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Riders' Instruction Book

for



Model
B31 350 c.c. O.H.V.
1946

The instructions in this book are also
applicable to the B.S.A. Competition
Model B32.

The following are the equivalent details under
"Useful Data" on page 2 for Model B32:

Gear ratios:	Top	...	...	...	7.1
	Third	...	...	...	9.2
	Second	...	...	...	14.2
	First	...	...	...	20.2
Tyre sizes:	Front	...	...	...	2.75-21
	Rear	...	...	...	4.00-19

TO you who have just bought this B.S.A. Motor Cycle we say: "Welcome to the ranks of B.S.A. riders, and may your motor cycling miles be many and thoroughly enjoyable."

We at B.S.A. have done our utmost to design and produce for you a machine which will give that reliability and excellence of performance which you have every right to expect. We know that before your B.S.A. left the factory every single component had passed the expert eyes and precision instruments of trained inspectors—that every detail of its assembly had been carried out and checked by skilled mechanics, and that on its final road test it had to pass the critical judgment of a man whose job—day in, day out—is riding and "passing off" motor cycles.

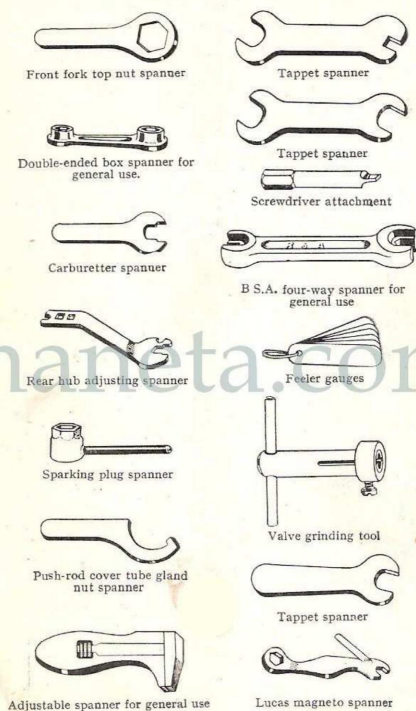
Henceforward the maintenance of your machine's performance and reliability is in your hands. That is the reason for this book, written with the sole idea of helping you—whether you be novice or expert—to carry out those periodical maintenance details which will keep your machine in perfect running trim.

USEFUL DATA.

Petrol tank capacity (approx.)	...	2½ galls.
Oil tank capacity	...	½ gall.
Gearbox capacity	...	1 pint
Bore (mm.)	...	71
Stroke (mm.)	...	88
Capacity (c.c.)	...	348
Tappet clearances (cold):		
Inlet and Exhaust	...	.003in.
Compression ratio	...	6.5/1
Piston ring gap:	Maximum	.012in.
	Minimum	.008in.
Valve timing:		
Inlet	...	Opens 25° before t.d.c.
	...	Closes 65° after b.d.c.
Exhaust	...	Opens 65° before b.d.c.
	...	Closes 25° after t.d.c.
Ignition timing (piston distance from t.d.c. with points just opening)		
Plug points gap	...	.015in.—.018in.
Gear ratios:		
Top	...	5.6
Third	...	7.3
Second	...	11.1
First	...	15.9
Tyre sizes:		
Front and rear	...	3.25 x 19
Tyre pressures:		
Front (per square inch)	...	17lb.
Rear (per square inch)	...	20lb.
Chain sizes:		
Front	...	½in. x .305in.
Rear	...	½in. x ¼in.
Engine sprocket	...	17T.
Standard carburetter jet	...	150

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THE TOOLKIT.



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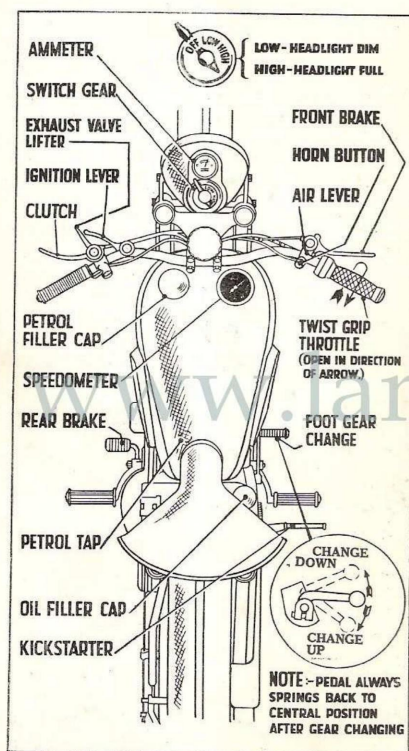


Fig. 1. The Controls.

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THE CONTROLS.

HANDLEBAR CONTROLS.

Twist-grip Throttle.

Controls engine speed. To open throttle (to increase engine speed) turn grip towards rider. Full movement about one quarter of a turn.

Front Brake.

Hand lever on right bar, below twist grip throttle. Pull lever towards bar to apply brake and note that this operates front brake only.

Air Lever.

On right bar, controls the additional supply of air to carburetter, allowing the mixture of air and petrol to be varied as conditions require. Pull towards rider to open (to increase supply of air). Normal running position fully open.

Clutch Lever.

Larger hand lever below left bar. Pull towards bar to declutch, i.e., disengage the drive between the engine and the rear wheel. As the clutch lever is slowly released, the drive is restored gradually and without sudden jerks. Always declutch to change gear.

Ignition Control.

Small lever on top of left bar, controls advance and retard of the spark produced by the magneto. Normal running position is fully advanced—lever pulled towards rider to its fullest extent. For starting engine, spark should be slightly retarded.

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Exhaust Valve Lifter.

Small lever below left bar. Pulling lever up towards bar opens exhaust valve and releases compression in combustion chamber, enabling engine to be rotated easily.

Speedometer.

Mounted in tank. Registers machine's speed and mileage.

FOOT CONTROLS.

Rear Brake Pedal.

On left-hand side, operates rear brake only.

Foot Gear Change Pedal.

On right-hand side, effects the change from one gear to another. To engage first gear from the neutral position, the pedal is moved upwards. Second, third and top gears are engaged by moving the pedal downwards. The pedal automatically returns to neutral position, ready for next gear change.

Kickstarter Pedal.

On right-hand side behind gear change pedal. Depression of this pedal rotates engine. See instructions on starting engine.

GENERAL.

Petrol Tap.

Located under rear end of tank. Tap has one serrated knob and one hexagon knob. To turn petrol off, serrated knob is pushed in. To turn petrol on, hexagon knob is pushed in. Above these

knobs is a small reserve tap. When tap is turned to right, feed is from main supply; when turned to left, from reserve supply.

Lighting Switch.

On panel at rear of headlamp. Controls lighting of lamps as indicated on markings.

Ammeter.

On top of headlamp. Enables rider to see at a glance whether dynamo is supplying charge to battery, or whether battery is discharging.

DRIVING.

To Start Engine.

Set gear control in neutral position, i.e., between first and second gear position.

If cold, first depress carburettor-tickler momentarily. Open twist grip control a small amount. Depress kickstarter pedal until compression is felt, raise exhaust valve lifter and depress kickstarter a little more. Release valve lifter, allow kickstart pedal to return to top of stroke and then give kickstarter a vigorous kick downwards.

To Engage First Gear.

Depress clutch lever and move gear change pedal upwards to its limit. If difficulty is experienced in engaging first gear when stationary, rock the machine backwards and forwards, maintaining slight pressure on the gear change pedal, until the gear is felt to engage.

To Move Off.

Open throttle slightly and gently release clutch lever. As clutch engages open throttle a little further.

To Change Gear (up).

Close throttle, disengage clutch and press gear-change pedal downwards to its limit, all these operations being performed simultaneously. Engage clutch and re-open throttle together immediately after changing. **Note.**—Violent pressure on the gearchange pedal is neither necessary nor desirable.

To Change Gear (down).

Open throttle slightly, disengage clutch and draw gearchange pedal upwards to its limit, all these operations being performed simultaneously. Re-engage clutch immediately.

NOTE.—When changing gear, either up or down, it is preferable—after moving pedal—to hold it in position with the foot until after the clutch lever has been released, when the gears will be felt to engage.

HINTS ON "RUNNING-IN" A NEW MOTOR CYCLE.

The rider who has just purchased a new machine will do well to remember that all the hidden working parts are just as new as the enamel and plating which he can see, and like a new pair of shoes or a new suit, these hidden parts have got to get "worn-in" before they become a nice comfortable fit.

This wearing-in—or running-in as we call it—is the most important period in the life of the engine, and the handling you give it during the first 1,000 to 1,500 miles will determine what sort of service it is going to give you for the following 10-20-30,000 miles.

Give your machine a reasonably easy time during that initial period, give the wearing surfaces a chance to get nicely bedded-in under the best conditions, and you will have a much sweeter-running engine as the result.

Avoid sudden and sharp acceleration, especially when the engine is not pulling under load.

Don't force it up hills in top gear when a change down will ease the load.

Have the patience to wait until that running-in period is up before you see what she will really do.

Carry out the periodical maintenance details described later with faithful regularity.

Don't be sparing with the grease-gun (except in the case of hubs), and above all—don't let the oil level in the tank get low. Economy in oil may prove very expensive at a later date. Full details of lubrication points and the correct grades of oil are given on the lubrication chart at end of book.

And one more tip that's worth while—have a small quantity of upper-cylinder lubricant added to the petrol each time you fill up—or if this is difficult to obtain, add about an egg-cup full of engine oil to every two gallons of petrol.

HOW THE LUBRICATION SYSTEM WORKS.

The engine lubrication system (see Fig. 2) is of the dry sump type operated by a double gear pump, situated in the bottom of the crankcase on the right-hand side. All oilways are internal except for the supply and return pipes from the tank and the oil feed to the valve rockers. The oil flows from the tank—through a filter in the tank—to the

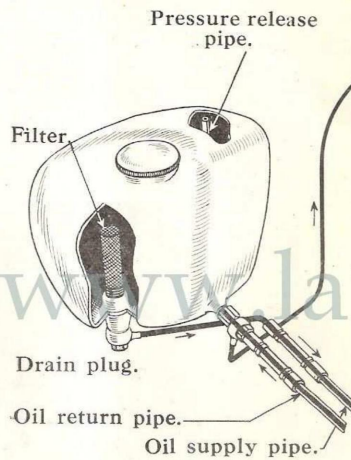
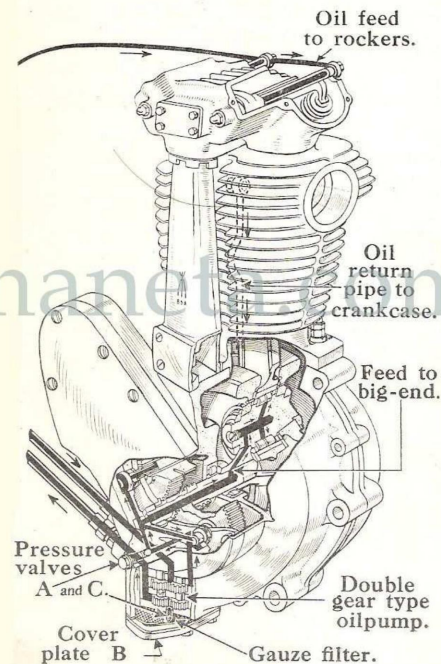


Fig. 2.

Diagram showing how oil is circulated from the tank throughout the engine and returned to the tank.

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supply pump (the top pair of gears) and thence past the pressure valve *A* to the oilways feeding the cam spindles and along the hollow mainshaft to the big-end bearing.

After lubricating the big-end and circulating through the engine in the form of mist, the oil drains down through a filter in the bottom of the crankcase, from which it is drawn by the return pump (lower pair of gears) past ball valve *C*, and delivered up the return pipe to the tank. Oil is fed through a union situated in the pipe between the return pump and the tank, to the rocker spindle, and after lubricating the rockers and enclosed valves, is returned to the crankcase through an external oil pipe attached to the base of the inlet valve spring housing.

Incorrect seating of the ball valve *A* will allow oil to transfer from the tank to the engine, whilst the machine is stationary. In this event, unscrew the plug over the valve, and remove spring and ball. Clean the ball and its seating and replace. If the ball valve *C* should get stuck in its seating, there will be no return of oil to the tank. To correct, remove the cover plate below the pump and insert a piece of wire into the valve orifice, and lift the ball off its seating to free it. To check the flow of oil in the lubricating system, remove the tank filler cap whilst the engine is running. Oil should be seen issuing from the return pipe from the crankcase. The tank and crankcase should be drained periodically, and replenished with clean oil (see Periodical Maintenance).

Any restriction in the pressure release pipe in the tank will cause an increase in pressure inside the oil tank, and will result in leakage of oil at the filler cap. This can be put right by inserting

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a length of flexible wire into the pipe at its lower end (just in front of the rear mudguard) and pushing the wire right up the pipe, thus clearing any obstruction.

To remove the oil tank filter for cleaning, remove the oil pipe banjo union plug at the bottom of the tank. The filter will come out with the plug. The filter should be placed in a can large enough to cover it with petrol, and thoroughly washed. Before replacing make sure that it is quite dry of petrol.

The pump filter can be withdrawn after removing the cover plate and should be thoroughly washed with petrol, dried and replaced.

On no account try to remove the oil pump

PERIODICAL MAINTENANCE.

WEEKLY.

Cleaning. Obviously regular and thorough cleaning will keep your machine looking smart and will help to retain both its new appearance and value. But it helps also to lengthen its life and maintain efficiency if the cleaning process is carried out correctly.

Take special care to prevent dust and grit from working into such parts as hubs, carburetter, magdyno, brakes and gearbox.

To rub dry and caked mud from the frame, tank and mudguards means that the enamel on these parts will be subjected to an abrasive action which will quickly destroy the polish. Soak the mud first, and then float it off with copious supplies of clean water supplied either with a hose or a sponge. If a hose is used, take care not to direct the stream of water directly on to the hub bearings, magdyno or carburetter.

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When all dirt is removed dry and polish off with a clean duster.

Engine and gearbox are best cleaned with brush and paraffin, and dried off when clean with clean rag.

An occasional coating of the cylinder head and fins with cylinder paint prevents rust formation and also helps heat radiation.

Oil Tank. Inspect level of oil at least once a week. Oil level should never be allowed to fall below the oil level mark on outside of tank. When topping-up do not fill the tank completely—leave about one inch margin between the oil and top of tank.

Tyres. Examine carefully for cuts and remove any flints or metallic scraps which may have become embedded in the cover. Check pressure with a gauge, and inflate to correct pressure if necessary.

Steering Head. Give two or three strokes of the grease gun every week.

Brake Pedal. Give two or three drops of oil occasionally.

Control Rod Joints and Exposed Cables. Give a few drops of oil weekly.

Battery. Top-up as often as necessary to maintain level of electrolyte one-quarter inch above top of plates. ALWAYS USE DISTILLED WATER WHEN TOPPING UP. This can be obtained cheaply at any garage or chemist's shop.

Gearbox. Examine oil level and top-up if necessary to the level plug.

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EVERY 1,000 MILES.

Hubs. Inject grease through nipples in centre of hub. Do not over-lubricate as grease may be forced on to the brake linings and cause ineffective brakes. Three or four strokes of the grease gun should be ample. DO NOT LUBRICATE WITH OIL. Check rear hub for excessive play in bearings by trying side-play and up-and-down movement at wheel rim. There should be a slight amount of side-play. If excessive adjust bearing as explained on page 17.

Steering Head. Lift machine and place a box under the crankcase so that front wheel is clear of the ground. Test for play in the steering head by trying up-and-down movement. Check also that steering is free. If necessary, adjust as explained on page 20.

Brake Cam Spindles. A few spots of oil is all that is required.

Tappet Adjustment. Check when engine is cold. Clearance on both inlet and exhaust tappets should be .003in. The correct method of checking and adjusting tappets is explained on page 21.

Clutch Adjustment. There should be a slight amount of play in the clutch control arm on the gearbox—or a short length of free cable at the handlebar lever end. If the play becomes excessive difficulty will be experienced in changing gear, as the clutch may not fully disengage, in which case the control arm should be adjusted as explained on page 25.

Chains. Check that there is not more than half-an-inch up-and-down movement at the centre of the front chain and not more than three-quarters of an inch in the case of the rear chain. If excessive adjust as explained on page 27.

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EVERY 2,000 MILES.

Oil Tank. Drain out the old oil (preferably after a run while the engine is still warm), wash out with flushing oil or thin machine oil—NOT paraffin or petrol—and refill with new oil. Remove filter and wash thoroughly in petrol or paraffin and make sure that it is absolutely dry before replacing.

Oil Pump Filter. Remove plate below oil pump and wash the gauze filter in paraffin, dry and replace it.

Contact-breaker Tappet. A very small quantity of thin oil should be injected into the lubricating wick (see Fig. 8), and the face cam smeared with oil.

Dynamo Armature Bush. A few spots of oil should be injected through the lubricator. DO NOT OVER-LUBRICATE.

Gearbox. Remove drain plug at bottom of gearbox and drain out old oil. Wash out gearbox with flushing oil and refill with new oil to level of filler plug.

Primary Chain Oilbath. Drain, and replenish with new oil to level of plug at side of case behind brake pedal. Do not fill above this level or clutch slip may occur.

Note.—In the case of new machines it is advisable to drain the oil tank and sump after the first 250 miles, and again after 1,000 miles. The gearbox should be drained after the first 500 miles. Thereafter these operations need only be carried out at 2,000 miles intervals.

Full details of lubrication points and correct grades of oil are given on the lubrication chart at end of book.

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HOW TO CARRY OUT THE VARIOUS ADJUSTMENTS CALLED FOR IN THE PREVIOUS SECTION.

Hubs. The front hub is fitted with ball journal bearings and no adjustment is required or provided for. To adjust the rear hub bearing, it is first necessary to remove the wheel from the frame. Proceed as follows: Disconnect the tail lamp wire and remove

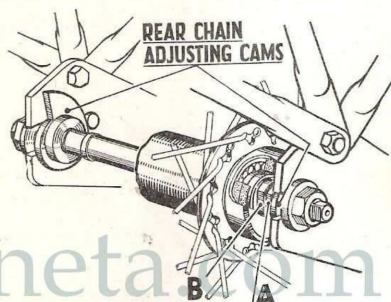


Fig. 3. Hub adjustment.

detachable portion of rear mudguard by unscrewing the two bolts adjacent to the lifting handle. Next disconnect the rear chain, unscrew the nut holding the brake anchor stop and remove the adjusting screw on the rear brake rod. Then loosen the two spindle nuts and wheel should slide out.

The adjustment of the bearing is carried out by loosening the locking nut (A, Fig. 3) and tightening or loosening the adjusting nut B as required. Both

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nuts are on the opposite side to the brake drum. Do not over-tighten the adjusting nut—it is most important that the wheel should have just perceptible side-play at the rim when replaced. When adjustment is correct tighten the locking nut against the adjusting nut. When replacing the wheel note that the spindle nuts are shouldered, and it is important that the shoulders should locate correctly in the forks.

Forks. No adjustment is provided for the forks fitted to this model, and the only maintenance likely to be required is if, after considerable mileage, they appear to develop excessive up-and-down

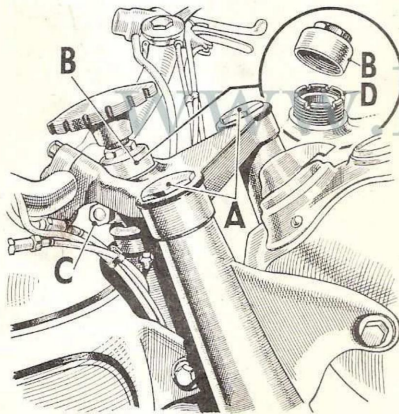


Fig. 4. Front fork and steering head.

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movement. If this occurs, remove the hexagon-headed cap (A, Fig. 4) at the top of each fork leg, and check the oil level. Each leg holds approximately quarter-pint of oil and the distance from the top of the oil to the top of the fork leg as

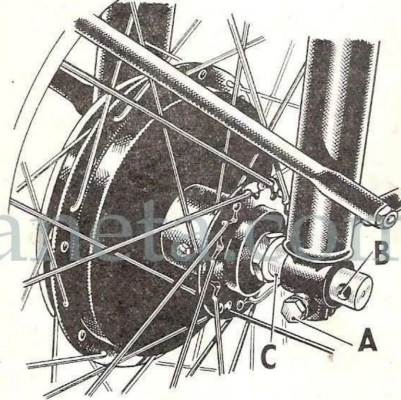


Fig. 5. Removal of front wheel.

measured with a dipstick is approximately 17½in. when the machine is loaded so that the distance from the lower edge of the fork leg outer sleeve to the wheel spindle centre is 10½in. These figures are approximate, and a slight deviation is immaterial. See lubrication chart for correct grades of oil.

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To remove front wheel from forks, detach brake cable, then slacken the pinch bolt (A, Fig. 5) at the front of the nearside fork end. Insert tommy bar in the hole in the spindle end B and unscrew. Note that this has a left-hand thread and unscrews clockwise. Spindle can then be pulled out, and by sliding distance bush C in fork end outwards to its fullest extent, the wheel will drop out. In replacing wheel, it is most important that when spindle is replaced, and before pinch bolt is tightened, the forks must be depressed once or twice to enable the nearside fork end to position itself on the distance bush. If this precaution is not observed, the fork leg may be clipped out of position and will not function correctly.

Steering Head. It is first necessary to raise the front wheel clear of the ground—a block or box

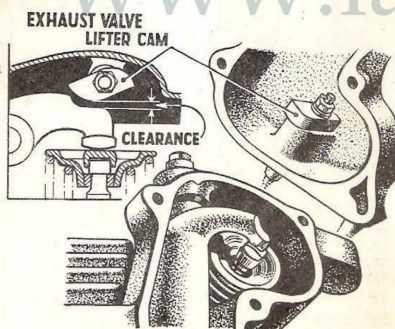


Fig. 6. Exhaust valve lifter adjustment.

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under the crankcase is the best method. Remove the steering head locknut (B, Fig. 4). Slacken the clip bolt C, and with the special spanner provided, tighten the adjusting sleeve D until slackness has been taken up. Do not over-tighten or steering will be stiff and the ball races may be damaged. Tighten the clip bolt after adjustment is complete, and then replace the steering head locknut,

Exhaust Valve Lifter. The exhaust valve lifter cam must always be well clear of the rocker arm (see Fig. 6), otherwise the engine will be noisy and the tappet clearances seriously affected. Failure to check that there is clearance at this point may result in a badly burnt exhaust valve. Adjustment is usually carried out by means of the cable adjuster screwed into the exhaust rocker box cover, but the actuating arm can be removed and reset to any position on its serrated shaft.

Tappet Adjustment. Before any attempt is made to adjust tappet clearances, check that the exhaust valve lifter is correctly adjusted as explained in the previous paragraph.

To check and adjust tappet clearances, it is most essential, owing to the special design of the cam form (see Fig. 7), that the following procedure be adhered to:

Rotate engine forward until the inlet valve has just closed (until tappet is just free to rotate).

Now adjust the exhaust tappet clearance to .003in.

Turn engine forward again until the exhaust tappet clearance is just taken up (but before valve actually starts to lift).

Now adjust inlet tappet clearance to .003in.

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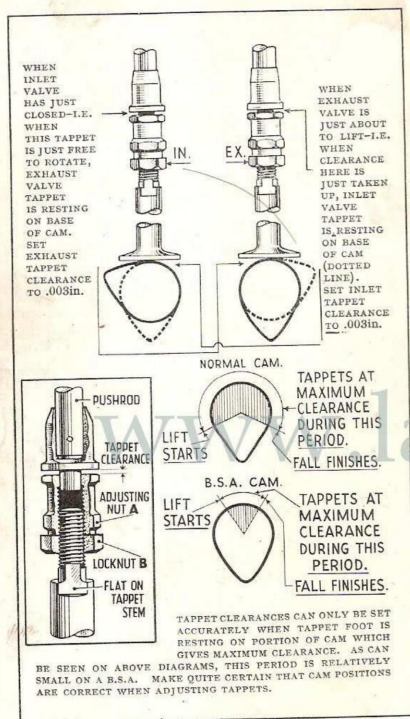


Fig. 7. Tappet adjustment.

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It is advisable, before inserting feeler gauge to check clearance, to lift the push rod with the fingers, otherwise the weight of the rod may prevent the gauge being inserted correctly, or may give a false tappet setting.

The actual adjustment is carried out by releasing the locknut (B, Fig. 7), holding the tappet with a spanner on the flat, and screwing the tappet head A either up or down. When correct clearance is obtained, the locknut must be tightened against the tappet head. Clearances should again be checked before replacing tappet cover.

Tappet adjustment should always be carried out with the engine dead cold, and the clearances recommended above regarded as a minimum, especially in the case of the exhaust valve.

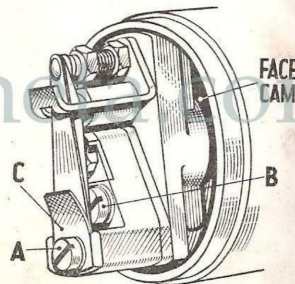


Fig. 8. Magneto lubrication.

Magneto—Lubrication. The face cam on which the contact breaker tappet operates is lubricated with a wick which is charged with oil before the

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instrument leaves the factory. Periodically it is necessary to recharge the wick with thin oil, otherwise the cam will get dry and rapid wear will develop on the tappet. Remove the magneto end cover, and this will expose the contact breaker mechanism (Fig. 8). To get at wick, remove screw A holding the spring arm, which carries the moving contact, and detach the arm complete. Then unscrew wick-holder B and give wick a few spots of thin machine oil. Smear a thin coating of oil over the face cam, then replace wick holder and spring arm. Note that the small backing spring C is fitted immediately under the securing screw, and that the small spring is fitted with the bent portion facing outwards.

Ignition Timing. It is a rare occurrence for the magneto pinion to slacken off and disturb the ignition setting, and it is not advisable to interfere with the standard setting unless it is known to be at fault.

It is, however, advisable to check over the timing after carrying out any adjustment to the magneto contact points, as a slight variation of the points tends to advance or retard the timing. (Opening the points advances timing, closing them retards timing.)

If the timing requires re-setting, first check that the fully-open gap at the points is between .010 in. and .012 in. Then remove the timing cover, and in so doing take care not to damage the small nozzle in the timing cover which feeds oil to the hollow crankshaft. It is advisable to leave three equally-spaced timing cover pins in position (but half unscrewed) while the cover joint is broken.

With the cover removed, take off the nut locking the magneto pinion on its shaft, and with the aid of a magneto pinion extractor release the

pinion on its taper. (Note that the pinion is held on its shaft by a plain taper only, and can only be released with safety by using the proper extractor.)

To reset timing, turn engine forward until piston reaches top dead centre on the compression stroke. Now turn the engine back until the piston has descended $\frac{1}{8}$ in. Turn contact breaker in its direction of rotation until the points are just about to open (not more than .002 in. open). Lightly tap magneto pinion into its taper, tighten nut and carefully check figures and positions. If setting is correct, finally tighten magneto pinion nut. It is most important that ignition setting is accurate. Too much or too little advance will result in higher running temperatures and may cause piston seizure.

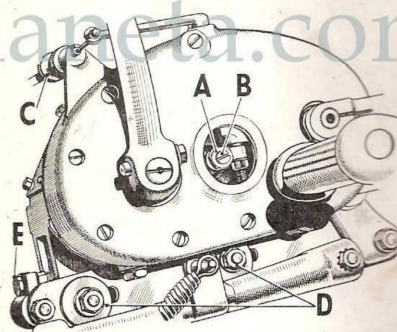


Fig. 9. Clutch adjustment.

Clutch. The main clutch adjustment is totally enclosed in the gearbox outer cover, and to reach it it is first necessary to remove the knurled filler

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plug. With the plug removed it will be seen that just inside the cover there is a nut (*A*, Fig. 9), which locks the adjusting screw *B* in position. Loosen the locknut and with the aid of a screw-driver adjust the screw so that there is a little clearance between it and the ball which is located behind it. Then retighten the locknut and replace the filler plug.

Further adjustment is provided by the knurled thumb nut *C*, on top of the gearbox. Remember, however, that some free movement in the control arm is necessary, as if the adjustment is too tight there will be constant pressure on the clutch, with consequent wear and loss of efficiency.

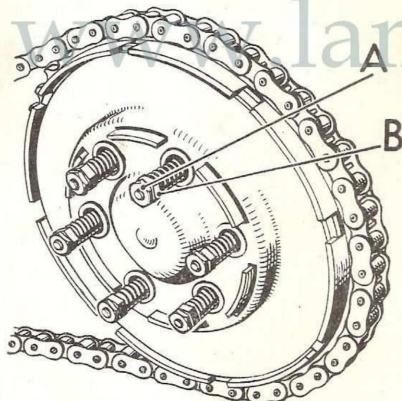


Fig. 10. Clutch spring adjustment.

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After a considerable mileage it may be desirable to increase the spring pressure a little. First remove the outer half of the primary chaincase, and when this has been done the clutch is exposed. It will be seen that the clutch plates are pressed together by springs (Fig. 10), the tension of which is controlled by the nuts *A* and *B*. To increase the spring pressure slacken the locknut *A* and tighten nut *B* a few turns. It is important that each of the six adjusting nuts are given an equivalent number of turns to ensure even pressure, otherwise the plates will slide unevenly and clutch drag may result. After adjustment tighten lock nuts against adjusting nuts and replace chaincase.

Chains. The front chain is adjusted by slackening the two large nuts under the gearbox on the right-hand side (*D*, Fig. 9), and screwing up the adjuster *E*. This draws the gearbox rearwards, tightening the chain. Don't forget to tighten nuts *D* when correct tension is obtained, which should allow half-an-inch up and down movement at the tightest point of the chain. Note that after tightening chain, rear chain will need adjusting.

The rear chain is adjusted by means of cams on the spindle operating against stops on the frame stays. (Fig. 3.) Loosen the two spindle nuts and with a spanner on the flats on the left-hand side of the spindle, turn the spindle. The wheel will slide backwards, tightening the chain. Revolve the wheel slowly and check chain tension. There should be three-quarter inch up-and-down movement in the centre at the tightest point. Make sure that the cams are hard against the stops and then tighten spindle nuts—first the left-hand nut and then the right-hand. Now check wheel alignment.

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either by glancing along the line of both wheels when the front wheel is set straight, or by means of a long straight-edge or the edge of a plank placed along the sides of the wheels. The straight-edge should touch both walls of both tyres.

It is a good plan periodically to remove both chains, clean thoroughly in petrol or paraffin and then gently warm in a mixture of grease and graphite. When cool wipe off excess grease, clean sprockets and replace chains. Remember when replacing a chain fitted with detachable connecting link that the spring fastener must always be put on with the closed end facing the forward direction of travel (i.e., on the top run) of the chain.

OTHER PERIODICAL ADJUSTMENTS.

Brakes. In the case of the rear brake a wing nut on the brake rod effects any adjustment necessary, and a few turns are all that is required to improve braking efficiency. The front brake is adjusted by means of the knurled thumb nut on the cable stop at the lower end of the forks.

Sparkling Plug. It is advisable periodically—particularly after the first 1,000 miles or so—to remove the plug for inspection and cleaning. To dismantle the plug hold the lower hexagon in a vice and unscrew the upper hexagon. When this is removed the central electrode can be pulled clear of the body. The electrode should be scraped clean, but on no account try to scrape the insulation if this is of the mica type; it should be cleaned with a petrol-soaked rag. If the plug has a badly "pitted" mica insulation it is advisable to fit a new plug. Scrape the earth points on the body

clean with a wire brush. Then re-assemble, taking care to see that the internal copper washer is in position when replacing the central electrode. When plug is re-assembled check the gap between the points. This should be .015-.018in., and if adjustment is necessary, tap or prise the earth points on the body to give required gap—do not bend central electrode.

Air Cleaner (if fitted). The air cleaner, being of the oil dip type, needs periodically to be dismantled and cleaned. The filter element should be washed thoroughly in petrol, allowed to dry, and then submerged in light engine oil for a few minutes. Then take out, allow the surplus oil to drain off and re-assemble.



Fig. 11.

Sparkling plug dismantled

Cylinder Head. After the machine has covered its first 250 miles from new or after decarbonising, check the tightness of the cylinder head bolts. If they need to be tightened work in diagonal order to ensure that the head is tightened evenly, otherwise distortion may result.

Carburettor. The carburettor is adjusted at the factory to give the most economical running consistent with the best engine performance, and generally speaking it is not advisable for the inexperienced rider to try to alter the setting. The

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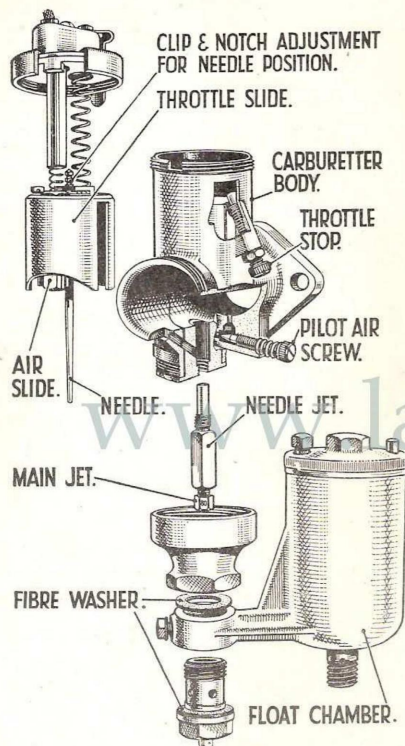


Fig. 12. The carburettor dismantled.

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slow-running mixture is adjusted by means of the pilot air screw (Fig. 12): screwing inwards richens the mixture, unscrewing weakens it. For slow running the mixture needs to be lightly rich, but if it is set too rich there will be a tendency for the engine to run on "pilot jet" under normal running with consequent high petrol consumption. The running mixture can only be altered by adjusting the height of the needle in the throttle valve or by fitting a main jet of different size.

DECARBONISING THE ENGINE.

Symptoms which indicate that decarbonising is necessary. Decarbonising and "top overhaul" of an engine is extremely simple, but it should only be carried out when the engine really needs it, which normally should be only at periods over 2,000 miles. The usual symptoms are an increased tendency to "pink" (a metallic knocking when under heavy load) due to the building-up of carbon on the top of the piston and inside of cylinder head; a general falling-off of power noticeable mainly on hills, and the engine inclined to run hotter than usual.

The correct procedure for decarbonising is described stage by stage.

It is first necessary to remove the petrol tank. Turn off the petrol tap and detach petrol pipe. Disconnect speedometer drive by releasing the strainer bolt under the tank, raising speedometer clear of the tank and unscrewing the knurled nut connecting the drive to the instrument. The tank is secured to the frame by one bolt through the steering head lug and two bolts to special lug at the rear of the frame top tube. When these bolts are removed, tank can be taken off.

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Next detach the high tension lead and remove the sparking plug. Disconnect the steadying stay from the rear of cylinder to the frame, and then take off carburettor by removing the flange bolts. Take care not to damage the carburettor flange washer. By unscrewing the ring nut at the top of the carburettor, the slide can be pulled right out and tied up to the top tube out of the way, while the main body of the instrument can be completely removed. By unscrewing the exhaust pipe and silencer clips to the frame, the pipe and silencer can be removed complete.

Removing Cylinder Head. Disconnect the oil feed pipe from the rocker spindles and the return pipe from the inlet rocker box. Note that the union screw plugs for oil pipe to the rockers have a much smaller hole in the side than the union for the return pipe—a point to remember when re-assembling.

The exhaust valve lifter cable can either be disconnected, or the exhaust rocker box cover removed leaving the cable intact. Remove the inlet valve rocker box cover. Slacken the castellated gland nut securing the push-rod cover tube to the cylinder head (a special Cee spanner is provided for this). Detach the tappet inspection cover at the base of the tube and undo the two acorn nuts clamping the base of the tube to the crankcase.

Lastly unscrew the four long bolts holding the cylinder head and barrel to the crankcase, applying the spanner to the top, or smaller diameter, hexagon. The larger diameter hexagon screws the bolt sockets into the crankcase and should not be touched unless it becomes necessary to replace a holding-down bolt, when the complete assembly of bolt and socket must be fitted.

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The cylinder head, complete with push-rod cover tube, should now be raised, the push-rods lifted off the tappets and dropped to the crankcase face. The head and push-rod cover tube can now be lifted upwards and forwards clear of the barrel. Note that the head has plain ground joint to the barrel—no gasket is used. If the head shows a tendency to stick, a few light taps with a wooden mallet under the exhaust port will loosen it. With the head clear of the machine the push-rod cover tube can be detached.

Rotate the engine by means of the kickstarter until the piston is at the top of its stroke, and scrape off the carbon deposit with an old penknife, taking care not to damage the piston crown.

All traces of carbon must be cleaned from the cylinder head.

Grinding-in Valves. It is not necessary to remove the rockers to take out the valves and springs, but if it is decided to strip the head completely, it is only necessary to undo the acorn nuts on the rocker spindles and tap these out, preferable using a small centre punch so as not to damage the threads on the spindle ends. Careful note should be kept of the rocker assembly for replacement—the spring, followed by the steel washer, and finally the aluminium oil seal washer.

To remove the valves place a wooden block, which will fit inside the cylinder head, on a bench, and then lay head on to the block with valve heads resting on it. Lift off the hardened end caps from the valve ends, then compress the valve springs until the split collets can be removed. When the collets are out, valve springs and top collar can be lifted out.

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Valve grinding should only be attempted if pitting is not deep. If deep pit marks appear, return the valve to B.S.A. at Small Heath for refacing, as attempts at grinding-in in this case will result in wear of the valve seats, and the valve may become pocketed.

Smear a small quantity of grinding compound (obtainable from any garage or accessory shop) over the face of the valve, and return the valve to its seat. Note that a light spring inserted under the valve head greatly facilitates the grinding-in operation, allowing the valve to lift and be rotated to a new position periodically. Hold the valve stem with the special tool provided and rotate the valve backwards and forwards whilst maintaining a steady pull. The valve should be raised and turned to a new position after every few strokes. Grinding should be continued until the valve seat and face show a uniformly polished surface all round. It is most important that valves should be ground-in on their correct seats—both valves are marked, one "IN" and the other "EX."

Should the valve seats be badly pitted, the head should be returned to B.S.A. for recutting, and this may necessitate the fitting of new valves.

Before replacing the valves and springs, all traces of grinding compound must be removed from both face and seat, and the valve stems smeared with engine oil.

Valve Springs. After a period of several thousand miles it may be desirable to renew the valve springs as these tend to lose their efficiency due to heat. If the springs are renewed whilst decarbonising, it will save dismantling specially to replace them at a later date.

Piston Rings. Whilst the engine is dismantled, it is advisable to examine the piston, rings and cylinder barrel. Lift the barrel upwards and forwards into the front angle of the frame, and as the piston emerges from the barrel it should be steadied to prevent possible damage. When the barrel is removed, cover the mouth of the crankcase with rag to prevent dust and grit falling in. To remove the piston from the connecting rod it is first necessary to take out one of the gudgeon pin circlips. This is best accomplished with a pointed instrument such as the tang of a file suitably ground.

Before the gudgeon pin can be withdrawn it may be necessary to heat the piston with the aid of rags immersed in hot water, wrung out, and held round the piston. Then, supporting the piston, tap the gudgeon pin through using a light hammer and a punch.

When the piston is free, mark the inside of the piston skirt at the back, so that it can be replaced the correct way round.

If the rings are stuck in the grooves they will need to be carefully prised free and removed from the piston. All carbon deposit should be carefully scraped from the grooves and the inside edges of the rings. If either of the rings shows brown patches on the face, replace with a new ring.

Check the piston ring gap by inserting the piston in the barrel and sliding each ring independently up to the skirt of the piston. Check the gap with feeler gauges, and this should not be less than .008in. or more than .012in. Fit new rings if the gap exceeds the figure stated. It is advisable to check the gap of new rings before fitting, and if the gap is less than .008in. the ends of the rings should be carefully filed to the correct limit.

It should be noted that piston rings are very brittle, and unless handled very carefully are easily broken.

Re-assembling. When the rings are refitted, replace the piston on the connecting rod (see that it is the right way round), smear the gudgeon pin liberally with engine oil, and tap into position. Then refit the gudgeon pin circlip.

Smear the piston liberally with clean engine oil; turn the rings so that the gaps are on opposite sides of the piston; fit a new cylinder base washer on the crankcase; liberally coat the inside of the cylinder barrel with clean engine oil and then, compressing the rings in turn by hand, carefully slide the barrel into position over the piston.

Next replace the valves into their respective ports, place the springs over the stems with the top collar in position, and with the head resting on wooden block as before, compress the springs until the split collets can be inserted. A dab of grease on the inside of the collets will serve to hold them in position until the spring is released. Make quite sure that the collets are correctly located.

Insert the push-rod cover tube into position in the cylinder head but do not screw up the gland nut. Place the push-rods inside the tubes and then lift the cylinder head into position. It will be necessary to keep the head raised whilst the push-rods are positioned on the tappets, and then the rods must be correctly located on the rockers. Now drop the head into position, replace the acorn nuts securing the push-rod tube, and then screw up the long cylinder head and barrel bolts, working in diagonal order until they are dead tight. The push-rod gland nut can now be tightened up. Before replacing the tappet inspection cover, check

tappet clearances and adjust to give .003in. clearance on both tappets. Connect up the oil feed and return pipes to the rockers and inlet rocker box. Replace engine steadying stay.

Replace the rocker box covers, the carburetter, the exhaust pipe and silencer, and finally, the petrol tank, connect up the speedometer drive and tighten strainer bolt, and replace petrol pipe. It is advisable to dismantle the sparking plug and clean it before replacing. Check that the gap between the points is correct and adjust if necessary.

SOME GENERAL HINTS.

A good rider periodically checks all nuts and bolts with a spanner to see that they are tight.

Poor compression may indicate either that tappets are badly out of adjustment, that exhaust valve lifter is out of adjustment, preventing valve closing, that valves need grinding in, or in the case of a machine which has covered a very big mileage, that piston rings are badly worn and need replacement.

It is advisable occasionally to clean the air holes in the petrol tank filler cap, as if these get choked, petrol starvation may cause engine stoppage.

At intervals of several thousand miles, it is advisable—when tank is almost empty—to remove the petrol tap, clean the filter above the tap, and drain the tank and wash out with petrol to remove any collection of dirt or water which may have accumulated. Blow through the tap before replacing.

Difficult starting or engine stoppage is usually due to faults in either the carburation or ignition system, and in the event of these troubles arising, the following checks will enable the cause to be located.

Make sure that there is petrol in the tank, and that it is reaching the carburetter by depressing the tickler and flooding the float chamber.

Examine main jet which can be reached by unscrewing the hexagon at the base of the carburetter body. Removing jet and blowing through it will clear any obstruction.

See that the high-tension lead to the sparking plug is connected. Remove plug and if oily or sooted, dismantle and clean. Check that plug is sparking correctly by connecting high-tension lead and laying plug on its side on top of cylinder; then turn engine over several times by means of the kickstarter, when plug should spark at intermittent intervals.

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PROPRIETARY INSTRUMENTS FITTINGS AND ACCESSORIES.

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

Tyres:

Messrs. Dunlop Rubber Co. Ltd., Fort Dunlop, Birmingham.

Electrical Equipment:

Messrs. Joseph Lucas Ltd., Birmingham.

Electric Horns:

Messrs. Joseph Lucas Ltd., Birmingham.

Speedometers:

Messrs. Smiths Motor Accessories Ltd., Cricklewood, London.

Carburetters:

Messrs. Amalgamated Carburetters Ltd., Perry Barr, Birmingham.

Grease Guns:

Messrs. Tecalet Ltd., Great West Road, Brentford, Middlesex.

SPECIAL NOTE.

Prompt attention to all claims under guarantee will be ensured if your covering letter gives:—

- (1) Make, year and model of motor cycle.
- (2) Date of purchase and name of dealer from whom obtained.

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