

**SUPPLEMENTARY
INSTRUCTION BOOK
FOR 1964 MODELS**

*Use this supplement in conjunction with the rider's
handbook for technical details, also adjustments,
that apply to the 1964 models only*

500 c.c. Scrambler Models

PUSH ROD ADJUSTMENT

By reason of the special cams used in this type of engine, the push rod adjustment is important, for maximum performance. This adjustment is made when the engine is cold, with the piston on the extreme top dead centre of the firing stroke, when both tappets are on the base circle of the cams. Adjust the inlet push rod to have a NIL clearance, the rod should be just free to rotate by finger application, with no up and down movement, see illustration 11 on page 26 in the manual.

With the engine positioned correctly, as described for the inlet push rod adjustment, deal with the exhaust push rod which should have a clearance of .005", which is obtained by adjusting the push rod to have a Nil clearance, then unscrewing the cupped adjusting screw (3) one-sixth of a turn, which is one flat on the hexagon on the cupped adjusting screw.

VALVE TIMING

Both cam wheels are marked for correct assembly, no useful purpose is served by deviating from the makers' markings. The average valve timing, taken from a number of engines, with normal push rod clearance, also with the valve .001" off its seat in the cylinder head is:

Inlet valve opens	60 degs	B T D C	Nil rocker clearance
Inlet valve closes	69 degs	A B D C	
Exhaust valve opens	74 degs	B B D C	.005" rocker clearance
Exhaust valve closes	46 degs	A T D C	

CYLINDER HEAD JOINT

To obtain a gas tight joint, between the head and the cylinder, take out the two sealing rubbers surrounding the push rod tunnels, apply a little grinding paste to the wide face of the head, put the head on to the cylinder. Using both hands move the head in an oscillating motion through an arc of 90 degs, using a slight downwards pressure. Continue this process until a continuous matt finish shows on both the head and cylinder face.

REFITTING THE CYLINDER HEAD

Use a torque spanner set to 40 foot lbs. to tighten the cylinder head sleeve nuts.

FRONT CHAIN ADJUSTMENT

The adjustment for the front chain described on page 54 applies also to the scrambler model. Two chain adjusting bolts are used, both bolts must be moved an equal amount, when making this adjustment.

MAGNETO CHAIN ADJUSTMENT

The rear magneto platform bolt hole is slotted for chain adjustment. Release the nut for the rear bolt, insert a screwdriver under the platform and lever upwards to tighten the chain, the platform will pivot on the front bolt. The adjustment is correct when there is $\frac{1}{4}$ " whip taken in the centre of the chain.

ENGINE SPROCKET

The normal engine sprocket has 19 teeth, see table of gear ratios on page 6.

1964 SINGLE CYLINDER MODELS

1964 350 c.c. and 500 c.c. SINGLE CYLINDER MODELS and 500 c.c. SCRAMBLER MODEL

LUBRICATION

A gear type oil pump driven by the worm gear on the timing side axle is retained by two studs, and secured by two nuts. A conical shaped heat resisting rubber seal is attached to the pump body, where it abuts against a drilling in the timing cover. From here oil is fed to the big end via a steel quill, which enters the timing side axle, lubricating the big end assembly. A by-pass from the main feed, taken from the timing cover conveys oil to positively lubricate the rocker gear. The oil supply is regulated in a manner described for the earlier type engines.

THE OIL SEAL

It is important that the oil seal is under light pressure when the timing cover is fitted, for a reason that is self evident. When both valves are closed and the timing cover fitted, the pressure of the seal should move the cover outwards, making a gap of about .010". If pressure does not exist, use packing shims, provided for this purpose, between the seal and the pump body. Conversely too much pressure can mutilate the seal and cause oil leakage.

THE OIL PUMP

The face of the oil pump body, where it joins the crankcase, must be perfectly flat, also free from bruises and blemish; otherwise the oil "pick up" from the pump will be curtailed, as the pump will suck air at this point. Use a little Wellseal as jointing compound on the pump body when fitting.

CHECK VALVE

A simple spring loaded ball valve is used in the timing cover to prevent oil seeping into the crankcase, when the engine is stationary. No adjustment is necessary to this part of the oiling system.

There are more than one type of oil pump worm nut and pump pinions. If at any time new parts are fitted, check the new ones against the old ones before they are installed. The pump pinions are of the three start type. If the pump is dismantled, on assembly make sure the end plates do not protrude over the pump body; they should be just below the pump body.

THE BEARING OIL SEAL

A thin bronze bush is used in the timing side crankcase, it does not constitute a bearing as it is simply an oil seal to stop oil leaking past the roller bearing.

CRANKCASE BEARINGS

The design of the driving side bearings is unaltered. Details for removal as described for earlier models still apply. A flanged type roller bearing is now used in the timing side of the engine on all single cylinder engines. The bearing sleeve is an interference fit in the crankcase. To take it out the crankcase must be gently heated, when the action of dropping the case on to a flat wood bench will dislodge the sleeve.

SEPARATING THE CRANKCASE

First take off the oil pump worm drive nut which has a left hand thread. Take off the oil pump, retained by two nuts. Remove the small timing pinion, which now has a parallel bore. With all the bolts passing through the crankcase taken out, the case can be parted, the inner member for the roller bearing remains on its shaft.

THE FLYWHEELS

To take off the inner member for the roller bearing use two taper steel wedges behind the bearing, once a gap is formed a puller can be used to extract the bearing member from its shaft.

TAPPETS AND GUIDES

The timing side crankcase tappet guide *in situ* has two locating diameters $\frac{1}{4}$ " wide at the top and bottom of the guide housing. The guides are located by a grub screw in register with a vee shaped groove machined circumferentially on the outside diameter of the guide. As the tappet foot is larger than the outside diameter of the guide, the tappet must be taken out from *inside* the timing chest, after removing the guide.

REMOVING THE TAPPETS

With the push rods, timing cover, oil pump, and cam gear removed, take out the grub screws, warm the crankcase, then push the tappet and guide upwards until the guide is clear, then take out the tappet from inside the timing chest. The short interference fit makes it easier to remove the guides.

FITTING TAPPETS AND GUIDES

Warm the crankcase, pass the tappet up the guide hole and put on it the tappet guide. Press the guide home until the edge of the large diameter is just flush with the crankcase face. The vee shaped groove should now register with the grub screw hole. Fit the screws.

TIMING GEAR

Single marking is used on all cams, for identification each cam wheel is marked with the factory part number. The 500 c.c. scrambler inlet cam is 030124, exhaust 030125. Inlet cam for the 350 c.c. is 030121, the exhaust is 030123. For the 500 c.c. standard engine the inlet cam is 030122, and for the same engine the exhaust is 030123 (same as the 350 c.c.).

500 c.c. SCRAMBLER MODEL

The alternative piston to give a ratio of 12 to 1 is suitable for the new engine, for use with octane 100 fuel. When this piston is used the ignition timing must be put back to 33° to 34° full advance. For long distance events, the use of a compression plate .050" thick should be used, to maintain engine efficiency.

IGNITION TIMING ALL 1964 SINGLES

Maximum advance 350 c.c. 34° (8.9 m.m.)

Maximum advance 500 c.c. 38° (10.98 m.m.)

Maximum advance 500 c.c. Scrambler 38° (10.98 m.m.)

All with the ignition unit fully advanced.

On coil ignition models the ignition unit can be advanced by using a tool in the slot provided in the end of the cam.

CARBURETTER SETTINGS

1964 350 c.c. model

Type No. 389/208

Main jet, 260 (with or without air filter)

Slide, 3

Pilot jet, 25

Needle jet, .1065

Needle position, central notch

1964 500 c.c. model

Type No. 389/209

Main jet, 290 (with or without air filter)

Slide, 3.5

Pilot jet, 25

Needle jet, .106

Needle position, central notch

1964 500 c.c. Scrambler

Type No. G.P.5 ($1\frac{1}{4}$ " choke)

Main jet, 310 (with air cleaner 290)

Air jet, .125"

Slide, 6

Needle, G.P.6, 5th notch

WHEELS AND BRAKES

TO REMOVE THE FRONT WHEEL

With the machine on the central stand: Detach the brake cable from the expander lever. Detach the brake cable adjuster from the brake plate. Detach the right hand spindle nut. Release the pinch stud in left fork slider end. Take the weight of the wheel by the left hand, pull out the wheel spindle. The wheel can be taken out of the forks.

TO REFIT THE WHEEL

Reverse the procedure described for removal, with the following precautions. Remove traces of rust from the spindle and grease. Exercise care to correctly locate brake plate in the fork slider. Do not tighten unduly the slider pinch bolt, overtightening can cause a fracture.

NOTE—If the fork motion is stiff after refitting the wheel, slack off the spindle nut and work the forks up and down (the fork tubes will take up alignment), then retighten the spindle nut.

TO REMOVE THE REAR WHEEL

The rear wheel is detachable from the brake drum. With the rear wheel clear of the ground: Take out the three rubber grummets (4). Remove the sleeve nuts (8) which retain the wheel to the brake drum. Unscrew the wheel spindle (20) and remove it. Take away the distance piece, between the speedometer drive, which will come away also, there is no need to separate the cable from the drive. Pull the wheel away from the driving studs in the brake drum. Incline the machine to the right side, then pass the wheel under the left side silencer, clear of the machine.

TO REMOVE THE BRAKE DRUM

With the rear wheel removed: Take off the brake rod hand adjuster, then remove the rear chain connecting link. Release the nut securing the dummy spindle, pull back the brake drum clear of the fork ends.

TO DISMANTLE THE FRONT HUB

The wheel hubs are packed with grease during initial assembly, and should not need further lubrication for at least 10,000 miles, when the hubs should be dismantled for cleaning and fresh grease used. To dismantle the front hub, with the wheel removed take away the brake plate with brake shoes.

Unscrew bearing lock plate on left side of hub, holes are provided for a peg spanner or use a punch. If the plate resists removal use a little heat which will facilitate removal, take out felt sealing washer and distance piece.

To eject the bearing use a drift through the brake side (the front wheel spindle can be used for this purpose) when a few light blows from a mallet will drive out the bearing until it is clear of the hub, and no more, as the other bearing goes into the hub during this process.

Take out the spindle, or drift, invert the wheel and repeat the process to eject the double bearing which will bring with it the large steel washer, the felt washer, also the thin steel washer.

ASSEMBLING THE HUB

Clean and repack both bearings with fresh grease (see table of lubricants). Press into the left side of the hub the single bearing, fit the distance washer (flat side against the bearing), then the felt washer and secure with the lock plate.

Invert the hub, insert the distance tube (small end first) against the bearing. Enter the double bearing square with the hub, use the drift through both bearings and drive home until the bearing abuts against the distance tube.

Fit the smallest of the two washers, the felt washer, then the large steel washer.

With a suitable punchpeen the hub material, where it joins the washer in three equidistant positions to retain the washer.

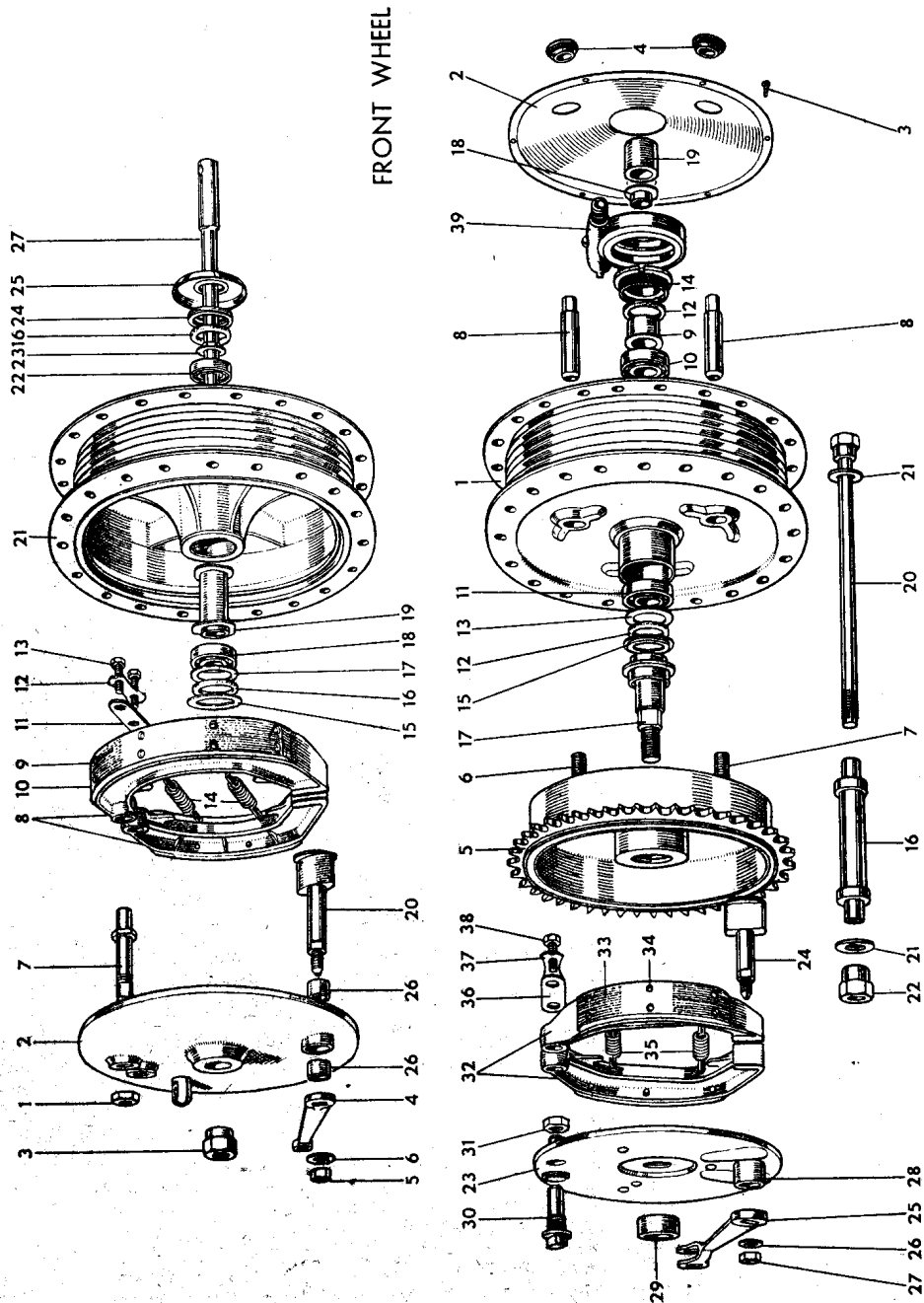


Fig. 1

REAR HUB DISMANTLING

With the wheel removed, remove the speedometer drive lock ring (this has a *left hand thread*), take out felt washer and distance piece. To eject the bearing use the wheel spindle with its washer also the distance piece that goes between the speedometer drive and the frame placed on the spindle. Partially drive out the bearing until it abuts against the reduced diameter inside the hub. Take out the spindle, use a short length of steel tubing with the outside diameter slightly smaller than the inside diameter of the bearing and drive out the bearing. Invert the wheel, then drift out the other bearing, which will take with it the steel cup, felt washer and the thin steel washer.

ASSEMBLING THE HUB

Deal with the bearings as already described and assemble by first fitting the single row bearing, in the reverse order described for dismantling, with the following precaution: when tightening the *left hand* lock ring avoid damage to the slots for the speedometer drive. Finally "peen" the hub dished washer to the hub. The hub assembly sequence is shown in Fig. 1.

DISMANTLING THE BRAKE DRUM

A bearing is not used in the brake drum; when the spindle nut is removed together with the spacer and washer, the spindle can be taken out.

FRONT FORKS

LUBRICATION

Use one of the grades of oil, S.A.E. 20 as shown in the table of lubricants. The normal oil content is five fluid ozs. (142 c.c.). Attention is only necessary at the first 1,000 miles and again at 10,000 miles when the oil should be changed by draining. An exploded drawing of the front forks is shown in Fig. 2, from which it will readily be seen that the fork springs abut against the filler plugs (34), before removing these plugs weight must be taken off the front wheel, by placing the machine on its central stand to avoid the forks collapsing.

TO DRAIN THE FORKS

With the machine on the central stand: Unscrew the two filler plugs (34). Have available a container to catch oil drained, then remove the drain plug screw (7) with its washer, with the container under the fork leg. If the wheel is inclined to one side, draining will be more complete. Deal with the other fork leg in a similar manner.

FILLING OIL

It will be seen the the air space between the fork spring, and the inside of the tube is very close; therefore fresh oil must be filled with extreme care, to avoid losses by spilling. Use a measured container for the correct content of 5 ozs. Replace the drain plugs before filling, also firmly tighten the filler plugs after.

STEERING HEAD ADJUSTMENT

On a new machine the filler plugs (34) should be checked for tightness due to settling down, check as well the steering head bearing at the first 100 miles, and then occasionally, as the mileage increases. Using the machine with movement in these bearings will damage the races. Movement in these bearings can usually be detected when the front

brake is applied. To check, raise the front wheel well clear of the ground, with a box under the crankcase. Try to raise or lower the front wheel with one hand and use the fingers of the other hand encircling the handle bar lug where it meets the frame, when movement can be felt. To adjust bearings a thin open ended spanner $1\frac{3}{8}$ " across the flats is needed. First release the tube clamping stud nut (28), unscrew the stem nut (37) slightly. Use the thin spanner on the sleeve nut (30) and manipulate as necessary. The bearing should be devoid of play with free movements. Retighten the column nut, also the clamping stud nuts.

DISMANTLING THE FORKS

The forks can be removed as a unit, or the fork legs can be removed individually. To take out one fork leg remove the front wheel as described elsewhere. Take off the front mudguard with stays. Release nut for pinch bolt (28). Remove filler cap plug (34), disconnect it from the damper rod, by using two spanners.

The fork inner tube can now be drawn downwards clear of the handlebar lug and fork crown. If the tube resists removal fit back the filler plug without being connected to the damper rod, screw in a few turns, then give it a few sharp blows with a soft faced mallet to separate the tube from its taper fixing in the handlebar lug.

TO REMOVE THE FORKS AS A UNIT

Follow the instructions given for removing a fork leg, as far as disconnecting the filler plugs from the damper rods. Proceed by taking off the headlamp leaving it suspended by the loom. Separate the control cables from the levers, and remove handlebars. Remove the column nut (37) then give the underside of the handlebar lug one or two blows with a mallet until it is clear of the fork tubes. At this stage support the ends of the forks, for after removing the sleeve nut (30) the forks will drop out. Watch for the steel balls for the races, there are 18 in each race (36 in all), if a steering damper is fitted detach the fixed plate from the frame.

TO DISMANTLE A FORK SLIDER

Remove from the fork slider the bolt fixing damper tube (11). Unscrew the bottom cover (23), holes are provided for a C spanner. Take away the fork slider (5).

The damper tube with the fork spring can be extracted from the tube. To dismantle further, take off nut securing fork spring, unscrew the damper tubecap (16) with a tommy bar through the holes in the damper tube, for if this is held in a vice it will distort and become useless. The damper assembly sequence is clearly depicted in Fig. 2.

NOTE—When removing the oil seal, sealing washer and flanged bush pass them along the fork tube and take off from the top end past the taper end, if the oil seal is to be used again.

ASSEMBLING THE FORKS

It will be apparent from the dismantling instructions given that there is nothing complicated in the fork assembly and if the reverse sequence is used, no difficulty should occur with the following precautions.

The fork tube, where the oil seal operates, must have a smooth finish and free from blemish.

The oil seal is fitted from the top of the tube, with the visible spring facing downwards against the flange for the bush.

The damper tube cap also the damper tube fixing bolt must be properly tightened. Finally tighten the bottom cover (23) when the front wheel has been put back.

Fill 5 ozs. of S.A.E. 20 oil to each fork leg.

STEERING LOCK

The lock is pressed into the handle bar lug, and can be removed by driving it out from underneath. A number is stamped on the bottom of the lock for key identification.

1964 Front Fork Assembly

- 1 FORK MAIN TUBE.
- 2 MAIN TUBE BUSH
- 3 MAIN TUBE BOTTOM BUSH
- 4 MAIN TUBE BOTTOM BUSH CIRCLIP
- 5 FORK END LEFT HAND
- 6 FORK END RIGHT HAND
- 7 FORK END DRAIN PLUG
- 8 WASHER FOR PLUG
- 9 OIL DAMPER TUBE
- 10 OIL DAMPER ROD
- 11 OIL DAMPER TUBE BOLT
- 12 WASHER FOR BOLT
- 13 WASHER FOR TUBE
- 14 NUT FOR ROD TOP
- 15 NUT FOR ROD BOTTOM
- 16 DAMPER TUBE CAP
- 17 PISTON LOCATING PEG
- 18 OIL DAMPER VALVE CUP
- 19 OIL DAMPER VALVE CUP SLOTTED RING
- 20 MAIN TUBE LOCK RING WITH CUP
- 21 MAIN SPRING
- 22 MAIN SPRING LOCATING BUSHES
- 23 SPRING COVER TUBE
- 24 SPRING TOP COVER TUBE SECURING PLATE
- 25 SCREWS SECURING PLATE
- 26 CROWN LUG COMPLETE WITH COLUMN
- 27 PINCH STUD FOR CROWN LUG
- 28 NUT FOR STUD
- 30 FORK HEAD RACE ADJUSTER NUT
- 31 TOP COVER LEFT HAND
- 32 TOP COVER RIGHT HAND
- 33 MAIN TUBE TOP COVER RING
- 34 FORK MAIN TUBE FILLER AND RETAINING PLUG
- 35 WASHER FOR PLUG
- 36 FORK HEAD CLIP
- 37 FORK CROWN AND COLUMN LOCK NUT

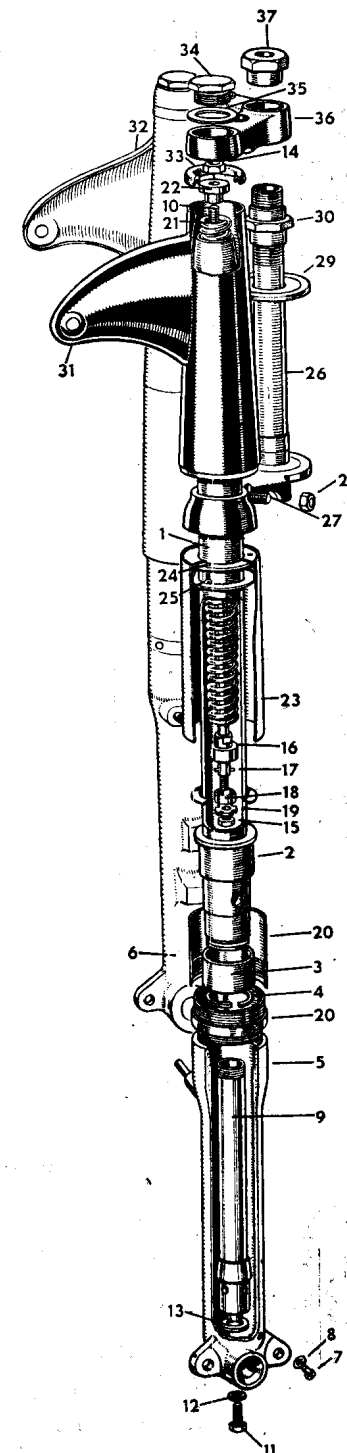


Fig. 2

ELECTRICAL SECTION

12 VOLT SYSTEM

This improved form of lighting was first introduced for the 1964 models. The heat sink plate, to which the Zener diode is attached, must be kept in the air stream for heat dissipation. Two 6 volt batteries in series are mounted in the battery compartment. It is most important to ensure that the battery cables, as well as the link cable, are securely tightened. A wiring diagram is shown on page 10

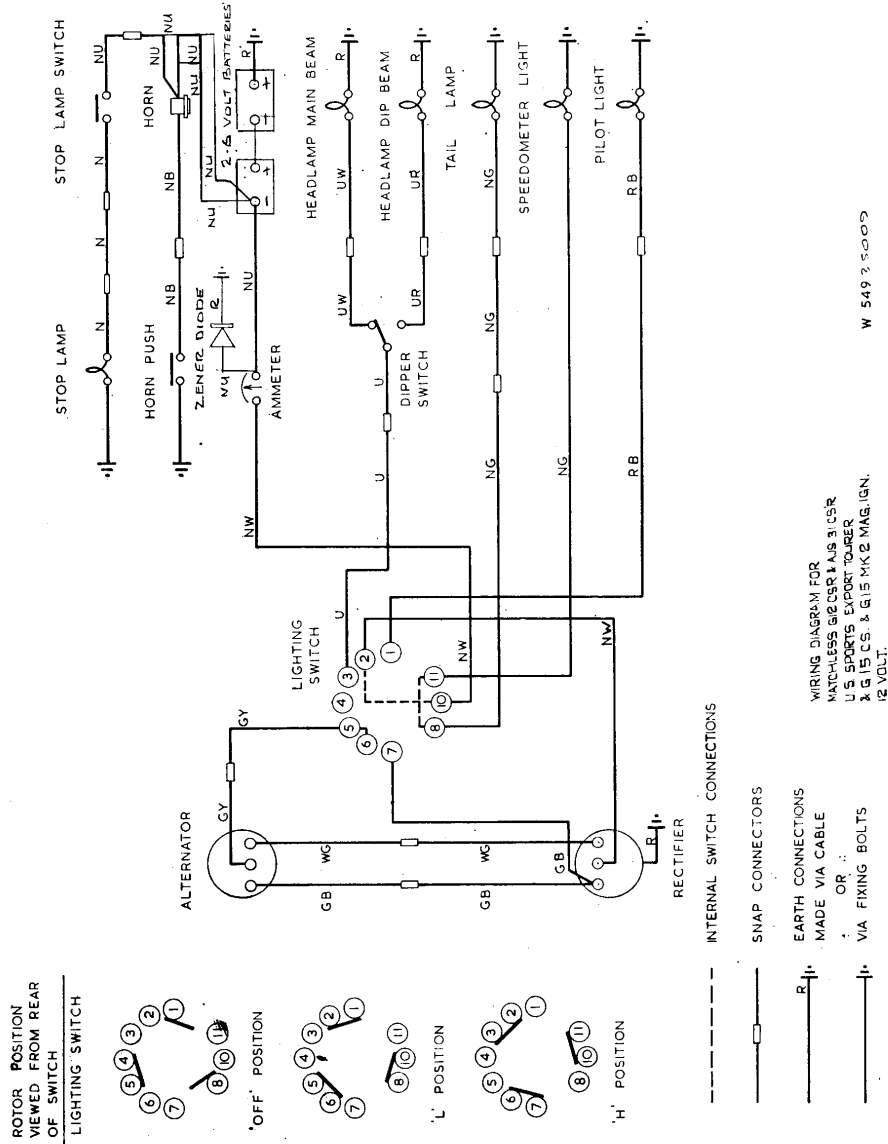


Fig. 3

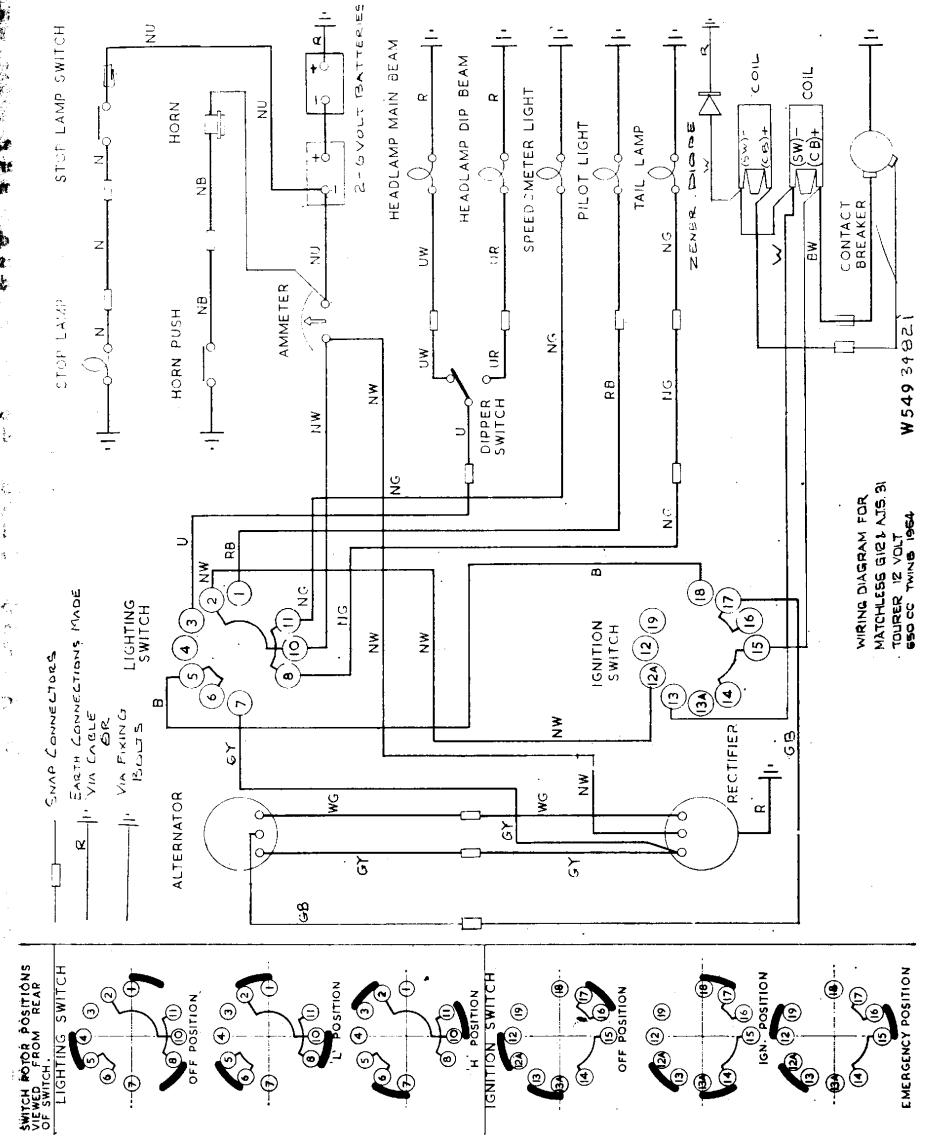


Fig. 4

COIL IGNITION 650 STANDARD TWIN MODEL

Two contact breakers, with a separate H.T. coil for each cylinder, is used in the ignition system for the above model.

The contact breaker housing, attached to the crankcase, houses also the automatic timing control.

MAINTENANCE

A few drops of light oil on the felt wick, periodically applied, will lubricate the cam. During routine maintenance, squirt a few drops of engine oil behind the contact breaker base plate to lubricate the moving parts of the automatic timing control. Check from time to time the pillar nuts retaining the condensers are tight.

NOTE—If the contact breaker housing is removed, or disturbed, note the yellow and black cable attached to the top contact set, goes to the front coil, which is attached to the frame top tube, below the petrol tank. The H.T. cable attached to the front coil goes to the left (driving side) cylinder.

TO CHECK IGNITION TIMING

First verify the contact breaker gap, with maximum separation is $\cdot 014''$ to $\cdot 016''$. To adjust the gap, release the slotted pillar nut, and move the small plate in the required direction.

Take out the left side spark plug, remove both rocker covers. Rotate engine forward until the left side piston is on the extreme top dead centre of the firing stroke (both rockers free) refer to details given on page 41 of the rider's manual for the method used to position the piston, as described for magneto twins, using the measurement given below, on the timing rod.

Turn the engine backwards until the left side piston is $13^{\circ} \frac{3}{4}''$ or 1.3 m.m., before top dead centre, with the automatic timing control in the fully retarded position, when if the timing is correct the contact points should start to separate, checked on the TOP contact set.

To check the timing with the automatic timing control in the full advanced position set the left side piston $35^{\circ} \frac{3}{4}''$ or 8.97 m.m., before top dead centre. The contact breaker base plate is slotted to adjust the timing after releasing the two screws passing through the base plate. Moving the base plate counter-clockwise, facing the contact breakers, will advance the timing.

REFITTING THE CONTACT BREAKER COVER

There are two insulating strips attached to each condenser see both strips are bent over to cover the condenser terminals, to avoid shorting out, against the cover, when it is refitted. The cable entry is at the bottom (6 o'clock).

REMOVING THE DRIVE GEAR

The gear is located by a spring pin, which is parallel, and can be pressed out from either side.

TO REMOVE THE AUTOMATIC TIMING CONTROL

With the drive gear taken off, remove the metal cover, take out the two screws that locate the base plate, when the cam, together with the automatic timing control with its shaft can be extracted from the housing. To separate the shaft from the contact unit, take out the central bolt, which retains the unit by a taper on the shaft.