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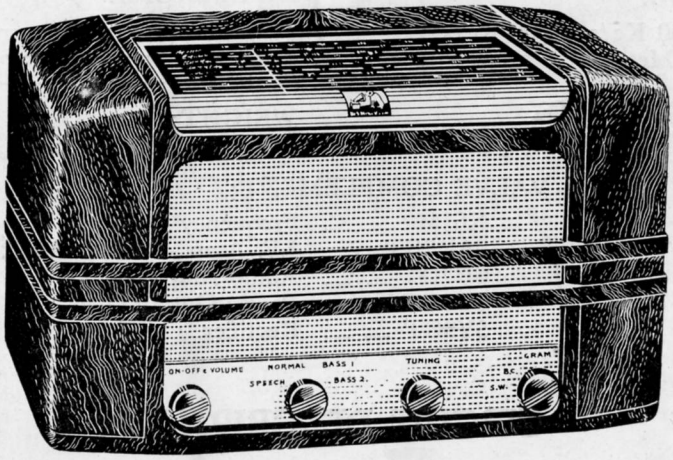
"HIS MASTER'S VOICE"

The Hallmark of Quality



"His Master's Voice"
SERVICE MANUAL

for

FIVE-VALVE

A.C. DUAL-WAVE RECEIVER

TABLE MODEL C23B

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THE GRAMOPHONE COMPANY LTD.
(Incorporated in England)
HOMEBUSH - N.S.W.

TECHNICAL SPECIFICATION

POWER SUPPLY:
200 to 250 volts, 40 to 50 c.p.s.

CONSUMPTION:
50 watts.

FREQUENCY RANGE:
Medium-wave: 540 Kc/s—1600 Kc/s.
Short-wave: 16.5 Metres—51 Metres.

INTERMEDIATE FREQUENCY:
457.5 Kc/s.

DIAL LAMPS:
6.3 volt, 0.15 to 0.3 Amp.

LOUDSPEAKER:
6-inch Permagnetic.
Voice coil impedance: 3.7 ohms at 400 cycles.

DIMENSIONS:

Width	19 inches
Height	11 inches
Depth	10¼ inches

WEIGHT:
Gross ..... 35 lbs. Net ..... 29 lbs.

VALVE COMPLEMENT:

X6IM	Frequency Changer.
6AR7GT	I.F. Amp.,-Demod.,-AVC.
6U7G	Audio Amplifier.
6V6GT	Power Output.
5Y3GT	Rectifier.

CIRCUIT DESCRIPTION

This model incorporates a 5-valve A.C. mains-operated superheterodyne receiver for medium-wave and short-wave reception.

FREQUENCY CHANGER

The aerial on the broadcast band is coupled to the signal frequency circuit by means of the iron dust core aerial transformer L1-L2. For short-wave reception, a short-wave aerial transformer, L5-L6, is switched into circuit.

A triode hexode valve, V1, is employed as frequency changer. Fixed padding capacitors are used on both bands. A variable padding adjustment is provided on the medium-wave band by means of an iron dust bolt in the broadcast oscillator coil L3-L4.

I.F. AMPLIFIER,-DEMODULATOR,-AVC.

The frequency changer valve is transformer-coupled to a duo - diode - super-control - pentode valve, V2. AVC potential for the pentode section of this valve and the frequency changer is obtained from one of the diodes, which is capacity-coupled to the primary of the 2nd I.F. transformer; a fraction of the AVC potential is also applied to the audio amplifier valve, V3. Standing bias and AVC delay voltage is obtained from a potential dividing network across the high-tension filter choke, CK1. Demodulation of the I.F. signal is effected by the remaining diode of V2.

A.F. AMPLIFIER

The input circuit of this valve may be switched to either the demodulator diode load R9 or to the external pick-up terminals. Tone control is effected at this stage by means of switch S2, which gives bass or treble cut as required by switching appropriate condensers. The output circuit of this valve is resistance-capacity coupled to the grid of the beam power output valve, V4.

POWER STAGE

The output of the beam power valve is coupled to the speaker by transformer T2. Negative feedback voltage is taken from the secondary of the transformer and fed into the tap of the volume control VR1 through a resistor. This arrangement provides negative feedback over the whole of the audio frequency system. By advancing the volume control setting for higher gain, the feedback factor is reduced. A phasing network comprising C34, R24 is connected across the transformer primary. The speaker is connected to the transformer secondary by means of a 2-pin plug.

HIGH-TENSION SUPPLY

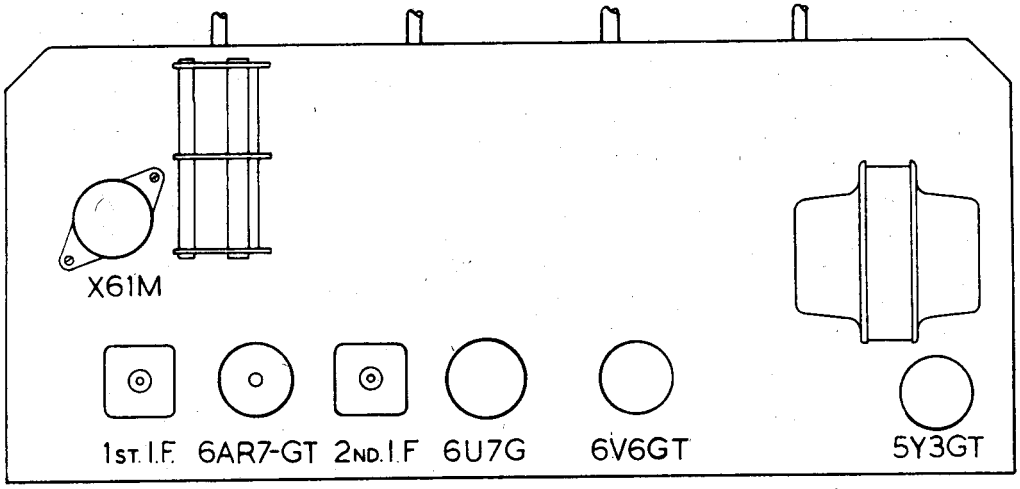
The power supply employs a directly-heated type high vacuum rectifier, V5. The filter circuit consists of an iron cored choke CK1 and two electrolytic condensers, C16 and C17. The mains supply is switched by S3, which is incorporated with the volume control.

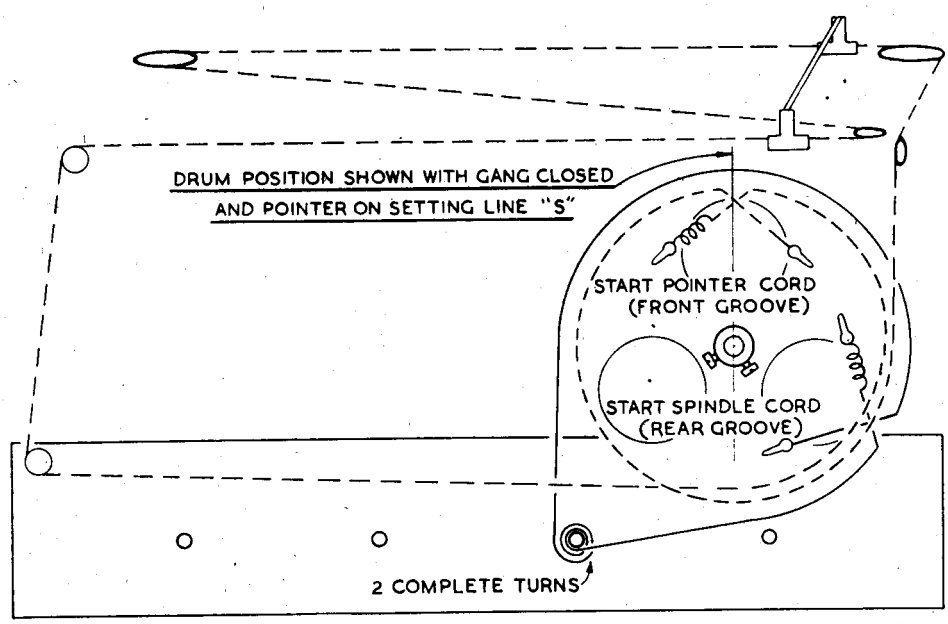
MODEL C23B

ALIGNMENT

I.F. 457·5 K.C.

B/C { OSC. 600 & 1500 K.C. / AER. ——— 1500 K.C. S/W { OSC. 17·65 M.C. / AER 17·65 M.C.





C0576

DISMANTLING

REMOVAL OF CHASSIS

1. Disconnect power plug from supply mains.
2. Disconnect aerial and earth wires.
3. Remove chassis fixing screws at rear of cabinet.
4. Withdraw chassis from cabinet.

RECEIVER ALIGNMENT PROCEDURE

In any case where a component replacement has been made in either the tuned I.F. or R.F. circuits of a receiver, all circuits must be realigned, and even if only one coil has been serviced, the whole of the realignment should be done in the order given. An output meter should always be connected across the voice coil terminals of the speaker to indicate when the circuits are tuned to resonance. In carrying out the following operations, it is important that the input to the receiver from the signal generator should be kept low and progressively reduced as the circuits are brought into line, so that the output meter reading does not exceed about 1 volt.

I.F. ALIGNMENT

1. Rotate the volume control fully clockwise, set the wave-change switch to "Broadcast" (centre) position and fully enmesh the tuning condenser vanes. Connect the output lead of signal generator to the cap of the X6IM converter valve, through a 0.1 mF. condenser; do not remove grid lead of the converter valve.
2. Tune signal generator to exactly 457.5 Kc/s.
3. Adjust the I.F. transformer trimmer screws for maximum reading on output meter, commencing with the second I.F. transformer and following with the first.
4. Repeat these operations on each transformer to ensure maximum output.

Note: If trimmer screws are screwed too far in, it may be possible to obtain a false peak. Start alignment of each individual transformer by first screwing its core well out, and then advancing core into the coil until resonance is obtained.

R.F. ALIGNMENT (BROADCAST)

1. With controls set as for I.F. alignment, connect signal generator output lead in series with a 200 mmF. condenser to the aerial terminal of the receiver, and connect the shielding of output lead to earth terminal.
2. Check that when the gang condenser is fully meshed the pointer coincides with the setting line, marked "S", on the extreme right of the dial scale. If necessary, the pointer may be adjusted to this position by softening the wax securing the drive cord to the pointer carrier.
3. Tune signal generator to 600 Kc/s.
4. Rotate tuning knob until the pointer is exactly over 600 Kc/s. calibration mark and adjust the oscillator padder screw for maximum response.
5. Tune signal generator to 1500 Kc/s.
6. Rotate tuning knob until the pointer coincides with the 1500 Kc/s. calibration mark and adjust the oscillator trimmer and aerial trimmer in turn for maximum response.
7. Repeat operations (3) to (6) inclusive for proper alignment.

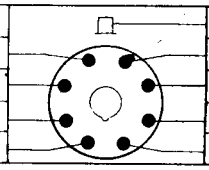
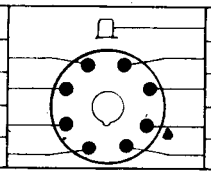
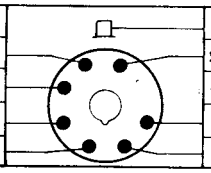
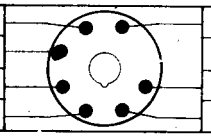
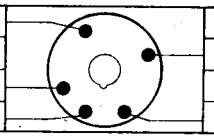
R.F. ALIGNMENT (SHORT-WAVE)

1. Set wave-change switch to "Short-Wave" (clockwise) position. Remove the 200 mmF. condenser from the output lead of the signal generator and replace with a 400 ohm non-inductive resistor; connect to the aerial terminal as before.
2. Rotate tuning knob until the pointer coincides with the 17 metres calibration mark.
3. Tune signal generator to 17 metres (17.65 Mc/s.).
4. Adjust S-W oscillator trimmer for maximum output. Two settings will be found at which this trimmer will peak; care must be taken that the setting finally selected is that which gives the lower capacity. Failure to select the correct position of the two will cause serious tracking error and loss of sensitivity.
5. Adjust S-W aerial trimmer for maximum output whilst "rocking" the gang condenser slightly to obtain the true resonance point.

— VOLTAGE TABLE —

(MODEL — C 23 B)

- VOLTAGES AND CURRENTS ARE WITH THE RECEIVER OPERATING ON AVERAGE MAINS VOLTAGE, AND TUNED TO A POINT OF NO RECEPTION ON THE BROADCAST BAND
- VOLTAGE READINGS TAKEN WITH METER RESISTANCE OF 1,000 OHMS PER VOLT.
- VOLTAGE AND CURRENT READINGS WITHIN ±15 %
- RESISTANCE READINGS ARE APPROXIMATE.

VOLTS TO CHASSIS	CURRENT M. A.	RESISTANCE TO CHASSIS	VALVE ELECTRODE	BOTTOM VIEW OF VALVE SOCKET	VALVE ELECTRODE	VOLTS TO CHASSIS	CURRENT M A	RESISTANCE TO CHASSIS
			V1	X61M	CONVERTER.			
					GRID	——	——	3 MEG Ω
84	5·0	INFIN	SCREEN GRID		OSC. GRID	——	——	50 K Ω
241	3·7	INFIN	PLATE		OSC. PLATE	106	4·4	INFIN
6·3 A.C.	300	——	HEATER		HEATER	NIL	——	NIL
NIL	——	NIL	METAL COAT		CATHODE	NIL	13·4	NIL
			V2	6AR7 - GT	I.F. AMPLIFIER — DEMODULATOR — A.V.C.			
					GRID	——	——	3·3 MEG Ω
84	0·92	INFIN	SCREEN GRID		DIODE N° 2	——	——	300 K Ω
241	4·2	INFIN	PLATE		DIODE N° 1	——	——	2·3 MEG Ω
NIL	——	NIL	METAL SHELL		CATHODE	NIL	5·12	NIL
6·3 A.C.	300	——	HEATER		HEATER	NIL	——	NIL
			V3	6U7 - G.	AUDIO AMPLIFIER.			
					GRID	——	——	3 MEG Ω
10	0·08	INFIN	SCREEN GRID		SUPPRESSOR	NIL	——	NIL
34	0·34	INFIN	PLATE					
NIL	——	NIL	HEATER		HEATER	6·3 A.C.	300	——
NIL	——	NIL	NO CONN.		CATHODE	NIL	0·42	NIL
			V4	6V6-GT	OUTPUT.			
					GRID	——	——	550 K Ω
241	3·0	INFIN	SCREEN GRID			——	——	500 K Ω
222	45	INFIN	PLATE		HEATER	6·3 A.C.	450	——
NIL	——	NIL	HEATER		CATHODE	11	48	250 Ω
NIL	——	NIL	NO CONN					
			V5	5Y3 - GT	RECTIFIER.			
280 A.C.	——	1030 Ω	PLATE N° 1					
					PLATE N° 2	280 A.C.	——	1030 Ω
241	2 AMP. A.C.	INFIN	HEATER					
——	——	——	NO CONN.		HEATER	241	——	INFIN

REMARKS:-

UNFILTERED H.T. VOLTAGE = 295 VOLTS
FILTERED H.T. VOLTAGE = 241 VOLTS
TOTAL H.T. CURRENT = 67 M.A.
RECTIFIER HEATER VOLTAGE = 5·0 VOLTS

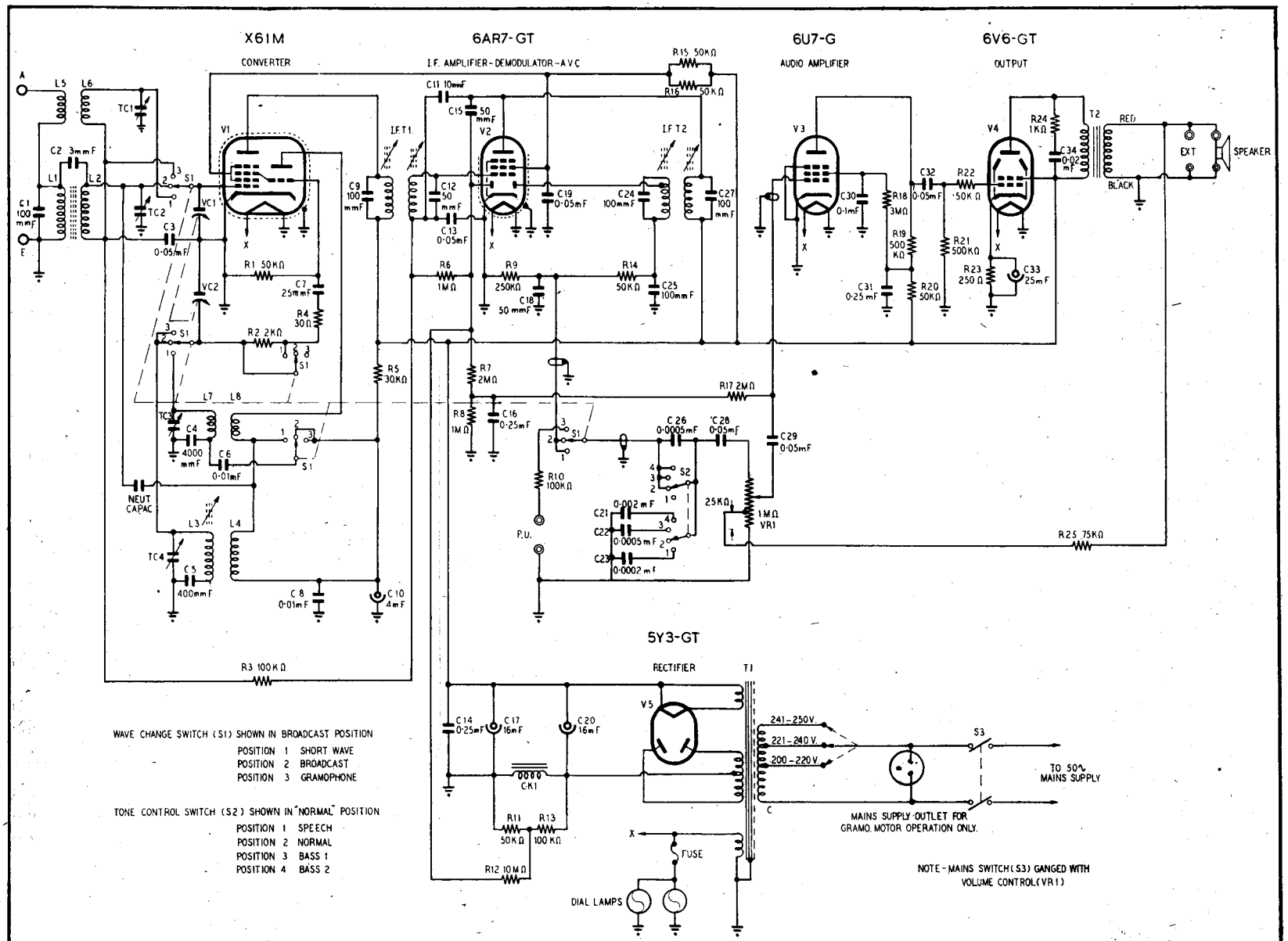
C.0575

6. Note that the signal is still tuned in correctly on the dial; if not, readjust S-W oscillator trimmer slightly until dial reads correctly, and repeat operation (5).

ADDITIONAL DATA

Any further service information desired may be obtained by addressing an enquiry to the "Service Department, The Gramophone Co. Ltd., 2 Parramatta Road, Homebush, N.S.W."

(The Company reserves the right to m ake any modification without notice).



— CIRCUIT DIAGRAM - MODEL C23B —

PARTS LIST

REF.	PART No.	DESCRIPTION
		RESISTORS
R1	H2X	50,000 ohms. ½ watt ± 10%
R2	AJ2X	2,000 ohms. ½ watt ± 10%
R3	J2X	100,000 ohms. ½ watt ± 10%
R3A	CB1X	30 ohms. ¼ watt ± 10%
R4	Not used	
R5	W3X	30,000 ohms. 1 watt ± 10%
R6	P2X	1 megohm. ½ watt ± 10%
R7	DH2X	2 megohms. ½ watt ± 10%
R8	P2X	1 megohm. ½ watt ± 10%
R9	N2X	250,000 ohms. ½ watt ± 10%
R10	H2X	50,000 ohms. ½ watt ± 10%
R11	AB3X	10 megohms. 1 watt ± 10%
R12	J2X	100,000 ohms. ½ watt ± 10%
R13	J2X	100,000 ohms. ½ watt ± 10%
R14	H2X	50,000 ohms. ½ watt ± 10%
R15	H3X 2 x	50,000 ohms. 1 watt ± 10%
R16	DH2X	2 megohms. ½ watt ± 10%
R17	Not used	
R18	AL3X	3 megohms. 1 watt ± 10%
R19	O3X	500,000 ohms. 1 watt ± 10%
R20	H2X	50,000 ohms. ½ watt ± 10%
R21	O2X	500,000 ohms. ½ watt ± 10%
R22	H2X	50,000 ohms. ½ watt ± 10%
R23	ZW3X	250 ohms. 1 watt ± 10% BWI
R24	D3X	1,000 ohms. 1 watt ± 10%
R25	AN2X	75,000 ohms. ½ watt ± 10%
		MISCELLANEOUS
TC1	D2395	Trimmer Condenser
TC2	D2395	Trimmer Condenser
TC3	D2395	Trimmer Condenser
TC4	D2395	Trimmer Condenser (All 2-28 mmF.).
L1-2	D1614D/2	B/C Aerial Coil
L3-4	D2224	B/C Oscillator Coil
L5-6	D2321/2	S/W Aerial Coil
L7-8	D2320	S/W Oscillator Coil

REF.	PART No.	DESCRIPTION
		CONDENSERS
C1	D0243P	100 mmF. ± 10%
C2	D0243BU	3 mmF. ± 1 mmF.
C3	C0013M	0.05 mF. 200V. wkg.
C4	D0243CQ	4,000 mmF. ± 100 mmF.
C5	D0243AM	400 mmF. ± 5 mmF.
C6	C0013N	0.01 mF. 600V. wkg.
C7	D0243BE	25 mmF. ± 10%
C8	C0013N	0.01 mF. 600V. wkg.
C9	D4405W	100 mmF. ± 5%
C10	C0014AT	4 mF. 350 P.V. Electro.
C11	D0243Z	10 mmF. ± 10%
C12	D4405X	50 mmF. ± 5%
C13	C0013M	0.05 mF. 200V. wkg.
C14	C0013C	0.25 mF. 400V. wkg.
C15	D0243Q	50 mmF. ± 10%
C16	C0013P	0.25 mF. 200V. wkg.
C17	C0014CB	16 mF. 525 P.V. Electro.
C18	D0243Q	50 mmF. ± 10%
C19	C0013G	0.05 mF. 400V. wkg.
C20	C0014BZ	16 mF. 525 P.V. Electro.
C21	C0013AO	0.002 mF. ± 10%
C22	D0243L	0.0005 mF. ± 10%
C23	D0243CY	0.0002 mF. ± 10%
C24	D4405W	100 mmF. ± 5%
C25	D0243P	100 mmF. ± 10%
C26	D0243L	0.0005 mF. ± 10%
C27	D4405W	100 mmF. ± 5%
C28	C0013M	0.05 mF. 200V. wkg.
C29	C0013M	0.05 mF. 200V. wkg.
C30	C0013E	0.1 mF. 400V. wkg.
C31	C0013C	0.25 mF. 400V. wkg.
C32	C0013AD	0.05 mF. 600V. wkg.
C33	C0014CC	25 mF. 40 P.V. Electro.
C34	C0013AK	.002 mF. 600V. wkg.
	D2398	Neutralizing Capacitor

REF.	PART No.	DESCRIPTION
		MISCELLANEOUS
CK.1	D2357	H.T. Choke
T1	D2358	Mains Transformer
T2	D2685	Output Transformer
S1	D2346	5-Pole 3-Position Switch
S2	D2351	2-Pole 4-Position Switch
S3, VR1	D2350	1 Megohm Potentiometer tapped at 25,000 ohms. (Incorporating Mains Switch).
VC1 & VC2	C0562	2 Gang Condenser
IFT1	D2278	1st I.F. Transformer
IFT2	D2355	2nd I.F. Transformer
V1	X6IM	Valve
V2	6AR7GT	Valve
V3	6U7G	Valve
V4	6V6GT	Valve
V5	5Y3GT	Valve
		Dial Lamps, 6.3 V., .15 to .3 A.
Spkr.	D2419	6in. Speaker Assembly
	C0559	Dial Scale
	D2704	Dial Pointer
	D0873	Dial Cord Spring
		H238 Lug (Dial Cord)
	D2394	Knob
	F1	5 Amp. Fuse Wire
	B0145	Dial Back Plate Assembly
	D2665	Speaker Grille Mesh
	D2286	P.U. Panel
		A & E Panel "Carr Fastener" 733-2-10
		Dial Cord (white), 11'6"
	D2534	Dial Pulley
	D2364	P.U. Plugs
	D2607	Extension Speaker Plug
	D2608	Speaker Socket

Amendments

MODEL C23B.

Lack of supplies of Type X61M Valves has made it necessary to substitute Innoval Type 6AN7 as Frequency Changer.

Resistor R2 (2,000 ohms) has also been changed to 4000 ohms on receivers fitted with Type 6AN7 Valves.

Performance and other circuit components are not affected.

During production of this receiver it has occasionally been necessary to substitute type EBF35 valve for type 6AR7GT.

Either type of valve is interchangeable with this receiver.