



**ARIEL**

THE MODERN MOTOR CYCLE

**OWNER'S  
GUIDE**

**MODELS**

350c.c. O.H.V. NH. HUNTER

500c.c. O.H.V. VH. HUNTER

600c.c. S.V. VB.

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**SINGLE CYLINDER MODELS**



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ADDENDUM FOR THE

**1957-59**

**OWNER'S GUIDE**

**SINGLE CYLINDER  
MODELS**

except LH COLT

## All Single Cylinder Models except LH Colt

**Petrol Tank.** 4½ gallon capacity. Refer to Owner's Guide re method of fixing and now read as follows:

The Petrol Tank is fitted to the top tube of the frame by one single bolt fixing, thus facilitating ease of removal for decarbonisation purposes.

To remove the tank, first take out the two small securing screws from the front end of the chromium plated strip across the top face of the tank and lift off this strip, taking note of the method of attachment at the rear end.

In the centre orifice of the tank will be observed the single fixing bolt nut ( $\frac{3}{8}$  in.  $\times$  26 T.P.I.), which can be removed with an ordinary tube spanner and the tank can then be lifted clear of the frame. When removing take care not to misplace the steel flat washer and one spring washer located under the nut.

Note also the position of the steel distance tube and thick packing rubber through which the fixing bolt is located.

The method of locating the head of the self-aligning fixing bolt in the slotted bracket on the top frame tube will also be noted.

Take care when fitting the tank to ensure that the four buffer rubbers are located in the recesses provided in the base of the tank.

**Detachable Rear Wheel.** Refer to Owner's Guide.

Note that it is not necessary to disconnect the rear chain when removing the rear wheel only, but it is essential to take off the chain when removing the rear sprocket from the L.H. rear fork end.

**Ignition Control Lever** on Handlebars (left-hand).

To **advance** the ignition, **pull** the control lever backward or toward the rider, and to **retard**, **push** the lever forward.

**Air Control Lever** on Handlebars (right-hand).

To **open** the air valve of the carburetter **pull** the lever backward, and to **close**, **push** the lever forward.

**Oil Pump. Single Cylinder Models except Colt 200 c.c.** Refer to pages 10 and 11, Single Cylinder Owner's Guide.

In order to prevent failure of the return oil pump to function due to foreign matter in the ball valve under the return plunger, an additional ball valve is fitted into the timing gear cover in the direct oil return line.

The valve consists of a small coil spring and a  $\frac{3}{32}$  in. diameter steel ball, the spring being located firstly in an enlarged hole in the aluminium timing cover immediately behind the oil pump on the return side, followed by the steel ball. If the oil pump is removed at any time, care should be taken to ensure that the steel ball and spring are not lost, because although the oil pump will function without these, there will not be present the additional safeguard against failure should the return pump valve become inoperative.

Also to ensure against failure of the delivery oil pump due to the ingress of foreign matter in the ball valve, an additional valve is fitted in the supply line, this valve being located in the feed pipe to the big end bearing immediately behind the oil pump and held in position by a small plug. This valve also consists of a coil spring and a  $\frac{3}{16}$  in. diameter steel ball, the spring being inserted first into the feed pipe followed by the ball and plug.

# ARIEL

## OWNER'S

## GUIDE

### MODELS

350c.c. O.H.V. NH. HUNTER

500c.c. O.H.V. VH. HUNTER

600c.c. S.V. V.B.

### SINGLE CYLINDER

### MOTOR CYCLES

**ARIEL MOTORS LTD.**

**ARMOURY ROAD - BIRMINGHAM, 11**

Telephone:  
VICtoria 5642

Telegrams:  
ARIEL, TELEX, BIRMINGHAM

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## INTRODUCTION

The information given in this book has been collected and compiled for your guidance by members of our Technical Staff who are practical motor cyclists of many years' standing and careful study of its contents will enable the owner to keep his machine in first-class running order by carrying out adjustments and repairs when necessary in a correct manner. Should any difficulty arise, however, our Technicians are always pleased to advise on any matter.

The following interesting literature is also supplied with every new "Ariel" Motor Cycle:—

"Lucas Lighting and Ignition."

"Chains and the Motor-cyclist."

"Tyres by Dunlop."

"Amal Carburetter."

When sending an enquiry, always state the Engine and Frame Numbers with Prefix Letters so that we can identify the exact specification of the machine. The Engine Number and Letter is stamped on the drive side crankcase immediately below the cylinder flange, and the Frame Number is stamped on the left-hand side of the steering head lug. We advise owners to make themselves conversant with all aspects of their machine by reading carefully the literature supplied.

For Contents and Index see page 63.

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## ENGINE

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### RUNNING-IN

Proper running-in of the new engine is of the utmost importance, as misuse during the first few hundred miles will lead to poor results and unnecessary expense. Definite running-in speeds cannot be given, as the safe limit of speed depends absolutely upon road conditions, etc. Keep the engine turning over easily on small throttle openings, letting it rev rather than pull slowly on large throttle openings. All motor cycles leaving our factory are in first-class condition, but we have to leave the running-in to you. What your engine ultimately becomes depends upon *your* care during the first 500-1,000 miles. Give yourself lasting satisfaction by using restraint until the piston and cylinder have become seasoned by constant heating and cooling and have acquired first-class bearing surfaces and well-fitting rings. During the first few hundred miles running, check all nuts, bolts and screws, etc., for tightness as parts will bed down during the running-in period thus causing slack bolts, etc.

A number of proprietary brands of running-in compound and upper cylinder lubricants are on sale and can be used generally according to the maker's instructions. Upper cylinder lubricant alone added to the fuel will assist valve lubrication and may be used throughout the life of the engine.

It is advisable to change the oil at approximately 200, 500 and 1,000 miles during the running-in period.

### FUEL, OIL AND GREASE

Good quality oil is always necessary, and even more essential during the running-in period.

The lubricants shown in the table on page 61 are being used in our Works and we very strongly recommend the exclusive use of one or other of these oils which are all suitable for mixing with running-in compounds.

Petrol and oil consumption is very dependent on road and driving conditions and the mechanical condition of the motor cycle in general. The harder the machine is

driven and the hillier the road, the more petrol will be used per mile. Under normal touring conditions, solo, in average country, petrol consumption should be approximately as follows in miles per gallon:—

Models NH, 80; VB, VH, 75.

If a sidecar is fitted petrol consumption will increase by about 20/25 per cent.

Oil consumption is also dependent to some extent on driving speed, but should average about 2,000/2,500 m.p.g. solo and 1,500/2,000 m.p.g. with sidecar.

### INSTRUCTIONS FOR STARTING

The engine will always start readily if the following instructions are carried out.

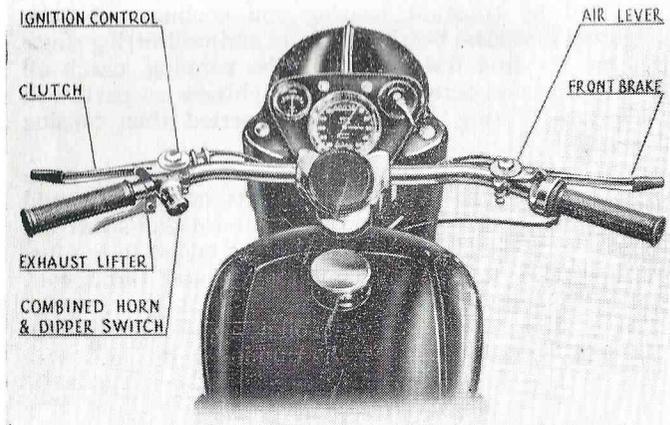


Fig. 1. THE CONTROLS.

Set the ignition one-third advanced, slightly open the throttle—about one-eighth of the total movement of the grip—close the air lever and very slightly flood the carburetter by momentarily depressing the “tickler” Depress the kickstarter until a good resistance is felt. Allow the kickstarter to return to the top of its travel.

Push forward the exhaust valve lifter trigger. Now depress the kickstarter sharply, releasing the valve lifter rather before the kickstarter crank is half-way down. If the engine has started, fully advance the ignition and open the air lever about half to three-quarters. As soon as the engine is warm—about half a minute—fully open the air.

The Ariel lubrication system is entirely automatic in action, and so long as the oil tank is kept replenished it is practically impossible for any trouble to occur.

Trouble in starting a new machine is more likely to be due to inexperience on the part of the rider than to there being any fault present.

If this is your first machine, persevere for a few minutes before starting to look for faults. If, however, the engine still fails to start, check over the various items in the Fault Finding Table on page 59, reading the table from left to right, and eliminating possible causes.

### DRIVING HINTS

(See also “Transmission,” page 32)

1. It is usual to start away by engaging the lowest gear, changing to the higher gears as the engine gathers speed. The gear change pedal movement is down for the next higher gear and up for a lower gear.

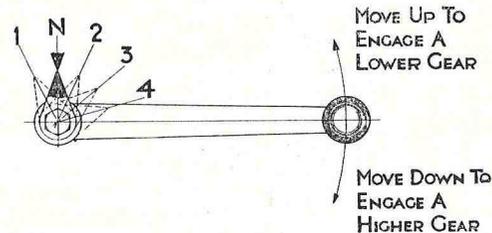


Fig. 2.

Neutral can be found by changing through the gears to the lowest, then moving the pedal half a stroke downwards. A dragging clutch due to incorrect adjustment makes neutral finding difficult. (See “Gearbox” Notes).

2. To engage low gear without noise after the machine has been standing some time, it is advisable to free the clutch-plates before the engine is started, by depressing the kickstarter once or twice, while the clutch is held out of engagement with the handlebar lever.

3. A silent gear change can be made if, when changing from a lower to a higher gear, the throttle is eased off and a slight pause is made in neutral position, halfway between the gears. The length of pause will depend on the engine revs, but a little experience will soon indicate the length of pause required.

4. When changing from a higher to a lower gear, leave the throttle partly open, so that the engine speeds up as soon as the clutch is released, then move the gear quickly, allowing the clutch to slip during the change.

5. Do not let the engine labour in a high gear, especially when a sidecar is fitted, but change down and get improved engine flexibility.

6. Do not open throttle suddenly at any time and do not "blip" the throttle when waiting in the traffic or starting away. The engine will continue to tick over if the throttle stop is set correctly. (See Amal leaflet).

7. Do not remain "in gear" long with the machine stationary and the clutch withdrawn, but change into neutral and release clutch.

8. Study the "Highway Code."

#### DRY SUMP LUBRICATION SYSTEM ALL MODELS

In the dry sump system the oil is continuously circulating through the engine and oil tank, thereby ensuring that the engine always has an adequate supply of oil, but without waste occurring. It is only necessary for the rider to keep the oil tank replenished and clean out the filters, etc., as required.

The actual working of the oiling system is as follows:—

Bolted on the outside of the timing case, but inside the magneto chain case, is the special Ariel pump. This has two plungers working side by side in the phosphor bronze pump body. These two plungers are caused to move up

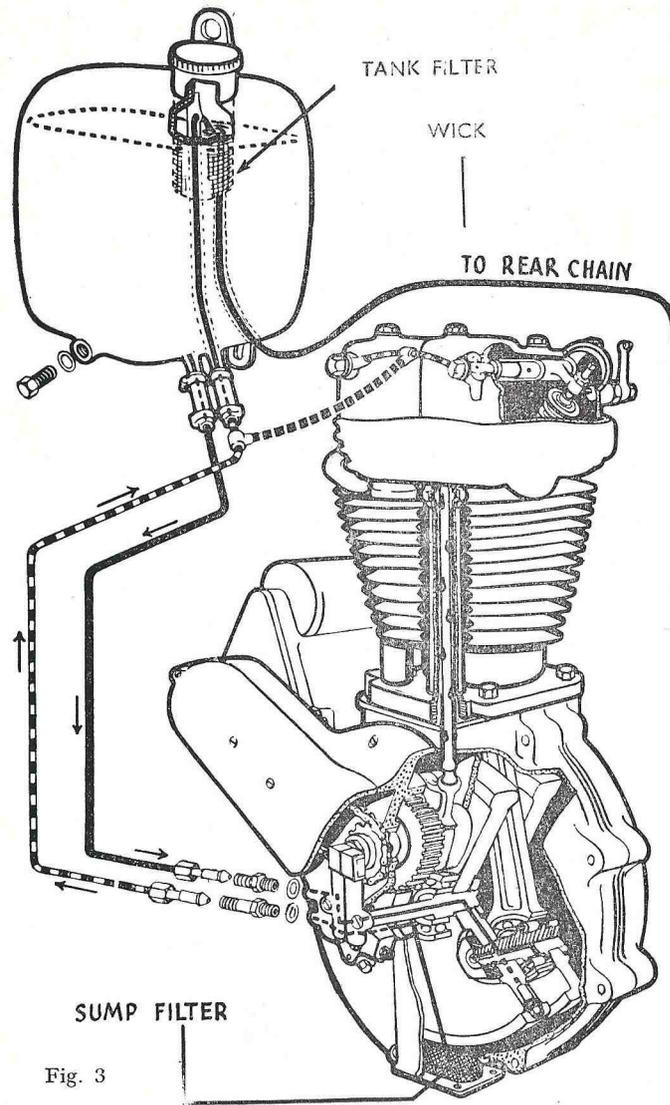


Fig. 3

ENGINE LUBRICATION SYSTEM  
CONNECTION TO THE ROCKER BOXES  
AND REAR CHAIN.

and down by means of a crank on the end of the cam spindle, movement being transmitted from the crank to the plungers through the medium of a sliding block.

These plungers are of two different diameters, but both have the same stroke so that one pump can pass more oil than the other. The smaller plunger is the delivery pump; it draws oil from the tank and passes it through a pipe fixed in the back of the timing cover and projecting into the hollow mainshaft spindle on the timing side. The oil is then forced through the Oil Purifier in the timing side flywheel, into the hollow crankpin, and so direct to the big-end bearing which is thus receiving a continuous stream of cool, clean oil. Escaping from the big-end, the oil is thrown on to the cylinder walls and piston, lubricating and cooling them; it then drains down into the crankcase.

Oil spray from the crankcase is forced through vent holes into the timing case and magneto chaincase, where it lubricates the timing gear and, after reaching a pre-determined level—which is such that the timing pinion is running in an oil-bath—it then drains back into the crankcase.

Below the timing gear, at the bottom of the crankcase, is a small sump in which the oil collects after passing through a large filter. It is then pumped back to the tank by the larger pump plunger already described.

When running at 25 m.p.h., in top gear, one pint of oil is circulated through the engine every ten minutes. The oil supply varies with the engine speed.

**THE ARIEL OIL PURIFIER**  
(Patent No. 353565)  
**AND OIL FILTERS**  
**ALL MODELS**

The Centrifugal Oil Purifier, already mentioned as being in the timing side flywheel, is an absolutely automatic and mechanical device for separating dust, grit, dirt, etc., from the oil. No matter how clean an oil is used, dirt and grit will get drawn into the engine via the carburetter, and unless this grit is removed immediately, it will help to wear away the bearings. The Ariel Oil Purifier removes this grit as soon as ever it gets into the circulating oil.

The action, briefly, is as follows:—

Oil enters the flywheel reservoir and due to centrifugal action all grit and foreign matter is forced outwards into the cleaning plug, whilst the cleaned oil passes back through suitable oilways to the crankpin oilways.

The dirt which has collected in the cupped plug should be cleared away about every 5,000 to 8,000 miles under normal conditions of use. Where the motor cycle is used in particularly dusty conditions, so that there is a proportionately greater chance of grit being drawn in through the carburetter, the plug should be removed for cleaning at shorter intervals.

To get to the purifier, remove the crankcase sump by undoing the four set bolts, and drop the sump complete with filter. Rotate the engine until the plug is immediately above the sump and then undo the plug. When the plug is removed, the dirt (if present in any quantity) will be found packed quite hard inside the cup formed in the plug, and must be removed with the blade of a penknife.

When replacing the plug, see that it is screwed up dead tight. It is locked into position by being slightly bell-mouthed so that it binds in the thread. No other locking device is used, and it is not needed so long as the plug binds slightly and is screwed hard home.

The plug can also be removed from the top when the barrel is removed, as for decarbonising.

The sump filter should, of course, be cleaned whilst detached. When replacing, see that the suction pipe is located in the hole in the top of the gauze and do not forget the joint washer. Wire up the set bolts to prevent loss.

Similar remarks as to cleaning also apply to the filter in the oil tank. This is removed after unscrewing the filler cap.

Although the Ariel Oil Purifier will remove all dirt, etc., from the oil, it cannot turn old oil into new, and it therefore becomes necessary to throw away the used oil as it loses its lubricating properties. This is recommended about every 1,000 to 1,500 miles under normal conditions of operation. This is highly important to avoid undue wear of piston, cylinder, etc. A suitable drain plug is provided at the bottom of the oil tank.

## OIL LEVEL IN TANK

Do not fill the oil tank above the level of one inch below the return pipe, and do not allow the level to drop below about two-thirds. The more oil there is in the tank, the cooler and cleaner it keeps.

Clean the filter every time the oil is changed.

## OIL SUPPLY TO ENGINE. ALL MODELS

Oil is supplied to the engine automatically under pressure by the plunger type pump and the supply can be checked by removing the oil filler cap on the tank and seeing that the oil is returned via the return pipe. The oil will come through in a continuous stream for a few seconds when the engine is first started, but the flow will rapidly decrease until the oil is returning in bubbles. This is the normal condition of the returning oil. It is not necessary to incorporate a pressure gauge with this system.

The oil feed pipe to o.h.v. rocker boxes is attached to and fed from the oil return pipe from the crankcase. Always see that the DELIVERY feed pipe from tank is connected to the TOP screwed union on the crankcase and the RETURN pipe to tank is connected to the LOWER screwed union on the crankcase.

Change the engine oil every 1,500 miles and wash out the filters and purifier.

## HEAVY OIL CONSUMPTION. ALL MODELS

If the oil consumption increases considerably it is most probably due to one of the following causes:—

1. Worn piston, piston rings or cylinder barrel; or possibly a scored cylinder due to a seizure at some time. *Remedy:*—Replace worn parts or have cylinder rebored and new oversize piston fitted.

2. A dirty lubrication system which permits particles of dirt and grit to get on to the valve beneath the scavenging pump plunger. This pump may appear to be operating properly, as judged by the oil return to the tank, but a little dirt on the valve may be causing the pump to operate inefficiently so that a certain amount of

oil remains behind in the engine sump. This might lead to excessive oil consumption through the flywheels dipping into the oil and causing splash. *Remedy:*—Thoroughly clean out the tank, oil pipes, engine sump, oil pump, etc., and fill up with fresh oil. Pay particular attention to the cleanliness of the pump and pump valves and renew the springs. (See exploded view).

3. An air leak at any point between the engine sump and the oil pump. The most likely places of air leakage are as follows:—

- (a) The sump pipe may be loose in the crankcase; make sure that this pipe is quite tight.
- (b) The pump body may not be a good fit on the face of the timing cover. See that a paper washer is fitted, that the holes in the washer register with the pump ports, and see that the securing screws are done up tightly. Occasionally two joint paper washers will be advantageous.
- (c) An air leak at the joint between the back of the timing cover and the boss on the crankcase; this is at the point where the oil return pipe projects from the boss which is inside the timing case. It will be noted from the instructions on page 24 that an extra .005in. washer should be fitted at this point. It may happen that after the engine has done some fairly considerable mileage, the timing cover will take a slight "set" away from the crankcase, so that even though an extra washer is inserted here as instructed, the joint may not be perfectly tight. *Remedy:*—Insert another washer—that is a total of two extra washers. Extra washers at this point should not be overdone or the timing cover will be strained.

4. A partial stoppage in the return oil system. The oil pipe from the tank to the timing cover is easily tested by taking off and blowing through, whilst the oil ways through the actual timing cover can be tested by taking off the pump and forcing paraffin down each passage by means of an oil gun. Test the oilway from the face of the timing cover down through the sump pipe by placing the nozzle of an oil gun against the appropriate port in the face of the timing cover.

The sump base must, of course, be taken off so that it can be seen if the paraffin comes through the sump pipe freely.

5. A worn pump—this should be returned to the Service Dept. for test and repair.

6. Loss through the breather pipe behind the mag-dyno chain case may be due to inefficiency in the oil return, or it may be simply that the connecting union requires screwing in further. Screw the union up as far as it will go and see that the non-return ball valve is in position. This valve consists of a quarter-inch steel ball dropped into the outer end of the union and held in position by a short wire pin.

#### **DECARBONISATION (General)**

The period for which an engine will run efficiently without being decarbonised, depends to a great extent upon driving conditions. To obtain the best results, however, decarbonisation should be carried out about every 2,000 to 3,000 miles. For the first time, however, decarbonisation can be done with advantage at about half the normal mileage as during the running-in period more oil will work through into the combustion chamber than will be the case when the piston and rings have bedded down into the cylinder bore. Therefore, on the first occasion decarbonise and grind in the valves after about 1,200/1,500 miles. This is a simple operation if carried out as follows:—

#### **DECARBONISATION. Model "VB". Side Valve**

Remove the sparking plug and the nine hexagon nuts and plain washers fitted to the fixed studs in the cylinder barrel and lift off the alloy head.

Scrape all carbon from the piston crown and from the inside of the head and have in readiness a new cylinder head gasket for re-fitting.

#### **VALVE REMOVAL AND GRINDING—S.V.**

To grind in the valves it is not essential to remove the cylinder; this is best left in position unless piston ring trouble is suspected. Disturbing the barrel will almost certainly lead to increased oil consumption, as the piston

rings cannot be re-fitted in exactly the same position. If, however, the barrel is to be removed, proceed as follows:—

Remove the carburetter, breather pipe from the valve spring chamber, exhaust pipe, and exhaust valve lifter wire. Undo the nine head securing nuts and remove the head and gasket; then undo the four cylinder base retaining nuts and lift the cylinder up and forwards. Push the piston down to the bottom of its stroke and the cylinder will come away.

To take out the valves, place the cylinder on the bench with the valve spring chamber upwards, and then compress the valve springs by means of a valve extractor. A suitable type is obtainable from most Accessory dealers. The forked end is placed under the valve collar and the point of the screw in the small centre hole in the valve head. Screw up, compressing the spring and then remove the split cones. Unscrew the extractor and remove the valve, spring and collars. Both valves are dealt with in this manner. Now scrape all carbon deposit from the exhaust valve port; an old screwdriver can be used for this.

The valves should not be interchanged and should be lightly ground in with fine emery powder (or one of the special preparations obtainable) until they and their seatings have a smooth bright surface. There should be no trace of pit marks left. Only a minute or two of light grinding should be necessary.

If the valves are ground in without removing the cylinder from the crankcase, exactly the same method of removal should be adopted. Before attempting to do any valve grinding, rotate the engine until the piston is towards the bottom of the cylinder and then place a large piece of clean rag into the cylinder bore so as to keep out all dirt, etc. Be careful not to get any grinding paste into the interior of the engine.

If this method of valve grinding is adopted, rotate the engine so that the valves are fully closed and also slack off the tappets to ensure clearance.

It is recommended that the carbon which forms round the top of the cylinder bore above the piston be left and not scraped off, as this carbon forms a very efficient oil seal thus minimising oil consumption and helping to delay carbon formation in the combustion chamber.

## THE PISTON—S.V.

The carbon on the piston head must also be scraped away. The piston is easily removed by pushing out the gudgeon pin, which is fully floating. Be careful to replace the piston and pin the same way round noting that the split section must be fitted facing to the FRONT.

Take care not to knock the piston, which is made of a hard wear-resisting, but somewhat brittle, alloy.

## GUDGEON PIN—S.V.

The gudgeon pin should be quite free in the small end bush, but may be slightly tight in the piston bosses; it will become free as soon as the piston expands with heat. The pin is held in position by means of two spring circlips which fit into grooves machined at each outer end of the gudgeon pin hole through the piston. These circlips can easily be removed by inserting a pointed instrument (*e.g.*, a scriber) in the slot, under the clip, and prising out. Take care not to damage the clip, which should be round and lie flat when removed. To replace the clip, push it into the gudgeon pin hole in the piston, and see that it springs out into the locating groove. These clips should be quite firm when in position and should not shake about. Do not refit circlips more than two or three times; replace by new ones.

## PISTON RINGS—S.V.

These should be bright all the way round where they rub upon the cylinder barrel. Brown marks, particularly near the ends of the rings, indicate that gas is blowing past, causing loss of compression, and the rings should be replaced. The rings should also be perfectly free in their grooves, but without much up and down movement (.003in. when new). Note the top ring is of chrome type and cannot be interchanged with the lower ones. When fitting new rings, the gap between the ends of the ring, when tried in the cylinder should be from .006in. to .008in. It is quite permissible for the gap to increase up to .025—.030in. before replacement. The lower piston ring on all models is of an oil scraper type.

## REASSEMBLY—S.V.

Before replacing, see that all parts are perfectly clean with no trace of emery powder from valve grinding.

Put the valves, springs and collars back in position and compress the springs with the spring compressing tool. The split cotters can now be inserted; if the recessed part of the valve stem is slightly greased, the cotters will be held in position while the spring is being released. If the tappets have been removed note that the locknut with the large collar goes on the exhaust tappet; the collar comes above the nut.

See that the cylinder base paper jointing washer is sound. If broken, fit a new one. See that there is a hole in the washer to register with the oil drain hole from the base of the valve spring chamber. This is important.

Oil on the inside of the cylinder, piston and rings. Set the gaps in the rings diagonally opposite one another and carefully replace the cylinder, easing the rings into the bore.

Replace the cylinder base nuts and washers and tighten down evenly and firmly.

See that the head joint washer or gasket and the joint faces are perfectly clean and put the head and washer back into position. Fit the securing nuts and screw these all down finger-tight until the head of each is down on to the cylinder head. Take a spanner and give one nut a one-eighth turn. Repeat this on the next but one nut, and then on the nut next but one to the last. Work round the head in this manner until every nut is tight. This method of pulling down the nuts ensures an even pressure on the joint face so that there will be no possibility of leakage.

Re-adjust the valve tappets if necessary.

The joint will probably give slightly after the engine has been run for a short time. Therefore, give the nuts a final pull down after about 30 miles running and whilst the engine is still hot.

## TAPPET ADJUSTMENT Side Valve Model "V.B."

Remove the valve spring cover and set the engine with the piston as near the top of the cylinder as possible with

both valves fully closed. To adjust the tappets, the tappet "C" (Fig. 4) should be held while the locknut "B" is loosened. Then rotate "A" holding the tappet "C" until the desired clearance is obtained. Then

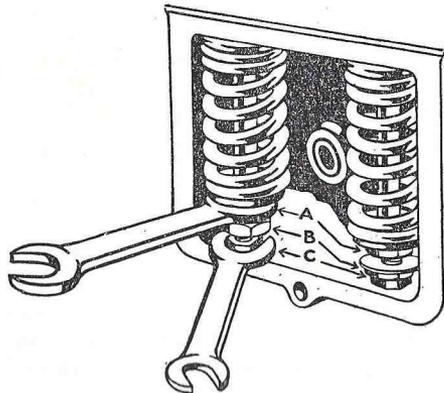


Fig. 4. VALVE TAPPET ADJUSTMENT. S.V. MODELS.

secure the locknut "B" and re-check the clearance several times whilst rotating the engine from the position where the inlet valve closes until the exhaust valve opens.

Tappet clearance—engine cold.

	<i>Inlet Valve.</i>	<i>Exhaust Valve.</i>
Side Valve, Model VB ...	.003in.	.006in.

**Note.**—With the side valve engine the clearance is measured between the top of the tappet head and the end of the valve stem. Do not be confused by there being no clearance for a few degrees just as each valve opens and closes; this is due to the action of the cam taking up the clearance slowly before the valves themselves begin to open.

#### EXHAUST VALVE LIFTER Side Valve Model "V.B."

This may require adjusting occasionally, in which case it should be set, by means of the control wire cable stop, so that there is a small amount of lost motion in the operating lever, before the lifter begins to move the tappet; this must be tested when the exhaust valve is fully closed.

The arm and spindle can also be adjusted by resetting the lifter-arm on the spindle. Leave the control cable connected and turn the engine until both valves are closed. Free the arm from the spindle and operate the exhaust lifter lever on the handlebar until the end of the lifter arm has moved forward approx  $\frac{1}{4}$ in. from its normal "off" position. Now turn the lifter spindle anti-clockwise—screwdriver slot in spindle end—until it makes contact with the tappet collar and retighten locknut.

Be sure that the small crank on the inner end of the spindle is not touching the tappet collar when the lifter is not in use.

#### DECARBONISATION

##### Overhead Valve Models "V.H."—"N.H."

This is done on similar lines to the Side Valve Model, but due to the difference in construction, the following additional notes will be helpful:—

Lift the petrol tank (see notes on page 55) and remove the sparking plug, carburetter and exhaust pipe. Disconnect the exhaust valve lifter wire and the oil feed pipe to the two rocker spindles. This pipe is best taken right off. Unscrew the rocker adjustment covers and rotate the engine until both valves are closed.

Unscrew the four bolts holding each rocker box, lift the boxes clear of the valves and swing them outwards when they can be lifted clear of the push rods. Pull out the push rods.

Undo the four cylinder head bolts and take off the head. The push rods are enclosed by cast in channels on the cylinder barrels. Take care not to damage the joint faces or break the fin.

The cylinder is best left in position, as described for the side valve model (see page 14). If, however, it is to be removed, undo the five base nuts and lift the barrel upwards and forwards. Support the piston as it falls free.

#### VALVE REMOVAL AND GRINDING—O.H.V.

The valves are held by taper cotters and collars. The springs are easily removed by the use of a valve spring compressor tool obtainable from most accessory dealers. The method of use is to place the forked end on the valve

spring collar, and the pointed end of the screw in the centre of the valve head. Then screw up until the spring is compressed sufficiently to enable the split cotters to be removed.

Now remove the valves, when the head and ports can be cleared of carbon and the valves ground in. *Do not interchange the valves.*

#### THE PISTON—O.H.V.

The carbon on the piston head must also be scraped away. The piston is easily removed by pushing out the gudgeon pin, which is fully floating. Be careful to replace the piston and pin the same way round noting that the split section must be fitted to the FRONT.

Take care not to knock the piston, which is made of a hard wear-resisting, but somewhat brittle, alloy.

#### GUDGEON PIN—O.H.V.

The pin is held in position by means of two spring circlips which fit into grooves machined at each outer end of the gudgeon pin hole through the piston. These circlips can easily be removed by inserting a pointed instrument (*e.g.*, a scriber) in the slot, under the clip, and prising out. Take care not to damage the clip, which should be round and lie flat when removed. To replace the clip, push it into the gudgeon pin hole in the piston, and see that it springs out into the locating groove. These clips should be quite firm when in position and should not shake about. Do not refit circlips more than two or three times; replace by new ones.

The gudgeon pin should be quite free in the small end bush, but may be slightly tight in the piston bosses; it will become free as soon as the piston expands with heat.

#### PISTON RINGS—O.H.V.

These should be bright all the way round where they rub upon the cylinder barrel. Brown marks, particularly near the ends of the rings, indicate that gas is blowing past, causing loss of compression, and the rings should be replaced. The rings should also be perfectly free in their grooves, but without much up and down movement

(.003in. when new). When fitting new rings, the gap between the ends of the ring, when tried in the cylinder should be from .006in. to .008in. It is quite permissible for the gap to increase up to .025—.030in. before replacement. The lower piston ring on all models is of an oil scraper type.

Note the top ring is of chrome type and cannot be interchanged with the lower ones.

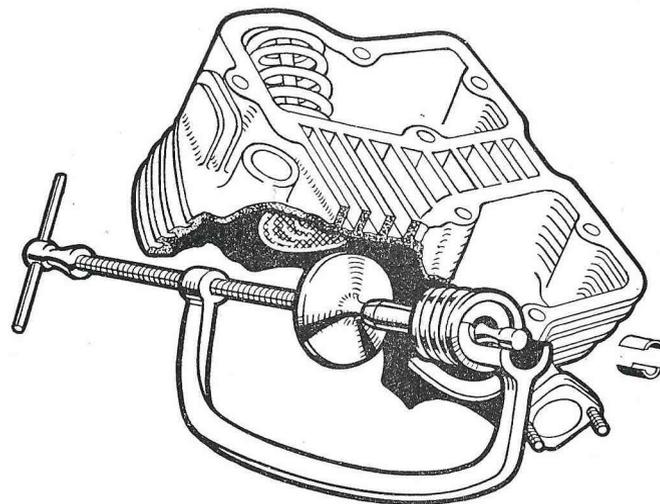


Fig. 5.  
METHOD OF REMOVING VALVES FROM O.H.V. MODELS  
O.H.V. ROCKER GEAR

As the complete rocker gear is carried in the cast aluminium boxes, it is quite unnecessary to disturb this in any way when decarbonising the engine. If it is required to dismantle the rockers at any time, the rocker box is taken off as already described and the large flat-headed screw is removed from the end of the rocker spindle next to the sparking plug. The spindle is then pressed or tapped out towards the same end, thus freeing the rocker.

Note the position of the double coil distance spring on the spindle end next to the flat-headed screw and when re-assembling see that the flat distance washer is fitted on the spindle between the rocker and the box itself on the opposite right-hand side. This washer prevents the rocker rubbing the soft aluminium and also forms an abutment against which the spindle is pulled when the outer oil union retaining nuts are screwed up. The flat-headed screw at the other end—in conjunction with the fibre washer—is nothing but an oil seal and must be tightened *after* the oil union nuts have been done up.

The rockers are lubricated by oil under pressure, the oil being fed in through the drilled spindles. Oil escaping from the rockers lubricates the valve stems and guides and the cup and ball joint between the push rods and rockers.

#### REASSEMBLY—O.H.V.

350 c.c. Model "NH" and 500 c.c. Model "VH"

Rotate the engine until neither cam lever is on the lift, *i.e.*, valves closed. See that all parts are clean and free from grinding paste. Make sure that the joint faces of the cylinder head and cylinder barrel are perfectly clean and smooth. To ensure a perfect oil tight joint it is advisable to fit new rubbers to the push rod enclosing top channel. To avoid oil leakage it is very important to fit the correct genuine replacements. Next take the head and lower the complete assembly into position. Insert the four head bolts, screw these in a few turns and make sure the rubber joint washers are correctly positioned. Screw down the bolts finger tight and then with a spanner put extra tension on the two bolts next to the push rod channels until the rubber washers have been compressed sufficiently to allow the head to make good contact with the cylinder all round the joint face.

Now give one bolt a one-eighth turn and repeat on the bolt diagonally opposite. Do the same on the two remaining bolts. Return to the first bolt, give it another one-eighth turn, repeat on the opposite bolt and then on the other two, and so on, working round the head from one bolt to another until all are perfectly tight. This will ensure a good gas-tight joint. Insert the two push rods.

See that the rocker box joint faces are clean, both on the head and on each box and examine the joint washers. If these are damaged, fit new ones or an oil-tight joint will not be obtained. Lay the washers in position on the head and take one of the boxes and **the long bolt which passes through the push rod end of the box.** Pass this bolt through the box and then put the box in position, but hold it about half an inch above the head. Start the bolt by two or three threads and then, using the bolt as a guide, slide the box down on to the joint face. If this is done carefully the ball end on the rocker will drop into the push rod cup; check this by testing the rocker for up and down play through the adjustment cover hole, whilst holding the box down firmly with the hand. When the rocker and push rod have engaged, insert the three short bolts and carefully tighten all four, pulling down each bolt a little at a time as was done for the head. Now fit the other rocker box in a similar manner.

Replace the carburetter, sparking plug, silencing system, etc.

**IMPORTANT.—Do not forget to replace the hardened steel end caps on the valve stems of all 500 c.c. O.H.V. models VH or considerable damage may be done.**

Valve Stem End Caps are NOT fitted to the 350 c.c. O.H.V. Model NH, the Stem of the Exhaust Valve being specially STELLITE tipped, and the Stem of the Inlet Valve plain hardened.

#### EXHAUST VALVE LIFTER—O.H.V. MODELS

No adjustment is provided for the control cable and the lifter must be set by altering the position of the exhaust lifter arm on the eccentric spindle. To break the taper joint between the arm and spindle, undo the nut a couple of turns and give the face of the nut a light sharp blow to drive the spindle inwards.

Leave the control cable connected and turn the engine until both valves are closed. Operate the exhaust lifter lever on the handlebar until the top end of the lifter arm has moved forward approx.  $\frac{1}{4}$  in. from its normal "off" position. Now turn the lifter spindle clockwise—

screwdriver slot in spindle end—until it makes contact with the rocker and re-tighten locknut. Always test the adjustment after re-setting the tappets and be sure that the lifter has slight idle movement before it touches the rocker, with valve closed.

### VALVE TAPPET CLEARANCE

**O.H.V. 350 c.c. and 500 c.c. Models "NH"—"VH"**  
*Set clearances with engine cold*

**Inlet Valve .006"**

**Exhaust Valve .008**

To ensure accurate adjustment the rocker boxes are fitted with a small screwed plug which when removed exposes an aperture into which a feeler gauge can be inserted and then located between the rocker adjusting screw and the valve end cap in order to check the clearance. Incorporated with the screwed plug is a protruding metal lock washer which should be located to engage with one of the grooves on the edge of the rocker cover or screwed cap to prevent loosening and loss. See Fig. 6.

Always commence the adjustment with the adjusting screw first turned clockwise to give just NIL clearance and then unscrew anti-clockwise to adjust correctly. Finally ensure that each adjuster screw locknut is firmly tightened.

When adjusting tappet clearances it is essential to adopt the following procedure:—

#### **Inlet Valve:**

Rotate the engine forward in the driving direction until the EXHAUST valve just commences to lift and then adjust the INLET tappet to .006in. clearance.

#### **Exhaust Valve:**

Rotate the engine forward in the driving direction until the INLET valve just closes and then adjust the EXHAUST tappet to .008in. clearance.

Set timing centre dots on cam gear and timing pinion as explained on page 24. To check valve timing, see page 25.

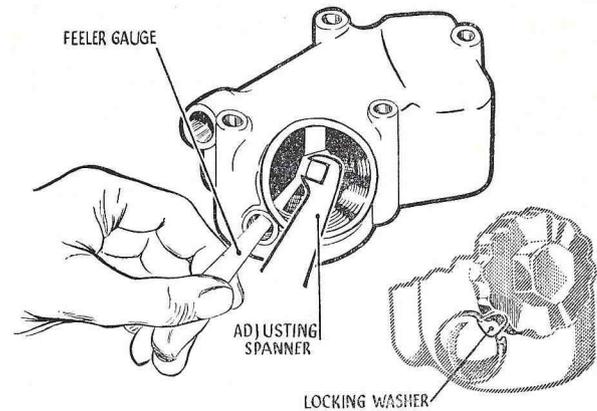


Fig. 6

### TIMING GEAR AND OIL PUMP. ALL MODELS

The cam operates cam levers which are carried on a centrally disposed pin. Each lever has one semi-circular face which bears on the cam profile, and in the case of the S.V. models, a further curved face which bears against the tappet foot. In the O.H.V. models the curved face is replaced by a cup carrying the lower end of the ball ended push rod. The top end of the push rod is cupped and engages with the ball end of the rocker arm.

The cam spindle extends through the timing cover and carries the sprocket for the magdyno drive. On the extreme end of the spindle a crank is formed and drives the oil pump. A dust and oil-tight cover is fitted over the pump and magneto chain.

To dismantle the timing gear, first undo the seven set screws securing the chain cover and remove this. Remove the oil pump by taking out the two cheese-headed screws. Next undo the nuts holding the magdyno driving sprockets and withdraw the sprockets with the Ariel Extractor, Spares No. 6621C—29 obtainable from all stockists. Before removing the sprocket behind the oil pump, place the small cupped adaptor supplied with the extractor on to the crank on the end of the

spindle, and so prevent damage as shown in Fig. 7. Undo the two oil pipes to the oil tank and the small one to the rockers, disconnecting these at the connections so that the unions remain in the timing cover. Now slack off the set bolt holding the magdyno platform and remove the five set screws securing the timing cover. Withdraw the gear cover, pressing on the end of the camshaft spindle to prevent this being pulled out and the timing upset.

If the cam is removed, the timing is easily reset. Rotate the engine until the piston is at top dead centre. Take the cam wheel, lift the cam levers and insert the cam wheel so that the centre dot marked on this coincides with the centre dot on the pinion. (Sometimes the dot on the timing pinion is covered up by the nut—left-hand thread). See Fig. 7.

When fitting the cam levers, first assemble them together by placing the plain or single end of the Inlet lever into the forked or double end of the Exhaust lever. Then place the assembly on the cam lever spindle with the forked exhaust lever on the right-hand side position in the timing case.

**Note.**—On certain series of engines a thin steel shim is used to centralise the cam levers by placing it on the lever spindle either at the back or front of the lever assembly.

It is impossible to get the timing wrong if these instructions are carried out carefully. The timing pinion has one keyway and the main shaft is keyed to the flywheel.

Be careful to replace all joint washers, renewing these if damaged, and securely tighten all nuts, screws, etc., or an oil leak may be experienced. It is most important to note that, when replacing the timing cover, the paper washer must be replaced in position and that there is an **\*additional paper washer .005in.** thick at the joint connection to the sump. Do not forget the set bolt supporting the magdyno platform.

\*See also Note 3 (c) on Heavy Oil Consumption, page 11.

#### VALVE TIMING

The timing should be checked with a card marked in degrees and mounted firmly on the engine shaft. Timing degree calibrated cards can be obtained from most accessory dealers or spares stockists.

#### Cam Assembly Side Valve Model "V.B."

Check timing with .010in. tappet clearance and then re-adjust to inlet valve .003in. exhaust valve .006in. running clearances.

#### Cam Assembly O.H.V. "NH" "VH"

Check timing with .023in.—.025in. tappet clearance and then re-adjust to inlet valve .006in.—exhaust valve .008in. running clearances. (See page 22).

Model	Inlet opens	Inlet closes	Exhaust opens	Exhaust closes
VB Side Valves	before T.D.C. Degs. 14	after B.D.C. Degs. 62	before B.D.C. Degs. 62	after T.D.C. Degs. 17
NH VH O.H.V.	26	77	70	33

#### OIL PUMP (Patent No. 325226) ALL MODELS

##### Do Not Remove this Needlessly

The action of this is described under Lubrication.

When replacing, be careful to place the joint washer correctly in position and tighten up the set screws securely. If the washer is damaged, fit a new one: it is most important to obtain a good joint between the pump face and cover. Sometimes an additional washer, making two instead of the usual one, will be beneficial in making a tight joint.

Do not forget the Duralumin block which operates the pump plungers and note that the chamfered edge of the hole faces inwards.

## FLYWHEEL ASSEMBLY. ALL MODELS O.H.V. AND S.V.

We strongly recommend only those with expert mechanical knowledge to dismantle the flywheels. We give, however, the following instructions to those competent to undertake the work:—

Both mainshafts and crank pin are secured by the usual taper fixing. (Except 500 c.c. Red Hunter crankpin which is parallel fit and not taper). The mainshafts are also keyed, whilst the crankpin has a peg engaging with a keyway in the timing side flywheel of models "VB" and "NH" on drive side flywheel of model "VH." This ensures that the oil-ways between the timing side shaft and the flywheel and between the flywheel and the crank-pin register correctly, and that the valve timing will also be correct if the camwheel is assembled to the instructions given.

Both crankpin nuts and driving spindle nuts are right-hand thread. Both timing spindle nuts are left-hand thread.

To dismantle the wheels:—

*First undo the crankpin nut* on the driving side, holding by the driving side flywheel only. Then support the drive side flywheel and press-out the crankpin complete with timing side flywheel, etc.

*The connecting rod* has a double row roller bearing big end, the hardened steel crankpin forming the inner member, while the hardened steel outer member is a press fit into the rod and can be renewed complete with crankpin when worn.

*When truing up* it is more important to get the spindles to run dead true than the outside diameter and sides of the flywheels, although if correctly assembled both should run true.

*When fitting flywheels into the crankcase*, carefully note that they have from .008in. to .012in. end clearance. Hardened packing washers of various thicknesses can be supplied for adjustment within reasonable limits. These washers are inserted on either mainshaft as necessary to maintain the flywheel assembly central in the crankcase.

**After re-assembly it is advisable to check the register of the oilways, by forcing oil down the hollow mainshaft and seeing that it exudes round the big-end bearing. This is very IMPORTANT.**

## ENGINE SHAFT SHOCK ASSEMBLY. ALL MODELS

The shock absorber assembly is not adjustable and providing the two locknuts are kept tight against the spring plate, which in turn will be locked against the shoulder of the driving shaft, the sliding member will work efficiently. If at any time the assembly is dismantled do not forget to replace the tab washer *between* the locknuts turning one tab over on to each respective NUT.

The shock absorber sliding action is automatically lubricated by the oil contained in the primary chaincase. Note the correct order of assembly for the complete shock absorber on all models as follows:—

- (a) Sprocket distance piece—plain—next to crankcase.
- (b) Engine driving sprocket.
- (c) Splined sliding member.
- (d) Spring.
- (e) Spring plate.
- (f) Locknut.
- (g) Tab washer.
- (h) Locknut.

Before the engine sprocket and absorber assembly can be dismantled or the primary chain removed it is first necessary to remove the clutch and outer half of the chaincase as described under the heading "Transmission."

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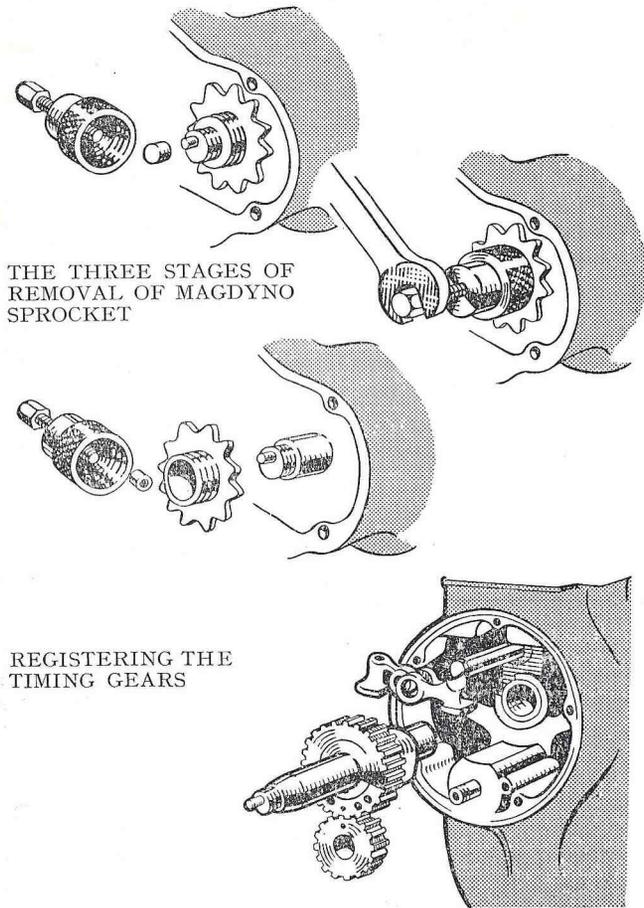
## THE MAGDYNO ALL MODELS

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### CONTACT BREAKER

Keep the points clean and correctly adjusted. Attention should only be required every 2,500 miles or more. To adjust the points, remove the contact breaker cover and turn the engine round slowly until the points are seen to be fully open. Now, using the magneto spanner, slacken the locknut and rotate the fixed contact screw by the hexagon head until the gap is set to the thickness (.012in) of the gauge (riveted to the spanner). Tighten the locknut, seeing that this operation does not move the fixed contact screw.

It is particularly important to keep the contact breaker free from oil and petrol or rapid burning of the points will occur. If they become blackened they may be cleaned with very fine emery cloth and afterwards with a



THE THREE STAGES OF  
REMOVAL OF MAGDYNO  
SPROCKET

REGISTERING THE  
TIMING GEARS

cloth moistened with petrol; clear away all traces of metal dust and let the petrol dry off before replacing the contact breaker.

To remove the contact breaker, take off the spring carrying the moving contact and undo the hexagon headed centre screw; this is locked by a tab washer.

When replacing the contact breaker, take care that the projecting key on the tapered portion of the contact breaker base engages with the keyway in the armature spindle or the timing will be upset.

When refitting the spring contact, see that the screw is tight and that the points are in register with one another.

Further information concerning the ignition and electric apparatus will be found in the Lucas instruction book.

### IGNITION TIMING

Model "VH" 500 c.c. Red Hunter  $\frac{1}{2}$  in. B.T.D.C. maximum advance for normal touring when the standard piston is fitted.

Model "NH" 350 c.c. Red Hunter the same as "VH" above.

Model "VB" side valve  $\frac{1}{2}$  in. maximum advance B.T.D.C.

(B.T.D.C. = BEFORE TOP DEAD CENTRE).

To set the timing, use Ariel extractor 6621C-29 to release the magdyno sprocket from the tapered armature shaft. See Fig. 7. Extractors can be supplied by Ariel stockists. Rotate the engine until the piston is the required amount before top dead centre on the compression stroke (both valves closed), and set the ignition control to full advance. (Note.—Be sure the contact breaker cam is responding to the movement of the lever). Move the contact breaker in the direction of rotation (clockwise when looking at the contact breaker), until the points are just separating and tighten up the chain sprocket, taking care that this operation does not alter the setting. It is advisable to check this setting because of its importance.

### MAGDYNO CHAIN. ALL MODELS

As this is entirely enclosed and lubricated from the engine it will require very little attention. Inspect

Fig. 7. REMOVAL OF MAGDYNO CHAIN SPROCKET AND  
REGISTRATION OF TIMING GEAR.

occasionally and adjust if necessary. To alter the chain tension slack off the two set bolts holding the magdyno on to its platform and then slide the magdyno backwards or forwards until the chain has about  $\frac{3}{8}$  in. up and down movement in the middle, when at the tightest point. Carefully re-tighten the set bolts, and make certain that the magdyno is held close up to the back of the chain cover, or the oil retaining washer may become displaced with ensuing oil leakage.

If the magdyno is removed at any time or the rubber washer requires renewing, note the order of assembly; small composition oil excluding washer on the armature shaft and against the back end plate of the magdyno, then the metal retaining washer or plate followed by the thick rubber oil seal.

### THE SPARKING PLUG

The sparking plug can greatly influence the performance of the engine. Especially on the O.H.V. engines it is necessary that best quality sparking plugs should be used.

Many riders prefer to select their own fancied plug on the trial and error method for best results. Works recommendations based on results of tests for all normal running on post-war fuel are as follows:—

Model "VB" side valve, Lodge HLN long reach and Champion N5 long reach.

Model "NH" 350 O.H.V., Lodge HLN long reach and Champion N5 long reach.

Model "VH" 500 O.H.V., Lodge HLN long reach and Champion N5 long reach.  
Set the points to the correct gap—.015in. to .018in.

It is advisable, especially when refitting plugs to the alloy cylinder head of the model "VB", "NH" and "VH" to well smear the threads with graphite and not to over-tighten, otherwise difficulty will be experienced when removing the plug after carbon has been deposited around the thread.

## THE "MONOBLOC" CARBURETTER

### NORMAL SETTINGS

Model	Amal Type	Main Jet Size	Throttle	
			Valve Size	Needle Position (notches from top)
NH	376/8	200	$3\frac{1}{2}$	3
VH	376/11	200	$3\frac{1}{2}$	3
VB	376/13	220	5	3

Riders are strongly advised not to alter needlessly the carburetter setting. Keep the carburetter clean and periodically empty sediment and moisture from the float chamber. Note that the size of the main jet controls mixture strength from approximately three-quarter to full throttle, whilst the positioning of the taper needle which is attached to the throttle slide controls the mixture between approximately one-quarter and three-quarter throttle. As the taper needle and needle jet wear, the mixture is richened up over this range, and petrol consumption will increase. This can be compensated for by lowering the needle (*i.e.*, securing in a higher notch); make the adjustment one notch at a time until all adjustment has been taken up, after which both parts must be replaced.

For further details of carburetter tuning, see the booklet issued by Amal Ltd., supplied with all motor cycles.

### AIR FILTER

The air cleaner is fitted with an oil impregnated gauze element and requires to be periodically serviced. At intervals of 1,000 to 1,500 miles, according to local climate and road conditions, the gauze element should be removed and washed in a solvent such as petrol or paraffin and allowed to drain and dry. Then re-oil the element by immersing in light engine oil (S.A.E. 20) and allow the surplus to drain off before replacing.

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## THE TRANSMISSION

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It may be said in general terms that the amount of power developed by a motor cycle engine depends upon

- (1) The amount of gas burned at each power stroke;
- (2) The number of power strokes obtained per minute.

The first condition is controlled by the position of the throttle lever and the second by the speed at which the machine is being driven, and the gear ratio employed.

Always recollect that a motor cycle engine gives the best results in all ways when it is running easily. It should not be driven at low engine speeds on large throttle openings as this causes "snatch" and harshness in the transmission, leading to rapid tyre wear, worn bearings and unevenly worn chains. At the first sign of jerkiness when hill-climbing or running slowly on the level, change down into a lower gear. Driving conditions vary so much that it is not possible to make hard and fast rules about when to change gear. The following suggestions may be regarded as useful and not binding:—

On the level, do not endeavour to run at less than 18-20 m.p.h. on top gear or 12-15 m.p.h. on third gear.

On a hill change down into third or second gear if the speed drops below about 25 m.p.h. and into bottom gear if the speed drops below about 12-15 m.p.h.

**Recollect, a gearbox is provided for use, and do not forget the intermediate gears.**

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## THE GEARBOX ALL MODELS

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The exploded view of the complete gearbox and clutch in this booklet clearly indicates the general arrangement of the internal gear, kickstarter and foot-change assemblies. Reference to the part numbers given in the list will provide a full description of each separate component part.

Location of the gearbox main case in the Motor Cycle frame is by the same method as adopted on previous models, *i.e.*, being held between the right and left-hand rear engine plates. The top fixing lug of the gearbox case is slotted and allows the box to be moved on the lower swivel lug to provide driving chain adjustment.

## LUBRICATION

Ordinary engine oil is recommended for lubrication of the complete box and a filler cap and an oil level plug are provided on the kickstarter end casing.

Oil code number or grade S.A.E. 50 to 60 of any recommended brand is suitable (see page 61).

The oil level should be checked every 1,000 miles and "topped up" as necessary.

## CLUTCH ADJUSTMENT

Clutch cable adjustment is by way of a common adjuster and cable stop on top of the gearbox end cover or top end of cable (VH). The internal clutch operating arm or lever is located within the enclosed kickstarter end of the gearbox and adjustment provided by the inclusion of a simple sleeve nut arrangement located in a small cover plate on the outer face of the end cover.

Adjustment to the clutch plates and springs is rarely necessary and the spring plate tension is correct when the ends of the springs are just visible when viewed across the face of the spring plate. This setting provides ample pressure to ensure efficient clutch grip. If the clutch adjustment screws are tightened more it makes clutch withdrawal unnecessarily heavy. After adjustment see that the spring plate lifts equally, if not, the adjusting screws should be eased off on the low side or tightened on the high side until the plate is equally lifted.

The clutch operating lever within the kickstarter cover should be set to give up to  $\frac{3}{16}$  in. clearance or free movement which can be felt for testing after removing the oil filler plug and exposing the lever.

To set the operating lever, loosen the small cover plate held by two screws on the face of the end cover and adjust the sleeve nut which can be turned complete with the plate, until the correct position is found to give the necessary clearance. Finally, take up all unnecessary slack in the control cable by means of the external adjuster but take care not to interfere with the free

movement or clearance already given to the internal operating lever. Reference to the fully descriptive exploded view of the gearbox will readily assist operators to identify and adjust the clutch withdrawal assembly.

## DISMANTLING THE CLUTCH ASSEMBLY

### Clutch Plates

Remove the clutch dome cover held by four screws and then undo the five spring retaining nuts projecting through the end spring plate. A slotted screwdriver is supplied in the tool kit for this purpose. The complete set of clutch plates can now be withdrawn from the housing. If clutch slip has taken place, carefully examine the condition of the cork inserts and replace with factory exchange plates if necessary. Care should be taken when re-assembling to fit the plates in the correct order. The first plate to put in is a plain one then alternately a cork insert plate and a plain plate, finishing with a plain one. See also "Clutch Adjustment."

### Clutch Body and Sprocket

After removing the clutch plates, undo the securing nut on the end of the mainshaft and pull off the clutch centre which is splined on the mainshaft sleeve. This leaves the clutch sprocket and outer clutch housing (carried on a needle roller bearing) in position on the shaft. To remove these parts, turn back the edges of the ring tab washer locking the six set bolts in the centre of the housing and take out the bolts; the outer housing is now free. To remove the sprocket, take off the outer half of the oilbath case when the sprocket, bearing cage and needle rollers can be slipped off the shaft. Note that the rollers are not held in the cage and can therefore drop out when the cage and sprocket are pulled off the shaft. When refitting these parts secure the needle rollers in the cage with a little grease. A plain washer fits **behind** the roller race and a tongued washer **outside** the race next to the clutch sprocket.

When re-assembling be absolutely sure that the six set bolts are screwed right home and that they are locked in position by the circular tab washer. Also ensure that the mainshaft nut securing the clutch centre is tightened fully and the special lock washer is placed behind the nut.

## DISMANTLING THE KICKSTARTER CASE END COVER

Removing the K.S. case end cover enables examination to be made of the internal clutch operating lever and plunger and also exposes the complete K.S. and foot-change mechanism as well as the speedometer spiral gear drive.

Before removing the end cover take out the oil drain plug and allow all oil to drain off.

Release the clutch cable adjuster sufficiently to allow the inner wire and nipple to be detached from the inner operating lever.

Next take off the nut securing the gear indicator cap and small coil spring enclosed on the end of the foot-change cam barrel spindle. Then unscrew the six cheese headed screws which secure the outer K.S. cover to the inner K.S. case, noting carefully the position of the three different lengths of screws used.

Next draw the cover forward approximately  $\frac{1}{2}$  in. taking care to hold securely the K.S. crank and pedal in the vertical position.

Tie the K.S. crank to the footchange lever in order to prevent the K.S. spring from unwinding.

The K.S. end cover can now be fully removed complete with K.S. quadrant and spring and also part of the footchange operating assembly.

Note the position of the main RETURN SPRING for the footchange control quadrant. This is the large "U" shaped flat steel spring working together with the cam cylinder.

After fitting any necessary replacement parts and cleansing, the end cover can be replaced by reversing the procedure, taking care to replace the paper joint washer and tightening all screws before refilling the case with oil. Be sure to replace correctly the small coil spring and gear indicator cap and nut.

## DISMANTLING THE KICKSTARTER CASE OR BACK PLATE

After removing the K.S. outer end cover, take off the mainshaft end nut, K.S. driving ratchet and pinion and the small coil spring and sleeve for pinion.

Next dismantle the gear selector spindle split pins and take out the footchange cam cylinder together with the spring plunger which it will be noticed makes contact with the various indentations on the face of the cylinder. Take out the clutch operating plunger and rod, noting the method of engagement between the plunger and the operating lever which will still be attached to the K.S. case outer cover. Also note the position of the small steel ball between clutch rod and plunger.

Remove the four cheese headed screws securing the inner K.S. case to the main gearbox shell, noting the position of the two different lengths of screws, and draw the case, leaving the internal gear assembly, etc. in position in the main housing or shell.

It is possible to remove the K.S. rear half case complete with the internal gear assembly, selector forks, etc., all left in position, by taking off the complete clutch as previously described but also removing the splined driving sleeve fitted to the clutch end of the mainshaft.

Without dismantling the K.S. ratchet pinion assembly the four securing screws are taken out and the rear half case can be pulled away with gear assembly attached. This method is the most satisfactory way of making a close up examination of the gear assembly.

Reference to the exploded view should be made when dismantling and re-assembling and the correct order of gear assembly, part numbers and titles, carefully noted. When refitting the footchange cam assembly, place in position the ball ended plunger and small coil spring so that the ball end engages with any one of the indentations on the rear face of the cam cylinder. Make quite certain that the paper joint washer is replaced between the K.S. case and the main shell and that the four securing screws are well tightened.

After dismantling the K.S. cover and case with the gear assembly attached as previously described, it will be noticed that the main driving gear ball bearing, rear sprocket and oil seal, will be left in position in the gearbox shell or main case. To remove these, secure the sprocket to prevent rotation and unscrew the large nut locking the sprocket to the driving gear sleeve. Note the special lock washer fitted behind the nut and also the order of assembly of the ball bearing, oil seal and retaining washers.

The driving gear will now push through into the gearbox case and the ball bearing, which is a press fit in the shell housing, can be driven out after removing the gland oil seal, etc.

Reference should be made to the exploded view when re-assembling.

## GEAR RATIOS

### CLOSE—STANDARD

Engine Driving Sprocket		First Gear	Second Gear	Third Gear	Fourth Gear (Top)
19T	...	15.15—1	9.72—1	7.50—1	5.72—1
21T	...	13.72—1	8.81—1	6.77—1	5.18—1
22T	...	13.10—1	8.42—1	6.47—1	4.95—1
23T	...	12.55—1	8.05—1	6.20—1	4.74—1

Model				Engine Sprocket	Sidecar
				Solo	
"NH" O.H.V.	...	...		19T	—
"VH" O.H.V.	...	...		23T	19T
"VB" Side Valve	...	...		22T	19T

GEARBOX and REAR WHEEL SPROCKETS are standard throughout the complete range of models and cannot be altered.

### Close Ratio Gearbox Code Numbers

"GB" 39 fitted to 350 c.c. Model "NH."

"GB" 40 fitted to 500 c.c. Models "VH" and 600 c.c. Model "VB."

G.B.39 gearbox fitted 2 cork plate clutch assembly **350 c.c. models.**

G.B.40 gearbox fitted 3 cork plate clutch assembly **500 c.c. model and 600 c.c. side valve.**

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## DRIVING CHAINS

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### PRIMARY CHAIN ( $\frac{1}{2}$ in. $\times$ .305in.) 73 or 74 Pitches ALL MODELS

Chain adjustment is made by swinging the gearbox, which is pivot mounted, back or forward as required. Slack off the pivot bolt which is below the gearbox and which passes through the two lugs on the cradle tubes; similarly, slack off the clamp bolt passing through the engine plates above the gearbox. At the top rear extremity of the offside engine plate will be found the draw bolt adjuster; rotating the nut on the draw bolt swings the box about the pivot bolt, varying the chain tension. Adjust until the primary chain has approximately  $\frac{3}{8}$ in. up and down movement midway between the sprockets at the tightest point. Retighten clamp bolt and pivot bolt.

If the draw bolt nut does not turn easily, do not force it or the lug on the gearbox may be broken. Ascertain why the box is not moving; probably the bolts are not properly free or the chain may be already too tight.

### REAR CHAIN ( $\frac{5}{8}$ in. $\times$ $\frac{3}{8}$ in.) 100 Pitches. ALL MODELS

For accessibility, the Spring Clip Fastener is fitted on the outer side of the Chain and it is important always to ensure that the CLOSED end of the clip points in the direction of the drive.

Note also "Chains" booklet issued with other literature for new machines.

To adjust the chain slack off the two rear wheel spindle nuts and loosen the nut securing the brake anchor bar to the brake plate; then adjust by rotating the screw adjusters; turn each adjuster by an equal amount. After making the adjustment, tighten up the spindle nuts, the locknuts on the adjusting screws and the brake anchor bar nut. Adjust the rear brake if necessary; see Brake Adjustment, page 42.

### ADJUSTMENT

The rear chain should be adjusted so that when the machine is on the centre stand and the damper units fully extended, the chain will have an up and down movement of between  $1\frac{1}{4}$  and  $1\frac{1}{2}$  inches.

The chain will then have the normal adjustment of  $\frac{5}{8}$  inch up and down movement when the rear wheel is on the ground and the rider seated. See Fig. 8 for chain case inspection hole.

### CHAIN LUBRICATION. ALL MODELS

The primary chain is lubricated by dipping into the oil in the case. Maintain the oil level up to the "Oil Level Plug," but do not overfill or the oil may be thrown out of the case where the gearbox mainshaft enters. The oil level is *not* maintained by the engine lubrication system. A drain plug is fitted and if it is desired to drain off the oil, the outer half of the chaincase need not be removed.

Rear Chain lubrication is carried out by means of a Feed Pipe taken from the return supply of oil in the Tank direct to the enclosed Rear Chain Case or Chain-guard and Chain. The Pipe is fed with warm oil through a felt wick immediately below the Tank Filler Cap and is therefore a drip feed to the Rear Chain only when the engine is running.

When a Rear Chain open type Guard only is fitted the exposed rear Driving Chain should be periodically removed and thoroughly cleaned with paraffin and then dipped in a grease and graphite mixture well warmed.

After cooling the excess mixture should be wiped off and the sprockets cleaned before replacing. Primary and Rear Chain spring clip fasteners must be fitted with the closed end facing forward when the chains are running in the correct direction.

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## REAR WHEELS AND BRAKE

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### 1. REMOVING REAR WHEEL AND BRAKE

Support the machine on centre stand. Remove the Brake Cable from the operating lever and adjuster on the brake plate after turning the latter and the Locknut until the "Split" allows the inner wire to be withdrawn. Remove the securing bolt from the front end of the Brake Anchor Bar.

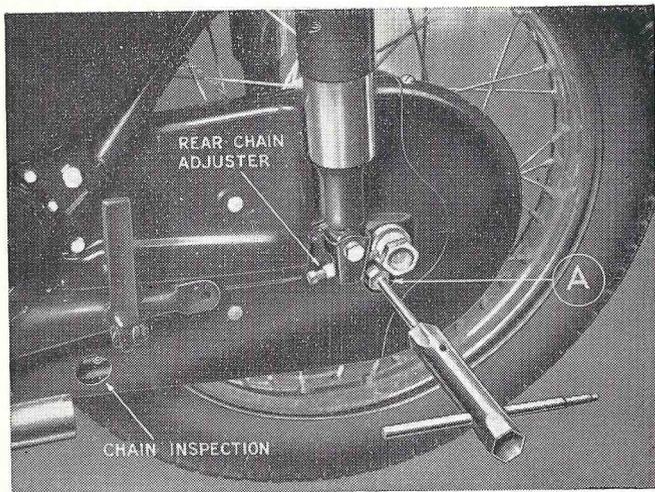


Fig. 8.

Remove the Rubber Plug "A", Fig. 8, from the enclosed Rear Chain Case when fitted and rotate the rear wheel to expose each of the four wheel securing nuts which can be removed by inserting the spanner provided through the Plug hole "A." Next release the main hub spindle bolt Fig. 9.

Remove the two bolts securing the Dual-Seat Stays and the four bolts securing the rear end of the mudguard.

Detach the two rear lamp "snap" cable connectors inside the rear guard and the rear end of the mudguard can be removed thus facilitating easy removal of the complete wheel, but leaving the Chain Sprocket and short fixed spindle in position.

## 2. REMOVAL OF BRAKE PLATE AND ATTACHMENTS

After removing the Rear Wheel, the Brake Plate with attachments can be withdrawn thus exposing the Brake Shoes, etc. To remove the Brake Shoes, first release the

tension on the two adjusting wedges by unscrewing fully, the fulcrum adjuster on the Brake Plate when the Shoes can be pulled off. See Fig. 10.

Note the location and action of the two Brake Shoe springs and one cam return spring.

Also when re-assembling lightly grease the Cam and Fulcrum Bearing faces and inject grease into the cam spindle bearing by way of the nipple provided.

## 3. REMOVAL OF HUB BALL BEARING

After taking off the Brake Plate with attachments, the screwed Bearing Locking Ring can be unscrewed (R.H. thread), but note the one indentation which must be removed, on the outer metal cover, before unscrewing the ring.

The single row ball journal bearing can be tapped or pressed out from the R.H. side, noting the location of the circlip which need not be disturbed.

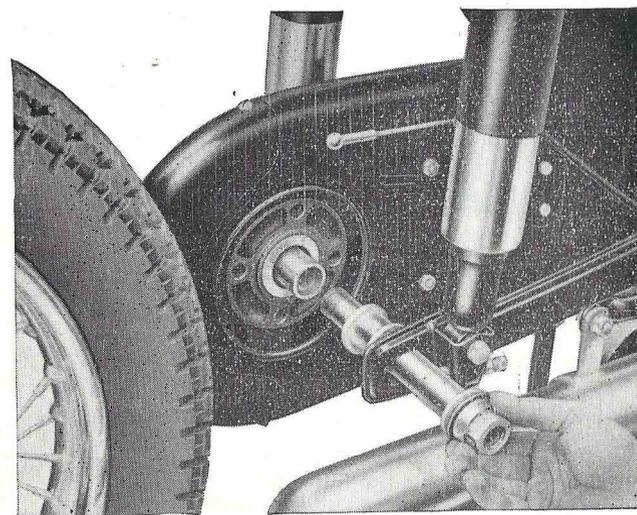


Fig. 9. REAR WHEEL REMOVAL (2).

#### 4. REAR HUB BEARING LUBRICATION

The Ball Bearing should be packed with grease before assembly and afterwards during service at approximately every 3,000 miles, when a small quantity of grease can be inserted by hand through the R.H. side of the Hub tube.

#### 5. REMOVAL OF CHAIN SPROCKET AND LUBRICATION OF BEARING

The Rear Chain Sprocket with spindle and Ball Bearing can be removed from the L.H. rear fork end after releasing the securing nut and distance piece(s).

Next remove the Spindle and take off the Dust Cover or Plate which will then expose the Ball Journal Bearing, which can be tapped or pressed out from the opposite side. Note the location of the felt grease retaining washer.

#### REPLACING THE REAR WHEEL

When replacing spindle, it is easier to engage the thread if the N/s nut is slackened about one turn. If the brake anchor bar is taken off, notice that it is not perfectly flat, the large end pointing very slightly inwards and the smaller end outwards.

Be very careful when re-assembling to refit in this position; also be careful when greasing the wheel bearings, not to use too much grease or some of the surplus may escape on to the brake linings.

#### REAR BRAKE ADJUSTMENT

Fitted to the Rear Brake Plate is a Cable Stop and Adjuster which can be used for adjusting the Cable tension and taking up the initial Cable stretch.

Adjustment for Brake Lining wear is made by turning the square-ended Cam, or Fulcrum Screw with one of the spanners provided in the Tool Kit.

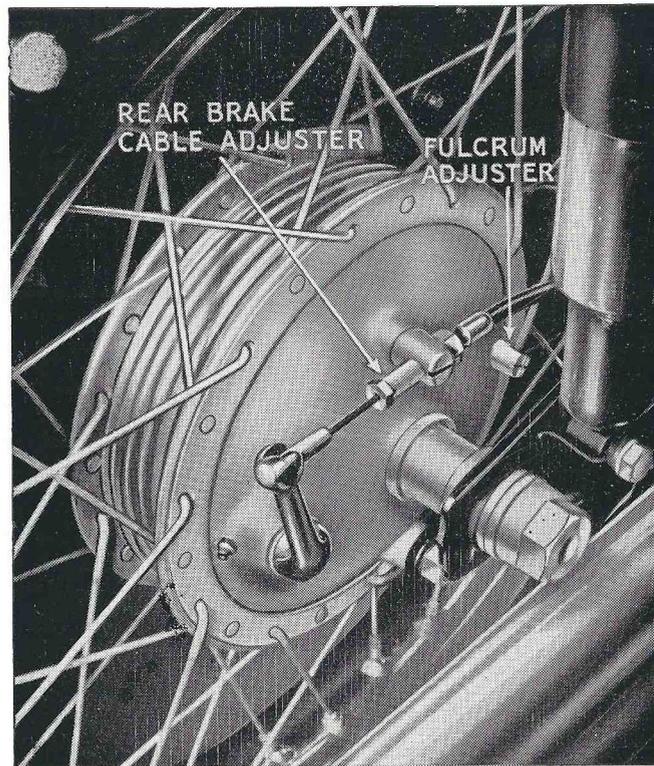


Fig. 10. REAR BRAKE ADJUSTMENT.

The Cable should first be slackened off as far as possible and then the Brake Shoes adjusted by turning the Fulcrum Screw clockwise until the Brake Linings just touch the bearing surface of the Drum. Release the Fulcrum Screw five or six notches, until the wheel revolves freely and then re-tension the Brake Cable with the adjuster, leaving just a trace of idle movement.

## WHEEL ALIGNMENT

Whenever adjustment has been carried out to the Rear Chain, it is advisable to check the road wheel alignment because if this is incorrect the steering will be unsatisfactory and undue wear will occur with the Sprockets and Chains.

### REAR BRAKE LININGS

The type of linings fitted to the full width alloy Hubs are of a special wear resisting material and thus guaranteed to give very long service under all conditions of running.

After lengthy service when it may be necessary to replace the linings, this should only be carried out by fitting a pair of complete Brake Shoes with linings attached as supplied direct from the factory.

All Brake Shoes are first fitted with the linings and then turned or ground on the Bearing surface to conform to a gauge corresponding to the size of the internal diameter of the Brake Drum which is 6.970in.—6.980in.

One of the original Brake Shoes will be found to have a colour code mark corresponding to a similar mark on the Brake Plate and the Shoes should be refitted in the original order, if for any reason dismantling has taken place.

Always insist that the local Ariel dealer supplies genuine works replacement Brake Shoes complete with linings and never attempt to reline the shoes unless facilities are available for turning or grinding linings after fitting.

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## FRONT WHEEL

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### 1. REMOVING FRONT WHEEL

With the machine on the front and centre stands, proceed in the following order:—

Release the Front Brake Cable from the Stop Lug. Release the R.H. Front Mudguard Stay and Brake Plate Anchor Bar. Fig. 11.

Loosen the Pinch Bolt on the lower end of the Fork Tube Fig. 12, and also remove the large Hub Spindle Nut on the Brake Plate side.

Insert a Tommy Bar in the hole on the end of the hub Spindle, and by turning this in either direction it can be pulled out leaving the wheel free for removal.

### 2. REMOVAL OF FRONT BRAKE PLATE AND ATTACHMENTS

After removing the wheel, the Brake Plate with attachments can be withdrawn, thus exposing the Brake Shoes, etc.

To remove the Brake Shoes, release the tension on the two Adjusting Wedges by fully unscrewing the Fulcrum Adjuster on the Brake Plate, when the shoes can be pulled off.

### 3. REMOVAL OF THE TWO FRONT HUB BALL BEARINGS

After taking off the Brake Plate with attachments, the screwed Bearing Locking Ring can be removed (R.H. thread), and also the same type screwed Locking Ring from the opposite side, noting the positions of the Felt Grease Retainers.

Both single row Ball Journal Bearings can be tapped or pressed out from each respective opposite side, noting the location of the two circlips which need not be disturbed.

### 4. FRONT HUB BEARING LUBRICATION

The two Ball Bearings should be packed with grease before assembly and afterwards during service at approximately every 3,000 miles, when a small quantity of grease can be inserted by hand direct into each bearing after removal of the Hub Spindle.

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## FRONT BRAKE ADJUSTMENT

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Fitted to the handlebar against the Brake Lever, is a knurled screw ring which can be used for adjusting the cable tension and taking up the initial cable stretch.

Adjustment for Brake Lining wear is made by turning the Square-Ended Cam, or Fulcrum Screw—Fig. 11—with one of the spanners provided in the Tool Kit.

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## FRONT BRAKE LININGS

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The type of linings fitted to the full width alloy hubs are of a special wear resisting material, and thus guaranteed to give very long service under all conditions of running.

After lengthy service, when it may be necessary to replace the linings, this should only be carried out by fitting a pair of complete Brake Shoes with linings attached, supplied direct from the factory.

All Brake Shoes are first fitted with the linings and then turned or ground on the Bearing surface to conform to a gauge corresponding to the size of the internal diameter of the Brake Drum which is 6.970in.—6.980in.

One of the original Brake Shoes will be found to have a colour code mark corresponding to a similar mark on the Brake Plate, and the Shoes should be re-fitted in the original order if for any reason dismantling has taken place.

Always insist that the local Ariel dealer supplies genuine works replacement Brake Shoes complete with Linings and never attempt to reline the shoes unless facilities are available for turning or grinding the linings after fitting.

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## FRONT FORK ASSEMBLY

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### LUBRICATION RECOMMENDATIONS

The Forks are filled with oil before leaving the factory, the correct amount being approximately one-third of a pint or nearest equivalent 7 fluid ounces for each respective leg. Under normal conditions of use, the Forks should not require "topping up", and providing leakage has not occurred, very lengthy service should be obtained before the Forks need draining and re-filling.

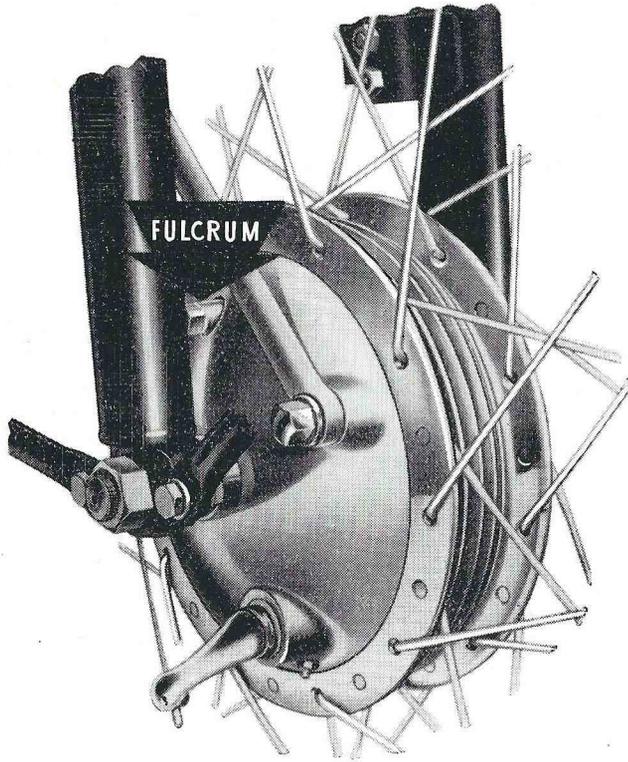


Fig 11. FRONT BRAKE ADJUSTMENT.

The Cable should first be slackened off as far as possible and then the Brake Shoes adjusted by turning the Fulcrum Screw clockwise until the linings just touch the Bearing surface of the Drum. Next, release the Fulcrum Screw five or six notches until the Wheel revolves freely, and then re-tension the Brake Cable with the knurled screw on the handlebar, leaving just a trace of idle movement.

If the Forks appear to have lost the original effective hydraulic damping action after lengthy service, each leg should be drained and re-filled with approximately 6½ fluid ounces of one of the following grades of oil:—

Wakefields	...	Castrol XL.
Esso	... ..	Essolube 30.
B.P. Energol	... ..	Energol 30.
Shell	... ..	Shell X100—30.
Mobiloil	... ..	Mobiloil A.

#### EXPORT

In countries where extremely cold conditions prevail it is recommended to use Mobiloil Arctic or an equivalent.

A heavier grade of oil can also be used especially if the Motor-Cycle is adapted for heavy sidecar duty.

#### DRAINING THE FORK LEGS. See Fig. 12.

1. Remove the Screw Plugs (A) from the top of each fork leg.
2. Remove the Drain Plug (B), at the bottom of each Fork Tube and drain off all the oil into a suitable vessel, preferably a graduated half pint (10 ozs.) measure. To ensure that all the oil is fully drained, work the forks up and down sharply. Note the amount of oil removed.
3. Refill each leg by way of the top screw hole (A) with approximately one-third of a pint or the nearest equivalent, 7 fluid ounces (198 c.c.) of any of the above recommended grades of oil.
4. Replace the Plugs (A) and tighten securely.

**Important.**—Do not over-fill the Fork Tubes or the hydraulic action will be retarded.

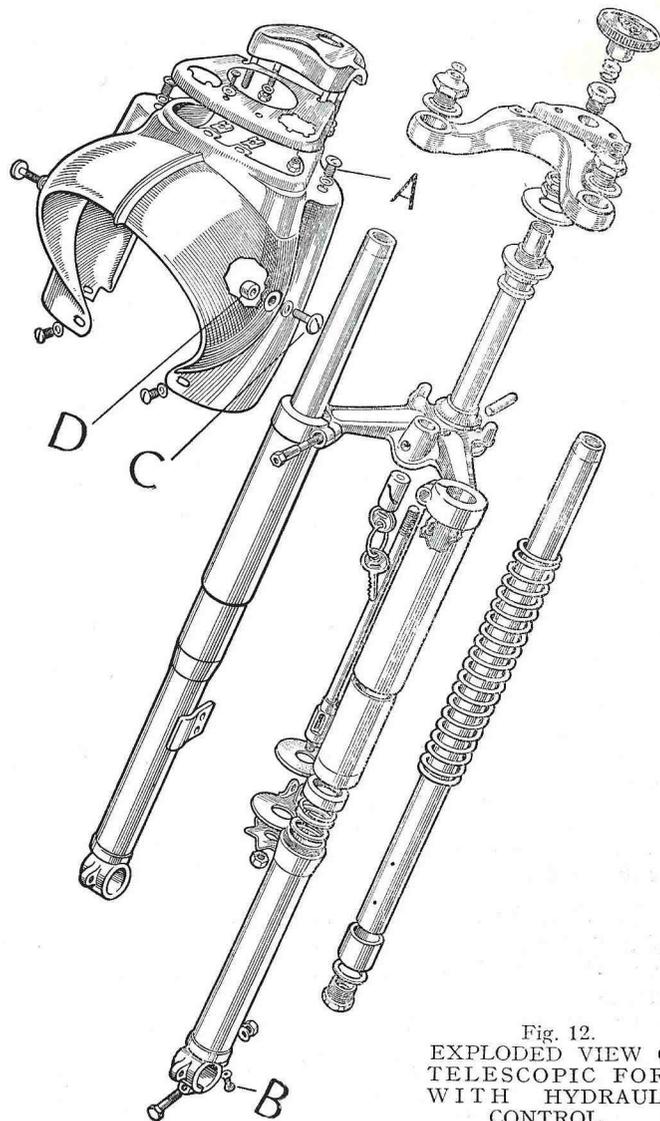


Fig. 12.  
EXPLODED VIEW OF  
TELESCOPIC FORK  
WITH HYDRAULIC  
CONTROL

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## MAIN COIL SPRINGS

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If the machine was ordered for use with a Sidecar, stronger Coil Springs would have been fitted at the Factory, but the Ariel dealer will advise upon this matter if consulted.

It is not advisable to attach a Sidecar to a machine not fitted with the stronger or Heavy Duty Springs, and also it is not advisable to use a solo machine fitted with the strong springs if the maximum efficiency and comfort is desired.

Consult the Ariel dealer from whom the machine was purchased if in doubt regarding the specification of the Fork Assembly, etc., if it is intended to use a Sidecar.

Owners of Ariel machines are advised not to needlessly dismantle the Fork Assembly as this calls for a certain amount of mechanical knowledge and therefore, such work should be placed in the hands of a competent mechanic or any Ariel dealer.

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## LAMPS

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### HEADLAMP

This is of the sealed beam type incorporating the main and pilot bulbs.

The lamp being positioned within the covering Hood or Cowl, must be withdrawn forward if it is necessary to exchange a bulb.

To withdraw the lamp, first unscrew the two securing pins "C," Fig. 12, taking note of the two inside distance pieces "D" which will fall away, and the complete lamp can then be withdrawn by placing one hand underneath the body and pulling forward out of the cowl or hood.

To gain access to both Bulbs first remove the head-lamp front after partially releasing the fixing screw at the base of the rim.

The Pilot Bulb is positioned in the beam or reflector unit by a sprung holder which can be simply pulled out. The main pre-focus bulb is held in position by a bayonet fixing cap and cannot be wrongly re-fitted.

When placing the complete lamp back within the fork cowl or hood, make certain to first position the two distance pieces "D" before inserting the screws "C."

### STOP AND REAR LAMP

To gain access to the twin filament bulb, it is only necessary to remove the two visible retaining screws and withdraw the red plastic portion of the lamp, the centre panel of which is the essential REFLECTOR.

### REPLACEMENT BULBS

Headlamp (Main). Lucas Pre-Focus 6v.—30/24 watts.  
Stop Tail Lamp. Lucas 6v./18 watts.

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## STEERING HEAD

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### ADJUSTMENT

The head bearings are of the cup and cone ball type and should be adjusted after the first few hundred miles running, after which they will require only infrequent attention. The front of the machine should be supported on a box under the engine and the front wheel clear of the ground. Loosen the top locknut and gently screw the bottom nut down until all clearance in the races has just disappeared and there is no sign of tightness in the steering. Then further tighten this nut 1/6th of a turn, that is, turn the nut from one pair of flats on the hexagon to the next flats and no more. Hold this bottom nut with the spanner to prevent it moving and securely tighten the top lock nut.

### LUBRICATION

Two grease gun nipples are provided for the two head bearings. Grease here every 1,000 miles.

## STEERING DAMPER Except Model "NH"

The action of the steering damper is to make the steering much stiffer. It is extremely useful for combination work and high speed solo work, particularly on rough roads. Do not tighten up the damper more than is necessary, and remember to slacken it off whilst reducing speed, as stiff steering at low speeds is very unpleasant and on occasions, very dangerous. The damper is controlled by the rotation of the black hand-knob projecting above the centre of the handlebars; turning clockwise increases the damping.

To dismantle the damper, support the front wheel off the ground by means of a box under the engine.

To take out the centre tie rod which passes through the steering column remove damper knob and punch out the short steel parallel peg which is driven into and through the crown at the base of the column. The peg also passes through the brass trunion piece connected to the end of the tie rod. Remove small damper plate anchor bolt and nut and the whole damper assembly can be withdrawn.

After lengthy service the friction fabric disc may require renewal otherwise no replacement should be necessary except in case of damage.

## STEERING LOCK

The lock is press fit in the base of the steering head lug and secured by a small grub screw.

Two keys are provided, both bearing the code number of the lock. The number is stamped upon the barrel of the lock, but this is not visible until the lock is withdrawn from the head lug. First remove the grub screw, and the lock can be prised downwards. Spare keys can be obtained from Ariel dealers, after quoting the code number of the lock.

Do not attempt to lubricate the steering lock internally, the mechanism is already packed with a special lubricant. If after being exposed to adverse weather conditions, however, a few drops of very thin machine oil may be applied to the outer edge of the moving cylinder.

## FRAME WITH PIVOTED REAR SUSPENSION

The "swinging arm" frame with front duplex down tubes gives the necessary rigidity for perfect steering, combined with load distribution between the extended cradle tubes, seat and engine—gearbox mountings.

The "swinging arm" or pivoted rear assembly is mounted to the main frame section by means of a fixed pivot spindle passing through two robust rubber bushings pressed into a welded cross tube. Upon this structure depends the rigidity of the rear wheel when subjected to side loads which occur especially when a sidecar is fitted and the design of the complete frame has been based on this important point.

The rear suspension damper units incorporate flexible coil springs to carry the weight of the rider and pillion passenger and the hydraulic damping device caters for all additional loading due to road shocks.

Built in lugs are provided on the frame for sidecar attachment at five points.

The damper units are detachable and are supplied in two graded types for solo or sidecar use.

The respective code markings are engraved on the damper top cover as follows:—

**Solo** Damper Unit No. AT.6/7—1096.

**Sidecar** Damper Unit No. AT.6/7—1096/1.

The damper units are sealed and do not require "topping up." After lengthy service the rubber mounting bushes may require renewal, these being easily removed by the ordinary workshop press method.

The "swinging arm" pivot does not require lubrication and the mounting bushes will give exceptionally long service.

See exploded view, Fig. 13.

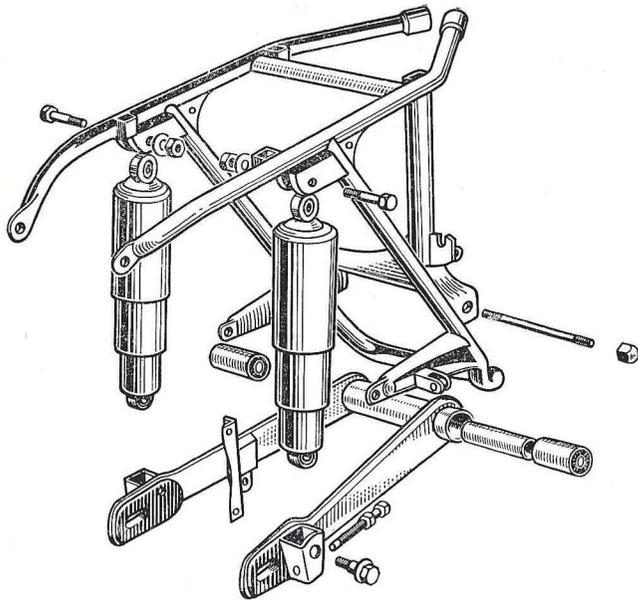


Fig. 13.

**EXPLODED VIEW OF FRAME WITH PIVOTED REAR SUSPENSION.**

Showing Damper Units, Chain Adjuster and Rubber Bushes.

**ADJUSTABLE FOOTRESTS**

The footrests are positioned to the frame on finely serrated tubes and are therefore adjustable within certain limits governed by the layout of the footchange and brake pedal levers. The rider should adjust each footrest to suit his own requirements and comfort, but ensuring ease of control for the brake pedal and foot-change levers.

To remove a footrest for adjustment purposes it is only necessary to take off the securing nut and tap the rest along the spline or serrated tube. When refitting take care to thoroughly tighten the securing nut.

**SPEEDOMETER**

To detach the driving cable from the gearbox unscrew the union nut at the gearbox end and pull out the inner cable.

When refitting the speedometer flex into the gearbox it will probably be necessary to rotate the back wheel so that the metal tongue on the end of the inner cable can slip into mesh with the corresponding slot on the driving spindle.

**FRONT STAND**

Never use the front stand by itself. Always first place the machine on the rear stand and then swing the front stand down under the wheel until the stand is vertical. Do not let it touch the brake cam bearing or damage may be done to either the stand or the brake.

**PETROL TANK**

The petrol tank is secured by four set bolts, each having two rubber washers and one plain steel washer and locked with a wire. The thick rubber washer goes next to the tank. The set bolts should not be screwed up too tightly.

**To Remove Filler Cap**

Press hard downwards, rotate filler cap a quarter of a turn anti-clockwise, and lift up.

**To Replace Cap**

Drop into position, press downwards and turn cap clockwise as far as possible.

**Reserve Petrol**

A two level petrol tap is provided. Always run on the main supply, then, when this is exhausted, the tap can be turned to the reserve position and the tank replenished at the next opportunity. Find out how far the machine will travel after turning the tap to reserve and you will then know for future use that petrol must be procured within this distance.

Do not forget to close the reserve tap after filling up.  
To open *main* supply: pull the plunger on fully.

To open reserve supply: Leave the plunger on fully and then turn clockwise (R. Hand) with a further slight pull to lock.

To remove the plunger complete with cork seating, take out the small grub screw at the side of the tap and pull out. In the event of petrol tap leakage after lengthy use, the complete plunger should be renewed.

#### TYRE PRESSURES

Model.		Tyre Size	Pressure (lb. per sq. in.)
N.H. Solo	...	Front 3.25-19	18
	...	Rear 3.25-19	24
V.H. Solo	...	Front 3.25-19	17
	...	Rear 3.25-19	24
V.H. S/car	...	Front 3.25-19	18
	...	Rear 3.25-19	28
	...	S/car 3.25-19	17
V.B. Solo	...	Front 3.25-19	18
	...	Rear 3.25-19	24
V.B. Sidecar	...	Front 3.25-19	22
	...	Rear 3.25-19	28
	...	S/car 3.25-19	17

These recommended inflation pressures are based on a rider's weight of 176 lb. For riders exceeding 176 lb., increase tyre pressures as follows:—

Front tyre: Add 1 lb. per sq. in. for every 28 lb. increase in weight above 176 lb.

Rear tyre: Add 1 lb. per sq. in. for every 14 lb. increase in weight above 176 lb.

If additional load is carried in the form of a pillion passenger or luggage, the actual load bearing upon each tyre should be determined and the pressure increased in accordance with the Load and Pressure Schedule shown in the Dunlop booklet.

## CLEANING

### Enamelled Parts

The enamelled parts should never be dry cleaned or the surface will be scratched. This may lead ultimately to moisture penetrating to the metal with resulting corrosion and flaking enamel.

To remove mud and dirt use a sponge and plenty of water, soaking the mud off. Oil and mud can be removed by soaking with paraffin. When all dirt has been removed, dry off the machine with a chamois leather and then polish, if desired with one of the proprietary polishes.

### Chromium Plating

Chromium plating must never be cleaned with ordinary metal polish, or the surface deposit will be destroyed and rusting will take place. Clean with a wet sponge and polish with a soft cloth or use one of the special chrome cleaning compounds now available.

Riders who live in industrial districts should remember that there is usually chemical matter on the roads. In wet weather, these chemicals get splashed on to the chrome and cause corrosion. Similarly, where salt is used to clear snow, the chrome may be attacked. Under these conditions chrome parts should be washed in clean water after the machine has been used.

Most accessory dealers can supply a tin of rust preventative compound recommended for use on all chromium plated parts during the winter months. Such a compound solution when applied to the metal, leaves a transparent protective film which can, however, be easily removed with a little clean petrol or chromium plate special polish.

Tins of specially prepared spirit graphite or thread anti-seize solution for use on sparking plug and other threads, can be supplied by Ariel stockist at price 2s. 0d.

## WHEN AND WHERE TO LUBRICATE

### Every 250 Miles

OIL Check level in tank and top up if required.

### Every 500 Miles

OIL Replenish Primary Chain Case to "Oil Level" Plug.

Check supply to Rear Chain ... 1 point.

All Handlebar Controls and Cables.

Front and Rear Brake Operation pivots and Cable.

GREASE Rear Brake Pedal Pivot ... 1 point.

Front and Rear Brake Cam Spindles ... 2 points.

### Every 1,000 Miles

GREASE Steering Head Bearings ... 2 points.

OIL—Top up level—"GB" gear-box.

### Every 1,500 Miles

Drain Oil Tank and Sump, flush out and refill.

### Every 3,000 Miles

GREASE Front Hub Bearings ... 2 points.

Rear Hub Bearings ... 2 points.

OIL Wick on Contact Breaker ... 1 point.

## FAULT FINDING CHART

IGNITION	CARBURATION	GENERAL
Misfiring.	Erratic Running.	Overheating and Loss of Power.
Gap at points incorrect.	Pilot jet choked or wrongly adjusted.	Oil Pipe connection loose.
Insulation covered with oil or carbon.	Wrong size main jet.	Engine badly carbonised.
Plug runs too hot and damages insulation or too cool and oils up.	Float needle not seating correctly, causing flooding.	Valve springs weakened or broken.
Insulation faulty.	Control slides not properly adjusted.	Valves and Guides badly worn.
Ignition too much retarded.	Taper needle wrongly set.	Cam levers badly worn, giving incorrect timing.
H. T. brush worn or seized in holder.	Taper needle or needle-jet worn.	
	Punctured carb. float.	
	Air leak at flange joint.	
	Piston rings:—	
	Excessive gap; stuck up; broken.	
	Head joint faulty.	
	Cylinder or piston badly scored.	
	Valves require grinding in.	
	Badly worn valve guides.	
	Exhaust lifter holding valve off seat.	
	Bad joint between pump face and timing case.	
	Pump ball valve not seating.	
	Oil pipe or filters choked.	
	Pump face joint washer fitted incorrectly.	
	Delivery pipe into mainshaft broken off.	

### TECHNICAL SPECIFICATION DATA

Description	NH	VH	VB
Wheelbase in inches	56	56	56
Overall length—inches	86	86	86
Handlebar width—inches	27	27	27
Ground clearance—inches	5½	5½	5½
Dual seat height—inches	31	31	31
Weight fully equipped—lb.	365	375	362
Oil consumption—m.p.g.	2000	2000	2000
Petrol tank capacity—gallons	4	4	4
Cylinder Bore	72 mm.	81.8 mm.	86.4 mm.
Engine Stroke	85 mm.	95.0 mm.	102.0 mm.
Engine b.h.p. at	18	26	18
Engine r.p.m.	5600	6000	4400
Cubic capacity—actual	347 c.c.	497 c.c.	598 c.c.
Compression ratio	7.0	6.8	5.0

B.H.P. is the average figure for standard compression engines. Engine sprockets for other gear ratios supplied to special order (see Spares List).

### LUBRICATION RECOMMENDATIONS

	Shell	Vacuum	Wakefield	B.P.	Esso
<b>Engine</b>					
Summer	X100—40	Mobiloil D	Castrol Grand Prix Castrol XXL	Engerol S.A.E. 40 Engerol S.A.E. 30	Essolube 50 Essolube 40
Winter	X100—30	Mobiloil BB			
<b>Gearbox "GB"</b>	Shell X100-40	Mobiloil BB	Castrol XXL	Engerol S.A.E. 40	Essolube 40
<b>Oil Bath, Chain-Case and Rear Chain</b>	Engine Oil	Engine Oil	Engine Oil	Engine Oil	Engine Oil
<b>Wheel Hubs</b>	Shell Retinax RB	Lithium Base Grease	Castrolase Heavy	Engrease C3	Esso Grease
<b>General Greasing</b>	Shell Retinax CD	Lithium Base Grease	Castrolase CL	Engrease C3	Esso Grease
<b>Telescopic Forks</b>	X100—30	Mobiloil A	Castrol XL	Engerol S.A.E. 30	Essolube 30
Normal conditions					
Arctic conditions	X100—20	Mobiloil Arctic	Castrolite	Engerol S.A.E. 20	Essolube 20

# ARIEL MOTORS LIMITED

## PROPRIETARY EQUIPMENT & ACCESSORIES

Although every effort is made to obtain the most suitable and highest quality fittings of a proprietary nature for incorporating into our Motor Cycles, our guarantee does not cover such parts.

In the event of trouble being experienced with proprietary fittings, the part or parts should be returned to and claims made direct on the actual manufacturers who will deal with them on the terms of their respective guarantees. Date of purchase and mileage covered should always be clearly stated when submitting a claim.

### Carburettors

Amal Ltd., Witton, Birmingham, 6.

### Chains

The Renold and Coventry Chain Co. Ltd., Didsbury, Manchester.

### Electrical Equipment

Messrs. Joseph Lucas Ltd., (Service Dept.), Great King Street and Great Hampton Street, B'ham, 19.

### Horns—Electric

Messrs. Joseph Lucas Ltd., (Service Dept.), Great King Street and Great Hampton Street, B'ham, 19.

Clear Hooters Ltd., 33, Hampton Street, B'ham, 19.

### Speedometers

Messrs. S. Smith (MA) Ltd., Cricklewood, London.

### Tyres

The Dunlop Rubber Co. Ltd., Fort Dunlop, B'ham, 24.

### Sparking Plugs

Lodge Plugs Ltd., Rugby.

Champion Sparking Plug Co. Ltd., Feltham, Middx.

### Gearboxes

Messrs. Burman and Sons Ltd., Wyhall Lane, Kings Norton, Birmingham, 30.

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**"GB" GEARBOX**  
(See Exploded View)

Part Nos.		No. Per Set
3600-52	Gearbox shell only	1
3602-52	Gearbox joint washer	1
3610-52	Kickstarter case	1
3611-52	Kickstarter case joint washer	1
3620-52	Kickstarter case cover	1
3623-52	Kickstarter case cover locating piece	1
3626-52	Mainshaft nut (k/s end)	1
3716-33	Mainshaft bearing	1
3628-52	Bearing retaining ring for mainshaft bearing	1
3630-56	Mainshaft	1
3631-52	Driving sprocket, $\frac{3}{8}$ in. + $\frac{1}{8}$ in., 19.T	1
3632-52	Sprocket spacing collar	1
3095-33	Driving gear bearing	1
3634-52	Bearing retaining ring (split)	1
3635-52	Driving gear oil seal	1
3636-52	Driving gear oil seal housing	1
3089-33	Driving gear nut	1
3091-33	Driving gear nut lock washer	1
3637-52	Driving gear bush	set of 2
3638-52	Driving gear with bush, 28.T	1
3641-52	First gear mainshaft, 17.T	1
3642-52	Second gear mainshaft, 22.T	1
3643-52	Third gear mainshaft, 25.T	1
3644-52	Third gear mainshaft bush	1
3648-52	First gear layshaft, 29.T	1
3649-52	Second gear layshaft, 24.T	1
3650-52	Second gear layshaft bush	1
3652-52	Third gear layshaft, 21.T	1
3653-52	First gear layshaft bush	1
3656-52	Layshaft pinion, 18.T	1
3657-52	Layshaft	1
3658-52	Layshaft bush (clutch end)	1
3659-52	Layshaft bush (k/s end)	1
3660-52	Layshaft bush dowel	2
3661-52	Layshaft cover washer	1
3663-52	Speedometer spindle	1
3664-52	Speedometer spindle bush	1
3665-52	Speedometer thrust washer	1
3160-31	Speedometer location button	1
3666-52	Speedometer spindle bush oil seal	1
3164-31	Speedometer spindle bush grub screw	1
3342-31	Gearbox filler plug	1
3670-52	Gearbox drain plug washer	1
3669-52	Gearbox drain plug	1
3671-52	Gearbox and k/s case dowel	1
3676-52	Screw, k/s cover to k/s case	2
3677-52	Screw, k/s case to gearbox	2
3678-52	Screw, k/s case to gearbox and k/s cover to k/s case	4

**"GB" GEARBOX**  
(See Exploded View)

Part Nos.		No. Per Set
3679-52	Screw, k/s cover to gearbox	2
3682-52	Gearbox adjuster pivot pin	1
3342-52	Oil level plug	1
3687-52	Oil level plug washer	1
3068-50	Mainshaft nut (clutch end)	1
3070-50	Mainshaft nut lock washer (clutch end)	1
3675-52	Dowel, k/s case cover locating piece	2
3680-52	Driving ratchet	1
3191-33	Ratchet pinion	1
3196-33	Ratchet pinion spring	1
3683-52	Ratchet pinion bush	1
3325-31	Kickstarter quadrant	1
3686-52	Kickstarter quadrant spindle	1
3688-52	Kickstarter spindle bush (inner)	1
3689-52	Kickstarter spindle bush (outer)	1
3335-48	Kickstarter spring	1
3690-52	Kickstarter spring pin	1
3696-52	Kickstarter lever	1
3305-31	Kickstarter lever pedal	1
3310-37	Kickstarter lever pinch bolt	1
3698-52	Kickstarter lever pinch bolt nut	1
3699-52	Kickstarter spindle oil seal	1
3701-52	Kickstarter lever bolt washer	1
3705-52	Cam assembly	1
3707-52	Cam plunger	1
3709-52	Cam plunger spring	1
3711-52	Cam spindle bush (inner)	1
3713-52	Cam spindle nut, retaining indicator	1
3716-52	Quadrant and drive peg for control spindle	1
3718-52	Quadrant spindle	1
3720-52	Quadrant spindle bush (inner)	1
3723-52	Quadrant spindle bush (outer)	1
3725-52	Quadrant spindle cover washer	1
3728-52	Main return spring for control quadrant	1
3733-55	Selector fork (layshaft)	1
3734-55	Selector fork (mainshaft)	1
3738-52	Selector spindle cover washer	2
3739-52	Selector spindle peg	4
3741-52	Selector spindle cotter pin	4
3743-52	Selector spindle oil seal	1
3746-52	Return spring (secondary) (coil)	1
3750-52	Footchange lever	1
3514-33	Footchange lever bolt	1
3516-33	Footchange lever bolt nut	1
3752-52	Footchange lever bolt nut washer	1
3508-33	Footchange lever rubber	1
3754-52	Footchange lever rubber fixing pin	1
3756-52	Footchange indicator	1
3758-52	Footchange indicator oil seal	1

**"GB" GEARBOX**  
(See Exploded View)

Part Nos.		No. Per Set
3760-52	Cam spindle bush (outer) ... ..	1
3763-52	Indicator oil seal spring ... ..	1
3766-52	Mainshaft sleeve ... ..	1
3770-52C	Clutch operating lever ... ..	1
3783-52	Clutch operating lever adjusting sleeve ... ..	1
3785-52	Adjusting sleeve cap ... ..	1
3788-52	Adjusting sleeve cap screw ... ..	2
3790-52	Clutch operating plunger ... ..	1
3794-52	Clutch operating plunger ball, 5/16 in. ... ..	1
	<b>Clutch parts.</b>	
3350-36	Clutch case "VH" "VB" (three plate) ... ..	1
3355-48	Clutch centre "VH" "VB" (three plate)" ... ..	1
3351-36	Clutch case "NH" (two plate) ... ..	1
3356-48	Clutch centre "NH" (two plate) ... ..	1
3360-36	Clutch plate fitted inserts "NH" "VH" "VB" ... ..	2 or 3
3365-36	Clutch cork inserts ... ..	...
3370-36	Clutch plain plate "NH" models ... ..	3
	"VH" "VB" ... ..	4
3380-36	Chainwheel ( $\frac{1}{2}$ in. $\times$ .305 $\times$ 44.T) ... ..	1
3388-41	Chainwheel set pin lockwasher ... ..	1
3391-36	Chainwheel set pin ... ..	6
3394-36	Thrust washer (inner) ... ..	1
3397-36	Thrust washer (outer) ... ..	1
3400-41	Clutch spring plate ... ..	1
3402-52	Clutch spring plate thrust cup ... ..	1
3495-36	Clutch spring ... ..	5
3410-31	Clutch spring cup ... ..	5
3413-31	Clutch spring adjusting nut ... ..	5
3417-36	Clutch spring stud (three plate) ... ..	5
3418-50	Clutch spring stud (two plate) ... ..	5
3420-37	Roller cage ... ..	1
3423-36	Needle rollers ... ..	12
3430-56	Clutch operating rod "NH" ... ..	1
3433-56	Clutch operating rod "VH" "VB" ... ..	1

## EXPLODED VIEWS

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(1) "G.B." GEARBOX

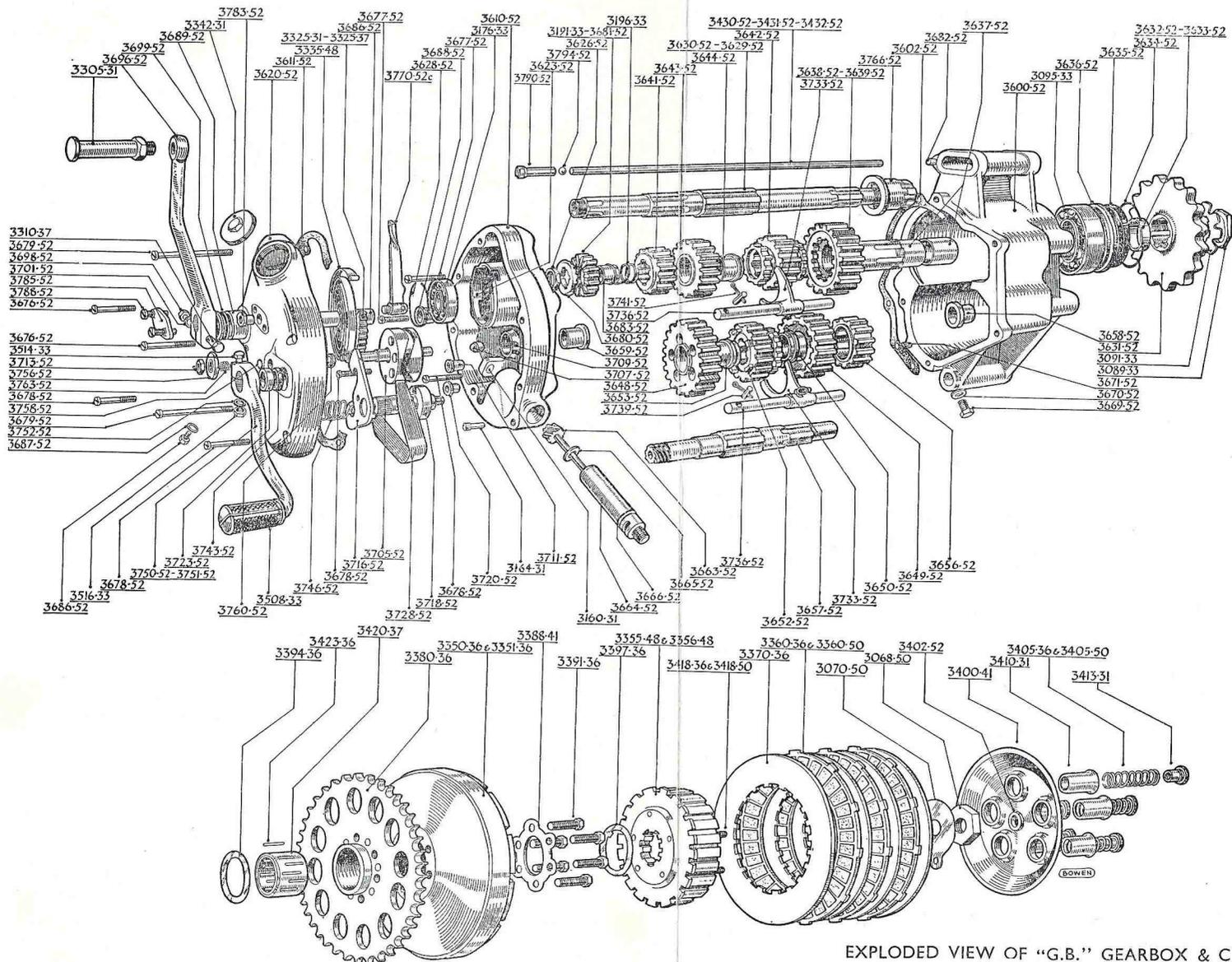
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(2) SINGLE CYLINDER ENGINE  
Model "VH" 500 c.c. O.H.V.

(3) SINGLE CYLINDER ENGINE  
Model "NH" 350 c.c. O.H.V.

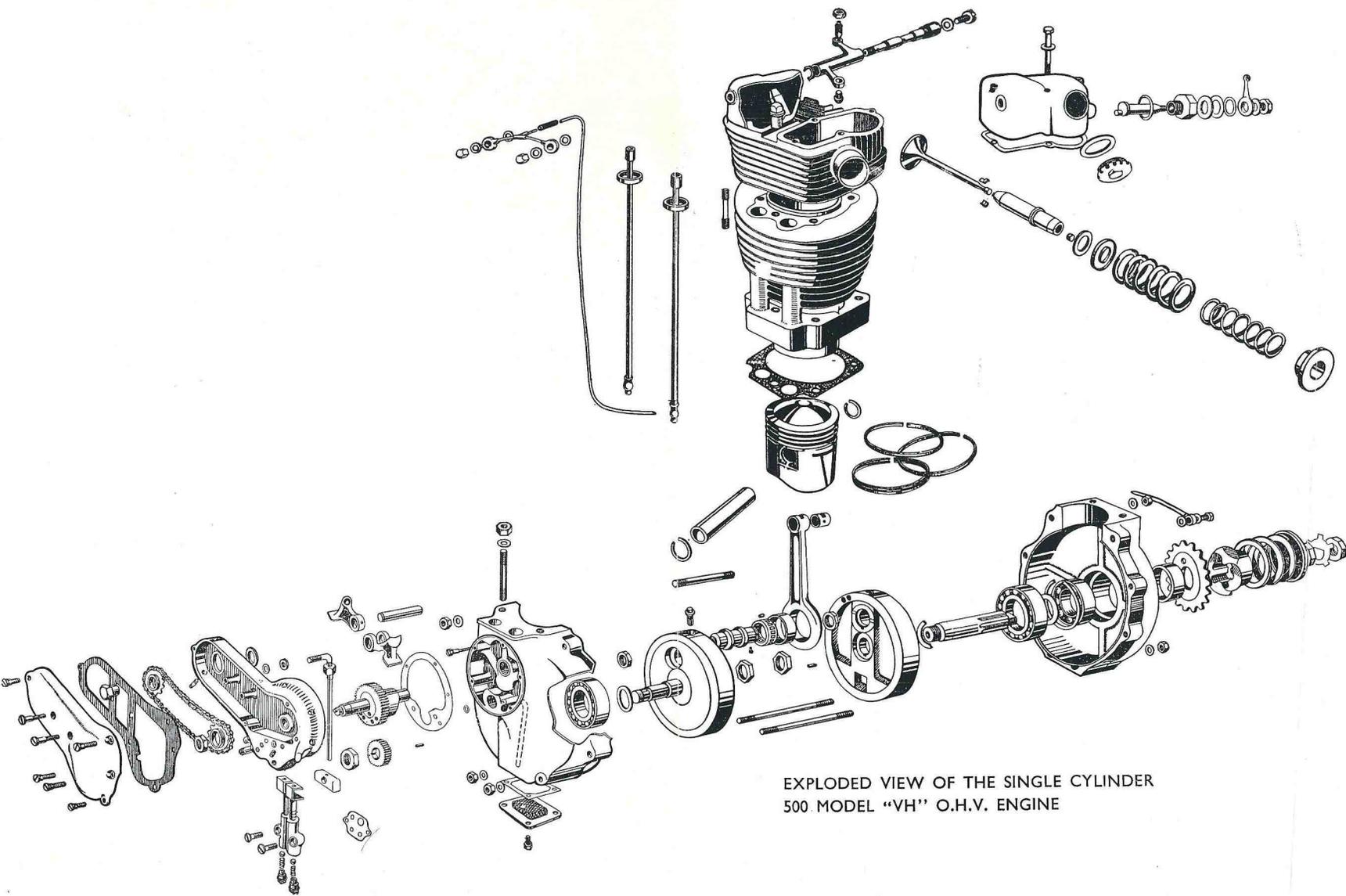
(4) SINGLE CYLINDER ENGINE  
Model "VB" 600 c.c. S.V.

"G.B." GEARBOX



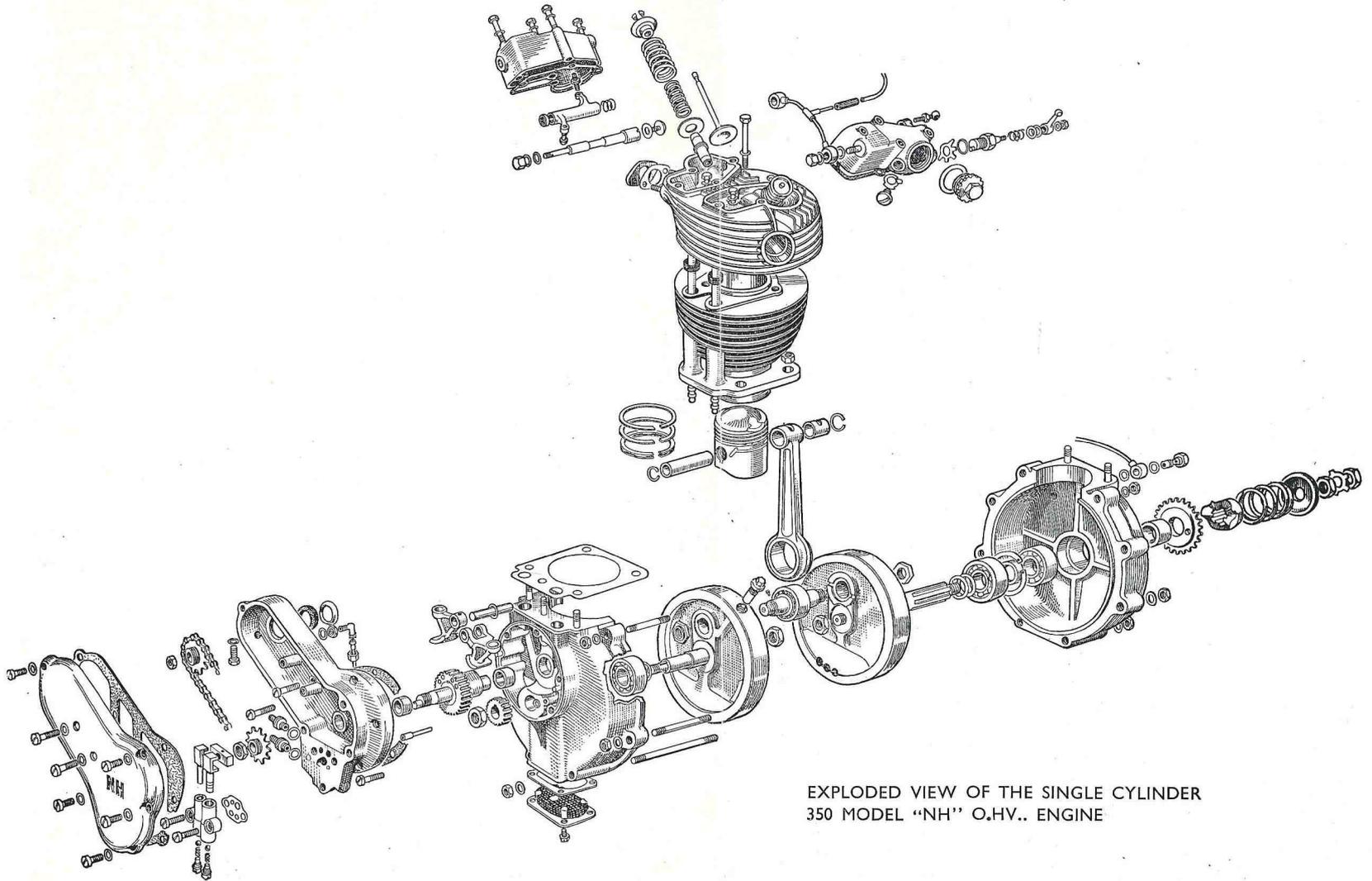
EXPLODED VIEW OF "G.B." GEARBOX & CLUTCH WITH PART NOS.

**SINGLE CYLINDER ENGINE**  
**Model "VH" 500 c.c. O.H.V.**



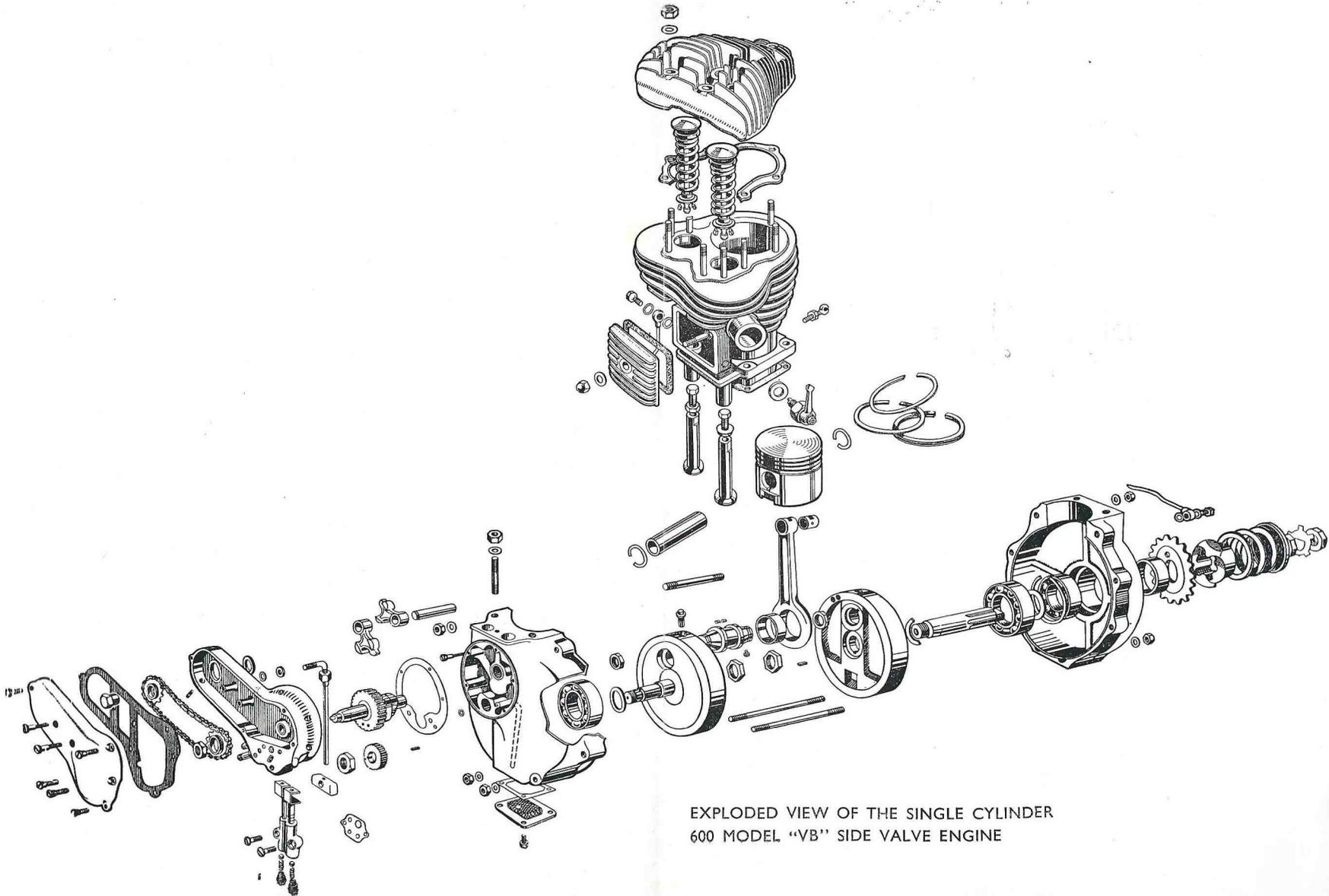
EXPLODED VIEW OF THE SINGLE CYLINDER  
500 MODEL "VH" O.H.V. ENGINE

**SINGLE CYLINDER ENGINE**  
**Model "NH" 350 c.c. O.H.V.**



EXPLODED VIEW OF THE SINGLE CYLINDER  
350 MODEL "NH" O.H.V.. ENGINE

**SINGLE CYLINDER ENGINE**  
**Model "VB" 600 c.c. S.V.**



EXPLODED VIEW OF THE SINGLE CYLINDER  
600 MODEL "VB" SIDE VALVE ENGINE

