BRIDGESTONE

350 GTR - GTO

SERVICE MANUAL

Rockford Motors inc.

FORWARD

The ever increasing demand for larger, more sophisticated motorcycles is the reason Bridgestone developed the 350GTR – the most advanced motorcycle in the industry. The increasing knowledgeability of your customers and complexity of their motorcycles make satisfactory maintenance service even more important.

This manual outlines the most efficient maintenance procedures. To give your customers the best possible service, have a clean, well organized repair shop equipped with all the necessary special tools and keep this manual always at hand for every service man's use.

BRIDGESTONE TIRE CO., LTD
MOTORCYCLE SECTION

1. TECHNICAL DATA

* Engine

(1) Type :	2-stroke, Dual Cylinders
(2) Piston Displacement :	344.9cc (21.5 cu-inches)
(3) Bore & Stroke :	61 mm × 59 mm (2.40 × 2.32 inches)
(4) Compression Ratio :	9.31:1
(5) Max. Brake Horse Power	40 HP/7500 rpm
(6) Max. Torque :	4.0 kg-m/7000 rpm
(7) Air Intake System :	Rotary disc valve
(8) Starting System :	Kick Starter
(9) Charging System :	A. C. Generator
	Contact breaker gap : 0.3 - 0.4 mm (0.012 - 0.016 inches)
(10) Ignition System:	Battery
(11) Ignition Timing:	(25+1-2) degrees before T.D.C.
(12) Spark Plug:	N.G.K. B-8H, Electrode gap : 0.6 mm (0.024 inches)
(13) Carburetor:	Type AMAL VM 26 SC
	Venturi: 26 mm
	Main Jet No.: 130 Throttle Valve Cut Away: 2.0
	Air Jet : 2.0 Adjustment of Needle Jet : 0.6
	Pilot Jet: 22.5 Pilot Air Screw Position: 2 turns out
	Needle Position: 3
(14) Engine Lubrication:	2 cycle oil
(15) Fuel:	Regular Gasoline
(16) Transmission Oil:	1.5 liter (2/5 US gal.) in transmission case
	SAE No. 10W/30 in all seasons or
	SAE No. 30 in summer and SAE No. 20 in winter

Performance

(1) Max. Speed :	100-110 mph
(2) Climbing Ability :	1 in 2
(3) Fuel Consumption :	94 mpg/25 mph (40 km/litre at 40 km/h)
(4) Min. Turning Radius :	2.25 m (7.38 feet)
(5) Acceleration :	
(Standing Start 1/4 mile)	13.7 sec
(Zero to 60 mph) :	5.2 sec
(6) Braking Distance :	(Less than 12m at 50 km/h)
	39 feet, at 30 mph

Frame and Suspension

(1) Frame:	Pipe Frame, Cradle Type
(2) Front Suspension:	Telescopic Fork with Hydraulic Damper
(3) Rear Suspension:	Swinging Arm with Hydraulic Damper

Transmission

(1) Clutch : Manual, Multiple discs, Dry type
(2) Transmission : Constant mesh 6-speeds
(3) Gear Ratio :

Primary (Helical Gear)		1:3.095
Gear Box:	1st	1:2.46
	2nd	1:1.647
	3rd	1:1.25
	4th	1:1.00
	5th	1:0.852
	6th	1:0.759
Secondary (Chain) :		1:2.40
Total Gear Ratio :	1st	1:18.27
	2nd	1:12.23
	3rd	1:9.29
	4th	1:7.43
	5th	1:6.33
	6th	1:5.64

Dimensions and Weight

(1) Overall Length : 2,110 mm (83.1 inches)
(2) Overall Width : 825mm (32.5 inches)
(3) Overall Height: 1,115 mm (43.9 inches)
(4) Saddle Height : 810mm (31.9 inches)
(5) Wheelbase: 1,375 mm (54.1 inches)
(6) Road Clearance : 145 mm (5.7 inches)
(7) Tire Size (Front) : 3.25-19 4 ply
(Rear): 3.25-19 4 ply
(8) Tire Pressure (Front) : 2.0kg/cm^2 (28-30 lbs/in^2)
(Rear): 2.2 kg/cm^2 (30-32 lbs/in^2)
(9) Caster : 63°
(10) Trail: 105 mm (4.15 inches)
(11) Banking Angle: 46°
(12) Net Weight: 165 kg (363 lbs)
(13) Fuel Tank Capacity: 15 litre (3-4/5 US gal.)
Including 3.2 litre (4/5 US gal.) reserve
(14) Oil Tank Capacity : 2.5 litre (3/5 US gal.)

Electrical Equipment

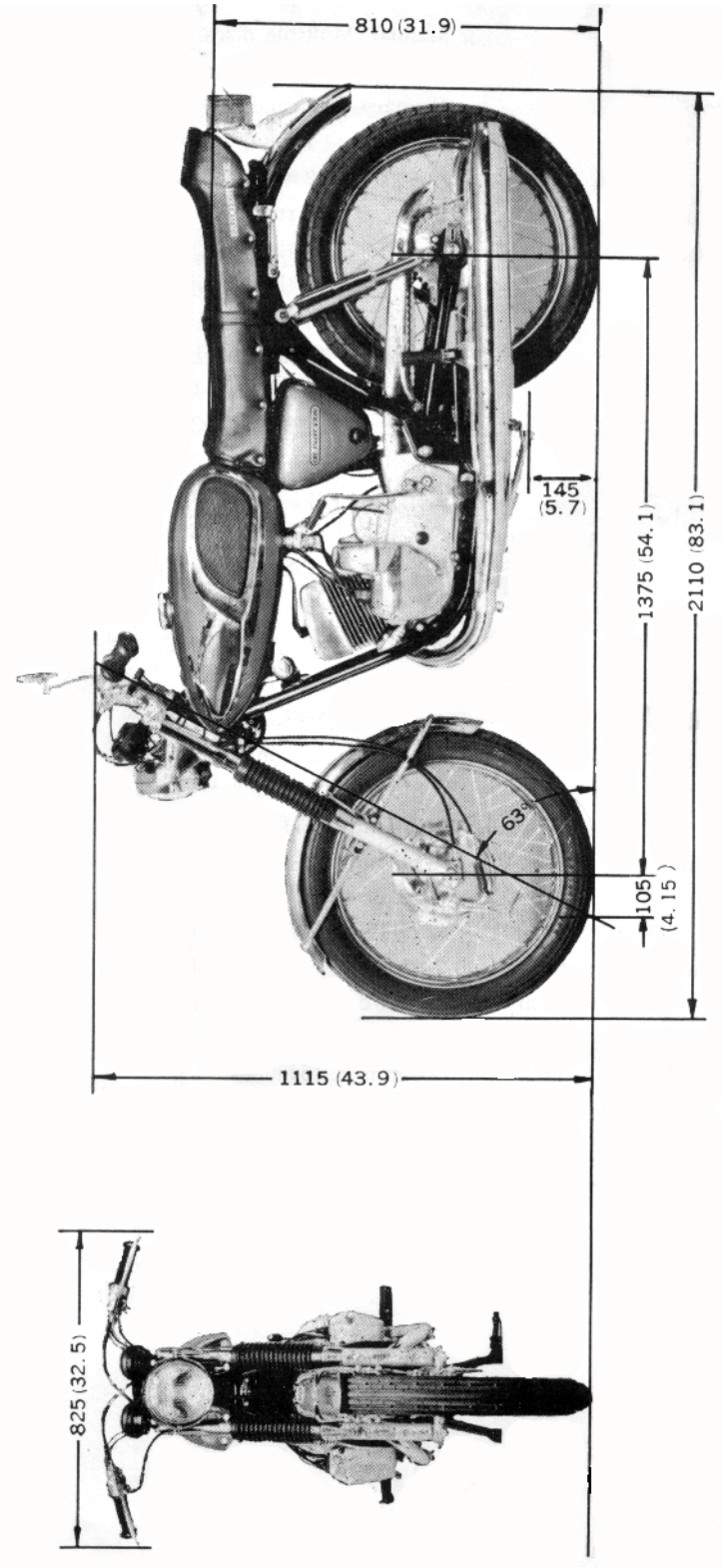
(1) Head Light :
(2) Tail Light :
(3) Stop Light : 12V-35/30W
(4) Speedometer Lamp : 12V-7W
(5) Tachometer Lamp : 12V-23W
(6) Neutral Indicator Lamp : 12V-3W
(7) 5th Gear Indicator Lamp : 12V-3W
(8) Headlight High Beam Lamp : 12V-3W

(9) Battery :

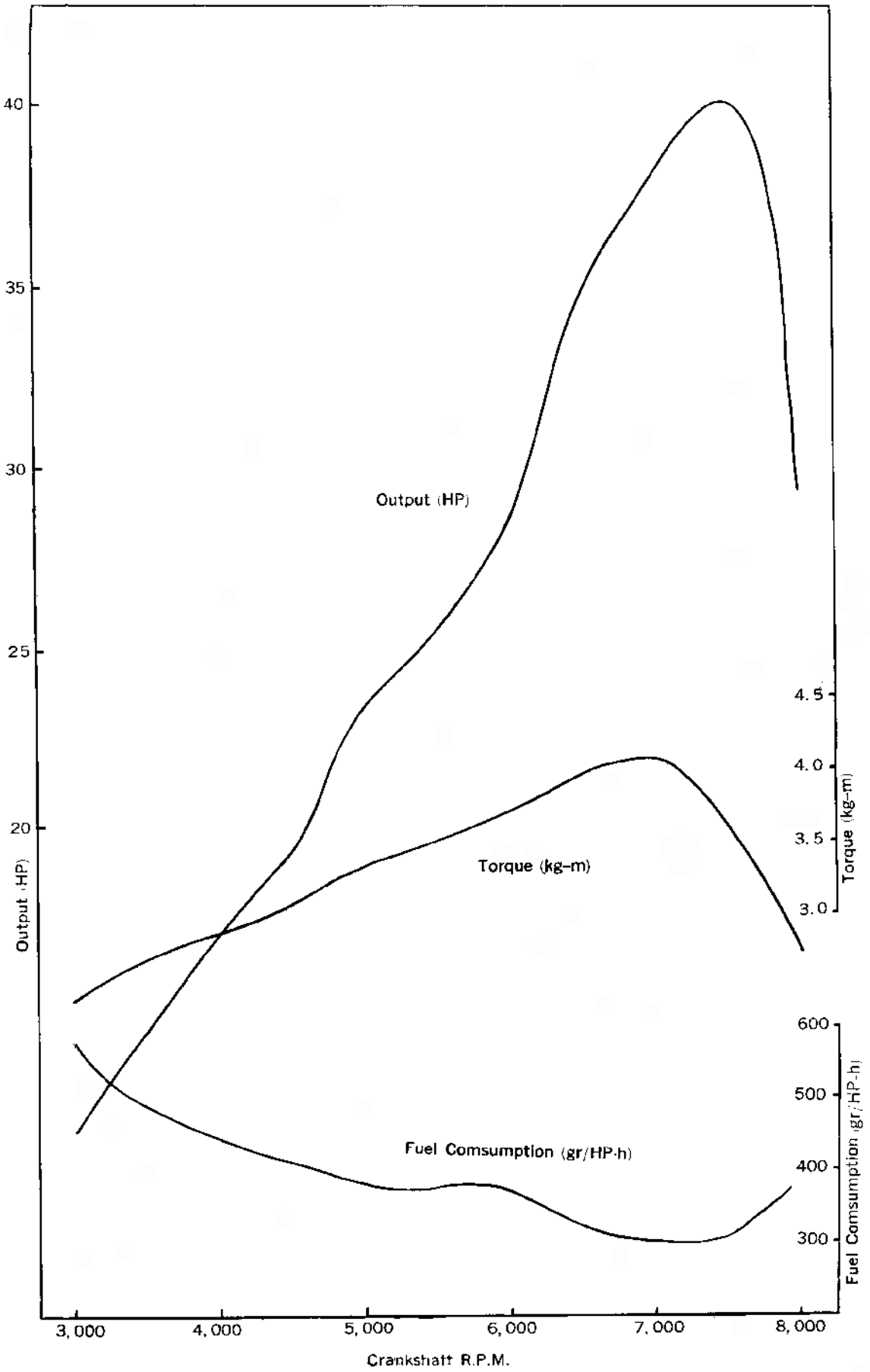
12V-3W
12V-3W
12V-6AH

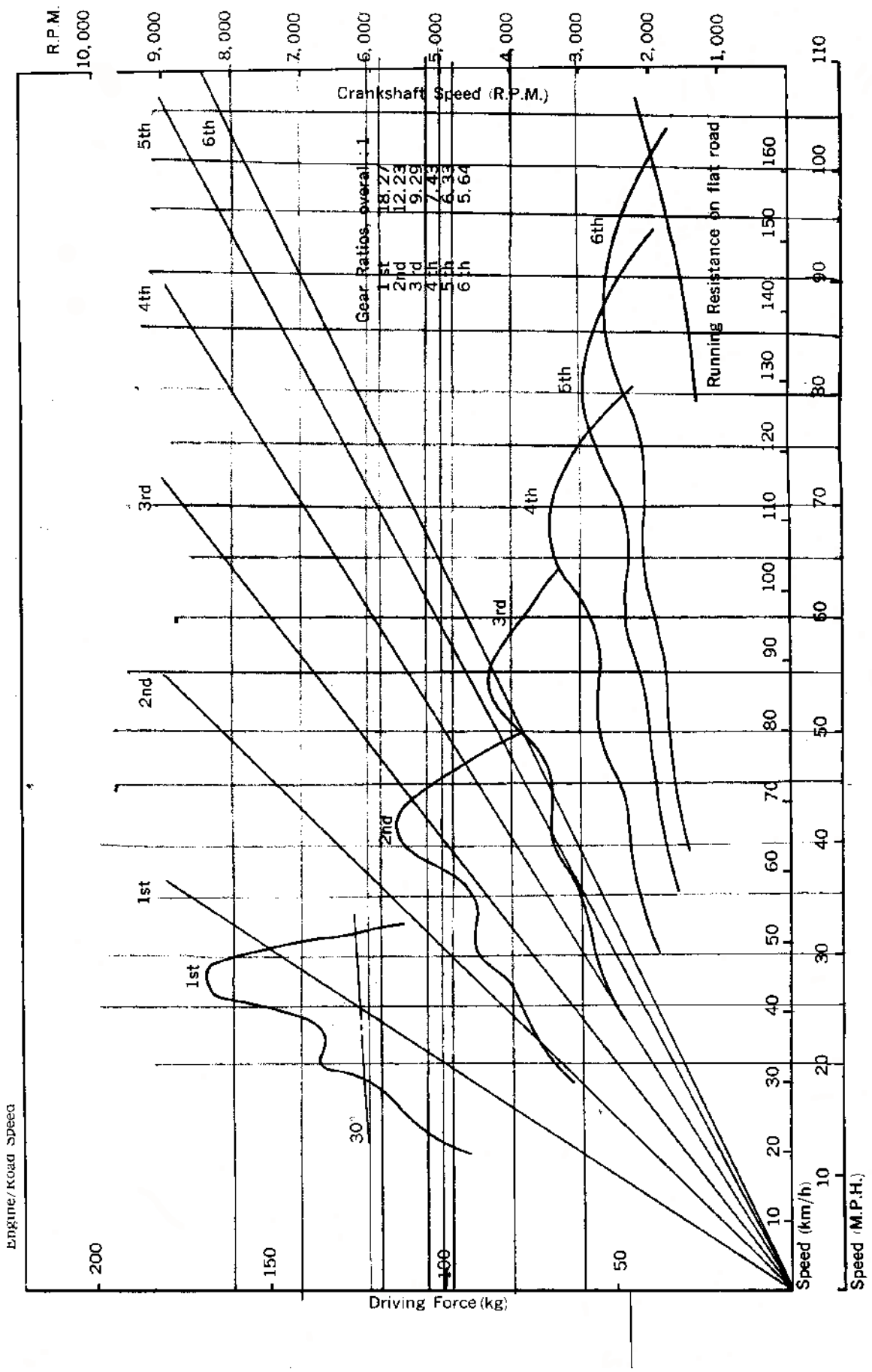
2. FRONT and SIDE VIEWS of BRIDGESTONE 350 GTR

Dimensions in millimeters (inches)



3. Performance




R.P.M.
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
Crankshaft Speed (R.P.M.)
Gear Ratios, overall
1st 18.27
2nd 12.23
3rd 9.29
4th 7.43
5th 6.33
6th 5.64
Running Resistance on flat road
Engine/Road Speed
200
150
100
50
Driving Force (kg)
Speed (km/h)
Speed (M.P.H.)
30°

4. ENGINE

4-1 Removing Engine

A. Notes of Caution:

1. Be careful not to damage the insulation of the various wires.
2. Be careful not to get oil on the clutch parts of the dry type racing clutch that is fitted to the 350 GTR.

B. Tools necessary for dismounting and mounting the engine:

1. Standard Tools:

1. Wrench 10 × 12mm
   14 × 17mm
   19 × 21mm
2. Screw driver ⊕ No. 3, No. 2
3. Screw driver ⊖
4. Side cutting plier
5. Combination plier
6. T Type wrenches: 10, 12, 14, 23mm

2. Special Tools: (Fig. 1)

1. Box wrench bar
2. 28mm nut wrench
3. 40mm ring nut wrench
4. Driven gear stopper
5. Clutch housing puller
6. Clutch housing stopper
7. Clutch hub stopper

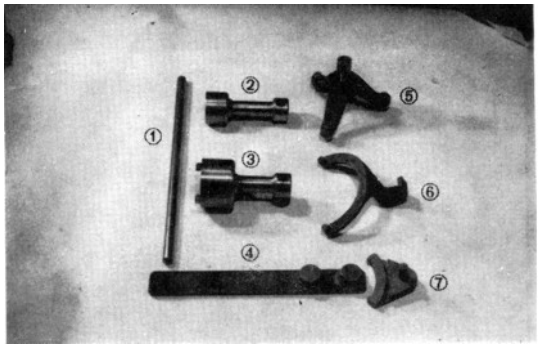


Fig. 1 Special Tools

C. Removing the Engine:

1. Remove left side cover and dual seat.

2. Disconnect mainswitch wires and A.C. Generator wires from the terminals. (Fig. 2)

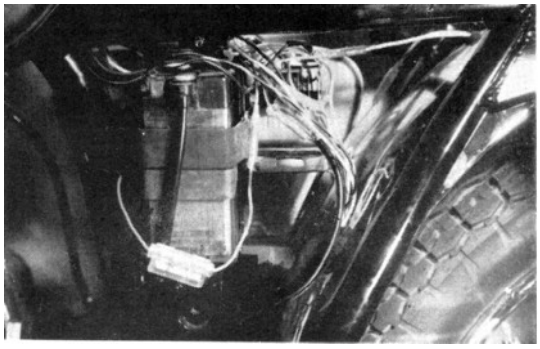


Fig. 2 Disconnecting wires

3. Remove both exhaust pipes by pulling out the four bolts. (Fig. 3)

4. Disconnect tachometer cable at the end of engine case, then remove high-tension terminal plug caps from spark plugs.

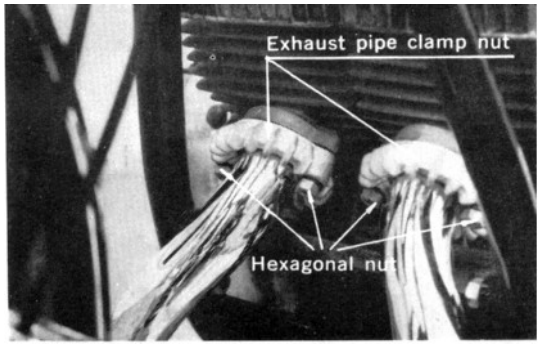


Fig. 3 Removing exhaust pipes

5. Disconnect oil tube C from union connector on oil tank and plug the connector as shown in Fig. 4. Take off the rubber cap of the tube valve on the tire and plug it to the union connector.

Fig. 4 Disconnecting oil tube C

6. Remove carburetor cover (R) by unscrewing the six screws (one 6 × 40, one 6 × 30, three 60 × 20, one 6 × 8) and take off rubber plug, then pull out carburetor. (Fig. 5)

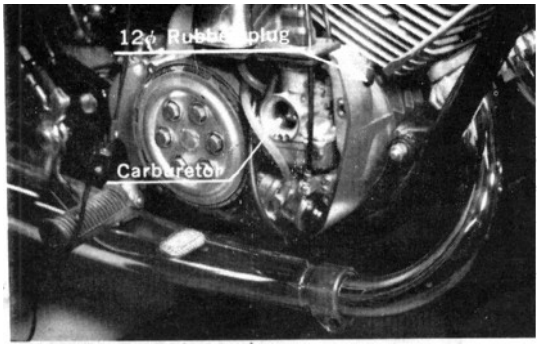


Fig. 5 Removing carburetor

7. Remove left carburetor following the same procedure as for the right carburetor. Remove change pedal and kick arm after taking off footrest (L).

9. Remove dust cover by unscrewing the three screws and remove the crankcase cover by removing the six screws (Fig. 6).

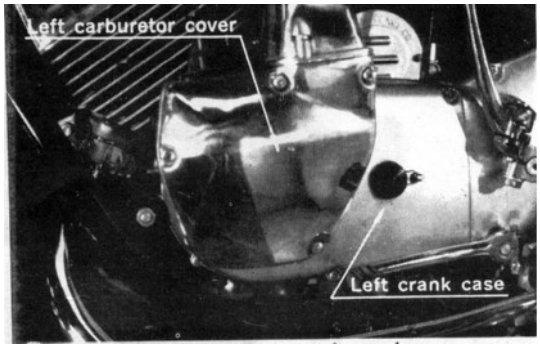


Fig. 6 Removing dust cover & crankcase cover

10. Disconnect chain and lift the front section of chain case by taking out the hexagonal bolt (6 × 48). (Fig. 7)

11. Take out four, engine mounting bolts: one 8 × 265, one 8 × 145, two 10 × 38 and then remove engine mounting bracket L. (Fig. 8)

12. Remove six screws (5 × 25) of air cleaner cover and lift engine from left side.

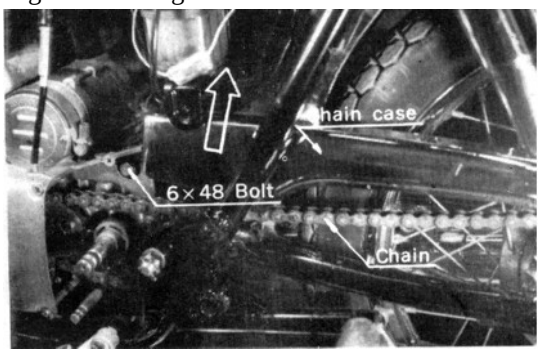


Fig. 7 Disconnecting chain

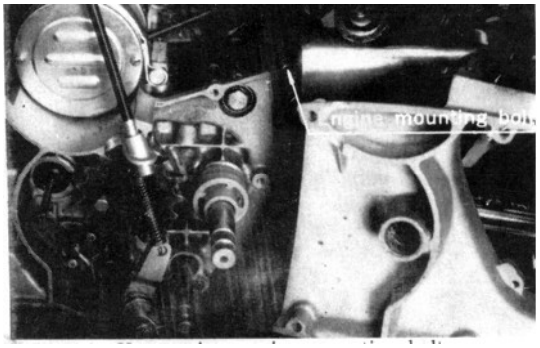


Fig. 8 Unscrewing engine mounting bolts

4-2 Mounting Engine on Frame

The engine should be installed in the reverse order of its removal.

★ Be careful of the following points:

1. Fit two (10 × 38) engine mounting bolts temporarily. (Fig. 9)

2. See that the wires work correctly and especially match the marks on the throttle valve and the projecting end of the control lever of the oil pump. (Fig. 10, 11)

3. Connect electric wires securely.

4. The chain connector should be linked with the open end pointing in the reverse direction of the moving chain. (Fig. 12) Chain adjustment is correct when chain slack is approximately 10mm (3/8") up or down when the rear wheel is on the ground.

5. See that the transmission is filled with the proper amount of oil (1.5 litre=2/5 US gal.) and check the oil level through the peep hole only when the oil has settled in the transmission case. (Fig. 13)

6. After starting the engine, exhaust air bubbles in the oil tubes A, B and C by manually opening the control lever of the oil pump with the engine at idling speed. (Fig. 14)

7. Fit carburetor cover (R) after checking the oil pump.

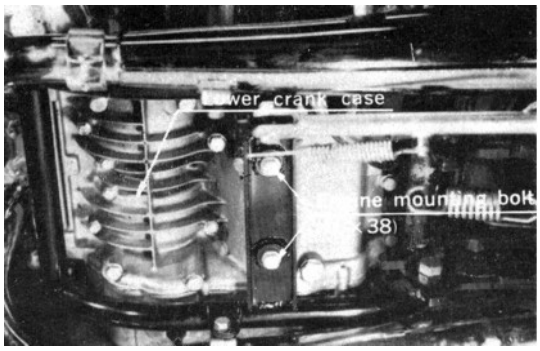


Fig. 9 Fitting engine mounting bolts

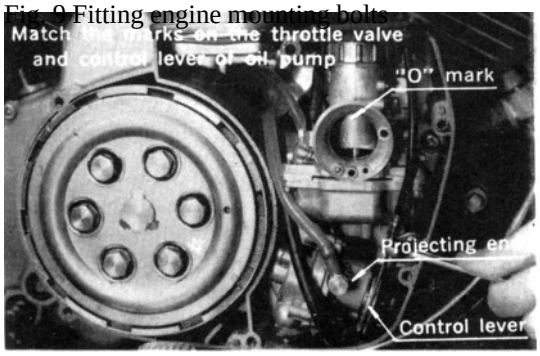


Fig. 10 Adjusting throttle valve

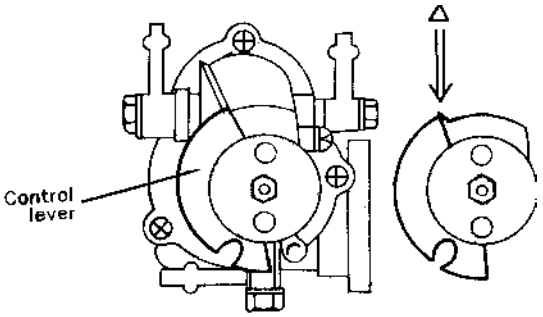


Fig. 11 Adjusting oil pump

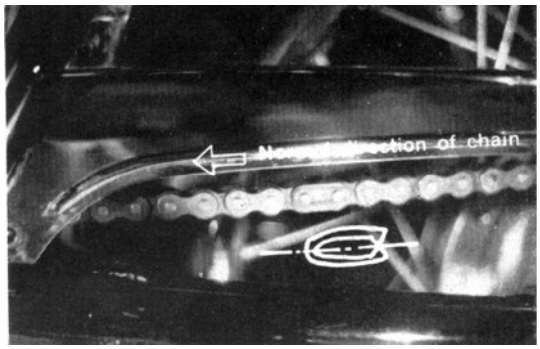


Fig. 13 Checking oil level

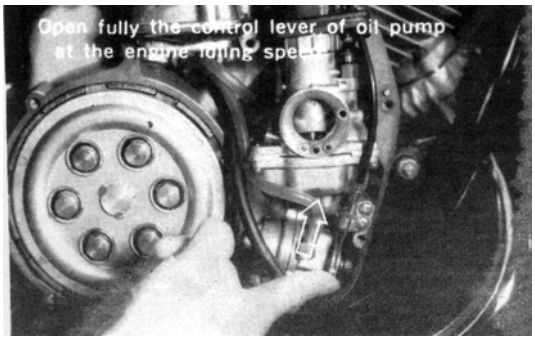


Fig. 14 Exhausting oil bubbles

4-3 Disassembling and Assembling Engine :

A. Special precautions.

1. When removing or installing the engine, use a wooden or plastic hammer and tap it lightly and uniformly so as not to strain any parts.

2. 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 are not mislaid or confused when assembling.

3. The parts should be carefully cleaned except the clutch parts.

★ This machine is equipped with dry racing type clutch which must be kept free from oil to ensure efficient action.

4. Bolt tightness of the clutch set bolt is 70 – 90kg/cm. (61 – 78 lbs-in)

B. Dismounting Engine

1. Disconnect oil tubes from the connector instead of disconnecting them from the check valves, to avoid air leakage. (Fig. 15)

2. Pull out oil pump assembly by removing the two pump screws, (Fig. 16)

3. Remove clutch springs and clutch facings and all related parts by pulling out diagonally and evenly the six hexagonal bolts of the clutch set plate. (Fig. 16)

4. Remove clutch hub nut (23mm) with clutch hub stopper (special tool). (Fig. 17)

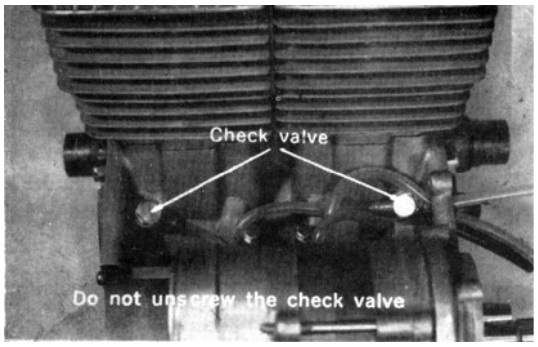
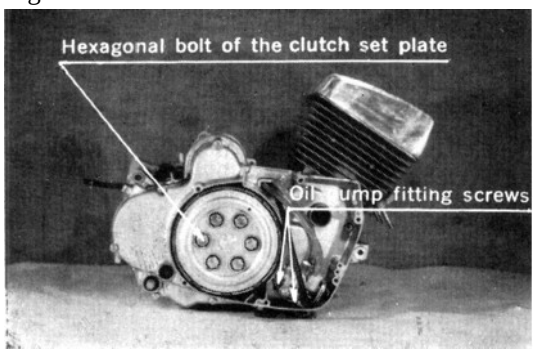


Fig. 15 Position of check valves



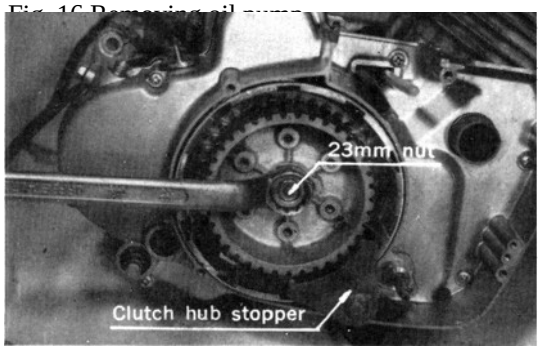


Fig. 17 Removing clutch hub

5. Remove ring nut with the clutch-housing stopper and the ring nut wrench (special tools) and then remove clutch housing. (Fig.18,19)

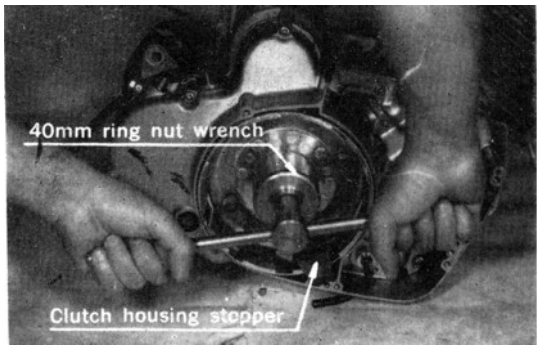


Fig. 18 Removing ring nut

6. Remove right crank case cover by unscrewing nine screws of right crank case cover.

7. Remove the left-hand threaded pinion gear nut with the driven gear stopper and 28mm nut wrench (special tool) and then remove the pinion gear. (Fig. 21) Then, remove timing gear fitting bolt, timing gear, driven gear and kick idler gear.

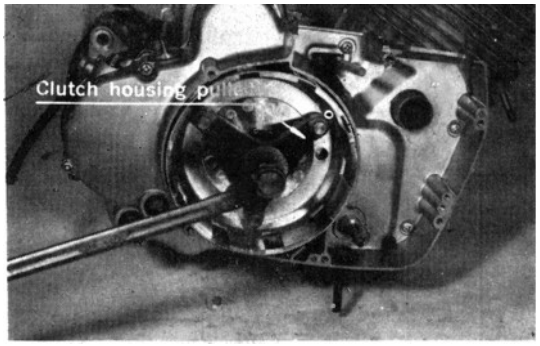


Fig. 19 Removing clutch housing

8. Remove over-run stopper plate by unscrewing the screw (shown by the arrow A in Fig. 22). (Fig. 22)
To do this, shift into any gear by installing the change pedal. Then pull out the change shaft.

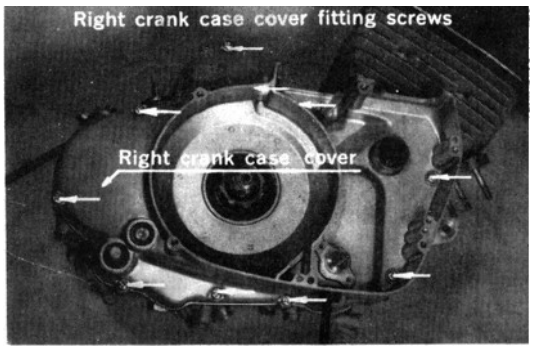


Fig. 20 Removing right crankcase cover

9. Remove guide plate and ratchet comp, by unscrewing the two (6 × 12) screws (shown by the arrow B) of the ratchet guide plate. (Fig. 22)

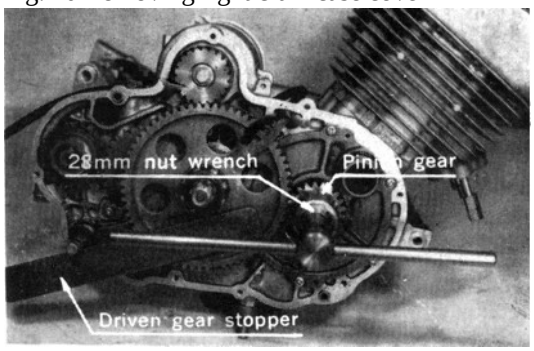


Fig. 21 Removing pinion gear (left-hand thread)

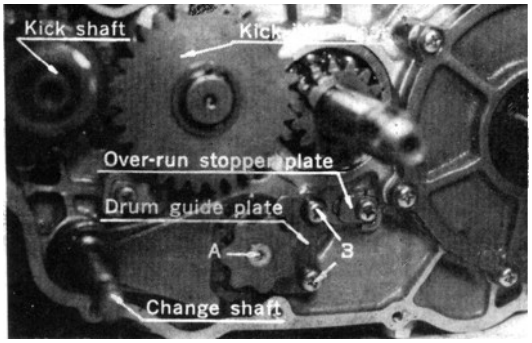


Fig. 22 Removing overrun stopper & guide plate

10. Remove rotary valve cover by unscrewing the six (6 × 16) screws. (Fig. 23)

11. Remove rotary valve cover, drive sprocket and neutral switch from the left side of engine. (Fig. 24)

12. Take off eight cylinder head nuts and remove cylinder heads, gaskets and cylinders.

13. Remove piston-pin circlips and then piston pins, pistons and needle hearings. (Fig. 25)

14. Remove screw (5 × 30) of AC Dynamo and hexagonal nut of set band. Then, remove AC generator by pulling it out in direction A. (Fig. 26)

15. Remove rotary disc valves.

16. Remove four hexagonal bolts, one 8 × 80, one 8 × 90, and two 6 × 65 of upper crankcase. (Fig. 27)

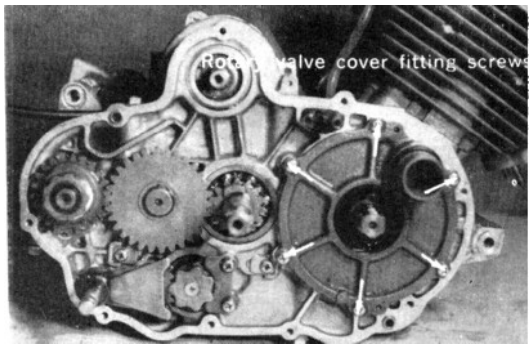


Fig. 23 Removing rotary valve cover

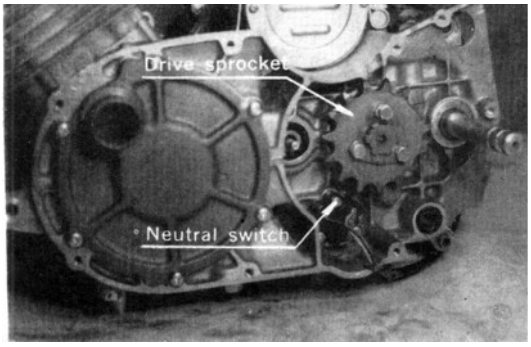


Fig. 24 Removing drive sprocket & neutral sw.

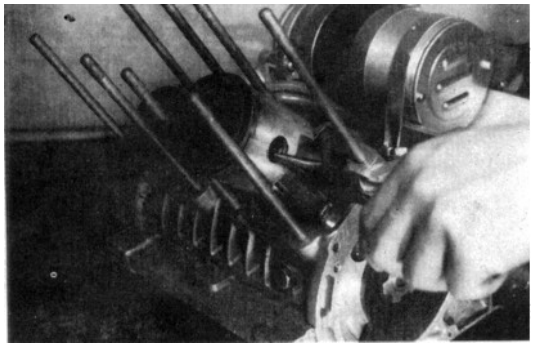


Fig. 25 Removing piston pin circlips

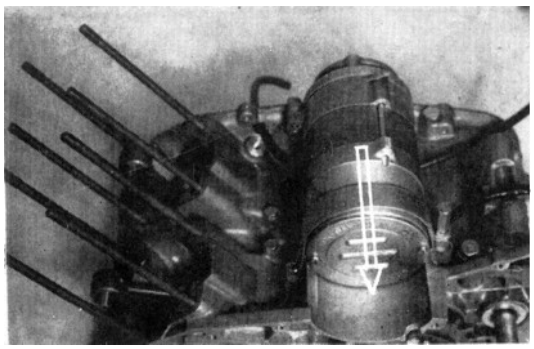


Fig. 26 Removing AC generator

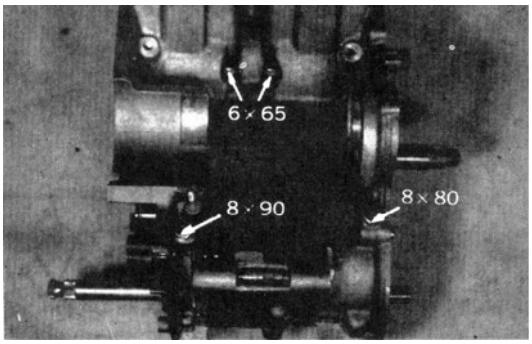


Fig. 27 Removing bolts of upper crankcase

17. Remove thirteen hexagonal bolts,one 8 × ll4, three 8 × 90, two 8 × 62, five 6 × 62, one 8 × 100 and one 6 × 90 of lower crankcase. (Fig. 28)

18. Remove upper crank case cover. Fig. 29 shows the gear box after taking off the upper cover.

19. Remove crankshaft comp, counter shaft, drive shaft and kickshaft from lower case. Shift drum and forks need not be removed from the case.

The previous 19 steps are generally all that will be necessary for most repairs. If it is necessary to remove the shift drum or forks, proceed as follows:

a) To remove shift drum, take off guide bolt, drum stopper, and guide stopper plate. Then pull out two guide pins in the direction of right crank case cover. (Fig. 30, 31, 32)

b) Take off split pin of fork guide, remove fork guide pins and the shift drum.

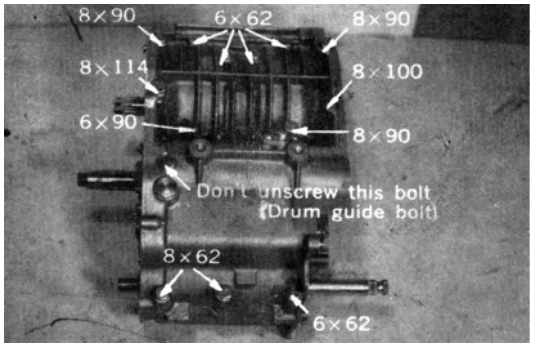


Fig. 28 Removing bolts of lower crankcase

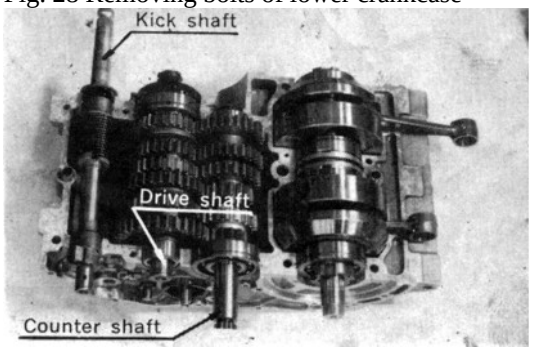


Fig. 29 Gear box

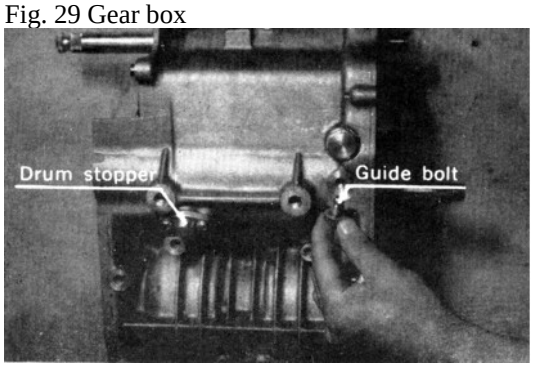


Fig. 30 Removing guide bolt and drum stopper

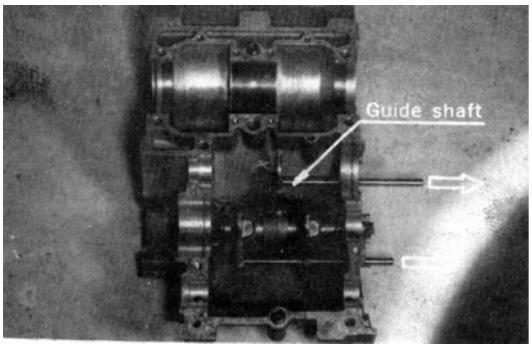


Fig. 32 Removing guide shafts

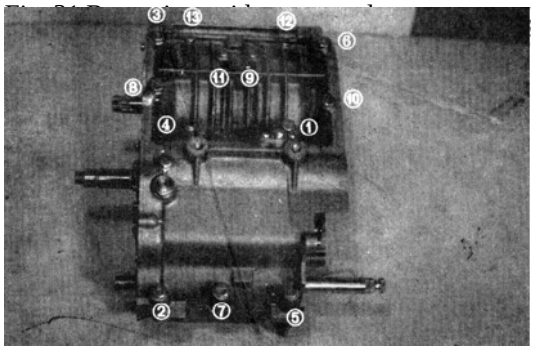
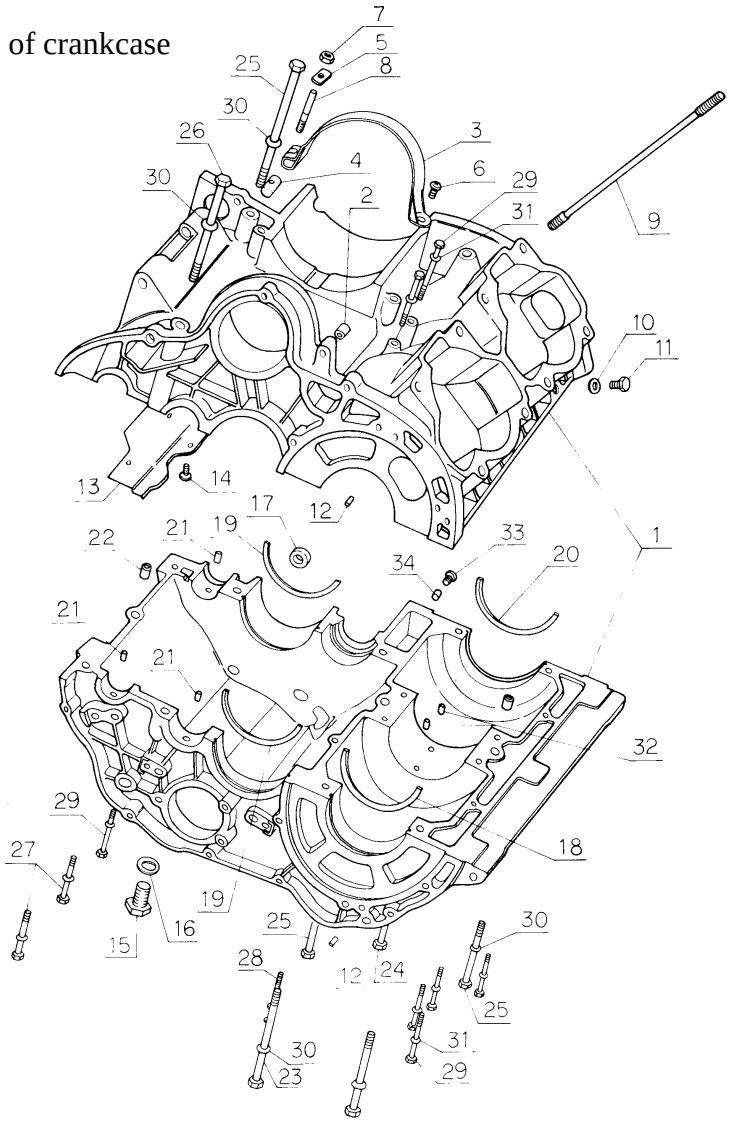


Fig. 33 Crankcase fitting

C. Component parts of crankcase

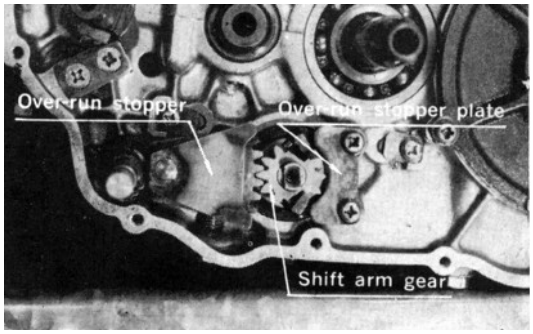


Index No.	Part No.	Part Name	No. Req'd
1	2101-9000	Crank case assembly	1
2	2116-9000	Dynamo spacer	1
3	2117-9000	Dynamo set band	1
4	2118-8000	Dynamo set pin	1
5	2149-8000	Set band washer	1
6	0311-0610	Cross recd pan head screw	1
7	09021-104	6 hexagon nut	1
8	09016-101	6 × 40 Stud	1
9	09016-114	8 × 156 Stud	8
10	09064-103	8 fiber gasket	1
11	0111-0812	Hexagon bolt A	1
12	09056-102	4 × 8 A dowel	1
13	2128-9000	Oil baffle plate	1
14	0311-0510	Cross recd pan head screw	3
15	09058-103	16 drain plug	1
16	09065-102	16 aluminum gasket	1
17	09090-101	12 oil seal	1
18	2122-9000	Bearing retainer A	1
19	2123-9000	Bearing retainer B	2
20	2125-9000	Bearing retainer C	1
21	09056-105	6 × 10 A dowel	3
22	09057-102	8 × 12 × 14 B dowel	2
23	09511-113	8×114 hexagon bolt	1
24	09011-102	8×100 hexagon bolt	1
25	0113-0890	Hexagon bolt A	4
26	0113-0880	Hexagon bolt A	1
27	0113-0862	Hexagon bolt A	2
28	09011-106	6×70 hexagon bolt	1
29	0113-0662	Hexagon bolt A	7
30	0411-0818	Plane washer A	9
31	0411-0613	Plane washer A	8
32	09056-111	5 × 10 A dowel	2
33	2137-9000	8 rubber plug	1
34	2139-9000	8 plug	2

D. Assembling Engine

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

1. Be careful to set gears and thrust washers correctly.
2. Be careful to insert knock pin and knock ring of bearings correctly.
3. Grease shafts and gears with heavy oil.
4. Caution: Be sure both crankcase halves are cleaned properly and no old sealer is left on the mating surfaces. Apply liquid sealer evenly and generously to the mating surfaces of both crankcase halves. We recommend a Goodyear product "Pliobond."
5. Hexagonal bolts of the cases should be fitted according to Fig. 33.
6. Set the over-run stopper as shown in Fig. 34, 35.
7. To fit kick shaft stopper, assemble upper and lower crank case covers first and fit kick pedal temporarily to the kick shaft by cranking the engine. (Fig. 36-1, 2, 3)



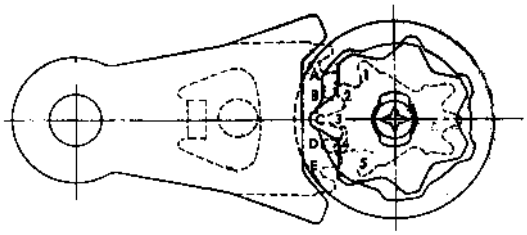


Fig. 35 Setting over-run stopper

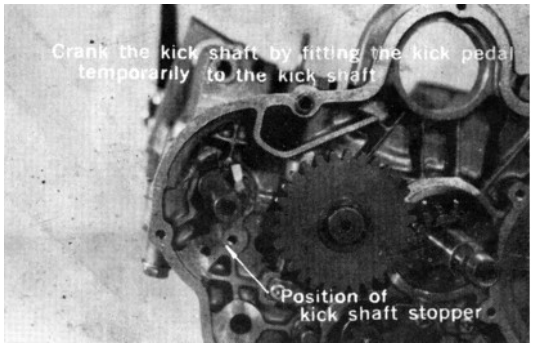


Fig. 36-1 Fitting kick shaft stopper (1)

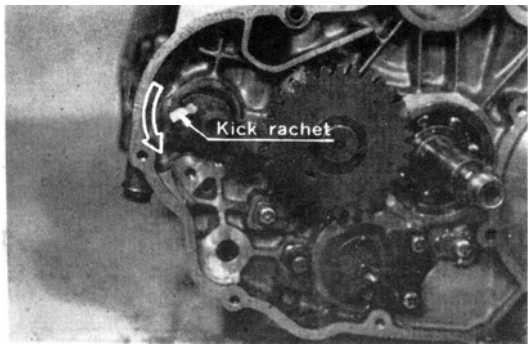


Fig. 36-2 Fitting kick shaft stopper (2)

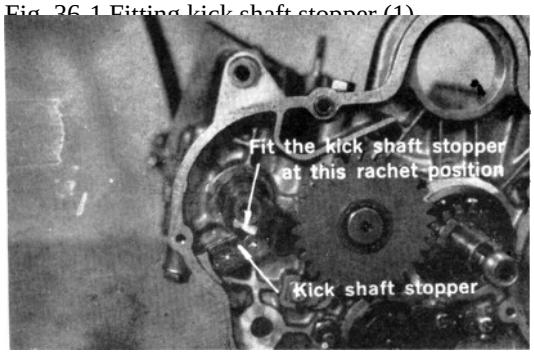


Fig. 36-3 Fitting kick shaft stopper (3)

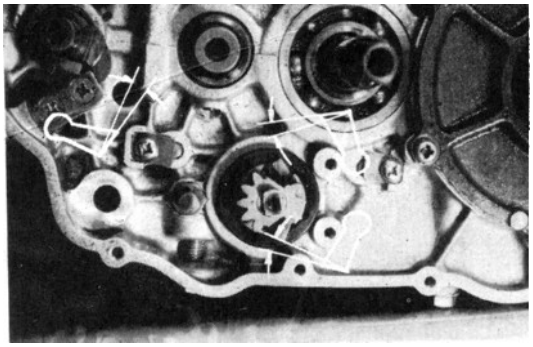


Fig. 37 Fitting kick ratchet & change ratchets

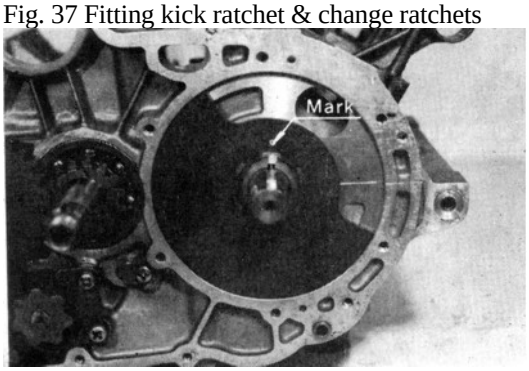


Fig. 38 Fitting rotary valve

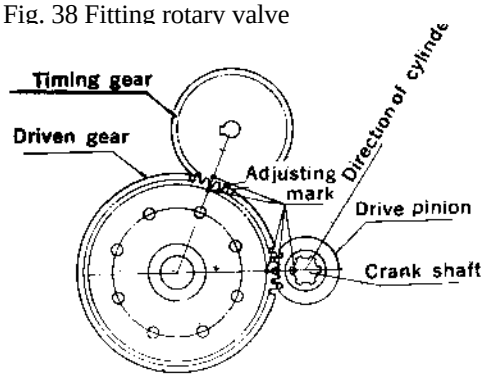


Fig. 39 Setting the timing marks

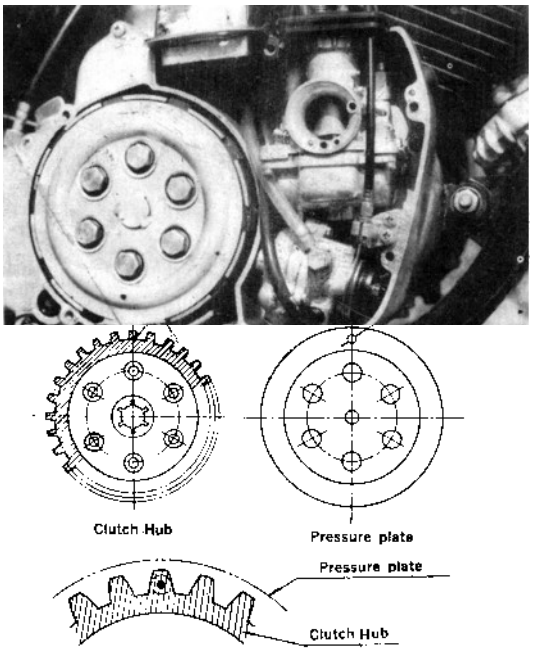


Fig. 40 Matching the 4mm ⌀ hole

8. Fit kick ratchet and change ratchets as shown in Fig. 37.
   Set the gears in neutral when fitting the ratchets.

9. Match the key position of rotary valve collar with the mark on the rotary valve. (Fig. 38)

10. Set the timing marks on the timing gear, driven gear and pinion gear as shown in Fig. 39.

11. Be careful in assembling clutch inner plates and clutch outer plate as they are of different thicknesses. The outer plate (3mm thick) should be installed first.

	Effective Serial No. Up to 21 S 01021		After Serial No. 21 S 01022	
	thickness	Q'ty	thickness	Q'ty
Inner plate :	1.6 mm	6	1.6 mm	7
Outer plate :	3.0 mm	1	–	none

12. Grease the top of the push rod when assembling.

13. Match the mark on the clutch hub with the 4mm hole on the pressure plate when assembling clutch pressure plate. (Fig. 40)

14. Mesh the oil pump gear with pinion gear by turning the worm shaft outside of right crankcase. (Fig. 41)
    No timing is necessary.

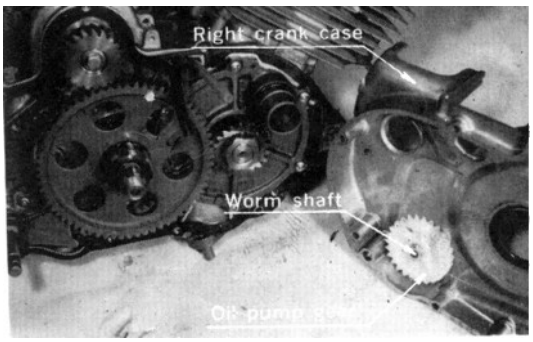


Fig. 41 Meshing oil pump gear

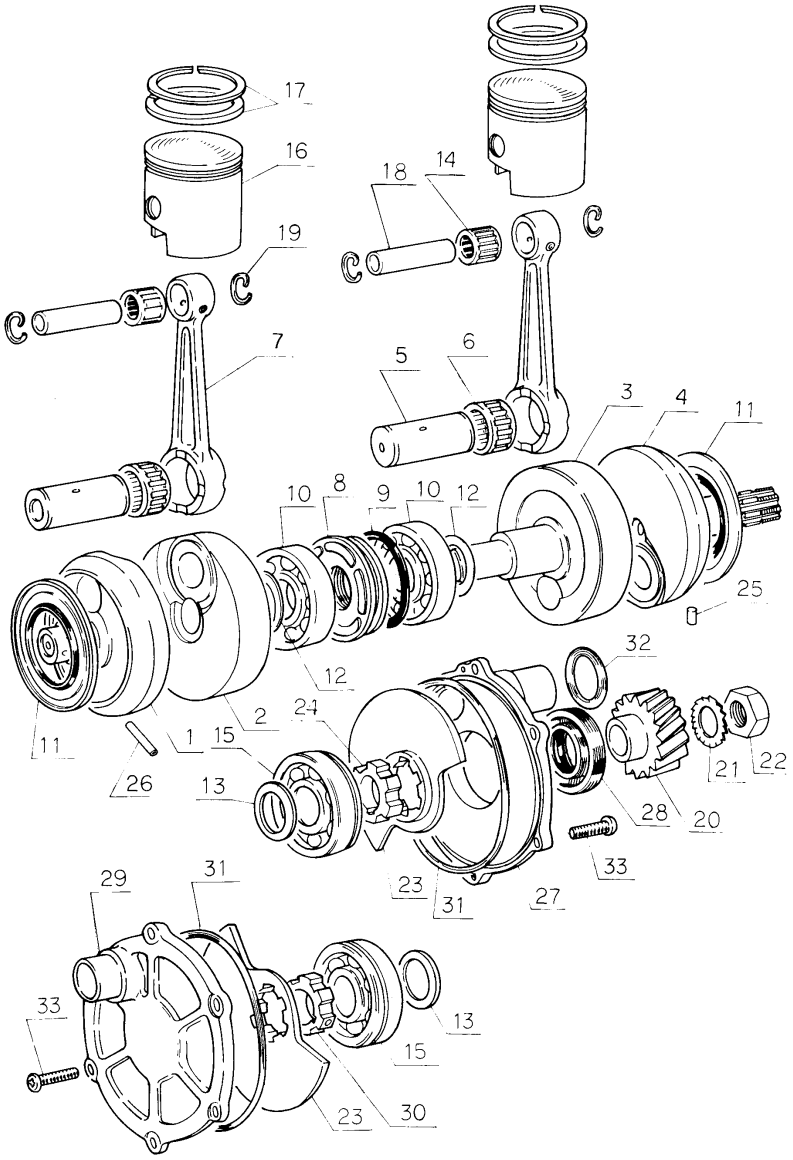
15. Be careful when fitting the oil tubes

	Color	Length	Remarks
Oil tube A	Transparent	340 mm (13.4 inches)	Left check valve
Oil tube B	Transparent	370 mm (14.6 inches)	Right check valve
Oil tube C	Black	530 mm (20.9 inches)	Oil tank

16. Adjust contact breaker point gap and ignition timing.

Contact breaker gap	0.3 – 0.4 mm (0. 012 – 0.016 inches)
Ignition timing	25°+1-2

Ignition timing should be checked carefully. (Refer to page 57)



CRANK SHAFT • PISTON • ROTARY VALVE

Index No.	Part No.	Part Name	No. Req'd
	1301-9000	Crank shaft complete	1
5	1321-9000	Crank pin	2
6	1325-9000	Needle bearing	2
7	1331-9000	Connecting rod	2
8	1337-9000	Labyrinth packing	1
9	09066-120	59 O ring	1
10	09075-104	Ball bearing	2
11	09090-117	57 Oil seal	2
12	09049-108	30 × 0.3 Shim	2
13	09049-109	25 × 0.3 Shim	2
14	1333-9000	Needle bearing	2
15	09075-106	Ball bearing	2
16	1341-9000	Piston	2
17	1305-9000	Piston ring set	2
18	1381-9000	Piston pin	2
19	1382-9000	Piston pin circlip	4
20	1385-9000	Drive pinion	1
21	09045-103	20 external toothed	1
22	09029-104	20 left thread nut	1
23	1412-9000	Rotary valve	2
24	1413-9000	Valve guide	1
25	09056-102	4 × 8 A dowel	1
26	09059-101	4 × 18 spring pin	1
27	1430-9000	Valve cover complete	1
28	09090-118	32 Oil seal	1
29	1441-9000	Left valve cover	1
30	1423-9000	Left valve guide	1
31	09066-121	125 O ring	2
32	09066-122	33 O ring	1
33	0311-0616	Cross recd pan head	12

5-1. CRANKSHAFT AND ROTARY DISC VALVES

A. Construction

Dual cylinders, dual carburetors and dual rotary disc valves are incorporated in the Bridgestone 350 GTR engine.
Rotary disc valves are spline fitted at each end of the crankshaft of this parallel twin. (Fig. 42)

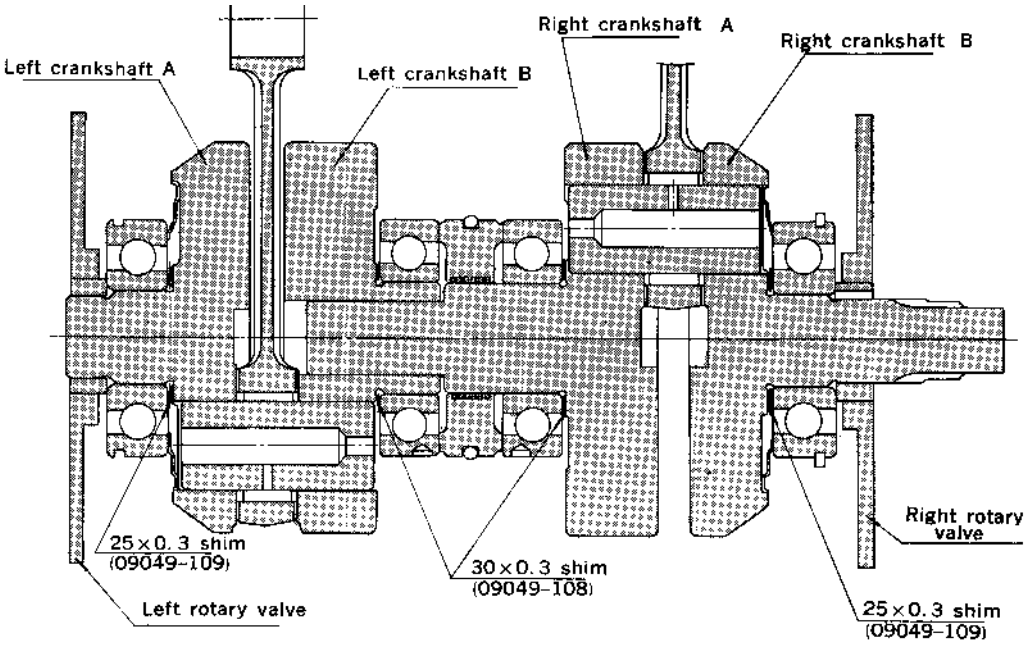


Fig. 42 Construction

B. Inspection

1. Measure crankshaft play with a dial gauge for tolerance and fit. (Fig. 43)
2. Inspect the crankshaft for wear and excess play where bearings are fitted.
   If abnormal noise is produced or there is excessive play, replace the crankshaft.
3. If the connecting rod big end bearing is worn or damaged, replace the crankshaft assembly.
4. If a disc valve is damaged, replace it.
5. If an O ring is damaged or worn, replace it.

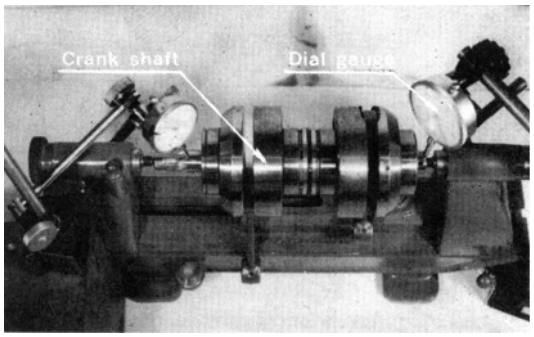


Fig. 43 Measuring crankshaft play

C. Lubrication of the crankshaft

Crankshaft bearings are lubricated automatically and correctly with oil fed from the oil pump through oil tubes B and C and the union bolt.

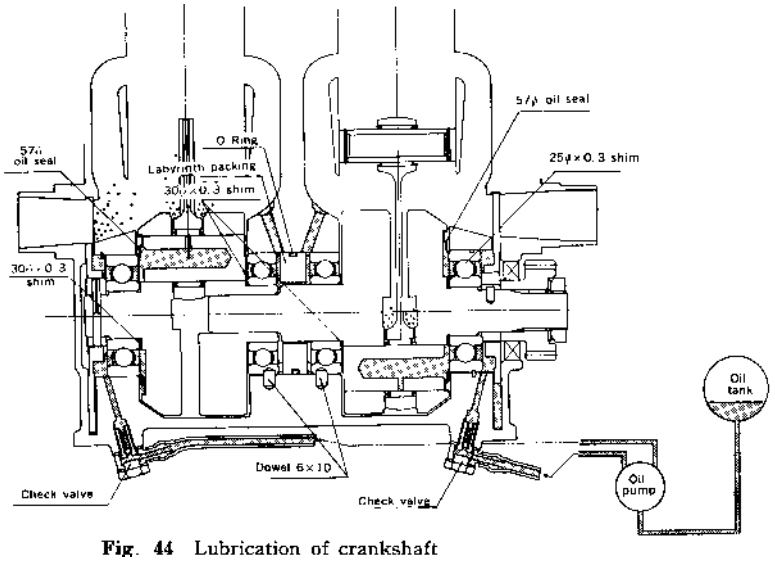


Fig. 44 Lubrication of crankshaft

The oil, which lubricates bearings, is sprayed to crank chamber after lubricating the big end of the connecting rod or passing in back of the rotary disc valves.

The oil sprayed from the crank shaft lubricates the cylinder walls, the small end of the crankshaft and the ball bearings of the crankshaft. (Fig. 44)

D. Lubrication of transmission gears

Oil stored in the gear box lubricates gears as shown.

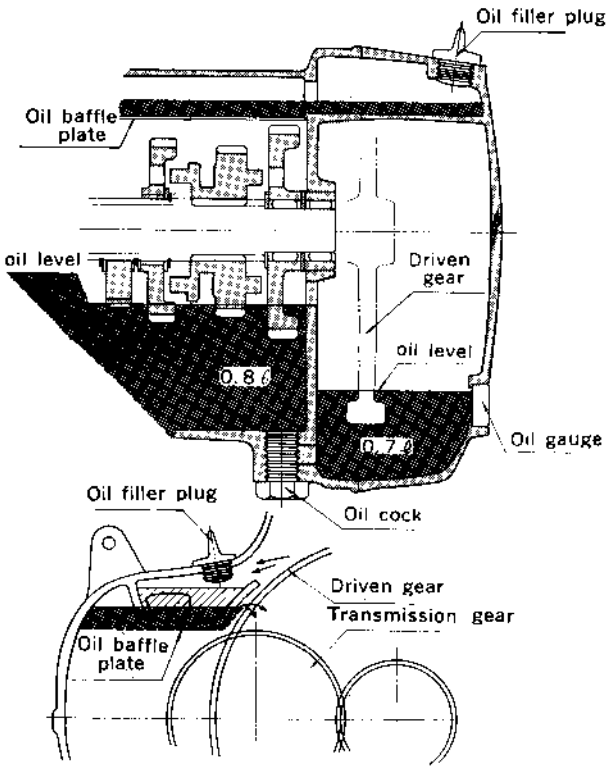


Fig. 45 Lubrication of transmission gears

Caution:

1. When refilling with new transmission oil, take off oil cock and fill with 1.5 litre (3/5 U.S. gal.) SAE No. 20W/40 in all seasons or SAE No. 20 in winter.

2. Check the oil level through the peephole only when the oil has settled in the transmission case.

3. Change the oil periodically as follows.

1st oiling	after break-in
2nd oiling	every 2,000 miles

5-2. CYLINDERS AND PISTONS

A. Construction

The cylinders of the Bridgestone 350 GTR are made of aluminum alloy. Cylinder walls are honed after hard chromium plating and then porous treated. Therefore, this engine has excellent cooling efficiency, and since the heat expansion coefficients of the cylinder and piston are the same, the piston/cylinder clearance can be kept to a minimum and the engine operates quietly. Moreover, the aluminum alloy cylinders reduce the weight of the engine.

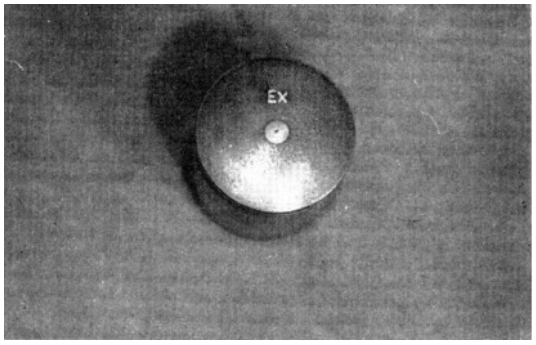


Fig. 46 Piston identification mark

B. Notes of Caution

1. Do not use chromium plated piston rings.
   Always use the ferox treated piston rings. (Cast iron)

2. Keep the air cleaner element clean.

3. Be careful to set the piston identification mark "EX" forward. (Fig. 46)

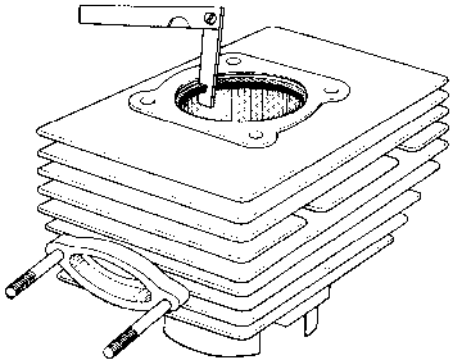


Fig. 47 Measuring piston ring gaps

C. Inspection

1. Measure piston ring gaps as shown in Fig. 47.
   Replace rings with new ones when gaps exceed 1mm (0.04 inches).

2. Check cylinder head gasket for damage. Replace with a new one if necessary.

3. Remove carbon deposit on cylinder ports and cylinder head with cleaning solvent or gasoline.

4. Replace the cylinder base packing with a new one.

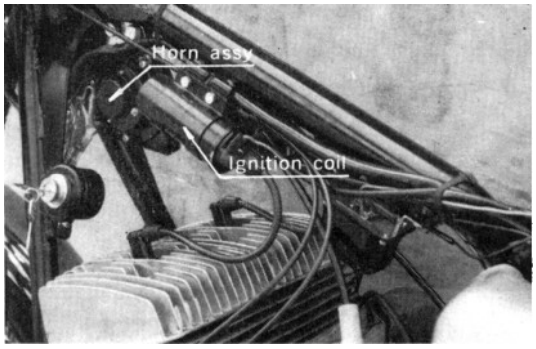


Fig. 48 Removing cylinder and piston

D. Disassembling

1. The cylinders and pistons can be removed without removing the engine from the frame by removing the dual seat, fuel tank, horn and ignition coil. (Fig. 48)

2. Before removing pistons, remove the cylinders and cover the crankcase with a cloth to prevent the piston circlips from entering the crankcase. (Fig. 49)

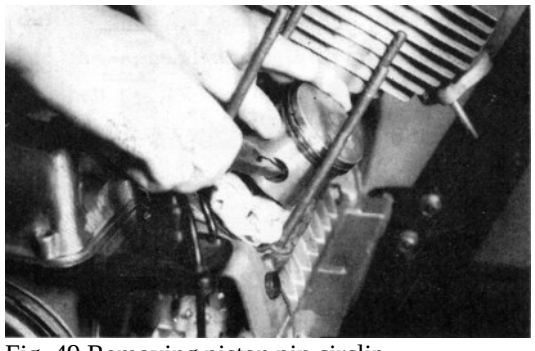
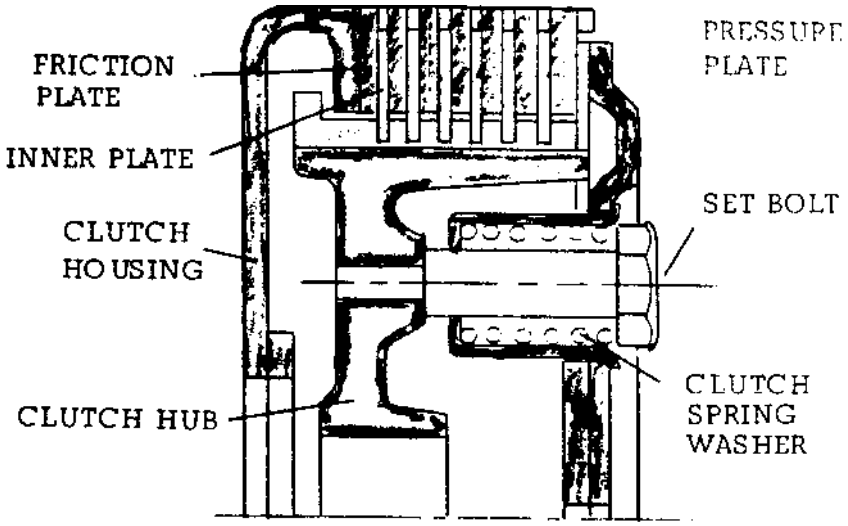


Fig. 49 Removing piston pin circlip

PARTS LISTS AND SECTIONAL VIEWS OF THE 3 TYPES OF MODIFIED CLUTCHES ARE SHOWN BELOW.

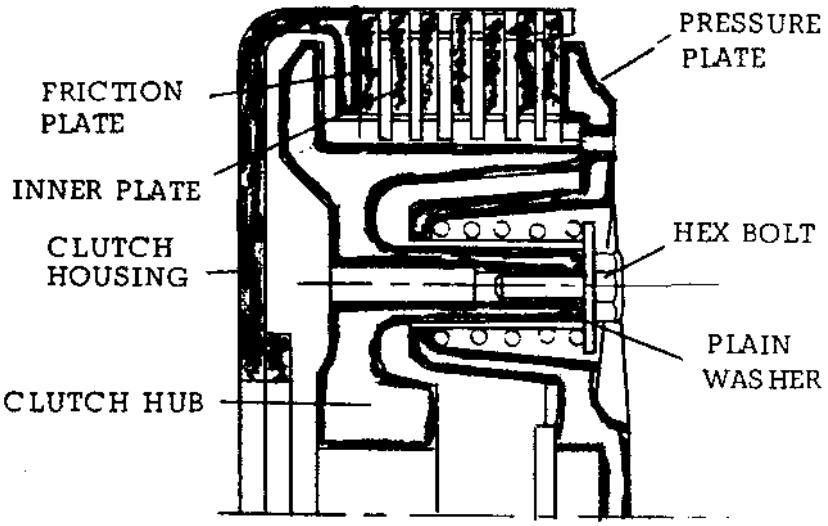
FIELD MODIFICATION #l - USING SPECIAL OUTER PLATE (2216-9010)
(BEFORE SERIAL NO. 21S01022)

PART NO.	NAME	QTY
2211-9000	Pressure Plate	1
2213-9000	Spring Washer	6
2214-9000	Friction Plate	7
2215-9000	Inner Plate	6
2216-9000	Outer Plate	Not Used
2218-9000	Clutch Spring	6
2219-9000	Set Bolt	6
2221-9000	Clutch Hub	1
2216-9010	Special Outer Plate	1
2195-9010	Grommet	1



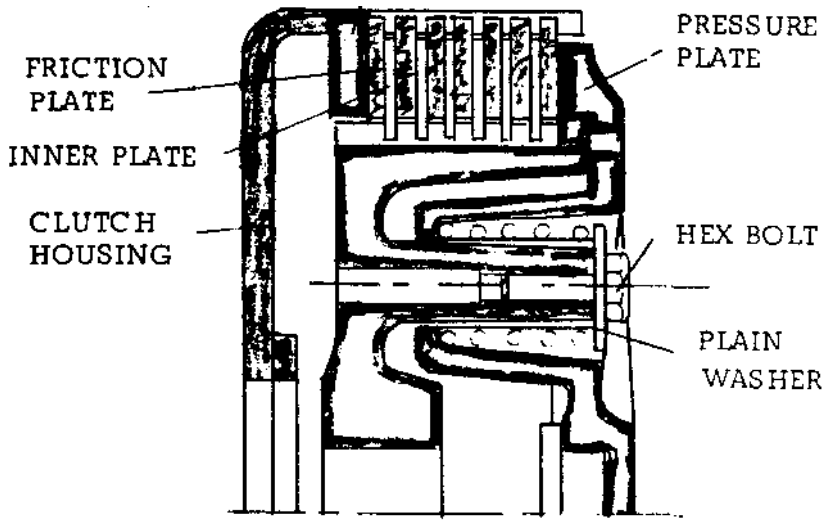
FIELD MODIFICATION #2 - USING
SPECIAL OUTER PLATE (2216-9010)
(AFTER SERIAL NO. 21S01022)

PART NO.	NAME	QTY
2211-9001	Pressure Plate	1
2214-9000	Friction Plate	7
2215-9000	Inner Plate	6
2218-9001	Clutch Spring	6
0113-0616	Hex Bolt	6
2221-9001	Clutch Hub	1
09040-112	Plain Washer	6
2216-9010	Special Outer Plate	1
2195-9010	Grommet	1



FACTORY MODIFICATION USING SPECIAL
OUTER PLATE (2216-9001)
(AFTER SERIAL NO. 21V04022)

PART NO.	NAME	QTY
2211-9001	Pressure Plate	1
2214-9000	Friction Plate	7
2215-9000	Inner Plate	6
2218-9001	Clutch Spring	6
2218-9002	Hex Bolt	6
2221-9002	Clutch Hub	1
09040-112	Plain Washer	6
2216-9001	Special Outer Plate	1
2195-9010	Grommet	1



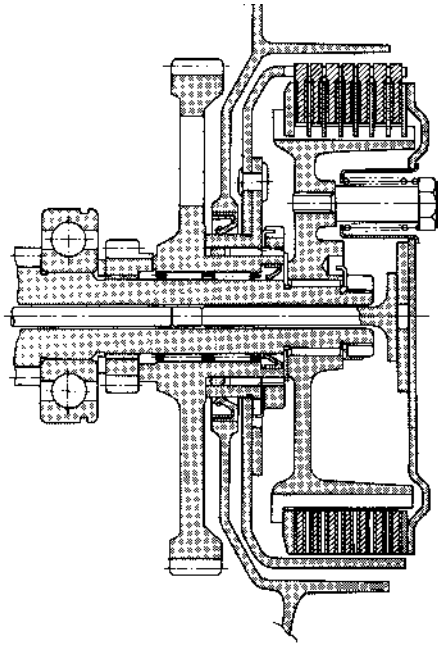


Fig. 50 General view of clutch

6. CLUTCH

A. Construction

The 350 GTR has racing type dry discs instead of conventional wet discs to ensure quick and powerful action for better performance by eliminating resistance of oil film.

B. Operation

1. Transmitting Engine Power

Engine power is transmitted through the drive pinion on the crankshaft and the driven gear. The driven gear is fitted to the clutch housing and clutch friction plates are fitted inside the clutch housing with teeth so that they turn together with the clutch housing and driven gear.
Clutch friction plates and inner plates are fitted alternately with the inner plates fitted to the clutch hub with teeth.
The clutch hub, friction plates and inner plates all fit inside the clutch housing and are pressed together tightly by the clutch springs. The clutch hub is spline fitted to the transmission countershaft, which turns the transmission gears.

	Effective Serial No. 21 S 01021	After No. 21 S 01022
Clutch Friction Plate	7	7
Inner Plate	6	7
Outer Plate	l	none
Clutch Spring	6	6
Spring tension	100kg (220 lbs.)	100kg (220 lbs.)

2. Clutch Disengaged
When the clutch lever is pulled, the clutch wire turns the clutch release arm so that the adjusting screw pushes the dowel (6×10), rod (6×236), and push rod and presses against the clutch pressure plate.
The clutch springs are then compressed so that they do not hold the clutch friction plates against the inner plates. As the friction plates and inner plates separate, the inner plates cease to turn so that engine power is cut off from the clutch hub and transmission countershaft.

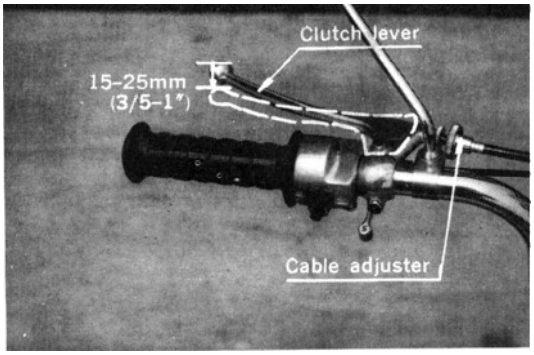


Fig. 51 Clutch cable adjuster

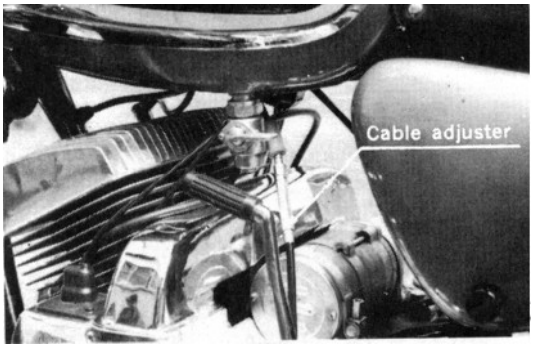


Fig. 52 Clutch cable adjust screw

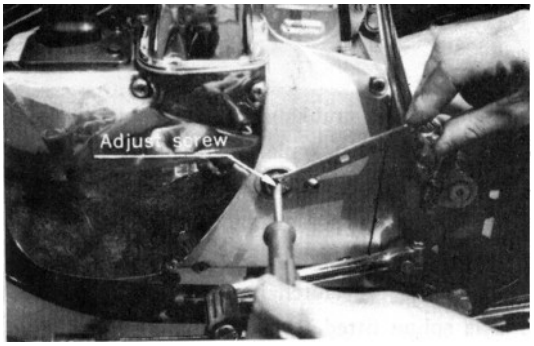


Fig. 53 Clutch adjustment screw

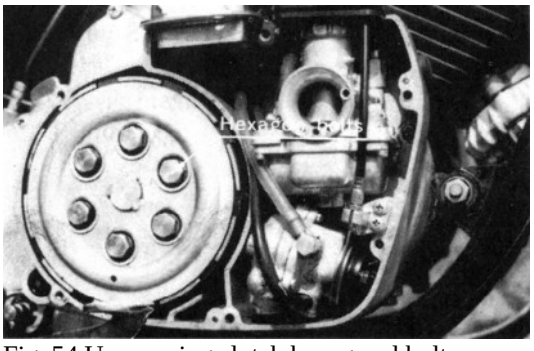


Fig. 54 Unscrewing clutch hexagonal bolts

C. Clutch Adjustment

1. Adjustment is easily carried out with the cable adjuster and cable adjust screw. (Fig. 51, 52)

2. When satisfactory adjustment cannot be made in this way; remove rubber cap from left crankcase cover, loosen locknut, and adjust by holding 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. 53)

D. Disassembling Clutch

1. Remove carburetor cover by unscrewing the six screws in the right carburetor cover, one 60×40, one 60×30, three 6×20, and one 6×8 screws.

2. Remove clutch springs and clutch facings and related parts by removing diagonally and evenly the hexagonal bolts of the clutch set plate. (Fig. 54)

3. Remove clutch hub nut (23mm) with clutch hub stopper (special tool) (Fig. 55)

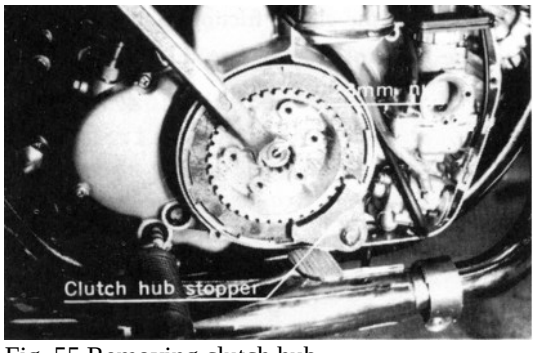


Fig. 55 Removing clutch hub

6. CLUTCH

4. Remove the ring nut with the clutch housing stopper and ring nut fitting tool (special tools), and then remove the clutch housing. (Fig. 56, 57)

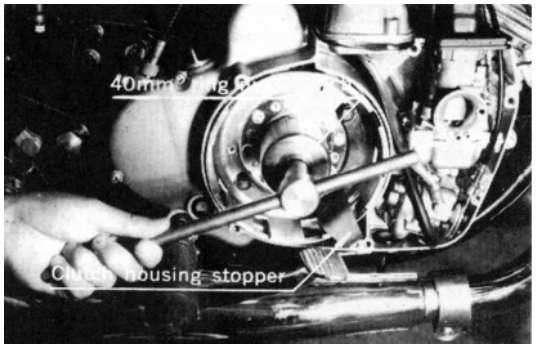


Fig. 56 Removing ring nut with clutch housing stopper

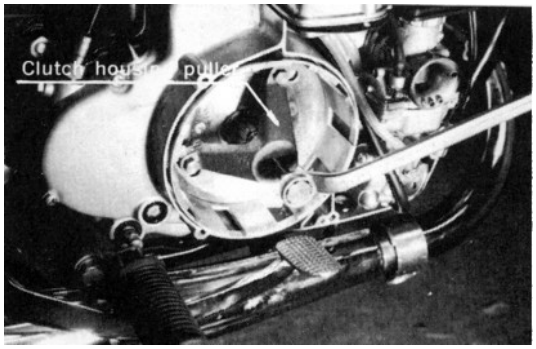


Fig. 57 Removing ring nut with ring nut fitting tool

E. Inspection

1. See if there is any damage such as serrations on the inner plate, and worn or uneven plates.

2. Check for damaged, worn or uneven arms on friction plates. (Fig. 58, 59)

3. Check release arm, release screw, release push screw dowel and rod for wear. Replace where necessary.

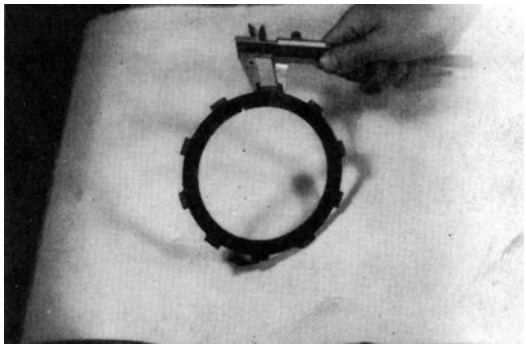


Fig. 58 Checking friction plate

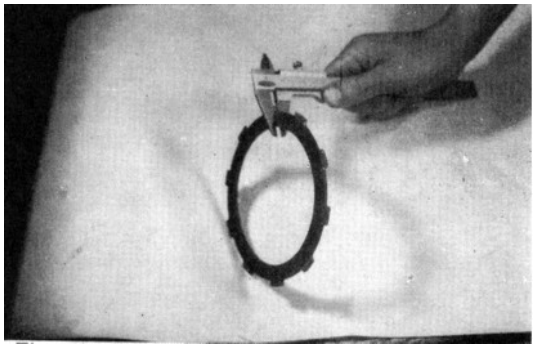


Fig. 59 Checking friction plate

7. TRANSMISSION
(See page 34)

A. Construction

The 350 GTR has a 6-speed, return-change transmission. (Fig. 60, 61)

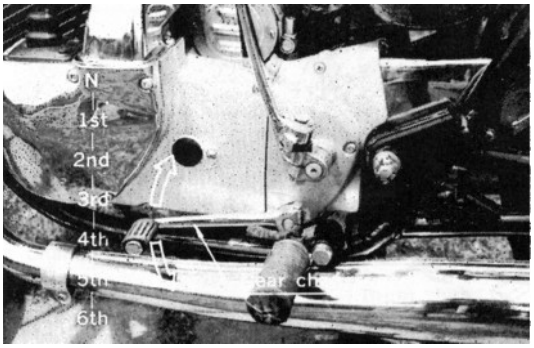


Fig. 60 Foot shift lever

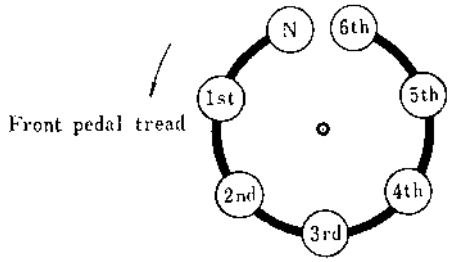
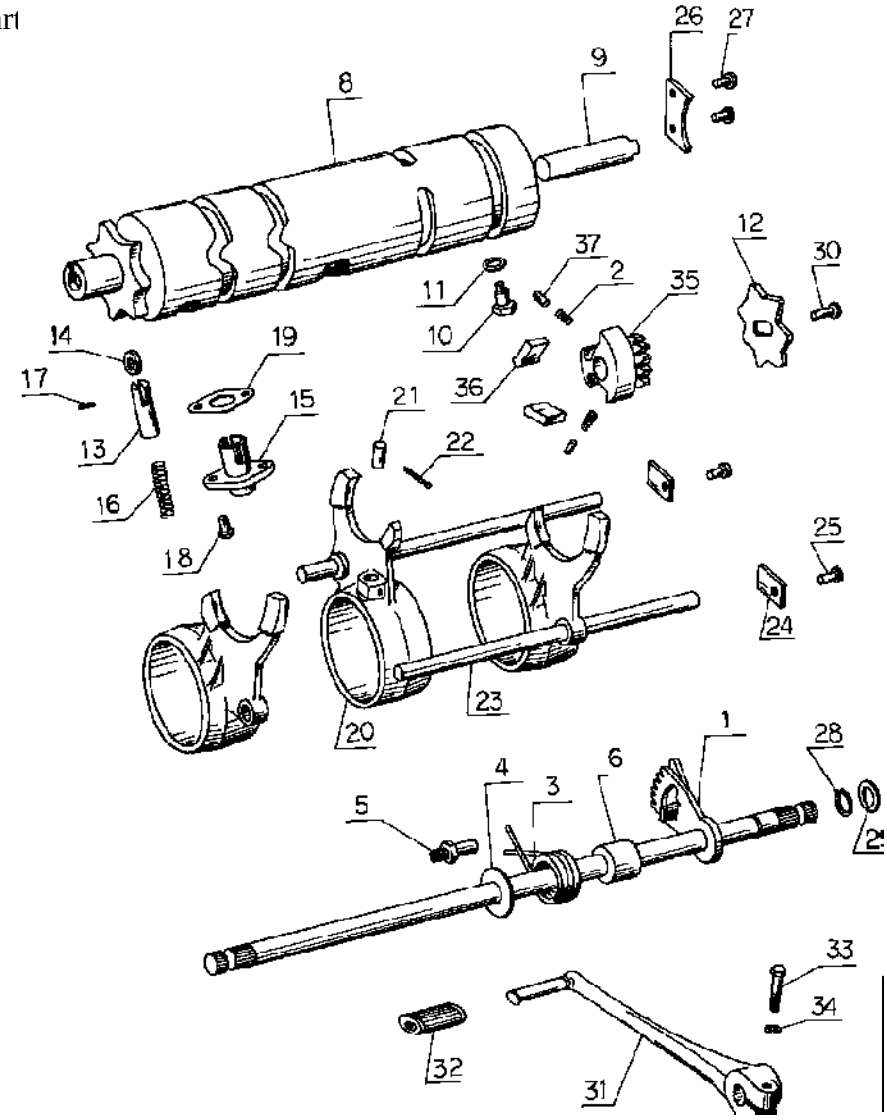


Fig. 61 Return change transmission

B. Operation

When the gear shift pedal is depressed, the shift drum is turned by the arm fixed on the gear change shaft.
Three shifting forks are fitted to the shift drum and travel along three grooves on the drum when it turns.
The gear shifting forks move the gears on the countershaft and drive shaft.
The operating angle of the gear shift pedal is 12 degrees and the gear shift drum turns 51.5 degrees for each gear change.

C. Component part



Index No.	Part Name	No. Req'd
1	Change arm complete	1
2	Ratchet spring	2
3	Change shaft return spring	1
4	Change shaft spring seat	1
5	Change arm stopper pin	1
6	Change shaft spacer	1
7	Shift drum complete	1
8	Gear shifter drum	1
9	Drum shifter shaft	1
10	Drum guide bolt	1
11	8 aluminum gasket	1
12	Stopper plate	1
13	Drum stopper arm	1
14	Drum stopper roller	1
15	Drum stopper boss	1
16	Drum stopper spring	1
17	4 × 8 A dowel	1
18	Cross recd pan head screw	2
19	Drum stopper gasket	1
20	Shift fork	3
21	Fork guide	3
22	Split pin	3
23	Fork guide pin	2
24	Fork guide stopper	2
25	Cross recd pan head screw	2
26	Drum guide plate	1
27	Cross recd pan head screw	2
28	12 B snap ring	1
29	12 thrust washer	1
30	Cross flat head screw	1
31	Gear change pedal	1
32	Change pedal rubber	1
33	Hexagon bolt A	1
34	Spring washer	1
35	Drum shifter	1
36	Ratchet	2

37	Ratchet pole	2

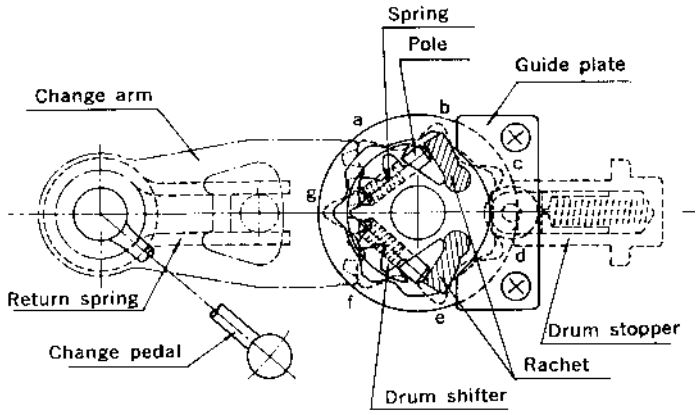


Fig. 62 Neutral gear position

D. Gear shift mechanism

C-l. Neutral gear position. (Fig. 62)

C-2. Operation of shift pedal pushed-down. (Fig. 63)

C-3. Operation of shift pedal lifted-up. (Fig. 64)

C-4. Operation of change arm stopper plate. (Fig. 65-1,2)

The 350 GTR is equipped with a change arm (over-run) stopper mechanism that prevents improper or excessive turning of the shift drum. This design makes it impossible to miss gears when shifting.

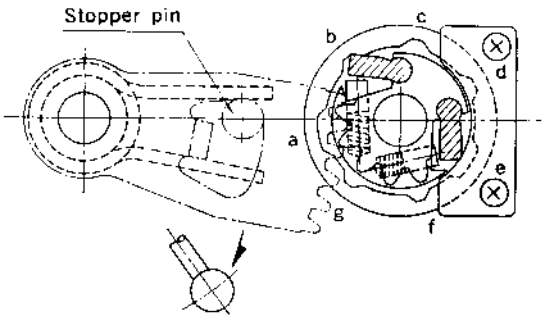


Fig. 63 Operation of shift pedal pushed down

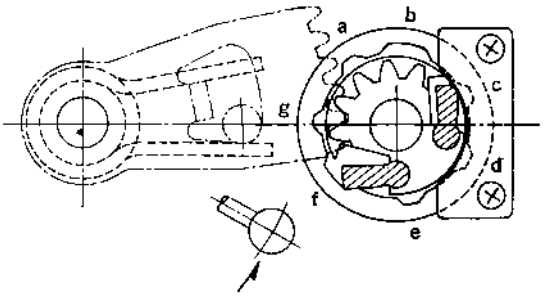


Fig. 64 Shift pedal lifted up

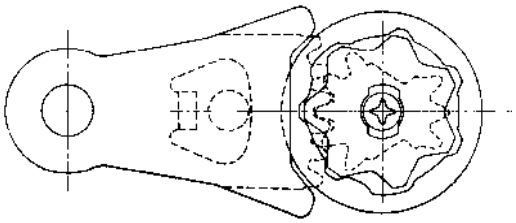


Fig. 65-1 Stopper plate

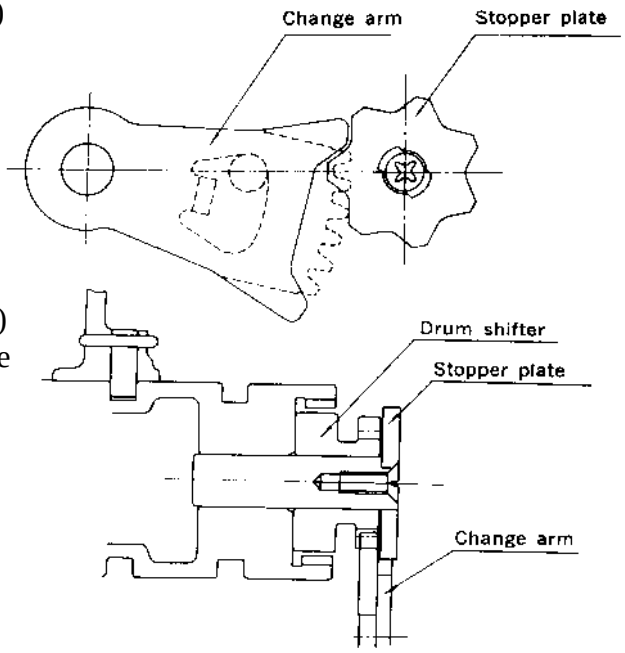
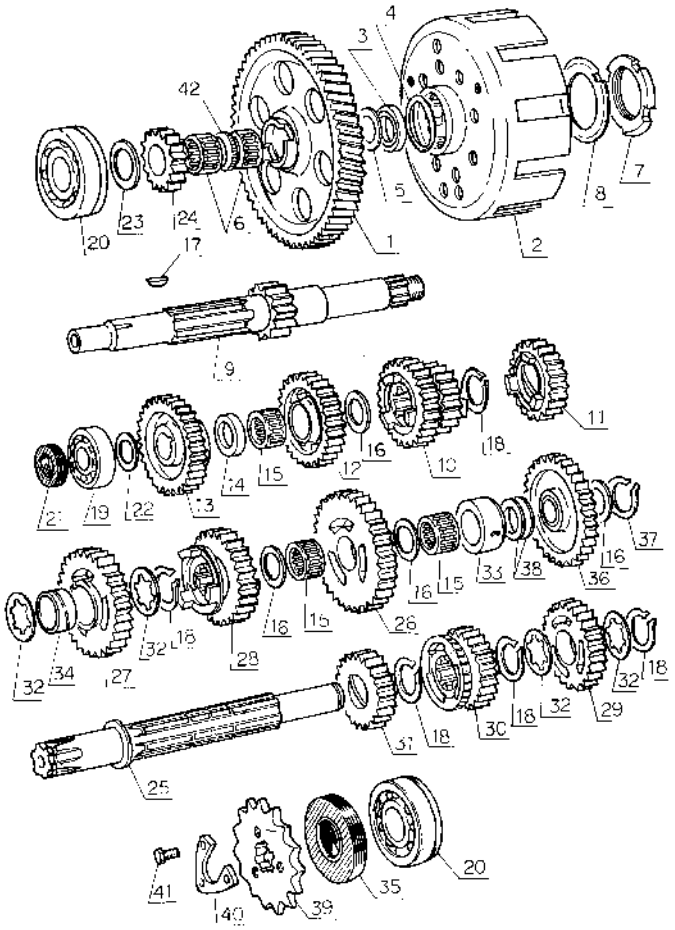


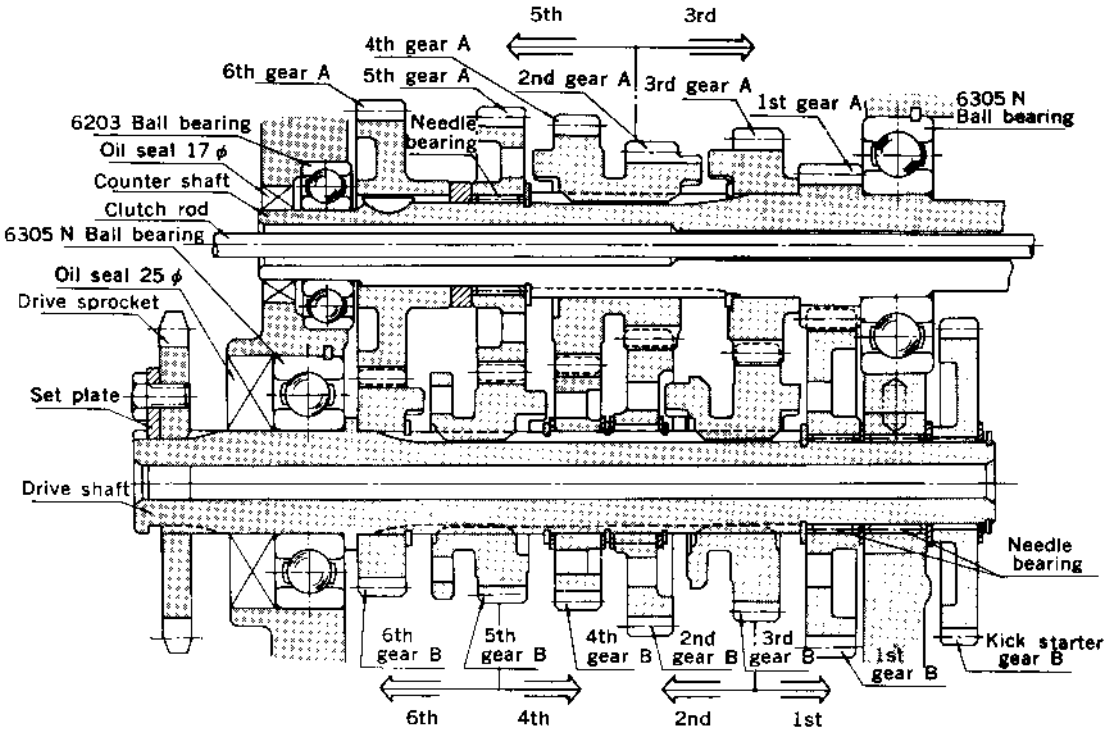
Fig. 65-2 Operation of charge arm stopper plate



Components part of gear box

Index No.	Part Name	No.
1	Driven gear	1
2	Clutch housing	1
3	22 oil seal	1
4	35 O ring	1
5	22 thrust washer	1
6	Needle bearing	2
7	40 ring nut	1
8	40 lock washer	1
9	Counter shaft	1
10	2nd gear A	1
11	3rd gear A	1
12	5th gear A	1
13	6th gear A	1
14	Counter shaft spacer	1
15	Needle bearing	3
16	20 thrust washer	4
17	3×15 Woodruff key	1
18	25 B snap ring	5
19	Ball bearing	1
20	Ball bearing	2
21	17 oil seal	1
22	17 thrust washer	1
23	22 thrust washer	1
24	Kick starter gear A	1
25	Drive shaft	1
26	1st gear B	1
27	2nd gear B	1
28	3rd gear B	1
29	4th gear B	1
30	5th gear B	1
31	6th gear B	1
32	25 thrust washer	4
33	Drive shaft bushing	1
34	2nd gear B bushing	1
35	25 oil seal	1
36	Kick starter gear B	1
37	20 B snap ring	1
38	20×0.3 Shim	2-3
39	Drive sprocket	1
40	Sprocket set plate	1
41	Hexagon bolt A	3
42	Needle bearing spacer	1

E. Gear operation and gear ratios



1. Transmission Mechanism in Neutral Gear (Fig. 66)

2. Gear ratios

Gears	Number of teeth		
	"A" Gears (Countershaft)	"B" Gears (Driveshaft)	Transmission Gear Ratio
1st gear (Low gear)	13	32	2.46
2nd gear	17	28	1.65
3rd gear	20	25	1.25
4th gear	23	23	1.00
5th gear	27	23	0.85
6th gear	29	22	0.76

3. Operation

The counter shaft and 1st gear A act as a unit. Second gear A and 4th gear A act as a unit and are spline fitted on the countershaft, and slide both ways on the countershaft spline.
3rd gear A and 5th gear A turn freely on the countershaft.
6th gear A is locked with a woodruff key on the countershaft.

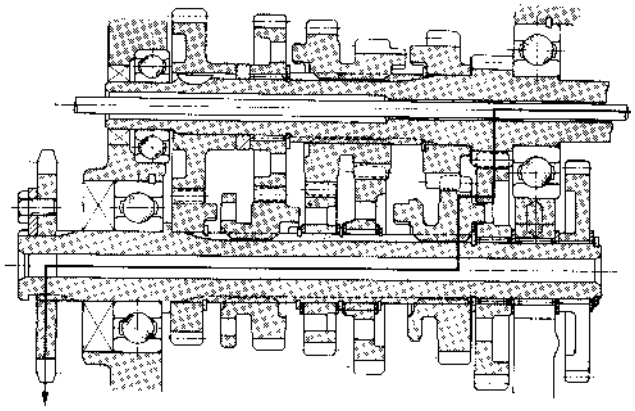


Fig. 67 In 1st gear position

1st gear B, 2nd gear B, 4th gear B and 6th gear B turn freely on the driveshaft. 3rd gear B and 5th gear B are spline fitted on the driveshaft.

1st gear:

With the gears on the countershaft remaining in position, the 3rd gear B on the drive shaft slides to the right and the drive dogs on this gear engage with 1st gear B.

- Engine power is transmitted in the following order: driven gear -- clutch – counter-shaft – First gear A – First gear B – 3rd gear B – driveshaft and drive sprocket. (Fig. 67)

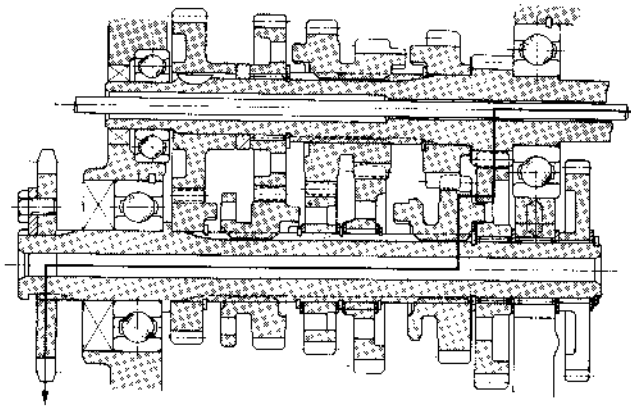


Fig. 68 In 2nd gear position

2nd gear:

With the 2nd gear A remaining in position, the 3rd gear B slides to the left and the drive dogs on this gear engage with 2nd gear B.

- Engine power is transmitted in the following order: driven gear – clutch – countershaft– 2nd gear A – 2nd gear B – 3rd gear B – driveshaft and drive sprocket. (Fig. 68)

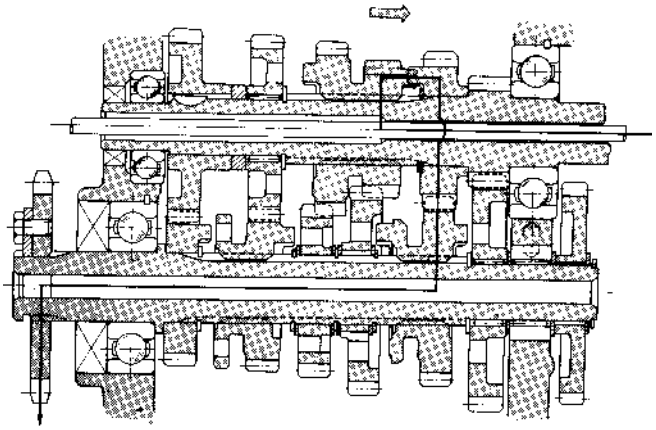


Fig. 69 In 3rd gear position

3rd gear:

With the 3rd gear B on the drive shaft remaining in position, the 2nd gear A slides to the right and the drive dogs on this gear engage with drive dogs on 3rd gear A.

- Engine power is transmitted in the following order: driven gear – clutch – countershaft – 2nd gear A – 3rd gear A – 3rd gear B – driveshaft and drive sprocket. (Fig. 69)

4th gear:

With the 4th gear A remaining in position, the 5th gear B slides to the right and the drive dogs on this gear engage with 4th gear B.

- Engine power is transmitted in the following order: driven gear – clutch – countershaft – 4th gear A – 4th gear B – 5th gear B – driveshaft and drive sprocket. (Fig. 70)

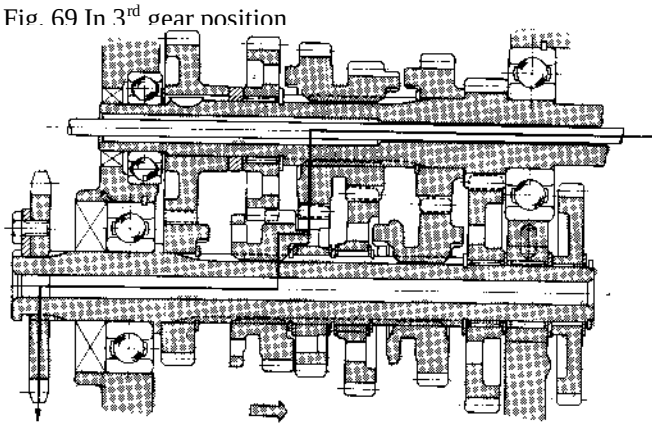


Fig. 70 In 4th gear position

5th gear:

With the 5th gear B remaining in position, 4th gear A slides to the left and the drive dogs on this gear engage with 5th gear A.

- Engine power is transmitted in the following order: driven gear – clutch – countershaft – 4th gear A – 5th gear A– 5th gear B – driveshaft and drive sprocket. (Fig. 71)

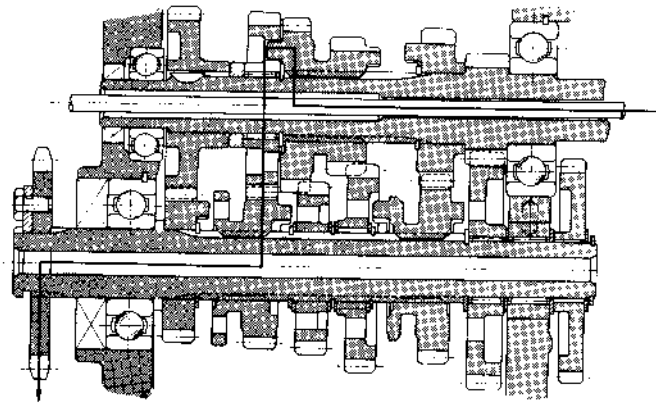


Fig. 71 In 5th gear position

6th gear:

With the 6th gear A remaining in position, 5th gear B slides to the left and engages with the Drive dogs on 6th gear B.

- Engine power is transmitted in the following order: driven gear – clutch – countershaft – 6th gear A – 6th gear B – 5th gear B – driveshaft and drive sprocket. (Fig. 72)

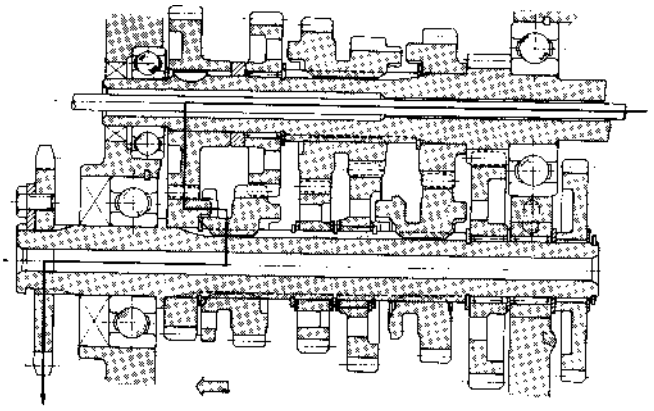


Fig. 72 In 6th gear position

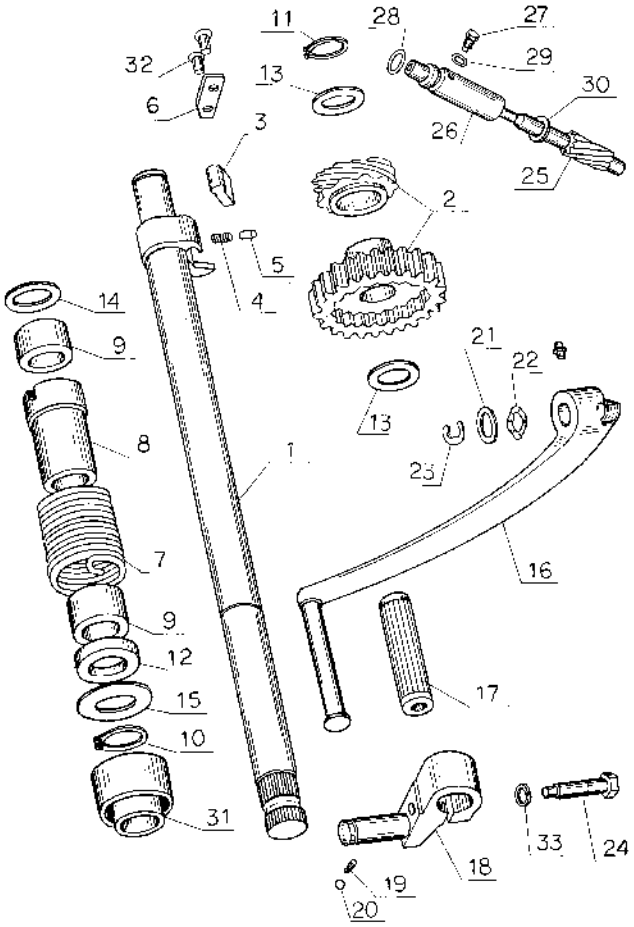
F. Inspection:

1. Check for worn or damaged gears, splines, bearings and shafts.

2. Inspect shift fork and drum grooves.

3. Check for wear on the change arm, ratchet and drum shifter spring.

8. KICK STARTER



Component parts of kick starter

Index No.	Part Name	No. Req'd
1	Kick starter shaft	1
2	Kick gear C comp.	1
3	Ratchet	1
4	Ratchet spring	1
5	Ratchet pole	1
6	Kick starter ratchet stopper	1
7	Kick starter return spring	1
8	Return spring spacer	1
9	Kick starter shaft bushing	2
10	18 B snap ring	1
11	15 F snap ring	1
12	18 oil seal	1
13	15 thrust washer	2
14	18 thrust washer	1
15	Plain washer A	1
	Kick starter arm ass'y.	1
16	Kick starter arm	1
17	Kick starter pedal rubber	1
18	Kick starter arm boss	1
19	Kick starter set spring	1
20	Ball	2
21	15 plain washer	1
22	15 wave washer	1
23	10 D snap ring	1
24	Kick starter shaft bolt	1
25	Tachometer gear B	1
26	Tachometer gear bushing	1
27	Tachometer bushing bolt	1
28	12 O ring	1
29	6 fiber gasket	1
30	8 thrust washer	1
31	Chain guide	1
32	Cross rec'd. round head screw	2
33	Spring washer	2

A. Construction:

A primary kick starter system similar to other Bridgestone models is used on the Bridgestone 350 GTR. Since the kick starter does not operate through the clutch, the engine can be started, even when the transmission gears are engaged, by simply pulling in the clutch lever. This very convenient system has earned a good reputation because it eliminates the need for finding neutral, thus allowing quick starting of the engine. In conventional kick starters, the kick gear engages with one of the transmission gears. But, with the primary type kick starter, three kick starter gears are installed independently in the transmission gear box. (Fig. 73)

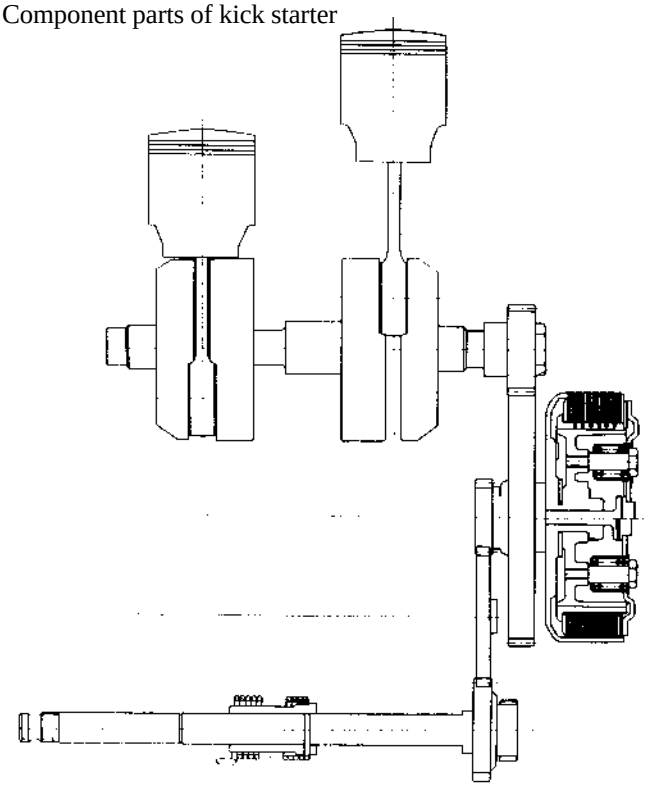


Fig. 73 Construction

8. KICK STARTER

B. Operation:

B-l To start:

1. The kick shaft and ratchet arm turn counter-clockwise as shown in Fig. 74. The pressure of the ratchet spring meshes the ratchet with the kick gear. (Fig. 74)

2. When the kick starter is operated, the ratchet turns the kick gear.

3. Since the kick gear is always in mesh with the kick idle gear, the force created by turning the kick shaft is transmitted from the kick starter gear B, kick starter gear A, driven gear and pinion gear to the crankshaft, and starts the engine.

4. When the kick shaft is released, it is returned to its original position by the return spring, the ratchet is released automatically from the kick gear, and the kick gear rotates freely.

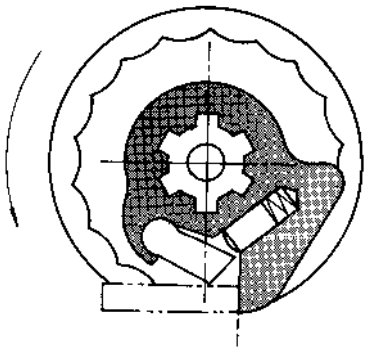


Fig. 74 In kicking position

B-2 In cruising.

The Ratchet arm is turned counterclockwise by the kick return spring, and ratchet and kick gear are held apart. (Fig. 75)

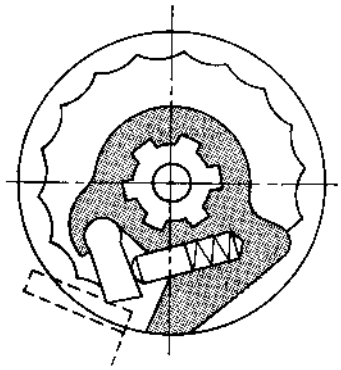
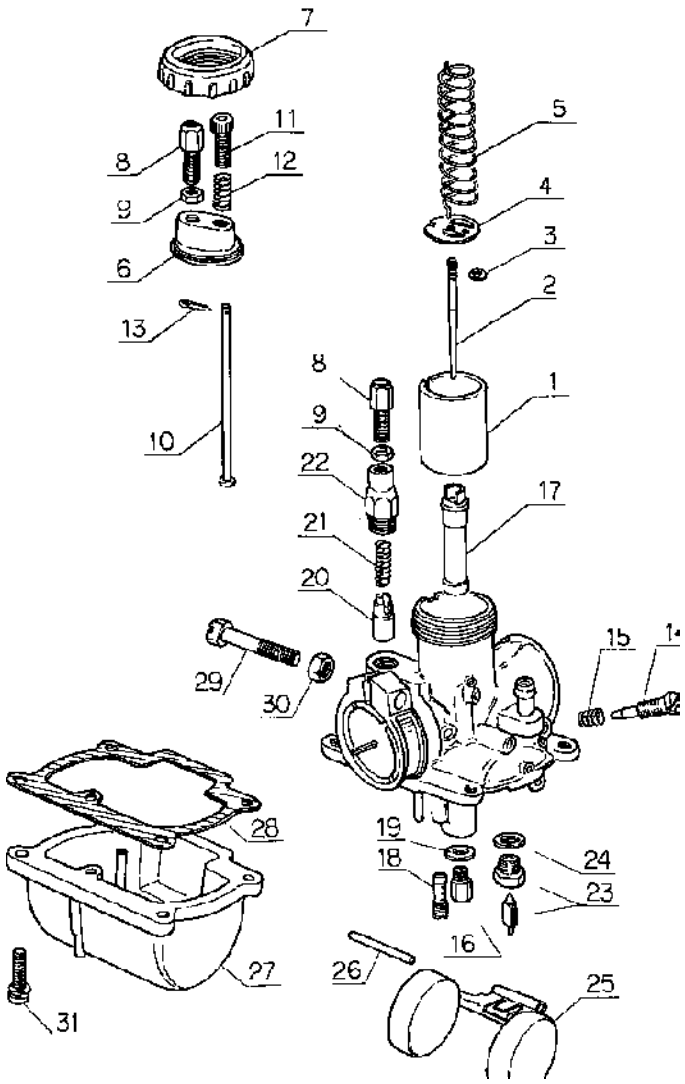


Fig. 75 In cruising position

C. Inspection

Check for worn or damaged gears, kick return spring and ratchet.



Component parts of carburetor

Index No.	Part Name	No.
	Carburetor assembly	2
1	Throttle valve	2
2	Jet needle	2
3	Needle clip	2
4	Spring seat	2
5	Throttle valve spring	2
6	Mixing chamber top	2
7	Mixing chamber cap	2
8	Cable adjuster	4
9	Adjuster lock: nut	4
10	Throttle stop rod	2
11	Throttle stop screw	2
12	Stop screw spring	2
13	Split pin	2
14	Pilot air screw	2
15	Air screw spring	2
16	140 main jet	2
	130 main jet	2
17	Needle jet	2
18	Pilot jet	2
19	Washer	2
20	Starter plunger	2
21	Plunger spring	2
22	Plunger cap	2
23	Float valve assy – before 21H	2
	Float valve assy – after 21H	2
24	Valve seat gasket	2
25	Float	2
26	Float pin	2
27	Float chamber body	2
28	Float chamber gasket	2
29	Clamp screw	2
30	Hexagon nut A	2
31	Set screw	8

9. CARBURETORS

A. Synchronizing Carburetors

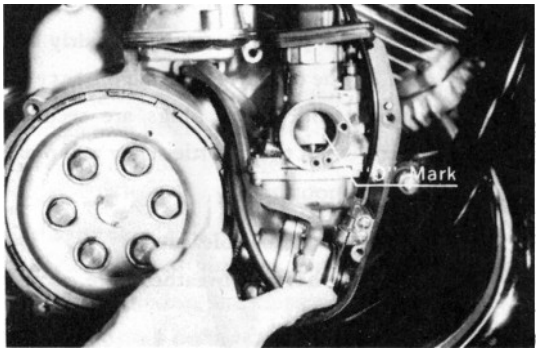


Fig. 76 Adjusting throttle valve

For best performance, the carburetor throttle valves should be adjusted so they operate together. To adjust, open the throttle slowly until the "O" mark on one of the throttle valves is at the top of the air intake hole. While holding in this position, adjust the throttle cable adjuster of the other carburetor so the mark on its throttle valve is also at the top of the air intake hole. Now close the throttle and check cable clearance. Each cable must have at least 1/32" free cable before carburetor opens or readjustment will be necessary. (Fig. 76)

B. Indication of trouble at various engine speeds.

Mixture Too Rich	**Mixture Too Lean**
1. Engine speed fluctuates	1. Engine overheats
2. Engine dose not run smoothly when starter lever is used.	2. Engine runs smoothly when starter is used
3. Engine does not run smoothly after warming up	3. Engine does not run smoothly when engine is cool
4. Spark plugs are apt to foul	4. Spark plugs are apt to heat or burn
5. Engine runs smoothly when carburetor cover is removed	5. Engine runs smoothly when carburetor is choked
6. Exhaust fumes are white or grey	6. Exhaust fumes are light blue or colorless

C. Idling Adjustment (0-1/8 Throttle opening)

1. When the engine stops at engine idling speed, control the engine speed with the throttle grip and turn the idle speed adjuster on both carburetors until the engine runs smoothly. (Fig. 77)

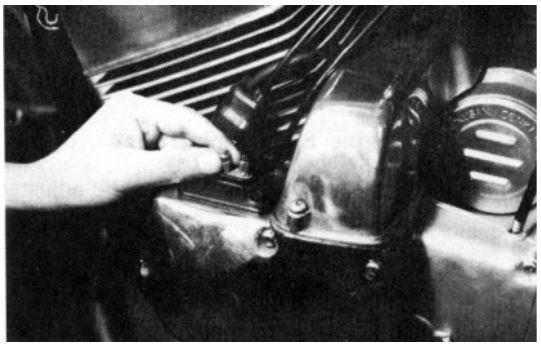


Fig. 77 Idling adjustment

2. Turn the pilot air screws on the carburetors alternately. Both screws must be turned an equal amount. Set the screws at the point where the engine runs the most smoothly.

★ When the pilot air screw is turned clockwise, the gasoline/air mixture becomes richer and when it is turned counterclockwise the mixture becomes leaner. Correct adjustment is approximately 2 turns out. (Fig. 78)

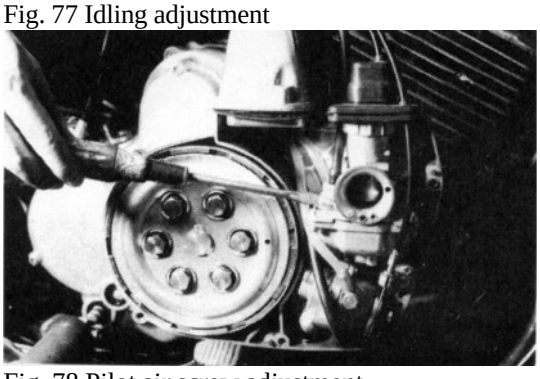


Fig. 78 Pilot air screw adjustment

3. To set the pilot air screw, a fairly satisfactory method is to detach one spark plug, and set the air screw on the carburetor of the other cylinder. Reverse the process for the other cylinder. If, when both spark plugs are reconnected, the engine runs slightly faster than desired, a slight readjustment of the throttle screw will put this right.

4. Trouble shooting.

Possible causes	Remedies
1) Pilot air hole or breather hole of pilot jet is plugged.	Clean and blow these holes.
2) Loose pilot jet	Set pilot jet securely.
3) Starter plunger does not close when starter lever is closed.	Adjust starter cable to set plunger completely closed.
4) Improper pilot air screw adjustment.	Adjust the air screw. Correct adjustment is 2 turns out.

D. Medium Engine Speed Adjustment (1/8 – 3/4 throttle opening)

1. The gasoline/air mixture can be adjusted by raising or lowering the jet needle at ⅛ – ¾ throttle opening for medium engine speed. Therefore, adjust the jet needle within the range where acceleration is not adversely affected.
2. Trouble shooting

Possible causes	Remedies
1) Clogged main jet or needle jet	Clean
2) Loose fitting of needle jet or main jet	Screw in securely
3) Worn needle jet	Replace it with a new one
4) Incorrect adjustment of needle jet position	Raise the jet needle when mixture is too lean and lower it when mixture is too rich. Standard jet needle position is in the third groove.

E. High Engine Speed Adjustment

1. The gasoline/air mixture can be adjusted by the main jet at 3/4 full throttle opening.
2. Trouble shooting

Possible causes	Remedies
1) Clogged needle jet hole	Clean
2) Loose fitting of needle jet or main jet	Screw in securely
3) Incorrect main jet size	Use a bigger main jet when mixture is too lean and a small one when mixture is too rich. Standard main jet is No. 130.

Caution : The main jet size should be decided according to the climate or temperature.

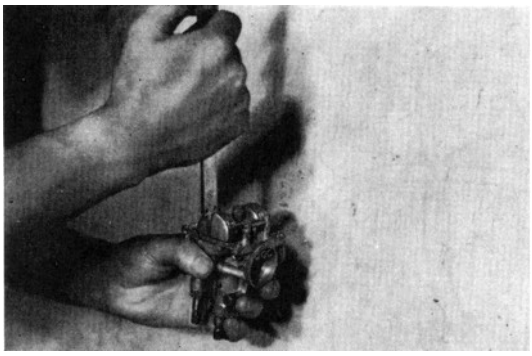


Fig. 79 Measuring float level

F. Adjustment of Carburetor Float Level

1. The float level affects the gas/air mixture ratio and should be checked as follows:

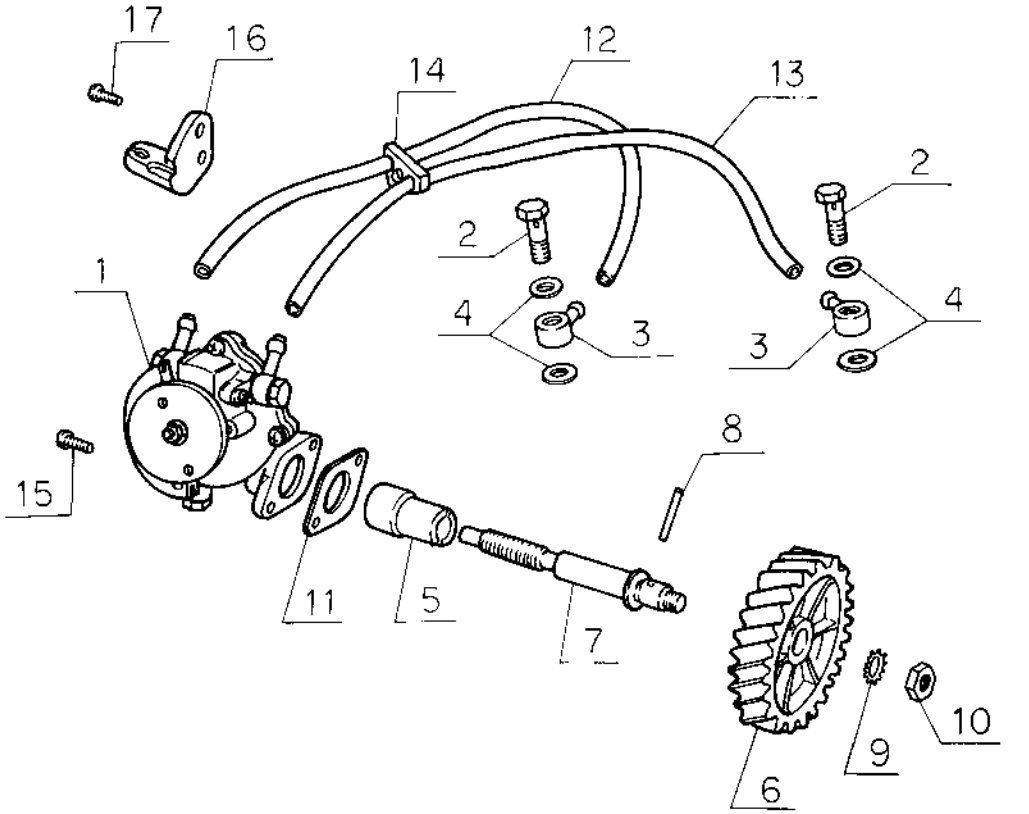
★ Gas/air mixture becomes rich at high floating level, and lean at low level.

2. Adjustment
Dismount carburetor, remove float chamber and hold mixing body upside down so the float arm is resting on the float needle valve. Measure the float adjustment as shown. (From gasket seat to top of float.) Correct float setting is 15/16" – 1". Adjustment is made by carefully bending the float valve tab.

G. Trouble Shooting of Gasoline Leaks from Carburetor

Possible causes	Main causes of trouble	Remedies
Gas leaks from carburetor	Inadequate contact between needle valve and valve seat	Replace needle valve and valve seat with a new one.
Gas overflows at any time (even cruising or stopping)	Punctured or deformed float.	Replace the float with a new one.
Gas leakage occasionally	1. Operation of float or needle spring is not correct. 2. Clogged needle valve and valve seat with dirt.	Adjust float or replace needle valve with a new one. Clean needle valve or valve seat. Clean fuel cock bowl.

10. OIL INJECTION SYSTEM



Component parts of oil injection system

Index No.	Part Name	No. Req'd
1	Oil pump assembly	1
2	Check valve assembly	2
3	Union connection C	2
4	8 Aluminum gasket	4
5	Worm shaft bush B	1
6	Pump gear B	1
7	Worm shaft	1
8	3 × 24 A dowel	1
9	External toothed washer	1
10	Hexagon nut C	1
11	Pump gasket	1
12	Oil tube A	1
13	Oil tube B	1
14	Oil tube grommet	1
15	Cross recd pan head screw	2
16	Wire bracket	1
17	Cross recd pan head screw	2

On the 350 GTR, the oil injection mechanism, which eliminates the necessity of pre-mixing gasoline and oil, injects lubricating oil directly to the crankshaft bearings and other parts. (Fig. 80)

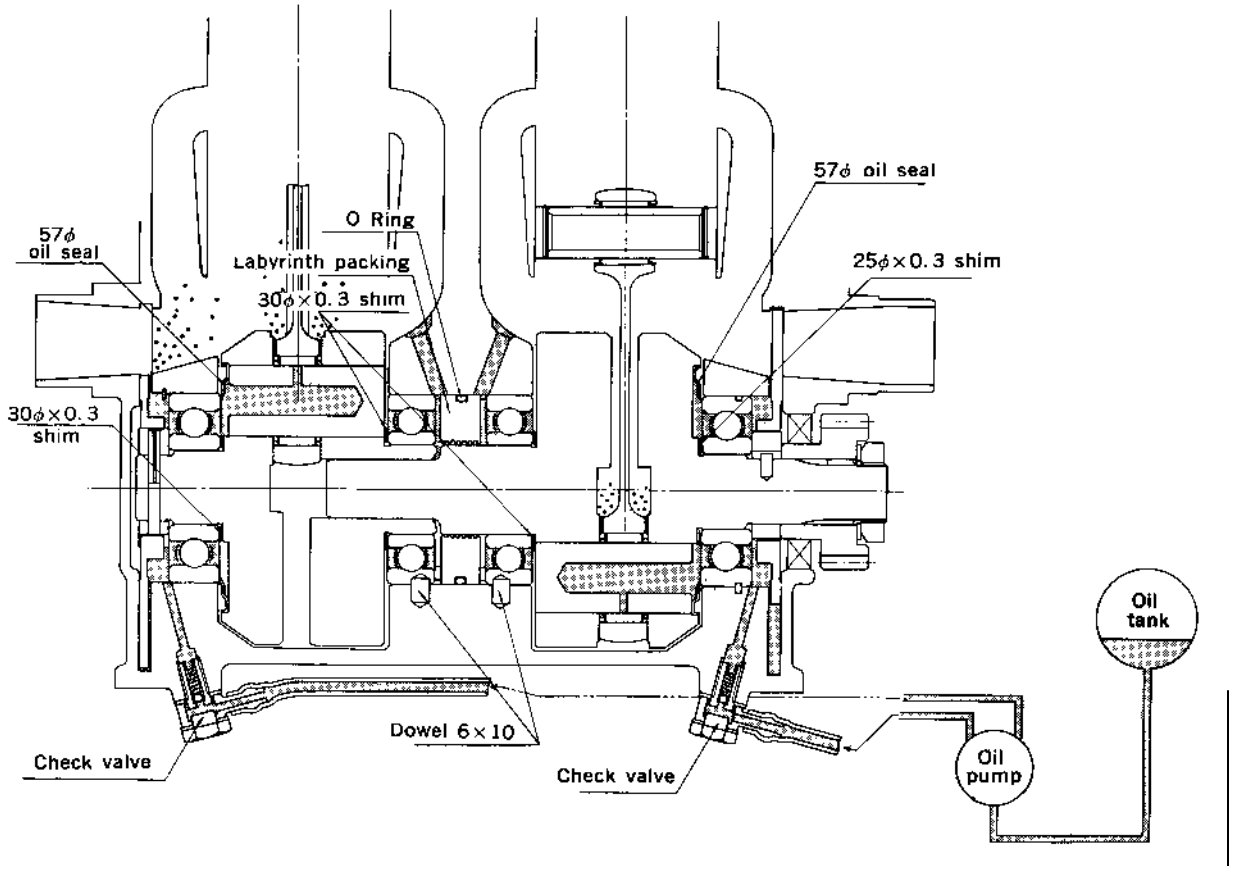


Fig. 80 Oil injection system

A. Operation

The worm wheel of the oil pump is driven through the Crankshaft –> Driven Pinion –> Pump gear B.

The worm wheel, the boss of which is cam shaped, is pushed in direction A by the plunger spring and contacts the rod (c) as shown in (Fig. 81)

The worm wheel plunger slides both ways, following the cam height.

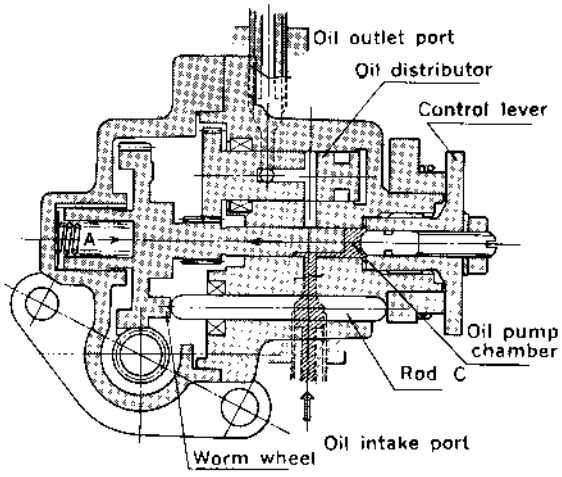


Fig. 81 Operation

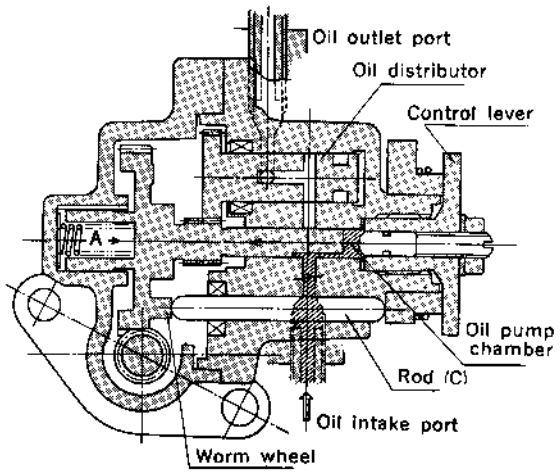


Fig. 82-1 Oil intake

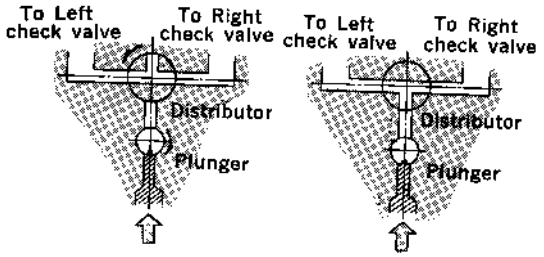


Fig. 82-2 Rotation of distributor Fig. 82-3

B. Oil Intake:

When the worm wheel contacts the rod at the highest point of the cam, the volume of the pump chamber increases and the pressure in the chamber decreases. The inlet port opens and oil is sucked into the oil pump chamber. (Fig. 82-1,2,3)

C. Oil Outlet:

When the worm wheel plunger slides in the direction A and contacts the rod at the lowest point of the cam, the pump chamber volume decreases, therefore oil is forced into the outlet port. (Fig. 83)

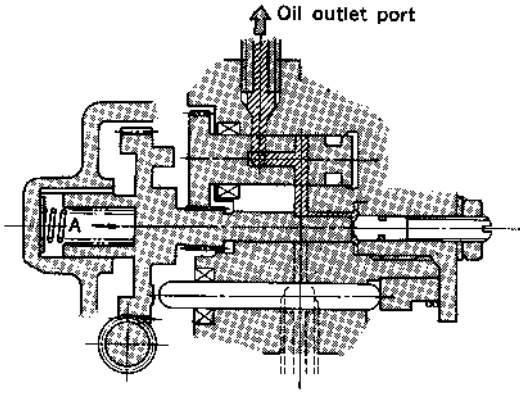


Fig. 83 Oil outlet

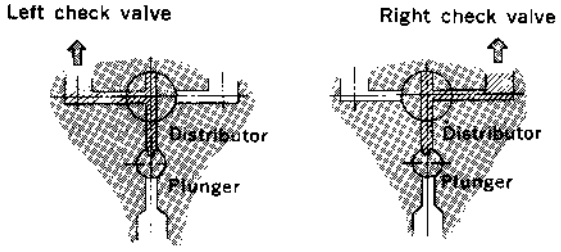


Fig. 84-1 Oil distribution - left valve Fig. 84-2 Right valve

D. Distribution of oil to both cylinders

The rotation of the distributor shaft is one half that of the worm wheel plunger. The distributor shaft has oil passage holes as shown in Fig. 84. Therefore, oil flows to each cylinder alternately. (Fig. 84-1,2)

E. Operation of worm wheel plunger in relation to the throttle grip:

l. Engine Idling at slow speed

When the throttle grip is in zero position (closed) the rod contacts the control lever at its lowest position.

The worm wheel plunger slides to the right by spring tension and the plunger contacts the adjust screw before it contacts the rod. When the cam height is at the lowest point, the plunger contacts the rod instead of the adjust screw.

The distance of the shaft of the plunger to the adjust screw (D) is shortened to less than the height of the worm wheel cam, thereby reducing the volume of oil. (Fig. 85, 86)

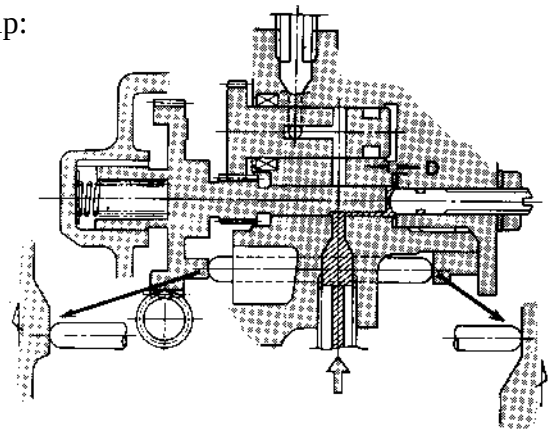


Fig. 85 Oil intake - zero throttle

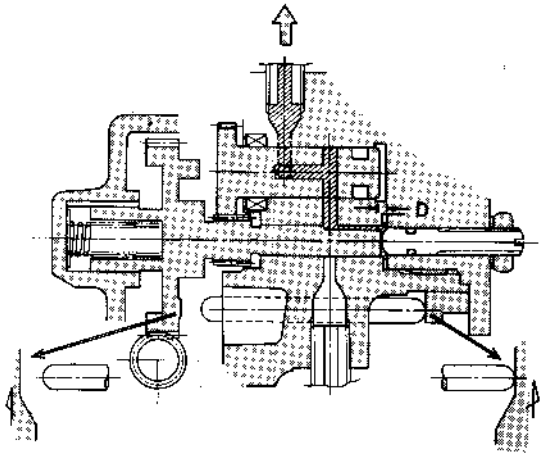


Fig. 86 Oil outlet - zero throttle

2. High Speed, wide open throttle

When the throttle grip is wide open, the cam of the control lever contacts the rod (c) at its highest point, thereby shifting the rod (c) to the left so that the distance of shift of the plunger is lengthened, and the volume of oil is increased. (Fig. 87, 88)

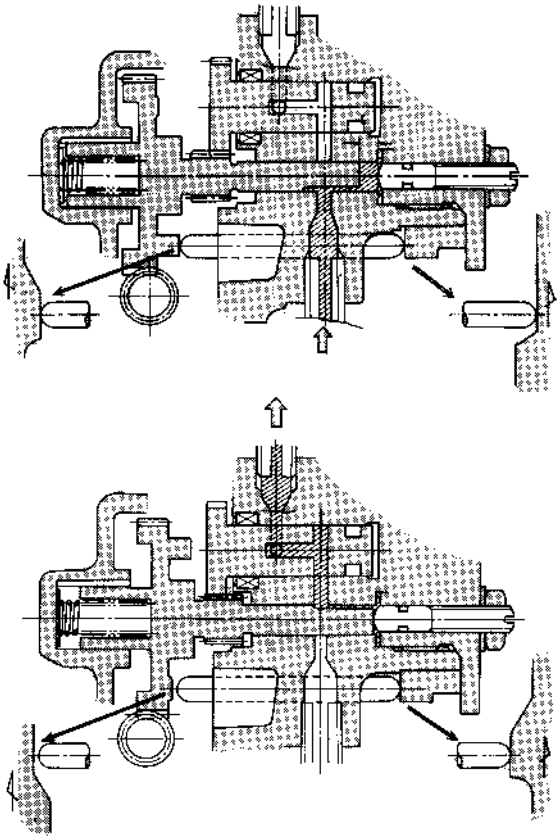


Fig. 88 Oil outlet - full throttle

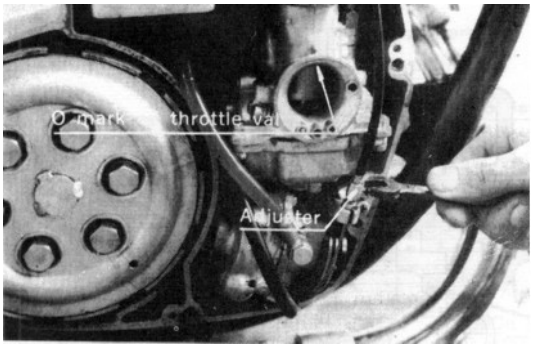


Fig. 89-1 Adjustment of oil pump wire

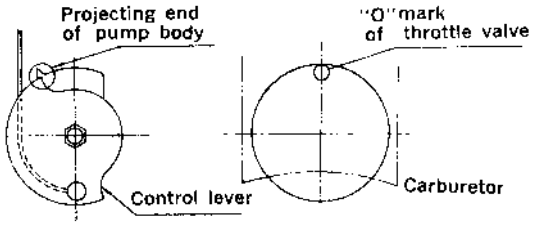


Fig. 89-2 Adjustment of oil pump

F. Adjustment of oil pump control wire

Open the throttle grip slightly, until the "O" mark of the throttle valve matches the top center of the air intake of the carburetor.

At the same time, the edge of the control lever of the oil pump should meet the protecting end of the oil pump body. (Fig. 89-1, 89-2)

Caution: Caution the customer not to touch the adjusting screw because it is adjusted accurately at the factory. The control lever is adjusted by turning the cable adjuster.
Turning the cable adjuster to the left lifts the lever up farther.

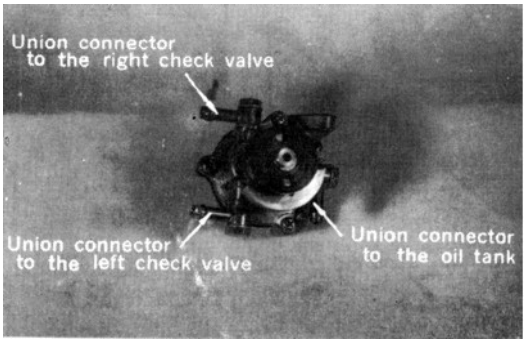


Fig. 90 Assembling the union connectors

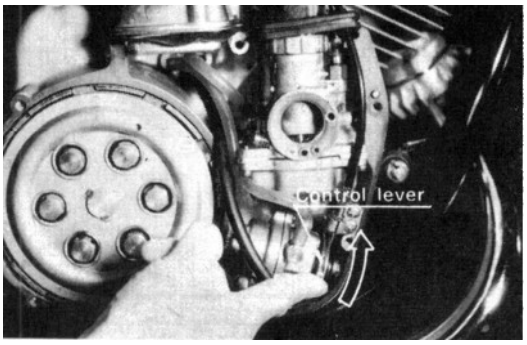


Fig. 91 Exhausting air bubbles

G. Special Attention:

1. Assemble the union connectors to the pump body as shown on (Fig. 90)

2. Do not unscrew the union bolts to avoid bending the 6mm aluminum gasket of the union bolts.

3. To exhaust air bubbles between the oil tank and the oil tube, disconnect the tube from the oil pump and let oil flow freely. Then connect the tube to the pump and hold the control lever wide open while running the engine at idle for about one minute. (Fig. 91)

4. Be sure to use only check valve bolts to connect oil lines to the crankcase.

H. Meshing the plunger gear with the distributor gear. (Fig. 92)

1. When the oil pump is disassembled, be careful to mesh the plunger gear with the distributor gear. Because the distributor gear has three oil passage holes, (Refer to Fig. 84 – one hole is for oil intake, the others for lubrication of both cylinders) it is necessary to match the holes of the distributor with the plunger cam slot.

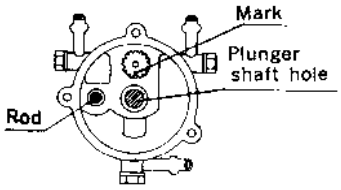


Fig. 92 Disassembled oil pump

2. How to mesh both gears

   1) Match the timing pin mark on the distributor gear with the center of the plunger shaft hole. (Fig. 92)

   2) Insert the plunger shaft by placing the end of the cam over the center of the distributor gear. (Fig. 94)

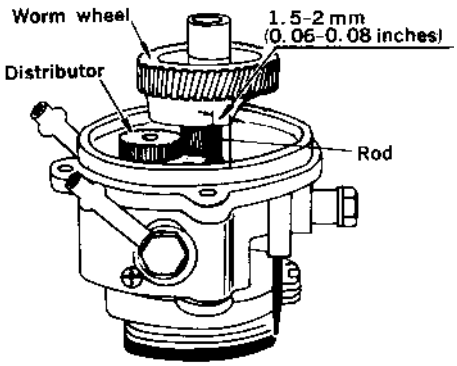


Fig. 93 Insert the plunger shaft as shown

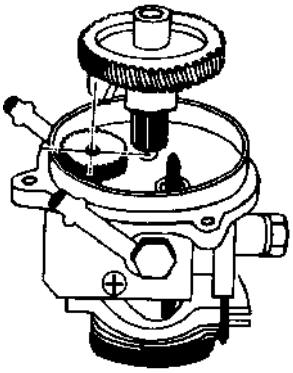
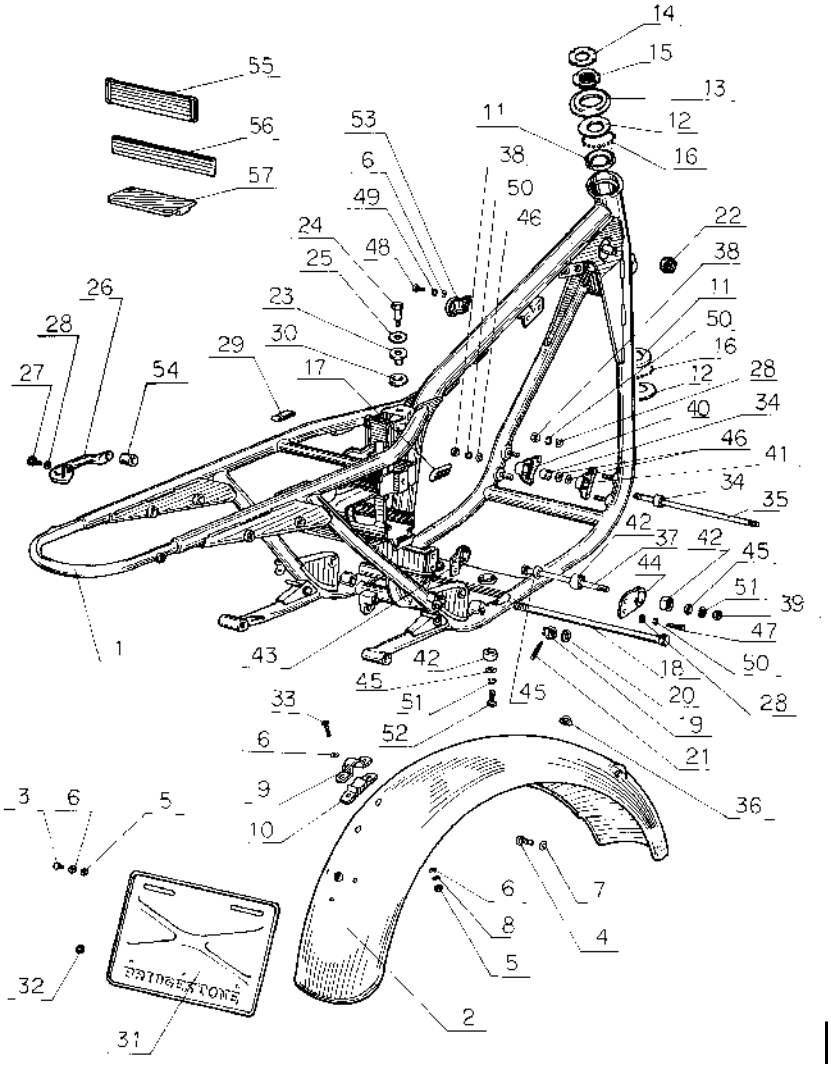


Fig. 94 Place the end of the cam over the center of the distributor.

11. FRAME



Component parts of frame and rear fender

Index No.	Part Name	No. Req'd
1	Frame complete	1
2	Rear fender complete	1
3	Hexagon bolt A	4
4	Hexagon bolt A	3
5	Hexagon nut A	4
6	Plane washer A	6
7	Plane washer A	3
8	Spring washer	2
9	Rear fender clamp	1
10	Fender mounting rubber	1
11	Outer race	2
12	Inner race	2
13	Race cap	1
14	Race lock nut	1
15	Race adjuster	1
16	Ball	38
17	Oil tank pad	1
18	Pivot shaft	1
19	14 hexagon slotted nut	1
20	15 plane washer	1
21	Split pin	1
22	Front tank cushion rubber	2
23	Rear tank cushion rubber	1
24	Tank mounting bolt	1
25	18 plane washer	4
26	Frame handle	1
27	Hexagon bolt A	1
28	Plane washer A	1
29	Cover pad	1
30	Tank cushion rubber	1
31	Number plate supporter	1
32	Supporter pad	3
33	Hexagon bolt	2
34	Engine cushion rubber A	2
35	Engine mounting bolt	1
36	Rear fender grommet	1
37	10 × 145 hexagon bolt	1
38	Hexagon nut A	6
39	Hexagon nut D	1
40	Left engine bracket	1
41	Right engine bracket	1
42	Engine cushion rubber B	4
43	Left engine hanger	1
44	Right engine hanger	1
45	10 plane washer	4
46	8 plane washer	4
47	Hexagon bolt A	4
48	Hexagon bolt A	2
49	Spring washer	2
50	Spring washer	10
51	Spring washer	3
52	10 × 38 hexagon bolt	2
53	Main switch bracket	1
54	Spacer A	1
55	Battery band	1
56	Battery pad	1
57	Battery seat	1

11-1 Handlebar

A. Removing Handlebar

1. Loosen clutch cable to the limit of the adjusting nut and remove from clutch lever.

2. Remove the adjusting nut of the front brake and pull the cable out of the brake lever.

3. Take off the 6 × 45 hexagonal nut of the starter lever and remove the starter cable from the lever.

4. Unscrew the head light rim fitting screws at the bottom of the rim, and disconnect the wiring harness connections from the terminals. (Fig. 95)

5. Take off the four handle holder fitting bolts (8 × 36) and remove the handlebar assembly from the front fork.

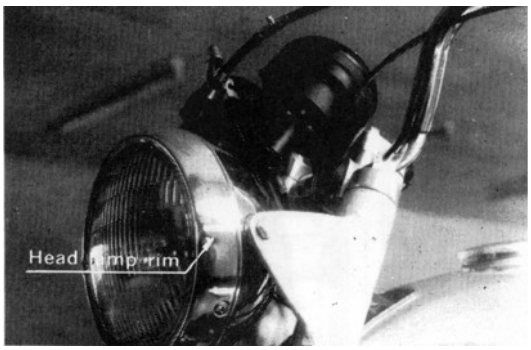


Fig. 95 Removing headlight rim

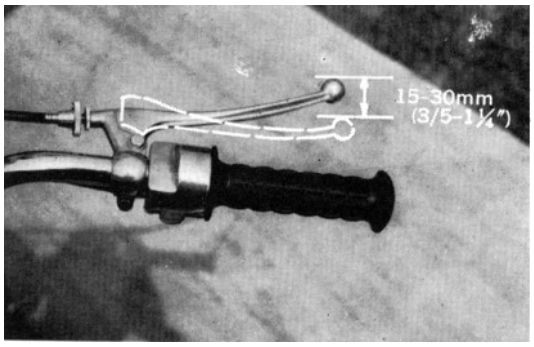


Fig. 96 Adjustment of brake lever

B. Assembling:
Assembling is done in the reverse order of removing.

C. Inspection:

1. Adjust clutch and brake levers periodically.

Brake lever

Front brake lever should be adjusted to allow a play of 15-30mm (3/8" – l-l/8") before the brake acts. (Fig. 96)

Clutch lever

When properly adjusted, there will be approximately 15-20mm (3/8" – 3/4") free play in the clutch control before the clutch disengages. (Fig. 97)

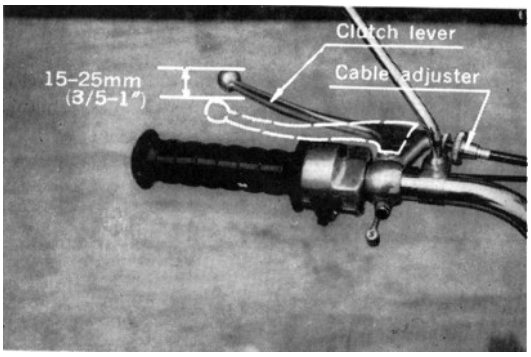
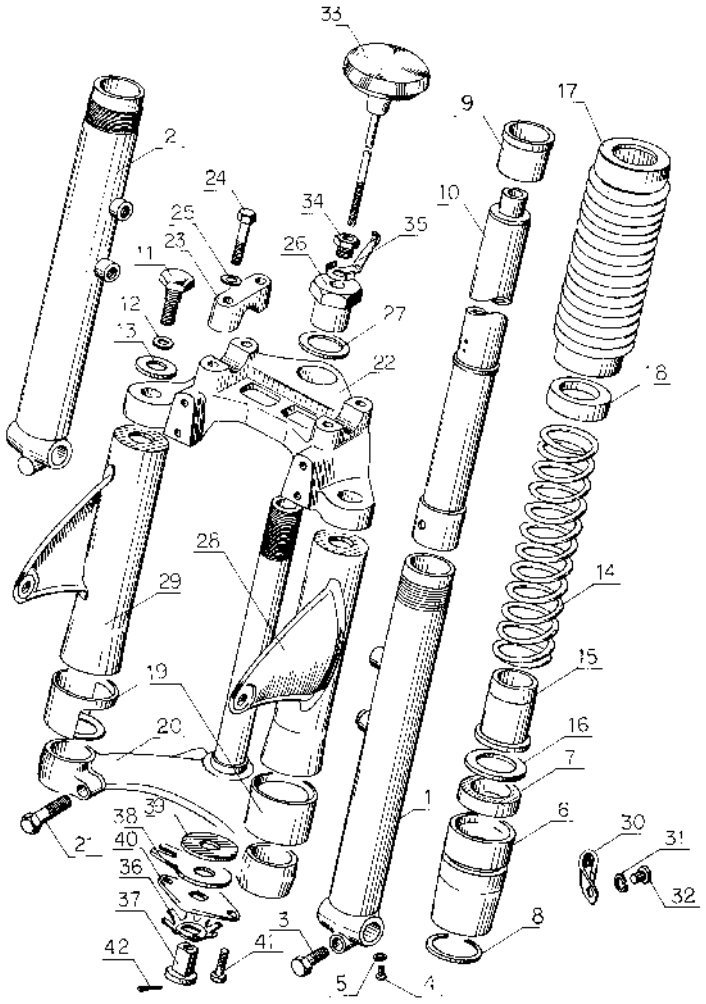


Fig. 97 Adjustment of clutch lever

2. Check for damaged or cracked wires in the grip holders, dimmer switch, and horn switch, and replace if necessary.

11-2 Front Fork



Index No.	Part Name	No. Req'd
	Front fork assembly	1
1	Outer tube B	1
2	Outer tube A	1
3	8 × 26 hexagon bolt	1
4	4 × 7 cross pan head screw	2
5	Drain plug gasket	2
6	Outer tube nut	2
7	34 oil seal	2
8	40 O ring	2
9	Cushion slide metal	2
10	Inner tube A	2
11	Upper bridge bolt	2
12	9 O ring	2
13	Upper bridge washer	2
14	Front main cushion spring	2
15	Dust seal	2
16	Main spring seat	2
17	Front fork boot	2
18	Upper boot holder	2
19	Fork cover guide	2
20	Lower bridge	1
21	10 × 32 hexagon bolt	2
22	Upper bridge	1
23	Handle holder	2
24	Hexagon bolt C	4
25	Plane washer B	4
26	Steering head nut	1
27	Steering head washer	1
28	Left fork cover	1
29	Right fork cover	1
30	Cable clip	1
31	Spring washer	1
32	Cross rec'd pan head screw	1
33	Steering damper knob	1
34	Damper knob guide	1
35	Damper lock spring	1
36	Steering damper spring	1
37	Damper spring guide	1
38	Friction plate	1
39	Damper facing	1
40	Damper guide plate	1
41	6×18 hexagon bolt	2
42	Split pin	1

A. Operation

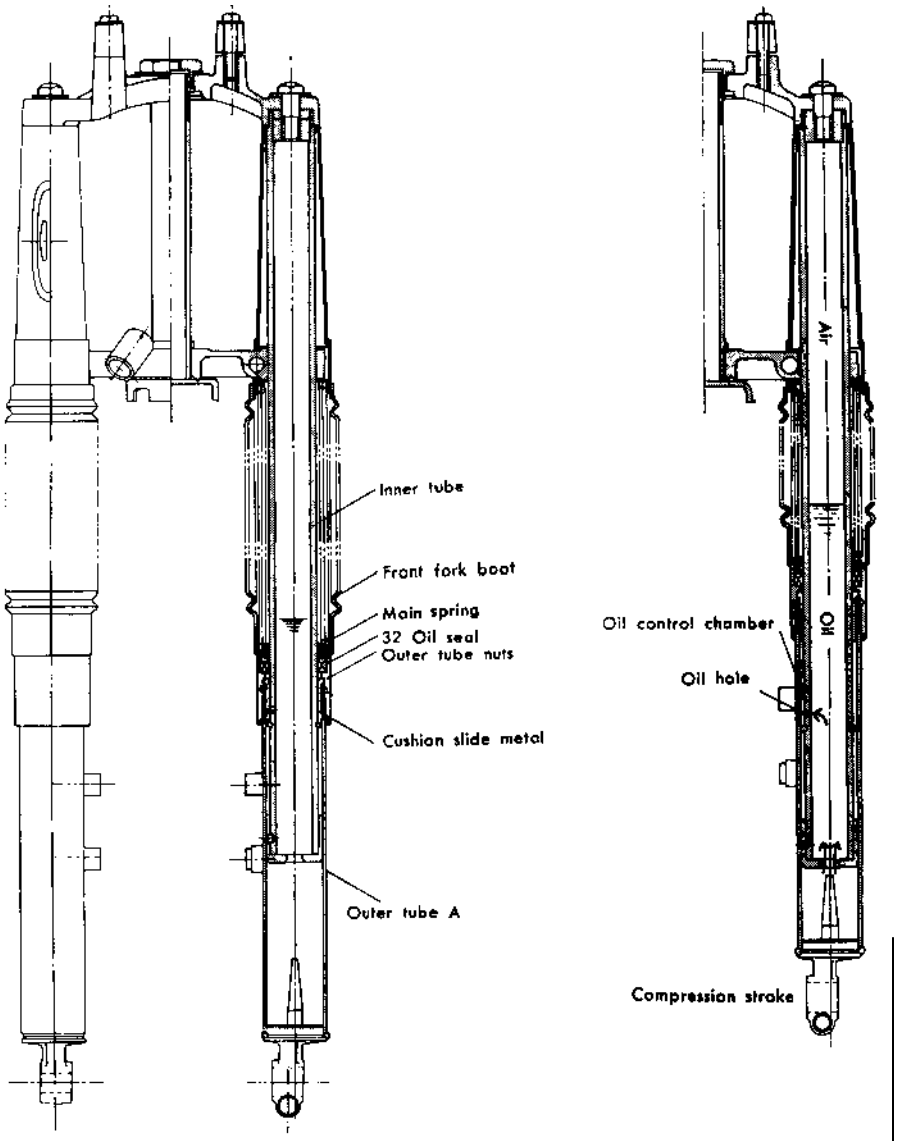


Fig. 98 Operation of front fork

When load is applied to the front fork, the load is received by the fork springs. At the same time, oil in the chamber flows into the oil control chamber. The load is held by resistance from the compressed oil and air, and the shock is absorbed.

Oil lock bars (dampers) are installed inside the bottom of the lower fork tubes to prevent the fork from bottoming when receiving severe shocks.

When oil moves through the gap between the piston oil hole and the oil lock bar, shock is absorbed by resistance of the oil.

The oil lock bar is tapered so that oil resistance increases as the front fork comes to the end of the stroke.

When the fork lengthens, rebound is damped by oil resistance generated by the oil flow from the oil control chamber through the gap between the oil lock bar and piston oil hole. (Fig. 98)

B. Disassembling:

1. Put the cycle on the mainstand and place a supporting block under the engine before disassembling the front fork and front wheel.

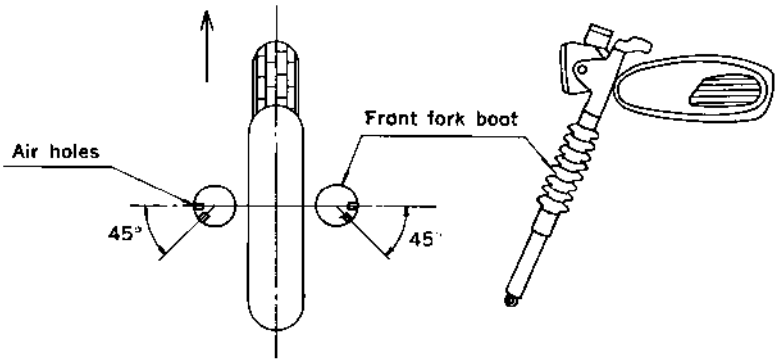


Fig. 99 Assembling front fork

2. Take off the front fender by loosening four hexagonal bolts (8x12) and then turning the outer tube of the fender.

3. The front fork is removed separately by removing upper bracket bolts and lower bracket bolts.

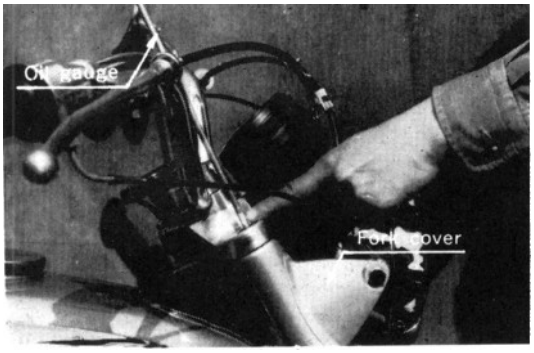


Fig. 100 Checking oil level

C. Assembling and Inspection

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

2. Place the air holes on the rubber boot facing back to prevent dust entering as shown in Fig. 99.

3. Fill each fork tube with 220cc of fork oil. (Do not use hydraulic brake fluid) (Fig. 100) The oil level is checked with an oil gauge: Correct level depths are 45mm (1.77 inches)

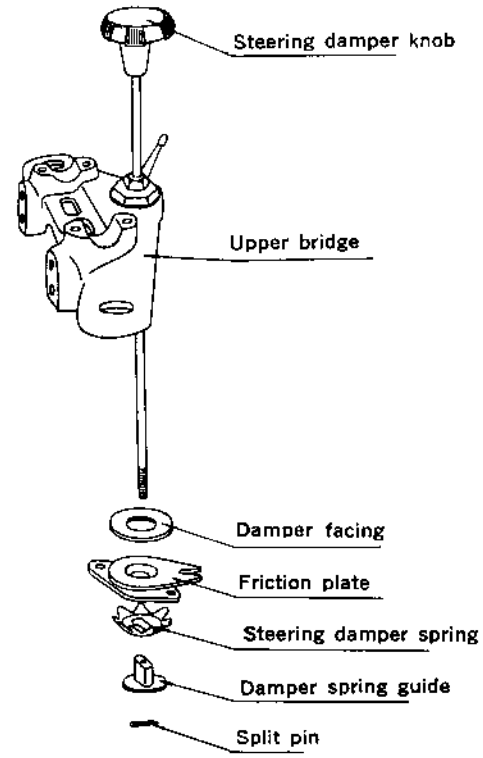


Fig. 101 Component parts of steering damper

D. Removing the steering damper.

1. The steering damper is disassembled by taking off the split pin at the bottom of the steering damper knob. Then loosen the steering damper knob and remove the special nut, friction plate, tension spring, and damper guide plate. (Fig. 101)

11-3 Rear suspension:

A. Construction:

The rear suspension of the 350 GTR is adjustable for land or road conditions by changing the mounting position at the top end of the shock absorber as shown in Fig. 102. The vertical position is stiffer.

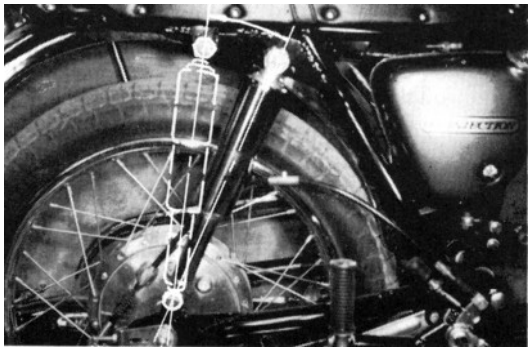


Fig. 102 Adjustment of rear suspension

B. Operation: (Fig. 103)

1. When depressed by shock or load:
   When the unit receives shock or load, the spring is compressed and the damping oil chamber becomes smaller. Oil enters the oil passage, pushes open the valve, and flows into the oil control chamber. Oil flows through the oil hole on the inner tube into the gap between the inner tube and the outer tube.
   Shocks are absorbed by this spring action and oil flow.

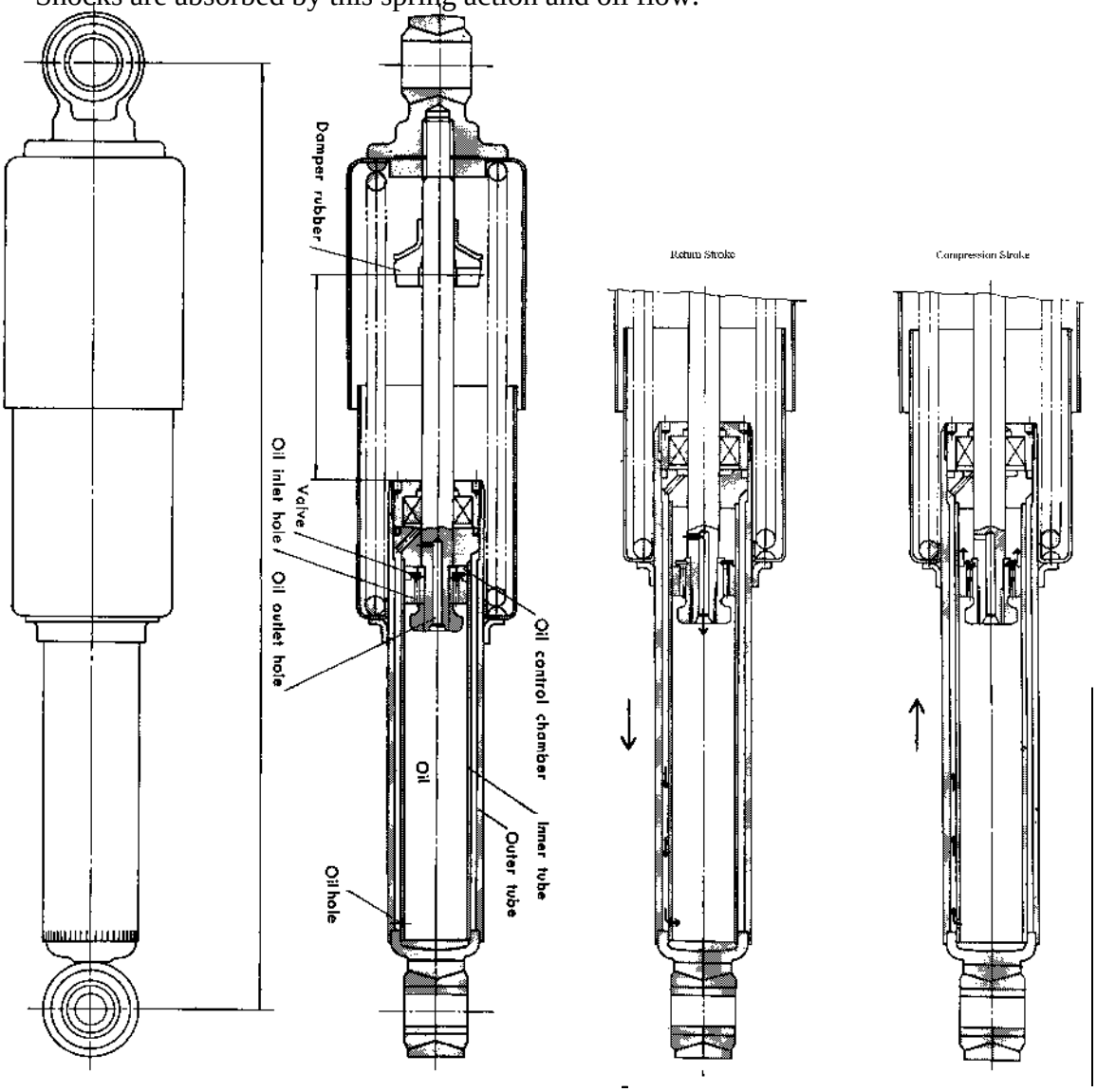
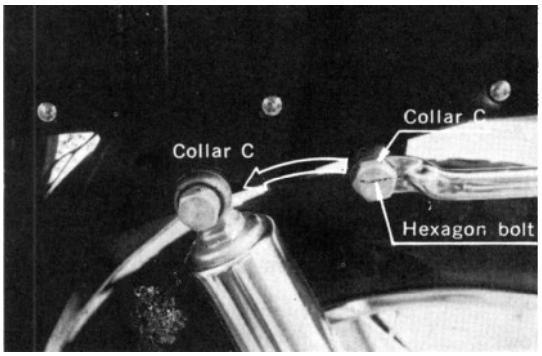


Fig. 103 Rear suspension

2. Return stroke:

   On the return stroke of the unit, the valve on the oil control chamber closes and the damping oil flows out through the oil passage.

   The oil overcomes strong resistance when it begins to flow in the gap between the inner tube and the outer tube and flows slowly back into the damping oil chamber. Rebound is absorbed by this oil flow resistance.



C. Adjustment of rear suspension

   To adjust the rear suspension, remove the suspension mounting bolts and reposition the rear suspension onto the second set of mounting holes. On the left side, the rear hole is also used for the frame handle. The spacer used under the frame handle should be kept on the other bolt when not used for the frame handle.

11-4 Wheels:

A. Construction:

Tires:	Front:	3.25-19, 4ply	
	Rear:	3.25-19, 4ply	
Drums:	Front:	180mm	(7.09 inches)
Rear:		180mm	(7.09 inches)

B. Checking of Tire Pressure and Balance

The 350 GTR has excellent acceleration and high speed performance, so correct tire pressure should always be maintained. Make a thorough check weekly.

Recommended tire pressure:

Front tire 2.0kg/cm^2 (28-30 psi)
Rear tire 2.2kg/cm^2 (30-32 psi)

Balance:

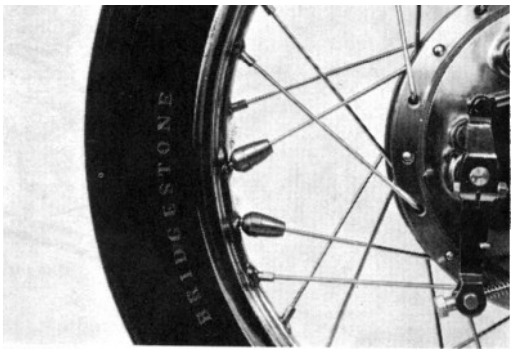


Fig. 105 Balance weights

1. Tire balance is very important to minimize vibration at high speeds.
2 When replacing tires or repairing punctures, check carefully the yellow spot on the side wall of the tire. The tube valve stem should be lined up with this mark. When this yellow mark is not recognizable, mark the position of the tube valve on the tire before removing the tire.
3. Balance weights clamped to the spokes should be attached to their original position. (Fig. 105)
4. To check the wheel balance, spin the wheel several times. A balanced wheel will stop in any position. If the wheel regularly stops in the same position, clamp a balancing weight to the top spoke (the lightest part) in the stopped position. (Fig. 106) Be sure to check the wear and air pressure of tires, bent or deformed rims, looseness of spokes and wear of shafts or bearings before balancing tire.
5. There are two balancing weights of 10 and 30 gram.
6. To fit the weights, tap them lightly onto the nipples by hand.

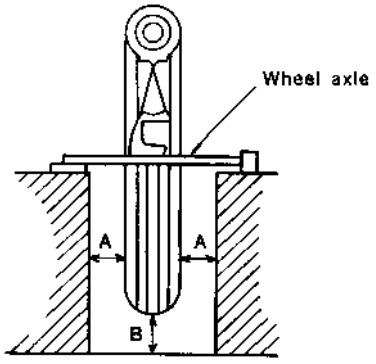
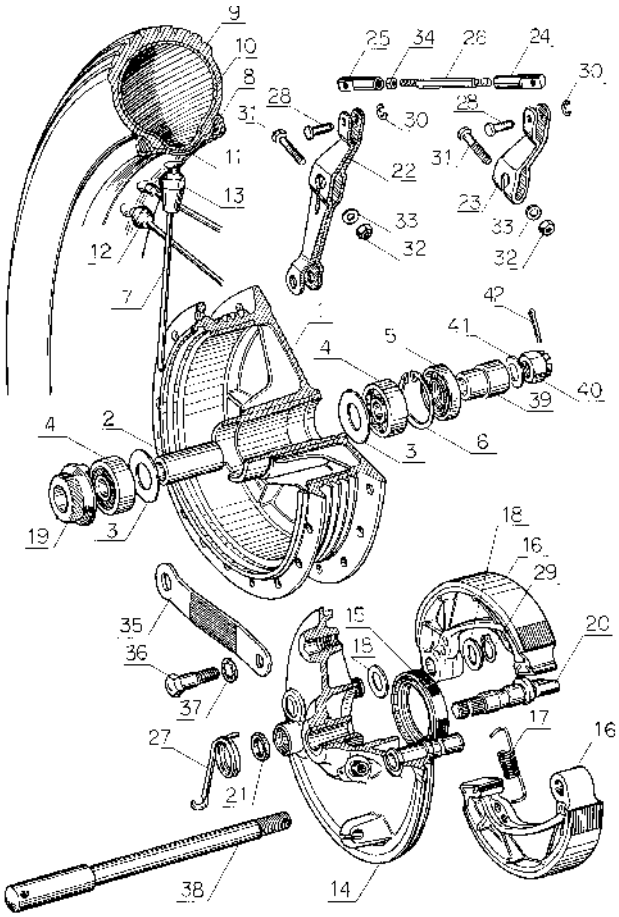


Fig. 106 Wheel balancing

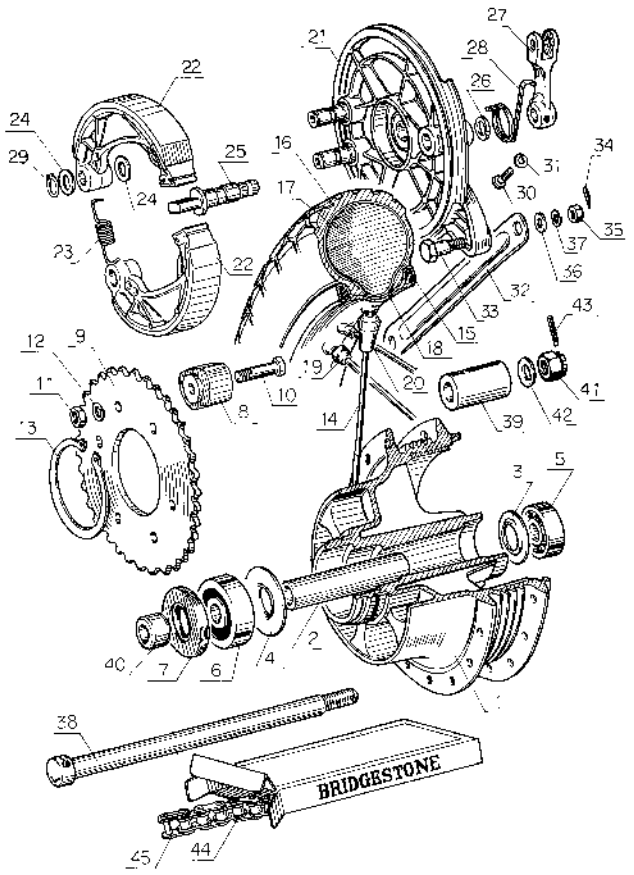
Front Wheel



Component parts of front wheel

Index No.	Part Name	No. Req'd
1	Front brake drum	1
2	Front drum collar	1
3	Collar supporter	2
4	Ball bearing	2
5	22 oil seal	1
6	42 A snap ring	1
7	Front spoke assembly	1
8	Front wheel rim	1
9	Front wheel tire	1
10	Wheel tube	1
11	Tire flap	1
12	Wheel balancing weight A	1
13	Wheel balancing weight B	1
14	Front panel complete	1
15	48 oil seal	1
16	Brake shoe complete	2
17	Brake shoe spring	2
18	14 thrust washer	4
19	Speedometer gear	1
20	Front brake cam	2
21	Cam dust seal	2
22	Brake arm A	1
23	Brake arm B	1
24	Rod end A	1
25	Rod end B	1
26	Brake arm rod	1
27	Front arm return spring	1
28	Brake arm pin	2
29	14 A snap ring	2
30	5 D snap ring	2
31	Hexagon bolt A	2
32	Hexagon nut A	2
33	Plane washer A	2
34	Hexagon nut C	1
35	Front torque link	1
36	Front link bolt	1
37	Internal toothed washer	1
38	Front wheel axle	1
39	Front axle collar	1
40	14 slotted hexagon nut	1
41	14 plane washer	1
42	Split pin	1

Rear Wheel

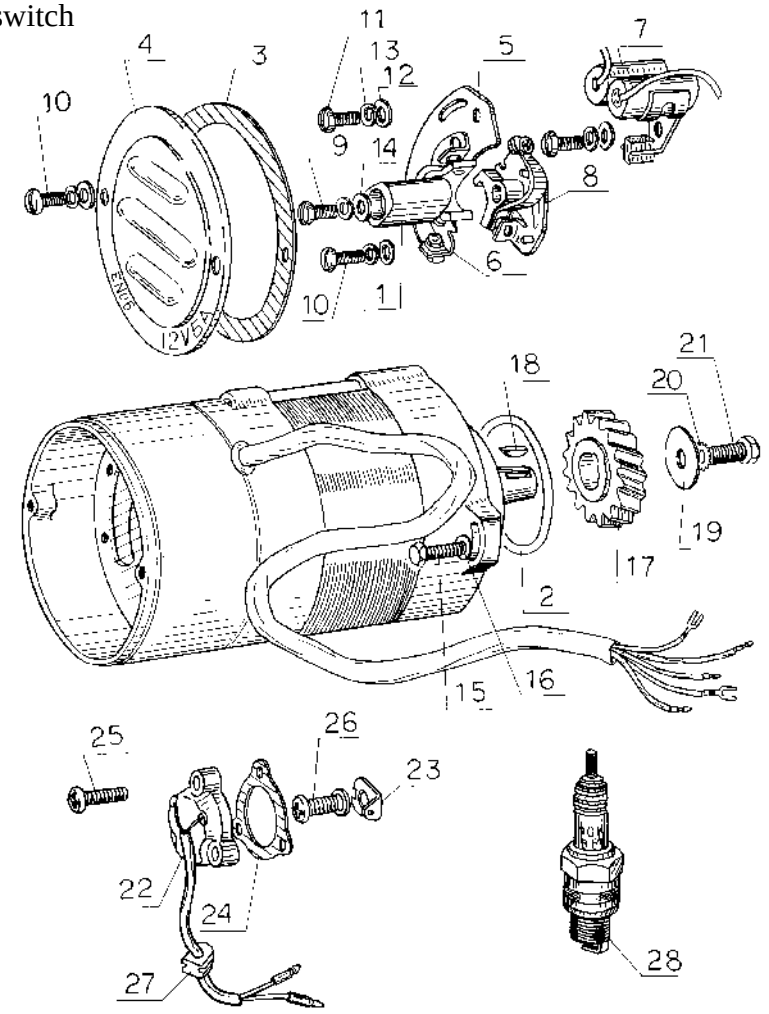


Component parts of rear wheel

Index No.	Part Name	No. Req'd
1	Rear brake drum	1
2	Rear drum collar	1
3	Collar supporter B	1
4	Collar supporter B	1
5	Ball bearing	1
6	Ball bearing	1
7	28 oil seal	1
8	Rear wheel damper	6
9	Driven sprocket	1
10	10×35 hexagon bolt	6
11	Hexagon nut C	6
12	Spring washer	6
13	78 B snap ring	1
14	Front spoke assembly	1
15	Front wheel rim	1
16	Rear wheel tire	1
17	Wheel tube	1
18	Tire flap	1
19	Wheel balancing weight A	1
20	Wheel balancing weight B	1
21	Rear panel complete	1
22	Brake shoe complete	2
23	Brake shoe spring	2
24	14 thrust washer	4
25	Rear brake cam	1
26	Cam dust seal	1
27	Brake arm C	1
28	Rear arm return spring	1
29	14 A snap ring	2
30	Hexagon bolt A	1
31	Spring washer	1
32	Rear torque link	1
33	Rear link bolt	1
34	Latch clip	1
35	Hexagon nut A	1
36	Plane washer A	1
37	Spring washer	1
38	Rear wheel axle	1
39	Rear axle collar	1
40	Oil seal collar	1
41	14 slotted hexagon nut	1
42	14 plane washer	1
43	Split pin	1
44	Roller chain assembly	1
45	Chain joint complete	1

12. ELECTRICAL EQUIPMENT

Dynamo and neutral switch



Index	Part Name	No.
	A.C. dynamo assembly	1
1	Contact breaker cam	1
2	O ring	1
3	Contact breaker cover gasket	1
4	Contact breaker cover	1
5	Contact breaker base	1
6	Left contact breaker assy	1
7	Condenser	1
8	Right contact breaker assy	1
9	Pan head screw	1
10	Pan head screw	5
11	Pan head screw	4
12	Plane washer B	6
13	Spring washer	10
14	4 plane washer	1
15	Hexagon bolt A	1
16	Plane washer A	1
17	Timing gear	1
18	3×13 woodruff key	1
19	6 plane washer	1
20	External toothed washer	1
21	Hexagon bolt A	1
22	Neutral switch case	1
23	Neutral switch contact plate	1
24	Neutral switch gasket	1
25	Cross rec’d pan head screw	3
26	Cross rec’d pan head screw	1
27	Neutral switch wire grommet	1
28	Spark plug NGK B8HS	2

12-1 A.C. Generator:

A. Description:

The generator fitted to the 350 GTR is a six-pole, magnetic, inner-rotor type A.C. dynamo. The dynamo consists of a rotor into which magnets are cast and a stator with an iron core and wires wound around the iron core. The timing gear is fitted on one end of the rotor and a cam which operates the contact breakers is fitted at the other end.

A six-pole, permanent magnet is contained in the center of the rotor. Its rated output of 88 watts is produced at an engine speed of 5000 r.p.m. and the peak output of 98 watts at 8000 r.p.m. The rated output therefore is obtained at the following speeds. (m.p.h.)

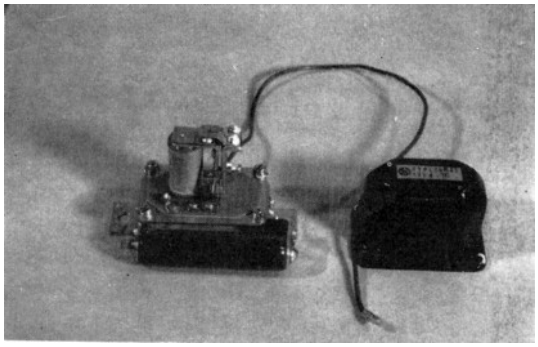
B. Charging current:

The following table shows the engine speed which charges the battery.

Operation of Engine		Speed M.P.H. (K.M.H.)			
	lighting	rpm	4th gear	5th gear	6th gear
Day time	0%	1850	19 (30)	22 (35)	25 (40)
	10%	2550	26 (41)	30 (48)	34 (55)
Upper beam	0%	2300	23 (37)	27 (43)	30 (48)
	10%	2850	29 (46)	34 (54)	39 (62)
Lower beam	0%	2250	23 (37)	27 (43)	30 (48)
	10%	3200	32 (52)	38 (61)	43 (69)

12-2 Voltage Regulator

The 350 GTR is equipped with a voltage regulator. (Fig. 107) The charging current generated by A.C. dynamo is regulated by the voltage regulator and the regulated current is shown below. (Fig. 108)



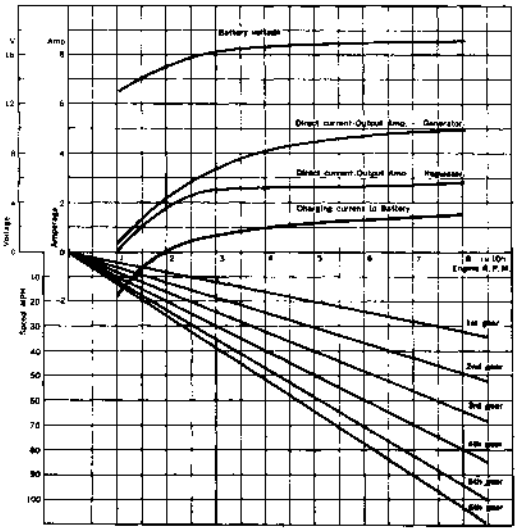


Fig. 108-1 Daytime driving (no lights)

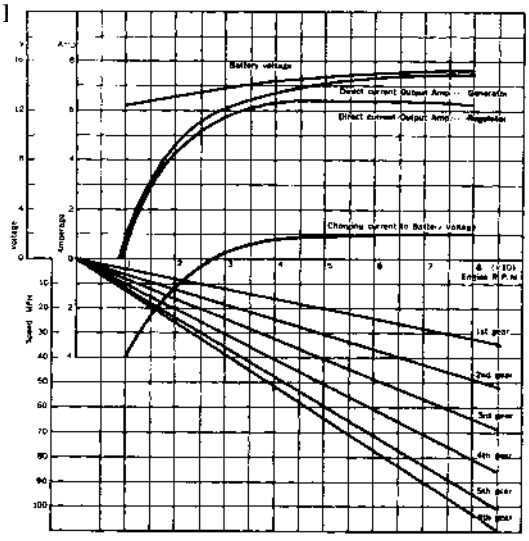


Fig. 108-2 Nighttime driving (upper beam)

12-3 Ignition system

A. Contact Breakers:

1. Description:

Two contact breakers are fitted on the A.C. dynamo. The A.C. dynamo is turned through the pinion gear, the driven gear and a timing gear.

The timing gear turns one complete revolution when the crankshaft turns one full revolution. The timing gear and point cam are fixed on the dynamo shaft and turn with it.

The engine of the 350 GTR is a two-stroke, twin cylinder engine so two explosions occur every time the crankshaft makes one full revolution.

Because the speed of the A.C. dynamo is the same as the crankshaft, contact points must supply two sparks for each revolution of the dynamo. Therefore, two sets of contact breakers are installed.

One contact breaker opens every 180° (1/2 turn) of cam rotation and high voltage current is induced in the ignition coil.

2. Maintenance:

Contact breaker points should be kept bright and smooth.

If point surfaces are rough or pitted, polish surfaces of both points with a point file. If point surfaces are excessively rough or pitted, polish lightly and evenly on an oil stone until the surfaces are smooth.

After polishing, wash the point surfaces with gasoline or thinner and wipe dry with a clean cloth.

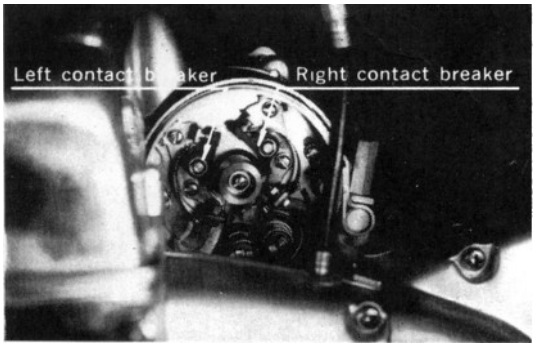


Fig. 109 Contact breakers

B. Adjusting the gap :

Turn the engine over until the point cam is holding the point at its widest position. Loosen the two lock screws of the breaker and adjust the gap to 0.3 – 0.4mm (0.012 – 0.016 inches) with a thickness gauge, by sliding breaker base slowly. (Fig. 109) Repeat for other points.

C. Checking and Adjusting Ignition Timing

Checking

Remove the 8×12 hexagonal bolt on the front of the crank case and install timing bolt and pin. (Same as 175)

Connect a continuity light to the points. Put the transmission in gear and rotate the rear wheel forward. If the continuity light goes out when the timing button snaps into the hole in the crankshaft, the ignition timing is correct.

Adjustment

Timing is adjusted by a point plate that moves both right and left points at the same time. The point gap settings are the same as on the Bridgestone 175 (.012-.016) but the generator does not turn for adjusting the timing.

Use the same timing bolt and pin used on Bridgestone 175's to locate the firing mark. Turn the point plate until the right point breaks at the timing mark. Check the left points, which should also now be in time. If not, turn the point plate approximately half the distance it is off of the timing mark to balance both the left and right sides as close as possible to the two timing marks.

To equalize for precision timing, open the gap slightly on the retarded side to speed it up; close the gap slightly on the advanced side to slow it down. Caution: After adjustment, the point gaps must be within the .012 – .016 inch tolerances.

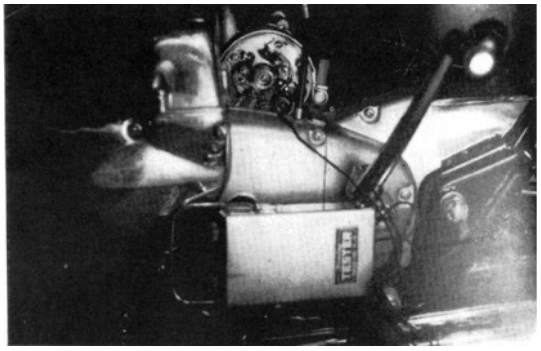


Fig. 110 Checking ignition timing

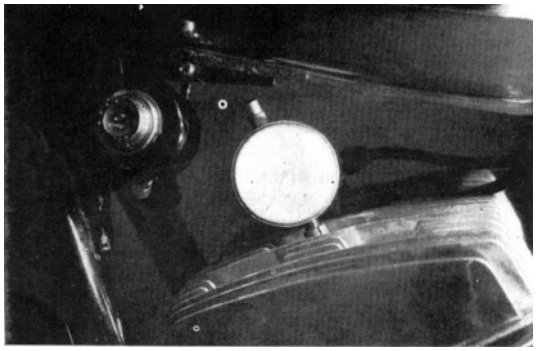


Fig. 111 Finding ignition timing

Note:	B.T.D.C.		23°	24°	25°	26°
	Piston distance	(m/m)	2.82	3.07	3.33	3.60
		(inches)	0.11	0.12	0.13	0.14

12-4 Selenium Rectifier:

The selenium rectifier converts A.C. current generated by the generator into D.C. current and charges the battery. (Fig. 112, 113)

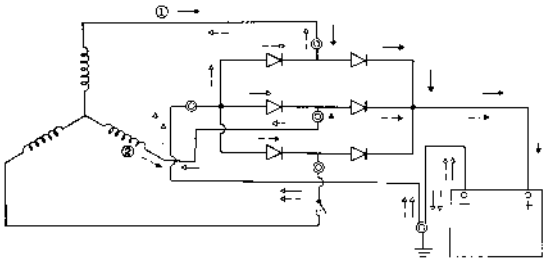


Fig. 112 Key position 1

When ① is positive cycle, ② changes into negative cycle and vice versa.

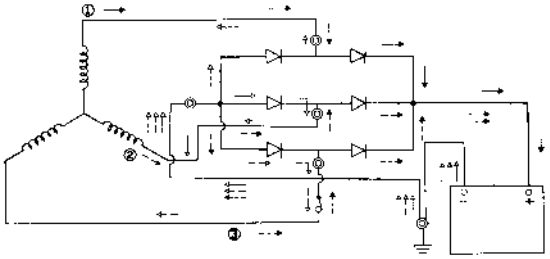


Fig. 113 Key position 2

When ① is positive cycle, ② or ③ changes into negative cycle.
② is positive cycle, ① or ③ negative.
③ is positive cycle, ① or ② negative.

A. Special Attention:

Take care not to wet the rectifier when washing the motorcycle or run the engine without the rectifier connected.

B. Inspection

1. Inspection is carried out easily by flowing 12-volt current in the reverse direction as shown in Fig. 114.
   If the bulb lights in the circuit, the rectifier is defective.
2. Insulation resistance should be more than 10Meg ohm with a 500V tester.

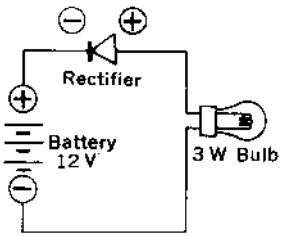


Fig.114 Inspection of rectifier

12-5 Condenser

A. Inspection

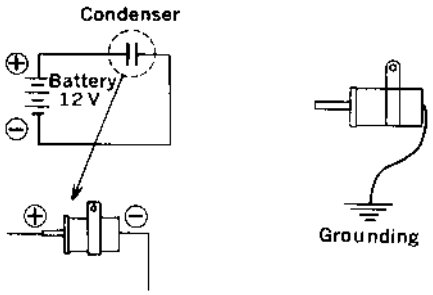


Fig. 115 Inspection of condenser

The capacity and insulation resistance of the condenser should be checked with an electric tester, but it can also be checked easily in the following manner.

Pass the current to the condenser by connecting the wire of the battery, and then ground the condenser wire.

If there is a sharp spark between the wire and the ground, the condenser is in good condition. (Fig. 115)

Condenser capacity 0.2 – 0.3 μF
Insulation resistance more than 5MΩ

12-6 Ignition coil inspection

The ignition coil requires no maintenance.
When testing the ignition coil, perform with an electro tester.
If the spark jumps 9mm or more, the coil is in good condition.

Checking	Standard figure
Sparking	Over 9mm at 1500 rpm
Insulate resistance	500 MΩ
Resistance of secondary coil	1 MΩ

12-7 Spark plug

A. Description

The standard spark plug used is N.G.K. B-8H whose sectional structure is shown in Fig. 116.
The spark gap should be 0.5 – 0.6mm (0.020 – 0.024 inches),

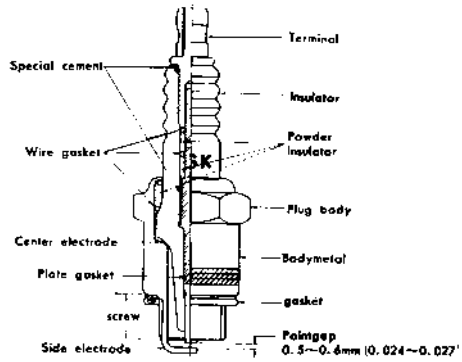


Fig. 116 Spark plug

B. Inspection and Adjustment

Check the spark plug every 3,000km (2,000 miles).
When the electrode becomes worn or coated with carbon, clean or replace it.
A worn or dirty plug produces weak sparks or none and causes hard starting, low output, irregular engine power, etc.

1. When too cold a plug is used.
   Oil will foul the electrode or heavy carbon deposits will form.
   Change to a "hotter" type plug. (Lower number)
2. When a correct plug is used.
   The plug remains nearly white, or light brown (sometimes greyish) deposits form.
3. When too hot a plug is used.
   Absence of deposits, bleached appearance of the insulator, and sometimes blisters indicate too hot a plug is being used.
   Change to a colder plug. (Higher number)
4. See chart below for plugs recommended.

BRAND	STANDARD	IF PLUG FOULS EASILY (Slow Speed)	IF PLUG OVERHEATS EASILY (High Speed)
NGK	B-8H	B-7H	B-9H
CHAMPION	L-58R	L-5	L-56T
BOSCH	W310T16	W240T	W340T16
LODGE	R47	3HN	R49

12-8 Battery

The capacity of the battery is 12V-6AH.

The battery should be checked periodically. Check the level of the electrolyte and the specific gravity. Specific gravity of the solution should be 1.260-1.280 at 20° centigrade (68° F) when the battery is fully charged.

A. 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
1.260	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 wall.

2) Read the hydrometer at A (upper level of contact) instead of B (lower level) as shown in Fig. 117.

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

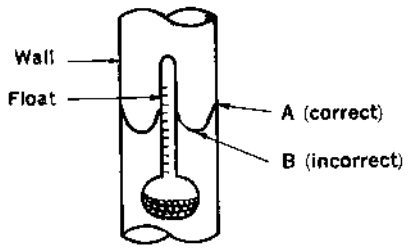


Fig. 117 Hydrometer

Relation between specific gravity and temperature of solution.

0° C 30° F	5° C 42° F	10° C 50° F	15° 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	1.215	1.212	1.208	1.205	1.202	1.198
1.233	1.230	1.227	1.223	1.220	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	1.290	1.287	1.284	1.280	1.276	1.273	1.269	1.265	1.261

B. Storage of dry charged battery.

Dry charged batteries, 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	Charging Rate
One Month	0%	100%	0.6Ampere × 10Hour
Three Month	15%	85%	0.6Ampere × 12Hour
Six Months	30%	70%	0.6Ampere × 14Hour
One Year	50%	50%	0.6Ampere × 20Hour

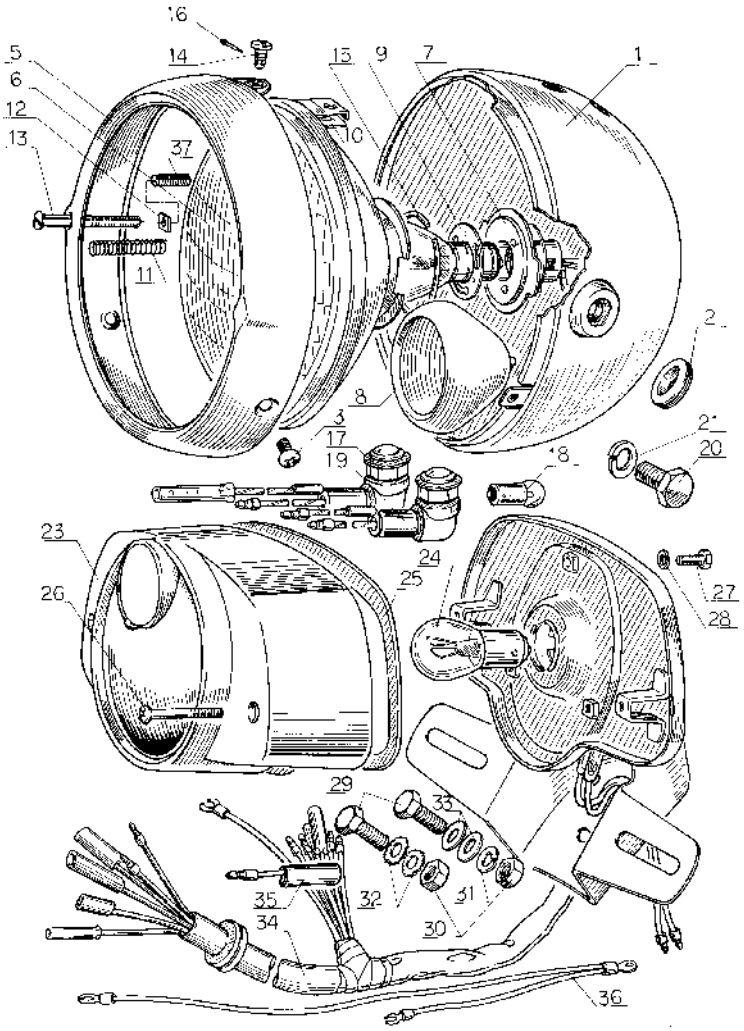
C. Initial Charging Rate

1) Fill the battery with sulfuric acid.
2) Wait 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 below until all cells are gassing freely and cell voltage and specific gravity stop rising and remain constant.
   The total charging time will be 10 hours.
   During charging, battery temperature should be kept below 45°C (113°F).
   If the temperature exceeds 45°C., stop charging for a time until the temperature falls below 45°C.

Proper charging 0. 6 Ampere × 12 hour
Quick charging 3 Ampere × 1 hour

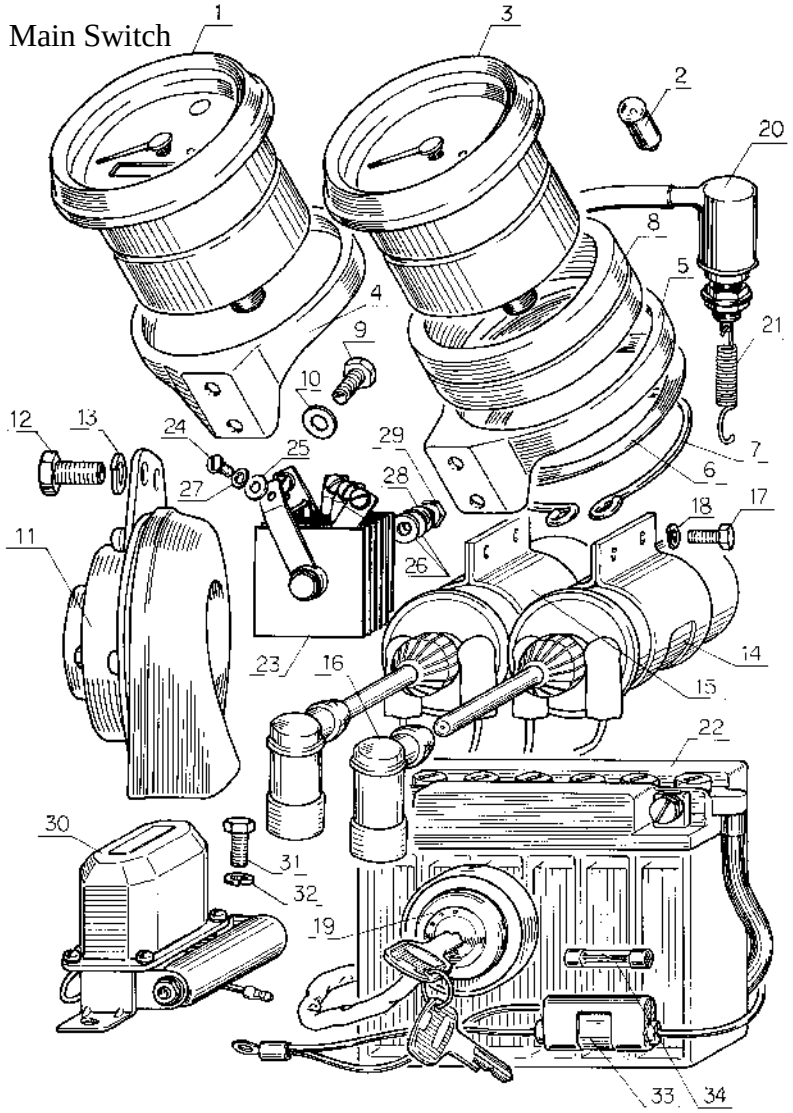
12-9 Lights

A. Head lamp • Tail lamp



Index No.	Part Name	No. Req'd
1	Head lamp body	1
2	Head lamp grommet	1
3	Cross oval head screw	2
4	Head lamp assembly	1
5	Head lamp rim assy	1
6	Head lamp lens comp	1
7	Socket complete	1
8	Shield rubber	1
9	Head lamp bulb	1
10	Quick acting nut	2
11	Adjuster spring	1
12	Square nut	1
13	Adjuster screw	1
14	Holder screw	2
15	Socket set ring	1
16	Split pin	2
17	Neutral lamp assembly	1
18	Speedometer bulb	2
19	High beam lamp assy	1
20	Hexagon bolt A	2
21	Spring washer	2
	Tail lamp assembly	1
23	Tail lamp lens	1
24	Tail lamp bulb	1
25	Tail lamp gasket	1
26	Cross oval head screw	2
27	Hexagon bolt A	3
28	Spring washer	3
29	Hexagon bolt A	3
30	Hexagon nut A	3
31	Spring washer	2
32	External toothed washer	2
33	Plane washer A	8
34	Wire harness	1
34	Wire harness	1
35	High beam wire	1
36	Body earth wire	1
37	Cover tube	1

B. Speedometer • Ignition Coil • Main Switch



Index No.	Part Name	No. Req'd
1	Speedometer assembly	1
2	Speedometer bulb	3
3	Tachometer assembly	1
4	Left meter holder	1
5	Right meter holder	1
6	Speedometer washer	2
7	Speedometer set spring	2
8	Meter cushion rubber	2
9	Hexagon bolt A	4
10	Plane washer A	4
11	Horn assembly	1
12	Hexagon bolt A	2
13	Spring washer	2
14	Left ignition coil assy	1
15	Right ignition coil assy	1
16	Plug cap complete	2
17	Hexagon bolt A	4
18	Spring washer	4
19	Main switch assy	1
20	Stop switch complete	1
21	Stop switch spring	1
22	Battery	1
23	Rectifier assembly	1
24	Pan head screw	5
25	Plane washer A	5
26	Plane washer A	2
27	Spring washer	5
28	Spring washer	1
29	Hexagon nut C	1
30	Regulator assembly	1
31	Hexagon bolt A	2
32	Spring washer	2
33	Fuse assembly	1
34	Fuse	2

C. Bulbs

Lamps	Wattage	Lamps	Wattage
Head lamp	12V-35/30W	5th Gear Indicator lamp	12V-3W
Speedometer lamp	12V-3W	Headlight Beam lamp	12V-3W
Tachometer lamp	12V-3W	Tail lamp	12V-7W
Neutral Indicator lamp	12V-3W	Stop lamp	12V-23W

D. Adjustment of head light beam

The headlight setting for high and low beams is important. This should be kept in proper adjustment. For this purpose, a cross should be drawn on a light colored wall at the same height as the center of headlamp.
The motorcycle should stand on its wheels about 33 feet (10 meters) from the wall, and be loaded by the rider.
Switch on the high beam and set the headlamp so that the beam strikes the center of the cross.
Switch to the low beam; the upper edge of the illuminated area should be about 3.5 inches (9 cm) below the cross: Adjust as required. (Fig. 118)
To adjust beam left and right, screw in or out the screw at the left side of the head light rim.

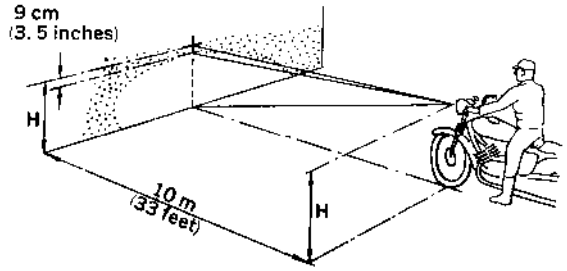


Fig. 118 Adjustment of headlight beam

12-10 Main Switch

The ignition switch is combined with the lighting and horn switches and divided into four positions and operated as follows.

Combination Table

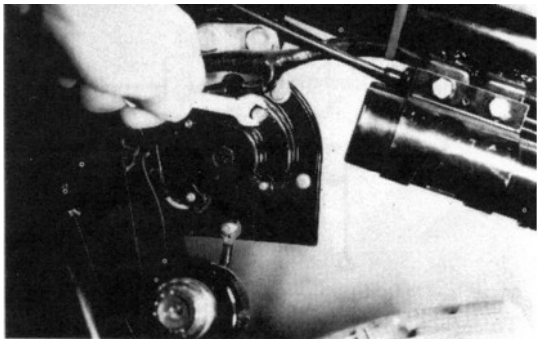
	Battery	Ignition coil	Head light	Tail light	Horn	Stop light	5th gear Indicator	Neutral	High beam	Parking
1	**O**	**O**			**O**	**O**	**O**	**O**		
2	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**
3	**O**									**O**

Position of key

0	For parking (Entire electric circuit is switched off)	Key can be pulled out
1	For daytime driving (Engine can be started and horn, stop light, neutral lamp, 5th gear indicator lamp are in circuit)	Key cannot be pulled out
2	For nighttime driving (Headlight, tail light, stop light, neutral lamp, high beam lamp, 5th gear indicator lamp, speedometer lamp, horn are in circuit)	Key cannot be pulled out
3	For parking (Parking light is in circuit)	Key can be pulled out

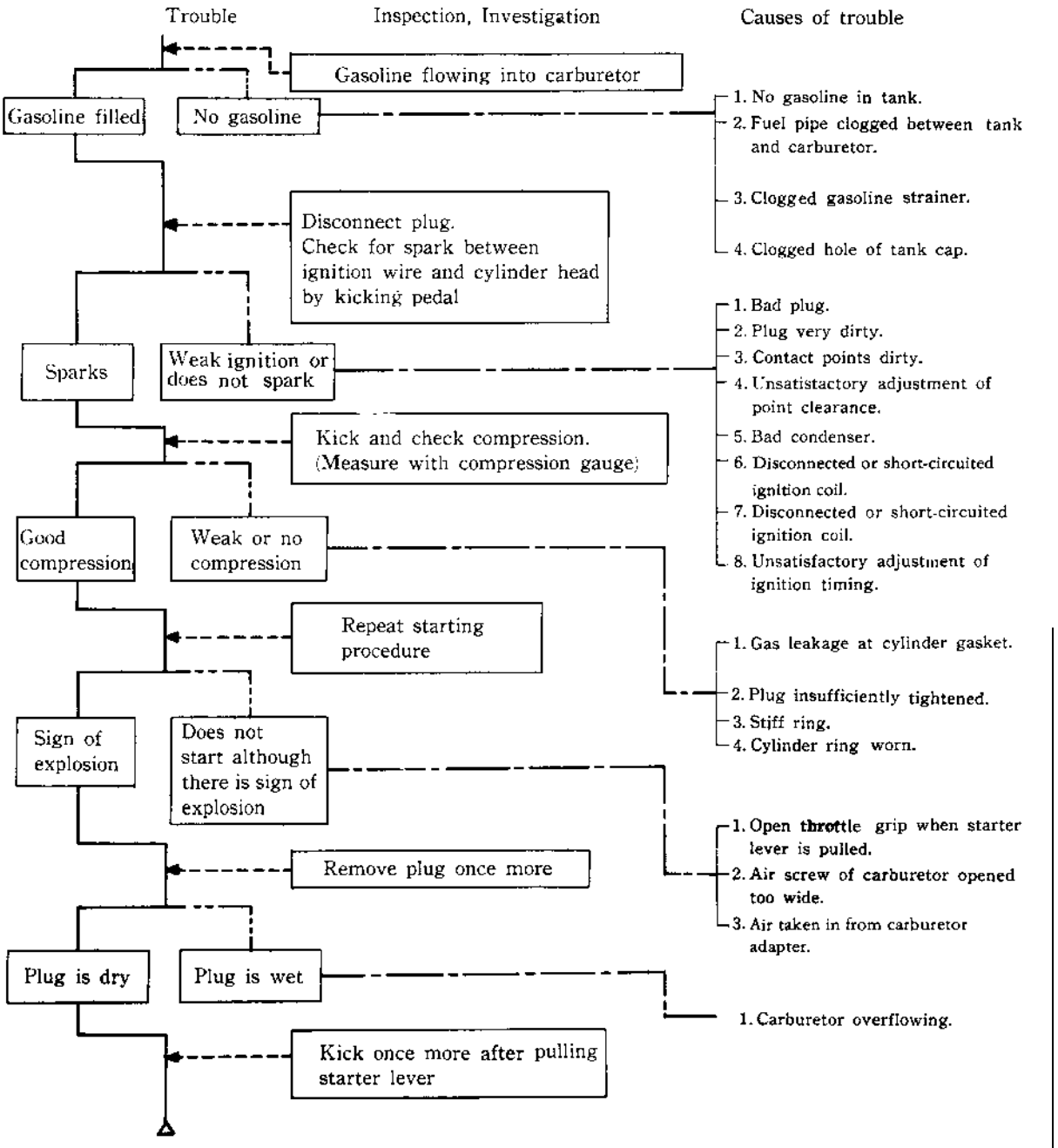
12-11 Horn

Adjust horn volume by screwing the adjusting screw. (Fig. 119)
When horn does not work correctly, the trouble may be disconnected wires, damaged contact points or a short circuited coil in the horn. Improper operation can also be caused by a defective horn switch, or a defective horn.



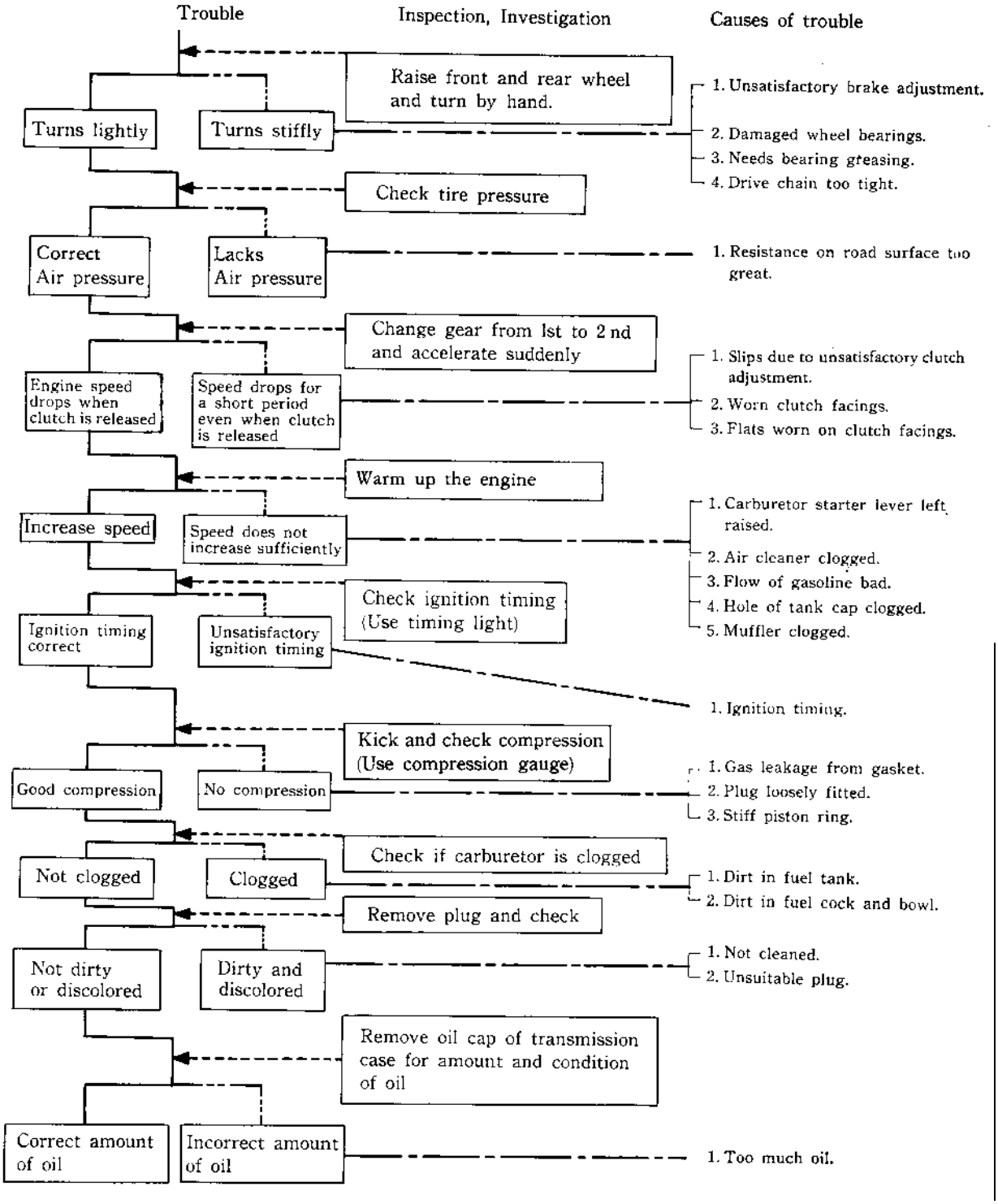
13. TROUBLE SHOOTING:

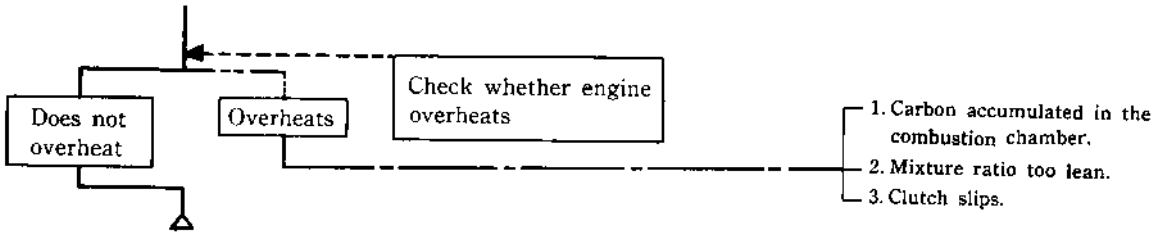
13-1 Engine is hard to start.



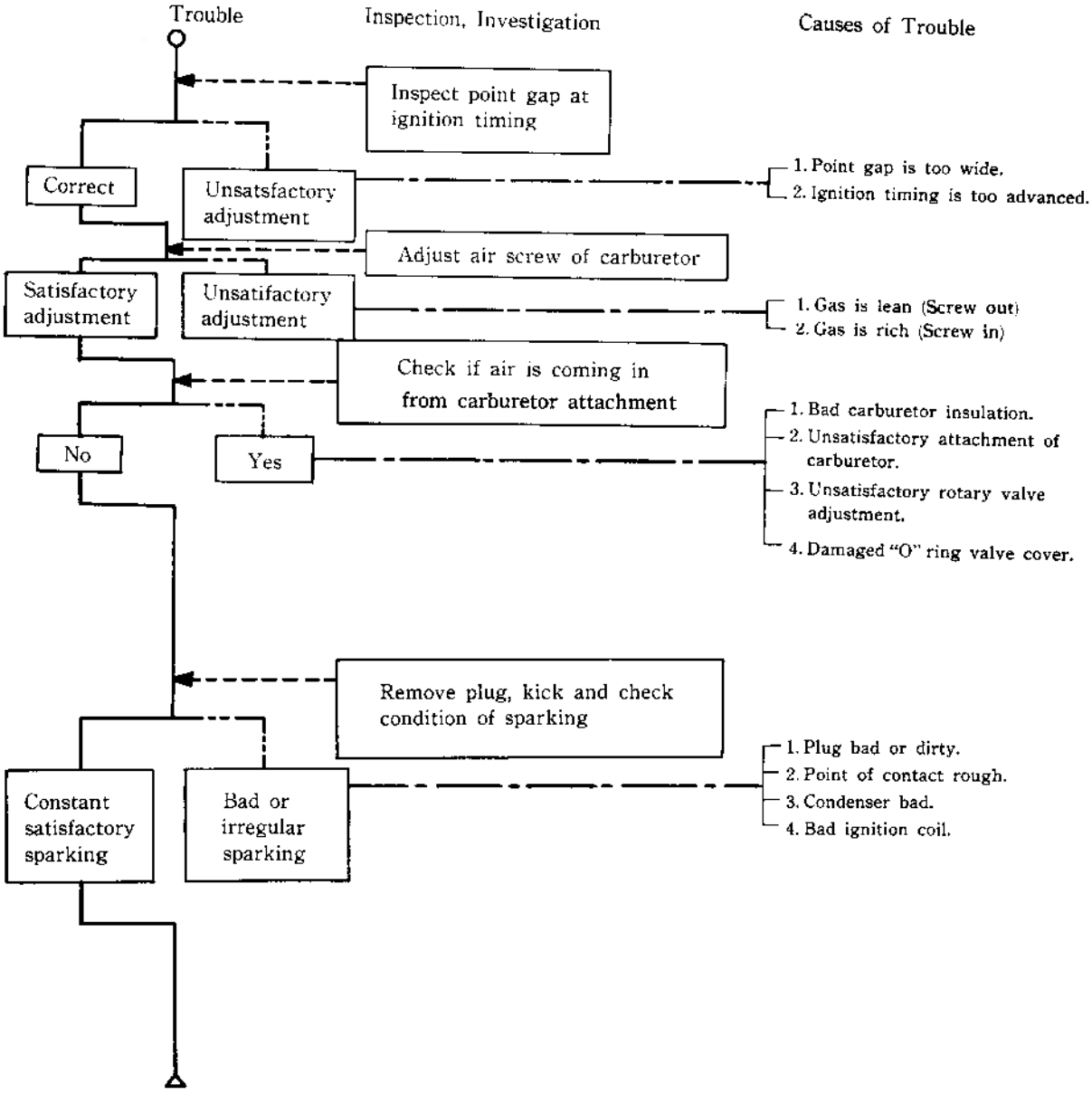
Fuel, spark and compression are basic points for engine operation.
To locate engine trouble first check these points.

13-2 High engine revolution cannot be obtained.
Insufficient power.



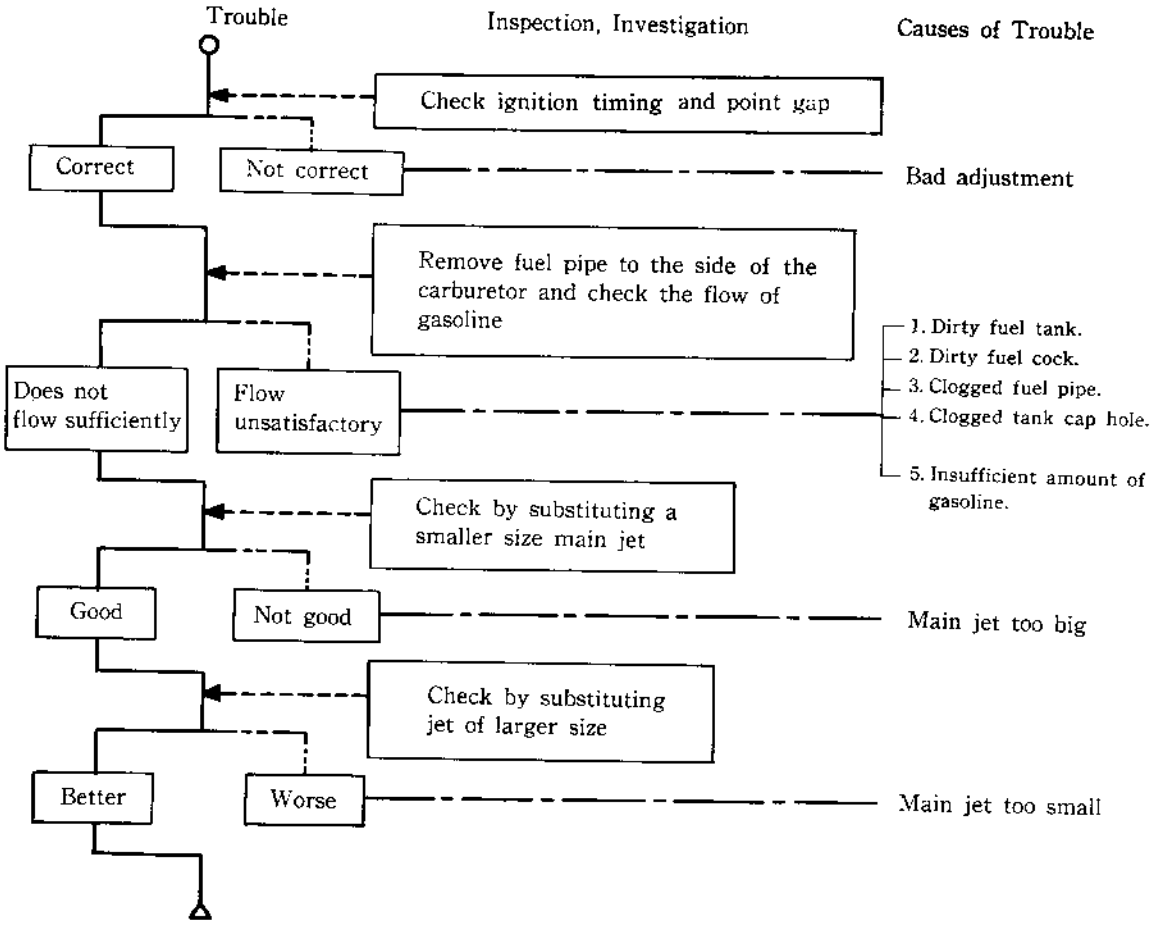


13-3. Unsatisfactory R.P.M.

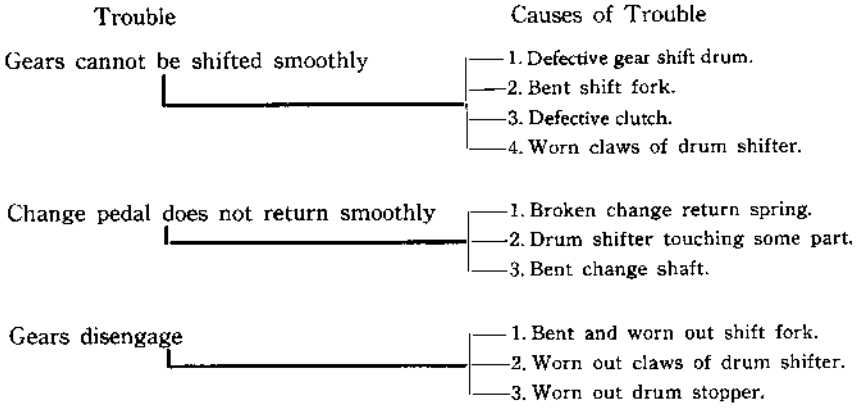


13. TROUBLE SHOOTING

13-4 Irregular Revolutions (At medium and high speeds).



13-5 Unsatisfactory gear shifting.



13-6 Common Failures, Their Causes and Correction

One cylinder goes dead. This is generally due to electrical, fuel or mechanical failure.

A. Possible causes of electrical failure
1. Spark plug fouled or in poor condition.
2. Contact breaker points fouled or out of adjustment.
3. Bad condenser.
4. Weak ignition coil.
5. Ignition timing incorrect.
6. Cable disconnected between spark plug cap and high tension wire of ignition coil.
7. Damaged or short circuited wiring.

B. Possible causes of fuel failure.
1. Throttle valves not opening synchronously.
2. Clogged fuel line (fuel pipe, fuel cock bowl, tank cap, etc.)
3. Improperly adjusted air screw of carburetors.
4. Clogged jet holes of carburetors.

C. Possible causes of mechanical failure.
1. Worn cylinder, piston or piston rings.
2. Air leak around carburetor.
3. Cracked rotary disc valve.

A. Electrical failure

Possible causes	Remedies
1. Spark plug fouled or in poor condition	Remove spark plug and ground it to the cylinder fin, and crank engine, Spark must then flash. If spark plug is fouled, replace it with the plug of the other cylinder and recheck.
2. Weak ignition coil	Defective ignition should be checked carefully with an electrotester. Before this test, remove spark plug, pull ignition cable out of spark plug adapter, hold cable at a distance of about 6 mm (0.236 inches) from the cylinder fin; If no sparks flash between cable and fin, the failure may be due to other causes including ignition coil.
3. Incorrect contact breaker point gap Breaker points dirty, oxidized or burned	Correct gap is 0.3–0.4 mm (0.012–0.016 inches). Clean both points with a fine file.
4. Excessive contact firing or badly burned contacts due to defective condenser	Check capacity of condenser with tester, replace it with new one when necessary. Correct capacity: 0.25±0.3 μF (micro-Farad) Insulation resistance : Over 5 MΩ (Meg-ohm)
5. Checking ignition timing.	The main cause of failure is incorrect ignition timing. To adjust ignition timing, refer to page 57.

B. Failures in fuel system

* Engine does not run smoothly at low and middle speeds

Possible causes	Remedies
1. Clogged fuel line	Check the fuel flow from fuel tank to carburetor.
2. Improperly adjusted pilot air screw	Correct adjustment is 2 turns out,
3. Throttle valves not opening synchronously	Adjust both slow adjuster screws and then open the throttle grip slightly until the "O" mark of throttle valve matches the upper line of ventilator.
4. Defective carburetor	Air-blast all passages and jets and reassemble parts properly. Replace gasket with a new one.

* Engine does not run smoothly at high speeds.

1. Fuel tank air vent hole plugged	Air blast the hole
2. Clogged main jet	Air blast the hole
3. Loosely fitting carburetor to engine	Tighten

C. Mechanical failures

1. Insufficient compression	Check the compression Standard : 8.5–9.5 kg/cm^2 (121-135 lbs/in^2) Permissible Limit : 6.3 kg/cm^2 (90 lbs/in^2)
2. Damaged rotary disc valve	Replace
3. Worn crankshaft bearings	Replace
4. Worn oil seals of crankcase	Replace

14. TOLERANCES AND FITS

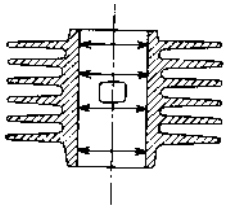
A. Engine

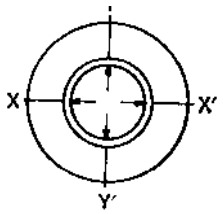
	Standard	Permissible Limit
1. Cylinder compression	8.5–9.5 kg/cm^2 (121-135 lbs/in^2)	6.3 kg/cm^2 (90 lbs/in^2)
2. Maximum speed	Over 160 km/h (100 mph)	

B. Cylinder

1. Inside diameter	61.005–61.025 mm (2.4018–2. 4026 inches)	61.1 mm (2.4055 inches)

Measure at 4 points along the wall

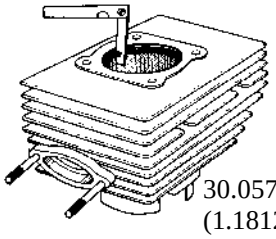




2. Thickness of cylinder head gasket	0.95–1.05 mm (0.037–0.041 inches)	
3. Nuts (Fitting torques)	250–300 kg/cm^2 (217–260 lbs/in^2)	

C. Piston

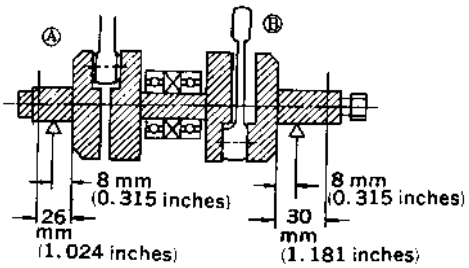
1. Maximum diameter at skirt	60.956–60.985 mm (2.3959–2.3967 inches)	60.85mm (2.3914 inches)
2. Maximum clearance between piston & cylinder	0.04–0.05 mm (0.0016–0.0019 inches)	0.15 mm (0.0059 inches)
	(Select piston and cylinder to get above clearance when replacing with new one)	
3. Outside diameter of the piston pin	16.994–17.00 mm (0.6678–0.6681 inches)	16.90mm (0.6288 inches)
4. Piston ring free gap	0.15–0.35 mm (0.0059–0.0138 inches)	1.0 mm (0.0393 inches)



D. Crankshaft & Rotary Disc Valve

1. Inside diameter of big end of connecting rod	30.008–30.017 mm (1.1793–1.1797 inches)	30.057 mm (1.1812 inches)
2. Inside diameter of small end of connecting rod	21.00–21.013 mm (0.8253–0.8258 inches)	21.053 mm (0.8274 inches)
3. Thrust side play of small end of connecting rod		4.2 mm (0.1654 inches)
4. Thrust side play of big end of connecting rod	0.l ~ 0.3 mm (0.004 ~ 0.012 inches)	
5. Outside diameter of left crankshaft (A)	24.004–25.009 mm (0.9434–0. 9829 inches)	23.98 mm (0.9424 inches)

	Standard	Permissible Limit
6. Outside diameter of right crankshaft (B)	21.99–22.005 mm (0.8642–0.8648 inches)	21.97 mm (0.8634 inches)

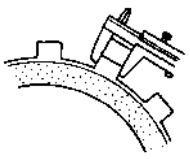


7. Up and down play of crankshaft	Less than 0.02 mm (0.0008 inches)	0.15 mm (0.0059 inch)
8. Thickness of rotary disc valve	3.95–4.00 mm (0.1552–0.1572 inches)	

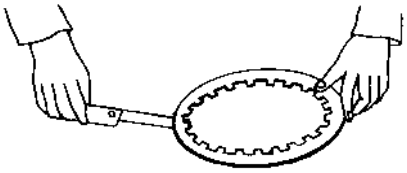
E. Clutch

1. Type	Multiple discs (seven facings), dry type	
2. Distortion of clutch friction plate	Less than 0.1 mm (0.0039 inches)	0.2 mm (0.0078 inches)
3. Thickness of friction plate	2.95 – 3.00 mm (0.1161– 0.1181 inches)	
4. Width of teeth of friction plate	.581	
5. Distortion of inner plate	Less than 0.2 mm (0.0078 inches)	
6. Distortion of outer plate	Less than 0.2 mm (0.0078 inches)	
7. Free length of clutch spring	30.3–30.9 mm (1.1908–1.2144 inches)	29 mm (1.1397 inches)

F. Number of teeth

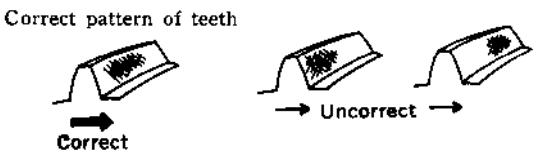


Inspecting width of teeth of friction plate



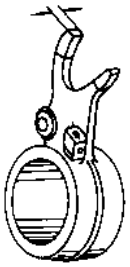
Inspecting distortion of inner plate

1. Drive pinion gear	21	11. 3rd gear B	25
2. Driven gear	65	12. 4th gear B	23
3. 1st gear A	13	13. 5th gear B	23
4. 2nd gear A	17	14. 6th gear B	22
5. 3rd gear A	20	15. Drive sprocket	15
6. 4th gear A	23	16. Driven sprocket	36
7. 5th gear A	27	17. Kick gear	22
8. 6th gear A	29	18. Kick starter gear A	15
9. 1st gear B	32	19. Kick starter gear B	30
10. 2nd gear B	28	20. Oil pump gear B	25



G. Fork guide

	Standard	Permissible Limit
1. Thickness of fork guide	5.35–5.45 mm (0.2103-0.2142 inches)	5.1 mm (0.2004 inches)



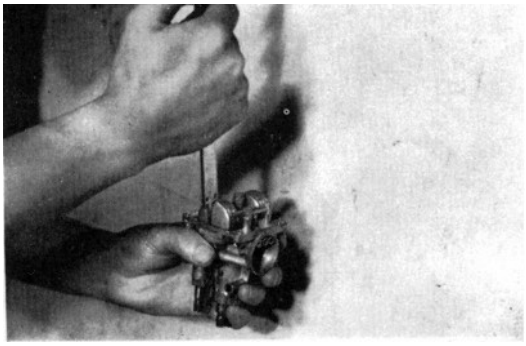
Measuring thickness of fork guide

H. A.C. Generator & Ignition coil

1. Rated output of A.C. Generator	62 Watt/2000 Engine rpm 88 Watt/5000 Engine rpm 98 Watt/8000 Engine rpm
2. Ignition timing	23–26° Before Top Dead Center (B.T.D.C.)
3. Contact breaker point gap	0.3–0.4 mm (0.012–0.016 inches)
4. Condenser capacity	0.22–0.28 micro Farad (μF)
5. Ignition coil	
Type	HS 12B
Sparks	Over 9 mm at 1,500 Engine rpm
Insulation resistance	Over than 500 Meg Ohm (MΩ)
6. Spark plug	
Type	B-8H or B-9H
Plug gap	0.5–0. 6 mm (0.020–0.024 inches)

I. Carburetor

1. Type	MikuniVM26SC
2. Throttle valve cut away	2.0 mm
3. Main jet	No. 130
4. Jet needle	4D 3-2/5
5. Pilot jet	No. 22.5
6. Air screw turn-back	2
7. Float level	24±1.0mm(0.98–0.91 inches)



J. Oil pump

	Standard	Permissible Limit
1. Min. plunger stroke	0.40–0.45 mm (0.016–0.018inches) (60cc/h~68cc/h) at 5000 Engine rpm	Plunger stroke is measured with a dial gauge
2. Max. plunger stroke	3.6~3.73 mm (0.142–0.147 inches) (600cc/h~626cc/h) at 5000 Engine rpm	

K. Frame

1. Caster	63	
2. Trail	105 mm (4.13 inches)	
3. Fuel tank capacity	15 litre (3-4/5 US. gal) Including 3.2 litre (4/5 US. gal reserve)	
4. Oil tank capacity	2.5 litre (3/5 US. gal)	
5. Brake lining thickness	4.5mm (0.1772 inches)	2 mm (0.079 inches)
6. Brake shoes thickness	179.6–179.9mm (7.07–7.08 inches)	177mm (6.97 inches)
7. Brake drum inside diameter	180–180.2mm (7.09~7.095mm)	181mm(7.13 inches)

L. Suspension

1. Front fork		
Stroke	120mm (4.716 inches)	
Oil capacity	220cc (1/2 pint)	
Oil surface	405mm (15.92 inches)	435mm (17.09 inches)
2. Rear suspension		
Stroke	80 mm (3.14 inches)	

M. Lighting equipment

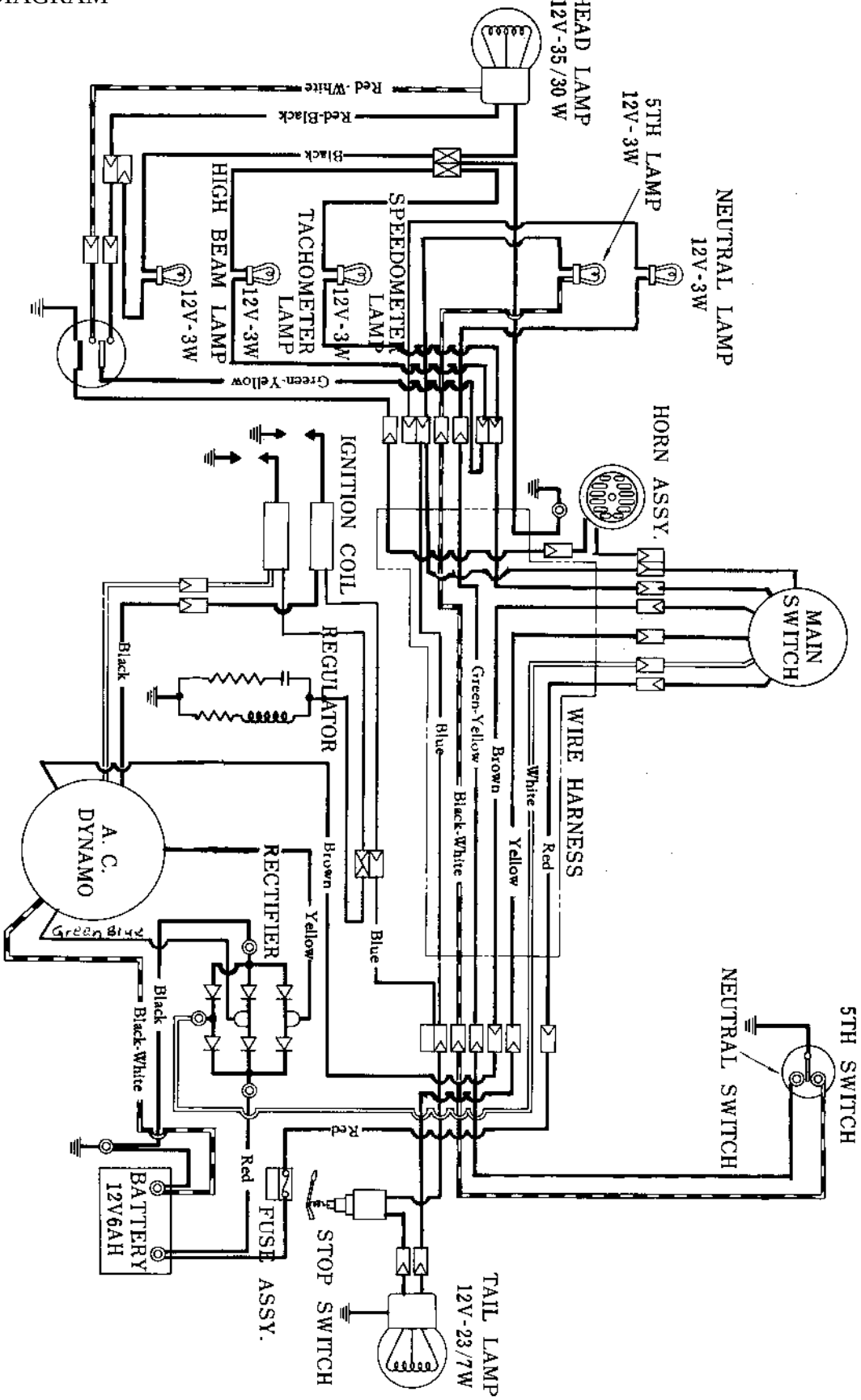
1. Battery		
Capacity	12V-6AH	
Acid capacity	390cc (4/5 pint)	
Specific gravity	1.280 at 20°C (68° F)	1.220
2. Main switch		
Insulation resistance over 1 MΩ		
3. Selenium rectifier		
Capacity	2.7Amp.	10mm Amp.
4. Head lamp	12V–35/30W	
5. 5th gear indicator lamp	12V–3W	
6. Speedometer lamp	12V–3W	
7. Stop lamp	12V–23W	
8. Tail lamp	12V–7W	
9. Horn volume	95–115 phone	
10. Fuse	10 A	
11. Speedometer error	+10% – 0	

14. TOLERANCE AND FITS

N. Adjusting Torque

Size	Kg-cm	Lbs-inch
Stud (8×50) Exhaust	250–300	217–260
Stud (6×40) Dynamo	100–120	86 –104
Stud (8×156) Cylinder	350–400	304–345
5 mm Hexagon bolt A	40 – 50	35 – 43
6 mm Hexagon bolt A	60 – 90	52 – 78
8 mm Hexagon bolt A	140–200	122–174
6 mm Clutch set bolt	70 – 90	61– 78
8 mm Drum guide bolt	150–200	130–174
8 mm Change arm stopper pin	200–250	174–217
6 mm Tachometer bushing bolt	70 – 90	61– 78
5 mm Cross pan head screw	35 – 45	30 – 39
6 mm Cross pan head screw	60 – 90	52 – 78
6 mm Cross flat head screw	60 – 80	52 – 69
40mm Ring nut (clutch)	400–500	347–434
8 mm Cylinder head nut	250–300	217–260
20mm Left thread nut (Pinion gear)	700–800	608–694
8 mm Hexagon nut C (worm shaft)	150–200	130–174
16mm Hexagon nut (Counter shaft)	400–500	347–434
Spark plug	200–300	174–260
8 mm Check valve ass'y.	60 – 80	52 – 69
16mm Drain plug	400–500	347–434
17mm Hexagonal nut	500–700	434–610
10mm Hexagonal nut	200–350	174–304

15. WIRING DIAGRAM



16. PERFORMANCE

16-1 Port Timing

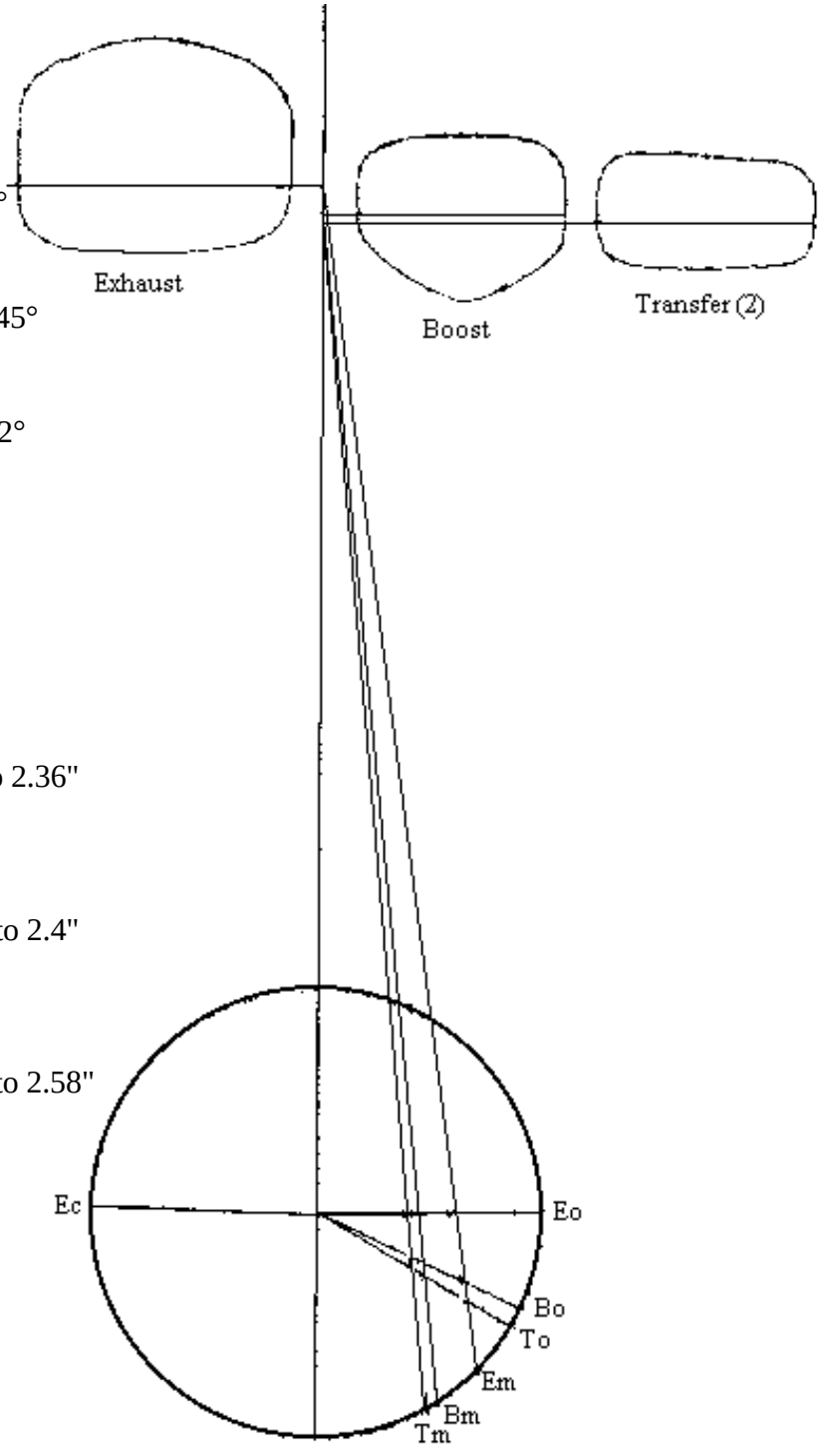
Exhaust Open Period = 89° to 272°
Exhaust Open Duration = 183°

Boost Port Open Period = 115° to 250°
Boost Port Open Duration = 135°

Transfer Port Open Period = 120° to 245°
Transfer Port Open Duration = 125°

Rotary Valve Open Period = 242° to 62°
Rotary Valve Open Duration = 180°

Connecting Rod length = ~ 4-9/16"
Piston Crown Height = ~1.5"



Actual size

16-2. Port Dimensions

Exhaust W = 1.4" H = 1.06"
Distance from top of cylinder = 1.3" to 2.36"
Mean Area = 150mm^2

Transfer W = 1.12" H = 0.5"
Distance from top of cylinder = 1.88" to 2.4"
Mean Area = 56mm^2 × 2

Boost W = 1.08" H = 0.76"
Distance from top of cylinder = 1.82" to 2.58"
Mean Area = 64mm^2

16-3. Port Time/Area

Exhaust = 3.4E-4 sec-cm^2/cm^3

Transfer = 8.67E-5 sec-cm^2/cm^3

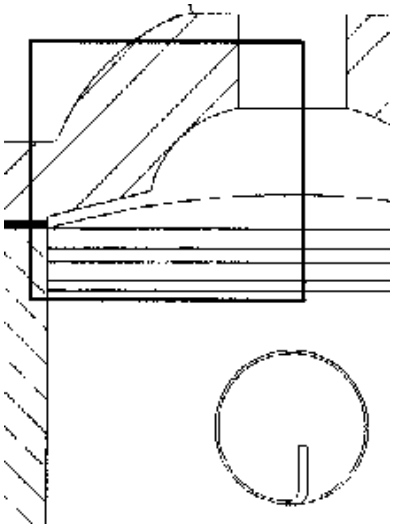
Boost = 1.07E-4 sec-cm^2/cm^3

16-4. Cylinder Exhaust Tract Length = 2.25" (center)

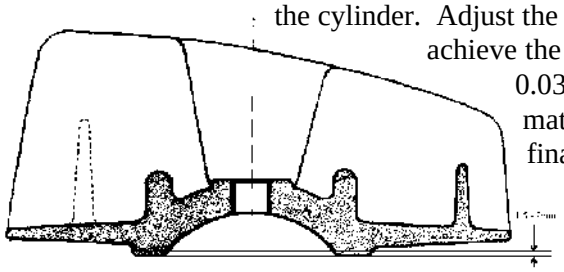
16-5. Head Pipe Length = 12.75" (inside) 14.625" (center) 16.5" (outside)

16-6. Squish Band Clearance = 0.035"±0.005"

Squish band (not to scale)

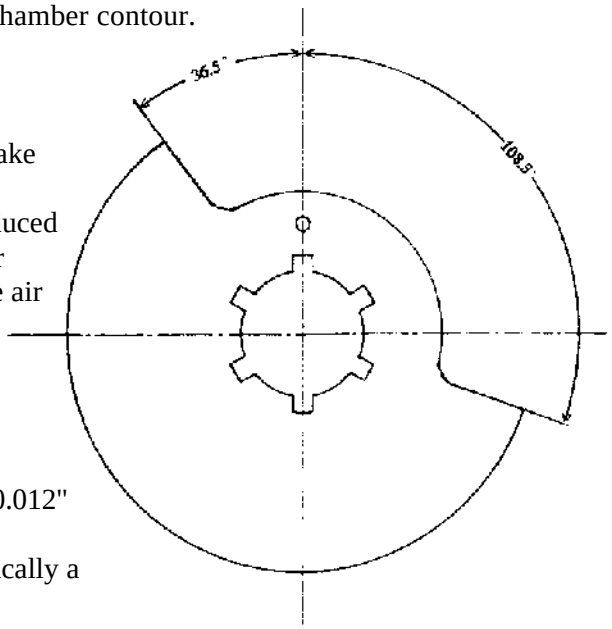


Measure by setting four pieces of solder into grease, radially at each diagonal edge of the piston, with the piston about a half inch before TDC. Bolt the head into place, torqued properly, with the head gasket installed and rotate the engine past TDC. Remove the head and measure the thickness of the solder, noting where each piece came from. If the four pieces in a cylinder do not measure the same thickness, it indicates the head is not properly centered on the cylinder. Adjust the head gasket material thickness to achieve the desired squish band clearance of 0.035"±0.005". Soft copper can be used for material, with copper gasket sealer during final assembly. If the thinnest material available will not bring clearance below 0.040", then planing and lapping of the head will be necessary. Milling may also be required initially to achieve the proper combustion chamber contour.



Milling head

16-7. Rotary Valve



No modification of rotary valves is recommended. Stock intake timing is optimal for street use. Cutting the disk will result in increased blowback during all but very high rpm, causing reduced cylinder charging and enrichening of the fuel/air mixture over most of the normal operating range. This is due to part of the air stream then actually entering the carburetor twice, drawing extra fuel.

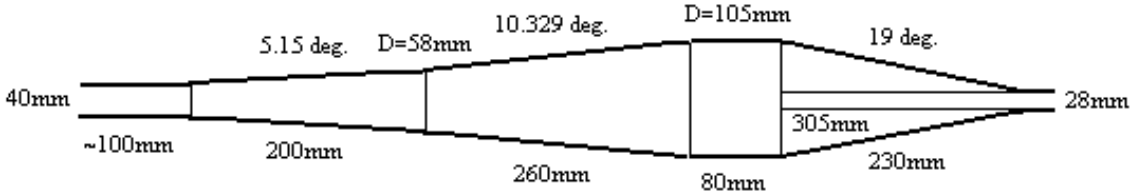
16-8. Ignition

Timing = (25° +0 -2) (23°±1 for racing) Point gap = 0.012"
Spark plug = NGK B-8HV
Add a ground strap from the engine to the frame. This is typically a braided non-insulated ribbon cable with lugs at each end.

Intake valve

16-8. Expansion Chamber

The chamber below will slip fit on the stock headpipe. The first segment (straight pipe) can be made long to start with, then cut shorter to move the power peak higher in the rpm band until the desired point is reached. The length below should cause power to roll off beyond redline, but is sensitive to actual exhaust port height. An adjustable (slotted) mount is recommended to allow tailoring to riding preference. The internal stinger reduces noise levels significantly, but for street use a canister-type silencer is still recommended.



Note: Internal stinger L=305mm ID=28mm
Flush with large dia. of exhaust cone

Expansion chamber