Owners' handbook

250cm³ & 500cm³ models

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Owners' handbook

250cm³ & 500cm³ models

Model B25SS	Gold Star 250SS	250cm³
Model B25T	Victor 250	250cm³
Model B50SS	Gold Star 500SS	500cm³
Model B50T	Victor 500	500cm³
Model B50MX	Victor 500MX	500cm³

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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, a comprehensive Workshop Manual and an illustrated Spares Catalogue can be obtained from his local BSA dealer.

Always quote full motor and frame number when ordering.

Motor Number - - - On left side of crankcase below cylinder base.

Frame Number - - - On side stand stop-plate.

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TECHNICAL DATA

	B25SS Gold Star 250 SS	B25T Victor 250	B50SS Gold Star 500 SS	B50T Victor 500	B50MX Victor 500 MX
MOTOR:					
Cylinder bore (mm.) ..	67	67	84	84	84
Stroke (mm.)	70	70	90	90	90
Capacity (cm³) ..	247	247	499	499	499
(cu. in.) ..	15	15	30·5	30·5	30·5
Compression ratio ..	10	10	10	10	10
Valve timing at ·015″ clearance:					
intake opens b.t.d.c. ..	51	51	51	51	63
intake closes a.b.d.c. ..	68	68	68	68	72
exhaust opens b.b.d.c. ..	78	78	78	78	80
exhaust closes a.t.d.c. ..	37	37	37	37	55
Valve clearances:					
intake (in.)	·008 (ALL MODELS)				
intake (mm.)	0·2 (ALL MODELS)				
exhaust (in.)	·010 (ALL MODELS)				
exhaust (mm.)	0·25 (ALL MODELS)				
Spark plug:					
type ..	N3	N3	N4	N4	N3
gap ..	0·020—·025″ (0·5—0·65 mm.) ALL MODELS				
Spark timing, degrees fully advanced ..	37	37	30	30	30
Contact breaker gap ..	·015″ (0·38 mm.) ALL MODELS				
Maximum safe r.p.m. ..	8,500	8,500	7,000	7,000	7,000
SPROCKETS, CHAINS, RATIOS:					
Gear ratios:					
high ..	6·92	7·35	5·14	6·45	6·92
third ..	8·60	9·14	6·38	8·03	8·60
second ..	11·35	12·06	8·42	10·58	11·35
first ..	18·33	19·48	13·6	17·1	15·04
Chain sizes:					
front ..	⅜″ pitch (duplex) ALL MODELS				
rear ..	⅝″ pitch × ¼″ wide (ALL MODELS)				
Teeth on:					
motor spkt.	23T	23T	28T	28T	28T
Transmission (g/box) spkt.	17T	16T	17T	15T	14T
clutch spkt.	52T	52T	52T	52T	52T
rear chain-wheel ..	52T	52T	47T	52T	52T

TECHNICAL DATA—*continued*

	B25SS Gold Star 250 SS	B25T Victor 250	B50SS Gold Star 500 SS	B50T Victor 500	B50MX Victor 500 MX
CAPACITIES:					
Gas (petrol)	U.S.A. HOME		U.S.A. HOME		
U.S. gallons	2½ or 3½	2½	2½ or 3½	2½	1¼
British gall.	2 or 3	2	2 or 3	2	1
Liters ..	9 or 13·5	9	9 or 13·5	9	4·5
Oil:					
U.S. pints	4¾	4¾	4¾	4¾	4¾
British pints	4	4	4	4	4
Liters ..	2.25	2.25	2.25	2.25	2.25
Transmission (gearbox):					
pints ..	½ pint (British); ⅝ pint (U.S.A.) ALL MODELS				
cm³ ..	280 cm³ (ALL MODELS)				
Primary chain-case:					
pints ..	¼ pint (British); 1/3 pint (U.S.A.) ALL MODELS				
cm³ ..	140 cm³ ALL MODELS				
Front forks:					
U.S. pints	2/5	2/5	2/5	2/5	2/5
British pints	1/3	1/3	1/3	1/3	1/3
cm³ ..	190	190	190	190	190
WHEELS:					
Tire size:					
front ..	3·25x18	3·00x20	3·25x18	3·00x20	3·00x20
rear ..	3·50x18	4·00x18	3·50x18	4·00x18	4·00x18
Tire type:					
front ..	K70	T.U.	K70	T.U.	Sports
rear ..	K70	T.U.	K70	T.U.	Sports
Tire pressures (p.s.i.):					
front (off road) ..	—	10	—	10	8
front (on road) ..	22	22	22	22	—
rear (off road) ..	—	14	—	14	12
rear (on road) ..	24	24	24	24	—
Brakes, dia. (in.)					
front ..	6 (8 HOME)	6	8	6	6
rear ..	7	7	7	7	7

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TECHNICAL DATA—*continued*

	B25SS Gold Star 250 SS	B25T Victor 250	B50SS Gold Star 500 SS	B50T Victor 500	B50MX Victor 500 MX
CARBURATION:					
Bore (mm) ..	28	28	30	30	32
Main jet ..	190	190	200	200	—
Throttle valve	3½	3½	3½	3½	—
Needle position	1	1	1	1	—
Needle jet ..	·106	·106	·106	·106	—
GENERAL DETAILS:					
Overall length in. (cm.) ..	85(216)	85(216)	85(216)	85(216)	82½(209)
Wheelbase in. (cm.) ..	54(137)	54(137)	54(137)	54(137)	54(137)
Ground clear'ce in. (cm.) ..	7(17.8)	7½(19)	7(17.8)	7½(19)	7½(19)
Overall width in. (cm.) ..	29(73.7)	29(73.7)	29(73.7)	29(73.7)	33½(85)
Weight lbs (kg)	290(131·5)	290(131·5)	310(140·6)	310(140·6)	240(108·8)

The recommended inflation pressures are based on a rider's weight of 154 lbs. If the rider's weight or additional load in the form of a pillion passenger or luggage exceeds 154 lbs., increase the tire pressure as follows:—

Front Tire:—Add 1 lb. per square inch for every 28 lb. increase above 154 lb.

Rear Tire:—Add 1 lb. per square inch for every 14 lb. increase above 154 lb.

THE CONTROLS

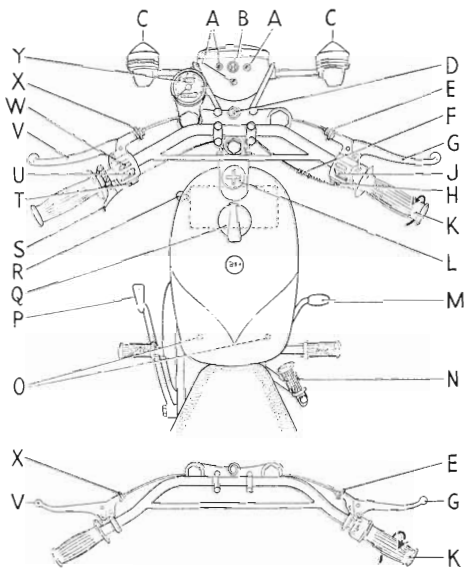

FIGURE 1. The controls.

(Specification details vary according to model. The lower illustration refers to the Moto-cross model only).

A Warning lights:
Green—main beam
Red—oil pressure (250 cm³ only)
Amber—direction indicators.
B Headlight switch.
C Direction indicator lights (also at rear).
D Steering lock.
E Front brake cable adjuster.
F Throttle cable adjuster.
G Front brake lever.
H Ignition cut-out.
J Direction indicator switch.
K Throttle twist grip control (open in direction of arrow).
L Oil filler.
M Gearchange pedal.
N Starter pedal.
O Gasoline (petrol) taps.
P Brake pedal.
Q Gasoline (petrol) filler.
R Master switch key.
S Exhaust valve lifter lever (500 cm³ models, except Moto-cross).
T Horn switch.
U Headlight dip switch.
V Clutch lever.
W Headlight flasher switch.
X Clutch cable adjuster.
Y Speedometer.

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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 and that the battery is filled and charged (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 the road.

The new rider should make sure that he is quite familiar with all the controls before attempting to ride the machine. The foot controls are adjustable, and should be positioned so that they can be reached without moving the feet from the footpegs. Handlebars should be adjusted so that a comfortable and natural riding position is achieved.

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

GASOLINE (PETROL)

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

NOTE:—Fuels containing alcohol must not be used in fiber-glass tanks.

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 incorporated in the cable. The rotary stiffness of the twist grip can be varied by means of the adjuster screw (D) FIG. 2, and locknut (E). It is set for average requirements when leaving the factory, but can be readjusted to suit individual preference.

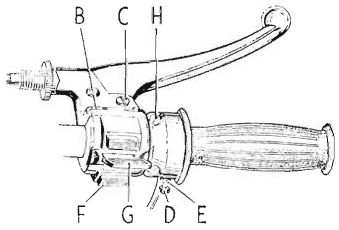

FIGURE 2.
The right handlebar controls.

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 after slackening the screws (B) FIG. 2. 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 for the 6″ diameter brake is situated midway in the cable. Finger adjustment for the cable is provided at the adaptor on the handlebar lever. Provision is made on the lever body for a Motoplas rear view mirror.

STOPLIGHT SWITCH (Front Brake) (except Moto-cross models):—Incorporated in the brake cable at (F) FIG. 29, this switch does not require any adjustment.

CLUTCH:—The lever is mounted on the left handlebar and its position can be adjusted after slackening off the screws (E) FIG. 3. 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 adaptor (D) FIG. 3, on the lever. A greasing point is provided in the cable at (B) FIG. 23. Provision is made on the lever body for fitting a Motoplas rear view mirror.

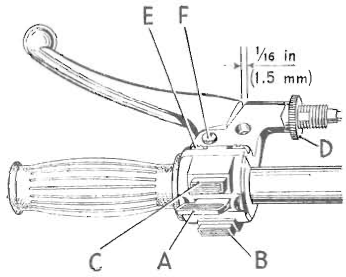

FIGURE 3.
The left handlebar controls.

EXHAUST VALVE LIFTER (500 cm³ engine, except Moto-cross model):—This is the small lever (S) FIG. 1, mounted on the left handlebar and it must be depressed in order to raise the exhaust valve and therefore relieve engine compression.

OTHER HAND CONTROLS

GAS (PETROL) TAPS:—Turn down the levers to open the taps. For normal running, open the right side tap only, when a reserve supply will be retained which can be fed to the carburettor after the left side tap is opened. Always turn off the taps when parking.

The taps can be removed as necessary for cleaning of the filters.

STEERING LOCK:—Carried in the top fork yoke. To operate the lock, turn the handlebars to the left, then turn the key in the lock to release the plunger, which registers in a socket in the frame. Withdraw the key and keep in a safe place.

MASTER ELECTRICAL SWITCH (except Moto-cross models):—This is incorporated in the electrical box beneath the tank, on the left side of the machine (FIG. 4). The key is detachable in two of the four positions, but cannot be withdrawn from the remaining two, viz:

(1) OFF. All equipment is switched off and the key can be removed. When leaving the machine return the key to this position and remove. Keep in a safe place.

(2) PILOT. The pilot bulb in the headlamp is illuminated (and remains so, even when the main lighting is in use) together with the rear light. The key can be removed.

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(3) IGNITION. With the key turned to this position the motor can be started and run. The key is retained.
(4) IGNITION AND LIGHTS. All electrical equipment is available for use with the switch in this position, and the key is retained.

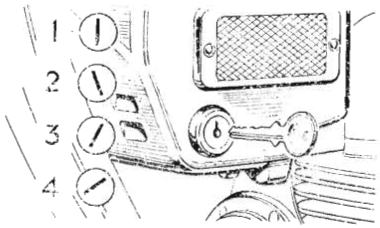

FIGURE 4.
Operation of the master electrical switch.

HORN, HEADLIGHT DIP SWITCH, HEADLIGHT FLASHER SWITCH:—These are combined in a triple switch unit on the left handlebar as part of the clutch lever body. The unit (and the control lever) can be adjusted for position after slackening the screws (E). The horn push button is at (B), and the headlight flasher switch at (C) FIG. 3.

HEADLIGHT SWITCH:—The headlight main beam is illuminated when the rotary switch on the lamp body is turned. A separate switch (A) FIG. 3, on the left handlebar controls the dipping of the beam and the master electrical switch (FIG. 4) controls the pilot light.

NOTE:—The zener diode takes care of the battery charging rate and ensures a fully charged battery at all times.

DIRECTION INDICATOR SWITCH, IGNITION CUT-OUT:—These are combined in a triple switch unit mounted on the right handlebar as part of the front brake lever body. The unit (and the control lever) can be adjusted for position after slackening the screws (B). The direction indicator switch is at (G) and the ignition cut-out at (F). The third switch is unused.

TICKLER (CARBURETTOR):—The carburettor is fitted with a spring-loaded plunger (P) FIG. 17, which, when depressed, prevents the float from rising, thus rapidly replenishing the level of fuel in the chamber. The plunger (or tickler) should be used for a brief interval only, otherwise the level of fuel in the float chamber will rise excessively, resulting in flooding of the carburettor and loss of fuel (see starting instructions, page 12).

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. 5, 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).

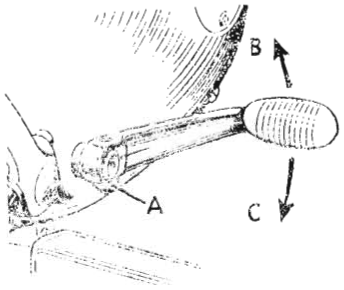

FIGURE 5.
The gearshift pedal.

REAR BRAKE PEDAL:—Operated by the left foot, the pedal is designed to contact a non-adjustable stop (E) on the footpeg, to ensure that the pedal pad lies comfortably below the foot ready for instant use.

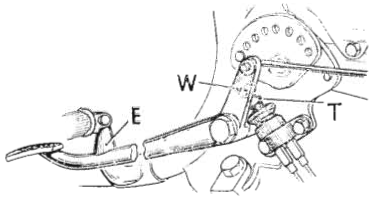

FIGURE 6.
Adjustment of the stop-light switch.

STOP-LIGHT SWITCH (Rear Brake):—This is actuated by the brake pedal and is operated by the adjustable stop (T) FIG. 6, locked by the nut (W). With the switch plunger fully depressed (by hand) and the brake pedal against its stop on the footpeg, there should be 1/32" gap between the stop (T) and the plunger. Adjust as required until this condition is obtained.

STARTER PEDAL:—The folding pedal on the right side of the machine behind the footpeg. Depression of the pedal rotates the motor.

INSTRUMENTS
(according to model)

SPEEDOMETER:—Where a "trip" mileage recorder is fitted, this can be reset to zero by rotation of the control knob on the side of the instrument. DO NOT PULL THE KNOB.

REVOLUTION COUNTER:—Driven direct from the motor, this records its revolutions per minute.

OIL WARNING LIGHT (250 cm³ engine):—The red light mounted on the headlight is illuminated when the pressure in the motor lubricating system is below a predetermined figure. It will be visible when first switching on the ignition but should be automatically extinguished a few seconds after the motor

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starts and remain extinguished when the motor is running. IF THE RED LIGHT BECOMES VISIBLE AT ANY TIME OTHER THAN WITH A STATIONARY MOTOR, STOP IMMEDIATELY AND INVESTIGATE THE CAUSE. If this is not done, serious damage will be caused to the motor due to insufficient lubrication.

HEADLIGHT WARNING LIGHT:—The green light on the lamp body is illuminated only when the main beam is in use and is extinguished when the beam is dipped or not in use.

DIRECTION INDICATOR WARNING LIGHT:—The amber light on the lamp body is illuminated when the direction indicators are in action and it will shine intermittently in unison with the direction lights.

DRIVING

TO START THE MOTOR

Stand astride the machine and make sure that the gears are in the neutral position, which lies between the 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) and if the motor is quite cold, depress the carburettor tickler momentarily. Note that it is neither necessary nor desirable to oscillate the plunger rapidly, as this may damage the float.

Switch on the ignition by turning the key in a clockwise direction to position "3" as shown in FIG. 4.

Open the twist grip a small amount only, because excessive opening may prevent easy starting, and push the starter pedal down slowly until resistance is felt. Retain the foot at this position and depress and immediately release the exhaust valve lifter lever (B50 models except M.X.); allow the pedal to return to the top of its stroke and then give it a firm downward swing which should set the motor in motion. If the motor fails to start at the first attempt, repeat this procedure, being careful to avoid rapid kicking at the pedal which will serve no purpose and may damage the operating mechanism. The ignition control is set automatically in the retarded position for starting, and advances as the motor speeds up.

Note that while it is necessary to use the tickler when starting from cold, this should not be necessary when the motor has already reached its normal running temperature.

TO STOP THE MOTOR

Select the neutral gear position and close the throttle, so reducing the motor speed to "tick-over", and turn the master electrical key to the position shown as "1", FIG. 4.

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.

RIDING HINTS

Use the throttle to control the speed of the machine, as gentle but definite braking is obtained by merely closing the throttle. On wet roads and particularly under icy conditions, the use of the motor as a brake is to be recommended. A shift to lower gear increases the braking effect.

Try to anticipate the need to shift gear or to brake, so that changes in speed are smoothly carried out. Always use both brakes together and apply them smoothly and progressively. Never accelerate or brake fiercely, especially on bends or wet roads. Both actions are signs of an inconsiderate driver.

BREAKING-IN

The "breaking-in" process is the most important period in the life of the motor, and the handling it receives during the first 1,000 to 1,500 miles will determine the service it will provide in return.

Breaking-in should commence at one-third to half-throttle and for the first 500 miles the speeds should not exceed those given on the "breaking-in" label. Thereafter the throttle opening may be progressively increased as the mileage builds up until at the end of the breaking-in period full throttle can be employed.

If excessive speeds are used in the early stages there is risk of seizure and other troubles and in any case until the machine has been properly "broken-in" it cannot be expected to give its best performance.

Smooth throttle control and selection of the correct gear for the prevailing conditions will ease the work of the motor. In particular avoid violent acceleration and do not allow the motor to pull hard on hills in a high gear when a shift to a lower gear would ease the load. This ensures that all parts of the machine are properly broken-in and are quite free.

When breaking-in is completed, balance the wheels (see page 36).

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

After the first 250 miles, and again at 500 miles, drain and refill the oil reservoir with fresh oil and clean the filters. The correct grades of oil are given in the lubrication chart. The oil in the transmission (gearbox) should also be changed after the first 500 miles.

Further oil changes should be carried out in accordance with the instructions under "Routine Lubrication."

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ROUTINE MAINTENANCE

The following list of items requiring regular attention will serve as a guide as to when maintenance should be carried out. The method of carrying out the various adjustments will be found under the appropriate heading in the later chapters. THE MILEAGE FIGURES QUOTED ARE BASED ON NORMAL ROAD WORK BUT FOR MACHINES USED FOR COMPETITION PURPOSES, THE PERIODS BETWEEN SERVICING SHOULD GENERALLY BE REDUCED.

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 reassembly. Threads must be kept clean and free from grit, exposed threads should be oiled or greased before assembly. Good fitting wrenches should be used at all times and nuts must be tightened firmly, but wrenches longer than standard length should not be employed as they may cause failure through over-tightening.

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 and 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.

EVERY WEEK:

Check tire pressures	Page 5
Examine battery acid level	Page 39

EVERY 2,000 MILES:

Check brake adjustment	Page 33
Check tightness of all nuts and bolts.	
Clean and check contact breaker points gap	Page 20
Examine auto-advance unit	Page 21
Check spark timing	Page 22
Check rear chain adjustment	Page 30

EVERY 4,000 MILES:

Check valve clearances	Page 18
Check and adjust spark plug	Page 24
Check clutch operation	Page 30
Check wheel alignment	—
Check steering head adjustment	Page 37
Check primary chain adjustment	Page 29
Check lights	Page 40
Clean air filter	Page 26

EVERY 10,000 MILES:

Examine brake linings, clean brake drums	—
Examine front fork for correct action	Page 37
Check headlight beam setting	Page 40
Examine rear suspension for correct action	Page 37

AS REQUIRED: Gas tap filters. —

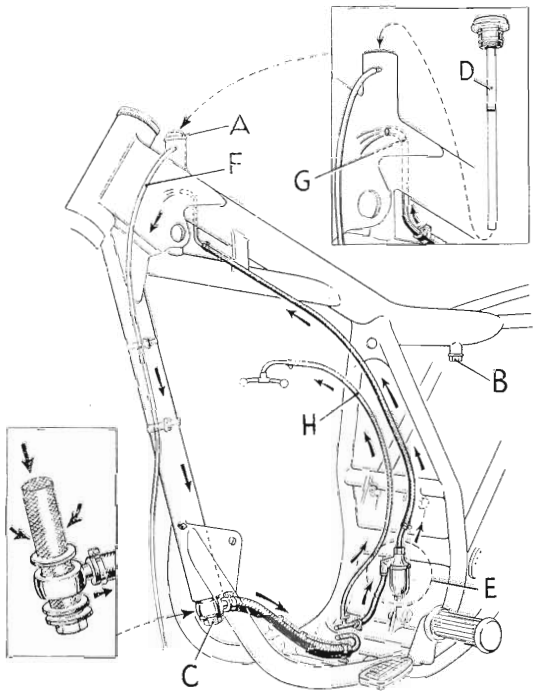

FIGURE 7.
The lubricating system showing the pipe lines, filters, etc.

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. 8, 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. 8, and delivered to the oil reservoir. If the filler cap (A) FIG. 7, is removed while the motor is running, the returning oil should be seen issuing from the pipe (G) FIG. 7, 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 18).

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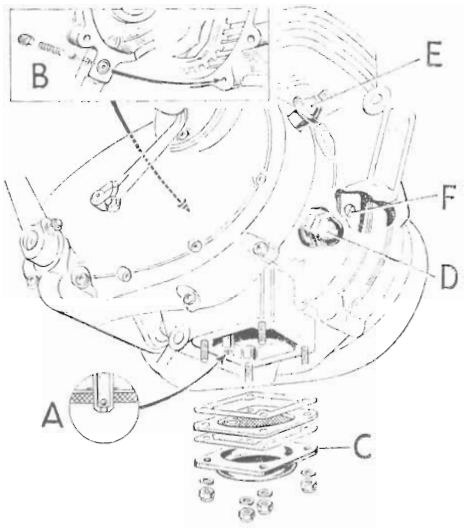

FIGURE 8. The engine lubrication system showing the ball valves (the oil pressure switch is fitted to 250 cm³ engines only).

A by-pass pipe (H) FIG. 7, leads a supply of oil to the rockers, push rod ends, etc.

The valve (B) FIG. 8, 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. 8, 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.

OIL PRESSURE SWITCH (250 cm³ models only) — (E) FIG. 8

This does not require any maintenance apart from ensuring that the electrical connections are clean and tight.

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. 7. 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 and the battery (except Moto-cross models). 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 28.

The oil capacity is 4¾ U.S. pints (4 British pints) and the normal level is given on the dipstick (D) FIG. 7, attached to the filler cap.

FILTERS

The oil reservoir filter and crankcase filter must be removed at regular intervals for cleaning (see "Routine Lubrication", page 27) and this should be carried out at the same time as the oil is changed.

The crankcase filter is retained by the sump plate (C) FIG. 8, which is released following removal of four nuts of the self-locking type. If worn or damaged they must be replaced by similar nuts.

The main filter (C) FIG. 7, is unscrewed from the bottom of the front down tube. It is essential that the fiber washers are fitted when the filter is replaced and that the filter itself is securely tightened.

Wash the filters thoroughly in gasoline (petrol) and dry before replacing. Refill the reservoir with motor oil in accordance with the recommendations given in the list on page 28.

250 cm³ *engine only*

An external oil filter E is fitted in the oil return line from the crankcase to the reservoir, FIG. 7, and is located behind the engine. It must be dismantled for cleaning at the same time as the above filters and for this purpose the bowl must be withdrawn.

Unscrew the bolt (A) FIG. 9, to dismantle the filter unit, at the same time supporting the bowl to avoid possible damage. Extract the filter cartridge, making sure that the sealing washers are retained, and if it is badly contaminated, it must be renewed. If it is only lightly contaminated, wash in gasoline (petrol) together with the filter bowl body and other parts and dry out. When reassembling, examine the sealing rings, replacing if they show any sign of deterioration.

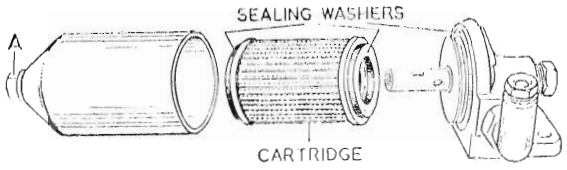

FIGURE 9. The external oil filter.

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 and the starter pedal operated twenty or thirty times with the ignition switched off, 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 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.

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BREATHER PIPES

The crankcase breather pipe (emerging from the timing case, near the clutch cable) and the oil reservoir breather pipe (F) FIG. 7, 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. 8, carried in the pump 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.).

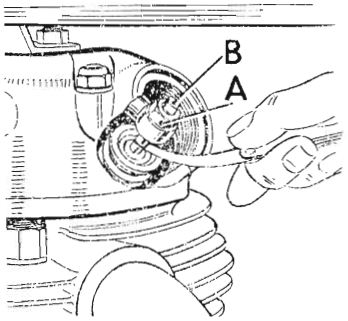

FIGURE 10.
Checking the valve clearances (500 cm³ engines).

500 cm³ engines

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.

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. 10.

If the clearance requires adjusting, slacken the locknut (A) FIG. 10, 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, retighten the locknut. Check the clearance again to make sure that tightening the locknut has not affected the setting.

250 cm³ engines

The clearance between the rocker arm and valve stems is adjusted by means of eccentric rocker spindles, although the gauge is still inserted through the inspection aperture as shown in FIG. 10.

Check the clearances using the same procedure described under "500 cm³ engines", and if adjustment is necessary this should be carried out as follows.

Remove the push rod inspection cover on the right side of the rocker box, which will expose the slotted ends of the rocker spindles (FIG. 11), and then slacken the locknuts on the opposite ends of the spindles.

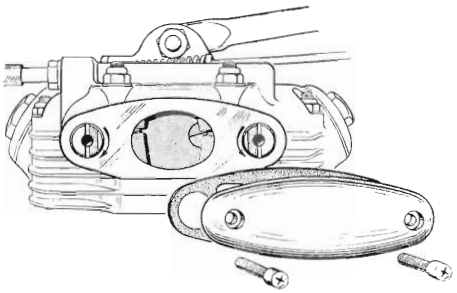

FIGURE 11.
Adjustment of the valve clearances (250 cm³ engines).

To obtain the correct clearances, rotate the exhaust rocker spindle in a counter-clock direction and the intake spindle in a clockwise direction (see arrows). The full range of adjustment is indicated by the shaded sections and it is therefore advisable to start with the spindle flats in the vertical or neutral position.

NOTE:—During adjustment it may be found that one of the rocker spindles has reached the end of its thread and can no longer be turned forward, in which case the spindle must be turned back through 360° before commencing adjustment.

Make sure that the gasket is in good condition before replacing, and tighten the spindle locknuts firmly after adjustment.

EXHAUST VALVE LIFTER (500 cm³ engine, except Moto-cross model)

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. 12.

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.

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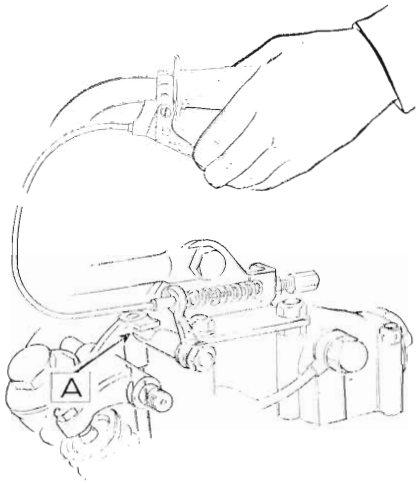

FIGURE 12.
Exhaust valve lifter clearance (500 cm³ engine, except Moto-cross model).

CONTACT BREAKER (FIGURE 13)

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 pack for this unit is housed in the electrical equipment box below the gasoline (petrol) tank.

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 gasoline. 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 ·015" (·38 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. 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 adjust the plate carrying the fixed contact point, by means of the eccentric pin (E), 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 cam slot is uppermost and apply ONE SPOT OF CLEAN MOTOR OIL for the purpose of lubricating the cam spindle.

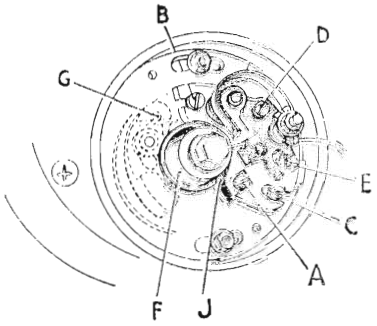

FIGURE 13.
The contact breaker. (Part of the auto-advance mechanism is shown behind the mounting plate).

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 (FIG. 13) move freely. (Before removing the contact breaker plate, 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 (G) with a drop of light oil. Do not over-lubricate or the excess oil may find its way on to the contact breaker points.

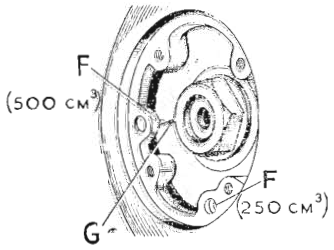

FIGURE 14.
Timing the spark by strobelight.

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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, 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. 14, 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 positiod of the pointer differs for the 250^3 cm and 500 cm^3 models. 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. If a tachometer is fitted this should record not less than 3,250 revs per minute. 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. 13, 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 positon 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.

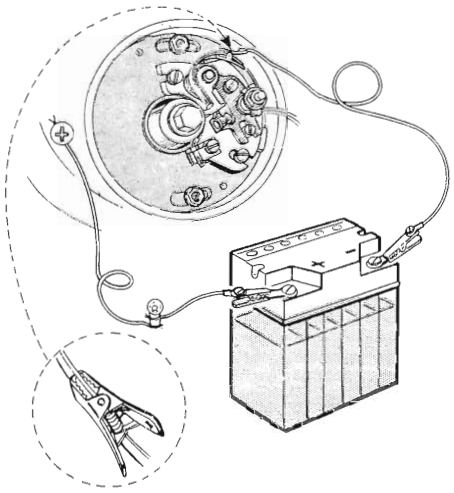

FIGURE 15. The connections for checking the opening of the contact breaker points.

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. 15). The crankshaft should then be a pre-determined number of degrees before top dead center, the figure varying with different models (see table, below).

TABLE OF SPARK TIMINGS

Engine Capacity	500 cm^3	250 cm^3
Spark timing fully advanced (crankshaft degrees)	30	37
Piston distance before top dead center (inches/mm.)	·304 (7·7)	·342 (8·7)

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If the spark setting is not correct, slacken the two screws (A) and (B) FIG. 13, 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 types N3 or N4 are recommended according to model (see page 4). Fitting sizes are 14 mm. diameter by ¾" 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 result in poor plug performance.

FIGURE 16.
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 socket 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. 17. 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 mixture 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.

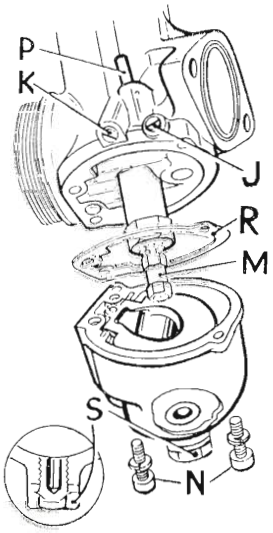

FIGURE 17.
The Amal carburettor (with concentric float chamber).

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 gasoline (petrol).

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PILOT MIXTURE ADJUSTMENT

Screwing in the pilot air screw (J) FIG. 17, 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 (K) 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

This is concealed behind the panel on the left side of the machine. Remove the panel and unscrew the central nut to release the filter.

The filter is of specially treated paper and 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 gasoline (petrol) consumption.

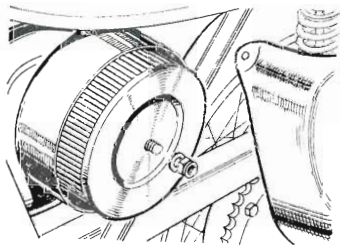

FIGURE 18. Dismantling the air filter.

(The Moto-cross air filter is similar in construction but is coupled direct to the carburetter intake).

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.

ROUTINE LUBRICATION

Ref. No.		
	EVERY 250 MILES	
1	Check oil level.	—
	EVERY 1,000 MILES	
2	Check oil level in primary chaincase	Page 29
	EVERY 2,000 MILES	
3	Check oil level in transmission case (gearbox) ..	Page 32
15	Lubricate center and side stand pivots (oil). ..	—
4	Lubricate rear chain	Page 30
5	Lubricate contact breaker cam	Page 21
5	Lubricate auto-advance mechanism	Page 21
16	Lubricate brake pedal pivot	—
6	Oil exposed cables and control rod joints.. ..	—
7	Grease clutch cable	Page 9
8	Grease speedometer drive	Page 33
	EVERY 4,000 MILES	
3	Drain and refill transmission case (gearbox) ..	Page 32
2	Drain and refill primary chaincase	Page 29
9, 1	Drain and refill the oil reservoir	Page 16
10	Clean oil filters..	Page 17
11	Clean external oil filter (250 cm³ only)	Page 17
12	Examine pump ball valve	Page 18
17	Grease rear brake cam spindle	Page 33
	EVERY 10,000 MILES	
13	Drain and refill front forks	Page 37
14	Clean and repack wheel bearings with grease ..	Page 33

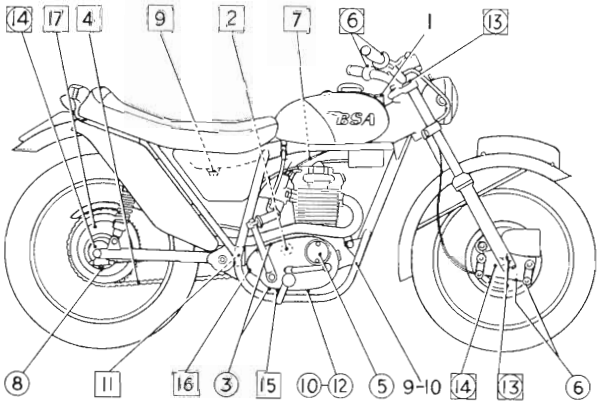

FIGURE 19. General lubrication diagram for all models. (The numbers in circles refer to the right side of the machine and numbers in squares refer to the left side).

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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 both 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				
Brand	Motor and Chaincase	Trans-mission (gearbox)	Chaincase (250 cm³ eng. only)	Forks	GREASE
Castrol	GTX or XL 20/50	Hypoy	Castrolite	TQF	Castrol LM
Mobil	Super	Mobilube GX90	Super	ATF 210	Mobilgrease MP or Super
Shell	Super Motor Oil	Spirax 90EP	Super Motor Oil	Donax T7	Retinax A
B.P.	Super Visco-Static	Gear Oil 90EP	Super Visco-Static	Autran B	Energrease L2
Texaco	Havoline 20W/50	Multi-gear 90EP	Havoline 10W/30	Texo-matic F	Marfak all-purpose
Esso	Uniflo	Gear Oil GX90/140	Uniflo	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; chaincase (250 cm³ only), Q5500; grease, LB10.
Filtrate: Motor and chaincase oil, Super 20W/50; transmission (gearbox), EP90; forks, AT Fluid F; chaincase (250 cm³ only), Super 10W/30; 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.I 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.

It is always advisable to make sure that the oil in the lubricating system is warm before driving at high speeds.

When taking part in competitive events, advantage should be taken of any warming-up period to get the motor warm and the oil circulated.

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 (see following section).

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. 22. The chain is in correct adjustment when there is a minimum of ⅛″ and a maximum of ¼″ 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. 20 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. 22, 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 28) 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 27).

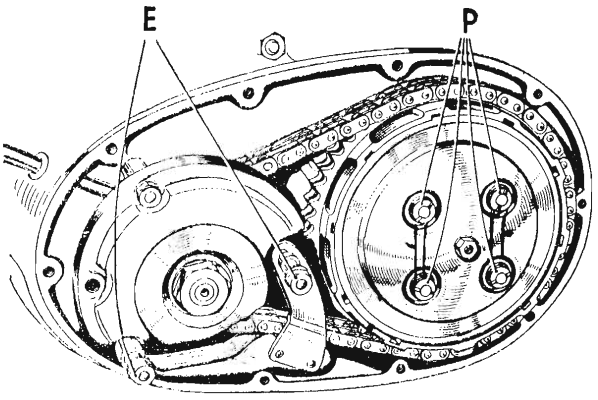

FIGURE 20. The primary chain and clutch.

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500 *cm³ engines only*. The chaincase oil level is automatically maintained from the engine, but the case should be drained and replenished as above at regular intervals (see page 27). Use the oils recommended on page 28 (see also page 44).

REAR CHAIN LUBRICATION

If maximum life is to be achieved, periodically remove the chain and wash it thoroughly in gasoline 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

With the motor-cycle on its center stand (or with a box below the crankcase to serve the same purpose) the total up and down play at the center of the chain run should not be less than 1¾″ (4.5 cm.).

Before any adjustment is made, slacken the brake rod adjuster at the rear wheel and also both 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. 21), and comprise quadrants (A) — one on each side — pierced with holes positioned at different radii from the pivot. Slacken the securing nut (D), lift the quadrants 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.

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.

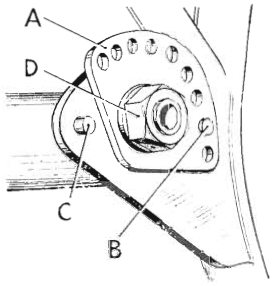

FIGURE 21. Rear chain adjustment.

The chain can be considered due for replacement when the wear exceeds ¼″ per foot of chain length, i.e., for a chain of ⅝″ pitch, the limit for sixteen pitches would be 10-7/32″ (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. 22.

If adjustment is necessary, slacken off the handlebar cable adjuster (A) FIG. 23, and release the cable from the control lever above the timing cover on the right-hand side of the motor. Release locknut (G) FIG. 22, 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. If necessary the adjustment must be modified until this condition is obtained.

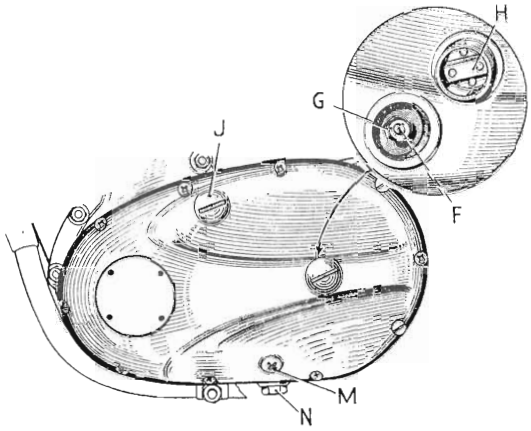

FIGURE 22. Clutch adjustment and chaincase oil level.

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. 23).

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

The clutch cable 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. 20, 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.

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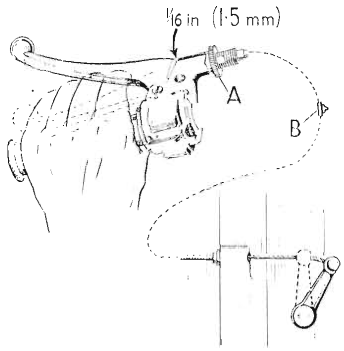

FIGURE 23.
Setting the clutch operating lever.

Adjust for true running of the plates by declutching and then operating the starter pedal, when it will be seen whether the spring pressure plate rotates truly or not. 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 plug carries a dipstick (D) FIG. 24, and the oil level should be maintained at the mark on the stick.

To drain the case, which should preferably be undertaken while the oil is warm after a run, unscrew the drain plug (E) FIG. 24, 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 ⅝ U.S. pint (½ British pint), and suitable oils are detailed on page 28.

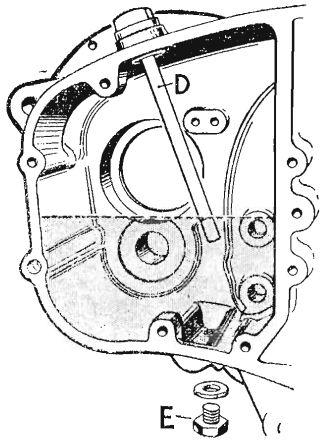

FIGURE 24.
The transmission (gearbox) drain plug and oil level.

WHEELS AND BRAKES

TIRES

At weekly intervals and always before setting out on a long journey, the inflation pressures should be checked carefully. 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 27). Details of this operation are given in the Workshop Manual.

SPEEDOMETER GEARBOX

The unit requires no attention apart from lubrication at intervals (see page 27). Grease with two applications from a HAND GREASE GUN ONLY.

REAR BRAKE CAM SPINDLE

One stroke of a HAND GREASE GUN is all that is required at regular intervals (see page 27).

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.

REAR BRAKE ADJUSTMENT

Adjustment of the brake is effected by turning the wing-nut (L) FIG. 26, in a clockwise direction (as seen from the rear of the machine).

FRONT BRAKE ADJUSTMENT

8″ *diameter* (203 *mm*). The brake is of the two leading-shoe type, the expansion of the shoes being equalised by the caliper action of the levers. The cable adjuster (used for fine adjustment only) is combined with the control lever on the handlebar and should be set to eliminate all slackness WITHOUT APPLYING THE BRAKE.

To adjust the brakes it is necessary to reposition the shoes within the drum, individual adjustment being provided by means of a screw at the fulcrum of each shoe, inside the brake plate.

Slacken off the cable adjuster at the handlebar lever and remove the grommet (G) FIG 25, from the hub shell. Rotate the wheel until the aperture is opposite to the adjuster screw (H) and apply a screwdriver to the head of the screw. The adjuster turns in a series of "clicks" and must be rotated in a clockwise direction until it cannot be turned any further, when the shoe will be fully expanded against the drum. Now unscrew the adjuster until the wheel is free to rotate and the shoe is just clear of the drum. Turn the wheel through half a revolution and repeat the adjustment on the remaining shoe. Check that the wheel revolves freely.

NOTE:—The internal adjusters are situated, one below the front cam spindle and the second above the rear cam spindle.

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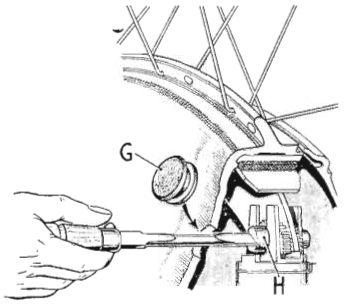

FIGURE 25.
Adjustment of the front brake shoes (two leading-shoes type).

6″ *diameter* (152 *mm.*). The brake shoes are expanded by a single cam and lever and an adjuster is provided for the cable at the control on the handlebar.

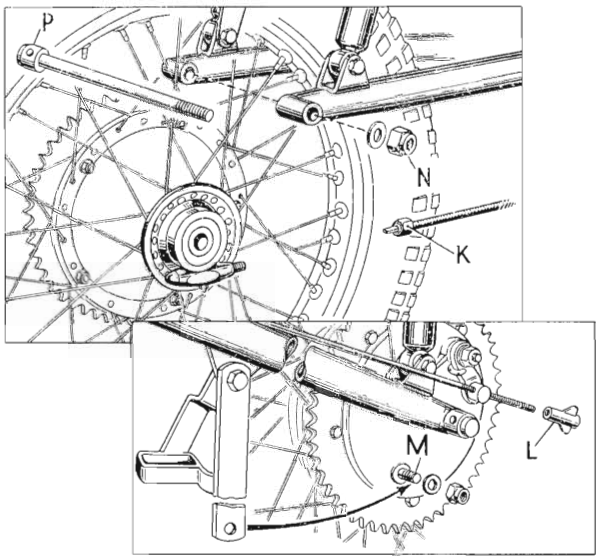

FIGURE 26. Removal of the rear wheel.
(*The chainguide is fitted to the Victor and MX models only*).

WHEEL REMOVAL

Set the motor-cycle on its center stand (or place a box below the crankcase to serve the same purpose).

REAR WHEEL

Disconnect the speedometer cable from its driving unit at (K) FIG. 26, and then 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. 26, 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 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 (*8″diameter brake*). FIGURE 27.

Slacken the brake cable as much as possible by means of the adjuster at the handlebar lever and remove the cable from the lever. This will provide sufficient loose cable for the extraction of the inner and outer cables from their sockets in the levers (A) on the brake plate. Unscrew the cover plate retaining nut (B) by one or two turns and remove the fork leg end caps (C). As the nuts (D) are unscrewed, support the wheel in order to avoid damage to the stud threads. Carefully lower the wheel until the cover plate draws clear of its slotted ear on the fork leg and remove the complete wheel assembly.

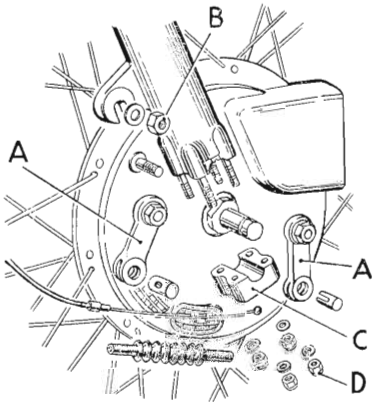

FIGURE 27.
Removal of the front wheel (8″ diameter brake).

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When replacing, ensure that the cover plate is properly engaged in the fork leg, and that the fork studs are located in the spindle grooves. Tighten the end cap nuts very lightly at this stage. Firmly tighten the cover plate nut (B) and note that the spindle grooves are elongated to allow the wheel assembly to align itself in the forks during this operation. Finally, securely tighten the end cap nuts.

Self-locking nuts are used for retaining the end caps and any replacements must be of the same type.

FRONT WHEEL (6" *diameter brake*)

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. 28. 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 (E) to remove the wheel, and as the nuts are unscrewed, support the wheel in order to avoid damage to the stud threads.

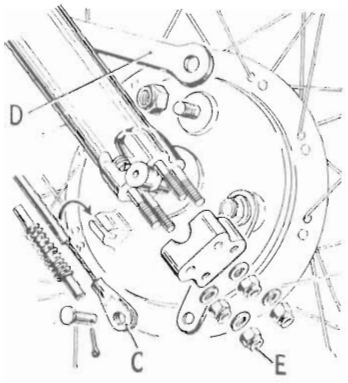

FIGURE 28. Removal of the front wheel (6" diameter brake).

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. Readjust the brake cable at the handlebar lever. Self-locking nuts are used for returning the end caps and any replacements must be of the same type.

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 27). First release the handlebar clamps (J) and lift the handlebars off the yoke (FIG. 29).

Unscrew the nuts (A) FIG. 29, 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 stride 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.

Recommended oils are given on page 28.

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. 29, 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 the forks 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). Recommended torque wrench settings are: cap nut (A), 50—55 lb. ft.; clamp bolts (E), 23—25 lb. ft.

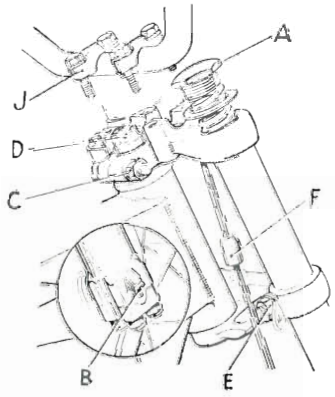

FIGURE 29. Front fork and steering head.

REAR SUSPENSION

The swinging fork is pivoted on needle roller bearings and no adjustment or lubrication is required.

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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. 30).

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

A special wrench is supplied in the toolkit for this adjustment and the cams on both units must be set on the same positions to ensure balanced loading.

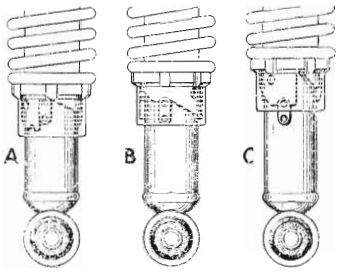

FIGURE 30.
Adjustment of the rear suspension springs.

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
(except Moto-cross models)

DESCRIPTION
Electrical energy in the form of rectified alternating current passes to the battery from the Lucas A.C. lighting/ignition unit, which comprises a six-pole alternator and rectifier. The rectifier converts the alternating current output of the alternator to unidirectional current which is essential for battery charging.

ALTERNATOR
Except for an occasional inspection of the snap connectors in the output cables (these connectors must be clean and tight) the alternator requires no maintenance.

ZENER DIODE
If disturbed, it is important to note that the fixing nut must not be subjected to a tightening torque of more than 28 lb./in. or less than 24 lb./in.

IGNITION COIL, IGNITION CAPACITOR, CONTACT BREAKER CAPACITOR, RECTIFIER, ZENER-DIODE, DIRECTION INDICATOR UNIT, AND MASTER ELECTRICAL SWITCH (all models except Moto-cross)
All these components are carried in a light alloy housing which also serves as a heat sink for the zener-diode. It does not need any attention apart from an occasional check to see that the high-tension lead to the coil, terminals, etc., are clean and tight.

The housing also carries a master lighting and ignition switch (see page 9, and FIG. 4) and a plug-and-socket connection for separating the front lighting equipment from the main electrical system (see FIG. 31).

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

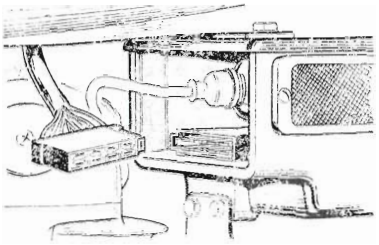

FIGURE 31.
The multi-pin connection for the front lighting.

REMOVING THE LIGHTS
The headlight, front directions lights, etc., can be removed, following withdrawal of the plug from the socket (FIG. 31). The battery may also be taken off, when ignition is provided through the capacitor. In this case, the battery negative (—) lead must be bound up with insulating tape to prevent short-circuiting by contact with the frame of the machine, otherwise the capacitor will be ruined. The tail light has a separate connector beneath the rear mudguard, and when this and other individual rear lighting connections have been uncoupled, all lights at the rear may be removed.

BATTERY (TOPPING-UP)
The battery becomes accessible following removal of the right side panel.

At weekly intervals (see "Routine Maintenance", page 14), and more frequently in warm climates, check the electrolyte level in the battery cells; if necessary, add distilled water to maintain the level indicated by the line. Do not add the water while the battery is on charge (either on or off the machine), nor use naked lights when examining the condition of the cells.

BATTERY (MAINTAINING CONDITION)
Never leave the battery in a discharged condition. If the motor-cycle is to be out of use for any length of time, have the battery fully charged, and every two weeks give it a short refreshing charge at ·7 ampere to prevent any tendency for the plates to become permanently sulphated.

The A.C. lighting/ignition unit has been designed for positive (+) earth systems. If the battery connections are reversed the equipment will be damaged, and it is therefore most important that, whenever the battery leads are being attached, the POSITIVE (+) LEAD MUST BE CONNECTED TO THE FRAME.

CONTACT BREAKER UNIT
The contact breaker points must always be kept free from grease or oil, and the gaps checked at intervals. It is also advisable to check the gaps after the first 500 miles.

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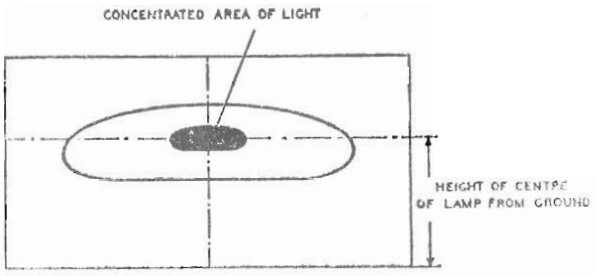

FIGURE 32. Headlight beam setting pattern.

LIGHTING EQUIPMENT (HEADLIGHT BEAM SETTING)

When the motor-cycle carries its normal load the headlight driving beam should be projected straight ahead and parallel with the road surface.

NOTE:—This instruction may require amendment to suit the lighting regulations of individual countries.

When checking setting:—

(*a*) Front of motor-cycle to be square with screen;

(*b*) Motor-cycle to be carrying normal load and standing on level ground;

(*c*) Recommended distance for setting is at least 25 feet.

To make an adjustment, slacken the side mounting (A) FIG. 33 and move it until the correct setting is obtained. Finally, retighten the securing screws.

With Lucas pre-focus bulbs fitted in these lamps, the filament is correctly positioned during manufacture in relation to the focal point of the reflector. No further focussing is necessary.

BULB REPLACEMENT (HEADLIGHT)

To gain access to the headlight bulb slacken the front rim retaining screw (B) situated at the top of the body (FIG. 33). Disengage and withdraw the front rim and light unit assembly (C) removing the upper edge first. Press and turn the adapter and withdraw the defective bulb. After fitting the replacement bulb, reverse the above procedure to reassemble the lamp. The bulbs are of the pre-focus type and are 12 volt, 50/40 watt.

HEADLIGHT BEAM, OIL PRESSURE (250 cm³) AND DIRECTION INDICATOR LIGHTS

The bulb holders are accessible from within the headlamp shell. Withdraw the holder and to remove the bulb depress and turn. Use a 24 volt, 2 watt bulb.

PILOT LIGHT

Disengage and withdraw the front rim and light unit assembly. The parking light bulb holder and bulb (E) FIG. 33, can then be withdrawn from the reflector in which it is a push-fit. Use a 12 volt, 6 watt bulb.

NOTE:—This bulb remains illuminated when the headlight is in use.

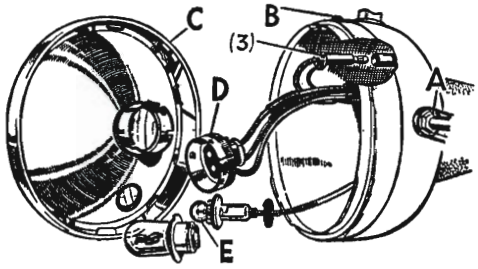

FIGURE 33. Headlight dismantled for bulb removal.

STOP/TAIL LIGHT

Access to the bulb is gained by slackening the two lens retaining screws. When fitting the replacement bulb note that the securing pins are offset to ensure correct insertion into the bulb holder. Use a 12 volt, 5/21 watt bulb.

WIRING DIAGRAM

A diagram of the electrical circuit appears on page 42. The insulation of the wires is individually colored and these colors are indicated on the diagram.

CABLE HARNESS

Connections within the headlamp shell are of the snap connector type and they should be examined occasionally to make sure that they are firmly joined.

FUSE

An in-line fuse is inserted in the feed cable (—) from the battery. The container carries a spring-loaded 35 ampere fuse retained by a bayonet cap (FIG. 34).

If the fuse fails, it indicates a fault in the electrical circuit which must be rectified before the fuse is replaced. SPARE FUSES SHOULD ALWAYS BE CARRIED.

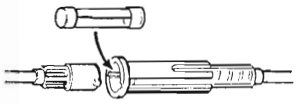

FIG. 34.
The in-line fuse dismantled.

If the zener-diode is damaged as a result of a fault in the circuit, after this has been eliminated and the fuse replaced, the motor-cycle may still be ridden home, providing that the zener-diode is disconnected and the machine ridden slowly with all lights switched on to prevent overcharging of the battery.

NOTE:—A FUSE OF A GREATER LOAD CARRYING CAPACITY THAN 35 AMPERES MUST NOT BE USED UNDER ANY CIRCUMSTANCES.

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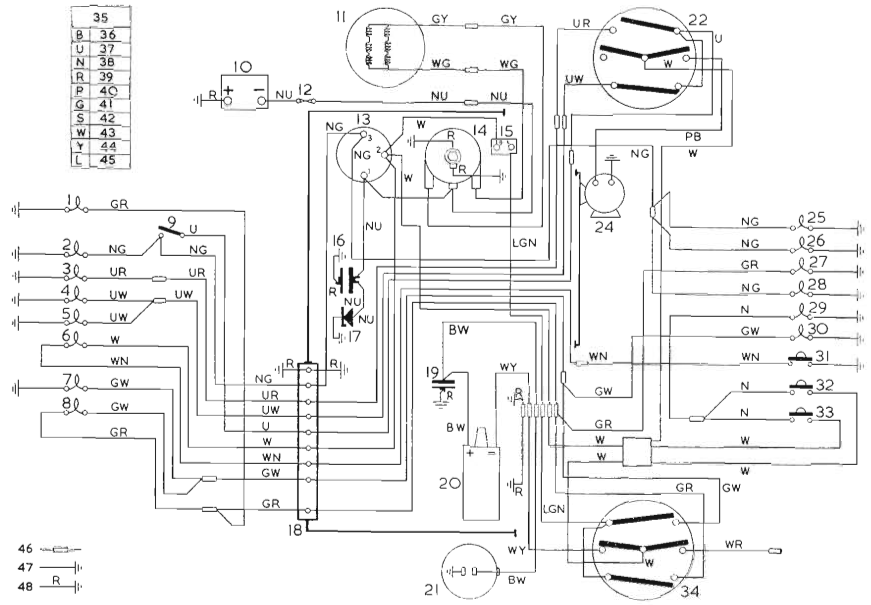

FIG. 35. Wiring diagram (all models except M.X.).

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KEY TO WIRING DIAGRAM

1. Left direction indicator.
2. Parking light.
3. Dipped headlight beam.
4. Main headlight beam.
5. Main beam warning light.
6. Oil pressure warning light (250 cm³ only).
7. Right direction indicator.
8. Direction indicator warning light.
9. Headlight switch.
10. Battery.
11. Alternator.
12. Fuse.
13. Ignition/lighting switch.
14. Rectifier.
15. Direction indicator unit.
16. Capacitor (2.M.C.).
17. Zener-diode.
18. Plug and socket (9-pin).
19. Ignition capacitor.
20. Ignition coil.
21. Contact breaker.
22. Left handlebar switches.
23.
24. Horn.
25. Speedometer light.
26. Tachometer light.
27. Left direction indicator.
28. Rear light.
29. Stop light.
30. Right direction indicator.
31. Oil pressure switch (250 cm³ only)
32/33. Front and rear brake light switches.
34. Right handlebar switches.
35. Cable color code.
36. Black.
37. Blue.
38. Brown.
39. Red.
40. Purple
41. Green.
42. Slate.
43. White.
44. Yellow.
45. Light.
46. Snap connectors.
47. Ground (earth) connection via cable.
48. Ground (earth) connection via fixing bolt.

THE CAPACITOR

All models fitted with a battery also have a capacitor which enables the motor to be run with or without a battery. Hence, for use in competitive events, the rider can remove the battery if he so desires.

A capacitor is also suitable for emergency operation in case of battery failure, since the motor can be started without the battery and run as normal, with full use of the standard lighting when the motor is running.

RUNNING WITHOUT THE BATTERY

Before running the motor with the battery disconnected, it is essential that the battery negative (—) lead is bound up with insulating tape to prevent short-circuiting by contact with the frame of the machine, otherwise the capacitor will be ruined.

NOTE:—Periodically check that the capacitor is serviceable by disconnecting the battery, when the motor should continue to run in the normal manner with full lighting also available.

THE ELECTRICAL EQUIPMENT

(Moto-cross models only)

Moto-cross models are equipped with an ignition system known as "energy transfer" ignition, a system which incorporates certain characteristics of both magneto and coil ignition. The alternator has six stator windings and an engine shaft rotor containing six high-energy permanent magnets.

The ignition coil is designed specially to operate on the energy-transfer principle. At the instant when the contact breaker points open, a pulse of electro-magnetic energy, developed by the alternator during the period that the points were closed is discharged through the ignition coil primary winding. The effect of this energy pulse in the primary windings is to induce a high voltage in the ignition coil secondary winding, and this high-tension voltage is applied to the sparking plug.

ALTERNATOR

Except for occasional inspection of the snap connectors (these must be clean and tight) the alternator does not require maintenance.

NOTE:—Vegetable-base oil MUST NOT BE USED in the primary chaincase because of possible harmful effects on the alternator.

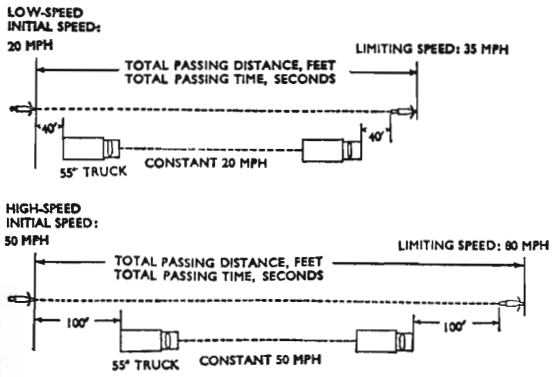
HIGH-TENSION IGNITION COIL

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

In the following pages information is provided in accordance with the requirements of U.S.A. Federal Highway Administration, Department of Transportation — Motor Vehicle Safety Regulations, Part 375 — Consumer Information.

Model	Brake/load stopping distance in feet from 60 m.p.h.		Low speed passing time and distance (20—35 m.p.h.)		High speed passing time and distance (50—80 m.p.h.)	
	Light	Max.	Distance in feet	Time in secs.	Distance in feet	Time in secs.
B25SS Gold Star 250SS	154	160	396	8·6	1384	15·3
B25T Victor 250	154	160	396	8·6	1384	15·3
B50SS Gold Star 500SS	145	151	384	8·3	989	9·9
B50T Victor 500	178	185	384	8·3	989	9·9
B50MX Victor 500MX	178	185	384	8·3	989	9·9

NOTE:—The above information represents results obtainable by skilled drivers under controlled road and vehicle conditions, and the information may vary under other conditions.



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BRAKE BURNISHING PROCEDURE

Brakes should be bedded in progressively during the first 300 miles. This is done by gradually increasing brake lever pressure during the period, and braking from progressively increasing speeds.

For guidance refer to the table below. The deceleration in ft./sec.^{2} is converted to the equivalent braking time/distance.

	Stage 1	Stage 2	Stage 3
Speed at commencement of stage	30	50	70
Speed at end of stage	0	30	30
Deceleration (feet/sec.^{2})	12·5	12·5	12·5
Distance travelled (feet)	77	135	344
Time taken (secs.)	3·5	2·3	4·7

STAGE 1

A minimum of 20 stops using the front and rear brakes together. Decelerate from 30 m.p.h. to rest using the distance travelled or time taken to obtain the required deceleration.

STAGE 2

A minimum of 50 decelerations from 50 to 30 m.p.h. using front and rear brakes together.

STAGE 3

A minimum of 30 decelerations from 70 to 30 m.p.h. using front and rear brakes together.

The distance between brake applications should not be less than ¼-mile in each case. Disengage the clutch when carrying out the procedure to ensure that the brakes receive the full braking load.

The use of the above procedure, subject to traffic conditions will ensure that any high spots on the brake linings are not hardened, resulting in reduced brake efficiency. Correct burnishing will give an approximate minimum lining contact area of 50 per cent which qualifies the published brake performance figures.

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