SECTION 4

CARRIER ALARM RECEIVERS HR/7, HR/7A AND HR/7B

Receiver HR/7

The HR/7 is a receiver used at studio centres to give warning of carrier failure at the local transmitter. The receiver has an a.f. output and can thus be used for programme checking.

Circuit Details (*Fig.* 5)

Basically the receiver consists of an r.f. stage followed by a diode detector which feeds two valves, one having a relay in its anode circuit to operate the warning device, the other providing the a.f. output.

The r.f. transformer T1 has a dust-iron core and the secondary winding of approximately 100-μH inductance is tuned by one section of a two-gang variable capacitor C1. Tuning is intended to be pre-set and, if the carrier to be checked has a frequency lower than about 700 kc/s, fixed trimming capacitors must be connected in parallel with both sections. The primary winding of the r.f. transformer is tightly coupled to the secondary winding and is centre-tapped. One end of the primary winding is earthed at tag E and an open aerial or the centre conductor of a co-axial cable may be connected to the two tapping points terminated at tags A and C, the choice depending on the aerial constants and the frequency.

The r.f. amplifier can be an AC/VP2 or an AC/SP3B ; the cathode circuit is decoupled by C2 and contains a pre-set variable resistor R2 labelled *sensitivity* which is used for control of r.f. gain, and is adjusted to give reliable operation of the relay in the anode circuit of V3. The screen of V1 is decoupled to earth by C3 and is held at a suitable voltage by the potential divider R3R4. The anode circuit of V1 is decoupled by R5C4 and is connected to the primary winding of the second r.f. transformer T2. This transformer is similar to T1 but has a larger primary winding and the secondary winding is tuned by the second section of the two-gang capacitor.

The detector is a D41, with both anodes strapped, and it is so connected that on conduction the cathode becomes positive with respect to earth. The grid of V3 is fed from the cathode via an r.f. filter C6R6C7 and an a.f. filter R7C8. Thus V3 grid receives a steady positive potential, the magnitude of which depends on the aerial input and the setting of R2. The cathode of V3 includes a bias resistor R8, the value of which was chosen to give an anode current small enough to hold the anode relay in the open position in the absence of a grid signal. R2 should be adjusted in the presence of the carrier so that the positive potential on the grid of V3 increases the anode current sufficiently for the relay to close. Thus the relay is open in the absence of a carrier and closes when the carrier comes on. The three contacts of the relay are brought out to tags, 8, 9 and 10, which can be connected to a warning lamp or buzzer as desired.

It is to be noted that, in addition to providing a warning of carrier failure, the alarm also operates on the failure of the receiver itself or of its power supply.

The a.f. signal corresponding to the steady potential at the grid of V3 is too large to be applied directly to the a.f. amplifier V4 and a fixed potential divider R10R11 is therefore included ahead of the d.c. blocking capacitor C9 and volume control R12 which feed V4. The cathode circuit of V4 includes a bias resistor R13, which is not decoupled, but the anode circuit is decoupled by R14C5 and includes an a.f. transformer T3, the secondary of which is connected to the output tags and the output jack on the front panel. To give 600-ohms output impedance, a fixed resistor of this value is connected across the secondary winding.

Note that the lower end of R10 is not connected to earth but to tag 11 on the tag strip. This is to enable an external microammeter to be connected in the diode load circuit. Such an instrument gives more accurate indication of carrier strength than the meter in the anode circuit of V3, the readings of which are affected by the shape of the

I_a—V_g characteristic. When external metering is not wanted tag 11 should be strapped to tag 12, which is earthed.

Receiver HR/7A

The receiver HR/7A is a modified version of Type HR/7 intended for use at transmitting stations to indicate carrier failure at a nearby transmitter.

Circuit Details (*Fig.*6)

The circuit is similar to that of the HR/7 but differs from it in the following respects :—

(*a*) A 180-kΩ fixed resistor is connected across the secondary winding of T1.

(*b*) A fixed resistor of 350-ohms value is connected in series with the grid of V1.

(*c*) There is no strap between the heater and cathode of V1.

(*d*) R3 is omitted and the screen is fed from the series resistor R4.

(*e*) The second r.f. transformer is tuned by a separate variable capacitor. This is operated by a second panel-mounted tuning control which is labelled *intervalve tuning* and is calibrated from 0 to 100%.

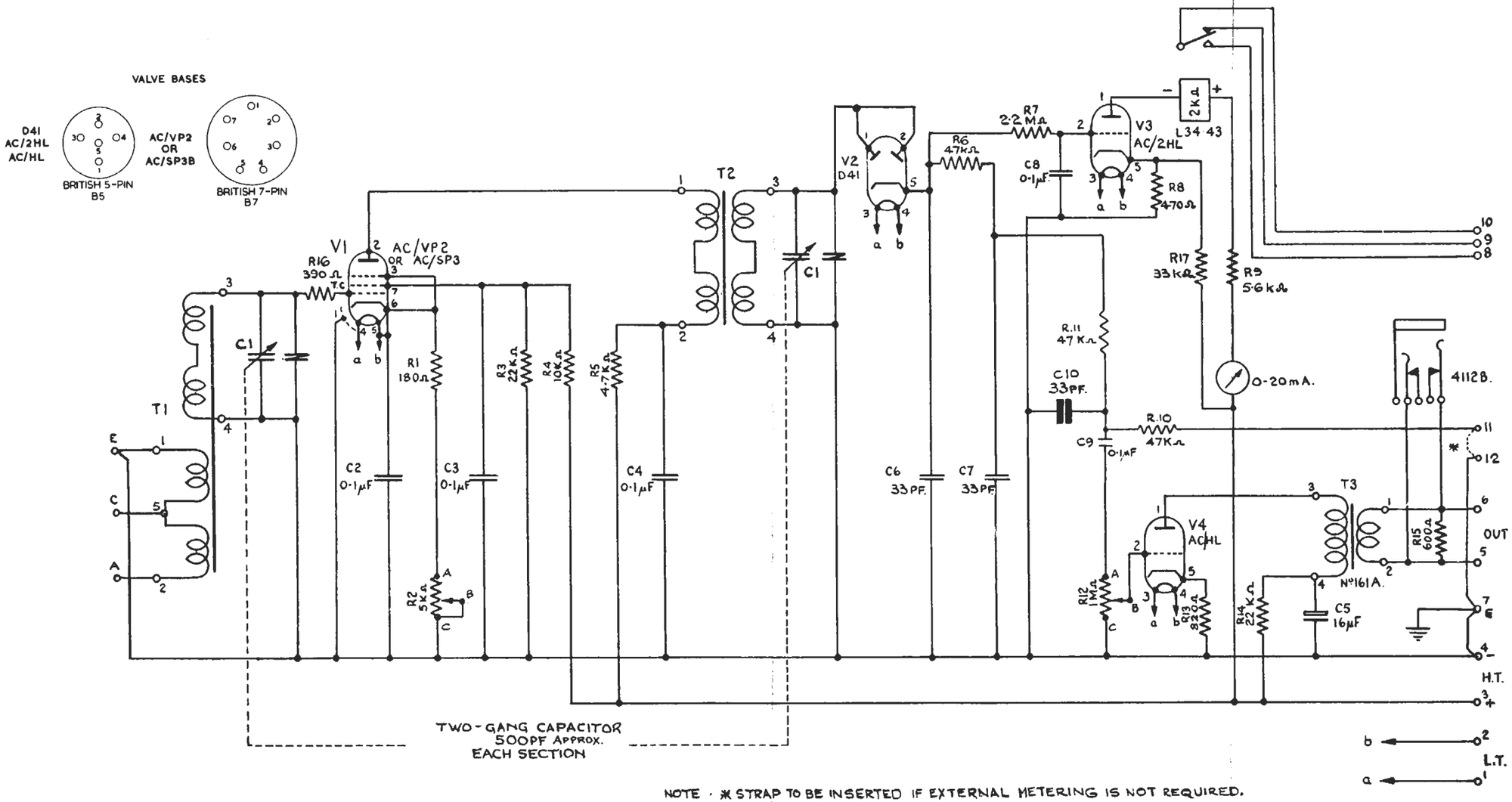
(*f*) A copper screen is fitted beneath the r.f compartment to improve stability.

Receiver HR/7B (Fig. 7)

The receiver HR/7B is another modified version of the HR/7 intended for use at some transmitting stations where it is necessary to include a filter in the aerial circuit of the receiver to reject the local carrier frequency. With the HR/7A the inclusion of the filter may result in poor response to the wanted carrier and unreliable operation of the relay even with maximum sensitivity. In the HR/7B an improvement is obtained by taking the cathode of V3 to earth directly instead of via R8. The detector, V2, is so connected that on conduction the anodes become negative with respect to earth. V3 grid receives a steady *negative* potential, the magnitude of which depends on the aerial input and the setting of R2. Thus the relay is *closed* in the absence of a carrier and *opens* when the carrier comes on. Note that with this arrangement the alarm does not operate on the failure of the receiver itself or of its power supply. Further small differences between the HR/7B and the other receivers may be seen from the circuit diagrams.

RS1

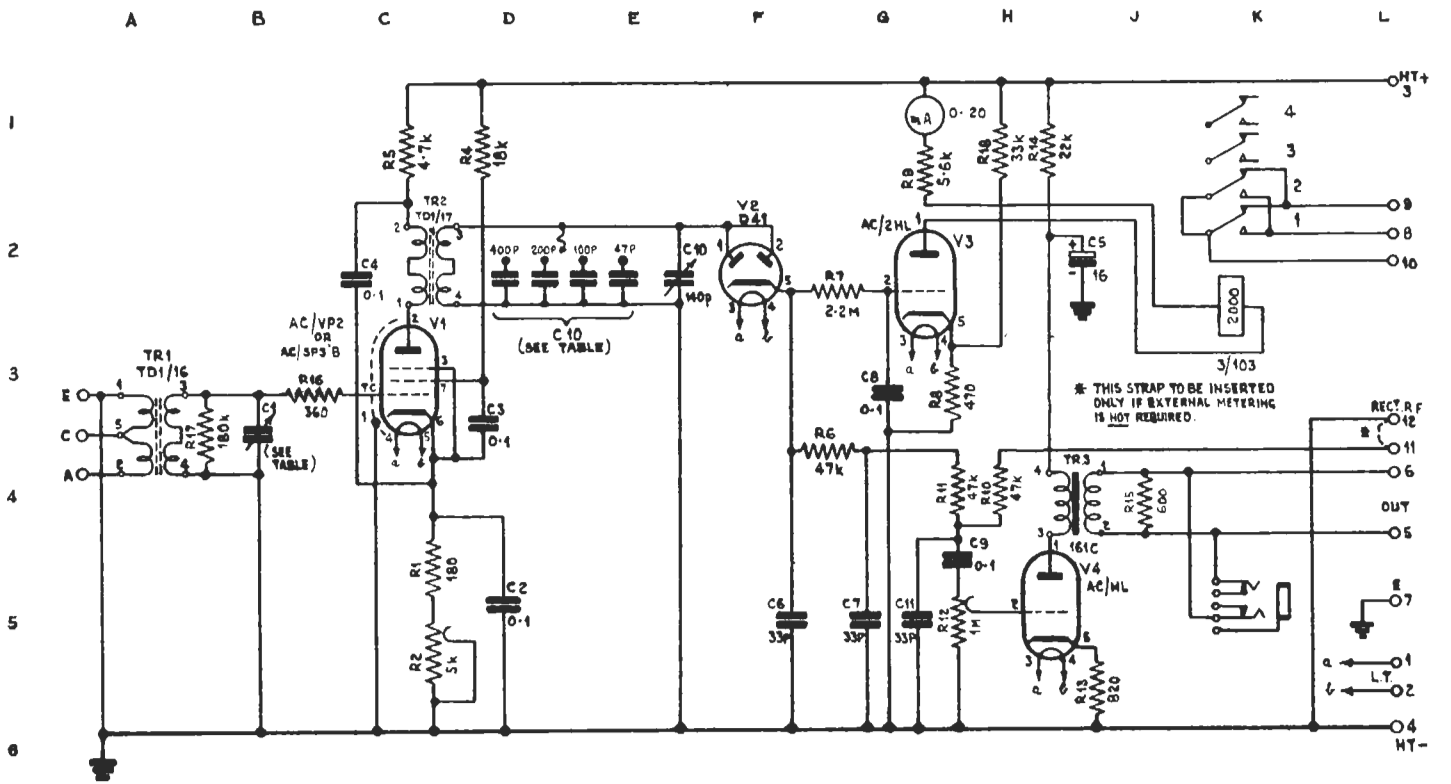
FIG 5



NOTE · * STRAP TO BE INSERTED IF EXTERNAL METERING IS NOT REQUIRED.

COMP	LOC	VALUE	TYPE	COMP	LOC	VALUE	TYPE	COMP	LOC	VALUE	TYPE	COMP	LOC	VALUE	TYPE
C1	C3	500p MAX		C9	K4	0·1		R6	J2	47K		R14	L6	22K	
C2	D4	0·1		C10	J4	33p		R7	J1	2·2M		R15	N5	600	
C3	E4	0·1						R8	K2	470	1 W	R16	C3	390	0·25W
C4	F4	0·1		R1	D3	180		R9	L2	5·6K	1 W	R17	L3	33K	3W
C5	L6	16		R2	D5	5K		R10	K4	47K		T1	B5		
C6	H5	36p		R3	E3	22K		R11	K3	47K		T2	G3		
C7	J5	36p		R4	E3	10K		R12	K6	1M		T3	M5		
C8	J2	0·1		R5	F4	4·7K		R13	L6	820					

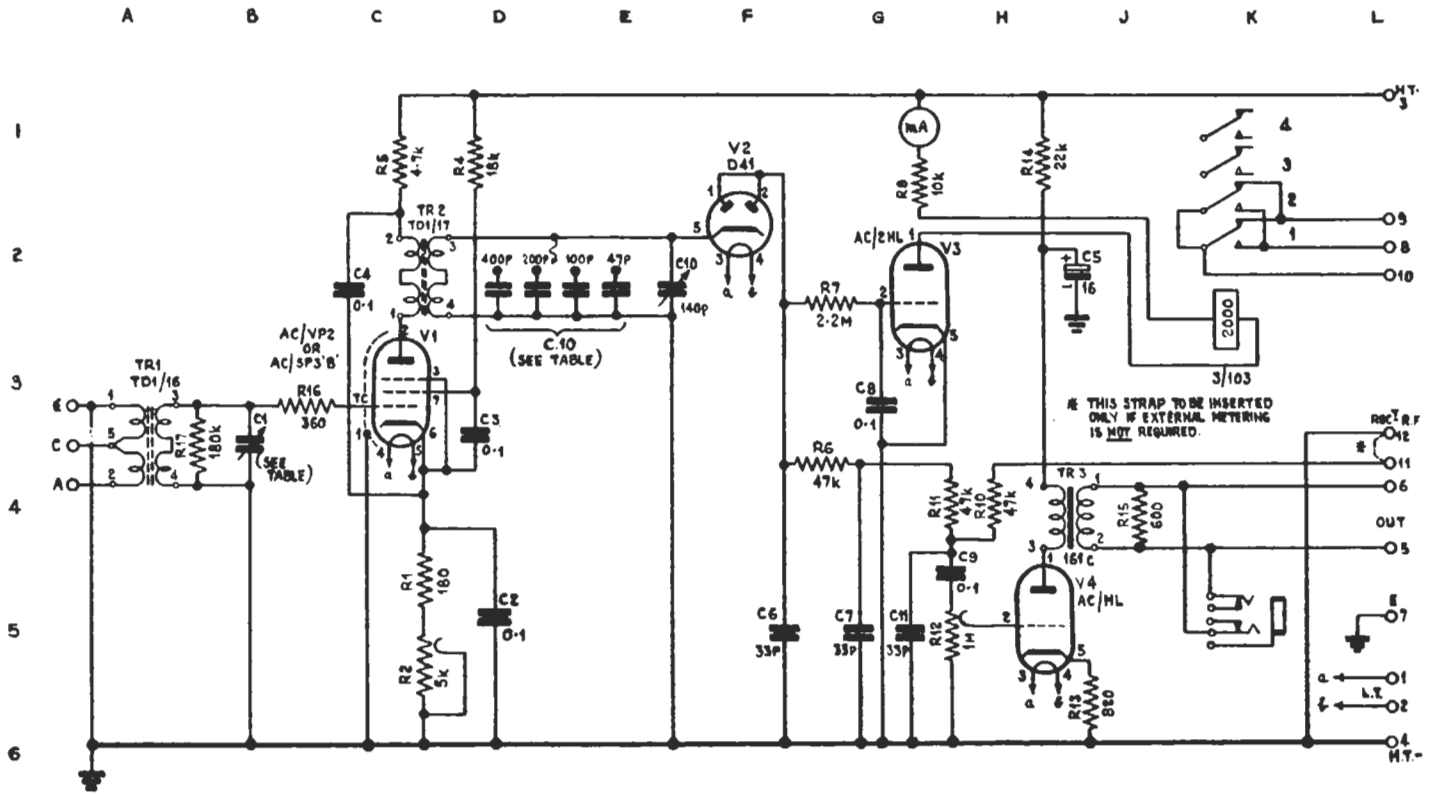
CARRIER ALARM RECEIVER HR/7 CIRCUIT



FREQUENCY RANGE Mc/s	1·65 1·18	1·18 0·945	0·945 0·811	0·811 0·721	0·721 0·655	0·655 0·602	0·602 0·566	0·566 0·532	0·532 0·519
C1.	2 SECTIONS IN SERIES		1 SECTION ONLY			2 SECTIONS IN PARALLEL			
C10 PADDING PF	0	100	200	300	400	500	600	700	747

CARRIER ALARM RECEIVER HR/7A

FIG. 6.



FREQUENCY RANGE Mc/s	1·65 1·18	1·18 0·945	0·945 0·811	0·811 0·721	0·721 0·655	0·655 0·602	0·602 0·566	0·566 0·532	0·532 0·519
C1	2 SECTIONS IN SERIES		1 SECTION ONLY			2 SECTIONS IN PARALLEL			
C10 PADDING PF	0	100	200	300	400	500	600	700	747

CARRIER ALARM RECEIVER HR/7B

FIG.7