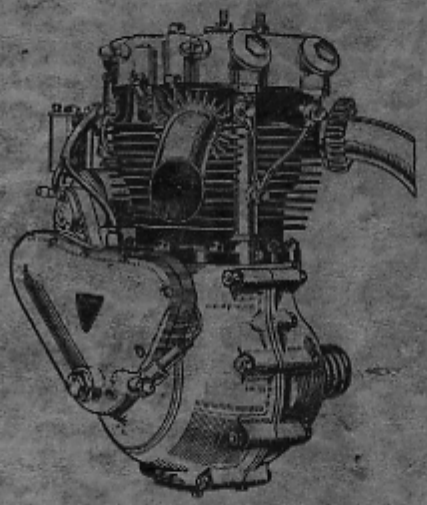
ENGINE 1153
FRAME FC 1630

TRIUMPH



INSTRUCTION BOOK

for

1939

TIGER "100," "80" & "70"

"SPEED TWIN" 6S, 5H, 5S, 3H,

3S, 3SC, 2H & 2HC

OPERATION AND CARE OF 1939

TRIUMPH

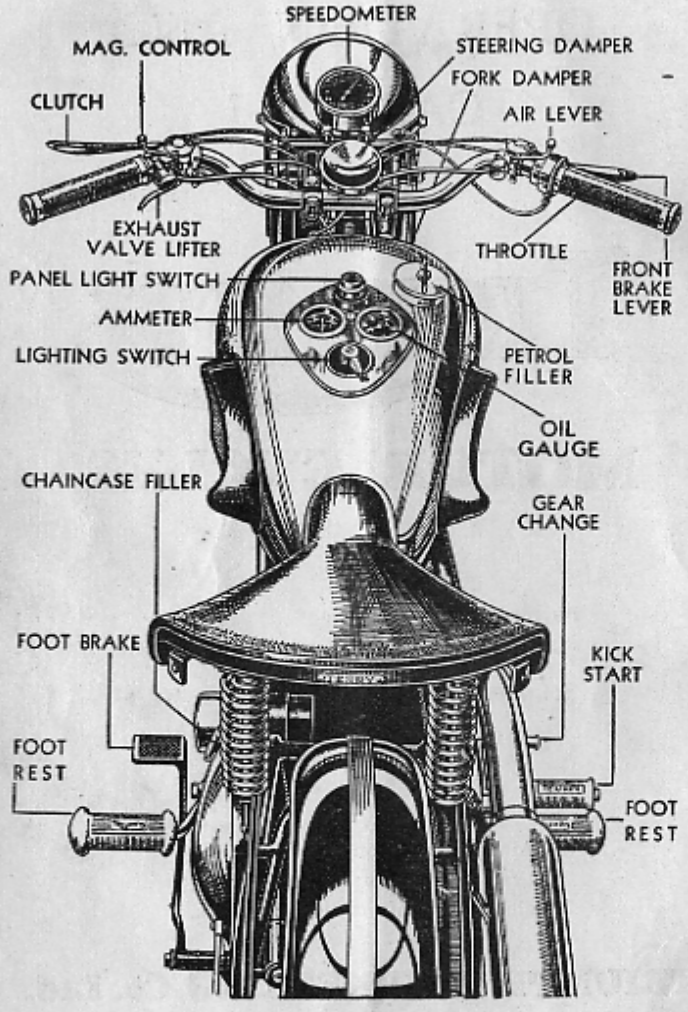
MOTOR CYCLES

MODELS:

TIGER "100," "80" & "70"
"SPEED TWIN," DE LUXE 6S,
5H, 5S, 3H, 3S, 3SC, 3SW, 2H,
AND 2HC.

Always mention Engine and Frame Numbers when asking either for information or parts.

TRIUMPH ENGINEERING Co. Ltd.
COVENTRY



Triumph Motor Cycle Layout.

INTRODUCTION

YOUR new motor cycle is a complicated piece of mechanism and in order to procure it and enjoy your sport with a new machine, you have expended a comparatively large sum of money. To obtain the best possible result from your investment you must keep your machine in such condition that it will give you long and satisfactory service. You should read this instruction book carefully and follow the advice it contains with care and regularity. If you ever require additional information, the Triumph Service Department will always be pleased to assist you if you write them fully and quote your engine number.

INDEX.

TAKING OVER THE MACHINE.

After taking delivery of your machine, and before taking it on the road, you should check it over very carefully and make certain that all parts are properly lubricated, and that the oil tank, primary chaincase and gearbox oil levels are correct. (*See pages 13 and 16*). The tyres should be checked with a pressure gauge to see that they are at the correct pressure (*see page 30*) and the controls, footrests, handlebars, etc., should be adjusted in order to give you a comfortable riding position (*see page 6*). Then after putting petrol in the tank, the machine will be ready to start up. Any anti-knock fuel can be used, such as Ethyl, Discol, National Benzole Mixture, or Koolmotor. "Straight" No. 1 petrols, or commercial grades of any kind should not be employed, as these engines are not designed to run satisfactorily on such spirits.

STARTING UP.

Even if you are an experienced motor cyclist, it will be necessary for you to find out the most advantageous control positions in which to start up your particular engine. Triumph engines are easy starters, but if the controls are not properly set, some difficulty may be encountered. Many riders make the mistake of over-flooding the carburetter, which gives a very rich mixture and causes difficult starting. To start up the engine :

1. See that the gear is located in the neutral position (note indicator on gearbox).
2. Lift clutch and depress the kickstarter to separate the clutch plates.
3. Retard the ignition very slightly by pushing the lever about $\frac{1}{8}$" to the front of the handle-bar.
4. Completely close the air control by turning the lever to the front of the handlebar as far as it will go.
5. Turn on the petrol and flood the carburetter a little by depressing the tickler on the top of the float chamber. A certain amount of experience is required in order to ascertain the amount of flooding which gives the best results, but the tickler should not be depressed until petrol flows in a constant stream from the air holes in the top of the chamber.

6. Open the throttle about four clicks on the twist grip. The grip opens inwards and is closed when it is twisted outwards as far as it will go.
7. Turn engine over with kickstarter until compression is felt, and then raise the exhaust lifter and turn engine just over compression. Twin models have no exhaust lifter. On these machines the kick starter crank should be moved down to a horizontal position by freeing the clutch.
8. Give the kickstarter a long swinging kick, when the engine should fire immediately. If the controls are not in the ideal position a second or third kick may be necessary.

As soon as the engine starts, advance the ignition fully and open the air lever as far as possible. With single cylinder machines it will probably be found that the engine will take full air as soon as it is started. With the "Twin," however, some preliminary warming up is usually necessary before the air lever can be fully opened. It is particularly important to open the air as soon as possible, as otherwise excessive petrol consumption will result.

When the engine starts, attention should be paid to the oil pressure gauge. In the case of single cylinder machines, the minimum oil pressure should be five pounds, though with a cold engine the reading may be considerably higher. With the "Twins" the minimum oil pressure should be 35 pounds. Both these figures should be registered with the engine running slowly. If the oil pressure does not register correctly, then the engine should be stopped immediately and the matter investigated. (See page 13).

RIDING POSITION.

It is advisable to become familiar with the positions of the controls with the machine on the stand before it is taken on the road. The handle-bar levers, horn button, etc., should be adjusted to suit your individual taste, and so that the controls come easily to hand.

The footrests are adjusted by slacking-off the securing nuts. That on the near-side is located on the primary chaincase by

means of a peg which fits into holes in the case, and gives a variety of positions. The footrest on the off-side is fitted to a taper distance piece, and can be adjusted to any required position. The handle-bars are clamped to the forks and by slacking off the clamping bolts can be adjusted for position. The clamps can be raised or lowered after slacking off the two large nuts on the head clip. The saddle position is adjusted within limits by means of the saddle spring bolts, which are secured in the two lugs attached to the back frame. There is a stop operating against the foot brake pedal so that it can be adjusted for position, and comes easily to the toe whatever the foot-rest adjustment. If this stop is adjusted then it will be necessary to re-adjust the rear brake accordingly (see page 29). It is well worth spending a little time in adjusting the riding position, because quite apart from this making the machine very much more comfortable to ride, it also makes it more controllable and is, therefore, an aid to safety.

When the machine is new, it is important to see that all nuts and bolts are kept properly tightened up. The whole of the machine should be gone over periodically, and every nut and bolt tried for tightness. In addition to being a very necessary precaution, this operation will also make the rider familiar with the various parts of the machine, and will prevent any loss or damage through slackness.

RUNNING IN.

For many years, motor cyclists were advised to ride their new machines at a speed not in excess of 30 m.p.h. for the first 1,000 miles. With a modern machine of high, or comparatively high, performance, this type of running-in is entirely useless, and at the end of the 1,000 miles only very little improvement would have been effected in the bearing surfaces of the engine.

Running-in should be carried out progressively, and it is necessary for the rider to make what may be termed a very definite arrangement with himself before he starts riding the new machine. He should make up his mind never to be bustled during the running-in period and to ride at his own speed entirely, irrespective of the speed of other traffic. It is, naturally, annoying when one owns a high performance machine to be passed on the open road by a lightweight, but the rider of a new model must control his impulses, happy in the thought that the treatment he is giving his engine will mean considerably improved performance at the end of the running-in period. When a machine is carefully and intelligently run, it will be faster, mechanically quieter, and will wear longer than the mount of a rider who pays no attention to the finer points of running-in.

With a new machine speed, within reason, does not greatly come into the question ; the main idea to keep in one's mind is that the engine must never be stressed. By far the best indication is the amount of throttle opening, and during the initial stages more than about a quarter throttle should not be used. The engine must not be allowed to slog in the higher gear ratios ; it is far better to change down to a lower gear when the engine will be revving faster, but much more easily. It is a good plan to put a little spot of white paint on the twist grip rubber, and a spot of black paint on the chromium plated twist grip body, in such a position that these coincide when the throttle is closed. It is then easy to estimate the throttle opening during the running-in period and the " spots " can easily be removed or the position of the white one altered.

After about 250 miles have been covered, the throttle opening can be increased to say a third, and this means that the speed will gradually increase. A further amount of throttle can be used as

the running-in progresses, until the full throttle opening has been worked up to at about 1,200 miles.

Following the principle throughout that the engine must never be unduly stressed, speed bursts will be carried out progressively. With experience it may be found that at a certain throttle opening the machine will easily reach 50 m.p.h. When the speedometer needle touches that speed for the first time, the engine should immediately be throttled down. After a period of slower running, the 50 m.p.h. mark can be worked up to again, and this time held for a little longer. By gradually working up in this way, the time will come when a burst of a few miles at 50 m.p.h. has been arrived at progressively. The same care should be taken when higher speeds are reached. With the higher performance machines in the Triumph range, similar care should be taken to see that the maximum speed is worked up to very carefully and is only held for a very short period initially. At really high speeds, it is advantageous to close the throttle momentarily at regular intervals, as this enables an increased amount of oil to pass up the cylinder bore. When the engine is thoroughly run-in this precaution is, of course, unnecessary.

During the running-in period great care must be taken carefully to follow the lubrication instructions, which will be found on page 17. A running-in compound in the engine oil and an upper cylinder lubricant in the petrol is strongly recommended as these substances materially assist in forming satisfactory bearing surfaces in the engine.

Lastly, do not forget that you will have plenty of time to try the paces of your new mount during the many thousands of miles you will cover after the running-in period has been completed. Never be tempted to " see what she will do " in the early stages, and do not be persuaded by your friends to test the speed of the machine against theirs until you are quite satisfied that your engine is thoroughly run-in.

RECOMMENDED LUBRICANTS.

	VACUUM Mobiloil	PRICES Motorine	ESSOLUBE	SHELL	New Patent CASTROL
ENGINE, Singles. Summer ...	D	B de Luxe	Racer	Golden (Extra Heavy)	XXL.
" " Winter ...	D	C de Luxe	Racer	Golden (Extra Heavy)	XXL.
ENGINE, Twin. Summer ...	D	B de Luxe	Racer	Golden (Extra Heavy)	XXL.
" " Winter ...	BB	C de Luxe	"50"	Double Shell	XL.
GEARBOX	D	C de Luxe	Racer	Golden (Extra Heavy)	XXL.
PRIMARY CHAIN CASE	Arctic	E de Luxe	"30"	Single	Castrolite
For Grease Gun	No. 2	Belmoline C	Essogrease	Retinax	Castrolease Medium
Easing Rusted Parts	Voco Penetrating Oil	Prices Penetrating Oil	—	Shell Penetrating Oil	Castrol Penetrating Oil

LUBRICATION.

ENGINE.

All Triumph engines are equipped with dry sump lubrication. The oil is contained in a tank fitted under the saddle, and it is fed through a pipe to the pressure side of the oil pump. From there it is forced through the crank shaft assembly, which is drilled for the purpose, and issues from the big-end or ends in the form of an oil fog which lubricates the internal parts of the engine.

The pressure is regulated by means of a release valve situated under the timing case in the case of the single cylinder Models, and in the centre of the timing case on the " Twins." These valves consist of a ball, which is normally held on its seating by a spring of suitable length. Should the oil pressure be excessive, then the ball will be lifted from the seating and the pressure will be released, the surplus oil flowing to the bottom of the crank-case. It will be seen that the strength of the oil pressure release valve spring regulates the poundage of the oil pressure.

After lubricating the engine, oil falls to the bottom of the crankcase through the filter, from where it is picked up by the suction side of the oil pump and returned to the oil tank. The suction side of the pump has twice the capacity of the pressure side, in order to make certain that no liquid oil remains on the floor of the crankcase. In the case of the O.H.V. Models, the pressure pipe is tapped to lead the oil supply to the O.H.V. rocker gear. On the single cylinder Models, the oil which has been forced through the rocker shafts and falls to the bottom of the rocker box, is returned to the crankcase by oil return pipes. On the " Twin " Models the oil from the rocker box is delivered by suitable pipes to the push rod tubes, where it falls to the bottom of the crankcase after lubricating the cams and tappet gear.

PRESSURE GAUGE.

The oil pressure gauge is mounted on the instrument panel, and registers the pressure at which the lubrication system is working. On single cylinder Models, the minimum oil pressure should be five pounds, and on the " Twins," thirty-five pounds. These pressures should be available with the engine ticking over and the oil hot. With O.H.V. Models the pressure will

register very shortly after the engine is started, but with side valve engines, it will take a little time to build up. In the winter, when the oil is cold and thick, the pressure will naturally be high, but the reading will fall as the oil reaches its normal running temperature.

GEARBOX.

The gearbox should be lubricated with engine oil. Under no circumstances must thick gear oil be used. In order to obtain a positive and easy gear change, only the correct amount of oil should be put into the gearbox casing. (See page 16).

PRIMARY CHAINCASE.

Except in the case of Models "5SE" and "3SE," the primary chain is enclosed in an oil bath. Only the correct grade of oil should be used, the proper quantity being three-quarters of a pint.

REAR CHAIN.

The rear chain is lubricated by means of an adjustable lubricator, which will be found at the rear of the primary chain case. Oil from the chain case is fed by splash into a small receptacle, from where it is delivered to the rear chain in a quantity governed by the adjustment of the screw.

BICYCLE PARTS.

All the remaining components, such as fork spindles, wheel bearings, etc., are provided with grease nipples for lubricating purposes, and care should be taken only to use the recommended lubricants for these parts. If more solid grades are used, then there is a danger that the various bearings and bushes may not receive a proper supply.

MAINTENANCE.

LUBRICATION SYSTEM.

The lubrication system employed in Triumph engines is very simple, and gives long service without attention. The only part likely to show wear after a very considerable mileage has been covered, is the oil pump drive block which can be renewed for 1/-. The plungers and the pump body being constantly immersed in oil have a very long life, and it is unnecessary therefore to suspect these parts if the lubrication system is not functioning properly. The oil tank should be filled to within 2" of the filler.

On the single cylinder machines, the oil pressure should never fall below five pounds, and with the "Twins" the minimum should be thirty-five pounds with the engine idling.

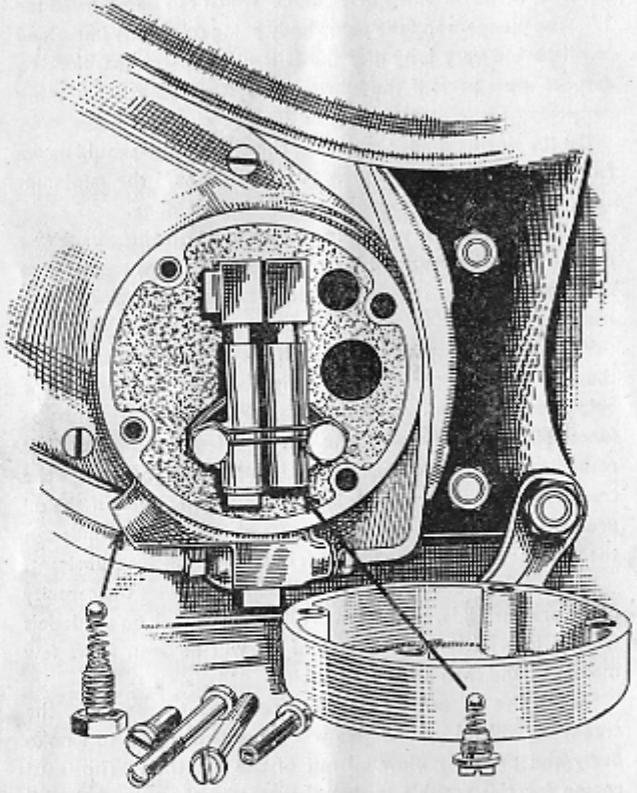
If this pressure is not being registered on the gauge the engine must be stopped immediately. Failure to observe this warning may result in serious damage and the engine may be entirely wrecked.

With the single cylinder Models, if the oil is being returned to the oil tank from the oil return pipe, which will be seen just below the oil tank filler cap, then the lubrication system must be functioning properly. On the "Twins," the fact that oil is returning to the tank is *not* proof that it is passing through the crank shaft assembly and lubricating the engine. Only if the oil pressure gauge is showing a minimum of thirty-five pounds can the rider be sure that the engine is obtaining sufficient lubricant.

Because the suction side of the oil pump has twice the capacity of the pressure side, the return of oil to the oil tank on all Models will be intermittent. A spurt of oil will be seen for a few moments, and then a few air bubbles.

Should the oil not be properly returned to the tank, the crankcase will fill up and this will cause the engine to smoke badly and probably blow oil out of the breather. The usual reason for this trouble is that the vent in the top of the oil tank has become obstructed. This vent relieves the pressure in the oil tank, and it is connected to the frame by a rubber tube in order conveniently to lead away any oil fumes. If the vent is obstructed or the rubber tubing kinked, then pressure will build up in the oil tank and prevent a proper scavenge of the crankcase. The remedy is obvious.

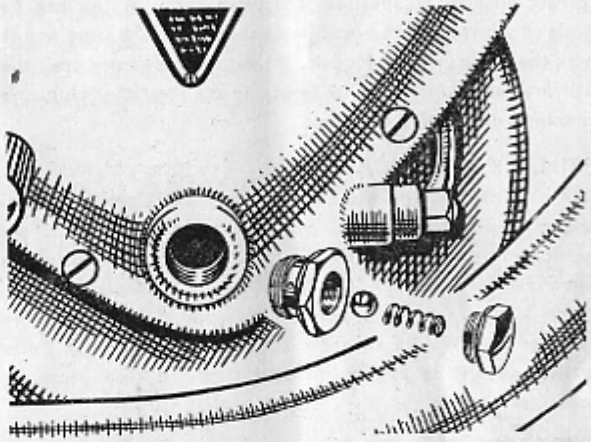
Should the balls underneath the oil pump not be seating properly, then the pump will not function satisfactorily. The remedy is to remove the balls for cleaning, and in extreme cases, the pump body should be taken off the engine and the balls given a sharp tap onto their seatings before re-assembly.



Oil Pumps.

Complete loss of oil pressure or very low pressure may be due to the ball in the oil pressure release valve being held off the seating by a particle of foreign matter. This trouble is unlikely to occur, and as a safeguard the valve on the twin cylinder

models is protected by a filter gauze. If the pressure falls, the valve should be dismantled for cleaning, and the ball given a sharp tap onto the seating before re-assembly. Lack of oil pressure as shown on the gauge is rarely the fault of the gauge itself, these units being very reliable.



Oil Pressure Release Valve.
Twin Models.

O.H.V. ROCKER LUBRICATION.

On single cylinder Models, there is an adjustment on the rocker feed pipe to enable the correct quantity of lubricant to be arranged. This adjustment takes the form of a screw with a hexagonal head, which is secured in position by a lock nut. If the adjustment is screwed in, then the oil feed will be reduced ; if it is screwed out, then the supply will be increased. On order to check up the amount of oil being fed to the rocker gear the two plated acorn nuts on the banjo unions to the rocker spindles, should be slacked off and the pipe eased away from the rockerbox with a screwdriver. Now if the engine is started up, the oil which is normally passed through the rocker spindles will leak from the banjo unions, thus indicating the amount being fed through to the Rocker gear. There should only be a slight trickle of oil when making this test. Oil is only delivered to lubricate the

rocker gear and not to cool it. An excessive supply will inevitably cause oil leaks.

The twin cylinder Models have no adjustment for the rocker oil supply. A threaded restrictor plug is fitted into the rocker oil pipe near the timing case, and oil forces its way between the threads of this plug and the body into which it fits, in the correct quantity to lubricate the valve gear. A test can be made to ascertain the amount being supplied in the same way as with the single cylinder Models. If the supply is scanty, then the delivery can be increased by removing the restrictor plug, and running a die down the threads.

PRIMARY CHAINCASE.

The primary chain case contains the clutch, primary chain, engine shock absorber and engine shocket. These parts are lubricated by special thin oil filled into the case by means of the filler plug (see page 10 for oil grades). Underneath the case there is a drain plug. Jointing compound should not be used on the faces of the primary chain case. A new paper washer should be employed every time the two halves are separated.

GEARBOX.

The gearbox is lubricated by means of engine oil, and under no circumstances should thick gear oil be employed. The drain plug will be found at the back of the box, and the filler plug is situated on the gearbox outer cover. The level plug will be found in the rear portion of the gearbox inner cover underneath the tool box. Care should be taken that an excessive amount of oil is not put into the box, as otherwise a very hard gear change will result.

BICYCLE PARTS.

A grease gun should be used on the various grease nipples on the frame, forks, wheels, etc., every thousand miles. In the case of the wheel bearings an excessive amount of grease should not be injected as this may find its way on to the brake linings. Remember that the forks are constantly operating when the machine is being ridden, and an ample supply of lubricant should always be maintained.

CONTROLS.

The control cables require lubricating at intervals, as if these become dry, stiffness in operation will result. A good plan is to remove the Bowden wire connection from the lever at its top end and make a funnel with brown paper round the casing, securing it with a rubber band. Then if thin machine oil is fed into the funnel and allowed to remain overnight, it will trickle down the casing and lubricate the cable. Control cables should always be kept clear of the engine as far as possible, as if they become over-heated the lubricant will be dried up.

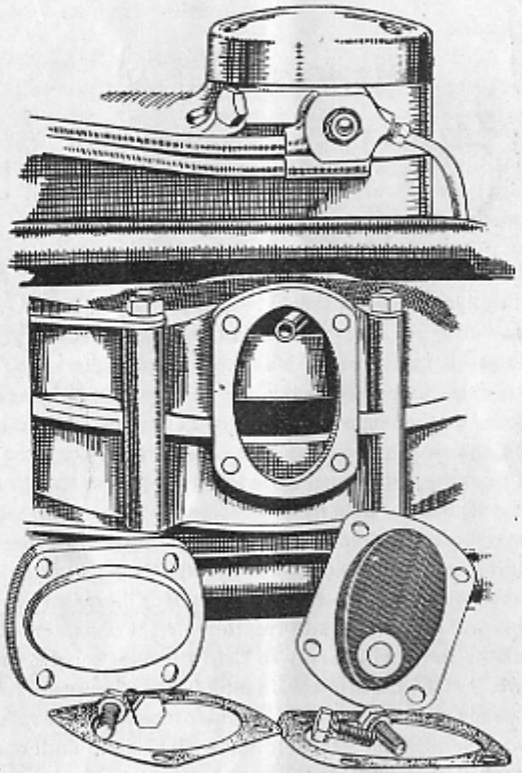
CHANGING THE OIL.

When the machine is new, the oil should be changed frequently during the running-in period, in order to make certain that any foreign matter which the oil picks up in the course of its circulation shall be eliminated.

ENGINE.

The oil in the engine should be changed at 250, 500 and 1,000 miles, during the running-in period, and thereafter every 1,500 miles regularly. When the oil is changed, the filters should be thoroughly cleaned. There is a filter in the oil tank which can be removed on the single cylinder Models by taking off the oil pipe block underneath the timing case and disconnecting the two feed pipes, by pulling them out of their rubber tubes. The large hexagonal nut can then be screwed out of the oil tank and the filter will come with it. On the " Twins " it is not necessary to remove the oil pipe block, the oil pipe being fitted with a suitable joint. Under the crankcase four hexagonal headed screws will be found, which secure the crankcase filter. These should be removed in order to clean the filter gauze. On the " Twin " Models, there is also a filter in the oil pressure release valve body on the timing case. All these filters should be cleaned by washing them in petrol. It is also advisable to flush out the oil tank with a flushing oil, which is obtainable from most Garages and accessory Dealers. This flushing oil can be filtered through a piece of muslin and retained for further use.

After the lubrication system has been drained and re-filled, all the joints which have been disconnected, and the oil tank drain plug, should be gone over again with a spanner to make certain that they are perfectly tight before the engine is started up. When the engine is again started, immediately check up to see that the oil pressure is registering correctly, and that the oil is returning to the tank.



Crankcase Base showing Oil Filter.

PRIMARY CHAINCASE.

The oil in the primary chaincase should be changed every thousand miles, or every month if a thousand miles has not been covered. The correct quantity is ½ pint. By carefully maintaining the oil level, and changing the oil at regular intervals, the primary chain will be kept in excellent condition, and will run for a long mileage without attention. If the oil is allowed to become dirty and partially broken down, then wear will develop on the primary chain, which will require constant adjustment.

GEARBOX.

The oil in the gearbox should be drained, and the gearbox flushed out, after the machine has run 500 miles. Thereafter, the oil should be changed every 5,000 miles, but it is advisable to check up the oil level at thousand mile intervals.

ENGINE BREATHER.

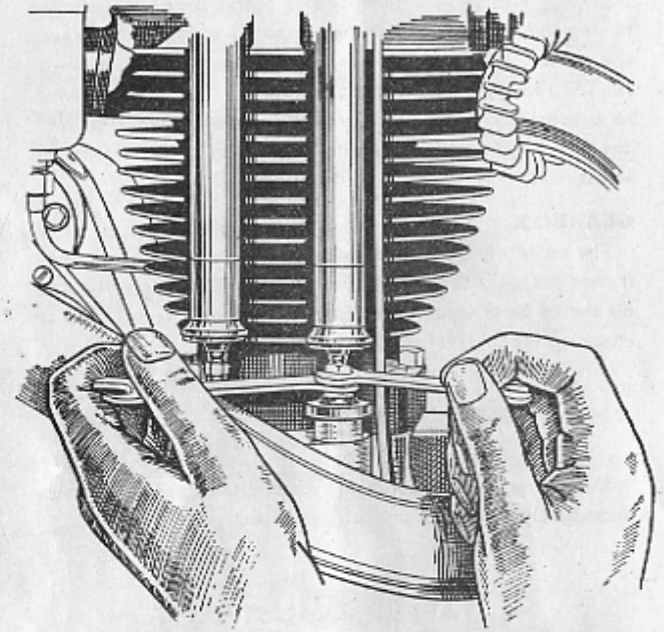
A breather of the diaphragm type is fitted to the crankcase, immediately behind the primary chaincase.

TAPPET ADJUSTMENT.

All tappet adjustments must be made with the engine stone cold.

On the single cylinder O.H.V. Models, the tappets are adjusted by lifting the push rod tubes. This operation can be carried out with a screwdriver, and a distance piece, consisting of a half round tube, will be found in the tool kit and can be used to prop up the tubes while the adjustment is being made. Great care must be taken to see that the tube does not spring back into its cap, which may be damaged. The adjustment is made by first of all turning over the engine and watching the inlet tappet to see when it falls. If the kickstarter is then depressed a little further, the engine will be found to be against compression, and this is the position in which the adjustment should be made. Slack off the lock nut immediately over the tappet, when it will

be found possible to rotate the tappet head. The head should be set so that there is no clearance between it and the push rod,



Tappet Adjustment—O.H.V. Single Cylinder Models.

but see that the push rod is free to revolve. Having made the adjustment correctly, the lock nut must be tightened up, taking care to hold the tappet head in position. After tightening the lock nut, the adjustment should again be tested. Finally, the push rod tubes should be returned carefully to their cups.

On the side valve Models, the tappet adjustment is accessible after removing the valve chest cover. The adjustment is made in the same way, but the clearance should be tested with a feeler gauge. The exhaust valve clearance should be .007" and the inlet valve .004".

The tappet adjustment on the twin cylinder engine is made on the rocker arms after removing the four tappet adjustment

caps on the rockerboxes. First make certain that the piston in that cylinder is on the compression stroke, by watching the inlet rocker arm to ascertain that the valve closes, and then depress the kickstarter a little further to bring the piston against compression. The adjustment is made by slacking off the lock nut with the hexagonal ring spanner provided in the tool kit, and turning the squared end of the tappet adjusting pin with the special spanner provided. The adjustment should be made so that there is just the very slightest amount of up and down shake on the rocker arm, which will give a clearance of about 1 thous.

After adjusting the tappets, the compression should always be tested to make certain that the valves are seating properly.

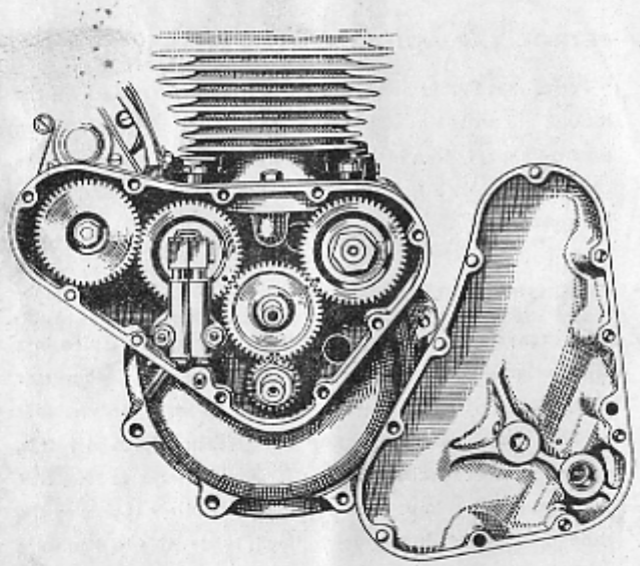
PETROL TAP ADJUSTMENT.

Petrol taps should be adjusted if they leak. First slack off the locking nut in the centre of the plunger thumb piece. Then unscrew the spindle a little with a screw driver in the slot in the centre of the lock nut. This expands the cork washer and makes it a tighter fit.

CARBURETTER.

Further information regarding the carburetter is issued in a separate leaflet, sent you with this Instruction Book. Carburetter settings are arrived at after very careful experiment, and it is unlikely that a different setting will give an improved result, unless for some special purpose. It should always be seen that the carburetter is kept clean and this particularly applies to the running-in period, during which time it is advisable to dismantle entirely and clean the carburetter two or three times. Always see that the joint washer between the carburetter flange and cylinder head, or induction pipe, is in good condition, in order to prevent an air leak. When the engine is decarbonised, it is

always advisable to fit a new washer to be on the safe side. On the twin cylinder Models, the joint between the induction pipe and the two inlet ports should also be inspected when the engine is being decarbonised, to see that the gaskets are in good condition, and that they are not over-lapping the bore. When new gaskets are fitted, they should be fixed to the cylinder head flange by means of gasket cement. Be careful to tighten up the nuts of this flange joint evenly. They should be tightened a little at a time, alternately, as otherwise great strain will be put on the flange, which may be fractured. Even tightening also ensures a good joint.



Timing Gear on the 500 c.c. Twin Models showing Timing Marks and the Double Plunger Pump.

VALVE TIMING.

The teeth which are meshed together in the timing gears are suitably punch marked, and it is impossible therefore to time the engine incorrectly. On the single cylinder Models, the marking " EX " on the inlet cam wheel and the marking " IN " on the exhaust cam wheel should be ignored. On these cam wheels, the marking "4N " for the inlet cam wheel and " EX " for the exhaust cam wheel are those which should be meshed with the marking on the main timing pinion.

MAGDYNAMO.

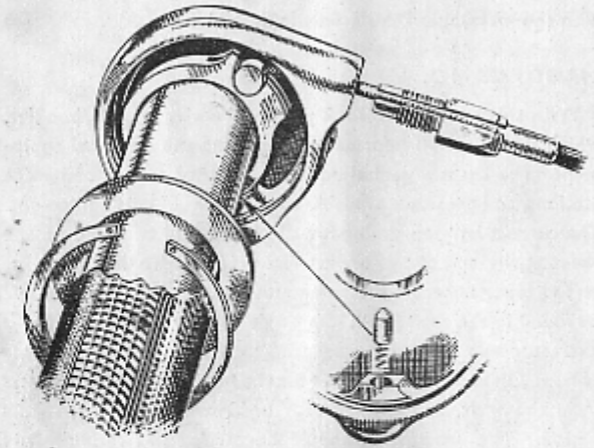
With this Instruction Book you will receive a Lucas booklet, which gives you full information regarding the electrical equipment. The Lucas organisation has established a chain of Service Stations, and these are available to any user of Lucas equipment. The correct ignition timing for all Models will be found on the sheet at the end of this book. The magneto driving pinion fits on to a taper armature shaft without a key, though a keyway will be found in the shaft itself. On single cylinder Models, a special extractor nut is used for securing and removing the driving pinion. On unscrewing the nut for the first few turns, it releases from the shaft, and with further unscrewing will remove the pinion. The unscrewing should be carried out carefully and progressively. If excessive force is used, especially in a jerky manner, there is danger that the three rivets may be pulled. On the twin cylinder Models, it is necessary to use a pinion extractor, and a suitable tool is provided in the tool kit.

PLUGS.

The recommended plug gap for Models with magneto ignition is 18 to 20 thous. and for coil ignition 22 thous. Though the plugs should be cleaned periodically, by washing them in petrol and removing any deposit from the electrodes, they should not be dismantled unless absolutely necessary. The plugs provided on all Models are suitable for average give and take running, but for continued high speed work it may be necessary to fit a harder plug to the faster engines. Recommended plugs for speed work are K.L.G. L.B.I. or Champion LAII

TWIST GRIP THROTTLE CONTROL.

The Triumph twist grip is unlikely to require any maintenance attention, but should it at any time be necessary to dismantle, the procedure is very simple. Peel back the rubber grip, and extract the spring ring and washer. The cable stop should then be unscrewed, after which the cable is simply drawn out. The grip can then be drawn off, care being taken not to lose the small plunger and spring which provides the click action.



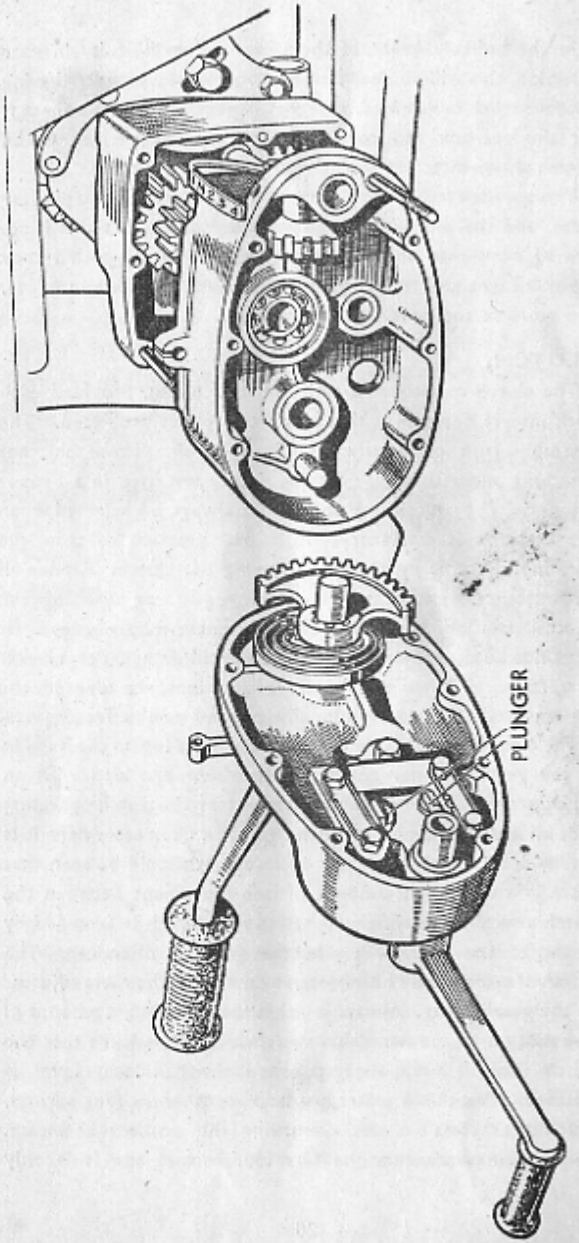
Construction of the Triumph Twist Grip Control.

When re-assembling the procedure is reversed, the only point to watch being that when re-inserting the cable the grip must be revolved so that it picks up the cable nipple and draws it into place.

GEARBOX.

The gearbox requires no attention, with the exception of the regular changing of the lubricant, as previously indicated.

Reference to the illustration showing the broken-open view of the gearbox shows clearly the general arrangement of the gear selection mechanism. When the gear change pedal is operated one or other, as the case may be, of the cam faced plungers is depressed against its spring as it is forced into contact with the plunger plate.



Broken-open view of Triumph 'Gearbox.

In the unlikely event of their ever being difficulty in gear selection, this will be due to one or both of the plungers having become stuck or jammed. All that is necessary to free them is for the gearbox and cover carrying the mechanism, to be detached, when access to the plungers can be gained.

The bevelled face of each must bear directly on to the plunger plate, and the plungers must be so positioned that this is so. Having positioned them correctly, and checked up that they are quite free and that the springs beneath them are in order, the gearbox and cover can be replaced.

CLUTCH.

The clutch consists of a series of steel plates, provided with cork inserts between which plain steel plates are fitted. The assembly runs constantly immersed in oil. These clutches give long and satisfactory service if they are used in a proper manner. The neutral position should always be selected when the machine is stationary. It is bad practice to stop the machine in traffic by simply extracting the clutch. Under all circumstances, except when changing gear, or selecting the neutral position, the clutch should remain fully engaged. It must not be slipped on corners or to avoid changing to a lower gear ratio. If these elementary precautions are adopted, the cork inserts will give exceptionally long and trouble-free service.

The clutch control cable passes through the lug on the outside of the gearbox inner cover, and is there provided with an adjustment. There is also an adjustment for the clutch operating rod, immediately underneath the gearbox filler cap where it is readily accessible but entirely enclosed. It should be seen that there is a very slight amount of free movement between the clutch arm and the clutch operating rod, which is arranged by means of the adjuster inside the gearbox filler cap. The length of cable should be adjusted by means of the cable adjuster on the gearbox lug. Always see that there is a slight amount of free motion at the handlebar end, which will ensure that the clutch itself is fully engaged when the handlebar lever is released. The clutch plates are held together by four springs, which are accessible after removing the primary chaincase. These springs are tensioned by four screws and it is only

necessary to tighten these sufficiently to prevent the clutch from slipping. A special key is provided in the tool kit. If they are tightened excessively, then the clutch may be prevented from freeing properly.

If the clutch is dragging, it will be difficult to engage bottom gear from neutral, and the gear change will not be entirely satisfactory. When first starting up the machine, the clutch lever should always be operated two or three times in order to free the plates, but it should then be possible to engage first gear without any grinding.

When assembling, the clutch plates should first be dipped into a bath of the correct grade of oil, to make sure that they are oily (see page 10).

The clutch runs in oil, and it is therefore important to see that ¾ of a pint of the correct grade of oil is in the primary chain case. if oil thicker than the recommended grade is used, then trouble will occur, and the clutch may not free properly.

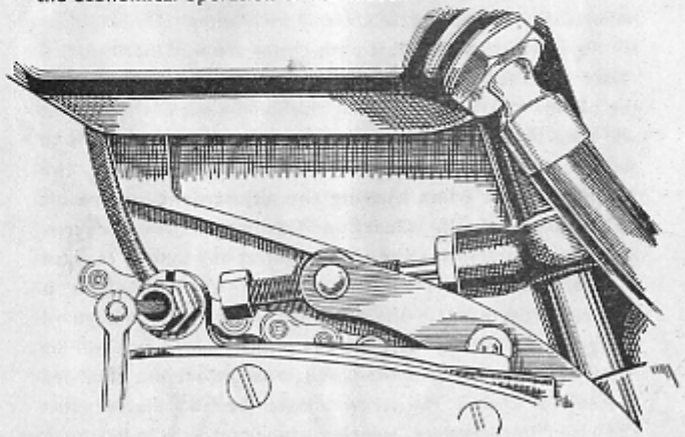
CHAINS.

Slack or badly adjusted chains are a prolific cause of harsh running and excessive wear. The adjustment of both chains should be such that there is half an inch free up and down movement mid-way between the sprockets. It is of the greatest importance that both gearbox and back wheel clamping nuts are kept dead tight and that both chains are well lubricated.

Access to the gearbox clamping nut is best secured by removing the off side footrest and pushing the spindle out of the way. It will then be possible to get the spanner on to the nut and to secure adequate purchase. **Failure to slack off the Clamping Nut when making the adjustment will result in fracture of the Gearbox Casing.** It is, of course, necessary after moving the rear wheel at any time to readjust the brake. Access to the gearbox trunnion bolt is obtained from beneath the machine, between the mudguard and gearbox. At the back of the primary chain case will be found an adjusting screw which governs the amount of oil fed to the rear chain. The screw should be so adjusted that the chain just receives sufficient lubricant, the adjustment

being arrived at by trial and error. To commence with, it is advisable to close the adjusting screw completely, by screwing it right in, after which it should be unscrewed two and a half turns.

Every thousand miles in the winter, and every 1,500 miles in the summer, it is advisable to remove the rear chain and clean it in paraffin. Successive baths of clean paraffin should be used until the chain is quite clean and free from grit. It should then be placed in a bath of molten graphite grease. The chain should be allowed to remain in the grease until it has cooled off and become solid again, as if it is just dipped in and removed, then the grease may not penetrate underneath the rollers and much of it will drain away. When the chain is removed, surplus grease should be wiped off it and it should be re-fitted and adjusted. When fitting the spring fastener on the removable link, care should be taken that it is placed in the correct position. The spring fastener is roughly the shape of a fish, and if you remember that a fish swims nose first, and fit your fastener so that the nose is always proceeding in a forward direction when the machine is running, you will have an easy aid to memory. Modern chains give very large mileages, if properly cared for, but no part of a motor cycle shows more quickly the result of abuse. As chains are comparatively expensive, proper maintenance will assist in the economical operation of the model.



Gearbox Primary Chain Adjustment.

BRAKES.

Neither brake will be fully efficient when the machine is new. It is necessary for the linings to bed down a little before the brakes are at their best.

ADJUSTMENT.

The front brake has two adjustments. There is a clevis at the bottom of the rod where it joins the brake lever. In order to adjust this it is necessary to remove the pin and slack off the lock nut, when the clevis can be screwed further on to the rod. There is also a finger adjuster on the fork, with which, normally, brake adjustments will be made. The brake should be set so that when it is fully applied the lever is just clear of the handle-bar. By this adjustment the rider will be able to exert the maximum amount of grip on the lever. The rear brake is adjusted by means of a finger adjustment on the end of the brake rod. This adjustment should be made so that the brake shoe is just clear of the drum when the brake is off. Thus a minimum amount of toe pressure will apply the brake powerfully. It should be remembered that in wet weather the gentle application of the front brake if the machine is ridden solo, is the safest method of pulling up the machine.

TYRES.

PRESSURE.

Tyre pressures should always be carefully maintained, as otherwise the covers will not give good service. The actual pressure at which the tyres should be maintained are more or less a matter for experiment, and depend on the rider's weight and the type of machine. The table overleaf should be used as a guide and a basis for experiment.

RECOMMENDED TYRE PRESSURES.

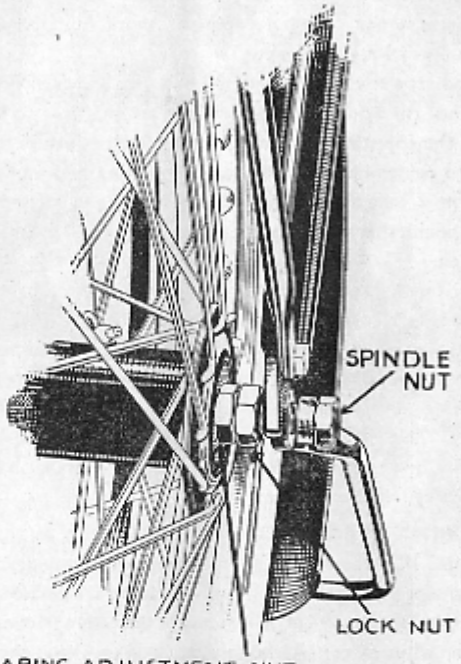
	FRONT.	REAR.
TIGER 100	22	18
,, 80	20	20
,, 70	18	20
SPEED TWIN	22	18
MODEL 6S	18	18
,, 5S ,, 5SE	18	18
,, 3S ,, 3SE ,, 3SW	16	20
,, 5H	18	18
,, 3H	16	20
,, 2H	18	20

It is usually advantageous to run the rear tyre with as low a pressure as possible, conducive with good steering. If the rear tyre is too soft, the machine will be inclined to wander ; if it is too hard then the rear wheel will bounce and the machine will be uncomfortable to ride. If the rear tyre is run on too low a pressure there is a danger that it will move round on the rim and pull the valve out from the tube, unless a security bolt is fitted.

EXAMINATION.

Especially during the period when the roads are being tarred and gritted, the tyres should be examined periodically and any sharp pieces of stone removed from the treads. If they are

allowed to remain, no immediate damage may be done, but they will later work right through the cover and puncture the tube.



Front Hub Adjustment.

WHEELS.

Beyond repacking the hubs with grease every 5,000 miles and occasionally checking over the spokes for tightness, the only attention likely to be required here is an occasional adjustment of the hub bearings. These bearings are of the taper roller type and it is important to note that after tightening the lock nut the adjustment should be such that there is just perceptible lateral movement at the wheel rim. On no account must the adjustment be closer than this.

FRONT FORK ADJUSTMENT.

Correct fork spindle adjustment is of importance, not only because of the direct bearing it obviously has on steering but also because the rebound dampers cannot function efficiently unless everything is in order.

To adjust a spindle, slack off the end nuts and turn the squared end until the knurled edged washers are just free to spin. Re-check the adjustment after tightening up the lock nuts. It is as well to remember that the spindle bearing and dampers will, when new, take about 1,000 miles of running to settle down and they should, therefore, have attention after this mileage has been covered.

Too much grease must not be used when lubricating the centre fork bridge, otherwise there will be a tendency for it to find its way on to the damper friction surfaces. After a considerable mileage, it may be found that with the lower rear spindle correctly adjusted the rebound dampers are not bedding down evenly. This is due to wear in the rear spindle knurled edged washers, and to get over the difficulty the worn washers should be replaced with new ones.

STEERING HEAD ADJUSTMENT.

Unless the steering head bearings are maintained in correct adjustment both steering and road-holding are certain to suffer. Too tight an adjustment will result in excessive friction and too slack an adjustment will lead to pitted ball races and the necessity for early renewal. To adjust, proceed as follows :—

Tighten rebound dampers down hard, so that the fork spring will not expand and bear against the frame when the weight of the machine is taken off the forks.

Slacken steering damper right off.

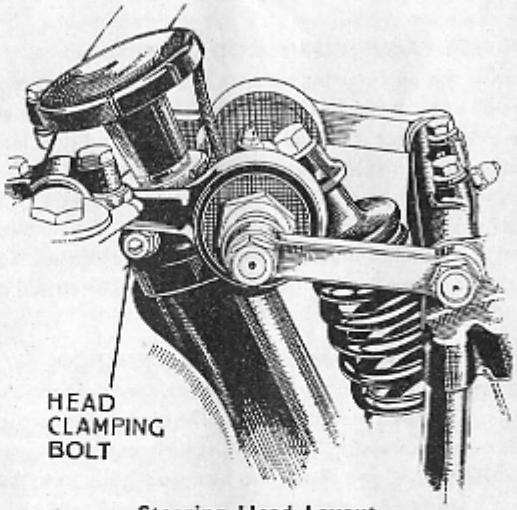
Support front forks clear of the ground by placing a stout box under the frame cradle.

Grasp the lower end of the front forks and by alternatively pushing and pulling, feel for traces of play in the head.

Check freedom of steering by turning from left to right and back again.

There should be no play registered by the first test, but at the same time the second one must register absolute freedom of movement.

Any adjustment necessary is carried out by slacking off the nut on the head clamping bolt and using the " C " spanner supplied in the tool kit on the collar, which lies immediately below the steering damper knob.



Steering Head Layout.

OIL LEAKAGE.

Triumph machines do not suffer from oil leakage if correctly serviced. An oil spattered engine is usually the result of carelessly made joints when the engine is decarbonised.

ROCKERBOX LEAKAGE.

Leakage from the rockerbox is due either to a faulty joint between the rockerbox and cylinder head, or an excessive oil feed to the rocker gear. (*See page 15 for adjustment.*) The rockerboxes are fitted with a gasket between the box and the head, and if leakage occurs, this should be renewed. Only the

standard gasket should be employed. It is not usually successful to cut one from a jointing material, as this will cause leakage at the push rod tubes if it is not the correct thickness.

LEAKAGE FROM EXHAUST VALVE LIFTER SPINDLE.

In very rare cases this is due to wear in the spindle bush, but usually occurs owing to an excessive oil feed to the rockerbox. The supply should be re-adjusted as per the instructions on Page 15.

LEAKAGE FROM PUSH ROD TUBES.

Even if the oil retaining washers are in good condition, oil leaks will be experienced if the rocker box oil feed is too great, Where the oil feed is properly adjusted, push rod tube leakage is usually due to faulty oil retaining washers, the renewal of which will cure the trouble. In rare cases, on single cylinder Models, it may be found that the push rod tube has been allowed to spring back on to the cup after adjusting the tappets, instead of letting it down gently. This may damage the cup and cause oil leakage.

PRIMARY CHAINCASE AND ROCKERBOX.

If leakage occurs from any of these joints, then the parts should be dismantled and a new joint made. The old jointing compound should be very carefully cleaned off the surfaces and new jointing compound applied and allowed to become slightly tacky before the parts are fitted together. The screws should then be tightened down evenly all round when a tight joint will result. Only a recognised jointing compound should be used, as paint, etc., is not satisfactory. All the well known makes of jointing compound available from accessory dealers will make a good joint. Where a joint does not hold after being renewed, the usual reason is that the old compound has not been cleaned off the faces. On machines where a paper washer is employed, do not use jointing compound.

LEAKAGE BETWEEN TIMING CASE AND MAGDYNO.

Inside the timing case, there is a cork washer, through which the magdyno driving shaft passes, in order to prevent oil leakage. This washer is under slight compression, and if oil leaks from the

timing case, it can be corrected as follows :—

Slack off the strap which holds the magdyno in position, and also the securing bolt underneath the platform on the " Twins " and lever the unit away from the timing case. While still exerting pressure, tighten up the magdyno strap. It should be noted that it is only necessary to exert sufficient pressure on the magdyno to prevent the oil leakage. Excessive pressure may cause damage to the cork washer. If the above procedure does not prevent the oil leakage, then the cork washer should be renewed. *(See page 23 for method of extracting magdyno driving pinion.)*

DECARBONISING.

The engine should be decarbonised only when it is showing definite signs that it requires this attention. Falling off in power, loss of compression, noisy operation, and more difficult starting are all signs that the engine requires decarbonising. Usually this attention should be given after the first 2,000 miles has been completed with the O.H.V. Models. The engine will then probably run three or four thousand miles between the decarbonising periods. Side valve engines usually require attention about every two thousand miles.

It should be noted that it is entirely unnecessary to remove the cylinder barrel when decarbonising the engine. We strongly recommend that this part is not taken off unless it is proposed to fit new piston rings or do some other work on the engine which necessitates the removal of the barrel. The engine will run more smoothly, and give better service if the piston rings are left undisturbed.

Gasket sets are available for all Models, and it is strongly recommended that the correct set for the Model be obtained before commencing the work.

SIDE VALVE MODELS.

Side valve engines are very easy to decarbonise. The cylinder head should be removed, after detaching the H.T. lead and removing the cylinder head bolts. If it is proposed also to grind

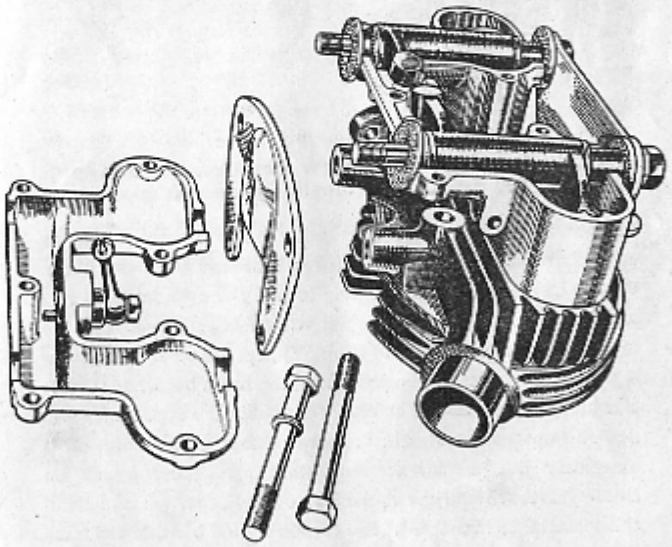
in the valves, then the cylinder barrel should be removed. The valves are held in position by split cotters, which can be removed after the valve spring has been compressed. A special tool for compressing the valve springs can be obtained from any accessory Dealer. (*See instructions for grinding valves on page 41.*)

When replacing the cylinder barrel, a new gasket should be used between the barrel and the crankcase. It should be seen that all the carbon has been removed from the cylinder head and the ports, but it is not advisable to remove the piston rings or disturb the piston in any way. The cylinder head gasket should be liberally greased before fitting, and the head can then be replaced. The bolts must be tightened up very carefully. They should be screwed down quite gently all round to start with and a little at a time, then gone over again two or three times, so that the cylinder head is very gradually drawn down. Work from the centre outwards, tightening the two bolts in the centre of the cylinder head first, then the centre one on the outside next to the sparking plug hole, next the one opposite to it and finally those on the four corners. The engine should now be started up and run until it is quite hot. The cylinder head bolts should then be tightened down again, using the same sequence. Do not forget to adjust the tappets correctly before the engine is started up. The cylinder head bolts should be tightened down on two or three subsequent occasions when the engine is hot in order to make sure that there is a good joint after the new cylinder head gasket has bedded down.

SINGLE CYLINDER O.H.V. MODELS.

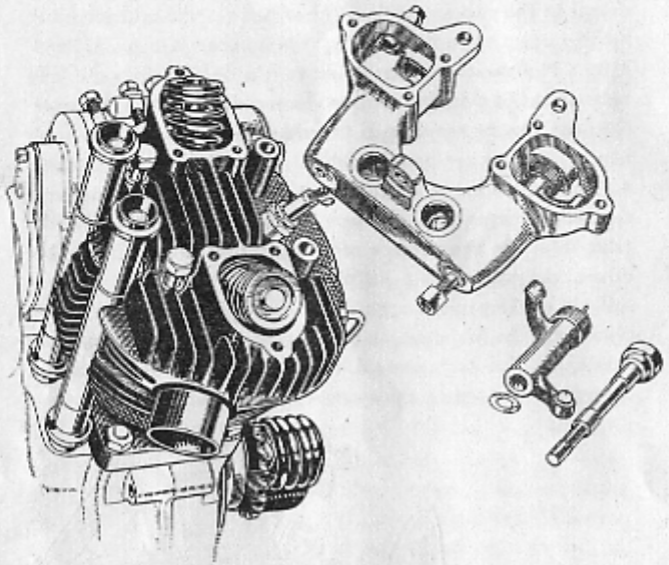
On O.H.V. Models, the petrol tank should be lifted before the decarbonising is commenced. First remove the screw securing the instrument panel, and lift it until the nut securing the oil pipe to the gauge is accessible. The oil pipe can now be detached. It is not necessary to remove any of the wiring. The petrol tank anchor bolts should now be removed and the tank lifted, first taking the precaution to put a duster over the front end, in order to prevent the handlebar brackets scratching the enamel. In order to give the tank enough clearance at the rear end, the saddle nose bolt should be taken out and the saddle cover drawn back by placing a piece of string over the front end of it and

looping this back to the number plate. The H.T. cable should be disconnected, and the plug removed. Disconnect the torque stay, the exhaust lifter wire, carburetter and exhaust pipe. Take off the rocker gear feed pipe by removing the two banjo unions at the rocker spindles. Now remove the cylinder head holding down bolts, which are four in number. On the 250 and 350 c.c. Models, it is necessary first to take off the two horizontal bolts on the off side, and remove the vertical plate. The cylinder head can now be removed and further work carried out on the bench. The rocker box should be removed, care being taken not to lose the hardened valve end caps. The valve springs are secured by means of split cotters, which fit in the grooves in the valve stem. In the absence of a special tool for removing the valves, the head should be placed flat on the bench with a suitable packing piece—the round cover of an electric light switch will be found suitable—underneath in the combustion chamber. This will prevent the valve itself dropping when pressure is exerted on the spring collar. A piece of hard wood



Cylinder Head and Rocker Box Construction—250 and 350 c.c. O.H.V. Models.

should then be suitably slotted, when it can be pressed down on the valve spring collar and will expose the cotters, which can be tapped out with a screwdriver. It should be noted that there is a valve spring seating washer under the exhaust valve spring,



Cylinder Head and Rocker Box Construction—
500 c.c. O.H.V. Single Cylinder Model.

but not under the inlet valve spring. The carbon should be carefully removed from the cylinder head and from the ports. Where convenient, it is desirable to boil the cylinder head in a solution of hot caustic soda, which will effectively remove all the carbon from inaccessible positions. This process has a disadvantage in that it takes off the paint from the head, but if the surface is copiously black leaded before re-assembly the appearance will not be impared. It should be noted that a caustic solution is extremely detrimental to aluminium parts, and under no circumstances should the rockerbox or any other parts made of this material be immersed. The carbon should be removed from the top of the piston and the top of the cylinder bore after the parts have been washed in petrol. Care should be taken to keep

the loose carbon away from the edge of the piston as far as possible, but after the operation has been completed, any particles which remain can be blown out by the vigorous use of the tyre pump. Great care must be taken not to scratch the top of the piston. It is a good plan to obtain a stick of solder and hammer it out flat at the end, using it to remove the carbon from the piston crown. (*See page 41 for grinding the valves.*)

While the cylinder head is dismantled, the push rods should be inspected and also the washers at the top and bottom of the push rod tubes, which it is desirable to renew as a precautionary measure, even if they appear to be in good condition.

Should it be desired to remove the rockers from the rocker box, the spindles should be tapped out from the threaded ends, care being taken not to damage the threads, after which the return springs can be extracted with a pair of pliers when the rockers themselves can be taken out.

To tap out the spindles use a copper or hide mallet, or failing these a hammer and a piece of wood.

When re-assembling the rockers, it is important to see that the end thrust washers are in position and to ensure that the return springs are correctly replaced. To do this proceed as follows :—

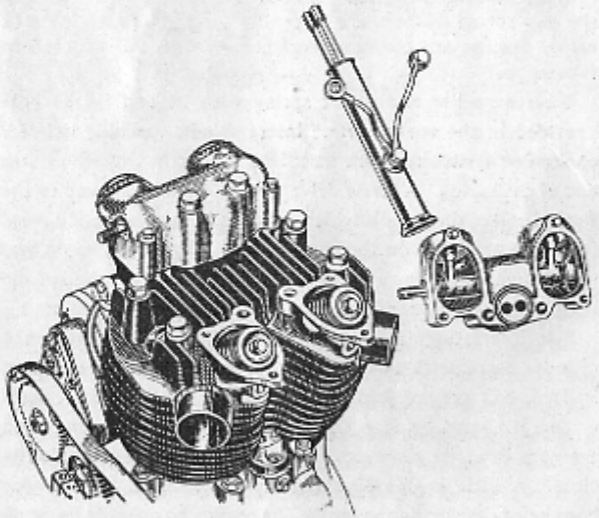
Replace rocker and insert spring with its end in the hole provided in the rocker arm. Insert spindle, pushing it in far enough to enable it to be mated up correctly with the outer end of the spring. A screw driver should then be applied to the slotted end of the spindle which can then be twisted round, so as to secure a tension on the spring, and finally forced home into the rocker box. Be sure that the locating peg on the spindle is correctly positioned in the slot formed in the rocker box.

Before re-fitting the cylinder head, it should be ground to the cylinder barrel with a fine valve grinding compound. No gasket is used, this ground joint being entirely gas-tight if properly made. It should be seen that all traces of grinding compound are very carefully removed, and that all parts are scrupulously clean. A little engine oil should be smeared on the cylinder bore before replacing the head. The rocker box should be fitted to the cylinder head on the bench, using new gaskets and being careful to tighten down the rocker box fixing bolts

gradually and evenly. The cylinder head can now be placed on the barrel, being careful to see that the push rods are properly positioned, and the four holding down bolts inserted and evenly tightened up. The tappets should then be adjusted. After completing the assembly and warming up the engine all bolts should again be gone over to make sure that they are tight. Before fitting the banjo unions to the rocker spindles, it is desirable to anneal the copper washers, by heating them over a gas ring. This will soften them and ensure an oil tight joint. (*See page 15 for adjustment of the rocker gear oil feed.*)

TWIN CYLINDER MODELS.

The procedure with this Model is similar to that with the other O.H.V. engines. There is a joint in the oil pipe to the oil gauge, just underneath the petrol tank, which makes it unnecessary to lift the instrument panel, by disconnecting the pipe before lifting the tank. The cylinder head is secured by



Cylinder Head, showing Rocker Box Construction. 500 c.c. Twin Models.

eight bolts, four of which also pass through the rockerboxes. In order to remove the head bolts it will be found necessary to turn the tank over sideways a little. The head should be removed from the cylinder block without detaching the rockerboxes, in the same way as with the other O.H.V. Models. When removing the oil return pipes, which connect to the cylinder head and push rod tubes, be careful to retain the copper washers. New gaskets should be used when re-assembling the rockerbox, and when re-fitting the cylinder head to the block care should be taken to see that the tappets and push rods are correctly located. The cylinder head should be tightened down evenly, working from the centre outwards. The cylinder barrel is fitted with a copper plate, which acts as a gasket between it and the head, and it is not necessary to re-new this except at considerable intervals. It is advantageous, however, to anneal it by heating over a gas ring before re-assembly. Do not omit to re-adjust the tappets before starting up, and after the engine is warm, again go over all the nuts aand bolts to make certain that they have been properly tightened.

VALVE GRINDING.

NOTE.—On all Models the inlet and exhaust valves are not interchangeable.

After the valves have been removed, their faces and seatings should be examined very carefully. If the valve faces are pitted, do not attempt to remove these marks by grinding, as this will also grind away the seating, which is undesirable. All good garages now have equipment for refacing valves, and this operation can be carried out very cheaply. It will usually be done while you wait, and quite apart from the damaging effects of excessive grinding, will save considerable time and labour. The valve stems should be examined to see that they are in good condition, and carefully cleaned and polished before the grinding is commenced. The carbon should be carefully removed from the valve head and the exposed portion of the valve stem. See also that the groove which retains the split cotters is in good condition and not worn. If wear is suspected on the groove,

the valve should be renewed as, particularly with O.H.V. Models, if the split cotters are not securely located, extensive damage to the engine may occur.

The actual grinding process is carried out with grinding compound. Tins can be obtained from any accessory Dealer, containing fine and coarse grinding compound. A small tin containing petrol and a piece of clean rag should be kept handy. First smear the face of the valve with a little of the fine grinding compound. Place the valve in position and rotate the valve backwards and forwards on the seating, lifting it and giving it half a turn every twenty seconds or so, in order to prevent a particle of grinding compound cutting a groove in any one place. After grinding for a short period, the valve should be removed and washed in petrol. If the face is then examined it can be seen how the grinding is progressing. The object is to produce a finely ground surface round the face of the valve. This surface will only be narrow, and will not cover the complete face. The grinding process should be continued until it is seen that both the valve face and the seating have assumed an even grey bearing without any marks. If the valve was in good condition when the operation was started, it should not be necessary to use any coarse compound. At any rate, a minimum amount of grinding should be carried out with the coarse compound. When the work appears to have been completed, both the valve seating and face should be cleaned off with petrol and carefully dried. With a pencil, marks should now be made on the valve, across the grinding marks round the whole surface of the face. The valve should next be re-inserted dry on to its seating and revolved a few times. Now if the grinding process has been carried out carefully, all the pencil marks should be removed from the ground surface. If the marks are not so removed, then the grinding should be continued until the test proves that the correct seating has been produced. When re-assembling the valve, it is advantageous to lubricate the stem with a colloidal graphite upper cylinder lubricant. A small quantity of this can be obtained from any good garage for a few pence, if you take your own bottle.

FAULTS.

Every mechanical contrivance, however simple, is subject to derangement. If a motor cycle is properly maintained, trouble will be reduced to a minimum. It should always be remembered that there are two methods of maintaining a motor cycle. One is to carry out the maintenance work in the garage, and periodically check over the machine to see that everything is in order. The rider who maintains his machine by this method obtains the most satisfactory results. The other system is to ride the machine and enter the garage only to put it away or collect it. This usually means that the maintenance has to be done at the side of the road, a most inconvenient site at the best of times. This type of rider obtains the minimum of pleasure from his machine and causes himself the maximum amount of trouble. Maintenance in the garage reaps its own reward. In spite of careful servicing, however, motor cycles do occasionally give unexpected trouble, and the purpose of this section of the Instruction Book is to suggest possible remedies for the most usual faults.

CARBURATION FAILURE.

- Controls out of order.
- Petrol supply exhausted.
- Petrol tap closed or only partially open.
- Choked jet.
- Choked float chamber passage.
- Excessive air leakage.
- Float needle sticking.
- Dirt on needle valve.
- Valve seating worn.
- Punctured float.
- Water in petrol.
- Choked petrol pipe.

IGNITION FAILURE.

- Control out of order.
- Faulty plug.
- Sooted plug interior.
- Oiled plug points.
- Short circuit on plug terminal or lead.
- Dirty contact points.
- Points incorrectly adjusted.
- Ignition too far advanced.
- Weak spark.
- Magneto failure.
- Broken carbon brushes.

CONDITIONAL FAILURE.

Incorrect valve clearances.
Valves require grinding.
Sticking valves.
Overheating.
Gummed piston rings.
Pitted valve faces.
Pre-ignition.
Poor compression.
Choked silencer.
Excessive carbon deposit.
Insufficient lubrication.
Worn piston rings.

MECHANICAL FAILURE.

Broken valve springs.
Weak valve springs.
Broken valve.
Stripped timing gears.
Broken piston.

ENGINE FAILS TO START.

To locate any fault in the case of the engine refusing to start, the rider should first of all verify the carburetter and petrol supply by seeing if the air and throttle lever controls and cables are in order, that there is petrol in the tank, the petrol tap is open, the petrol pipe is clear, and that there is no obstruction in the jet.

Assuming that the carburetter floods on depressing the float needle, test for a spark at the plug points, and, if a spark shows, trouble may be due to its being too weak to fire under compression or to a short circuit on the plug terminal or lead. If there is no spark at the plug, test for a spark at terminal, and should this answer, it is then proved that either the plug is faulty, the plug points sooted up, the spark is weak (necessitating a re-adjustment of the points), or that there is a short circuit in the plug itself. If there is no spark at the terminal, make sure that the contact breaker arm is free, but should this be found satisfactory examine the points, see if dirty, and test the gap for distance with the gauge provided. Make sure that the contact breaker points line up with each other. If the insulation of the magneto has failed, this can only be detected by special tests.

Failing to find any fault by the above means, make sure that the carburetter controls are not sticking, that the engine is correctly timed, and that there is no air leakage at the induction pipe joints.

ENGINE RUNS IMPERFECTLY.

The general troubles experienced under this heading are :—

1. Lack of power.
2. Engine knocks.
3. Engine misses fire.
4. Engine fails on hills.

1. If the engine lacks power at intervals it is usually due to a partial obstruction of petrol, an obstruction in the petrol filler cap vent, or a sticking valve. If the engine lacks power constantly, the controls may be out of order, or it may be due to poor compression, incorrect valve clearances, valves needing grinding, valve springs weak, choked silencer, incorrect valve timing, obstruction in petrol pipe, or excessive carbon deposit.
2. If the engine knocks, the trouble may be due to excessive carbon deposit, overheating (insufficient or unsuitable oil) or pre-ignition.
3. When the engine misses fire in an irregular sort of way the trouble may be due to the breaker arm sticking, sooted plug, dirty breaker points, or an occasional short circuit in the ignition system. If, however, the spark is regular, an imperfect mixture, water in the petrol or a starved carburetter will probably be the cause.
4. If the engine fails on hills, the fault is probably due to the engine being dirty, incorrect valve clearance, a sooted plug or ignition too far advanced.

ENGINE STOPS.

Ascertain first of all whether there is petrol in the tank, and, if so, verify the spark at plug points. Then test for compression, and see if carburetter is in order. If this is the case, a broken valve or valve spring, disconnected controls, lack of oil or air leakage will be the cause. Should the carburetter not be working, then the cause may be due to a choked jet or pipe, a punctured float, a flooded float chamber or carburetter needle sticking.

With a spark at plug points and no compression, the fault may lie with a broken valve, broken piston rings, worn piston rings, gummed piston rings, valve sticking in guide, or a pitted valve face.

With no spark at the plug points, test for a spark at the magneto, and this being found correct, attention should be paid to a dirty or broken plug, wrong timing or faulty high tension wire. With no spark at magneto, the trouble may be that the contact breaker arm is sticking, the points require attention, internal shorting due to wet, failure of insulation, or dirty contact breaker points.

CARBURETTER FAILURE.

Carburetter trouble divides itself into two forms—absolute, in which the engine stops completely, indicating that the carburetter had ceased to function ; or conditional, in which it functions badly, the running depending on how badly.

ABSOLUTE.

If the engine stops, first verify the throttle cable is not broken, allowing the throttle to remain closed. If you find that the cable is in order, then see that you have petrol in the tank and that the tap is turned on ; remove the jet from the bottom of the carburetter and see if it is choked. Make certain that the petrol is flowing from the float chamber to the carburetter. The flow may be restricted if there is water in the float chamber. Water in the float chamber is an infrequent trouble, except during very stormy weather.

CONDITIONAL.

If the engine runs hot the fault may be that the mixture is too weak, and the needle in the carburetter should be lifted one or more notches. Poor pulling power may also be due to the needle being too low, and it should be lifted and a further test made. Both these troubles can also result from an air leak at the carburetter joint, which will admit air and cause a weak mixture. A weak mixture may also cause excessive pinking.

Heavy " thumpy " running will occur if the mixture is too rich, and in this case the needle should be tried in a lower

position. Mis-firing, where due to a carburetter fault can usually be traced to too weak a mixture, probably caused by a partially obstructed jet or water in the carburetter.

Uneven running with the " Twin " Models may be caused by the induction pipe gaskets over-lapping the ports, and thus causing a restriction. New gaskets should be fitted, and these should be fixed to the cylinder head flanges by means of gasket cement.

Flooding may be due to dirt under the float chamber valve, or to a bent needle or punctured float.

NO OIL PRESSURE.

See page 13.

OIL NOT RETURNING TO TANK.

See page 13.

LEAKAGE FROM ENGINE BREATHER.

See page 13.

NOISY ROCKER GEAR.

Re-adjust tappets (page 19) and check up lubrication (page 15).

Oil changed in engine, gear box + chain case @ 500 miles

.. do .. do do dc @ 1,200 .

NOTES.

Decarbonised 1st March 1939 @ 1200 .

Speedo changed @ 1,500 .

Decoke. New rings. 10,534

New rear tyre 10,534

Decarbonised 14,394

Complete overhaul (Dec 1944) 14,400

New valve springs only.
& clutch
Cylinder re-sleeved, new pistons & rings
new valves + guides, rockers re-bushed
new small end bush. Dec 1948 19,616

17/3/49 Speedo reading 20,060

11/9/49 Oil changed in engine 20,080

9/5/49 oil changed in engine, 21,765.
Gear Box & primary Chain case

TECHNICAL INFORMATION

MODEL NUMBER	5 T 'Speed Twin'	T 100 Twin	T 80	T 70	6 S	5 H	5 S and 5 SE	3 H	3 S and 3 SE	2 H and 2 HC
Engine Type	O.H.V. Twin	O.H.V. Twin	O.H.V.	O.H.V.	S.V.	O.H.V.	S.V.	O.H.V.	S.V.	O.H.V.
Bore and Stroke ... ... m/m	63 x 80	63 x 80	70 x 89	63 x 80	84 x 108	84 x 89	84 x 89	70 x 89	70 x 89	63 x 80
Cylinder Capacity ... c.c.	498	498	343	249	597	493	493	343	343	249
Compression Ratio	7 : 1	7.75 : 1	7.5 : 1	7.7 : 1	5.6 : 1	6.1	5.6 : 1	6.7 : 1	5.3 : 1	6.92 : 1
B.H.P. at R.P.M.	28.5 at 6000	33-34 at 7000	20 at 5700	16 at 5800	18 at 4800	23 at 5000	15 at 4800	17 at 5200	12 at 4500	13 at 5200
Petrol Tank Capacity	3½ galls.	4 galls.	3 galls.	3 galls.	3½ galls.	3½ galls.	3 galls.	3 galls.	3 galls.	3 galls.
Oil Tank Capacity	¾ gall.	1 gall.	¾ gall.	¾ gall.	¾ gall.	¾ gall.	¾ gall.	¾ gall.	¾ gall.	¾ gall.
Carburettor Main Jet	140	160	150	110	170	200	120	150	120	110
Valve Timing Inlet Opens B.T.C.	26½ deg.	26½ deg.	36 deg.	36 deg.	19 deg.	26½ deg.	19 deg.	36 deg.	19 deg.	36 deg.
Inlet Closes A.B.C. ...	69½ deg.	69 deg.	70 deg.	70 deg.	60 deg.	62½ deg.	60 deg.	70 deg.	60 deg.	70 deg.
Exhaust Opens B.B.C.	61 deg.	61 deg.	70 deg.	70 deg.	67 deg.	75½ deg.	67 deg.	70 deg.	67 deg.	70 deg.
Exhaust Closes A.T.C.	35 deg.	35 deg.	36 deg.	36 deg.	29 deg.	20½ deg.	29 deg.	29 deg.	36 deg.	36 deg.
Ignition Timing Fully Adv. ...	⅜"	⅜"	⅜"	⅜"	5/16"	⅜"	5/16"	⅜"	5/16"	⅜"
Engine Sprocket (Teeth) ...	22	22	20	18	23	23	20	20	18	18
Rear Wheel Sprocket (Teeth) ..	46	46	46	46	46	46	46	46	46	46
Gear Ratios: Top	Solo 5.0 / Sidecar 5.8	Solo 5.0 / Sidecar 5.8	5.5	6.1	Solo 4.78 / Sidecar 5.23	Solo 4.78 / Sidecar 5.23	4.95	5.5	6.1	6.1
Third	6.0 / 6.95	6.0 / 6.95	6.6	7.33	5.75 / 6.28	5.75 / 6.28	5.94	6.6	7.3	7.3
Second	8.65 / 10.03	8.65 / 10.03	9.5	10.5	8.26 / 9.05	8.26 / 9.05	8.56	9.5	10.5	10.5
Low	12.70 / 14.73	12.70 / 14.73	14.0	15.5	12.1 / 13.3	12.1 / 13.3	12.52	14.0	15.5	15.5
Tyre Sizes, inches, Front ...	26" x 3.00"	26" x 3.00"	26" x 3.00"	26" x 3.00"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.00"
Rear ...	26" x 3.5"	26" x 3.5"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"	26" x 3.25"
Wheel Base, ... Inches	54	54	52½	52½	54	54	52½	52½	52½	52½
Overall Length ... ... Inches	84	84	82	82	84	84	82	82	82	82
Overall Width ... ... Inches	28½	28½	28½	28½	28½	28½	28½	28½	28½	28½
Weight Fully Equipped ... lbs.	360	362	320	316	356	362	322	322	316	318