

# Instruction Manual

for



## Portable Industrial Engines

**B.S.A. CYCLES LTD.**

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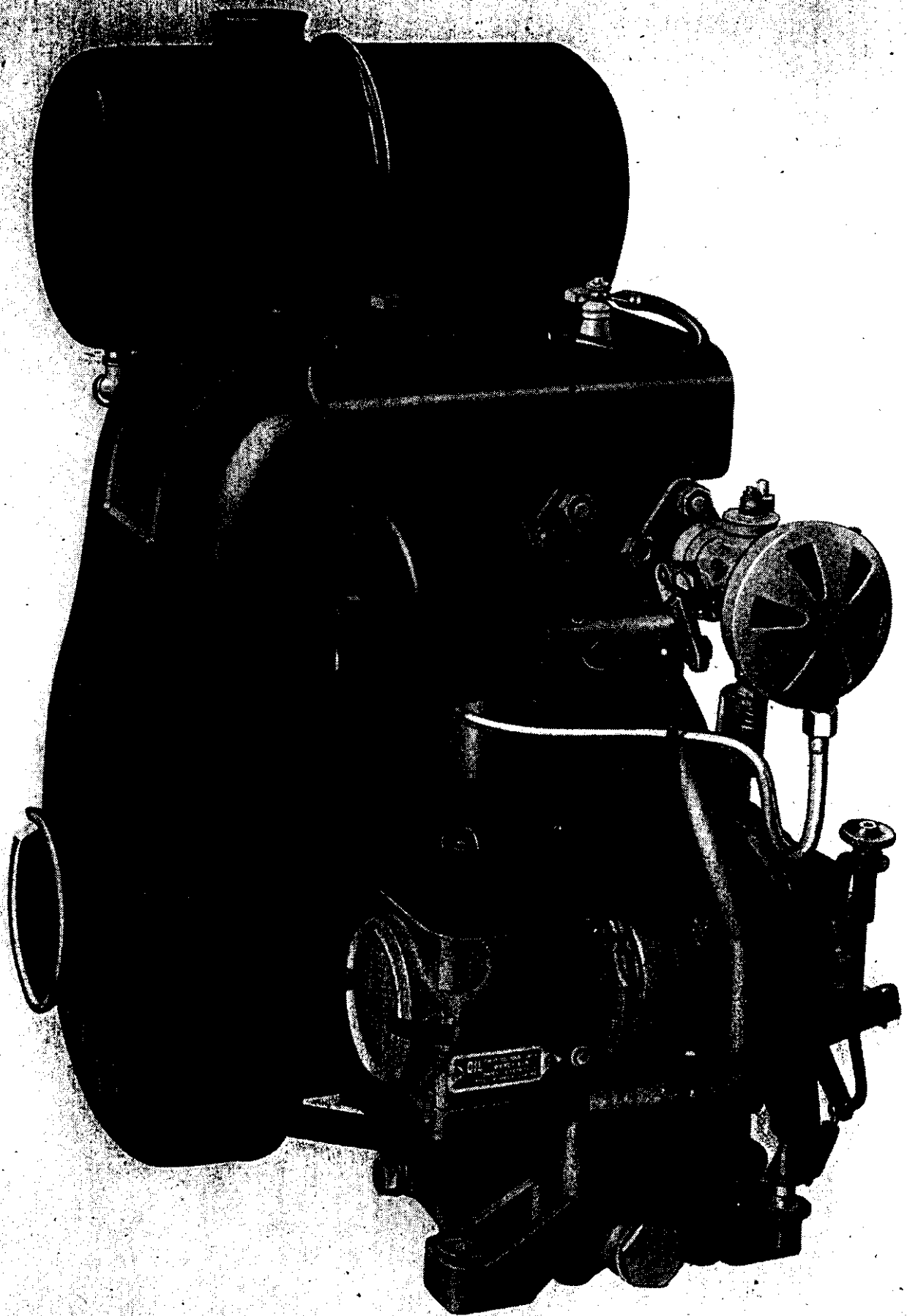
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# 320 c.c. Industrial Engine.

## Installing the Engine.

The engine is suitable for fixing to a floor or for bolting on to existing apparatus, whether stationary or transportable, which it may be intended to drive, and for this purpose fixing lugs are provided. It is always desirable that the engine should be securely mounted and also that it should be as level as possible in order to ensure correct operation of the carburation and lubrication systems. Fig. 1 gives the dimensions of the fixing lugs for installation purposes.

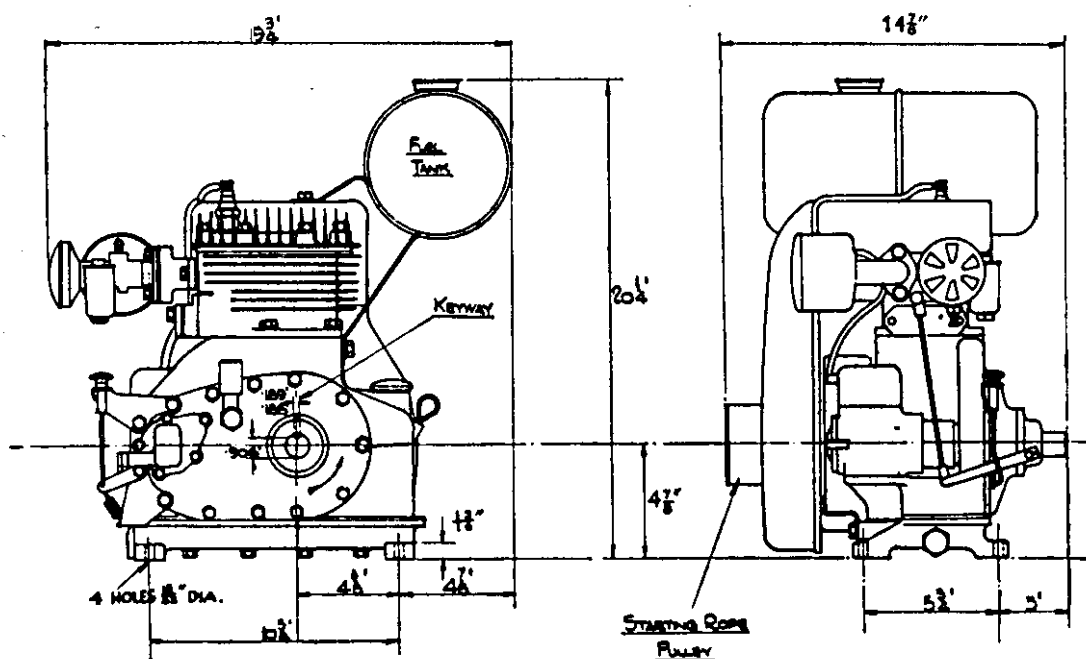


Fig. 1.

## Preparation of a New Engine.

When a new engine is to be installed for the first time, certain precautions must be observed. The ignition and valve timing and the tappet clearances are correctly set before the engine is despatched from the Works, so that there is no real necessity to check these points.

Before despatch the engine parts are oiled, but the oil sump is probably empty unless the Dealer has already attended to this point, and it should therefore be checked by unscrewing the plug at the front of the crankcase and examining the dipstick, which is attached to the plug (on certain models the dipstick is separate). The correct quantity of oil is two pints, and the recommended lubricants are specified on the engraved plate attached to the fan cowling. These are given on page 4.

The fuel tank (capacity one gallon) should be filled with ordinary petrol and during the running-in period at least it is a good idea to add a small quantity of upper cylinder lubricant or, failing this, ordinary hydrocarbon machine oil, the quantity being about a desertspoonful per tankful of petrol.

Remove the sparking plug and examine the points to see that they are correctly adjusted (see page 9), and also that they are clean or free from any trace of moisture which might have accumulated during storage.

Check the carburettor setting to ascertain that this has not been interfered with. The correct position for the main jet control is about half a turn open, and for the slow running adjustment about four turns open, both figures being approximate as described under the carburettor heading on page 11. The main and slow running adjusters are shewn in Fig. 5, and are marked *A* and *C* respectively.

### Oil Recommendations.

The following oils have been thoroughly tested in the B.S.A. 320 c.c. Industrial Engine and are recommended by us:—

<b>Summer:</b>	Castrol Grand Prix	Mobiloil D	Triple Shell	Essolube 50	Price's Motorine C
<b>Winter:</b>	Castrol XXL	Mobiloil A	Double Shell	Essolube 40	Price's Motorine M

For extremely cold weather conditions lighter grades of oil than the above may be used to facilitate cold starting, the "Arctic" grades of the above brands of oil to S.A.E.20 specification being suitable. For sub-zero conditions, even thinner oils to S.A.E.10 specification may be used. It is emphasized, however, that such low viscosity oils should not be employed except in special circumstances.

### Starting and Running. (See also special note on page 16).

*To Start the Engine*, turn on the petrol tap and flood the carburettor. Lift the starting control rod by its knob *B* (Fig. 3) until the collar on the rod latches on the top face of the bracket through which it slides. (In the case of engines fitted with Bowden control cable the throttle should be moved until the lever on the carburettor is approximately in a horizontal position.) Move the "Rich Mixture" lever on the carburettor away from the engine. Fit the knotted end of the starting cord in the "V" notch on the pulley, and wind the remainder of the cord around the pulley in a clockwise direction. Grip the free end of the cord firmly, and pull smartly **to its full extent and clear of the pulley**. As soon as the engine is running steadily, return the "Rich Mixture" lever to its normal running position (i.e. towards the engine). It is advisable to leave the engine running slowly on light load for a short while in order that the oil may be allowed to circulate.

*Governor and Speed Control.* All engines are fitted with a governor, and this is set at the appropriate speed for the particular duty required. The starting control rod when set for starting actually overrides the governor, and should be used to slow the engine down for occasions when full load at maximum governed speed is not required (see also page 9).

In the case of engines fitted with Bowden or similar throttle control the operation of reducing speed will be by means of this control.

*To Stop the Engine* it is only necessary to press the button situated on the side of the magneto. This is marked with the word "Stop." Hold your thumb or finger on the button until the engine comes to rest.

### **Routine Maintenance.**

The B.S.A. 320 c.c. Industrial Engine with its circulating lubrication system, is entirely self-contained, and will run for very long periods with practically no attention. Certain routine points should, however, be dealt with as the occasion arises, these being as follows:—

1. *Fuel Supply*: Replenish as required.
2. *Oil Supply*: Check the oil level every 8 hours running and replenish as necessary. Drain and refill every 100 hours
3. *Tappet Adjustment*: This rarely requires attention unless the valves have been reground (see page 5).
4. *Decarbonisation*: This should not normally be necessary at intervals of less than some hundreds of hours running. The symptoms indicating excessive carbon deposit are an increased tendency to pink under load, a general falling off in power and a tendency for the engine to run hotter than usual. Full instructions for decarbonisation are given on page 6.
5. *Valve Regrinding*: Circumstances governing the regrinding of valves are similar to those for decarbonisation, and the operation is described on page 7.
6. *Sparking Plug*: Examine the sparking plug at least once a week and clean the points if necessary (see page 9).
7. *Carburetter*: This normally requires no maintenance but it should be stripped and cleaned periodically—every time the engine is decarbonised, for example (see page 11).
8. *Magneto*: This is of the plain bearing type and an oiler is provided which should be lubricated every 200 hours, as indicated on the magneto instruction plate. Access to the oil hole in the lubricator is obtained by pulling the knurled knob away from the magneto (see also page 12).

### **Tappet Adjustment.**

The tappet cover plate is easily removed when the central fixing bolt *A* (Fig. 2) is unscrewed and the tappet clearances can then be checked by inserting a feeler between the top of the tappet and valve stem. The correct clearance is .008in. for the inlet and .012in. for the exhaust and under normal conditions this will be maintained almost indefinitely.

There may be a tendency, however, after a very considerable period of running, for the tappet clearances to become less and this is also liable to happen when the valves are reground. The correct

clearance is obtained by the fitting of a hardened steel thimble *B* to the end of the valve stem and the clearance is varied by inserting steel discs *C* of different thicknesses, these being graded in manufacture for this purpose.

To fit a new thimble or discs, insert a screwdriver or other suitable lever, under the valve spring collar, and by depressing the lever raise the cover together with the valve, which will enable the thimble to be lifted clear. Fit a new thimble or discs of the desired thickness and release the valve spring collar, subsequently checking the clearance to ascertain that it is now correct.

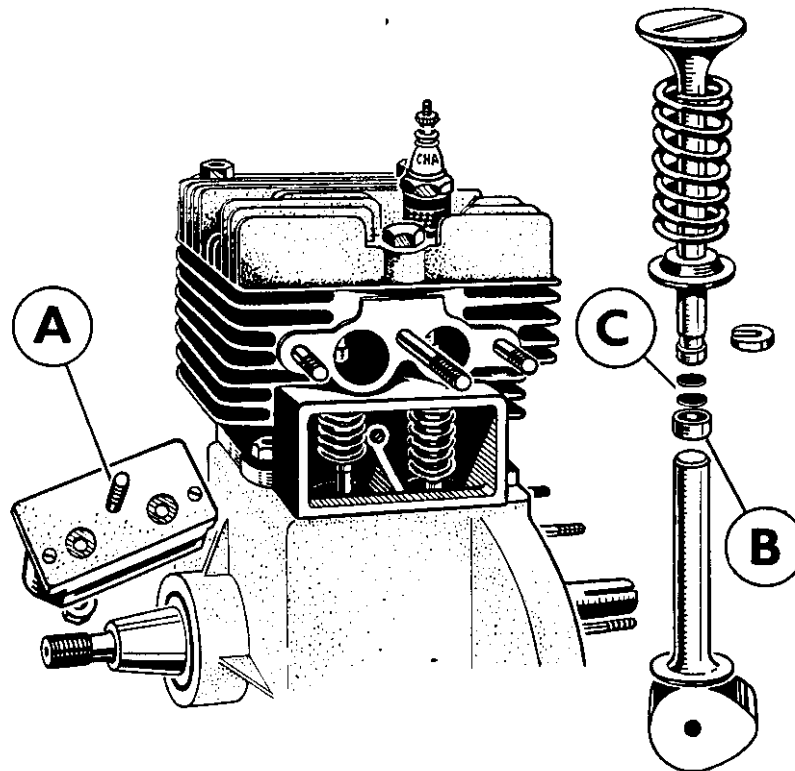


Fig. 2. Valve and tappets.

This is an extremely simple operation and if observation of the clearance before adjustment is carefully made and a new thimble or discs of correct thickness are fitted, the desired tappet clearance should be obtained with the minimum of difficulty and unnecessary amount of trial and error.

Replacement of the tappet cover, having first made certain that the washer is sound and having a smear of jointing compound on it, such as gold size, varnish, fish glue or one of the proprietary brands, completes the operation of tappet adjustment.

### **Decarbonisation.**

This is an extremely simple operation which is carried out as follows:—First turn off the fuel tap and detach the fuel pipe by unscrewing the union nut underneath it, and then remove the fuel tank complete by withdrawing its four fixing bolts, two above the cylinder head and two at the crankcase just above the oil filler plug. Disconnect the carburetter control rod from the carburetter lever, and then remove the exhaust and inlet manifold complete

with exhaust pipe and carburetter by unscrewing the three nuts which hold the manifold in position, taking care not to damage the joint washer. Next detach the high tension battery lead from the sparking plug and remove the latter from the cylinder head. The cooling duct or cowl can then be detached by removing the two bolts by which it is located at the starting pulley side of the engine, and then sliding it off, the two other fixing bolts having been already removed as these are also used for attaching the fuel tank. When the cowl is taken away it will be seen that the cylinder head is fixed to the barrel by means of six bolts. Remove these and the head can then be lifted clear of the cylinder. Remove also the copper asbestos cylinder head gasket, which may be quite free or which may adhere to the top face of the cylinder barrel. In the latter event, prise it off gently in order to avoid damage, and if it is found on examination to be sound it can be put on one side for refitting when re-assembly is carried out.

Remove the valves by inserting a screwdriver or similar lever under the valve spring cup and levering upwards. This will either free the valve cotter (see Fig. 2) or raise the valve head. In the former case the cotter should be placed on one side and the valve can then be lifted out. If the cotter does not free and the valve is raised bodily instead, give the valve head a sharp tap with the shaft of a hammer or soft mallet while still exerting pressure with the screwdriver or lever. This will release the cotter and the valve can then be taken out. Place both valves on one side together with the appropriate thimbles, spring cups and cotters in order that they may be replaced correctly during re-assembly.

With a screwdriver or scraper, or other suitable tool, carefully remove the carbon deposit from the piston crown and cylinder head, bearing in mind that both of these are made of aluminium alloy which is relatively soft and therefore liable to be damaged by injudicious application of the scraper. Remove also the carbon deposit from the top face of the cylinder barrel around the valve seats and wipe all these surfaces with a slightly oily rag in order to remove the last traces of loose carbon before replacing.

While the valves are out, their seatings and those in the cylinder barrel should be examined for condition.

*Grinding-in Valves.* 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. With a screwdriver, rotate the valve backwards and forwards whilst maintaining a steady pressure. 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 cylinder 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 hundred hours 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.

*Examination of Piston and Rings.* The operation of decarbonisation does not necessitate the removal of the cylinder barrel since, as explained above, the surfaces on which carbon becomes deposited are immediately accessible when the cylinder head only is removed. If, however, the performance of the engine indicates that an examination of the piston and rings might be desirable, this should be carried out as follows:—

The cylinder barrel is easily removed when the nuts on the four cylinder base studs are undone. Be careful when lifting the cylinder clear of the piston that the latter does not fall forward against the crankcase and become bruised.

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.



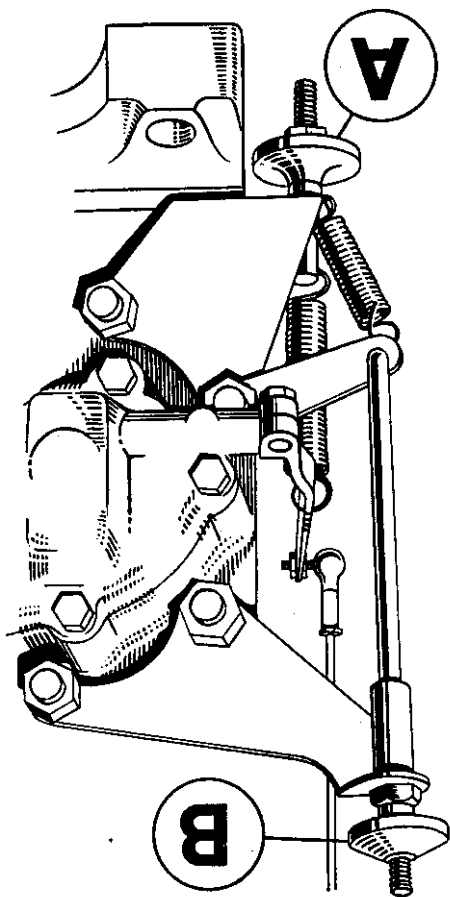
The satisfactory running of an engine depends among other things upon the correct functioning of the sparking plug, and it is, therefore, essential to examine this periodically in order to ascertain that it is still in good condition. The plug fitted to this engine is Champion Model 7, and provided that the carburation and lubrication systems are in good order, it should continue to function

### Sparking Plug.

The governor mechanism is entirely automatic in operation, and once set for the desired speed it needs no further attention or adjustment. To set the governor at the speed at which the engine is required to run, it is only necessary to screw the knurled adjusting nut *A* (Fig. 3) up or down as the case may be, until the desired speed is obtained. The upper knurled adjusting nut *B* is for putting the governor out of operation and thus closing the throttle, for starting purposes, this already having been explained under the heading dealing with Starting on page 4.

### Governor Adjustment.

Fig. 3.



This is carried out in exactly the reverse direction to that described prior to decarbonising. The gudgeon pin, piston and rings should be liberally smeared with oil before fitting and care should be taken to see that the cylinder base and cylinder head bolts are made really tight. All of these, particularly the latter, should be checked for tightness after an hour's running.

### Re-assembly.

faultlessly for very long periods without attention. If, however, the mixture from the carburetter is too rich, carbon deposit will form on the plug points, and these will eventually become so fouled as to interfere seriously with the running of the engine, and will certainly make starting difficult. If, therefore, such a deposit is found, clean it off carefully and check the carburetter setting as described on page 11.

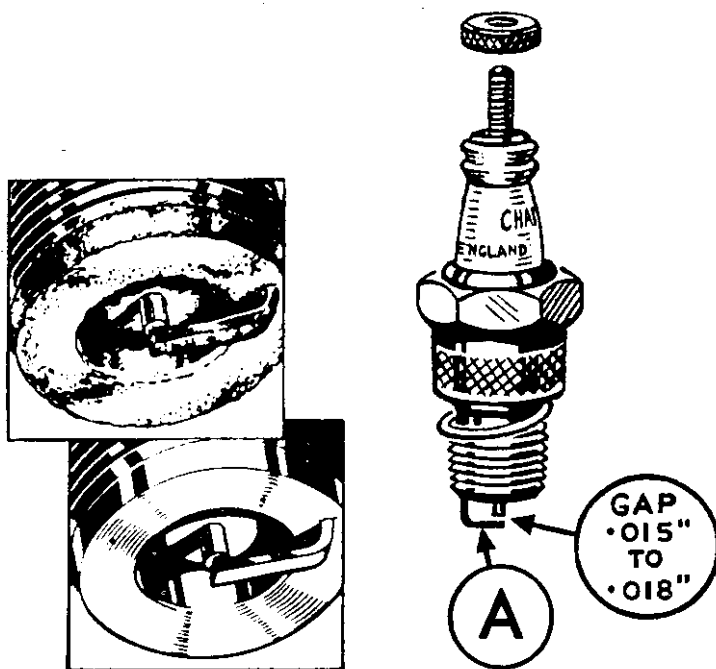


Fig. 4.

Too much oil getting past the piston and into the combustion chamber will also foul the points with carbon deposit, but this will not occur unless the cylinder is badly worn or the piston rings, particularly the bottom oil control ring, are so badly worn as to need replacement.

A light deposit due to any of these causes can easily be cleaned off, but if it is allowed to accumulate, particularly inside the body, the plug may spark internally with an adverse effect on engine performance—if, indeed, it does not stop the engine altogether—and the plug should be taken to a garage for cleaning. If eventually the cleaning process fails to restore the plug to its original condition of efficiency, it should be replaced by a new one.

When inspecting a plug, also check the gap between the points. This should be .015in.–.018in. and adjustment should be made by bending the side wire *A* (Fig. 4). Never attempt to move the centre electrode, and it is always advisable to use a special plug gap tool obtainable at 6d. from any Champion Plug stockist or from the Champion Sparking Plug Co. Ltd., Feltham, Middlesex. Feeler gauges are attached to verify correct gap.

## Carburetter.

The Amal Carburetter type 124 when fitted to this engine is tuned at the factory before delivery and the only points likely to require attention during running are the setting of the throttle adjusting screw, the main jet, and the slow running jet. These items are dealt with in the following instructions as and when they apply.

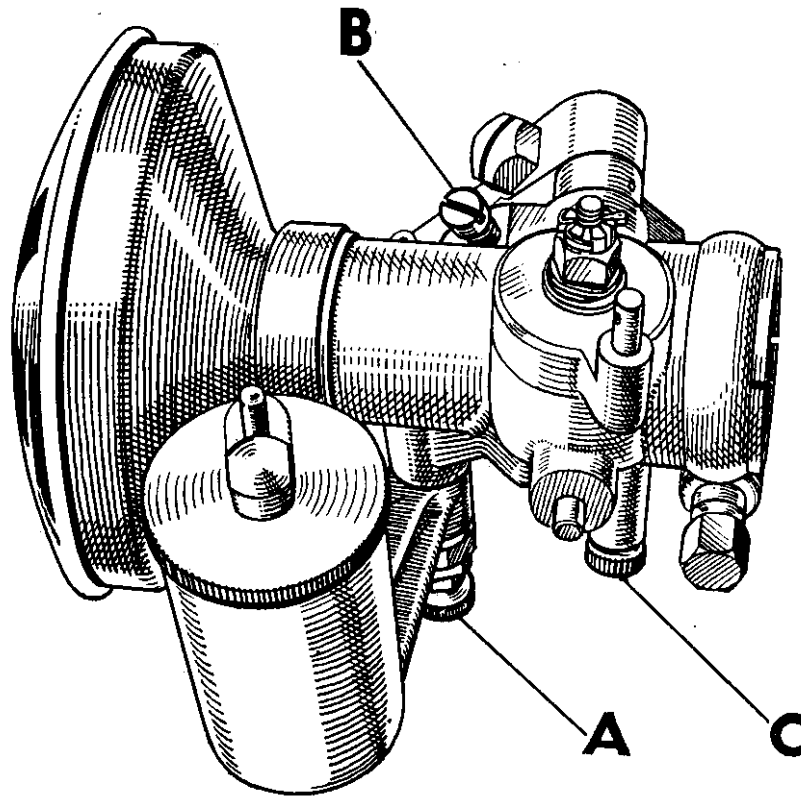


Fig. 5. Carburetter.

### Attachment to Engine.

If the carburetter should be removed at any time care should be taken on replacement that there is a perfect joint at the fitting flange since any air leaks at this joint will cause erratic running.

See also when refitting and coupling the starting valve control that this valve fits on its face when rotated as air leaks at this joint will also cause trouble. Do not omit the spring washer as this holds the valve firmly in position.

### Tuning Instructions.

**No. 1—Main Jet.** With the throttle set wide open and the engine working under a maximum load, i.e. with the governor fully extended, adjust the main jet screw *A* (Fig. 5) to its best position. This is done by screwing the knurled head into the jet holder, i.e. towards until a point is reached when the power appears too full. Then unscrew a fraction of a turn. This will give the best possible power consistent with good fuel economy.

**No. 2—Slow Running.** Assuming that the slow running jet is fixed, the slow running can be regulated by means of a throttle adjusting screw *B* and by adjusting the air screw *C*. A small amount

of experimenting will soon indicate the effect of altering these adjustments and it will, therefore, be easy for the intelligent operator to find the setting most suitable for his requirements.

Slow running will, of course, be adversely affected if the jet is of unsuitable size, if for example it is too small the engine may refuse to run slowly and will actually stop when the throttle is closed to the slow running position. If, on the other hand, when the throttle is in this position the engine shows a tendency to "hunt" (i.e. if its speed fluctuates) this is an indication that the slow running jet is too large and a smaller size should be fitted.

*No. 3—Starting.* A rich mixture is required for starting from cold and it may be that for extreme low temperature conditions the jet is so large that the mixture strength is excessive for slow running. This richness may be counteracted by lowering (i.e. unscrewing) the screw *C* which has the effect of admitting additional air to the slow running jet only. An alternative is, of course, to fit a smaller slow running jet as in the case of the above but this may have an adverse effect in other directions.

### Magneto.

*Impulse Coupling:* The impulse coupling is designed to give a spark of high density for starting. It automatically cuts out at about 165 r.p.m. The engine should not be run continuously below this speed, as this would cause an unnecessary strain and wear on the impulse parts.

The impulse also provides a retarded spark for starting, automatically advancing it as the engine speeds up, returning to the retarded position when the engine stops.

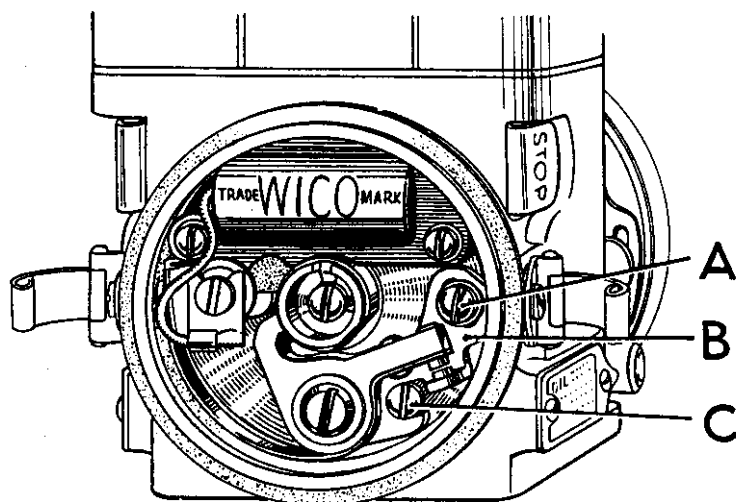


Fig. 6.

*Cleaning of Impulse:* If the impulse becomes clogged with dirt, and the trip arm fails to engage or disengage, or the impulse is sluggish in action, it should be flushed out thoroughly with paraffin, taking care not to allow any paraffin to work its way into the magneto housing.

**Breaker Point Opening:** The correct breaker point opening is .015in. When re-adjustment is necessary, loosen the screw *A* (Fig. 6) which locks the fixed contact plate *B*, and turn the eccentric headed screw *C* until the correct opening of points is obtained. Then lock the plate securely.

**Replacement of Breaker Points:** If the points need replacing, both the fixed and moving points should be replaced at the same time.

To remove the breaker arm, take off the breaker arm clamp screw, lockwasher and clamp washer together with the breaker arm terminal screw and pull the assembly off the breaker arm pivot. The fixed contact plate may then be taken off the breaker arm pivot, after removing the fixed contact screw.

**Lubrication.** The magneto bearings must be lubricated every 200 hours. Recommended oils are *Castrolite*, *Mobiloil Arctic*, *Single Shell*, *Essolube 20*, and *Price's Motorine E*. (See page 4.)

### Lubrication System.

A gear type oil pump driven from the magneto pinion draws oil from the sump and delivers it through passages drilled in the crankcase and the timing cover walls, first to the engine mainshaft bearing on the power take off side, then from a groove in the journal of this bearing through a hole drilled in the journal and the crank

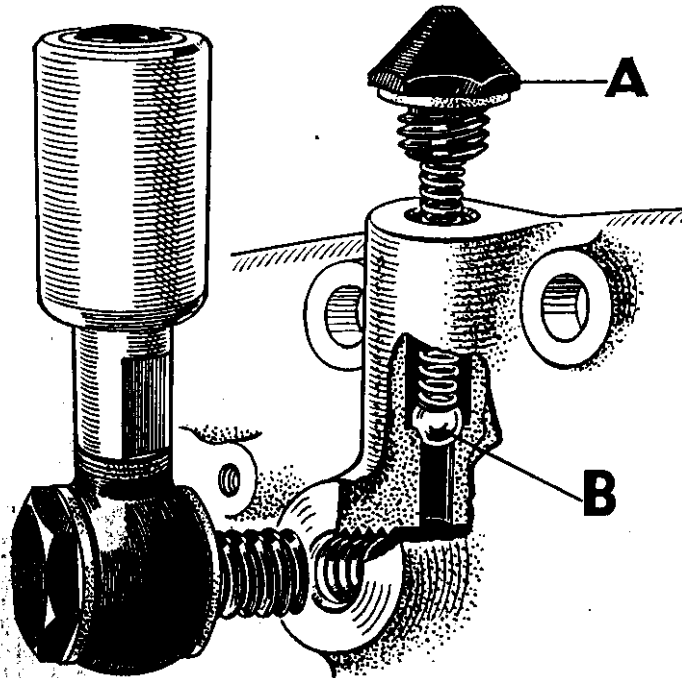


Fig. 7. Ball valve.

to the big-end journal. From this point the oil escapes into the crankcase where it is broken up into oil mist by the rapid movement of the reciprocating parts, and this oil mist permeating the interior of the engine, provides copious lubrication for the cylinder wall, the timing gear, flywheel side main bearing and other moving parts. This oil mist finally condenses into liquid oil

and returns by gravity through a filter to the sump. The top of the three piston rings is of the slotted scraper type and scrapes excess oil from the cylinder walls, thus ensuring that the lubrication does not escape into the combustion chamber where it would be burnt, and thus destroyed. The escape of oil at the main bearings is effectively prevented by the provision of a spring loaded oil seal at the outer end of each bearing. The crankcase breather is effectively controlled by the provision of a 'duplex' non-return disc valve built into the tappet cover plate, and the combination of these items results in complete freedom from oil leaks with a consequently clean engine exterior at all times and, of course, enhanced oil economy.

The functioning of the lubrication system is entirely automatic so long as the oil level is maintained in the sump, and the only attention required is the periodical examination of the dipstick attached to the oil sump filler plug (see page 3). Each of the graduations on this represents one pint and the level should never be allowed to fall below the two pint mark.

At the top of the timing cover on certain engines there is an oil telltale of the projecting button type. Whenever the engine is running and oil is, therefore, being delivered by the pump, the black button at the top of the telltale projects about a quarter of an inch. If the button should be withdrawn or fail to come out when the engine is started it is an indication that there is a fault in the lubrication system or that the oil supply in the sump is exhausted. Owing to the simple and robust nature of the lubrication system any oil failure due to a defect is an extremely remote contingency unless by mischance some dirt or foreign matter has been introduced into the system causing a stoppage in the oil passages or even damage to the pump gears, and if, on examination, the oil level in the sump is found to be adequate and the telltale does not operate, the defect should be investigated without delay.

Adjacent to the telltale there is a plug A (Fig. 7) which forms part of a spring-loaded ball valve in the delivery line from the pump to the main bearings, and this valve, seen in section at B, should be checked for freedom of action. The best way to ascertain this is to remove the plug as already indicated and turn the engine over a few times by means of the starting rope or handle and observe whether oil is discharged from the orifice. If it is not, it is an indication that the ball is stuck, or the passages adjacent to it are obstructed.

Rectification of this calls for removal of the timing cover as described on page 15, and possibly also an examination of the gear pump itself, although trouble here is highly improbable and it is emphasized that this pump should not be disturbed unless absolutely necessary.

### **Valve and Ignition Timing.**

These are, of course, correctly set before the engine leaves the Works, and there is normally no occasion to disturb the settings. If, however, the engine is dismantled for any reason, the valve and ignition timing can easily be correctly set by reference to

Fig. 8, from which it will be seen that the camshaft pinion *A* is directly driven by the engine shaft pinion *B*, and also, that a tooth of the engine shaft pinion marked with a dot engages in the space between two teeth on the camshaft pinion each of which is marked with a dot.

A similar method of marking is employed for the ignition timing. When the valve timing marks are set as described above, it will be found that a tooth on the camshaft pinion pointing towards the magneto axis is marked with a dot, and when the magneto is correctly timed, this marked tooth should occupy the space between two teeth on the magneto pinion *C*, this space—and not the two adjacent teeth this time—being marked with a dot.

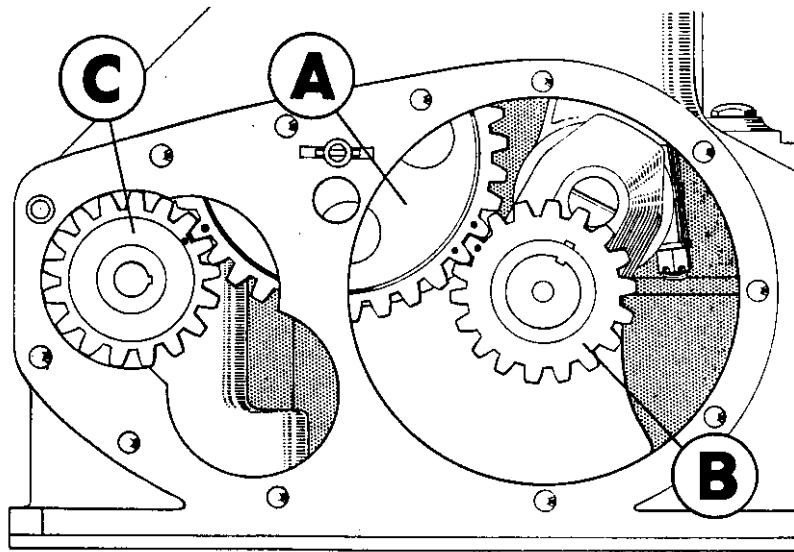


Fig. 8.

Timing is carried out during the process of assembling and when the crankcase is completely stripped, the first component to be inserted should be the camshaft, followed by its fixed spindle which is pressed into position and located by a cotter in a groove in the timing chest. When fitted, turn the camshaft until the space between the two adjacent marked teeth is pointing towards the axis of the crankshaft. Then insert the crankshaft in such a position that the marked tooth on its timing pinion engages in the marked space in the camshaft pinion just referred to.

Next take the timing cover and insert the governor spindle which projects inwards from its bearing and then fit the magneto driving pinion to this spindle in such a way that the marked tooth on it can be seen through the aperture in the rear wall of the timing cover, not forgetting first to fit the key to the governor spindle. Having fitted the magneto pinion in this way, turn it until the marked space between the two teeth is in such a position that when the cover is fitted to the crankcase this space will be occupied by the marked tooth on the camshaft pinion. The nuts should then be fitted to the timing cover studs and the crankcase

should be turned round in order that the magneto driving dog can be attached by means of a nut with tab washer to that portion of the governor spindle which projects from the back of the timing cover.

Next rotate the engine until the piston or crankpin is at top dead centre with both valves closed, and leave the engine in this position while attention is turned to the magneto.

Remove the contact breaker cover from the latter and turn the armature in the correct direction of rotation, which is clockwise looking at the contact breaker end, until the points are just beginning to open as they rise on the contact breaker cam. Then place the loose coupling dog with four slots on the magneto driving dog and slide the magneto into position on its platform in such a way that its driving dogs engage also with the coupling dog. Finally, fit the four magneto base screws.

### **SPECIAL NOTE.**

#### **Instructions when Paraffin or Kerosene is used as Fuel.**

The carburetter setting is equally suitable for petrol or paraffin, but it is necessary to start and warm the engine on petrol before changing over to the heavier fuel. For this purpose an auxilliary tank to hold a small quantity of petrol is mounted adjacent to the main fuel tank and each of the two tanks has a separate petrol tap leading to a common pipe which feeds the carburetter.

When starting from cold, close the tap on the main fuel (*i.e.* paraffin) tank, and open the tap on the auxilliary petrol tank. Start the engine up and immediately close the petrol tap and open the paraffin tap. The change over from petrol to paraffin will then take place quite smoothly and interceptibly as the float chamber empties of petrol and refills with paraffin.

In order to ensure a correct supply of petrol in the carburetter for the next start after stopping, especially if an interval of time is involved which would allow the engine to cool off, it is desirable to stop the engine by closing the paraffin tap. This will allow the float chamber to be emptied of paraffin in readiness for the next start up on petrol.

The above procedure when stopping the engine is not necessary if a re-start is to be made before the engine cools off, but if the engine is to remain stationary for a considerable period, such as overnight, the practice should be adopted as a regular routine.



# CATALOGUE

of



for



## Portable Industrial Engines

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## **B.S.A. INDUSTRIAL ENGINE AND SPARE PARTS GUARANTEE.**

**We give the following guarantee with B.S.A. Portable Industrial Engine and Spare Parts, instead of the guarantee implied by statute or otherwise, as to the quality or fitness of such parts for the purpose for which they are intended, any such implied guarantee being in all cases excluded, nor can any claim for consequential damages be entertained.**

**WE GUARANTEE**, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and be in force for six months only from the date of purchase, and the damages for which we make ourselves responsible under this guarantee are limited to the replacement of any part which may have proved defective.

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

### **REPAIRS AND RENOVATIONS GUARANTEE.**

Any B.S.A. industrial engine sent to us to be completely overhauled will be treated upon the same conditions as if it were a new engine (i.e.), we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of material and workmanship, such guarantee to extend and be in force for six months only from the time such work shall have been executed, and this guarantee is in lieu and in exclusion of any Common Law or statute warranty, and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

### **CONDITIONS OF GUARANTEE.**

If a defective part should be found in our industrial engine it must be sent to our Works at Small Heath, carriage paid, and be accompanied by an intimation from the sender that he desires it repaired free of charge under our guarantee, and he must also furnish us at the same time with the number of the engine, which will be found stamped on top side of crankcase, also on instruction plate, the name of the Dealer from whom he purchased, and the date of the purchase.

Failing compliance with the above no notice will be taken of anything which may arrive, but such articles will lie here at the risk of the sender, and this guarantee or any implied guarantee shall not be enforceable.

We do not guarantee the specialities of other firms, such as electrical equipment, carburettors, sparking plugs, etc., or of any component part supplied to the order of the purchaser differing from our standard specifications, whether supplied with our industrial engines or otherwise.

### **THE TERM "AGENT."**

We do not appoint agents for the sale of our industrial engines or other goods. We assign to Dealers (styled "Regional" Dealers), who carry on business on their own account, in areas in which they have the exclusive or other right to sell goods purchased from us. A Regional Dealer purchasing from us, or a Sub-Dealer purchasing from him, may, on our behalf (as our agent for the purpose only) give the guarantee printed above. Any such dealer is not authorised to advertise, incur any debts, or transact any business whatsoever on our account, nor is he authorised, so as to bind us to give any warranty or make any representation on our behalf or to sell subject to or with any condition other than those contained in such guarantee.

## SPARES AND REPAIRS.

Please carry out the following in order to ensure prompt attention and correct execution of orders.

### SPARES.

1. Parts forwarded as patterns and all orders for spares should be addressed to "Spares," B.S.A. Cycles Ltd., Birmingham 11.
2. When ordering parts the engine number must be quoted. This will be found stamped on top side of crankcase and on instruction plate. It is essential that the component numbers of the parts be clearly stated.

**IMPORTANT.**—In quoting engine number the full number, including prefix letters, MUST BE GIVEN (see specimen order page 21).

3. To avoid delay orders for spare parts should be written on a separate order form or sheet of paper to correspondence on other matters.

### REPAIRS.

4. All industrial engines, or components for repair, must be consigned to "Repair," B.S.A. Cycles Ltd., Birmingham 11.
5. In cases where we are simply instructed to "overhaul," the engine or component will be entirely dismantled and all worn parts renewed, re-assembled and tested in a suitable manner.
6. In the case of telephone enquiries relating to the supply or repair of engine parts customers are requested to communicate with the Department concerned as above. Telephone No. Birmingham Victoria 2234 (3 lines).
7. It frequently happens that parts are forwarded to us which do not bear the sender's name and address. Care in this respect will prevent delay and annoyance.
8. All goods must be consigned to us carriage paid.
9. All prices quoted in the price list do not include the cost of postage or carriage and packing, and are subject to alteration without notice. B.S.A. Cycles Limited reserve the right to charge for all goods supplied at prices ruling at time of delivery.
10. It must be understood that when no Ledger Account is open with the Company orders must be accompanied by a remittance. At the same time instructions should be given as to the method of despatch (either post, passenger or goods train), and such charges should be included in the remittance. All cheques and Postal Orders should be made payable to B.S.A. Cycles Limited.
11. Complaints relative to defects in proprietary goods such as carburettors, sparking plugs, electrical equipment, etc., should be sent direct to the manufacturer of such articles as these goods are only guaranteed in accordance with the respective makers' warranty.

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*B.S.A. Cycles Ltd. reserve the right to alter the designs or any constructional details of their manufactures at any time without giving notice.*

# How to Order.

1. Quote Engine Number including prefix letters.

*THE ENGINE NUMBER IS STAMPED ON TOP SIDE OF CRANK-CASE ALSO ON INSTRUCTION PLATE.*

2. State part number of component required and the catalogue description.

3. Address to B.S.A. Cycles Ltd., Service Dept., Birmingham, 11.

Telephone Birmingham Victoria 2234 (3 lines).

## *Specimen Order*

*April 21, 1948.*

**W. LEE**

24 DEVON ROAD  
BRISTOL

*B.S.A. Cycles Ltd.,  
Service Dept.  
Birmingham*

INDUSTRIAL ENGINE N<sup>o</sup> A800

*Please supply per C.O.D.*

2 86-724 INLET AND  
EXHAUST VALVES

2 86-94 VALVE TAPPETS

*W. Lee*

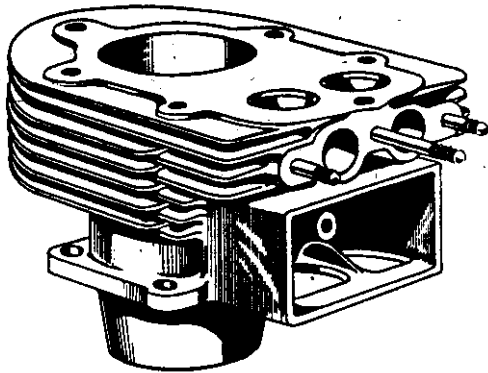
WRITE IN  
BLOCK  
CAPITALS  
PLEASE

# 320c.c. INDUSTRIAL ENGINE

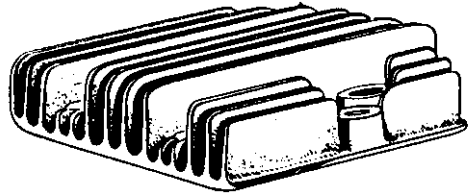
DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Cylinder Barrel, complete with fixed fittings.	86-616	86-616	86-616
Cylinder Barrel Joint Washer (paper).	86-90	86-90	86-90
Cylinder Barrel Fixing Stud ...	86-120(4)	86-120(4)	86-120(4)
Cylinder Nut ...	21-26(4)	21-26(4)	21-26(4)
Do. Washer (spring) ...	K51A(4)	K51A(4)	K51A(4)
Cylinder Head ...	86-16	86-16	86-16
Cylinder Head Gasket ...	86-31	86-31	86-31
Cylinder Head Fixing Bolt ...	21-336(4)	21-336(4)	21-336(4)
Cylinder Head Fixing Bolt (spec.)	86-24(2)	86-24(2)	86-24(2)
Cylinder Bolt Washer (plain) ...	15-431(6)	15-431(6)	15-431(6)
Valve Guide ...	86-743(2)	86-743(2)	86-743(2)
Inlet and Exhaust Manifold ...	86-147	86-617	86-617
Manifold Gasket (Hallite) ...	86-104	86-104	86-104
Manifold Stud (short) ...	86-615(2)	86-615(2)	86-615(2)
Manifold Stud (long) ...	86-614	86-614	86-614
Manifold Stud Nut ...	35-487(2)	35-487(2)	35-487(2)
Manifold Stud Nut ...	35-487	—	—
Manifold Stud Nut Washer (spring)	24-8784(3)	24-8784(3)	24-8784(3)
Manifold Barrel Nut ...	—	86-677	86-677
Inlet and Exhaust Valve ...	86-724(2)	86-724(2)	86-724(2)
Inlet and Exhaust Valve Spring	86-723(2)	86-723(2)	86-723(2)
Valve Spring Retaining Collar ...	35-1360(2)	35-1360(2)	35-1360(2)
Valve Cotter ...	35-1347(2)	35-1347(2)	35-1347(2)
Valve Spring Retaining Cup ...	57-138(2)	57-138(2)	57-138(2)
Valve Stem Cap ...	86-66(2)	86-66(2)	86-66(2)
Valve Tappet ...	86-94(2)	86-94(2)	86-94(2)
Valve Shim (.002") ...	86-67	86-67	86-67
Valve Shim (.003") ...	86-600	86-600	86-600
Valve Shim (.007") ...	86-601	86-601	86-601
Tappet Guide ...	86-53(2)	86-53(2)	86-53(2)
Valve Chest Cover, complete ...	86-117	86-117	86-117
Valve Chest Cover Stud ...	86-689	86-689	86-689
Valve Chest Cover Nut ...	21-27	21-27	21-27
Valve Chest Cover Washer (spring)	24-6035	24-6035	24-6035
Breather Unit, complete ...	89-427(2)	89-427(2)	89-427(2)

NOTE.—Figures in brackets denote number per set, e.g., (2), 2 per set.  
 When no figures in brackets are shown one part constitutes a set.  
**Quote Engine Numbers, with prefix letters, when ordering spares.**

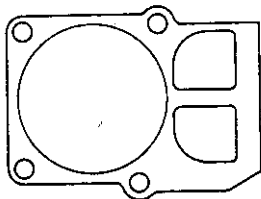
320c.c. INDUSTRIAL ENGINE



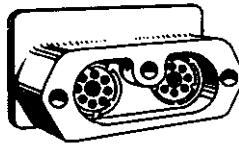
86-616



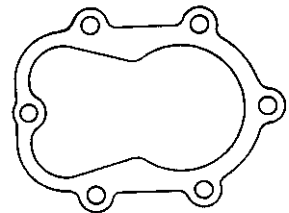
86-16



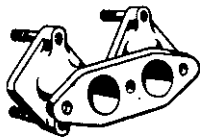
86-90



86-117



86-31



86-617



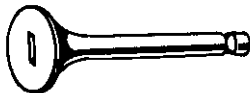
86-147



89-427



86-723



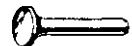
86-724



86-743



86-104



86-94



86-53



86-24



57-138



35-1360



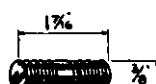
15-431



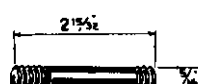
86-677



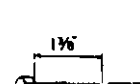
86-689



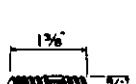
86-120



86-614



21-336



86-615



K51A  
24-8784



24-6035



35-487  
21-26  
21-27



35-1347



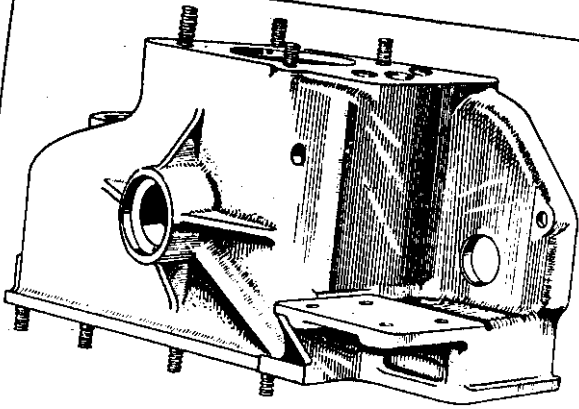
86-66

### 320c.c. INDUSTRIAL ENGINE—continued

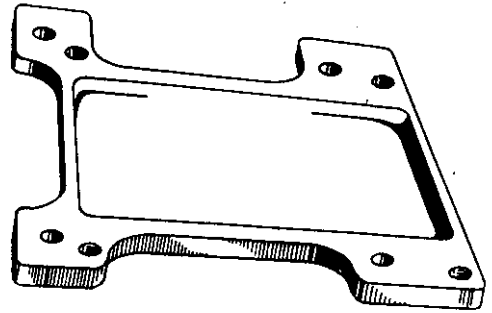
DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Breather Unit Cover ... ..	86-109	86-109	86-109
Breather Unit Cover Fixing Screw	65-2158(2)	65-2158(2)	65-2158(2)
Breather Unit Baffle Plate ... ..	86-111	86-111	86-111
Crankcase, complete ... ..	86-643	86-55	86-55
Crankcase Base Plate ... ..	86-155	—	—
Crankcase Base Plate Fixing Bolt	21-340(4)	—	—
Crankcase Base Fixing Bolt Washer (spring).	K51A(4)	—	—
Crankcase End Cover, with fixed fittings.	86-56	86-56	86-56
Crankcase End Cover Joint Washer	86-108	86-108	86-108
Crankcase End Cover Fixing Dowel Bolt.	86-122	86-122	86-122
Crankcase Cover Fixing Stud ... ..	86-142(9)	86-142(9)	86-142(9)
Crankcase End Cover Fixing Stud Nut.	21-27(12)	21-27(12)	21-27(12)
Crankcase End Cover Fixing Stud Washer (spring).	24-8784(11)	24-8784(11)	24-8784(11)
Crankcase Cover Bracket Stud ... ..	86-660(3)	86-660(3)	86-660(3)
Crankcase Inspection Plate ... ..	86-32	86-32	86-32
Crankcase Inspection Plate Joint Washer.	86-48	86-48	86-48
Crankcase Inspection Plate Fixing Screw.	21-2888(4)	21-2888(4)	21-2888(4)
Crankcase Inspection Plate Washer (spring).	28-260(4)	28-260(4)	28-260(4)
Oil Filler Cap ... ..	86-626	—	—
Oil Filler Cap and Dipstick, complete.	—	—	86-12
Do. (fitted up to Engine No. A761).	—	86-12	—
Oil Filler Cap (fitted on and after Engine No. A762).	—	86-697	—
Dipstick (fitted on and after Engine No. A762).	—	86-624	—
Dipstick ... ..	86-624	—	—
Oil Filler Cap Washer ... ..	—	89-223	89-223

NOTE.—Figures in brackets denote number per set, e.g., (2), 2 per set.  
When no figures in brackets are shown one part constitutes a set.  
**Quote Engine Numbers, with prefix letters, when ordering spares.**

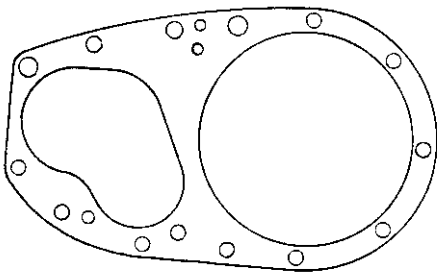
320c.c. INDUSTRIAL ENGINE



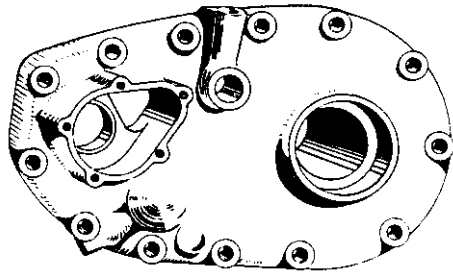
86-643  
86-55



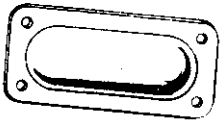
86-155



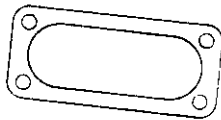
86-108



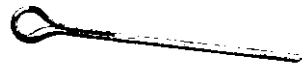
86-56



86-32



86-48



86-624



86-12



86-111



86-109



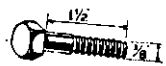
86-626



86-697



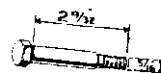
89-223



21-340



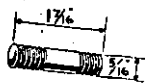
21-2888



86-122



86-660



86-142



65-2158



21-27



28-260



24-8784  
K 51A

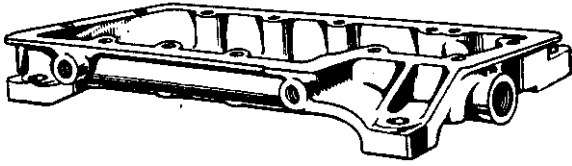


## 320c.c. INDUSTRIAL ENGINE—continued

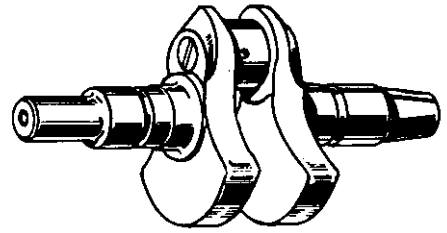
DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Oil Filler Cap Retaining Spring	—	86-178	86-178
Oil Filler Cap Retaining Spring Screw.	—	89-215	89-215
Oil Filler Cap Retaining Spring Washer (spring)	—	24-8784	24-8784
Oil Filler Tube ... ..	86-625	—	—
Oil Filler Tube Retaining Screw	86-627	—	—
Oil Filler Tube Washer (spring)	K197	—	—
Oil Sump ... ..	86-14	86-14	86-14
Oil Sump Joint Washer ... ..	86-92	86-92	86-92
Oil Sump Fixing Stud ... ..	86-144(12)	86-144(12)	86-144(12)
Oil Sump Stud Nut ... ..	21-27(12)	21-27(12)	21-27(12)
Oil Sump Fixing Stud Washer (spring).	24-8784(12)	24-8784(12)	24-8784(12)
Crankcase Plug ... ..	86-113	86-113	86-113
Crankshaft, complete with fixed fitting.	86-618	86-618	86-618
Crankshaft Gear ... ..	86-60	86-60	86-60
Crankshaft Key ... ..	35-1896	35-1896	35-1896
Crankshaft Bush (long) ... ..	86-728	86-728	86-728
Crankshaft Bush (short)... ..	86-729	86-729	86-729
Crankshaft Oil Seal ... ..	86-148(2)	86-148(2)	86-148(2)
Crankshaft Shim (.002") ... ..	89-5635	89-5635	89-5635
Crankshaft Shim (.003") ... ..	89-5636	89-5636	89-5636
Crankshaft Shim (.007") ... ..	89-5558	89-5558	89-5558
Crankshaft Shim (.005") ... ..	89-5556	89-5556	89-5556
Connecting Rod, complete with bushes, bolts, nuts and split pins.	86-619	86-619	86-619
Connecting Rod Bush (small end)	86-145	86-145	86-145
Connecting Rod Bush (big end)	86-123	86-123	86-123
Connecting Rod Bolt ... ..	86-143(2)	86-143(2)	86-143(2)
Connecting Rod Bolt Nut ... ..	35-1206(2)	35-1206(2)	35-1206(2)
Connecting Rod Bolt Split Pin...	35-706(2)	35-706(2)	35-706(2)
Piston, complete with rings, gud- geon pin and retaining circlips	86-749	86-749	86-749
Do. complete (.010" oversize)	86-755	86-755	86-755
Do. complete (.020" oversize)	86-759	86-759	86-759

NOTE.—Figures in brackets denote number per set, e.g., (2), 2 per set.  
When no figures in brackets are shown one part constitutes a set.  
**Quote Engine Numbers, with prefix letters, when ordering spares.**

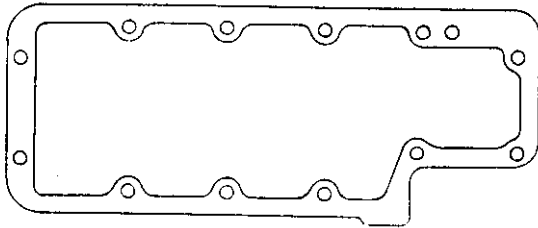
320c.c. INDUSTRIAL ENGINE



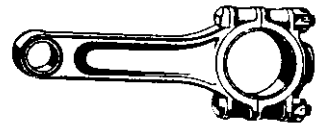
86-14



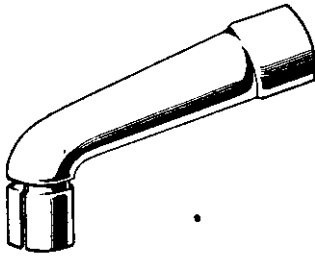
86-618



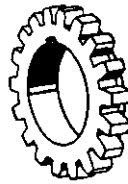
86-92



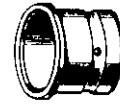
86-619



86-625



86-60



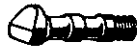
86-728  
86-729



89-5635 -002  
89-5636 -003  
89-5556 -005  
89-5558 -007



86-148



86-143



86-123



86-145



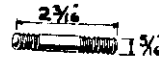
86-178



86-627



86-726



86-144



89-215



37-706



35-1206



21-27



35-1896



86-727



K 197  
24-8784

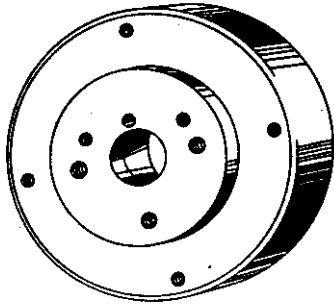
### 320c.c. INDUSTRIAL ENGINE—continued

DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Piston only ... ..	86-4	86-4	86-4
Do. (.010" oversize) ... ..	86-756	86-756	86-756
Do. (.020" oversize) ... ..	86-760	86-760	86-760
Gudgeon Pin ... ..	86-5	86-5	86-5
Gudgeon Pin Circlip ... ..	66-954(2)	66-954(2)	66-954(2)
Compression Ring ... ..	86-6(2)	86-6(2)	86-6(2)
Do. (.010" oversize) ... ..	86-757(2)	86-757(2)	86-757(2)
Do. (.020" oversize) ... ..	86-761(2)	86-761(2)	86-761(2)
Scrapper Ring ... ..	86-7	86-7	86-7
Do. (.010" oversize) ... ..	86-758	86-758	86-758
Do. (.020" oversize) ... ..	86-732	86-762	86-762
Flywheel, complete ... ..	86-620	86-620	86-620
Flywheel Nut ... ..	21-24	21-24	21-24
Flywheel Nut Lockwasher ... ..	86-116	86-116	86-116
Flywheel Key ... ..	35-1896	35-1896	35-1896
Starting Rope, complete ... ..	—	86-666	—
Starter Pulley ... ..	86-153	—	—
Starter Pulley (Birtley) ... ..	—	86-153	—
Starter Pulley (Standard) ... ..	—	86-41	—
Starter Pulley Fixing Bolt ... ..	21-337(3)	—	—
Starter Pulley Fixing Bolt (Birtley) ... ..	—	21-337(3)	—
Do. Washer (spring) ... ..	24-8784(3)	—	—
Do. Washer Spring (Birtley) ... ..	—	24-8784(3)	—
Starter Pulley Packing Washer... ..	86-157	86-157	86-157
Fan ... ..	86-40	86-40	86-40
Fan Fixing Screw... ..	89-5613(4)	89-5613(4)	89-5613(4)
Fan Fixing Screw Washer (spring) ... ..	24-978(4)	24-978(4)	24-978(4)
Fan Casing, complete ... ..	86-45	86-45	86-45
Fan Casing Fixing Bolt ... ..	21-2879(2)	21-2879(2)	21-2879(2)
Fan Casing Washer (spring) ... ..	K51A(2)	K51A(2)	K51A(2)
Camshaft ... ..	86-44	86-44	86-44
Camshaft Spindle, complete ... ..	86-622	86-622	86-622
Oil Pump Gear (driving) ... ..	86-28	86-28	86-28
Oil Pump Gear (driven) ... ..	86-30	86-30	86-30
Oil Pump Driving Pinion ... ..	86-26	86-26	86-26
Oil Pump Driving Pinion Split Pin ... ..	35-702	35-702	35-702
Oil Pump Driving Pinion Key ... ..	27-1386	27-1386	27-1386
Oil Pump Driving Pinion Washer (plain).	F21	F21	F21

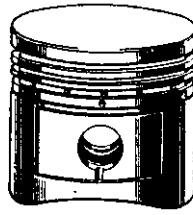
NOTE.—Figures in brackets denote number per set, e.g., (2), 2 per set.  
When no figures in brackets are shown one part constitutes a set.

**Quote Engine Numbers, with prefix letters, when ordering spares.**

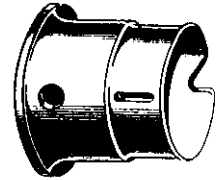
320c.c. INDUSTRIAL ENGINE



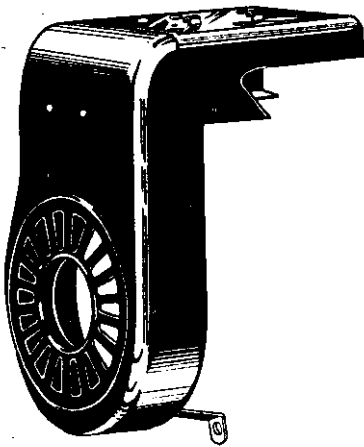
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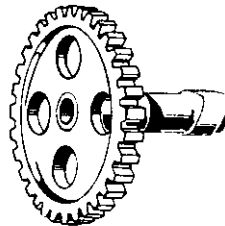
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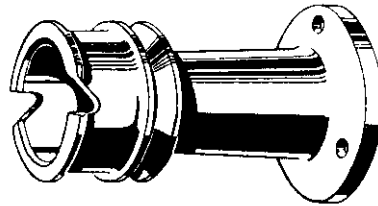
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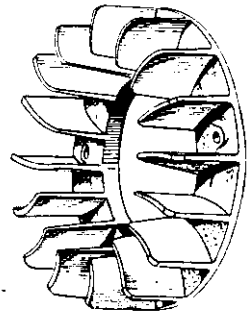
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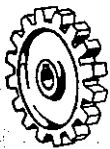
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86-153



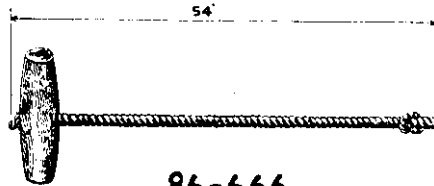
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86-26



86-157



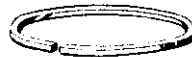
86-666



86-116



86-7



86-6



86-5



86-622



86-28



21-337  $\frac{7}{8} \times \frac{5}{16}$   
21-2879  $\frac{5}{8} \times \frac{3}{8}$



89-5613



86-30



21-24



86-954



F21



35-702



35-1896  
27-1386



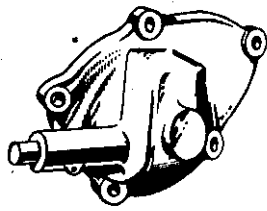
K15A 24-978  
24-8784

### 320c.c. INDUSTRIAL ENGINE—continued

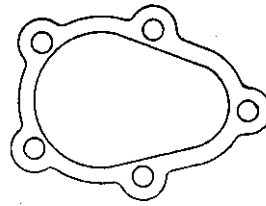
DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Oil Pump Cover ... ..	86-27	86-27	86-27
Oil Pump Cover Screw ... ..	86-46(4)	86-46(4)	86-46(4)
Oil Pump Cover Washer (Shake- proof).	29-3319(4)	29-3319(4)	29-3319(4)
Oil Filter, complete ... ..	86-746	86-746	86-746
Oil Filter Washer (fibre) ... ..	86-49	86-49	86-49
Oil Release Valve Ball ... ..	90-241	90-241	90-241
Oil Release Valve Spring ... ..	86-39	86-39	86-39
Oil Release Valve Cap ... ..	86-38	86-38	86-38
Oil Release Valve Cap Washer (fibre).	M552A	M552A	M552A
Oil Pressure Telltale ... ..	31-234	31-234	—
Oil Pressure Telltale Plug ... ..	—	—	86-752
Oil Pressure Telltale Washer ... ..	M841	M841	—
Oil Pressure Telltale Banjo Con- nection.	86-647	86-647	—
Oil Pressure Telltale Banjo Con- nection Bolt.	86-648	86-648	—
Oil Pressure Telltale Banjo Con- nection Washer (fibre).	M838A(2)	M838A(2)	—
Magneto (impulse start) ... ..	86-99	86-99	86-99
Magneto Driving Coupling ... ..	86-70	86-70	86-70
Magneto Driving Dog ... ..	86-50	86-50	86-50
Magneto Driving Gear ... ..	86-25	86-25	86-25
Magneto Driving Gear Key ... ..	15-40	15-40	15-40
Magneto Fixing Screw ... ..	21-2888(4)	21-2888(4)	21-2888(4)
Magneto Fixing Screw Washer (spring).	K197(4)	K197(4)	K197(4)
Magneto Oil Seal ... ..	86-149	86-149	86-149
Governor Cover, complete ... ..	86-127	86-127	86-127
Governor Cover Joint Washer ... ..	86-107	86-107	86-107
Governor Cover Fixing Screw ... ..	86-686(5)	86-686(5)	86-686(5)
Governor Cover Fixing Screw Washer (spring.)	24-7068(5)	24-7068(5)	24-7068(5)
Governor Outer Lever ... ..	86-74	86-74	86-74

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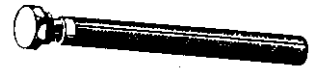
320c.c. INDUSTRIAL ENGINE



86-127



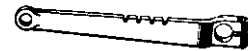
86-107



86-746



31-234



86-74



86-25



86-27



86-70



86-50



86-648



86-752



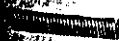
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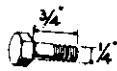
86-38



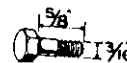
86-647



86-39



21-2888



86-686



86-46



M552 A  
M838 A  
M841



29-3319



K197  
24-7068



15-40

### 320c.c. INDUSTRIAL ENGINE—continued

DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Governor Outer Lever Fixing Screw.	86-125	86-125	86-125
Governor Lever Operating Pin...	86-62	86-62	86-62
Governor Lever Tension Spring .	86-694	86-694	86-694
Governor Lever Tension Spring Adjusting Screw.	86-76	86-76	86-76
Governor Adjusting Nut ...	86-75	86-75	86-75
Governor Lever Locknut ...	21-25	21-25	21-25
Governor Lever Spacer ...	86-674	86-674	86-674
Governor Spring Bracket ...	86-629	86-629	86-629
Governor Shaft, complete ...	86-128	86-128	86-128
Governor Shaft Nut ...	86-102	86-102	86-102
Governor Shaft Lockwasher ...	86-101	86-101	86-101
Throttle Control Lever ...	86-650	86-650	86-650
Throttle Control Shackle Pin ...	86-656	—	86-656
Throttle Control Nut ...	86-651	86-651	86-651
Throttle Control Cable Bracket...	86-653	86-696	86-653
Throttle Return Spring ...	86-655	86-655	86-655
Throttle Bracket Distance Washer	K359A(4)	K359A(4)	K359A(4)
Throttle Control Cable Fork ...	86-652	—	86-652
Throttle Control Cable Adjuster	89-8556	—	89-8556
Throttle Cable Adjuster Locknut	89-366(2)	—	89-366(2)
Throttle Control Washer...	F21(2)	—	F21(2)
Throttle Control Spacer ...	—	86-657	86-657
Throttle Control Rod ...	—	86-659	—
Link Rod Ball Joints ...	86-670(2)	86-670(2)	86-670(2)
Link Rod and Ball Joint Locknut	21-25(3)	21-25(3)	21-25(3)
Do. Washer (Shakeproof) ...	29-3319(2)	29-3319(2)	29-3319(2)
Carburetter ...	86-671	86-671	86-671
Carburetter Link Rod ...	86-675	86-97	86-97
Carburetter Stud ...	—	86-124(2)	86-124(2)
Carburetter Nut ...	—	35-487(2)	35-487(2)
Carburetter Adapter, complete ...	—	86-187	86-187
Carburetter Gasket ...	—	86-613	86-613
Sparking Plug ...	86-150	86-150	86-150

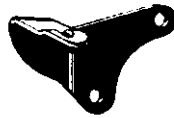
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# 320c.c. INDUSTRIAL ENGINE



86-629



86-696



86-653



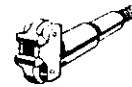
86-187



86-655



86-694



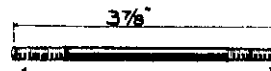
86-128



86-670

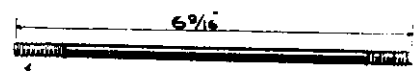


86-659



2BA

86-675



2BA

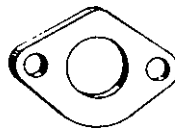
86-97



86-652



86-657



86-613



86-650



86-75



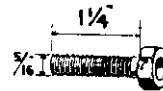
86-76



86-62



86-150



89-8556



86-101



86-656



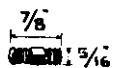
86-674



86-125



86-651



86-124



102



35-487



89-366



21-25



F21  
K359A



29-3319



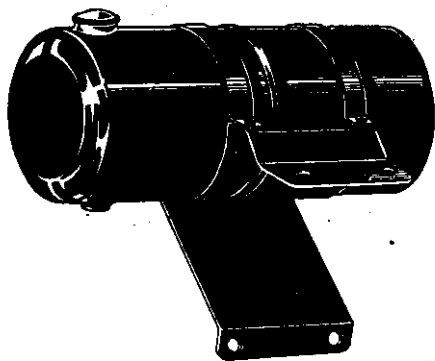
### 320c.c. INDUSTRIAL ENGINE—continued

DESCRIPTION	Models up to Number A700	Models Numbered A701 to A1000	Models Numbered A1001 to A3000
Sparking Plug Spanner ... ..	86-725	86-725	86-725
Sparking Plug Spanner Tommy Bar.	29-9253	29-9253	29-9253
Petrol Tank, complete ... ..	86-161	86-734	—
Petrol Tank Strap Fixing Screw	—	86-738(4)	—
Do. Washer (fibre) ... ..	—	—	M814A(2)
Petrol Tank Strap Nut ... ..	—	86-739(4)	—
Petrol Tank Fixing Bolt ... ..	21-2902(4)	21-2902(4)	21-2902(4)
Petrol Tank Washer (spring) ...	24-6035(4)	24-6035(4)	24-6035(4)
Petrol Tap ... ..	86-151	86-151	—
Petrol Tap Washer (fibre) ... ..	15-792	15-792	—
Petrol Filler Cap ... ..	86-602	86-602	—
Petrol Pipe, complete ... ..	86-644	86-691	—
Instruction Plate ... ..	86-160	86-160	86-160
Instruction Plate Screw ... ..	86-687(4)	86-687(4)	86-687(4)
Instruction Plate Nut ... ..	86-688(4)	86-688(4)	86-688(4)
Flame Trap Cap ... ..	86-61	86-61	86-61
Flame Trap Cap Nut ... ..	21-29	21-29	21-29
Flame Trap Washer (spring) ...	K197	K197	K197
Exhaust Pipe, complete ... ..	—	86-98	86-98
Exhaust Pipe, complete (long) ...	86-190	—	—
Exhaust Pipe, complete (short)	86-177	—	—
Exhaust Pipe Bolt ... ..	21-337(2)	—	—
Exhaust Pipe Gasket ... ..	86-105	86-105	86-105
Exhaust Pipe Stud ... ..	—	86-124(2)	86-124(2)
Exhaust Pipe Fixing Nut ... ..	35-487(2)	35-487(2)	35-487(2)
Exhaust Pipe Washer (spring) ...	N566(2)	N566(2)	N566(2)
Air Cleaner... ..	86-179	86-721	—
Air Cleaner Elbow ... ..	86-156	—	—
Air Cleaner Bolt Washer ... ..	K197	—	—
Air Cleaner Connecting Tube Clip	66-2659(2)	—	—
Air Cleaner Connecting Tube ...	86-158	—	—

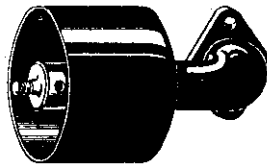
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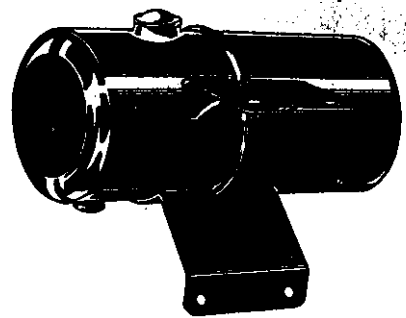
320c.c. INDUSTRIAL ENGINE



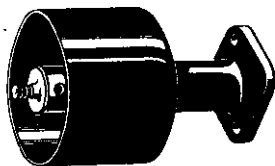
86-734



86-98



86-161



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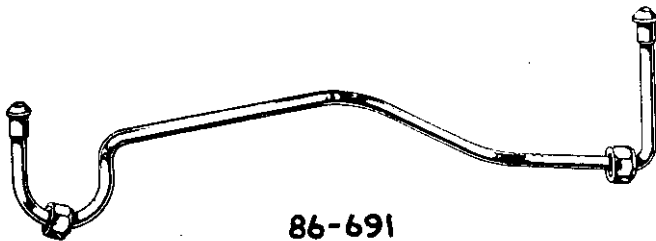
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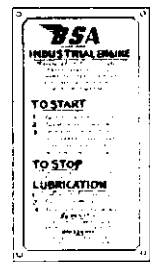
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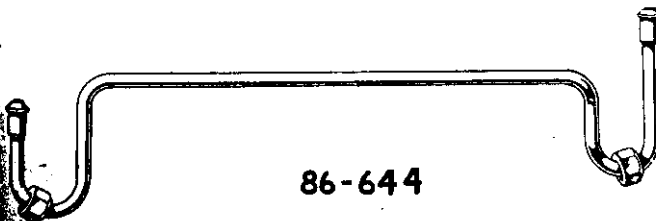
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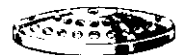
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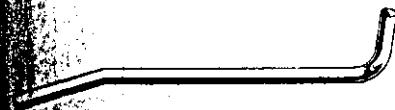
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86-725



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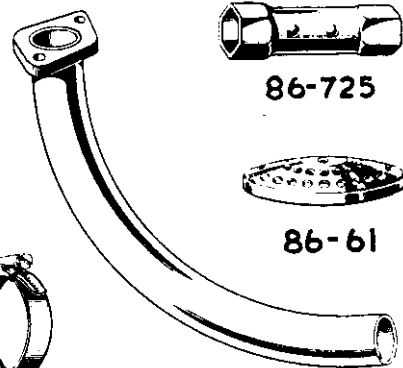
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66-2659



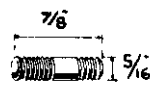
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1337 7/8 x 3/16  
2902 3/4 x 5/16



86-738



86-124



86-687



86-688



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21-29



86-739



M814A 15-792



24-6035



K197 N566

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86-61 ...	1	0	Flame trap cap ... ..	35	34
86-62 ...	2	2	Governor lever operating pin ...	33	32
86-66 ...	6		Valve stem cap ... ..	23	22
86-67 ...	1		Valve shim (.002")... ..	23	22
86-70 ...	3	0	Magneto driving coupling... ..	31	30
86-74 ...	4	6	Governor outer lever ... ..	31	30
86-75 ...	10		Governor adjusting nut ... ..	33	32
86-76 ...	6		Governor lever tension spring ad- justing screw ... ..	33	32
86-80 ...	1		Cylinder barrel joint washer ...	23	22
86-82 ...	3		Oil sump joint washer ... ..	27	26
86-83 ...	2	11	Valve tappet ... ..	23	22
86-84 ...	10		Carburettor link rod ... ..	33	32

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Part No.	Price		DESCRIPTION.	Page	
	£	s. d.		illustratcd.	Page described.
86-98 ...	8	6	Exhaust pipe complete ...	35	34
86-99 ...	—		Magneto (impulse start) ( <i>price on application</i> ) ...	... not illust'd ...	—
86-101 ...	2		Governor shaft nut lockwasher ...	33	32
86-102 ...	3		Governor shaft nut ...	33	32
86-104 ...	1		Manifold gasket ...	23	22
86-105 ...	5		Exhaust pipe gasket ...	35	34
86-107 ...	1		Governor cover joint washer ...	31	30
86-108 ...	3		Crankcase end cover joint washer	25	24
86-109 ...	3	6	Breather unit cover ...	25	24
86-111 ...	9		Breather unit baffle plate ...	25	24
86-113 ...	4		Crankcase plug ...	27	26
86-116 ...	2		Flywheel nut lockwasher ...	29	28
86-117 ...	19	0	Valve chest cover complete ...	23	22
86-120 ...	6		Cylinder barrel fixing stud ...	23	22
86-122 ...	1	6	Crankcase end cover fixing dowel bolt ...	25	24
86-123 ...	4/-	pair	Connecting rod bush (big end) ...	27	26
86-124 ...	5		Exhaust pipe stud ...	35	34
86-124 ...	5		Carburetter stud ...	33	32
86-125 ...	2		Governor outer lever fixing screw	33	32
86-127 ...	11	0	Governor cover complete ...	31	30
86-128 ...	1	1 0	Governor shaft complete ...	33	32
86-142 ...	6		Crankcase cover fixing stud ...	25	24
86-143 ...	2	6	Connecting rod bolt ...	27	26
86-144 ...	6		Sump fixing stud ...	27	26
86-145 ...	3	6	Connecting rod bush (small end)	27	26
86-147 ...	12	6	Inlet and exhaust manifold ...	23	22
86-148 ...	4	0	Crankshaft oil seal ...	27	26
86-149 ...	3	0	Magneto oil seal ...	31	30
86-150 ...	—		Sparking plug ( <i>price on application</i> )	33	32
86-151 ...	5	0	Petrol tap ...	35	34
86-153 ...	17	0	Starter pulley ...	29	28
86-155 ...	—		Crankcase base plate ( <i>price on application</i> ) ...	25	24
86-156 ...	5	6	Air cleaner elbow ...	35	34
86-157 ...	2	1	Starter pulley packing washer ...	29	28
86-158 ...	10		Air cleaner connecting tube ...	35	34
86-160 ...	3	9	Instruction plate ...	35	34
86-161 ...	1	10 0	Petrol tank complete ...	35	34
86-177 ...	8	6	Exhaust pipe complete (short) ...	35	34
86-178 ...	3		Oil filler cap retaining spring ...	27	26
86-179 ...	—		Air cleaner ( <i>price on application</i> ) . not illust'd ...	...	—
86-187 ...	2	6	Carburetter adaptor complete ...	33	32
86-190 ...	16	3	Exhaust pipe complete (long) ...	35	34
86-600 ...	1		Valve shim (.003")... ..	23	22
86-601 ...	1		Valve shim (.007")... ..	23	22
86-602 ...	3	6	Petrol filler cap ...	35	34
86-613 ...	9		Carburetter gasket ...	33	32
86-614 ...	6		Manifold stud (long) ...	23	22

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Part No.	Price			DESCRIPTION.	Page	
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86-615 ...		6		Manifold stud (short) ... ..	23	22
86-616 ...	4	18	6	Cylinder barrel with fixed fittings	23	22
86-617 ...		13	3	Inlet and exhaust manifold complete	23	22
86-618 ...	4	15	6	Crankshaft complete with fixed fittings ... ..	27	26
86-619 ...	2	2	0	Connecting rod complete ... ..	27	26
86-620 ...	1	17	6	Flywheel complete ... ..	29	28
86-622 ...		4	3	Camshaft spindle complete ... ..	29	28
86-624 ...			5	Dipstick ... ..	25	24
86-625 ...		13	6	Oil filler tube ... ..	27	26
86-626 ...			3	Oil filler cap ... ..	25	24
86-627 ...			4	Oil filler tube retaining screw ...	27	26
86-629 ...		1	6	Governor spring bracket ... ..	33	32
86-643 ...	8	15	0	Crankcase complete ... ..	25	24
86-644 ...		5	6	Petrol pipe complete ... ..	35	34
86-647 ...		3	3	Oil pressure tell-tale banjo connection ... ..	31	30
86-648 ...		1	0	Oil pressure tell-tale banjo connection bolt ... ..	31	30
86-650 ...			6	Throttle control lever ... ..	33	32
86-651 ...			4	Throttle control lever nut ... ..	33	32
86-652 ...		1	7	Throttle control cable fork ... ..	33	32
86-653 ...		1	6	Throttle control cable bracket ...	33	32
86-655 ...		1	5	Throttle return spring ... ..	33	32
86-656 ...			6	Throttle control shackle pin ... ..	33	32
86-657 ...			9	Throttle control spacer ... ..	33	32
86-659 ...			9	Throttle control rod ... ..	33	32
86-660 ...			6	Crankcase cover bracket stud ...	25	24
86-666 ...		3	6	Starting rope complete ... ..	29	28
86-670 ...		1	8	Link rod ball joints ... ..	33	32
86-671 ...	—			Carburetter ( <i>price on application</i> ) not illust'd ...		—
86-674 ...		2		Governor lever spacer ... ..	33	32
86-675 ...		9		Carburetter link rod ... ..	33	32
86-677 ...		6		Manifold barrel nut ... ..	23	22
86-686 ...		4		Governor cover fixing screw ...	31	30
86-687 ...		1		Instruction plate screw ... ..	35	34
86-688 ...		1		Instruction plate nut ... ..	35	34
86-689 ...		9		Valve chest cover stud ... ..	23	22
86-691 ...		5	6	Petrol pipe complete ... ..	35	34
86-694 ...			6	Governor lever tension spring ...	33	32
86-696 ...		1	9	Throttle control cable bracket ...	33	32
86-697 ...		2	0	Oil filler cap ... ..	25	24
86-721 ...	—			Air cleaner ( <i>price on application</i> ) not illust'd ...		—
86-723 ...		1	0	Inlet and exhaust valve spring ...	23	22
86-724 ...		7	0	Inlet and exhaust valve ... ..	23	22
86-725 ...		2	0	Sparking plug spanner ... ..	35	34
86-728 ...		12	0	Crankshaft bush (.long) ... ..	27	26
86-729 ...		11	0	Crankshaft bush (short) ... ..	27	26
86-734 ...	1	10	0	Petrol tank complete ... ..	35	34
86-738 ...		2		Petrol tank strap fixing screw ...	35	34

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86-739 ...	2		Petrol tank strap fixing screw nut	35 ...	34
86-743 ...	3	6	Valve guide... ..	23 ...	22
86-746 ...	6	0	Oil filter complete ... ..	31 ...	30
86-749 ...	1	9 4	Piston complete with rings and gudgeon pin ... ..	<i>not illust'd</i> ...	—
86-752 ...	6		Oil pressure tell-tale plug ...	31 ...	30
86-755 ...	1	9 4	Piston complete (.010" oversize)...	<i>not illust'd</i> ...	—
86-756 ...	17	6	Piston only (.010" oversize) ...	<i>not illust'd</i> ...	—
86-757 ...	1	11	Compression rings (.010" oversize)	<i>not illust'd</i> ...	—
86-758 ...	2	8	Scraper ring (.010" oversize) ...	<i>not illust'd</i> ...	—
86-759 ...	1	9 4	Piston complete (.020" oversize)...	<i>not illust'd</i> ...	—
86-760 ...	17	6	Piston only (.020" oversize) ...	<i>not illust'd</i> ...	—
86-761 ...	1	11	Compression ring (.020" oversize) .	<i>not illust'd</i> ...	—
86-762 ...	2	8	Scraper ring (.020" oversize) ...	<i>not illust'd</i> ...	—
89-215 ...	8		Oil filler cap retaining spring screw	27 ...	26
89-223 ...	9d.	doz.	Oil filler cap washer (leather) ...	25 ...	24
89-366 ...	1		Throttle cable adjuster locknut ...	33 ...	32
89-427 ...	5	0	Breather unit complete ... ..	23 ...	22
89-5556 ...	2		Crankshaft shim (.005") ... ..	27 ...	26
89-5558 ...	2		Crankshaft shim (.007") ... ..	27 ...	26
89-5613 ...	4		Fan fixing screw ... ..	29 ...	28
89-5635 ...	2		Crankshaft shim (.002") ... ..	27 ...	26
89-5636 ...	2		Crankshaft shim (.003") ... ..	27 ...	26
89-8556 ...	1	0	Throttle control cable adjuster ...	33 ...	32
90-241 ...	2/6	doz.	Oil release valve ball ... ..	<i>not illust'd</i> ...	—
F21 ...	1		Oil pump driving pinion washer .	29 ...	28
F21 ...	1		Throttle cable adjuster locknut washer ... ..	33 ...	32
K51A ...	6d.	doz.	Crankcase base fixing bolt washer (spring) ... ..	25 ...	24
K51A ...	6d.	doz.	Cylinder barrel fixing stud washer (spring) ... ..	23 ...	22
K51A ...	6d.	doz.	Fan casing fixing bolt washer (spring) ... ..	29 ...	28
K197 ...	6d.	doz.	Magneto fixing screw washer (spring)	31 ...	30
K197 ...	6d.	doz.	Flame trap cap nut washer (spring)	35 ...	34
K197 ...	6d.	doz.	Air cleaner elbow bolt washer (spring) ... ..	35 ...	34
K197 ...	6d.	doz.	Oil filler tube retaining screw washer ... ..	27 ...	26
K359A ...	2		Throttle bracket distance washer .	33 ...	32
M552A ...	6d.	doz.	Oil release valve cap washer (fibre)	31 ...	30
M814A ...	6d.	doz.	Petrol tank fixing bolt washer ...	35 ...	34
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