chamber. This item should not be subjected to a great deal of wear and is therefore unlikely to require replacement.

Having dismantled the carburetter, carefully clean all parts in petrol (gasolene). Hard deposits on the carburetter body are best removed with a light grade wire brush. After washing the parts in clean petrol, allow to dry and ensure that all holes or small drillings are free from dirt. A hand pump is ideal for "blowing through" any blockages in the drillings. Inspect the component parts for wear and check that the jets are in accordance with the recommended sizes given in General Data.

Reassembly is simply a reversal of the above instructions but remember to replace any gaskets or "O" rings that appear unserviceable. Refer to Fig. C1 for guidance.

SECTION C2

INSPECTING CARBURETTER COMPONENTS

The parts most liable to show wear after considerable mileage are the throttle valve slide and the mixing chamber.

(1) Inspect the throttle valve slide for excessive scoring of the front area and check the extent of wear on the rear slide face. If wear is apparent, the slide should be renewed; be sure to fit slide with correct degree of cut-away (see General Data).

(2) Check the throttle return springs for efficiency. Check also that it has not lost its compressive strength by measuring the free length and comparing it with the figure given on page GD3.

(3) Examine the needle jet for wear or possible scoring and check the tapered end of the needle for similar signs.

(4) Check the float needle for efficiency by inserting it into the float needle seating block, pouring a small amount of petrol (gasolene) into the aperture surrounding the needle and checking it it for leakage.

(5) Ensure that the float is not punctured by shaking it to see if it contains any fuel. Do not attempt to repair a damaged float. If there is any doubt about its condition, replace it with a new one.

(6) Check the petrol filter that fits over the needle seating block, for any possible damage to the mesh. If the filter has parted from its supporting structure it will allow the petrol (gasolene) to pass through unfiltered.

SECTION C3

POINTS TO NOTE

THROTTLE CABLE

See that there is a minimum of backlash when the twist grip is turned back and that any movement of the handlebar does not cause the throttle to open.

Use the adjuster on the cable to obtain the correct setting and ensure that the throttle slide shuts down freely.

PETROL FEED

Unscrew the float chamber "banjo" bolt, remove the "banjo", and take off the filter gauze from the needle seating.

Ensure that the filter gauze is undamaged and free from all foreign matter. To check fuel flow before replacing the "banjo", turn on petrol tap momentarily and see that fuel gushes out.

FLOODING

This may be due to a worn needle or a punctured float, but is more likely due to impurities (grit, fluff, etc.) in the tank. This trouble can sometimes be cleared by periodically cleaning out the float chamber. If however, the trouble persists the tank must be drained and swilled out.

CARBURETTER AIR LEAKS

Erratic slow-running is often caused by air leaks between the joints at the carburetter flange and the cylinder head and can be detected by applying oil around the joints. Eliminate by fitting new washers and tightening the flange nuts evenly to a torque wrench setting of 10 lbs./ft. (1.383 kg./m.).

Also check that the rubber sealing ring in the carburetter flange is undamaged and located correctly.

On high mileage machines look for air leaks caused by a worn throttle or a worn inlet valve guide.

BANGING, IN EXHAUST

This may be caused by too weak a pilot mixture when the throttle is closed or nearly closed. It may also be caused by too rich a pilot mixture and an air leak in the exhaust system. The reason in either case is that the mixture has not fired in the cylinder but has fired in the hot silencer.

If the banging occurs when the throttle is fairly wide open, the trouble will be traced to ignition, not carburation.

EXCESSIVE PETROL CONSUMPTION

If this cannot be corrected by normal adjustments, it may be due to flooding caused by impurities from the petrol tank lodging on the float needle seat, so preventing its valve from closing. The float needle should also be checked for wear or damage.

High consumption can also be caused by a worn needle jet and may be remedied or improved by lowering the needle in the throttle. If this method is unsatisfactory, then a new needle and needle jet will have to be fitted.

There are many other causes of high petrol consumption and it should not be assumed that the fault lies in the carburetter alone.

AIR FILTERS

If a carburetter is first set with an air filter and the engine is then run without, the jet setting may be affected and care must be taken to avoid overheating the engine due to too weak a mixture. Testing with the air supply will indicate if a larger main jet and higher needle position are required.

EFFECT OF ALTITUDE ON A CARBURETTER

Increased altitude tends to produce a rich mixture; the greater the altitude, the smaller the main jet required. Carburetters ex-works are suitably set for use in altitudes of up to approximately 3,000 feet. Carburetters used constantly in altitudes of between 3,000 to 6,000 feet should have a reduction in main jet size of 5 %. A further reduction of 4 % should be made for every 3,000 feet in excess of 6,000 feet altitude.

SECTION C4

TRACING FAULTS

Faults likely to occur in carburation can be placed in one of two categories; either richness or weakness of petrol/air mixture.

INDICATIONS OF RICHNESS

Black smoke in exhaust.
Petrol spraying out of carburetter.
Eight-stroking.
Heavy lumpy running.
Sparking plug sooty.

INDICATIONS OF WEAKNESS

Spitting back in carburetter.
Erratic slow-running.
Overheating.
Engine goes better if throttle is almost closed.

Having established whether the mixture is too rich or too weak, check if caused by:—

(1) Petrol feed—check that jets and passages are clear, that filter gauze in float chamber "banjo" connection is not choked with foreign matter, and that there is ample flow of fuel. Also ensure there is no flooding.

(2) Air leaks—usually at the flange joint or due to worn inlet valve stem and guide.

(3) Defective or worn parts—such as a loose-fitting throttle valve, worn needle jet, loose jets.

(4) Air cleaner choked-up.

(5) An air cleaner having been removed.

(6) Removal of the silencer—this requires a richer setting.

Having ensured that the fuel feed is correct and that there is no air leaks etc., check the ignition, valve operation and timing. Now test to see if the mixture is rich or weak by partially covering the carburetter inlet and noting how the engine runs. If the engine runs better, weakness is indicated, but if the engine runs worse then the mixture is too rich.

For suggested rectifications see Section C6.

SECTION C5

CARBURETTER ADJUSTMENTS

(A) **Throttle Adjusting Screw**
Set this screw to hold the throttle open sufficiently to keep the engine running when the twist grip is shut off.

(B) **Pilot Air Adjusting Screw**
This screw regulates the strength of the pilot mixture for "idling" and for the initial opening of the throttle. The screw controls the depression on the pilot mixture chamber by metering the amount of air that mixes with the petrol.

(C) **Main Jet**
The main jet controls the petrol supply when the throttle is more than three-quarters open, but at smaller throttle openings although the supply of fuel goes through the main jet, the amount is diminished by the metering effect of the needle in the needle jet.

Each jet is calibrated and numbered so that its exact discharge is known and two jets of the same number are alike. Never ream out a jet, get another of the right size. The bigger the number the bigger the jet.

To gain access to the main jet the float chamber must first be removed (two screws). The main jet can now be unscrewed from its holder in the mixing chamber base.

(D) **Needle and Needle Jet**
The needle is attached to the throttle valve and being taper—either allows more or less petrol to pass through the needle jet as the throttle is opened or closed throughout the range, except when idling or nearly full throttle. The taper needle position in relation to the throttle opening can be set according to the mixture required by fixing it to the throttle valve with the jet needle clip in a certain groove. thus either raising or lowering it. Raising the needle richens the mixture and lowering it weakens the mixture at throttle openings from quarter to three-quarters open.

(E) **Throttle Valve Cut-away**
The atmospheric side of the throttle is cut away to influence the depression on the main fuel supply and thus gives a means of tuning between the pilot and needle jet range of throttle opening. The amount of cut-away is recorded by a number marked on the throttle valve, viz. 900/3½ means throttle valve type 900 with number 3½ cut-away; larger cut-aways, say 4 and 5, give weaker mixtures and 2 a richer mixture.

(F) **Tickler or Primer**
This is a small spring-loaded plunger, in the carburetter body. When pressed down on the float, the needle valve is allowed to open and so "flooding" is achieved. Flooding temporarily enriches the mixture until the level of the petrol subsides to normal.

SECTION C6

CORRECTING MIXTURE

TO CURE RICHNESS

Position 1. Fit smaller main jet.
Position 2. Screw out pilot air adjusting screw.
Position 3. Fit a throttle with a larger cut-away (see paragraph E, Section C5).
Position 4. Lower needle one or two grooves (see paragraph D, Section C5).

TO CURE WEAKNESS

Position 1. Fit larger main jet.
Position 2. Screw pilot air adjusting screw in.
Position 3. Fit a throttle with a smaller cut-away (see paragraph E, Section C5).
Position 4. Raise needle one or two grooves (see paragraph D, Section C5).

(Positions 1, 2, 3 and 4 refer to positions of throttle openings as shown in Fig. C4, Section C5).

Note. It is incorrect to attempt to cure a rich mixture at half-throttle by fitting a smaller jet because the main jet may be correct for power at full throttle. The correct method is to lower the throttle needle.

SECTION C7

TUNING THE CARBURETTER

Read remarks on page C5 for each tuning device and get the motor going perfectly on a quiet road with a slight up-gradient so that on test, the engine is pulling under load. Set carburation in the following order:—

1st. **Main Jet** with throttle in position 1 (Fig. C2). If at full throttle the engine runs "heavily", the main jet is too large. If at full throttle, the engine seems to have better power when the throttle is eased off or the carburetter intake is slightly covered, then the main jet is too small.

With the correct sized main jet, the engine at full throttle should run evenly and regularly with maximum power.

If testing for speed work, ensure that the main jet size is sufficient for the mixture to be rich enough to maintain a cool engine. To verify this, examine the sparking plug after taking a fast run, declutching and stopping the engine quickly. If the sparking plug has a cool appearance the mixture is correct; if sooty, the mixture is rich; if, however, there are signs of intense heat, the plug being very white

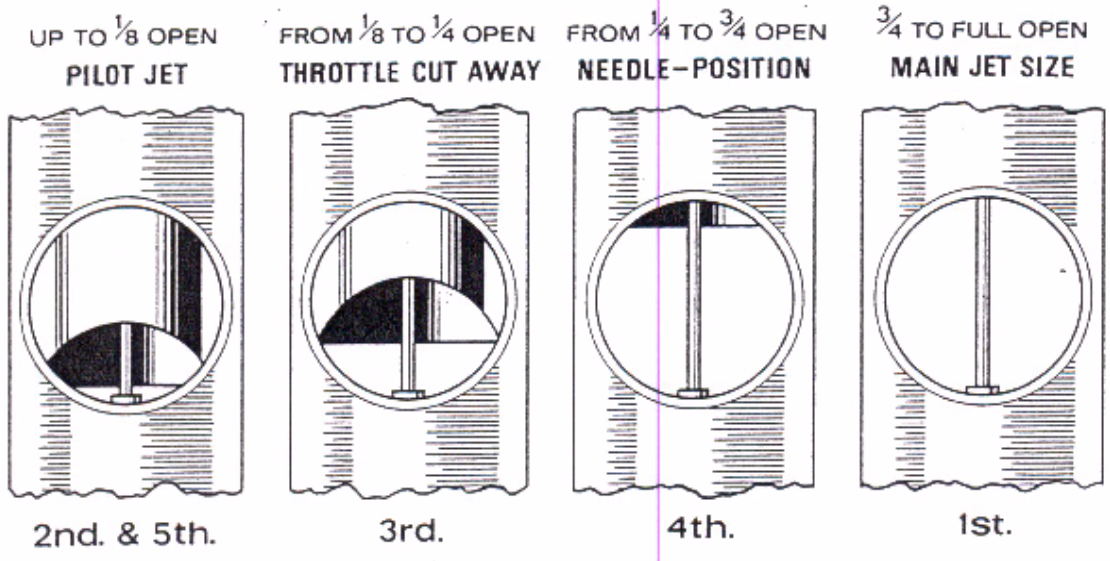


Fig. C2. Sequence of adjustment

in appearance, the mixture is too weak and a larger main jet is necessary.

2nd. **Pilot Mixture** (Fig. C2) with throttle in positions 2 and 5. With engine idling too fast with the twist grip shut off and the throttle shut down on to the throttle adjusting screw, and ignition set for best slow-running: (1) Screw out throttle adjusting screw until the engine runs slower and beings to falter, then screw pilot air adjusting screw in or out, to make engine run regularly and faster. (2) Now gently lower the throttle adjusting screw until the engine runs slower and just begins to falter, adjust the pilot air adjusting screw to get best slow-running, if this second adjustment leaves the engine running too fast, go over the job a third time.

3rd. **Throttle Cut-away** with throttle in position 3 (Fig. C2). If, as you take off from the idling position, there is spitting from the carburetter, slightly richen the pilot mixture by screwing in the air screw. If this is not effective, screw it back again, and fit a throttle with a smaller cut-away. If the engine jerks under load at this throttle position and there is no spitting, either the jet needle is much too high or a larger throttle cut-away is required to cure richness.

4th. **Needle** with throttle in position 4 (Fig. C2). The needle controls a wide range of throttle openings and also the acceleration. Try the needle in as low a position as possible, viz. with the clip in a groove as near the top as possible; if acceleration is poor and with the carburetter inlet partially covered, the results are better, raise the needle by two grooves; if very much better try lowering the needle by one groove and leave it where it is best. If mixture is still too rich with clip in groove number 1 nearest the top, the needle jet probably wants replacement because of wear. If the needle itself has had several years' use replace it also.

5th. **Finally,** go over the idling again for final touches.

SECTION D

FRAME

INDEX

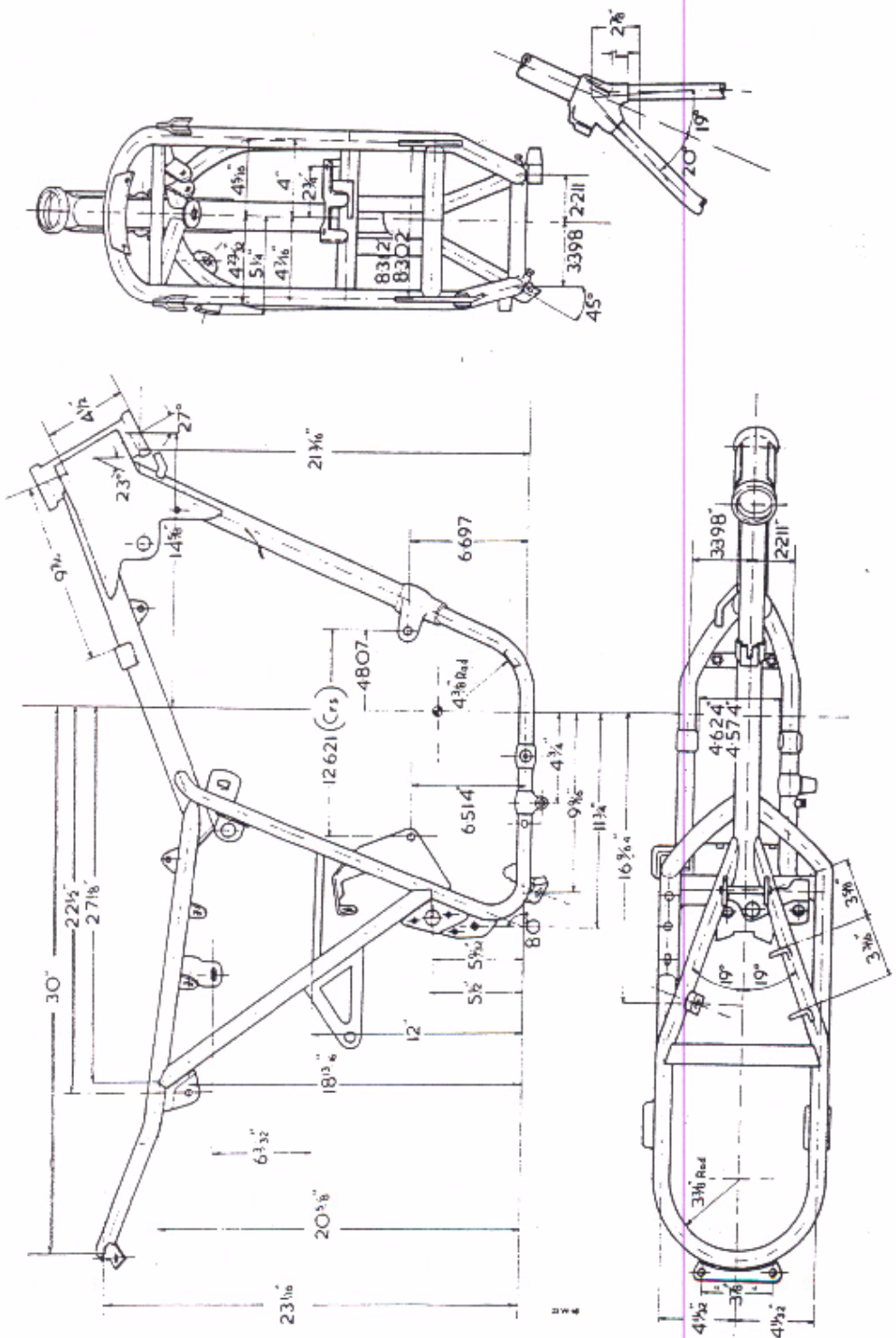


Fig. D1. Frame dimensions

SECTION D1

FRAME ALIGNMENT

The only satisfactory way of checking the frame for correct alignment is on an engineers setting-out table. In addition to the table, which should be approximately 5ft. x 3ft., the following equipment will also be necessary.

One mandrel and two blocks, as in Fig. D2.
One mandrel or bar for swinging arm pivot $\frac{13}{16}$ in. diameter x 12 in. long.
One large set-square.
One 18 in. Vernier height gauge or large scribing block.
One pair of large "V" blocks and several adjustable height jacks.

If a scribing block is used, then an 18 in. steel rule will also be required. The mandrels must be straight and round, otherwise measurements will be affected. Figure D.3 shows the basic set-up for checking the frame, though variations can of course be used according to the facilities available.

Place the blocks in the steering head, insert the mandrel and support with the "V" blocks at one end of the table. Check the mandrel at each end to ensure that it is parallel with the surface of the table. Insert the $\frac{13}{16}$ in. diameter mandrel through the swinging arm pivot hole.

Now, using jacks or packing pieces, set the frame horizontal to the table so that checks taken at points (*A*) are the same.

If the frame has suffered damage in an accident, it may not be possible to set points (*A*) parallel in which case points (*B*) can be used.

Sometimes if the machine has been subjected to a frontal impact, the main tube may remain parallel at points (*A*) but will be arched. A straight-edge made from a piece of good quality hardboard can be used for this purpose, but the checking edge must be quite straight.

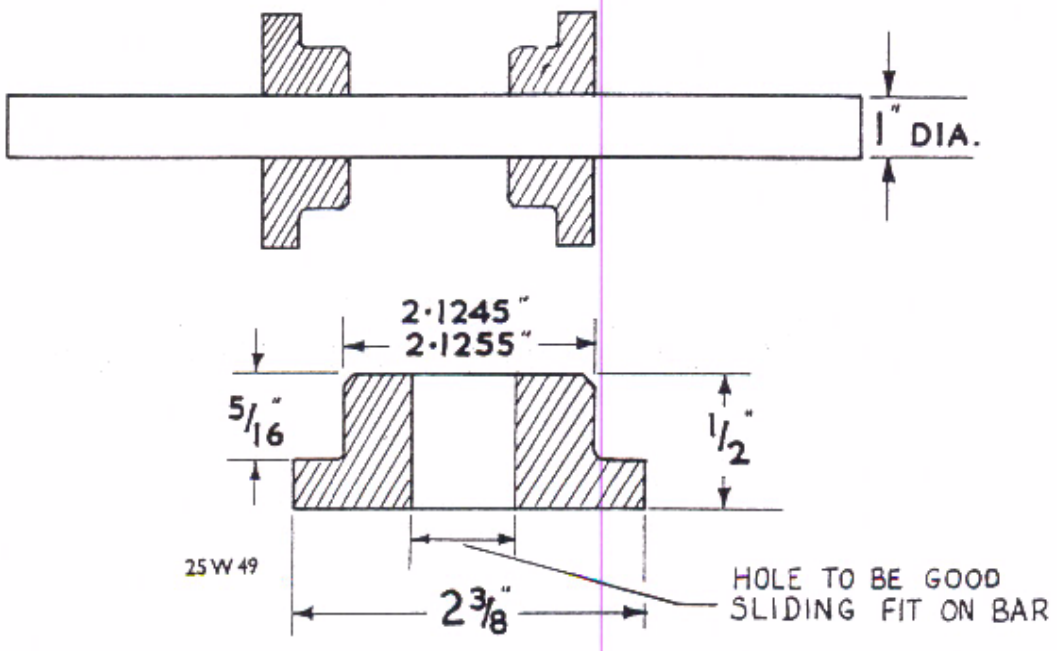


Fig. D2. Steering head mandrel

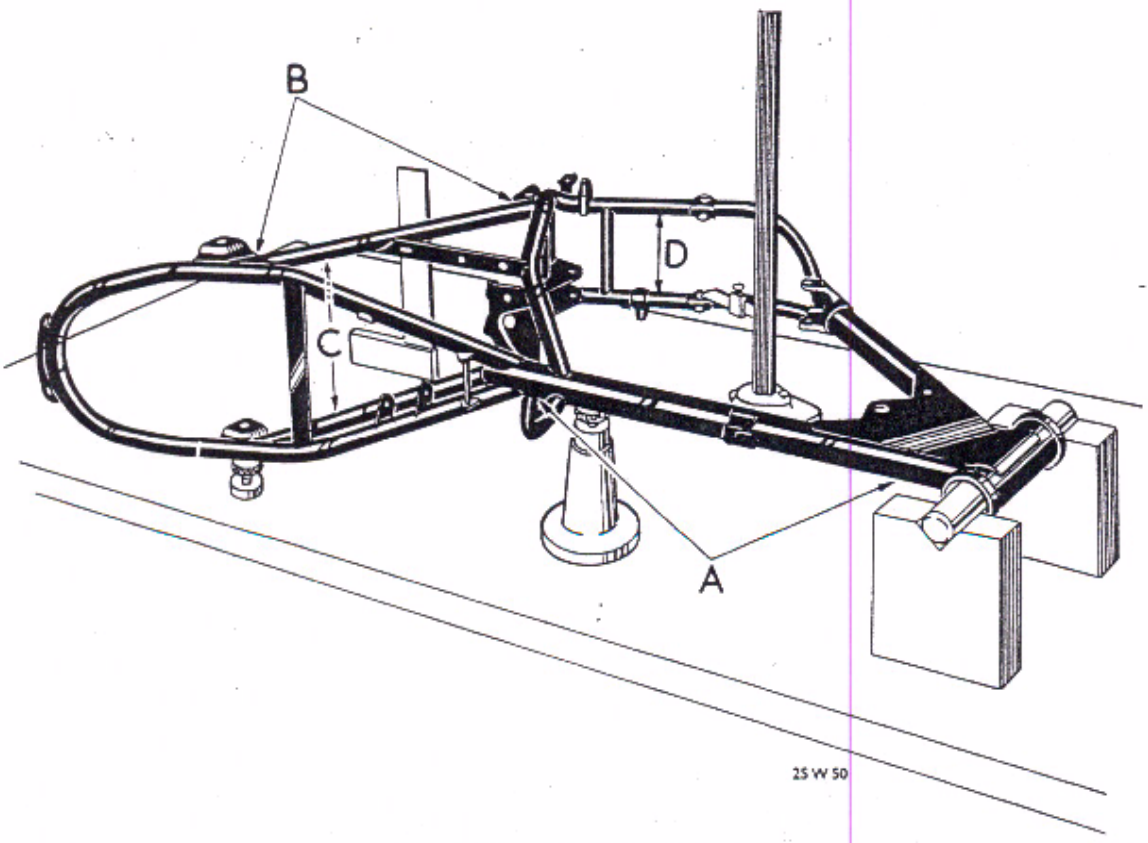


Fig. D3. Showing frame on setting table

When the frame is set parallel to the surface table, the mandrel through the swinging arm pivot holes should be vertical. This can be checked using the set-square and internal calipers or a slip gauge between the mandrel and the square. The set-square should touch both the upper and lower tubes together at points (*C*) and (*D*) if the frame is true and correctly set-up on the table. To find the frame centre line, take the height of the main tube and subtract half the diameter of the tube.

Checks can now be taken at the engine mounting lugs and other points of the frame. Errors at any point should not exceed $\frac{1}{32}$ in. (.79 mm.).

SECTION D2

CHAINGUARD REMOVAL

Take out the nut and bolt securing the chainguard to the uppermost swinging arm lug. Release the two rear fixing nuts and bolts securing the guard stay to the swinging arm left fork end then withdraw the chainguard from the rear.

SECTION D3

REAR SUSPENSION UNITS

The rear shock absorbers, or dampers, are of the coil-spring type, hydraulically damped and are mounted on bonded rubber bushes at each end.

The actual damping unit is a sealed assembly and the only dismantling that can be carried out is for the removal and replacement of the springs.

The top damper fixing bolts also retain the ends of the twin seat bracket and the mudguard support rail.

To remove a damper, take out the top fixing bolt with nut and washers and unscrew the lower fixing self-locking nut at cupped dust cover. Pull the damper off the stud at the bottom and withdraw from the top frame bracket.

If necessary the removal and replacement of the mounting bushes will be found much easier if a little liquid soap is applied.

The damper springs are graded at 100 lb./in. rate.

The damper positions are shown in Fig. D4 and D5 and they must be set in the "light load" position before dismantling. A "C" spanner for this adjustment is provided in the toolkit.

On late units with a castellated sleeve adjuster as in Fig. D5 the cam ring is fitted inside the castellated sleeve and the cam ring should be turned with service tool D2184 to the three progressively harder positions. These units are normally supplied and fitted in the light load position.

To remove the spring grip the bottom lug of the suspension unit in a vice, grasp the spring, or top cover on earlier models, in both hands and pull down until the spring is sufficiently compressed to allow the spring retainers to be removed by a second operator.

The damper unit should be checked for leakage, bending of the damper rod and damping action.

Reassembly is a reversal of dismantling. Check that the cam is in the light load position before compressing the spring.

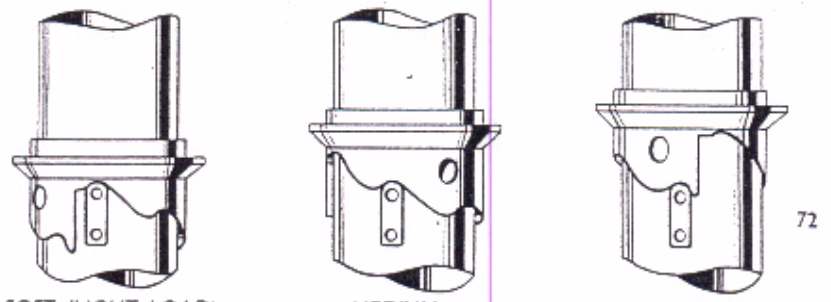


Fig. D4. Cam ring positions (with exposed cam ring)

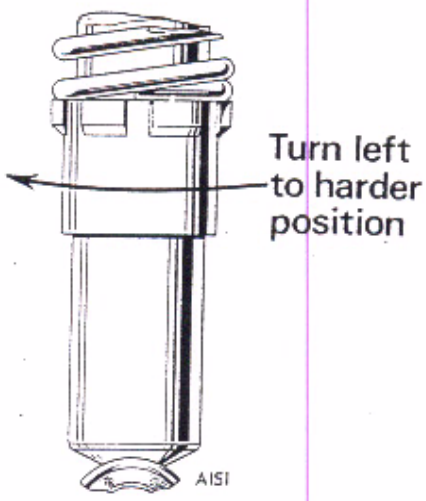


Fig. D5. Cam ring adjustment late type

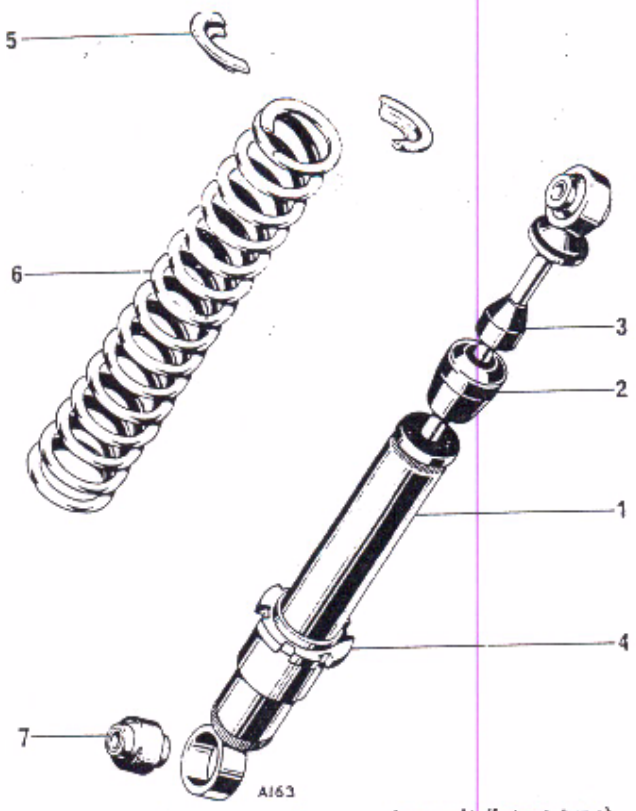


Fig. D5. Exploded view of suspension unit (latest type)

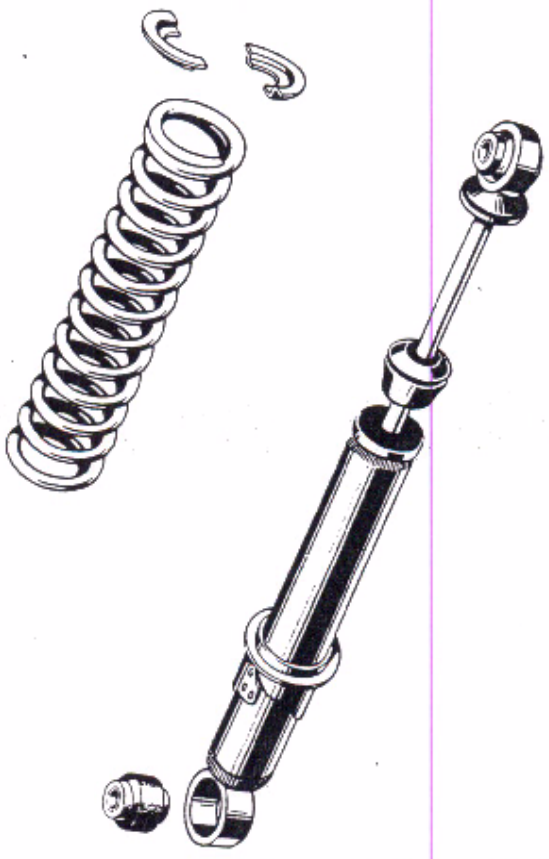


Fig. D6. Exploded view of suspension unit (earlier type)

SECTION D4

REMOVING THE SWINGING ARM

Take off the rear wheel, chainguard, dampers and rear brake pedal as described in Sections F4, D2, D3, and D9 respectively.

The left-hand pillion footrest bracket is welded to the swinging arm spindle and also carries the brake light switch. Disconnect the cable connectors at the switch and release the nut and bolt holding the bracket to the frame plate. The brake pedal stop is held by one nut and must also be removed. Unscrew the large nut with lockwasher, securing the swinging arm spindle at the right-hand side and drive the spindle out, using a suitable shouldered drift.

Now, using a hide mallet, tap the left-hand side of the swinging arm downwards and the right-hand side upwards to release it from the frame plates.

When replacing the swinging arm, do not tighten the large spindle nut until the dampers have been refitted.

SECTION D5

SWINGING ARM BUSHES

Each of the two bushes fitted to the swinging arm fork consist of two steel sleeves, bonded together with rubber. The inner sleeve is slightly longer than half the width of the fork in the frame, the two inner sleeves are locked together on the end faces, so placing the rubber under tension when the fork moves.

Under normal circumstances, the bushes will last the life of the machine, but should they require renewal, the rubber will have to be first removed. This can be done by progressively burning out the rubber with thin rods or strips of metal which have been heated. When sufficient rubber has been burnt away, drive out the inner sleeves, after which the outer sleeves can be removed with a suitable drift.

SECTION D6

CHECKING SWINGING ARM ALIGNMENT

Before checking the swinging arm alignment, it must be established that the bushes are in good condition.

Using the same mandrel that was used for the swinging arm pivot on the frame (see page D3), set the swinging arm in "V" blocks as shown in Fig. D7. Another mandrel 9 in. long x $\frac{5}{8}$ in. diameter should be inserted through the fork ends. Both mandrels should be parallel to the surface table. Should there be less than $\frac{1}{4}$ in. malalignment of the swinging arm fork it is permissible to correct it by means of a suitable lever but, care must be taken to avoid causing further damage.

To check that the forks are square to the pivot, they must be set-up at 90° to the position illustrated, so that the pivot is vertical. Next, find the centre of the pivot and check that the fork ends etc., are in accordance with the dimensions shown in Fig. D8.

When there is considerable malalignment in either frame or swinging arm, it is recommended that a works reconditioned unit is fitted.

Note. There may also be a variation in the rear dampers and a careful examination should be made of the overall length between the mounting eyes. It is possible that one damper may be weaker than the other, caused by the "settling" of a spring. If this should be the case, it is advisable to renew the springs in both dampers.

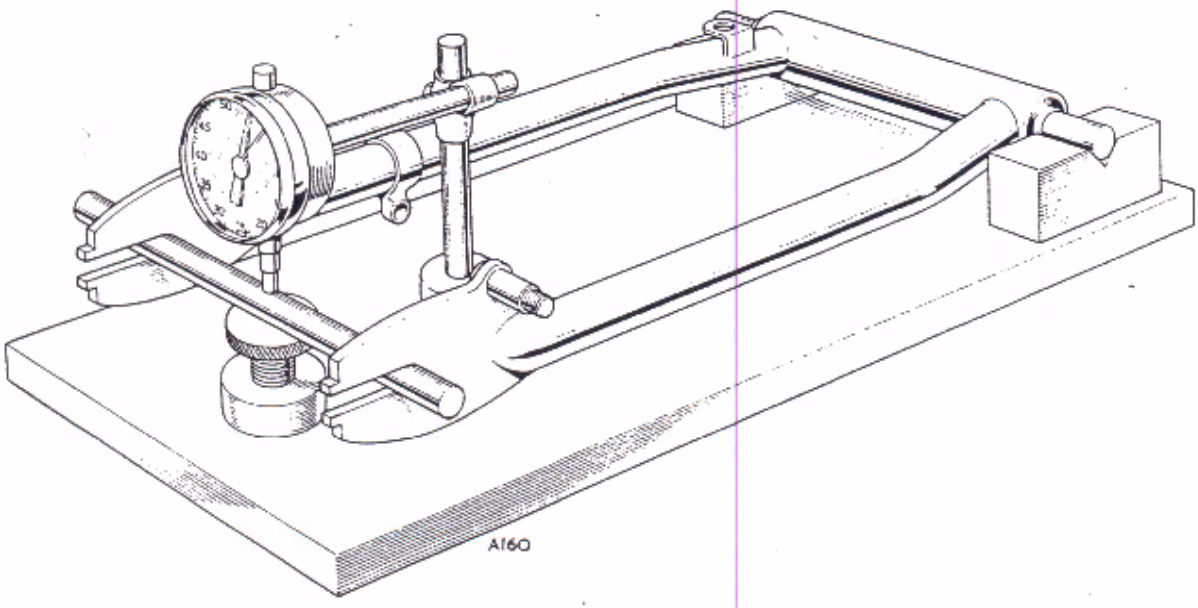


Fig. D7. Checking the swinging arm

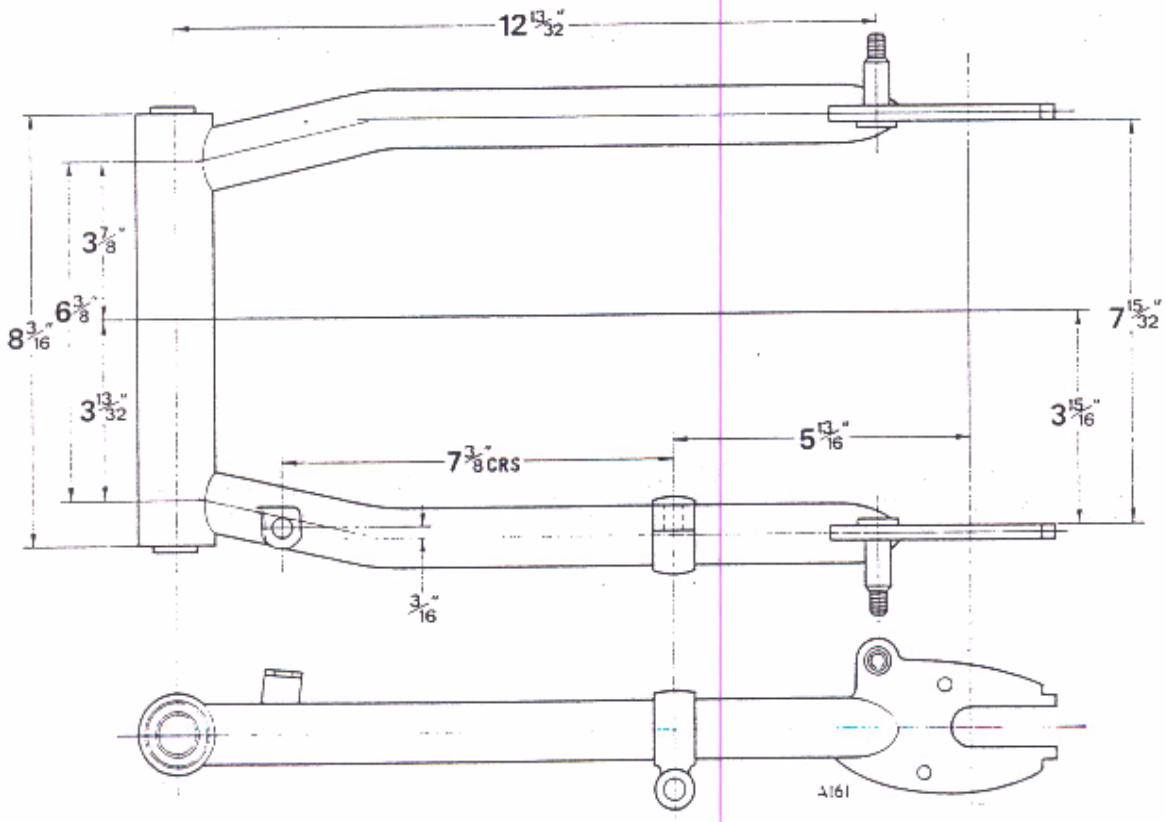


Fig. D8. Swinging arm dimensions

SECTION D7

TWIN SEAT

The twin seat is mounted on a bracket at the rear, which is secured at each side by the damper top fixing bolts. It will only be necessary to loosen these bolts sufficient to allow the seat to be raised at the rear. Withdraw the seat rearwards to disengage the front clip from the frame tie bar.

The clip is held to the base of the saddle by two nuts with washers and is slightly offset.

Replace in the reverse order, making sure that the clip engages correctly with the front mounting rod.

SECTION D8

PROP STAND

The prop stand is secured to the frame lug with one bolt and lockwasher. Bend back the tabs of the lockwasher and unscrew the bolt. The return spring will be released as the stand is drawn off the frame lug.

SECTION D9

REAR BRAKE PEDAL

Release the spring clip that holds the brake rod to the pedal and allow the rod to fall clear. Remove the central fixing bolt with large plain washer from the fulcrum pin and take off the pedal with return spring. The fulcrum pin is fixed to the frame with one large nut and washer.

The pedal is fitted with two adjuster bolts. The upper bolt controls the operation of the brake light switch and the lower one is used for setting the pedal position against the brake stop.

SECTION D10

MUDGUARDS

Removal of the front mudguard should be found quite straightforward, providing the stays are also removed. The mudguard blade should be tilted until it clears the fork legs.

The rear mudguard must be removed complete with its support rail, rear light and number plate. Whilst supporting the swinging arm, take out the damper top fixing bolts and lift off the dual seat. The ends of the support rail will now be free.

Disconnect the rear light cables (brown and brown/green) at their snap connectors near the battery. Reach inside the guard and release the two nuts and bolts holding the lower front of the guard to the frame cross-member.

Unscrew two nuts and bolts securing the mudguard to the rear of the seat rail and withdraw the guard from the rear, complete with its fittings.

Replace in the reverse manner and check that the rear light cables are not damaged at any point.

SECTION D11

AIR CLEANER

The carburetter air cleaner should be regularly examined at intervals of 1,000 miles(1,600 Km.), but if the machine is used under exceptionally severe conditions a weekly examination must be made. Running the machine with a badly choked air cleaner will cause restricted maximum speed, an increase in fuel consumption and many other carburation troubles.

The air cleaner unit is simply screwed on to the carburetter intake. Release the clip nut and bolt, holding together the ends of the perforated band and dismantle the unit.

The surgical gauze element must be washed in clean petrol and thoroughly dried before being replaced. If, however, the element no longer appears serviceable, it should be renewed.

Refer to Fig. D8 for details of correct reassembly.

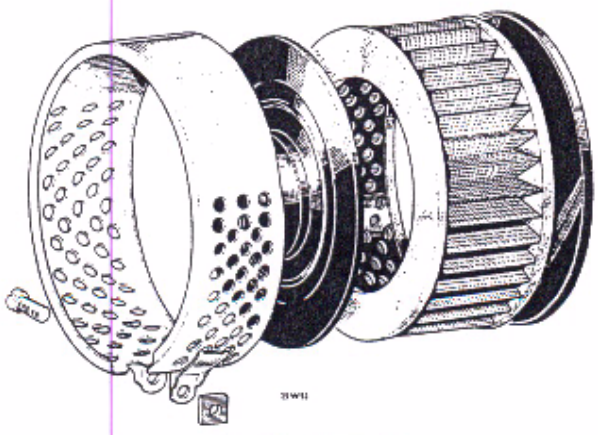


Fig. D8. Air filter

SECTION D12

OIL TANK REMOVAL

Remove the exhaust system complete after slackening the finned clip and removing the forward exhaust pipe stay nut and bolt and removing the silencer to frame nut and bolt. Turn the two 'ODDIE' fasteners half a turn to release the right side panel which should be removed.

Unscrew the tank filter plug and allow the oil to drain into a suitable receptacle, taking care not to lose the large fibre washers fitted each side of the oil feed pipe connection. Whilst waiting for the oil to drain, loosen the damper top fixing bolts, raise the dual seat at the rear and withdraw from the frame tie-bar at the front. Undo the small fixing clip and detach the rubber oil return pipe from the oil pipe junction block assembly on the engine. The rocker oil feed pipe need not be disturbed.

Two long bolts with nuts secure the tank mounting clips to the dual seat support rail. Each clip is fitted with a rubber sleeve which should be left in place, unless in need of renewal. The tank is located at its base by a peg which passes through a rubber grommet, mounted in a frame bracket. A small self-tapping screw retains the grommet in its housing.

Having released the top mounting bolts raise the tank to disengage the peg from its location and carefully withdraw the unit from the bottom first.

The tank can be replaced in the reverse manner but a thorough check must be made of the oil pipe connections to ensure that there is no oil leakage. If the mounting rubbers have become saturared with oil, it is advisable to renew them.

SECTION D13

BATTERY CARRIER AND TOOLBOX

Access is gained to the battery carrier and toolbox by removing the fibre-glass sidecover. This is retained by two "Oddie" studs which require only half a turn to release.

Disconnect the battery terminal connections, unclip the fixing strap and lift out the battery. Note that a vent pipe is connected to the battery top and is so arranged that corrosive fumes from the battery cells are directed clear of the machine.

Proceed by removing the rubber mat from the carrier base to expose the three fixing bolts. The two outer bolts are each fitted with two rubber bushes, two plain washers and a nut. A third nut retains the sidecover buffer bracket on to the end of the front bolt. The inner fixing point consists of one long bolt, three rubber bushes, a spacer tube, four plain washers and a nut.

The rubber bushes help to insulate the battery and carrier from road shocks and vibration. It is most important therefore, that a note is made of the way in which they are fitted, in order to ensure correct reassembly.

To remove the toolbox, first take out the toolroll then release the two fixing bolts and nuts. The lower bolt is fitted with a spacer between the toolbox base and the frame bracket. Gently pull away the toolbox and, noting their terminal locations, disconnect the rectifier cables, allowing the assembly to be withdrawn from the frame.

The rectifier is held to the rear of the toolbox by a single nut and should not be disturbed unnecessarily. When either unscrewing or tightening the fixing nut, the bolt head must be held firmly with a second spanner to prevent it from turning.

If this precaution is not taken, the rectifier plates may twist and break the internal connections.

SECTION D14

REMOVAL OF HEADLAMP

Pull out the bulb holder from the base of the speedometer head. Slacken the rim retaining screw situated at the top of the headlamp. Pull the rim away from the top and disengage from the clip at the base to release the light unit assembly. Press the main bulb adaptor inwards, rotate it to the left and lift it off. Pull out the parking bulb holder from its location in the reflector, withdraw the light unit and rim assembly and place to one side. To avoid damage, the bulbs should now be taken out of their holders.

Disengage the light switch cable socket (press-fit).

Pull out the headlamp main beam warning light holder from its sleeve and take out the bulb.

By displacing the large rubber grommet at the base of the headlamp shell, the harness complete with switch socket and bulb holders can now be withdrawn from the shell. Note on reassembly, that the harness is held securely by a spring clip inside the headlamp shell.

Finally, take out the two fixing bolts with washers from the fork leg brackets and withdraw the headlamp shell.

Replace in the reverse manner, making sure that all connections are secure and that the cables are not "bared" at any point.

Remember to adjust the headlamp to give the correction beam setting as detailed in Section G10.

SECTION D15

PETROL TANK REMOVAL

Turn off both petrol taps, release the petrol pipes from the taps by unscrewing the pipe union nuts.

Remove the two screws at the rear of the tank centre styling band and unhook the band from the front of the tank.

Unscrew the single centre holding nut, lift off the thick washer and sleeve and the tank is free to be removed. To facilitate removal note that the rear should be lifted first taking care not to damage the twinseat nose with the petrol taps. The front of the tank will need to be pulled upwards away from the support grommets in the frame steering head gussets.

To reassemble ensure that the two grommets are in place in the frame gussets and ensure also that both shaped rubbers are fastened with adhesive to the petrol tank tunnel (the stepped 'U' shaped rubber is the front one). The large rubber plug for the single holding bolt is fitted into the tank prior to assembly.

Fit the tank bolt with the special head into the frame top tube lug and the split sleeve over this.

Lower the tank complete with rubber over the bolt and fit the thick steel washer and the thin plain sleeve, finally fitting and tightening the centre nut. Refit the centre styling band and connect the petrol pipes at the taps.

SECTION D16

CONTROL CABLE REPLACEMENT

THROTTLE CABLE

First turn the twist grip to open the throttle, then, whilst pulling the cable sleeve, release the grip to allow the slotted cable stop to be removed. Now remove the two screws from the twist grip control and take off the top half to expose the cable nipple. Ease the nipple out of the grip and remove the cable.

Fit the replacement cable to the grip by inserting it up through the lower half and locating the nipple in its slot. Replace the top half of the grip, but, before tightening the screws, check that the grip turns freely. Do not replace the cable stop at this stage.

Proceed by removing the petrol tank (see Section D13) and detaching the cable from the frame clips.

Take out the two Phillips-head fixing screws and withdraw the carburetter top cover complete with throttle valve assembly. Compress the throttle spring, raise the needle with clip and after making careful note of its position, remove the needle clip to release the needle. Whilst still compressing the spring, push the cable downwards to release the nipple from its location in the valve. Take care not to lose the needle clip when taking off the spring and top cover.

First pass the replacement cable through the cable guide bracket then insert the cable through the top cap, spring and needle clip. Whilst compressing the spring, insert the cable nipple through the valve needle hole and locate to one side. Fit the valve needle and secure with the spring clip in the correct needle groove (second from the top). Assemble the throttle valve to the carburetter body, making sure that the needle enters the needle jet squarely. Locate the peg on the throttle valve with the slot in the mixing chamber and fit the top cap. Do not tighten the cap fixing screws until the throttle valve has been checked for correct operation.

Finally, attach the cable to the frame, replace the cable stop at the twist grip and adjust the cable as necessary (see Section C3).

CLUTCH CABLE

Unscrew and remove the handlebar lever fulcrum bolt and nut. Slacken the cable adjuster and swing the control lever away from the bracket, allowing the cable nipple to be released.

The adjuster and cable can now be withdrawn from the bracket. It will now be possible to release the nipple at the other end of the cable from the clutch actuating lever.

Replace the cable in the reverse manner and adjust as necessary to give correct operation.

Note. After adjustment, the control lever on the timing cover should take up a position approximately parallel with the timing cover joint face, when operated.

FRONT BRAKE CABLE

To remove the front brake cable, first completely loosen the cable adjusters and unscrew the nut and bolt holding the toggle to the lever on the brake cover plate. Now, pull the cable adjuster away from the handlebar lever bracket and slip the cable nipple out of the lever. Finally screw the bottom cable adjuster with knurled locknut out of the fork right hand bottom member lug.

Replacement is simply a reversal of the above procedure but do not omit to re-adjust the brake cable and test the efficiency of the brake thoroughly before using the machine.

SECTION E

TELESCOPIC FORKS

INDEX

DESCRIPTION

The front forks are telescopic and incorporate a double hydraulic damping system, the oil for which also lubricates the internal components.

Being of robust design, the forks and steering assembly require the minimum of maintenance apart from the periodical oil changes of the fork legs, detailed on page A11.

SECTION E1

STEERING HEAD ADJUSTMENT

It is most important that the steering head races are always correctly adjusted.

Place a strong support underneath the engine so that the front wheel is raised clear of the ground then, standing in front of the wheel, attempt to push the lower fork legs backwards and forwards. Should any play be detected, the steering head must be adjusted.

Care is necessary to distinguish between play in the head races and play in the fork bushes.

In some cases there may be both.

If possible, ask a friend to place the fingers of one hand lightly round the top head races, whilst the forks are being pulled back and forth. Any play will be felt quite easily by the fingers.

It should be possible to turn the forks from side to side quite smoothly and without any "lumpy" movement. If the movement is "lumpy", the balls are indented into the races or broken. In either case they and the cups and cones should be renewed.

To adjust the steering head assembly, slacken the clamp nuts Fig. E1 and the top yoke pinch bolt, then tighten down the adjuster nut until adjustment is correct. There should be no play evident in the races but great care must be taken not to overtighten, or the ball bearings will become indented into the races, making steering extremely difficult and dangerous.

Having carried out the adjustment, tighten the clamp nuts and the top yoke pinch bolt securely. Re-check the adjustment.

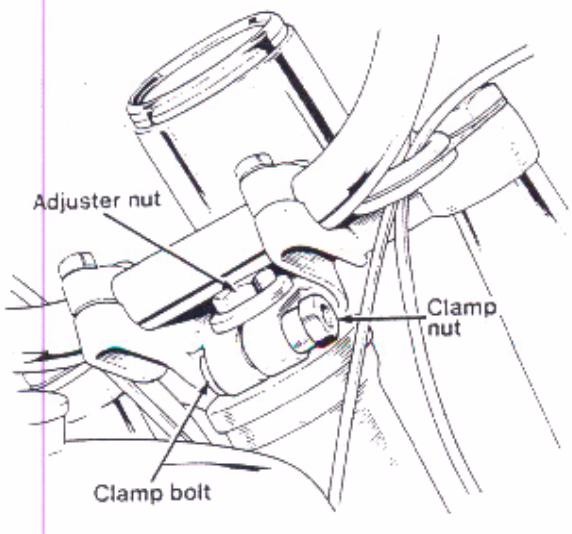


Fig. E1. Steering head adjustment

SECTION E2

RENEWING HEAD RACES

The steering head can be dismantled without stripping the forks but sufficient slack must be obtained in the headlamp cable harness and the front brake cable disconnected, to allow the column to be drawn out of the head.

If required, the headlamp can be removed, as detailed on page D11. To avoid risk of damage it is recommended that the speedometer head and the Zener Diode, together with its finned heat sink (see Fig. E2), are also removed.

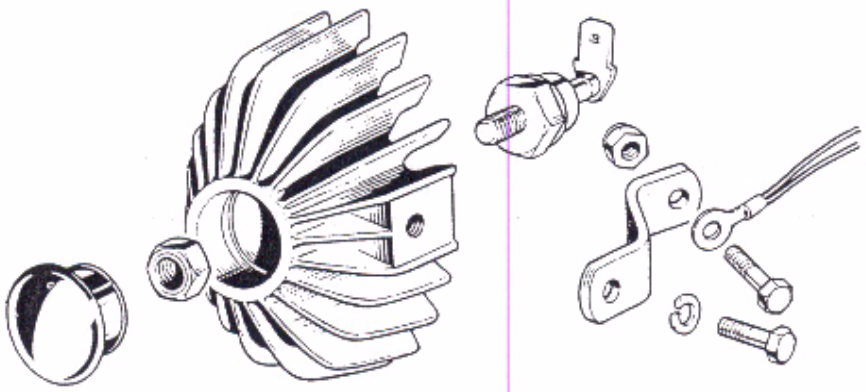


Fig. E2. Zener diode and heat sink

Protect the fuel tank with a piece of cloth, take out the four bolts securing the handlebar clips and place the handlebar on the tank.

Slacken the clamp nuts (*C*), the top yoke pinch bolt, and take off the adjuster nut (*B*). Unscrew and pull upwards, the fork caps (*A*). To release from the internal damper rod, loosen the locknut beneath the cap and unscrew from the rod.

The cable guide brackets can be left on the control cables.

Then, using a raw-hide mallet, strike the under sides of the top yoke alternately to release from the tapered legs. Place the top yoke to one side and draw the steering stem down and out of the head, taking care not to lose the bearings, which will be released as the stem is withdrawn. There should be twenty $\frac{1}{4}$ in. diameter steel balls in each race (see page A.16 for details on lubrication). Top race can be left undisturbed.

The two bearing cones differ slightly in size but the cups are identical.

The lower cone can be prised off the column but, when fitting the replacement, care must be taken to see that the cone is seated squarely. For this purpose a length of heavy gauge steel tubing, long enough to clear the column and $1\frac{1}{4}$ inch in diameter is most useful for driving the cone on to its seating.

The cups can be removed with the aid of service tool No. 61–3063. Slacken off the nut on the tool sufficient to allow the tool to be screwed into the cup, then tighten the nut until the tool is expanded tightly into the cup threads. Drive out the cup with a suitable bar from inside the head tube (as shown in Fig. E3).

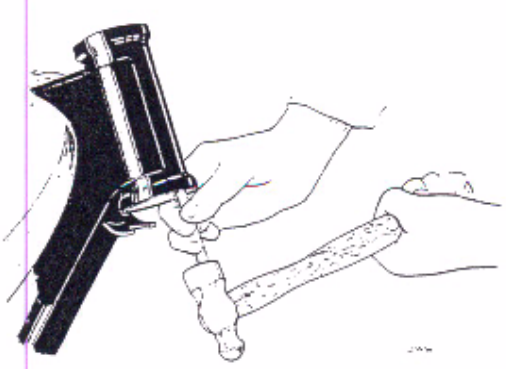


Fig. E3. Removing the top cup

Remove the tool by loosening the nut and repeat the procedure for the other cup.

When fitting replacement cups, see that they enter their housings squarely. Do not drive the cup in with a drift against the radius of the ballrace as this will impose undue strain and is liable to fracture the cup. If possible, use a piece of steel bar or tube having a diameter slightly less than that of the cup sides. A suitable drift would be as shown in Fig. E4.

After replacing the cups and bottom cone, grease the cups and assemble 20 balls into each cup. Slide the column back into the head, replace the top cone and dust cover then fit the top yoke. Screw on the adjuster cap and adjust the steering as quoted on page E1.

Reassembly from this point is simply a reversal of the dismantling procedure, but do not omit to fit the cable guide brackets under the fork cap nuts.

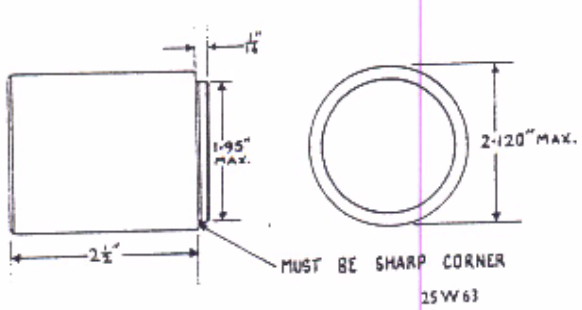


Fig. E4. Cup drift

SECTION E3

REMOVING THE FORK LEGS

Before commencing work on the forks, it is advisable to have the following servicing tools and replacements available:—

(a) Oil seal (2).

(b) Top bush (2).

(c) Lower bush (2)

(d) Damper rod bush (2)

(e) 61–3350 Service tool

(f) 61–3005 Service tool

(g) 61–3006 Service tool

(h) 61–3007 Service tool

(i) 61–3765 Service tool

and a length of No. 5 twine, approximately 15 in. long.

Remove the front wheel as described on pages E1 and F3, then take off the front mudguard. Drain the oil from each fork leg (see Section A17) and slacken off the pinch bolts in the bottom yoke. Slacken completely the top gaiter clips and slide the gaiters clear of the fork top shrouds.

Unscrew the fork leg cap and raise it sufficiently to enable the damper rod locknut (beneath the cap) to be loosened. The cap can then be unscrewed from the damper rod top. Screw service tool No. 61–3350 (minus the large nut and washer) into the top of the fork leg, take a firm grasp of the lower sliding member and strike the top of the service tool sharply with a mallet. This will release the leg from its taper fit in the top yoke, allowing the complete leg to be withdrawn.

The top shrouds are secured to the bottom yoke by the pinch bolts and need not be disturbed.

Remove the bottom gaiter clips and gaiters and the fork springs can now be pulled out of the oil seal holder and checked for wear. If replacement springs are required, smear them with grease before fitting.

SECTION E4

DISMANTLING THE FORK LEG

To assist in dismantling, hold the fork leg firmly in a soft-jawed vice at its wheel spindle lug. Slide service tool No. 61-3005 over the main tube and engage the dogs with the slots at the base of the oil seal holder.

Whilst pressing down firmly on the tool, turn anti-clockwise to unscrew the holder.

Remove the tool and slide the holder upwards until it locks on the tapered section of the tube, but do not use force or the oil seal may be damaged.

The main tube assembly can now be withdrawn from the lower sliding member.

Grip the unground portion of the tube in a vice, using soft clamps, and unscrew the large nut at the base of the shaft, enabling the bushes, spacer and oil seal assembly to be withdrawn.

The damper tube is retained in the lower sliding member at its base by one large "Allen" screw.

After removing the "Allen" screw, take out the two circlips at the damper tube top releasing the damper rod with valve and bush.

The damper valve assembly is secured to the damper rod by one nut (see Fig. E6).

The rubber sealing washer and special retainer, immediately below the damper rod top locknut need not be disturbed unless they require renewal.

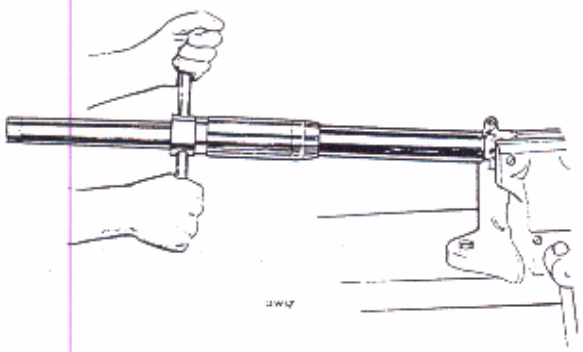


Fig. E5. Removing oil seal holder

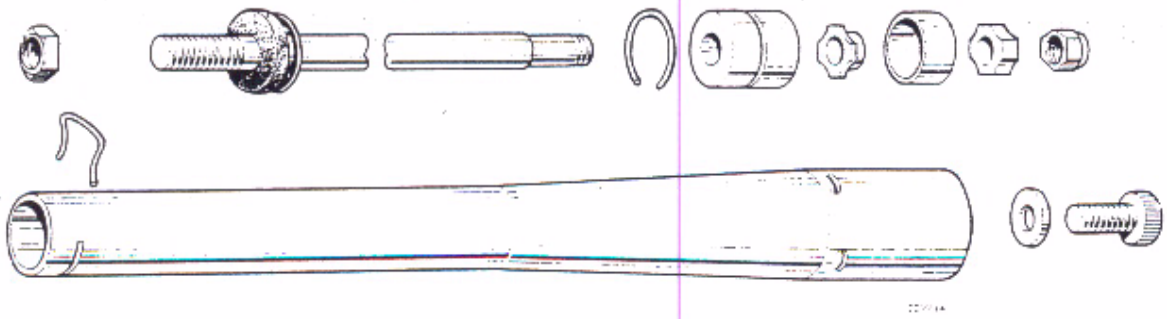


Fig. E6. Damper and damper rod assembly

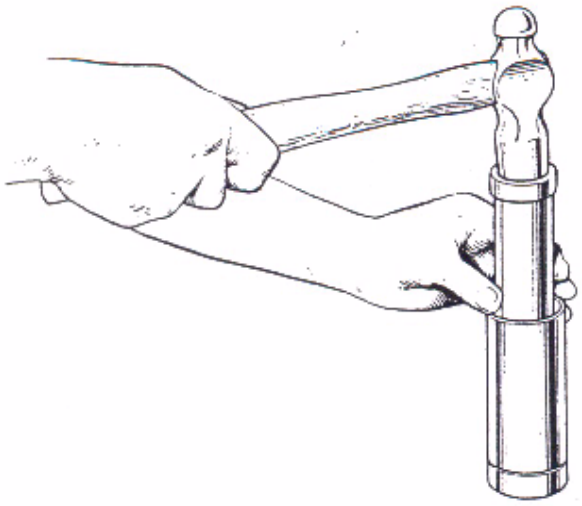


Fig. E7. Removing oil seal

If it is necessary to change an oil seal, place the lower edge of the holder on a wooden block and insert service tool No. 61–3006 into the top of the holder. Give the tool a sharp blow with a hammer and the seal will be driven out.

To fit a replacement seal, coat the outside with a good jointing compound and, whilst still wet, enter the seal squarely into the holder with the open side upwards. Drive the seal home with service tool No. 61–3007.

Care must be taken to avoid damaging the feather edge of the oil seal and this should be greased before reassembly.

SECTION E5

REASSEMBLING AND REPLACING THE FORK LEG

Reassembly is carried out in the reverse order to the dismantling procedure. Cleanliness is essential and before reassembly clean all the components thoroughly.

Note. During final assembly, screw down the oil seal holder on to one turn of twine round the groove at the end of the screw thread (see Fig. E8). This will provide an additional oil seal.

Screw service tool No. 61–3350 (minus the nut and collar) into the top of the fork leg and pass the assembly complete with gaiters up through the two yokes. Fit the collar and nut, and tighten the latter until the leg is drawn firmly home into its taper. Tighten the pinch bolts in the bottom yoke before removing the tool. Ensure that the lower end of each gaiter is fitted over the oil seal holder and the upper end over the lip on the top shrouds.

Using service tool No. 61–3765, raise the damper rod to the top of the tube to enable the cap nut to be screwed on to the rod. Do not omit to fit the cable guide bracket under the cap nut.

Ensure that the rubber sealing washer and special retainer are correctly fitted directly below the damper rod locknut.

Repeat the operations on the other fork leg, refill with the correct amount of oil ($\frac{1}{3}$ pint to each leg) and screw down the cap nuts firmly.

Final assembly is of course, simply a reversal of the procedure for dismantling.

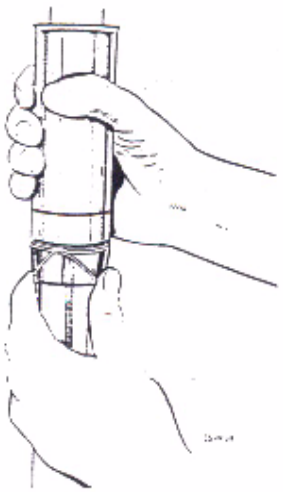


Fig. E8. Using the twine

SECTION E6

FORK ALIGNMENT

After replacing the fork legs, mudguard and wheel, it may be found that the fork is incorrectly aligned.

To rectify this, the fork wheel spindle cap and bolts must first be screwed up tight on the right-hand leg and the spindle cap on the left-hand leg slackened off. Also loosen the top caps and the pinch bolts in both the bottom and top yokes. The forks should now be pumped up and down several times to line them up and then tightened up from bottom to top, that is, wheel spindle, bottom yoke pinch bolts, top caps and finally, the steering stem pinch bolt in the top yoke.

If, after this treatment, the forks still do not function satisfactorily then either the fork stanchions are bent or one of the yokes are twisted.

The stanchions can only be accurately checked for straightness with special equipment such as a surface plate. Special gauges are also required to check the yokes. It is possible, however, to make a reasonable check of the stanchions by rolling them on a surface plate or flat surface such as a piece of plate glass, but it is not a simple operation to straighten a bent tube, and a new part may be necessary.

Check the stanchions for truth by rolling them slowly on a flat checking table. A bent stanchion may be realigned if the bow does not exceed $\frac{5}{32}$ in. maximum. To realign the stanchion, a hand press is required. Place the stanchion on two swage "V" blocks at either end and apply pressure to the raised portion of the stanchion. By means of alternately pressing in this way and checking the stanchion on a flat table the amount of bow can be reduced until it is finally removed.

Having checked the stanchions for straightness and reset as necessary, the top and bottom yokes can now be checked. First, assemble the two stanchions into the bottom yoke so that a straight edge across the lower ends is touching all four edges of the tubes, then tighten the pinch bolts. Now view them from the side; the two stanchions should be quite parallel. Alternatively, the lower 12 in. of the stanchions can be placed on a surface plate, when there should be no rocking.

If the stanchions are not parallel, as in Fig. E9, then it will be necessary to reset the yoke, providing the error is not excessive.

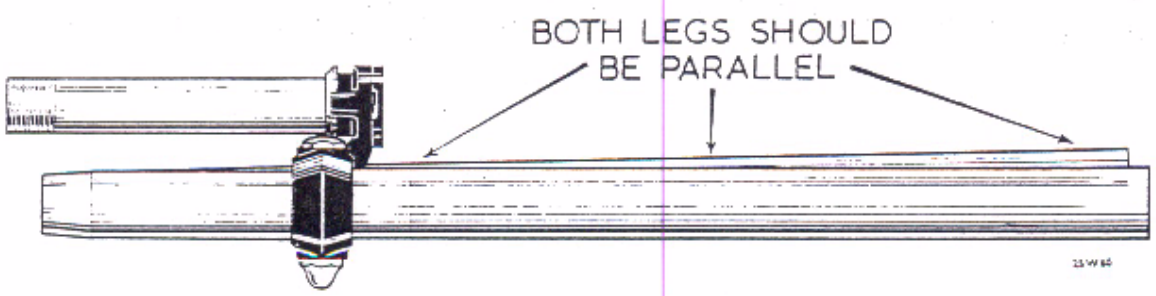


Fig. E9. Fork leg alignment

To reset, hold one stanchion in a vice on the unground portion (using soft clamps) and reposition the other stanchion, using a longer and larger diameter tube to obtain sufficient leverage. Having checked the stanchions this way, check the gap between them on the ground portion.

The next step is to place the top yoke in position over the stanchions, when the steering column should be quite central. Figure E10 shows a bent steering column.

The final step is to check if the tubes are parallel when assembled into the top yoke only. In this case the bottom yoke can be fitted loosely on the tubes, acting as a pilot only.

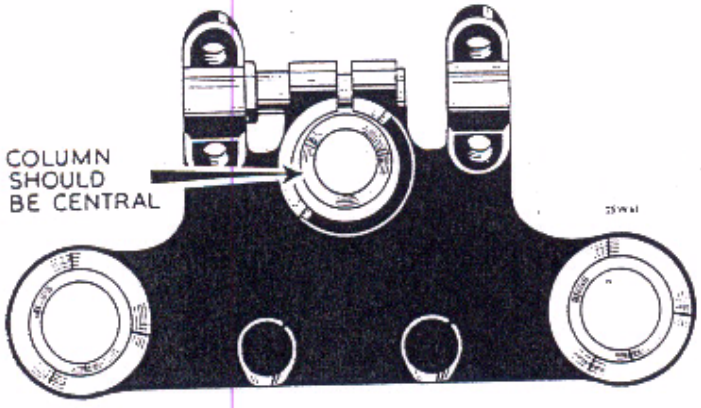


Fig. E10. Bent steering column

Though it is permissible to rectify slight errors in alignment by resetting, it is much safer to replace the part affected especially when there is excessive malalignment. Works reconditioned units are available to owners in the United Kingdom through the dealer network.

SECTION E7

HYDRAULIC DAMPING

Figure E11 shows a sectional view of a front fork leg extended.

Note the four $\frac{3}{32}$ in. diameter bleed holes in the main tube and the transfer holes at the base of the damper tube.

When the forks are compressed, a double damping action takes place within each fork leg. As the fork leg rises, oil in the damper tube is compressed by the valve and is forced through the transfer holes, into the main tube. At the same time, the oil in the main tube is also being compressed and is forced upwards between the outside of the damper tube and the top tube bush. The pressure of the oil increases as the gap narrows around the tapered damper tube, progressively slowing the fork spring action.

When the top tube begins to fill with oil which can no longer be compressed, the oil passes through the bleed holes into the area between the fork leg and top tube bushes. Eventually the point of maximum compression is reached and is cushioned by the remaining oil in the main reservoir.

As the fork leg begins to extend again, the oil in the area between the two fork bushes is compressed and forced through the four bleed holes, back into the main tube.

The damper valve, as it rises, creates a vacuum and draws oil into the damper tube, via the transfer holes, thus providing a smooth cushioned motion.

It will be seen therefore, that each leg should contain the same amount of oil ($\frac{1}{3}$ pint) to provide uniform damping.

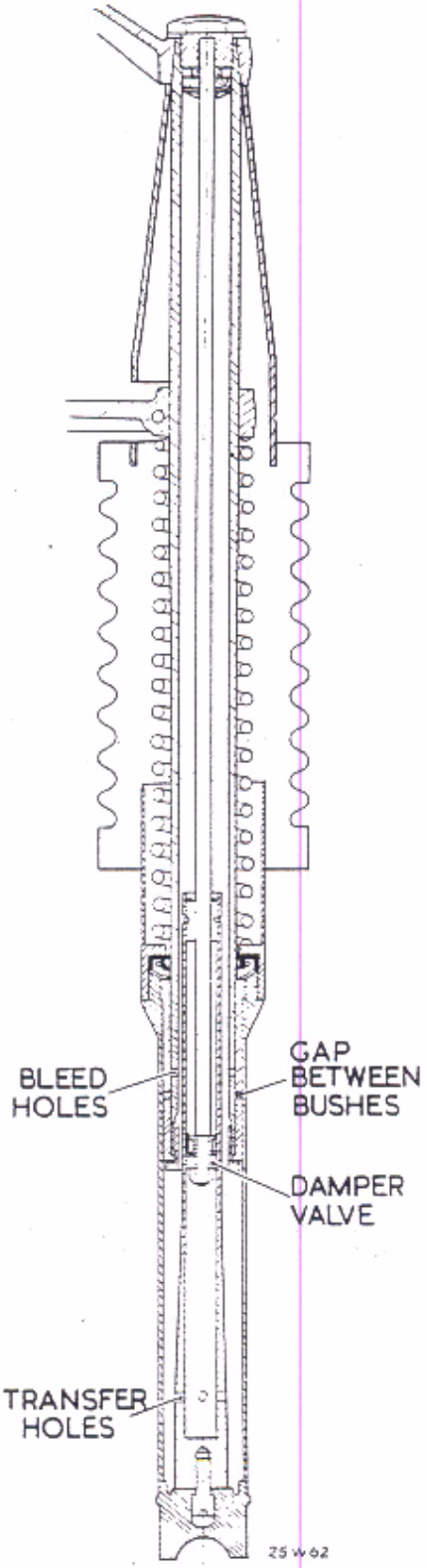


Fig. E11. Hydraulic damping features

SECTION F

WHEELS, BRAKES AND TYRES

INDEX

SECTION F1

REMOVING AND REFITTING THE FRONT WHEEL

Place the machine with the front wheel approximately six inches off the ground. First, unscrew the handlebar front brake adjuster then disconnect the cable at the actuating lever on the brake plate. Unscrew the two wheel spindle cap bolts from the base of each fork leg and remove the wheel.

Refitting the wheel is the reversal of the above instructions but care should be taken to ensure that the anchor plate locates correctly over the peg on the inside of the right fork leg. Tighten the spindle cap bolts evenly a turn at a time.

SECTION F2

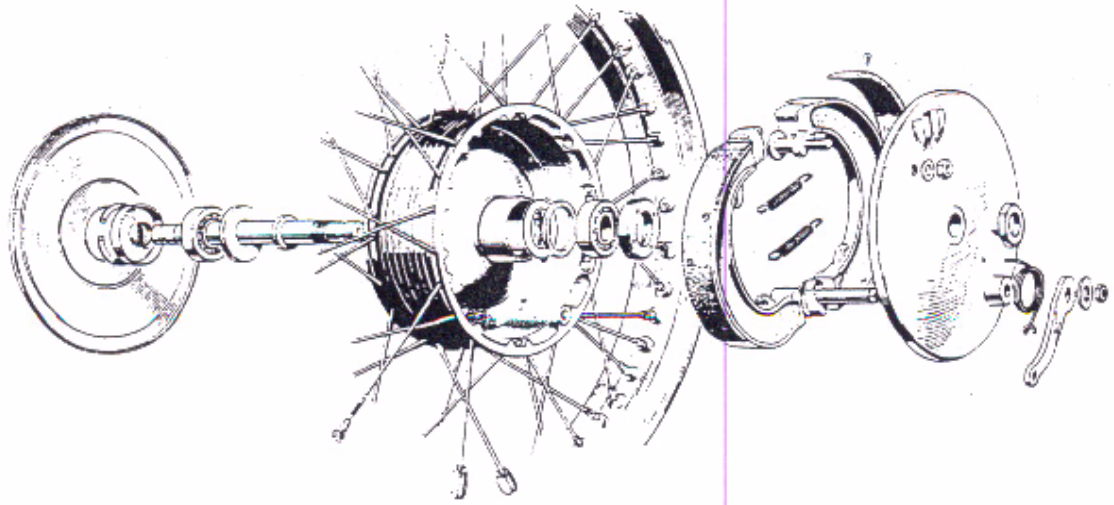
REMOVING AND REFITTING THE FRONT WHEEL BEARINGS

Remove the front wheel from the fork (see Section above) and withdraw the front anchor plate from the brake drum. Unscrew the retainer ring (left hand thread) using service tool Z76.

The right bearing can be removed by using the spindle and driving through from the left side. Withdraw the backing ring and inner retaining disc. To remove the left bearing, spring out the circlip and insert the spindle from the right side, driving the bearing out complete with inner and outer grease retainer plates.

Fully clean all parts in paraffin (kerosene). Clean and dry the bearings thoroughly. Compressed air should be used for drying out the ball races. Test for end float and inspect the balls and races for any signs of pitting. If there is any doubt about their condition, the bearings should be renewed.

To refit the bearings, first insert the left inner grease retainer, bearing and outer dust cap, using a liberal amount of grease (see page A18). Refit the spring circlip and insert the shouldered end of the wheel spindle from the right, using it as a drift to drive the bearing and grease retainer until they come up to the circlip. Re-insert the spindle the opposite way round and refit the right hand grease retainer disc and backing ring. Drive the right bearing into position well smeared with



47

Fig. F1. Exploded view of front wheel bearing arrangement

grease, then screw in the retainer ring (left hand thread) until tight.

Finally, tap the spindle from the left to bring the spindle shoulder up against the right bearing. Refer to Fig. F1 for correct layouts. Re-assembly then continues as a reversal of the above instructions.

SECTION F3

STRIPPING AND REASSEMBLING THE FRONT BRAKE

Access to the brake shoes (front or rear) is obtained by removing the wheel and unscrewing the central nut which retains the brake anchor plate. If the brake operating lever is then turned to relieve the pressure of the shoes against the drum, the complete brake plate assembly can be withdrawn from the spindle.

Slowly release the lever and continue until the return spring can be removed, then take off the brake shoes by the method shown in Fig. F2 Remove the nut and washers securing the brake lever to the cam spindle and remove the lever. The cam spindle can then be easily withdrawn from the plate.

INSPECTION PROCEDURE

(1) Examine the anchor plate for cracks or distortion, particularly in the brake cam housing.

(2) Clean out the grease in the brake cam spindle and remove any rust with a fine emery cloth.

(3) Inspect the return springs for signs of fatigue and distortion. Renew them if necessary.

(4) Examine the brake drum for scoring or ovality. In the case of the rear wheel if the drum requires skimming it should be removed from the wheel. Do not skim more than .010 in. from the drum. If the diameter exceeds more than given in the GENERAL DATA by more than .010 in. the drum should be renewed.

In the case of the front wheel drum, scoring or signs of ovality can be removed by similar procedure but a large swing lathe of 18 in. or 19 in. diameter is required.

(5) Examine the brake shoes. The brake linings should be replaced immediately the rivets show signs of having worn level with the linings face, or the linings show signs of cracks or uneven wear. Also check that the brake shoes are not cracked or distorted in any way.

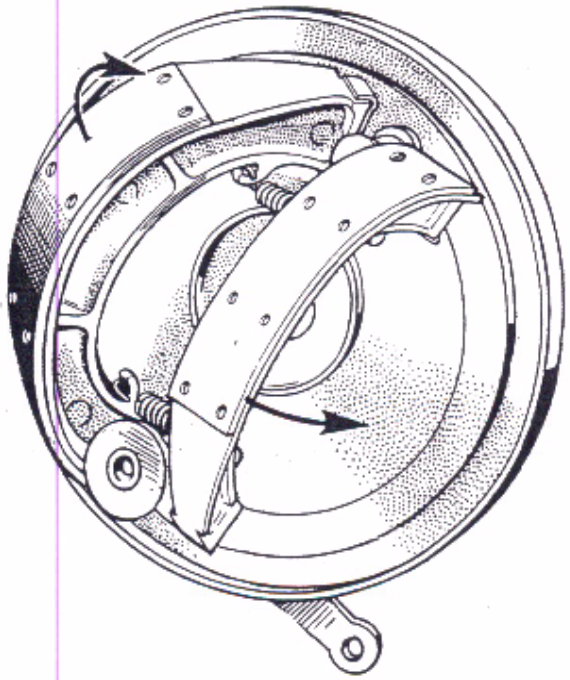


Fig. F2. Refitting brake shoes

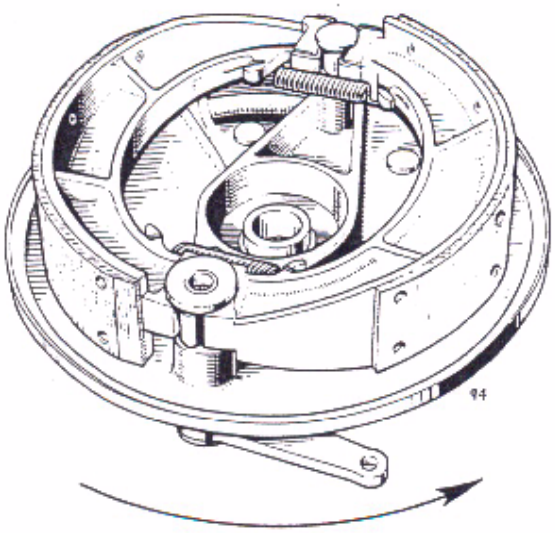


Fig. F3. Correct assembly of brake shoes onto front anchor plate. Arrow indicates direction of rotation

To re-assemble the brake shoes to the brake anchor plate first place the two brake shoes on the bench in their relative positions. Fit the return springs to the retaining hooks, hook ends uppermost, then taking a shoe in each hand (see Fig. F2) and at the same time holding the springs in tension, position the shoes as shown over the cam and fulcrum pin and snap down into position by pressing on the outer edges of the shoes. Locate the brake lever in an anti-clockwise position and engage the return spring.

Note. When replacing the brake shoes, note that the leading and trailing brake shoes are not interchangeable in either the front or rear brake and ensure that they are in their correct relative positions as shown in Fig. F3.

Re-assembly then continues by placing the anchor plate over the wheel spindle and locking it with the spindle nut. Refer to Section F12 for final re-alignment of the wheel if this is found to be necessary.

The front brake shoes are semi-floating to allow them to self centralise on the fulcrum pin. In addition the front wheel brake shoe fulcrum pin is adjustable and is identified by a hexagonal nut just behind the fork bottom member on the anchor plate. To adjust, slacken the nut, apply full pressure to the front brake handlebar lever, and whilst holding this pressure, retighten the nut. This locks the fulcrum pin in the position which ensures the maximum area contact of the brake shoes within the brake drum.

The adjustment of the front brake operating mechanism is by means of a knurled adjuster nut incorporated in the handlebar abutment. Turn the nut anti-clockwise to take up the slack in the control cable. The correct adjustment is with not less than $\frac{1}{16}$ in. (1.5 mm.) and not more than $\frac{1}{8}$ in. (3 mm.) slack in the inner cable at the handlebar lever.

SECTION F4

REAR WHEEL REMOVAL AND REPLACEMENT

Removal of the rear wheel does not affect the chain or brake adjustments.

Detach the speedometer drive cable then unscrew and withdraw the wheel spindle (D) Fig. F4, using a suitable steel bar through the head. It has a normal right-hand thread and is therefore unscrewed in an anti-clockwise direction.

The outer collar (E) should fall clear on removal of the spindle and the wheel can then be pulled away from the brake drum and withdrawn from the machine.

The speedometer drive unit can now be pulled away from the hub, and the end cover unscrewed.

It will not be necessary to disturb the wheel nut (A) on the left-hand side, as this retains the brake drum assembly.

Replace in the reverse manner but do not omit to refit the spindle outer collar.

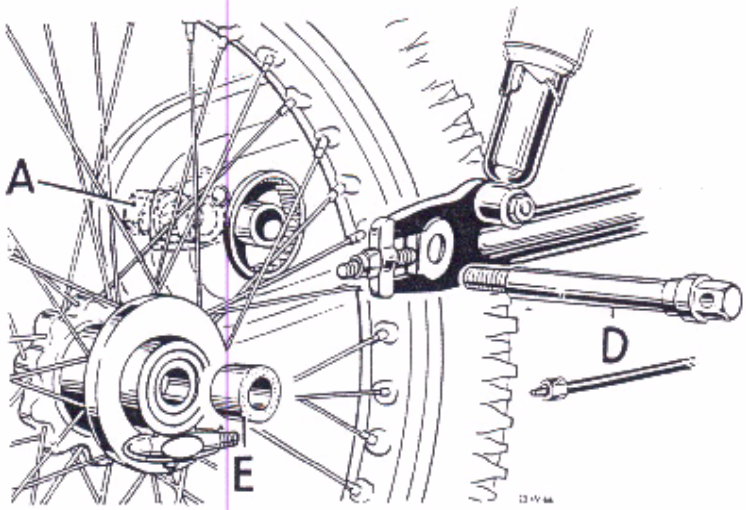


Fig. F4. Removal of rear wheel

SECTION F5

REMOVING AND REPLACING REAR WHEEL BEARINGS

The hub is fitted with two identical single-seal bearings which are a light press-fit on to the hollow spindle in the hub shell. The brake drum bearing is the same size as the hub bearings, but has a double oil seal.

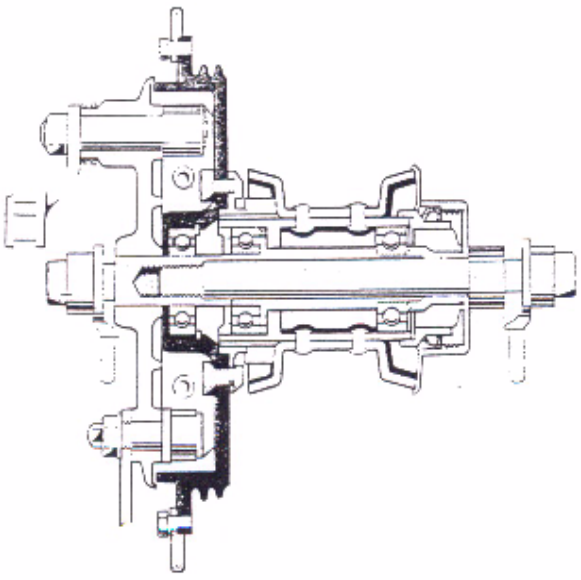


Fig. F5. Section of rear hub

To remove the bearings, first unscrew the bearing retainer on the left-hand side; this has a left-hand thread and is unscrewed in a clockwise direction.

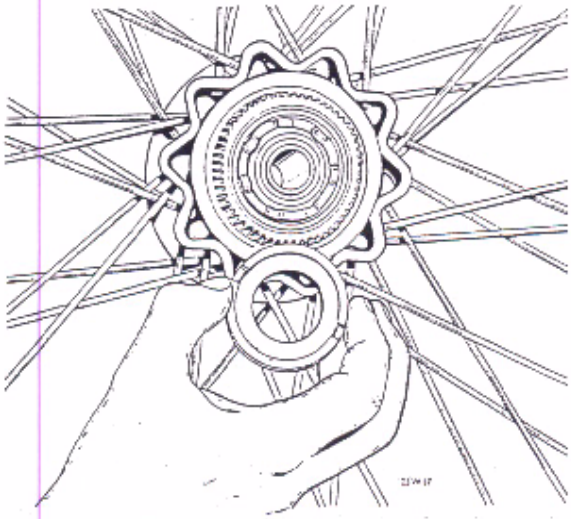


Fig. F6. Bearing retainer

Using a drift slightly under .875 in. diameter, drive out the hollow spindle from the left-hand side, releasing the right-hand bearing, inner collar and washers from the right-hand side.

The left-hand bearing and its thrust washer can now be driven out from the right-hand side.

The rubber oil seal for the left-hand bearing need not be disturbed and may be left in the hub.

To examine the bearings, wash thoroughly in paraffin and if possible, blow out with a high-pressure air line. Examine each bearing carefully for signs of roughness indicating broken balls or damaged tracks, or excessive play.

Reassembly of the hub is simply the reverse of the dismantling procedure but, when pressing the bearings in, apply pressure only to the outside ring of the bearing and ensure that the retainer on the left-hand side is quite tight.

Note that the hollow spindle is fitted with the short end on the left-hand side and also that the bearings are fitted with their oil seals outwards.

SECTION F6

REAR BRAKE DRUM AND BEARING

The brake drum is retained in the rear fork end by the spindle nut and the self-locking nut securing the brake anchor strap to the swinging arm lug.

To remove the drum, disconnect the rear chain at its spring link and unscrew the brake rod adjusting sleeve. Take off the spindle nut and the anchor strap bolt, and withdraw the complete brake drum assembly.

The brake plate complete with brake shoes and springs, can now be lifted off the spindle.

There is no need to disturb the cam spindle unless it is to be replaced, in which case the position of the brake lever should be noted to assist in reassembly.

The brake shoes and springs can be removed in the usual way.

To remove the bearing, first drive out the spindle from the left-hand side and release the bearing circlip with steel washer. The bearing can now be driven out from the front of the drum using a suitable drift.

Reassembly is the reverse of the dismantling procedure but, do not omit to replace the steel washer under the bearing circlip so that it seats on the outer ring of the bearing, not the inner ring.

It should not be necessary to disturb the driving flange unless it is known to be worn and is being replaced.

To remove the flange, flatten the locking plates, unscrew the six bolts and withdraw.

When fitting the new flange, see that it enters the drum squarely and that the mating surfaces are clean. Replace the six bolts and, after tightening the nuts evenly, turn the edges of the locking plates over.

If the chainwheel teeth are hooked or the inside of the brake drum is badly scored they should be replaced.

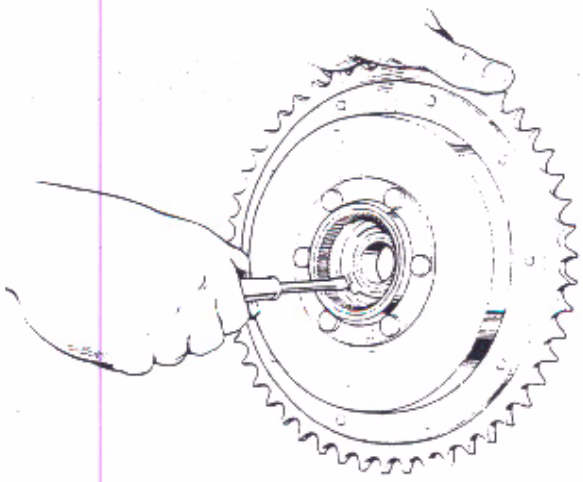


Fig. F7. Releasing bearing circlip

Note the following when reassembling the brake drum:

See that the spindle is pressed well into the bearing and replace the cover plate complete with brakes, shoes etc. Place the assembly into the fork end, and fit the chain adjuster, washer and nut, on to the spindle end. If the chain tension was correct, there will be no need to make any adjustment now. Do not tighten the spindle nut until the wheel has been replaced, so that the alignment can be made for the complete assembly.

See that the self-locking nut, securing the brake anchor strap to the swinging arm lug, is tightened securely.

SECTION F7

BRAKE ADJUSTMENT

The brakes must be adjusted to give maximum efficiency at all times and for this to be maintained, the shoes should be just clear of the drum when the brake is off, and close enough for immediate contact when the brake is applied. The brakes must not be adjusted so closely, however, that they are in continual contact with the drum; excessive heat may be generated, resulting in deterioration of braking efficiency.

The front brake adjuster is situated on the lower fork leg and rotation of the screwed sleeve alters the effective length of the cable, so adjusting the position of the shoes in the drum. The locknut should be tightened after adjustment.

A self-locking cable adjuster is also provided at the handlebar lever.

The rear brake is adjusted by turning the self-locking sleeve in a clockwise direction (viewed from the rear of the machine), to shorten the effective length of the brake rod and so open the shoes in the drum.

Note that if maximum efficiency is to be obtained, the angle between the brake cable or rod and the operating lever on the brake plate should not exceed 90° when the brake is fully applied.

Both front and rear brake operating levers have serrated cam holes, enabling them to be removed and replaced in a new position to give finer brake adjustment.

When new front brake shoes have been fitted or if, during dismantling of the front wheel, the fulcrum pin was disturbed, the shoes must be centralized within the drum.

To do this, slacken the fulcrum pin nut and operate the brake cam so as to open the brake shoes. The fulcrum pin will then position itself in the housing until both shoes are pressing equally on to the drum. Tighten the fulcrum pin nut firmly and realease the brake.

The rear brake shoes are of the fully-floating type (i.e., they are not pivoted on a fulcrum) and are therefore self-centralizing.

SECTION F8

REAR CHAIN ADJUSTMENT

The rear chain must be adjusted when the wheel is at the lowest point of the suspension travel (when tha wheel is raised clear of the ground).

Rotate the wheel slowly until the tightest point on the chain is found, then check its up and down movement in the centre of the chain run. The total movement should be $1\frac{1}{8}$ in. and if it varies from this setting, the chain must be adjusted by moving the rear wheel either forwards, to increase slackness or backwards, to reduce slackness. As chains invariably stretch periodic inspection and adjustment is essential.

To adjust the chain, first slacken the wheel spindle nuts, the nuts retaining the anchor strap and the brake rod adjusting sleeve. Tighten both chain adjuster nuts evenly until the correct chain setting is obtained.

After adjustment, tighten the wheel spindle and anchor strap nuts, re-check the setting of the chain and adjust the rear brake.

It is advisable to check the wheel alignment after any adjustment to the rear chain has been made; full details of this are given in Section F12.

SECTION F9

RENEWING BRAKE LININGS

Hold the shoe firmly in a vice and, using a good sharp chisel, cut off the peened-over portion of the rivet as shown below.

Drive out the rivets with a suitable pin punch and discard the old lining. Reverse the shoe in the vice and draw-file the face of the shoe to remove any burrs.

Clamp the new lining tightly over the shoes and, using the shoe holes as a jig, drill straight through the lining with a $\frac{5}{32}$ in. diameter drill.

Remove the clamps and, holding the lining carefully in the vice, counterbore or countersink (according to the type of rivet used) each hole to no more than two-thirds the thickness of the lining, i.e., if the lining is $\frac{3}{16}$ in. thick, then the counterbore must not be deeper than $\frac{1}{8}$ in.

Having prepared the linings for riveting, start at the centre and position the lining with one or more rivets.

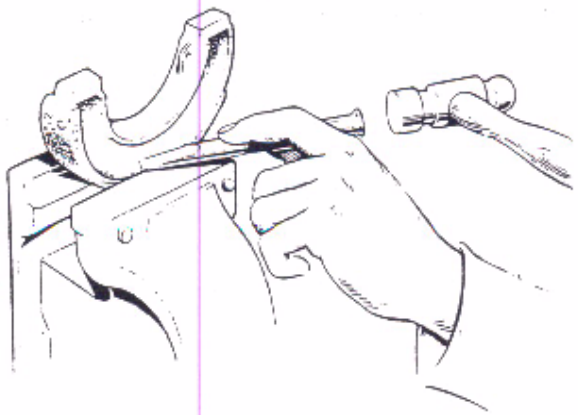


Fig. F8. Chiselling off brake rivets

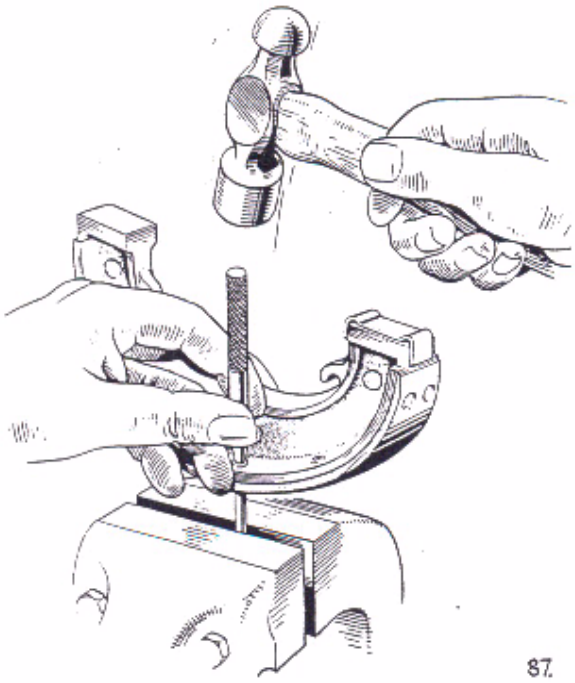


Fig. F9. Punching lining rivets

Place a suitable mandrel in the vice, clamp the linings to the shoes with either small "G" or toolmakers clamps and peen-over the rivets as shown in Fig. F9, working alternatively outwards from the centre.

The mandrel used in the vice must be flat on the end and the diameter should be no more than that of the rivet head. It will also help to bed the rivet down if a hollow punch is used before peening.

Note. If the clamps are used correctly, that is, next to the rivet being worked on, the linings can be fitted tightly to the shoe.

If the linings are fitted incorrectly, a gap will occur between the lining and the shoe, resulting in inefficient and "spongy" braking.

When the riveting is completed, file a good chamfer at each end of the lining to approximately half its depth and lightly draw-file the face of the lining to remove any fraze caused by the drilling.

SECTION F10

WHEEL BUILDING

This is a job which is best left to the specialist as it is essential that the wheel is laced correctly and that when truing, the spokes are correctly tensioned.

It is however, possible for the less experienced to avoid trouble by periodically examining the wheels. As spokes and nipples bed down the tension will be lost and unless this is corrected the spokes will chafe and ultimately break.

Periodically test the tension either by "ringing", that is striking with a metal tool or by placing the fingers and thumb of one hand over two spokes at a time and pressing them together.

If tension has been lost there will be no ringing tone and the spokes will move freely across each other.

When a spoke needs tensioning, the nipple through the rim must be screwed further on to the spoke but at the same time, the truth of the wheel must be checked and it may be necessary to ease the tension at another part of the wheel in order to maintain its truth.

It will therefore be obvious that spoke replacement, spoke tensioning or wheel truing are not operations to be treated lightly.

Careful examination of the wheel will show that for every spoke there is another pulling in the opposite direction and that the adjacent spoke goes to the opposite side of the hub.

Increasing the tension tends to pull the rim so, to counteract this, it is sometimes necessary to increase the tension on the spoke or spokes either side to maintain the truth of the wheel.

With a little care and patience it is possible for the

unskilled to at least re-tension the spokes but, turn each nipple only a little at a time as, once the spoke is under tension only a fraction of a turn is sometimes sufficient to throw the rim badly out of truth.

SECTION F11

WHEEL BALANCING

When a wheel is out of balance it means that there is more weight in one part than in another. This is very often due to variation in the tyre and at moderate speeds will not be noticed but at high speeds it can be very serious, particularly if the front wheel is affected.

Wheel balancing can be achieved by fitting standard one ounce and half ounce weights which are readily available, as required. All front wheels are balanced complete with tyre and tube before leaving the factory and if for any reason the tyre is removed it should be replaced with the white balancing "spot" level with the valve. If a new tyre is fitted, existing weights should be removed and the wheel re-balanced, adding weights as necesaary until it will remain in any position at reat. Make sure that the brake is not binding while the balancing operation is being carried out.

For normal road use it is not found necessary for the rear wheel to be balanced in this way.

SECTION F12

WHEEL ALIGNMENT

If the alignment is either (A) or (C) then the rear chain adjusters must be moved as indicated by the arrows to correct the alignment. Assuming that the chain adjustment is correct the movement of the rear wheel will be made on the right hand side chain adjuster which should be screwed in or out as necessary after the spindle nuts have been slackened off.

A machine suffering accidental damage may have wheels so out of alignment that they cannot be corrected in this way. Frame, fork or wheel geometry may basically be upset in which case reference should be made to the repair details in Section D.

Steering will be affected if the wheels are the slightest bit out of alignment.

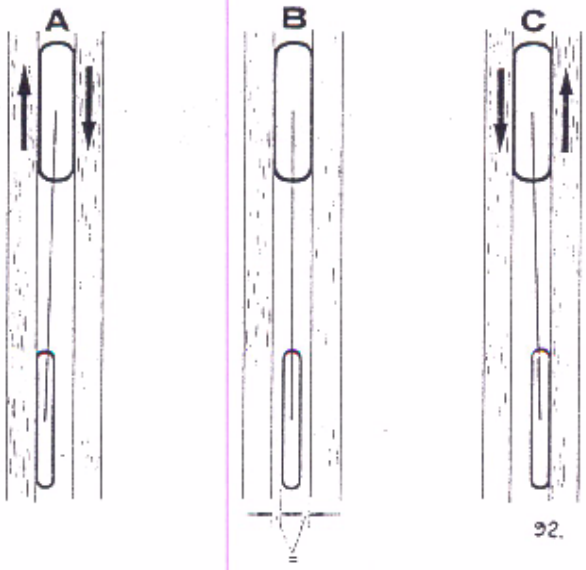


Fig. F10. Checking alignment

Since the front wheel cannot be adjusted in this respect, it is the rear wheel which must be aligned to the front wheel. The adjustment will be necessary whenever the chain is adjusted or the wheel removed. It is also necessary to adjust the rear brake whenever re-alignment has been carried out.

To check the alignment of the wheels a straight-edge of timber or steel is required approximately 80in. long.

The straight-edge should be laid on blocks four to six inches high (alternately) each side of the machine.

If the tyres are the same size and the wheels in alignment the straight-edge will be touching the tyres at four points on each side.

If the front tyre is of smaller section then it should be as drawing (B) Fig. F10.

SECTION F13

REMOVING AND REPAIRING TYRES

To remove the tyre first remove the valve cap and valve core, using the valve cap itself to unscrew the core. Unscrew the knurled valve securing nut and then place all parts where they will be free from dirt and grit. It is recommended that the cover beads are lubricated with a little soapy water before attempting to remove the tyre. The tyre lever should be dipped in this solution before each application. First, insert a lever at the vale position and whilst carefully pulling on this lever, press the tyre bead into the well of the rim diametrally opposite the valve position (see Fig. F11). Insert a second lever close to the first and prise the bead over the rim flange. Remove the first lever and reinsert a little further round the rim from the second lever. Continue round the bead in steps of two to three inches until the bead is completely away from the rim. Push the valve out of the rim and then withdraw the inner tube. To completely remove the tyre first stand the wheel upright and then insert a lever between the remaining bead and the rim. The tyre should be easily removed from the rim as shown in Fig. F12.

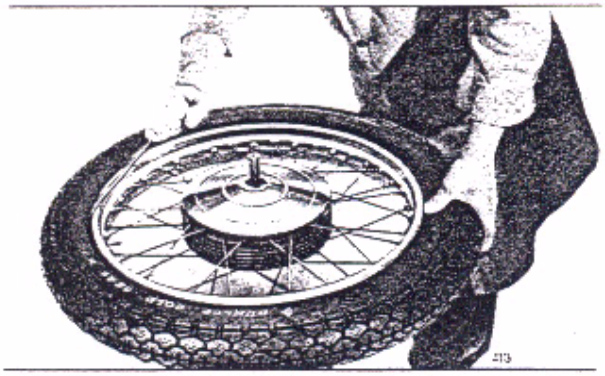


Fig. F11. Removing the first bead of the tyre—Lever inserted close to valve whilst bead is pressed into well on opposite side of wheel

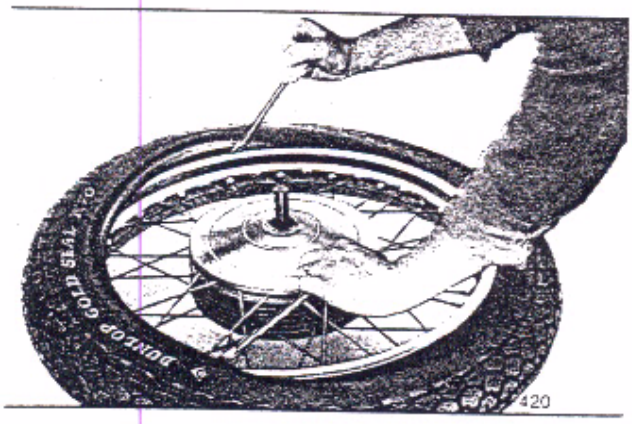


Fig. F12. Removing the first bead of the tyre, using two tyre levers

Fig. F13. Cover and tube assembled ready for refitting to the wheel

REFITTING THE TYRE

First place the rubber rim band into the well of the rim and make sure that the rough side of the rubber band is fitted against the rim and that the band is central in the well. Replace the valve core and inflate the inner tube sufficiently to round it out without stretch, dust it with french chalk and insert it into the cover with the valve located at the white "balancing spot" leaving it protruding outside the beads for about four inches either side of the valve.

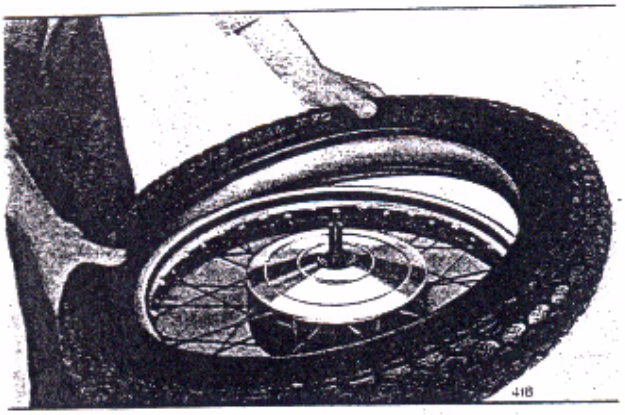


Fig. F14. Refitting the tyre to the wheel. Note valve engaged in rim hole

At this stage it is advisable to lubricate the beads and levers with soapy water (see Fig. F13).

Squeeze the beads together at the valve position to prevent the tube from slipping back inside the tyre and offer the cover to the rim, as shown in Fig. F14, at the same time threading the valve through the valve holes in the rim band and rim. Allow the first bead to go into the well of the rim and the other bead to lie above the level of the rim flange.

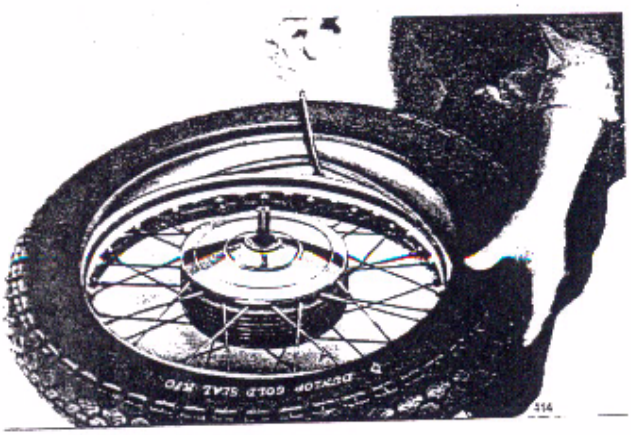


Fig. F15. Levering the first bead onto the rim

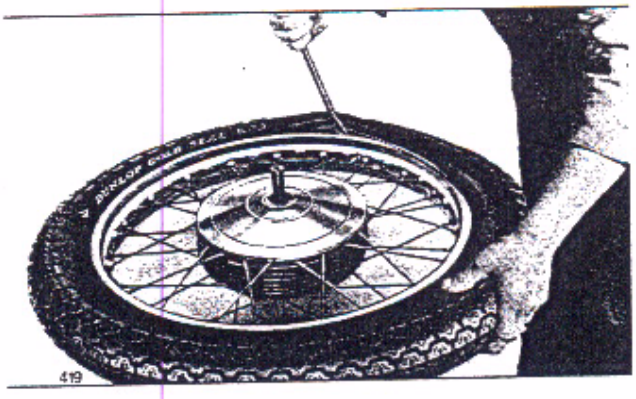


Fig. F16. Refitting the second bead over the wheel rim. Care must be taken not to trap inner tube

Working from the valve, press the first bead over the rim flange by hand, moving forward in small steps and making sure that the part of the bead already dealt with, lies in the well of the rim. If necessary use a tyre lever for the last few inches, as shown in Fig. F15. During this operation continually check that the inner tube is not trapped by the cover bead.

Press the second bead into the well of the rim diametrally opposite the valve. Insert a lever as close as possible to the point where the bead passes over the flange and lever the bead into the flange, at the same time pressing the fitted part of the bead into the well of the rim. Repeat until the bead is completely over the flange, finishing at the valve position (see Fig. F16).

Push the valve inwards to ensure that the tube near the valve is not trapped under the bead. Pull the valve back and inflate the tyre. Check that the fitting line on the cover is concentric with the top of the rim flange and that the valve protrudes squarely through the valve hole. Fit the knurled rim nut and valve cap. The tyre pressure should then be set to the figure given in General Data.

SECTION F14

SECURITY BOLTS

Security bolts are fitted to the rear wheel to prevent the tyre "creeping" on the rim when it is subjected to excessive acceleration or braking. Such movement would ultimately result in the valve being torn from the inner tube. There are two security bolts fitted to the rear wheel, which are equally spaced either side of the valve and thereby do not affect the balance of the wheel.

Note. The security bolt nuts must not be overtightened, otherwise excessive distortion may occur.

Where a security bolt is fitted the basic procedure for fitting and removing the tyre is the same, but the following instruction should be followed:—

(1) Remove the valve cap and core as described.

(2) Unscrew the security bolt nut and push the bolt inside the cover.

(3) Remove the first bead as described.

(4) Remove the security bolt from the rim.

(5) Remove the inner tube as described.

(6) Remove the second bead and tyre.

For refitting the tyre and inner tube:—

(1) Fit the rim band.

(2) Fit the first bead to the rim without the inner tube inside.

(3) Assemble the security bolt into the rim, putting the nut onto the first few threads (see Fig. F17).

(4) Partly inflate the inner tube and fit it into the tyre.

(5) Fit the second bead but keep the security bolt pressed well into the tyre, as shown in Fig. F18, and ensure that the inner tube does not become trapped at the edges.

(6) Fit the valve stem nut and inflate the tyre.

(7) Bounce the wheel several times at the point where the security bolt is fitted and then tighten the security bolt nut.

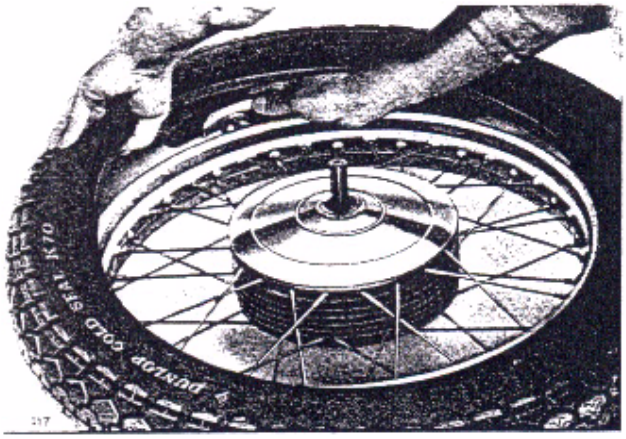


Fig. F17. Placing the security bolt in position

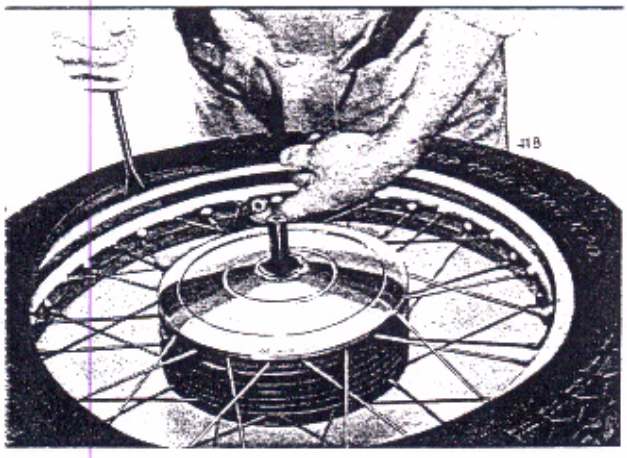


Fig. F18. Refitting the second bead with the security bolt in position

SECTION F15

TYRE MAINTENANCE

To obtain optimum tyre mileage and to eliminate irregular wear on the tyres it is essential that the recommendations governing tyre pressures and general maintenance are followed. The following points are laid out with this in mind.

(1) Maintain the correct inflation pressure as shown in "General Data". Use a pressure gauge frequently. It is advisable to check and restore tyre pressures at least once per week. Pressure should always be checked when tyres are cold and not when they have reached normal running temperatures.

(2) When a pillion passenger or additional load is carried, the rear tyre pressure should be increased appropriately to cater for the extra load.

(3) Unnecessary rapid acceleration and fierce braking should always be avoided. This treatment invariably results in rapid tyre wear.

(4) Regular checks should be made for flints, nails, small stones etc, which should be removed from the tread or they may ultimately penetrate and damage the casing and puncture the tube.

(5) Tyres and spokes should be kept free of oil, grease and paraffin. Regular cleaning should be carried out with a cloth and a little petrol (gasoline).

(6) If tyres develope irregular wear, this may be corrected by reversing the tyre to reverse its direction of rotation.

(7) If a sidecar is fitted then correct alignment should be maintained. The method for testing sidecar alignment is given in Section F14.

Before inflating, check that the fitting line on the tyre wall just above the bead on each side is concentric with the rim.

If necessary bounce the wheel to help seat the tyre but, see that there is adequate pressure to prevent damaging the tyre or tube and only use moderate force. If the tyre will not seat, it is better to release the pressure, apply soap solution to lubricate and re-inflate.

Inflate to the required pressure and check fitting lines again. Inflation should not be too rapid, particularly at the commencement, to allow the beads to seat correctly on the rim.

See that the valve protrudes squarely through the valve hole before screwing down the knurled nut and finally, replace the dust cap.

SECTION F16

TYRE PRESSURES

The recommended inflation pressures of 17 p.s.i. (front tyre) and 17 p.s.i. (rear tyre) are based on a riders' weight of 140 lb. If the riders' weight exceeds 140 lb. the tyre pressure should be increased as follows:—

Front Tyre
Add 1 lb. per square inch for every 28 lb. in excess of 140 lb.

Rear Tyre
Add 1 lb. per square inch for every 14 lb. in excess of 140 lb.

It is further recommended that when carrying a pillion passenger or equipment giving additional weight, the inflation pressures should be increased in relation to the actual load on each tyre, as indicated in the chart below. To find the load on each tyre, place the front and rear wheel in turn, on to a weighbridge. The reading should be taken when the rider is seated on the machine together with the additional weights.

	Inflation pressure (lb. per sq. in.)					
	16	18	20	24	28	32
	Load per tyre (lb.)					
Front	200	230	260	320	380	440
Rear	280	310	335	390	450	500

SECTION G

ELECTRICAL

INDEX

DESCRIPTION

The electrical system is suppled from a generator, model RM.19, contained in the primary chaincase and driven from the engine shaft.

A Zener-Diode is connected in circuit to regulate the battery charging current and thereby prevents over-charging.

The current supplied to the ignition system is controlled by a contact breaker, driven direct from the camshaft.

Routine maintenance needed by the various components is detailed in the following sections. Whilst checking the electrical system, opportunity should be taken to ensure that all wiring connections and frame earthing points are clean and secure.

SECTION G1

ALTERNATOR

The alternator consists of a spigot-mounted 6-coil laminated encapsulated stator with a rotor carried on and driven by an extension of the crankshaft. The rotor has an hexagonal steel core, each face of which carries a high-energy permanent magnet keyed to a laminated pole tip. The pole tips are riveted circumferentially to aluminium side plates, the assembly being cast in aluminium and machined to give a smooth external finish.

There are no rotating windings, commutator, brush-gear, bearings or oil seals and consequently the alternator requires no maintenance apart from occasionally checking that the snap connectors in the output cables are clean and tight.

If rotor removal is necessary, there is no need to fit magnetic keepers to the rotor poles. When removed, wipe off any swarf which may have been attracted to the pole tips and put the rotor in a clean place until required for refitting.

SECTION G2

BATTERY INSPECTION AND MAINTENANCE

DESCRIPTION

The container for the model PUZ5A battery is moulded in transparent material through which the acid can be seen. The tops of the containers are so designed that when the covers are in position, the special anti-spill filler plugs are sealed in a common venting chamber. Gas from the filler plugs leaves this chamber through a vent pipe. Polythene tubing may be attached to the vent pipe to lead the corrosive fumes away from any parts of the machine where they might cause damage.

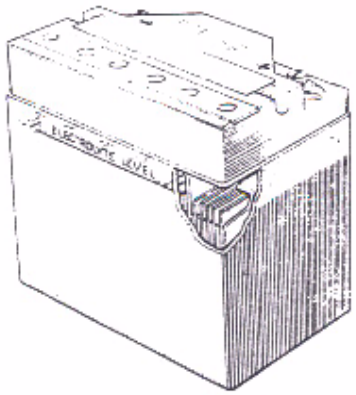


Fig. G1. The PUZ5A battery

PART A

CHARGING THE BATTERY

Whilst the battery leaves the factory in the fully "dry-charged" condition, it may slowly lose some charge in storage. In view of this, the following filling instructions must be carefully observed:—

With the acid, battery and room temperature between 60°F., and 100°F. (15.5/37.7°C.), remove the vent plugs and fill each cell to the coloured marker line.

Measure the temperature and specific gravity of the electrolyte in each of the cells.

Allow to stand for 20 minutes and then re-check the temperature and specific gravity of the electrolyte in each cell.

The battery is then ready for service **unless** the above checks show the electrolyte temperature to have risen by more than 10°F. (5.5°C.) or the specific gravity to have fallen by more than 10 "points", i.e., by more than 0.010 specific gravity.

In this event, it will be necessary to recharge the battery at the appropriate charge rate (0.7 amperes) until the specific gravity values remain constant for three successive hourly readings and all cells are gassing freely.

During charging, keep the electrolyte in each cell level with the coloured marker line by adding distilled water—**not** acid.

PART B

ROUTINE MAINTENANCE

Every 1,000 miles (1,600 km.) or monthly, or more regularly in hot climates the battery should be cleaned as follows:—

Remove the battery cover and clean the battery top. Examine the terminals: if they are corroded scrape them clean and smear them with a film of petroleum jelly, or with a silicone grease.

The level of the electrolyte in each cell should be checked weekly or every 250 miles. Lift the battery out of the carrier so that the coloured filling line can be seen. Add distilled water until the electrolyte level reaches this line.

Note. On **no** account should the battery be topped-up above the **coloured line.**

With this type of battery, the acid can only be reached by a miniature hydrometer, which would indicate the state of charge.

Great care should be taken when carrying out these operations not to spill any acid or allow a naked flame near the electrolyte. The mixture of oxygen and hydrogen given off by a battery on charge, and to a lesser extent when standing idle, can be dangerously explosive.

The readings obtained from the battery electrolyte should be compared with those given in the table opposite. If a battery is suspected to be faulty it is advisable to have it checked by a Lucas depot or agent.

A lead-acid battery slowly loses its charge whilst standing—the rate of loss being greater in hot climates. If a battery is not being used, it is important to give it freshening charges at the appropriate recharge rate. These should be given fortnightly in temperate climates and weekly in the tropics.

PART C

SPECIFIC GRAVITY OF ELECTROLYTE FOR FILLING THE BATTERY

U.K. and climates normally below 80°F. (26.6°C.)		Tropical climates over 80°F. (26.6°C.)	
Filling	Fully charged	Filling	Fully charged
1.260	1.270—1.290	1.210	1.210—1.230

To obtain a specific gravity strength of 1.260 at 60°F. (15.5°C.), add one part by volume of 1.840 specific gravity acid to 3.2 parts of distilled water.

To obtain a specific gravity strength of 1.210 at 60°F. (15.5°C.), add one part by volume of 1.840 specific gravity acid to 4.3 parts of distilled water.

PART D

MAXIMUM PERMISSIBLE ELECTROLYTE TEMPERATURE DURING CHARGE

Climates normally below 80°F. (26.6°C.)	Climates frequently above 80°F. (26.6°C.)
100°F. (38°C.)	120°F. (49°C.)

Note. The specific gravity of the electrolyte varies with the temperature. For convenience in comparing specific gravities, they are always corrected to 60°F., which is adopted as a reference temperature. The method of correction is as follows:—

For every 5°F. below 60°F. deduct .002 from the observed reading to obtain the true specific gravity at 60°F. For every 5°F. above 60°F., add .002 to the observed reading to obtain the true specific gravity at 60°F.

The temperature must be indicated by a thermometer having its bulb actually immersed in the electrolyte and not the ambient temperature. To take a temperature reading tilt the battery sideways and then insert the thermometer.

SECTION G3

COIL IGNITION SYSTEM

DESCRIPTION

The coil ignition system comprises an ignition coil, mounted below the petrol tank, and a contact breaker unit fitted in the timing cover. Apart from cleaning in-between the terminals, and checking the connections for soundness, the coil will not require any other attention. Testing the ignition coil is amply covered in Part "C", page G5, whilst testing the contact breaker is detailed in Part "D".

The best method of approach to a faulty ignition system is to first check the low-tension circuit for continuity as shown in Part "A", then follow the procedure laid out in Part "B" to locate the fault(s).

Failure to locate a fault in the low-tension circuit indicates that the high-tension circuit or sparking plug is faulty, and the procedure detailed in Part "E" must be adopted. Before commencing any of the following tests, however, the contact breaker and sparking plug gaps must be cleaned and adjusted to eliminate this possible source of fault.

PART A

CHECKING THE LOW-TENSION FOR CONTINUITY

To check whether there is a fault in the low-tension circuit and to locate its position, the following tests should be carried out:—

First inspect the in-line fuse in the battery earth cable and replace if suspect.

Turn the ignition on and slowly rotate the engine. At the same time, observe the ammeter needle, which should fluctuate between zero and a slight discharge, as the contact breaker points open and close respectively.

If the ammeter needle does not fluctuate in the described way, then a fault in the low-tension circuit is indicated.

First, examine the contact breaker points for pitting, piling or presence of oxidation, oil or dirt, etc.

Clean and ensure that the gap is set correctly to .015 in. (.381 mm.) as described in Section B.18.

PART B

FAULT FINDING IN THE LOW-TENSION CIRCUIT

To trace a fault in the low-tension wiring, turn on the ignition switch and rotate the engine until the contacts are opened, or alternatively, place a piece of insulating material between the contacts whilst the following test is carried out:—

For this test it is assumed that the wiring is fully connected as shown in the wiring diagram, page G.16. With the aid of a 0-15 volt D.C. voltmeter and two test-prods make a point to point check along the low-tension circuit starting at the battery and working right through to the ignition coil, stage by stage, in the following manner, referring to the relevant wiring diagram.

(1) First, establish that the battery is earthed correctly by connecting the voltmeter across the battery negative terminal and the machine frame earth. No voltage reading indicates that either the fuse has blown or that the red earthing lead is faulty. Also, a low reading would indicate poor battery earth connection.

(2) Connect the voltmeter between the ignition coil (—) terminal and earth. No voltage reading indicates a breakdown between the battery and the coil (—) terminal, or that the switch connections or ammeter connections are faulty.

(3) Connect the voltmeter between both of the ammeter terminals in turn and earth. No reading on the "load" side indicates that either the ammeter is faulty or there is a bad connection along the brown and blue lead from the battery, and a reading on the "battery" side only indicates a faulty ammeter.

(4) Connect the voltmeter between ignition switch "feed" terminal and earth. No reading indicates that the brown and white lead has faulty connections. Check for voltage at the brown/white lead connections at rectifier, ammeter and lighting switch terminals 2 and 10.

(5) Connect the voltmeter across ignition switch "load" terminal and earth. No reading indicates that the ignition switch is faulty and should be replaced. Battery voltage reading at this point but not at the ignition coil (—) terminal indicates that the white lead has become "open circuit" (broken or disconnected).

(6) Disconnect the black/white lead from the (+) terminal of the ignition coil. Connect the voltmeter across the (—) terminal of the coil and earth. No reading on the voltmeter indicates that the coil primary winding is faulty and a replacement ignition coil should be fitted.

(7) With the contact points open, reconnect the ignition coil lead and then connect the voltmeter across the contact points. No reading indicates that there is either a faulty connection or the internal insulation has broken down in the contact breaker condenser (capacitor).
If the condenser is suspected, then a substitution should be made and a retest carried out.

PART C

IGNITION COIL

The ignition coil consists of a primary and secondary winding, wound concentrically about a laminated soft iron core, the secondary winding being next to the core.

The primary and secondary windings of the coil have 310 turn and 17,000—17,600 turns respectively of enamel-covered wire, the secondary being much finer. Each layer is paper insulated from the next on both primary and secondary windings.

To test the ignition coil on the machine, first ensure that the low-tension circuit is in order as described in Part "A", then disconnect the high-tension lead from the sparking plug. Turn the ignition switch to the IGN position and crank the engine until the contacts are closed.

Flick the contact breaker lever open a number of times whilst the high-tension lead from the ignition coil is held about $\frac{3}{16}$ in. away from the cylinder head. If the ignition coil is in good condition a strong spark should be obtained, if no spark occurs this indicates the ignition coil to be faulty.

Before a fault can be attributed to the ignition coil it must be ascertained that the high-tension cable is not cracked or showing signs of deterioration, as this may often be the cause of misfiring etc. It should also be checked that the ignition points are actually making good electrical contact when closed and that the moving contact is insulated from earth (ground) when open. It is advisable to remove the ignition coil and test it by the method described below.

BENCH TESTING IGNITION COIL

Connect the ignition coil into the circuit shown in Fig. G.2 and set the adjustable gap to 9 mm. With the contact breaker running at 100 r.p.m., not more than 5% missing should occur at the spark gap over a period of 15 seconds. The primary winding can be checked for short-circuit coils by connecting an ohmeter across the low-tension terminals. The reading obtained should be within the figures quoted below (at 20°C.).

Primary Resistance	
Minimum	Maximum
3.0 ohms	3.4 ohms

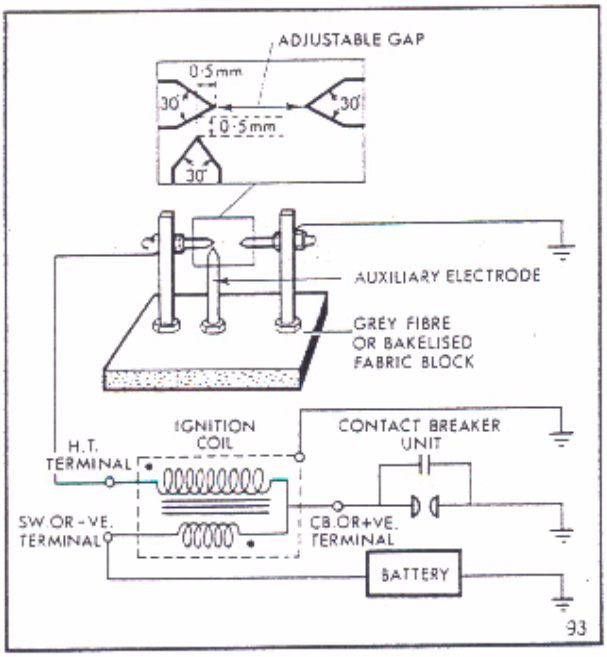


Fig. G2. Ignition coil test rig

PART D

CONTACT BREAKER

Faults occurring at the contact breaker are in the main due to, incorrect adjustments of the contacts or the efficiency being impaired by piling, pitting, or oxidation of the contacts due to oil etc. Therefore, always ensure that the points are clean and that the gap is adjusted to the correct working clearance as described section B18.

To test for a faulty condenser, first switch on the ignition, then take voltage readings across the contacts when open. No reading indicates that the condenser internal insulation has broken down.

Should the fault be due to a condenser having a reduction in capacity, indicated by excessive arcing when in use, and overheating of the contact faces, a check should be made by substitution.

Particular attention is called to the periodic lubrication procedure for the contact breaker which is given on page A9. When lubricating the parts ensure that no oil or grease gets on to the contacts.

If it is felt that the contacts require surface grinding then the complete contact breaker unit should be removed as described on page B18, and the moving contact disconnected by unscrewing the securing nut from the condenser terminal. Grinding is best achieved by using a fine carborundum stone or very fine emery cloth, afterwards wiping away any trace of dirt or metal dust with a clean petrol (gasolene) moistened cloth. The contact faces should be slightly domed to ensure point contact. There is no need to remove the pitting from the fixed contact. When refitting the moving contact do not forget to refit the insulating shield to the condenser terminal and apply a smear of grease to the contact breaker cam and moving contact pivot post. Lubricate the felt pad.

PART E

CHECKING THE HIGH-TENSION CIRCUIT

If ignition failure or misfiring occurs, and the fault is not in the low-tension circuit, then check the ignition coil as described in Part "C". If the coil

proves satisfactory, ensure that the high-tension cable is not the cause of the fault.

If a good spark is available at the high-tension cable, then the sparking plug suppressor cap or the sparking plug itself may be the cause of the fault.

Clean the sparking plug and adjust the electrodes to the required setting as described on page G.8 and then reset the engine for running performance. If the fault re-occurs then it is likely that the suppressor cap is faulty and should be renewed.

SECTION G4

SPARKING PLUG

It is recommended that the sparking plug be inspected, cleaned and tested every 2,000 miles (3,200 km.) and a new one fitted every 10,000 miles (16,000 km.).

To remove the sparking plug a box spanner ($\frac{13}{16}$ in., 19.5 mm. across flats) should be used and if any difficulty is encountered a small amount of penetrating oil should be placed at the base of the sparking plug and time allowed for penetration.

Examine the plug for signs of petrol (gasolene) fouling. This is indicated by a dry, sooty, black deposit, which is usually caused by over-rich carburation, although ignition system defects such as a faulty contact breaker, coil or condenser defects, or a broken or worn out cable may be additional causes.

Examine the plug for signs of oil fouling. This will be indicated by a wet, shiny, black deposit on the central insulator. This is caused by excessive oil in the combustion chamber during combustion and indicates that the piston rings or cylinder bore is worn.

To rectify this type of fault the above mentioned items should be checked with special attention given to carburation system.

Overheating of the sparking plug electrode is indicated by severely eroded electrode and a white, burned or blistered insulator. This type of fault can be caused by weak carburation or over-advanced ignition timing although plugs which have been operating whilst not being screwed down sufficiently can easily become overheated due to heat that is normally dissipated through to the cylinder head not having an adequate conducting path. Overheating is normally symptomized by pre-ignition, short plug life, and "pinking" which can ultimately result in piston crown failure. Unnecessary damage can result from over-tightening the plugs. To achieve a good seal between the plug and cylinder head, screw the plug in by hand on to its gasket, then lightly tighten with a box spanner.

A plug of the correct grade will bear a light flaky deposit on the outer rim and earth electrode, and these and the base of the insulator will be light chocolate brown in colour. A correct choice of plug is marked (A). (B) shows a plug which appears bleached, with a deposit like cigarette ash; this is too "hot-running" for the performance of the engine and a cooler-running type should be substituted.

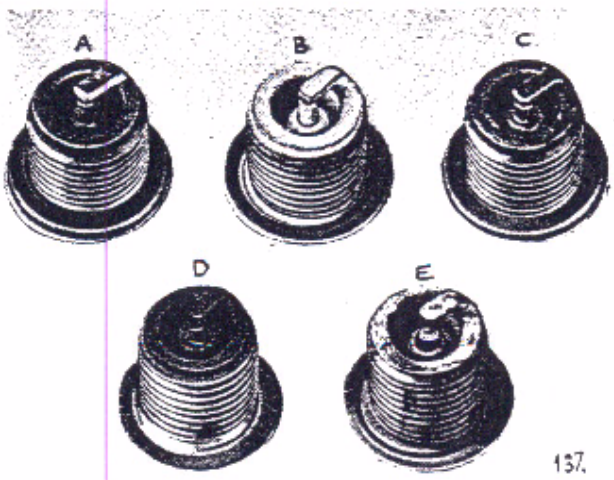


Fig. G3. Sparking plug diagnosis

A plug which has been running too "cold" and has not reached its self-cleaning temperature is shown at (C). This has oil on the base of the insulator and electrodes, and should be replaced by a plug that will burn off deposits and remove the possibility of a short-circuit. The plug marked (D) is heavily sooted, indicating that the mixture has been too rich, and a further carburation check should be made. At illustration (E) is seen a plug which is completely worn out and in need of replacement.

To clean the plug it is preferable to make use of a properly designed proprietary plug cleaner. The makers instructions for using the cleaner should be followed carefully.

When the plug has been carefully cleaned, examine the central insulator for cracking and the centre electrode for excessive wear. In such cases the plug will have completed its useful life and a new one should be fitted.

Finally, the sparking plug electrode should be adjusted to the correct gap setting of .025 in. (.635 mm.). Before refitting sparking plug the threads should be cleaned by means of a wire brush and a minute amount of graphite grease smeared on to the threads. This will prevent any possibility of thread seizure occurring.

If the ignition timing and carburation settings are correct and the plug has been correctly fitted, but overheating still occurs, then it is possible that carburation is being adversely affected by an air leak between the carburetter and the cylinder head.

This possibility must be checked thoroughly before taking any further action. When it is certain that none of the above mentioned faults are the cause of over-heating then the plug type and grade should be considered.

Normally the type of plug quoted in General Data is satisfactory for general use of the machine, but in special isolated cases, conditions may demand a plug of a different heat range. Advice is readily available to solve these problems from the plug manufacturer who should be consulted.

SECTION G5

CHARGING SYSTEM

DESCRIPTION

The alternator gives "maximum" output with the lighting switch in all switch positions, the coils being permanently connected across the rectifier.

Excessive charge is absorbed by the Zener Diode which is connected in parallel with the battery.

Always ensure that the ignition switch is in the OFF position whilst the machine is not in use.

Proceed to test the alternator as described in Part "A". If the alternator is satisfactory, the fault must lie in the charging circuit, hence the rectifier must be checked as given in Part "B" and then the wiring and connections as shown in Part "C".

PART A

CHECKING THE ALTERNATOR OUTPUT

Disconnect the three alternator output cables and run the engine at 3,000 r.p.m.

Connect an A.C. voltmeter (0-15 volts) with 1 ohm load resistor in parallel with each of the alternator leads in turn as shown in the Table, on page G15. and observe the voltmeter readings. A suitable 1 ohm load resistor can be made from a piece of Nichrome wire as shown in Part "D", page G11.

The test is conducted by connecting a voltmeter and the 1 ohm load resistor between the following cables and note the readings:—

(a) White/green and green/black cables—voltmeter should read 4.0 volts (minimum).

(b) White/green and green/yellow cables—voltmeter should read 6.5 volts (minimum).

(c) White/green and joined green/black and green/yellow cables—voltmeter should read 8.5 volts (minimum).

From the results obtained, the following deductions can be made:—

(1) If the readings are all equal to or higher than those quoted then the alternator is satisfactory.

(2) A low reading on any group of coils indicates either that the leads concerned are chafed or damaged due to running on the chains or that some turns of the coils are short-circuited.

(3) Low readings for all parts of the test indicate that either the green/white lead has become chafed or damaged due to rubbing on the chains or that the rotor has become partially demagnetized. As the latter is an extremely rare occurrence it is advisable to check by substitution before returning the rotor to the manufacturer for re-magnetization. If it is found that the rotor has become demagnetized, check that it has not been caused by a faulty rectifier and that the battery is of correct polarity.

(4) A zero reading for any group of coils indicates that a coil has become disconnected, is open-circuit, or is earthed.

(5) A reading obtained between any one lead and earth indicates that coil windings or connections have become earthed.

If any of the above mentioned faults occur, always check the stator leads for possible chain damage before attempting repairs or renewing the stator.

It is beyond the scope of this manual to give instruction for the repair of faulty stator windings. However, the winding specification is given in the Table, on page G14 for those obliged to attempt repair work.

PART B

RECTIFIER MAINTENANCE AND TESTING

The rectifier is a silicon semi-conductor device which allows current to flow in one direction only. It is connected to provide full wave rectification of alternator output current.

The rectifier requires no maintenance beyond checking that the connections are clean and tight. The nuts clamping the rectifier plates together must not under any circumstances be slackened. A separate nut is used to secure the rectifier to the back of the toolbox and it is important to check periodically that the rectifier is firmly attached.

When tightening the rectifier securing nut, hold the spanner as shown in Fig. G4, for if the plates are twisted, the internal connections will be broken. Note the circles marked on the fixing bolt and nut indicating that the thread form is U.N.F.

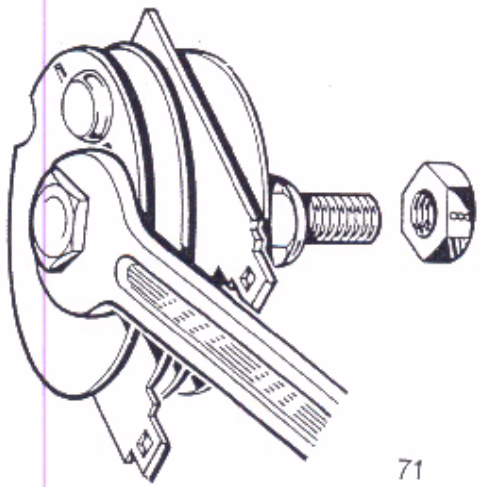


Fig. G4. Securing the rectifier

TESTING THE RECTIFIER

To test the rectifier, first disconnect the brown/white lead from the rectifier centre terminal and insulate the end of the lead to prevent any possibility of a short-circuit occurring, and then connect a D.C. voltmeter (with 1 ohm load resistor in parallel) between the rectifier centre terminal and earth.

Note. Voltmeter positive terminal to frame earth (ground) and negative terminal to centre terminal on rectifier.

Ensure that all the temporary connections are well insulated to prevent a short-circuit occurring then turn the ignition switch to IGN position and start the engine.

With the engine running at approximately 3,000 r.p.m. observe the voltmeter readings. The reading obtained should be at least 7.5 volt minimum.

(1) If the reading is equal to or slightly greater than that quoted, then the rectifier elements in the forward direction are satisfactory.

(2) If the reading is excessively lower than the figures given, then check the rectifier earthing bolt connection. If the connection is good then a replacement rectifier should be fitted.

(3) If the reading is lower than the figures quoted or zero readings are obtained, then the rectifier or the charging circuit wiring is faulty and the rectifier should be disconnected and bench tested so that the fault can be located.

Note that all the previous conclusions are made with the assumption that the alternator A.C. output figures were satisfactory. Any fault at the alternator will, of course, reflect on the rectifier test results. Similarly any fault in the charging circuit wiring may indicate that the rectifier is faulty. The best method of locating a fault is to disconnect the rectifier and bench test it as shown below.

BENCH TESTING THE RECTIFIER

For this test the rectifier should be disconnected and removed. Before removing the rectifier, disconnect the leads from the battery terminals to avoid the possibility of a short-circuit occurring.

Connect the rectifier to a fully charge 12 volt battery of approximately 40 ampere/hours capacity at the 10 hour rate, and 1 ohm load resistor, and then connect the D.C. voltmeter in the V2 position, as shown in Fig. G6.

Note the battery voltage (should be 12 volt) and then connect the voltmeter in V1 position whilst the following tests are conducted.

In Fig. G7, the rectifier terminal markings 1, 2 and 3 are as shown physically in Figs. G6 and G5,

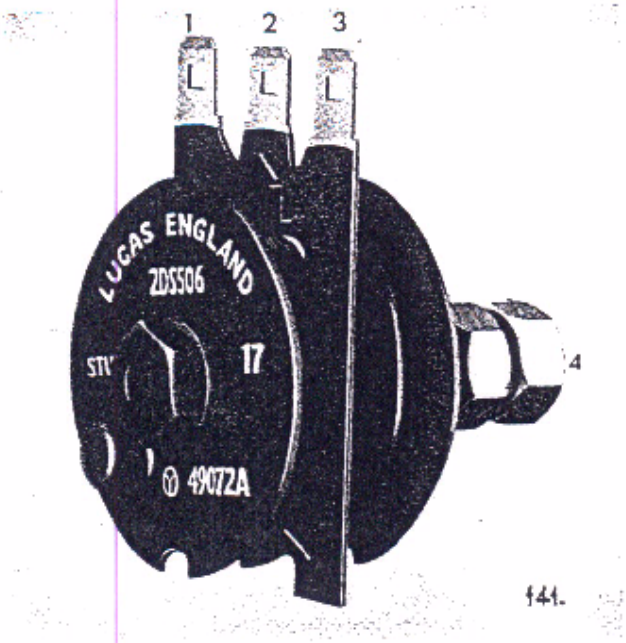


Fig. G5. Rectifier—showing terminal connections for bench tests 1 and 2

while terminal 4 represents the rectifier centre bolt. 1 and 3 are the A.C. inupt terminals while 2 and 4 are the D.C. output terminals (—ve and —ve respectively).

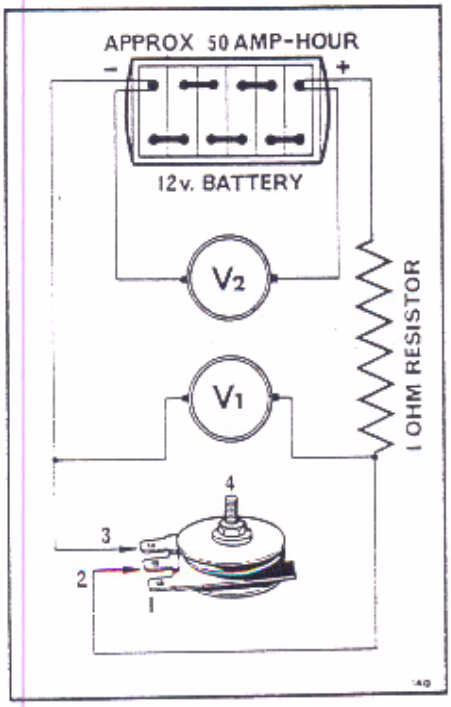
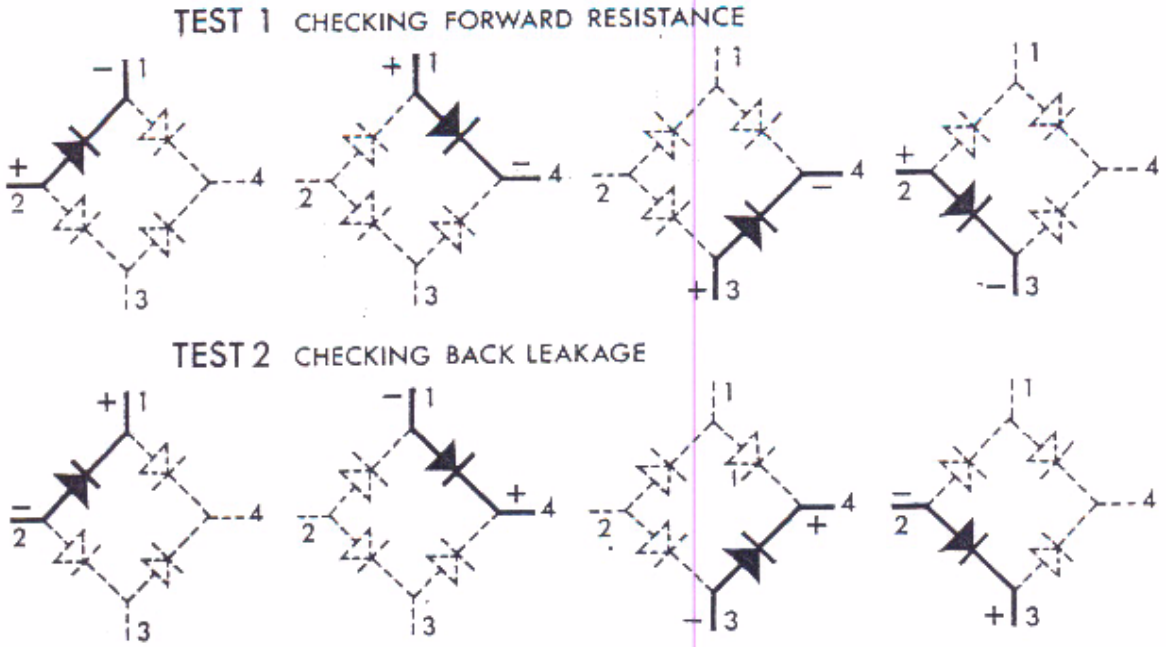


Fig. G6. Bench testing the rectifier



142

Fig. G7. Rectifier test sequence

TEST 1
With the test leads, make the following connections but keep the testing time as short as possible to avoid overheating the rectifier cell: (A) 1 and 2, (B) 1 and 4, (C) 3 and 4, (D) 3 and 2. Each reading should not be greater than 1.5 volts with the battery polarity as shown.

TEST 2
Reverse the leads or battery polarity and repeat Test 1. The reading obtained should be the same as the battery voltage (V2).

If the readings obtained are not within the figures given, then the rectifier internal connections are shorting or aged and the rectifier should be renewed.

PART C

CHECKING THE CHARGING CIRCUIT FOR CONTINUITY

This test utilizes the machine's own battery to test for continuity or breakdown in the A.C. section of the charging system.

The battery must be in a good state of charge and the alternator leads must be disconnected at the snap connectors so that there is no possibility of demagnetizing the rotor.

First, check that there is voltage at the rectifier centre terminal by connecting a D.C. voltmeter, with 1 ohm load resistor in parallel, between the rectifier centre terminal and earth, remember (−ve) positive earth (ground). The voltmeter should read battery volts. If it does not, there is a faulty connection in the wiring and test 1, 3 and 4 in Part "B", page G5, should be carried out to locate the fault.

PART D

CONSTRUCTING A 1 OHM LOAD RESISTOR

The resistor used in the following tests must be accurate and constructed so that it will not overheat otherwise the correct values of current or voltage will not be obtained.

A suitable resistor can be made from 4 yards ($3\frac{3}{4}$ metres) of 18 s.w.g. (.048 in., i.e., 1.2 mm. diameter) Nichrome wire by bending it into two equal parts and calibrating it as follows:—

(1) Fix a heavy gauge flexible lead to the folded end of the wire and connect this lead to the positive terminal of a 6 volt battery.

(2) Connect a D.C. voltmeter (0-10 volts) across the battery terminals and an ammeter (0-10 amp.) between the battery negative terminal and the free ends of the wire resistance, using a crocodile clip to make the connection.

(3) Move the clip along the wires, making contact with both wires until the ammeter reading is numerically equal to the number of volts shown in the voltmeter. The resistance is then 1 ohm. Cut the wire at this point, twist the two ends together and wind the wire on an asbestos former approximately 2 in. (5 cm.) diameter so that each turn does not contact the one next to it.

SECTION G6

ZENER DIODE CHARGE CONTROL

DESCRIPTION

The Zener Diode output regulating system which uses the coils of the alternator connected permanently across the rectifier, provides automatic control of the charging current. It will only operate successfully on a 12 volt system where it is connected in parallel with the battery as shown in the wiring diagram, Fig. G12.

Assuming the battery is in a low state of charge its terminal voltage (the same voltage is across the Diode) will also be low, therefore the maximum charging current will flow into the battery from the alternator. At first non of the current is by-passed by the Diode because of it being non-conducting due to the low battery terminal volts. However, as the battery is quickly restored to a full state of charge, the system voltage rises until at 14 volts the Zener Diode becomes partially conducting, thereby providing an alternative path for a small part of the charging current. Small increases in battery voltage result in large increases in Zener conductivity until, at approximately 15 volts about 5 amperes of the alternator output is by-passing the battery. The battery will continue to receive only a portion of the alternator output as long as the system voltage is relatively high.

Depression of the system voltage, due to the use of headlamp or other lighting equipment, causes the Zener Diode current to decrease and the balance to be diverted and consumed by the component in use.

If the electrical loading is sufficient to cause the system voltage to fall to 14 volts, the Zener Diode will revert to a high resistance state of non-conductivity and the full generated output will go to meet the demands of the battery.

PART A

MAINTENANCE

The Zener Diode is mounted on a finned aluminium heat sink below the bottom yoke of the steering head. Providing the Diode and the heat sink are kept clean, and provided with an adequate airflow, to ensure maximum efficiency, no maintenance will be necessary.

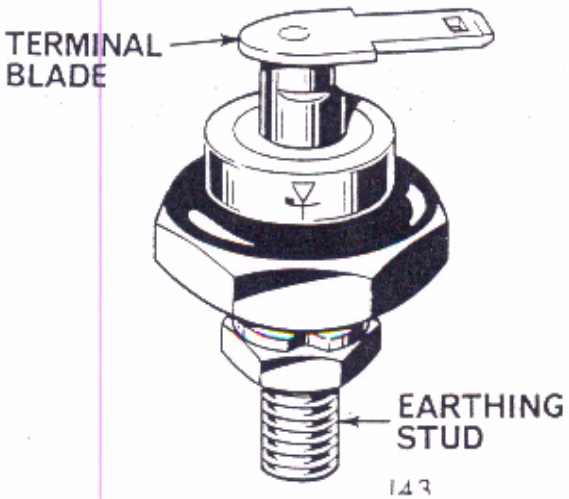


Fig. G8. Zener Diode

The "earthing" stud which secures the Diode to the heat sink, must not be subjected to a tightening torque greater than 24-28 lb./in. The earth wire must be fitted under the fixing nut, **not** between the Diode and heat sink.

CHECKING PERFORMANCE OF ZENER DIODE

The following procedure enables the Zener Diode to be tested on the machine. Only suitably calibrated first-grade moving coil instruments should be used.

Note. It is essential that the battery is in good condition and in reasonably good state of charge. If the battery condition is uncertain, it should be temporarily replaced by a good battery for this test.

(1) Withdraw the cable from the Zener Diode terminal blade.

(2) Connect a suitable ammeter between the end of the cable removed and the Zener Diode terminal blade, using a suitable jumper lead.
Note. The ammeter red or positive lead must be connected to the Zener Diode.

(3) Connect a suitable voltmeter between the Zener Diode terminal blade and the heat sink.
Note. The voltmeter red or positive lead must be connected to the heat sink.

(4) Check that all lights are switched off.

(5) Start the engine and gradually increase the speed while observing both meters:—

(A) When the voltage across the Zener Diode reaches 12,75 volts, the Zener current ammeter must indicate zero.

(B) Increase engine speed until a Zener current of 2 amperes is indicated on the ammeter. At this value, a satisfactory Zener Diode should cause a reading on the voltmeter of between 13.5 and 15.5 volts.

(6) If the Zener current ammeter in test (A) registers any current at all before the Zener voltmeter indicates a voltage of 12.75 volts across the Zener, then a replacement Zener Diode must be fitted.

If test (A) proves satisfactory but in test (B) a higher voltage than that stated is registered on the voltmeter, before the Zener current ammeter registers 2 amperes, then a replacement Zener Diode must be fitted.

SECTION G7

ELECTRIC HORN

DESCRIPTION

The horn is of a high frequency single-note type and is operated by direct current from the battery. The method of operation is that of a magnetically operated armature, which impacts on the core face, and causes the tone disc of the horn to vibrate. The magnetic circuit is made self-interrupting by contacts which can be adjusted externally.

If the horn fails to work, check the mounting bolts etc., and horn connection wiring. Check the battery for state of charge. A low supply voltage at the horn will adversely effect horn performance. If the above checks are made and the fault is not remedied, then adjust the horn as follows.

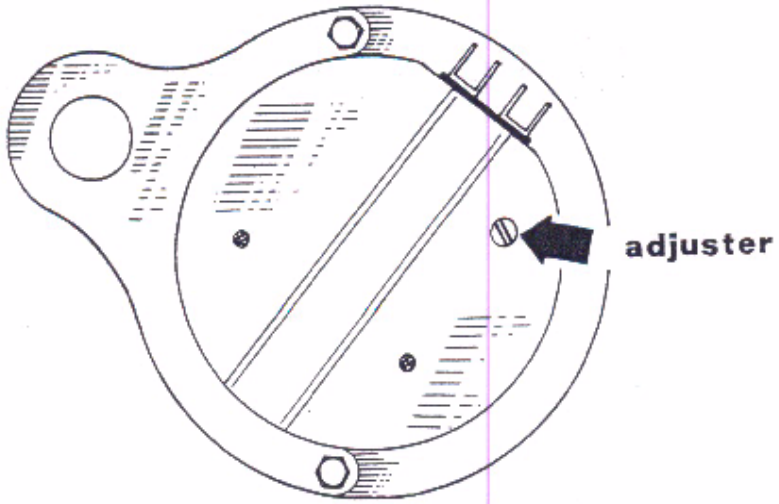


Fig. G9. Electric horn showing adjustment screw

The headlamp shell contains the high beam warning light, a 3 position toggle switch for lights and a push button dip switch, access to these being gained by removing the light unit assembly.

The speedometer light is housed within the base of the speedometer head.

Each bulb holder is a push-fit into its respective component, and the bulbs are located by means of a peg arrangement, except for the speedometer light which has a screw type bulb.

SECTION G8

TAIL AND STOP LAMP UNIT

Access to the bulb in the tail and stop lamp unit is achieved by unscrewing the two slotted screws which secure the lens. The bulb is of the double filament offset pin type and when a replacement is carried out, ensure that the bulb is fitted correctly. Check that the two supply leads are connected correctly and check the earth (ground) lead to the bulb holder is in satisfactory condition.

When refitting the lens, do not over-tighten the fixing screws or the lens may fracture as a result.

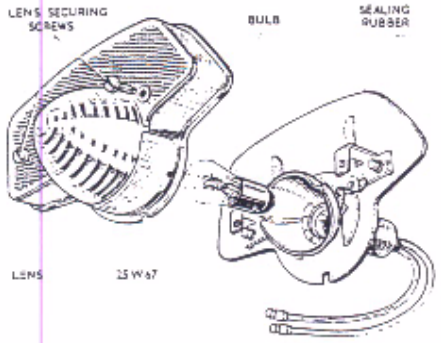


Fig. G10. Stop and tail lamp dismantled

SECTION G9

ALTERNATOR—ADDITIONAL INFORMATION

Specifications and Output Figures

Stator No.	System Voltage	Alternator Output Minimum A.C. Volts at 3,000 r.p.m.			Stator Coil Details		
		A	B	C	No. of Coils	Turns Per Coil	S.W.G.
47162	12 volt	4,0	6,5	8,5	6	140	22

A—White/green and green/black

B—White/green and green/yellow

C—White/green and green/black—green/yellow connected

HORN ADJUSTMENT

When adjusting and testing the horn do not depress the horn push for more than a fraction of a second or the circuit wiring may be overloaded.

A small adjustment peg situated near the terminals (see Fig. G.9) is provided to take up wear in the internal moving parts of the horn. To adjust, turn this peg anti-clockwise until the horn just fails to sound, and then turn it back (clockwise) about one-quarter to half a turn.

SECTION G10

HEADLAMP

DESCRIPTION

The headlamp is of the pre-focus bulb light unit type and access is gained to the bulb and bulb holder by withdrawing the rim and light unit assembly. To do this slacken the screw at the top of the headlamp shell just behind and adjacent to the rim and prise off the rim and light unit assembly.

The bulb can be removed by first pressing the cylindrical adapter inwards and turning it anti-clockwise. The adapter can then be withdrawn and the bulb is free to be removed.

When fitting a new bulb, note that it locates by means of a cut-away and projection arrangement.

Also note that the adapter can only be replaced one way, the tabs being staggered to prevent incorrect reassembly. Check the replacement bulb voltage and wattage specification and type before fitting.

Focusing with this type of unit is unnecessary and there is no provision for such.

BEAM ADJUSTMENT

When the motorcycle carries its normal load, the headlamp full-beam should project straight ahead and parallel with the road surface.

To achieve this, place the machine on a level road pointing towards a wall at a distance of 25 feet away, with a rider and passenger, on the machine, slacken the two headlamp fixing bolts at either side and tilt the beam unit until the beam is focused as indicated in Fig. G11. Do not forget that the headlamp should be on "full beam" lighting during this operation. Tighten the bolts fully after adjustment.

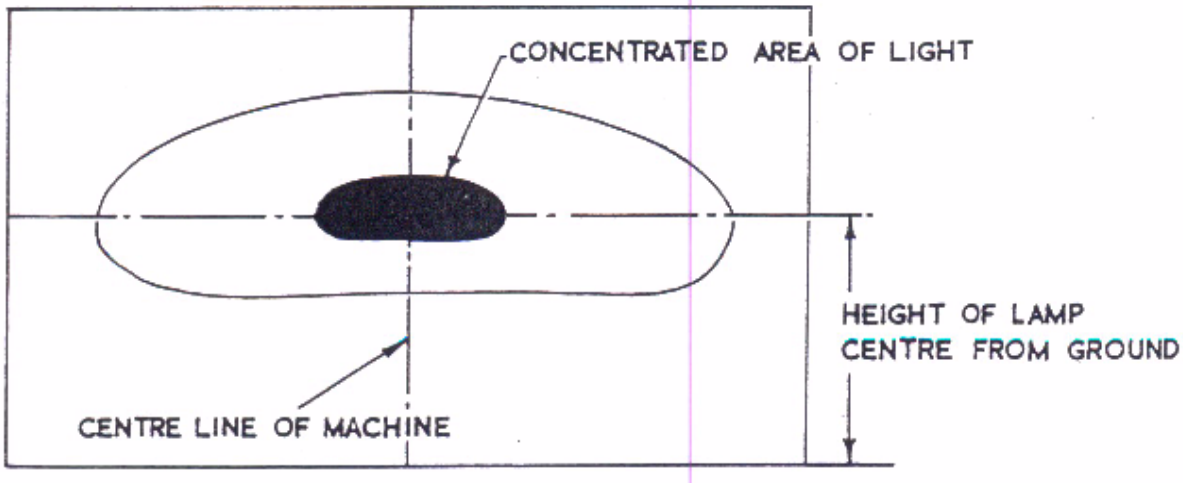


Fig. G11. Beam adjustment

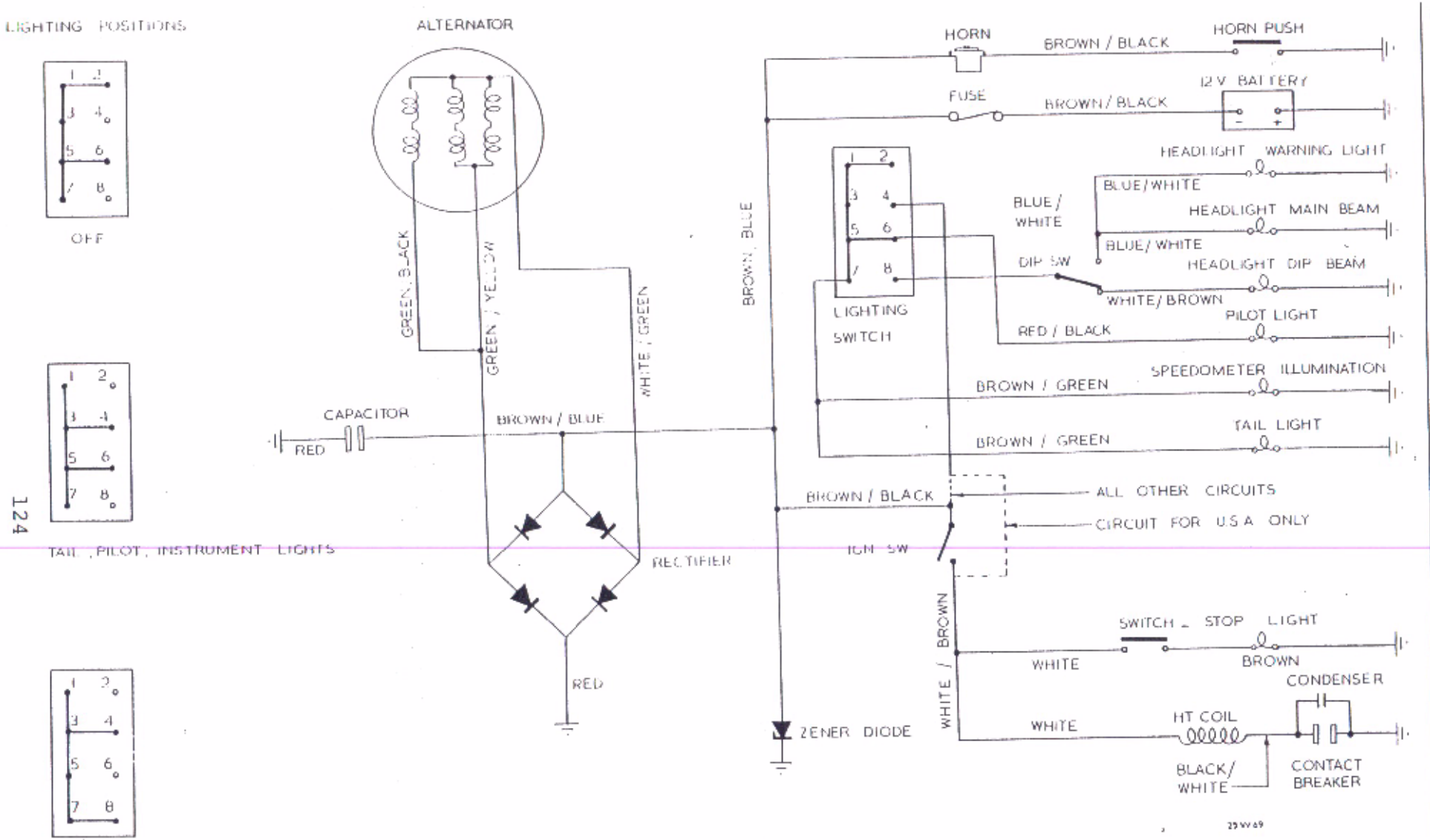


Fig. G12. Wiring diagram

SECTION G11

CAPACITOR IGNITION

The TR25W can be equipped with electrolytic capactor ignition if required, thus enabling the machine to be operated less the battery. The system operates as follows:—

Energy pulses from the alternator are stored by the capacitor to ensure that sufficient current flows through the ignition coil at the moment of contact opening thus producing an adequate spark.

Fit the capacitor mounting spring F8320 to the bracket on the frame rear top loop above the toolbox. Fit the capacitor into the mounting spring with the terminals downwards by inserting this at the widest end of the spring and pushing it down until the small coil locates in the groove on the capacitor body. Note that the small $\frac{3}{16}$ in. Lucas terminal with the red paint spot is the positive (earth or ground) terminal. When the battery is removed, insulate the negative lead to protect the capacitor from damage by shorting.

The capacitor negative terminal must be connected to the rectifier centre terminal as shown in the diagram Fig. G12.

SECTION J

SERVICE TOOLS

INTRODUCTION

This section of the Workshop Manual illustrates pictorially the workshop service tools that are available for carrying out the major dismantling and reassembly operations on the UNIT CONSTRUCTION 250 c.c. TRIUMPH MOTORCYCLE.

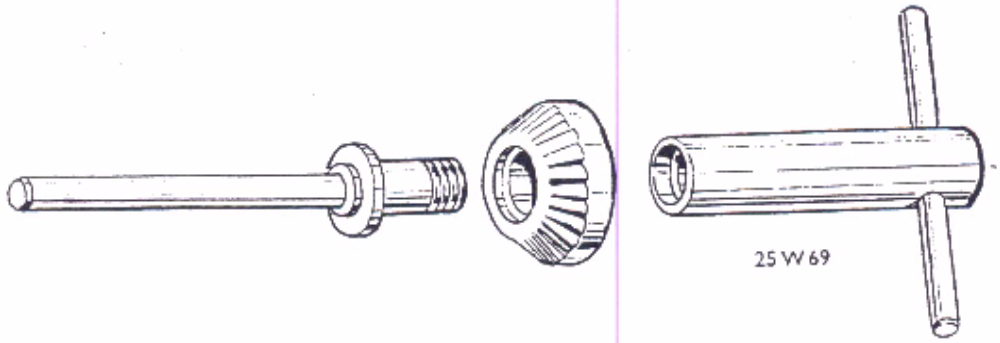


Fig. J1.

Valve seat cutter pilot No. 61-3293

Valve seat cutter No. 61-3300

Valve seat cutter holder No. 61-3290

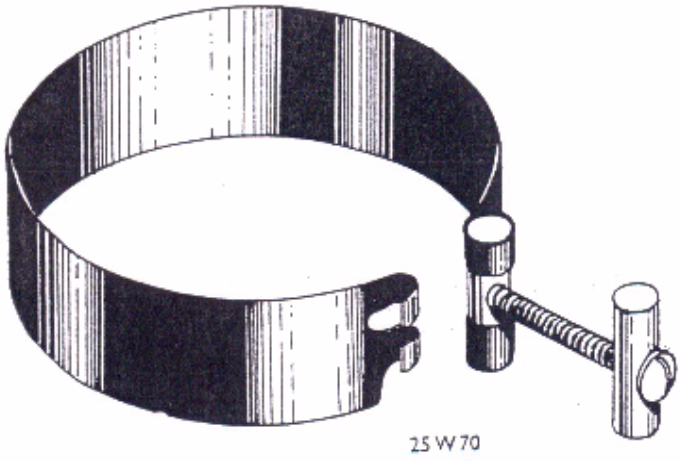


Fig. J2.

Piston ring slipper

No. 61-3682 (65-70 mm.)

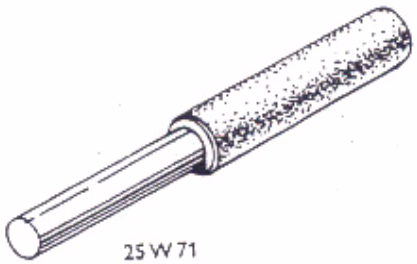


Fig. J3.

Valve guide fitting and extracting punch No. 61-3382

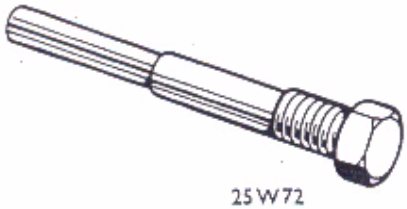


Fig. J4.

Contact breaker cam removal tool
N4. 61-3761

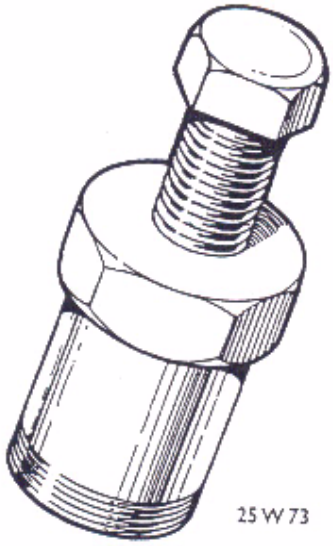


Fig. J5.

Clutch sleeve extractor No. 61-3583

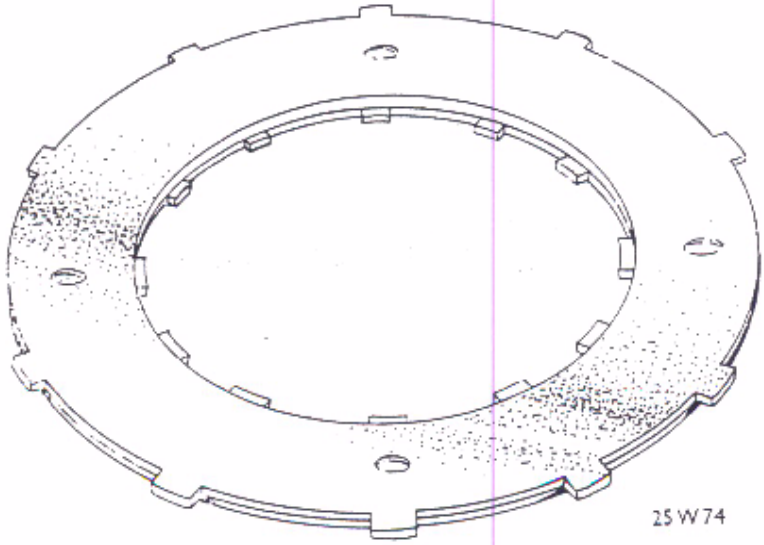


Fig. J6.

Clutch locking tool No. 61-3774

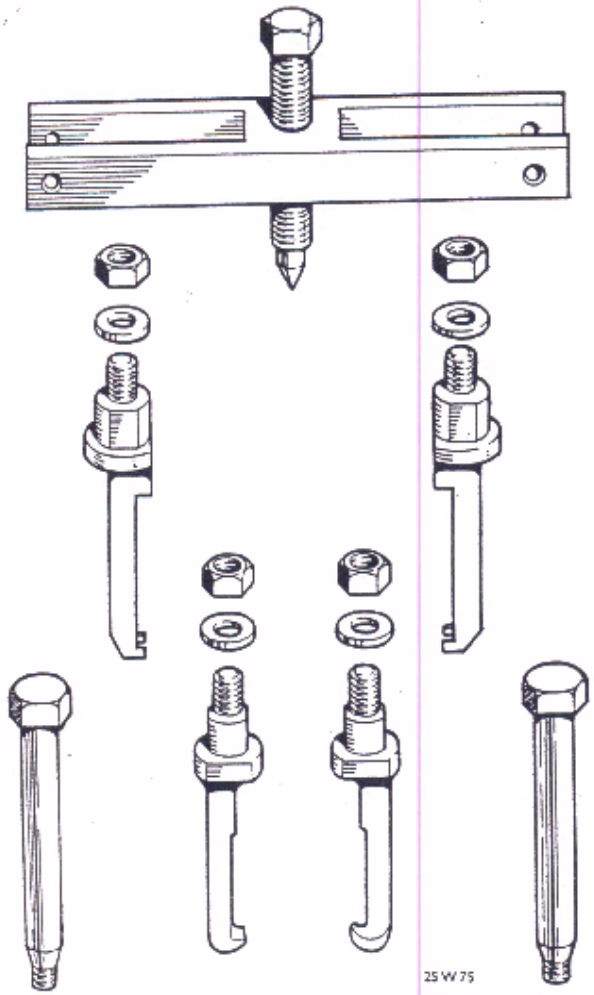


Fig. J7.

Pinion extractor set
No. 61–3773

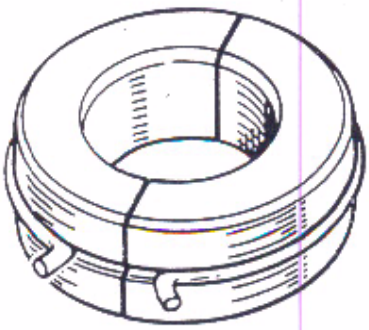


Fig. J8.

Crankshaft balance weight
No. 61–3809

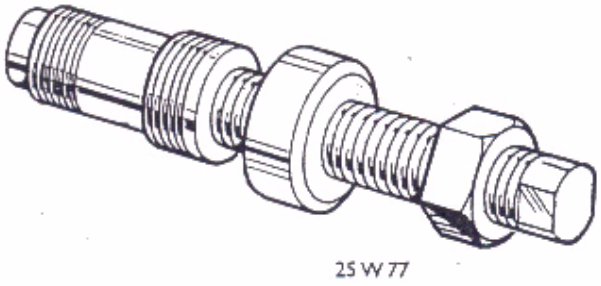


Fig. J9.

Fork leg removal and assembly tool No. 61–3350

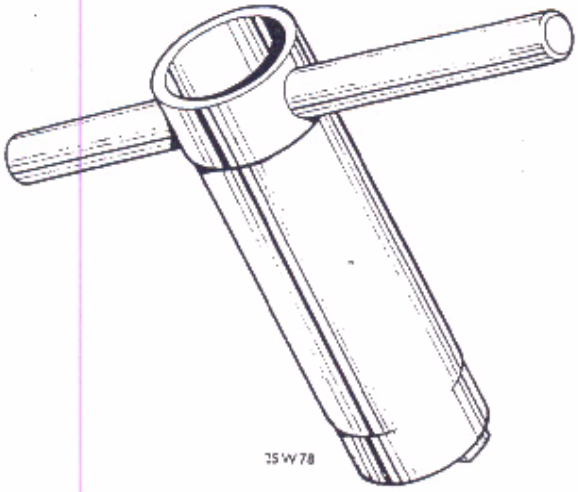


Fig. J10.

Fork oil seal holder removal tool No. 61–3005

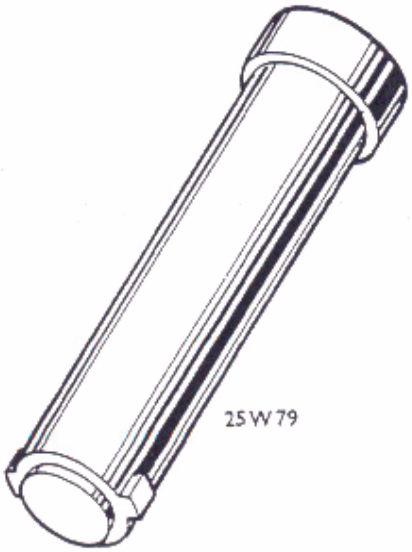


Fig. J11.

Fork oil seal extractor No. 61–3006

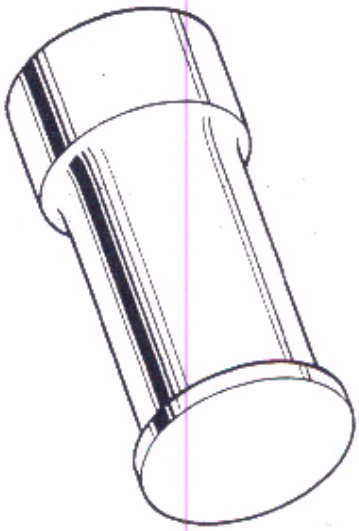


Fig. J12.

Fork oil seal assembly tool No. 61–3007

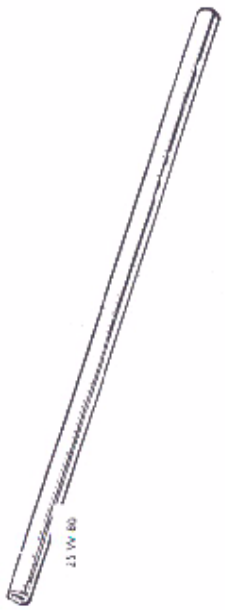


Fig. J13.

Fork damper rod recovery tool No. 61-3765

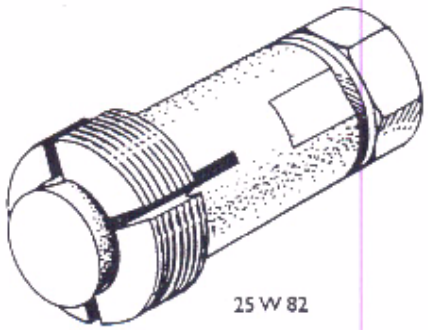


Fig. J14.

Steering head cup extractor No. 61–3063

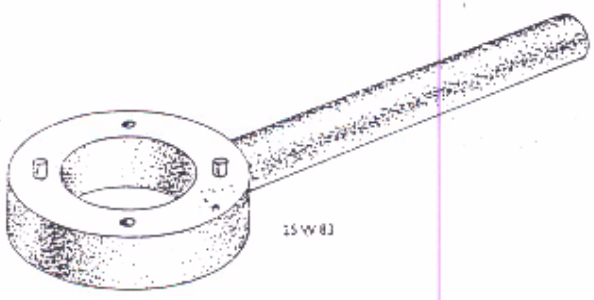
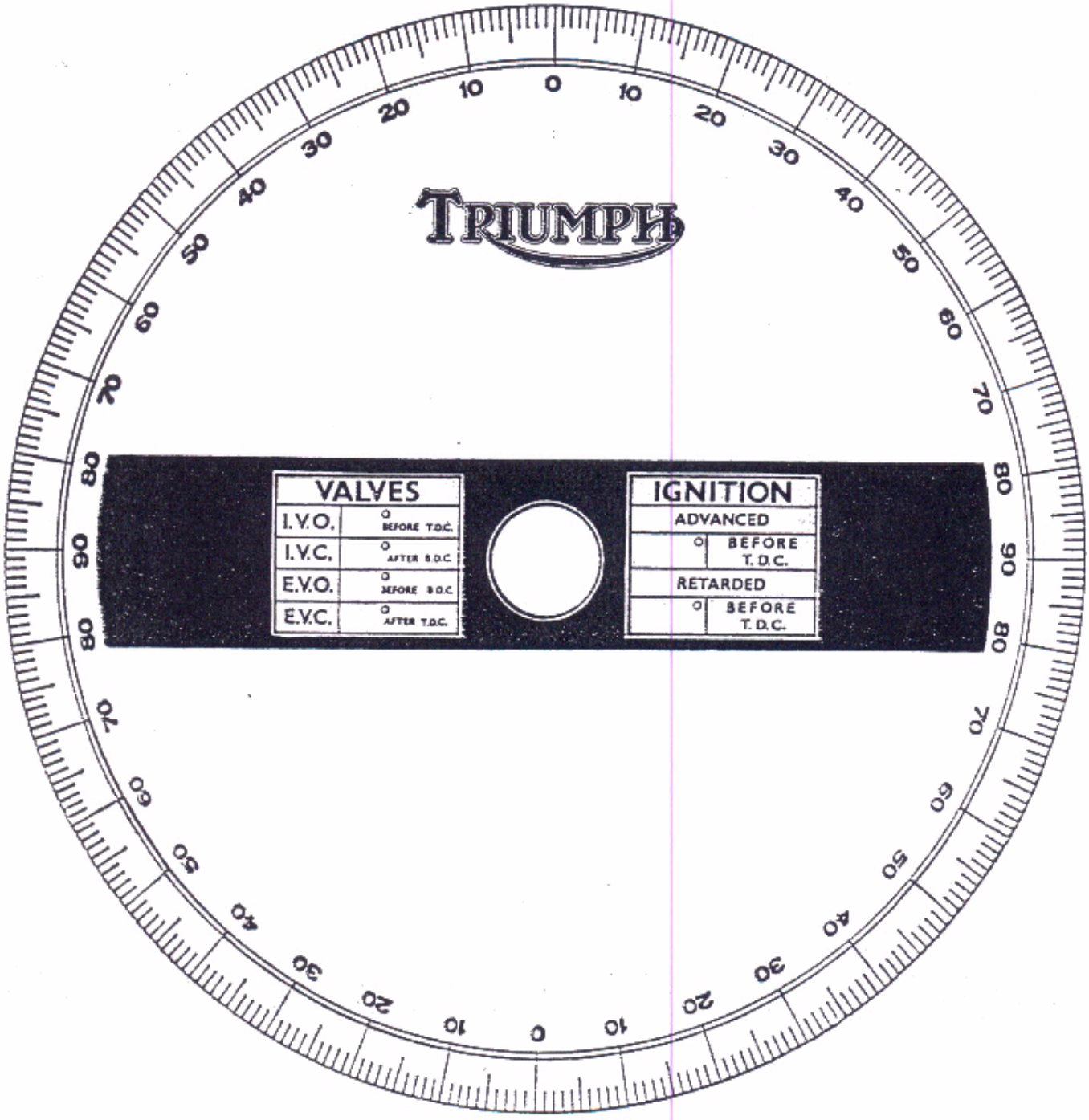


Fig. J15.

Wheel bearing retainer peg spanner No. 61–3694



ENGINE TIMING DISC. DETACH AND AFFIX TO STIFF CARDBOARD BACKING AND USE FOR VALVE TIMING IGNITION SETTING ETC.