HINTS & TIPS

ON THE CARE AND MAINTENANCE

of

The

Incomparable

Rex-Acme

The efficiency Motor Cycle
which is making history.

Winner of the TOURIST TROPHY RACES; AUSTRIAN T.T. ITALIAN AMATEUR T.T.; BELGIUM GRAND PRIX; ULSTER GRAND PRIX; LEINSTER HUNDRED. Many World's Records have been established and broken by REX-ACME Motor Cycles. The only Motor Cycle fitted with 350 c.c. engine to secure the "Blue Riband of the Track."—The 500 c.c. Hour Record.

SPARE PARTS LIST

1927

All previous lists are hereby cancelled.

THE REX MOTOR MANUFACTURING Co., Ltd.

Telephone: Coventry 8641 COVENTRY Telegrams: "REX," Coventry

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LUBRICATION :

We recommend Wakefields "XL" Oil for General purposes, and Wakefields "Castrol R" for racing.

For Gearbox Lubrication use Wakefields "Castrol-ease" Medium.

HINTS AND TIPS.

USING KICK STARTER.

Put Gear Lever in Neutral.
Push Kick Starter Pedal down until Compression is felt.
Then loose it back to its original position.
Lift Exhaust Lever.
Put some force behind it and push down Pedal as far as it will go, releasing Exhaust Lever, just as the push down is well started before reaching halfway.

FOR STARTING OFF.

Set Carburettor for running engine steady.
Withdraw Clutch.
Put Gear Lever in Low.
Gradually open the Throttle at the same time steadily engaging Clutch.
Do not try to put in any Gear with engine running, until Clutch is released.

CHANGING FROM A LOW TO A HIGHER GEAR ON ALL MODELS.

After a good speed has been attained on Low:
Lift Clutch Lever.
Move Lever into next higher Gear.
Let Clutch in gently.

FOR CHANGING DOWN TO A LOWER GEAR.

Withdraw the Clutch.
Put Gear Lever firmly into next Lower Gear, and let the Clutch in gently.
Gear changing should not be tried on a hill for the first time.
The movements should be practised methodically in the order given, with machine on stand and engine running at various speeds; and then practised on a level open road.
The above instructions are of course only given to denote the order in which the various movements are to be made.
The time taken over the change will vary according to the speed of the engine; machine; condition of road; gradient etc.; but the real aim should be to rest between two Gears long enough for the engine speed to alter relative to the Road Wheel; quickening for a Lower Gear; and slowing for a Higher Gear.

ON SLIPPING THE CLUTCH.

This **must not** be done to assist the engine up hills. When the engine begins to labour change into the next Lower Gear; but, in traffic, or for cornering, it is quite in order and will do no harm if not carried to excess under a heavy load.

BURMAN GEARBOX.

CLUTCH ADJUSTMENT.

Models "E," "J," "L" and "M"—Adjustment is rarely necessary, and all is correct as long as Spring Nuts stand level with Face of Spring Plate. After adjusting the Clutch see that the Spring Plate lifts equally. If not, the nuts should be eased off on the Low side, and tightened on the High until it does.

CLUTCH ROD CLEARANCE—IMPORTANT.

It is important that there should always be a clearance of not less than $\frac{1}{32}$ in. between the end of the Clutch Rod and the Ball in the Clutch Lever at the Kick Starter end of the Box. Failure to allow this clearance will mean a slipping Clutch, and will probably result in burning out the Corks.

ADJUSTMENT TO TAKE UP CHAIN WEAR.

Take great care that when the Box is finally tightened up in the Frame, the CHAINS ARE NOT TIGHT ; pull round slowly for at least two turns of the largest of the two Wheels, and see that there is a slight sag in the Chain, even in the tightest place.

ADJUSTMENT FOR CHAIN WEAR.

On all models (except those with Control on the Box) the Gear positions should be checked after chain adjustment. There should be an equal clearance each side the Control Lever Latch in the middle position.

LUBRICATION.

All Boxes are sent out filled with Light Gear Grease, and should be replenished every 500 miles with LIGHT GREASE or THICK GEAR OIL, about an egg cup full. **Thick Heavy Grease must on no account be used.** Clutch plates do not require lubrication on either model.

The Clutch Operating Rod should be taken out occasionally and greased and all outside moving joints should be kept oiled, including the Clutch cable.

We have thoroughly tested and can confidently recommend Wakefield " Castrolease Medium " for Gear Box lubrication.

TAKING DOWN THE CLUTCH.

Remove the Cover Ring.

Take off the 4 Spring Nuts and Spring Plate.

The Clutch Plates can then be drawn out, but care should be taken to reassemble them in the correct order.

The first plate to be put in of either model is the thick Plain Plate, then a Cork Plate and Plain Plate alternately, finishing with a Plain Plate.

TO TAKE OFF THE CLUTCH CENTRE.

Unscrew the Nut, about 1 turn, and with a light hammer and a piece of brass or copper, give the end of the Shaft a few sharp blows, this will release the Centre from the taper, and Clutch Case, Chain wheel and Centre will come off together.

TAKING GEAR BOX APART.

This is not a job we recommend except by a Mechanic.

It is far better when anything is wrong to send the Box to the Works, but we give the following instructions for those who prefer to do it themselves :

Take off the Clutch Lever Bracket, Kick Starter Cover Plate, Cotter and Washer from Kick Starter Centre Pin, and Clutch Rod out of Main Shaft.

Draw Kick Starter Lever far enough off the Centre Pin to get it round past the Studs and unwind the Spring ; the Lever, Quadrant and Spring will all come off together.

Take the Nut off end of Main Shaft, also the Spring, the Ratchet Pinion and the Ratchet Nut.

It is advisable while unscrewing the Nuts at either end of the Main Shaft to leave on the Rear Chain, the engaging of one of the Gears then Locks the Shaft.

Next, on Model " J," take off the Control Lever. This is not necessary on Model " M," as the Control will come off complete with the Kick Starter Case, on removing the Screws which hold the Case to the Gear Box. The Layshaft Spindle will come out fixed in the Kick Starter Case, and all the Gears can then be taken out except the Driving Gear. To remove this, take off the Clutch (see special instructions), the Driving Gear Nut and Sprocket or Pulley, also take out the Inner Gear Lever on all Models, the Driving Gear will then push through into the Box. Do not use Screwdrivers between Joint faces, it makes them leak and throws them out of alignment. A pull, and a jar with a Light Hammer is all that is necessary.

ON RE-ASSEMBLING.

With Model " J " take care that the Operating Lever Block is in the Slot of Sliding Dog, and that the end of the Control Inner Lever is in the Trunnion Block.

With Models " E," " L " and " M," take care that the Operating Lever Block is in the Slot of the Main Shaft Sliding Gear, and the Flange and Slot of the 2 Sliding Gears are in proper relation, and also in Model " M " that the Ball on the Control Inner Lever is in place in the end of the Ball Crank Lever.

" BLACKBURNE " ENGINES.

The performance of the engine is dependent upon the efficient co-operation of three important factors, namely, carburation, ignition, and lubrication.

CARBURATION.

The proportion of air to petrol drawn into the engine through the carburetter is extremely important, and is governed by the size of jet nozzle in the carburetter. If the mixture is too rich, i.e., the proportion of petrol is too great to that of air, misfiring will occur at slow engine speeds, and black smoke will issue from the exhaust pipe. If, on the other hand, the mixture is too weak, i.e., the proportion of petrol is too small to that of air " popping back " will take place in the carburetter and the engine will misfire or stop altogether. Too rich a mixture will be caused either by the use of too large a jet in the carburetter or by flooding of the carburetter, which in turn may be due to any one of the following causes :

1. Dirt between float needle and its seating.
2. Bent needle.
3. Punctured float.
4. Float needle binding in lid of float chamber.

Too rich a mixture will not cause serious damage to the engine, but on the other hand, too weak a mixture may cause overheating and consequential damage. It is desirable to keep the mixture on the rich side rather than on the weak. This is due to the fact that the richer the mixture the cooler will the engine run. A weak mixture can be due to any of the following causes :

1. Dirt or water in petrol.
2. Insufficient head or supply of petrol.
3. Air lock in the petrol tank.
4. Air leaks in the induction system or at Inlet Valve Guide.
5. Low petrol level in float chamber due to the level being incorrectly adjusted or to the carburetter not being fitted vertically.
6. Jet size too small.

IGNITION.

Though trouble is not often experienced with the magneto, it is advisable to have a copy of the maker's Instruction booklet available. It is important that the setting of the magneto should be correct in accordance with the instructions given on page 7 of this booklet. If the magneto is timed such that the contact breaker points break too early the engine will knock and overheat. If, on the other hand, the timing is too late, the engine will lose power and overheat also.

In the event of the magneto appearing to be at fault, attention is directed to the following parts :—

The rocker arm of the contact breaker must work quite freely, and the platinum points must be clean and free from pitting. If pitted they should be trimmed with fine emery cloth or a small file. The contact breaker points should show a gap of about the thickness of a postcard (or half millimetre). The carbon brush at the high tension terminal must be quite free in its guide, and the spring be sufficient for it to form good contact with the collector ring. The latter should be kept free from oil. The high-tension wire must not be chafed or nipped tightly, as this is likely to cause a " short circuit."

LUBRICATION.

It is of paramount importance that the engine be correctly lubricated. An insufficiency of oil ruins the engine ; too much oil fouls it ; it is better to give too much than too little. The regulator should be set so that the engine is given 30 to 40 drops per minute according to the capacity and load of the engine. Blue smoke showing at the exhaust outlet is an indication that the engine is getting too much oil, and the supply should be reduced as an excess is likely to foul the sparking plug points, and necessitate decarbonising at frequent intervals. The plug in the bottom of the crankcase should be removed and all surplus oil drawn off every five or six hundred miles. The plug should then be replaced and a supply of fresh oil should be put into the engine. It is important that only suitable grades of good quality oil should be used in the engine. We recommend Wakefield's " X L " which we have found suited to our engines.

For racing purposes Wakefield's " Castrol R " is recommended. Grades suitable for racing do not mix with grades for touring. In consequence, it is of vital importance that both the oil tank, oil pipes and crankcase be thoroughly cleaned whenever a change is made from racing grade to touring, and vice versa.

SPARKING PLUGS.

The Sparking Plug can greatly influence the performance of the engine either for good or evil. Especially on high efficiency O.H.V. engines is it necessary that best quality sparking plugs should be used. As a general rule, we do not recommend the use of multi-point sparking plugs. For S.V. engines the KLG type HS3 or the Lodge Model " H " are types among others that can be recommended. For O.H.V. models for touring the KLG type HS3, F12 or Lodge Model " H " are suitable.

For racing the KLG type CB, 244, 180, 221 or Lodge BR4 and BR29 can be recommended. The points of the sparking plug should be set such that the gap does not exceed $\frac{1}{32}$ in. It is well to remember the following points in connection with trouble experienced with sparking plugs and which are often not really the fault of the sparking plugs at all, namely, **over-oiling and fusing of the sparking plug.** Apparent over-oiling is often really due to the mixture being much too rich (see paragraph on Carburation). Fusing of the sparking plug is often due to the engine being run on too weak a mixture or to the ignition being set too far advanced. See previous remarks on this subject.

THE ENGINE.

An engine, as sent out, with fair treatment, should run for at least 2,000 or 3,000 miles without requiring attention. In the event of loss in efficiency and power output or poor compression after running for a season, it may be assumed that an overhaul is required.

DECARBONIZATION AND OVERHAUL OF " BLACKBURNE " ENGINE.

This operation will take between two to four hours, varying with the experience of the operator ; detachable head engines may be dealt with in an even shorter space of time.

REMOVAL OF CYLINDER AND HEAD.

First remove the carburetter, and disconnect the exhaust pipe union at the exhaust port and remove the sparking plug. On engines fitted with a detachable cylinder head the head holding down bolts should be removed and the head lifted clear. If necessary, a little paraffin applied to the threads will facilitate these operations. On engines where the head and cylinder are all in one piece, it will be necessary to slacken off the four nuts on the cylinder flanges and to pull the cylinder and head off complete. The top of the piston should be scraped with a blunt knife or chisel until it is free from all carbon deposit.

The valves should then be removed and all carbon deposit should be chipped from the heads of the cylinders and ports, no projections being left, as these are likely to cause pre-ignition. Care must be taken that the valve seats are not damaged, and in the event of their being pitted they should be re-ground. All parts should be thoroughly cleansed in paraffin and the engine may be washed out with paraffin. If the cylinder barrel is removed, the piston rings may be examined, and if they are not quite free in their grooves they should be carefully removed, and any carbon that may be present should be removed from both rings and grooves. The rings should be bright and polished, and if either of the rings is discoloured it indicates that gases are escaping past it, and a new ring should then be fitted. The rings should be a good fit in their grooves and there should be a gap between the ends of the rings when the rings are in the cylinder of not less than ·003 in. nor greater than ·014 in.

If the piston is removed, care must be taken to see that it is replaced the same way round in the cylinder as it had been running previously.

On re-assembling the engine it must be seen that all parts are perfectly clean and free from the slightest trace of grit. Before replacing the cylinder the sides of the piston and cylinder wall should be smeared with a thin film of engine oil, and it should be seen that the joints of the piston rings are not opposite. The paper washer on the top face of the crankcase should be renewed if broken or damaged, and great care should be taken to see that the cylinder flange nuts are evenly tightened.

REPLACEMENT OF " BLACKBURNE " DETACHABLE CYLINDER HEAD.

(All O.H.V. Engines ; Side Valve Engines prior to 1925).

The copper washer forming the joint between the cylinder head and cylinder barrel should be carefully cleaned and examined, and if damaged should at once be replaced. The faces of the joint between the cylinder and head must also be carefully cleaned. Great care should be taken that the cylinder head holding down nuts are tightened evenly and after the engine has been run for a little while, they should again be tightened to take up any shrinkage that may have occurred. This point should receive special care when the old gasket washers are replaced by new ones.

If the springs on the exhaust valve become appreciably weaker than those on the inlet valve they must at once be renewed.

Should the flywheel be removed, extreme care must be taken when re-fitting as it is essential that the flywheel be properly secured and fastened very tightly (see instructions for removal and replacement of flywheel).

Before starting up the engine a supply of oil should be injected into the crankcase. The engine should not require overhaul more than once in every 3,000 miles. If the supply of oil is carefully regulated it is possible to run the engine a far greater distance before overhaul is necessary.

GENERAL NOTES ON RUNNING AND ADJUSTMENT.

GRINDING IN VALVES.

Remove the valves from the cylinder head and thoroughly clean the heads and stems. Smear a small quantity of grinding compound on the valve seats and rotate the valve on its seating with a semi-rotary motion, lifting occasionally to ensure even distribution of the grinding compound. Care should be taken not to give complete turns as this tends to make grooves in the seating. Continue this operation until the valve faces are quite bright all round. The valves and valve seats should be washed clean of emery with paraffin or petrol and replaced in position. Inlet and exhaust valves are not interchangeable.

PISTON RINGS.

When the engine has run about 3,000 miles it is probable that the grooves in which the piston rings work are carbonized. The rings should be removed and the grooves and the back of the rings should be thoroughly cleaned and all traces of carbon removed.

Care should be taken that the joints of the two rings are not opposite. In time the piston rings may lose their spring and the gap at the ends of the ring become too wide. Replacement should then be made.

If the compression is weak and all other possible sources of leakage have been tested, it may be assumed that new piston rings are required.

GUDGEON PIN ASSEMBLY.

The Gudgeon Pin is of the fully floating type, free to rotate in the small end bush of the connecting rod, and in the bosses of the aluminium piston. The ends of the Gudgeon Pin are protected from scoring the cylinder wall by end caps, and when removing or replacing the Gudgeon Pin in the piston, special attention must be paid to the following points :

1. The end caps must be a very tight fit in the Gudgeon Pin.
2. In pushing the Gudgeon Pin in or out of the piston, great care must be taken not to damage the surface of the cap or to crack the cap.
3. The end of the cap is shaped to conform with the contour of the cylinder wall and should be polished smooth.
4. It should be noted that the Gudgeon Pin will automatically be a tighter fit in the piston when the latter is cold than when hot, therefore, to facilitate the removal or replacement of the Gudgeon Pin in the piston, the piston may, if necessary, be warmed.

REMOVAL OF THE FLYWHEEL.

Should it become necessary to detach the flywheel from crankshaft, proceed as follows :—

1. Remove extractor cap on flywheel boss, using spanner supplied with engine.
2. Unscrew flywheel nut.
3. Insert extractor disc in cap (where no extractor screw is provided).
4. Replace extractor cap on flywheel and screw up until contact is made with end of crankshaft, afterwards tightening by giving it one or two turns, until flywheel is withdrawn.

   The flywheel should now be readily removed, but in case of difficulty, a blow with a hammer on head of the cap is of assistance.

When replacing the flywheel, attention should be given to the following points :

1. The taper on crankshaft and in flywheel must be quite clean and dry. In the event of a new key being used, great care must be taken that it does not prevent the flywheel fitting true on shaft.
2. The nut on crankshaft securing flywheel must be dead tight, necessitating the use of a very long spanner.
3. Remove extractor disc or slacken set screw and replace extractor cap.

TAPPETS.

To vary the tappet clearance, the head should be held while the locknut is loosened, when the desired alteration can be made, a hexagon is provided on the tappet in case it should be necessary to hold the tappet stem while adjusting the tappet clearance. When the adjustment has been corrected, carefully secure locknut.

TAPPET CLEARANCES (WITH ENGINE COLD).

	Inlet Valve.		Exhaust Valve.
Side Valve Engines ...	·002 in.	...	·005 in.
O.H.V. Engines ...	·001 in.	...	·002 in.

VALVE TIMING.

It is generally assumed that this is a particularly difficult operation. If the following instructions, however, are carefully followed out, the operation should present no difficulty to a person possessing a very limited knowledge of the principles of the internal combustion engine.

The two following points should be remembered :

1. The Inlet Valve starts to open slightly before the commencement of the induction stroke.
2. The Exhaust Valve finally closes slightly after the commencement of the induction stroke, and it will thus be seen that both valves are open at the same time for a short period. This period is called the period of overlap.

To obtain the correct valve setting the final closing of the exhaust valve should occur three parts of the overlap after the completion of the exhaust stroke, and the inlet valve should start to open two parts of the overlap before the completion of the exhaust stroke.

In order to measure the exact period of overlap :

Put the camwheel into the engine and measure how many degrees of angle or millimetres of stroke the engine has to be rotated through from the commencement of the Inlet opening to the completion of the Exhaust closing. Divide this measurement in the ratios of 3 to 2, and time the engine such that the Inlet opens two-fifths of the overlap before top, and the Exhaust closes three-fifths after top.

TIMING IN DEGREES.

Suppose that there are 40° overlap, the timing should be set such that the Inlet valve opens 16° before Top Dead Centre and Exhaust valve closes 24° after Top Dead Centre. The other actions of opening and closing will be then automatically correct.

TIMING IN MILLIMETRES OF STROKE.

Suppose there are five millimetres of overlap, the timing should be set such that the Inlet valve opens two millimetres before Top Dead Centre and Exhaust valve closes three millimetres after Top Dead Centre. The other actions of opening and closing will be then automatically correct.

MAGNETO TIMING.

Remove compression tap or sparking plug on O.H.V. models and rotate flywheel until piston is at Top Dead Centre, both valves closed. Set ignition control to " fully advanced " position and rotate flywheel backwards until piston is eleven millimetres from Top Dead Centre. Move contact breaker in direction of rotation until points are just separating and tighten up chain sprocket, taking care that this operation does not alter setting.

LOSS OF POWER AND OVERHEATING.

May be due to the following causes :

A. Inadequate lubrication will readily cause trouble. See previous remarks on this subject.,

B. Leakage at the joints between valve cap and cylinder head, and between cylinder head and cylinder barrel on detachable head engines. If leaking, the copper washer should be renewed. They can be readily tested by smearing them over with engine oil and trying the compression with the kick-starter, when if the joints are leaking the oil will bubble up at the defective part.

C. Gases escaping past valves. If the valve seatings become pitted or dirty, they should be ground in. See instructions under " Grinding in Valves."

D. Leakage past piston rings. See paragraph on piston rings.

E. Unsuitable or faulty type of sparking plug. See paragraph on Sparking Plugs.

F. Weak or broken valve spring. If the springs have lost their temper and become too weak, new springs should at once be fitted. It will be noted that the ends of the valve spring that lie nearest to the engine are weaker than the other ends on account of the heat which they have to withstand. When replacing springs, therefore, after removal at any time, care should be taken to place the compressed or weaker end next to the cylinder face, otherwise both ends will be affected by the heat to the detriment of the springs.

G. Tappet clearances and valve and ignition timing should be checked.

POSSIBLE CAUSES OF ERRATIC RUNNING.

1. Stopped petrol pipe or water in petrol. Petrol not turned on or tank empty.
2. Choked jet or stopped fuel passages in carburetter. These can be cleared with a piece of fine wire, such as strands of Bowden cable. When the petrol supply is at fault or the jet is choked the trouble may be readily diagnosed as the engine suddenly develops misfiring or blowing back through the carburetter and can only be run with the air supply reduced.
3. Sparking plug points out of adjustment or dirty. Clean the plug with petrol and check the gap at the points. This should be about the thickness of a postcard and under no circumstances should exceed $\frac{1}{32}$ in.
4. Magneto contact breaker points pitted or incorrectly adjusted. See instructions under " Ignition " for cleaning and adjustment.

POINTS TO REMEMBER.

1. Over-oiling can cause no real damage.
   Under-oiling may result in a wrecked engine.
2. Use suitable and good quality grades of lubricating oil only.
3. Sprockets have **Left Hand** threads when fitted between flywheel and crankcase, and a **Right Hand** thread when fitted outside the flywheel. The crankshaft pinion wheel locking screw has a **Right Hand** thread.
4. Do not overlook the lubrication of the overhead rockers on O.H.V. engines. We recommend thick oil or a mixture of engine oil and graphite for this purpose.
5. A little graphite grease smeared occasionally on the valve stems will minimise wear and eliminate a tendency to squeak.
6. Do not habitually use the Exhaust lifter for governing the speed of a machine. Such a practice leads to burning of the Exhaust valve seating and causes serious increase in petrol consumption.
7. It is better to change down into second gear early and to allow the engine to " rev " rather than to hang on to top gear until the last possible moment.
8. If you decide to fit a sidecar or discontinue its use, remember that a different set of gear ratios will be needed. The necessary reduction or increase may be obtained by the use of different engine sprockets.
9. Always obtain your spares direct from us or from one of our recognised agents. We accept no responsibility whatever for breakage or consequential damage resulting from the use of spare parts which are not of our manufacture.
10. If in doubt, or desiring information on any point relating to " Blackburne " engines, we shall always be happy to assist you to the best of our ability. Such communications will at all times receive our most careful attention.

CARE OF TRANSMISSION CHAIN FROM ENGINE TO COUNTER SHAFT.

The engine chain must be kept properly lubricated and adjusted. If no provision is made for a continuous oil feed to the chain, we recommend that the chain should be occasionally treated with a semi-solid lubricant such as Graphite grease or other similar compound. The chain should be removed and washed free from dirt and grit in paraffin, and dried. It should then be immersed in the lubricant which should be warmed until liquid and then left to cool, excess lubricant being finally removed. This process should be repeated every six or seven hundred miles.

FLYWHEEL RING.

Excessive chain noise and flywheel ring are nearly always due to the engine chain being worn out or in bad condition. The chief causes of chain trouble are :

1. Insufficient lubrication.
2. Chain out of adjustment, either too tight or too slack.
3. Engine and crankshaft sprocket out of line resulting in seizure of side links and chain.
4. Teeth of engine sprocket badly worn.

RACING.

NOTES ON TUNING AND ADJUSTMENT OF O.H.V. " BLACKBURNE " ENGINES FOR COMPETITION WORK.

All standard O.H.V. engines as delivered are intended to be used as fast touring models. If it is desired to use them for competition work or hill climbs, the high compression piston and racing cam should be obtained from the manufacturers.

Specially tuned racing engines are supplied at an extra cost to order. Particulars should be obtained from the manufacturers of machines fitting " Blackburne " engines or from us direct. The racing engine differs from the standard engine in regard to the following points :—

1. A light high compression piston is fitted.
2. A racing cam is fitted.
3. The inlet and exhaust ports are filed and fettled out and finally polished.
4. The valve seatings are rounded off and specially finished.
5. All clearances are increased suitably for racing.
6. The connecting rod is slightly lightened and polished.
7. The copper washer between cylinder and head is dispensed with and the cylinder head is ground direct on to the cylinder barrel.
8. All adjustments and clearances are very carefully checked and the engine is subjected to a special test.

On no account should the piston or connecting rod be drilled, and we will accept no responsibility for trouble that may arise in consequence of any such alterations being made.

VALVE TIMING.

The standard cam is essentially suitable for touring. For racing, long or short distances, a special cam is obtainable. For the correct setting of either cam see Valve Timing, page 7. If the directions given are carefully followed out, the best setting is automatically obtained.

MAGNETO TIMING.

With the contact breaker fully advanced, the points should commence to break 45° or 13 m/m before Top Dead Centre.

VALVE ADJUSTMENT.

1. Seatings. The valve should be ground in with fine grinding paste and finally finished off with metal polish. The width of the seatings both on valve and in the cylinder head may be adjusted to a width not exceeding $\frac{1}{16}$ in.
2. Attention should be paid to the fit of the valve stems in their guides. The stem should be polished and should work freely in the guide. If the valve stem is too tight a fit in the guide a considerable drop in power will be experienced.

PISTON RINGS.

These should be lapped into the cylinder with metal polish and must show good contact all round. The gap at the joint should be from ·006 in.—·010 in.

TAPPET ADJUSTMENT.

Engine cold. Both tappets should be adjusted such, that the clearance is approximately ·001 in.

SPARKING PLUGS.

For racing we recommend the K.L.G. Model C.B., 244, 221 or 180, or Lodge Model B.R. 4 or B.R. 29.

CYLINDER HEAD JOINT.

We recommend that the copper washer between the cylinder and head should be discarded. It is possible to obtain a good gastight joint between the cylinder and head without the use of the copper washer, and its omission will further slightly raise the compression ratio. The following instructions, however, should be carefully carried out.

Grind the cylinder head direct on to the cylinder with fine grinding paste until the two surfaces of the joint fit together perfectly all over. In connection with this operation it will probably be found necessary to file back the spigot on the cylinder head, in order that it may clear the inner flange on the cylinder barrel by not less than ·006 in. The head may then be re-assembled on the cylinder, omitting the copper washer and using instead some heat resisting jointing compound such as Firmantite, which may be obtained from us.

LUBRICATION.

For racing we recommend Wakefield's "Castrol Grade R," or failing the above, pure Castor Oil. The above oils are from a vegetable basis; the majority of other oils used for lubrication of combustion engines are manufactured from a mineral basis. Mineral and vegetable oils **will not mix,** and should both types ever be present in an engine at the same time, there is grave risk of engine seizure. If, therefore, it is ever desired to change over either from a vegetable to mineral oil or vice versa, it is of the utmost importance that the whole engine and oil tank and lubrication system should be thoroughly washed out with Benzol.

LUBRICATION OF O.H.V. ROCKERS.

We recommend the use of either very thick oil such as "Castrol S." or a mixture of thick oil and Graphite. The ends of the push rods should be occasionally smeared with Graphite also.

EXHAUST LIFTER.

The exhaust lifter should only be used for starting. It should not be used for changing gear or for stopping the machine after running, as under such conditions there would be risk of the valves touching the piston.

GEAR RATIOS.

The 350 cc. engine gives off its maximum power at about 4,800 r.p.m. ; the 250 cc. at about 5,200 r.p.m. For flat racing a top gear ratio of about 4·9 or 5·1 may be used on the 350 model and on the 250 top ratio between 5·8 and 6·1. For hill climbs and standing start sprint races on the flat, lower gear ratios will of course be required having regard to the maximum speed the engine is likely to attain on the course.

CARBURETTER SETTING.

It must be remembered that a weak mixture will tend to cause serious overheating and burning of sparking plugs and exhaust valves, and thereby further serious damage to the engine. On the other hand a mixture slightly on the rich side will keep the engine cool and cause very much less wear. The setting of the carburetter has a great bearing upon the running temperature of the engine and is therefore of very great importance.

If further information or any assistance is required in connection with the tuning of these engines, we are always ready to do our best to supply the necessary particulars immediately upon the receipt of enquiries.

ROLLER BEARING ROCKER GEAR.

The design of the rocker gear for O.H.V. Blackburne engines has recently been improved by mounting the rockers upon caged roller bearings. The ends of the valves are fitted with hardened steel caps and the top of the push rod is cup shaped to receive the ball end of the rocker.

The bearings of the rocker gear should be kept well lubricated with a mixture of graphite grease and engine oil. The plugs fitted in the ends of the rocker standards should be removed and the lubricant injected by means of a grease gun.

The cupped ends of the push rods and of the tappets should be occasionally filled with graphite grease.

ASSEMBLY OF THE ROCKER GEAR.

In the course of general overhaul of the engine it would be desirable to dismantle the rocker gear in order to thoroughly clean it. The rocker gear should be assembled in the following manner :—

The roller cages should be smeared with thick grease and the rollers should then be assembled into the roller cages. It will be found that the grease will keep the rollers approximately in their correct position.

A piece of round steel should then be obtained, length just under 1¾ ins., diameter just under ⅜ in. The cages complete with rollers should then be threaded on to this piece of round steel together with two washers and distance piece, the two washers being outside each cage, the cage slots facing the washers and the distance piece in the middle between the two cages. The piece of steel complete with washers, cages, distance piece and rollers should then be inserted in the barrel of the rocker. Place the rocker in position between the arms of the standard and push the rocker pin through the standard and rocker barrel, thereby displacing the piece of steel bar. Having pushed the rocker pin right home, the locking plate for holding the two standards together may be attached followed by the two lock nuts and lubricators, the latter being fitted at the opposite end of the rocker pin. Before actually fitting the lubricating plugs, the rockers should be filled with lubricant.

REPAIRS.

Repairs are undertaken in a department specially organised and equipped for such work at the lowest cost consistent with good material and expert workmanship and every possible care is taken to ensure satisfaction. No guarantee is however given. All repairs should be sent to us carriage paid and with fullest instructions concerning the repairs. The repairs will than be carefully examined and a detailed estimate of the cost of these repairs will be sent for the approval of the owner.

If an engine is sent to us for repairs or adjustment it should be placed in a very strong wooden box with ample packing round it. The label accompanying the repairs must distinctly state the name and address of the sender of the engine.

BEST & LLOYD MECHANICAL PUMP.

ADJUSTING THE OIL SUPPLY.

The flow of oil is regulated by turning block by means of which the supply may be set to any position, to give the amount of oil required by the engine.

To turn the block, slightly loosen the two screws which hold the fixing plate. Half a turn is sufficient. Adjust the block with a pair of pliers or small spanner and tighten screws again.

It is dangerous to undo the screws too far while the engine is running.

RE-ASSEMBLING.

When the pump has been taken to pieces for examination it should be re-assembled in the following manner.

Place the gear wheel (with the check side upwards) in the body of the pump.

Examine the steel plunger and see that the loose key which engages in the keyway of the gear wheel is in position, then place the end of the plunger in the groove of the regulating block and give one half turn. Put the plunger and regulating block into the pump body and turn the regulating block round, at the same time applying a little pressure, until the key of the plunger engages in the keyway of the wheel.

The serrations in the face of the regulating block should stand just above the top face of the pump body when correctly assembled. Secure the regulating block in position by means of the fixing plate and two screws. Place the worm drive in position and refix the pump.

When the pump is started up the regulating block should be set at the full " ON " position and the delivery of oil reduced by turning the regulating block until the correct setting is obtained.

OIL INDICATOR.

In lieu of a sight feed chamber on the tank, a " tell-tale " or plunger type of indicator is sometimes fitted close to the mechanical pump. When the oil is passing to the engine the knob on the indicator plunger is raised from its seating.

The indicator plunger is spring loaded and readily shows the pulsations of the pump.

Should the pulsations cease and the knob return to its seat very little oil is passing, this should be tested by removing the nut and nipple.

Leakage of oil around the plunger is prevented by means of a suitable cup leather.

TERMS OF BUSINESS.

PAYMENT.

In all cases where we have no ledger account, an invoice will be submitted to intending purchasers, on payment of which the goods will be forwarded, or approved references must be given.

REPAIRS.

Repairs are charged at net cash prices in all cases. Machines or parts for repair must be forwarded, carriage paid to the works, with sender's name attached, and an advice sent under separate cover. All accessories should be removed.

Machines, when finished, are handed to the Railway Company and signed for as being received in good condition, and, unless otherwise ordered, are consigned at the lowest rates, i.e., at consignee's risk. In case of damage all claims should be addressed to the carriers.

SPARE PARTS OR REPLACEMENTS.

When Ordering Spare Parts or Replacements, it is advisable to send patterns, so as to ensure the order being executed correctly. If this cannot be done, please furnish the number of the machine (which will be found stamped on the ball head or seat lug), and also number of the engine (stamped on crank case).

The despatch of pattern should be promptly advised BY SEPARATE POST, and full instructions clearly given, otherwise unnecessary delay and an oyance are often caused.

Customers having no account with us should not fail to accompany orders with remittance, which must include postage.

When making enquiries respecting any part or repair, PLEASE QUOTE OUR REFERENCE NUMBER IN EVERY CASE, otherwise it is difficult to trace the order.

Do not enclose cash (coin or notes) with patterns. Remittances should be sent letter post.

PRICE MAINTENANCE.

It is our desire, while giving the best value for money, to prevent any undue cutting of prices, and our goods are only sold on the strict condition that they will not at any time be resold at less than the retail prices set out in our current catalogue.

DEPOSIT SYSTEM.

Regular customers are recommended to open a deposit account with the Company to prevent the delay in executing urgent sundry orders through pro forma invoices. The saving of annoyance and delay will be apparent when goods can be despatched on receipt of telegraphic or telephonic instructions.

CONDITIONS OF SALE.

All goods of Rex-Acme manufacture are sold under guarantee as below. The specialities of other firms are outside our warranty and only bear the guarantee given by the various makers to the public.

THE COMPANY GIVE THE FOLLOWING GUARANTEE WITH THEIR MOTOR CYCLES:

WE give the following guarantee with our Motor Cycles instead of the guarantee implied by statute or otherwise, as to the quality or fitness of such machines for the purpose of motor cycling; any such implied guarantee being in all cases excluded, nor can any claim for consequential damages be entertained. In the case of machines which have been used for "hiring out" purposes or from which our Trade Mark 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 material and workmanship; but this guarantee is to extend and to be in force for three months only from the date of purchase and damages for which we make ourselves responsible under this guarantee are limited to the replacement of any part which may have proved defective.

WE UNDERTAKE, subject to the conditions mentioned below, to make good at any time within three months any defects in these respects. As Motor Cycles are easily liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear-and-tear, misuse or neglect.

CONDITIONS OF GUARANTEE. If a defective part should be found in our Motor Cycles or in any part replaced, it must be sent to us, carriage paid, and accompanied by an intimation from the sender that he desires to have it repaired free of charge under our guarantee, and he must also furnish at the same time with the number of the machine, the name of the agent from whom he purchased, and the date of the purchase, or the date when the alleged defective part was replaced, whichever applies. Failing compliance with the above no notice will be taken of anything which may arrive, but such articles will lie here at the risk of the senders; and this guarantee, or any implied guarantee, shall not be enforceable.

We guarantee only those machines which are bought either direct from us or from one of our duly authorised agents, and under no other conditions.

We do not guarantee the specialities of other firms, such as tyres, saddles, chains, lamps, etc., or of any component part supplied to the order of the purchaser differing from our specification standard supplied with our Motor Cycles or otherwise.