SECTION L-7, Part A
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LUCAS

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EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

MOTOR CYCLE ELECTRIC HORNS

MODELS HF 1234 - 1235

JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

Printed in England

MOTOR CYCLE ELECTRIC HORNS

MODELS HF 1234 - 1235

GENERAL DESCRIPTION

These horns are of the high frequency type. The only difference between the two models lies in the finish: Model HF 1234 has a chromium-plated clamping rim and Model HF 1235 is all black.

The operation of the horn is based on the simple trembler principle. When the horn push is pressed, current flows through the closed contacts of the contact breaker and energises the coil. The coil core is thus magnetized and attracts the armature towards the core face. The contact breaker opens each time the armature is pulled down to the core, de-energizing the magnet system and causing the cycle to be repeated at a frequency determined by the characteristics of the diaphragm.

The vibrating armature is coupled to a flexible diaphragm and to a rigid tone disc. The impact of the armature on the core face sets the diaphragm and tone disc into vibration, the diaphragm at a relatively low frequency (300-400 c/s) and the tone disc at a higher frequency determined by its size and the rigidity of its material. These two sets of vibrations combine together with their various 'overtones' to give the horn its characteristic note.

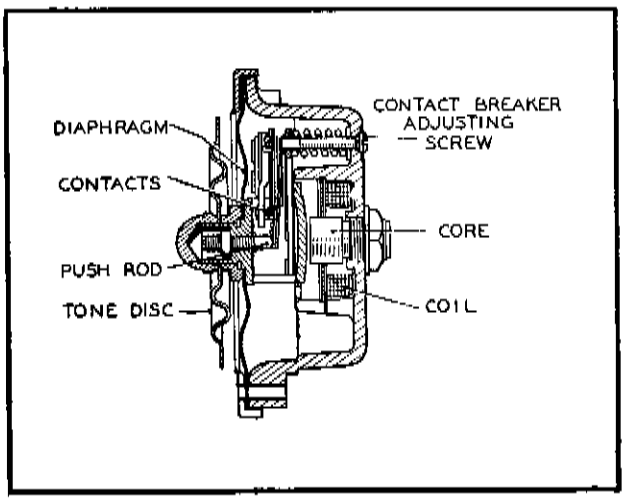

Fig. 1
Internal arrangement of horn

SERVICING

Before making any adjustments to the horn, make certain that the battery is in a good state of charge.

Do not dismantle the horn until the external check and adjustments have been made.

Dismantling and re-assembly procedure is given in paragraph 5.

1. HORN LOOSE ON MOUNTING

Check that the bolts securing the horn bracket are tight and that the body of the horn does not foul any other fixture. See that any units fitted near the horn are rigidly mounted and do not vibrate when the horn is operated.

SERVICING SUMMARY

Symptoms	Possible Causes	Reference
Note unsatisfactory or operation intermittent.	(i) Horn loose on mounting	Para. 1
	(ii) Faulty wiring	,, 2
	(iii) Incorrect contact breaker adjustment	,, 3
	(iv) Internal faults:—	
	Faulty contact breaker	,, 4 (a)
	Push-rod adjustment incorrect	,, 4 (b)
	Armature-to-core air gap incorrect	,, 4 (c)
Horn does not operate	(i) Faulty wiring	Para. 2
	(ii) Internal faults:—	
	Push-rod adjustment incorrect	,, 4 (b)
	Faulty coil	,, 4 (d)

2. FAULTY WIRING

Examine the cables of the horn circuit, renewing any that are badly worn or chafed. Ensure that all connections are tight, and that the connecting eyelets, or ferrules, make good contact with the cables.

3. CONTACT BREAKER ADJUSTMENT

Make sure that the poor performance is not due to the above causes before attempting any adjustment of the horn. Adjustment does not alter the tone of the horn. It merely takes up wear of the moving parts which, if not corrected, will result in loss of power and/or roughness of tone.

Correct adjustment of the horn requires the use of a 0—10 amp. D.C. ammeter, and the procedure is as follows:—

The note of the horn is to be tested when the horn is cold, using a pure D.C. supply (rectified A.C. is not permissible) over a range of 4 to 8 volts. The current consumption should at no time exceed 6.5 amps. and a good clear high frequency note obtained over the full voltage range.

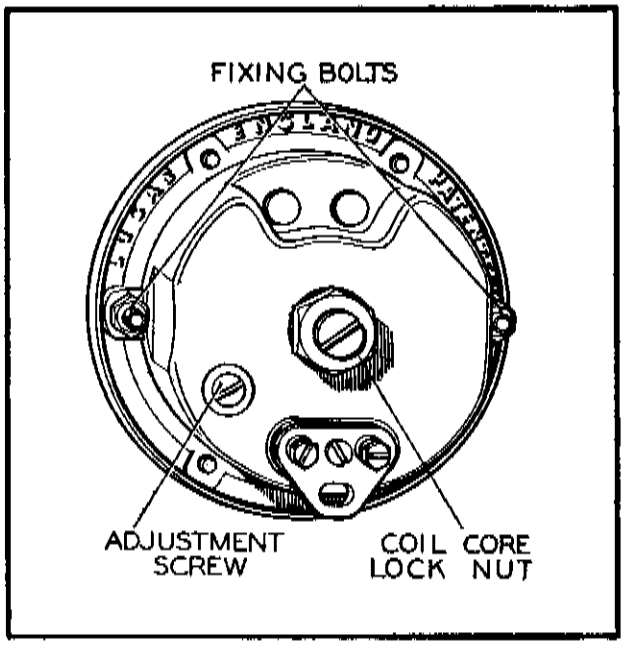

Fig. 2
Rear view of horn

To adjust, turn the contact breaker adjustment screw (Fig. 2) in an anticlockwise direction until the horn just ceases to sound. Then turn the serrated adjustment screw clockwise six notches (a quarter of a turn) and check the performance and current consumption. Further adjustment should be made by turning the adjustment screw one 'notch' at a time in a clockwise direction and re-checking.

4. INTERNAL FAULTS

(a) FAULTY CONTACT BREAKER

Intermittent operation may be due to worn contacts on the contact breaker, or 'pitting and piling' caused by incorrect operation. If the contacts are badly worn a replacement contact set must be fitted. Rough operation and high current consumption may be due to a faulty contact spring. The pressure just to open the contacts, measured at the tip of the contact spring, should be 32-40 oz.

(b) PUSH ROD ADJUSTMENT

If the push-rod locking ring becomes loose the vibratory motion of the armature will slowly unscrew the push-rod and the current consumption of the horn will rise. To obtain correct adjustment of the push-rod proceed as follows:—Turn the contact breaker adjustment screw as far as possible clockwise, and then screw back anticlockwise for 2½ complete turns.

Remove the cover nut and tone disc, and loosen the push-rod locking ring. Adjust the push-rod, using a tool similar to that illustrated in Fig. 3; turning clockwise to decrease and anticlockwise to increase the current consumption. When the current consumption has been brought down to 5.5—6.5 amps. tighten

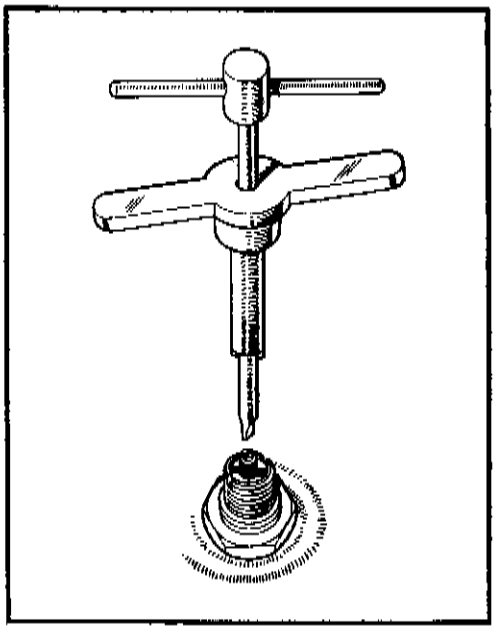

Fig. 3
Push-rod adjusting tool

the locking ring, replace the tone disc and cover nut and, by means of the contact breaker adjusting screw, make final adjustment as in Para. 3.

(c) ARMATURE-TO-CORE AIR GAP SETTING

Check the tightness of the core lock-nut on the rear of the body. Remove the cover nut and tone disc and check the tightness of the diaphragm lock-nut. Check and set the air gap between the armature and core faces as follows: -Turn the contact breaker adjusting screw several turns in a clockwise direction, so that the contacts remain closed when the armature is pulled flat against the core face. Energise the coil momentarily and measure the movement of the armature, by means of a clock indicator gauge bearing on the tip of the push-rod. The correct air gap between the armature and core faces is 0.010 to 0.012 in. To adjust the air gap, loosen the coil, core lock-nut and, using a screwdriver, turn the core clockwise to decrease the air gap and anticlockwise to increase the air gap. While the contact breaker is rendered inoperative, energise the horn for **only a few seconds** at a time to prevent the coil over-heating.

(d) FAULTY COIL

If no click is heard on energising the horn and, when the horn is dismantled, the magnet is found to be inoperative, then the continuity of the coil and its connections must be checked. Connect an ohmeter across the supply terminals and check the coil resistance. The correct coil resistance limits are 0.18 to 0.19 ohm.

If the continuity of the coil is not satisfactory, then the horn must be dismantled. Before replacing the coil, ensure that the connecting wires to the coil are in order.

5. DISMANTLING AND REASSEMBLY PROCEDURE

(a) TO DISMANTLE

Remove the various components in the following order:—

Cover Nut.

Tone Disc.

Clamping Rim Securing Screws

Clamping Rim and Mounting Bracket

Body Assembly	*Diaphragm Assembly*
Contact Breaker	Push Rod and Locking Ring
Coil Core	Lock Nut
Coil and Clamping Washer	Diaphragm
	Armature

To assist removal of the diaphragm assembly from the body, loosen the push-rod locking ring and turn the push-rod anticlockwise until the assembly can be withdrawn from the body.

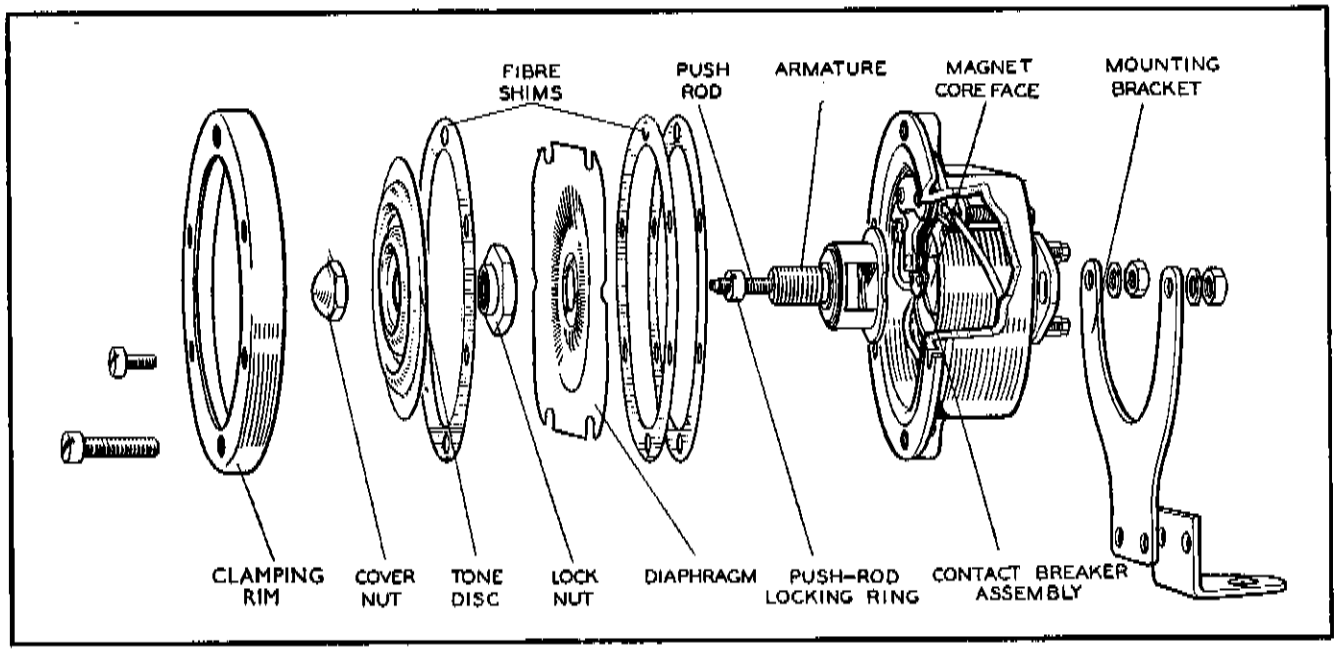

Fig. 4
Dismantled view of horn with section of body removed to show contact breaker and core

To remove the coil winding it may be necessary to destroy the clamping washer as it is a force fit in the body.

(b) TO ASSEMBLE

Reverse the dismantling procedure given above, including, where indicated, the following adjustments:

Coil core, washer and lock-nut to be assembled loosely in the body.
After the coil has been positioned, and tightly clamped with the brass clamping washer, it must not be possible to move the washer by pressing tangentially with a screwdriver. Before placing the diaphragm assembly on the horn body, adjust the contact breaker assembly to lay parallel with the diaphragm, when the latter is fitted. To avoid short circuits due to chafing of cable insulation through vibration, the cables from the coil and contact breaker must be coiled smoothly to follow the curve of the body, but not to touch it.

The diaphragm clamping nuts must be tightened to a torque exceeding 30 lb. ins.

Before replacing the tone disc and cover nut, the air gap and push rod settings must be carried out in accordance with the instructions given in Para. 4 (b) and (c).

When the air gap adjustment has been made, the coil core lock-nut must be tightened to a torque of 200—250 lb. ins.

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MOTOR CYCLE ELECTRIC HORNS

MODELS

HF.1440—41—44

JOSEPH LUCAS LTD · BIRMINGHAM 19 . ENGLAND

Printed in England

ELECTRIC HORNS

MODELS HF.1440 — 41 — 44

GENERAL DESCRIPTION

These horns are of the high frequency type, the only difference between the three models being external and not affecting these instructions.

The operation of the horn is based on the simple electric bell principle. When the horn push is pressed, current flows through the closed contacts of the contact breaker and energises the coil. The coil core is thus magnetized and attracts the armature towards the core face. The contact breaker opens each time the armature is pulled down to the core, de-energising the magnet system and causing the cycle to be repeated at a frequency determined by the characteristics of the diaphragm.

The vibrating armature is coupled to a flexible diaphragm and to a rigid tone disc. The impact of the armature on the core face sets the diaphragm and tone disc into vibration, the diaphragm at a relatively low frequency (300-400 c/s) and the tone disc at a higher frequency determined by its size and the rigidity of its material. These two sets of vibrations combine together with their various 'overtones' to give the horn its characteristic note.

SERVICING

Before making any adjustments to the horn, make certain that the battery is in a good state of charge. Do not dismantle the horn until the external checks and adjustments have been made.

Dismantling and re-assembly procedure is given in para. 6.

Servicing Summary.

Symptom	*Possible Causes*	*Reference*
Note unsatisfactory or operation intermittent.	(i) Horn loose on mounting. (ii) Faulty wiring. (iii) Incorrect contact breaker adjustment. (iv) Incorrect armature-to-core air gap setting. (v) Internal fault. Faulty contact breaker.	Para. 1. Para. 2. Para. 3. Para. 4. Para. 5 (*a*)
Horn does not operate.	(i) Faulty wiring. (ii) Incorrect contact breaker adjustment. (iii) Incorrect armature-to-core air gap setting. (iv) Internal fault. Faulty coil.	Para. 2. Para. 3. Para. 4. Para. 5 (*b*)

1. Horn Loose on mounting

Check that the bolt securing the horn bracket is tight and that the body of the horn does not foul any other fixture. See that any units fitted near the horn are rigidly mounted and do not vibrate when the horn is operated.

2. Wiring

Examine the cables of the horn circuit, renewing any that are badly worn or chafed. Ensure that all connections are tight and that the connecting eyelets, or ferrules, make good contact with the cables. In the event of complete failure of the horn, check the wiring for an open circuit.

3. Contact breaker adjustment

Make sure that the poor performance is not due to one of the above causes before attempting any adjustment of the horn. Adjustment takes up wear of moving parts which, if not corrected, will result in loss of power and/or roughness of tone.

Correct adjustment of the horn requires the use of a 0—5 amp. D.C. ammeter, and the procedure is as follows:—

The note of the horn is to be tested when the horn is cold, using a pure D.C. supply (rectified A.C. is not permissible) over a range of 4 to 8 volts. An indication of correct contact breaker adjustment is given by measurement of the current consumption of the horn,

which should at no time exceed 4 amps., and a good clear 'high frequency' note should be obtained over the full voltage range. If current is in excess of 4 amps., remove cover nut, slacken the push-rod locking ring and turn the push-rod, clockwise to decrease current consumption or anticlockwise to increase. Make only a small adjustment at a time, continuing until the correct setting is obtained. For adjusting the push-rod and tightening the locking ring, use a tool similar to that illustrated in Fig. 1.

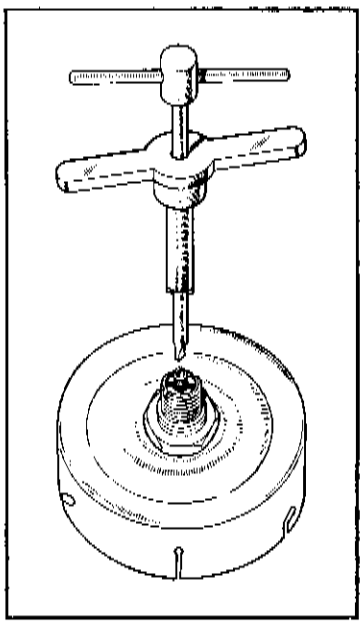

Fig. 1
Adjusting push-rod and locking ring.

4. Armature-to-core air gap setting

Remove the cover-nut, tone disc locknut and tone disc, and check that the diaphragm locknut and clamping band are tight. Then proceed to check and adjust the air gap as follows:

Loosen the push-rod locking ring and turn the push-rod anticlockwise until on energising the coil only a click is heard, indicating that the contact breaker remains closed as the armature is pulled flat against the core face. Measure the movement of the armature, with the aid of a clock indicator gauge bearing on the edge of the armature sleeve, when the coil is energised momentarily. This measurement, corresponding to the air gap between the armature and core faces, should be between 0.011 in. and 0.013 in.

To adjust the air gap, loosen the diaphragm clamping band and twist the diaphragm clockwise for a smaller gap and anticlockwise for a wider gap. Retighten the band securely after adjustment.

While the contact breaker is rendered inoperative, energise the horn for **only a few seconds** at a time to prevent the coil overheating.

5. Internal fault

(*a*) Contact Breaker.

Intermittent operation may be due to worn contacts on the contact breaker, or 'pitting and piling' caused by the horn operating with incorrect setting. If the contacts are badly worn a replacement contact set must be fitted.

Rough operation and high current consumption may be due to a faulty contact spring. The pressure just to open the contacts, measured at the tip of the contact spring, should be 32 to 40 oz. Rough operation and high current consumption may also be caused by excessive wear of the striker pad riveted to the contact breaker spring.

(*b*) Faulty Coil.

If no click is heard on energising the horn and, when the horn is dismantled, the magnet is found to be inoperative, then the continuity of the coil and connections must be checked. Connect an ohmeter across the supply terminals and check the coil resistance. The correct coil resistance limits are 0.38—0.42 ohm. If there is an open circuit in the coil windings, it must be replaced. Before replacing the coil, ensure that the connecting wires to the coil are in order.

6. Dismantling and reassembly procedure

(*a*) To dismantle:

Remove the various components in the following order:—

Cover Nut.
Tone Disc Lock Nut.
Tone Disc.
Push Rod and Locking Ring.
Diaphragm Lock Nut.
Diaphragm Clamping Band.
Diaphragm.
Armature.
Contact Breaker.
Coil and Clamping Washer.

To remove the diaphragm lock nut, the armature must be held stationary while the lock nut is turned. A suitable tool for this operation is illustrated in Fig. 2. Failure to prevent the armature rotating as the locknut is turned will cause the contact breaker arms to be damaged. To remove the coil it may be necessary to destroy the clamping washer, for it is a very tight friction fit in the body.

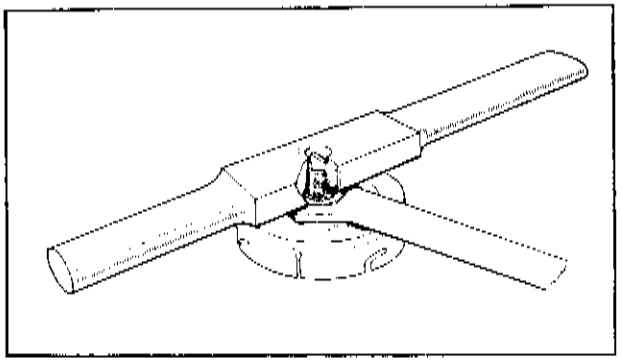

Fig. 2
Diaphragm lock-nut adjusting tool.

(*b*) To assemble:
The coil must be positioned in the magnet cup and clamped firmly with the brass washer, so that pressure applied tangentially to the washer with a screwdriver will not move it.

The contact breaker components must be carefully assembled and tightly riveted into the body. The contacts must meet squarely and must be parallel with the diaphragm when the latter is fitted.
To replace the armature, diaphragm and lock-nut proceed as follows:—

Place the armature on the pole piece and turn clockwise until the contact breaker arms prevent further movement. Locate the diaphragm on the three pegs in the horn body and tighten the lock-nut finger tight. The armature will now be correctly positioned with relation to the diaphragm and, using the tool illustrated in Fig. 2, the diaphragm lock-nut can be fully tightened while the armature is held in position. The diaphragm lock-nut must be tightened to a torque of 450 lb. ins.

When the push-rod and locking ring have been replaced, setting must be carried out in accordance with the instructions given in paras. 3 and 4.
When the final adjustments have been made, securely tighten the diaphragm clamping band.

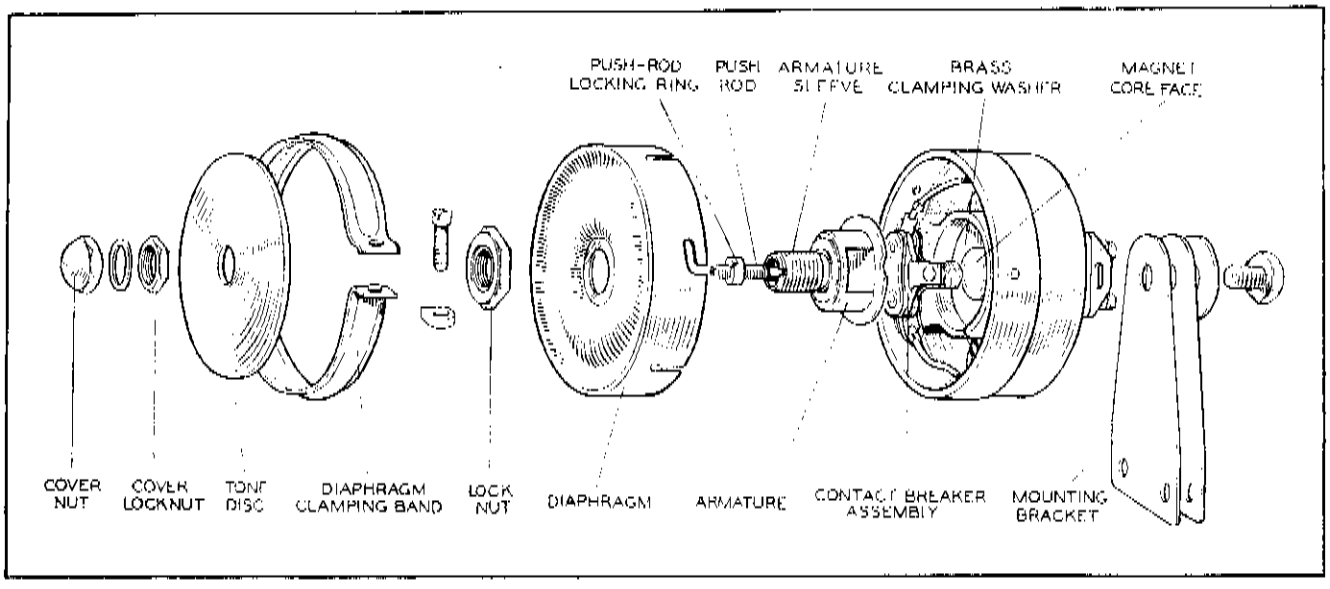

Fig. 3
Horn, dismantled view.

SECTION L-7 Part C
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VOLUME 2

WORKSHOP INSTRUCTIONS

MOTOR CYCLE ELECTRIC HORN

MODEL HF 1849

JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

Printed in England

MOTOR CYCLE ELECTRIC HORN

MODEL HF1849

1. GENERAL

Model HF1849 is produced in various paint finishes and in the de luxe form has a chromium-plated front rim. The operation of the horn is based on the simple trembler principle. When the horn push is pressed, current flows through the closed contacts of the contact breaker and energises the coil. The coil core is thus magnetised and attracts a leafspring-suspended armature towards an adjustable push rod attached to the diaphragm and tone disc. Movement of the armature opens the contact breaker each time the armature is drawn into the coil, de-energising the magnet system and causing the cycle to be repeated at a frequency determined by the characteristics of the diaphragm and the spring leaves.

The diaphragm and tone disc are coupled by an adjustable push rod. The vibrating armature impinging on this push rod sets the diaphragm and tone disc into vibration, the diaphragm at a relatively low frequency and the tone disc at a higher frequency. These two sets of vibrations combine together with their various harmonics to give the horn its characteristic note.

2. MAINTENANCE

No internal maintenance is required. Externally, all that is required is an occasional inspection of the horn circuit cables and the fixing bolts.

3. SERVICING

If the horn fails to operate, or operates unsatisfactorily, first carry out the following external checks:

(*a*) Examine the cables of the horn circuit, renewing any that are badly worn or chafed. Ensure that all connections are clean and tight and that the connecting nipples are firmly soldered to the cables.

(*b*) Check that the bolts securing the horn bracket are tight and that the body of the horn does not foul any other fixture.

After making a thorough external check remove the horn cover, secured by a single screw, and examine the cable connections inside the horn.

Examine the contact breaker contacts. If they are burned or blackened, clean them with a very fine file, then wipe with a petrol-moistened cloth.

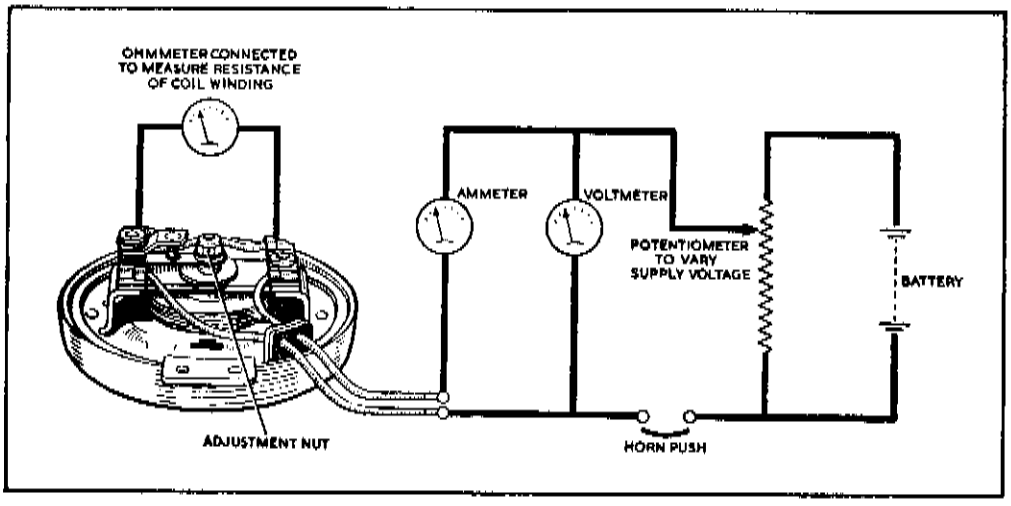

Fig. 1
Horn test, circuit connections

After cleaning the contacts, connect the horn in a test circuit as shown in Fig. 1, and check the horn performance.

Use 1st. grade instruments for measuring voltage and current when checking and, if necessary, adjusting the horn performance. A horn in correct adjustment has a current consumption of 2½—3 amps.

Horn Adjustment

Remove the cover nut, dished identification washer, lock nut, washer, push rod, tone disc and spacer.

Energise the horn at 4 volts, using a pure D.C. supply —not rectified A.C. Turn the adjustment nut on the armature stem until the armature buzzes and a current reading of 2 amps. is given.

Loosely refit the push rod, spacer, tone disc, washer and lock nut. Raise the supply voltage to 6 volts and screw in the push rod until the horn operates. Tighten the push rod lock nut before testing the horn after each adjustment. Test the horn over a voltage range from 6 to 8 volts when a clear steady note should be obtained. Make the final tests for performance with the dished identification washer and tone disc cover nut in position.

If the contacts are so worn that correct adjustment is not possible, then the body plate assembly must be renewed.

Coil Testing

If, when the horn is energised with the cover removed, the ammeter (see Fig. 1) gives an indication of a short or open circuit, check the horn coil. Connect an ohm meter, or other suitable test instrument, between the two coil supply cables. The resistance of the coil should be approximately 0.35—0.40 ohms.

If the coil is burnt out, the windings will show visible signs of overheating.

A fault in the coil necessitates the renewal of the complete body plate assembly. Do not attempt to remove the coil from the assembly.

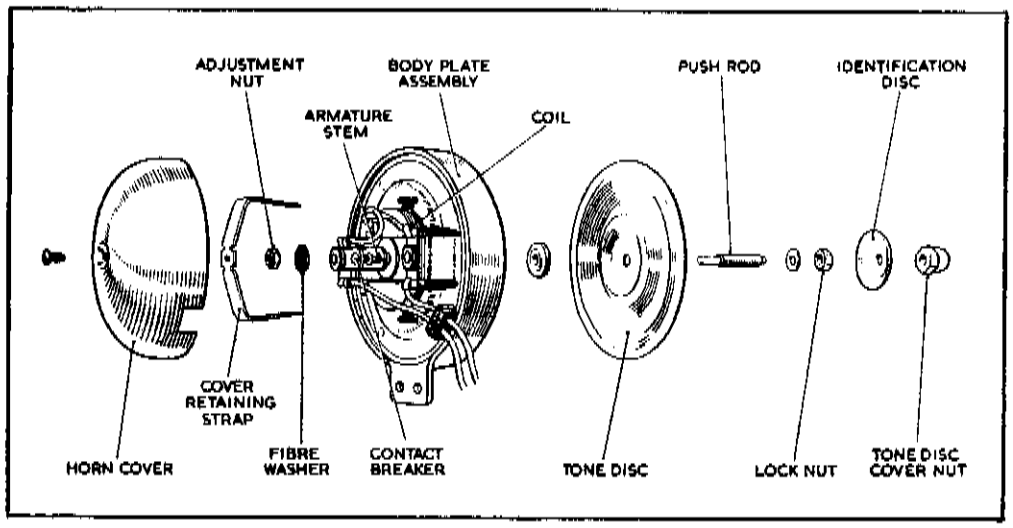

Fig. 2
Horn, dismantled