ELECTRICAL AND IGNITION

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q8

SB/BB.1/NT.

Subject : OVERHAUL OF STARTER MOTOR DRIVES. 20 H.P., 20/25 H.P., 25/30 H.P. & WRAITH MODELS.

Date of Issue 16th March, 1953.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

GENERAL:

In order to prolong the life of the starter pinion and flywheel teeth, a friction drive is embodied in the Starter Motor of the above chassis.

This leaflet is intended as a guide when overhaul of these Starter Drives is undertaken, assuming the electrical system to be in order.

If the clutch pit is excessively oily, due to over-use of the one-shot system or poor condition of the rear main bearing, slipping of the Starter Drive will occur. Deterioration of the friction discs will also result from accumulated condensation in the clutch pit, a fault which may be rectified by drilling a 3/16" dia. hole between the clutch housing main strengthening webs immediately below the Starter. In either case, attention to the primary cause of failure is necessary.

The friction drive is positioned on the end of the Starter Motor armature shaft and is separately removable. The drive takes the form of either a single or multi-plate clutch, held in compression by a spring and designed to slip at a figure within the limits 15 - 30 lbs./ft.

On the early 20 H.P. cars (Chassis No.G-1 to GTM-41) a single cork disc drive was employed. The three disc pattern was used from Chassis No.GFN-1 to the end of the 20/25 H.P. series, and the five disc type was introduced for all 25/30 H.P. and Wraith models. The five disc drives were subsequently modified to the seven disc pattern, and opportunity should be taken when overhauling to embody this modification.

REMOVAL OF THE STARTER DRIVE FROM THE CAR:

On all models, the Starter Drive may be withdrawn from the rear, leaving the Starter Motor in position. On all 20 H.P. and 20/25 H.P. models, it is necessary to remove the cap situated towards the rear of the bell housing, and undo the nut on the end of the shaft; allowing the Starter Drive to be drawn off. On 25/30 H.P. and Wraith models, removal of the outermost ring of four nuts permits the withdrawal of the Starter Drive complete with end bearing assembly. In all cases care must be taken to ensure that the spiral spring positioned between the Starter Motor and the pinion is not lost.

DISMANTLING PROCEDURE:

Single Disc Type: (Chassis G-1 to GTM-41).

Using pliers and screwdriver, the retaining ring which is externally dogged, can be withdrawn. The large cap can then be lifted off, followed by a second dogged ring. The member housing the buffer spring and bush, will then be pushed from the casing by the spring, carrying with it the shaft and engaging nut (1/hand thread). The latter can then be removed and the cork friction washer examined.

In order to remove the buffer spring (this may first be compressed slightly so that it is clear of the ring, by using the shaft and engaging nut), the threaded nut of the shaft should be pressed through the member and the nut screwed on. Shaft and nut can be screwed together until the bush is seen to be pressed clear of the ring. The ring can now be removed.

3-Disc Drive: (Chassis No. GFN-1 to end of 20/25 H.P. Series, GTK-53.)

Having drawn the splined stop and bearing off the shaft, remove the retaining ring and pull off the cap, and remove the ring and fibre washer. The spring will then push out the engaging nut, friction discs and buffer spring housing assembly.

The friction washers may now be examined. The method of removing the buffer spring is the same as for the single-disc type.

5 & 7 Disc Drives: (Chassis GUL-1 to end of series, GZR-41, Wraith WXA-1 to WEC-74).

Undo the three securing nuts and remove the end cap. Release the tab washer and undo the shaft nut; the end housing and bearing together with the stop nut may then be drawn off the shaft. As with the earlier types, prising out of the retaining ring will release the clutch assembly for examination. The shaft may then be drawn through the pinion and used as previously described in removing the buffer spring if necessary.

INSPECTION AND OVERHAUL OF FRICTION DISCS:

Owing to the material situation, it is sometimes not possible to provide the correct grade of cork and as an agglomerated cork washer is unsatisfactory, Ferodo washers will be supplied for the 3 and 5 disc drives, in lieu of sheet cork.

Single Disc Drive:

In the case of the single disc drive, the correct grade of washer, part number D.51291 is available.

3-Disc Drive:

When the Ferodo Discs, RD.3726, are supplied for the 3-disc drive, it is necessary to fit 4 instead of 3. The additional washer is due to the decreased thickness of the disc and two washers should be fitted face to face to give the correct length of pack. In practice it may be found that a slipping torque of 15 - 30 lbs./ft is not obtainable and it may be found necessary to increase the thickness of the pack by the insertion of an additional steel washer, D.51584, between the two Ferodo washers normally fitted face to face. The total thickness of the pack should be .623", bringing the resultant torque up to specification.

5-Disc Drive:

Whenever a 5-disc drive is dismantled, opportunity should be taken to modify this drive to the later 7-disc pattern. In place of the cork washers, it will be found beneficial to use the Ferodo washer, R.3726. 7 discs are now provided and it will be necessary to modify the existing friction plates and the driving shell stiffener. One each additional friction plate D.51584 and RD.3727 will be supplied in replacement. The conversion scheme is given below.

RE-ASSEMBLY PROCEDURE:

Single Disc Drive:

When reassembling, first fit the buffer spring bush and spring ring through the member. The shaft and nut can be used as before to compress the buffer spring for replacement of the spring ring. A little thin oil may be smeared on the screw thread and other engaging surfaces, but none must be allowed to reach the friction washer or the flange of the nut which engages with it.

If the pinion has been removed from the casing, care must be taken to see that the red fibre washer is in position in the casing before replacing the pinion. The order of assembly is as follows:-

1. Large coil spring.
2. Shaft.
3. Member, fully assembled.
4. Engaging nut (screwed lightly on the shaft until the thread of the shaft protrudes).
5. Ring.
6. Cap.
7. Locking ring.

Replacement of the cap, which involves compressing the spring, will be facilitated if the assembly is mounted vertically on two wooden blocks with the pinion downward, so that the weight of the unit and the reaction of compressing the spring is taken on the rounded end of the casing.

The armature shaft should be quite clean and lightly lubricated. While steadying the motor, the assembly with the spring can be slipped on the shaft, followed by the stop and nut. When the latter is tightened, the ball race can be replaced on the stop, the split cotter fitted to the nut and the end cover replaced, tightening the 4 set screws evenly.

3-Disc Drive:

Using the shaft and nut to compress the buffer spring, the spring ring can be replaced.

All parts of the drive should be carefully cleaned and oiled with the exception of the cork friction washers and the screw threads of the shaft and nut which should be lubricated sparingly.

If the pinion has been removed from the casing, it must be ascertained that the red fibre washer is in position before replacing the pinion.

The various parts can be built in to the casing as follows:-

1. Fit the coil spring into casing.
2. Fit the shaft into the pinion.
3. Assemble on the engaging nut in the following order: 1 Ferodo washer, 1 externally serrated plate, 1 Ferodo washer, 1 Steel washer (D.51584) 1 Ferodo washer, 1 internally serrated plate, 1 Ferodo washer and the member containing all the parts.
4. Fit the assembly into the casing, screwing the shaft lightly into the engaging nut.

5. Replace the ring and washer.
6. Fit the cap.
7. Fit the locking ring.

In some cases a locking ring is supplied in the tool kit of the car.

It will be found easier to replace the cap if the assembly is mounted vertically on two wooden blocks, arranged so that the weight of unit and the reaction of compressing the spring is taken on the rounded end of the casing.

The armature shaft should be quite clean and smeared with a little lubricant.

The drive with the spring can then be replaced on the shaft, followed by the stop, bearing and a plain washer.

5-Disc Drive:

Place the fibre washer over the pinion with the chamfer outwards, place the pinion into the shell and drop the shaft into the shell through the pinion. Place the engaging spring into the shell. Place the assembly, consisting of the end clutch plate, the damping spring, washer and spring ring over the shaft and into the engaging spring and shell. Holding the operating nut vertically, assemble the discs to it in the following order, noting that the outer steel clutch disc is securely held by the spring ring: First a Ferodo disc, steel disc with projections, Ferodo disc, spigotted steel disc, Ferodo disc, second steel disc with projections, Ferodo disc, 2nd spigotted steel disc, Ferodo disc, steel disc with projections, Ferodo disc, third spigotted steel disc and finally last Ferodo disc.

Having thus assembled the discs, hold them closely together with the fingers, remove the operating nut and measure the overall thickness of the discs, which should be 1.108" (- .010"). If it is found that this measurement is above the limit, it is permissible to reduce the thickness of the Ferodo discs by rubbing them on glass paper on a flat surface. If below the limit, increase the thickness by selective assembly of the Ferodo discs, which are initially .094" thick. The Ferodo discs, when the correct thickness of pack has been obtained, can then be soaked in oil for 30 minutes and reassembled on to the operating nut as previously described.

The remainder of the assembly is more easily carried out if the drive is mounted vertically in a vice. The sub-assembly can then be placed over the shaft and forced down against the spring by screwing the shaft through the operating nut. The assembly can then be completed by placing the fibre distance washer into the clutch ring, entering the chamfer downwards. The clutch ring and distance washer can then be placed on to the outer clutch disc and held down by turning the shaft, allowing the cover to be fitted and retained by means of the locking ring.

With the stop operating bush in position in the bearing and the key in its keyway, the aluminium housing and bearing can be fitted and secured with a new locking washer and slotted ring nut. The slipping torque of the drive can then be checked to ascertain that a reading of 15 - 30 lbs./ft. is obtainable. When this test has been satisfactorily concluded the nut can be locked and the bearing lubricated with H.M.P. Grease, the end cover replaced and secured with three nuts.

When checking the slipping torque, the measurement should be taken after slipping the drive by hand for at least 10 revolutions. Correction is effected by selective fitting of the Ferodo washers and/or by reducing the thickness as required.

If a torque spanner is used, it will be necessary to remove the slotted ring nut from the end of the drive and substitute a standard $\frac{1}{2}$" BSF nut. The drive can be mounted vertically in a vice and the torque spanner applied to the nut with the pinion firmly held. If no torque spanner is available, a torque arm suitable for the purpose can be made from ordinary steel plates, the end which fits around the pinion being suitably shaped so that two or three projections in the shape of teeth are left to engage with the teeth of the pinion. The length of the arm should be 1 ft. between the two hole centres and a spring scale reading up to 35 lbs. will be required. The torque can be read directly off the spring scale, keeping the spring scale at approximately right angles to the torque arm.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q7(a)

SB/VA.2/SF.

Subject :

BATTERIES.

Date of Issue 29th March, 1954.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

The batteries recommended for all pre-war Rolls-Royce cars are as follows. Those specified are currently available and are not necessarily the type originally supplied. This Service Instruction Leaflet supersedes Leaflet No.RR/Q7, which should be destroyed.

Model	Type	Make	R.R. Part No.	Length	Width	Height	
20-HP	6-MXP-9L	Exide	R-4654	13-3/16"	6-13/16"	10"	With cover
Early 20/25HP	6-HZP-11G	Dagenite	Y-3008	15"	6-13/16"	10"	With cover
Late 20/25 & 25/30HP	6-HZP-11S	Dagenite	Y-3003	15"	6-13/16"	10"	With cover
Wraith	6-HZP-11G	Dagenite	Y-3008	15"	6-13/16"	10"	With cover
Silver Ghost & Early Ph.I	6-RR5-1	Exide	Y-3007	$20\frac{1}{8}$"	$6\frac{1}{4}$"	10-1/16"	No cover
	6-RR-11AW	Dagenite	"	$20\frac{1}{8}$"	$6\frac{1}{4}$"	$10\frac{1}{4}$"	No cover
Late Ph.I & Ph.II	3-RRS-1-JL	Exide	Y-3005	$10\frac{7}{8}$"	$6\frac{1}{8}$"	10-1/16"	No cover
	3-RRN-11AW	Dagenite		$10\frac{5}{8}$"	$6\frac{1}{8}$"	$10\frac{1}{4}$"	No cover
Ph.III	6-GLK-13-S	Dagenite	Y-3006	$17\frac{3}{4}$"	6-13/16"	10"	With cover

NOTE: All the above are 12 volt batteries.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR / Q7

SB/GE.2/EB

Subject : RECOMMENDED REPLACEMENT BATTERIES FOR ROLLS-ROYCE CARS: ALL MODELS.

Date of Issue 28th June, 1948.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

In view of the fact that many of the batteries fitted to pre-war Rolls-Royce cars have deteriorated through age and service, and identical replacements are no longer obtainable, the current replacements covering all Rolls-Royce chassis are quoted hereunder.

R.R. Model.	Battery Maker's Type Designation.		Approximate. AMP/HRS.capacity.
	P & R Dagenite.	Exide.	
20-HP.	6 - TBD - 7E.	6 - XL3 - 4.	50 amp/hrs.
20/25-HP.	6 - TBS7- A. or 6 - BGD9- 5.	6 - XSM - 1L. or 6 - XHR - 1ML.	50 amp/hrs.
25/30-HP.	6 - HZD11 - S or 6 - HZD11 - G.	6 - XCMR11 - 1RL. or 6 - XCKR11 - SL.	60 amp/hrs.
Wraith.	6 - HZD11 - G.	6 - XCKR11 - SL.	60 amp/hrs.
40/50-HP Phantom 1.	6 - RR - N11. (Chassis Nos. 1-MC to 101-WR). 2x3 - RR - N11. (Chassis Nos. 102-WR to 90-OR).	6 - RR5 - 1A. 2x3 - RR5 - 1L.	75-80 amp/hrs.
40/50-HP Phantom 11.	2x3 - RR - N11. (Chassis Nos. 1-WJ to 211-RY). 6 - GLD13 - SR. (Chassis Nos. 2-SK to 82-UK).	2x3 - RR5 - 1L. 6 - XCMR13 - 1MR.	75-80 amp/hrs.
Phantom 111.	6 - GLD13 - SR.	6 - XCKR13 - MR.	80 amp/hrs.

NOTE:- All the above are 12 volt batteries.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q 6

SB/GF.1/SF.

Subject : VOLTAGE CONTROL REGULATORS. TESTING AND MAINTENANCE.

Date of Issue

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

The purpose of this leaflet is to give the necessary information relating to the adjustment, maintenance, location and correction of faults in the types of regulators fitted to Rolls-Royce cars.

GENERAL DESCRIPTION.

A regulator is incorporated within the electrical system between the dynamo and battery, its function being to meet the varying demands of the battery while in service by controlling the output of the dynamo.

Thus, when the battery is in a discharged state, the rate of charge will be increased in order to restore the battery to its normal state in the minimum possible time. Conversely, when the battery is fully charged, there will be only a trickle charge, thereby eliminating the possibility of damage through overcharging. Current taken from the battery by use of lights and other electrical accessories is balanced by an increase of charging rate, this being provided for by the regulator.

It will, therefore, be seen that the correct functioning of the regulator will result in the longer life of the battery, and will protect all the other accessories which are dependent on the battery for their operation.

The actual operation of the regulator depends upon the fact that the voltage of the dynamo is kept constant, while the voltage of a battery varies between certain fixed limits, according to the state of charge of the battery, the voltage being a maximum when the battery is fully charged, and a minimum when fully discharged.

We illustrate below a typical installation.

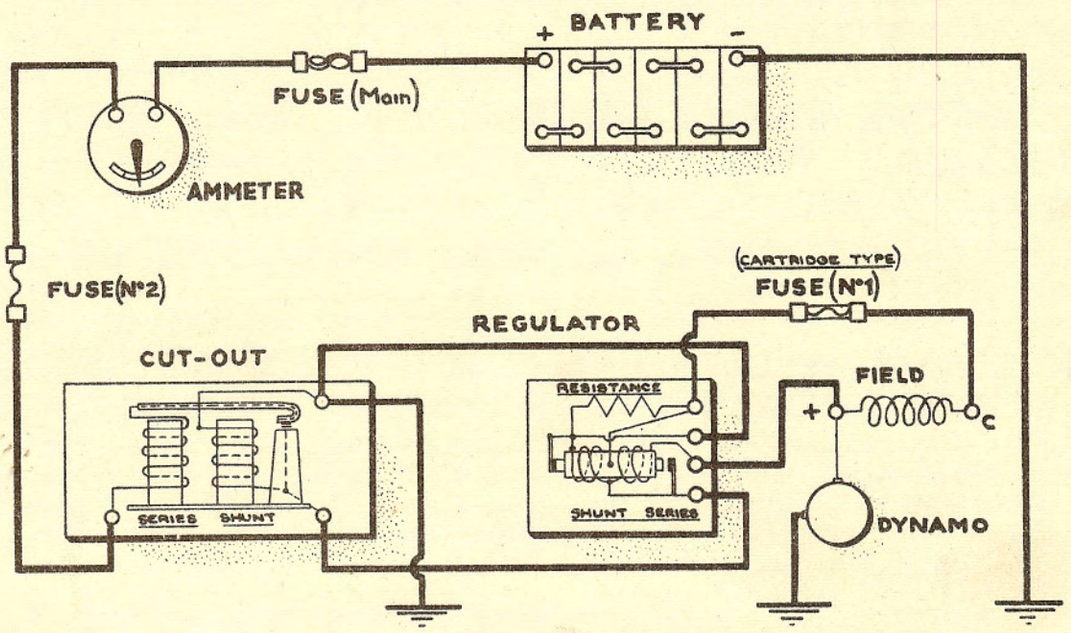


Fig. 1.

TECHNICAL DESCRIPTION OF OPERATION.

The regulator consists of a cylindrical steel shell, housing two windings, while an armature carried on a pair of guide springs, moves axially at its centre.

The armature carries at its two extremities the moving elements of two pairs of contacts, which control the field circuit, one pair serving to insert a resistance, while a second pair, on further movement of the armature, short circuits the field winding itself. The first pair of contacts are held closed by means of a spring when the regulator is inoperative.

The windings consist of a voltage winding, connected to and directly across, the dynamo terminals, and a current winding, which carries the full current from the dynamo to the battery. These coils assist each other in energising the magnet system, and thus in effecting movement of the armature.

When the dynamo voltage reaches a predetermined figure, the magnetic field due to the voltage winding becomes sufficiently strong to attract the armature. This causes the first set of contacts to open, thereby inserting the resistance in the field circuit. This reduction in field circuit lowers the dynamo voltage, and this, in turn weakens the magnetic fields due to the voltage coil. This allows the armature to return to its original position, thus closing the contacts, so that the voltage returns to the predetermined maximum. The cycle is then repeated, and the armature is set into vibration.

As the speed of the dynamo rises above that at which the regulator comes into operation, the amplitude of vibration increases, and the periods of interruption increase in length, with the result that the mean value of the voltage on the machine terminals undergoes practically no increase, once the operating speed has been attained.

When the amplitude of vibration increases beyond a certain point, the second pair of contacts come into operation, short circuiting the field winding of the machine. The initial movement of the armature therefore, inserts resistance in the field, and additional movement short circuits the field winding entirely, so as to give a still more pronounced regulating effect.

The series winding provides a compensation on this system of control, for, if the control were arranged entirely on the basis of dynamo voltage, there would be a risk of very seriously overloading the dynamo when the battery was in a low state of charge, particularly if the lamps were simultaneously in use. Under these conditions, the dynamo would be forced to give an output to bring the voltage of the system up to the same value as if the battery were in its normal fully charged state, and thus, with a battery of low internal resistance would necessitate an extremely heavy current, far beyond the normal capacity of the machine. The series winding assists the voltage coil, so that when the dynamo is delivering a heavy current into a discharged battery, the regulator comes into operation at a somewhat reduced voltage, thus limiting the dynamo output accordingly.

AMMETER READINGS.

The ammeter is merely a visible means of indicating the amount of current passing into, or out of, the battery and readings will depend upon the general conditions of the battery.

Providing the battery is fully charged, ammeter readings during normal daytime running, will seldom be more than a few amperes.

A discharge may, however, be observed immediately after switching on the head lamps or any other heavy consumer of current. This is normal, and usually indicates that the battery voltage is high. This voltage will fall after a short while, and the regulator will respond, causing the dynamo to balance the load by increase of output.

On the other hand, if a start has been made from cold by using the starter motor, the battery will be in a partially discharged state and the charging rate will rise to a steady maximum, remaining there for perhaps 10/15 minutes, after which it will drop to a steady charge suitable to the condition of the battery.

Ammeter readings, although dependent principally on battery condition, may however, indicate irregularities in regulator performance, but this should be supported by other corroborative evidence, as abnormal ammeter readings may be the result of one or several faults developing within the complete electrical system. Examination of such items as the wiring system, including switches, battery and dynamo should, therefore, be carried out before making an adjustment to the regulator.

A fault locating chart will be found on Page 7 of this leaflet, which will assist in determining whether an electrical fault lies in the regulator, or in another part of the circuit.

TYPES OF REGULATOR USED ON ROLLS-ROYCE CARS.

Regulator Type.	Rolls-Royce Chassis.
B2 CJ 1	20/25-HP(GAF52 to GBK58 incl.) Phantom II(3 TY " 82 UK ")
B2 CJ 1A	20/25-HP(GBK59 to GTK53 incl.) 25/30-HP(GUL1 " GZR41 incl.) Phantom III(3-AZ20 to 3-DL160 incl.)
B2 CJ 11	Phantom III(3-DL162 to 3-DH203 incl.)
B2 CS 11	Wraith(WXA1 to WEC74 incl.)

NOTE: Regulator B2 CJ 1 is now obsolete, and has been superseded by type B2 CJ 1A.

TESTING OF REGULATOR - B2 TYPE.

All settings for type B2 regulator are tested on open circuit, the battery being isolated from the dynamo, and all load due to lamps and other accessories switched off. To isolate the battery from the dynamo, all that is necessary is to insert a piece of thin dry paper between the cut-out points.

The limits of open circuit voltage setting for the four regulator types fitted to Rolls-Royce cars are as follows:-

Regulator.	Limits of Open Circuit Voltage.
B2 CJ 1	15.0 - 15.5 volts(now obsolete).
B2 CJ 1A	15.3 - 15.8 "
B2 CJ 11	15.8 - 16.4 "
B2 CS 11	15.8 - 16.4 " (Wraith only).

PROCEDURE FOR TESTING ON OPEN CIRCUIT.

1. Isolate battery from the dynamo.
2. Connect a moving coil voltmeter, calibrated in 1/10ths of a volt, across the dynamo terminals. (One reading from 1-20 volts would be most suitable).
3. Start the engine, and run the dynamo up to a speed of 1000/1500 r.p.m. when the reading should become steady. If it falls between the limits of open circuit voltage relating to that particular type of regulator, then regulator is functioning correctly.
4. If however, the readings do not fall between the limits, then STOP the engine and carry out the following adjustments to contacts.

NOTE: When this test is being carried out, the regulator MUST be cold.

For the purpose of regulator contact adjustments and open Circuit Voltage tests, the relationship between engine and dynamo speeds is given in the following table:-

CAR MODEL:	DYNAMO GEARING:	ENGINE R.P.M.	DYNAMO R.P.M.
Phantom II	1½ x engine speed.	670 r.p.m. approx.	1,000 r.p.m.
Phantom III	1¼ x " "	800 r.p.m. "	" "
20/25-HP.	1½ x " "	670 r.p.m. "	" "
25/30-HP.	1½ x " "	" r.p.m. "	" "
Wraith.	1½ x " "	" r.p.m. "	" "

ADJUSTMENT AND SETTING.

Before making any adjustments, it is necessary to have the proper tools available. These are obtainable from this Service Station and are as shown in Fig.2.

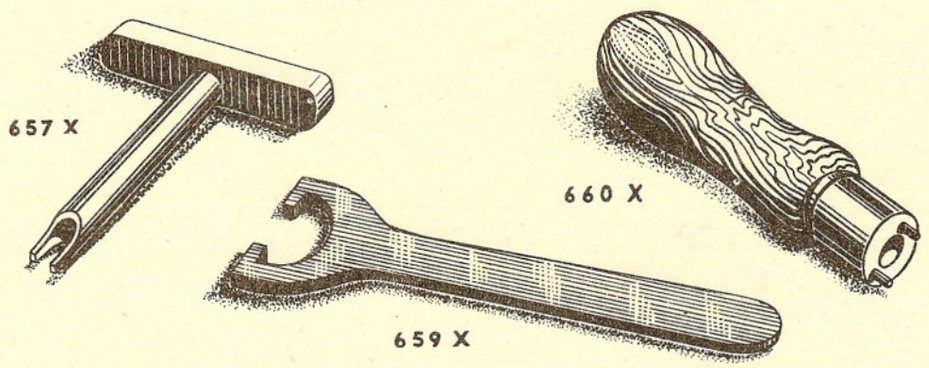


Fig.2. Tools for B2 Type Regulator.

When an adjustment is necessary, it is essential to remember the following points:-

1. Always STOP engine before moving adjusting screws.
2. Use only a high grade moving coil voltmeter; calibrated in 1/10ths of a volt.
3. Be sure that the battery is isolated or disconnected from the dynamo.

PROCEDURE - METHOD OF ADJUSTMENT.

1st Operation with engine STOPPED:

a) Slacken off locknuts (X,R & Y) using 659X and 657X.

b) Screw back contact (J), using tool 660X

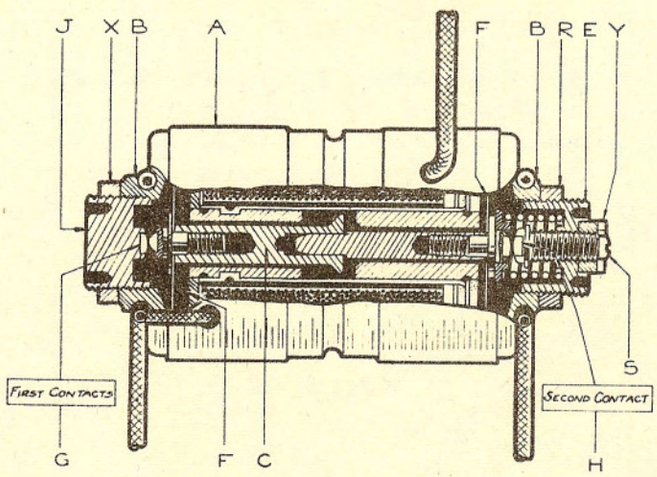
c) Screw back second contact (S) as far as possible.

d) Screw back the sleeve (E), using tool 660X.

e) Screw IN the first contact (J) as far as possible, until the armature (C) makes contact with the sleeve (D).

f) Screw back the first contact approximately one and a half turns.

g) Lock the first contact screw (J) in this position by means of the locking nut (X).



2nd Operation with engine RUNNING:

a) Run dynamo at approximately 1000 r.p.m.(see table giving engine to dynamo speeds).

b) Screw in sleeve (E) until the voltmeter reading is within limits of setting.

c) Run dynamo for one minute.

d) Adjust sleeve (E) until first contact setting is not more than 0.3 volt ABOVE lowest limit of setting,(e.g. if the setting should be 15.8/16.4v - set 1st contact at 15.8 to 16.1v).

e) Lock sleeve (E) in position by means of locknut (R).

f) STOP engine - screw in contact (S) as far as possible. Turn contact (S) back one complete turn, and then lock in position by locknut (Y).

g) Start dynamo and run up to 2000 r.p.m. Voltage setting on second contacts should be at least 0.1 volts above first contact setting, but within the general limits of setting. Assuming first contacts set at 16.1 volts, second contact must be set at 16.2/16.4 volts.

h) If second contact voltage is above limit, stop dynamo and screw IN (J) slightly, re-check first contact setting and then proceed in same manner as (f) in 2nd operation.

j) If second contact voltage is below that of first contact, stop dynamo and screw OUT (J) slightly. Re-check first contact setting and then proceed in same manner as (f) in 2nd operation.

The adjustment of contact (S) is only possible while the dynamo is stationary. If the contact is screwed up while the dynamo is running, a short circuit is caused on the dynamo, resulting in a fusing or welding of the regulator points.

NOTE: In actual practice, there will often be occasions when the open circuit voltage can be varied within the limits shown, by simply screwing in or out, the spring tensioning screw (E), and leaving the contact settings unaltered.

To carry this out, check the open circuit voltage, and, should it require for example, a 1 volt rise, stop engine, slacken off lock ring (R), and screw in (E) one quarter of a turn, (this giving approximately, the required 1 volt rise). Lock (R) tightly. This will have taken contact (S) in with it, so slacken off locking ring (Y) and turn (S) back to its original position. Lock (Y) tightly and test.

INTERCHANGEABILITY OF SETTINGS: B2 CJ 1A AND B2 CJ 11:

The incorporation within the electrical system of additional heavy consumer accessories, imposes a greater demand upon the battery, necessitating an increase in dynamo output to balance the load.

On those chassis fitted with a B2 CJ 1A regulator, this demand for increased dynamo output can be met by the alteration of the contact setting to correspond to that of the B2 CJ 11.

Conversely, persistent overcharging experienced on a chassis fitted with a B2 CJ 11 regulator can be overcome by an interchange in contact setting. The normal working limits appertaining to these two types of regulator are as follows:-

	MIN.		MAX.
B2 CJ 1A	5 -	AMPS. -	12
B2 CJ 11	10	"	15

As the settings of these regulators are interchangeable, a method of determining the actual settings has been agreed upon, consisting of the following identification marks:-

a) If a B2 CJ 1A is set to a B2 CJ 11 setting, a yellow spot should be painted adjacent to the series winding lead.

b) If a B2 CJ 11 is converted to a B2 CJ 1A setting, a blue or green spot should be painted in the same location.

MAINTENANCE OF B2 TYPE REGULATORS.

With the exception of the cleaning of the contact, no attention to the regulator is required.

After prolonged periods of running, the contacts should be inspected, and if dirty, cleaned with spirit or very fine carborundum paper. On no account should a file or coarse grit be used.

PROCEDURE FOR REMOVAL OF CONTACTS.

a) Slacken back locknut (X) and screw out first contact (J).

b) Slacken back locknut (R) and screw out second contact (S) by means of sleeve (E).

FAULT LOCATION.

OSCILLATION.

PROBABLE CAUSE:	REMEDY:
1. Dynamo connections loose. 2. Battery connections loose. 3. Regulator connections loose.	Examine connections & tighten.
4. Greasy commutator or brushes.	Clean with petrol and soft rag.
5. Brushes not seating properly.	If worn, replace. Seat correctly.
6. Cut-out points dirty.	Clean with spirit or fine carborundum paper.
7. Ammeter not functioning correctly.	Examine & replace if necessary.
8. Faulty regulator.	Replace regulator.

LOW OUTPUT.

1. Fully charged battery.	No action.
2. Regulator contacts incorrectly set.	Check and adjust.
3. Dynamo brushes worn out.	Replace.

HIGH OUTPUT.

1. Regulator shunt circuit broken.	Examine connections, replace and tighten.
2. Regulator contact settings incorrect.	Adjust accordingly.
3. Regulator, first contacts sticking.	Examine, clean and replace.
4. Field lead earthed between dynamo and regulator.	Examine and rectify.

NO OUTPUT.

1. Dynamo connections broken.	Replace and tighten up.
2. Dynamo main or field fuse blown.	Replace fuse.
3. Cut-out points remain open.	Examine, clean or replace.
4. Commutator dirty or greasy.	Clean with petrol and soft rag.
5. Battery connections broken.	Replace and tighten.
6. Dynamo burnt out.	Replace dynamo.
7. Regulator burnt out.	Replace regulator.
8. Dirty regulator contacts.	Clean and re-adjust.

REGULATOR BURNT OUT.

1. Regulator contacts fused or welded. 2. Dynamo to regulator leads crossed.	Replace regulator.

SLUGGISH RESPONSE TO DISCHARGE RATE.

1. Battery completely discharged.	Charge from external source.
2. Dynamo brushes worn.	Replace brushes.
3. Regulator contacts incorrectly set.	Adjust.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q5.

Mdx/FAH/DER

Subject :

PHANTOM III
IGNITION SYSTEMS & IGNITION TIMING.

Date of Issue 8th April, 1947.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

IGNITION SYSTEMS.

Ignition is provided by two independent coil systems. Each system comprising, ballast resistance, ignition coil, and a twelve segment distributor, housing a six lobe cam operating dual contact breakers connected in parallel, set at an angle of 150° relative to one another to permit alternate breaks to be made for each 30° rotation of the cam. A common condenser affords protection to both sets of contact breaker contacts.

The two coil systems are identified "A" and "B". "A" Distributor Tower is located on the OFFSIDE of the engine and feeds the exhaust sparking plugs, whilst "B" Distributor is on the NEARSIDE and is connected to the spark plugs adjacent to the inlet ports.

On the earlier series of Phantom III chassis the two ignitions are not arranged to fire simultaneously in the cylinder, "B" ignition system (inlet plugs) is timed to fire 2° before the exhaust plugs, this necessitates two timing marks on the flywheel, B.A.I. ("B" Advanced Ignition) 45° B.T.D.C., following which will be found A.A.I. ("A" Advanced Ignition) 43° B.T.D.C. On later cars the two ignitions were arranged to fire at the same time, and are both timed to a single mark on the flywheel "A & B.A.I.", or on some chassis "B.A.I.". All the above markings apply to No. A.1 cylinder.

NOTE:

It should always be ascertained that the switch is correctly coupled when Phantom III cars are being tested, to ensure that the independent systems are working in accordance with the "A" and "B" positions of the switch, should this not be so, it would indicate that the wires had been incorrectly connected between the switch box and the ballast resistances. A check should then be made to locate whether the reversed connection is above the fuses or below, if found to be above the fuse, it would indicate that the connections at the switch box end were reversed, in which case to avoid unnecessary dismantling it is in order to exchange the connections at the top of the two ignition fuses. Should the fuses be registering correctly the reversal has probably taken place in the conduit, between the fuses and the ballast resistances, in which case the connections below the fuse should be transposed.

It will be noted that after rectifying these faults in the wiring, in the manner described above, the identification ferrules at the fuse connections will be reversed, but this may be disregarded.

IGNITION TIMING.

Before carrying out the re-timing of the ignition systems it is essential to synchronise the contact breaker points in each tower to their relative position of 150°. This adjustment is best done with the distributor removed from the engine, and a series lamp and battery connected to the points to check breaking position. The two distributor towers are identical in so far as synchronising is concerned, both cams turning in a clockwise direction as viewed from the top, and both having the nearside point assembly moveable.

To synchronise the contact breakers proceed as follows:-

See that rocker arm pivot pins are rigid. (Note IV)

Set both point gaps as accurately as possible to .030", preferably on the same cam lobe.

IGNITION TIMING (Cont'd)

The tools required for checking the synchronising of the contact breakers are a protractor ring, marked off every 30° with a hole 4.10"diameter to fit over the register for the distributor cover, and a pointer to fit on the cam in place of the rotor.

The ring can be thin sheet metal or even stout card, and the pointer a stiff wire with two turns wound round the extension at the top of the contact breaker cam which normally carries the rotor, and the other end ground to a point and terminating close to the edge of distributor case.

Locate the ring so that fixed points break when pointer is on one of the 30° lines, they should then break on every alternate line, i.e. every 60°.

Check breaking position of moveable points which should occur when pointer is on lines in between those on which fixed points break, i.e. alternate points break every 30° of cam rotation.

The nearside points are mounted as a sub-assembly on the base plate and can be rotated a few degrees about the cam centre. Adjustment is effected by slackening the two fixing screws about half a turn and turning the eccentric headed screw. (This is very similar to the point gap adjustment, but is not to be confused with it.)

To enable the sub-assembly, carrying the nearside points, to move freely during this adjustment, it is necessary to slacken the 5-B.A. stud (hexagon head) which secures the connecting strips, carrying the main feed to the respective contact breakers. The connecting strip feeding the adjustable unit is suitably slotted at this point.

Adjust as necessary on eccentric screw, lock plate before re-checking. When correct lock all relevant screws, etc.

The ignition towers are now ready for timing to the engine, which should be carried out in the following manner:-

With both sets of points adjusted to .030", the distributor can be refitted to timing gear case (helical gear can be engaged in any tooth). A.1 cylinder should be placed on the compression stroke by turning the engine forward from clutch end until exhaust valve on No.6 cylinder "A" bank (offside) commences to close, watch timing marks on clutch case and continue turning until A.A.I. ("A Distributor Advanced Ignition, A.1 cylinder) coincides with pointer.

Put steering wheel control lever to full advanced position.

Slacken 2-B.A. nut under small lever at front of governor case on "A" side distributor, set lever in centre of range.

Remove countersunk screw from centre of cam, lift off cam and re-fit splines so that with rotor fitted, the electrode would point most nearly to A.1 segment of distributor. (The offside screw of the two which secure the bakelite moulding for the low tension lead, will be found to have the same angular position as the A.1 segment so that the correct position for the rotor electrode can be ascertained conveniently without reference to the distributor cover.)

Connect a 12-volt low wattage bulb between low tension terminal on distributor and earth, preferably on long lead so that bulb is visible from driver's side of dashboard.

Turn engine back about 30° (five minutes on clock face) switch on ignition and turn engine forward until lamp lights, this will indicate point opening position for A.1 cylinder, provided that the rotor is now pointing to A.1 position of the distributor.

Check pointer against A.A.I. mark on flywheel.

IGNITION TIMING (CONT'D)

If A.A.I. mark is found not to have reached pointer, i.e. timing is early, rotate distributor in a clockwise direction by means of the small lever previously referred to, turn engine back again about 30° and then slowly forward until lamp lights once more.

If further adjustment is necessary, continue until a position for the lever is found which brings pointer and timing mark into coincidence when lamp lights.

Finally lock lever securely by nut below. (Note V.)

For "B" side ignition proceed as described for "A", but work to B.A.I. mark on clutch case. (Page 1. Para: 3.)

NOTE: I.

If you overshoot the mark when checking timing, always turn crankshaft well back and then come forward once more in order to wind up spring drive and take up backlash in gears.

NOTE: II.

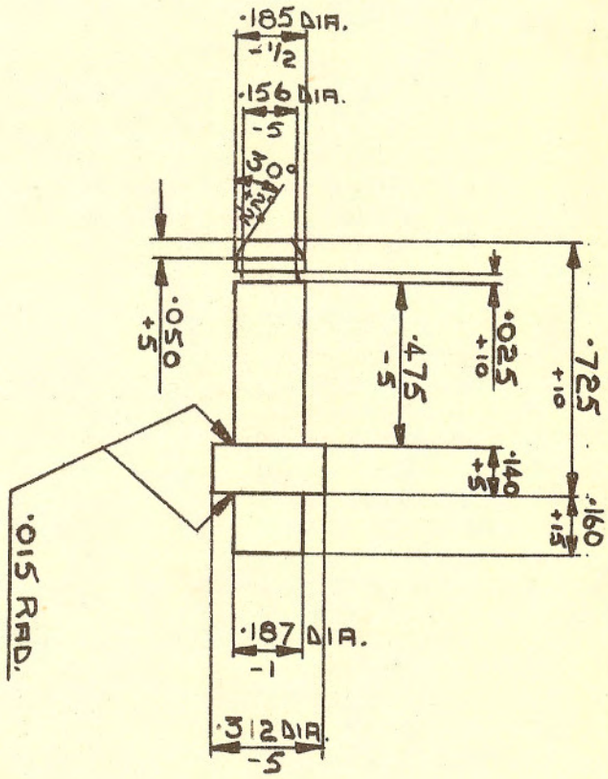
In the event of an individual distributor tower being removed from the engine for reasons other than adjustment purposes, as for instance, to facilitate the fitting of new high tension leads, provided that no disturbance has been made to the contact breaker mechanism of any kind, it will be quite easy to replace the distributor tower without retiming by meshing the helical gear correctly so that the rotor position matches up with that on the distributor that has not been disturbed.

NOTE: III.

Phantom III distributors, due to their large diameter and thin section, are particularly fragile and it will be found advisable to tie them back when they are removed from the distributor towers for any purpose. If not secured in this way there is also a possibility of the distributor fouling the rotor when the engine is turned which may cause the rotor key to be sheared, this key being a part of the bakelite moulding.

NOTE: IV.

Whenever trouble is experienced, or work is being carried out on Phantom III ignition systems, the rocker arm pivot pins should be checked for rigidity. These pins are riveted into their respective base plates and the amount of material available on the original pin (D.75147) may be insufficient to permit of re-rivetting being satisfactorily carried out, although in some cases it will be found possible to tighten on the rivet and complete the operation by sweating at this point. Should this procedure appear inadequate, it will be necessary to manufacture new pivot pins in BZ/PD (Phosphor Bronze drawn) with sufficient extension at the bottom (See Sketch) to allow for rivetting with a fairly flat snap head. (The floor of the ignition tower housing is suitably recessed to allow the base plates to bed down without fouling at this point.) To carry out this work involves the complete strip of the ignition tower assembly, as the base plates cannot be removed until the upper serrated portion of the drive shaft is disconnected from the lower drive shaft to which it is secured by a parallel pin, located by a brass collar crimped in position, this collar and pin are only accessible after the lower housing has been disconnected and removed from the upper part of the ignition tower body.



SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q4

SB.1/SF.

Subject : SPARKING PLUGS ALL MODELS.

Date of Issue 7th October, 1946.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

Owing to supply difficulties with certain plugs, it has been necessary to authorise alternative types for use in pre-war Rolls Royce and Bentley Cars. The following table shows these alternatives:-

ALTERNATIVE PLUGS

MODEL.	K·L·G	LODGE	CHAMPION	SIZE (m.m.)
20 H.P.	M 30	–	No.7.	18
20/25 H.P.	M 30	–	No.7	18
25/30 H.P.	FLB 30X	–	LB8	14
WRAITH	FLB 30X	–	LB8	14
PHANTOM I	–	C 3	No.7	18
" II	–	C 3	No.7	18
" III	FE30	–	NA8	14
BENTLEY 3½ AND 4¼	FLB 30X	–	LB8	14

NOTE:

The KLG. FE30 is the post-war detachable version of the pre-war non-detachable KLG. FE30X, which is no longer manufactured. Also, the KLG. M30 replaces the pre-war KLG. K1.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q 3

SB/CM.1/IP.

Subject :

REPLACEMENT OF IGNITION COILS.
20 H.P. 20/25 H.P. & 25/30 H.P. Models.

Date of Issue 12th August, 1946.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

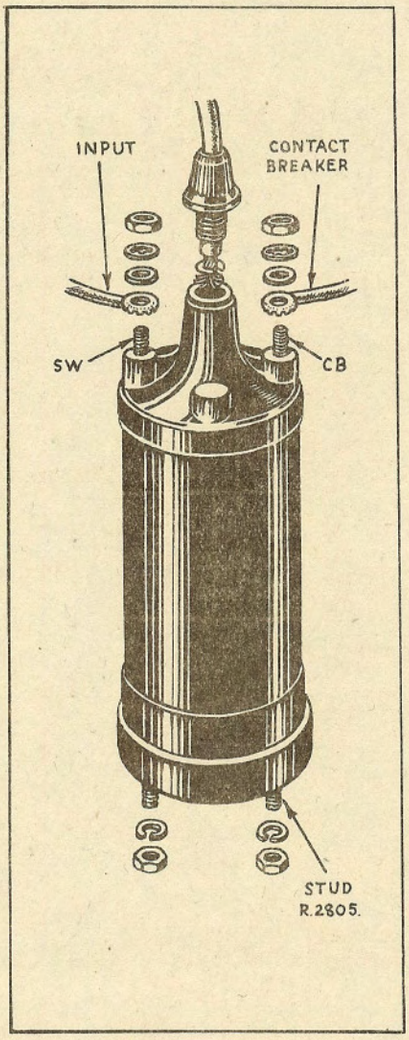
Further to Service Instruction Leaflet RR/Q2, it has been decided, as a temporary measure, to introduce an alternative Lucas Coil, Part No. RD.3008, which may be fitted as a replacement on any of the above cars, other than those carrying the original square base mounted coil.

The Lucas Coil is interchangeable with the Rolls-Royce Coil without any additional parts, excepting on the 25/30 H.P. cars which have dual mounted coils. On these cars the Lucas Coil should be fitted in pairs, the existing spare Rolls-Royce coil being credited for use as a service replacement. Also a special carrier bracket R.3225 will be required to mount the Lucas Coils, in place of the existing bracket EB.1780.

The high tension wire may require shortening, and the end of the wire should be bared for a short distance to enable the strands of wire to be turned over the brass washer provided. The low tension connections are as normal, the coil being marked S.W. for the Input and C.B. for the Contact Breaker.

IMPORTANT.

This coil operates at full battery voltage, and no ballast resistance is required. Therefore the ballast resistance should be cut out of circuit by attaching both ballast leads to the same terminal. This will be better than short circuiting the resistance as it will be obvious that the ballast is not in use in the event of an R.R. coil being substituted again at a later date.



SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED
DERBY

RR/Q2

SB.1/DJ.

Subject :

Replacement of Ignition Coils.
All Models.

Date of Issue 3rd Feb. 1946.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

Owing to manufacturing difficulties in producing the various types of coil used on existing models it has been decided to standardise for replacement purposes two types of coil as follows:-

For all R.R. models except Phantom III D75673

For Phantom III cars only D75260

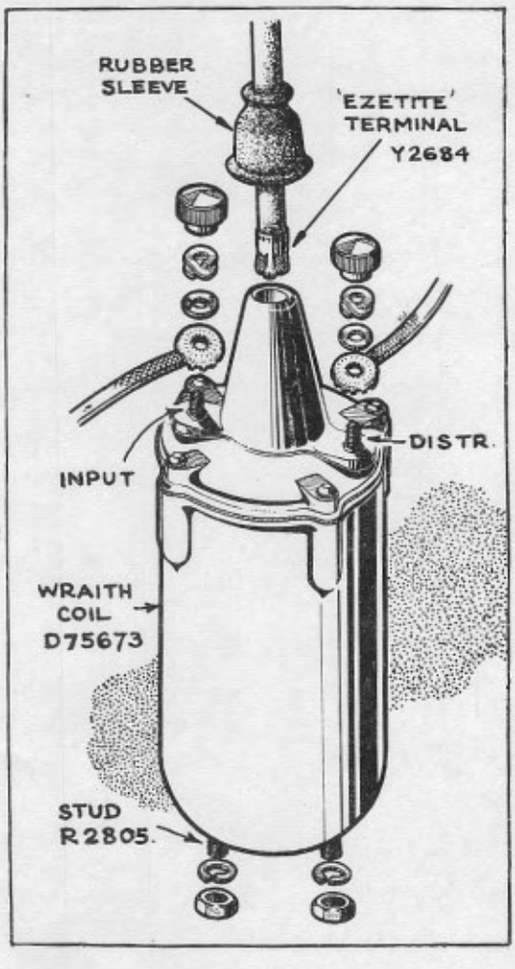
The above replacement coil D75673 is the Wraith type having a central H.T. outlet. When this coil is fitted to cars other than the Wraith it will obviously entail slight alterations to the existing wiring, also in certain cases to the method of fixing.

Fixing.

The coil will be sent out with special studs which are long enough to accommodate any type of base on the different models. If set screws are used with the existing coil these should be discarded. For certain old type models having a four bolt square base fixing, the coil will be provided with a suitable aluminium base to maintain interchangeability.

Electrical Connections.

The existing H.T. cable may have to be shortened to remove any unnecessary length, and a new "Ezetite" metal terminal secured to the end of the H.T. wire so that it makes electrical contact with the wire, and is a push fit in the bakelite moulding on the coil. A Delco-Remy rubber shield No. 120095 (R.R. No. 330/2950) should be pushed over the wire before fitting the terminal. The existing low tension wires require no alteration. The coil is marked "Input" and "Distr" to which the ballast resistance wire and the distributor wire should respectively be connected.



The Phantom III coil referred to above is retained for use on Phantom III cars as it has special electrical characteristics which are necessary.

Existing coils D72503 may still be repaired and will be issued as replacements when available.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q1(a)

SB/NM. 2/IP.

Subject :
Replacements of Existing Types of Ignition Condenser.
All RR models excepting Wraith & Phantom III.

Date of Issue 1st Jan, 1946.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

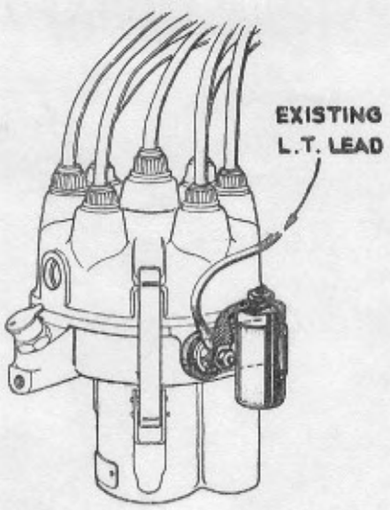
This leaflet cancels RR/Q1 and indicates additional condensers affected.

Owing to manufacturing difficulties encountered in producing further supplies of the old flat and tubular type condensers, Part Numbers, D.54808, D.74117, D.75461, and D.75462 which were housed inside the distributor casing, it has been necessary to adopt an alternative type which will serve as a common replacement. This is tubular in shape, and is mounted externally on the existing low tension terminal pillar as illustrated below. The Part Number of the new condenser complete with its connections is RD.3070. The existing condenser may be either removed or, if preferred its connections severed to prevent electrical contact.

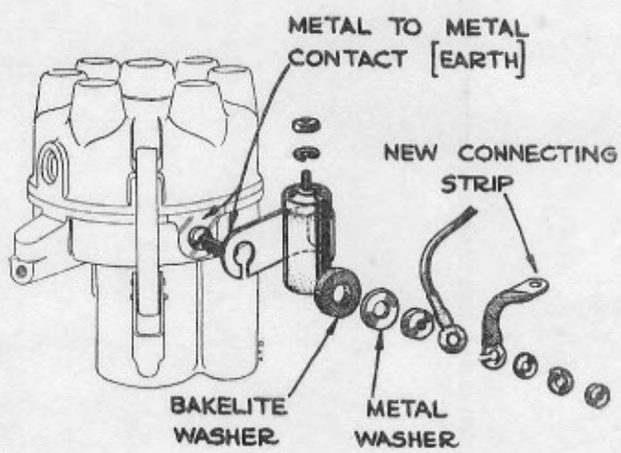
The method of fitting the new condenser is as follows:-

1. Disconnect the existing L.T. Lead.

2. Remove the nut, metal and bakelite washers.



NEW CONDENSER IN SITU



3. Place the new condenser with the flat supporting tab against the body of the distributor making sure that there is metal to metal contact between them, and that the insulating bush is centralised in the hole.

4. Next place the bakelite and metal washers over the stud and clamp up with the nut.

5. Replace the original L.T. Lead on the stud and follow with the short new connecting strip. Place the plain and lock washers on the stud, and clamp up with the nut.

6. Connect the short connecting strip to the top terminal of the condenser.

ALL COMMUNICATIONS SHOULD BE ADDRESSED TO
ROLLS-ROYCE LIMITED, SERVICE STATION, HYTHE ROAD, WILLESDEN, LONDON, N.W.10

continued:

Note:

On certain early 20 HP and 40/50 HP cars the low tension terminal is fitted with a spring loaded plunger instead of a nut and washer.

In this case it is necessary only to unhook the L.T. lead and slack off the large nut so as to be able to draw the bakelite washer away from the distributor casing until the new condenser can be passed over the terminal stud. The condenser can then be centralised on the bakelite spigot and the nut tightened up.

The new connecting strip is then hooked on with the L.T. lead, of which the terminal shank should be bound with insulation tape to prevent it coming in contact with the condenser and causing an earth.

SERVICE INSTRUCTION LEAFLET

ISSUED BY

ROLLS-ROYCE LIMITED

RR/Q 9

SB/VK/TRY.

Subject : REPLACEMENT IGNITION COILS.

Date of Issue 22.2.57.

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

The original design ignition coil fitted to Rolls-Royce 20 HP, 20/25 HP, 25/30 HP and Phantom II is no longer available, and in future all replacements will be of the later coil of more advanced design as fitted to the latest model Rolls-Royce Silver Cloud.

It will be necessary for brackets to be supplied with the latest ignition coils owing to the different methods of attachment to the various types of car.

The brackets for the relevant cars are listed below.

IMPORTANT.

This coil operates at full battery voltage, and no ballast resistance is required. Therefore the ballast resistance should be cut out of circuit by attaching both ballast leads to the same terminal. This will be better than short circuiting the resistance as it will be obvious that the ballast is not in use in the event of an R.R. coil being substituted again at a later date. If only one coil is being replaced, the ballast resistance for that coil only is to be deleted as above.

Retailers, when ordering ignition coils for stock purposes, should mentioned which type of car for which the coil is intended in order to avoid any confusion over the various types of bracket which may be supplied with the commonised ignition coil.

MATERIALS.

Rolls-Royce Phantom II.

The ignition coil assembly Part No. is R.5440 consisting of:

	PART NO.	NO. OFF.
Ignition Coil	UD.1983	1
Mounting Bracket	R. 5441	1
Coil Mounting Bolts	KC. 296	2
Coil Mounting Nut	K. 4009	2
Coil Mounting Spring Washer	K. 9009	2
Bracket Mounting Bolt	KC. 173	2
Bracket Mounting Nut	K. 4006	2
Bracket Mounting Spring Washer	K. 9006	2

Continued/-...

Rolls-Royce 20 HP and 20/25 HP.

Assembly Part No. R.5439.

	PART NO.	NO.OFF.
Ignition Coil	UD.1983	1
Mounting Bracket	R. 5438	1
Coil Mounting Bolts	KC. 296	2
Coil Mounting Nut	K. 4009	2
Coil Mounting Spring Washer	K. 9009	2
Bracket Mounting Bolt	KC. 173	2
Bracket Mounting Nut	K. 4006	2
Bracket Mounting Spring Washer	K. 9006	2

Rolls-Royce 25/30 HP, Phantom III.

Assembly Part No. R.5435.

Ignition Coil	UD.1983	2
Mounting Bracket	R. 5434	1
Coil Mounting Bolts	KC. 296	2
Coil Mounting Nut	K. 4009	2
Coil Mounting Spring Washer	K. 9009	2
Bracket Mounting Bolt	KC. 173	2
Bracket Mounting Spring Washer	K. 4006	2
Bracket Mounting Spring Washer	K. 4006	2
Existing Coil Mounting Bolts (where applicable)	K. 173	2

NOTE:

On this final assembly, if one coil only is to be changed, the remaining coil is to have the 2 BA studs removed from the base and mounted on the bracket R.5434 by two bolts (K.173) through the mounting bracket and into the base of the coil.