Private and Confidential *For Trade Use Only*

"His Master's Voice"

SERVICE MANUAL

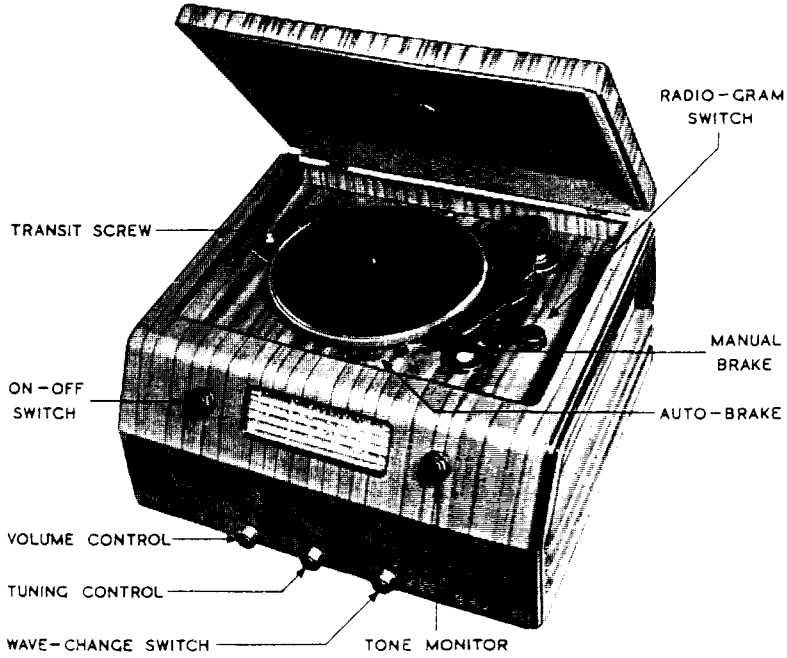
for

FIVE - VALVE DUAL - WAVE

A.C. RADIOGRAM

TABLE MODEL 118

(Incorporating Chassis Type A537DS/RG)



TECHNICAL SPECIFICATION

POWER SUPPLY:

200 to 250 volts. 50 c.p.s.

CONSUMPTION:

Radio: 48 watts. Gram.: 56 watts.

FREQUENCY RANGE:

Broadcast: 540 Kc/s to 1600 Kc/s.
Short-Wave: 16.5 metres to 53 metres.

I.F. FREQUENCY:

457.5 Kc/s.

VALVE COMPLEMENT:

6J8GA	Converter
6U7G	I.F. Amplifier
6B6G	Demod., AVC., Audio Amplifier
6V6GT	Power
5Y3GT	Rectifier.

DIAL LAMPS (2):

6.3 volts, 0.15 to 0.3 amps.

LOUDSPEAKER:

3-inch Permagnetic. 2.0 ohms voice coil impedance at 400 cycles.

PICK-UP:

H.M.V. Type 13.

TURNTABLE MOTOR:

Rim-drive synchronous A.C. motor.

DIMENSIONS:

Width	20¼ inches
Height	11¼ inches
Depth	17½ inches

WEIGHT:

Gross ..... 43 lbs. Net ..... 36½ lbs.

CIRCUIT DESCRIPTION

This model incorporates a 5-valve A.C. mains-operated radio-gramophone combination. The receiver is a dual-wave superheterodyne for broadcast 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 cored aerial transformer L1-L2. For short-wave reception the short-wave aerial transformer L5-L6 is switched into circuit.

A triode-heptode V1 is employed as frequency changer. Fixed padding capacitors are used on both bands. A variable padding adjustment is provided on the broadcast band by means of an

iron dust tuning bolt in the broadcast oscillator coil L3-L4.

I.F. AMPLIFIER

The converter valve is tranformer coupled to a super-control pentode V2. This valve is in turn transformer coupled to one diode section of a duo-diode-triode V3. Both I.F. transformers IFT1 and IFT2 are permeability tuned and have fixed tuning capacitors.

AVC.-DEMOD.-A.F. AMPLIFIER

The AVC potential for the converter and I.F. amplifier valves, V1 and V2, is obtained from the remaining diode of V3, which is capacity coupled to the primary of the second I.F. transformer IFT2. The action of this diode is delayed by the potential across the back bias resistor R5 in the high tension negative lead.

The input circuit of the triode section of this valve may be switched to either the demodulator diode load R10 or to the pick-up. Bias voltage is provided by the grid leak resistor R8. 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 of this valve is resistance-capacity coupled to the grid of the beam power output valve V4.

OUTPUT STAGE

This stage employs a beam power output tube V4. Negative feedback voltage is taken from the secondary of the output transformer T2, 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 a condenser in series with a resistor C31, R18, is connected across the primary of the output transformer.

HIGH TENSION SUPPLY

The power supply is mounted on a separate chassis which is connected to the receiver chassis by means of a plug-in cable. High tension voltage from the power transformer T2 is rectified by the directly heated type high vacuum rectifier V5; the output is filtered by the iron-cored choke CK1 and associated electrolytic condensers C13 and C14.

PICK-UP

The pick-up is a low impedance constant velocity device, having a DC resistance of 1.3 ohms. It is coupled, through a step-up transformer T1 to the input circuit of the audio amplifier. Ordinary needles should not be used with this pick-up; "His Master's Voice" "Silent Stylus" or Columbia "99," which are a new miniature type, should be used. The needle should be inserted and pushed fully home without using undue pressure; it is normal for the needle to feel loose when correctly inserted; it should also protrude evenly and be vertical to the pick-up face.

MOTOR

For transit purposes the motor pulley is disengaged from the turntable rim by means of a transit screw. This screw, which is located on top of the motor board, should be unscrewed sufficiently to allow the motor pulley to fully bear on the turntable rim; the locknut should then be retightened.

The motor bearings are lubricated for many years service. It is advised that no further lubrication be added.

THE AUTO-BRAKE

OPERATION

To switch "On," the pick-up arm is swung away from the turntable until lever L1 pushes the right fork of L2 in the same direction. This movement of L2 moves L4 to the left and this lever in turn moves L5. At the end of its travel L5 switches on the motor switch (under the motor board) and releases the brake HB.

During playing, the pick-up arm travels across the record until L1 commences to push the left fork of L2. This slight movement is transmitted to the trip lever L3 by the friction bearing BR. As long as the needle progresses over the record at the normal rate (obtained only by the actual playing of a record) the movement of the pick-up arm is not enough to move L3 sufficiently for the upper, or semi-circular portion of the pawl CW to engage fully with the tooth D on the frictional collar around the turntable bush. The cam A engages the lower portion, circular rubber bush, of CW, thus pushing the pawl away at each revolution. When, however, the end of the record is reached and the spiral quick "run-in" groove gives the pick-up arm a more rapid movement, the increase in speed of movement is sufficient to cause the pawl to move far enough towards the turntable spindle

for the tooth D to strike the face B, thus actuating the brake and operating the motor switch.

For hand operation, the "Auto-brake on/off" lever is moved to the "Off" position, thereby holding lever L3 away from the frictional collar on the turntable bush. Hand brake lever HB is then used for stopping the turntable.

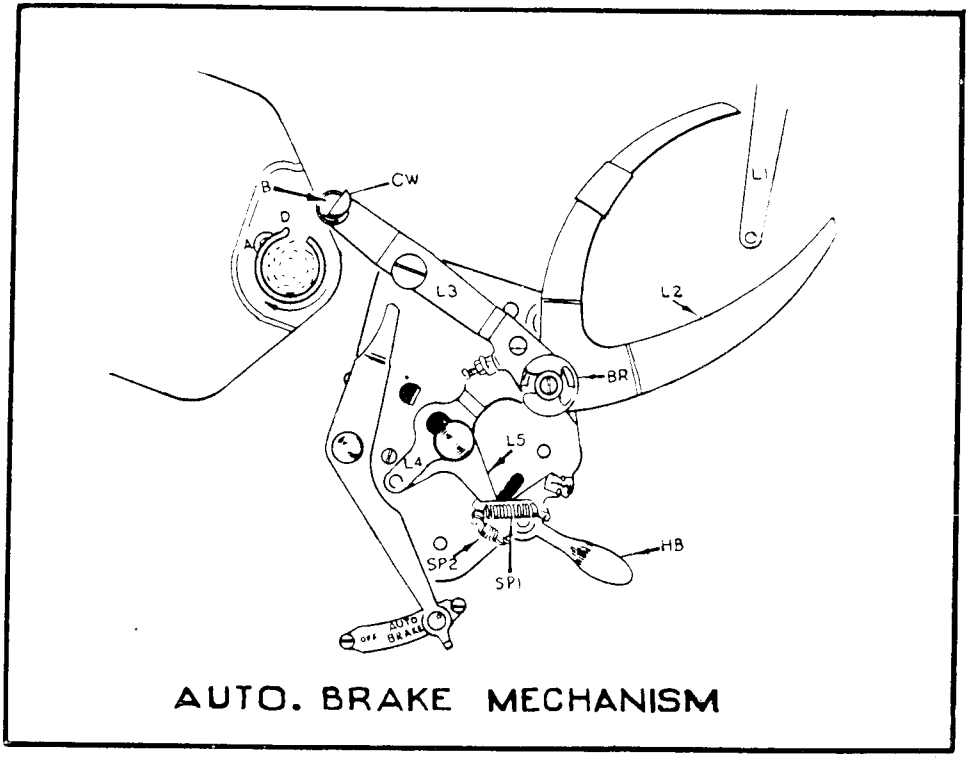
Switching "On" is the same for both "Hand" and "Auto" operation.

ADJUSTMENT OF BRAKE

If at any time the spring SP1 in the hand brake is renewed or replaced, make sure that the axis of the spring lies as far distant as possible from the centre of the pivot of the HB lever, otherwise the friction brake may fail to operate in conjunction with the automatic stop.

If the auto-brake does not function, increase the friction at BR by removing the Isle-o'-Man washer and bending the arms in order to increase the effective thickness. Too much friction at BR may cause a hollow knocking sound to be transmitted to the pick-up and may also cause undue record wear. If a knocking sound is heard, decrease slightly the friction of BR, but do not apply oil.

The only parts which may need lubrication are the pivots of all levers and a smearing of grease should be applied between the frictional collar and the turntable bush. Under no circumstances apply lubrication to the frictional bearing BR. As the pivot at the centre of L3 has to be loose for satisfactory operation, any noise from this pivot can be reduced by applying a smearing of grease.



AUTO. BRAKE MECHANISM

DISMANTLING

Note: A service hatch, provided at the base of the cabinet, gives access to the receiver chassis for servicing.

REMOVAL OF MOTOR-BOARD

1. Withdraw the power plug from the mains supply socket.
2. Remove the 6 wood screws securing the motor-board and, after fastening the pick-up to its rest with a length of string, tilt the motor-board to a vertical position against the cabinet lid.
3. Unsolder 3 leads from receiver chassis at the Radio-Gram switch.
4. Unsolder mains leads to the motor at the voltage adjustment panel on the power pack chassis.
5. Withdraw motor-board.

REMOVAL OF RECEIVER CHASSIS

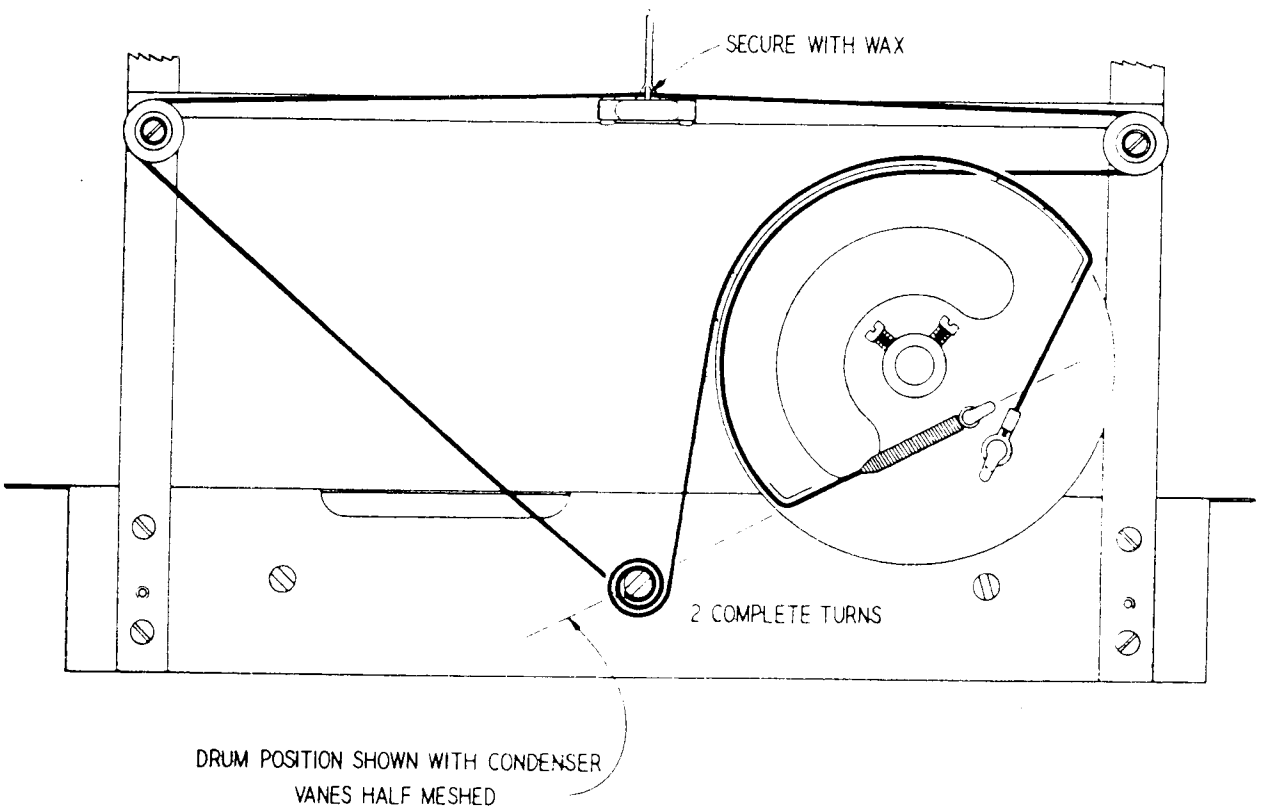
1. Remove motor-board.
2. Remove Aerial-Earth panel and feed through slot to inside of cabinet.
3. Unsolder speaker leads from chassis at the voice coil terminals.
4. Disconnect power-pack plug from chassis.
5. Remove 2 chassis-securing screws at base of cabinet.
6. Remove 5 control knobs.
7. Slide chassis towards rear of cabinet and remove mains supply switch from chassis.
8. Withdraw chassis.

REMOVAL OF POWER PACK CHASSIS

1. Unsolder 4 mains supply leads at voltage adjustment panel.
2. Disconnect power-pack plug from receiver chassis.
3. Unscrew 3 chassis-securing screws and withdraw chassis.

REMOVAL OF SPEAKER

1. Unsolder 4 leads at voice coil terminals.
2. Remove two nuts securing the floating mounting to the cabinet and withdraw speaker. (Care should be taken not to lose the spacers in the rubber grommets).



DIAL CORD ARRANGEMENT

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 re-aligned. I.F. alignment should always precede R.F. alignment, and even if only one coil has been serviced, the whole of the re-alignment should be done in th 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 0.5 volt.

I.F. ALIGNMENT

1. Rotate the volume control fully clockwise, set the wave-change switch to "Broadcast" (anti-clockwise) position and fully enmesh the tuning condenser vanes. Connect the output leads of a signal generator to the cap of the .6J8GA 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. Continue this alignment on each transformer in turn until no greater output can be obtained. It is necessary to repeat this procedure twice to ensure good alignment.

Note: If trimmer screws are screwed too far in, it may be possible to obtain a false peak due to coupling effects between the iron cores. 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 and earth terminals of the receiver.
2. Check that when the gang condenser is fully meshed the pointer coincides with the setting line, marked "S." on the extreme left 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 (second mark from the left on upper dial scale) and adjust the oscillator padder screw for maximum response.
5. Rotate tuning knob until the pointer coincides with the 1500 Kc/s calibration mark (second mark from the right on the upper dial scale) and adjust the oscillator trimmer and aerial trimmer in turn for maximum response.
6. Repeat operations (3) to (5) inclusive for proper alignment.

R.F. ALIGNMENT (SHORT-WAVE)

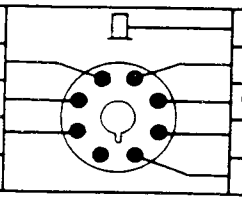
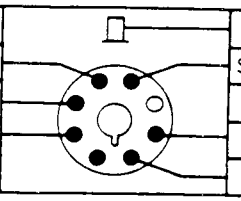
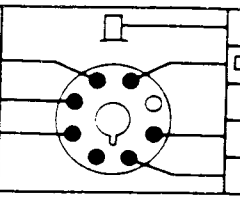
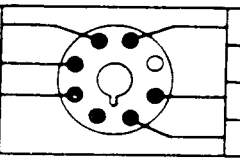
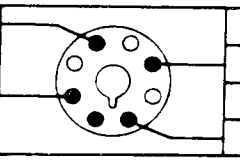
1. Set wave-change switch to "Short-Wave" (clockwise) position. Remove the 200 mmF. condenser from the output lead of the signal generator and replace with a 400 ohm non-inductive resistor; connect to the aerial terminal as before.
2. Rotate tuning knob until the pointer coincides with the 17 metres 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 (plunger further out). 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.
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."

VOLTAGE TABLE

- 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 MA.	RESISTANCE TO CHASSIS	VALVE ELECTRODE	BOTTOM VIEW OF VALVE SOCKET	VALVE ELECTRODE	VOLTS TO CHASSIS	CURRENT MA	RESISTANCE TO CHASSIS
			V1	6J8-GA	CONVERTER			
90	2·1	INFIN.	SCREENGRID		GRID	——	——	3 MEG Ω
245	1·1	INFIN.	PLATE		OSC. GRID	——	——	50,000Ω
6·3AC.	450A.C.	——	HEATER		OSC. PLATE	145	4·7	INFIN.
			NO CONN.		HEATER	NIL.	——	NIL.
					CATHODE	NIL	7·9	NIL
			V2	6U7-G	I.F. AMPLIFIER			
90	1·7	INFIN.	SCREENGRID		GRID	——	——	3 MEG Ω
245	7·1	INFIN.	PLATE		SUPPRESSOR	NIL.	——	NIL.
6·3AC.	300A.C.	——	HEATER					
			NO CONN.		HEATER	NIL.	——	NIL.
					CATHODE	NIL.	8·8	NIL.
			V3	6B6-G	A.V.C. – DEMODULATOR – AUDIO			
——	——	0·28MEGΩ	DIODE # 2		GRID	——	——	10 MEG Ω
					DIODE # 1	——	——	1 MEG Ω
80	0·5	INFIN.	PLATE					
6·3A.C.	300A.C.	——	HEATER		HEATER	NIL	——	NIL.
			NO CONN.		CATHODE	NIL.	0·5	NIL.
			V4	6V6-GT	OUTPUT			
245	3	INFIN	SCREENGRID		GRID	——	——	0·6MEG Ω
225	48	INFIN.	PLATE					
NIL.	——	NIL.	HEATER		HEATER	6·3A.C.	450A.C.	——
			NO CONN		CATHODE	12	51	250 Ω
			V5	5Y3-GT	RECTIFIER			
288 A.C.	——	380Ω	PLATE # 1					
					PLATE # 2	288A.C.	——	400Ω
——	2 AMP.A.C.	INFIN.	HEATER					
			NO CONN.		HEATER	295	——	INFIN.

REMARKS :

UNFILTERED H.T. VOLTAGE	=	295	VOLTS
FILTERED H.T. VOLTAGE	=	245	VOLTS
TOTAL H.T. CURRENT	=	68	MA.
BACK BIAS VOLTAGE (R5)	=	3·7	VOLTS
RECTIFIER HEATER VOLTAGE	=	5·0	VOLTS

PARTS LIST

RESISTORS

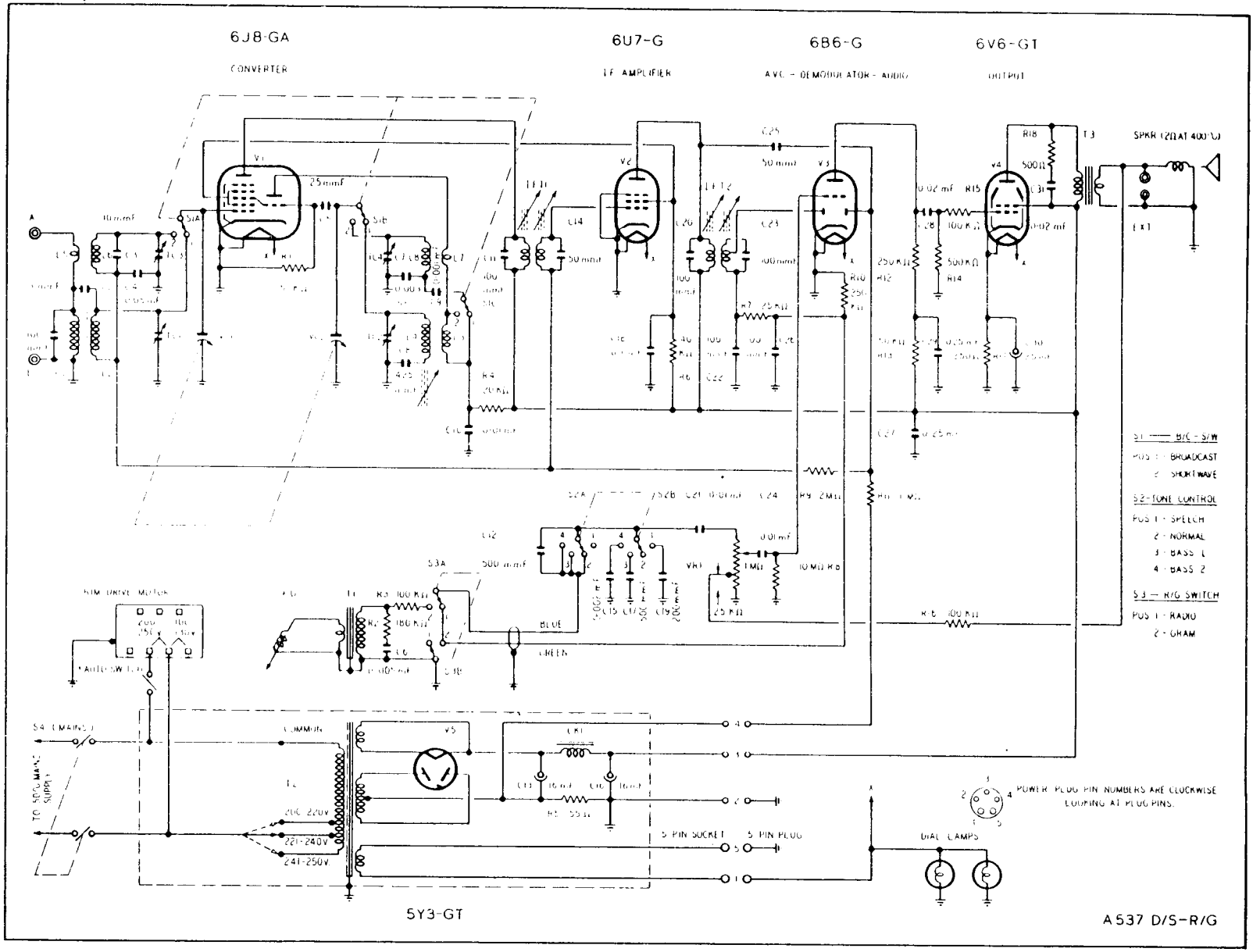
REF.	PART No.	DESCRIPTION
R1	H2X	50,000 ohm ½ watt ± 10%
R2	DS2X	180,000 ohm ½ watt ± 10%
R3	J2X	100,000 ohm ½ watt ± 10%
R4	V3X	20,000 ohm 1 watt ± 10%
R5	DFW3X	55 ohm 1 watt ± 10%
R6	S3X	40,000 ohm 1 watt ± 10%
R7	AE2X	25,000 ohm ½ watt ± 10%
R8	DJ3X	10 Megohm 1 watt ± 10%
R9	DH2X	2 Megohm ½ watt ± 10%
R10	N2X	250,000 ohm ½ watt ± 10%
R11	P2X	1 Megohm ½ watt ± 10%
R12	N3X	250 000 ohm 1 watt ± 10%
R13	H3X	50,000 ohm 1 watt ± 10%
R14	C92X	500,000 ohm ½ watt ± 10%
R15	J2X	100,000 ohm ½ watt ± 10%
R16	J2X	100 000 ohm ½ watt ± 10%
R17	ZW3X	250 ohm 1 watt ± 10%
R18	B2X	500 ohm ½ watt ± 10%

CONDENSERS

REF.	PART No.	DESCRIPTION
C1	D0243P	100 mmF. ± 10%
C2	D0243BU	3 mmF ± 1.0 mmF.
C3	D0243Z	10 mmF. ± 10%
C4	C0013M	0.05 mF. 200V.
C5	D0243BE	25 mmF. ± 10%
C6	C0013AK	0.005 mF. ± 10% 600V
C7	D0243CZ	0.003 mF. ± 100 mmF.
C8	D0243CW	425 mmF. ± 5 mmF.
C9	D0243K	0.001 mF. ± 10%
C10	C0013N	0.01 mF. 600V.
C11	D4405W	100 mmF. ± 5%
C12	D0243L	500 mmF. ± 10%
C13	C0014BZ	16 mF. 525 P.V.
C14	D4405X	50 mmF. ± 5%
C15	D0243H	0.002 mF. ± 10%
C16	C0014CB	16 mF. 525 P.V.
C17	D0243L	500 mmF. ± 10%
C18	C0013E	0.1 mF. ± 400V.
C19	D0243CY	200 mmF. ± 10%
C20	D4405W	100 mmF. ± 5%
C21	C0013N	0.01 mF. 600V.
C22	D0243P	100 mmF. ± 10%
C23	D4405W	100 mmF. ± 5%
C24	C0013N	0.01 mF. 600V.
C25	D0243Q	50 mmF. ± 10%
C26	D0243P	100 mmF. ± 10%
C27	C0013C	0.25 mF. 400V.
C28	C0013S	0.02 mF. 600V.
C29	C0013C	0.25 mF. 400V.
C30	C0014CC	25 mF. 40 P.V.
C31	C0013S	0.02 mF. 600V.

MISCELLANEOUS

REF.	PART No.	DESCRIPTION
TC1	D2395	Trimmer Condenser
TC2	D2395	Trimmer Condenser
TC3	D2395	Trimmer Condenser
TC4	D2395	Trimmer Condenser
L1, L2	D1614F	B/C Aerial Coil
L3, L4	D2275	B/C Oscillator Coil
L5, L6	D2451	S-W Aerial Coil
L7, L8	D2452	S-W Oscillator Coil
CK1	D2357	H.T. Filter Choke
T1	34720E	P.U. Input Transformer
T2	D2358	Mains Transformer
T3	D2410	Output Transformer
S1	D2268	3-Pole 2-Position Switch
S2	D2424B	2-Pole 4-Position Switch
S3	D2444	2 Pole 2 Position Switch
S4	D2445A	D.P.S.T. Rotary Switch
VR1	D1944A	1 Megohm Potentiometer (Tapped at 25,000 ohm)
VC1 & VC2	D1993	2-Gang Condenser
IFT1	D2278	1st I.F. Transformer
IFT2	D2238	2nd I.F. Transformer
		Dial Lamps: 6.3V., 0.25A. S.C.
Spkr.	C0131A	8in. Speaker
	D2455	Dual-Wave Dial Glass
	D2011A	Dial Pointer
		H238 Lug (Dial Cord)
	D0873	Cord Spring
	D2674	Control Knob
P.U.	35218B	No. 13 Pick-Up
	32370M	Rim Drive Motor (Turntable type 30874G).



CIRCUIT DIAGRAM OF MODEL 188, INCORPORATING CHASSIS TYPE A537DS/RG.