SERVICE CASEBOOK

When a certain make of set seems liable to a particular fault or when you solve a specially interesting problem, write a note for " Casebook." Contributions are paid for.

EKCO AC/DC

AN Ekco AC-DC gave fairly good performance, but lacked the usual "punch." It was difficult to decide whether the fault was HF or LF, but, first things first, each valve was replaced in turn by a known good one.

No improvement, so the chassis was withdrawn for detailed examination. Voltages everywhere were OK ; in fact, a little higher than specification. A quick check of the trimmers showed them all to be set correctly.

The next thing we checked were the various small decoupling condensers, and this we accomplished by paralleling a known good one across each in turn. No improvement.

During this time, however, the idea was gaining ground that the speaker, an energised job, was insensitive. To check this theory we connected a PM speaker in its place, and immediately the volume increased by at least 50 per cent.

We carefully tested the speaker to find the reason for its insensitivity. The field winding had its correct resistance value, so did the primary of the output transformer ; the cone was perfectly free in suspension, and there was no complete or partial s/c across the speech coil. Yet it was undoubtedly insensitive.

Then a little further investigation showed why. As this receiver is only a three-valve job, the HT current does not amount to a very great figure. It is insufficient, in fact, to fully energise the speaker, and so the manufacturers connect a 5,000-ohm bleeder across the HT line which increases the current through the field coil by about 40 mA.

In our model, this resistor had broken down, and thus the speaker was not being fully energised. We replaced the resistor, and once again the set performed with its usual " punch."—G.R.W.

INTERMITTENT DISTORTION

A SMALL semi-portable AC-DC receiver came in with the report that distortion occurred after one hour's use. When the chassis was removed from its cabinet the distortion stopped. I also noticed that when the volume was turned to maximum the distortion ceased.

These two clues suggested that the trouble was due to heat and existed somewhere in the double-diode triode stage. Concentrating on this, I eventually replaced the capacitor feeding the AVC diode and this cured the fault.

The curious thing is that the " old " capacitor is perfect on test. But I can only assume that when thoroughly warm it develops a leak which upsets the AVC bias and causes the trouble.—E.G.C.

ALBA T411

AN Alba T411 television receiver, employing a tetrode type CRT and mains transformer EHT, was being investigated for the failure of the vision section, sound being quite OK.

EHT and CRT heater continuity and voltage were checked. K, G_1 and G_2 voltages were measured and found to be above 200, brilliance control variation swinging the G_1 voltage appropriately. An oscilloscope connected to the CRT cathode showed a healthy video signal arriving there.

The measured G_2 voltage (215) was considered high after allowing for the shunting effect of the analyser as it was derived from a 2.2 megohm tapping on a 22 meg EHT bleeder chain. The high section of this chain was therefore checked and found to be open circuit. Its replacement cured the fault.

It is assumed that the tube cathode-anode current formed a low impedance between the cathode and G_2, thereby creating a measurable voltage on that electrode which might have been mistaken for the correct voltage.—C.H.W., Enfield.

PHILIPS 209U

A CUSTOMER asked for a pilot bulb for a Philips 209U AC-DC receiver, and was sold an exact replacement. The following day he returned, saying that the set would not work ; he also said he had tried a bulb previously, but that it had burnt out after a few minutes. He was advised to bring the set in for examination.

Tests showed that the special current control resistor was OC. It was replaced, continuity tested, and the set switched on. The pilot lamp became excessively bright, and the set was switched off and retested, and everything appeared normal.

The set was switched on again and voltages taken, and these showed that three valves had no heater volts applied, yet the circuit was continuous.

Further examination revealed that the rectifier valve developed a heater-cathode short on heating, and that there was therefore a short circuit for AC via the rectifier cathode and the reservoir electrolytic condenser to earth, causing excessive current through the dropping resistors and pilot bulb.

Incidentally, on being told of the fault, the customer said that he had had all the valves tested and had been told they were all OK.—A.T., N.15.

ALBA AC/DC

THE owner of a prewar universal Alba complained that within the past two months he had had three rectifiers burn out.

On the bench everything looked OK, but to be on the safe side we changed the smoothing condenser block. We saw no HT leads that could possibly move about and short to chassis, and the rectifier valveholder pins were all clear of one another.

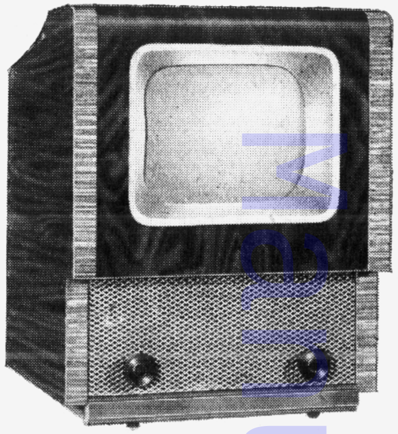
After some prolonged inspecting we switched on, and after a preliminary voltage check-up turned volume fully to maximum ; then, as is our custom, we advanced the tone control to maximum " top," when " phut," another rectifier was burnt-out.

The fault, as you may have surmised, was the tone control condenser, which, although reading OK on an ohmmeter, would occasionally " spark-over " when the control was turned to " brilliance."

We changed this condenser, of course, but even after just breaking down it healed up and was reading almost infinity when we removed it.—G.R.W.

RAYMOND F49, F49B

Fourteen-valve television receiver suitable for 200 to 250V 50c/s AC. Fitted with a 9in. CRT giving a 7½ by 6in. picture. Housed in figured walnut veneered table cabinet. Model F49 is for London frequencies and Model F49B for Birmingham frequencies. Made by Raymond Electric, Ltd., Brent Crescent, North Circular Road, London, NW10.



THE receiver operates on lower sideband of carrier and employs TRF circuits with permeability tuned inductances, the first two RF stages being common to both sound and vision channels. Vision interference and sound noise suppression circuits are fitted. EHT is generated from line flyback pulses.

Aerial input is designed for a 75 to 80 ohm coaxial feeder. The earthy side of input cable and coupling coil L1 are isolated from receiver chassis by C58.

Vision channel consists of three RF amplifiers V1, V2, V6, signal rectifier V7A, video output valve V8, and interference suppressor V7B.

Aerial signal is coupled by RFT1 to g1 of first RF amplifier V1. Bandpass transformer coupling is employed between V1, V2, V6 and V7A. Secondary L4 of RFT2 is damped by R56 to provide a wide bandwidth to cover both sound and vision frequencies.

V2 is coupled by RFT3 through sound trap coil L9 and RFT4 to V6. L9 which is sharply tuned to 41.5mc/s gives a sound on vision rejection of greater than 100 to 1. Tuning of RF stages is staggered to give an overall bandwidth of 2.5mc/s at 3dB down.

Gain of V1 is controlled by VR3 the **Sensitivity** control and gain of V2 by VR1 the **Contrast** control.

The rectified signal developed across V7A diode load R12 is DC coupled to g1 of video output amplifier V8 through RF filter L17 and grid stopper R13. L18 is video frequency correcting choke. Positive video signal at anode V8 is fed by C20 to grid of CRT.

DC restoration of signal is provided from cathode circuit of sync separator V9 through R23. The video signal applied by R22, C21 to cathode of V9 is approximately twice the amplitude of that fed by C20 to CRT grid. R24, R25 form a potential divider in the cathode V9 to give correct DC restoration voltage to grid of CRT.

The value of cathode bias decoupling capacitor C16 is carefully chosen so that gain of V8 is greater at the higher frequencies to compensate for single sideband operation of RF stages of receiver.

Interference suppressor. Anode of diode V7B is connected to anode of video output amplifier V8, whilst its cathode is connected to junction of R17, R18 which form a potential divider across R16. A positive bias is developed on C18 which is approximately equal to average picture signal and V7B is therefore cut-off. When a high-frequency interference pulse appears at anode of V8, the anode V7B is driven heavily positive but, due to long time constant of R17, R18, C18, its cathode voltage remains unaltered. The diode conducts and passes the full signal (twice the amplitude of that fed to CRT grid by C20) through C18 to cathode of CRT which is blacked out for the duration of the interference.

Sound Channel. The sound signal which is amplified with the vision by V1, V2 is coupled by secondary L7 of RFT3 through C30 on to g1 of sound RF amplifier V3, which is then bandpass coupled by high Q transformer RFT6 to signal rectifier V4A. Rectified signal is developed on R35, C36 and fed by C37 through series noise suppressor diode V4B and coupled by C42 to volume control VR2 in grid circuit of pentode output valve V5. Audio output is fed by OP1 to a 6½in. television type PM speaker.

Noise suppressor. Anode of diode V4B is positively biased from the HT line through R36, R37. It conducts and sets up a voltage across cathode load R38. The time constant of R37, C39 in the anode circuit is such that the voltage set up on C39 follows that of the audio signal which is fed by C37 to its cathode. When a large amplitude short duration interference pulse is passed by C37 then, because of comparatively long time constant of R37, C39, the cathode of V4B is driven more positive than its anode and the diode is cut-off. Thus during the interference no signal is passed by V4B to the output stage.

Sync separator is V9 which operates as a DC restorer and sync separator. Its grid and suppressor are earthed and the positive going video signal from anode of video amplifier V8 is applied by R22, C21 to its cathode. The negative going sync pulses drive its cathode negative—the valve conducts and produces negative going sync pulses at the anode.

Frame sync pulses are integrated by R28, C23 and fed by C24 to anode of frame scan oscillator VIIA. Line sync pulses are fed by C22 to suppressor (g3) of line time base generator V10.

Frame scan oscillator is triode VIIA operated as a grid blocking oscillator with anode to grid transformer back coupling by FT1. Frequency is determined by time constant of VR6, R44, C45. The scan voltage is developed on C49. Sync pulses which are fed to anode are phase inverted and stepped up by FT1 and applied to the grid.

Adjustment of anode volts of V11A by VR5 gives control of picture **Height,** and variation of grid voltage by VR6 gives **Frame Hold** control.

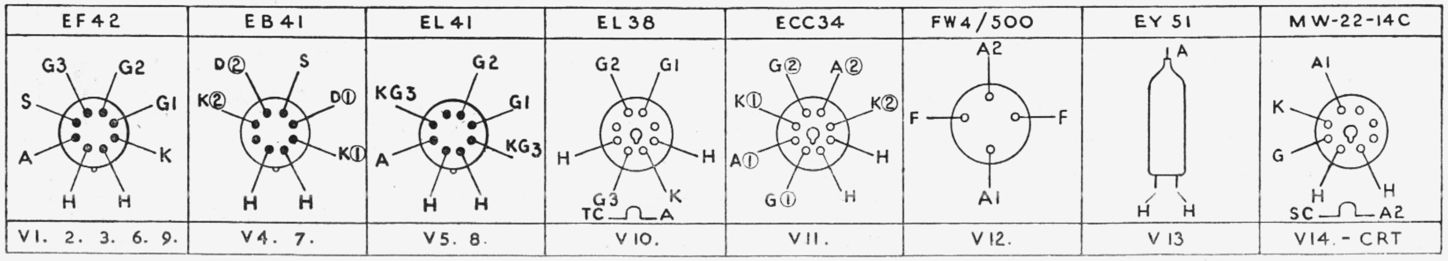
Frame amplifier. Oscillator output is fed by C47 to grid of V11B. After amplification the scanning waveform is coupled by frame output transformer FT2 in the anode circuit to frame deflector coils L36 on the neck of the CRT. **Linearity** is controlled by adjustment of VR8 which varies the amount of negative feedback from anode to grid of V11B. C50, R46 is a differentiating network to compensate the shunt inductance of FT2, whilst VR8, C48 form an integrating network to compensate leakage in FT2 and scanning coils L36.

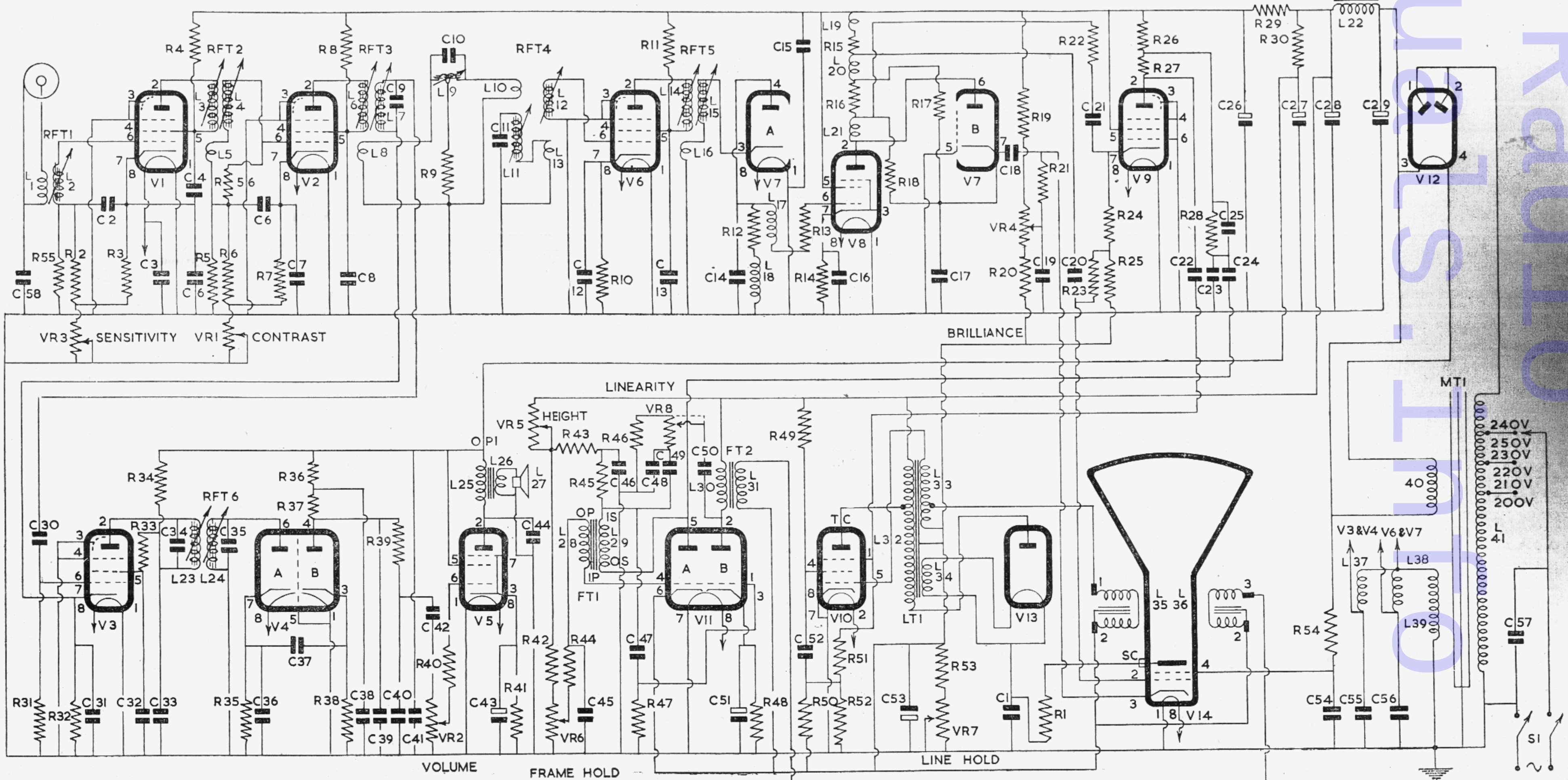
Line scan waveform is obtained from pentode V10. Anode is tightly coupled to grid by L32, L33 of LT1 and the valve functions as a saw-tooth current generator, the output being coupled by section of L33 direct to line deflection coils L35 on neck of CRT.

VOLTAGE READINGS

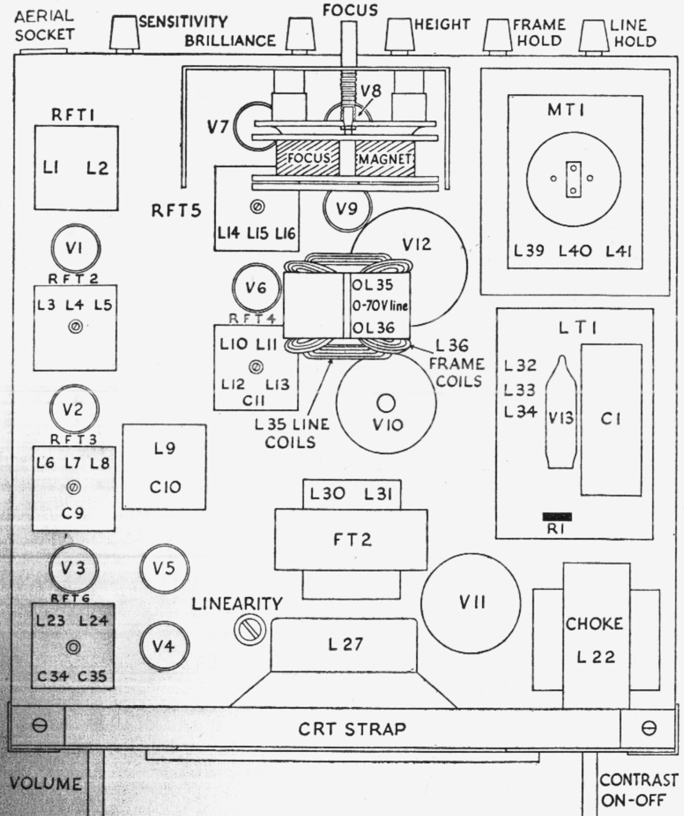
V	Type	A	G2	K	Remarks
1	EF42	215	215	2—32	VR3 Max. to Min.
2	EF42	215	215	2—32	VR1 Max. to Min.
3	EF42	200	190	1.5	
4	EB41	—	—	20	D_2 = 20V approx.
5	EL41	200	210	5.2	
6	EF42	215	215	1.75	
7	EB41	—	—	K_2 90	D_2 = 90V
8	EL41	90	215	5.2	
9	EF42	135	215	3.7	VR1 VR3 at Min.
10	EL38	245	115	0	
11	ECC34	A_2—15 A_1—240	—	K_2 70-ve K_1 13.5	
12	FW4/500	270RMS	—	265	
13	EY51	—	—	7kV	
14	MW22/14C	7kV	265	—ve 12 + ve 30	VR4 Max to Min.

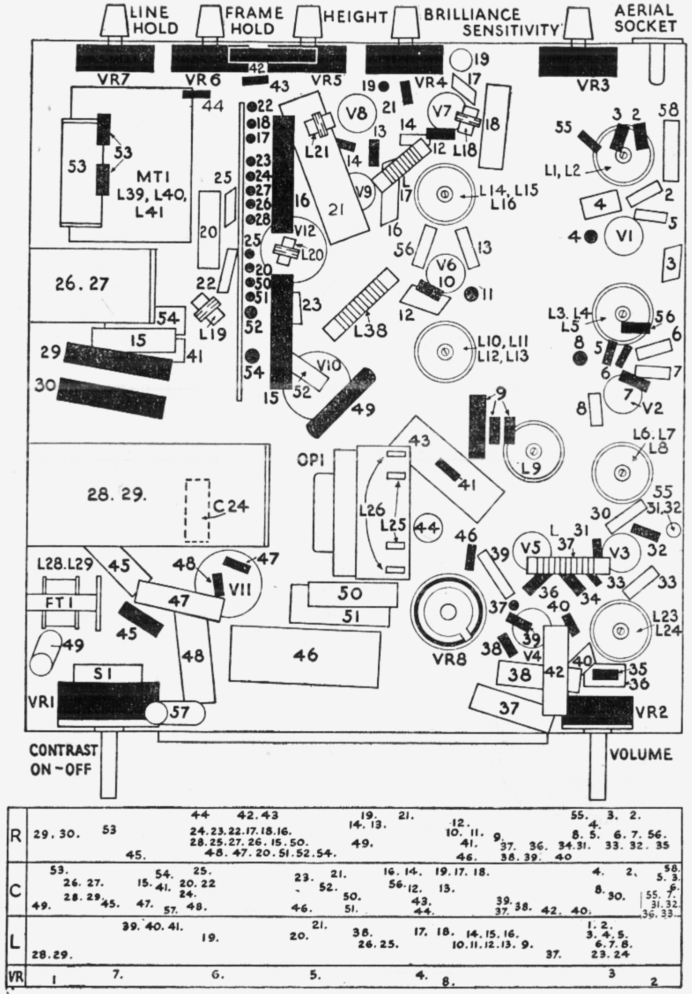
Total HT current V12 = 200 mA.
Total mains Consumption at 230V = .58A





In the under-chassis diagram, the letters R and C are omitted: resistors, in solid black, and capacitors, in outline, are immediately distinguishable





CAPACITORS

C	mF Type
1	.001 Tubular 10kV
2	.001 Mica
3	.001 Mica
4	.001 Mica
5	.001 Mica
6	.001 Mica
7	.001 Mica
8	.001 Mica
9	4.7pF Ceramic
10	390pF Silver Mica (L)
10	200pF Silver Mica (B)
11	10pF Silver Mica
12	.001 Mica
13	.001 Mica
14	4.7pF Ceramic
15	.1 Tubular 350V
13	.003 Silver Mica
17	100pF Silver Mica
18	.1 Tubular 350V
19	.05 Tubular 350V
20	.01 Tubular 500V
21	.25 Tubular 350V
22	39pF Silver Mica
23	.001 Mica
24	.005 Tubular 350V
25	300pF Silver Mica
26	32 Electrolytic 450V
27	32 Electrolytic 350V
28	100 Electrolytic 350V
29	50 Electrolytic 350V
30	10pF Silver Mica
31	.001 Mica or Ceramic
32	.001 Mica or Ceramic
33	.001 Mica or Ceramic
34	10pF Silver Mica
35	10pF Silver Mica
36	39pF Silver Mica
37	.05 Tubular 350V
38	.05 Tubular 350V
39	300pF Silver Mica
40	300pF Silver Mica
41	.1 Tubular 350V
42	.05 Tubular 350V
43	25 Electrolytic 25V
44	.02 Tubular 350V
45	.02 Tubular 350V
46	.5 Tubular 350V
47	.1 Tubular 350V
48	.05 Tubular 350V
49	.02 Tubular 350V
50	.1 Tubular 350V
51	25 Electrolytic 50V
52	.005 Tubular 350V
53	8 Electrolytic 150V
54	.1 Tubular 350V
55	.001 Mica or Ceramic
56	.001 Mica or Ceramic
57	.02 Tubular 350V
58	.01 Tubular 350V

INDUCTORS

L	Ohms
1-16	Very low
17	3.5
18	9
19	6.5
20	6.5
21	6.5
22	75
23-24	Very low
25	350
26	Very low
27	2.5
28	520
29	250
30	760
31	2.4
32	450 Tapped65
33	9.5 Tapped 2
34	Very low
35	14
36	27
37	Very low
38-40	Very low
41	17.5 Total

RESISTORS

R	Ohms	Watts
1	330K	$\frac{1}{4}$
2	3.9K	$\frac{1}{4}$
3	150	$\frac{1}{4}$
4	1K	$\frac{1}{4}$
5	56K	$\frac{1}{8}$
6	3.3K	$\frac{1}{8}$
7	150	$\frac{1}{4}$
8	1K	$\frac{1}{4}$
9	160HS	1W (L)
9	230HS	1W (B)
10	150	$\frac{1}{4}$
11	1K	$\frac{1}{4}$
12	3.9K	$\frac{1}{4}$
13	150	$\frac{1}{4}$
14	180	$\frac{1}{8}$
15	2.7K	2W
16	2.7K	2W
17	6.8M	$\frac{1}{8}$
18	10M	$\frac{1}{8}$
19	100K	$\frac{1}{8}$
20	27K	$\frac{1}{8}$
21	6.8K	$\frac{1}{8}$
22	6.8K	$\frac{1}{8}$
23	470K	$\frac{1}{8}$
24	330K	$\frac{1}{8}$
25	220K	$\frac{1}{8}$
26	47K	$\frac{1}{8}$
27	47K	$\frac{1}{8}$
28	47K	$\frac{1}{8}$
29	560	2W
30	1K	2W
31	100K	$\frac{1}{8}$
32	150	$\frac{1}{4}$
33	3.3K	$\frac{1}{8}$
34	1K	$\frac{1}{4}$
35	68K	$\frac{1}{4}$
36	390K	$\frac{1}{4}$
37	1.8M	$\frac{1}{8}$
38	1M	$\frac{1}{8}$
39	6.8K	$\frac{1}{8}$
40	33K	$\frac{1}{8}$
41	180	$\frac{1}{8}$
42	33K	1W
43	82K	$\frac{1}{8}$
44	3.3M	$\frac{1}{8}$
45	1M	$\frac{1}{2}$
46	82K	$\frac{1}{8}$
47	2.2M	$\frac{1}{8}$
48	1.8K	$\frac{1}{4}$
49	3.9K	6W
50	100K	$\frac{1}{8}$
51	47K	$\frac{1}{8}$
52	68K	$\frac{1}{4}$
53	3.3K	2W
54	4.7M	$\frac{1}{4}$
55	56K	$\frac{1}{8}$
56	4.7K	$\frac{1}{4}$ (L)

VR	
1	10K Potr. with DPST switch
2	500K Potr.
3	10K WW Potr.
4	20K WW Potr.
5	20K WW Potr.
6	20K WW Potr.
7	3K WW Potr.
8	20K WW Potr.

The saw-tooth voltage which is produced across screen (g2) resistor R49 during the scanning stroke' is applied by C52, R51 to suppressor (g3) to improve linearity. Function of R50, R52 is to provide an initial bias to suppressor (g3). Frequency of oscillation is adjusted by VR7 the **Line Hold** control in the grid circuit. The heavy grid current flow of this valve produces approximately 70V across R53, VR7 which is smoothed by C53 and utilised as additional deflection power.

EHT of approximately 7kV for final anode of CRT is obtained by rectifying the high surge voltages developed across over-wound primary L32 of line output transformer LT1 when V10 is cut off. An auxilliary secondary winding L34 on LT1 provides the heater current of the rectifier V13. The EHT supply is smoothed by C1 and fed through R1 to final anode of CRT.

HT is provided by an indirectly-heated rectifier V12 connected in a half-wave circuit. Its anode voltage is obtained from mains auto-transformer primary L41 and heater current from secondary L40. Choke-capacity and resistance-capacity smoothing is given by L22, R29, C26, C27. C28, C29. C29 should be rated to handle 500 mA ripple current. Screen or second anode of CRT is fed from a separate feed resistor R54 which is decoupled by C54.

Heaters of V1, V2, V5, V8 to V11 and CRT are connected in parallel and obtain their current from secondary L39 of mains input transformer MT1.

Heaters of V3, V4 and V6, V7 are each parallel connected and fed from L39 through RF chokes L37, L38, respectively. C3, C55, C56 are filament decoupling capacitors.

Primary L41 of MT1 is tapped for inputs of 200-210, 220-230, 240-250 Volts 50c/s. S1 which is ganged to contrast control is the ON/OFF switch.

CRT is a 9in. tetrode with permanent magnet ring focussing. Brilliance is controlled by variation of its cathode voltage by **VR4**.

Model F49B, which covers the Birmingham frequencies, is similar to the above receiver with the exception of R9, C10 which are of a different value, as shown in the list of components and R56 which is not fitted.

ALIGNMENT PROCEDURE—F49

1 **Equipment required.** (1) Signal generator covering 40-50 mc/s modulated 30 per cent. and having an internal impedance of 75 ohms. (2) 100-150V full-scale DC meter to be connected between junction R16, L21. Reading on meter will be approximately 70-75V with no signal. (3) 50-100V full-scale AC output meter to be connected across primary L30 of output transformer OP1, and (4) 1,000 ohm resistor with short leads and fitted with crocodile clips.

Procedure. (1) Remove shield under chassis. (2) Switch receiver on and allow to warm up for three minutes. (3) Turn VR1, VR2, VR3 to minimum and feed signal of 44 mc/s between grid of V6 and chassis by means of crocodile clips.

(*a*) Load secondary L15 of RFT5 with 1,000 ohm resistor and tune primary L14 (bottom) for maximum volts on DC meter; remove resistor. (*b*) Load primary L14 with resistor and tune secondary L15 (top) for maximum volts (signal generator may have to be turned full on in this condition as sensitivity is low). (*c*) Remove resistor and check bandwidth which should be flat ±1 dB from 42-45 mc/s and sensitivity 60 to 80 mV for 25V deflection on DC meter.

(4) Turn VR1, VR2 to maximum and feed signal of 41.5 mc/s between grid of V3 and chassis. Tune primary L23 (bottom) and secondary L24 (top) of RFT6 for maximum output on AC output meter. Sensitivity will be approximately 20 to 30 mV for 15V deflection on output meter.

(5) Feed signal of 41.5 mc/s between grid of V2 and

Continued on page 3

GARRARD—*Continued*

played. This is usually due to arm timing being set a shade too fine or having slipped.

To correct timing, loosen two screws 106 and revolve turntable slowly by hand until platform is in its most forward position. Put lever 148 in 10in. position (upwards), hold it there and push link towards centre of changer until it comes against the stop; then ease it back approximately $\frac{1}{32}$in. and re-tighten screws 106.

Uncertain 12in. dropping, 10in. working correctly. This is due to timing causing selector lever 148 to move slightly just as needle is being lowered to record. Reset timing as described above.

Pickup height. Height is controlled by lifting arm 220 and may be adjusted by loosening the set screw next to eccentric pivot and turning pivot as necessary. The longest needle should just clear surface of eighth record on turntable when PU is returning to rest.

Auto-trip mechanism. Satisfactory operation of changer depends upon operation of auto-trip. Occasional adjustment of auto-trip friction spring may be necessary.

If at end of a record, the PU remains on disc see that record has a run-off groove. If record is in order, increase tension of friction spring by turning screw 18 in an anti-clockwise direction; about half a turn is all that should be necessary. This screw is accessible on removing turntable.

When changer operates before end of record or a bumping or tapping noise is audible, first examine trip lever rubber 25, and if worn, give it half a turn to present a new surface to striker. If badly worn, renew. If trip lever rubber is in good condition, reduce tension of friction spring (half-a-turn in clockwise direction).

If excessive friction is required to move operating lever 8, t can be assumed that something is counteracting its movement, as when correctly adjusted lever will move without any pressure from spring. Lever should be examined to see if it, or trip lever 26, carried by it, is fouling another part of mechanism, or if felt pad situated underneath it (just in front of screw 18) has not worn flush with lever thereby allowing metal to touch friction plate 20. The felt pad should protrude from lever approximately $\frac{1}{32}$in. and should be soaked with thin machine oil. There should be no oil on pivot of operating lever.

Certain records not operating changing mechanism. Radius of operation for auto-trip mechanism has been set to operate on all standard commercial recordings made in the last ten years or so. A few early 12in. recordings having a very meagre playing area and a large diameter run in groove, have been re-issued but modification for these cannot be made.

Auto-stop not acting correctly. If auto-stop does not switch off motor after last record has been played, read description of auto-stop mechanism above and check that when overarm has dropped, the adjusting screw underneath it (resting on thin knock-off spindle) has pressed spindle down to limit of its travel, and that end of lever J is lifted clear of lever 140 leaving it free to move. If it is not lifted clear, gently bend up lip which will give lever J more movement.

If auto-stop switches off motor when there are records remaining on record spindle to be played, check that end of J is interfering with movement of lever 140 effectively locking it and preventing it moving. If end of J is not moving low enough, unlock adjusting screw underneath overarm and turn it up until with one 10in. record on platform and overarm resting on it, end of J is locking lever 140. If there is insufficient adjustment in the screw, bend down the lip just sufficient to produce desired result. If end of J has been bent sideways out of path of lever 140 it should be corrected as necessary.

If switch off mechanism is out of adjustment, slacken two screws 130. Lower overarm so that J is clear of lever 140. Rotate cam until the node is resting on tip of the lever B *i.e.* so that levers B and 140 are pivoted to the fullest extent of their travel. Move link E as far as it will go towards lever 140 and hold it there. Adjust link E1 until tip of switch lever 117 will just ride along radius of lever 118. Then re-tighten the two screws.

Mechanism failing to drop first record. This is due to knock-off clutch lever 133 failing to engage clutch lever at end of previous programme thereby allowing mechanism to over-run and pass through the record dropping operation of next cycle. To correct, bend lip lever 133 (which engages clutch) down for approximately $\frac{1}{16}$in.

Pickup jumping groove or repeating. PU lead, where it emerges from arm, should stand clear in a small half loop before passing down through unit plate, so ensuring that it does not put a bias on PU arm. Make sure both vertical and lateral movement pivots of arm are free; a spot of thin machine oil will help.

If a lightweight PU head is being used, and if it is under one ounce, weaken counterbalance spring 185.

Pickup skids. Providing the points mentioned in previous paragraph have been attended to, this trouble is usually due to the use of a needle with a curved shank which throws the tracking arc forward.

Adjustment of camshaft spring. If spring 155 is too weak, the mechanism may operate in an erratic fashion and PU move in a series of jerks. If spring is too strong, it will put a heavy load on motor, paralyse overthrow action, and cause clutch to click.

Clutch clicking. Check tension on camshaft spring and observe overthrow action, as described earlier. If roller on cam is stopping on corner of overthrow lever and lever is not giving the final push to clear clutch, bend tail of lever 31 slightly away from clutch lever so that it will engage clutch lever a little later, this will let roller get past corner of overthrow lever before motor drive is cut off. If, however, it is found that roller passes corner on overthrow lever and lever gives it the final push before clutch disengages, bend tail of lever 31 towards clutch lever.

Adjustment of platform and platform stop. Load one 12in. record on spindle, operate changer slowly by braking turntable with the hand and stop immediately platform reaches its furthest point away from record. There should be a gap of approximately $\frac{1}{8}$in. between edge of record and front edge of platform latch (or pawl 204) which pushes the record off spindle. If gap is incorrect it may be adjusted by moving screws B into an adjacent hole, which will alter the length of the link.

When changer is in the playing position, *i.e.* with needle on record, there should be a gap of approximately $\frac{1}{8}$in. between tail of pawl 204 and front of stop 207. This can be adjusted by loosening the two screws 208. To obtain access to stop, the name plate may be slid off platform.

If pawl rides over stop when a 10in. record is to be played, or engages against stop when a 12in. record is next, the lip on stop should be bent up or down as necessary.

Platform tilt. When unit is in playing position the surface of platform should be in line with under surface of record resting on it. If it is otherwise, first check angle of record spindle by laying it on template printed in instruction manual supplied with unit, and having corrected, if necessary, by gently bending top of record spindle, the angle of platform may be adjusted by moving the screws A to an adjacent hole.

Record spindle. Record spindle should point directly to platform pawl. Make sure it is seating correctly in fixed spindle. Loosen two screws at bottom of main spindle shaft and turn fixed spindle until record spindle is pointing correctly.

Pickup. Garrard magnetic types are interchangeable with crystal without alteration to PU arm, provided PU is in a Garrard head.

To remove pickup head. Unscrew PU fixing screw, withdraw PU easing lead under arm, and remove two plug connections from back.

If reproduction ceases, or becomes distorted when fitted with a Garrard standard magnetic PU, first make sure amplifier is in order. Should this be found satisfactory, a slight adjustment to PU may be necessary or damping rubber may need renewing.

To examine PU: Remove cover and examine armature to see that it is in centre of gap between pole pieces. If it needs re-centring, loosen two screws holding adjusting plate.

If armature will not retain its centre position, it will be necessary to renew damping rubber.

Top damping rubber tends to perish in time. It should, therefore, be replaced whenever it appears that needle stiffness has increased.

Distortion can be caused by foreign matter in gap between pole pieces. Winding can be checked for continuity with an ohmmeter.

If a crystal or high-fidelity pickup is suspect, the head should be returned for examination.

Motor Maintenance.

If motor fails to start, check power supply and ascertain if current is reaching motor terminals. Next examine terminal block and see that leads and screws are tight; also examine switch contacts.

Motor requires occasional lubrication, depending on how often changer is used. Lift off turntable and insert a few drops of Garrard or thin lubricating oil in oil holes. If a thick oil has been used to lubricate bearings the motor will appear weak or will not start. Motor will have to be dismantled and all traces of heavy oil removed.

Should motor run hot, check that voltage changeover links are properly set. Wavy reproduction from records is usually due to dry governor pads. These should be lubricated by saturating felt pads with oil. To cure governor rattle, put a little thick oil on shaft where governor sleeve slides.

RC65/D16.—This is an induction motor for 40-60c/s AC of 100-130 and 200-250V. Maximum current should not exceed 110mA on 200-250V, 220mA on 100-130V or 240mA on 110V 60c/s.

RC65/U16.—This is a universal for 100-130, 200-250V DC and 25-60c/s AC. Periodical examination of carbon brushes should be made. Brushes can be cleaned by slightly scraping contact surface with a penknife. It is essential that brushes be returned to their original holders and the same way round as previously. New brushes are 9/16in. long under the springs. When worn to $\frac{3}{8}$ in. they should be replaced.

In the event of it being necessary to clean the commutator, remove brushes and springs, (marking brushes to ensure they are replaced correctly), slacken screw which secures governor to armature spindle and remove the four screws which fix brush carrier. The brush carrier can now be drawn off as far as leads will allow and armature taken out leaving governor assembly in motor.

If, on testing, speed is too far out to be corrected by control lever, loosen governor fixing screw and slide governor along spindle towards felt pads to lower speed or away from pads to increase speed. Make sure that finally the fixing screw is tight.

RC65A Record Changer

There are three modifications in the RC65A. The PU arm has been redesigned to take the interchangeable plug-in heads; a muting switch has been fitted; the action of the stop mechanism has been re-designed.

Pickup Arm.—The new arm is fitted with a three-pin socket into which the PU head is plugged, connections to leads being made automatically.

Connections are so arranged that the lead from centre of PU coil is connected to top contact of muting switch, and the other lead to lower contact. If at any time it becomes necessary to renew the PU lead, connect top contact of muting switch to socket in the PU arm on righthand side when arm is viewed from front. The lefthand socket should be connected to lower switch contact, and lower socket via the lead screening to centre tag of muting switch which also acts as an earthing point for changer and motor.

Muting switch.—This is situated under changer at rear righthand corner and is also used as terminal point for PU lead. A twin core screened lead should be used for connecting changer to PU terminals on radio set or amplifier, and as centre of PU coil is connected to top contact of switch, it will generally be found desirable to connect top contact to PU terminal on set which links up with the grid of first amplifying valve.

The switch, which is controlled by the lifting lever for PU arm, is normally closed and is opened by lifting lever as it lowers needle on to record. The timing is so arranged that switch opens and closes as needle alights on record and lifts therefrom at end of a recording.

If reproduction ceases and tests reveal the PU head, PU lead and amplifier to be in good condition, examine muting switch to ensure that blades are separating correctly when needle alights on record.

The switch blades are made of nickel silver, and having a slight wiping effect at contact point are normally self-cleaning. If, however, noise is heard from speaker during the changing cycle when switch is closed, blades should be examined to ensure that contacts are clean.

Re-designed stop mechanism.—In the original RC65 moving the control knob to "Stop" only opened the motor switch causing the mechanism to "freeze" in whatever position it happened to be, the needle remaining on the record it was playing at the time.

If the knob was then moved to "Start," the changing cycle commenced and the next record was started.

In the RC65A moving the control knob to "Stop" does not affect the main switch, but instead it unlocks auto-stop and sets the changing cycle in motion, the unit then operates as if last record had been played—*i.e.*, the PU returns to the rest before the motor switches off.

RAYMOND F49—*Contd. from p.7*

chassis. (*a*) Tune primary L6 (bottom) and secondary L7 (top) of RFT3 for maximum output on AC output meter. (*b*) Increase signal until fair deflection (10-20V) is seen on DC meter. Tune L9 Trap coil for minimum deflection on DC meter. (*c*) Repeat (*a*) and re-tune RFT6 for maximum output on AC meter. Sound sensitivity should now be approximately 1.5 to 2 mV for 15V deflection on output meter.

(6) (*a*) Unscrew fully core of primary L11 (top) of RFT4 and turn VR2 to minimum. (*b*) Change signal to 42.25 mc/s and tune secondary L12 (bottom) for maximum deflection on DC meter. (*c*) Change signal to 45 mc/s and tune primary L11 (top) for maximum deflection on DC meter. (*d*) Repeat (*b*), (*c*). (*b*).

(*e*) Check bandwidth, which should be flat within 3dB from 42.5-45 mc/s. Sensitivity should be approximately 6 to 8mV for 25V deflection on DC meter.

7. (*a*) Tune signal generator to 43.5 mc/s and feed into aerial socket with appropriate plug. (*b*) Load secondary L4 of RFT2 with 1,000 ohm resistor and tune primary L3 (bottom) for maximum volts on DC meter. Remove resistor. (*c*) Load primary L3 with resistor and tune secondary L4 (top) for maximum volts on DC meter. Remove resistor. (*d*) Turn VR1 to minimum. Turn VR3 to maximum. Tune L2 of RFT1 (bottom) for maximum volts on DC meter.

8. Replace shield.

9. Turn VR1 to maximum and check bandwidth which should be flat within 3dB between 42.5 and 45 mc/s. Sensitivity at 45 mc/s should be approximately 80-100 microvolts for 25V deflection on DC meter.

10. Turn VR2 to maximum and check sound sensitivity at 41.5 mc/s which should be approximately 15-20 microvolts for 15V deflection on output meter.

11. Feed 100 microvolts at 45 mc/s into aerial socket and adjust VR3 until deflection on DC meter is 5 volts.

Tune signal to 41.5 mc/s and increase signal 100 times, i.e., 10 millivolts (make sure that generator frequency is accurate by locating with BBC).

Re-tune L9 trap coil until deflection is at minimum on DC meter (tuning is very sharp and core has to be turned very slowly). The deflection on DC meter should then be no more than 5 volts. Should the trap not be capable of reducing deflection to desired reading R9 may have to be slightly reduced by adding in parallel a resistor of between 1,000 to 22,000. This trap is capable of giving infinite rejection if R9 is of the correct value, but rejection of better than 100 to 1 is more than sufficient to eliminate sound break through on picture. (On no account must R9 160 ohm 1 per cent. high-stability resistance be replaced by a resistor of a different type.)

ALIGNMENT OF MIDLANDS MODEL—F49B

To align the Birmingham model, F49B, a signal generator covering 55-65 mc/s is needed. Procedure is exactly as for the F49 but the following frequencies and sensitivities should be substituted for the figures given above.

2. Inject 60.5 mc/s. Response within 1dB ove 61.75-59 mc/s.

4. Inject 58.25 mc/s. Sensitivity : 30-40mV for 15V deflection.

5. Inject 58.25 mc/s.

6. (*b*) Inject 59 mc/s. (*c*) 61.75 mc/s. (*e*) Bandwidth flat within 3dB from 61.75-59.25 mc/s. Sensitivity 8-11 mV for 25V deflection.

7. 60 mc/s.

9. Within 3dB from 61.75-59.25 mc/s. Sensitivity at 61.75 mc/s 160-220 microvolts for 25V deflection..

10. Sensitivity at 58.25 mc/s 30-40 microvolts for 15V deflection on output meter.

11. 61.75 mc/s. Tune to 58.25 mc/s and increase signal 100 times.

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