

HINTS AND TIPS

FOR THE

ROYAL ENFIELD



DRY-SUMP LUBRICATED
MOTOR CYCLES

Models B, ~~C~~, ~~S~~ and ~~S2~~

MODEL B

September, 1936.

Hints and Tips

FOR



MOTOR CYCLES

MODELS B, C, S and S2.

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Hints and Tips for the Royal Enfield Models B, C, S and S2.

1 Foreword. The motor cycles dealt with in this booklet are lightweight machines of strikingly clean and handsome design. The range covers both utility mounts and fast touring machines with a de luxe specification.

The 248 c.c. side-valve Model B is a utility machine which is capable of good average speeds. It is offered as an alternative to the Royal Enfield two-stroke Model A for those riders who prefer a four-stroke engine.

The 248 c.c. O.H.V. Model S is similar in design, but has a considerably higher performance—equal to that of many larger machines. The de luxe Model S2 is very striking in appearance, and its equipment includes a Lucas Magdyno lighting set, oil bath chain case, tubular front fork, plated tank, etc. The most discriminating rider may well be proud to own such a machine.

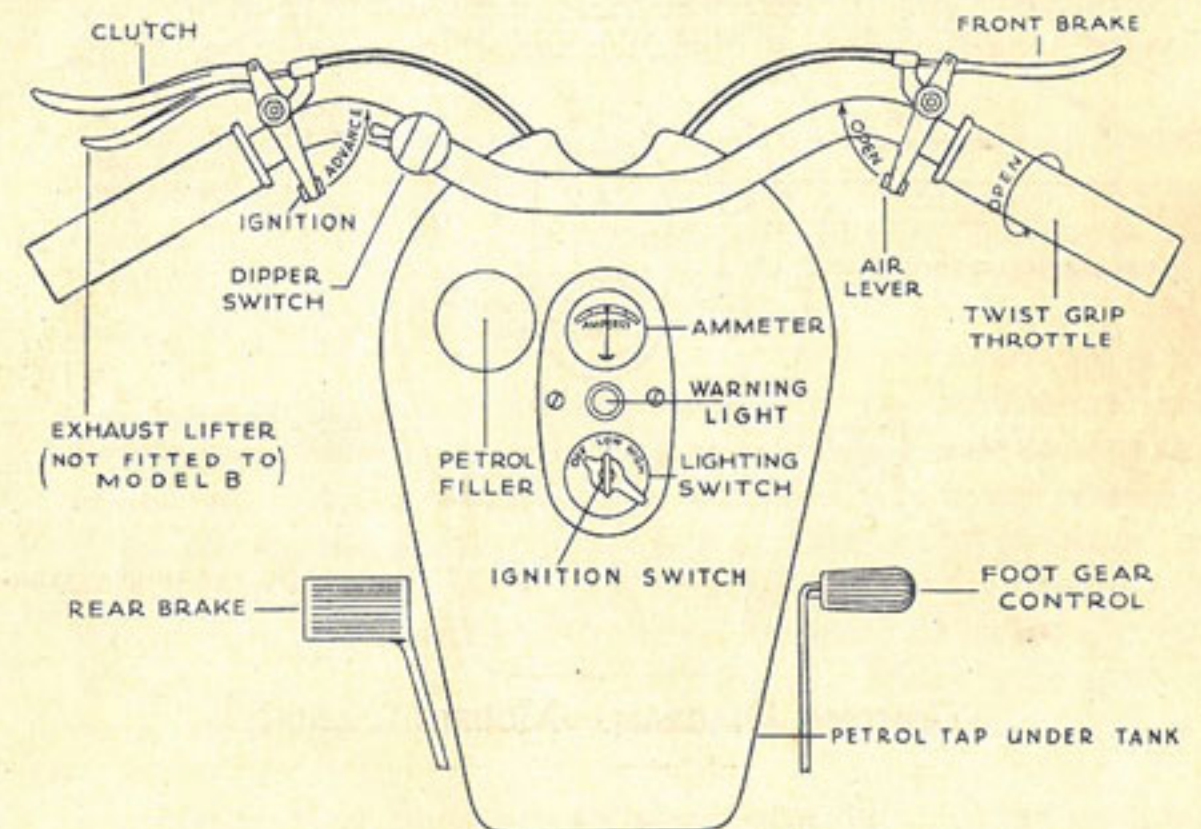
The 346 c.c. side-valve Model C is similar in equipment to the Model S2. The larger capacity side-valve engine shows to particular advantage when pulling slowly up steep hills, even though the maximum speed is no greater than that of the Model S2.

All these models are fitted with four-speed gear boxes with foot control. This is of particular advantage on machines of small capacity as it enables the engine always to be used to the best advantage.

A special feature is the total enclosure and automatic lubrication of the valve gear on the O.H.V. as well as on the side-valve engines. This reduces noise and wear; in consequence these machines require only the minimum of attention.

OPERATION OF THE MOTOR CYCLE.

2 To Start the Engine. Fill up the tank with petrol and the oil tank (in the engine crankcase) with oil. Turn on the petrol and depress the tickler of the carburettor until petrol overflows at the bottom of the carburettor body. Place the gear control in the neutral position, partly close the air lever, slightly retard the ignition, turn the switch to the "on" position,

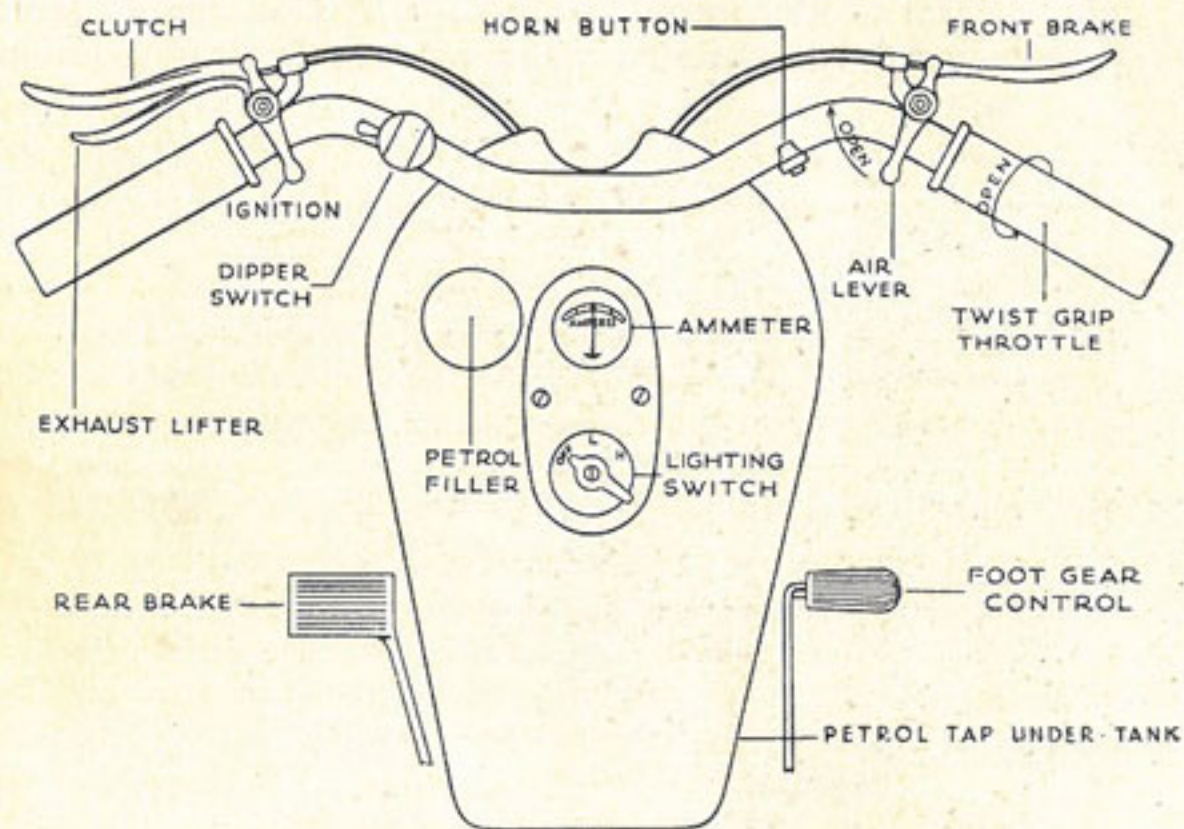


CONTROL DIAGRAM.—MODELS B AND S.

(on Models B and S), open the throttle lever about one-eighth, raise the exhaust lifter (on Models C, S and S2), and smartly depress the kick starter allowing the lifter to drop when about half way through the stroke of the kick starter pedal. If the engine fails to fire first or second time, repeat with a slightly different throttle opening. The best position for starting will soon be found from experience. When starting a warm engine, do not flood the carburettor or the mixture will become too rich.

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In the case of a new machine allow the engine to run gently until oil can be seen returning through the oil return pipe, visible through the oil filler hole. Never race a cold engine, especially in cold weather, until you are sure that the oil is circulating properly.



CONTROL DIAGRAM.—MODELS C AND S2.

- 3 To Start the Machine.** Pull up the clutch lever. Engage the lowest gear by pressing the foot control up as far as possible and then releasing it. Slowly release the clutch lever, at the same time accelerating the engine by opening the throttle slightly and the machine will move away without jar or jerk. When the machine has attained sufficient speed partly close the throttle, de-clutch and change to second gear by pressing the foot control downwards as far as it will go and then releasing it. Let in the clutch gradually and open the throttle again until the speed of the machine is sufficient to require a change into third gear, when the foregoing operations are repeated. Finally, change up to top gear when sufficient speed has been attained in third.

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Once top gear is engaged and the machine is running at a comfortable speed, the air lever should be fully opened and the ignition fully advanced.

- 4 Driving Hints.** A new machine should not be driven at a speed exceeding 25 m.p.h. in the case of a side valve, or 30 m.p.h. for an overhead valve, for the first 200 miles, and until at least 500 miles have been covered the throttle should not be opened above half-way. After this period short bursts of speed may safely be indulged in, but no sustained full throttle work should be done until 1,000 to 1,500 miles have been covered.

For normal running on the level the air lever can be left fully open and the ignition fully advanced, the speed being controlled by the throttle, but when accelerating or climbing a hill it may be necessary to retard the ignition slightly, and while the engine is cold, partly close the air lever.

As a guide to the correct positions for the ignition and air control levers the beat of the engine should be studied. If the engine is "eight-stroking," i.e., firing on only every alternate firing stroke, the mixture is too rich and the air lever should be opened further. If the engine cuts out on opening the throttle the mixture is too weak and the air lever should be closed further. If the engine "pinks" (i.e., a sharp metallic knock), the ignition is too far advanced or the mixture is on the weak side.

Never allow the engine to labour on a hill. If the machine will not climb comfortably on top gear, change down by de-clutching and pressing the foot control up as far as possible, then releasing it, leaving the throttle lever open during the change. When in the lower gear the ignition may be advanced and the air lever opened to suit the higher engine speed. If a hill is long and steep enough to demand a change to a lower gear it is always desirable to make this change before the engine has commenced to labour. One change low down may save two higher up, and at the same time enable a faster climb to be made.

To stop the machine, close the throttle and apply the brakes. Before coming to rest, de-clutch and engage neutral gear. All

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machines are set at the Works so that the engine "ticks over" when the throttle lever is shut. To stop the engine, therefore, in the case of Models B and S it is necessary to **switch off the ignition. The warning light is a reminder to switch off** in case the engine should be stopped by accident. In the case of Models C and S2, which are fitted with magdyno ignition the engine should be stopped by raising the exhaust lifter.

An indicator is fitted to the foot operated gear control showing which gear is in use. To obtain neutral from bottom or second gear, move the control down or up half the amount necessary to engage the next gear.

LUBRICATION.

- 5 **Lubrication of the Engine.** The lubrication system employed on this engine is of the true dry-sump type, *i.e.*, the oil in the "sump" or portion of the crankcase below the flywheels, is kept at a level below the bottom of the flywheels, so that these do not dip.

The main supply of oil is carried in an oil tank formed in the crankcase casting. (Note that this is not the sump, nor is the oil carried in the sump, which is kept dry.) This tank has a capacity of over three pints, and should always be kept well filled.

The oil is sucked from the tank by the oil feed pump, through a filter, and is delivered by the oil feed nozzle into the timing side shaft of the engine. From this point it is flung by centrifugal force through a passage in the web of the flywheel to the big end, from which it is flung on to the walls of the cylinder.

After circulating round the working parts of the engine the oil collects in the sumps and is sucked through a second filter by the oil return pump (which is slightly larger than the feed pump), and is delivered to the tank by the oil return passage, which is visible through the filler hole. The oil issuing from the return passage is an assurance that all is well with the lubrication system.

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On Models S and S2, a spring-loaded ball valve is placed in the delivery passage from the return pump and part of the return oil is diverted to the overhead rocker gear. This oil runs to the timing gear by gravity and is returned to the oil tank by the two idler wheels in the dynamo drive which are arranged to act as a gear pump.

On Models B and C there is no ball valve, but the delivery passage from the return pump is divided, part of the oil going to the timing gear and part direct to the oil tank.

6 LUBRICATION ROUTINE FOR THE ENGINE.

Never allow the oil tank to become empty. Since there is no reserve of oil in the sump, an empty tank means immediate shortage of oil to the working parts. The oil level should be kept above the bottom of the dipstick attached to the filler cap. By keeping a large quantity of oil in circulation, its temperature is kept low, and the oil retains its lubricating qualities for long periods.

We recommend the following oils for use in our engines :

**Patent Castrol (XL),
Mobiloil (D),
Aeroshell,
Essolube (Racer),
Price's Motorine (B. de Luxe).**

These flow freely when cold and at the same time have adequate heat-resisting properties. The importance of efficient lubrication cannot be over-estimated. The use of cheap oils is false economy and we strongly recommend the use of the oils mentioned above, as we have found from experience that these are the most suitable for our engines. It is advisable to specify the brand as well as the grade, and as an additional precaution oil should be bought from branded cabinets or sealed cans.

About every 1,500 to 2,000 miles the oil should be drained from the tank and the sump by removing the two filter plugs.

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(Note that the rear plug drains the tank, the front one the sump.) The filter gauzes should be brushed with paraffin to clean them and the tank and sump swilled through with petrol, allowed to drain, and refilled with fresh oil. This procedure is conveniently carried out when the engine is being decarbonised. The oil will flow more readily if the plugs are removed at the conclusion of a ride, or the tank and sump may be allowed to drain overnight. Waste of oil is reduced by allowing the oil level in the tank to become reasonably low before draining.

- 7 **Lubrication of the Gear Box.** The gear box should be filled to the level of the filling orifice with engine oil. On no account should heavy yellow grease be used in the gear box. The oil level should be checked every 500 to 1,000 miles.
- 8 **Lubrication of Chains.** The front chain case (on Models C and S2) should be filled with oil up to the level of the overflow plug. The chain will thus be kept clean and well lubricated, giving a silent and efficient drive.

The rear chain (and the front chain on Models B and S) should be lubricated at frequent intervals with engine oil or grease, and should be removed about every 2,000 miles, and after washing in paraffin should be soaked in melted tallow.

- 9 **Grease Gun Lubrication.** The fork spindles, rear brake pedal, and gear control spindle should be greased, with the grease gun provided, every 200 miles or once a week. The hubs should be greased very sparingly and not too often, or grease may find its way on to the brake linings.

For the fork spindles a low melting point grease, such as Castrolase (Medium), Mobilgrease (No. 2), Shell Retinax, Esso Grease, or Belmoline (D), should be used. For the hubs use a high melting point grease such as Castrolase (Heavy), Mobilgrease (No. 4), Shell R.B. Grease, Esso Grease or Belmoline (C).

After using the grease gun it is an excellent practice to go over all nuts and see that they are tight.

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TROUBLE ON THE ROAD.

- 10 Royal Enfield motor cycles enjoy a wonderful reputation for reliability. Trouble on the road is very unusual; nevertheless stoppages may sometimes occur and it is hoped that the following hints may help towards the speedy location of the trouble.
- 11 **Engine Stops owing to lack of Petrol.** This is the commonest form of engine stoppage. The first symptoms are irregular firing, which is temporarily cured by closing the air lever. Make sure that there is plenty of petrol in the tank. If so, disconnect the petrol pipe at the carburettor end and turn on the tap. If a good flow of petrol occurs, the stoppage is probably in the carburettor jet. If the flow from the petrol pipe is restricted, the stoppage lies either in the petrol tap, or the pipe itself.
- 12 **Engine Misfires or Stops owing to faulty Ignition.** The symptoms in this case are that the engine will not run regularly and is very hard to start. In other cases the engine may suddenly "cut out" without warning. First see that the high tension lead has not become disconnected at either end and is not worn or burnt through, allowing the bare wire to touch some metal part of the machine. See also that the plug insulator and high tension lead are not wet, and check the connections to the battery, dynamo, coil and contact breaker, to make sure that none of these have pulled out.

If all the above is in order remove the sparking plug and hold it with the body touching the engine cylinder, but with the terminal clear of the machine and connected to the high tension lead. Turn the engine round by the kick starter (with the ignition switched on if coil ignition is fitted). If a good spark is obtained at the plug points, the ignition is in order and the trouble lies elsewhere. If no spark or a very weak spark is obtained, remove the plug and hold the end of the high tension wire about $\frac{1}{8}$ in. from a metal part of the machine and rotate the engine. If a spark is obtained from the wire, the fault lies with the sparking plug. If this is oily or sooty it can be taken apart

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and cleaned, but if the points are red and burnt the plug has been too hot and a new one should be fitted, preferably of a type designed to stand more heat (see paragraph 28). The gap between the plug points should be .018in. to .025in.

If the plug is satisfactory the trouble lies with the ignition system. See that the contact breaker points are clean and that they open and close properly. These should open between .018in. and .012in. If this is in order try the battery by switching on the lights, as with coil sets the ignition will not function if the battery is discharged.

13 Other Causes of Engine Stoppage. Other possible causes of an engine stoppage are :—

(1) **Water in Carburettor.** The symptoms are usually intermittent misfiring and banging in the silencer following a heavy rain storm.

The remedy is to clean out the float chamber and jets.

(2) **No clearance at tappets.** This is evidenced by an entire lack of compression when turning over with the kick starter. The remedy is to adjust the tappets.

(3) **Sticking Valve.** In this case there is no compression and excessive tappet clearance, the valve remaining partly open.

The valve may free itself on cooling, but sometimes it is necessary to dismantle the engine to free the valve.

(4) **Broken Valve.** This trouble is very rare and is usually caused by consistent overdriving of the machine and by neglect of the tappet clearances (see paragraph 22). The symptoms are that the engine "cuts out" suddenly and stops with no tappet clearance. Furthermore, it is not possible to obtain any clearance at the tappets. A valve breakage on an O.H.V. engine is likely to have very serious consequences.

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(5) **Seized Piston.** This is caused by overdriving a new machine before the engine is properly "run in." The symptoms are loss of power and a tendency to "pink," followed by the engine locking up solid. An aluminium piston will always free itself if allowed to cool. If the clutch was withdrawn and the throttle closed before the final seize up, the consequences may not be serious, but the cylinder and piston should be examined as soon as possible by a competent mechanic to have any score marks removed. A seizure may also occur through running with insufficient oil, in which case the consequences will be far more serious.

14 **Clutch Trouble.** A slipping clutch may be caused by lack of clearance in the control (see paragraph 34).

A binding clutch is caused by too much slack in the control wire. New clutches sometimes tend to bind until the inserts have bedded down dead level.

OVERHAULING THE ENGINE.

15 **Decarbonising.** When an engine has been in use for some time, carbon deposit forms on the piston and cylinder head and the engine must be partly dismantled to allow this deposit to be scraped off and the valves to be re-ground.

The time when decarbonising becomes necessary will be indicated by an increased tendency to "pink" and will occur after approximately the first 1,000 to 1,500 miles, and subsequently at intervals of about 2,000 miles.

16 **Removal of Cylinder Head.** To remove the cylinder head, proceed as follows :—

(a) **Side Valve Models B and C.** The head can be lifted straight off after removing the nuts securing it to the cylinder.

(b) **Overhead Valve Models S and S2.** First remove the petrol tank. The wires to the lighting panel need not be

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disturbed as they are long enough to permit the tank being lifted back on to the saddle (if necessary disconnect the head lamp wires from the lamp).

Now remove the cover over the valve gear, the carburettor, exhaust pipe and silencer. Remove the rocker bearing caps and rockers and lift the push rods out of their tubes. The cylinder head can then be lifted off after unscrewing the four nuts securing it to the cylinder.

17 Removal of Cylinder and Piston.

- (a) **Side Valve Models B and C.** Remove the silencer and exhaust pipe, carburettor, the cover over the valve springs and the exhaust lifter cable (on Model C). Unscrew the four cylinder base nuts, place the piston at the bottom of its stroke and lift the cylinder off. Push out the gudgeon pin after removal of one of the wire retaining clips and remove the piston. The inside of the piston should be marked to ensure re-assembling the same way round.
- (b) **Overhead Valve Engines.** After removal of the cylinder head disconnect the exhaust lifter cable, unscrew the four cylinder base nuts, place the piston at the bottom of its stroke and lift the barrel off. Remove the piston and mark the inside to ensure re-assembly the same way round.

18 Removal of Valves.

- (a) **Side Valve Engines.** Compress the valve spring, preferably using one of the many spring compressors on the market (the "Terry" is a suitable type). Lift out the split conical collars and release the spring, when it and the valve can be withdrawn. It is advised that the cylinder be removed, in addition to the head, before removing the valves.
- (b) **Overhead Valve Engines.** First remove the hardened end caps from the valve stems. These should lift off, but if they have stuck, can be removed by compressing the spring slightly and gripping the end cap in a vice. Then remove

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the valves and springs in a similar manner to that described for the side valve engines.

- 19 Removal of Carbon and Grinding-in of Valves.** If desired, Models B and C can be decarbonised by removing the cylinder head with all other parts in position. This is a great convenience when time is pressing, but care must be taken that no carbon is allowed to get between the piston and cylinder walls. It is not recommended that the valves should be ground-in when the cylinder is in position on the machine, and for this reason it is suggested that the first and at least every alternate decarbonisation should be carried out by removal of the cylinder as described in paragraph 17.

To remove the carbon deposit scrape the piston top, cylinder head, ports and valves with a suitable scraper, followed by a rub with smooth emery cloth and polish the piston top with metal polish. Smear the valve seat with a little grinding compound or fine emery and oil. Replace the valve in position, and rotate it with a screw-driver, frequently lifting the valve off its seat, until a bright ring is obtained on the face of the valve, and also on the seating.

If the valves or seats are very badly pitted and will not form good faces with a reasonable amount of grinding, the parts should be returned to the Works for new seats to be cut. Excessive grinding forms a pocket which will restrict the flow of the gases.

- 20 Re-assembly of Parts.** Before replacing the valves, make quite sure that all trace of grinding compound has been removed from the ports.

Do not interchange inlet and exhaust valves, as these are made of different materials and the inlet valves may fail if used in the exhaust position.

After re-assembly of the valves, it is an excellent plan to test the seats by pouring petrol into the ports and watching for leakage past the valves. Not the slightest sign of moisture should be permitted.

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- 21 Care should be taken that all parts are scrupulously clean before re-assembling. To replace the cylinder, proceed in the reverse order to that employed in taking it off. Smear the cylinder wall and piston with oil before replacing the cylinder. When tightening down the cylinder base nuts, give each a successive turn, otherwise, by screwing one home by itself, the cylinder is liable to be damaged or distorted and will not bed accurately on the crankcase. This also applies to the bolts holding down the cylinder head on the O.H.V. engines.

To ensure a gas tight joint at the cylinder head, the copper washer should be smeared with shellac varnish or a similar jointing compound.

Do not forget to fit the gudgeon pin retaining circlips before replacing the cylinder and use new circlips every time as they are liable to distortion when being removed.

The push rod ends should be greased before re-assembling. If the soft washers (which seal the head joint at the points where the push rod tubes pass through it) have become damaged, new ones should be fitted.

- 22 **Clearance of Valve Stems.** The valve stems should just clear the rocker arms or tappets when the valves are closed. As a guide to the correct clearances, allow the following when the engine is cold :—

O.H.V. Engines Models G and J	{	Inlet. No clearance. Tappet just free to turn.
		Exhaust. Just perceptible up and down play in tappet.

S.V. Engines Models H and L	}	Inlet. '002in.
		Exhaust. '004in.

Always test valve clearances with the piston at the top of the compression stroke.

To adjust the clearances, proceed as follows :—

Remove the tappet cover from the side of the cylinder and hold the tappet by means of the locknut (middle hexagon) and

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the head (top hexagon). Unlock the head by turning it to the right and the locknut to the left. Now hold the tappet body (bottom hexagon) and turn the tappet head and locknut to the right or left to lengthen or shorten the tappet as required. Lock up the lock-nut against the tappet head and replace the valve spring cover. As the exhaust lifter on Models C, S and S2 prevents a spanner from reaching the exhaust tappet head, in this case the second spanner should be fitted on to the tappet body (bottom hexagon) when tightening or loosening the locknut. Make the adjustment by turning the tappet body to left or right respectively to lengthen or shorten the tappet.

Running with insufficient valve clearance (most probable on S.V. engines) causes loss of power and burning and possible fracture of the exhaust valve.

Running with excessive valve clearance causes valve clatter (especially on O.H.V. engines) and may result in the fracture of either valve.

Owing to the initial bedding down of the wearing surfaces, the tappets on new machines frequently require adjustment after the first hundred miles have been run.

- 23 **Engine Bearings.** Roller bearings are fitted to the big end and both main shafts of Royal Enfield dry-sump engines. These allow the engine to revolve more freely than plain bearings and have better wearing qualities than either plain or ball bearings. A small amount of end play should be present in these bearings and some "shake" may be present in the connecting rod. If, however, after long use, definite up and down play can be felt in the big end or main shaft bearings, it is best to send the crankcase, flywheels and connecting rod back to the Works for the worn parts to be replaced, as special appliances are necessary to ensure the correct assembly of these parts.

The gudgeon pin is fully floating and of large diameter. When the engine is cold it should be a free working fit in the small end bush and a push fit in the piston bosses.

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24 Removal of Engine from the Frame. Probably most Royal Enfield owners will never find it necessary to remove the engine from the frame, but after a long period of use it may be desired to send the engine back to the Works for an overhaul or to have new bearings fitted.

Remove the exhaust pipes and silencers, chain case, chain and all external fittings.

To remove the front half of the chain case unscrew the nut holding the near side footrest, remove the footrest and brake pedal and pull the front of the case away from the rear half.

To remove the rear half of the case first take off the engine sprocket, clutch-and primary chain. Then unscrew the small pin securing the case to the engine and the two nuts securing it to the gear box attachment bolts and lift the case away.

Now remove the bolts holding the engine into its plates. Remove the offside engine plate and lift the engine out of the frame.

25 Dismantling the Crankcase. After removal of the engine from the frame, drain the oil tank and remove the cylinder and piston, if not already done.

Next unscrew the timing cover screws and tap off the cover, then remove the dynamo (or magdyno) driving pinion. This is a taper fit on its shaft and is tapped for a small extractor, which will be found in the tool kit. Now lift out the two cam wheels and the intermediate driving pinions for the magneto drive.

To remove the tappets and guides, tap them gently from underneath with a brass or aluminium drift.

Now loosen the dynamo (or magdyno) securing strap and lift the complete instrument away.

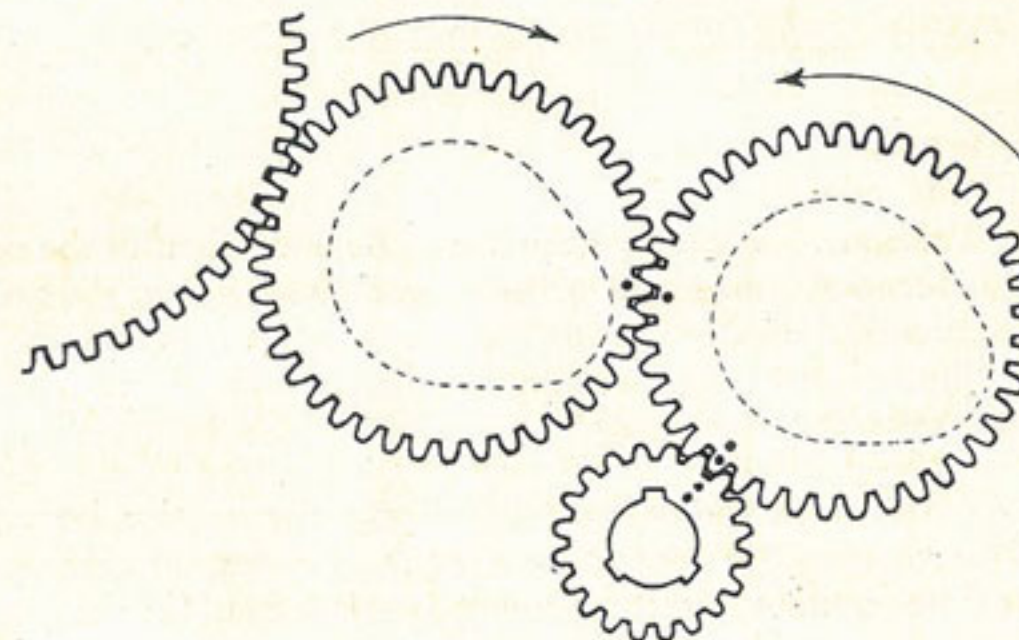
Remove the timing pinion nut which has a left-hand thread. The pinion can now be drawn off the taper shaft, preferably using a sprocket drawer. If one is not available, wedge a screwdriver behind the pinion and tap the end of the shaft, but

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take great care not to damage the shaft. It is now only necessary to remove the bolts holding the two halves of the crankcase together, when these can be separated. Do not lose the rollers from the main bearings as these fall out. Do not attempt to separate the flywheels.

26 Re-assembly of Crankcase—Valve Timing. No difficulty should be experienced with this. Take care to have all parts scrupulously clean and put some clean oil on all bearings and on the cams.

The valve timing is marked and the cam wheels should be so assembled that the two dots on the small pinion are in line with the two on the exhaust cam wheel, while at the same time the single dot on the exhaust cam wheel is in line with the single dot on the inlet cam wheel. (See Diagram).



For those who wish to check the valve timing the opening and closing points are given below.

Exhaust opens	75° before bottom dead centre.		
Exhaust closes	35° after top	"	"
Inlet opens	30° before top	"	"
Inlet closes	60° after bottom	"	"

These points are all given at .005in. tappet clearance, and it is important that this clearance should be used when checking,

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as the first part of the valve lift is comparatively slow and a small variation in clearance considerably alters the opening and closing points. For running, set to the clearances given in paragraph 22.

The joint between the halves of the crankcase should be made with shellac, seccotine or a similar jointing. The timing cover joint **must** be made with the special washer between the surfaces.

When replacing the tappets and guides note that the longer pair operate the exhaust valve.

If the oil pumps have been stripped down, see that they are assembled correctly—the larger plunger goes in the return pump, which is the one in front of the timing cover. Do not omit the spring washer between the pump disc and the cover plate. This is essential to the correct functioning of the pump.

- 27 **Ignition Timing.** To time the ignition, turn the engine until the piston is at the top of its compression stroke (both valves closed). Then turn the engine backwards until the piston has descended $\frac{3}{8}$ in. ($\frac{1}{4}$ in. in the case of Model B). This can conveniently be gauged with a piece of wire inserted through the plug hole on O.H.V. engines or by removal of the cylinder head on side valve engines.

With the engine in this position and the ignition lever fully advanced, turn the contact breaker (in the case of magneto or magdyno ignition) or the contact breaker cam (in the case of coil ignition) in the direction in which it normally runs until the contact points are just beginning to break. This position can be gauged conveniently by using thin tissue paper between the points. Lock up the dynamo (or magdyno) driving pinion in this position and the ignition will be correctly timed.

In the case of machines fitted with coil ignition the contact breaker cam can be turned without removing the dynamo driving pinion. To do this, unscrew the large central screw which secures the cam to the dynamo shaft.

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- 28 **Sparking Plugs.** The following are the types of plugs in the Lodge and K.L.G. ranges, which are best suited to Royal Enfield engines:—

- (a) For running in and ordinary touring:—
Side Valve Engine, Model B, Lodge H1 or KLG KS5 ;
Side Valve Engine, Model C, Lodge TS3 or KLG K1 ;
O.H.V. Engines, Models S and S2, Lodge H14 or KLG LKS5.
- (b) For prolonged high speed running:—
Side Valve Engine, Model B, Lodge H45 or KLG 583 ;
Side Valve Engine, Model C, Lodge H1 or KLG KS5 ;
O.H.V. Engines, Models S and S2, Lodge R14 or KLG L583.

- 29 **Lighting Set.** The battery on new machines is sent out dry and uncharged. Before use, it must be filled with sulphuric acid of density 1.285 and charged for 32 hours at a rate of 0.8 amps. When once charged, the dynamo on the machine will keep the battery well charged provided the proportion of night riding is not excessive and the machine is not left standing with the lights on for long periods.

**On coil ignition sets the charging switch provides two alternative rates of charge. The Summer "Half Charge" position provides sufficient current for the ignition with a small surplus at normal speeds. This position should normally be used when the battery is already well charged. The "Winter Full Charge" position gives the full available output of the dynamo. This position should be used when driving mainly at low speeds (as in traffic) and also for the first hour or so of a long run if the battery is known to be nearly discharged through using the lights when the machine is standing. The full charge rate should not be employed continually at high speeds or the battery will be damaged.*

On machines fitted with a Magdyno lighting set, about one hour's charging each day will be sufficient, and for the remainder of long runs the switch should be set to the "off" position.

*The instructions in italics do not apply to machines fitted with automatic voltage control (see para. 30).

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The warning light on coil ignition sets shows when the ignition is switched on. This light goes out when the engine speed is such that the dynamo starts to charge. If the warning light bulb should burn out, the running of the machine is not affected, but the bulb should be replaced as soon as possible by one of the correct type, otherwise the absence of a warning may result in the ignition being left "on" when the engine is stopped.

The correct bulbs are 2.5 volt .2 amp.

If bulbs of lower voltage **or amperage** are used they will burn out very quickly.

The following are the correct bulbs for use in the head and tail lamps :—

Head lamp (main light, twin filament)

Magdyno Sets	6 volt—24 and 24 watt
Coil ignition Sets	6 volt—18 and 18 watt

Tail lamp and head lamp pilot light

...	6 volt—3 watt
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When the lighting switch is in the "high" position, a finger-operated switch on the left handlebar can be used to dip the light.

The various wires or leads in the system should be examined occasionally to make sure that they have not become disconnected or chafed. The two battery leads and the positive lead from the dynamo to the switch panel (or voltage regulator) are particularly important. If the dynamo should cease charging, the cause may be a faulty lead. As a temporary expedient, disconnect the field circuit lead (green marking) from the dynamo. This will not make the dynamo charge but may save it from damage.

The acid level in the battery should be maintained at $\frac{1}{4}$ in. above the top of the plates by the addition of distilled water at regular intervals. **Regular attention to the battery and wiring will ensure the satisfactory working of both lights and ignition.**

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- 30 Automatic Voltage Control.** On machines fitted with automatic voltage regulation there is no charging switch. The rate of charge is controlled by an automatic regulator which limits the dynamo voltage to approximately seven volts. The rate of charge is consequently high when the battery is nearly discharged and low when the battery is fully charged.

The lighting and ignition set is fully described in a booklet issued by the manufacturers, a copy of which we will forward on request.

- 31 Carburettor.** The carburettor is correctly set at the works, and is unlikely to require attention beyond occasional cleaning, and possibly resetting the slow running adjustment.

This adjustment is made with a small milled-head screw on the side of the carburettor. The adjustment should be made when the engine is warm and should be set so that the engine will "tick-over" evenly when the throttle is nearly closed. A throttle stop is also provided so that the throttle can be set to be slightly open when the control is shut.

Do not attempt to save petrol by fitting a smaller main jet. The main jet has no effect unless the machine is being driven at above half throttle.

If the machine uses an excessive amount of petrol look for possible leaks, check the slow running adjustment and try lowering the taper needle (held in the throttle slide) one notch. Examine also possible causes in the machine, such as brakes binding, tight or dry chains, incorrect tappet adjustment, slipping clutch, etc.

The following are the correct carburettor settings :—

Model B	...	Main 75, Needle in No. 3 groove.
Model C	...	Main 85, Needle in No. 3 groove.
Models S and S2	...	Main 75, Needle in No. 2 groove

(Counting from the top).

Full particulars of the carburettor are given in a booklet issued by the makers, a copy of which we will supply on request.

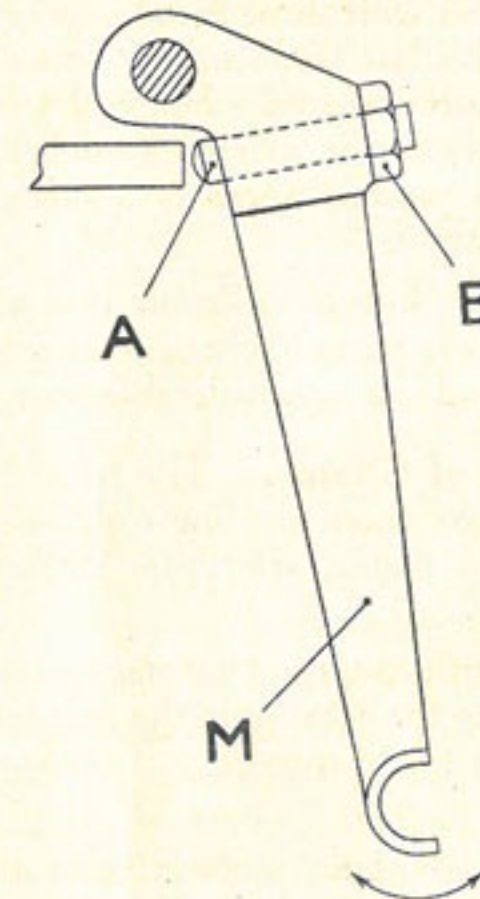
TRANSMISSION.

- 32 **Enfield Four-Speed Gear.** This gear box is very simple in operation and provided it is kept well lubricated will give long and trouble-free service. A special feature is that the gears are controlled by a single striking fork so that it is quite impossible to engage two gears at once no matter how much wear has taken place.

The foot control lever is mounted directly on the box and consequently the gear cannot get out of adjustment. It may, however, be found that, after moving the gear box to tension the front chain the gear control lever is too close to or too far from the footrest. In this case, slacken the pin securing the lever to the operating mechanism on the box, remove the lever and replace it one serration higher or lower as required.

- 33 **Clutch.** The clutch is of the two-plate type, with cork inserts. If clutch slip occurs first make sure that there is some slack in the control wire (see next paragraph). If this is in order, the clutch plates should be examined. To do this remove the front half of the primary chain case and unscrew the three pins near the centre of the clutch. The springs and plates may now be lifted away. If the cork inserts are worn flush with the metal or are burnt, they should be renewed. Cork clutches grip equally well whether oily or dry and wear better when oil is present so that it is best to keep the chain case well filled with oil. If the machine has been run for some time with a slipping clutch, new springs as well as new inserts may be required.

- 34 **Adjustment of Clutch Control. Important.** It is absolutely essential that there should be a small amount of free movement of the clutch operating lever on the gear box. (See illustration on next page.) If this is not present, part of the spring pressure will be taken by the clutch control wire instead of by the friction surfaces, clutch slip will result and the clutch inserts may be ruined.



Lever to have about $\frac{1}{16}$ " free movement.

To adjust the lever, loosen the locknut B and turn the adjusting screw A until the lever M has a little free motion (about $\frac{1}{16}$ in.), then lock up the nut B.

NOTE. Owing to the initial bedding down of the clutch friction material, it frequently happens that the clearance in the clutch control is taken up during the first hundred miles with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary.

- 35 **Patent Cush Drive Rear Hub.** All Royal Enfield motor cycles are fitted with a patent cush drive rear hub, which takes up the drive to the rear wheel with great flexibility and smoothness. This hub has a marked effect on the running of the machine, absorbing all engine shocks, and preventing any snatching of the driving chain, and consequently minimising the wear on the rear tyre. The drum on the driving side of the

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rear hub is provided with three metal vanes, and the inside of the driving sprocket has three similar vanes. On each side of the vanes in the hub is placed a block of solid rubber, and the vanes on the inside of the driving sprocket fit between these blocks. When in position there is a block of rubber and a metal vane alternately.

This cush drive hub is so simple that adjustment is seldom necessary. The only parts likely to wear are the rubber blocks, which, however, will last a considerable time.

- 36 Adjustment of Chains.** The front chain is adjusted by pivoting the gearbox about the lower of the two bolts holding it to the rear engine plates, after first slackening the two nuts securing it.

The rear chain is adjusted by slackening the wheel spindle nuts, then adjusting the set pins in the rear fork ends, which vary the position of the wheel spindle. Take care to adjust the two set pins equally.

On no account should a chain be run quite tight. The primary chain should have about $\frac{1}{4}$ in. up and down free movement; the rear chain about $\frac{1}{2}$ in.

After adjusting the rear chain, the rear brake operating cable may also require adjustment. Should it be necessary to remove either of the chains, it is important that, when replacing the connecting link, the spring fastening is so fitted that the split end is behind the direction in which the chain travels.

MISCELLANEOUS.

- 37 Removal of Wheels. Detachable Rear Mudguard.** To facilitate tyre repairs and the removal of the rear wheel, the rear mudguard on these machines is made quickly detachable, it being only necessary to slacken the four nuts securing the mudguard stays to the rear portion of the frame, when the mudguard (and carrier) can be lifted away. Having done this, remove the pin retaining the brake anchor arm and the brake adjusting wing nut, disconnect the rear chain at the spring link, loosen the spindle nuts and the wheel will slide out of the slotted fork end.

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To remove the front wheel, place the machine on both stands (never use the front stand only), disconnect the front brake control, loosen the spindle nuts, spring the forks slightly open and the wheel will drop out.

- 38 Removal of Tyres.** The wired-on tyres fitted are easily removed if the correct procedure is adopted. Deflate the tyre by unscrewing the inside of the valve with the key formed on the dust cap. Remove the milled locknut securing the valve to the rim. At a point opposite the tyre valve, press the walls of the tyre down into the well in the centre of the rim, and work the walls down into the well as far as possible in either direction. It will then be found possible to lever the cover off, starting at a point near the valve and working in either direction. When replacing the cover reverse this procedure, starting opposite the valve and finishing close to it with the tyre at the opposite side of the wheel pressed down into the rim. When only slightly inflated, see that the wired edges are in their proper places, not down in the well. As a check on this, examine the fine line moulded on the wall of the tyre near the rim. This should be about a quarter of an inch from the rim, all the way round.

It is not always appreciated that punctures in the rear tyre can be repaired with the wheel in position. If the puncture is caused by a nail or similar object, whose position is known, it will be found convenient to remove the mudguard, leave the wheel in position, remove one side of the cover and expose sufficient of the tube to enable the puncture to be repaired.

- 39 Expanding Hub Brakes.** All Royal Enfield expanding hub brakes are fitted with brake shoes lined with a special moulded material, which it will be found has long-wearing qualities, does not score the drums and seldom requires renewing. Should an excess of grease find its way from the hub bearings on to the brake linings, the brake will lose a certain amount of its efficiency. In this case the shoes and linings should be taken out and scraped to remove the grease. After re-assembly, drive with the brake "on" for half a mile or so to burn off the last traces of grease. The rear brake is adjusted by a wing nut at the end of the brake rod, while the front brake adjustment is by means of a milled nut near the bottom fork links.

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40 Wheel Bearings. The bearings of both wheels are single row, deep groove journal races. These have been proved by extensive tests to be superior to cup and cone bearings, and are adequate to deal with both radial and thrust loads. They require no adjustment.

41 Front Forks. Side play in the front fork links is taken up as follows:—Release the nuts on the fork spindles, and adjust the latter with the squares provided on their ends. Each spindle is provided with a right and left-hand thread, which will open or close the fork links as required. The left-hand threads are on the off-side of the machine, and the locknuts are loosened by turning in the direction of the arrows on the fork links.

42 Ball Head. All Royal Enfield motor cycles are designed with ball heads of ample dimensions, which will rarely require attention. If on inspection, however, it is found, when lifting at the handlebars, that a small amount of play has developed, this should immediately be taken up. To adjust the ball head, release the pin through the ball head clip, and adjust the nut on the top of the steering stem, which holds the ball head clip in position, until all play has disappeared.

When testing for play in the head, take the weight off the front wheel by placing a suitable box underneath the crank case.

43 Cleaning. The black enamelled portions of the machine and coach painted sidecars are best cleaned with cold water, using a brush for the wheels. A hose pipe is the ideal, but if buckets must be used, the parts can be prevented from drying with a "smeary" finish by swilling several buckets of cold water over the machine after washing.

The engine, gear box and any other parts which are greasy should be brushed with paraffin.

The bright parts being finished in chromium plate need no polishing except for an occasional rub with a soft cloth. Never use metal polish on chromium plate.

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A DOZEN "DON'TS" FOR DRIVERS.

DON'T let in the clutch with a jerk. This practice places unfair strains on the engine, transmission and tyres.

DON'T leave the brakes alone till the last moment and then have to apply them hard. This is only asking for skids and tearing miles off your tyres.

DON'T slam the throttle open suddenly. Give your machine an easy life and it will repay you.

DON'T drive on the exhaust lifter. Its purpose is to help in starting and stopping the engine.

DON'T slip the clutch to save changing gear. The clutch is for use, but this is abusing it.

DON'T be afraid of the lower gears. They also are for use. On the other hand—

DON'T race the engine in a low gear when it will readily pull a higher one. This is abuse.

DON'T try to economise in grease or oil. They are cheaper than repair bills.

DON'T neglect the essential adjustments, particularly the tappets and the clutch control. If you do—

DON'T blame the makers for the inevitable consequences.

DON'T run your tyres too soft. They are expensive, but air is cheap.

DON'T neglect to consult our Service Department at any time.

ROYAL ENFIELD MOTOR CYCLES

MOTOR CYCLE GUARANTEE.

Reprinted from our current Motor Cycle Catalogue.

The following is a copy of the Guarantee given by Dealers in Royal Enfield Motor Cycles :—

We give the following Guarantee with our Motor Cycles, Motor Cycle Combinations and Sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise, all such implied warranties and liabilities being in all cases excluded. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication, shall not be construed as enlarging, varying or over-riding this guarantee.

In the case of machines (a) which have been used for " hiring out " purposes or (b) any motor cycle and/or sidecar used for any dirt track, cinder track, or grass track racing or competitions or any competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition or (c) machines from which the trade mark, name or manufacturing number has been removed, no guarantee of any kind is given or is to be implied.

WE GUARANTEE, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and to be in force for six months only from the date of purchase, and damages for which we make ourselves responsible under this guarantee are limited to the free supply of a new part in exchange for the part of the motor cycle, motor cycle combination or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing, such new part in the motor cycle, motor cycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As motor cycles, motor cycle combinations and sidecars are easily liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect. The term " misuse " shall include amongst others the following acts :—

- 1 The attaching of a sidecar to the motor cycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
- 2 The use of a motor cycle or of a motor cycle and sidecar combined, when carrying more persons or a greater weight than that for which the machine was designed by the manufacturers.
- 3 The attaching of a sidecar to a motor cycle by any form of attachment not provided or supplied by the manufacturers or to a motor cycle which is not designed for such use.

Any motor cycle or motor cycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions, *i.e.*, we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed or until the expiration of the six months above referred to, and this guarantee is in lieu and in exclusion of any common law or statute warranty or condition, and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

CONDITIONS OF GUARANTEE.

If a defective part should be found in our motor cycles, motor cycle combinations or sidecars, or in any part supplied by way of exchange before referred to, it must be sent to us CARRIAGE PAID, and accompanied by an intimation from the owner that he desires to have it repaired or exchanged free of charge under our guarantee, and he must also furnish us at the same time with the number of the machine, the date of the purchase, or the date when the alleged defective part was exchanged as the case may be.

Failing compliance with the above, such articles will lie here AT THE RISK OF THE OWNER, and this guarantee and any implied guarantee, warranty or condition shall not be enforceable.

We do not guarantee specialities such as tyres, saddles, chains, lamps, etc., or any component parts supplied to the order of the purchaser differing from standard specifications supplied with our motor cycles, motor cycle combinations, sidecars or otherwise.

Models B, S and S2 are sold subject to the condition that we cannot accept responsibility if used with a sidecar.

NOTICE.

We do not appoint agents for the sale on our behalf of our motor cycles or other goods but we assign to motor cycle Dealers, areas in which we supply to such Dealers exclusively for re-sale in such areas. No such Dealer is authorised to transact any business, give any warranty, make any representation or incur any liability on our behalf.