SERVICE CASEBOOK

ETRONIC, ROMAC SUBSTITUTES

HAVING had difficulty in getting frame oscillator transformers for Etronic receivers, I have found that the transformer supplied for Cossor 12-in. receivers is a suitable substitute.

For the EHT transformer that has given so much trouble in Romac 12-in. table receivers a suitable substitute is the EHT transformer available for GEC model 5145 receivers.—R.W., Malton.

PYE FVI/FVIC

INSTALLED only a few days, a model developed frame slip, needing constant readjustment. After extensive tests the fault was traced to a 470pF capacitor in the interlace filter (C76 in **Service Charts**, September 1951, **Service Chart Manual** Vol. 6) which had developed a leak, occasionally as low as 2K.—D. ANDERTON, Torquay.

PHILIPS 1502U

A PHILIPS 1502U, the customer complained, had frame trouble because the raster closed up slightly, top and bottom, after about half an hour's use. We checked all frame components without finding anything wrong and so put the chassis on another test run.

It was now noticed that the width also diminished —the mask had hitherto prevented this being seen. This development suggested falling HT or change of EHT. A voltmeter was connected across the HT and another test made. After 1½ hours the voltage had fallen 15 per cent.

Electrolytics were found to be OK, but the fault cleared when a new PZ30 rectifier was tried. Checking the original PZ30 we found that after a period of running the surge resistors connected to the anodes became very hot; the valve has been returned to makers for investigation.—
E. J. P. Birmingham.

PLESSEY SPEAKER REPAIR

THIS is my way of fitting new field coils to Plessey speakers, used in Ferguson and other sets, which have the field-coil frame fixed by four internal bolts near the centring ring.

I have made a "stepped" (off-set end) spanner from mild steel, drilling $\frac{1}{16}$in. and filing five flats to fit bolt heads. Two screws securing the metal centring ring are taken out and a wedge inserted each side to allow the spanner to be used.

Before fitting the new coil, four holes are drilled in the outer (rear) frame of the magnet assembly in line with the bolting down holes. Then the ends of the four screws are slotted so that, on reassembly, the adjusting and tightening of the frame can be done with the screwing of the bolts from the "wrong" end by means of a screwdriver pushed through the newly-drilled holes.—LEO TAYLOR, St. Annes-on-Sea.

EVER READY MODEL K

THIS set came in with violent self-oscillation. On shunting the obvious by-pass condensers, the set would stop oscillating, perform normally, and not re-commence oscillating for at least half an hour. It was eventually discovered that operation could be turned on and off by "wiggling" the DAF91; as reception went off, the set gave a howl of a few micro-seconds duration.

Both in performing and non-performing positions of the DAF91 voltages seemed normal but in the non-operating position the grid pin was dead. The

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fault, it appeared, must lie in the valve or in the holder; both were changed without cure.

After changing nearly all the components around this valveholder and double checking earthing contacts, the cause was found to be the screen feed resistance. Yes! As simple as that. The resistor ends were firmly fixed yet by some internal looseness it was going from 4.7 meg. to a much higher value and the howl was due to microphony, not oscillation.—E. H. MEADOWS, Alton.

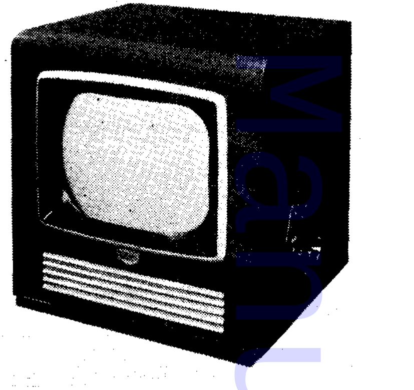
MARCONIPHONE 262AC

THIS receiver would emit an ear-piercing shriek during the warming-up period, followed by normal operation.

The cause was traced to an incorrect valve replacement. The first AF amp had been replaced by a non-metalised type.—J. HALL, Peel, IoM.

ULTRA V80, W80

Five-channel television receiver fitted 12in. CRT. Model V80 is housed in a walnut veneered-table cabinet and W80 in a similarly finished console. For 200-250V 50c/s AC. Manufactured by Ultra Electric Ltd., Western Avenue, London W3



THE receiver is a superhet operating on lower sideband of vision carrier. Aerial, RF and oscillator circuits are tunable to any of the five BBC channels. Vision interference and sound noise suppression circuits are fitted.

Standard models, for use in good reception areas, are supplied factory tuned to any of the five channels and are identified by suffix letters L (London), M (Midlands), N (Northern), S (Scottish), W (West). Fringe area models, incorporating an additional IF amplifier V19, common to both vision and sound channels, and an adjustable sound-channel tone control, are available and identified by a second suffix letter F. Circuit of V19 and tone control are shown in broken lines on the theoretical circuit diagram.

Layout diagrams apply to standard models only. On fringe area models, L6 L7 V11 and L8 L9 V12 and their associated components are moved up on chassis and L22 L23 V19 and components are fitted in places previously occupied by L8 L9 V12. Tone Control P.10, C72 are fitted adjacent to P8 the Picture Interference Suppressor Control at rear of chassis.

Aerial input is for use with 80-ohm co-axial feeder. Outer screening and centre core are DC isolated from primary L6 of input transformer by C42 C43 and outer screening from chassis by C41.

RF amplifier.—Aerial signal is coupled by L7 to grid of RF amplifier V11, the gain of which is preset controlled by P6, **Sensitivity** control, in its cathode.

Frequency-changer is V12 operated as a combined oscillator and mixer. Amplified RF signals are bandpass transformer fed by RFT2 to grid. Oscillatory tuned circuit L10 T2 is connected, through C50, between screen and R56 C48 in earthy side of secondary L9 of RFT2. C49, which can be connected across T2 by plug and socket link S1, is fitted to tune oscillator to its lowest frequency, 22.5mc/s, on channel 1 (London).

Oscillator signal is mixed with RF applied to grid by L9 to produce, across primary L11 of IFT1 in its anode, a vision IF of 19.5mc/s and a sound IF of 16mc/s. Bandwidth to cover both sound and vision frequencies is secured by damping resistor R58. L13 C54, in series with L11 and tuned to 22.5mc/s, functions as local oscillation absorption filter when receiver is tuned to channel 1.

Vision channel consists of IF amplifier V13, signal rectifier V14A, interference suppressor V14B, and video amplifier V15.

Vision signal at anode of frequency-changer V12 is bandpass transformer coupled by IFT1 to vision IF amplifier V13, the gain of which is controlled by P7, the **Contrast** control, in its cathode. Amplified signal at anode V13 is bandpass transformer coupled by IFT2 to signal rectifier V14A. Sound-on-vision rejection at 16mc/s is given by L18 C56 in grid circuit V13 and adjacent channel 1 rejection at 21mc/s is provided by L16 C73 and the anode circuit.

Rectified video signal is developed across R66 and fed through peaking coil L17 to grid of video amplifier V15. Output at anode is applied through peaking coil L1, and R14 C9, to cathode of CRT.

On all fringe models, and on channels 1, 3 and 5 standard receivers, provision is made to feed video output to cathode of CRT through R14 C9 only, L1 being connected in series with video feed to sync separator V1.

Interference suppressor is diode V14B connected with its cathode to anode of video amplifier V15 and its anode positively biased from P8 the **Picture Interference** control. P8 is normally adjusted so that with peak white video signal the diode remains just cut-off. When a high amplitude negative-going interference pulse appears cathode V14B is driven negative to its anode and the diode conducts to short the pulse to chassis through C59.

Fringe models. Receivers with suffix F have an additional IF amplifier V19 connected between frequency-changer V12 and IF-amplifier V13. In these receivers, vision and sound IF signals at anode of frequency changer V12 are bandpass transformer coupled by IFT4 to grid of common vision and sound IF amplifier V19. Amplified signals at its anode are then passed by IFT1 to grid of V13.

Sound channel consists of an IF amplifier V16, signal rectifier and AF amplifier V18, noise suppressor V17, and sound output amplifier V8. Sound IF signal of 16mc/s at anode of frequency-changer V12 is fed by C53 to L19 in grid of sound IF amplifier V16. Amplified signal at its anode is bandpass transformer coupled by IFT3 to signal rectifier diode of V18.

Rectified audio signal is developed across R73 C64 and fed by C65 through noise-suppressor diode V17 and thence passed by C26 to **Volume** control P5 in grid of triode AF amplifier section of V18.

Signal at anode V18 is fed by C22 through stopper R38 to pentode output valve V8. Audio output is transformer fed by OP1 to a 6in. elliptical PM speaker L27. Negative feedback from secondary L26 on OP1 is applied through volume contro P5 to grid V18.

Fringe models incorporate variable tone control circuit P10 C72 between anode V18 and chassis; in addition, HT feed to IF amplifier V16 is decoupled by R84 C71.

Noise suppressor is diode V17 with its anode biased positively from HT through R76. Diode conducts to set up a potential across R75 C66 in its cathode. The time constant of R75 C66 is such that the voltage across the network follows that of the audio signal fed by C65 to anode V17. When a high-frequency interference pulse is passed by C65, anode V17 is driven negative to its cathode, the potential of which is maintained by the comparatively long time constant of R75 C66. The diode is cut off for the duration of the interference pulse.

Sync separator. Video signal at anode of video amplifier V15 is fed by R10 C1 to grid of sync separator V1. Positive sync pulses cause grid current and resultant bias across R1 is sufficient to place video portion of waveform below cut-off; thus only sync pulses appear at anode.

Line sync pulses are taken from anode and fed by C5 to anode of line scan oscillator V2B.

Frame sync pulses: triode V2A is operated with zero bias and hence conducts. Sync pulses at anode V1 are passed through an integrating circuit to grid V2A. Line sync pulses are attenuated and have little or no effect on V2A. The longer frame pulses, however, drive grid V2A below cut-off and thus produce at the anode a positive-going frame sync pulse which is fed by C6 to grid of frame scan oscillator V6.

Frame scan is generated by thyratron V6. Scan voltage is developed on C17 which charges up from HT line through R29 P4 and is discharged by V6 when it is fired by frame sync pulse on its grid. Variation of charging resistance by P4 gives **Height** control and adjustment of cathode bias by P3 gives **Vertical Hold.**

Scan waveform is fed by R31 C18 to frame amplifier V7. Amplified scan voltage at its anode is applied direct to high impedance deflector coils L5 on neck of CRT. C20 is DC blocking capacitor. Negative pulse at cathode V7 during flyback is fed by C19 to grid of CRT to black-out screen during frame flyback.

Line scan is generated by triode V2B operated as a grid blocking oscillator with anode grid back-coupling by transformer LT1. Adjustment of grid voltage by P1 gives **Horizontal Hold.** Scan waveform, which is developed on C8, is fed by C10 R16 to grid of beam-tetrode line amplifier V3. Secondary L33 of line output transformer LT2 in anode V3 feeds scan waveform to low-impedance line deflector coils L4 on CRT.

P2 by adjusting amount of cathode negative feedback gives **Line Amplitude** control. **Width** of line scan is controlled by variable inductance L2 shunted across section L32 of primary winding of LT2. T1 or R44 C33 across one half of line deflector coil damps out residual shock oscillation not removed by V5A.

Efficiency diode. During flyback V5A rectifies and damps out the overshoot voltage set up in LT2 and in so doing builds a charge on C12 C14. During first part of line scan V3 is biased to cut-off by grid current and line deflection is provided by discharge of C12 C14.

Linearity of line scan is controlled by variable inductance L3 in anode circuit of V3.

EHT of approximately 10kV for final anode of CRT is provided by V4 which rectifies high surge voltage set up on primary L30 and overwind L31 of LT2 when V3 is cut-off at end of line scan. EHT is smoothed by C13 and fed through R20 R22 to CRT anode.

HT of approximately 440V is provided by V5B V9 which are connected in a voltage doubling circuit fed from auto-transformer primary L37 of MT1. Voltage doubling capacitors are C28 C30 and resistance-capacity smoothing is given by R42 C31.

Maximum voltage is fed to timebase valves V2B V3 V6 V7 and to anode of vision interference suppressor V14B. Low voltage from across C28 is smoothed by R41 C27 and fed to anode of sound output amplifier V8 and thence further smoothed by hum-bucking section of primary L24 of LS output transformer OPI together with R36 C21 and fed to remainder of receiver.

Heaters of V1-3 6 11-19 are parallel connected and fed from 6.3V tapping on secondary L36 of MTI. Heaters of V7 V8 are parallel connected and fed from 45V tapping on L36. V9 heater is connected across a 27V section and V5 heater across an 80V section of auto-transformer primary winding L32. CRT heater is fed from a separate 2V secondary L35.

Primary L32 of MTI is tapped for inputs of 200 225 245V, 50c/s.

Mains input is fused in each lead. S2 which is ganged to volume control spindle is on/off switch.

CRT is a 12in. triode Mazda CRM121B in table model V80 and CRM123 is console model W80. Both employ permanent magnet focusing with variable grid potential from P9 giving **Brightness** control. R19 prevents high voltage developing between heater and cathode.

ALIGNMENT INSTRUCTIONS

Connect an oscilloscope with Y-plate amplifier or, alternatively, a suitable output meter between video input socket on CRT base and chassis. Connect AC output meter across secondary L25 of OPI. Place P7 at maximum.

IF stages. (1) Inject 18.25mc/s to grid V13 and adjust core L14 (bot.) for maximum vision. (2) Inject 21mc/s to grid V13 and adjust core L16 for minimum vision. (3) Inject 18.25mc/s to grid V13 and adjust core L15 (top) for maximum vision. (4) Inject 16mc/s to junction R56 C48 L9 and adjust cores L18 L19 for minimum vision. (5) Inject 25.5mc/s as above and adjust core L13 for minimum vision. (6) Inject 17mc/s and adjust core L12 (bot.) for maximum vision. (7) Inject 19.5mc/s and adjust core L11 (top) for maximum vision. (8) Inject 16mc/s as above and adjust core L20 (top) and core L21 (bot.) for maximum sound. (9) Repeat operation (4).

Fringe models only. (10) Inject 19.5mc/s to junction R56 C48 L9 and adjust core L22 (top) for maximum vision output. (11) Inject 16mc/s and adjust core L23 (bot.) for maximum vision.

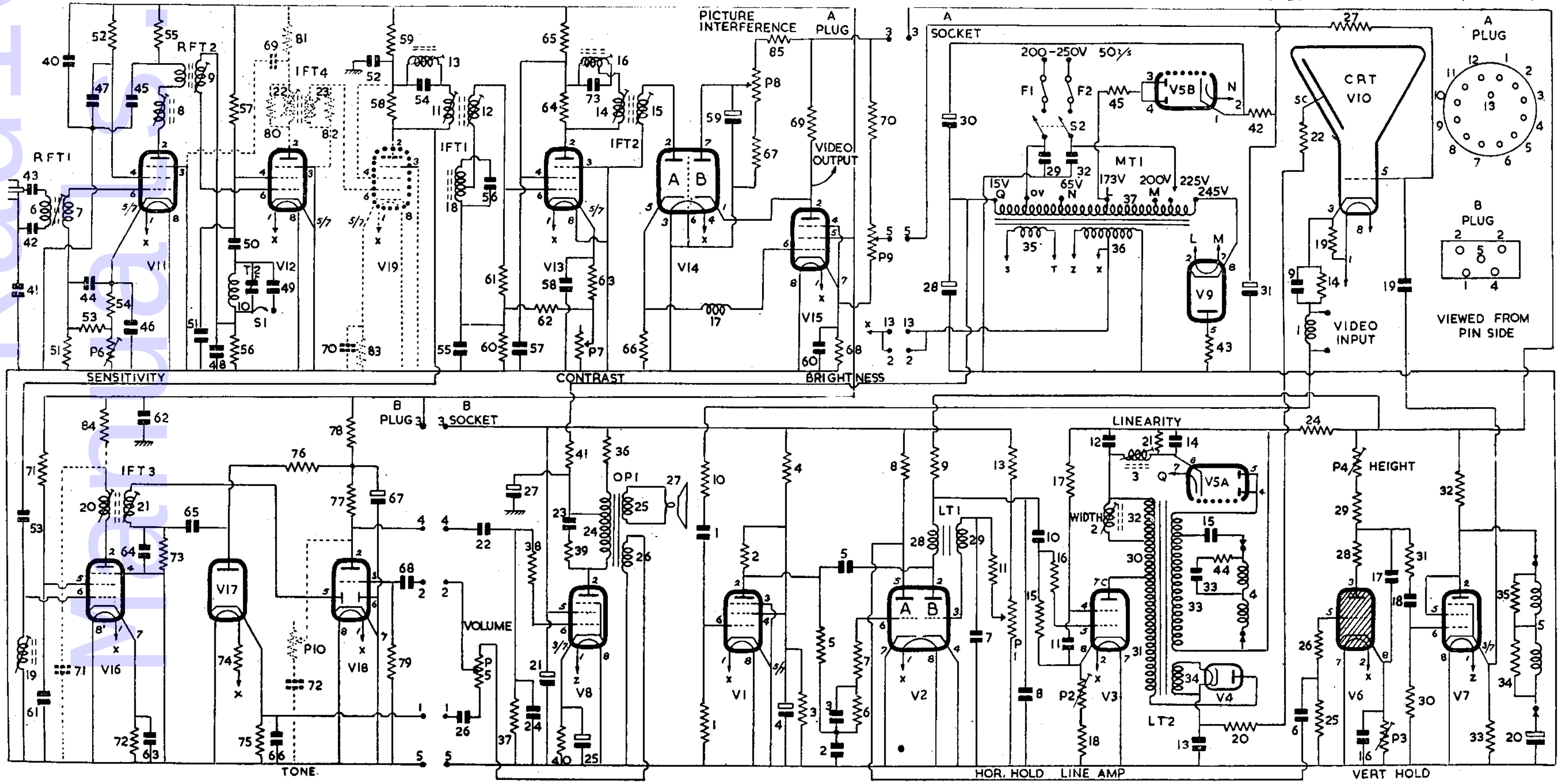
RF stages. Connect oscilloscope between anode V12 and chassis. Place P6 at maximum and P7 at minimum.

(1) Inject appropriate tuning frequency (see table below) to aerial input socket and damp L9 with 390-ohm resistor. Adjust core L8 (top) for maximum. (2) Adjust core L7 (bot.) for maximum.

(3) Inject appropriate sound frequency (see table below) and adjust T2 for maximum. (4) Inject tuning frequency as above, damp L8 and adjust core L9 (bot.) for maximum. (5) Remove damping resistor and connect oscilloscope to anode V15. Inject sound frequency and adjust T2 for minimum.

NOTE: On Fringe models, sensitivity control P6 should be adjusted with 100 microvolt input at vision channel frequency to give 10V peak to peak output on oscilloscope before carrying out operation (5).

	Sound carrier	*Tuning frequency*
Channel 1 (London) ...	41.5mc/s	43.25mc/s
Channel 2 (Northern)...	48.25 „	50 „
Channel 3 (Scottish) ...	53.25 „	55 „
Channel 4 (Midland) ...	58.25 „	60 „
Channel 5 (Western) ...	63.25 „	65 „



RESISTORS

R	*Ohms*	*Watts*
1	1M	¼
2	68K	¼
3	39K	¼
4	18K	½
5	180K	¼
6	1.5M	¼
7	1M	¼
8	82K	½
9	330K	¼
10	10K	¼
11	560K	½
12	No Component	
13	68K	¼
14	470K	¼
15	470K	¼
16	100	¼
17	5K	3
18	47	½
19	100K	¼
20	270K	¼
21	10K	2
22	270K	¼
23	No Component	
24	550	5
25	22K	¼
26	10K	¼
27	56K	¼
28	100	¼
29	120K	¼
30	1M	¼
31	120K	¼
32	3K	10
33	220	1
34	10K	¼
35	10K	¼
36	560	5
37	470K	¼
38	5.6K	¼
39	3.3K	½
40	270	½
41	270	5
42	680	30
43	15	4
44	4.7K	¼
45	47	4
46 to 50	No Components	

R	Ohms	Watts
51	100K	¼
52	5.6K	¼
53	2.2K	¼
54	120	¼
55	1.2K	¼
56	47K	¼
57	150K	¼
58	18K	¼
59	5.6K	¼
59	1.2K (Fringe)	¼
60	100K	¼
61	18K	¼
62	3.9K	¼
63	120	¼
64	18K	¼
65	1.8K	¼
66	4.7K	¼
67	22K	¼
68	270	¼
69	10K	3
70	3.9K	¼
71	27K	¼
72	270	¼
73	47K	¼

R	Ohms	Watts
74	12	¼
75	1.5M	¼
76	1M	¼
77	47K	¼
78	47K	¼
79	10M	¼
80	6.8K	¼ } Fringe only
81	5.6K	¼ } Fringe only
82	6.8K	¼ } Fringe only
83	120	¼ } Fringe only
84	1.8K	¼ } Fringe only
85	27K	¼

VARIABLE RESISTORS

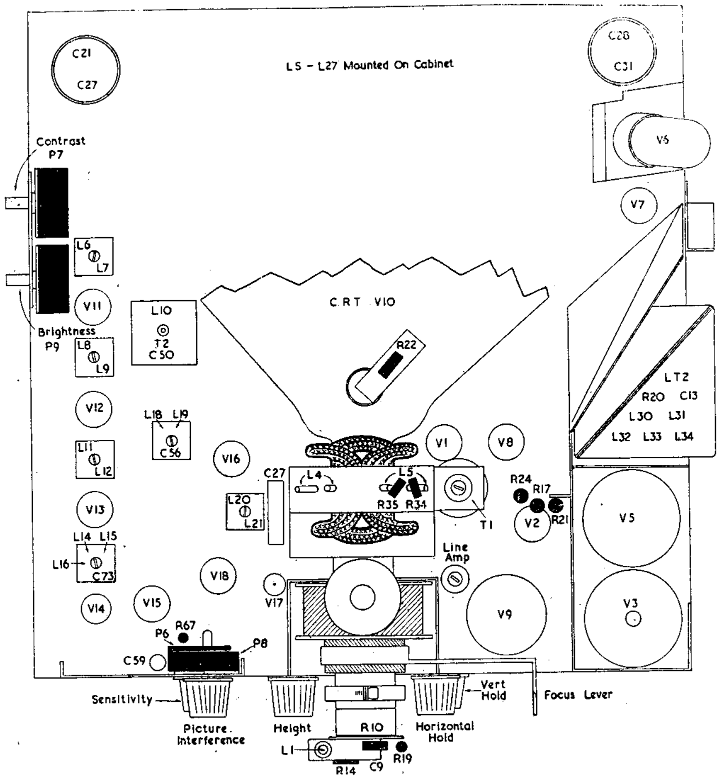
1 ... 50K Potr.
2 ... 250 WW Potr.
3 ... 10K Potr.
4 ... 500K Potr.
5 ... 500K Potr.
6 ... 10K WW Potr.
7 ... 10K WW Potr.
8 ... 100K Potr.
9 ... 50K WW Potr.
10 ... 50K Potr. Fringe only

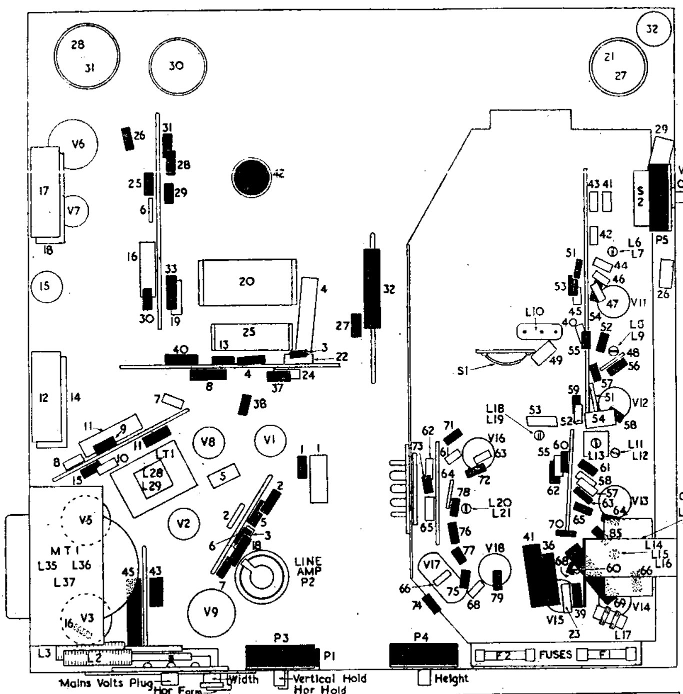
INDUCTORS

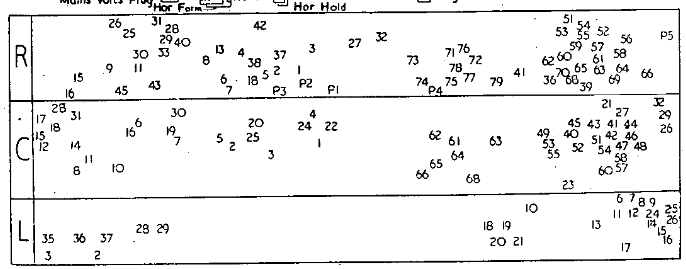
L	Ohms
1	14.5
2	4.5
3	4.5
4	20
5	800
6—16	Very low
17	14.5
18—23	Very low
22	Very low } Fringe only
23	Very low } Fringe only
24	366 Total Tapped 5.5
25	Very low
26	2
27	2.5
28	40
29	108
30	23
31	475 or 15000
32	1
33	11.5 Tapped
34, 35	Very low
36	6
37	28.5 Total

CAPACITORS

C	Capacity Type
1	.02 Tubular 350V
2	100pF Silver Mica
3	.01 Tubular 150V
4	1 Electrolytic 350V
5	33pF Silver Mica
6	22pF Silver Mica
7	200pF Tubular 600V
8	.001 Tubular 150V
9	.1 Tubular 350V
10	.001 Tubular 350V
11	.1 Tubular 350V
12	.5 Tubular 350V
13	500pF Special 12kV
14	.5 Tubular 350V
15	.5 Tubular 350V
16	.02 Tubular 350V
17	.5 Tubular 350V
18	.5 Tubular 350V
19	.01 Tubular 350V
20	40 Electrolytic 275V
21	100 Electrolytic 275V
22	.04 Tubular 150V
23	.01 Tubular 350V
24	500pF Tubular 150V
25	100 Electrolytic 12V
26	.04 Tubular 150V
27	60 Electrolytic 275V
28	60 Electrolytic 350V
29	.1 Tubular 350V
30	50 Electrolytic 275V
32	.1 Tubular 400V AC
33	120pF Silver Mica 750V
34 to 39	No Components
40	500pF Tubular 350V
41	100pF Tubular 750V
42	.001 Tubular 750
43	.001 Tubular 750V
44	500pF Tubular 350V
45	500pF Tubular 350V
46	500pF Tubular 350V
47	500pF Tubular 350V
48	33pF Silver Mica
49	33pF Silver Mica
50	20pF Ceramic
51	20pF Silver Mica
52	.01 Tubular 150V
53	2pF Silver Mica
54	68pF Silver Mica
55	.01 Tubular 150V
56	15pF Silver Mica
57	.01 Tubular 150V
58	.01 Tubular 150V
59	1 Electrolytic 350V
60	.003 Tubular 350V
61	.001 Tubular 350V
62	.001 Tubular 350V
63	.01 Tubular 150V
64	33pF Silver Mica
65	.04 Tubular 150V
66	.001 Tubular 350V
67	1 Electrolytic 350V
68	.01 Tubular 150V
69	.01 Tubular 150V
70	.01 Tubular 150V
71	.01 Tubular 350V
72	.05 Tubular 350V
	(C68-72 fringe only)
73	70pF Silver Mica







VOLTAGE READINGS

V	Type	A	G_2	K
1	6F1	5	90	0
2 A	6L1	35	—	0
2 B	6L1	70	—	0
	6P28	—	240	5—21
		P2 Min-Max		
	U25	—	—	10kV
5 A	U801	—	—	425
5 B	U801	140 RMS	—	450
6	6K25	45 - 85	—	.2-4.6
		A-P4 Min-Max. K-P3 Min-Max.		
7	UL46	175	—	12
8	UL46	215	200	0
9	27SU	—	—	215 RMS
10	CRM121B	10kV	—	165
11	6F1	175-185	160-165	1.5-40
		P6 Min-Max		
12	6F1	150	35	0
13	6F1	160-180	160-180	1.5-40
		P7 Min-Max		
14 A	6D2	—	—	—
14 B	6D2	50-225	—	220-235
		P8 Min-Max		
15	6F14	220	190	5
		P8 at Min		
16	6F15	190	95	2.5
		Standard		
16	6F15	160	95	2.5
		Fringe		
17	D1	30	—	30
18	6LD20	45	—	0
19	6F1	165	165	1.5
		Fitted only on fringe models		

Voltage on C27 = 225V.
Voltage on C28 = 255V.
Voltage on C31 = 335V.
Voltage on C30 = 450V.
Voltage on C21 = 190V.