MORRIS

G32 to G39

SERVICE INFORMATION

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Revised: 1st December, 1937

Re-conditioning Morris Connecting Rods

CONNECTING rods of Morris Engines in which the white metal is run direct into the big-ends should be returned to the Works for re-conditioning.

In addition to the remetalling process, the bearings are machined with a very fine finish to afford a correct clearance. The connecting rods are properly balanced. These points are essential to ensure smooth running and reliable service.

The retail charges, which are subject to the same discount as for other quick-moving parts, are as follows :—

	Each rod s.	d.
Morris Minor	7	3
Morris Eight, 1935 or Series I	7	3
Morris Ten-Four	7	3
Morris Ten-Six	7	3
Morris Cowley Four, 1934	7	6
Morris Twelve-Four, 1935	7	6
Morris Cowley Six	7	3
Morris Fifteen Six	7	3
Morris Major Six	7	3
Morris Oxford Six, 15 h.p., 1930-1932	7	3
Morris Oxford Six, 16 h.p., 1933-1934	7	6
Morris Oxford Six, 16 h.p. and 20 h.p., 1935	7	6
Morris Twenty-five	8	0
SERIES II MODELS		
Morris Eight	7	3
Morris Ten-Four	7	3
Morris Twelve-Four	7	6
Morris 10-cwt. Van	7	6
Morris Fourteen-Six	7	6
Morris Sixteen and Eighteen Sixes	7	6
Morris Twenty-one and Twenty-five Sixes	8	0
SERIES III MODELS		
Morris Ten-Four	7	3
Morris Twelve-Four	7	6
Morris Fourteen-Six	7	6
Morris Twenty-five Six	8	0

Re-conditioned connecting rods should be regarded as Morris Spare Parts and held in stock by all Distributors and Dealers.

Connecting rods or connecting rod caps which have been rendered non-standard, e.g. by filing, cannot be accepted for re-conditioning.

All connecting rods for re-conditioning should be forwarded carriage paid, carefully labelled, bearing sender's name and address, and directed to :—

Messrs. Morris Motors Ltd.,
Service (Technical) Department,
COWLEY, OXFORD,

accompanied by a letter of advice, and covering order similarly addressed.

Revised : 1*st April,* 1940

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	Each rod s. d.
Morris Minor	8 0
Morris Eight, 1935 or Series I	8 0
Morris Ten-Four	8 0
Morris Ten-Six	8 0
Morris Cowley Four, 1934	8 3
Morris Twelve-Four, 1935	8 3
Morris Cowley Six	8 0
Morris Fifteen Six	8 0
Morris Major Six	8 0
Morris Oxford Six, 15 h.p., 1930-1932	8 0
Morris Oxford Six, 16 h.p., 1933-1934	8 3
Morris Oxford Six, 16 h.p. and 20 h.p., 1935	8 3
Morris Twenty-five	9 0
SERIES II MODELS	
Morris Eight	8 0
Morris Ten-Four	8 0
Morris Twelve-Four	8 3
Morris 10-cwt. Van	8 3
Morris Fourteen-Six	8 3
Morris Sixteen and Eighteen Sixes	8 3
Morris Twenty-one and Twenty-five Sixes	9 0
SERIES III MODELS	
Morris Ten-Four	8 0
Morris Twelve-Four	8 3
Morris Fourteen-Six	8 3
Morris Twenty-five Six	9 0

Whilst every endeavour will be made to maintain these prices, we reserve the right to make any alteration without notice.

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Date of issue: July, 1933

INSTRUCTIONS FOR FITTING BRAKE-SHOE ANTI-SQUEAK WEIGHTS

THE following are the instructions necessary for fitting brake-shoe anti-squeak weights on the Morris Minor, Morris Ten, Morris-Cowley, Morris Major and Morris-Oxford Models.

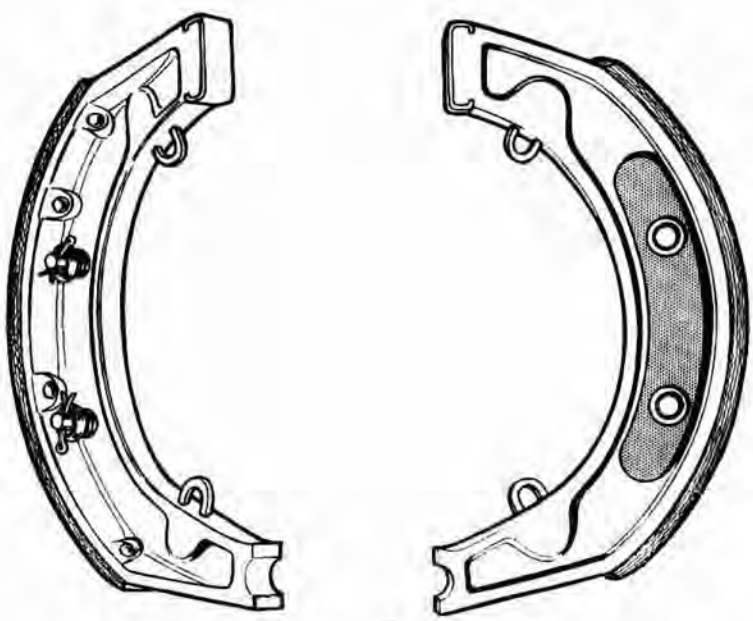
Morris Minor Models

1. Remove road wheels, brake-drums and brake-shoes.

2. Place a lead weight on brake-shoe in position as shown in sketch hereunder, ***making sure that clearance exists at both sides of weight***, and drill two $\frac{13}{64}$ in. diameter holes through brake-shoe web, using the lead weight as a jig.

3. Assemble each brake-shoe with one lead weight on the outside, locating it with two pins and springs. The pins are fitted first of all with a brass washer, and passed through the weight and shoe. The spring, cup washer and split pin can then be added to each pin, and the shoes, brake-drums, etc., replaced. It is advisable to clean up the linings with a rough file before replacing.

Time, $1\frac{1}{2}$-2 hours.



Date of issue: July, **1933**

Instructions for Fitting Brake-Shoe Anti-Squeak Weights—*continued*

Morris Ten, Morris-Cowley and Morris Major Models

1. Remove road wheels, brake-drums and brake-shoes.

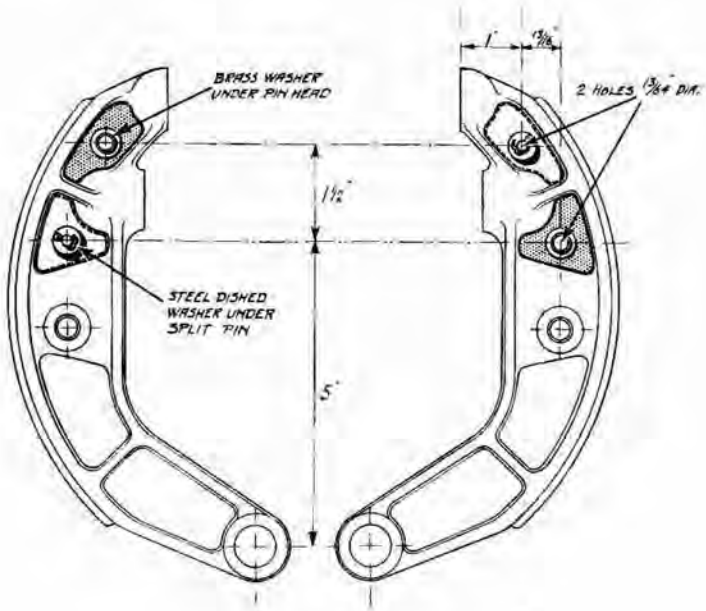
2. Drill two 13/64 diameter holes in each brake-shoe as shown in the diagram hereunder. The weights may be used as a jig for this operation, but care must be taken to see *that clearance exists on all sides of weights.*

3. Assemble each brake-shoe with a triangular-shaped lead weight and an oblong-shaped lead weight to their respective positions. It will be found that each anti-squeak lead weight fits the shape of a recess in the brake-shoe, and that one lead weight goes to one side of the shoe and the other to the opposite side.

4. Assemble pin with brass washer first, passing it through the hole in the lead weight and brake-shoe. Add spring and special washer to the other side, locating the assembly by means of a split pin.

5. When the brake-shoes are reassembled to the car, it will be found that on one shoe a triangular-shaped weight is at the front and the oblong-shaped weight to the back, and on the other shoe the triangular-shaped weight will be at the back and the oblong-shaped weight on the front.

Time—Front brakes, 1—1¼ hours.



Date of issue: July, **1933**

Instructions for Fitting Brake-Shoe Anti-Squeak Weights—*continued*

Morris-Oxford Models

1. Remove road wheels, brake-drums and brake-shoes.

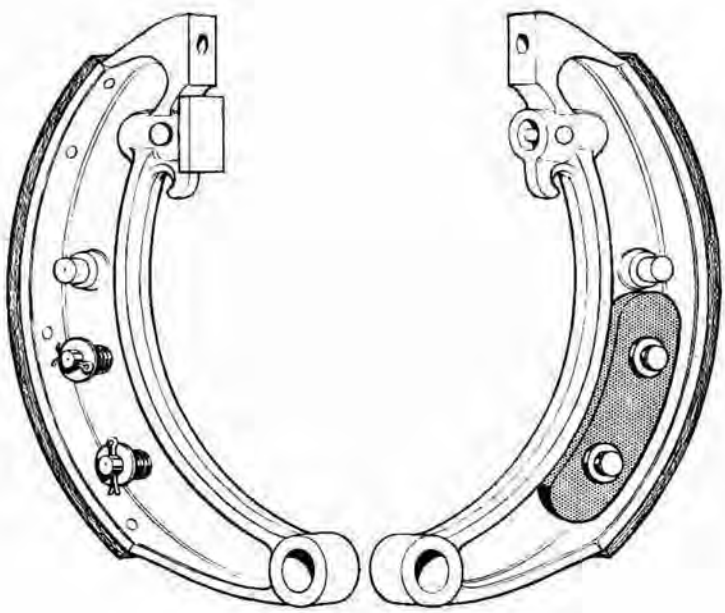
2. Place a lead weight on brake-shoe, in position as shown in sketch hereunder, ***making sure that clearance exists at both sides of weight***, and drill two $\frac{11}{32}$ in. holes through brake-shoe web, using the lead weight as a jig.

3. Assemble each brake-shoe with one lead weight as indicated. Each weight is located by two pins and springs, the pins being assembled with one washer under the head and then passed through the weight and brake-shoe. A spring and washer are then added to the pins on the other side, after which the necessary split pins are added.

4. When the shoes are fitted to the axle it will be found that a lead damper weight will come to the front on one shoe and to the rear on the opposite shoe.

5. It is advisable to clean up the surface of the brake linings with a rough file.

Time, 3½-4 hours.



Date of issue: September, **1933**

Bendix Automatic Clutch Control

WITH the Bendix clutch control apparatus the entire operation of the clutch becomes automatic, the power required being furnished solely by vacuum created in the engine induction system, and operated by a power cylinder, suitably connected to the clutch withdrawal mechanism.

The principle of operation is very simple. The accelerator pedal is allowed to move back still farther after the throttle has reached its closed position. This over-travel or, as it is technically termed, "lost motion" opens a valve which connects the closed end (towards the front of the car) of the power cylinder to the induction manifold, thus creating a vacuum behind the piston. In this way the piston and rod are forced inwards by atmospheric pressure, air entering the one-way spring-loaded valve in the cylinder front end cover, throwing the clutch out of engagement. Since the accelerator pedal must be relieved of all pressure before the valve, which will disengage the clutch, can be opened, it is possible to drive the car normally with the clutch engaged and the engine idling, if the accelerator pedal is prevented from returning to its fullest extent.

As the accelerator pedal is depressed to increase the speed of the engine, the valve previously mentioned is closed, thus cutting off the vacuum connection to the cylinder, and at the same time allowing air at atmospheric pressure to enter behind the piston. The clutch then returns to engagement through the force of the clutch springs. The return travel, however, is controlled, a rapid movement being allowed up to the point of engagement or, as it is technically termed, the "cushion point," at which the clutch takes up the drive. From this point up to the moment of full engagement, the speed is slowed down—perfectly controlled—to effect a smooth and ideal engagement.

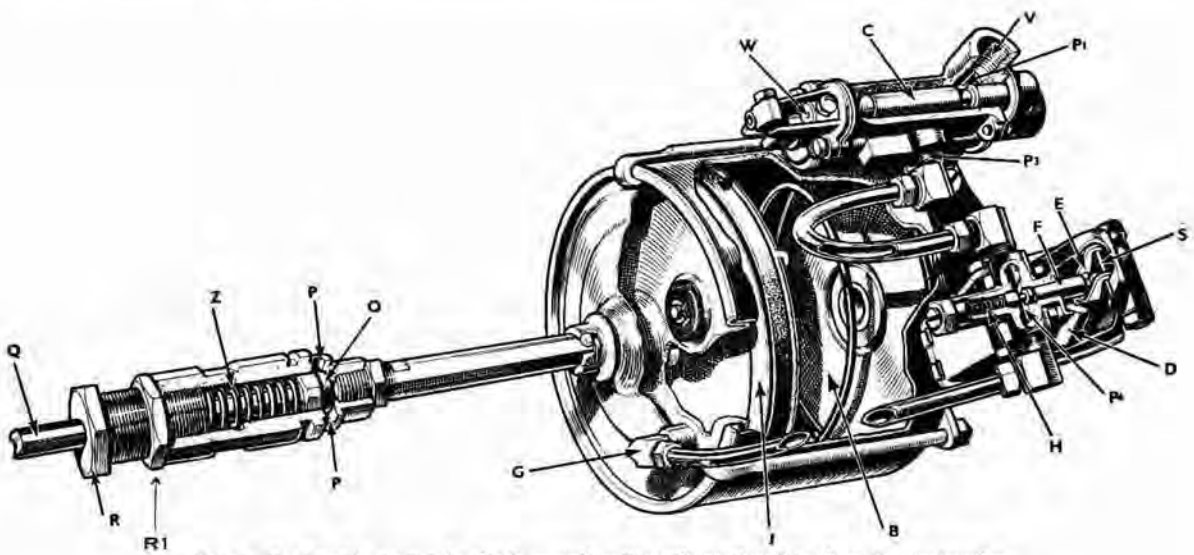


Fig. 1.—The Bendix automatic clutch control unit partly sectioned to show its construction.

ACTION OF THE DEVICE

The assembly comprises five main units:—

1. The cylinder.
2. The cut-off valve.
3. The control valve.
4. The automatic cushion valve.
5. The pendulum valve.

} See Figure 1.

The cut-off valve (see Fig. 2) enables the automatic operation of the clutch to be dispensed with should it be so desired. It consists of a plunger (C) which is connected by a Bowden wire at W to a control button on the dashboard. When the plunger is pushed in, vacuum is permitted to pass through the passage (V) into the control valve. When the plunger is out, the port (P1) is closed, thus cutting off the vacuum and allowing air to pass to the back of the piston through a small hole in the end cover, past the end of the plunger, which is chamfered. The automatic clutch control is then inoperative.

Bendix Automatic Clutch Control—*continued*

The control plunger (A) is connected to the accelerator cross shaft, and thus to the accelerator pedal. When all pressure is relieved from the accelerator pedal the plunger occupies its extreme outward position, allowing vacuum to pass through the port (P2) to the closed end of the cylinder. As the accelerator is depressed, the plunger moves in, cutting off the port (P2) to vacuum, and allowing air, at atmospheric pressure, to enter through the slot (S1) in the base of the plunger, through the port (P2) to the closed end of the cylinder. (The plunger is shown in this position in the diagram.)

In the side of the control plunger is a small bleeder slot (S2), which, as the plunger moves in, passes a port (P3) in the side of the valve. This port is connected to the opening (G) (see Fig. 1) through the plate at the open end of the cylinder. The functioning of the bleeder slot will be explained later.

THE CYLINDER AND AUTOMATIC CUSHIONING VALVE

When the accelerator is closed, vacuum is created in the cylinder (B), causing the piston (J) to move inwards, and consequently disengaging the clutch, as explained. As the accelerator pedal is depressed, the operation of the control valve cuts off the vacuum and permits air to enter the closed end of the cylinder. The piston rod then moves out and air is expelled from the underside of the piston through the hollow piston rod and out through the holes (P) in the automatic cushion valve (see Fig. 1). This movement is rapid.

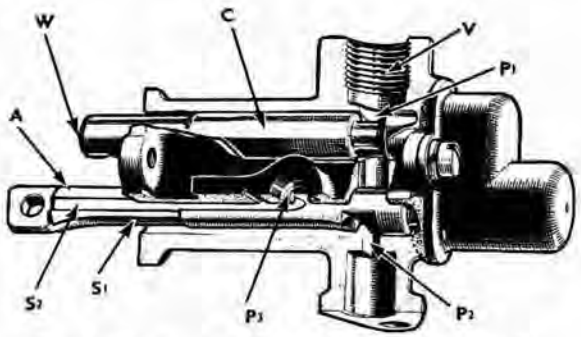


Fig. 2.—The constructional details of the cut-off valve are here clearly shown.

The passage of air through the holes (P) is controlled by a spring-loaded plunger valve (O) on the end of the connecting rod (Q). At the commencement of the stroke, the holes (P) are uncovered by the plunger valve, this being accomplished by the weight of the clutch springs. The spring tension on the plunger valve is adjustable by screwing the hexagon-headed sleeve (R) in or out, and is so set that at the moment the clutch plates touch, i.e. at the cushion point, the pressure due to the valve spring (Z) is sufficient just to overcome the pull of the clutch springs, so that at this instant the plunger valve closes on to its seat and prevents any further escape of air through the holes (P). Therefore, further movement of the piston is checked, and the only air now escaping is regulated by the bleeder slot (S2) in the side of the control plunger (A), and as the slot is tapered at this point, the escape of air is slow through the port (P3). This furnishes a perfectly controlled movement of the piston during the time that the clutch is actually engaging and taking up the drive of the car.

As the accelerator pedal is further depressed, the bleeder slot (S2) in the control plunger makes a greater opening, which allows the air from the underside of the piston to bleed back faster through the port (P3). This results in a more rapid movement of the piston after the engagement or cushion point has been passed, until the clutch is completely "in." A light pressure coil spring in the closed end of the cylinder ensures that when the clutch is fully engaged, any load on the clutch thrust bearing is relieved.

Whilst, with this arrangement, all normal clutch operations are satisfactorily accomplished, it is still necessary to make special provision for a slower engagement of the clutch when starting on a hill, or perhaps when attempting a quick getaway on the level. Therefore, a further controlling device called the pendulum valve (see Fig. 1) is introduced in the bleed line from the cylinder to the control valve.

It comprises a weight (D) suspended by an arm (E) from a pivot (S) so that the weight and arm are free to swing. Coupled to the arm is a plunger (F) which slides across a port (P4) interposed in the bleed line, and cushioned by a spring (H). As mounted on the car, compression of the spring moves the plunger forward or to the right until the port is fully open. In this position the weight will hang at a slight angle from the vertical to the right.

Bendix Automatic Clutch Control—*continued*

On an incline, the weight will take up a position near the vertical or even past it, depending on the steepness of the slope, so that the smaller groove in the plunger comes opposite the bleed control port (P4), which limits the rate at which air can escape from the rear of the piston, thus securing more gradual engagement than when on the level.

Similarly, if the car tends to lurch forward during the clutch engagement, the weight will swing back by inertia, closing off the bleed port, and so ensuring a more gradual take up of the drive. No adjustment of this valve is required or should be attempted.

ADJUSTMENTS

There are only two important adjustments, and these are in connection with :—

1. The cushion point.
2. Correct amount of lost motion.

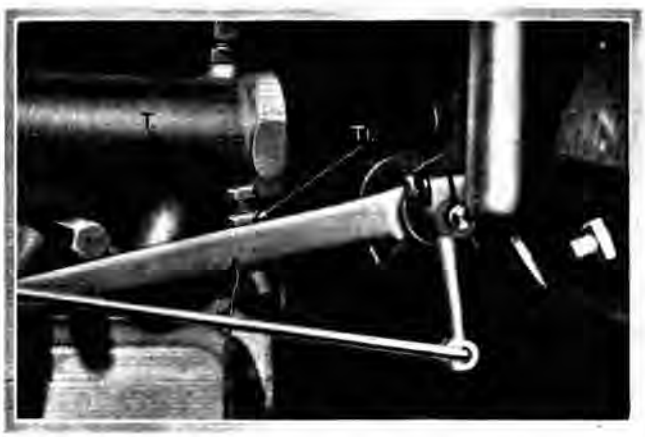


Fig. 3.—The lost motion adjustment on the throttle lever.

Before attempting any adjustments at all, check over the external connections, particularly the " cut-off " valve plunger. This must be right in when the dash button is pushed home, i.e. when the auto-clutch control is in operation. To check the cushion point adjustment, advance hand throttle control to a fast idling position, i.e. approximately 1000 r.p.m., and engage third speed. Then pull out dash control button smartly to put auto-control out of operation.

The car should make a smooth start immediately the button has been pulled out.

Note.—It is important to return the button to the working position " in " after making this test.

Adjustment.

1. If the car jerks forward, slacken off lock nut (R1) on the auto-cushion valve and screw sleeve (R) " in," by a half turn, and test again. Continue this process until a smooth engagement has been obtained.

2. If car does not move off immediately, and takes up too gradually, with an unnecessary amount of clutch slipping, unscrew (R), again by a half turn, until the correct position has been ascertained.

3. When the setting has been corrected, lock up lock nut (R1).

Lost Motion.

The adjustment will be found immediately above the pick-up lever to which is attached the lever connection to the carburetter throttle. The correct lost motion setting should be obtained as follows :—

Engage low gear, move accelerator pedal very gradually until the clutch comes to " cushion point." At this moment the engine should just be starting to accelerate.

" the clutch engages and tends to stall the engine, too much lost motion is indicated. This is corrected ing off lock nut (T1) (see Fig. 3) and giving bolt (T) a fraction of a turn clockwise. If, on the other ha speed has increased unnecessarily before the clutch commences to take up the drive, too little lost mot cated. Unscrew bolt (T) a fraction of a turn, and try again.

Date of issue: September, 1933

Bendix Automatic Clutch Control—*continued*

FAULT-FINDING TABLE

Fault.	*Cause.*	*Cure.*
Excessive engine revs when starting.	(*a*) Cushion point incorrect. (*b*) Too little lost motion.	Test for cushion point first: if incorrect, adjust; if correct, increase lost motion.
Jerky start.	Cushion point incorrect.	Slack off lock nut (R1) on cushion valve, screw (R) in.
Sluggish withdrawal.	(*a*) Controls sticking, preventing valve plunger from returning to full-out position.	(*a*) Ease if necessary and reset as per instructions.
	(*b*) Dash control button not pushed right in.	(*b*) Reset as per instructions.
	(*c*) "Cut-off" valve plunger not right in.	(*c*) Reset as per instructions.
	(*d*) Leak in vacuum connections.	(*d*) Test pipe line and unions for leaks

LUBRICATION

The power cylinder should be lubricated every three months by pouring a teaspoonful of cycle or sewing machine oil through the port (V) in the control valve housing. To do this it is necessary to disconnect the flexible rubber pipe and unscrew the elbow fitting.

The unit, including as it does various working parts, calls for the exercise of a reasonable amount of care in this direction, and, as will be generally accepted, there is no better insurance for satisfactory performance and long life than regular lubrication.

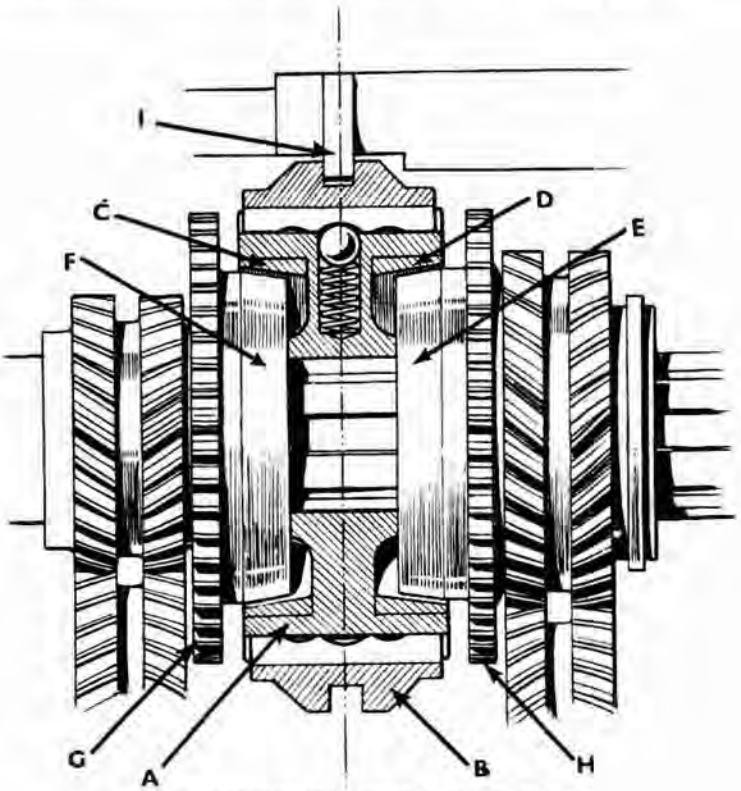
Date of issue : October, 1933

The Synchromesh Gearbox

SYNCHROMESH is a name which has been given to a special clutch device designed to facilitate gear changing. In the case of the Morris car the synchromesh unit is interposed between third and top gears. The duty of the synchromesh unit is to bring either of two gears to the same rotational speed just before they are engaged, or, in other words, to synchronise them, so that an easy and noiseless gear change is assured, without recourse to double declutching.

In the orthodox gearbox the difficulty experienced in changing gear is the result of attempting to mesh gears which are revolving at different speeds. Thus, changing quietly becomes a matter of some skill and judgment in slowing down or speeding up the gears to be meshed so that they will engage without difficulty or noise, remembering that one gear, in this process, is controlled by the engine speed, whilst the speed of the other gear is definitely controlled by the speed of the car on the road.

The synchronising of gear speeds, by means of the synchromesh unit, is brought about by interposing cone clutches between the gears. The first movement of the gear lever brings the two clutch friction surfaces into contact, resulting in bringing the two gears to the same speed, whilst the further movement of the gear lever definitely moves the gears into engagement. The synchronising clutches are not called upon to take any actual driving load, and merely carry out the synchronising process, whilst the definite engagement of the gears by dogs of the gear tooth type transmits the power necessary to drive the car, as in the ordinary gearbox.



The arrangement of the synchromesh components

Reference to Fig. 1 will show quite clearly the parts comprising the synchromesh unit. The inner sliding hub (A), which is located to the sliding shaft by splines, carries six balls and springs. When the sliding hub is assembled to the striking dog (B), the balls fit into a groove cut in the centre of the striking dog teeth. Therefore, when the striking dog is moved in either direction, it carries the sliding hub with it.

On the inside of the sliding hub, at each end, phosphor bronze liners (C) and (D) are fitted, which act as the female cones of the synchromesh clutches. The male cones (E) and (F) are integral with the top and third speed gear dogs (G) and (H), while the striking dog is machined to take the top and third speed selector fork (I).

It will now be seen that as the gear lever moves the top and third selector towards the gear to be selected, the striking dog of the synchromesh unit will carry the sliding hub with it (by means of the six spring-loaded balls) until it comes into contact with the clutch cone integral with the gear dog to be engaged. This has the effect of speeding up or slowing down the gear wheel to be engaged until it revolves at the same speed as the sliding hub.

When this has been accomplished, further movement of the gear lever will overcome the resistance of the spri ded balls and carry the striking dog over the teeth of the required gear dog, thus making positive engagem

Date of issue: October, 1933

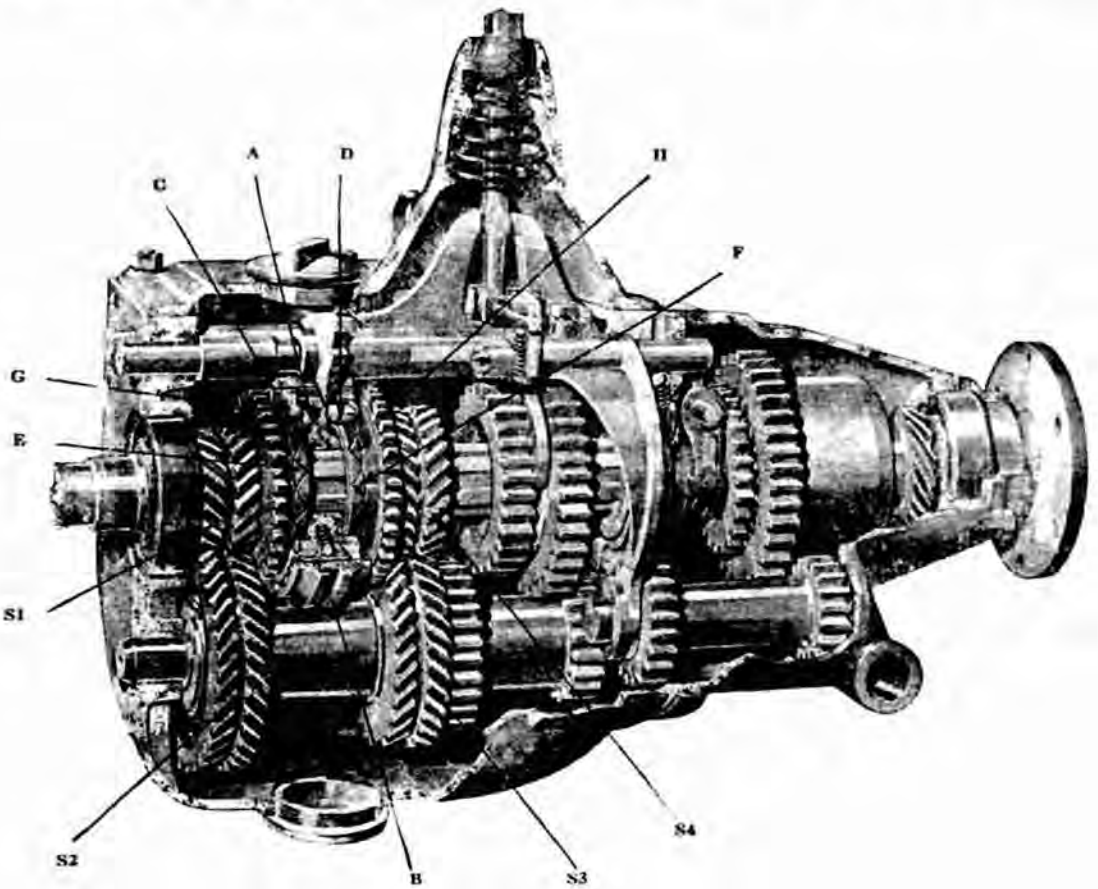
The Synchromesh Gearbox—*continued*

Reference to the diagram of the gearbox (Fig. 2) showing the sectioned synchromesh unit in position on the sliding shaft will explain the main features of the complete gearbox assembly. The double-helical toothed gear wheels, S1, S2, S3 and S4, are in constant mesh with each other, and, therefore, always rotate when the gearbox drive gear is revolving.

S1 and S2 are, of course, the constant mesh gears, S1 being the gearbox drive gear and S2 the layshaft driven gear. S3 and S4 form the silent third speed. S4 is mounted on the gearbox sliding shaft by means of a built-up roller bearing, and, therefore, revolves independently of it.

No explanation need be given here of the action of the first, second and reverse gears, since they are brought into engagement and released in the usual orthodox manner. It will be as well, however, to run through the sequence of events in engaging top or third gears.

Taking first the engagement of the top gear, when the gear lever is moved towards this position the selector will push the striking dog (B) of the synchromesh unit towards the top gear dog (G). Through the medium of the six spring-loaded balls the sliding hub (A) will be carried with it and until the cone clutches are in contact with each



The Morris 4-speed synchromesh gearbox with interceptor and free wheel, showing the disposition of the parts of the synchromesh.

other. This will slow down the speed of the gearbox drive gear, and in turn the clutch plate to the speed of the sliding shaft. As the inner hub cannot move farther than the cone clutch will allow it, further movement of the gear lever will compress the balls and springs, allowing the striking dog (B) to slip over the gearbox drive gear dog (G). As the sliding hub is splined to the sliding shaft, and the striking dog toothed to the sliding hub, the drive is taken direct from the gearbox drive gear to the sliding shaft and thence to the rear wheels.

In engaging the silent third speed, synchronisation of the gears is obtained in a similar manner to that of the top gear, but obviously the drive is not direct. In this case the drive is taken from the gearbox drive gear to the layshaft, and from the layshaft to the silent third speed gear on the sliding shaft. As this gear revolves independently of the sliding shaft, however, the drive in this case goes through the striking dog of the synchromesh unit to the sliding hub, and as this is splined to the sliding shaft in this way it is transmitted to the rear axle.

It should be noted particularly that the synchromesh unit is free from contrivances which, if they failed, would put the gearbox out of action.

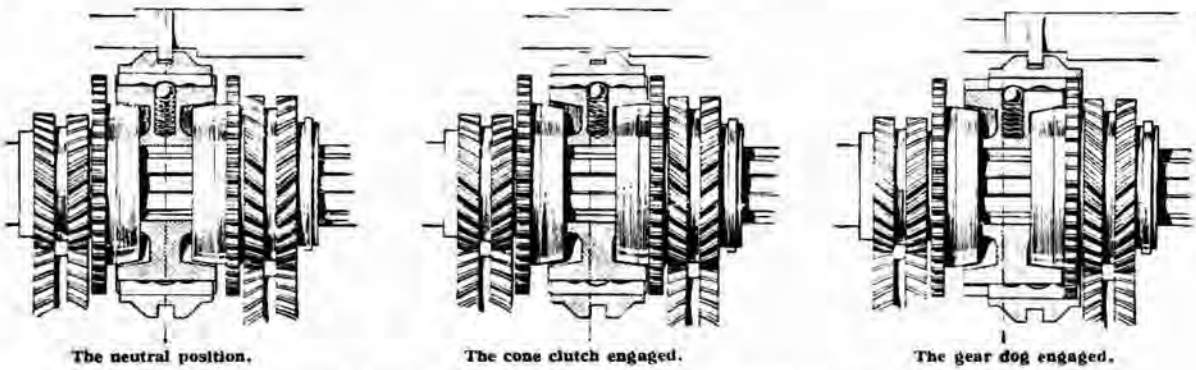
Co

The Synchromesh Gearbox—*continued*

Even if, in the course of time, the cone clutches developed wear or the springs lost all their tension, causing the synchromesh to cease to operate, the gearbox would continue to function as in the case of the ordinary type unit.

In the ordinary way the synchromesh device previously described ensures perfect gear changing, but there is just the possibility that the synchromesh clutch may locate the gear dog to be engaged in such a position that its teeth exactly coincide with those of the striking dog so that they meet end on, and cannot be engaged. The correct method of dealing with such an eventuality is, of course, to place the gear lever in neutral again and then make a fresh attempt to engage the gear. This will usually prove entirely successful.

On the gearboxes fitted to the Morris Cowley Six and the Morris Big Sixes, namely the 16 h.p. Morris Oxford the Morris Isis and the Morris "25," an interceptor device is fitted which prevents even the possibility of this occurring, and also prevents the striking dog from being moved into engagement with the required gear dog until synchronisation actually takes place.



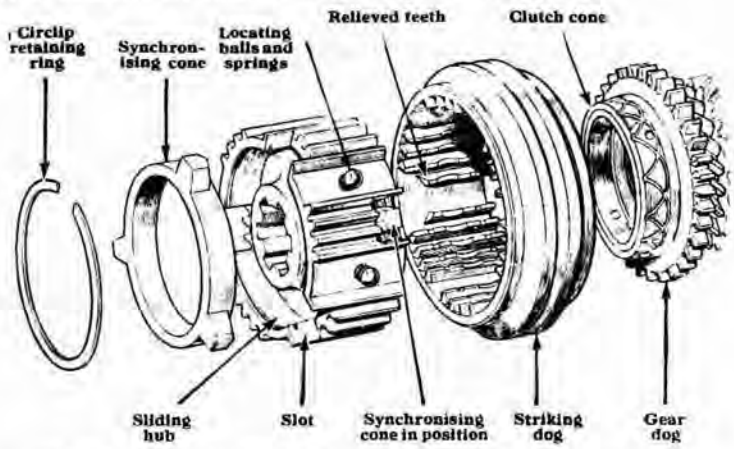
The neutral position. The cone clutch engaged. The gear dog engaged.

Here are shown the three positions of the synchromesh assembly.

THE INTERCEPTOR DEVICE

This device not only synchronises the components, but ensures that the gears are not engaged until the synchronising action is complete. It also enables the gears to be engaged without difficulty on every occasion. In general principle it is exactly the same as the normal synchromesh device, and differs only in the details of its construction.

The female cones of the sliding hub of the synchromesh clutch with interceptor are not fixed to the hub as on the ordinary synchromesh, but are separate units, which are permitted a small amount of rotational movement relative to the hub—actually 8 mm., or the extent of the pitch of one tooth. This is achieved by three lugs on their outer edge which engage with three slightly wider slots on the outer edges of the sliding hub. The inner faces of the lugs on the synchronising cone members are finished wedge shape at a steep angle.



Here are the component parts of the interceptor type synchromesh device, separated to show their construction clearly.

The striking dog of the synchromesh has its teeth cut away in three positions to accommodate the lugs on the female cones, and the ends of these teeth are finished in the form of a "V" of the same angle as the wedge faces the cone lugs.

Clearance is provided between the lugs and the ends of the teeth so that in the neutral position the full rotational movement is permitted between the female synchronising cone and the sliding hub.

Date of issue: October, 1933

The Synchromesh Gearbox—*continued*

This assembly functions in precisely the same way as the ordinary synchromesh device previously described up to the point where the cones are in engagement.

Further movement of the gear lever in the case of the interceptor device is prevented by the inclined surfaces of the relieved striking dog teeth making contact with the wedge surfaces of the lugs of the synchronising cone which is held firmly against one end of its slots by the inertia of the members about to be synchronised. As soon as synchronisation takes place and both the clutch cone on the gear about to be engaged and the synchronising cone revolve in unison, this side pressure on the synchronising cone ceases to exist and it then becomes an easy matter for the relieved teeth on the striking dog to centralise it in its slots so that it passes freely through the gap provided in the teeth of the striking dog. This in turn enables the striking dog to be moved into engagement with the gear dog, and since the two are now revolving in unison a perfectly quiet change takes place. It will also be realised that the action of centralising the synchronising cone imparts to it a slight rotary motion, and that the gear dog is therefore also given a slight rotary movement. In short, the teeth are not engaged by a straight sliding movement, but by slightly spiral motion, which ensures that the teeth engage properly and prevents them from remaining in a position where they are exactly end on to each other.

NOTE.—Since the whole principle of the synchromesh device is to level up the speeds of the gears about to be engaged, it is obvious that the clutches must be given sufficient time to carry out this important function, particularly when no interceptor is fitted.

Ultra rapid gear changes are, therefore, not to be advocated, and a definite pause between the neutral position and the fully engaged position (i.e. where the synchromesh clutch is felt to engage) is definitely to be recommended in order to give the synchromesh clutches a reasonable opportunity of doing their work.

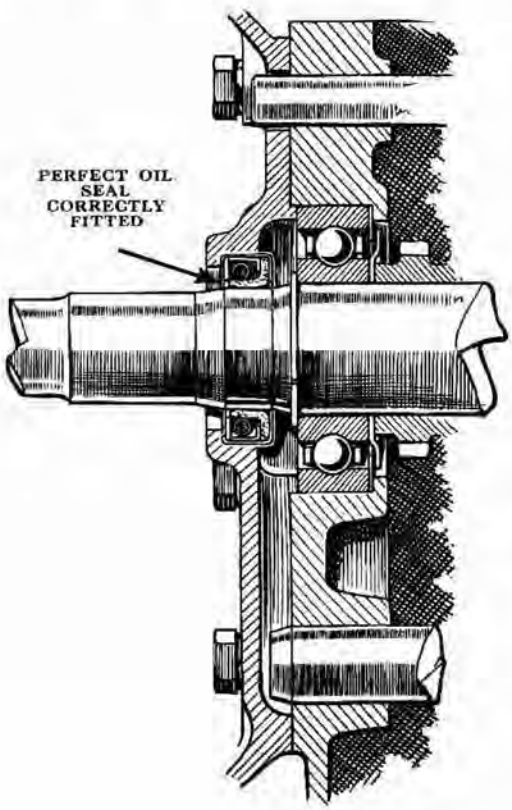
Date of issue : July, 1934

Instructions for Fitting Perfect Oil Seals—1934 Models

REFERENCE to the diagram hereunder will show that Perfect oil seals should be fitted with the knife edge, or flexible portion of washer, facing towards the engine, and not facing the gearbox, as has been the accepted practice previously.

They should be soaked in engine oil heated to a temperature not exceeding 120° F. for a period of approximately one hour before installing. *This is important.*

When fitting the aluminium clutch casing with Perfect oil seal in place to the gearbox, care should be taken to see that the knife edge of the seal is not damaged by the splines of the gearbox drive gear. A tapered piece of steel tube applied to the end of the shaft in such a manner that the oil seal can be led over the leading edges to the top of the splines is recommended. This will avoid cutting the leather.



Date of issue: 12*th February*, 1935

Morris Pistons

IN order to simplify the servicing of piston assemblies by Distributors and Dealers, we have decided considerably to curtail the number of sizes which are to be ordinarily held in stock, in accordance with the details given on Sheet No. 2.

It will be noted that the range of all types will be standard size, with .001 in., .002 in., .003 in. oversize, followed by .010 in., .015 in. and increasing by steps of .005 in. up to .045 in.

All piston sizes will be marked on the outside of the carton **with the degree of oversize bore which they will fit**, the requisite clearance having been allowed for in the diameter. The actual pistons, however, will, for the time being, still bear the existing markings, as for example, Type 103/5 " A " Standard, will still be marked " A—12," and .001 in. oversize " A—10." etc.

Any intermediate sizes to those shown on the Chart may still be had to special order at short notice.

Obviously there should be little demand for replacement pistons of " standard " sizes. It is therefore very essential, when ordering replacements to fit original bores, that the existing markings of pistons should be carefully noted and clearances checked so that suitable oversize pistons can be selected.

It is requested that all future orders for piston assemblies should state oversize required in thousandths of an inch.

PISTON AND RING (...)T (PRE "SERIES" MODELS)

	O.H.V.	Minor S.V.	S.V.		SA	SA	SA	...	...	SA	SA	SA	SA	SA	SA	SA	SA	SA	
Sub-Assembly No.	37380	38968	38969		1508/2	722/8	1205/8	1205/4	103/11	104/13	104/14	1812/2	722/9	1118/8	1118/9	548/4	543/5	1003/4	PISTON RING SIZE.
Piston Skirt Clearance ... (millimetres)	(inches) .003	(inches) .0025	(inches) .0025		.07	.09	.09	.09	.10	.11	.07	.10	.09	.09	.11	.14	.11	.14	

BORE SIZES			PISTON MARKINGS																Size.	Grade.
Grade	Metric	Nearest English equivalent																		
"A"	Standard		A X Y Z	A X Y Z	A X Y Z	—.0005" Mean +.0005"	A— 7	A— 9	A— 9	A— 9	A—10	A—11	A— 7	A—10	A— 9	A— 9	A—11	A—14	A—11	A—14	Standard "A"
	+.02	.001"	AZ1 Z	AZ1 Z	AZ1 Z		A— 5	A— 7	A— 7	A— 7	A— 8	A— 9	A— 5	A— 8	A— 7	A— 7	A— 9	A—12	A— 9	A—12	
	+.05	.002"	AZ2 Z	AZ2 Z	AZ2 Z		A— 2	A— 4	A— 4	A— 4	A— 5	A— 6	A— 2	A— 5	A— 4	A— 4	A— 6	A— 9	A— 6	A— 9	
	+.08	.003"	AZ3 Z	AZ3 Z	AZ3 Z		A+ 1	A— 1	A— 1	A— 1	A— 2	A— 3	A+ 1	A— 2	A— 1	A— 1	A— 3	A— 6	A— 3	A— 6	+.003"	
	+.10	.004"					A+ 3	A+ 1	A+ 1	A+ 1	A— 0	A— 1	A+ 3	A— 0	A+ 1	A+ 1	A— 1	A— 4	A— 1	A— 4	+.003"	
	+.13	.005"					A+ 6	A+ 4	A+ 4	A+ 4	A+ 3	A+ 2	A+ 6	A+ 3	A+ 4	A+ 4	A+ 2	A— 1	A+ 2	A— 1	+.005"	
"B"	+.25	.010"	B Z	B Z	B Z		B— 7	B— 9	B— 9	B— 9	B—10	B—11	B— 7	B—10	B— 9	B— 9	B—11	B—14	B—11	B—14	+.010"	"B"
	+.38	.015"	BZ5 Z	BZ5 Z	BZ5 Z		B+ 6	B+ 4	B+ 4	B+ 4	B+ 3	B+ 2	B+ 6	B+ 3	B+ 4	B+ 4	B+ 2	B— 1	B+ 2	B— 1	+.015"	
"C"	+.50	.020"	C Z	C Z	C Z		C— 7	C— 9	C— 9	C— 9	C—10	C—11	C— 7	C—10	C— 9	C— 9	C—11	C—14	C—11	C—14	+.020"	"C"
	+.63	.025"	CZ5 Z	CZ5 Z	CZ5 Z		C+ 6	C+ 4	C+ 4	C+ 4	C+ 3	C+ 2	C+ 6	C+ 3	C+ 4	C+ 4	C+ 2	C— 1	C+ 2	C— 1	+.025"	
"D"	+.75	.030"	D Z	D Z	D Z		D— 7	D— 9	D— 9	D— 9	D—10	D—11	D— 7	D—10	D— 9	D— 9	D—11	D—14	D—11	D—14	+.030"	"D"
	+.89	.035"	DZ5 Z	DZ5 Z	DZ5 Z		D+ 7	D+ 5	D+ 5	D+ 5	D+ 4	D+ 3	D+ 7	D+ 4	D+ 5	D+ 5	D+ 3	D— 0	D+ 3	D— 0	+.035"	
"E"	+1.0	.040"	E Z	E Z	E Z		E— 7	E— 9	E— 9	E— 9	E—10	E—11	E— 7	E—10	E— 9	E— 9	E—11	E—14	E—11	E—14	+.040"	"E"
	+1.14	.045"	EZ5 Z	EZ5 Z	EZ5 Z		E+ 7	E+ 5	E+ 5	E+ 5	E+ 4	E+ 3	E+ 7	E+ 4	E+ 5	E+ 5	E+ 3	E—O	E+ 3	E—O	+.045"	
"F"	+1.25	.050"					F— 7	F— 9	F— 9	F— 9	F—10	F—11	F— 7	F—10	F— 9	F— 9	F—11	F—14	F—11	F—14	+.050"	"F"
	+1.40	.055"					F+ 8	F+ 6	F+ 6	F+ 6	F+ 5	F+ 4	F+ 8	F+ 5	F+ 6	F+ 6	F+ 4	F+ 1	F+ 4	F+ 1	+.055"	
"G"	+1.50	.060"					G— 7	G— 9	G— 9	G— 9	G—10	G—11	G— 7	G—10	G— 9	G— 9	G—11	G—14	G—11	G—14	+.060"	"G"

MODEL and ENGINE Nos.	Minor O.H.V. 101 onwards	Minor S.V. 101 to 7529	Minor S.V. 7530 onwards		Eight 501 to 50744	* See below	Ten Six RA501 onwards	Ten Six Special RB1907 onwards	M.C. 11.9 h.p. 393968 to 435205	14/28 h.p. and 14/32 h.p. 192902 onwards	Van 14/32 h.p. 362452 onwards. Special light-weight cast iron	M.C. Twelve Four 501 to 8569 and Twelve Four Van 4039 to 10314	Major 14 h.p. LE501 to 14950	M.O. 16 h.p. QA501 to 8950	M.O. 20 h.p. QF501 onwards	Isis 9169 to 16648	Isis 16649 onwards	Morris 25 h.p. OA501 onwards	

* Ten Four, MA501 to 44459. Major 15 h.p., LB16735 to 28530. Major 15 h.p., LF13605 to 14950. M.O. 15 h.p., LA501 to LC33440. M.C. Six and Fifteen Six, 14951 onwards.

PISTON CHA... SERIES" MODELS)

NOTE THAT ALL PISTONS ARE NOW MARKED FOR BORE SIZE. THE CORRECT STANDARD CLEARANCE BEING PROVIDED FOR IN THE COURSE OF MANUFACTURE—i.e. PISTON MARKING (FOR BORE SIZE A O.K.) **FITS THE "A" STANDARD BORE.**

When ordering pistons indicated on this chart your order must read "Piston assembly for bore size——" and you only need to concern yourself with the Bore size. The engine numbers concerned are clearly indicated in the table below.

SUB-ASSEMBLY NUMBER.	SA 1508/4	SA 1508/3	SA 3002	SA 3002/1	SA 1508/6	SA 1720/1	SA 1720/2	SA 2223/3	SA 2223/2	SA 2223/4	SA 1312/3	SA 1312/4	SA 1922/2	SA 1922/5	SA 1312/5	SA 1118/11	SA 1118/12	SA 2017/4	SA 1118/10	SA 1118/6	SA 1003/7	SA 1003/5	SA 1003/8	SA 2127/3
CASTING NUMBER (EMBOSSED ON GUDGEON PIN FLAT)	15340	15437	30004	30004	15499	17107	17107	22273	22273	22537	13162	13162	19396	19396	13354	11617	11617	20589	11458	11548	10349	10382	10382	21486
PISTON SKIRT CLEARANCE. Inches	.0028	.0016	.0024	.002	.0024	.0035	.0035	.0035	.0028	.0031	.0035	.0039	.0028	.0028	.0031	.0031	.0031	.0024	.0031	.0035	.0051	.006	.006	.0024
mm.	.07	.04	.06	.05	.06	.09	.09	.09	.07	.08	.09	.10	.07	.07	.08	.08	.08	.06	.08	.09	.13	.15	.15	.06
PISTON SKIRT TYPE.	Plain	Split	Slotted	Slotted	Slotted	Plain	Plain	Plain	Slotted	Slotted	Plain	Plain	Slotted	Slotted	Slotted	Plain	Plain	Slotted	Plain	Plain	Plain	Plain	Plain	Split
	Eight Series I UB Engines 56745 to 172600	Eight Series II UB Engines 172601 onwards	Eight Series I Series II Recon-ditioned Engines only	Eight Series I Series II Recon-ditioned Engines only	Eight Series "E" and Series "Z" Vans USHM 501 onwards	Ten Four Series II Engines MK and MSJM 44460 onwards	Ten Four Series III Engines MPJM 501 to 7452	Ten Four Series III Engines MPJM 7453 to 8084	Ten Four Series III Engines MPJM 8085 onwards	Ten Four Series "M" Engines XPJM 501 onwards	Twelve Four Series II Engines TJ or TSBM 8570 onwards Series II 10-cwt. Van Engine TK 101315 onwards	Twelve Four Series III Engines TPBM 501 to 3950	Twelve Four Series III Engines TPBM 3951 to 16460	Twelve Four Series III Engines TPBM 16461 onwards	Twelve Four Series "Y" Vans Engines TK3	Fourteen Six Series II Engines QSDM 501 onwards	Fourteen Six Series III Engines QPDM 501 to 2115	Fourteen Six Series III Engines QPDM 2116 onwards	Sixteen Six Series II Engines QH 8951 onwards	Eighteen Six Series II Engines QJ or QSHM 2520 onwards	Twenty-one Six Series II Engines OJ 501 onwards	Twenty-five Six Series II Engines OK 501 onwards	Twenty-five Six Series III Engines OPEM 501 to 868 and 889 to 979	Twenty-five Six Series III Engines OPEM 869 to 888 and 980 onwards
	When sets of pistons are required for the above engines always order SA1508/6. They are fitted to all Works reconditioned engines and cylinder blocks of this type.					When sets of pistons are required for the above engines always order SA2223/2. They are fitted to all Works reconditioned engines and cylinder blocks of this type.					When sets of pistons are required for the above Engines always order SA1922/5. They are fitted to all Works reconditioned engines and cylinder blocks of this type.					When sets of pistons are required always order SA2017/4. They are fitted to all Works reconditioned engines and cylinder blocks of this type.							Pistons of this type will be supplied in accordance with engine numbers.	

PISTON MARKINGS

GRADE	A						B		C		D		E		F		G
IZE. Inches	Standard	+.001	+.002	+.003	+.004	+.005	+.010	+.015	+.020	+.025	+.030	+.035	+.040	+.045	+.050	+.055	
" Metric equivalent	—	.02	.05	.08	.10	.13	.25	.38	.50	.63	.75	.89	1.0	1.14	1.25	1.40	
MARKING (for Bore Size).	A OK	A+2	A+5	A+8	A+10	A+13	B OK	B+13	C OK	C+13	D OK	D+14	E OK	E+14	F OK	F+15	

Date of issue: March, 1935

Clutch Pedal Clearance in Footboard

WE are taking this opportunity of bringing before your notice the following very important point in connection with the maintenance of Morris cars.

It is not always appreciated that as the clutch corks bed down the clutch pressure plate assembly will gradually move closer to the flywheel, and that this movement will decrease the clearance between the clutch pedal and the footboard. Unless the requisite clearance is maintained by periodical adjustment of the pedal it may rest against the floorboard and clutch slip may result. More important, however, because it is less easily detected, is the fact that long before clutch slip occurs the clutch withdrawal thrust mechanism will be subjected to continual pressure which it is not designed to withstand, and failure of the thrust bearing, with resultant damage to the fork ends of the withdrawal shaft, may occur. The remedy against any such possibility of failure is simple—it is only necessary to maintain the requisite footboard clearance.

Date of issue: May, 1935

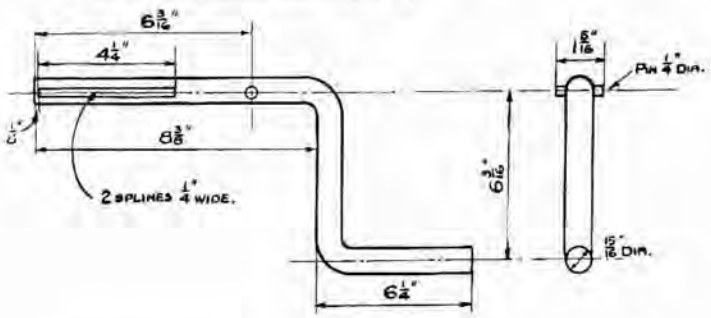
Gear Meshing—Rear Axle

THIS Sheet is prepared to deal solely with the correct and recommended method of adjusting the rear axle gears on all current models to obtain quiet running and durability.

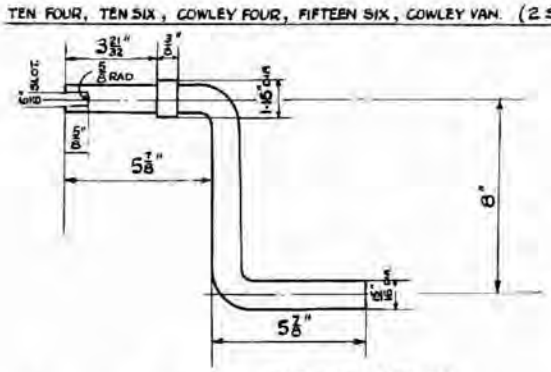
After the differential assembly has been removed from the car, and the gears stripped and thoroughly cleaned, the crown wheel assembly, complete with differential cages and bearings, should be mounted to the differential carrier or front cover, taking care that both bearings are firmly set against their shoulders in the casing and caps before the cap bolts have been tightened. It is always advisable to check this point by tapping gently the outer rings of the differential bearings with a suitable punch, until they are heard to strike against their shoulders.

The differential cage adjusting nuts should now be tightened until all side play has been eliminated, but at the *same time the bearings are not nipped.* When finally adjusted, the crown wheel assembly should spin quite freely on its bearings, without any signs of tightness. Any further adjustment to gain the correct amount of backlash will be made by slackening off one nut a given amount and tightening the other a similar amount, at the same time assisting the assembly to move in the bearings by giving the caps a smart blow from a hammer.

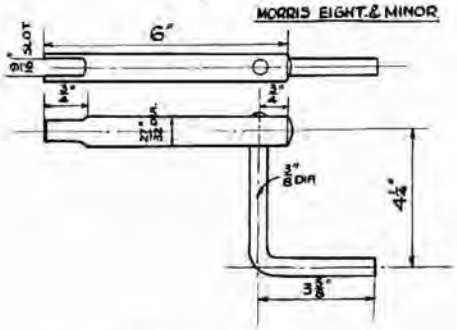
OXFORD 16 & 20, COWLEY VAN. (4 STAR.)



TEN FOUR, TEN SIX, COWLEY FOUR, FIFTEEN SIX, COWLEY VAN. (2 STAR)



MORRIS EIGHT & MINOR



To check the backlash accurately a clock gauge should be employed mounted on the differential casing in such a way that its indicator spindle is at right angles to the tooth face.

After the drive pinion assembly has been added, and the sleeve adjusted to give a dead flush tooth at the toe, the crown wheel assembly should be set in the manner described to give a backlash *of not less than .007 in. and not more than .010 in.* This point should always be checked by a clock gauge in the manner illustrated.

Using a suitable cranking handle—see illustration—the crown wheel assembly should be turned in both direct d the position of the drive pinion altered in and out until the quietest running position of the gears is obtai eedless to say, if it is found necessary to adjust the pinion in, to obtain quiet running, it will be necessary to re-pos e crown wheel assembly to increase the backlash to the correct limits, and vice versa if it is found that the qui nning position is obtained by bringing the drive pinion assembly out.

Date of issue: May, 1935

Gear Meshing—*continued*

The final adjustment is now made by taking a marking of the teeth, using red lead mixed with engine oil. Approximately a dozen crown wheel teeth should be lightly coated, and again the crown wheel assembly turned in both directions by the suitable cranking handle.

Reference to the illustrations below will show the correct marking required when the assembly is tested without load on the bench. It will be appreciated, of course, that when mounted in the car the marking will travel up towards the full length of the teeth without creeping over the heel, which would, of course, produce very noisy operation.

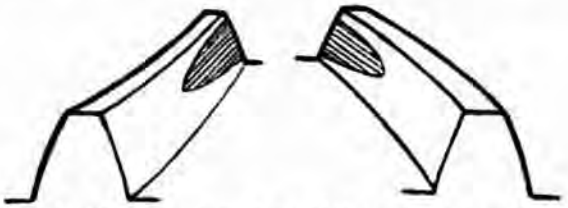


Fig. 1. Shows the correct marking on the crown wheel teeth when the gears are tested on the bench without load. If the marking shows higher on the driving side, this can be corrected by adjusting the pinion towards the crown wheel and readjusting the crown wheel for backlash. If the marking shows high on the over-run side of the teeth, the pinion should be taken away from the crown wheel, and the backlash reduced to not less than .007 in.

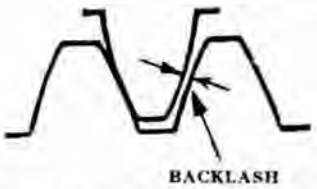


Fig. 2. Shows the backlash, which should not be less than .007 in. nor greater than .010 in.

Fig. 3

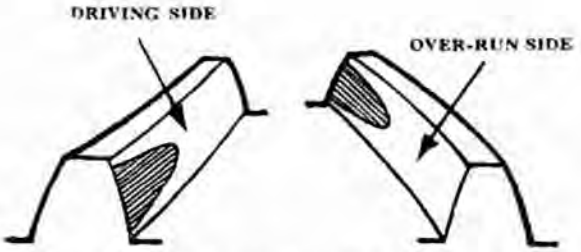


Fig. 4. Shows a heel and toe bearing, which is definitely wrong. To obtain correct marking (Fig. 1) adjust pinion towards crown wheel and set crown wheel away from the pinion to restore backlash .007 in. to .010 in.

Fig. 5. This marking is incorrect and is caused by the pinion being too far into mesh with the crown wheel. To correct, adjust pinion away from crown wheel and reset backlash.