

Matchless  
IN NAME & REPUTATION

INSTRUCTION BOOK

FOR

CLUBMAN

1938 OVERHEAD VALVE MODELS

- |       |       |       |
|-------|-------|-------|
| G2.   | G3.   | G80.  |
| G2M.  | G3C.  | G80C. |
| G2MC. | G4. ✓ | G90.  |

Supplied free, upon application,  
with each new cycle.

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MATCHLESS  
MOTOR CYCLES

(Proprietors) ASSOCIATED MOTOR CYCLES LIMITED

PLUMSTEAD, LONDON, S.E.18



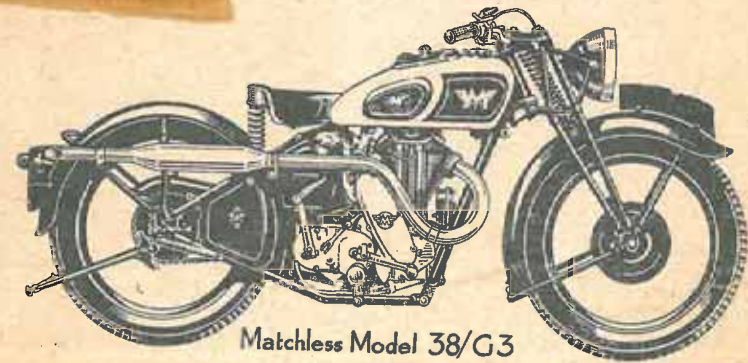
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# DRIVING AND ADJUSTMENT INSTRUCTIONS

NOW ALSO  
CLOSED  
SATURDAY

FOR ALL 1938 O.H.V. MODELS



Matchless Model 38/G3

ISSUED BY THE MANUFACTURERS

## MATCHLESS MOTOR CYCLES

(Proprietors: ASSOCIATED MOTOR CYCLES LIMITED)

Registered Offices:

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**PREFACE.**

It is our sincere desire that every "Matchless" owner should obtain from his mount the service, comfort, and innumerable miles of low-cost travel that we have earnestly endeavoured to build into it. Motor-cycling is one of the most economical and pleasurable modes of transport. A motor cycle, it must be remembered however, is a highly specialised piece of engineering, and must be treated with reasonable care and consideration. While it does not call for great skill in driving, the exercise of a little mechanical sense, and the occasional use of a spanner, cleaning cloth, etc., is very necessary if the maximum service is to be obtained with the requisite degree of satisfaction.

In the pages which follow we have endeavoured to give in simple and straightforward language comprehensive instructions concerning the lubrication and adjustment of those parts likely to require attention. Neglect to make necessary adjustments, or only casual attention to the lubrication of important parts, will soon neutralise the best efforts of the designers, and may bring needless trouble to its owner.

We are always pleased to give "Matchless" owners the full benefit of our wide experience in matters relating to motor cycles of our manufacture. Enquiries of a technical nature should be addressed to the Service Department, and must necessarily include full particulars of the cycle concerned, i.e., engine number in full (stamped on the driving side of the crankcase, immediately below the cylinder base), frame number and model, together with year of manufacture.

**MATCHLESS MOTOR CYCLES.**

**1938 MATCHLESS O.H.V. MOTOR CYCLES**

Model.	Bore and Stroke.	c.c.	Description.
G2 ... 250	62.5mm.x80mm.	246c.c.	Clubman *
G2M ... 250	62.5mm.x80mm.	246c.c.	Clubman de Luxe
G2MC ... 250	62.5mm.x80mm.	246c.c.	Clubman Special
G3 ... 350	69mm.x93mm.	347c.c.	Clubman
G3C ... 350	69mm.x93mm.	347c.c.	Clubman Special
G4 ... 350	69mm.x93mm.	347c.c.	Super Clubman
G80 ... 500	82.5mm.x93mm.	498c.c.	Clubman
G80C ... 500	82.5mm.x93mm.	498c.c.	Clubman Special
G90 ... 500	82.5mm.x93mm.	498c.c.	Super Clubman

\*Coil ignition.

A separate Instruction Book is issued for all Side-Valve "Tourist" Matchless 1938 Motor Cycles.

**DRIVING**

**CONTROLS.**

The following controls are provided :—

- CARBURETTOR.** Throttle—Quick action twist grip on right handlebar. (Inwards to open.)  
Air—Small lever on right handlebar. (Inwards to open.)
- IGNITION.** Advance and Retard—Small lever on left handlebar. (Inwards to advance.)  
Ignition Switch—on tank panel (G2 only).
- EXHAUST.** Valve Lifter—Lower lever on left handlebar.
- CLUTCH.** Upper large lever on left handlebar.
- BRAKE.** Front—Large lever on right handlebar.  
Rear—Foot lever on left side of machine.
- GEARS.** Foot lever on right side of gear box. Pull right up to engage lowest gear on all models except G2 and G2M. Press right down on Models G2 and G2M.
- LAMPS.** Main Switch—On tank panel.  
Dipping Switch—On left handlebar.
- HORN.** Switch on right handlebar. (Press to operate.)
- DAMPER.** Steering—Knurled knob on top of steering column. (Turn in clockwise direction to increase damping action.)  
Fork—Knurled knob on left side of front fork lower front spindle. (Turn in clockwise direction to increase damping action.)
- OIL.** The oils we recommend are :—  
For Summer use—Patent Castol XXL  
Mobiloil D\*  
Golden Shell (extra heavy)  
For Winter Use—Patent Castrol XL  
Mobiloil D\*  
Golden Shell (extra heavy)  
\*Use B Grade if D not obtainable.

## STARTING.

**FUEL.**—For machines fitted with standard pistons we recommend all makes of No. 1 Quality Petrol. For machines fitted with normal high compression pistons use fuel composed of half No. 1 Quality Petrol and half pure Benzol. If an ultra high compression piston is used it is essential to use an alcohol fuel.

Before taking the cycle on the road, a new owner is advised to first place the machine on the rear stand, sit on the saddle and become familiar with the various controls. Neutral or free engine position of the gears is indicated by pointers on the gear change pedal and the gear box end, and it must be observed that this neutral position is obtained (both pointers in line with each other) before starting up the engine. The ignition is advanced and retarded by the small lever on the left handlebar and, when starting, this lever should be set to about its midway position. The throttle is controlled by means of a twist grip on the right handlebar and adjacent is the small lever by which the air supply is controlled. Both open by an inward movement. When starting from cold, the throttle should not be more than about one-sixth open and the air completely closed. The petrol is turned on by pressing inwards the end of the sliding plunger on the petrol tap marked "PUSH ON." Assuming that the tanks have been filled and all levers set as above, to start the engine, first flood the carburettor until petrol actually overflows from the vent hole in the float chamber cap. Then raise the exhaust valve by means of the lower lever on the left handlebar and turn the engine over two or three revolutions, keeping the valve raised. Then turn the switch in the panel to position "I.G." and "C.H." (coil-ignition Model G2 only) and give the kickstarter pedal a vigorous push downward, releasing the handlebar valve lifter when the pedal is nearly at the bottom of its travel so as to take the maximum possible advantage of the fly-wheel momentum. Immediately the engine starts, open up the air as required so that the engine runs evenly and the throttle should be opened and shut quickly, two or three times, to clear the combustion chamber and the silencing system of all condensed moisture which otherwise will have a corrosive action on the silencer interior. Do not in any circumstances race the engine up from cold, but allow it to idle at a fair speed for a moment or two to warm up as quickly as possible, and while doing so, take the opportunity of observing that the oil is circulating properly. (See information re engine lubrication). Then, sitting astride the cycle (make sure gear is in neutral position), gently move same forward until the stand is released, after which disengage the clutch by drawing inwards the large lever on the left handlebar. Then with the right foot move the gear change pedal to obtain low gear (a downward pressure on Model G2 and G2M, and an upward pressure on all other models) and slowly release the clutch lever while still keeping pressure upon the foot change pedal with the right foot when the cycle will commence to move forward. When well under way, again release the clutch and engage second gear, this time with an upward movement of the pedal on Models G2 and G2M and a downward

movement on all other models, retaining the pressure as before until the change of gear has actually been accomplished. Repeat the operation until top gear is reached, and endeavour to make the movements of hand and foot as simultaneously as possible, but remember that in all gear changes a steady pressure of the foot is advisable and this pressure should be maintained until the clutch lever is released. If it is not sufficient to jab the foot pedal and then engage the clutch. When actually in motion it will be found sufficient to merely release the clutch a trifle to ease the drive and with reasonable care, changes of gear can be made without a sound. Always endeavour to make smooth, silent gear changes and avoid racing the engine during the operation. With ordinary care the movements of the clutch lever and change pedal are too quick to permit of any appreciable rise in engine revolutions, but until quite conversant with rapid gear changing, it will be found desirable to close the throttle down while making a change. By suddenly engaging the clutch while the engine is racing, an enormous load is imposed on the gears and chains.

When, by reason of travelling slowly in top gear or by reason of travelling up a hill, the engine commences to labour, it is then necessary to change to a lower gear in order to lessen the strain on the engine. Remember the gear box is provided to be used, and full use of the lower gears should be made in order to obtain effortless hill climbing.

## RUNNING IN.

For the first 500 miles at least, full throttle driving should be studiously avoided. Although mention is made elsewhere of the desirability of not exceeding 30 miles per hour during this running-in process, what is meant actually is "keep the engine well within its limits." Short speed bursts are permissible after this initial running-in, but it is recommended to avoid extended high speeds until at least 1,000 miles have been covered. At the conclusion of the first 100 miles' and 500 miles' running, the adjustment of tappets, chains, contact points, etc., should be checked and corrected if necessary. Subsequent to the initial settling-down process, attention to such details will only be necessary at very infrequent intervals.

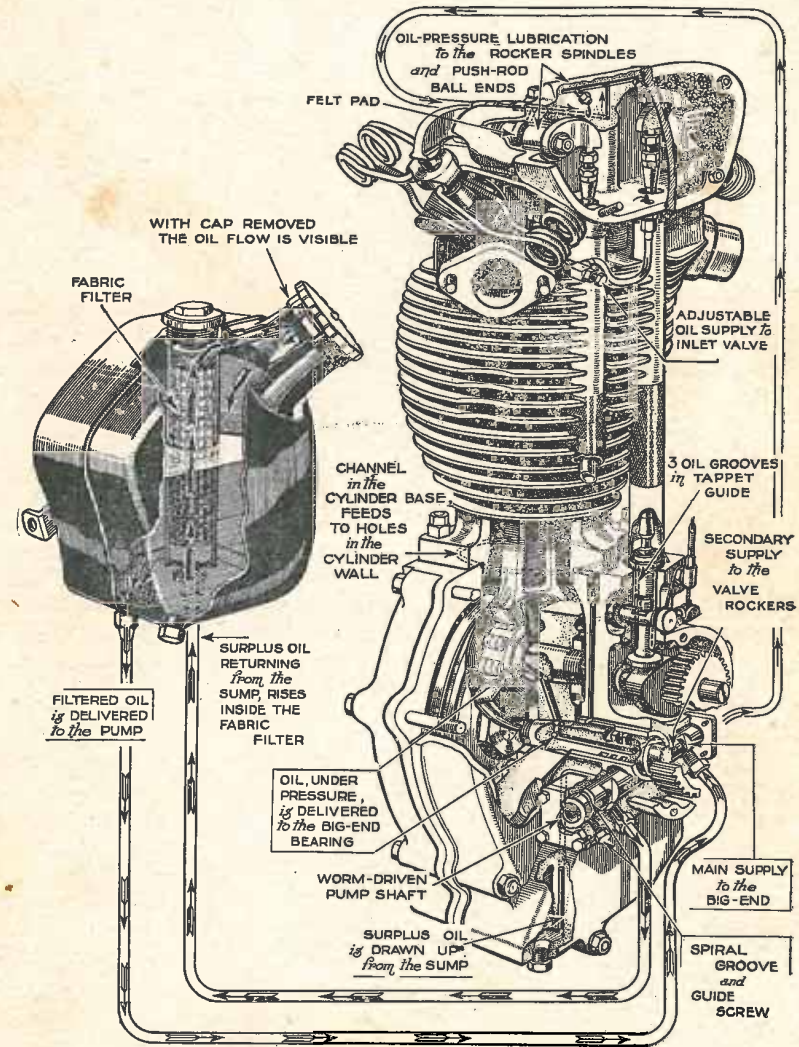
## STOPPING.

To stop the machine, close the throttle, declutch by lifting the large lever on the left handlebar and apply both brakes gently, increasing the pressure on them as the speed of the machine decreases. Place the foot gear lever in the neutral position before releasing the clutch lever. To stop the engine, lift the lower lever on the left handlebar (exhaust lifter) and keep it raised until the engine ceases to fire, and, in the case of coil ignition Model G2, place the panel switch in the "off" position.

**IMPORTANT NOTE.**—Always turn the petrol off upon leaving the cycle idle. Owing to the downswept inlet port, there is a possibility of neat petrol entering the cylinder, should the carburettor flood while cycle is stationary, and in addition to the risk of fire, there is a real danger of oil thinning and consequent engine seizure if this simple precaution is not taken. **Therefore, turn the petrol off after each run.**

**" DON'TS."**

- DO NOT race the engine unnecessarily or let the clutch in sufficiently suddenly to cause the wheel to spin. Take a pride in a silent, smooth getaway.
- DO NOT use the brakes with violence. Brake early and drive on the throttle instead of the brakes.
- DO NOT allow the engine to labour on high gear on a steep gradient, and remember that an easier, faster and better ascent can be made on the next lower gear.
- DO NOT attempt to start the engine with ignition on full advance or with throttle more than slightly open.
- DO NOT under any circumstances allow the chains to run very slack or very dry. Either will soon cause trouble, and adjustments are easy. Slack chains will inevitably cause harshness of transmission.
- DO NOT force the engine or drive above a maximum speed of 30 m.p.h. for the first 500 miles. Mention is made of this warning on account of the natural desire of a new owner to ascertain his mount's maximum capabilities. However, until all bearings are well run in, it is advisable to refrain from speed bursts and the accompanying possibility of seized bearings, piston rings, etc. The first 500 miles of an engine's existence is far more important than the next 5,000.
- DO NOT race the engine in neutral gear position, violently accelerate from a standstill, or drive at full speed on open throttle, etc., when in a residential district. Any motor cycle, or for that matter, any motor vehicle when so driven creates abnormal noise, and in the interests of all motorists we earnestly implore every "Matchless" owner to studiously refrain from any of the practices enumerated, or any calculated to cause annoyance to the public in general. Recollect that the degree of silence of your cycle is judged not by the actual noise it is making, but by comparison with other noises present. For example, in a busy street your cycle might be inaudible, while in a quiet narrow street of high buildings it might be heard for several hundred yards, although in each case being driven in exactly the same manner.
- DO NOT omit to turn the ignition off after a run, or a discharged battery may result (Coil-Ignition Model G2 only).



**Oiling System.**

## LUBRICATION

### ENGINE LUBRICATION.

Proper lubrication is of vital importance, and the use of only the best lubricant will be repaid many times over by long wear and good service. The following lubricants are specially recommended:—

Summer—Patent Castrol XXL

Mobiloil D\*

Golden Shell (extra heavy)

Winter—Patent Castrol XL

Mobiloil D\*

Golden Shell (extra heavy)

\*or B in countries where D is not obtainable.

Oil is carried in the tank underneath the saddle, and in use the level of oil in the tank should never be allowed to fall below the half-full mark. The integral oil pump is of the double-diameter single-plunger type, the larger diameter being used for exhausting the crankcase sump, and the smaller end for delivering oil to all the essential parts of the engine interior, from whence it drains into the sump to be returned to the tank. Provision is made on all models to observe the oil in circulation, and a practice should be made of checking the operation of the oiling system before each run. It is advisable to remove the oil tank filler cap when the returning oil may be observed running from the small spout immediately underneath the cap. This check should be made preferably upon starting up the engine from cold, owing to the fact that when stationary, oil from all parts of the engine interior drains back into the sump, and until the surplus is cleared the return is very positive, whereas normally it is somewhat spasmodic and mixed with air bubbles, due partly to the fact that the return oil plunger has a greater pumping capacity than that delivering fresh oil, and partly to variations in the amount of oil in suspense in the crankcase according to engine speed. For example, upon a sudden acceleration the return flow may cease entirely for a time, only, of course, to resume at a greater rate than normal upon deceleration. No provision is made for external adjustment of the oil supply, except the inlet valve, the correct delivery to each part of the engine being arranged internally by suitably dimensioned passages. It might here be explained that oil is delivered to the timing gear chamber, which, after filling same to a pre-determined level, overflows into the flywheel chamber, and so drains away to the sump. Oil is also forced into the timing gear side flywheel axle bearing, and thence through a drilled passage in the flywheel to the big end bearing, the splash from which passes up into the cylinder interior. In addition to this splash, the cylinder receives oil via a direct ball valve controlled oil passage, which ensures a very adequate supply under all conditions for this, the most vital part of the engine. No attention to the oiling system is required other than observing the return of oil to the tank prior to a run, and the occasional replenishment of the supply tank, the level of oil in which, as mentioned above, must be above the half-full mark, and must not

be filled, when the engine is cold, to a level higher than one inch below the return pipe outlet. The adjuster for inlet valve oiling referred to consists of a needle-pointed screw-down control which, once set, requires little or no attention. The approximate correct setting of the screw is one half of a complete turn from the fully closed position, and unless troubled with valve squeak or excess of oil, owners are advised to leave the adjustment as set on the road test.

NOTE.—Excessive oil consumption, an oily exhaust, or an oiled plug, in the case of a new machine, usually indicate this needle valve is passing too much oil.

### NOTES ON THE OILING SYSTEM.

If the engine is dismantled for any reason, the crankcase must not on any account be separated until the pump plunger has been withdrawn. To withdraw this plunger, first remove both end caps, and also the guide screw, when the plunger can be pushed out large end first. When re-assembling, the plunger must be inserted after the crankcase sections have been bolted together, and before re-fitting the end caps, the guide screw must be replaced, with its relieved tip engaging the profiled cam groove in the plunger. By moving the plunger to and fro while this screw is being introduced, the correct location of the groove can be easily felt, and the screw in question must be finally firmly screwed home. The entire oiling system is simplicity itself (see the illustration of the oiling system) only one moving part being employed, viz., the double-diameter plunger. This plunger is rotated by the engine shaft, and moves backward and forward while rotating, under the influence of the small guide screw which engages with the profiled annular groove cut in the plunger end. As the plunger moves in its housing in one direction, the large end draws oil from the sump, while at the same time, the smaller end is delivering fresh oil to the various channels provided. Upon the reverse movement of the plunger the large end returns to the tank oil already drawn from the sump, while the smaller end draws a fresh charge of oil from the tank in readiness for delivery to the engine upon the following movement of the plunger. This action, of course, goes on all the while the engine is revolving, and since the exhausting end of the plunger is the larger, the engine sump is always kept clear of oil, hence the term "dry sump." At the same time a large quantity of clean, cool oil is being forced under pressure to all working parts. An efficient filter for the oil is provided in the tank consisting of a felt cartridge through which the returning oil is compelled to pass before emerging from the spout immediately underneath the tank filler cap. On each occasion the engine is decarbonised the filter should be removed and carefully washed in clean petrol (it can be removed upon unscrewing the hexagonally-headed cap on the top of the oil tank) while once each season or not less frequently than once every 5,000 miles, the entire tank should be drained, thoroughly washed out with petrol, and afterwards filled to the correct level with fresh, clean oil. To avoid undue waste, it is quite permissible to arrange for this clean-out when the oil

is at the lowest recommended level, although it must be pointed out that normally it is highly desirable to add fresh oil frequently in small quantities in preference to allowing the supply to become almost exhausted before refilling, the reason for this being that the more oil there is in the tank, the cooler it will keep in circulation.

### SPECIAL WARNING.

1.—Never mix oils of different makes or grades.

2.—A dirty or choked oil filter cartridge will inevitably cause heavy oil consumption. If thoroughly soaking and washing in petrol does not effect a cure, fit a new cartridge. (Part No. STD796. Price 2s. 9d., plus 2d. postage.)

### O.H.V. ROCKER LUBRICATION.

It will be observed upon reference to the oiling system illustration that all parts of the overhead rocker mechanism are positively lubricated by an ingenious arrangement of jets, the oil delivered eventually finding its way back to the sump via the push rod cover tubes and grooves machined in the bore of each tappet guide. This arrangement is a distinct step forward on the old hit and miss method of manual grease injection.

### GEAR BOX.

Monthly, or about once every 1,000 miles, grease should be injected, as necessary, into the gear box. The gear box must not be entirely filled, and under normal conditions the addition of about two ounces of grease every 1,000 miles will be found ample.

On gear boxes having an external clutch operating lever, the grease is best inserted via the aperture on the gear box top, covered by an oval metal cap that is retained by two nuts. This cap is slotted at one end to allow it to be twisted round to uncover the aperture without removing the nuts. On this type of gear box also inject a little grease in all the grease nipples every week. (Do not overlook the nipple for the kickstarter axle and the nipple for the foot change mechanism, which are screwed into the gear box end cover.)

On gear boxes having completely enclosed clutch operating mechanism there is only one grease nipple. This feeds the entire gear box, including the gear change and kickstarter parts, and additions of grease should be made through this nipple as recommended above.

The greases recommended for gear box lubrication are:

Castrolase Medium.

Mobilgrease No. 2.

Shell Motor Grease (Soft).

These are supplied in collapsible tube containers with a suitable bent spout to facilitate injection into the gear box interior.

In no circumstances must heavy grease or oil be used for gear box lubrication.

### CHAINS.

The primary chain and the dynamo chain both run in an oil bath case and, provided that the oil level is correctly maintained (use engine oil) will require no attention other than occasional adjustment. The inspection cap orifice on the chain case determines the correct level and it is imperative that the level is not allowed to fall more than about 3/16in. below the height of the bottom edge of this orifice. Failure to maintain this level will result in rapid chain wear and possibly destruction. It is therefore advisable to make a practice of verifying the level weekly. The rear chain should be removed every 1,500 to 2,000 miles in summer, and every 1,000 miles during winter, and thoroughly washed in paraffin. After carefully wiping, it should then be immersed in a bath of molten tallow, or, as a poorer substitute, ordinary engine oil. If the latter is used, the chain should be laid in soak overnight in order to ensure penetration to all link joints. If treated in this manner, at least 8,000 to 10,000 miles of satisfactory service should be obtained.

The cases covering the magneto drive chains on models fitted with magneto ignition are packed with grease during assembly. Grease nipples are fitted to the outer covers and a small quantity of grease should be added periodically, say once every 1,000 miles.

### WHEEL HUBS.

Upon assembly, all hubs are tightly packed with grease. To prevent the entry of mud and water in use, a small additional quantity of grease should be injected by means of the grease gun via the nipples provided on each hub, about once every 500 miles.

### FORK SPINDLES.

To maintain efficient front fork action, adequate spindle lubrication is essential and an injection of grease via the various nipples provided is recommended weekly, or at least every 500 miles. Inject grease until it is seen to exude from both ends of each bearing. This surplus should then be wiped off.

### STEERING HEAD BEARINGS.

Two grease-gun nipples are provided, and only a small quantity of grease should be injected monthly, or once every 1,000 miles.

### BRAKE CAM LEVER AND ROD JOINT LUBRICATION.

Inject grease sparingly into each brake cam nipple about once every 1,000 miles, or monthly. Grease the brake pedal bearing occasionally, and oil brake rod joints frequently, particularly in bad weather.

## **BOWDEN CABLES.**

A small metal clip will be observed on all the control cables. These clips cover a small bared patch on the outer casing through which lubricant can be injected by means of a specially constructed oil gun. This article is not supplied in the standard tool kit, but owners are advised to obtain one, price 5s. 9d. (plus 3d. postage) for their home tool kit. The operation of flooding the inner wire with lubricant takes only a few seconds, and the effect upon a dry cable has to be tried to be believed. Oil is injected through the small bared patch on the outer casing and is forced through the spiral on to and along the inner cable. All that is necessary is to slide the small clip along the casing to enable the specially designed oil gun to be clamped with the bared patch occupying a central position on the rubber pad on the gun nozzle. A few turns of the screwed gun plunger then floods the entire length of the cable with lubricant.

## **SPEEDOMETER LUBRICATION.**

A small quantity of grease should be injected monthly, or once every 500 miles, into the speedometer gear box. This is situated on the front brake cover plate and is provided with a sunk grease nipple in its end. No other part of the speedometer requires lubrication.

## **DYNAMO LUBRICATION (Coil-Ignition Model G2).**

Use oil sparingly. A few drops of oil should be inserted through the lubricator on the driving end once every 500 miles, and a small quantity of grease should be pressed into the hole closed by a round head screw in the centre of the commutator end once every 1,000 miles. Avoid using too much grease or pressure, otherwise it may be forced through the bearing on to the commutator, and cause trouble.

## **DYNAMO LUBRICATION (All Models except G2).**

The Lucas dynamo fitted to magneto-ignition models is packed with grease before leaving the works and lubricators are not, therefore, provided. After the motor cycle has run several thousand miles, the dynamo should be dismantled for cleaning, adjustment and re-packing the bearings with grease. This is carried out preferably at the nearest Lucas Service Depot.

## **MAGNETO LUBRICATION (All Models except G2).**

The Lucas magneto fitted to magneto-ignition models is packed with grease before leaving the works and lubricators are not, therefore, provided. After the motor cycle has run several thousand miles, the magneto should be dismantled for cleaning, adjustment and re-packing the bearings with grease. This is carried out preferably at the nearest Lucas Service Depot.

# **MAINTENANCE**

## **DECARBONISATION.**

The period for which an engine will run satisfactorily without being decarbonised depends to a great extent upon driving conditions. Generally, however, this process should be carried out every 1,500 to 2,000 miles. The need for decarbonising will be indicated by a tendency to pink or knock when ascending hills, or upon accelerating after rounding a corner, and particularly so when the engine is hot. Although to remove carbon deposit it is only necessary to take off the cylinder head, it is advisable to remove the cylinder each 5,000 miles in order to also inspect the piston rings and remove any deposit from the grooves in which they operate. All piston rings should have a uniform matt appearance on their exterior, and any showing signs of leakage by black portions on the contact surface should be replaced. All carbon deposit should be scraped off both the piston top and cylinder head interior. Do not use emery cloth or any other abrasive to remove carbon on piston crown, and do not overlook deposit in the inlet and exhaust ports.

If, for any reason, the piston is removed, extreme care should be taken when replacing the gudgeon pin circlips (retaining rings). A pair of special pliers is supplied, with the tool kit, for removing and refitting the circlips. In use, the rounded ends of the pliers should be inserted in the "ears" or holes in the circlip and gently compressed. The circlip should be introduced into the piston with a rotary movement until the whole of the circlip lies snugly in the groove which is machined in the gudgeon pin boss in the piston. This is most essential. It will be appreciated that if the circlips are not properly fitted there is a possibility of the gudgeon pin working out of position and scoring the cylinder wall with dire results.

## **TO REMOVE AND REFIT CYLINDER HEAD.**

Ensure the piston is on the top dead centre of the firing stroke, then first remove the entire exhaust system, petrol feed pipe, oil feed pipe, and sparking plug, together with the small oil feed pipe from the O.H. rocker box to inlet valve guide (except G4 and G90). Then unscrew the top cap of carburettor mixing chamber and gently withdraw the throttle and air slides. (If the carburettor fitted has a vertical mixing chamber, it will be found more convenient to detach same bodily from the inlet port flange.) Next (except Models G2 and G2M) remove the four petrol tank fixing bolts, and if Model G4, G80, G80C or G90, also drain all petrol from the tank and remove the U pipe connecting the two sides of the tank (not necessary on G3). Next slide the tank backwards until the rear end rests on the saddle nose and insert a wooden block under the forward end so as to support the tank at a sufficient height to allow free access to the rocker box fixing bolts and cylinder head stay fixing bolt. Then slack off the bolt securing the



cylinder head stay to the frame tube and after removing the securing nut at the rocker box end, gently spring the stay clear. (All 250, G4 and G90 Models have no cylinder head stays.) Next remove all the rocker box fixing bolts. On Models G4 and G90, the cylinder head together with the push rods and cover tubes can be removed as one unit after the four cylinder head bolts have been taken out. On all other models the entire rocker box assembly, including push rods, etc., can now be removed by sliding gently outwards on the timing side with the right hand, using the left hand to retain both the push rods. The assembly should be carefully laid aside awaiting re-assembly. (Do not interchange the push rods). The four cylinder head bolts may now be removed when the head is free to be lifted off. Care must be taken to prevent damage to the soft copper head gasket and the small hardened caps on valve ends should not be interchanged.

The re-assembly should be in the reverse order of dismantling and meticulous care must be taken to see that the cylinder head and cylinder top faces, together with the gasket, are perfectly clean before the head is applied, and also to make certain that all cylinder head bolts are tightened down evenly and firmly. Do not forget to replace the hardened caps on the ends of the valve stems before rocker box is replaced. Upon refixing the rocker box assembly it will be found advisable to first remove the cover in order to see that the push rod ends are correctly located encircling the rocker studs. The engine should be revolved to a position at which both tappets are down. In refixing the petrol tank it will be found most convenient to secure the rear end first. When the assembly has been completed and before starting up the engine, carefully check the rocker clearances, and if necessary, adjust the valve tappets as described elsewhere.

#### **TO REMOVE AND REPLACE VALVES (Models G4 and G90, after Cylinder Head has been removed).**

Before the valves on Models G4 and G90 can be removed it is first necessary to withdraw the overhead rockers. To do this first slightly slacken the nut securing the rocker on the push rod end of the rocker spindle, then, by means of the small tommy bar supplied with the tool kit, remove the special circular nut securing the rocker at the valve end, whereupon the rocker spindle with sleeve and the rocker arm on the push rod side can be gently withdrawn. It is desirable to remove one rocker and valve at a time in order to avoid any possibility of interchanging the parts.

A special tool is provided with the tool kit to facilitate valve removal and re-assembly. This is a bar, which is fixed across the top face of the valve spring chamber, and is held in position by the two screws which normally secure the spring chamber cap. When fixed in this way the two pointed screws fitted in the bar are evenly screwed down with the pointed ends engaging with the small depressions in the valve spring top cap until the springs are sufficiently compressed to

permit the removal of the split taper collet, when the valve will be free and can be withdrawn.

The valve springs are positioned by a mounting block which is secured by two screws (which will be observed in the apex of the cylinder head). The valve springs with the mounting block may be removed by slackening these screws. The valves should be ground in by the method described below.

To re-assemble, the valve springs and bottom mounting block must be first laid in position. Then fix the valve spring compressing tool as previously described, whereupon the springs can be compressed, the valve inserted and the taper collets placed in position, after which, evenly unscrew the two screws applying pressure on the springs and carefully observe that the collets are retained in their correct positions. The next operation is to secure the bottom valve spring block by means of the two screws previously mentioned. It is necessary to see that the coils of both springs are clear of all parts of the casing. Do not use excessive force on these screws, the object of which is merely to locate the springs so that while in operation they do not foul any part of the confined chamber in which they work.

The overhead rocker may now be refitted, care being taken to tighten the drilled nut securing the rocker arm (valve end) right up against the shoulder on the rocker axle, and finally to very firmly tighten the nut securing the other rocker arm (push rod end). This is very important as if left insufficiently secure damage may occur to the splined ends of the rocker axle.

#### **TO REMOVE AND REPLACE VALVES (All Models except G4 and G90) (after cylinder head has been removed).**

To facilitate valve removal, rest the head of each valve in turn upon a small block (wood preferable) while the springs are being compressed to allow of the removal of the split taper collet. It may be necessary to give the valve spring cap a sharp tap to release this taper collet.

#### **GRINDING IN VALVES (after removal from cylinder head).**

It is advisable to grind the valves in upon each occasion that decarbonisation is undertaken. After carefully scraping all carbon deposit off valve heads, the face of each valve should be smeared with a good grinding paste (this may be obtained already mixed) and the valve revolved slightly backward and forward (never revolve completely) on its seat while slight pressure is applied to the head.

During this operation, it is advisable to occasionally raise the valve off its seating and turn in the guide slightly, afterwards repeating the backward and forward movement.

Generally, one application of grinding paste will be ample for the inlet, but two or three applications may be necessary to entirely restore the exhaust valve seating. After this grinding-in has been satisfactorily

accomplished, all traces of the grinding mixture should be carefully washed off with petrol, and both valve stems and guides cleaned thoroughly. Prior to re-fitting, it is advisable to smear each valve stem with graphite grease.

NOTE.—A small clamp tommy wrench to facilitate valve grinding can be supplied suitable for all models (except G4 and G90) at a cost of 7d. (Part No. 3282) plus 2d. postage. A special tool for Models G4 and G90 (Part No. 38-G4-TK9-A) costs 3s. 6d., plus 3d. postage.

### TO ADJUST VALVE TAPPETS.

With the rocker box cap removed, rotate the engine until the piston is on top dead centre of the compression stroke. This position is one at which both tappets are on the base circle of the cams. This is essential owing to the presence on the cam flanks of what are technically termed quietening curves. These curves are actually a very gradual incline from the base circle of the cam to the flanks or humps and it is also owing to their presence that when checking valve timing a tappet clearance sufficient to skip the curves is necessary in order to obtain an accurate recording. Reverting to tappet adjustment, slack off the adjusting head lock nut and adjust until no up and down movement can be felt and the push rod can be freely rotated. Test this several times and with the lock nut in each case perfectly tight. It must be clearly understood that the correct clearance is the nearest approach to nil possible, and the method described will ensure a high degree of mechanical silence.

When replacing the rocker box cap on all models except G4 and G90, care should be taken not to over-tighten the retaining knurled headed nuts because the joint is made with a rubber fillet and undue pressure is not necessary.

### VALVE TIMING.

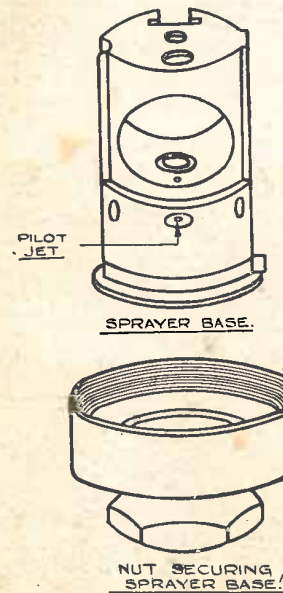
The timing gears are marked for re-setting purposes, and the correct opening of the valves is as follows: the inlet commences to open 20 degrees, or  $7/64$ in. before top of exhaust scavenging stroke, and closes 67 degrees, or  $25/32$ in. up the compression stroke. Exhaust valve commences to open 75 degrees, or  $31/32$ in. from bottom of firing stroke, and closes 28 degrees, or  $7/32$ in. down induction stroke. Owing to the presence of quietening curves on the cam flanks it is necessary before checking valve timing to first set the rockers to .016in. clearance. See earlier instructions for normal running clearances.

To reset the timing by using the marks on the gears proceed as under. Turn the engine over till the mark on the small timing pinion is in line with the centre of the inlet (rear) camshaft bush. Then insert the inlet camshaft so that the mark on it is in mesh with the marked tooth on the small pinion. Next rotate the engine in a forward direction till the mark on the small pinion is in line with the centre of the exhaust (front) camshaft bush. Then insert the exhaust camshaft so that the mark on its is in mesh with the mark on the small pinion.

### CARBURETTOR ADJUSTMENT.

Although owners are advised to refrain from tampering without good cause with the setting of the carburettor, a rough idea how this unit functions and how adjustments may be effected is given below:—

The correct level of petrol is maintained by means of a float and needle valve, operating in much the same manner as the ball float and valve of an ordinary domestic water cistern. The correct level is obtained by the carburettor manufacturers and no alteration under any circumstances should be made. In the event of a leaky float or worn needle valve, the part in question should be replaced. Control over the petrol supply to the engine is obtained firstly by the main jet, and secondly by means of a taper needle attached to the throttle valve and operating in a tubular extension of the main jet. The main jet controls the mixture entirely from  $\frac{3}{4}$  to full throttle, and the adjustable taper needle from  $\frac{3}{4}$  down to  $\frac{1}{4}$  throttle. The cut-away portion of the air intake side of throttle valve controls mixture from  $\frac{1}{4}$  throttle down to about  $\frac{1}{8}$  open, and a pilot jet with independently adjusted air supply takes care of idling on nearly closed throttle up to about  $\frac{1}{8}$  open. These various stages of control must be borne in mind when any adjustment is contemplated. The correct jet size and throttle cut-away is selected for each model and should not be altered without some very good reason. For Models G3, G3C and G4, the combination is 150 main jet and 6x4 throttle slide. For Models G80, G80C and G90, the combination is 180 main jet and 29x4 throttle slide. For Models G2, G2M, G2MC, the combination is 120 main jet, and 5x3 throttle slide. With this combination it is possible to use full or nearly full air under all conditions, except perhaps when the engine is cold or pulling hard up hill on full throttle, when some benefit may be obtained by closing the air down a trifle. Weak mixture is always indicated by popping or spitting at the air intake, whilst a rich mixture usually causes bumpy or jerky running, in extreme cases accompanied by black smoke from the exhaust. A rough test for correct setting is to warm the engine up and then fully retard the ignition, and with the air about  $\frac{3}{4}$  open, slowly open up the throttle to full open, during which the engine should respond without a misfire, but upon a sudden opening of the throttle again with fully retarded ignition and about  $\frac{3}{4}$  air, it should splutter and stop. This is, of course, only a rough test but is, nevertheless, a fairly accurate guide to correct main jet and needle setting. To check the pilot jet and air control setting, warm up the engine, and with the ignition about  $\frac{2}{3}$  advanced



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and air about  $\frac{3}{4}$  open, with throttle almost closed, the engine should idle positively and evenly. If it fails to do so, slacken the lock nut securing the pilot jet air screw, which will be observed at the base of the mixing chamber, and find a position at which even firing is obtained. The adjustment of this screw is not unduly sensitive and it should be possible to obtain the correct adjustment in a few seconds. Before concluding that incorrect carburation is responsible for heavy consumption, and before carrying out any of the tests described, make certain that the ignition is set correctly, and the sparking plug points are not adjusted too wide or too close (.018 to .020 recommended). This is most important. In the event of adjustment of the air screw failing to affect slow running in the manner described, it may be reasonably assumed that the minute passage for petrol has become choked. This is always a possible danger unless meticulous care is taken to prevent the entry of dust or foreign matter of any description into the petrol tank. The jet or petrol passage in question consists of a small hole drilled in the side of the sprayer base. This sprayer base may be pushed out of the mixing chamber upon removing the float chamber and the large nut at the bottom of the mixing chamber. To make the location of the petrol passage quite clear, a line illustration is shown, and in the event of difficulty being experienced, a fine piece of steel wire (a strand of Bowden cable will do) should be passed through the very small hole indicated by an arrow.

**IMPORTANT.**—Never run the engine on full retard and full throttle for more than a few seconds at a time.

**Failure to obtain good idling may be due to:—**

1. Air leaks, either at the junction of the carburettor and engine or by reason of badly worn inlet valve stems or guides.
2. Faulty valve seatings or incorrect tappet clearances.
3. Sparking plug faulty or points too close.
4. Too much ignition advance.
5. Contact points dirty or setting too close.

**Failure to obtain satisfactory petrol consumption may be due to:—**

1. Late ignition setting (carefully follow instructions).
2. Bad air leaks.
3. Weakened valve springs (renew).
4. Leaky float, causing flooding (renew).
5. Taper needle extension insufficient (note position before altering).
6. Compression poor, due to worn piston rings, or defective valve seatings (test compression with wide open throttle).
7. Incorrect tappet adjustment.

**ELECTRICAL EQUIPMENT.**

Miller lighting and ignition equipment is fitted to Model G2, and Lucas dynamo lighting with separate magneto to all other models. The dynamo charge rate on all models is controlled by means of a constant voltage automatic unit. This unit functions when the dynamo generated voltage rises above 7.3 to 7.5 volts and under fully charged battery and no load condition only a small current flows through the system. As load is switched on the dynamo output automatically increases to meet the demand. It is therefore only under run-down battery conditions and during daylight running that a high charge rate will show on the ammeter, and under such conditions a rate as high as 5 to 6 amps may be recorded. The normal rate, however, is between 2 and 4 amps, according to the condition of the battery. The object of this constant voltage control system is, of course, to maintain a fully-charged battery without the risk of over-charging so commonly experienced in the past with switch charging rate control and particularly so on motor cycles with their unavoidably small capacity batteries. The head lamp fitted has a double filament driving light bulb in addition to a parking light bulb, the dipped filament being brought into instant use as and when required by means of a switch on the left handlebar. As in car practice a red warning light is provided on the tank panel (coil ignition Model G2 only) to remind the driver to switch the ignition off when the engine is not running and the contact breaker points are together. This light goes out immediately the dynamo is revved up to supply sufficient current to close the automatic cut-out contacts, but may glow slightly when the dynamo is generating maximum output.

**BATTERY.**

**TOPPING UP.**—At least once a month, the vent plugs in the top of the battery should be removed and the level of the acid solution examined. If necessary distilled water, which can be obtained at all chemists and most garages, should be added to bring the level above the top of the plates, but well short of the bottom of the vent plugs. When examining the cells, do not hold a naked light near a vent, as there is a danger of igniting the gas coming from the plates.

**STORAGE.**—If the equipment is laid by for several months, the battery must be given a small charge from a separate source of electrical energy about once a fortnight, in order to obviate any permanent sulphation of the plates. In no circumstances must the electrolyte be removed from the battery and the plates allowed to dry, as certain changes take place which result in loss of capacity.

**DYNAMO.**

The only parts of the dynamo calling for occasional attention are the brushes and the commutator, which are readily accessible when the end cover is removed. The brushes should slide freely in their holders. They should be clean and the face in contact with the commutator

should appear uniformly polished. Dirty brushes may be cleaned with a cloth moistened with petrol. The commutator surface must be kept clean and free from oil or brush dust. (See earlier instructions re dynamo lubrication.)

#### **CONTACT BREAKER (Magneto Ignition) (All Models except G2).**

Occasionally remove the contact breaker cover and examine the contacts. If they are burned or blackened, clean with very fine emery cloth and afterwards with a cloth moistened with petrol. Take care to wipe away all particles of dirt or metal dust.

The contact breaker gap is carefully set and should not be altered unless it varies considerably from the correct setting. If adjustment is necessary, proceed as follows:—

Turn the engine until it is seen that the contacts are fully opened, then slaken the nut securing the stationary contact screw and adjust this screw until the gap is about .012in. After making the adjustment, care must be taken to tighten the locking nut by which the stationary contact screw is secured.

NOTE.—Check contact breaker gap at 100 and 300 miles. Owing to an initial settling down, there is a tendency for the gap to decrease in the first few hundred miles of use. This may seriously affect ignition setting. Subsequently, adjustment will only be necessary at long intervals, but should be checked every 1,000 miles.

A book giving maintenance and running instructions for the electrical equipment is supplied with each new machine. In that book are addresses of service stations at which service is provided for owners of Matchless motor cycles.

#### **CONTACT BREAKER (Coil Ignition) (Model G2).**

Occasionally remove the bakelite contact breaker cover and examine the contacts. If they are burned or blackened, clean with very fine emery cloth and afterwards with a cloth moistened with petrol. Take care to wipe away all particles of dirt or metal dust.

The contact breaker gap is carefully set and should not be altered unless it varies considerably from the correct setting. If adjustment is necessary, proceed as follows:—

Turn the engine until it is seen that the contacts are fully opened, then slaken the nut securing the stationary contact screw and adjust this screw until the gap is about .018 to .020. After making the adjustment, care must be taken to tighten the locking nut by which the stationary contact screw is secured.

NOTE.—Check contact breaker gap at 100 and 300 miles. Owing to an initial settling down, there is a tendency for the gap to decrease in the first few hundred miles of use. This may seriously affect ignition setting. Subsequently, adjustment will only be necessary at long intervals, but should be checked every 1,000 miles.

#### **IGNITION SETTING.**

The correct ignition setting for coil-ignition Model G2 is 5-16in. before T.D.C. and for all other Models 7-16in. before T.D.C., in each case with the ignition fully advanced.

#### **TO RE-TIME IGNITION ON MODEL G2.**

Remove the bakelite contact breaker cap and slacken the screw securing the contact breaker cam. Then with a small punch operating in one of the slots in this cam, give a sharp but light tap. This will loosen the cam on the taper end of the shaft to which it is fitted. Now set the piston and the ignition lever in the position mentioned above, after which gently turn the cam with the fingers in an anti-clockwise direction until the contact points are just about to part, in which position carefully re-tighten the cam fixing screw and replace the bakelite cap. It is essential, in this ignition setting operation, to obtain exactly the prescribed piston setting on the compression stroke, i.e., the stroke at the top of which both valves are closed.

NOTE.—Check contact breaker gap before setting timing (.018in. to .020in.).

#### **TO RE-TIME IGNITION ON ALL MODELS (EXCEPT G2).**

Remove the outer portion of aluminium magneto chain cover and slack off the nut securing the lower sprocket. Then, with a stout screwdriver, or the hooked end of a stout tyre lever, gently lever the sprocket loose from the taper on the camshaft to which it is attached. Then carefully turn the engine until the piston is at the exact position described above (according to model), observing that it is on the stroke at which both valves are closed. Now fully advance the ignition and remove the contact breaker cap, after which gently turn the magneto with the fingers in its ordinary direction (i.e., clock-wise when looking at the contact breaker) until the contact points are just about to break, in which position the sprocket fixing nut must be carefully re-tightened. Needless to add, it is of vital importance to correctly obtain the prescribed piston position and to secure the chain sprocket at the exact position at which the contact points commence to part. To find the exact point of break, place a piece of cigarette paper between the points and turn the magneto armature until the paper is just released, and no more, upon a gentle pull.

NOTE.—Check contact breaker gap before setting timing (.012in.).

#### **SPARKING PLUGS.**

All O.H.V. Matchless motor-cycles are fitted with Lodge H14 sparking plugs (14 m.m. thread). Occasionally check the plug points gap (.018in. to .020in.).

#### **STEERING HEAD ADJUSTMENT.**

The steering head races are of the floating self-aligning type with spherical seats. The steering head should be occasionally tested for correct adjustment by exerting pressure upwards, from the extreme tips of the handlebars, while the steering damper, if fitted, is completely slacked off. Should any shake be apparent, the top nut on steering column should be slacked and the lower nut screwed down until all trace of slackness has disappeared, when the top nut should be again tightened down. Hold the lower nut while tightening down the upper one.

**IMPORTANT.**—To guard against unconsciously over-tightening the head bearings, the effect of which is extremely difficult steering, it is advisable to jack up the front of the machine (a box of suitable height under the crankcase will serve) in order that all shake may be taken up satisfactorily and the steering head left perfectly free.

#### **FRONT FORK SPINDLE ADJUSTMENT.**

Provision is made for taking up side or endwise wear of the various fork spindle bearings. The need for adjustment will be made apparent by a click or creaking noise heard when the steering head is abruptly turned. By placing the fingers partly over the spindle link and partly upon the lug through which spindle passes it can be determined which spindle or spindles require adjustment by the movement which will be felt when the handlebar is sharply moved from side to side. Then slack off both spindle nuts and turn the spindle bodily by means of the hexagonal offside end in a right-hand or clockwise direction to take up slack. Do not turn more than half a revolution before a re-trial with the nuts re-tightened. Care is essential to guard against over-tightening when the fork will become stiff in action or most probably refuse to function. The washers which are fitted between the lug ends and the spindle side plates are not provided for frictional purposes, but to prevent actual seizure in the event of the spindle adjustment being too tight. Never attempt to adjust more than one spindle at a time. The necessary friction damper effect is provided independently and is adjusted as described below.

#### **TO ADJUST FORK ACTION DAMPER.**

The fork action damper is best adjusted while the cycle is actually in motion, and a badly corrugated surface such as may be found on many bus routes provides the best condition for the purpose. The ebonite damper hand nut should be screwed sufficiently tight to make the fork action sluggish under such circumstances as those described, and will subsequently require very little variation for other conditions of road surface to provide the maximum degree of comfort.

#### **CLUTCH AND CLUTCH CABLE ADJUSTMENT.**

It will be appreciated that, as the result of wear on the clutch cork inserts the plates tend to close up. This action increases the effective length of the clutch thrust rod, while on the other hand, the clutch operating cable tends to stretch in use.

Two adjustments are provided to cope with these conditions. One is arranged on the clutch operating lever on the gear box so that the position of the screw in this lever may be moved in order to deal with the clutch plate settlement mentioned above and also to deal with any wear that may take place on the clutch thrust rod.

The other adjustment is on the clutch cable and takes the form of an adjustable clutch cable stop. This is threaded into the gear box casing (the cable passes through it) and its position is secured by a lock nut.

The clutch cable adjustment should be such that the screw in the clutch operating lever on the gear box does not bear against the clutch thrust rod. It should be possible to move the clutch lever on the handlebar about half an inch (measured at the tip of the lever) before the screw mentioned above commences to move the clutch thrust rod. This movement is felt by virtue of the greatly increased resistance of the handlebar lever as the declutching action commences.

Minor adjustment of the clutch cable may be made by the adjustable clutch cable stop. Major adjustment may be made by altering the position of the screw in the gear box clutch operating lever. Access to this screw is made by disconnecting the clutch cable from the gear box clutch operating lever. This will allow the lever to be hinged downward and thereby permits the adjusting screw to be moved as may be required.

On Models G2 and G2M the clutch operating lever does not have this screw adjustment, but in the clutch spring pressure plate (the outside plate on the clutch) is a centre screw with lock nut. This screw can be adjusted to cope with any extreme wear on the clutch thrust rod.

On all Models (except G2 and G2M) the clutch operating arm on the gear box having completely enclosed clutch operating mechanism does not have a central screw. In lieu of this the fulcrum of the lever is adjustable. This adjustment is situated under the small raised plate retained to the gear box end cover by two screws. This plate should be removed by taking away the two screws. A sleeve nut will then be noticed. Turn this nut in an anti-clockwise direction to take up wear between the clutch thrust rod and the operating lever and in a clockwise direction if the lever is bearing on the clutch thrust rod (thereby causing clutch slip).

On gear boxes having enclosed clutch operating levers access to the levers in order to disconnect or replace the clutch control cable can be made as under.

On Models G2 and G2M by removing the steel plate (retained by two nuts) on the front of the gear box immediately under the point where the clutch cable enters the box.

On all Models except G2 and G2M by unscrewing the plated large knurled nut on the top edge of the gear box end cover.

In the event of clutch slip being experienced, the most likely cause is incorrect cable adjustment. If the cable adjustment is found satisfactory, then adjustment should be made to the clutch spring adjuster nuts, each of which should be screwed in exactly half turn, when a re-trial should be made. If necessary, repeat—but be careful to adjust each of the four nuts a similar amount. Normally, the correct adjustment of these nuts is five complete turns from right home, and after dismantling the clutch, the correct setting is obtained by screwing all four nuts right home and then slackening off five complete revolutions. Uneven or excessive tightening of these nuts will prevent the clutch releasing properly.

### TO ADJUST THE DYNAMO CHAIN (All Models).

Adjustment is arranged by revolving the dynamo unit in its cradle mounting, and the correct adjustment should permit a movement of about  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in. as the top run of the chain is lightly pressed up and down midway between the sprockets. When checking, try a number of positions and obtain the described adjustment at the tightest place. To adjust, first slacken the dynamo clamp bolt and then twist the unit bodily in its mounting in a forward or clockwise direction to tighten. Always check the adjustment after the clamp bolt has been re-tightened. It will be found that the tension of both dynamo and primary chains can be checked by the fingers passing through the inspection cap orifice in the front chaincase. This cap is released upon unscrewing the knurled edge screw.

**IMPORTANT.**—Should it be necessary for any reason to remove the chain sprocket on the dynamo, it is absolutely essential both during **removal and re-fitting** to hold the sprocket with a spanner while loosening or tightening the fixing nut. The object is to relieve the dynamo armature of any bending strain, and two flats will be found on the sprocket boss to permit of the application of a spanner.

Before removing the sprocket fixing nut take away the spring locking ring that encircles the nut and the locking washer next to it.

### TO ADJUST THE MAGNETO CHAIN (All Models except G2).

Adjustment to the magneto chain is obtained by tilting the unit bodily on the lower crankcase bolt upon which the platform is mounted, the upper fixing bolt holes being slotted for the purpose. To adjust the chain, first remove the outer cover of chaincase, then slack off slightly only the two crankcase bolts by which the magneto platform is fixed and insert a lever or screwdriver under the top edge to force the back end up until the correct adjustment is obtained, when securely tighten the two fixing bolts and before replacing the outer chain cover smear the chain with grease. (See Dynamo Chain for amount of whip.)

### TO ADJUST PRIMARY CHAIN.

To obtain adjustment for the primary chain, provision is made to swing the gear box bodily upon its lower fixing bolt. It will be observed that the upper fixing bolt operates in slotted holes to permit the necessary movement. To make adjustment, the offside nut of the top gear box fixing bolt must first be slackened. Then to tighten the chain adjustment, first slack off the nut on adjuster bolt nearest the engine and turn the nut furthest from engine clockwise until the chain is tight, after which slack off the nut farthest from engine and tighten down the nut nearest to engine until the correct adjustment is obtained, when securely tighten up the nut farthest from engine to lock the adjustment, and also securely re-tighten the offside nut on the top gear box fixing bolt. The correct adjustment (which should allow a whip or movement of  $\frac{3}{8}$  in. to  $\frac{1}{2}$  in. as the run of the chain is lightly pressed up and down midway between the sprockets) should be obtained for the tightest place.

### TO ADJUST THE REAR CHAIN.

First jack the rear wheel up on the stand, slack off the extended rear wheel centre spindle nut and also the large nut securing the brake drum dummy spindle (both on left side). Then adjust the chain as required by means of the bolts which pass through each of the fork ends, after which securely re-tighten the spindle nuts. The correct adjustment (which should allow a whip of  $\frac{3}{8}$  in. to  $\frac{1}{2}$  in. when chain is pressed up and down) should be obtained for the tightest place.

**NOTE.**—Before tightening the rear chain, the adjustment of the front chain should be inspected, and, if attention to each is required, the latter should be treated first.

**IMPORTANT.**—Care is necessary when tightening the rear chain to leave the wheel in correct alignment. When correct, a piece of thin string stretched taut across both wheels, about four inches from and parallel to the ground, should be observed to just touch each tyre at both sides of wheel centre simultaneously. Alternatively, a straight wooden batten about five feet long is a very handy article to be used for the purpose of checking wheel alignment, applied, as in the case of string, parallel to and about four inches from the ground.

**NOTE.**—Models G/2 and G2M are not fitted with quickly detachable rear wheel and to adjust the rear chain on same it is necessary to slack off the axle nut on each side.

### NOTES ON CHAIN ADJUSTMENT.

The tension of all chains should be tried in a number of places and the adjustments described obtained for the tightest position. When making any adjustment take the opportunity of generously applying lubricant if necessary.

A chain rivet extractor (Part No. LC25) can be supplied for 5s. 6d. (plus 4d. postage).

### SPROCKETS.

The engine transmission sprockets on all 1938 O.H.V. Matchless motor cycles are interchangeable and can be supplied with 16, 17, 18, 19 or 21 teeth, at a cost of 10s. 5d. each (plus 4d. postage).

### GEAR RATIOS.

Engine Sprocket	Top Gear Ratio on G2 and G2M.	Top Gear Ratio on all Models except G2, G2M.	Standard Fitting on all Models
16 TEETH	6.25	6.56	G2MC
17 TEETH	5.88	6.17	G2, G3C, G2M,
18 TEETH	5.55	5.83	G3, G4
19 TEETH	5.26	5.52	G80C,
21 TEETH	4.76	5.00	G80, G90*

\*19 teeth sprocket used for sidecar.

### TO ADJUST WHEEL BEARINGS (Models G2 and G2M).

The wheel bearings on this Model are of the ball, cup and cone type, and although care in adjustment to avoid over-tightening is necessary, it is not necessary to adjust with a shake as with taper roller bearings. To adjust either wheel bearing, first remove the wheel from the machine, then take away the brake cover plate which will allow access to the left-hand side wheel bearing, next slack off (on the near side) the thin lock nut on the axle, and with the special spanner provided, turn the cone in a clockwise direction until all shake is taken up, after which slack off a trifle, and re-tighten the locking nut.

### TO DISMANTLE AND ADJUST WHEEL BEARINGS (All Models except G2 and G2M).

Instructions which must be carefully carried out for dismantling and re-assembling taper roller bearing hubs:—

To dismantle, release the locking nut and screw out the adjusting ring. The dished plate containing felt washer and plain plate will then drop out. Take out spring ring from the opposite side of hub and remove felt washer and holder consisting of two plates and retaining ring, the latter being between the two plates. The spindle can now be pressed or driven out from either end, bringing with it one of the outer races. The other race can then be driven out, if desired.

To re-assemble, press in outer race on fixed or plain end of hub, **taking great care that it goes in square.** This race is pressed in about 1/32in. beyond its actual position, to enable the felt washer and its retaining ring, together with the two plates, to be put in and the spring ring to snap into its groove. **Care must be taken to put the plate with the larger hole in last. This is most important.** This outer race can now be forced back until the plates are tight on the spring ring. The spindle can now be inserted, the short end being placed in first. **The long end of the spindle must be on the adjusting side.** The other race can now be pressed in until there is about 1/16in. **end play in the spindle.** Insert plain plate and dished plate with felt washer, screw in adjusting ring, and **gradually screw down until there is just a fraction of end play in the spindle.** This should be .001 of an inch.

It is of the utmost importance that the bearings are not adjusted too tight as this would ruin them in a few miles. Having got this adjustment correct, the locking ring can be put on and tightened up, again **taking care that the adjusting ring does not creep forward and make the bearings too tight.**

### TO REMOVE DETACHABLE REAR WHEEL (All Models except G2 and G2M).

Jack rear wheel up on the stand and remove the nut on the left hand end of the detachable rear wheel spindle. Disconnect rear lamp cable connector, slack off the nuts securing the tubular mudguard arch assembly to the rear fork ends and remove the nut securing the rear mudguard joint under saddle. If the cycle has upswept exhaust pipes remove the nuts securing the tail pipe clips and swing the clips round clear of the studs. The rear portion of the rear guard is now free to be removed. Next remove the three long square-headed bolts securing the wheel hub flange to the brake drum, after which withdraw the detachable wheel spindle when the distance collar on the right side will fall out. The wheel can now be moved to the right to disengage the driving studs and removed. To replace the wheel, first push it squarely on to the driving pegs and insert the centre spindle together with the distance piece. Then screw on and firmly tighten down the three long sleeve bolts, after which screw on the centre spindle end nut and securely tighten. It is very important to point out that when the centre spindle is removed the wheel is hanging on one fork end only, so any rough treatment must be carefully avoided, otherwise damage or breakage of the brake side fork end may result. **Under no circumstances must the centre spindle be removed until the cycle is jacked up on the stand and the spindle must always be in position before the cycle is taken off the stand again.** If for any reason the wheel should be difficult to pull off the driving pegs, insert the centre spindle minus the distance collar. This will steady the wheel. If the rider wishes to fit a new tube without removing the entire wheel he must first take off the one side of the tyre and remove the tube in the ordinary way. Next take out the centre spindle and distance piece only, leaving the sleeve nuts intact. This will be found to give sufficient space between the hub and fork end to allow the tube to be passed through and drawn completely out. Then pass the repaired or new tube through the space and replace the distance piece and the centre spindle, and proceed to refit the tube and cover. Fitting the centre spindle first holds the wheel firmly while the tyre is being manipulated.

**Periodically test the centre spindle and sleeve nuts with the spanner and keep them tight.** If the sleeve nuts are loose, a dull hammering will be felt when driving at slow speeds. If this is noticed, tighten the sleeve nuts at once. When the back wheel is removed, the wheel only is taken out leaving the chain, sprocket, brake, chain case, etc., remaining in their original position.

### TYRES AND SERVICE.

To obtain satisfactory life and service from the tyres is largely within the user's control, and the first essential to obtain this is proper inflation. The correct amount of pressure is governed substantially by the load to be carried, and it is therefore difficult to lay down a hard and fast ruling. Assuming the weight of driver to be normal, the pressures recommended may be regarded as satisfactory, and we urge all users to make a practice of checking the

actual pressure by means of a low-pressure Schrader tyre gauge. This takes a few seconds only, and will amply repay the owner by reason of additional service and immunity from failures.

### TYRE PRESSURES.

Model.	Front.	lbs.	Rear.	lbs.
G2, G2M ...	26x3.25 ...	16 ...	26x3.25 ...	18
G3, G80 ...	26x3.25 ...	17 ...	26x3.25 ...	20
G4, G90 ...	26x3.00 ...	20 ...	26x3.50 ...	24

For abnormal weight drivers, or pillion passengers, add 2lbs. per square inch to rear tyre only.

### TYRE REPAIRS.

When a wired-on cover has been removed for making repairs, it is very important when replacing it to make sure that the whole cover runs truly. Otherwise the steering will be affected. Take care not to strain the wires when removing and replacing the cover. To take cover off, completely deflate the tube and push edge of cover right down into the base of the rim exactly opposite the valve; then cover can be taken off at the valve without using force. When replacing, very slightly inflate tube and put cover on first opposite the valve. If the edge is kept well down into the rim all the way round, the cover will slip on at the valve without force. Then half inflate and make sure that the edges go into their proper place all the way round on both sides of the rim. Spin the wheel and test for true running of the cover before and after fully inflating.

### PERIODICAL INSPECTION OF NUTS.

Satisfactory service depends largely upon the necessary immediate attention to details. The adage "A stitch in time saves nine" applies with particular force to motor cycle maintenance. Make a point of occasionally testing the security of all nuts with a spanner. There is possibly more dissatisfaction and damage caused through neglecting such details than for any other reason. It must be remembered that a motor cycle is a highly specialised piece of engineering, and that while it does not call for great engineering skill in driving, the exercise of a little mechanical sense and the occasional use of a spanner, cleaning cloth, etc., is very necessary if the maximum service is to be obtained with the requisite degree of satisfaction. Therefore, do not wait until to-morrow, but adjust it now.

### SERVICE.

The Service Department is in Burrage Grove, Plumstead, London, S.E.18, and is open on Mondays to Fridays from 9 a.m. to 6 p.m., and on Saturdays from 9 a.m. to 1 p.m. (Closed on Sundays and national holidays.)

If it is necessary to bring a machine personally to the works for an urgent repair, please note it is essential that an appointment is made beforehand, by letter or telephone, to avoid disappointment.

### CLEANING.

If the machine is used to any extent in bad weather, a small hose is almost indispensable for removing mud. Care should be exercised to avoid directing water on to the engine, carburettor, or other such parts. Do not attempt to rub or brush mud off any enamel surface when dry or the polish will soon be destroyed. For the engine, etc., a good stiff paint brush and pot of petrol is preferable.

It is a common assumption that chromium plating is impervious to rust. This, of course, is incorrect. The chief reason it is used is because of the oily character of its surface, as a result of which it has more resistance to moisture penetration. To preserve the condition of chromium plated parts, frequently clean them with a damp chamois leather. If, at any time, the lustre deteriorates, an application of special chromium cleaning compound should be used. Ordinary metal polishing liquids or paste must not be used as these, almost without exception, contain oleic acid, which attacks chromium.

### CORRECTIVE MEASURES.

No adjustments should be made or any part tampered with until the cause of the trouble is known. Otherwise adjustments which are correct may be destroyed.

#### Engine Suddenly Stops :—

- Petrol shortage in tank.
- Choked petrol supply pipe or tap.
- Choked main jet.
- Water in float chamber.
- Oiled-up or fouled sparking plug.
- Water on H.T. pick-up or on sparking plug.
- Choked vent hole in petrol tank filler cap.

#### Engine Fails to Start, or Difficult Starting :—

- Lack of fuel, or insufficient flooding if cold.
- Excessive flooding, allowing neat petrol to enter cylinder.
- Oiled-up sparking plug.
- Stuck-up valve, or valve stem sticky.
- Weak valve spring, or valve not seating properly.
- Too liberal throttle opening.
- Pilot jet choked.
- Contact breaker points dirty, or gap incorrect.
- Retaining clip on contact breaker cover out of position (coil ignition only).



**Loss of Power :—**

- Valve or valves not seating properly.
- Weak valve spring or springs.
- No tappet clearance or excessive clearance.
- Lack of oil in tank.
- Brakes too closely adjusted.
- Badly fitting or broken piston rings.
- Punctured carburettor float.
- Creeping ignition lever.
- Sticking valve.

**Engine Overheats :—**

- Lack of proper lubrication.
- Weak valve springs.
- Pitted valve seats.
- Worn piston rings.
- Late ignition setting.
- Punctured float, causing rich mixture.
- Air control to carburettor out of order.
- Creeping ignition lever.

**Engine Misses Fire :—**

- Loose terminal on coil (coil ignition only).
- Valve spring weak.
- Defective or oiled plug.
- Incorrectly adjusted contact breaker.
- Incorrectly adjusted tappets.
- Defective sparking plug cable.
- Oil on contact breaker points.

**Excessive Oil Consumption :—**

- Stoppage or partial stoppage in pipe returning oil from engine to tank.
- Clogged or partially clogged cartridge filter in oil tank.  
(Drain sump and test with filter removed.)
- Badly worn or stuck-up piston rings, causing high pressure in engine crankcase.
- High crankcase pressure caused by inoperative release valve (breather) action. (Disc may be damaged or jammed with dirt.)
- Air leak at rear oil pump end cap.
- Incorrect adjustment of the needle valve controlling supply of oil to inlet valve stem.

## GUARANTEE

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.

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 conditions, 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 which have been used for "hiring out" purposes, or racing, or 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 be in force for six months only from 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 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 motor cycle and sidecar combined, when carrying more persons or a greater weight than for which the machine was designed by the manufacturers.
3. The attaching of a sidecar by any form of attachment not provided, supplied or approved by the manufacturers, or to a motor cycle which is not designed for such use.

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Any motor cycle, 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 at which 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, magnetos, 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.

**IMPORTANT NOTE.**—Any part sent to us for any reason whatsoever must bear distinctly the sender's name and address and instructions or requests relative to parts must be sent separately by letter post.

MATCHLESS MOTOR CYCLES,  
PLUMSTEAD,  
LONDON, S.E.18.

### PROPRIETARY INSTRUMENTS, FITTINGS, AND ACCESSORIES.

No expense is spared to secure, as standard equipment, the most suitable and highest quality instruments and accessories. Nevertheless, our Guarantee does not cover such parts, and in the event of trouble being experienced the parts in question should be returned to and claims made direct on the actual manufacturers, who will deal with them on the terms of their respective guarantees, as follows:—

Carburettors.—Messrs. Amalgamated Carburettors, Ltd., Perry Barr, Birmingham.\*

Chains.—The Renold and Coventry Chain Co., Ltd., Didsbury, Manchester.\*

Electrical Equipment.—Messrs. Joseph Lucas, Ltd., Great King Street, Birmingham 19.\*  
Messrs. H. Miller and Co., Ltd., Aston Brook Street, Birmingham 6.\*

Gear Boxes.—Messrs. Burman, Ltd., Ryland Street, Birmingham.\*

Horns.—Messrs. Joseph Lucas, Ltd., Great King Street, Birmingham 19.\*  
Messrs. Clear Hooters, Ltd., 79-81, Lombard Street, Birmingham 12.

Saddles.—Messrs. Lycetts and Motor Accessories Co., Ltd., Western Works, Arthur Street, Small Heath, Birmingham 10.  
Messrs. Herbert Terry and Sons, Ltd., Redditch.  
Messrs. Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.

Sparkling Plugs.—Messrs. Lodge Plugs, Ltd., Rugby.

Speedometers and Clocks.—Messrs. S. Smith and Sons (M.A.), Ltd., Cricklewood, London.

Tyres.—Messrs. Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.\*  
Messrs. Firestone Tyre and Rubber Co., Ltd., Great West Road, Brentford, Middlesex.\*

\*These manufacturers issue instructive literature regarding their products which are fitted to Matchless Motor Cycles.

MATCHLESS MOTOR CYCLES  
(Proprietors: ASSOCIATED MOTOR CYCLES LIMITED)

PLUMSTEAD,  
LONDON, S.E.18.

**PRINCIPAL MATCHLESS SPARES DEALERS.**

Alexander's, Ltd.,  
339, Union Street Aberdeen (Tel. Aberdeen 120)

Alexander and Co.,  
113 to 117, Lothian Road Edinburgh 3. (Tel. Edinburgh 21176)

Alexander and Co.,  
272 and 274, Gt. Western Rd. Glasgow (Tel. Douglas 3802)

Alexander's Motor Stores, Ltd.,  
46, 48, 70, 72, City Road Manchester, 15. (Tel. Central 5114)

P. H. Allin and Sons,  
10-15, Bridge Street Cambridge (Tel. Camb. 3431)

R. O. Clark,  
2a, Upper King Street Norwich (Tel. Norwich 987)

Colmore Depot,  
178, Belgrave Gate Leicester (Tel. Leicester 20117)

Colmore Depot,  
77, Station Street Birmingham 5. (Tel. Midland 4004)

Colmore Depot,  
8, School Lane Liverpool, 1. (Tel. Royal 2408)

Cleare and Co., Ltd.,  
1 and 125, High Street Woolwich (Tel. Woolwich 0174)

Dene Motor Co., Ltd.,  
Haymarket Newcastle-on-Tyne 2. (Tel. Newcastle 21837)

Chas. W. Duffin,  
17 and 19, Gt. Victoria Street Belfast (Tel. Belfast 25815)

D. and J. (Motors), Ltd.,  
100-106, Hylton Road Sunderland (Tel. Sunderland 4088)

James Grose, Ltd.,  
379-381, Euston Road London, N.W.1. (Tel. Museum 8910)

Reg. Horsley,  
24, King Edward Street Leeds (Tel. Leeds 21515)

Hoe Street Garage,  
414, Hoe Street Walthamstow (Tel. Walthamstow 0930)

Hardy's Motors,  
18, 20, 22, Tooting Bec Road London, S.W.17. (Tel. Streatham 3310)

Hooley's Garage, Ltd.,  
Upper College Street Nottingham. (Tel. Nottingham 3669)

S. R. Jeffery and Son, Ltd.,  
137, High Street Guildford (Tel. Guildford 373)

Jordan and Co. (Hull), Ltd.,  
93, Prospect Street Hull (Tel. Hull 36809)

Kay's of Ealing, Ltd.,  
8 and 10, Bond Street Ealing, W.5. (Tel. Ealing 2387)

Marble Arch Motor Supplies,  
Ltd.,  
286-292, Camberwell Road London, S.E.5. (Tel. Rodney 2181)

Mountford, Reed and Co., Ltd.,  
45, Cleveland Street London, W.1. (Tel. Museum 0372)

Glanfield Lawrence, Ltd.,  
230, Tottenham Court Road London, W.1. (Tel. Museum 7611)

Putney Autos, Ltd.,  
263, Putney Bridge Road Putney, S.W.15. (Tel. Putney 2645)

P. Pike and Co., Ltd.,  
166-167, Union Street Plymouth (Tel. Plymouth 3108)

Precision Garage,  
Borough Road Gillingham (Tel. Gillingham 5551)

T. J. Ross,  
106, Lee High Road Lewisham, S.E.13. (Tel. Lee Green 0744)

J. A. Stacey,  
10-14, Ecclesall Road Sheffield 11. (Tel. Sheffield 22695)

Stanstead Motors,  
226-228, Stanstead Road Forest Hill, S.E.23. (Tel. Forest Hill 2585)

Waycott Bros.,  
14, 16, 18, Old King Street Bristol (Tel. Bristol 25619)

White Bros.,  
Northgate Road Darlington (Tel. Darlington 2379)

# GENUINE MATCHLESS PARTS

PURCHASED FROM THE FACTORY  
DIRECT OR FROM AN AGENT,  
ARE IDENTICAL WITH THE PARTS  
ORIGINALLY BUILT INTO YOUR  
MOTORCYCLE. IN GETTING  
GENUINE MATCHLESS PARTS,  
MADE BY THE FACTORY THAT  
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ACCURATELY AND GIVE THE  
UTMOST IN SATISFACTORY  
SERVICE.

IF IN DIFFICULTY WITH YOUR  
MATCHLESS MOTORCYCLE WRITE  
TO THE SERVICE DEPARTMENT  
FOR ASSISTANCE.