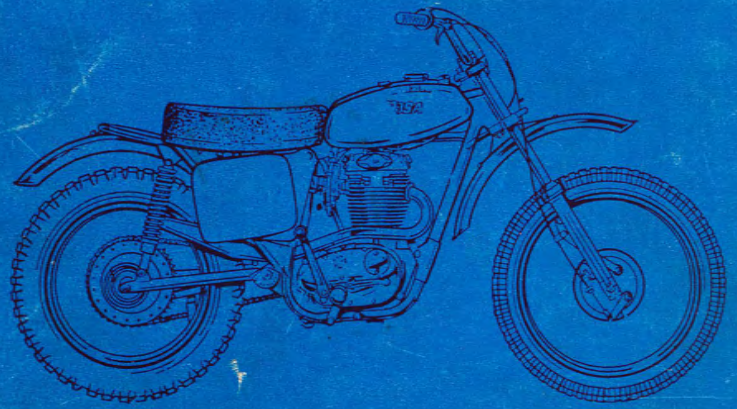
Owners' handbook

B50 MX Victor 00-4221



OWNER'S HANDBOOK

For

Model B50MX

500 CM^3

BSA MOTOR CYCLES LTD.

ARMOURY ROAD - SMALL HEATH - BIRMINGHAM B11.2PX
ENGLAND

Telephone: 021-772-2381 **Telegrams and Cables: "Selmoto" Birmingham.**

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INTRODUCTORY NOTES

This handbook is intended to acquaint the BSA owner with details of the controls, general maintenance and technical data which may be required for normal operation of the machine.

It does not contain the information necessary to carry out stripping for major overhauls, decarbonising, etc., but if any owner feels competent to carry out this type of work, any of the special tools illustrated in the Service Tools Catalogue can be obtained from his local BSA dealer.

When applying for any of the above items, or when writing on any subject connected with the motor-cycle, always give the motor and frame numbers. This will enable the dealer to give prompt service.

Motor number . . . . On left side of crankcase below cylinder base.

Frame number . . . . On left side of steering head.

INDEX

TECHNICAL DATA

Motor

Cylinder bore (mm)	84
Stroke (mm)	90
Capacity:	
(cm^3)	499
(cu. in.)	30·5
Compression ratio	9
Valve timing at ·015″ clearance:	
intake opens b.t.d.c.	51
intake closes a.b.d.c.	68
exhaust opens b.b.d.c.	78
exhaust closes a.t.d.c.	37
Valve clearances:	
intake	·008 ins (0·20 mm)
exhaust	·010 ins (0·25 mm)
Spark plug:	
type	N3
gap	0·020—0·025″ (0·5—0·65 mm)
Spark timing degrees fully advanced	34
Contact breaker gap	·012—·017″ (0·30—0·43 mm)
Maximum safe r.p.m.	7,000

Sprockets, Chains, Ratios

Gear ratios:	
high	6·92
third	8·60
second	11·35
first	15·04
Chain sizes:	
front	$\frac{3}{8}$″ pitch, duplex
rear	$\frac{5}{8}$″ pitch × $\frac{1}{4}$″ wide
Teeth on:	
motor sprocket	28
transmission (gearbox) sprocket	14
clutch sprocket	52
rear chainwheel	52

TECHNICAL DATA—*continued*

Capacities

Gas (petrol):	
U.S. gallons	2·4
British gallons	2
liters	9
Oil:	
U.S. pints	$4\frac{3}{4}$
British pints	4
liters	2·25
Transmission (gearbox):	
pints	$\frac{1}{2}$ British pint; $\frac{5}{8}$ U.S. pint
cm^3	280
Primary chaincase:	
pints	$\frac{1}{4}$ British pint; $\frac{1}{3}$ U.S. pint
cm^3	140
Front forks:	
U.S. pints	2/5
British pints	1/3
cm^3	190

Wheels

Tire size:	
front	3·00×21
rear	4·00×18
Tire type:	
front	Sports
rear	Sports
Tire pressures (p.s.i.):	
front (soft ground)	8
front (hard ground)	22
rear (soft ground)	12
rear (hard ground)	24
Brakes, diameter (in.):	
front	6
rear	7

TECHNICAL DATA—*continued*

Carburettor (Amal 932/18)

Bore (mm)	32
Main jet	250
Throttle valve	3½
Needle position	No. 1
Needle jet	·106

General Details

Overall length, in. (cm)	82½ (209)
Wheelbase, in. (cm)	54 (137)
Ground clearance, in. (cm)	7½ (19)
Overall width, in. (cm)	33½ (85)
Weight, lb. (kg)	240 (108·8)

THE CONTROLS

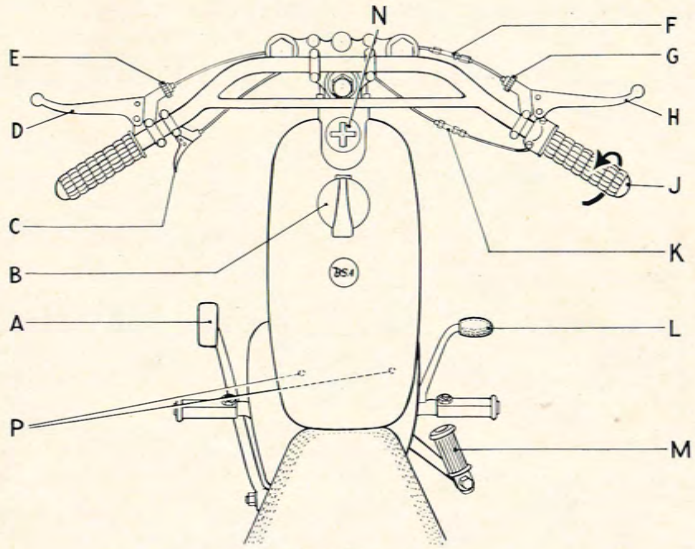


Fig. 1. The controls.

G & F	Front brake cable adjuster.	M	Starter pedal.
K	Throttle cable adjuster.	P	Gasolene (petrol) taps.
H	Front brake lever.	A	Brake pedal.
J	Throttle twist grip control (open in direction of arrow)	B	Gasolene (petrol) filler.
		C	Exhaust valve lifter lever.
N	Oil filler.	D	Clutch lever.
L	Gearchange pedal.	E	Clutch cable adjuster.

TAKING OVER THE MACHINE

Before running the machine make sure that the oil reservoir, transmission (gearbox), primary chaincase and front forks are properly topped-up with oil (see appropriate chapters for filling instructions). Normally these preparations will be carried out by the dealer supplying the machine and the new owner has only to arrange the controls to his liking for the machine to be ready for use.

The new rider should make sure that he is quite familiar with all the controls before attempting to ride the machine. The gearchange pedal is adjustable, and should be positioned so that it can be operated without moving the foot from the footpeg. Handlebars should be adjusted so that a natural riding position is achieved.

Make sure that the bolts retaining the handlebar clamps are tight after completing any adjustment.

Gasolene (Petrol)

For best performance the octane rating of the fuel used should not be less than 98.

HANDLEBAR CONTROLS

Twist Grip. Mounted on the right handlebar, it controls the throttle opening and consequently the motor speed. To open the throttle (i.e. to increase motor speed) turn the grip so that the top moves towards the rider. Excess slackness in the cable can be removed by means of an adjuster (B), Fig. 2, incorported in the cable.

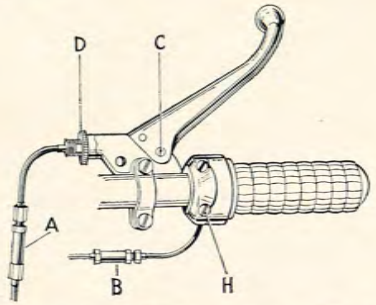


Fig. 2.
The right handlebar controls.

The twist grip body can be moved after slackening the screws (H). Tighten securely after adjustment.

Front Brake. The lever is mounted on the right handlebar in front of the throttle control and its position can be adjusted as required. The looseness of the lever is adjusted by rotation of screw (C) after slackening its locknut. Grip the lever gently to operate the brake. The main adjuster (A), Fig. 2, is situated midway in the cable and finger adjustment (D) for the cable is provided at the adapter on the handlebar lever.

Clutch. The lever is mounted on the left handlebar and its position can be adjusted as required. The looseness of the lever is adjusted by rotation of screw (F) Fig. 3, after slackening its locknut. Grip the lever to free the clutch (i.e. disengage the drive between the motor and the rear wheel). Finger adjustment for the clutch cable is provided at the adapter (D) Fig. 3, on the lever. A greasing point is provided in the cable at (B), Fig. 19.

Exhaust Valve Lifter. This is the small lever (G) Fig. 3, mounted on the left handlebar and it must be depressed in order to raise the exhaust valve and thereby relieve compression. An adjuster is provided at the engine end of the cable.

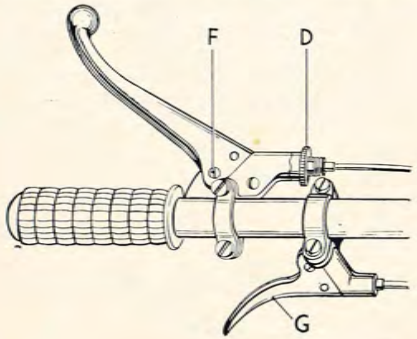


Fig. 3.
The left handlebar controls.

OTHER HAND CONTROLS

Gas (Petrol) Taps. Turn down the levers to open the taps. To ensure an ample supply of fuel at the carburettor, both taps should be opened when used for competition purposes. Always turn off the taps when parking.

They can be removed as necessary for cleaning of the filters.

Tickler (Carburettor). The carburettor is fitted with a spring-loaded plunger (P) Fig. 13, which, when depressed, prevents the float from rising, thus rapidly replenishing the level of fuel in the chamber. Under conditions of extreme cold, the plunger (or tickler) should be used for a brief interval only, (see starting instructions, below).

FOOT CONTROLS

Gearshift Pedal. Operated by the right foot, the gearshift mechanism is of the positive stop type and following a shift of gear, the lever returns to its central position as soon as foot pressure is released.

Neutral position is between first and second gears, and downward movement (C) Fig. 4, of the lever selects a lower gear, whilst an upward movement (B) selects a higher one. The pedal can be repositioned as required after releasing its pinch bolt (A).

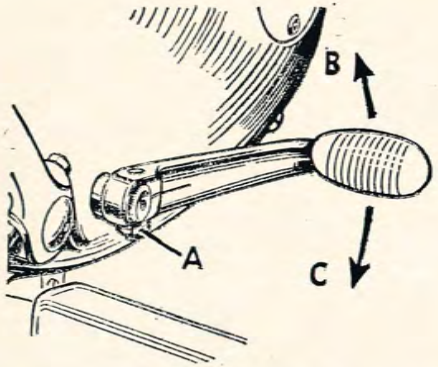


Fig. 4.
The gearshift pedal.

Rear Brake Pedal. Operated by the left foot, the pedal is designed to contact a non-adjustable stop on the footpeg, to ensure that the pedal pad lies comfortably below the foot ready for instant use.

Starter Pedal. The folding pedal is on the right side of the machine behind the footpeg. Depression of the pedal rotates the motor.

STARTING

Before starting, grip the clutch lever and operate the starter pedal two or three times to ensure separation of the clutch plates.

Make sure that the gears are in the neutral position, which lies between first and second gears. Should the machine be in gear it will move forward as the starter pedal is depressed.

Turn on the gas (petrol), but at normal temperatures it is not necessary to operate the carburettor "tickler". However, under conditions of extreme cold it may be necessary to press the "tickler" plunger down for a few seconds before starting.

Do not open the twist grip throttle control. Press the starter pedal down slowly until resistance is felt. Retaining the foot at this position, depress and immediately release the exhaust valve lifter lever; allow the pedal to return to the top of its stroke and give a firm downward swing to start the motor.

If it fails to start after three or four attempts, excessively rich mixture in the combustion chamber should be cleared by depressing the exhaust valve lifter lever, opening the throttle fully, and operating the starter pedal several times.

The initial starting procedure may then be repeated, but avoid rapid kicking at the pedal which will serve no purpose and may damage the operating mechanism. The ignition control is automatically set in the retarded position for starting, and advances as the motor speed increases.

To Stop the Motor

Select the neutral gear position and close the throttle.

Using the Transmission (Gearbox)

Correct use of the transmission (gearbox) must be made in order to obtain best results in all-round performance, especially with regard to acceleration and to the attainment of maximum speed.

In particular, to obtain maximum speed it is essential to obtain peak revs per minute in third gear before changing into high gear.

Breaking-in

As far as is practicable, the motor cycle leaves the factory ready for a certain amount of hard work, but it cannot be considered as suitable for racing immediately after purchase, because the breaking-in process is not complete. This is an operation which must be left to the rider.

The "breaking-in" process is the most important period in the life of the motor and the handling it receives during this time will determine the service it will provide in return.

For obvious reasons a moto-cross model cannot be used on public highways so that, before engaging in serious competition work, every opportunity should be taken for "off the road" riding until the owner is satisfied that all the working parts are fully broken-in. This procedure should commence at about half throttle, the amount of throttle opening being progressively increased until eventually full throttle can be employed.

The B50 MX cannot be expected to give its best performance until it has been broken-in correctly

Do not allow the oil level to fall too low, because economy in oil may prove very expensive at a later date and running consistently with too low a level causes the oil to become unduly hot. It must be remembered that oil cools as well as lubricates and a new engine tends to run a little hotter than one which is well broken in.

At an estimated 250 miles, 500 miles and also when the breaking in process is completed, drain off all the motor oil, clean all filters and re-fill the reservoir with fresh oil. At the same time the gearbox oil should be changed, Suitable grades of oil are given in the Lubrication Chart, page 11.

During breaking-in, it is advisable to examine the various adjustable clearances, such as contact breaker gap, valve clearances, clutch mechanism etc. and to check the tightness of all nuts and bolts to ensure that the initial settling down does not allow any components to become loose.

When breaking-in is completed, balance the wheels.

Special Note

It is always advisable to make sure that the oil is warm before driving the motor strenuously. For moto-cross purposes advantage should be taken of any warming-up period to get the motor warm and the oil circulated.

ROUTINE MAINTENANCE

A good rider always prepares his machine with meticulous care before every competitive event, and the list which follows is of items which should be examined, and if necessary adjusted, prior to every meeting. The method of carrying out the various adjustments will be found under the appropriate headings in the later chapters.

Whenever any work is carried out on the machine, attention to detail and scrupulous cleanliness must be observed. All joints must be clean and gaskets in good condition before assembly. Threads must be kept clean and free from grit and exposed threads should be oiled or greased before assembly. Good fitting spanners should be used at all times and nuts must be tightened firmly.

Note

When a B50 MX is used for leisure off-the-road purposes, pre-race preparation carried out by riders using their machines for competitive events will not apply, and the charts on pages 11 and 23 give the frequency with which maintenance and lubrication should be carried out under the differing circumstances.

Since the model is not fitted with an odometer, the mileages will, of necessity, have to be estimated and it will be preferable to underestimate these, rather than otherwise.

Take care when cleaning the machine that dirt is not introduced into the electrical system, brakes, air cleaner, etc. Do not attempt to rub off dry dirt or mud but wash off with a copious supply of clean water, preferably from a hose. Any oily areas should be treated with a proprietary detergent before being hosed down.

Chromium-plating should be washed clean with a soap and water solution; an abrasive cleaner must not be used.

Apply a good quality wax polish to the enamelled and chromium-plated parts as soon as the machine is dry.

	Page
Every 2 Weeks	
Check tire pressures	5
Every 2,000 Miles	
Check brake adjustment	30
Check tightness of all nuts and bolts	—
Clean and check contact breaker points gap	16
Examine auto-advance unit	17
Check spark timing	18
Check rear chain adjustment	26
Clean air filter	22
Clean chaincase breather filter	26

Every 4,000 Miles

Check valve clearances	15
Check and adjust spark plug	20
Check clutch operation	27
Check wheel alignment	—
Check steering head adjustment	32
Check primary chain adjustment	25
Examine brake linings, clean brake drums	—
Examine front fork for correct action	32
Examine rear suspension for correct action	33

As required

Gas tap filters	—

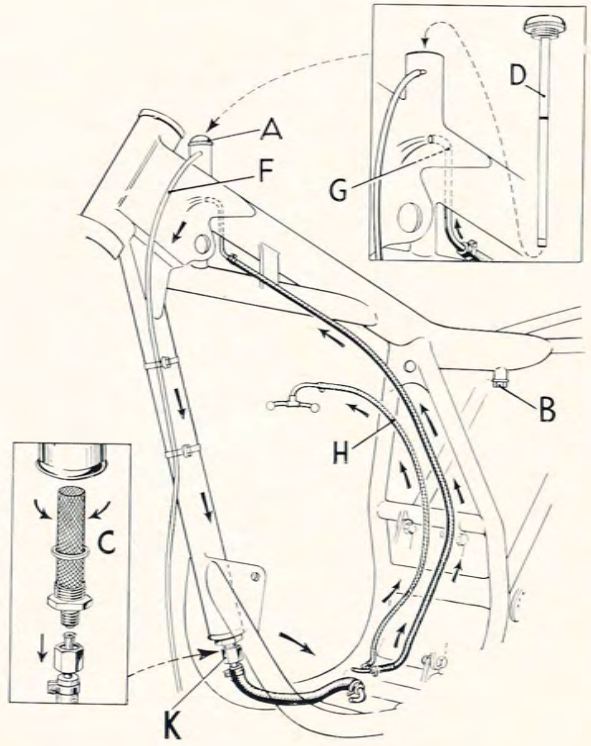


Fig. 5. The lubricating system showing the pipe lines, filters, etc.

Lubrication System

The lubrication system is of the dry sump type and is operated by a double gear-pump situated in the bottom of the crankcase on the right-hand side. Oil is drawn from the reservoir by the supply pump and is then delivered past the non-return valve (B) Fig. 6, through a duct in the mainshaft to the big-end.

After lubricating the motor, the oil drains through a filter to a small sump in the bottom of the crankcase, from which it is drawn by the scavenge pump past the non-return valve (A) Fig. 6, and delivered to the oil reservoir. If the filler cap (A) Fig. 5, is removed while the motor is running, the returning oil should be seen issuing from the pipe (G) Fig. 5, below the filler neck. The flow of oil will in all probability contain air bubbles, but this is a normal condition due to the larger capacity of the return pump. **If there is no flow from the pipe, stop the motor immediately and investigate the cause** (see "Pump Ball Valve", page 14).

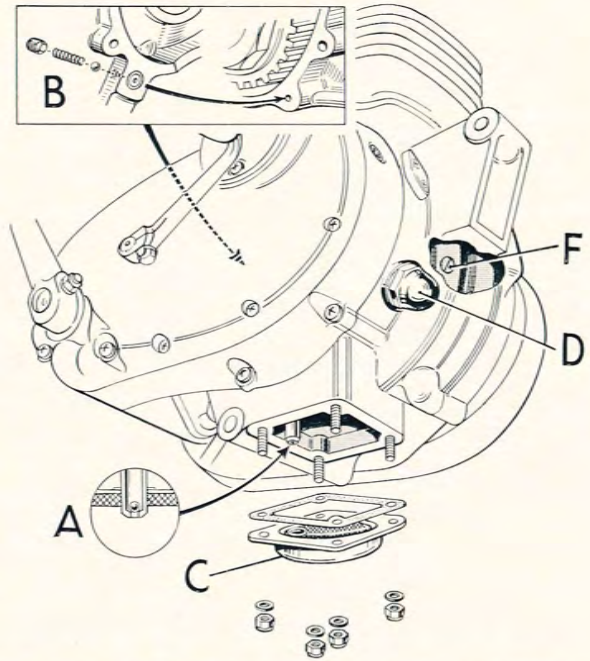


Fig. 6. The engine lubrication system showing the ball valves.

A by-pass pipe (H) Fig. 5, leads a supply of oil to the rockers, push rod ends, etc.

The valve (B) Fig. 6, prevents oil transfer from the reservoir to the crankcase while the machine is not in use and, together with the flywheel centrifugal filter (F), does not require attention until such time as the motor is completely dismantled.

A by-pass valve (D) Fig. 6, limits the pressure in the lubricating system, excess quantities of oil being returned by the scavenge pump to the reservoir. This valve should not be removed until the motor is dismantled for servicing.

Changing the Oil

This should preferably be carried out immediately after running when the oil is warm and will, therefore, flow more freely. Remove the filler cap (A) Fig. 5 Unscrew the drain plug (B), at the base of the oil reservoir, for which purpose it will be necessary to remove the right side panel. Next, unscrew the filter (C) at the lower end of the front down tube, collecting the oil in a suitable receptacle. Clean the filter (see below) and replace, together with the drain plug.

Refill the reservoir with motor oil in accordance with the recommendations given in the list on page 24.

The oil capacity is $4\frac{3}{4}$ U.S. pints (4 British pints) and the normal level is given on the dipstick (D) Fig. 5, attached to the filler cap.

Do not add anti-friction compounds (see page 26).

Filters

The oil reservoir filter and crankcase filter must be removed at regular intervals for cleaning (see "Routine Lubrication", page 23) and this should be carried out at the same time as the oil is changed.

The crankcase filter is incorporated in the sump plate (C) Fig. 6, which is released following removal of four nuts of the self-locking type.

The main filter (C) Fig. 5, is unscrewed from the bottom of the front down tube following removal of the pipe union nut (K). It is essential that the filter is securely tightened.

Wash the filters thoroughly in gasolene (petrol) and dry before replacing. Refill the reservoir with motor oil to the dipstick mark in accordance with the recommendations given in the list on page 24.

Note:—Until the oil pump has had sufficient time to refill all the oil ducts, etc., it will ensure immediate lubrication of the internal parts if a small quantity of motor oil (say, half a pint) is added to the crankcase. Then operate the starter pedal twenty or thirty times, simultaneously gripping the exhaust valve lifter lever, until oil is seen issuing from the return pipe in the filler neck.

The oil can be inserted through the aperture exposed by removal of the sealing plug on the left side of the crankcase immediately in front of the cylinder barrel. It will be necessary to allow sufficient space in the oil reservoir to receive this additional quantity of oil.

This procedure should also be followed when the motor-cycle has not been used for an appreciable time.

Oil Reservoir Breather

The breather pipe (F) Fig. 5, must be examined regularly and maintained clear of any obstruction.

Pump Ball Valve

When the crankcase filter is removed for cleaning, it is a good opportunity to check the ball valve (A) Fig. 6 carried in the crankcase suction pipe. The ball must be free on its seating. If the ball adheres to its seating, there will not be a return flow of oil to the reservoir and the crankcase may become flooded. Alternatively, if the crankcase contains an excessive quantity of oil this may be due to the ball not seating properly caused by a particle of foreign matter so allowing oil to pass through the pump to the crankcase when the motor is stationary.

Valve Clearances

These must be set when the motor is quite cold and the clearances should be: ·008″ intake, and ·010″ exhaust (0·2 mm and 0·25 mm).

Remove the inspection caps and take out the spark plug so that the motor can be rotated easily by hand. It may be necessary to slacken the carburettor flange nuts to provide clearance for the removal of the intake inspection cap. Rotate the motor forward until the intake valve has just closed (i.e. the push rod is just free to rotate). This is the correct position for checking or adjusting the exhaust valve clearance.

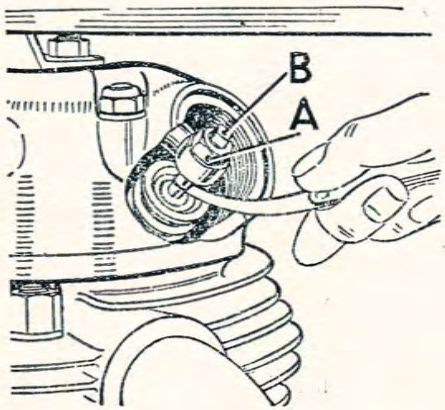


Fig. 7. Checking the valve clearences.

When the exhaust valve clearance has been adjusted, rotate the motor forward again until this clearance is just taken up (i.e. just before the valve actually starts to open). This is the correct position for checking and adjusting the intake valve clearance. Check the valve clearances by sliding a feeler gauge between valve stem and adjusting pin, as shown in Fig. 7.

If the clearance requires adjusting, slacken the locknut (A) Fig. 7, and adjust pin (B) until a feeler gauge of the correct thickness will just slide between the valve and pin.

Holding the pin in its new position, and retighten the locknut. Check the clearance again to make sure that tightening the locknut has not affected the setting.

Exhaust Valve Lifter

It is essential that the cable length is adjusted so that there is always ample clearance between the lobe on the exhaust rocker arm and the lifter spindle at (A) Fig. 8.

The setting should be such that there is appreciable movement of the handlebar lever before considerable resistance indicates that the faces of the lobe and spindle are in contact and hence that the exhaust valve is about to be lifted off its seat against the spring pressure.

Incorrect setting of this control will cause difficult starting, a burnt valve, or other troubles.

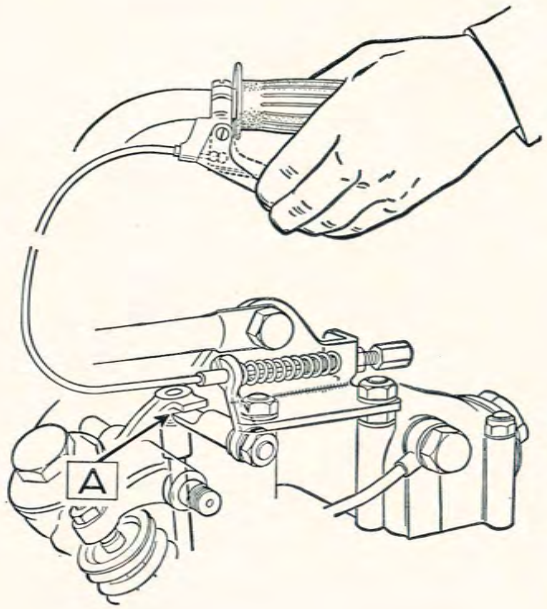


Fig. 8. Exhaust valve lifter clearance.

Contact Breaker (Fig. 9)

After the first 500 miles and thereafter every 2,000 miles, the contact points gap should be examined and reset as necessary.

The unit is contained in a separate compartment and becomes accessible when the circular inspection cap is removed from the timing cover on the right side of the motor.

The condenser for this unit is carried on the main frame tube, below the seat.

Cleaning. The contacts must be absolutely clean at all times. If they are burned or blackened, clean with a fine carborundum stone or very fine emery cloth, afterwards wiping away any trace of dirt or metal dust with a clean cloth moistened with gasolene. Cleaning of the contacts is made easier if the moving contact is withdrawn and it can be lifted off its post after unscrewing the nut which secures the end of the spring. When reassembling, make sure that the insulating pivots, bushes and washers are correctly replaced.

Gap Setting. When the points are fully opened, the gap should be set to ·012—·017″ (0·30—0·43 mm). To check the setting, first remove the spark plug so that the motor can be rotated slowly until the "heel" on the arm of the moving contact is on the peak of the cam (F), as determined by the mark (H) on the cam face. In this position the gap will be at its maximum, when setting can be verified with the aid of a feeler gauge. If incorrect, slacken the fixing screw (D) and, by means of the eccentric pin (E), adjust the position of the stationary contact point until the gap is correct. Retighten the screw and check for adjustment.

Lubrication. Apply a **very small amount** of thin grease to the felt pad (J) which lubricates the cam (F). Do not use an excessive quantity because it is most important that the contact points are kept free from lubricant, otherwise misfiring and difficult starting may occur. At the same time, turn the motor until the groove (L) on the face of the cam is vertical and apply **one spot of clean motor oil** for the purpose of lubricating the cam spindle.

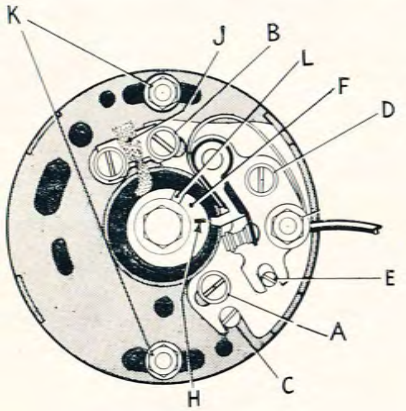


Fig. 9.
The contact breaker.

Advance and Retard Mechanism

The spark timing is automatically advanced and retarded by means of a governor mechanism behind the contact breaker.

Inspect the mechanism whenever the contact breaker gap is checked, and make sure that the two governor weights (visible through apertures in the base plate), move freely and that if the cam (F) is turned by hand to the advanced position (weights fully extended outwards) and released, the springs withdraw the weights to the inner position (retarded). (Before removing the contact breaker plate (extended nuts K) scribe a line across the plate and its housing so that it can be replaced in exactly the same position, otherwise the spark will have to be retimed).

Oil each bearing with a drop of light oil. Do not over-lubricate or the excess oil may find its way on to the contact breaker points.

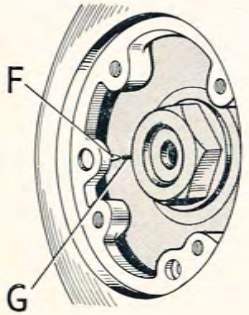


Fig. 10.
Timing the spark
by strobelight.

Spark Timing

Before carrying out any check on the spark timing, the contact breaker gap should first be verified and, if necessary readjusted as above.

The importance of accurate spark timing cannot be over-emphasised, especially in the case of models fitted with energy-transfer ignition, and the best method is by means of a "strobelight", an instrument possessed by most B.S.A. dealers.

Provision is made on all engines for the use of this device, comprising a pointer (F) Fig. 10, on the interior of the chaincase cover and marker line (G) on the alternator rotor, both of which are exposed after removal of the circular cover on the front of the chaincase. The strobelight must be connected in accordance with the manufacturer's instructions, and it is important to note that an independent battery must be used for this operation, not the one on the machine.

Run the motor at a speed high enough to ensure that the automatic control has moved the spark timing to the fully advanced position. With the strobelight beam projected through the aperture, the marker line on the rotor appears to become stationary and, if the timing is correct, will be exactly opposite the pointer.

Should adjustment be required, slacken the two screws (A) and (B) Fig. 9, which secure the plate carrying the contact breaker assembly and adjust the eccentric pin (C) until the points are just opening and the above condition obtained. Retighten the screws securely.

Spark Timing without a Strobelight. Remove the spark plug so that the motor can be rotated without resistance due to compression, and engage high gear to enable the motor to be turned either backwards or forwards by rotation of the back wheel.

The motor can be timed accurately with the aid of a degree plate, for which purpose the primary chaincase cover must be removed and the plate mounted centrally on the mainshaft. A pointer should be attached to some convenient part of the motor.

Rotation of the motor through several degrees near the top dead center position produces a very small movement of the piston, which is extremely difficult to detect. It is preferable to have some form of stop (such as a dummy plug with a projection into the cylinder head), so that the piston can be brought gently against it by rotating the motor forwards or backwards as far as possible in each direction. If degree plate readings are taken in each position, the point midway between them is easy to calculate and this will be at precise dead center. The pointer and the zero position on the plate must be set to coincide.

If the cylinder head has been removed, a straight-edge placed across the top of the cylinder barrel will act as a suitable stop.

The next step is to set the auto-advance mechanism of the contact breaker in the fully advanced position. Carefully remove the central securing bolt to avoid releasing the whole mechanism, withdraw the washer and temporarily replace the latter with another washer having a hole just large enough to fit over the cam bearing, thus allowing the washer to bear against the side face of the cam. Replace the bolt, but before tightening, rotate the cam to its limit in a counter-clock direction, hold in position, and tighten the bolt. This will lock the auto-advance mechanism in the fully advanced position which is the correct position for timing the spark.

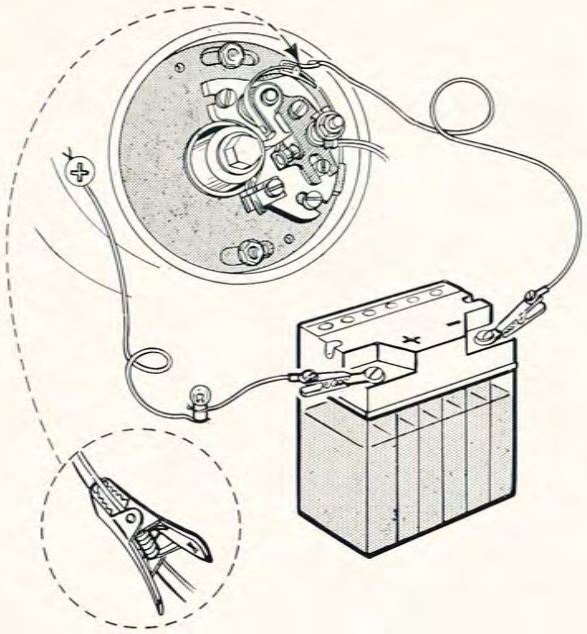


Fig. 11. Checking the opening of the contact breaker points by means of a battery and bulb.

To check the spark setting first determine the top dead center position of the piston (compression stroke) by the above method, at which point both valves will be closed. Rotate the motor backwards about 45° and then bring it forward slowly until the contact breaker points are just opening. A battery and bulb in series with the contact breaker points will indicate the instant at which they separate (Fig. 11). The crankshaft should then be 34 degrees before top dead center.

Equivalent piston distance before top dead center, inches (mm) . . ·385 (9·78)

If the spark setting is not correct, slacken the two screws (A) and (B) Fig. 9, which secure the plate carrying the contact breaker assembly and adjust the eccentric pin (C) until the points are just opening.

Firmly tighten the screws and check for adjustment. Do not forget to remove the special washer fitted temporarily behind the contact breaker securing bolt, otherwise the auto-advance mechanism will be inoperative.

Spark Plug

Champion plug type N3 is recommended. Fitting sizes are 14 mm diameter by $\frac{3}{4}$" reach.

The plug should be cleaned on an abrasive blast machine and afterwards, the sparking surfaces of the electrodes should be dressed with a fine file in order to restore clean, flat parallel faces. It is most important that the gap should be reset to specification, ·020—·025". Gap adjustment should be made by bending the side wire. The threads of the plug, and the gasket seat should be wiped clean and smeared with graphite grease before refitting the plug to the motor. The upper portion of the insulator should be also wiped clean after fitting, and prior to connecting the high-tension cable. It is good practice to wipe periodically the top of the insulator with a clean cloth in order to remove any accumulation of grime or dust, etc., as such deposits can be conductive, and results in poor plug performance.

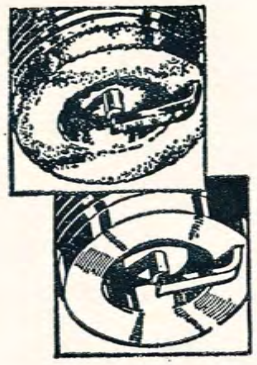


Fig. 12.
The spark plug.
(Above)—fouled with burnt oil, or soot.
(Below)—correct.

The special non-detachable steel gaskets are designed to last the life of the plug.

When refitting the plug, screw in as far as possible by hand, and then use a ring wrench for final tightening, to avoid possibility of damage to the insulator.

THE AMAL CARBURETTOR

An exploded view of the carburettor is shown in Fig. 13. Opening the twist grip throttle control raises the throttle slide, thus controlling the supply of air to the motor. The tapered needle controlling the supply of gas (petrol) is attached to the throttle slide so that a balanced mixture is always provided. The needle has grooves at its upper end and it is secured in the throttle slide by the spring and by the circlip which locates in one of these grooves.

Mixture control at tick-over and at low speeds is by the pilot jet which has an adjustable air supply and an adjustable throttle stop is also provided to regulate the slow-running speed.

Comprehensive tuning details are given in the Workshop Manual.

Running Adjustments

The main jet, throttle valve, needle and needle jet sizes are selected by the factory to give the best results and should not be altered without expert advice. It may however, be necessary to make small adjustments to the pilot mixtuer to suit different climatic conditions and give good idling.

Always make any carburettor adjustments with the engine at its normal running temperature.

The settings are those normally recommended and will be suitable for most atmospheric conditions. They are intended for altitudes of 0—3,000 feet (1,000 meters). Above this height some reduction in main jet size is necessary to provide a balanced mixture. At altitudes of 3,000—6,000 feet (1,000—2,000 meters) a reduction in main jet size by 5 per cent is usually necessary and for every 3,000 feet (1,000 meters) increase over 6,000 feet (2,000 meters) a further 4 per cent reduction is required.

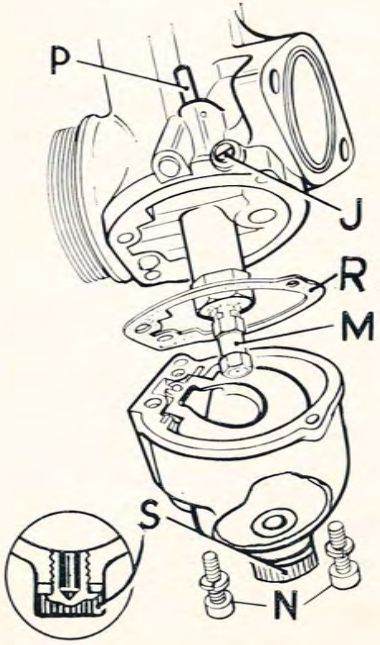


Fig. 13.
The Amal carburettor (with concentric float chamber).

The Jets

It is not necessary to dismantle the carburettor in order to take out the main jet (M). Removal of the drain plug (S) below the float chamber will expose the jet. When replacing, do not screw up too tightly, because when the main jet is unscrewed on a future occasion, the jet holder may also be released. If possible, use a torque wrench set to 50 lb. in. The drain plug is designed to retain any sediment deposited in the bowl and should be carefully cleaned before refitting. It is not possible to remove the pilot jet.

If the float bowl is taken off following removal of the screws (N), check that the gasket (R) is in good condition, otherwise there will be loss of gasolene (petrol).

Pilot Mixture Adjustment

Screwing in the pilot air screw (J) Fig. 13, restricts the air supply, thus giving a richer mixture and unscrewing it gives a lean mixture.

The amount by which the air screw is unscrewed can be varied to suit requirements.

Slow-Running

When proper adjustment of the pilot mixture has been determined the motor may be running too fast and in this case the throttle stop screw (adjacent to the air screw J) should be unscrewed until a steady and even tick-over is achieved. If considerable alteration to the throttle stop has been made, the pilot air screw should be readjusted. Do not attempt to obtain a very slow tick-over because it will probably become unreliable under different atmospheric conditions. The throttle stop and pilot air screws are fitted with rubber "O" rings to retain the adjustment and if these screws are taken out, the rings must be carefully retained.

Throttle Cable

Cable adjustment is provided by means of an adjuster midway in the cable.

Air Filter

If the machine is being used regularly for Competition work or under exceptionally severe conditions, the filter should be cleaned at intervals of not more than one week and preferably before every event.

The filter is of specially treated paper and, on machines used for leisure only, should receive attention at a maximum mileage of 2,000 (more frequently in exceptionally dusty climates). It must be well brushed to remove all traces of dust and the interior of the container treated similarly. It is preferable for the filter to be replaced every 5,000 miles.

Failure to clean the filter regularly may cause it to become partially choked with a consequent deterioration in performance and gasolene (petrol) consumption.

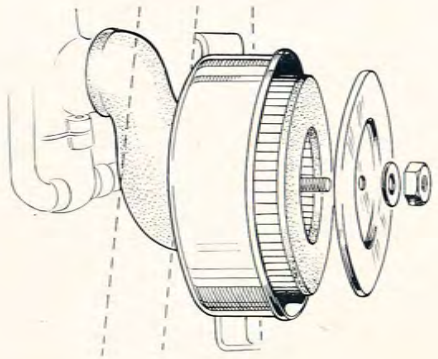


Fig. 14. Dismantling the air filter.

ROUTINE LUBRICATION

Ref. No.		Page
	Every 250 Miles	
1	Check oil level	—
	Every 1,000 Miles	
2	Check oil level in primary chaincase	25
	Every 2,000 Miles	
2	Drain and refill primary chaincase	25
9	Drain and refill the oil reservoir	14
10	Clean oil filters	14
3	Check oil level in transmission case (gearbox)	28
15	Lubricate side stand pivots (oil)	—
4	Lubricate rear chain	26
5	Lubricate contact breaker cam	17
5	Lubricate auto-advance mechanism	17
16	Lubricate brake pedal pivot	—
6	Oil exposed cables and control rod joints	—
7	Grease clutch cable	8
18	Grease swinging arm (2)	33
	Every 4,000 Miles	
3	Drain and refill transmission case (gearbox)	28
12	Examine pump ball valve	14
17	Grease rear brake cam spindle	29
	Every 10,000 Miles	
13	Drain and refill front forks	32
14	Clean and repack wheel bearings with grease	29

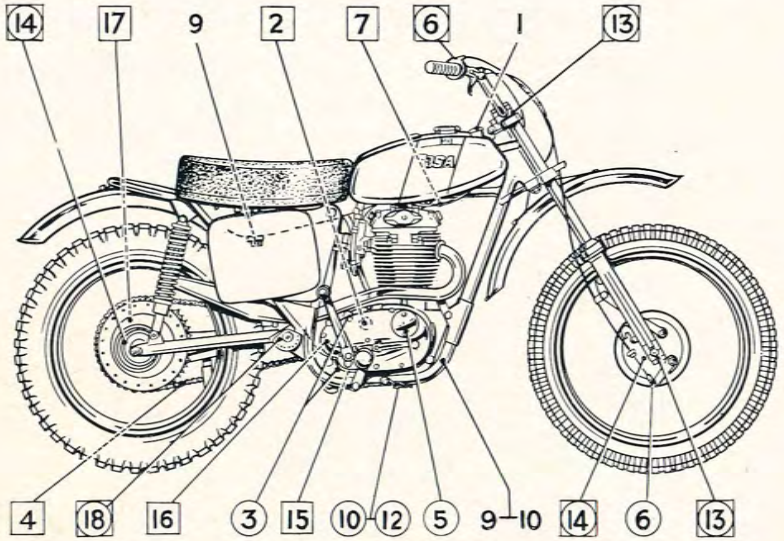


Fig. 15. Lubrication diagram. (The numbers in circles refer to the right side of the machine and numbers in squares refer to the left side).

LUBRICANTS

Recommended Motor Oils

U.S.A. only. B.S.A. motor oil is specially blended in U.S.A. for B.S.A. motor-cycles, and wherever this oil is available its use is preferred.

All other countries. Other recommended brands of lubricants for use in Summer and Winter, are given below (also for U.S.A. where B.S.A. oil is unobtainable).

Suitable lubricants are also given for other parts of the machine.

	OILS			GREASE
Brand	Motor and chaincase	Transmission (gearbox)	Forks	
Castrol	GTX or XL 20/50	Hypoy	TQF	Castrol LM
Mobil	Super	Mobilube GX90	ATF 210	Mobilgrease MP or Super
Shell	Super Motor Oil	Spirax 90EP	Donax T7	Retinax A
B.P.	Super Visco-static	Gear Oil 90EP	Autran B	Energrease L2
Texaco	Havoline 20W/50	Multi-gear 90EP	Texomatic F	Marfak all-purpose
Esso	Uniflo	Gear Oil GX90/140	Esso Glide	Multi-purpose H

The above lubricants are recommended for all operating temperatures above —18°C.

Approved Lubricants

The following lubricants are also approved for use in B.S.A. motor-cycles:—Duckham's: Motor and chaincase oil, Q20-50; transmission (gearbox), Hypoid 90; forks, Q-Matic; grease, LB10.

Filtrate: Motor and chaincase oil, Super 20W/50; transmission (gearbox), EP90; forks, AT Fluid F; grease, Super Lithium.

Approval is also given to lubricants marketed by companies other than those listed above, provided that they have similar multi-grade characteristics and meet the A.P.1 Service M.S. performance level.

The table gives recommendations for conditions in temperate climates. In countries where the climatic conditions are extreme, some alteration may be necessary, bearing in mind that the higher the temperature, the higher is the S.A.E. rating required, and vice versa.

THE CHAINS, CLUTCH, AND TRANSMISSION (GEARBOX)

Primary Chain

Unit construction allows the use of fixed centers between clutch and motor sprockets so that a pre-stretched endless chain of the duplex-type is fitted. A spring link connection is not provided.

The only maintenance required is to ensure a satisfactory oil level in the chaincase

Adjustment. An adjustable slipper-type tensioner is provided for the chain and its slackness can be tested after removal of the filler cap (J) Fig. 18. The chain is in correct adjustment when there is a minimum of $\frac{1}{8}$″ and a maximum of $\frac{1}{4}$″ of free play at the midway position between the sprockets.

Note:—The motor must be stationary when making this check.

When the two lower generator retaining nuts (E) Fig. 16 are slackened, the position of the slipper can be altered to give the correct tension.

After the adjustment is completed it is essential to make sure that the clearance between the alternator rotor (mounted on the motor shaft) and the stator poles is not less than ·008″.

Lubrication. The screw (M) Fig. 18, determines the oil level. To replenish with oil, first remove this screw and then the filler cap (J) at the top of the chaincase. Add oil of the correct grade (see "Recommended Lubricants", page 24) and allow to stand until any surplus oil has drained away. Replace the level screw and inspection cap. The machine should be on horizontal ground when this operation is carried out.

A drain plug is provided at (N) for draining the case at regular intervals (see page 23).

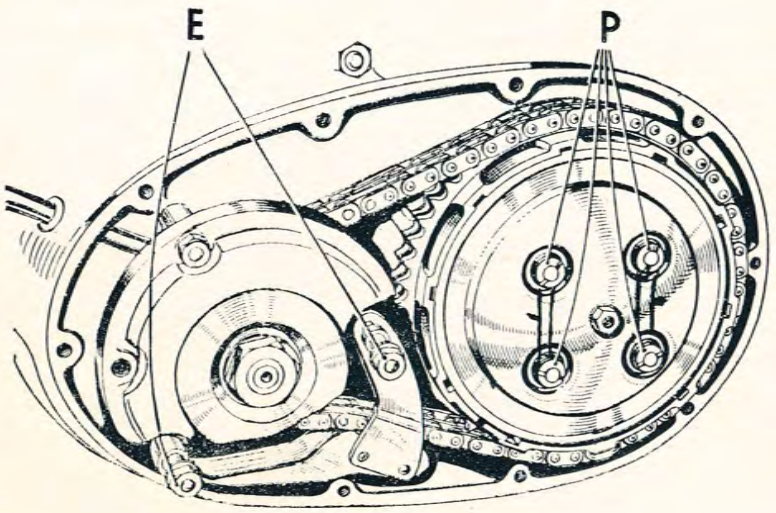


Fig. 16. The primary chain and clutch.

The chaincase oil level is automatically maintained from the engine, but the case should also be drained and replenished as above at regular intervals (see page 23). Use the oils recommended on page 24.

Anti-friction compounds must not be added, because the chain oil-bath provides lubricant for the clutch.

Chaincase Breather

The breather tube from the chaincase terminates at a filter located on the rear mudguard. At intervals of 2,000 miles, i.e. whenever the lubricating oil is being changed, remove the filter and wash thoroughly in gasolene. Replace when dry.

Rear Chain Lubrication

Regular application of a small amount of motor oil will do much towards prolonging the life of the rear chain, which should always be kept moist with lubricant.

If maximum life is to be achieved, however, periodically remove the chain and wash it thoroughly in gasolene to remove all dirt and grease. Allow the chain to dry completely then immerse it in a tray containing warm graphited grease. When replacing the chain make sure that the spring clip of the connecting link has its closed end pointing in the direction of the chain travel (i.e. forwards on the top run).

Rear Chain Adjustment

The total up and down play at the center of the chain run should not be less than $1\frac{3}{4}$" (4·5 cm), when un-laden.

Before any adjustment is made, slacken the brake rod adjuster at the rear wheel and also the damper unit pivots to allow freedom of movement for the wheel and swinging arm assembly.

Chain adjusters are situated at the swinging arm pivot (Fig. 17), and comprise quadrants (A) — one on each side — pierced with holes positioned at different radii from the pivot. Slacken the securing nut (D) by an amount sufficient to allow the quadrants on both sides to be lifted off their retaining pegs (B) and draw the swinging arm rearwards, rotating the quadrants until a new hole is aligned with the peg in the frame. Corresponding holes must be selected for both sides of the machine. Now tighten the securing nut and the damper unit pivots. Readjust the brake.

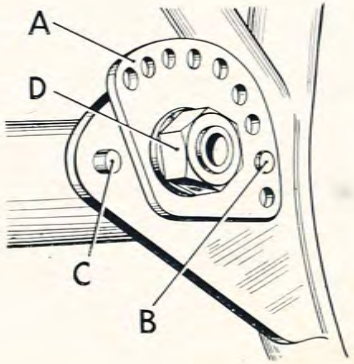


Fig. 17. Rear chain adjustment.

When all the adjuster holes have been used in succession, a further range of adjustment is obtained if the quadrants are again released from their pegs (B), turned through 180°, and located on the rearmost pegs (C). To adjust the chain, the quadrants must now be rotated in the reverse direction to that used formerly.

The chain can be considered due for replacement when the wear exceeds $\frac{1}{4}$" per foot of chain length, i.e. for a chain of $\frac{5}{8}$" pitch, the limit for sixteen pitches would be $10\frac{7}{32}$" (10" when new).

Note:—One pitch is the distance between two roller centers.

Clutch Control Adjustment

The main adjustment consists of a screw pin (F) and locknut (G) mounted on the clutch pressure plate. These are accessible after removal of the inspection cover (H) Fig. 18.

If adjustment is necessary, slacken off the handlebar cable adjuster (A) Fig. 19, and release the cable from the control lever above the timing cover on the right-hand side of the motor. Release locknut (G) Fig. 18, and adjust the pin (F) until the control lever is inclined outwards by a small amount. Add a short length of tubing to the lever to provide additional leverage and disengage the clutch, when the lever should take up a position approximately parallel with the timing cover joint face, shown dotted in Fig. 19. If necessary the adjuster must be modified until this condition is obtained.

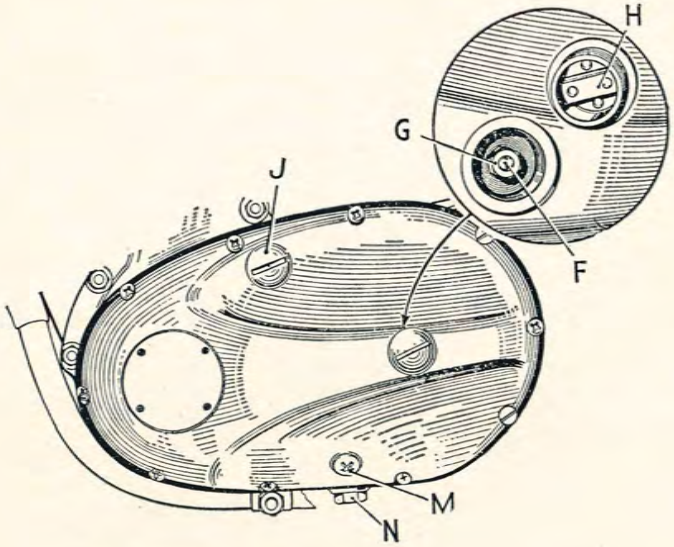


Fig. 18. Clutch adjustment and chaincase oil level.

Finally reconnect the cable to the control lever and readjust the cable length at the handlebar lever until there is about $\frac{1}{16}$" of free play (see Fig. 19).

There must always be a small amount of play at the lever, otherwise the clutch will slip, with consequent rapid wear of the plates.

Clutch Cable

Lubricate the cable at regular intervals (see page 23) by means of the greasing point midway in the cable.

The latter can readily be detached or replaced if the handlebar adjustment is first slackened off to its fullest extent and the control arm rotated inwards, when the cable ends can be removed from their sockets.

Clutch Spring Pressure

Whenever the clutch has been dismantled, the spring pressure must be reset carefully. The four retaining nuts (P) Fig. 16, should be screwed in until the underside of the head of each nut is approximately $\frac{1}{16}$" from the face of a spring cup. The figure is an arbitrary one and it is a simple matter to vary it according to circumstances. If the springs are compressed excessively, the handlebar lever will be stiff to operate and tiring to the hand; alternatively, if the spring pressure is insufficient, the clutch will tend to slip.

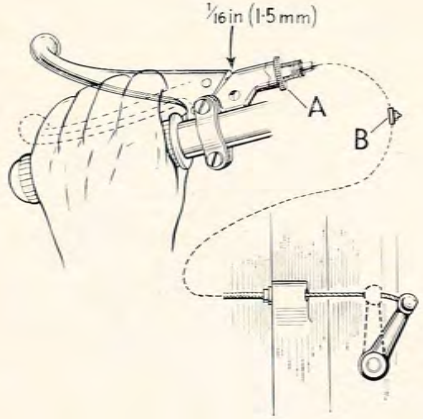


Fig. 19.
Setting the clutch control lever.

Adjust for true running of the plates by declutching and then operating the starter pedal, when it will be seen whether or not the spring pressure plate rotates truly. If necessary, adjust the nuts individually until true running is obtained.

Transmission (Gearbox)

Apart from topping-up at regular intervals, very little maintenance should be required. The filler cap also serves as a breather, and after checking the oil level by means of the dipstick (D), Fig. 20 (supplied as a separate item), the normal filler cap must be replaced.

To drain the case, which should preferably be undertaken while the oil is warm after a run, unscrew the drain plug (E) Fig. 20, below the case. When replacing, make sure that the sealing ring is in good condition otherwise there may be a leakage of oil. The capacity of the gearbox is approximately $\frac{5}{8}$ U.S. pint ($\frac{1}{2}$ British pint), and suitable oils are detailed on page 24.

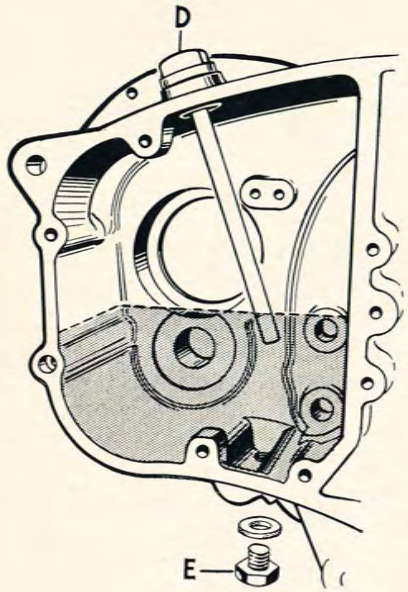


Fig. 20.
The transmission (gearbox) drain plug and oil level. The dipstick is shown screwed into position for checking purposes only. (see page 28)

WHEELS AND BRAKES

Tires

The inflation pressures of tires on motor-cycles used on the road should be checked carefully every two weeks. Under-inflation will not only seriously affect the life of the tire, but will also affect the steering of the machine.

Correct pressures are given under "Technical Data", page 5.

Bearings

Both wheels are fitted with ball journal bearings which do not require adjustment. The bearings are packed with grease during assembly and no further greasing is required until the hubs are dismantled for maintenance at the specified intervals (see page 23). Details of this operation are given in the Workshop Manual.

Rear Brake Cam Spindle

One stroke of a **hand grease gun** is all that is required at regular intervals (see page 23).

Brakes

For obvious reasons the brakes should always be kept at maximum efficiency and for this to be maintained the brakes should be adjusted whenever the hand lever or pedal movement has become excessive. Shoes should be just clear of the drum when the brake is not in use, but close enough for immediate contact when the brake is applied. The brakes must not be adjusted so closely, however, that they are continually in contact with the drum, otherwise excessive heat may be generated, resulting in deterioration of braking efficiency and performance.

After driving through flood water, it may be necessary to dry out the brakes and restore their efficiency by several light applications.

Rear Brake Adjustment

Adjustment of the brake is effected by turning the wing-nut (L) Fig. 21, in a clockwise direction (as seen from the rear of the machine).

Front Brake Adjustment

The brake shoes are expanded by a single cam and lever and an adjuster is provided in the cable and at the control on the handlebar. (Fig. 2.)

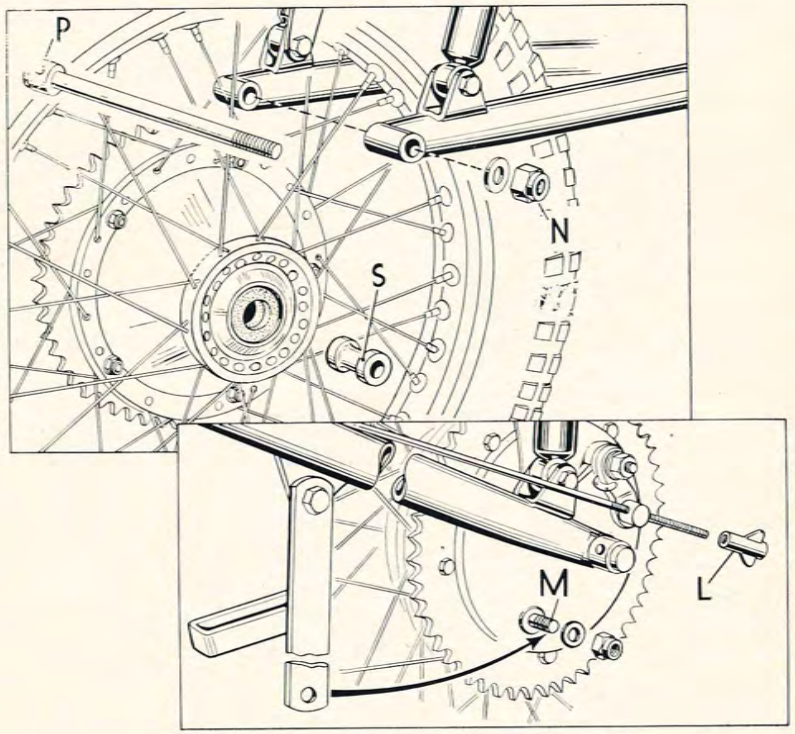


Fig. 21. Removal of the rear wheel.

WHEEL REMOVAL

Rear Wheel

Unscrew the brake adjuster (L) from the brake rod. Uncouple the chain at its spring link, and unwind it from the rear wheel sprocket, but leave it in position on the gearbox sprocket, to simplify replacement.

Disconnect the torque arm at the brake plate (M) Fig. 21, and slacken the front connection to allow the arm to remain suspended on the fork tube. Remove the wheel spindle nut (N) on the right side and with the aid of a tommy-bar, draw out the spindle (P) from the left side. Support the wheel while extracting the spindle and spacer (S) and then lower to the ground and remove. When replacing the chain make sure that the connecting link spring clip has its closed end pointing in the direction of travel of the chain (i.e. forwards on the top run). Readjust the brake as required.

Front Wheel

Slacken the brake cable as much as possible by means of the adjuster at the handlebar lever and extract the pivot pin from the clevis (C) Fig. 22. Remove the outer cable from its socket on the brake cover plate to release the cable completely. Detach the torque arm (D). Take off the fork leg end caps to remove the wheel, and as the nuts (E) are unscrewed, support the wheel in order to avoid damage to the stud threads.

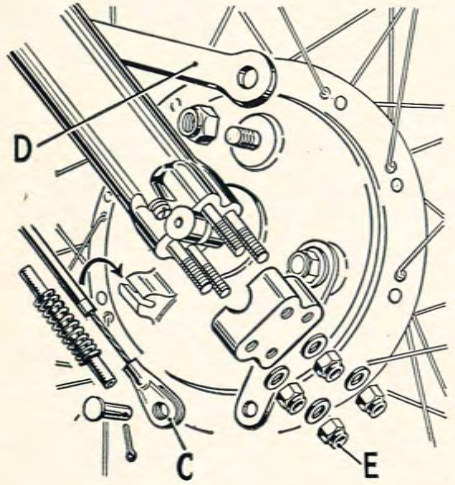


Fig. 22.
Removal of
the front wheel

When replacing, ensure that the fork leg studs are located in the spindle grooves. Tighten the end cap nuts lightly and equally on each side, finally tightening securely in position. Replace the torque arm, firmly tightening at both ends, and readjust the brake cable at the handlebar lever. Self-locking nuts are used for retaining the end caps and any replacements must be of the same type. For safety reasons, it is advisable to fit a new split pin in the clevis pivot pin.

Wheel Balancing

As soon as the machine is broken-in and the initial stiffness has been eliminated, check that the wheels are still in balance.

A wheel is in balance when, if it is turned gently and released, it shows no tendency to stop in any particular position.

If the wheel always stops in the same position, it is unbalanced and weights must be added to the appropriate spokes until the correct balance is obtained.

When balancing the rear wheel, disconnect the chain and remove from the wheel sprocket.

Important:—When replacing the connecting link make sure that the closed end of the "hairpin" spring clip is pointing in the direction of travel of the chain (i.e. forwards on the top run).

SUSPENSION AND STEERING

Front Forks

The only servicing which the front forks require is renewal of the oil at regular intervals (see "Routine Lubrication", page 23). First release the handlebar clamps (J) and lift the handlebars off the yoke (Fig. 23).

Unscrew the nuts (A) Fig. 23, and the drain plugs in the lower end of the fork sliding members as shown at (B). Allow all the oil to drain out, then standing astride the machine, apply the front brake and depress the forks a few times to drive out any oil remaining in the system.

Replace the drain plugs. Pour 2/5 U.S. pint (1/3 British pint) of oil into each leg. (Alternatively, use 190 cm^3 of oil.) Replace the top nuts (A) and tighten firmly.

Suitable oils are given on page 24.

Steering Head Adjustment

The steering head should be tested occasionally for play and to ensure that the forks rotate freely. Support the crankcase on a box so that the front wheel is clear of the ground, then grasp the front fork legs and attempt to push them backwards and forwards. If any play is detected the steering head bearings must be adjusted.

Slacken the clamping nut (C) Fig. 23, then gently tighten down the cap nut (D) below the handlebars until only a trace of play is present. Hold the handlebars lightly and move them round slowly. The steering must be free, and theforks must rotate smoothly. If the movement is harsh it is a sign that the adjustment is too tight or that the bearings are damaged. When the adjustment is correct, tighten the clamping nut (C).

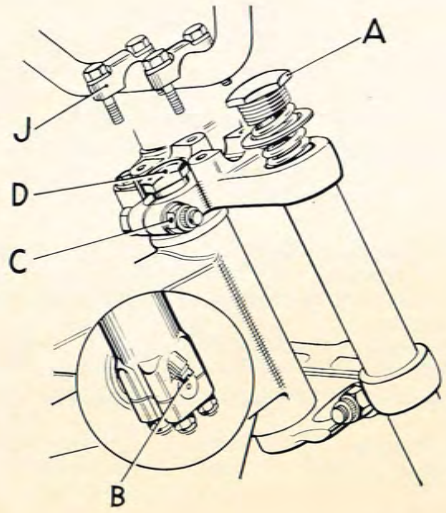


Fig. 23. Front fork and steering head.

Rear Suspension

The swinging fork is pivoted on needle roller bearings and no adjustment is required. Grease at regular intervals as detailed on page 23 (two points).

The two suspension units comprise a compression coil spring with a hydraulic damper unit.

Static loading on the springs can be varied by a three-position cam ring adjuster (Fig. 24).

Position (A) is for the lightest loading, position (B) for medium loads, and position (C) for heavy loads.

The cams on both units must be set on the same positions to ensure balanced loading.

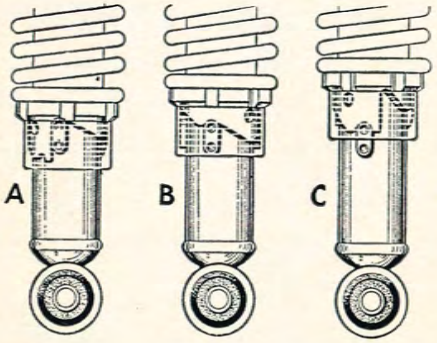


Fig. 24. Adjustment of the rear suspension springs.

The hydraulic dampers require no attention whatever. They are sealed during manufacture, and if they suffer damage or become inefficient they must be replaced.

THE ELECTRICAL EQUIPMENT
MODELS FITTED WITH ENERGY-TRANSFER IGNITION

This ignition system incorporates certain characteristics of both magneto and coil ignition. The alternator, specially designed for use with energy-transfer ignition, has six stator windings and a shaft rotor containing six high-energy permanent magnet. The high tension ignition coil is also specially designed for this system.

At the instant when the contact breaker points open, a pulse of electromagnetic energy, developed by the alternator during the period that the points were closed, is discharged through the ignition coil primary winding, thus inducing a high voltage in the ignition coil secondary winding, passing directly to the sparking plug.

Alternator

Except for occasional inspection of the snap connectors, which must be kept clean and tight, the alternator does not require maintenance.

Contact Breaker Unit

Although similar in appearance to the standard assembly, the cam form is of a design suitable for energy transfer ignition only. Similarly, the range of the automatic advance and retard mechanism, behind the contact breaker plate, is limited to the reduced amount necessary for this type of ignition. The contact breaker points must always be kept free from grease or oil and the gap checked at intervals, see page 16. It is also advisable to check the gap after the first 500 miles.

High Tension Coil

The coil requires no attention beyond keeping its exterior clean, particularly its terminals, and occasionally checking that its connections are tight.

Wiring Diagram

A diagram appears on page 35, showing the individidual colors of the wires.

MODELS FITTED WITH CAPACITOR IGNITION

In this ignition system, the high-capacity electrolytic capacitor takes the place of the battery, absorbing the pulses of electrical energy received from the generator via the rectifier. When the contact breaker points open, this stored supply is instantly released to the ignition coil and thence to the sparking plug.

Alternator

Except for occasional inspection of the snap connectors, which must be clean and tight, the alternator does not require maintenance.

Rectifier

The nuts clamping the rectifier plates together must not be slackened under any circumstances, because the pressure has been set during manufacture to give correct rectifier performance. A separate nut is used to secure the rectifier to its bracket, below the seat.

Coil

This does not require attention apart from an occasional check on the tightness and cleanliness of the terminals and high-tension lead connection.

Contact Breaker Unit

The contact breaker points must always be kept free from grease or oil and the gap checked at intervals, see page 16. It is also advisable to check the gap after the first 500 miles.

Zener Diode

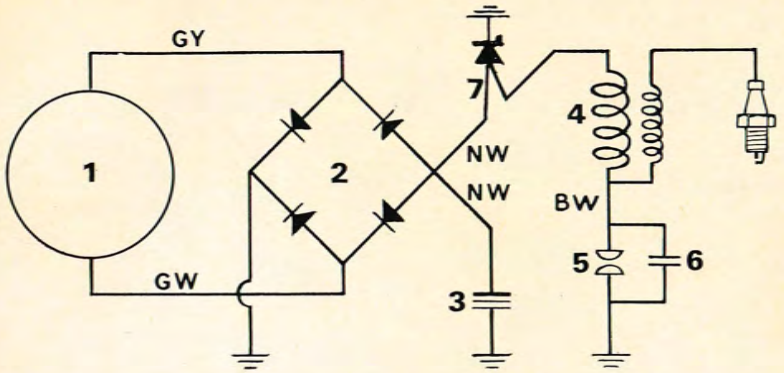
Mounted on the lower steering yoke. If disturbed, it is important to note that the fixing nut must be subjected to a tightening torque of not more than 28 lb. ins. or less than 24 lb. ins. (·32–·28 Kg.M.).

Capacitor

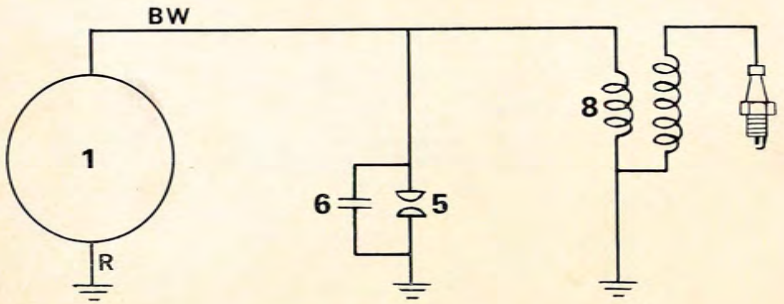
The only maintenance required is to keep the terminal connections clean and tight. The spring mounting is necessary for shock absorbing purposes and the capacitor must never be mounted directly onto the frame.

Wiring Diagram

A diagram appears on page 35, showing the individual colors of the wires.



Capacitor Ignition.



Energy-transfer Ignition.

Key to Wiring Diagrams

1 Alternator	4 Ignition Coil	7 Zener-Diode
2 Rectifier	5 Contact Breaker	8 High-tension coil
3 Capacitor	6 Condenser	

Cable Color Code: G—Green, Y—Yellow, W—White, N—Brown, B—Black, R—Red

⏚ Earth (Ground)

Fig. 25

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