THE LABGEAR LG300 MK II TRANSMITTER

INSTRUCTIONS - PLEASE READ CAREFULLY

1) Unpack the transmitter, carefully, and note the mains tap adjustment on the attached inspection label. If this differs from the mains voltage in your district, it will be necessary to alter the mains tap on the filament transformer.

In order to remove the transmitter from the cabinet, unscrew the ten bolts along the two vertical edges of the front panel one screw on back cover and withdraw the unit carefully.

To expose the multiplier valve position, remove the lower chassis cover, unscrewing the nine screws identified by BLUE spots.

2) Unpack the valves from their carton and insert them in the correct positions, remembering to connect the P.A. anode cap. To maintain accurate V.F.O. calibration the V.F.O. valve has been labelled. Note the V.F.O. valve holder has been fitted with a screening can. This must be fitted before using the transmitter.

3) Attach the lower chassis cover and replace the unit in the cabinet.

4) Connect the power supplies to the multi-way socket provided as follows:-

Pin 1 Mains	Pin 5 Blank
" 2 Blank	" 6 150V stabilised
" 3 Blank	" 7 Mains
" 4 300V+	" 8 Earth and H.T.-

4 or 5 core screened cable is recommended. If 4 core screened cable is used, the screening may be used for the H.T.- connection. The pin numbers are clearly moulded on the bakelite socket insert. The main high voltage supply should be connected to the co-axial socket at the rear of the transmitter via a length of co-axial lead. The outer screening should make good electrical contact both at the power unit and transmitter ends.

5) If telephony operation is required, the secondary of the modulation transformer is connected in series with the high voltage feed. This can conveniently be effected at the power unit end. The modulating load impedance depends on the operating conditions of the P.A. stage. It may be quickly derived from the formula:-

$$Z_L = \frac{V_A}{I_A + I_{g2}}$$

V_A is the D.C. anode voltage applied to the 813.
I_A " " " " " current of the 813
I_{g2} " " " " screen " " " "

For example using a 1000V supply and

I_A = 150 mA; I_{g2} = 32mA; $Z_L = \frac{1000}{182 \times 10^{-3}} = 5{,}500$ ohms

The modulator output impedance should be set to this value in this instance.

6) The R.F. output of the transmitter is intended for feeding into a co-axial line of any impedance between 52 and 80 ohms. The output loading circuit is sufficiently flexible to provide matching outside of these limits but each case then has to be considered on its own merits.

To quote an example, many users may find that an aerial fed with 150 ohm twin lead, can be coupled directly to the output of the transmitter with excellent results, although such a practice is not technically perfect. In another case the adoption of this simple technique will result in harmonic radiation from the feeder causing T.V.I.

contd...

The correct procedure is to utilise a standard aerial tuning unit as described in all the popular Amateur Radio Handbooks whenever the aerial feeder is not 52 - 80 ohm co-ax.

7) Switching-on and Tuning-up Procedure.

The power unit should have been designed so that all filaments can be switched-on independantly of the H.T. The +300V. and 150V. stabilised line may be conveniently controlled by one switch and the H.V. to the 813 and modulator H.T. by another. One further master control switch for all H.T. supplies should be used for normal operation after tuning-up and loading has been effected.

(a) Switch on all filaments and wait for M.V. rectifiers (if employed) to attain correct temperature.
(b) Set both band switches to band required.
(c) Set V.F.O. to frequency required.
(d) Switch-on 300V. and 150V. stabilised lines.
(e) Check Drive to 813 (R.H. Meter) and adjust "peak drive" and increase drive" controls as necessary. Leave drive on for 1 to 2 minutes initially after which V.F.O. drift is negligible.
(f) Now reduce drive to a low value (3-5mA) before applying H.V.
(g) Turn righthand "loading" control fully clockwise.
(h) Apply H.V.
(i) Resonate left hand "tuning" control (minimum reading on L.H.meter)
(j) Adjust loading by turning counter clockwise the "loading" control and after each setting re-resonate P.A. tuning.
(k) When the P.A. stage has been approximately adjusted, advance the drive to the working value (5 - 15 mA). Low drive results in low harmonic output but more is required on 'phone than on C.W. to ensure linear modulation. Generally speaking the lowest drive which will yield satisfactory results should be used. There is nothing to be gained by exceeding 10 mA although no damage will result up to full scale deflection of the grid current meter.
(l) Now finally adjust the P.A. loading and tuning controls for a satisfactory anode voltage to anode current ratio. For 150 watt operation it is suggested 1000 volts be employed at 150 mA. A wide deviation from this order of voltage to current ratio should be avoided for best results especially on telephony. It is not such an important factor on telegraphy.

8) Telephony

Theoretically the modulator should be capable of giving 75 watts of audio (as measured at the secondary of the modulation transformer) for 100% sine wave modulation. In practice a modulator giving 50 - 60 watts is all that is required for good communications quality speech. The load impedance has been discussed under (5).

9) Telegraphy

Use a co-ax lead between the key and the transmitter. R.F. key clicks can be eliminated by a simple filter connected at the key terminals (not at the transmitter end). A small R.F. choke and two small mica by-pass condensers can usually be accommodated in the key housing.

If both 'phone and C.W. are normally employed, the secondary of the modulation transformer should be shorted when using telegraphy.

Use the upper jack to key normally, or the lower one where the oscillator signal would be inconvenient for break-in working.

10) Generally speaking "netting" is best achieved by turning the drive control to minimum. Some operators may, however, prefer to insert an open circuited jack - plug in the "Key Buff" jack whilst "netting".

Notes on T.V.I.

Extensive screening and lead filtering ensure a very low harmonic output at frequencies of 40Mc/S and over. A built-in tuned filter is incorporated at the ouput of the pi-network anode circuit of the P.A. stage. This is adjustable over the range 40 - 70Mc/S and should be resonated at the frequency of the local T/V service.

Preferably a harmonic monitor comprising a tuned circuit(s), crystal rectifier and micro-ammeter should be conected to the left hand co-ax socket and tuned to the T/V channel in use. The trimmer at the top of the front panel should then be carefully set for minimum harmonic indication. If the fundamental output of the transmitter is troublesome and causes a permanent reading on the harmonic indicator, the effect may be eliminated by inserting a Labgear E.5028 high-pass filter between the output and the monitor. A T/V receiver may be used instead of the harmonic indicator suggested but in this case extra care should be taken not to overload the receiver and some form of attenuator should be incorporated.

When it is desired to use a Labgear E.5034 low-pass filter to reduce still further the harmonic radiation, it is most important to note that unsatisfactory results will be obtained unless it is correctly terminated. This means that it must be inserted in a 75 ohm co-ax line and the standing waves on this line (as checked for example with a Labgear E.5029 S.W.R. meter) must have been reduced to near unity by correct matching. The use of an aerial tuning unit greatly facilitates this task. Damage can result to the L.P. filter if it is badly mis-matched. For this reason reduced power should be used until the matching has been checked when using a low-pass filter.

Finally, it must be appreciated that in many instances, when harmonics from the transmitting equipment have been reduced to a practical minimum, a residue of T.V.I. may still exist due to one or more of the following reasons:-

(a) Fundamental over-load of the receiver giving rise to harmonic generation in the receiver or cross-modulation.
(b) Direct break-through of the fundamental into the T/V receiver circuits.
(c) T/V receiver I.F. co-incident with transmitter frequency.
(d) External generation of harmonics due to the shock excitation of conductors in the proximity of the transmitting station associated with non-linear components. For example a length of gutter making partial contact to another piece of metal may give rise to contact rectification with the result that strong harmonics are radiated.

Technically speaking the correct treatment is as follows:-
(a) Insert a Labgear E.5028 high-pass filter in the aerial feeder lead of the receiver.
(b) Screen the affected circuits.
(c) Same treatment as (a).
(d) Locate and remove such non-linear elements.

It is appreciated that the correct treatment is not always practicable and in such cases the licencing authority should be called in for arbitration. Again the T/V signal may be so weak that, from a technical viewpoint, it may be considered unreasonable to operate an H.F. transmitter and T/V receiver in close proximity owing to the fact that however well a transmitter is designed, there must always be some measure of residual harmonics, however small.

A FEW SPECIAL POINTS TO BE OBSERVED TO ENSURE SATISFACTION WITH THE LG 300 TRANSMITTER.

1.) Switch on heaters and pause for at least 15 seconds before applying H.T.
2) 300 volt H.T. line should have good regulation; make sure that it does not exceed 330 volts when exciter is switched to 3.5Mc/S band and not less than 280 volts when switched to 28Mc/S band.

contd...

3) H.T. supplies should be reasonably ripple-free.
4) Do not apply anode volts to 813 before exciter H.T.
5) Never apply modulation excepting under correct loaded conditions.
6) SWITCH OFF ALL H.T. BEFORE TURNING EITHER BAND SWITCH.
7) Do not frequency multiply in the P.A. stage - i.e. always set both band switches to the same band.
8) Never switch-on anode volts of 813 unless drive has been reduced to limit the anode current, should the anode circuit not previously been correctly resonated.
9) Do not let the transmitter run for extended periods off-load.
10) DO NOT OBSTRUCT THE VENTILATION. THE PERFORATED SECTIONS OF THE CABINET MUST BE LEFT CLEAR.
11) In the event of break-down, check the power supplies and modulator. Change the valves if necessary and if the trouble is not cleared return the transmitter for service.

Warranty

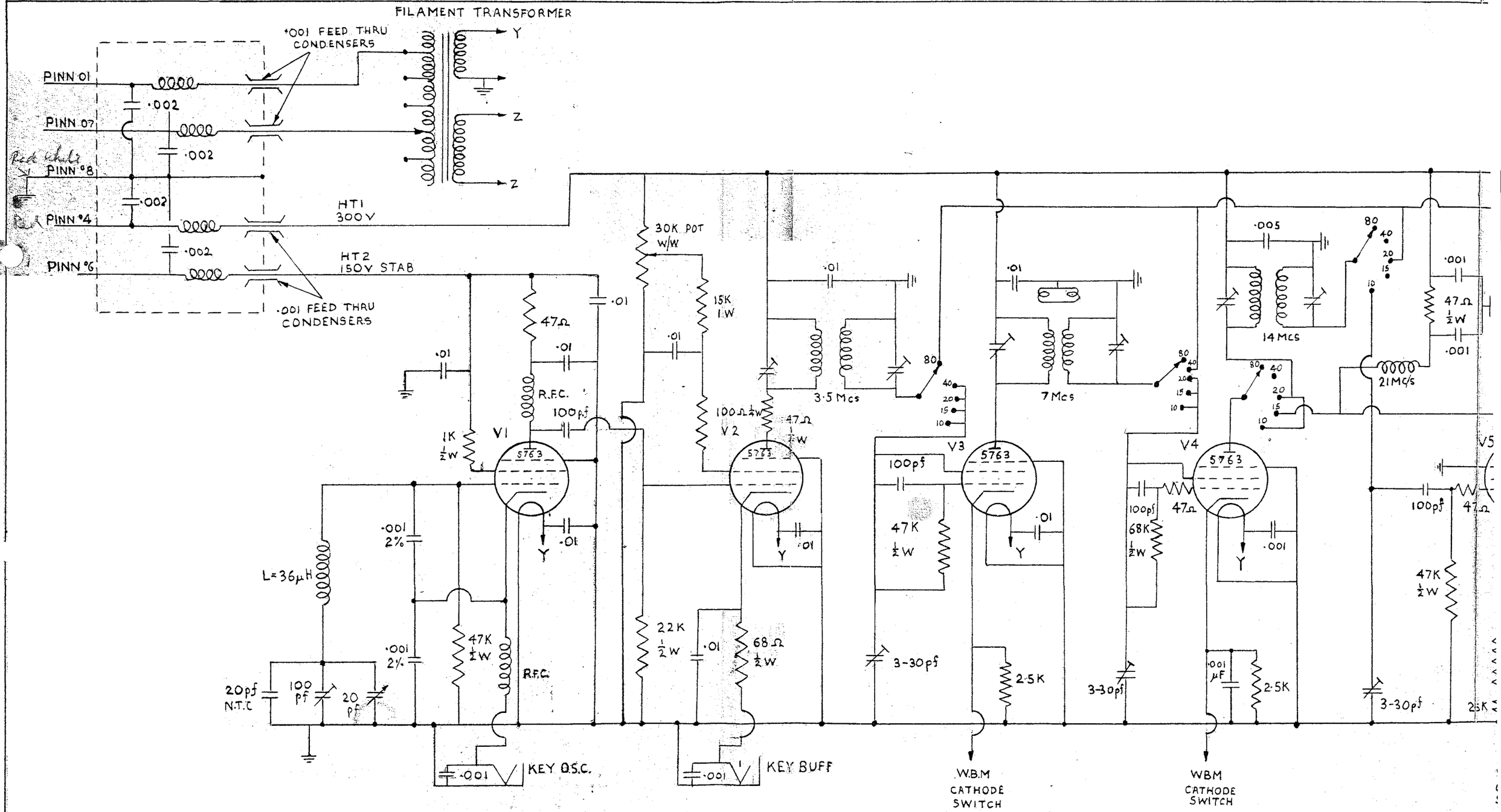
This transmitter is guaranteed for a period of SIX months from date of purchase and any faults resulting, in our opinion, from defective materials or workmanship, will be rectified free of charge. This warranty does not cover any of the valves which may or may not be the subject of a valve manufacturer's guarantee.

All other warranties, implied or otherwise, are expressly excluded.

- - - - - - -

CIRCUIT DIAGRAM

NEW DESK TOP 150W TRANSMITTER MARK II

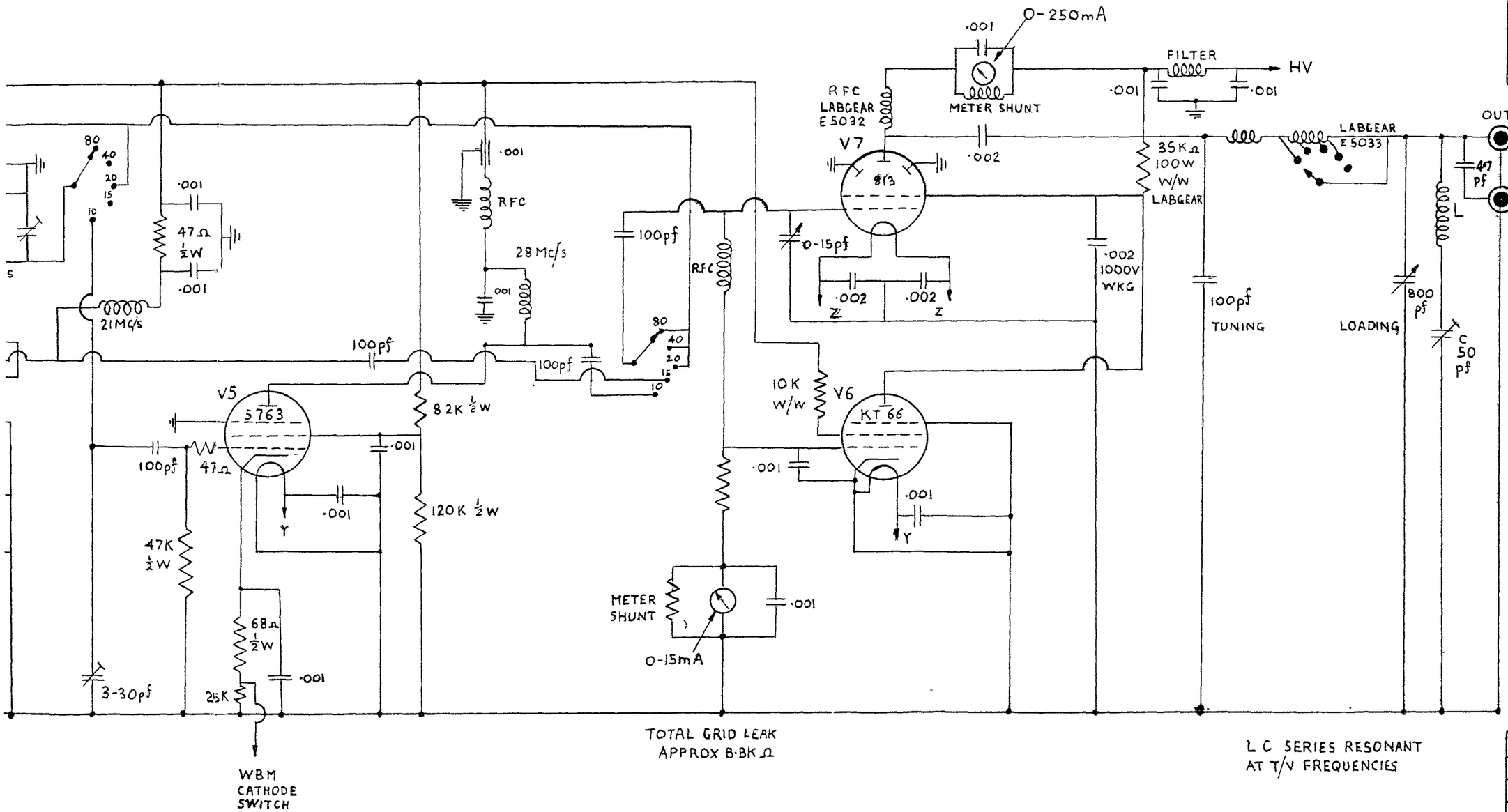


SH-2385

ISSUES

1 47Ω RESISTANCES ADDED AT V4 & V6 JG 11-5-55

T/V channel	V	S
1	45"	41·5"
2	51·75"	48·25"
9	194·75"	181·25"



SH 2385

DRN JG 10-10-55	
TRD JG-14-5-56	
CKD B. 28-5-56	
LABGEAR CAMBRIDGE ENGLAND	