOK

BS BRIDGESTONE TIRE CO., LTD.

TOKYO, JAPAN

TECHNICAL HAND BOOK

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1. OUTSTANDING FEATURES

Bridgestone 90 belongs to the class of regular motorcycles perfected by concentrating the know-how and technical skill of Bridgestone's engineers.
Incorporating many features, such as styling and superlative finish, comfortable riding position and stability, and powered by a two-stroke rotary disc valve engine, it gives matchless performance.

1. 1 Main Features of the Engine :

A

Rotary Disc Valve System :
The rotary disc valve system for intake of fuel, gives stable high torque from low to high speeds and quick and smooth acceleration from a standing start.

B

Kick Starter :
Regardless of transmission in any position, kick starting is possible by simply operating the clutch lever, that is, quicker starting is effected by disengaging the clutch and kicking the pedal without the need of putting the gear first in neutral.

C

Four-Speed Rotary Transmission :
The four-speed rotary transmission enables gear changes to be effected smoothly and a high speed in high gear of 95 km/h (60 M. P. H) or more is possible.

D

Carburetor :
The carburetor is completely enclosed in the transmission case for protection against dust and water, the need for which had long been a problem for two-cycle engines.

E

Little Vibration :
Attention has been paid especially to perfect balancing of the crank shaft, to minimize engine vibration which communicates to the frame.

Riding comfort is assured at any speed in low or high gear.

1. 2 Outstanding Features of the Frame :

A

Telescopic Front Fork with Oil Damper :
The adoption of a telescopic front fork with oil damper assures great stability even at high speeds on rough roads.

B

Maneuverability :
Exceptional stability in maneuvering even on rough roads because of ample road clearance and banking angle.

C

Light and Strong Frame :
This permits safety, easy riding and handling.

D

Braking Performance :
Extra wide brake hubs 130 mm ϕ (5. 12 ϕ inch) and the completely watertight drums assure efficient braking.

2. SPECIFICATIONS

***Engine :**

(1) Type :	2-stroke, Single Cylinder.
(2) Piston Displacement :	88 cc. (5. 39 cu inch)
(3) Bore & Stroke :	50 mm×45 mm (1. 97×1. 77 inch)
(4) Compression Ratio :	6. 8 : 1
(5) Max. Brake Horse Power :	7. 8 HP/7, 000 rpm.
(6) Max. Torque :	0. 85 kg-m/5, 000 rpm.
(7) Air Intake System :	Rotary disc valve.
(8) Starting System :	Kick Starter.
(9) Charging System :	A. C. Magneto.
(10) Ignition System :	Flywheel Magneto.
(11) Ignition Timing :	22° befor T. D. C.
(12) Spark plug :	N. G. K. B-7H.
(13) Carburetor :	AMAL Type, VM 15 SC.
(14) Fuel Mixture :	20 (gasoline) to 1 (motor oil SAE No. 30)
(15) Transmission Oil :	0. 6 litre (0. 158 US gal.) in transmission case SAE No. 20 in winter or SAE No. 10 W/30 in all seasons.

***Performance :**

(1) Max Speed :	95 km/h (60 mph)
(2) Climbing Ability :	1 in 3
(3) Fuel Consumption :	75 km/1 (177 mpg/20 mph) at 30 km/h paved flat test road.
(4) Min. Turning Radius :	1. 8 m (70. 8 inch).
(5) Acceleration :	13. 0 seconds (Standing start 0-200 m)
(6) Braking Distance :	6 m at 35 km/h (20 feet, at 22 mph).

***Frame & Suspension :**

(1) Frame Type :	Pressed Steel, Backbone Type.
(2) Front Suspension :	Telescopic Fork with Hydraulic Damper.
(3) Rear Suspension :	Swinging Arm with Hydraulic Damper.

***Transmission :**

(1) Clutch :	Manual, Multiple discs in oil bath.	
(2) Transmission :	4 speed constant-mesh gear and foot control.	
(3) Gear Ratio :	Primary (Herical Gear) ;	1 : 3.95
	Gear Box : 1 st	1 : 2.77
	2 nd	1 : 1.72
	3 rd	1 : 1.23
	4 th	1 : 0.924
	Secondary (Chain) :	1 : 2.43
	Total Gear Ratio : 1 st	1 : 26.58
	2 nd	1 : 16.51
	3 rd	1 : 11.81
	4 th	1 : 8.86

***Dimensions, Weight :**

(1) Overall Length :	1,830 mm (72.0 inch)
(2) Overall Width :	660 mm (26.0 inch)
(3) Overall Height :	970 mm (38.1 inch)
(4) Saddle Height :	750 mm (29.5 inch)
(5) Wheel base :	1,160 mm (45.7 inch)
(6) Road Clearance :	150 mm (5.9 inch)
(7) Tire Size (Front) :	2.50–17, 4 ply
(Rear) :	2.50–17, 4 ply
(8) Tire Pressure (Front) :	1.6 kg/cm^2 (23.0 lbs/in^2)
(Rear) :	2.0 kg/cm^2 (28.0 lbs/in^2)
(9) Caster :	63°
(10) Trail :	80 mm (3.15 inch)
(11) Banking Angle :	45°
(12) Dry Weight :	79 kg (174 lbs)
(13) Fuel Tank Capacity :	7.0 *l* (1.85 US gal.)
	Including 1 litre (0.264 US gal.) reserve
(14) Front Brake :	Right Hand
(15) Rear Brake :	Right Foot

***Electrical Equipment :**

	STANDARD	EXCLUSIVELY FOR CHP
(1) Head light :	6 V–15/15 W	6 V–15/15 W
(2) Tail light :	6 V–2 W	6 V–5 W
(3) Stop light :	6 V–8 W	6 V–18 W
(4) Battery :	6 V–4 AH	6 V–4 AH
(5) Turn signal light	6 V–8 W	——

Top, side and front views of "BRIDGESTONE 90"

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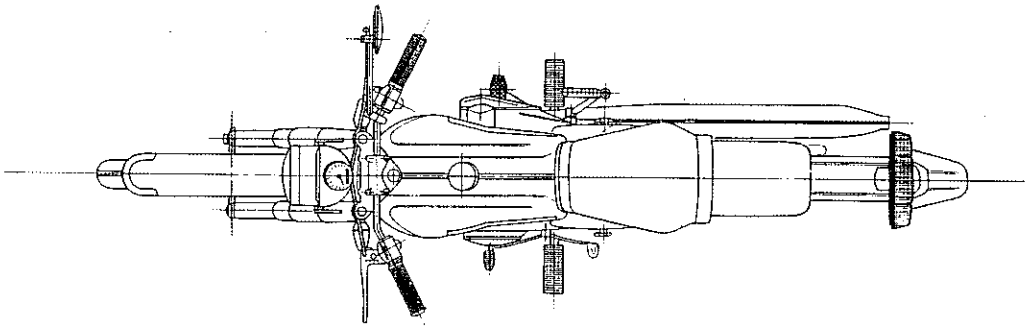
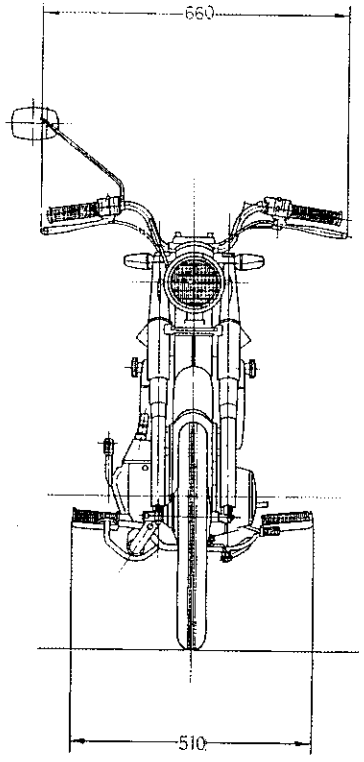
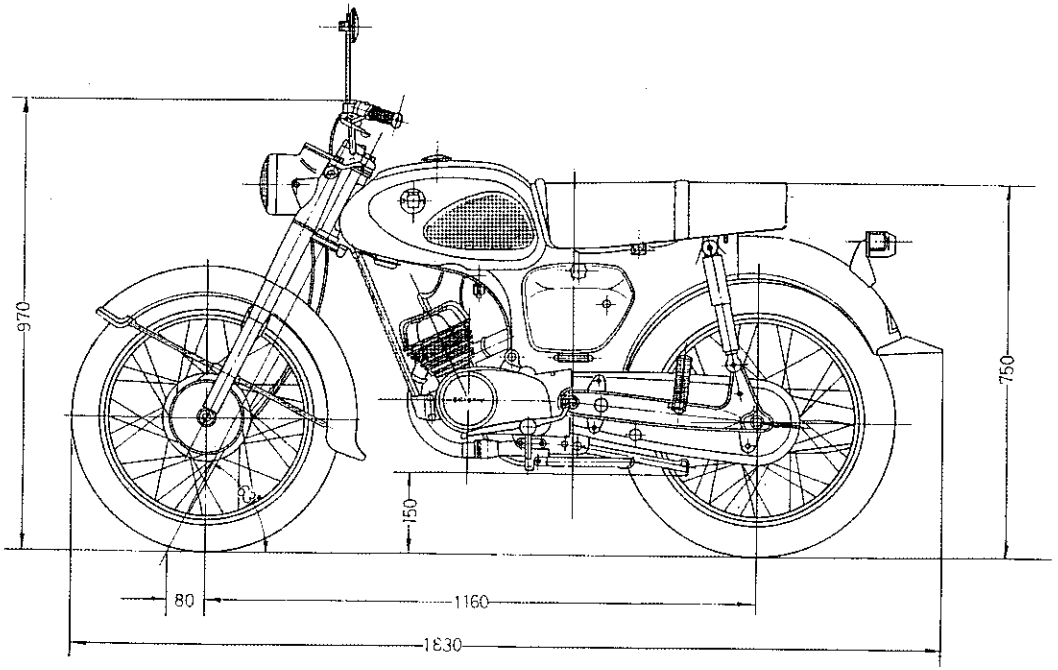
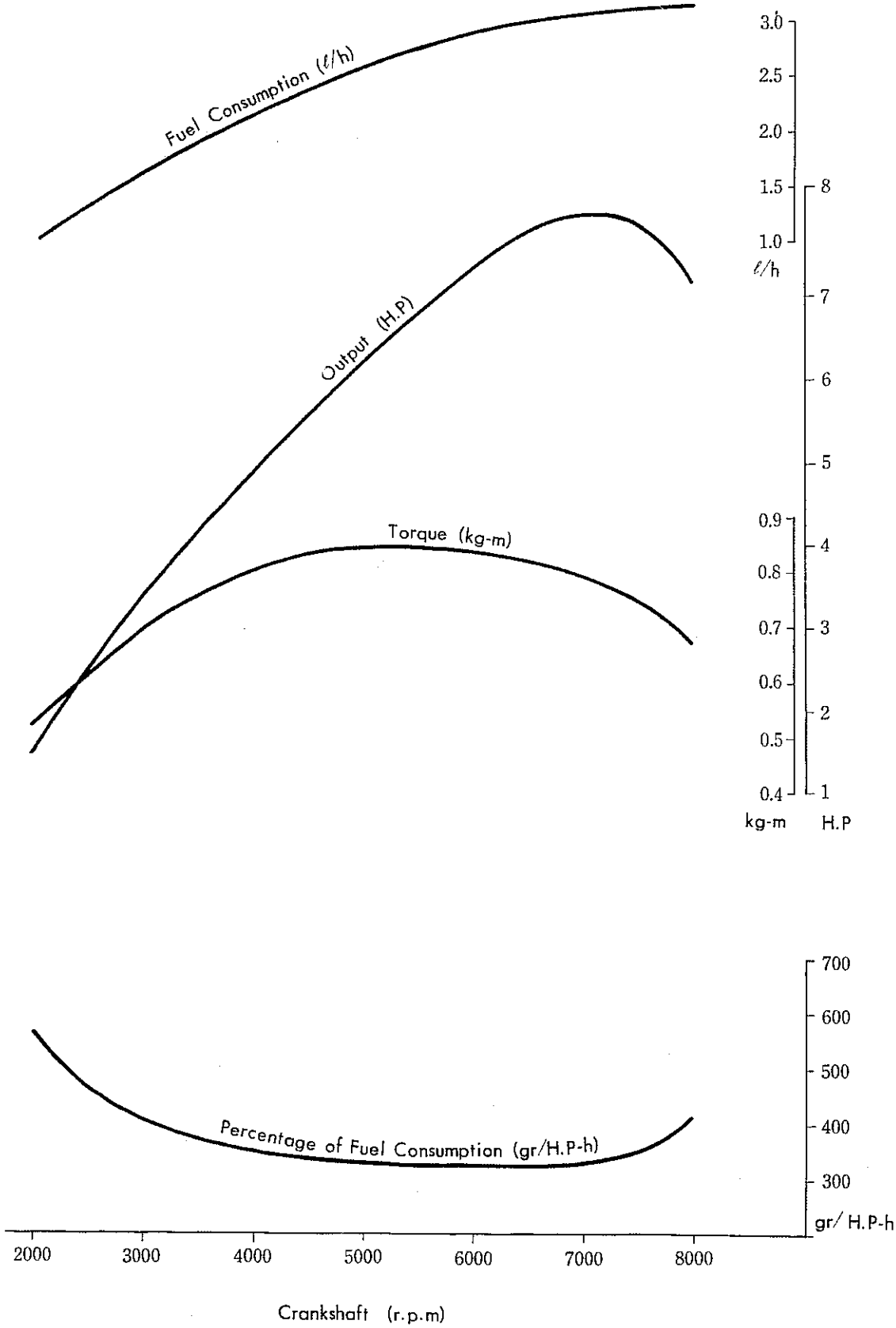


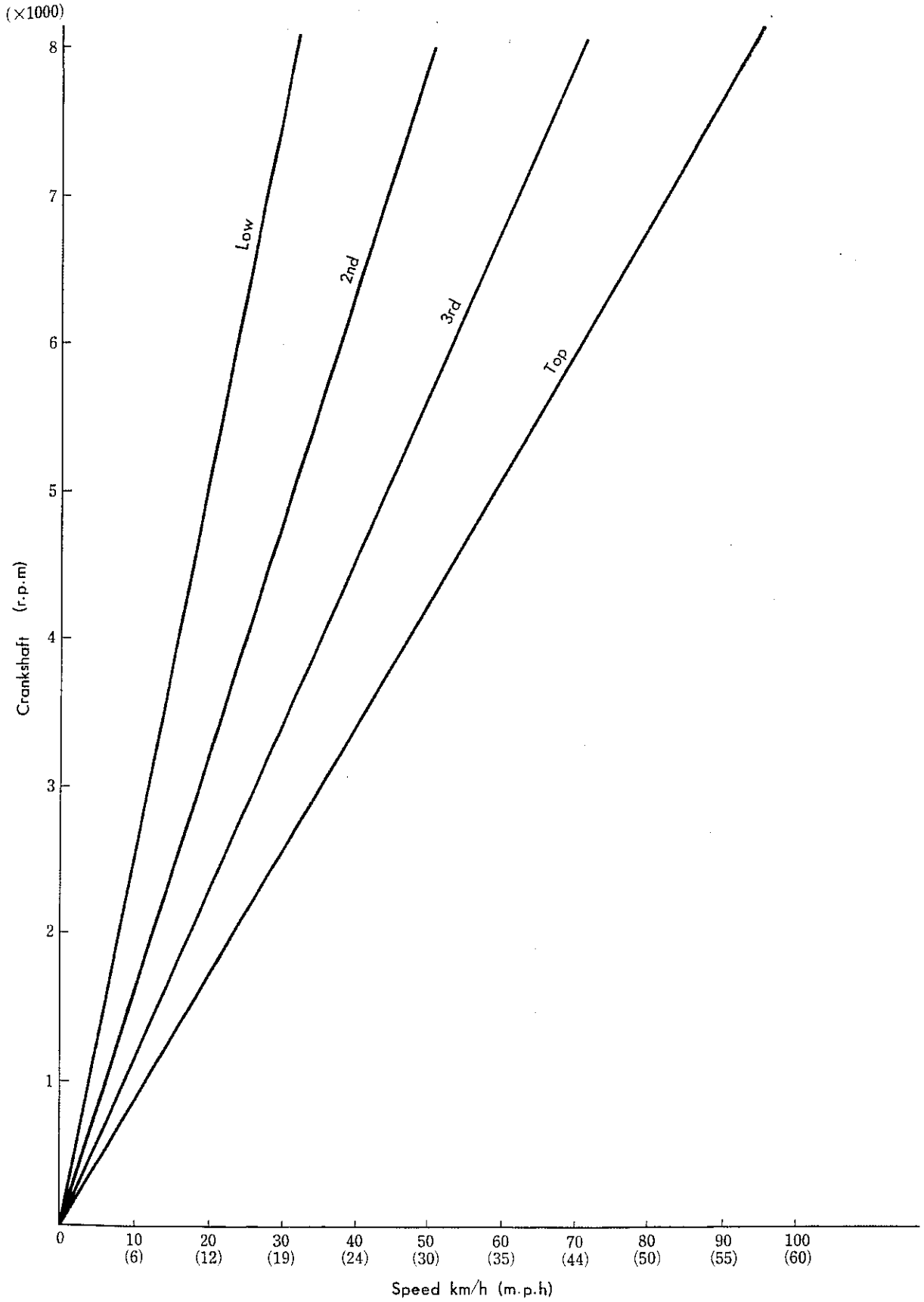




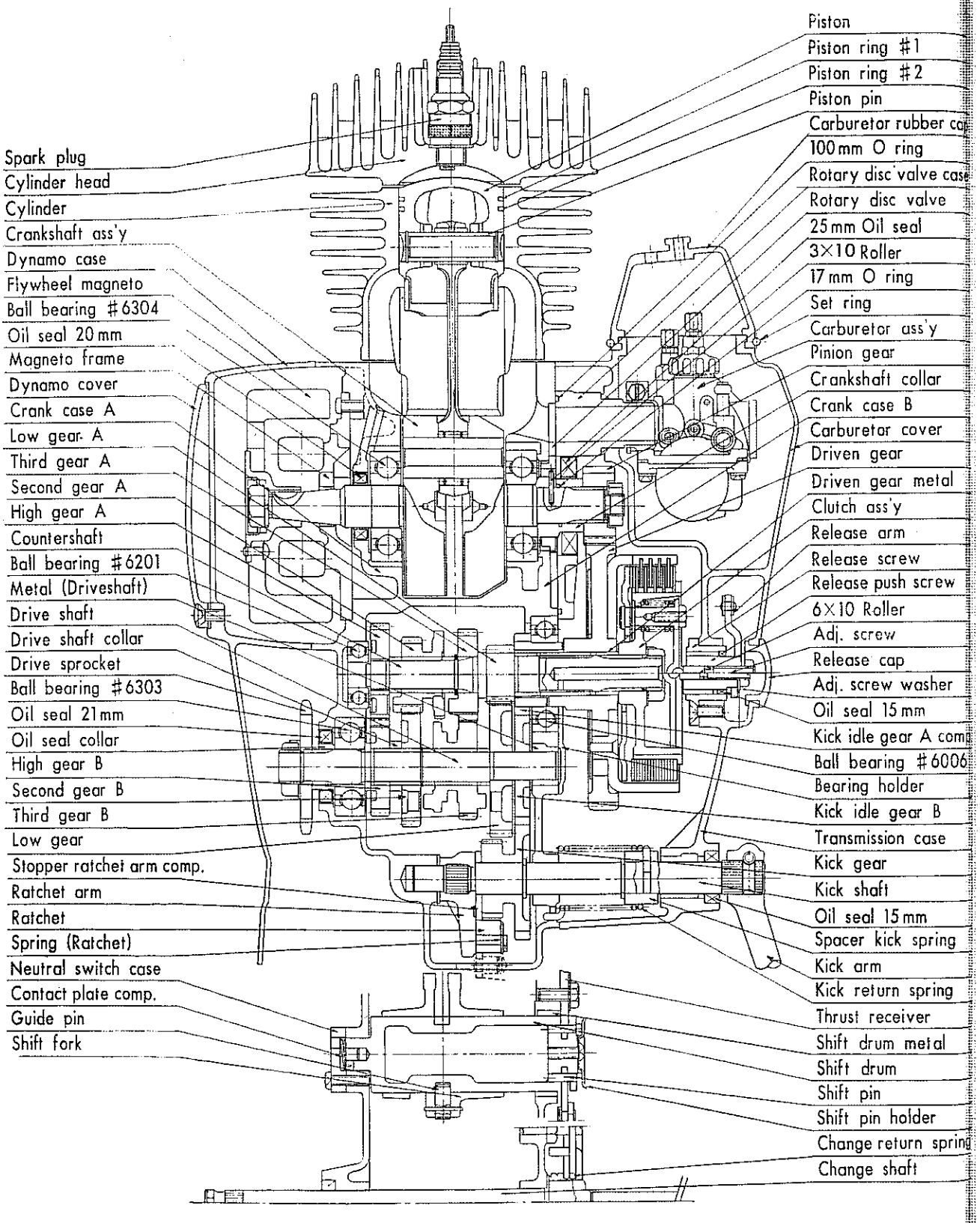
3. PERFORMANCE CURVE

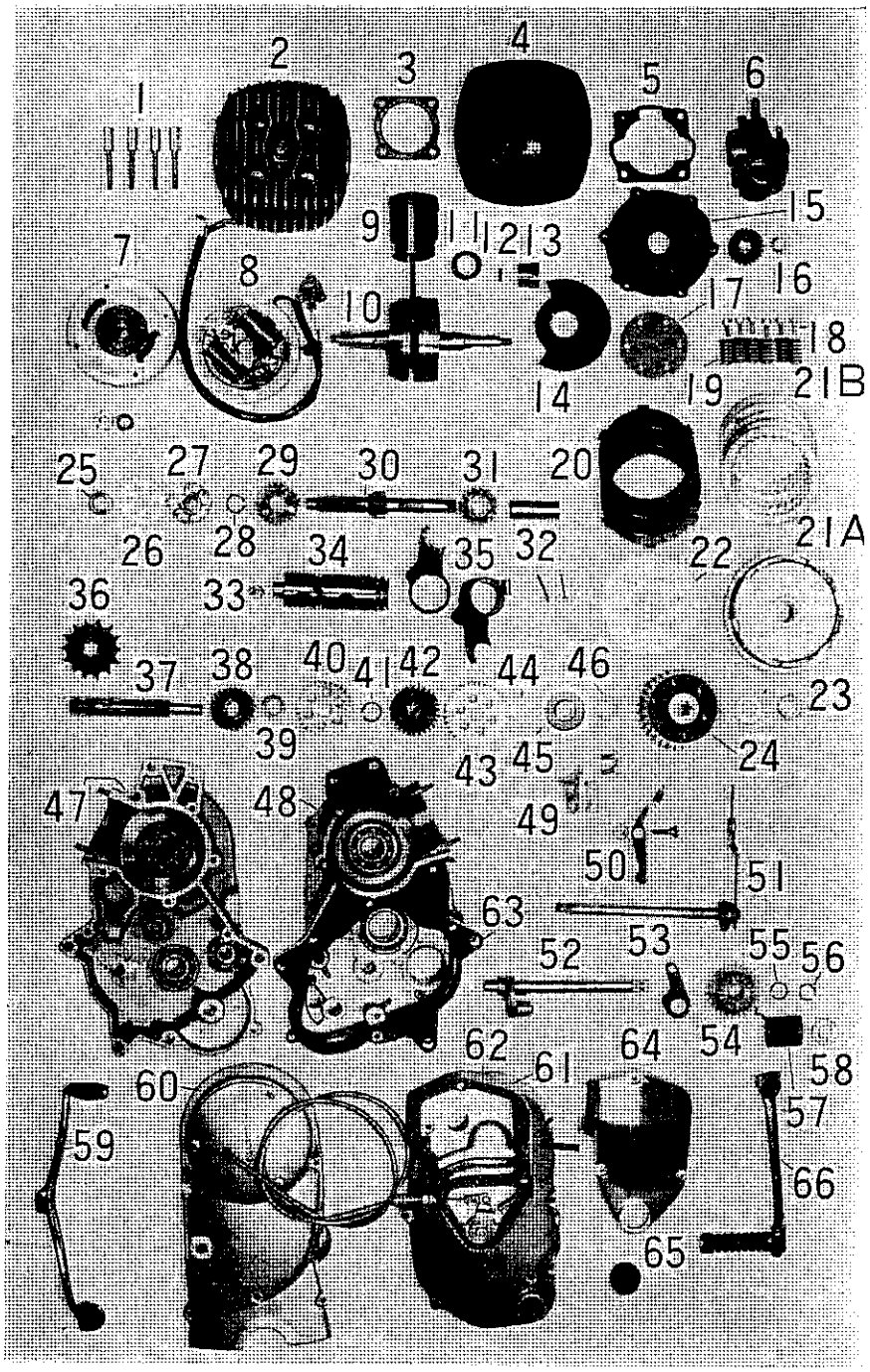


ENGINE/ROAD SPEED



4. CROSS SECTION OF ENGINE





Ensine Components

1. Nut (Cylinder Head)
2. Cylinder Head
3. Gasket (Cylinder)
4. Cylinder
5. Packing (Cylinder)
6. Carburetor Ass'y
7. Flywheel
8. Frame Ass'y.
9. Piston
10. Crankshaft Ass'y.
11. Shim
12. 3×10 Roller
13. Crankshaft Collar
14. Rotary Valve Complete
15. Rotary Valve Case
16. Pinion Gear
17. Set Plate
18. 5×15 mm Hex. Bolt
19. Clutch Spring
20. Clutch Facing
21. A Clutch Outer Plate
    B Clutch Inner Plate
22. Pressure Plate
23. Driven Gear Complete
24. Clutch Braket
25. 12 mm Thrust Washer
26. Top Gear A
27. Second Gear A
28. Circlip 17 mm
29. Third Gear A
30. Countershaft
31. Kick Idle Gear A
32. Idle Gear Metal
33. Contact Plate
34. Shift Drum
35. Shift Fork
36. Drive Sprocket
37. Drive Shaft
38. High Gear B
39. Drive shaft Collar
40. Second Gear B
41. Circrip 17 mm
42. Third Gear B
43. Low Gear B
44. 13 mm Thrust Washer
45. Kick Idle Gear B
46. 13 mm Thrust Washer
47. Crank Case A
48. Crank Case B
49. Thrust Receiver
50. Drum Stopper
51. Changeshaft Complete
52. Kick Shaft
53. Stopper Ratchet Arm
54. Kick Gear
55. Circlip 15 mm
56. Circlip 15 mm
57. Kick Return Spring
58. Spacer Kick Spring
59. Change Pedal
60. Dynamo Case
61. Transmission Case
62. Packing (Carburetor Cover)
63. Packing (Crank Case)
64. Carburetor Cover
65. Release Cap
66. Kick Arm

4. 1 Dismounting and Mounting Engine in Frame:

A. Care to be observed

(1) Be careful not to damage the insulation of the various lead wires.

(2) Be careful not to damage the frame or engine when handling bolts, nut and tools.

B. Dismounting Engine:

(1) Tools necessary.

(2) Remove two hexagonal bolts (8×32) of the down tube (frame stay), loosen hexagonal bolt (8×32) at the top of down tube, and push tube forward (Fig. 2).

Fig. 1. Tools Necessary.

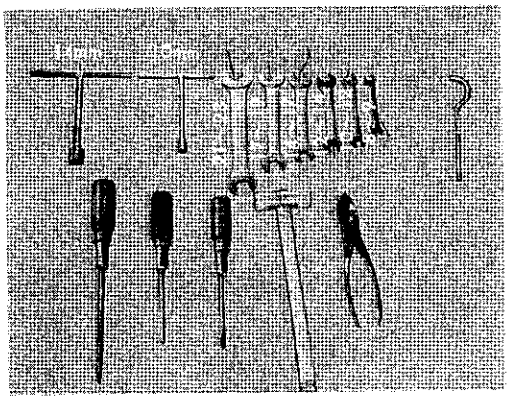
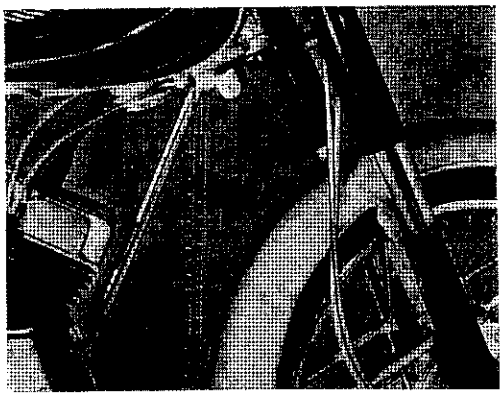


Fig. 2. Pushing away down tube (stay).



(3) Remove clamp nut of exhaust pipe with a clamp nut removing tool and remove exhaust pipe and gasket.

(4) Let clutch cable adjuster have full play and remove cable from the clutch lever. (Fig. 3 & 4)

Fig. 3. Clutch cable adjuster.

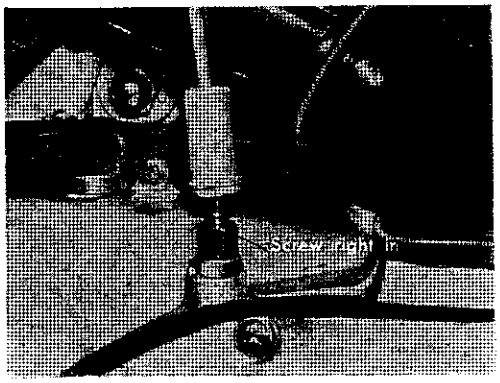
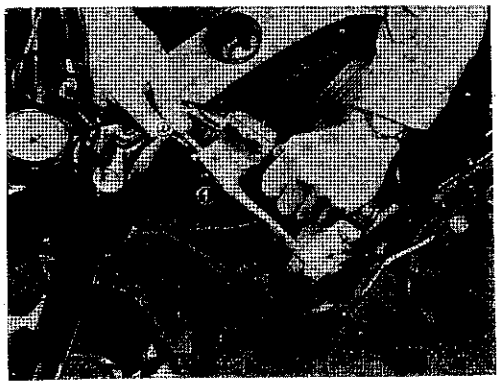


Fig. 4. To remove clutch cable first pull and then detach.



(5) Remove hexagonal bolt (6×25) of kick arm and detach kick arm.

(6) Remove fuel pipe from the side of cock after shutting of fuel cock.

(7) Remove rubber cap from carburetor by pulling it up.

(8) Remove carburetor cover by removing one (6×25) and three (6×14) bolts.

(9) Pull out carburetor by removing rubber plug using a driver. (Fig. 5)

(10) Take off side cover on left side of frame, remove battery rubber band, disconnect ⊕ and ⊖ terminals of battery, and remove battery.

Fig. 5. Pulling out carburetor

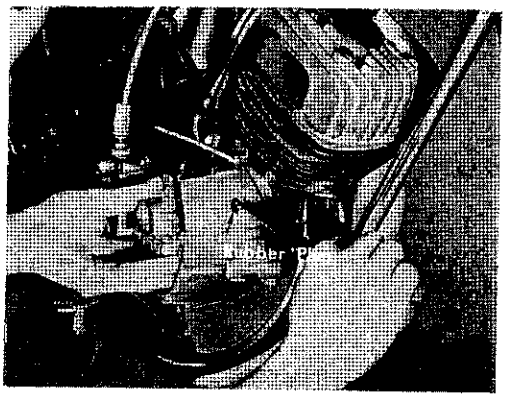
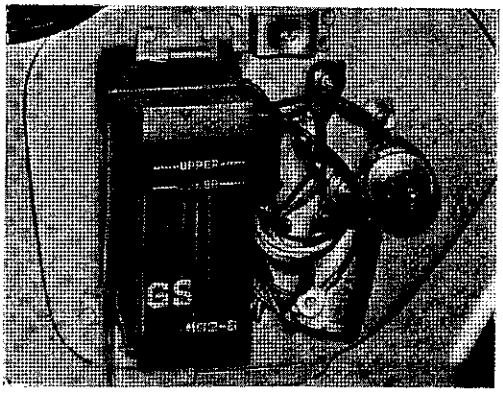


Fig. 6. Removing battery.

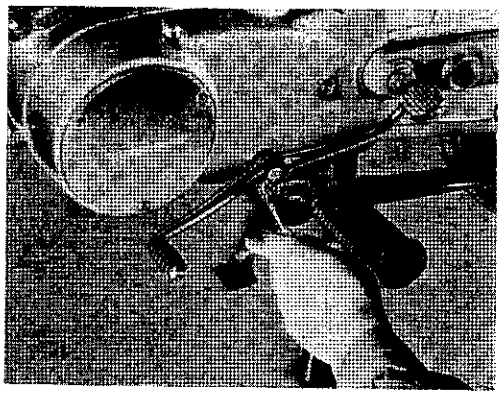


(11) Disconnect main switch lead wires and flywheel magneto wires from the terminals.

(12) Remove high-tension terminal plug cap from spark plug.

(13) Take off change pedal by removing hexagonal bolt (6×20) of change pedal. (Fig. 7)

Fig. 7. Taking off change pedal.



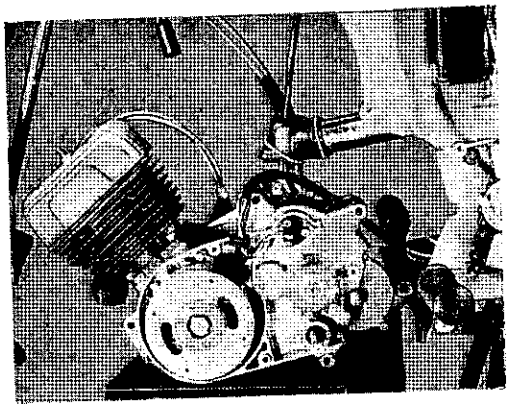
(14) Take off dynamo case by removing three (6×35) and two (6×25) dynamo case fitting screws.

(15) Remove two (6×10) screws on lower half of chain case.

(16) Remove chain connector link and lift the chain off the drive sprocket. Join up the chain temporarily so that the connector will not get lost.

(17) Place block (support) under the engine, remove one (3×114) footrest bolt, one (8×106) and one (8×102) hexagonal bolts, then pull out the engine. (Fig. 8)

Fig. 8. Dismounting engine



C. Mounting Engine:

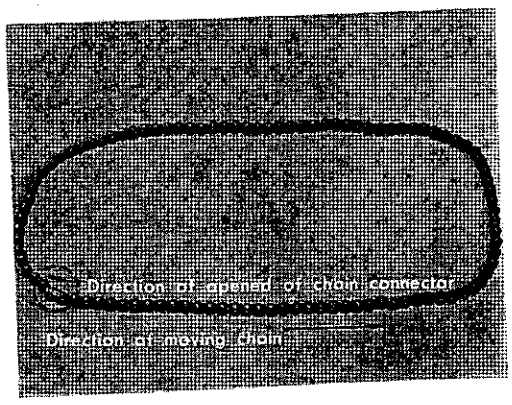
(1) The engine should be installed in the reverse order of removal.

(2) To mount easily, first push in the upper rear part of engine's back part by raising the front slightly. Then return the engine to horizontal position and push in the back part.

*** Be careful of the following points:**

a) The chain connector should be linked with the open end pointing in the reverse direction of the moving chain. (Fig. 9)

Fig. 9. Link of chain connector



b) Mount the carburetor securely.

c) See that the throttle valve works properly.

d) Set the clutch wire correctly.

e) See that the clutch works properly.

f) See that gas does not leak from the exhaust pipe and muffler joint.

g) See that all nuts, bolts and screws are tightened firmly.

h) See that the transmission is filled with the proper amount (0.6 litre=0.158 U. S. gallons) of oil.

4. 2 Disassembling and Assembling Engine :

A. Matters that require special attention when disassembling and assembling engine.

(1) When removing or installing, use a wooden or plastic hommer and tap lightly and uniformly so as not to strain any part. (4. 2B. 20-25)

(2) When handling bolts, nuts, screws, tools, etc., exercise great care so that the component parts of gear, case, piston, cylinder etc. are not damaged or lost.

(3) When disassembling, take careful note of the position of the meshing gears and location of the many washers, and lay the parts out in an orderly manner, so that they may not get mislaid or confused when assembling.

(4) Be careful not to damage the case to prevent leakage of oil.

(5) Handling of the respective parts should be carried out carefully and neatly.

(6) The parts should be carefully cleaned.

B. Disassembling Engine :

(1) Tools required for disassembling engine. (Fig. 10)

(2) Loosen and remove diagonally four nuts of the cylinder head and remove cylinder head and gasket. (Fig. 11)

Fig. 10. Tools for Removing.

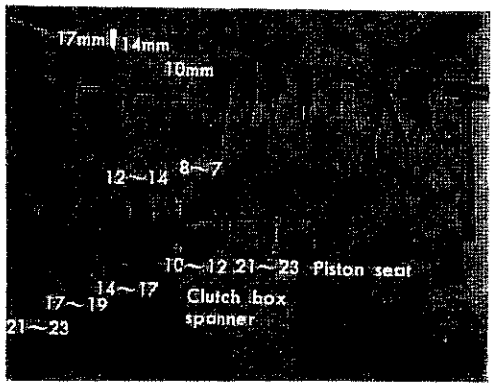
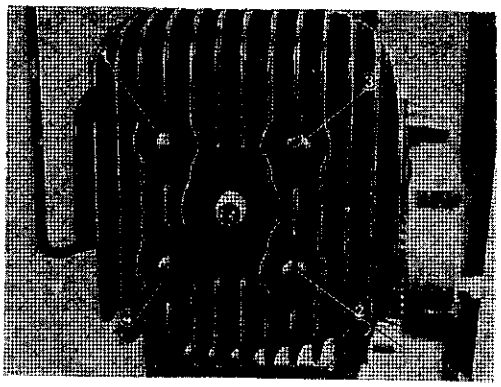


Fig. 11. Remove cylinder head.



(3) Remove four hexagonal nuts holding down the cylinder, lift up cylinder gently, and remove cylinder packing. (Fig. 12).

(4) Place the "piston seat" under the piston, turn magneto section upward and remove magneto flywheel nut. Then pull out magneto flywheel with the magneto puller. (Fig. 13)

Fig. 12. Remove Cylinder

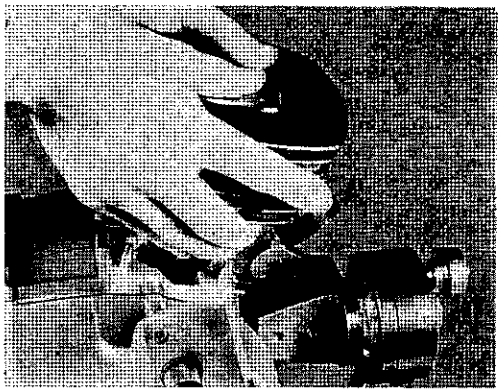
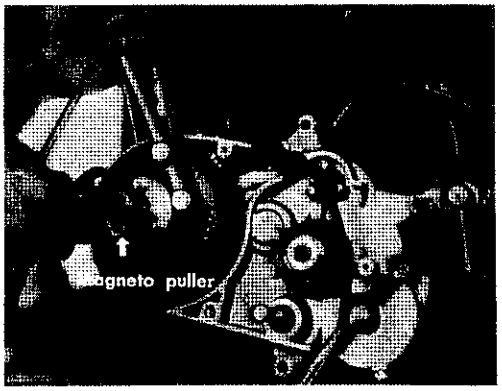


Fig. 13. Remove magneto flywheel



(5) Remove three (5×12) neutral switch screws, then the neutral switch and contact plate.

(6) Remove three (5×12) magneto frame screws and remove magneto frame. (Be careful to keep in mind the location where the magneto frame should be installed.)

(7) Loosen drain bolt on the under side of the engine and drain out transmission oil.

(8) Face upward the transmission case, take off transmission case by removing five (6×55), one (6×45) and twe (6×35) screws.

(9) Remove diagonally and evenly the six (5×14) hexagonal bolts of the clutch set plate. (Fig. 14)

(10) Flatten the lock washer of the clutch setting nut, engage transmission with first gear, fit stopper (special tool) to the drive sprocket, and then remove the clutch assembly with 23 mm. box spanner. (Fig. 15)

Fig. 14. Removing six bolts of clutch

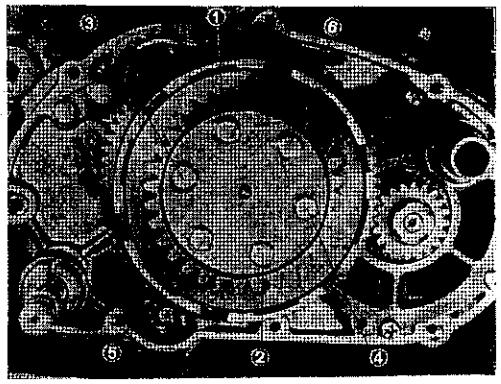
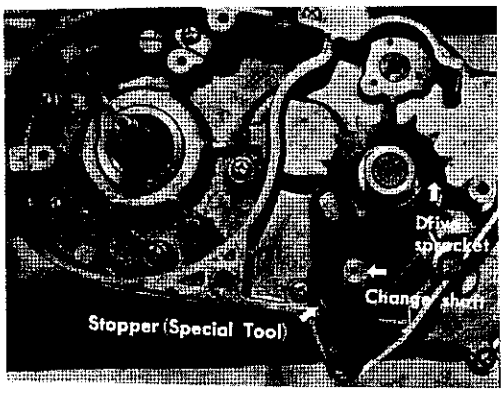


Fig. 15. Fitting stopper to the drive sprocket.



(11) Flatten the lock washer of drive sprocket bolt, fit sprocket stopper and then remove drive sprocket with 23 mm. box spanner. (Fig. 15)

(12) Remove pinion gear with clutch box spanner (special tool), which can also be used for BS-50 and BS-7 models.

(Be careful of left-hand thread screw).

(13) Remove kick spacer and take out kick return spring. (Fig. 16)

(14) Remove drum stopper with 12 mm. wrench, and detach spring which is attached to drum stopper and case. (Fig. 17).

Fig. 16. Removing kick spacer and kick return spring.

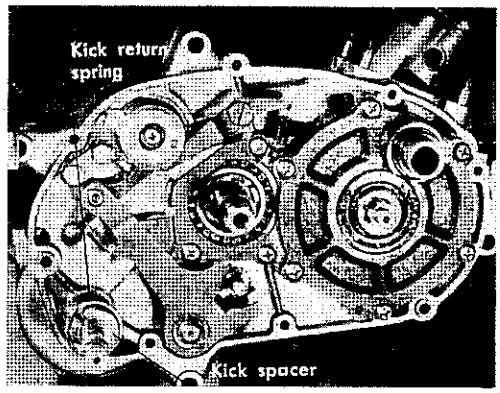
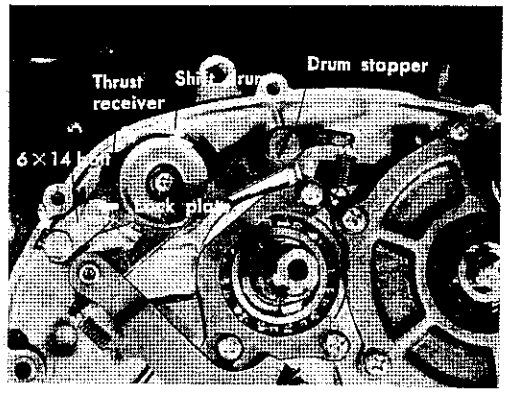


Fig. 17. Mechanism of drum shifter

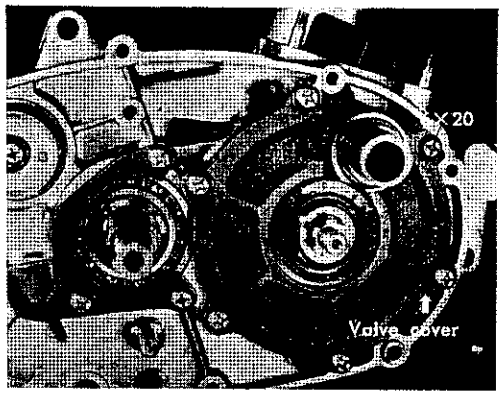


(15) Flatten the lock plate of thrust receiver and remove two (6×14) hexagonal bolts.

(16) Remove drum shifter from shift drum, and pull out change shaft assembly.

(17) Take off rotary valve cover by unscrewing six (6×20) valve cover screws. (Fig. 18).

Fig. 18. Rotary Valve Cover



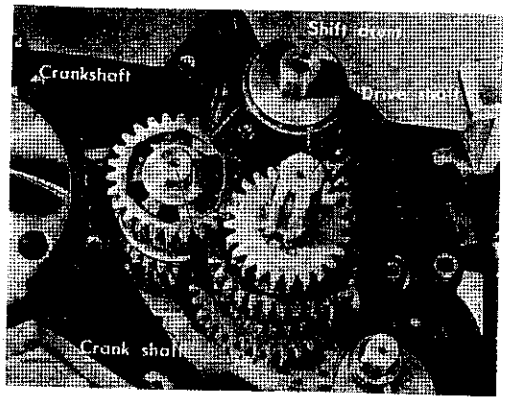
(18) Pull out rotary disc valve

(19) Remove crankshaft collar and knock out 3×10 pin.

(20) Face the magneto upward, unscrew four (6×45), four (6×55) and one (6×25) crank case A screws, and remove crank case.

(21) Take out the gears together with shift drum, counter shaft and drive shaft, as a unit. (Fig. 19).

Fig. 19. Take out the gears.



(22) Face the transmission case upward, remove kick shaft circlip, and take kick shaft out of crank case.

(23) Remove kick idle gear A from crank case B.

(24) Remove gears from counter shaft and drive shaft.

(25) Take crankshaft assembly out of crank case B. (Be careful not to damage the lip of oil seal.)

(26) Remove packing of each case.

C. Inspection :

After dismounting, inspect each part comparing it with servicing standards.

D. Assembling Engine :

(1) The engine should be assembled in the reverse order of disassembling.

(2) When installing shift drum, connect spring first with case and stopper and then tighten stopper screw bolt. (Fig. 20, 21)

Fig. 20. Connecting drum stopper spring

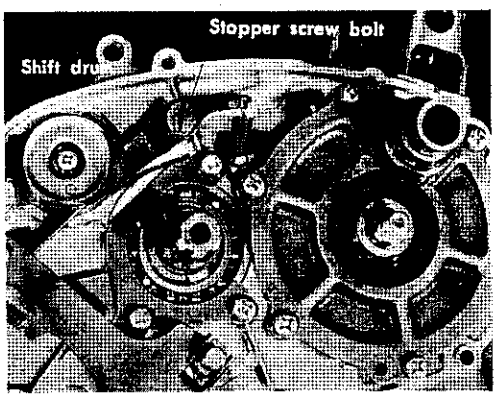
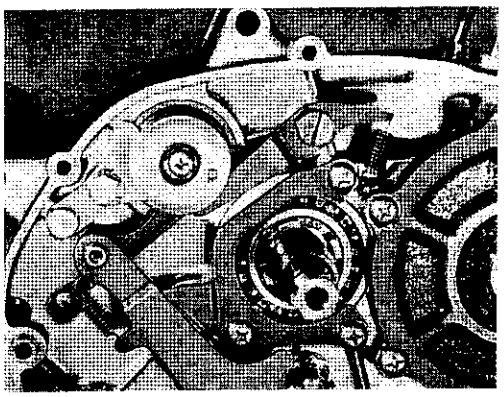


Fig. 21. Inserting stopper screw bolt



(3) After engine has been completely assembled, the point gap and ignition timing should be adjusted.

(Refer to P. 60 for adjustment procedure.)

SERVICE MEMO :

5. CONSTRUCTION OF ROTARY DISC VALVE ENGINE :

A. Description :

(1) The engine is a rotary disc valve type, in which a disc valve with a section cut out for fuel and air intake into the cylinder, is attached to the crankshaft and rotates with it (Fig. 22 & 23)

Fig. 22. Cross section of rotary disc valve engine

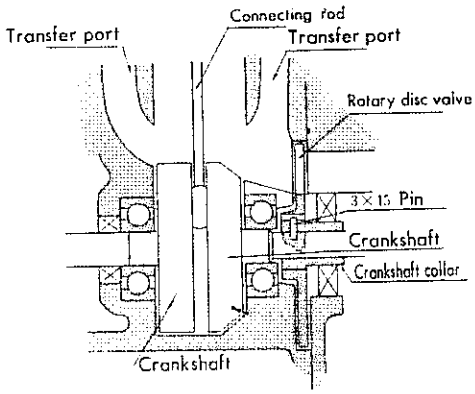
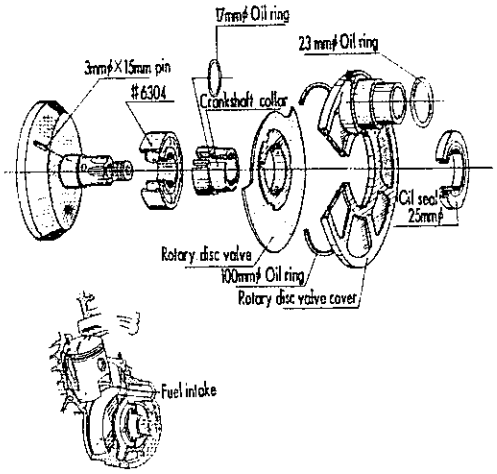


Fig. 23. Component parts of rotary disc valve



In the conventional piston valve type engine, suction of the fuel is limited by the position of piston at top dead center, whereas the timing of the Bridgestone rotary disc valve engine is determined solely by the size and shape of the cutout area of the valve, and thus a better suction is obtained, and back flow of raw fuel to carburetor as in the case of piston valve engines in which the piston cuts off the intake port in its descent, is prevented.

Fuel consumption is thereby decreased and engine performance greatly improved.

2) Construction :

(1) The rotary disc valve is made of heat hardening phenol resin and the thickness of disc is 3 mm. (0.0118 inch)

(2) The disc valve is a sliding fit on the crankshaft, secured by a 3 mm. stop pin. The bushing of the valve is of cast metal.

(3) Compression of the fuel is maintained by the disc valve rotating with the crankshaft closing the intake port and shifting tightly against the rotary valve cover fitted with 0 ring.

B. Rotary Disc Valve Timing :

Fig. 24. Start of intake :
107° before Top Dead Centre

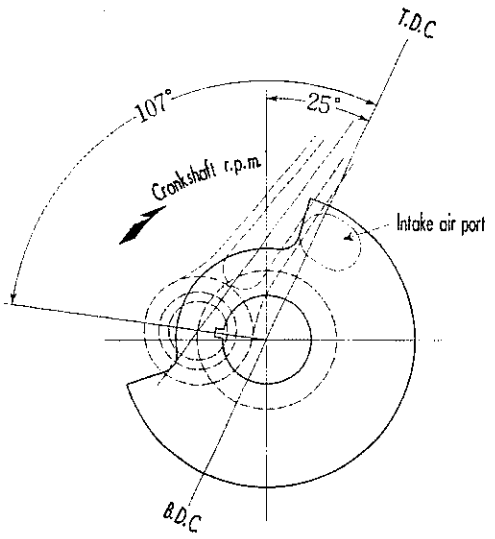
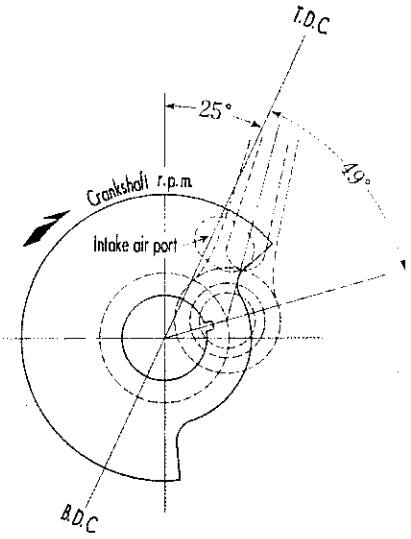


Fig. 25. Closing of intake :
49° after Top Dead Centre



C. Disassembling :

Remove rotary disc valve according to the procedure described in earlier paragraphs (17, 18 and 19 of 4. 2. B).

D. Inspection :

1) Check to see if lip of oil seals is damaged or ineffective and replace if necessary.

2) Check whether O rings are damaged and replace if necessary.

E. Assembling :

1) Assembling can be performed in the reverse order of disassembling.

2) Fit 17 ϕ mm. 0 ring inner side of crank shaft collar and 100 ϕ mm 0 ring into groove of valve cover.

SERVICE MEMO :

6. CONSTRUCTION OF CYLINDER AND PISTON :

A. Description :

A–1. Cylinder :

The cylinder is of high-grade cast iron and accurately finished by honing.

In the piston valve engine, the fuel is drawn through the intake port from the carbu retor which is located outside, the flow being dependent upon the action of the piston, and therefore limited.

In the case of the rotary disc valve engine, the carburetor is encased in the transmission case and therefore no intake port in the cylinder is required, the intake of fuel being controlled by the opening and closing of the rotary valve.

Instead of the intake port, however, a third transfer or "boost" port is provided to obtain better scavenging. (Fig. 28 29)

Fig. 26. Fuel intake system.

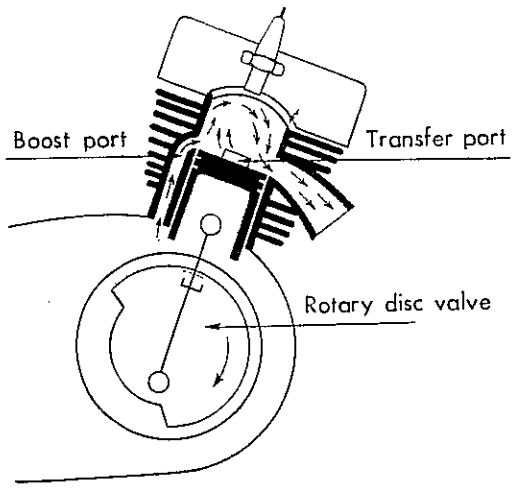
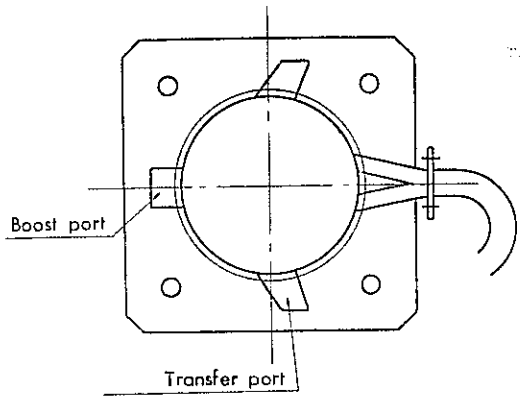


Fig. 27. Cross section cylinder.

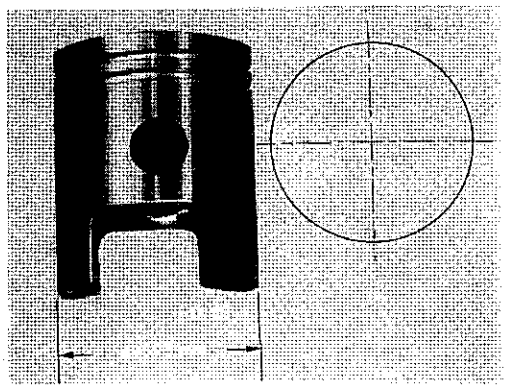


A–2. Piston :

The piston is of high silcon aluminum alloy with a low coefficient expansion and light specific gravity, and it has excellent wearing and heat proof qualities. (Fig. 28)

Note : The mark "EX" is cast on top of piston to correspond with the exhaust port.

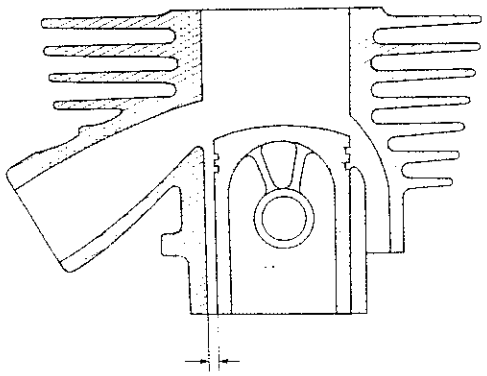
Fig. 28. Piston



A-3. Clearance between Piston and Cylinder Wall.

The standard clearance between piston and cylinder wall is 0.08 mm.—0.10 mm. $\left(\frac{3.15}{1,000}-\frac{3.94}{1,000}\text{inch}\right)$. (Fig. 29)

Fig. 29. Clearance between piston and cylinder wall



B. Disassembling :

(1) The cylinder can be taken off without removing engine from the frame.
Disconnect high tension terminal and plug cap from spark plug and detach exhaust pipe by removing exhaust pipe clamp nut with a special tool.

(2) Take off cylinder head nut and remove cylinder head and gasket.

(3) Remove the hexagonal nut at four places at bottom of cylinder and remove cylinder gently lifting it.

(4) Before removing piston, cover the crank case opening with cloth to prevent dirt from entering into the crank case and then remove piston pin circlips.

(5) Remove piston pin with puller (special tool) and detach piston from connecting rod. (Be careful connecting rod is not forced left or right.)

(6) Remove piston rings from piston and be very careful not to damage the rings or the piston.

C. Assembling :

(1) Replace piston rings on piston.

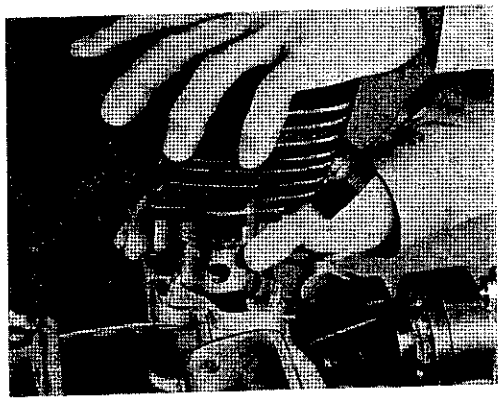
(2) The "EX" mark on the piston head should correspond with the exhaust port.

(3) Befor inserting piston pin, heat piston in an oil bath to about 120°C (248°F.). Piston pin should be gently pushed in with the finger.

(4) Insert piston pin circlips at both ends of piston pin hole.

(5) After oiling with engine oil the cylinder wall and piston, set piston at bottom dead center and pressing down the rings in the grooves, slide cylinder into place carefully.

Fig. 30. Sliding cylinder into place.



(6) Insert cylinder gasket and fit cylinder head to cylinder.

(7) Fit high tension terminal plug cap to spark plug and put back exhust pipe.

D. Cleaning :

Throughly scrub piston, piston rings and cylinder with gasoline or cleaning solvent to remove carbon deposits.

Pay particular attention to the cylinder intake and exhaust ports.

Where carbon deposit is heavy or hard, it is advisable to scrape it before cleaning.

Use extreme care to avoid scratching the wall of the cylinder.

Clean piston ring grooves. After the parts are throughly washed, dry with compressed air. Force air through all passages in cylinder.

E. Inspection :

E-1. Insufficient Power :

(1) Rotate fly wheel with hand and if very little compression is felt, the cause may be either wear of piston rings or cylinder. Replace parts where necessary. (Refer to Service Standards Manual.

(2) Check side clearance between piston and cylinder and see whether any part is damaged (such as burnt spots, stiff rings or scratches).
(Refer to Service Standards Manual.)

(3) Check for gas leakage through cylinder gasket and cylinder packing. Replace if unsatisfactory with new ones.

E-2. Knocking :

(1) Check clearance between piston skirt and cylinder wall. (Refer to Service Standards Manual).

(2) Check for tightness of piston pin. (Refer to Service Standards Manual).

SERVICE MEMO :

7. CLUTCH :

A. Construction :

The clutch, which is of the wet multi-disc type, is mounted on the counter shaft of the transmission. It has five clutch friction discs and six clutch springs. The springs have the strength to withstand 50 kg. (110 lbs.)

Moreover, six shock absorbing damper rubber discs are attached to the driven gear.

Fig. 31. General view of Clutch

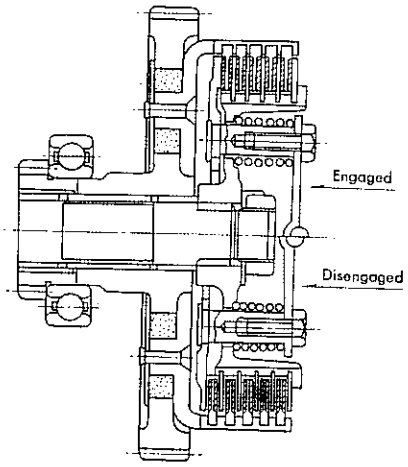
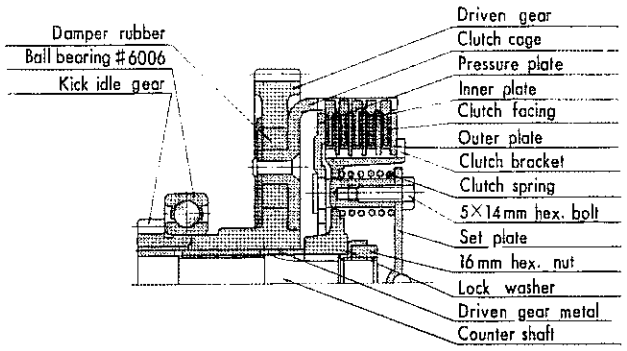


Fig. 32. Sectional view of clutch



B. Clutch Functions :

The clutch is located between the engine and transmission to transmit or disconnect engine power.

Smooth transmission and cut-off of power is important especially in starting and gear changing.

B-1. Power Trnsmission :

The engine power is transmitted to the pinion on the crankshaft and the driven gear and rotates the clutch cage.

The clutch cage has six bolts which hold in place the arms of the clutch facings, which, under pressure of the clutch springs cause the clutch inner and outer plates to come into solid contact and ratate as a unit.

The inner plates and outer plate fit into the spline of the clutch bracket, the clutch bracket fits into the spline of the countershaft, and the engine power is transmitted to the countershaft of transmission.

B-2. Cutting off the Engine Power:

When the clutch lever is depressed, the clutch wire lifts the release arm and the 6ϕ ×10 roller, which is set by an adjusting screw, acts on the 7/32″ ball of the clutch set plate.

When this set plate is pressed, the clutch springs are depressed and lose tension, causing the clutch discs to separate, cutting off engine power.

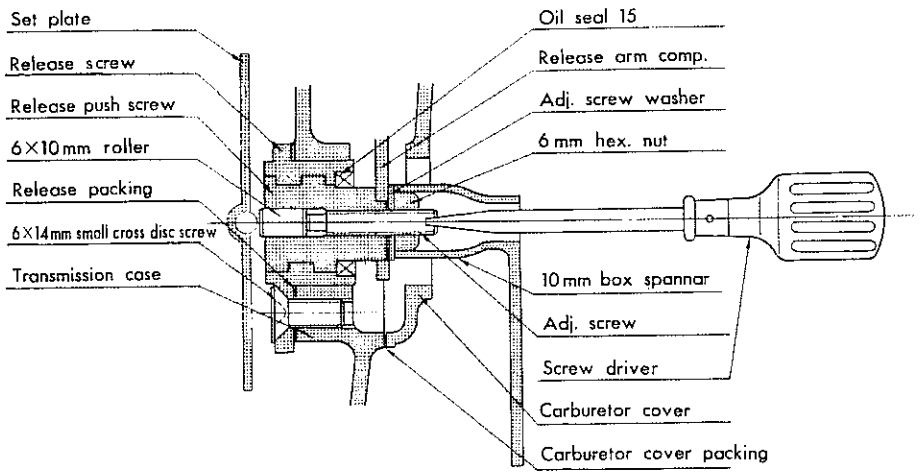
C. Clutch Adjustment:

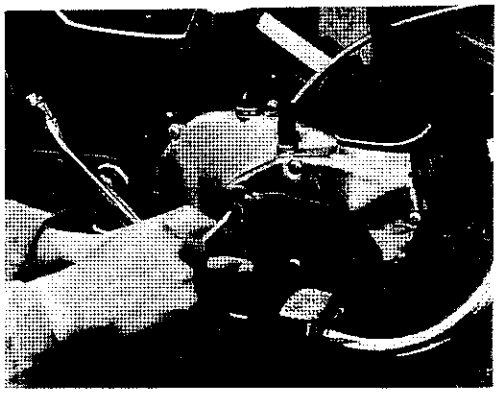
(1) Adjustment is easily carried out with the cable adjuster.

(2) When satisfactory adjustment cannot be made in this way, remove rubber cap from carburetor cover, loosen lock nut with 10 mm. box spanner in the tool set, and adjust by holding down the lock nut and turning adjustment screw.

The play of the lever is lessened by turning the screw right and increased by turning left.

Fig. 33. Clutch Adjustment.





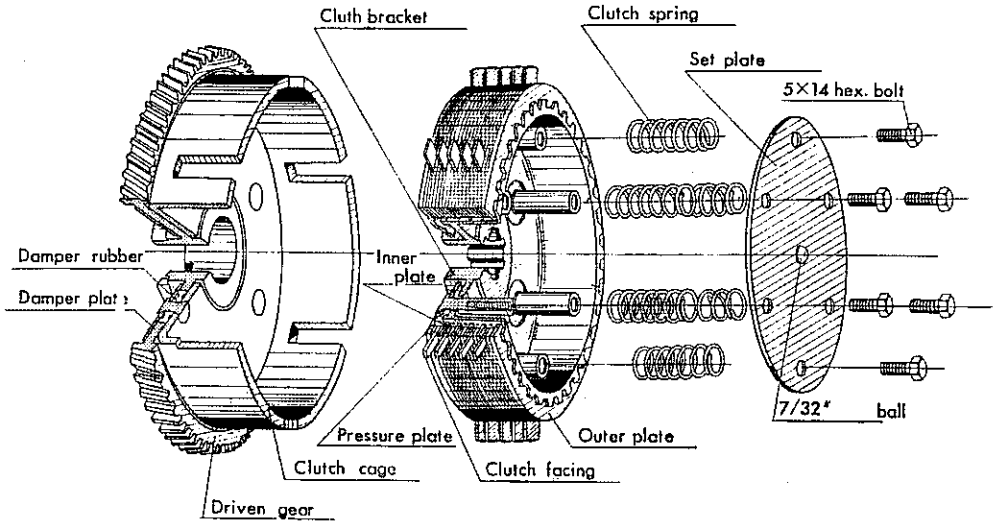
D. Disassembling Clutch :

(1) Follow procedure described under 4. 2 B 8 for removing transmission case. (This work can be done by removing kick pedal, air pipe, carburetor cover and carburetor, without dismounting the engine.)

(2) Remove six (5×14) hexagonal clutch set plate bolts.

(3) Flatten lock washer of countershaft nut (16 mm. hexagonal nut), put transmission into first gear and insert a stopper in the drive sprocket, and remove clutch nut. (When engine is not dismounted from frame, remove nut after transmission is put into first gear and with the rear brake on.)

Fig. 34. Component parts of clutch.



E. Assembling:

(1) Assembling can be done in the reverse order of disassembling.

(2) The facings and inner plates alternately contact with each other. The outer plate is thicker than the other plates.
(Thickness 2 mm. (0. 012″)).

F. Inspection :

(1) See if there are any damaged serrations on the inner and outer plates, and worn or uneven plates.

(Refer to Service Standards Manual).

(2) Chek for damaged arms on facings worn on uneven.

(3) Check for irregularities in set plates, looseness of set bolts or weakened tension or breakage of return springs.

Adjust or replace any that are found to be unsatisfactory.

(4) Check release arm for wear, release screw, release push screw or 7/32'' boll. Replace where necessary.

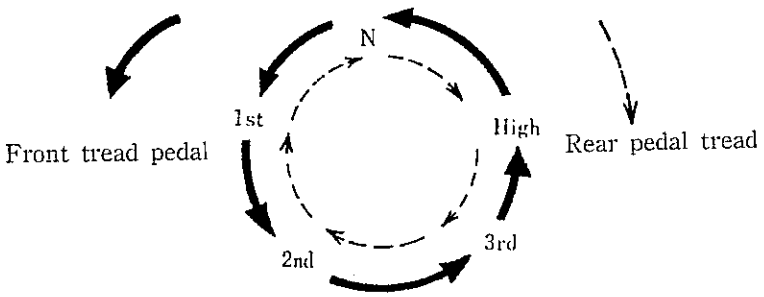
SERVICE MEMO :

8. TRANSMISSION :

A. Construction :

The transmission is of the four-speed constant-mesh, rotary type, and all parts being encased in the transmission case, inspection is easy, and repair work and dismounting greatly facilitated.

Fig. 35. Gear shifting.



B. Mechanism :

(1) The shift drum is maintained in a constant position by a thrust receiver.

Pressing down the change pedal front or rear, the drum shifter on the change arm attached to the change shaft, turns the drum forward or backward on notch.

The pedal is depressed approximately 11°, and as the drum rotates every 72°, the shift fork moves to left or light as the case may be, along the drum groove and clutch claws engage the corresponding sliding gears.

(2) Shift Arm positions in Relation to Pedal Control.

Fig. 36 Neutral Gear.

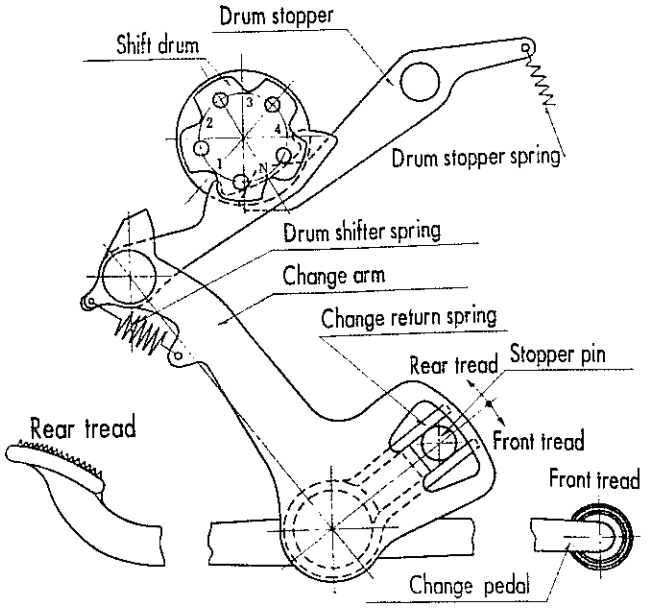


Fig. 37. Pedal pushed down front with foot once showing drum advanced one notch, (engaging 1 st gear) 2 nd, 3 rd, High and Neutral follow in succession.

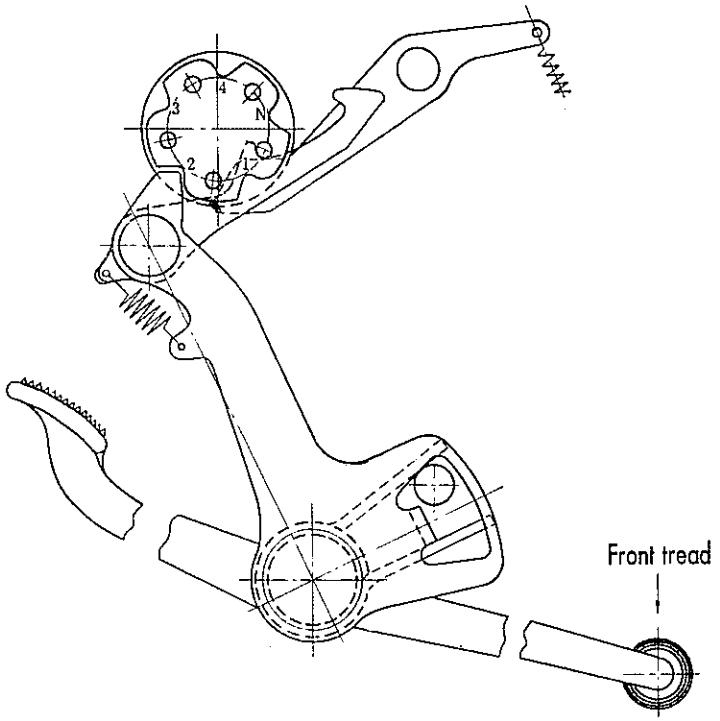
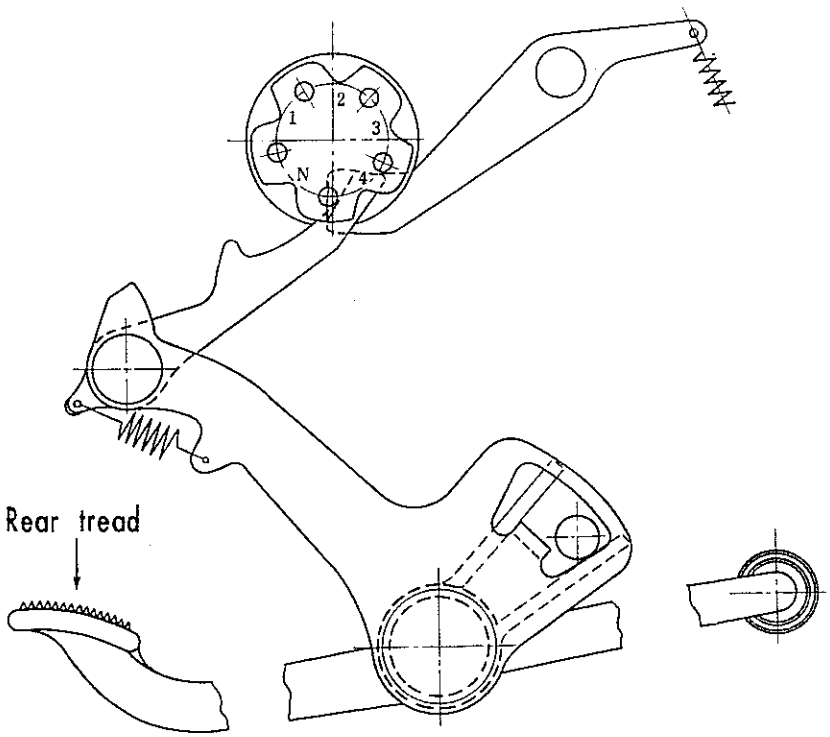


Fig. 38. Back pedal tread pushed down with foot once showing drum turned in the opposite direction and shifting gear in reverse.



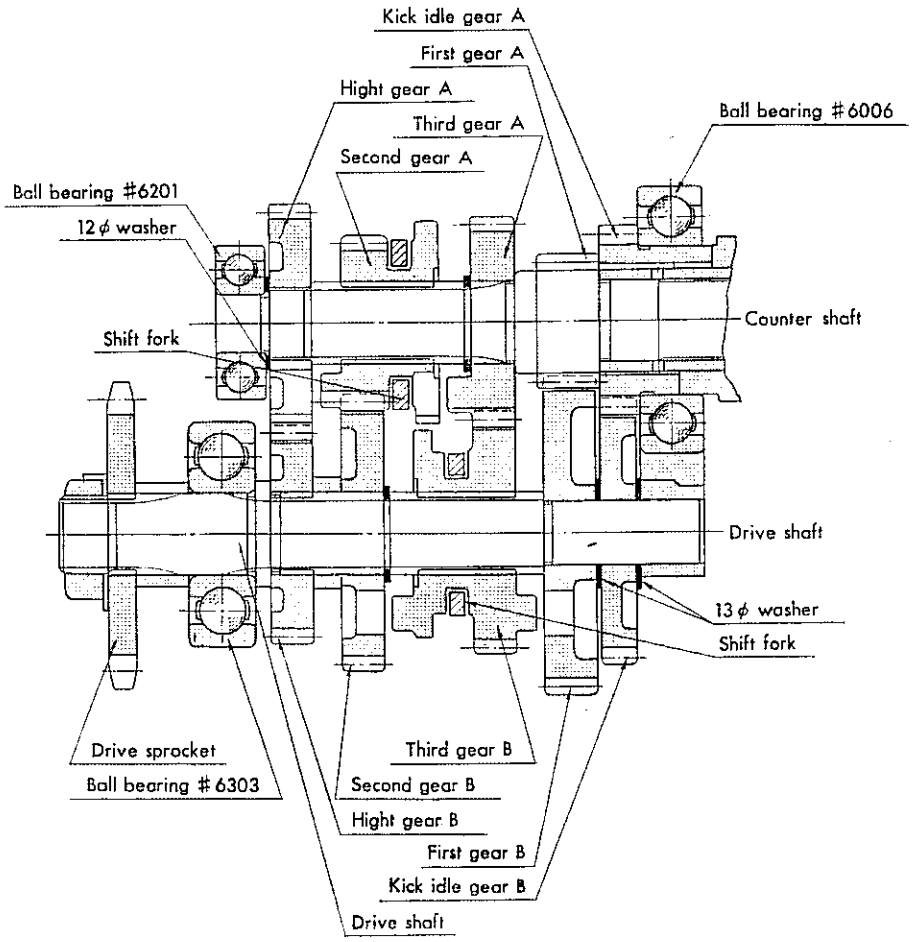
(3) Gear Manipulation and Gear Ratios.

NO. OF TEETH	COUNTERSHAFT	DRIVE SHAFT	TRANSMISSION GEAR RATIO
First Gear (Low Gear)	13	36	2.77
Second Gear	18	31	1.72
Third Gear	22	27	1.23
High Gear	26	24	0.924

The countershaft and First Gear A act as a unit, and Second Gear A slides on the countershaft spline. The Third Gear A and High Gear A turn freely on the countershaft. The Second Gear A engages with the dog claws on the Third Gear A and also with the High Gear A which has oval holes to engage the claws on the Second Gear.

The High Gear B and Third Gear B are spline fitted on the drive shaft. The second Gear B and First Gear B turn freely on the drive shaft, and only Third Gear B slides both ways and engages with First Gear B or Second Gear B with claws.

Fig. 39. Transmission Mechanism in Neutral Gear Position.

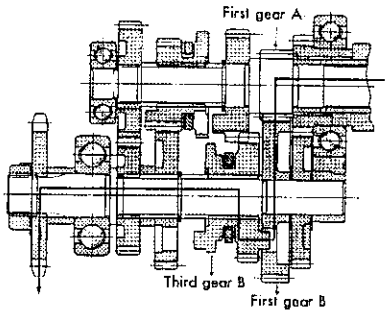


First Gear :

With the Second Gear A on the counter shaft remaining in position, the Third Gear B on the drive shaft slides to the right and the clutch claws engage with the First Gear B.

Engine power is transmitted in the order of driven gear—clutch—countershaft—First Gear A—First Gear B—Third Gear B—drive shaft and drive sprocket.

Fig. 40. In First Gear Position.

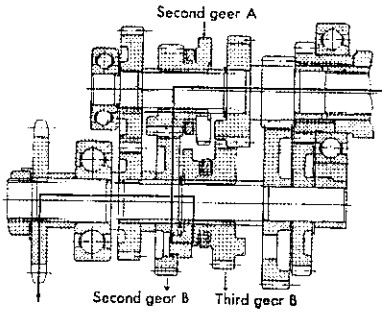


Second Gear :

The Second Gear A remaining in position the Third Gear B slides to the left and the clutch claws on this gear engage with the Second Gear B.

The engine power is transmitted in the order of driven gear—clutch—countershaft—Second Gear A—Second Gear B—Third Gear B—drive shaft and drive sprocket.

Fig. 41. In Second Gear Position.

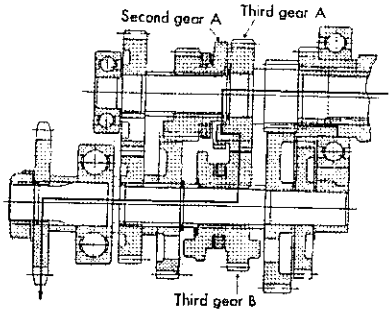


Third Gear :

With the Third Gear B on the drive shaft remaining in position, the second Gear A slides to the right and engages with the clutch claws on the Third Gear A.

The engine power is transmitted in the order of driven gear—clutch—countershaft—Second Gear A—Third Gear A—Third Gear B—drive shaft and drive sprocket.

Fig. 42. In Third Gear Position.

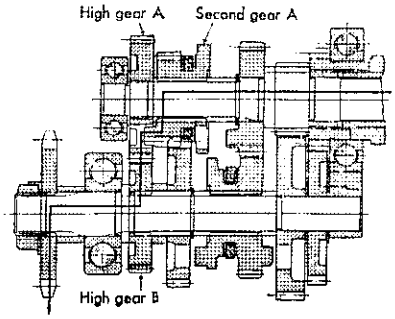


High Gear :

The Third Gear B remaining in position, the Second Gear A slides to the left and the dog teeth engage with the High Gear A.

The engine power is transmitted in the order of driven gear—clutch—countershaft—Second Gear A—High Gear A—High Gear B—drive shaft and drive sprocket.

Fig. 43. In High Gear Position.



C. Disassembling :

Disassembling and assembling procedures are carried out in accordance with paragraph 4. 2.

D. Inspection :

(1) Check for worn or damaged gears, splines, bearings and shafts.
(Refer to Service Standards Manual.)

(2) Inspect shift fork and drum grooves.
(Refer to service Standards Manual)

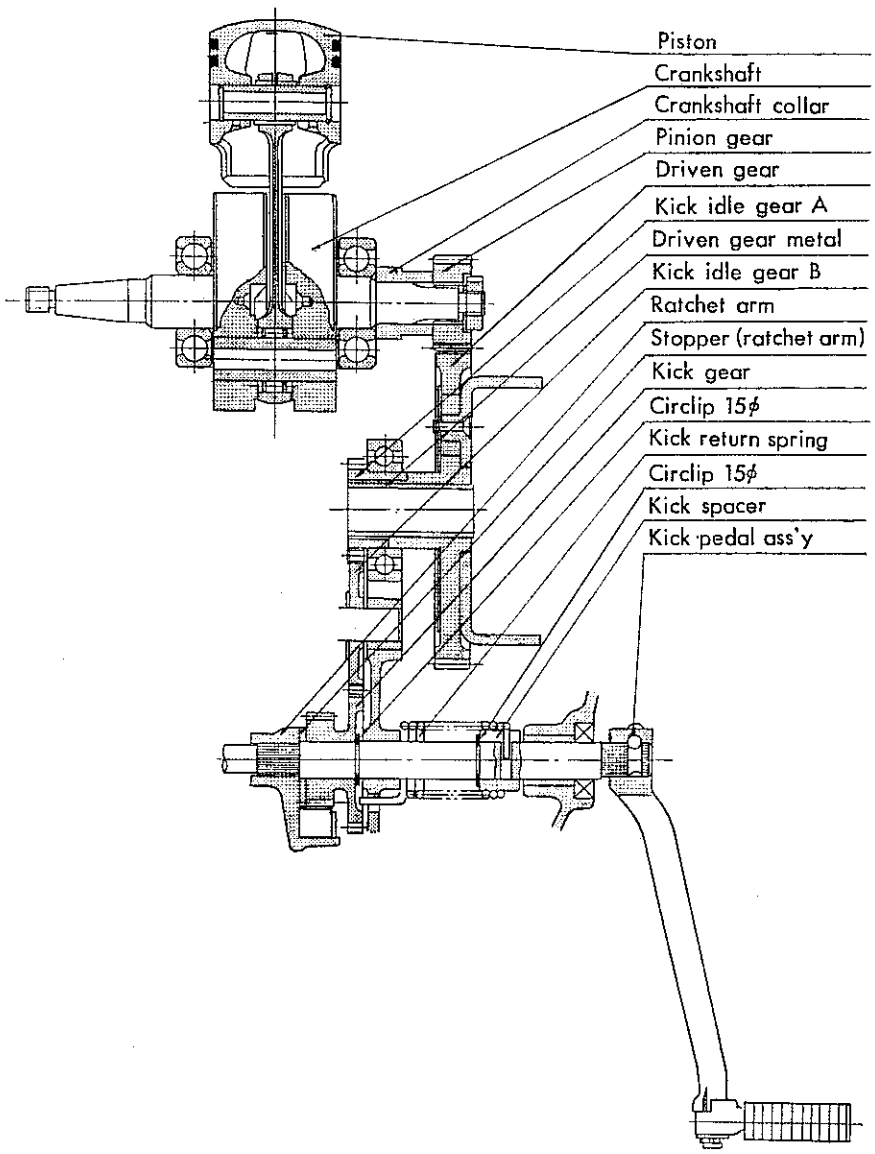
SERVICE MEMO :

9. KICK STARTER :

A. Construction :

On the Bridgeston 90, the new kick system (Primary Type) is equipped. In this method, the kick pedal can be used regardless of the transmission in any gear, by simply disengaging the clutch with the lever. It is therefore very convenient and the engine can be started quickly.

The kick idle Gear A meshes with the driven gear, kick idle gear B meshes with kick idle gear A, and the kick gear meshes with kick idle gear B.



B. Operation :

B-1 In Cruising.

(1) Ratchet arm is turned counter clockwise, as shown, by the kick return spring.

(2) Ratchet is kicked up by the ratchet arm stopper counterwise as shown by arrow "B" in Fig. 44, and rachet and kick gear are held apart.

Fig. 44. In cruising position.

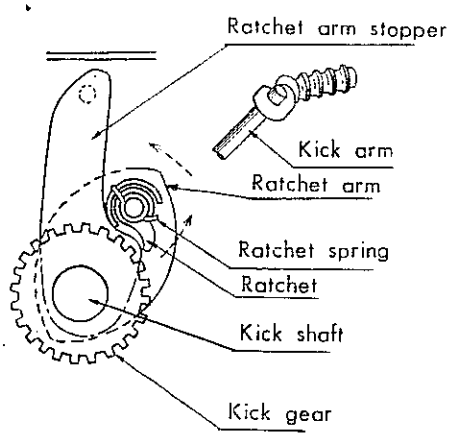
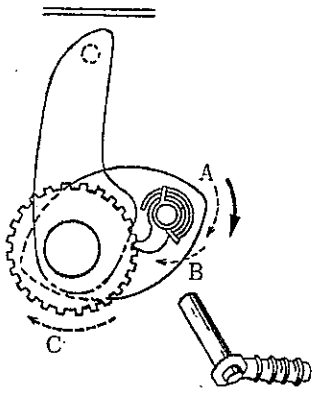


Fig. 4. In kicking position



B-2. To start

(1) Kick down kich-arm.

(2) Kick shaft and rachet arm turn clockwise as shown by arrow "A" in Fig. 45.

(3) Ratchet turns clockwise as shown by arrow "B" in Fig. 45, resulting from the pressure of ratchet spring, and mesh with the kick gear.

(4) Ratchet, which is in mesh, turns kick gear clockwise as shown by arrow "C" in Fig. 45.

(5) Since kick gear is always in mesh with kick idle gear B, the force created by turning the kick pedal is transmitted from kick gear, through kick idle gear B, kick idle gear A, driven gear and pinion gear, to the crankshaft and start the engine.

(6) When the kick pedal is released, it is returned to its original position by the return spring and the ratchet is released automatically from the kick gear, and the kick gear rotates freely.

C. Disassembling and Assembling :

Performed according to procedure described in earlier paragraph 4. 2.

D. Inspection :

Check for worn or damaged gears and kick return springs.

SERVICE MEMO :

10. CARBURETOR :

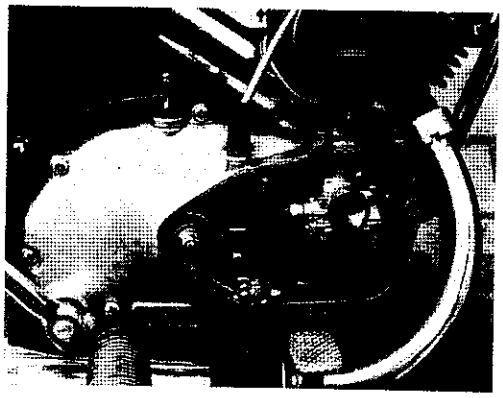
A. Design & Operation :

(1) Principle ;

The air entering through the air cleaner flows into the cylinder past the throttle valve.

The vacuum in the venturi (main bore) created by this flow of air causes the fuel in the float chamber to flow through the main jet into the needle jet and out into the passage to the cylinder intake port mixing with the air entering through the venturi, the fuel having been atomized by the air entering through the air jet (air bleed).

Fig. 46. Carburetor



(2) Idling (Pilot Jet) ;

The vacuum caused by the engine suction draws fuel out of the pilot jet, and mixes with the air, which is controlled by an adjusting screw, entering from the pilot air hole. This mixture flows out of the pilot outlet and is further mixed with the small amount of air entering through the venturi and then sucked into the engine as correct air-fuel mixture.

(3) Starting :

Pulling the starter lever raises the starter plunger. Kicking the kick-pedal with throttle grip in closed position, will create a vauum in the intake port side of engine and draw fuel through the starter jet, mixing it with the air entering through starter emulsion tube.

This mixture flows out of the starter jet located at the rear of throttle valve and is further mixed with the air entering through the venturi and then sucked into the engine as correct air-fuel mixture for starting engine from cold. (Fig. 48).

Fig. 48. Fuel Flow :

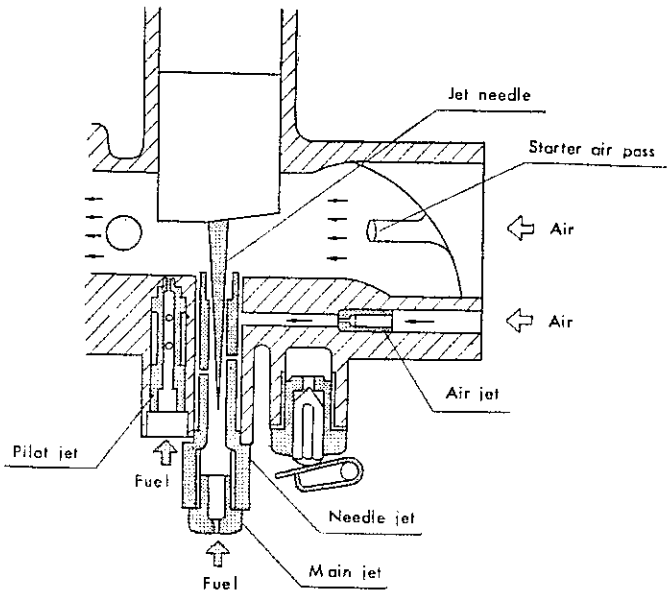
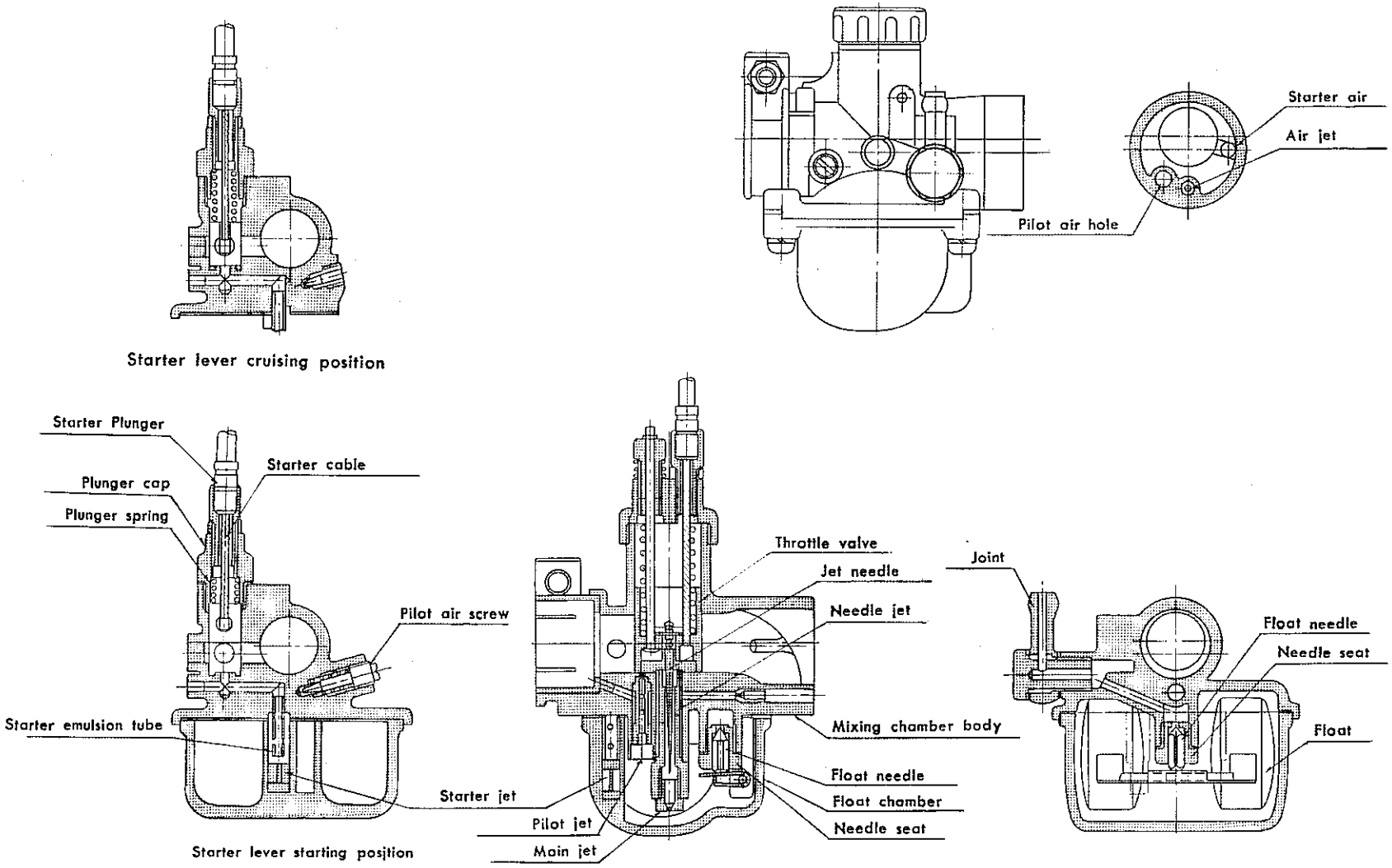


Fig. 47. Cross Section of Carburetor



(4) Float chamber maintains the correct fuel level, the fuel flows into float chamber, the level of fuel being controlled by float valve. As fuel enters, the float rises pushing up the float arm and cuting off the flow by the closing of the valve. As fuel level drops, the float also drops and the valve opens allowing the fuel to flow into the chamber. This process is repeated, maintaining the correct amount of fuel in the chamber proportionate to the amount consumed.

B. Functions of Various Parts :

(1) Main Jet (M. J.)

The main jet controls the fuel supply when the throttle is more than three-quarters open, but at smaller throttle openings although the fuel passes through the main jet the amount is diminished by the tapered needle jet.

Standard number of the main jet of this machine is No. 130.

Fig. 49. Main Jet

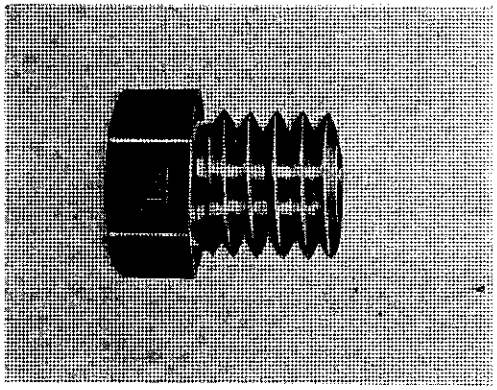
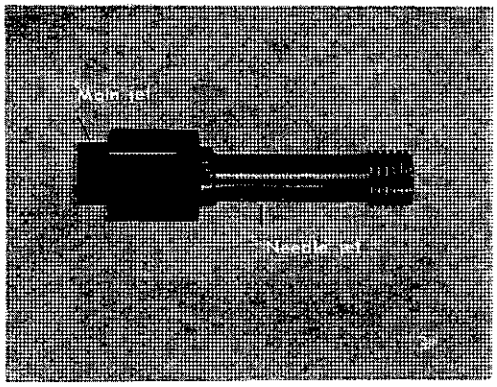


Fig. 50. Needle Jet



(2) Air Jet (A. J.)

The air jet controls the flow of air entering the needle jet. The fuel passing through the needle jet mixes with the air coming in from the air jet.

(3) Needle Jet (N. J.)

With full throttle or at medium speeds, the fuel is first regulated by the main jet and the needle jet acting simultaneously. (Fig. 50)

(4) Jet Needle (J. N.)

The tapered jet needle attached to the throttle valve works in the needle jet and adjusts the air-fuel ratio at medium throttle 1/4 to 3/4 throttle opening.

The taper needle position in relation to throttle opening can be set according to the mixture required by clipping it to the throttle valve with the jet needle clip in one of the grooves.

The lower the groove, richer the mixture will be at 1/4-3/4 throttle.

The jet needle has five grooves No. 1 to No. 5 from top to bottom. The standard clip position of BS-90 is No. 3 (Fig. 51).

Fig. 51. Jet Needle

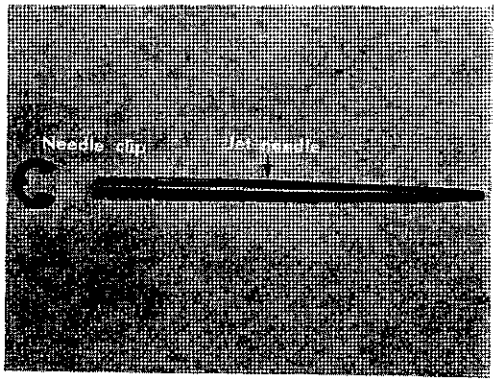
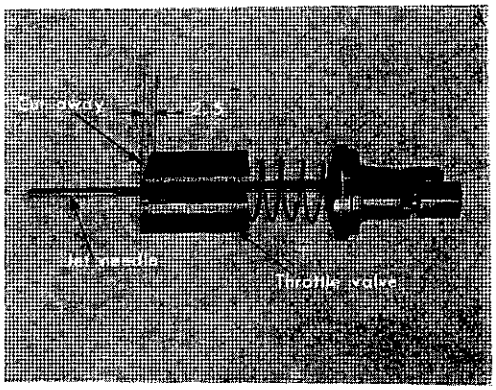


Fig. 52. Throttle Valve



(5) Throttle Valve (C. A.)

The throttle valve is cut away on the inlet side and controls the flow of main fuel supply from 1/8 to 1/4 throttle opening. The extent of cut away is marked on the valve, viz. 2.5 for 2.5 m/m cut away. Thus, mark 3 indicates a weaker mixture and 2 a richer mixture (Fig. 52)

(6) Pilot Jet (P. J.)

At idling speed or cut down throttle, the pilot jet controls the flow of fuel mixed with air which enters through the air jet, and atomizes the mixture. (Fig. 53)

(7) Air Screw (A. S.)

The air screw controls the flow of air which mixes with the fuel passing through the pilot jet. (Fig. 54).

The standard adjustment of screw position is 1 turn back.

Fig. 53. Pilot Jet

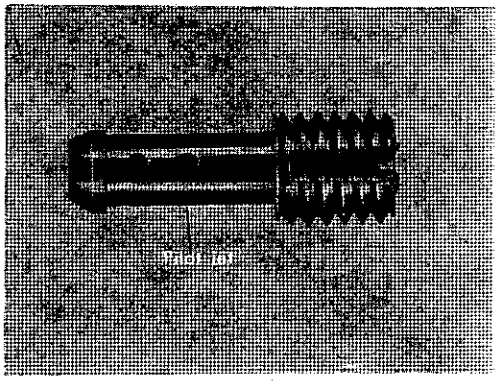
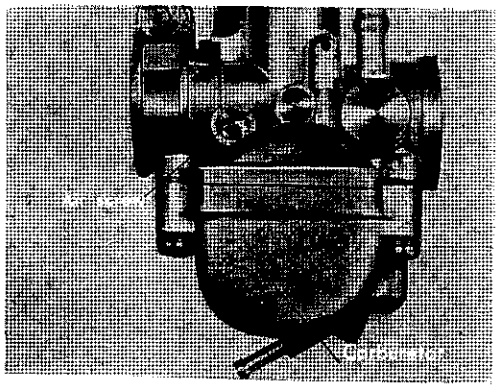


Fig. 54. Air Screw



C. Adjustment :

Engine performance is mainly dependent on the proper functioning of the carburetor, i. e. its ability to adjust itself to the supply of the most suitable air-fuel mixture at any speed, from idling to the maximum engine speed. Thorough experiments and tests have been conducted by the carburetor maker and Bridgestone technicians, to produce the efficient carburetor fitted to the BS 90. As all the component parts have been correctly set by experts at the factory, it would be unwise to make casual adjustments.

In the event, however, of adjustment being inevitable, a careful check of the engine and component parts should be first made as indicated.

(1) Look for possible air leakage from carburetor adaptor connection.

(2) Replace all worn parts.

(3) Warm up the engine for 2 to 3 minutes before adjusting.

C-1. Adjusting Mixture Gas :

How to determine correct mixture.

(1) Too Rich

Exhaust fumes are white and heavy.

Engine runs irregularly.

Spark plug apt to be wet and coated with carbon.

(If the spark plug is too cold or running speeds very slow, change to a hotter plug.)

(2) Too Lean :

Idling is irregular.

Engine overheats easily.

Engine rpm irregular at a constant throttle opening.

Poor acceleration.

Spark plug electrodes dry and spotted with white deposit.

(If the spark plug is too hot or running speeds are very high, change to a colder plug.)

C-2. Adjusting for Various Speeds :

THROTTLE OPENING	TOO RICH	TOO LEAN
0 -1/8	Turn air screw back a little.	Turn in slightly air screw.
1/8-1/4	Use throttle valve with larger cut away.	Use throttle valve with smaller cut away.
1/4-3/4	Lower jet needle.	Raise jet needle.
3/4-Full	Use smaller number main jet.	Use larger number main jet.

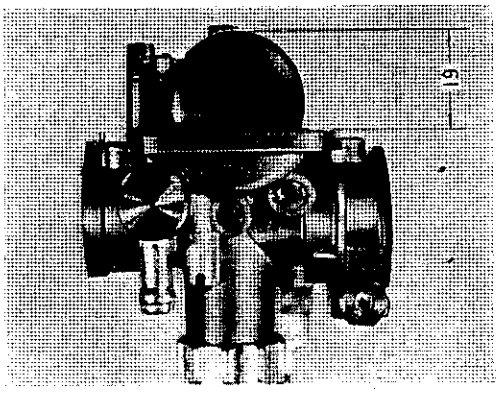
C-3. Adjusting Fuel Level :

Loosen the four float chamber screws and remove float chamber.

Place the carburetor upside down.

Adjust the float position with the float arm. The bottom of the float should be 19± 0.5 mm from the point shown in Fig. 55 with the float arm touching the float valve.

Fig. 55. Adjusting Fnel Level



SERVICE MEMO :

11. FRAME:

Frame Structure:

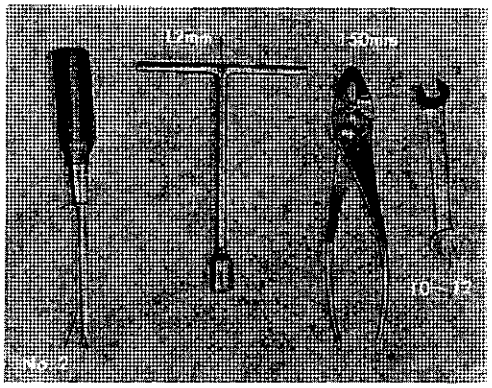
Frame is built with pressed steel plates backbone type, very rugged but light in weight. And the telescopic fork with oil damper assures excellent suspension on any type of road

11. 1 Handle Bar:

A. Removing Handle Bar:

(1) Tools necessary (Fig. 56.)

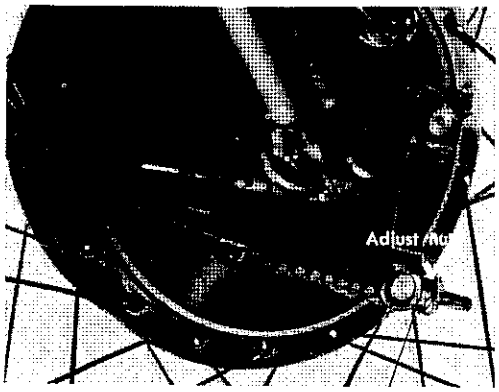
Fig. 56. Tools necessaly



(2) Loosen clutch cable to the limit of adjusting nut and remove from clutch lever.

(3) Remove adjusting nut of front brake wire, pull out of brake lever. (Fig. 57.)

Fig. 57. Remove brake wire



(4) Remove carburetor mixing chamber top from body, and remove throttle cable while pressing down throttle valve spring.

(5) Take off (5×35) hexagonal nut of body starter lever and remove starter cable from lever.

(6) Unscrew head light screw at left bottom of head cover and light rim, and remove wire harness connections from terminals.

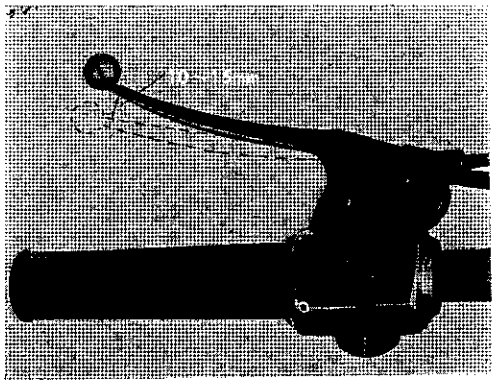
(7) Take off steering head bolts, handle holder and remover handle assembly from front fork.

B. Assembling:

(1) Assembling is done in the reverse order of removing.

(2) Connect up all lead wires and adjust them. (Fig. 58)

Fig. 58. Adjustment of Clutch Lever



SERVICE MEMO:

11. 2 Front Fork :

A. Operation :

The load or shock on the front fork is absorbed by oil cushion, coil springs and compressed air acting as a damper. The down stroke of the upper fork tube (cover) forces the oil in the lower tube through the oil plunger hole into the upper tube and the pressure (compression) increases as the plunger in the lower tube closes the hole.

The air in the upper tube is thus compressed by the filling oil, the coil springs come into action, the whole process acting as a damper.

As the load is released the process is reversed.

Fig. 59. Front Fork

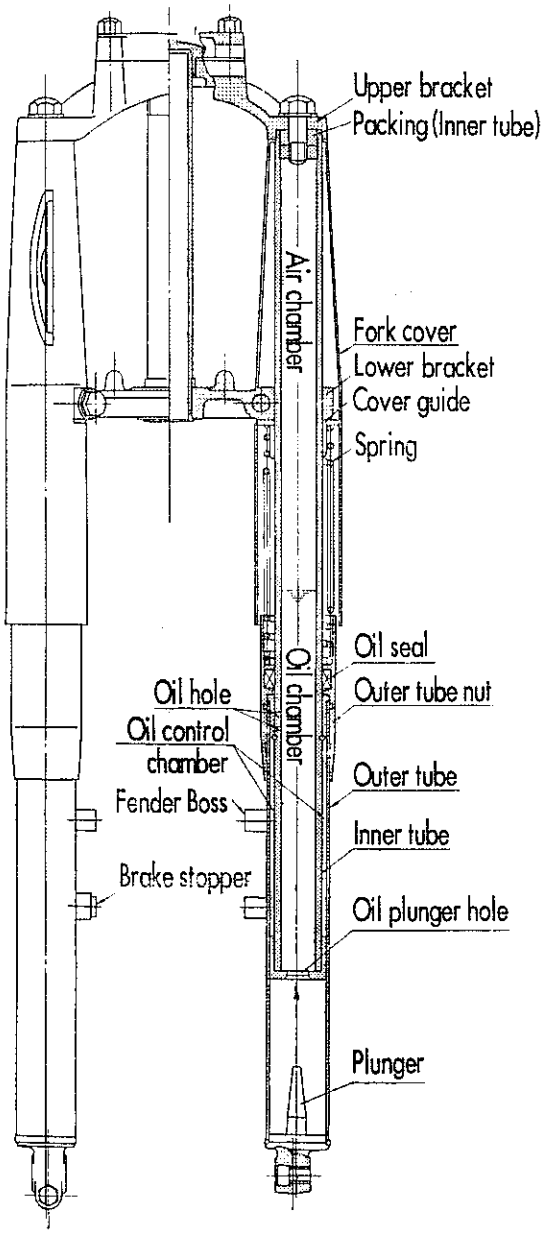
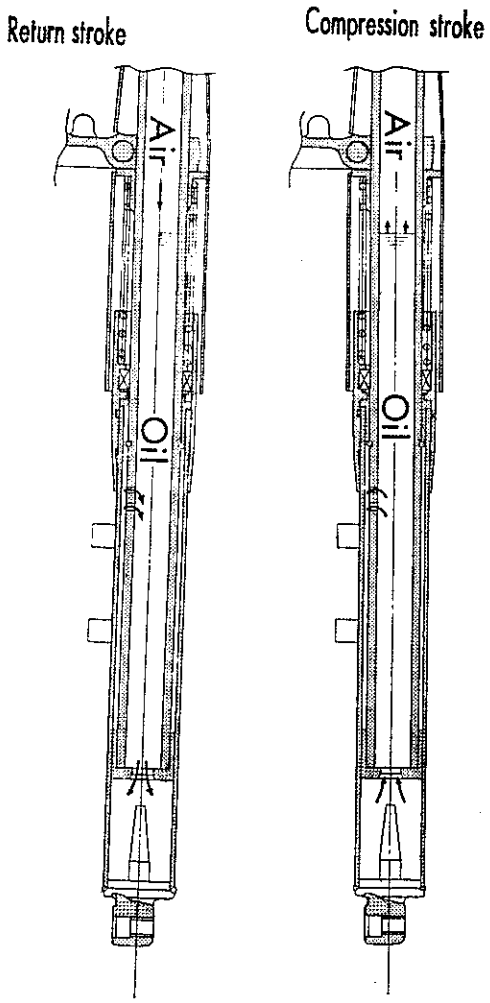


Fig. 60.



B. Disassembling :

(1) Tools necessary. (Fig. 61)

(2) Handle bar is removed according to the procedure given in 11. 2 A.

Fig. 61. Tools necessary

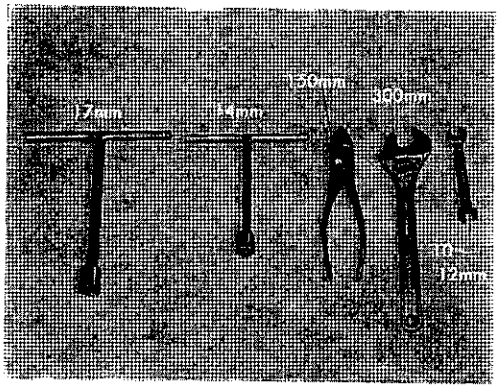
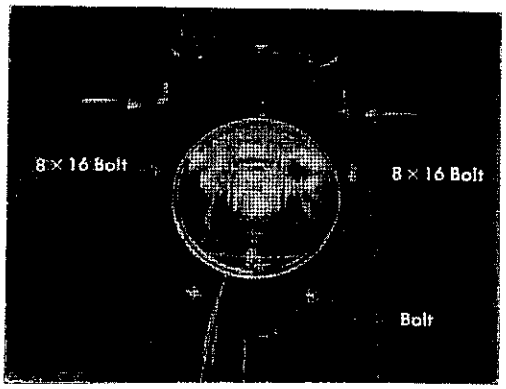


Fig. 62. Remove head cover



(3) Take off two (8×16) hexagonal bolts of head cover, and remove head cover. (Fig. 62).

(4) Push aside front tension bar at hub end,

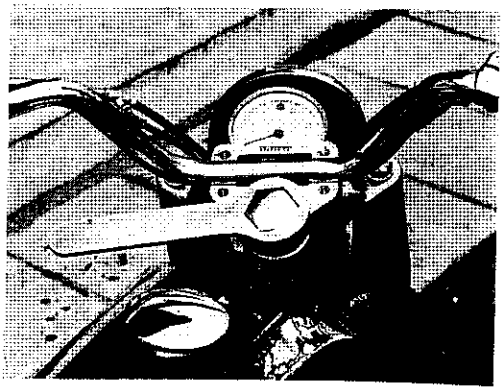
(5) Loosen (8×25) hexagonal bolt (bolt axle bracket) at bottom right of front fork and remove front shaft.

(6) Place a supporting block under the engine, raise the front fork and remove wheel assembly.

(7) Take off front mudguard by loosening four (6×8) hexagonal bolts.

(8) Remove upper bracket by loosening cap nut (32 mm) on upper part of steering head, and two hexagonal bolts (10×28) of the holder upper bracket. (Fig. 63)

Fig. 63. Remove handle bar



(9) Loosen bolts of lower bracket, pull down front fork and detach.

C. Inspection :

(1) Repair or replace outer tube which is bent. (Refer to Service Standards Manual.)

(2) Replace upper bracket and lower bracket which are bent or have flaws.

(3) Adjust or replace parts which are the source of oil leakage or any springs which have lost tension.

(Free length of spring 168 mm.)

(4) Fill in the ratio of 6 and 4 with 135 c.c. fork oil in each fork tube. Mixture of No. 60 spindle oil (60 %) and No. 30 engine oil (40 %).

The fork oil can be drained from the draining hole at the bottom of fork tube by removing screw.

D. Assembling :

(1) Lay upper bracket washer on the fork cover, insert cover guide into outer tube while pressing it down with finger, insert outer tube into fork cover and screw in the front fork tool (special tool). (Fig. 64)

Fig. 64. Raise outer tube with special tool.

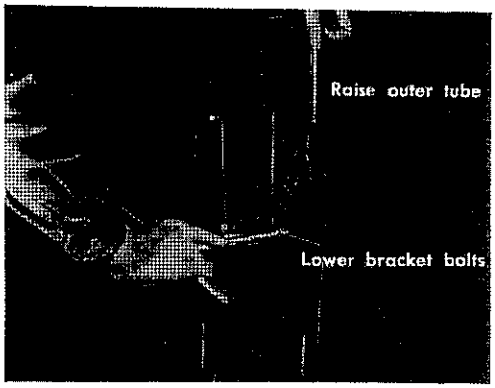
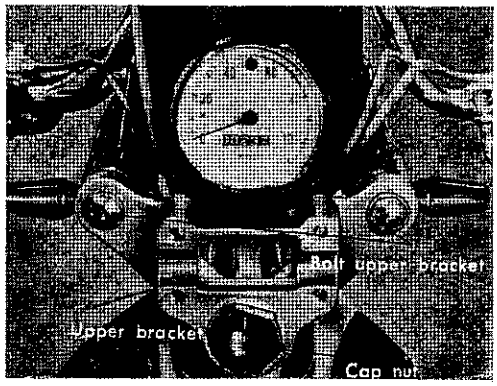


Fig. 65. Upper bracket.



(2) Raise outer tube right up and tighten lower bracket bolt temporarily.

(3) After tightening the outer bracket temporarily, install upper bracket, tighten cap nut and upper bracket temporarily.

(4) After lower bracket bolts, tighten upper bracket bolts and cap nuts uniformly. (Fig. 65)

(5) Tighten lower bracket bolts.

(6) Install outer parts in the reverse order of disassembling.

11. 3 Rear Frame and Rear Suspension :

A. Construction :

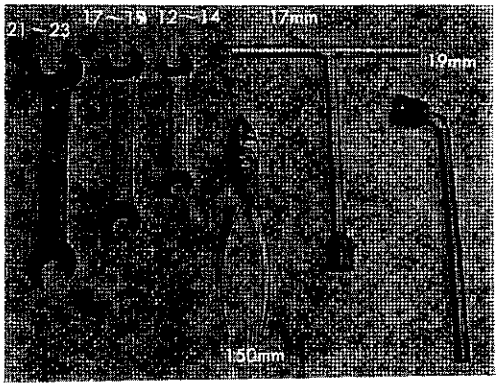
The rear frame is built of pressed steel plate, and connected to the main frame by the rear frame shaft (bolt), and pivots on this shaft.

The rear suspension is fixed by bolts to the main frame and the upper end of the rear frame.

B. Disassembling :

(1) Tools necessary. (Fig. 66).

Fig. 66. Tools.



(2) Remove chain case and drive chain.

(3) Remove rear tension bar and rear wheel.

(4) Remove rear suspension by loosening four bolts.

(5) The rear frame will be detached by pulling out the rear frame bolt. (Fig. 67)

(6) The rear frame torsion rubber will come out by tapping with a plastic hammer. (Fig. 68).

Fig. 67. Loose rear frame bolts.

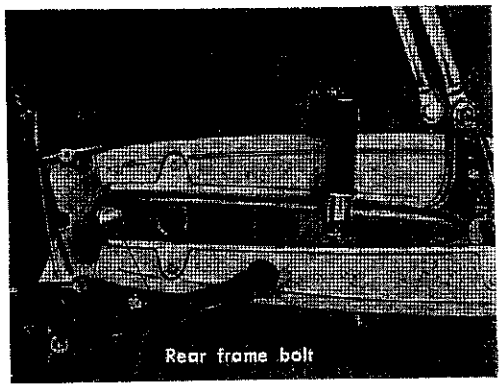
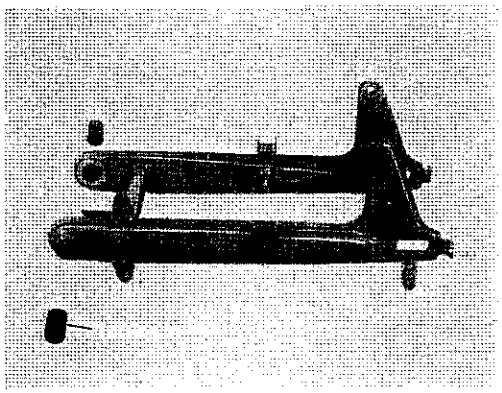


Fig. 68. Rear Frame.



C. Inspection :

(1) Check for bends or damage of frame and rear frame shaft (bolt).

(2) Check to see if torsion rubber is damaged and replace if necessary.

(3) Check to see if rear suspension is damaged or leaking and replace if necessary.

11. 4 Front and Rear Wheels:

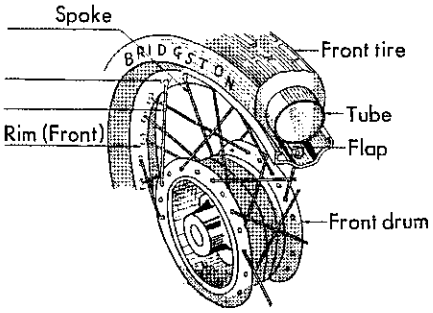
A. Description:

Both the front and rear wheels consist of tire tube, rims, spokes, etc.

Both tire are 2.50-17, 4 PR and spokes No. 12 for front and No. 10 and No. 11 for the rear.

Brake hubs are of aluminum alloy, 130 mm ϕ.

Fig. 69. Construction of Tire



CORRECT AIR PRESSURES

	FRONT	REAR
1 passenger	1.6 kg/cm^2 (22.5 lb/in^2)	2.0 kg/cm^2 (28.4 lb/in^2)
2 passenger	1.6 kg/cm$_2$ (22.5 lb/in^2)	2.1 kg/cm^2 (29.9 lb/in^2)

1. FRONT WHEEL:

The front wheel has the brake on the right side of the machine. The speedometer unit is installed in the hub to keep out water and dust.

2. REAR WHEEL:

The rear wheel has the rear sprocket on the left side of the machine and the brake on the right side.

B. Removing Front Wheel:

Place a supporting block under the engine, loosen axle bracket bolt, remove front tension bar from the hub side, remove front shaft nut, pull out front shaft, raise front fork slightly, and detach wheel. (Fig. 70, 72).

Fig. 70. Pull out front shaft.

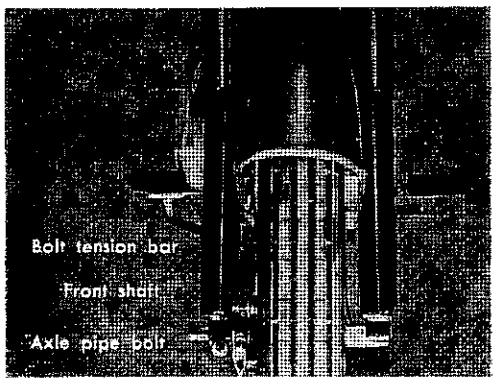
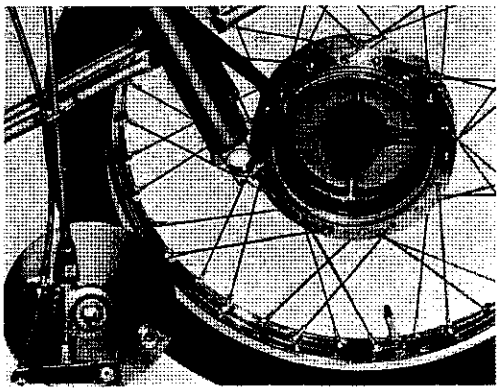


Fig. 71. Removed Hub Cover



C. Removing Rear Wheel :

Lift the machine on its main stand, remove brake rod adjusting nut, remove tension bar from the side of the hub, remove rear shaft nut on left side (**The big nut need not be touched**), pull out rear shaft together with chain adjuster, and by removing rear hub collar the wheel will come off the drive flange on the right side.

Take out wheel by leaning machine to the left.

Fig. 72. Remove rear wheel.

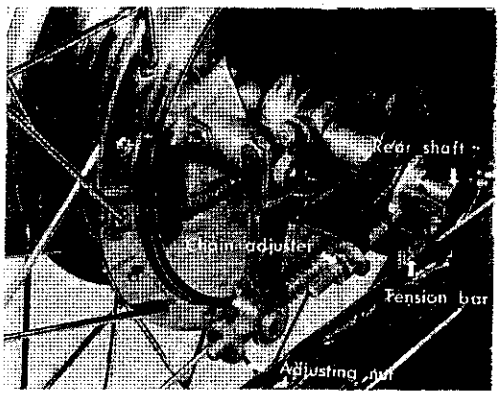
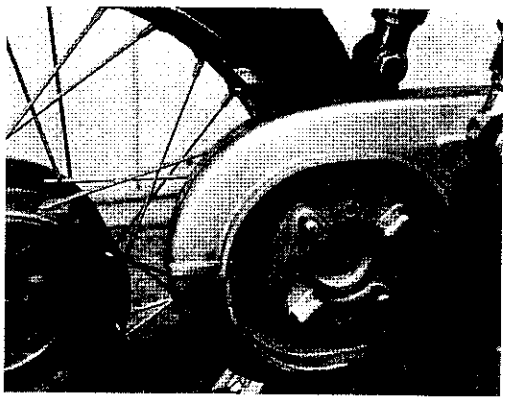


Fig. 73. Remove rear wheel.



D. Inspection :

(1) Bent or deformed rim.

(2) Check to see if any spokes are loosen and tighten if necessary.

(3) Check to see if tires have any bad cuts or nails embedded and if necessary make repairs or replacements.

(4) Wash ball bearings of the hubs well and check for looseness and snatching action in idle running. Make replacements if necessary.

(5) Replace bent or damaged front and rear shafts.

(6) The speedometer gear should rotate smoothly. Apply grease if necessary. Also check pinion speedometer.

(7) Check if the oil seal is damaged, deformed or worn out. Replace if necessary.

E. Assembling :

Assembling is performed in the reverse order of disassembling.

Assemble after applying sutficient grease to ball bearings.

F. Removing Tire :

(1) When removing tire to repair punctures, bursts, etc., take off valve cap and with its top loosen valve care in the stem, to let air out.

After deflating, lay wheel on the ground as shown in Fig. 74 and press tire down with the feet. Detatch bead of tire from rim, insert tire lever between rim and tire bead, and with the tire lever it out of the rim.

It would be more convenient to use two levers for this purpose. When one side of

the bead is completely out of the rim, push in stem of tube valve and pull out tube.

Fig. 74. Press tire down with the feet

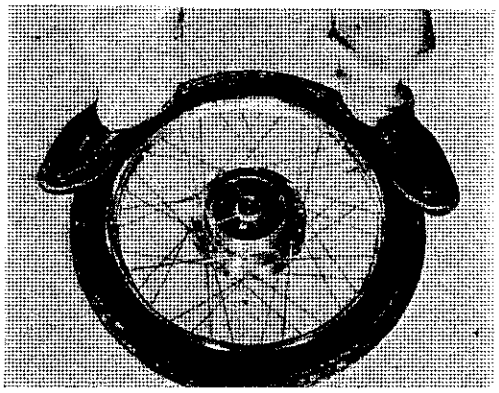
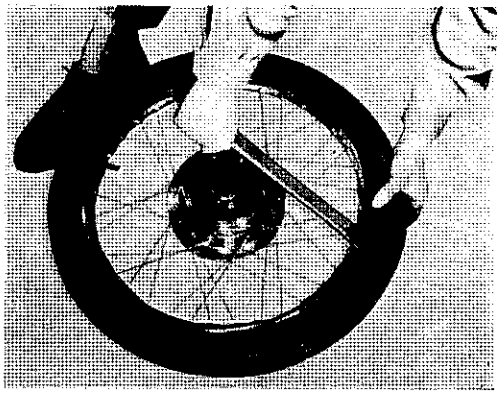


Fig. 75. Insert tire lever



After repairing tube, replace it in the tire, being careful to see that the valve stem is exactly centered in the hole of the rim.

G. Mounting Tire on the Rim :

To lever the bead on the rim, hook one tire lever on the rim and with the other lever gradually pull the bead over the rim.

H. Caution :

(1) As tire bead is a very tight fit on the rim, be careful not to put too much strain on it when mounting tire on the rim. Refer to 11.4 A on page 47 regarding correct tire pressure.

(2) Always choose the correct size (2.50–17, 4 PR) tire or tube for replacement.

(3) After inflating, put soap water on the valve tip to check for leakage of air. If it is found to be leaking, tighten valve or replace it with a new one.

(4) When removing or putting back tube, be careful not to the screw tread of stem.

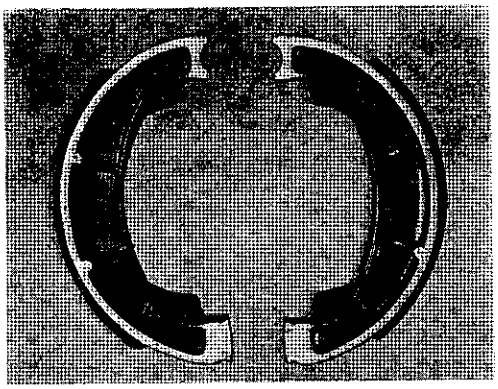
SFRVICE MEMO :

11. 5 Brakes :

A. Description :

The front and rear brakes are of the internal expansion type and operated by a lever and pedal respectively, and the brake shoes contact the drum by cam action. The brake linings made of asbestine woven are cemented on the shoes with a special adhesive agent. (Fig. 76).

Fig. 76. Brake shoe and lining.



B. Disassembling :

(1) By removing the wheel according to the procedure given in 11. 4 B and C, the hub cover (front or rear hub) will be detached.

(2) Unhook springs from one shoe only, and both shoes can be detached.
Remove brake arm and cam after shoes are detached. (Fig. 77).

Fig. 77. Hub cover & shoes ass'y.

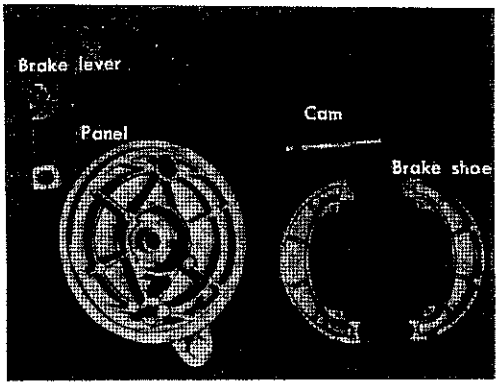
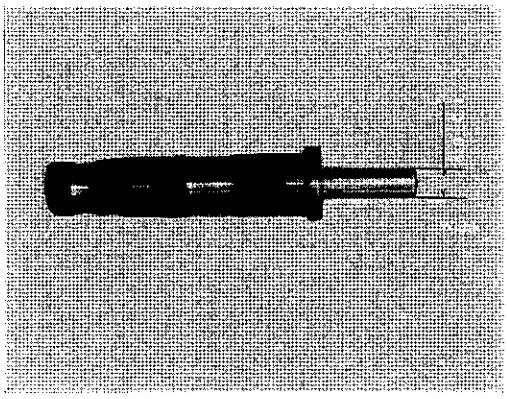


Fig. 78. Brake Cam.



C. Inspection :

(1) Check brake cam for wear. (Fig. 78).
Refer to the Service Standards Manual.

(2) Check worn return springs (brake shoe) and replace if necessary.

(3) Replace shoe assembly when worn to the limit. Refer to Service Standards Manual.

(4) Replace bent or damaged oil seal.

D. Assembling:

Assembling is carried out in the reverse order of disassembling. When any particles are embedded in the surface of the shoe lining or if it is unevenly worn, roughen the surface with a rough sandpaper.

11. 6 Fuel Tank and Seat:

A. Description:

The fuel tank is located on the frame with the rear part fastened by two hexagonal bolts and the front insulated by rubber pads attached to the frame. (Fig. 79. 80).

The seat is hooked on to the fuel tank bracket pipe, and the brackets on the rear are fastened by two hexagonal nuts of rear suspension.

B. Removing:

Take off hexagonal nuts on the rear suspension and raise rear of seat slightly and uuhook.

The fuel tank will be detached by taking off the two hexagonal bolts at the back and moving it to the rear.

Fig. 79. Fuel Tank

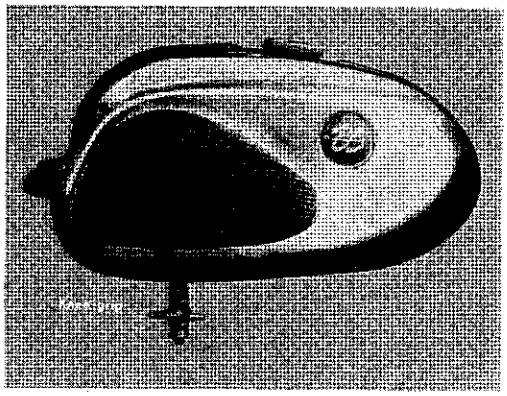
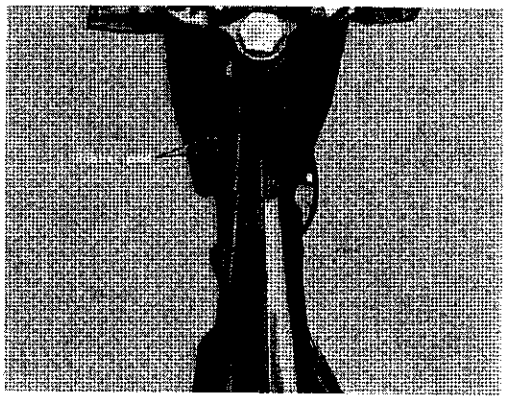


Fig. 80. Frame



C. Inspection:

(1) Replace front insulation rubber of fuel tank if it is worn or damaged.

(2) Replace fuel tank if there is any leakage.

(3) Replace tank cap packing if it is damaged or worn-out.

(4) Replace damaged pipe union or clips of drain pipe and fuel pipe if they are worn.

11. 7 Air Cleaner :

A. Description :

The air cleaner element is installed in the side cover (right) at center of left side of frame by two screws. The air sucked in here is filtered, and flows into the carburetor through the air hose. (Fig. 81)

Fig. 81. Air passage

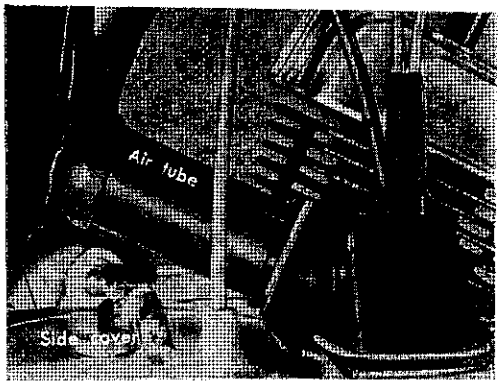
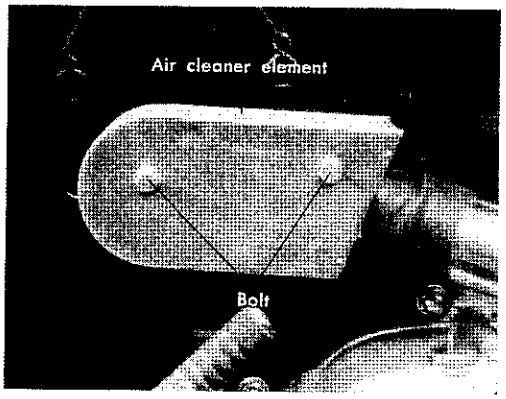


Fig. 82. Remove Air cleaner



B. Removing :

Remove left side cover, joint rubber, and hexagonal nuts and the complete air cleaner assembly can be detached. (Fig. 82).

C. Inspection :

(1) Clean or replace air cleaner element periodically by compressed air or with soft hair brush.

(2) Replace joint rubber if it is damaged.

D. Installing :

Install in the reverse order of removing. However, special attention should be paid when installing air cleaner to see that no air is sucked in from any source other than through the air cleaner to prevent any foreign matter entering the carburetor.

SERVICE MEMO :

11. 8 Exhaust System :

A. Removing :

Remove muffler blind nut bolt nut on rear frame, and bolt and nut on muffler bracket, and then the muffler will come off by pulling it to the rear.

The exhaust pipe will detach by loosening clamp nut. (Fig.83).

Fig. 83. Remove Exhaust Pipe

B. Inspection :

(1) Scrape off carbon from exhaust pipe and muffler periodically. (Fig. 84).

(2) When rubber joint is noticeably worn and causes gas leaks or when ring rubber joint or ring is worn out, make necessary replacements. (Fig. 85).

(3) When exhaust gascketis noticeably worn, make necessary replacements.

Fig. 84. Muffler.

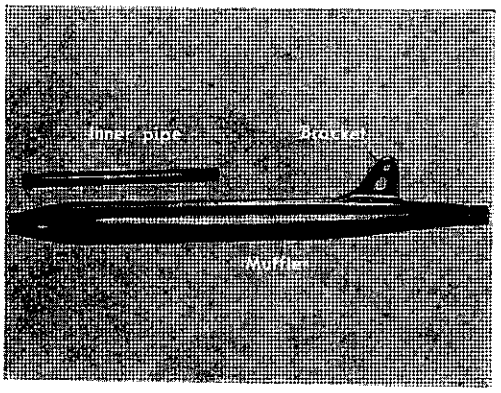
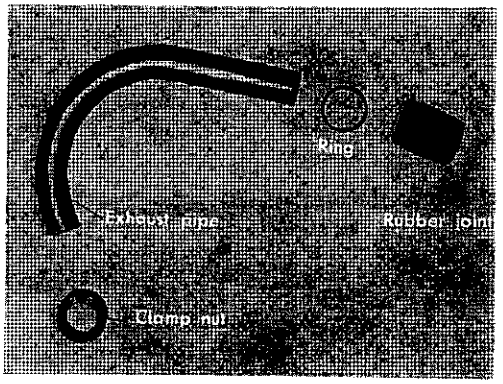


Fig. 85. Exhaust Pipe.



C. Installing :

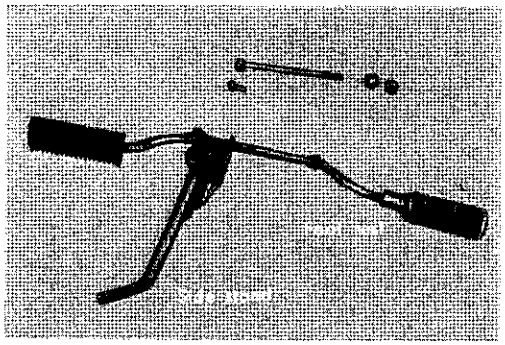
Installing is carried out in the reverse order of removing.

11. 9 Footrest and Stands (Main stand and side stand):

A. Removing:

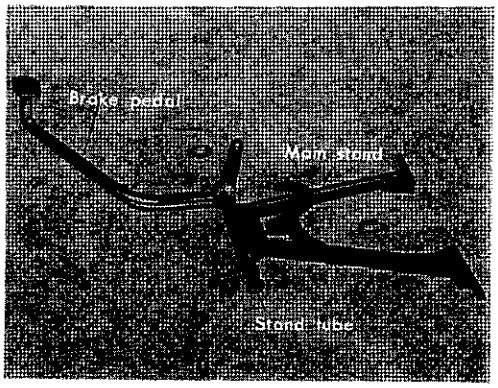
(1) The footrest and side stand can be detached together by loosening engine bolt (8×114) and frame bolt (8×16). (Fig. 86).

Fig. 86. Footrest and Side Stand.



(2) To detach main stand, suspend motorcycle with rope or lean it against the wall with the stand in position, take off cotter pin, take out stand tube by hammering, and the brake pedal will come off, after which the main stand can be removed from the spring. (Fig. 87).

Fig. 87. Main stand & Brake pedal.



B. Inspection:

(1) Check the outer diameter of stand tube and stand pipe, adjust or replace if necessary according to Service Standard Manual.

(2) Replace worn-out brake pedal return spring and main stand spring.

(3) Adjust or replace bent main stand and brake pedal.

C. Installing:

Install in the reverse order of removing, applying grease to working parts of main stand pipe and brake pedal.

11.10 Main Frame :

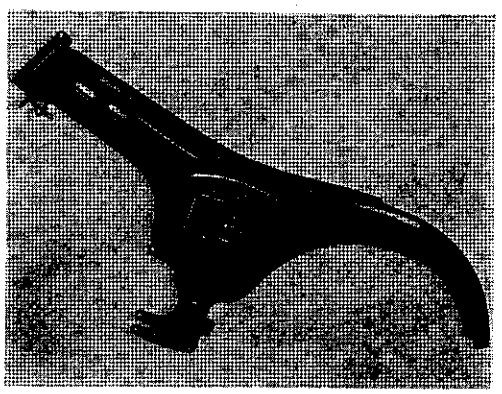
A. Construction :

The frame is built with pressed steel plate backbone type, very rugged but light in weight.

B. Disassembling :

Fig. 88 shows the frame after the engine and other parts have been dismounted.

Fig. 88. Main Frame.



C. Inspection :

(1) Repair by welding (arc welding) where necessary and replace broken or damaged pipes.

(2) Check for any bend in frame and head. Replace frame if defect is too great.

(3) Check for wear of steel balls, and replace if necessary.

(4) Check for damaged or worn inner and outer races, and replace if necessary.

D. Assembling :

Assemble in accordance with procedure described in the previous paragraph.

SERVICE MEMO :

12. ELECTRICAL EQUIPMENT:

12. 1 Ignition System:

The ignition system consists of the magneto, condenser, ignition coil, contact breaker and spark plug.

A high voltage electric current of approximately 10,000 V. is created and conveyed to the spark plug.

A. Contact Breaker:

The contact breaker is mounted on the magneto frame and its actuating cam is on the crankshaft.

Adjustment and Repair: The contact points should be checked. If the points are rough, file carefully with a fine file or emery paper.

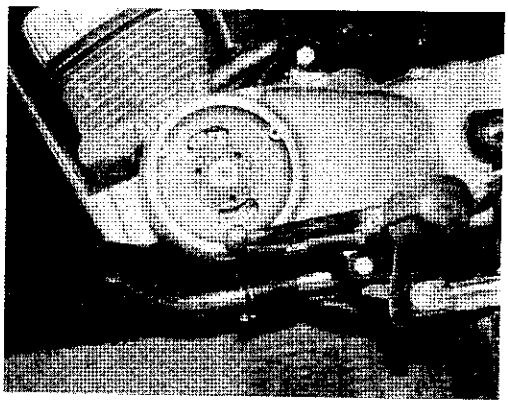
If the sureface is very rough and uneven, take them out, and file lightly with an oil-stone. After this wash with gasoline and wipe clear with a rag before assembling.

Replace with new if perfect contact of the two points is not possible.

Adjusting Ignition Timing: The ignition timing of the engine is 22 degrees (22 $\pm\frac{1}{2}$ degrees) befor Top Dead Center and point gap is 0.3–0.4 mm. (0.012″–0.016″)

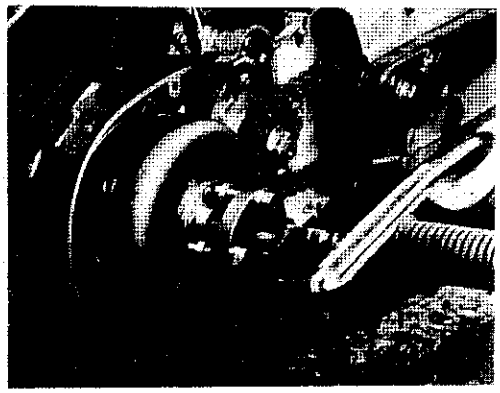
(1) Take off dynamo cover and check point gap. (Fig. 89).

Fig. 89. Adjusting Ignition Timing.



(2) Use flywheel magneto puller (special tool) and remove flywheel magneto (Fig. 90).

Fig. 90. Remove Flywheel Magneto.



(3) Loosen screw (2) and set point gap by turning contact breaker (1) 0.35 mm. (0.014″) with thickness guage. (Fig. 91).

(When breaker is turned to the left, gap increases.)

(When breaker is turned to the right, gap decreases.)

(4) Then loosen magneto frame screws, turn the magneto frame left or right and set it as Fig. 91 : when the notch on the flywheel meets the corresponding mark on the crankcase, the point should separate. (Fig. 92).

(When magneto frame is turned to the **left**, ignition is retarded.)

(When magneto frame is turned to the **right**, ignition is advanced.)

Fig. 91. Magneto Frame.

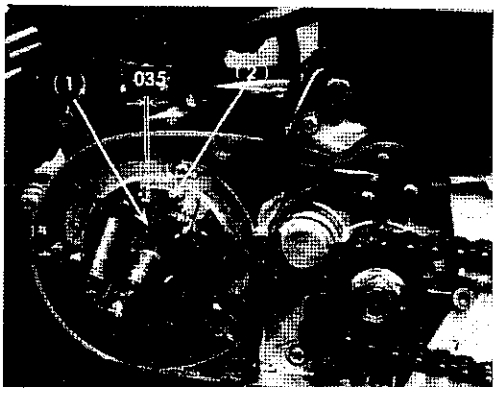


Fig. 92. Set the ignition timing mark.

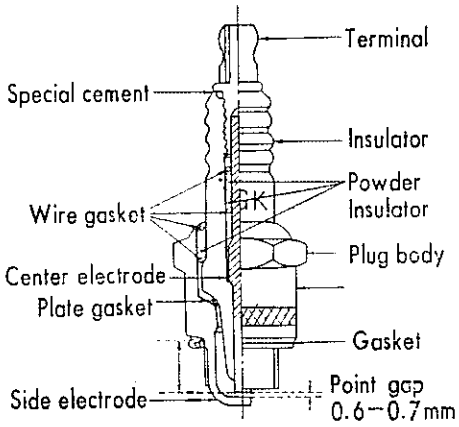
B. Condenser :

The condenser is mounted on the magneto frame, and absorbs the current generated when the contact breaker cuts out and assists the functioning of the ignition coil.

C. Spark Plug :

The standard spark plug is used N. G. K. B-7 H whose sectional structure is shown in Fig. 93.

Fig. 93. Spark Plug.



The gap of the spark electrodes should be adjusted to 0. 6 mm–0. 7 mm (0. 024″–0. 027″)

Inspection and Adjustment :

Check the spark plug every 3, 000 km. (2, 000 miles). The electrode wears and becomes coated with carbon or oil. A worn or dirty plug produces weak sparks or none and causes hard starting, low output, irregular rpm and damages the ignition coil, etc.

Wash the plug with gasoline to remove dirt.

(1) When Too Cold a plug is used.

Oil on the electrode or heavy carbon deposit.

Change to a hotter plug (lower number.)

Check the fuel supply (feed) and clean air cleaner.

(2) When Correct a plug is used.

Nearly white or light crown, sometimes greyish deposit.

(3) When Too Hot a plug is used.

Absence of deposit, bleached appearance of insulator, sometimes blistered.

Change to a colder plug (higher number).

Check the fuel supply and increase feed.

(4) See chart below for plug recommendation.

BRAND	STANDARD	IF PLUG FOULS EASILY (Slow speed)	IF PLUG BURNS EASILY (High speed)
NGK	B-7 H	B-6 H	B-7 HC B-8 H
CHAMPION	L-5	L-7 L-85	LA-10
BOSCH	W 240 T_1	W 225 T_1	W 290 T_{16}
LODGE	3 HN	2 HN	R 49
AC	43 F 42 L-Com.	44 F	

D. Flywheel Magneto :

The flywheel magneto is mounted on the left side of the crank shaft and the permanent magneto fitted to the flywheel rotates around the steel-cored coil.

E. Testing Ignition Coil :

Disconnect plug, and connect the wire with the lead wire of the electro tester. If the spark jumps 6 m/m or over, the coil is in good condition. Lesser spark means unsatisfactory ignition coil or decrease in the magnet.

Normally, the fault lies in the coil.

When charging efficiency of the lighting coil hat dropped, it may be also due to weakened magnet.)

12. 2 Charging System :

The charging system consists of the lighting coil of the magneto, selenum rectifier and battery. The current generated by the magneto is transmitted to the headlight, taillight, speedometer light and also to for the battery.

The alternating current is rectified to Direct Current by a rectifier for charging.

A. Coil for Charging :

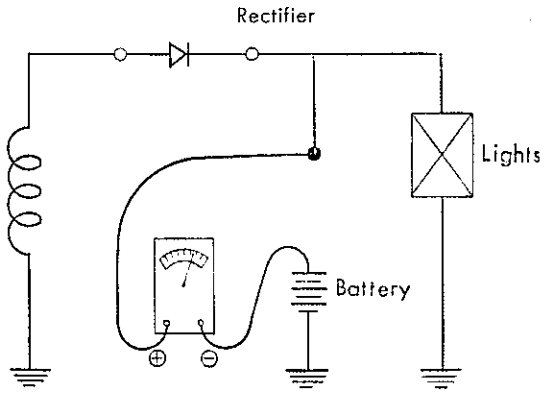
The coils are classified into coil for battery charging and coil for lighting the headlight, taillight and speedometer light at night.

To check whether the coils are satisfactory, link an ampere meter in a series (about 2 Amp. reading) to the battery fuse, as shown in Fig. 94.

Start engine and measure electric current responding to different crank rotations.

Measure with the main switch on separately in day time and at night and if

Fig. 94. Check charging rate.



the excess or shortage is within 10–20 % of the stadard charging rate, the condition is satisfactory. But if it is below or above the standard, the lighting coil should be replaced.

CRANKSHAFT R.P.M		2500	8000
DAYTIME	Current charged (A)	Start charging	Less than 2.5 A
AT NIGHT	Current charged (A)	Over than 0.1 A	Less than 9 V
	Light voltage (V)	Over than 6 V	

The Normal Electric Current Raised by Each Rotation.

B. Selenum Rectifier :

The selenum rectifier performes the funtion of rectifying the A. C. curren toriginafing from coil into direct current and charging it to the battery.

Running the machine in the daytime without the battery or fuse will damage the rectifier and burn out the bulbs.

The battery should be checked periodically without fail.

The battery should be checked periodically without fail.

C. Battery :

The horn, winker light, neutral lamp, stoplight, etc. work on the direct current supplied by the battery. The 6 V–4 AH battery for BRIDGESTONE–90 is connected to the rectifier by a fuse and also serves as an earth for the machine.

A periodic check should be conducted by the user and the dealer.

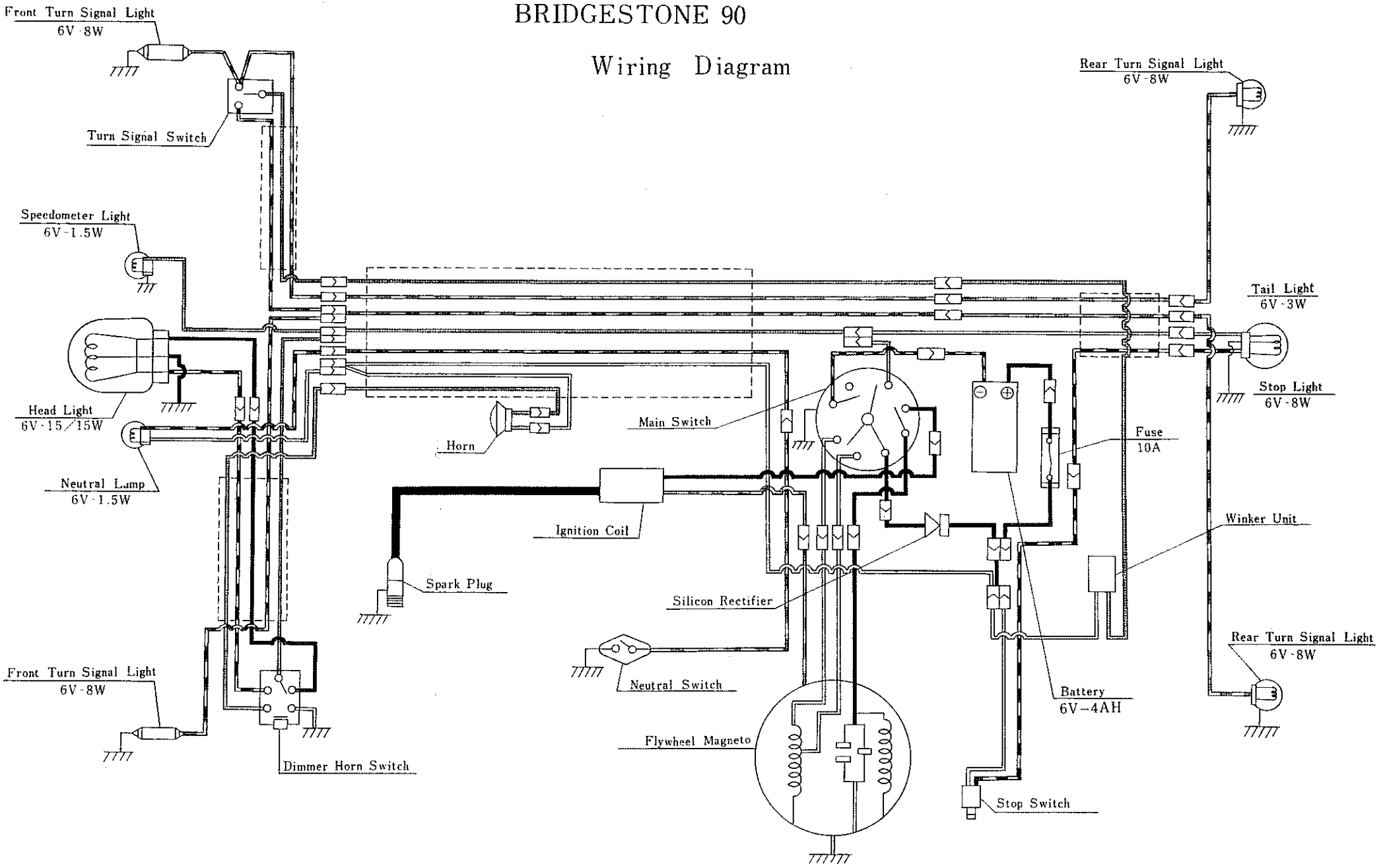
The main item of check and maintenance is the liquid and its specific gravity.

The specific gravity of 1.260 at is full charge.

SERVICE MEMO :

BRIDGESTONE 90

Wiring Diagram



13. INSPECTION AND MAINTFNANCE :

A. Daily Check Procedure :

Tire Air Pressure	Front 1.6 kg/cm² (22.8 lbs./in²) Rear 2.0 kg/cm² (28.4 lbs./in²)
Front Brake	Proper adjustment
Rear Brake	Proper adjustment
Fuel	Is it sufficient ?
Horn	Does it work well ?
Lights	Proper operation.
Transmission Oil	Check level.
Battery	Check liquid level.
Carburetor	Adjust idling.

B. Periodic Checking :

400 km (250 miles) 3, 000 km (2, 000 miles) 6, 000 km (3, 500 miles)

ITEM	PROCEDURE	AFTER BRAKE-IN (400 km)	ONCE EVERY 3,000 km. (2,000 mile)	ONCE EVERY 6,000 km. (3,000 mile)
Front & Rear Brake Play	Check	×	×	×
Chain Play	Check	×	×	×
Muffler & Exhaust Carbon	Clean		○	○
Clutch Play	Check	×	×	×
Carburetor Operation	Check		○	○
Battery Liquid	Check	×	×	×
Spark Plug	Clean		×	×
Contact Points Gap	Check	○	○	○
Air Cleaner	Clean		○	○
Cylinder Head Carbon	Clean		×	×
Bolts and Nuts	Tightness	○	○	○
Fuel Cock Filter	Clean		○	○

Items marked "O" should be checked frequently.

C. Periodic Greasing :

Periodic greasing with a grease gun and lubrication.

	ITEM	1 ST GREASING	2 ND GREASING MILEAGE INTERVAL	PROCEDURE
1.	Front Brake Cam Shaft	400 km. (250 miles)	3, 000 km. (2, 000 miles)	Grease
2.	Rear Brake Cam Shaft	400 km. (250 miles)	3, 000 km. (2, 000 miles)	Grease
3.	Grip Pipe	400 km. (250 miles)	3, 000 km. (2, 000 miles)	Grease
4.	Speedometer Gear Box	6, 000 km. (3,500 miles)	4, 000 km. (2, 500 miles)	Grease
5.	Front & Rear Wheel Bearings	3, 000 km. (2, 000 miles)	3, 000 km. (2,000 miles)	Grease
6.	Steering Bearings	6, 000 km. (3, 500 miles)	6, 000 km. (3, 500 miles)	Grease
7.	Oil Felt (Magneto)	6, 000 km. (3, 500 miles)	6, 000 km. (3, 500 miles)	Grease
8,	Cables	1, 500 km. (1,000 miles)	3,000 km. (2, 000 miles)	Grease
9.	Chain	400 km. (250 miles)	1, 000 km. (600 miles)	Motor Oil
10.	Stand Tube	3, 000 km. (2, 000 miles)	3, 000 km. (2, 000 miles)	Motor Oil
11.	Front Fork	10, 000 km. (6,000 miles)	10, 000 km. (6,000 miles)	135 cc. of Hydraulic fork oil (or mixture of 70 parts of Spindle oil No. 60 to 3 parts of No. 30 motor oil).

D. Inspection and Maintenance During Storage :

As new motorcycles are placed in the warehouse pending sale and delivery, the Distributor/ Dealer should carry out certain inspections and certain measures for protection of the machines to avoid trouble after delivery due to rust and other causes resulting from long storage.

Safeguard against such a possibility will save much labour and time.

I. BATTERY :

1. Inspection of specific gravity of electrolyte fluid.
2. Storage of dry charged battery.
3. Initial charging rate.

II. CARBURETOR :

1. Draining off fuel mixture in float chamber.
2. Adjusting for slow running.

III. CONTACT BREAKER IGNITION POINTS :

1. Cleaning of points.
2. Adjustment of point gap.

IV. TRANSMISSION OIL :

1. Quantity of transmission oil.
2. Quality of oil.

V. FUEL TANK :

1. Draining off.

I. BATTERY :

1. Inspection of Specific Gravity :

The condition of the battery can be determined by measuring the specific gravity of the electrolyte solution.

If the gravity is below 1.220, the battery should be charged without delay.

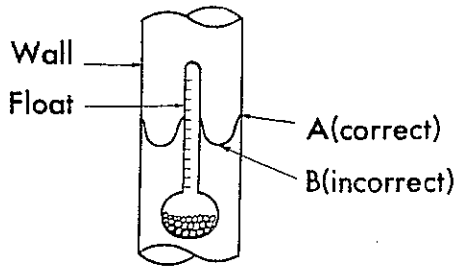
Specific Gravity (At 20°C. (68°F.) Solution Temperature)	Amount of Charge
1.280 (for electric starter) 1.260 (for kick starter)	100%
1.220	75
1.160	50
1.105	25
1.050	None

(Caution) Take care of the following points when checking the specific gravity.

(1) Do not let the hydrometer float touch the side of the wall.

(2) Read the hydrometer at A (high point of contact) instead of B (low level) as shown in Figure.

(3) A specific gravity varies according to the temperature of the solution, apply the following conversion table based on standard 20°C. (or 68°F.) for the different temperatures.



Relation between Specific Gravity and Temperature of Solution

0°C 32°F	5°C 42°F	10°C 50°F	25°C 59°F	20°C 68°F	25°C 77°F	30°C 86°F	35°C 95°F	40°C 104°F	45°C 113°F
1,218	1,215	1,212	1,208	1,205	1,202	1,198	1,195	1,191	1,188
1,223	1,220	1,217	1,213	1,210	1,207	1,203	1,200	1,196	1,193
1,228	1,225	1,222	1,218	1,220	1,212	1,208	1,205	1,202	1,198
1,233	1,230	1,227	1,223	1,225	1,217	1,213	1,210	1,206	1,203
1,238	1,235	1,232	1,228	1,225	1,222	1,218	1,215	1,211	1,208
1,244	1,241	1,237	1,234	1,230	1,226	1,223	1,219	1,216	1,212
1,249	1,246	1,242	1,239	1,235	1,231	1,228	1,224	1,221	1,217
1,254	1,251	1,247	1,244	1,240	1,236	1,233	1,229	1,226	1,222
1,259	1,256	1,252	1,249	1,245	1,241	1,238	1,234	1,231	1,227
1,264	1,261	1,257	1,254	1,250	1,246	1,243	1,239	1,236	1,232
1,269	1,266	1,262	1,259	1,255	1,251	1,248	1,244	1,240	1,237
1,274	1,271	1,267	1,264	**1,260**	1,256	1,253	1,249	1,245	1,242
1,276	1,276	1,272	1,269	1,265	1,261	1,258	1,254	1,250	1,247
1,284	1.281	1.277	1,274	1,270	1,266	1,263	1,259	1,255	1,252
1,289	1,286	1,282	1,279	1,275	1,270	1,268	1,264	1,260	1,257
1,294	1.260	1,287	1,284	1,280	1,276	1,273	1,269	1,265	1,261

2. Storage of Dry Charged Battery:

Dry charged battery, if stored in a relatively dry place, will remain in good condition for a considerable period, but if the cells absorb moisture during storage, the negative plates will discharge slowly and the charging rate will be longer as shown in the following table.

Storage period	Decreased Capacity	Capacity
One Month	0%	100%
Three months	15%	85%
Six months	30%	70%
One year	50%	50%

3. Initial Charging Rate:

(2) Leave battery from 2 to 12 hours after filling before charging. When the level of electrolyte has dropped, add more electrolyte until the proper level is reached.

(3) Charge at the proper rate as given in table below until all cells are gassing freely and cell voltage and specific gravity stop rising and remain constant.

The total charging time will be about 10 hours. During charging, battery temperature should be kept below 45°C (113°F.) Should the temperature exceed 45°C., stop charging for a time until the temperature falls below 45°C.

Model	Proper Charging	Quick Charging
BRIDGESTONE 7		
Deluxe	0.6 Ampere×12 hour	3 Ampere×1 hour
Standard	0.2 〃 ×12 〃	1 〃 ×1 〃
BRIDGESTONE 50		
HOMER (Standard)	0.2 〃 ×12 〃	1 〃 ×1 〃
BRIDGESTONE 50 sport	0.2 〃 ×12 〃	1 〃 ×1 〃
BRIDGESTONE 60 sport	0.2 〃 ×12 〃	1 〃 ×1 〃
BRIDGESTONE 90	0.4 〃 ×12 〃	2 〃 ×1 〃

II. CARBURETORS:

1. Drain off Remaining Fuel Mixture in Float Chamber:

(Reason)

Over three months' storage of motorcycle will cause the fuel mixture in carburetor float chamber to become too rich, due to evaporation of gasoline, which will make starting difficult.

(Maintenance)

(1) Disassemble float chamber, and clean it with gasoline.

(2) Clean hole on main jet, and needle jet with an air-pump.

2. Adjusting for Slow Running:

(Note) Warm up the engine for 2 or 3 minutes before adjusting.

(Adjusting)

(1) Screw up the air screw to the limit and then unscrew;

2 full turn for model BRIDGESTONE 50 HOMER

2 turns for model BRIDGESTONE 7

1 turns for model BRIDGESTONE 90

1 turn for model BRIDGESTONE 50 sport

1 turn for model BRIDGESTONE 60 sport

(2) Adjust the engine with the throttle stop screw to the lowest revolution it will run.

(3) Turning the air screw back and forward about 1/2 turn each way, find the position where the engine fires best.

(4) Re-adjust the idling speed with the throttle stop screw.

III. CONTACT BREAKER IGNITION POINTS:

1. Cleaning of Points:

After three months storage, polish the points with a point file before starting up the machine.

(Reason) After long storage, the points will be coated with a thin oxidized film.

Do not use emery paper, as residue emery powder will cause rapid wear of the points.

2. **Adjustment of Point Gap**:

Keep the point gap between 0.3–0.4 mm (0.024~0.027).

IV. TRANSMISSION OIL:

Do not overlook to fill up before taking machine out on the road.

Fill with high grade motor oil.

1. **Quantity of Transmission Oil**:

1 litre (0.26 U.S. Gal.) for model BRIDGESTONE 50 HOMER and 7.

0.6 litre (0.158 U.S. Gal.) for model BRIDGESTONE 90.

0.5 litre (0.132 U.S. Gal.) for model BRIDGESTONE 50 sport & 60 sport

2. **Quality Oil**:

SAE No. 30 in summer.

SAE No. 20 in winter.

or

SAE No. 10 W/30 all season oil.

V. FUEL TANK:

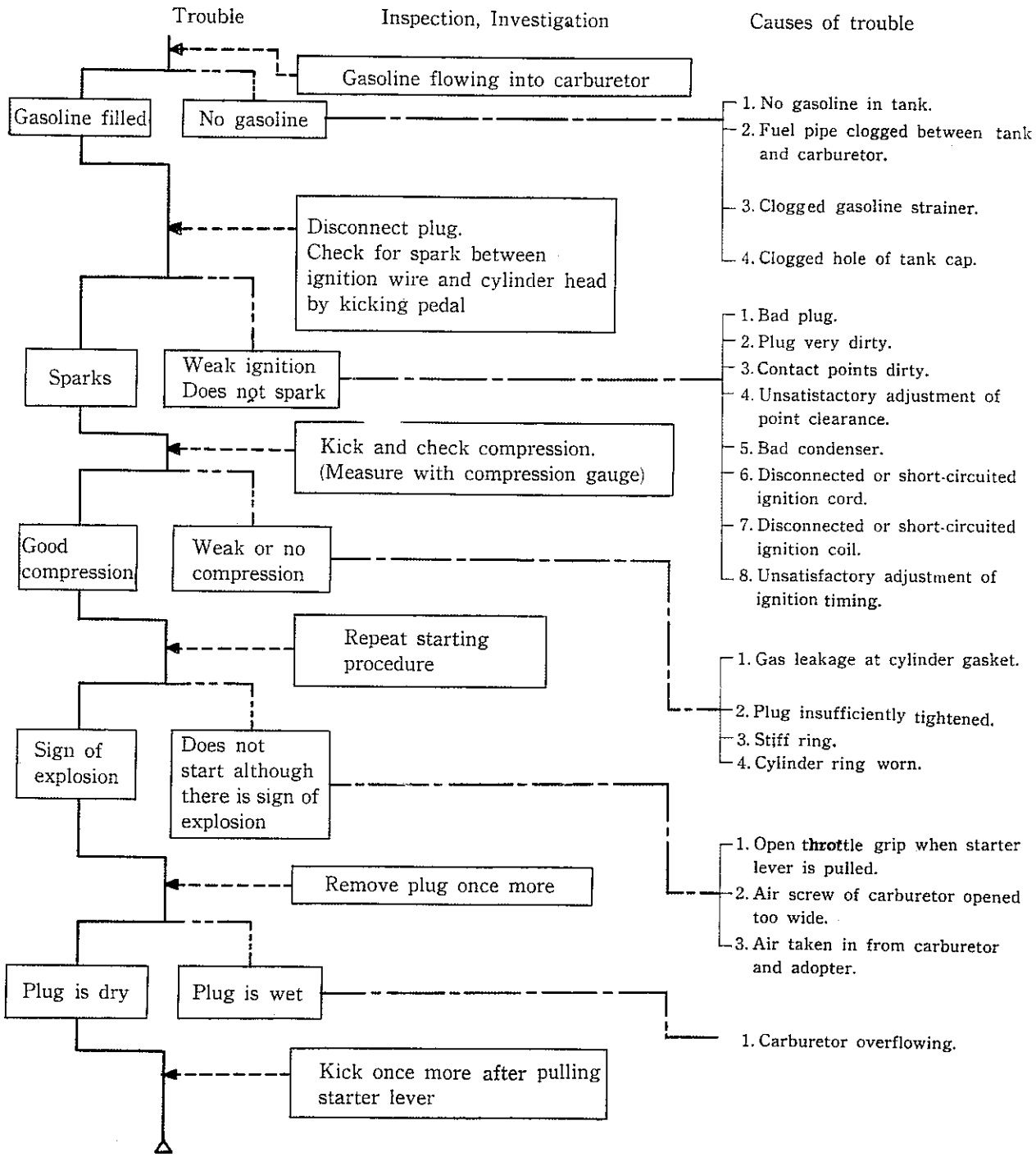
Fuel tank should first be completely drained and all deposits and grit cleaned out.

Then refill with mixture of 1-pint of 2 cycle enging oil (SAE No. 30) and 1.8 gallons of recognized brand of "Regular grade gasoline".

SERVICE MEMO:

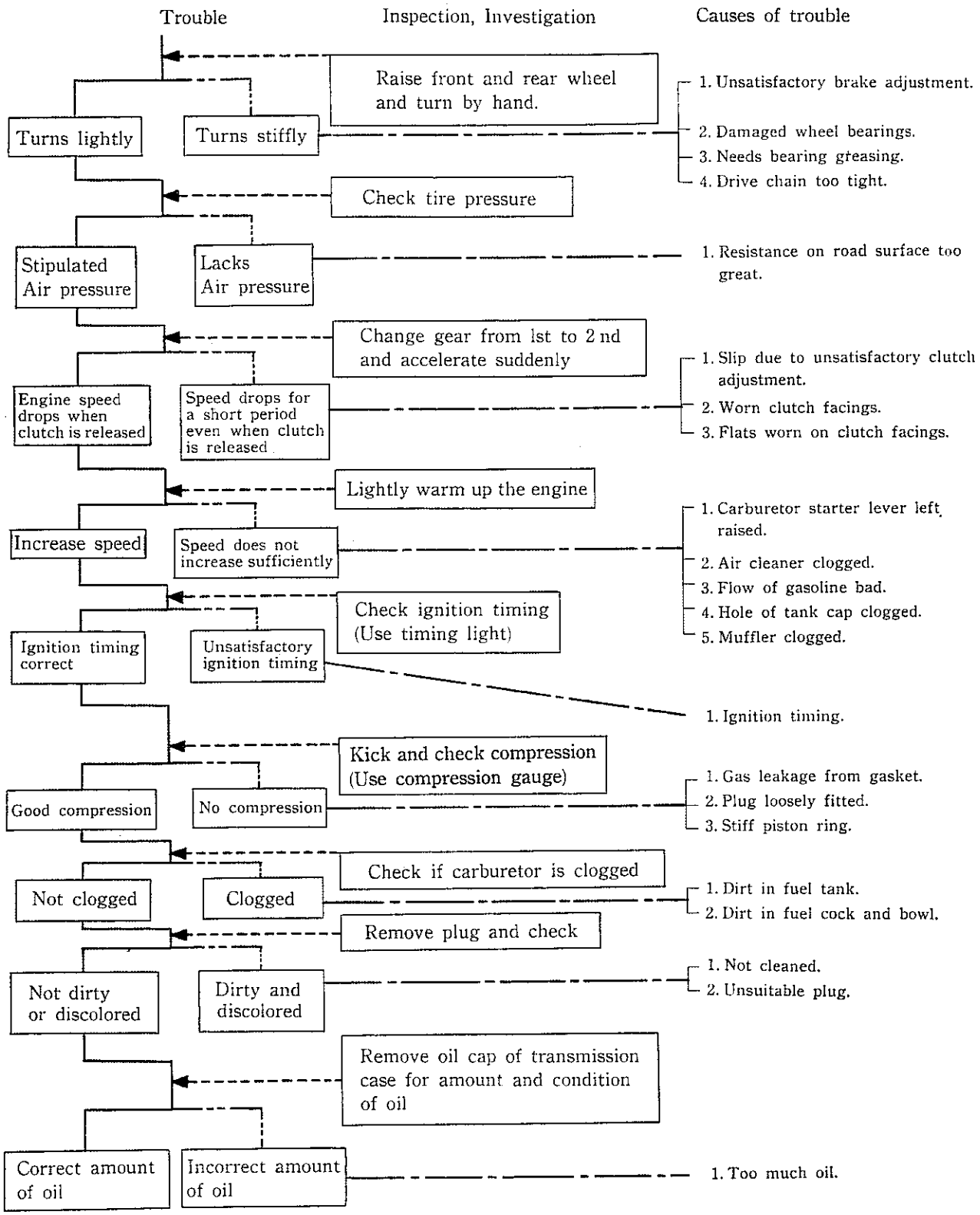
14. TROUBLE SHOOTING :

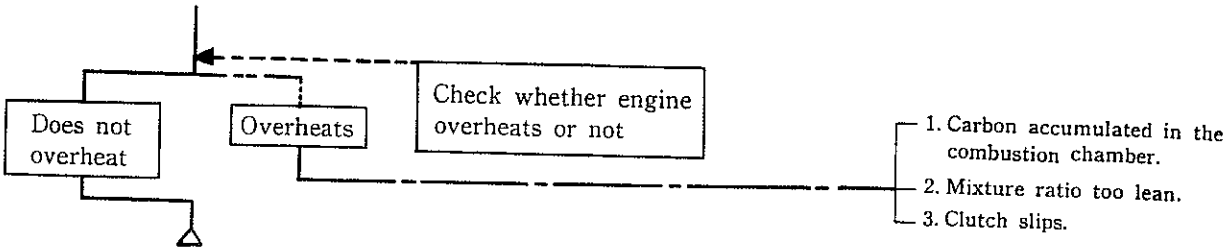
(1) Engine is hard to start.



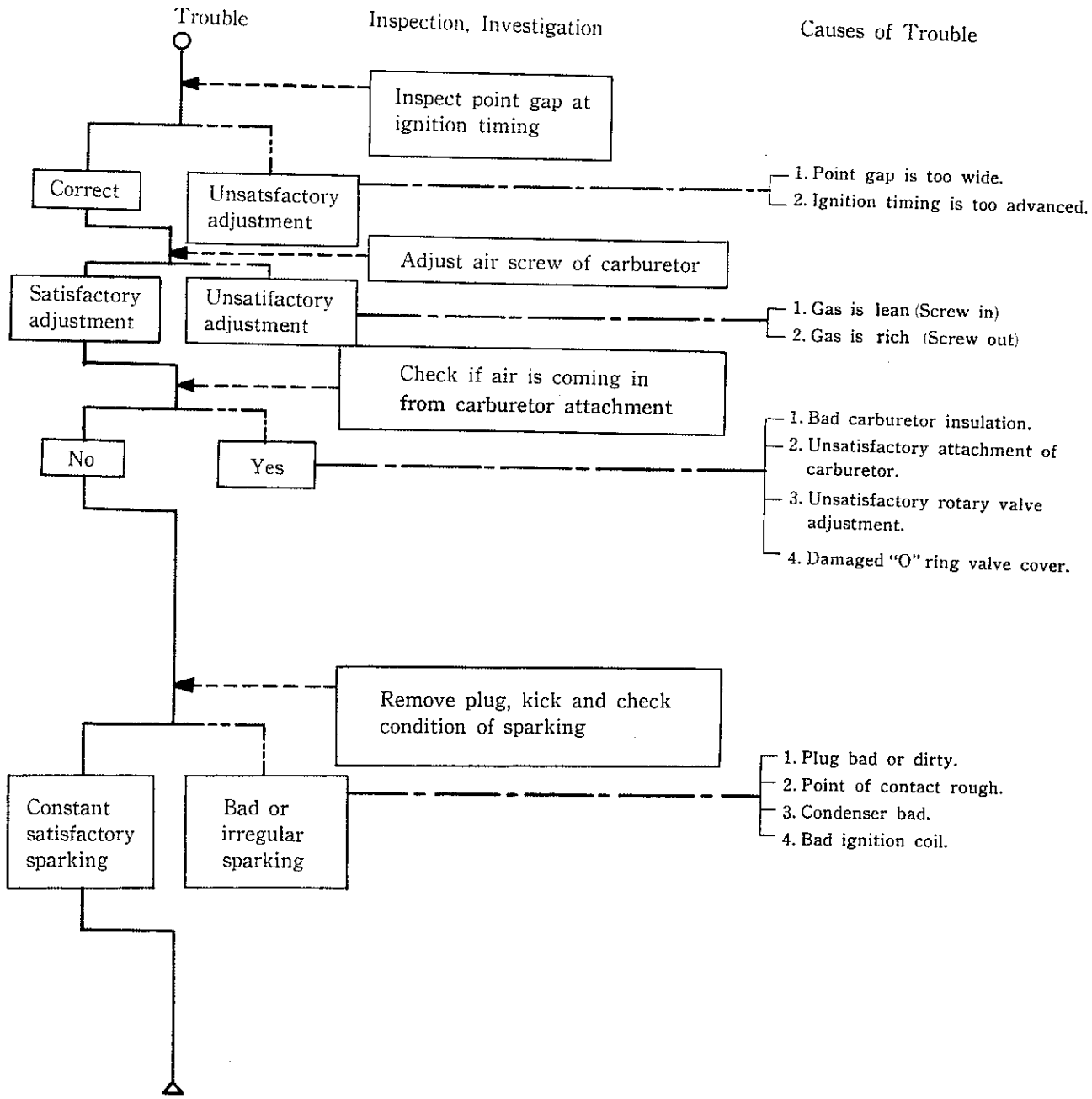
Fuel, spark and compression are basic points for engine operation.
To locate engine trouble first check these points.

(2) **High engine revolution cannot be obtained.**
Insufficient power.

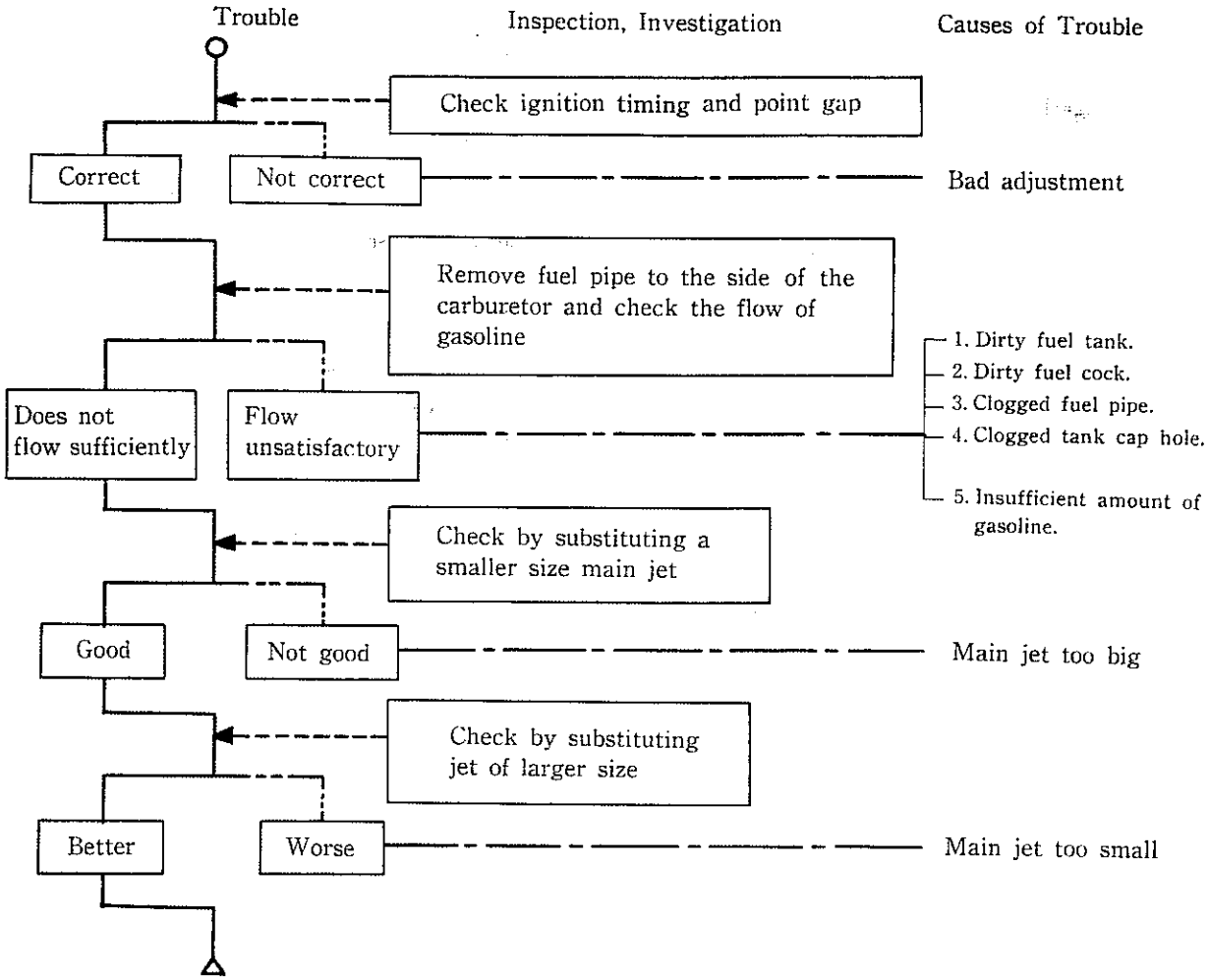




(3) **Unsatisfactory R. P. M. (Chiefly at low speed and idling).**



(4) **Iregular Revolutions (At medium and high speeds).**



(5) Unsatisfactory Gear Shifting.

Trouble	Causes of Trouble
Gears cannot be shifted smoothly	1. Improper working gear shift drum. 2. Bent shift fork. 3. Improper working clutch. 4. Worn claws of drum shifter.
Change pedal does not return smoothly	1. Broken change return spring. 2. Drum shifter touching some part. 3. Bent change shaft.
Gears disengage	1. Bent and worn out shift fork. 2. Worn out claws of drum shifter. 3. Worn out drum stopper.

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