

SECTION K-4  
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**LUCAS**

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**EQUIPMENT**

VOLUME 2

**WORKSHOP  
INSTRUCTIONS**

**HORNS**

**MODELS HF1746-47-48**



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# LUCAS WORKSHOP INSTRUCTIONS

## HORNS

MODELS HF1746-47-48

### GENERAL

These horns are of the high frequency type and their construction and method of operation is as follows:— The vibrating armature is coupled to a flexible diaphragm and to a rigid tone disc. The diaphragm vibrates at a relatively low frequency (280-360 cps.) and the impact of the armature on the core face sets the tone disc into vibration, at a high 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.

The horn operates electrically on the same principle as the electric bell, i.e., when the horn push is pressed, current flows through the coil windings and causes the core to be magnetized, whereupon the armature is pulled downwards and impacts on 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.

To prevent sparking and consequent wear of the contacts, a condenser is connected across the contact breaker circuit.

### SERVICING SUMMARY.

<i>Symptoms</i>	<i>Possible Causes</i>	<i>Reference</i>
Note unsatisfactory or operation intermittent.	(i) Horns loose on mounting.	Para. 1
	(ii) Faulty wiring.	Para. 2
	(iii) Horn out of adjustment.	Para. 3
	(iv) Internal fault:	Para. 4
	(a) Misalignment of armature and core faces.	
	(b) Incorrect armature-to-core air gap setting.	
	(c) Worn contact set.	
Horns fail to operate.	(i) Faulty wiring.	Para. 2
	(ii) Horn out of adjustment.	Para. 3
	(iii) Internal fault:	Para. 4
	(d) Faulty condenser.	
	(e) Faulty coil.	

### SERVICING

Before making any adjustments to the horn, make certain that the battery is in a good state of charge. These high output horns will not sound correctly unless they are securely clamped in a vice or other heavy fixture while they are being tested.

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

Dismantling and re-assembling procedure is given in Para. 5.

#### 1. HORN MOUNTING

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

#### 2. WIRING

Examine the cables of the horn circuit, and renew any that are worn or chafed. All connections must be clean and tight and connecting eyelets and ferrules making good contact with the cables. Complete failure of the horns can be caused by a blown fuse. If the fuse has blown, examine the wiring and horns for evidence of a short circuit. Check also associated circuits protected by the same fuse. A horn badly out of adjustment and taking excessive current may cause the fuse to burn out.

#### 3. HORN ADJUSTMENT

Check the voltage at the horn with the horn blowing. A clear 'High Frequency' note should be heard over the following voltage ranges:—

6 volt	...	...	4—8 volts
12 volt	...	...	10—16 volts
24 volt	...	...	20—28 volts

Adjustment will 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 roughness of tone. Before making an adjustment, connect an ammeter (0—10 amps. scale) in series with the horn.

The current consumption should be:—

6 volt model	...	5 amps.
12 volt model	...	4 amps.
24 volt model	...	3 amps.



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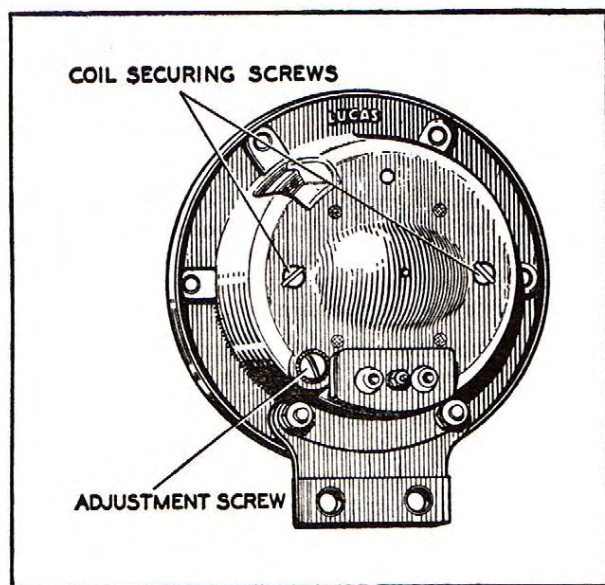


Fig. 1.  
Rear view of horn showing adjustment screw.

If necessary, connect the horn to a battery of appropriate voltage and adjust as follows:—

Turn the adjustment screw (Fig. 1) not more than 3 notches in an anti-clockwise direction to reduce the current. Check horn performance. Repeat adjustment until the best performance is obtained with approximately the current consumption quoted above.

#### 4. INTERNAL FAULTS

##### (a) Mis-alignment of Armature and Core Faces.

To check and reset the alignment of the armature and core faces:—

Remove the cover nut and tone disc. 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.

Loosen the cone nut, and energise the coil from a battery of correct voltage.

Tighten the cone nut while the armature is pulled flat against the core face.

Replace the tone disc and cover nut.

Whilst energising the horn, turn the adjustment screw anti-clockwise until the correct horn note and current consumption is obtained.

NOTE: Do not energise the coil for longer than a few seconds while the contact breaker is rendered inoperative (i.e., is not operated by the armature movement). If a continuous current is allowed to flow through the coil for long periods the coil may be damaged.

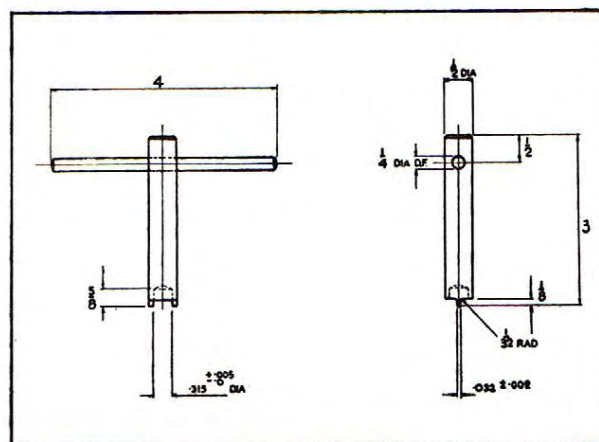


Fig. 2.  
Tool for adjusting air gap setting.  
(Measurements in inches)

##### (b) Incorrect Armature-to-Core Air Gap Setting.

Before the air gap setting can be checked, remove the cover nut and tone disc. Ensure that the cone nut and sleeve lock nut are tight, then proceed as follows:

Turn the adjustment screw several turns clockwise so that the contacts will remain closed when the armature is pulled against the core face. Measure the movement of the armature by mounting a clock indicator gauge to bear on the armature sleeve and momentarily energising the coil. The correct air gap settings are:—

6 volt model	High Note 0.019 ins.—0.022 ins. Low Note 0.019 ins.—0.022 ins.
12 volt model	High Note 0.019 ins.—0.022 ins. Low Note 0.024 ins.—0.026 ins.
24 volt model	High Note 0.019 ins.—0.022 ins. Low Note 0.024 ins.—0.026 ins.

If the air gap setting is incorrect, loosen the cone nut and sleeve lock nut. Turn the adjusting sleeve in a **clockwise** direction to **reduce** the gap, **anti-clockwise** to **increase** the gap. Use the tool shown in Fig. 2 to make this adjustment.



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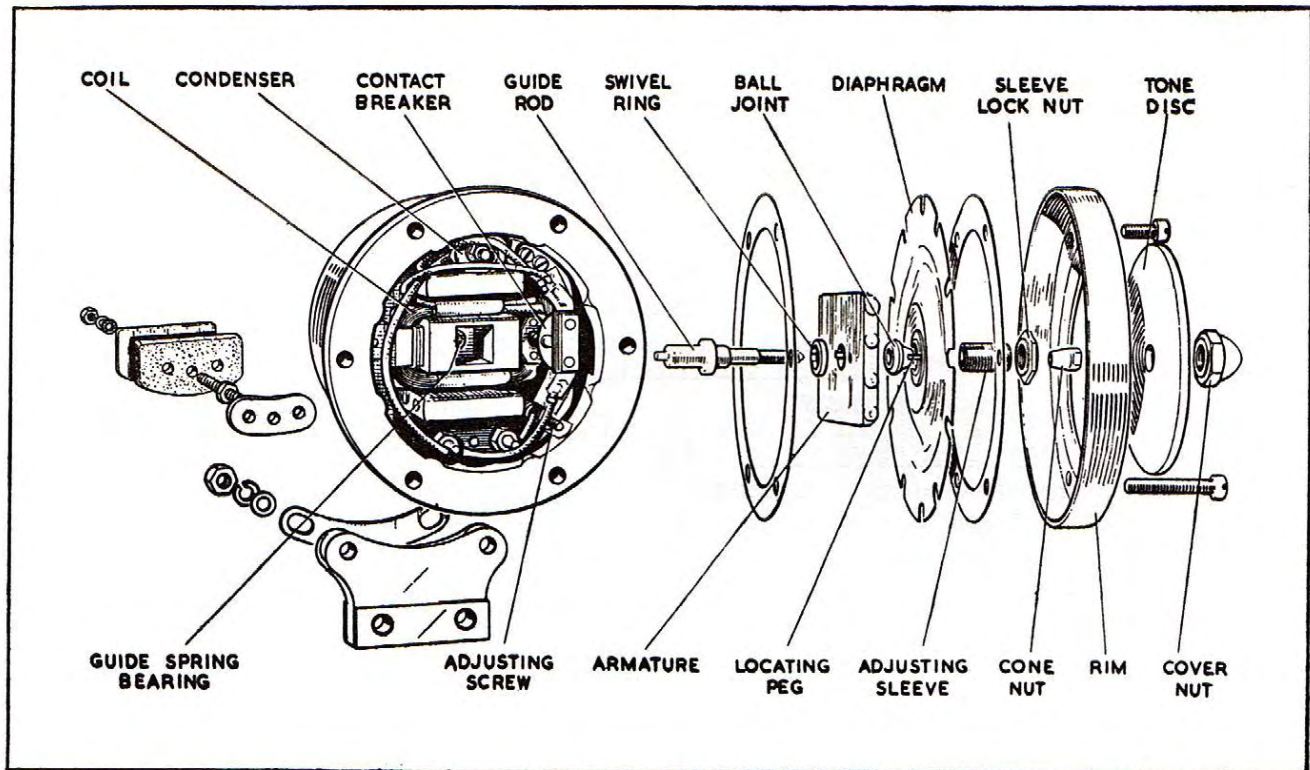


Fig. 3. Dismantled view of horn.

Lightly tighten the sleeve lock nut. Energise the coil, and tighten the cone nut. **Never** tighten the cone nut before the sleeve lock nut or the diaphragm locating peg may shear.

Then recheck the gap with the clock indicator gauge as described above and, if the air gap is still incorrect, repeat this procedure until satisfactory.

Replace the tone disc and tighten the cover nut.

Adjust horn adjustment screw until correct note and current consumption is obtained.

#### (c) Worn Contact Set.

If the contact breaker points are badly worn the operation of the horn may be intermittent and a new contact set must be fitted. If the contacts are badly pitted (this might be caused by a faulty condenser) they can cause an open circuit and complete failure of the horn. The pressure required at the end of the contact spring to just open the contacts, must not be more than 50 ozs. and not less than 42 ozs. If the spring pressure is outside these limits, it is necessary to fit a new contact set.

#### (d) Faulty Condenser

Should the horn 'click' when energised, but not produce a note, turn the adjustment screw anti-clock-

wise. If the horn still does not sound when the head of the screw disengages from the serrations in the body then the condenser may be short circuited internally. Remove cover nut, tone disc and securing rim, and withdraw the diaphragm assembly. The condenser may now be checked with a 500 volt megger. Disconnect the lead from the condenser terminal, and connect the megger between the condenser terminal and case. The megger reading should not be less than 3 megohms. Replace condenser if faulty, re-assemble horn and adjust for correct note and normal current consumption.

#### (e) Faulty Coil.

If, after checking the contact breaker as in (c) above there is still an open circuit in the horn, the coil continuity must be checked. To do this, connect an ohmmeter across the supply terminals with the contact breaker points closed. The correct coil resistance should be:—

6 volt model ...	0.22—0.26 ohms
12 volt model ...	0.70—0.75 ohms
24 volt model ...	2.0—2.4 ohms

If the readings do not compare favourably with these figures the coil must be replaced. Reassemble the horn, and adjust for normal current.



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## 5. DISMANTLING AND RE-ASSEMBLY PROCEDURE

A partly dismantled horn is shown in Fig. 3 and the sequence of removal operations is laid down in Fig. 4.

Do not bend the guide spring more than is necessary, or the spring steel may be damaged.

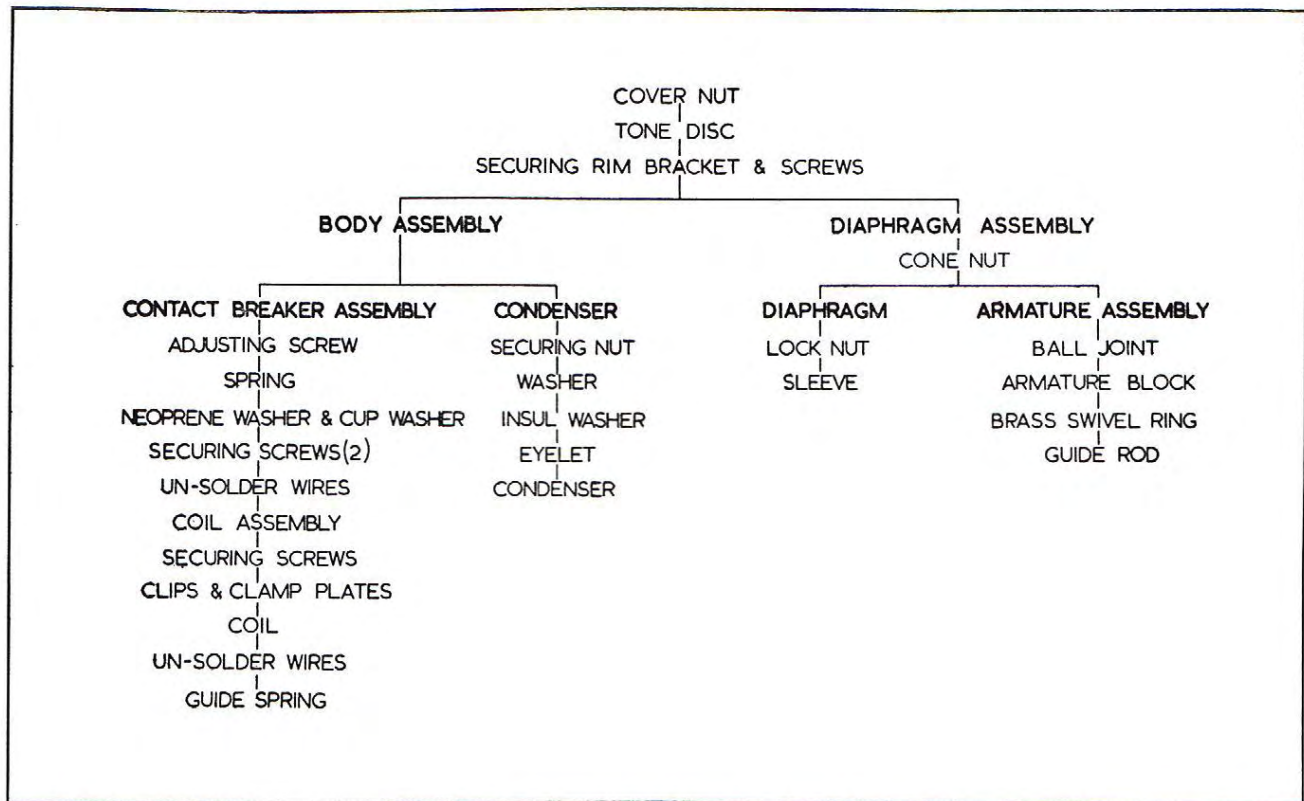


Fig. 4.  
Sequence of dismantling and reassembly.

The assembly procedure is a reversal of the dismantling operation. The following points must be observed when the horn is being assembled:—

- (a) Before tightening the screws securing the coil assembly, the guide spring bearing must be centralised in the horn body. Place the centralising jig (Figs. 5 & 6) over the horn body, with the central peg located in the guide spring bearing, and tighten the coil securing screws. Make sure that the coil clamping plates are square to the windings, and that the coil is firmly clamped around the former and not moveable by hand.
- (b) To avoid short circuits due to chafing of cable insulation through vibration, the cables from the coil,

contact breaker and condenser must be coiled smoothly to follow the curve of the body, but not to touch it.

(c) All operating surfaces of the ball joint, guide rod tip and guide spring bearing must be thinly coated with Duckham's H.B.B. grease.

(d) When building-up the diaphragm assembly, leave the cone nut and sleeve lock nut loose until the securing rim has been replaced and the horn is ready for setting.

(e) After the horn has been completely assembled and tested, it is advisable to paint over scratched parts. This will prevent rust attacking the horn.



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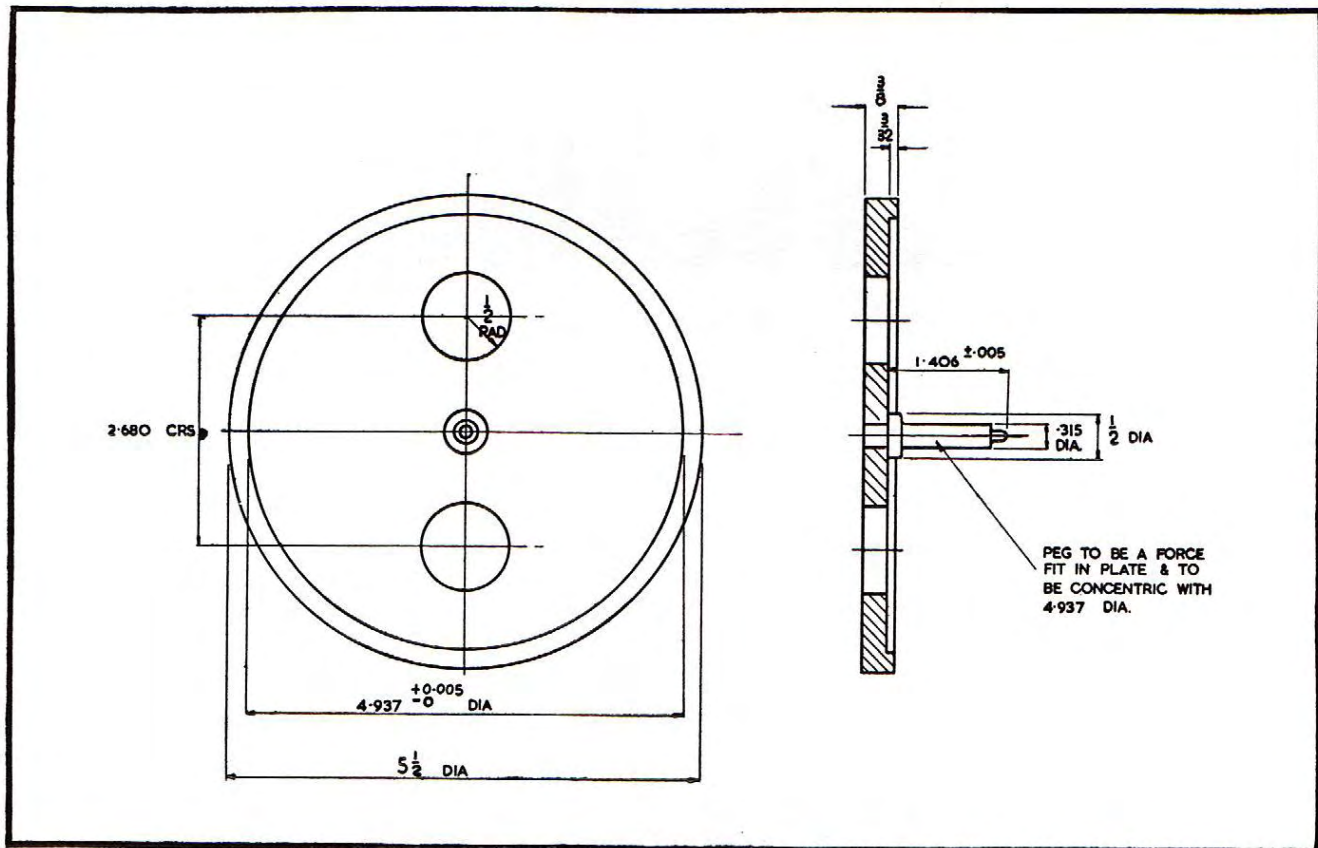


Fig. 5.  
Plan view of centralising jig.  
(Measurements in inches).

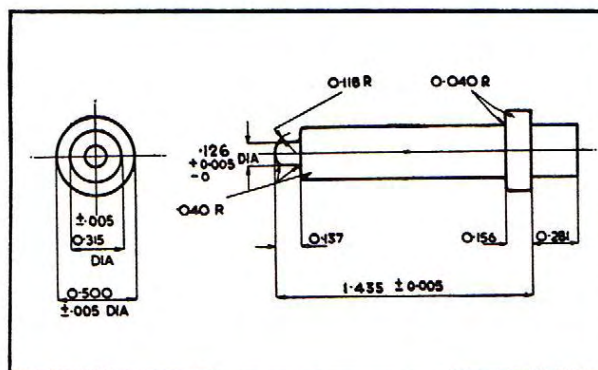


Fig. 6.  
Details of peg for centralising jig.  
(Measurements in inches).

The air gap adjusting tool (Fig. 2) and centralising jig (Figs. 5 and 6) must be made under local arrangements. The correct material for both tools is mild steel, case hardened.

