The VMARS Archive

Guidance on using this electronic document

Acrobat Reader version

You need to view this document with Acrobat Reader **version 5.0** or later. It is possible that the document might open with an earlier version of the Acrobat Reader (thus allowing you to get this far!), but is also likely that some pages will not be shown correctly. You can upgrade your Acrobat Reader by direct download from the internet at http://www.adobe.com/products/acrobat/readermain.html or going to http://www.adobe.com/ and navigating from there.

Don't miss the index!

This document has had "bookmarks" added – which provide you with an "on-screen index". These allow you to quickly move to particular parts of the document, a numbered section or maybe the circuit diagrams for instance, merely by clicking on the page title. Click on the "Bookmarks" tab on the left hand side of the Acrobat Viewer window to access this feature – move the cursor over these titles and notice it change shape as you do so. Click on any of these titles to move to that page.

Large diagrams

The large diagrams are given in two formats – in A4 size sheets to allow easy printing, and complete as originally published to allow easy on-screen viewing. These versions are in different sections of the document, which can be found within the bookmarks.

Printing the document on an A4 format printer

The document has been optimised for printing on A4 size paper (this is the common size available in UK and Europe, which measures 29.7cm by 21.0cm). Please follow these steps (these are based on Acrobat Reader version 6.0 – other versions may differ in detail):

1. Work out the page numbers you want to print. If you want to print the whole document, then within "Bookmarks" (see above), first click on "**Front**", and note the page number given at the bottom of the Acrobat window – this will give you the page number of the first page to be printed. Similarly click on "**End of A4 printable copy**", to determine the last page to be printed.

2. Select "File – Print" or click on the printer icon. This will bring up the print dialog box.

3. Select the correct printer if necessary.

4. In the area marked "Print Range" click on the radio button marked "Pages from..", then enter the first and last page numbers worked out in step 1 into the "from" and "to" boxes.

5. In the "Page Handling" area, next to "Page Scaling", select "Fit to paper". The press "OK"

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Any other problems?

Please get in touch with me at archivist@vmarsmanuals.co.uk.

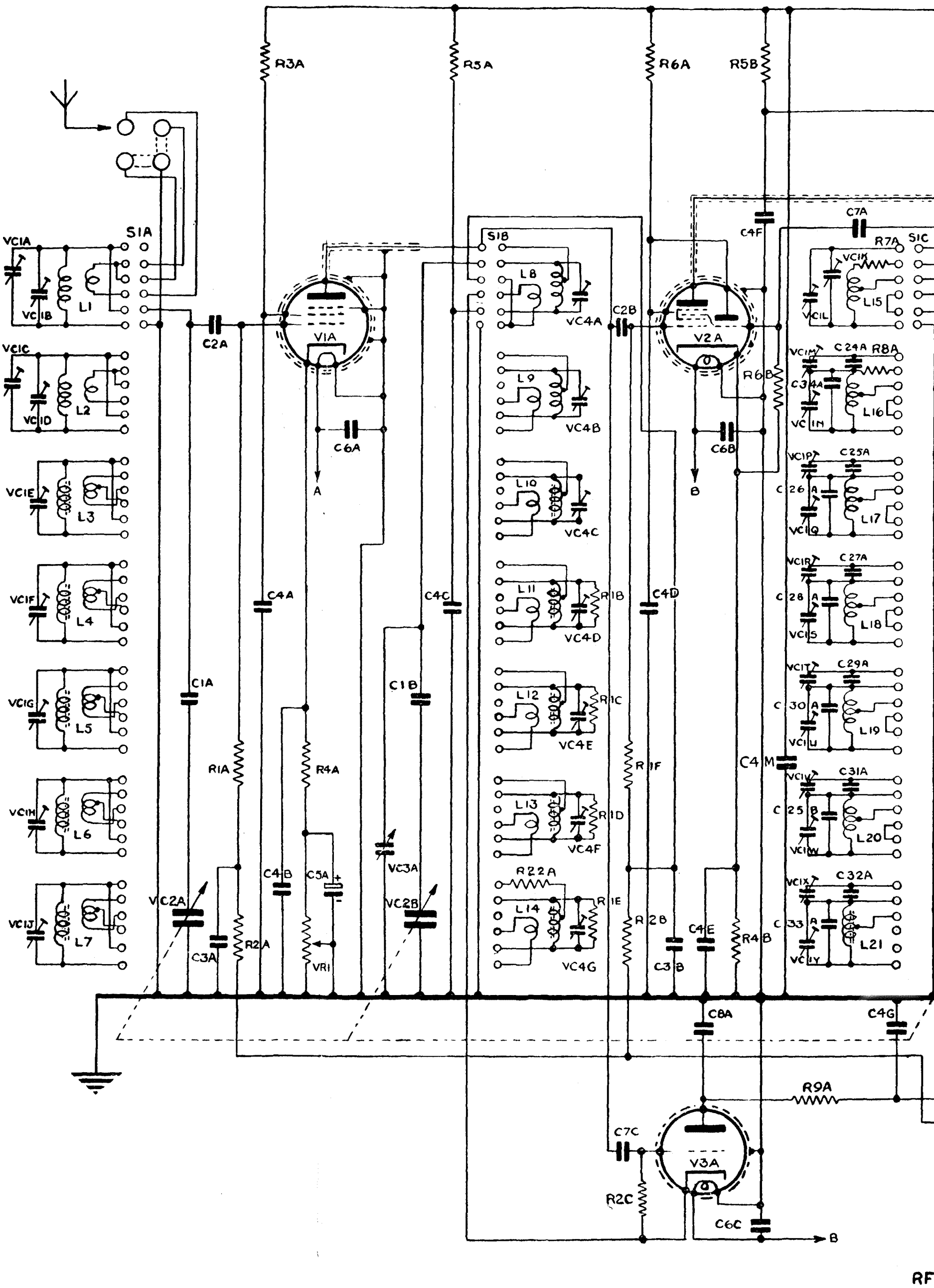
Richard Hankins, VMARS Archivist, Summer 2004

RECEPTION SETS
D.S.T. 100. Mk. II, Mk. III & Mk. III*

WORKING INSTRUCTIONS.

PARTS I & II.

ZA 14020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R5B
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S1B
S1C
VC1A
VC1B
VC1C
VC1D
VC1E
VC1F
VC1G
VC1H
VC1J
L1
L2
L3
L4
L5
L6
L7
C2A
V1A
C6A
A
C4A
C1A
R1A
VC2A
C3A
R2A
C4B
C5A
R4A
VR1
VC3A
VC2B
C4C
C1B
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L9
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VC1L
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C24A
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C29A
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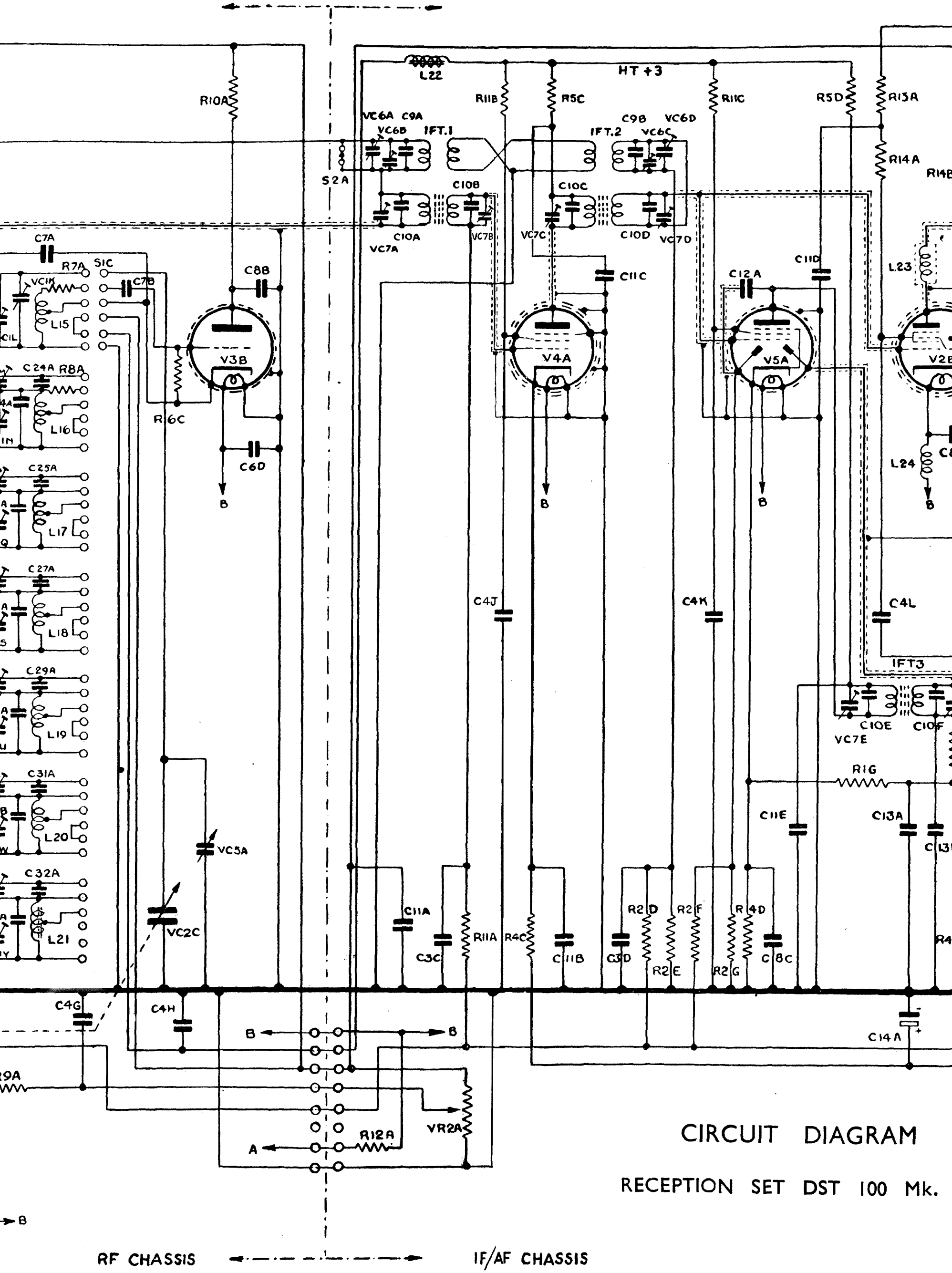
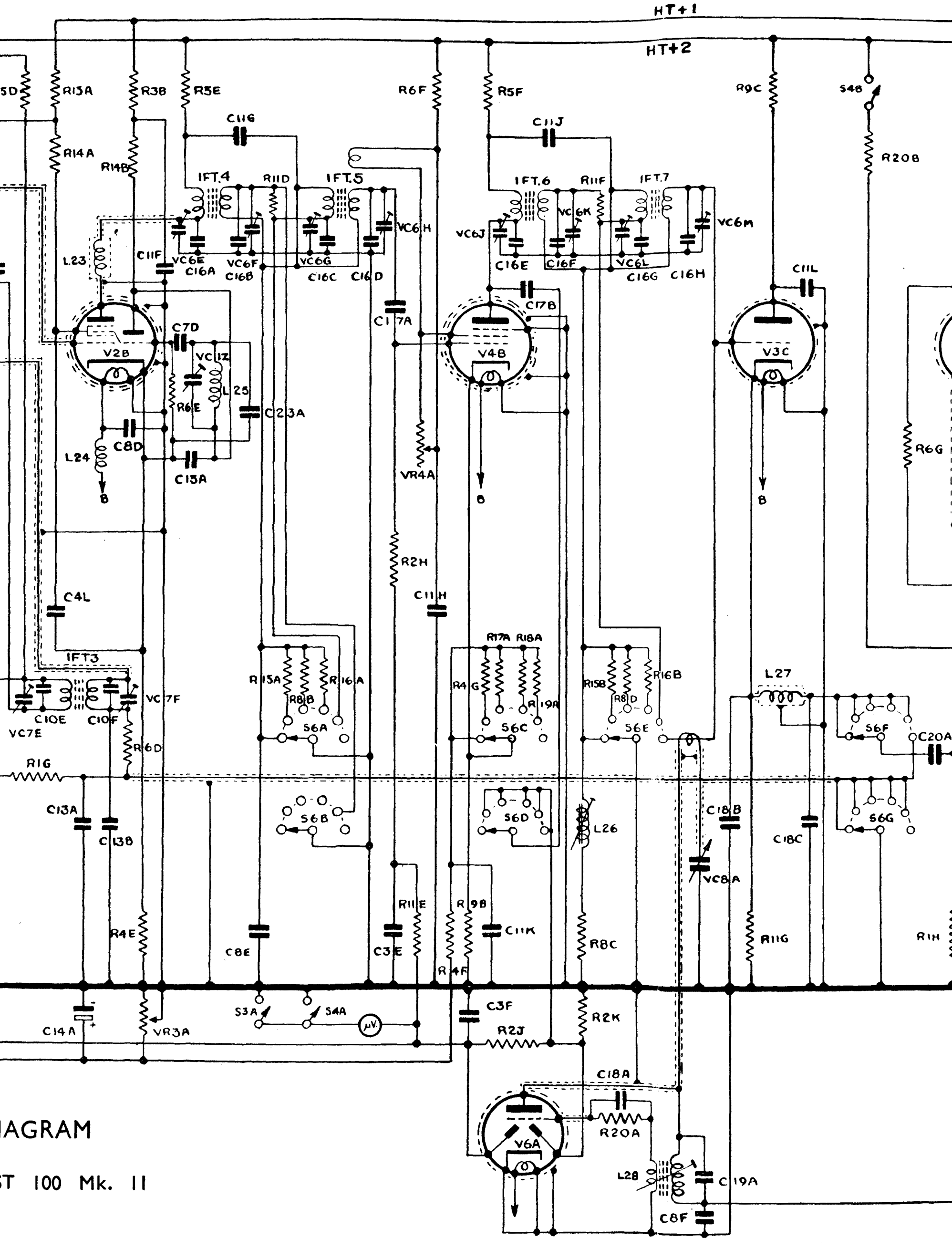
R2C
C6C

RF



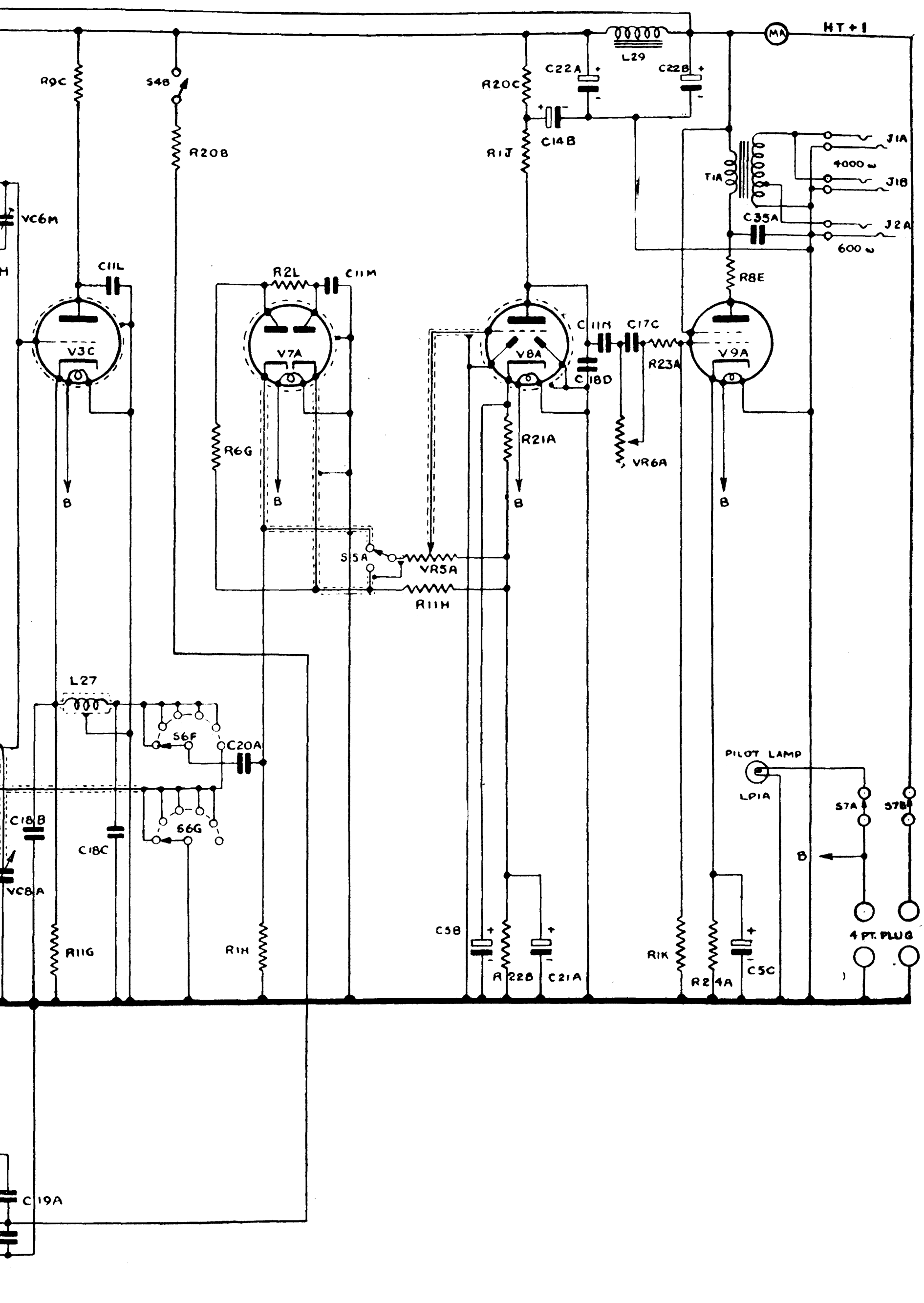
CIRCUIT DIAGRAM

RECEPTION SET DST 100 Mk.



IAGRAM

ST 100 Mk. II



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C22B
R9C
S4B
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C14B
R20B
R1J
J1A
4000 ω
T1A
J1B
VC6M
C35A
J2A
600 ω
C11L
R2L
C11M
R8E
C11N
C17C
V3C
V7A
V8A
V9A
R23A
C18D
R21A
VR6A
R6G
B
S5A
VR5A
R11H
L27
S6F
C20A
PILOT LAMP
LP1A
S7A
S7B
C18B
S6G
C18C
VC8A
C5B
C21A
R22B
R1K
R24A
C5C
4 PT. PLUG
R11G
R1H
C19A

COMPONENT LIST

FIXED CONDENSERS

C1	2,000 μμF. 0·5% Silvered Mica	C13	·0002 μF. 15% Moulded Mica	C25	300 μμF. 1% Silvered Mica
C2	200 μμF 15% Silvered Mica	C14	8 μF. Electrolytic 500 w.v.	C26	30 μμF. 4% Silvered Mica
C3	·04 μF. Paper Tubular 350 w.v.	C15	2,000 μμF 5% Silvered Mica	C27	180 μμF. 1% Silvered Mica
C4	·1 μF. Paper Tubular Ex. T.F.	C16	350 μμ F. 2·5% Silvered Mica	C28	50 μμF. 5% Silvered Mica
C5	25 μF. Elec. Tubular 25 w.v.	C17	·0005 μF 15% Moulded Mica	C29	100 μμF. 2% Silvered Mica
C6	·005 μF. 10% Moulded Mica	C18	·0003 μF. 15% Moulded Mica	C30	120 μμF. 2% Silvered Mica
C7	100 μμF. 15% Silvered Mica	C19	250 μμF. 2·5% Silvered Mica	C31	85 μμF. 2% Silvered Mica
C8	·01 μF. 10% Moulded Mica	C20	·025 μF. Paper Tubular 350 w.v.	C32	200 μμF. 1% Silvered Mica
C9	600 μμF. 5% Silvered Mica	C21	50 μF. Elec. Tubular 12 w.v.	C33	45 μμF. 5% Silvered Mica
C10	100 μμF. 2·5% Silvered Mica	C22	32 μF. Electrolytic 500 w.v.	C34	20 μμF. 5% Silvered Mica
C11	·1 μF. Paper Tubular 350 w.v.	C23	500 μμF. 2·5% Silvered Mica	C35	·005 μF. Paper Tubular 2000 w.v.
C12	·0001 μF. 15% Moulded Mica	C24	560 μμF. 0·5% Silvered Mica		

VARIABLE CONDENSERS

VC1	3–30 μμF. Air Dialectric Trimmer
VC2	430 μμF. 3 Section Gang
VC3	20 μμF. Air Dialectric Trimmer
VC4	2–8 μμF. Air Dialectric Trimmer
VC5	1–2 μμF. Air Dialectric Trimmer
VC6	220 μμF. Compression Mica Trimmer
VC7	50 μμF. Air Dialectric Trimmer
VC8	100 μμF. Air Dialectric Trimmer

PILOT LAMP

LP1A	M.E.S. 6v. O·3A.

FIXED RESISTORS

R1	·25 meg. Ω ½ watt 15%	R13	25,000 Ω 1 watt 15%
R2	·5 meg. Ω ½ watt 15%	R14	40,000 Ω ½ watt 15%
R3	5,000 Ω 1 watt 15%	R15	12·5 Ω ½ watt 15%
R4	200 Ω ½ watt 15%	R16	300 Ω ½ watt 15%
R5	3,000 Ω 1 watt 15%	R17	390 Ω ½ watt 15%
R6	50,000 Ω ½ watt 15%	R18	560 Ω ½ watt 15%
R7	25 Ω ½ watt 15%	R19	4,000 Ω ½ watt 15%
R8	50 Ω ½ watt 15%	R20	25,000 Ω ½ watt 15%
R9	10,000 Ω 1 watt 15%	R21	5,000 Ω ½ watt 15%
R10	15,000 Ω 2 watt 15%	R22	1,000 Ω ½ watt 15%
R11	100,000 Ω ½ watt 15%	R23	3,000 Ω ½ watt 15%
R12	3·5 Ω Wire Wound 3 watt	R24	270 Ω 1 watt 15%

INDUCTANCES

L1	'A' Band Aerial Coil	L13	'F' Band R.F. Coil	L25	Oscillator Coil (2nd Mixer)
L2	'B' Band Aerial Coil	L14	'G' Band R.F. Coil	L26	Selectivity Loading Coil
L3	'C' Band Aerial Coil	L15	'A' Band Osc. Coil	L27	110 Kc/s Filter Choke
L4	'D' Band Aerial Coil	L16	'B' Band Osc. Coil	L28	B.F.O. Coil
L5	'E' Band Aerial Coil	L17	'C' Band Osc. Coil	L29	H.T. Smoothing Choke
L6	'F' Band Aerial Coil	L18	'D' Band Osc. Coil		
L7	'G' Band Aerial Coil	L19	'E' Band Osc. Coil		
L8	'A' Band R.F. Coil	L20	'F' Band Osc. Coil		
L9	'B' Band R.F. Coil	L21	'G' Band Osc. Coil		
L10	'C' Band R.F. Coil	L22	Relay Winding		
L11	'D' Band R.F. Coil	L23	2 Mc/s Filter Choke		
L12	'E' Band R.F. Coil	L24	Filter Choke (Heater)		

TRANSFORMER

T1	Output Transformer

VARIABLE RESISTORS

VR1	5,000 Ω Wire Wound Potentiometer
VR2	50,000 Ω Wire Wound Potentiometer
VR3	2,000 Ω Wire Wound Potentiometer
VR4	50 Ω Wire Wound Potentiometer
VR5	·5 meg Ω Carbon Potentiometer
VR6	·5 meg Ω Carbon Potentiometer

JACKS

J1	Jack Telephone No. 2
J2	Jack Microphone No. 2

SWITCHES

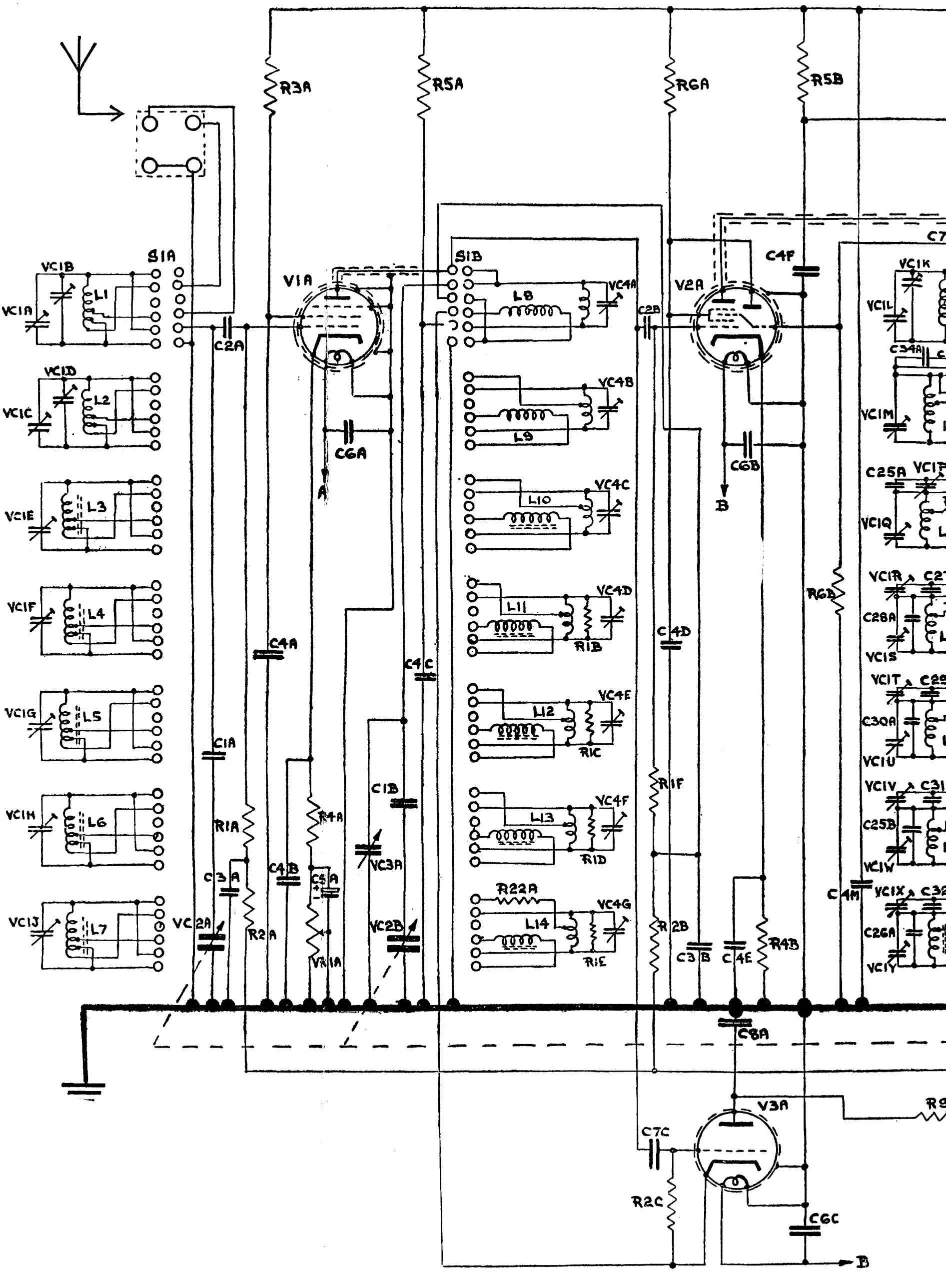
S1	Turret Switch
S2	Relay Switch S.P. On/Off
S3	S.P. On/Off
S4	D.P. On/Off
S5	S.P. Changeover
S6	2 Pole 6-way 4-Gang
S7	D.P. On/Off

VALVES

V1	CV21
V2	ARTH2
V3	6J5G
V4	ARP34
V5	6B8G
V6	6R7G
V7	6H6G
V8	6Q7G
V9	6V6G

I.F. TRANSFORMERS

IFT1, IFT2	2 Mc/s and 110 Kc/s Link Winding
IFT3	2 Mc/s
IFT4, IFT6, IFT7	110 Kc/s
IFT5	110 Kc/s with Regen. Winding



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R6A
R5B
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VC1B
VC1A
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V1A
S1B
L8
VC4A
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VC4D
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VC1R
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C30A
VC1U
C1A
C1B
VC1H
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R1A
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VC4F
R1D
R1F
VC1V
C25B
VC1W
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C26A
VC1Y
VC1J
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VC2A
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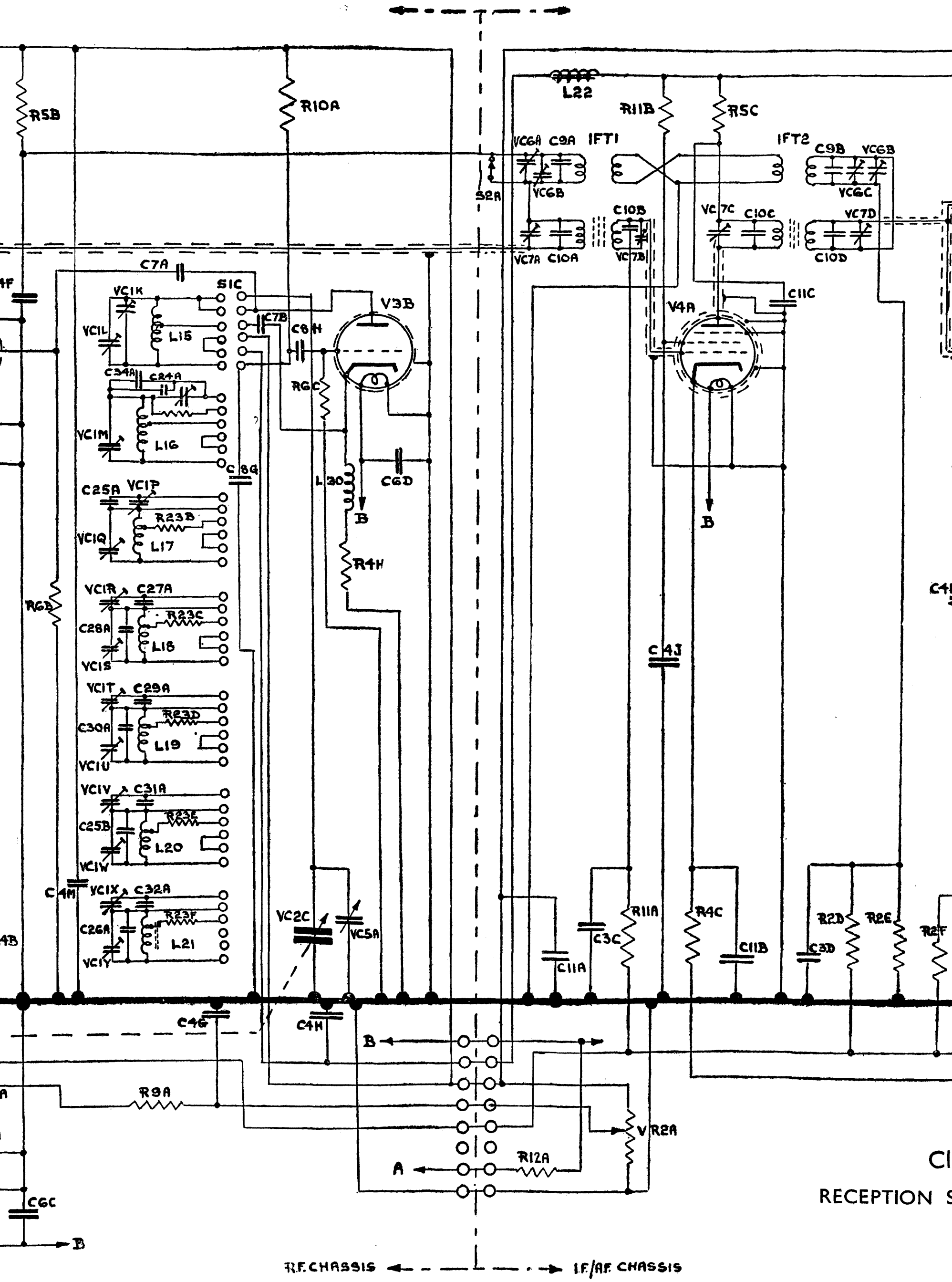
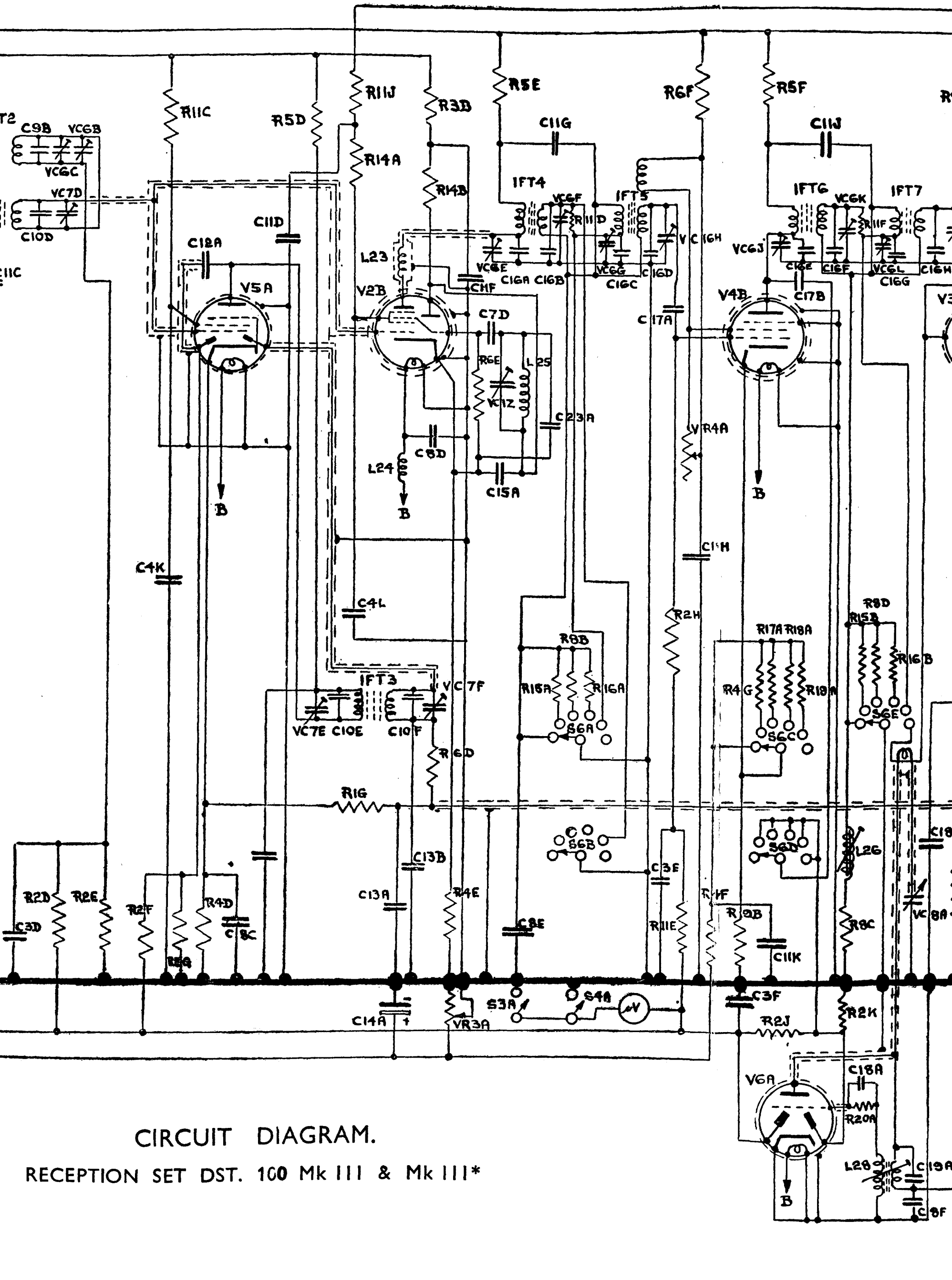
R2C
C6C
B



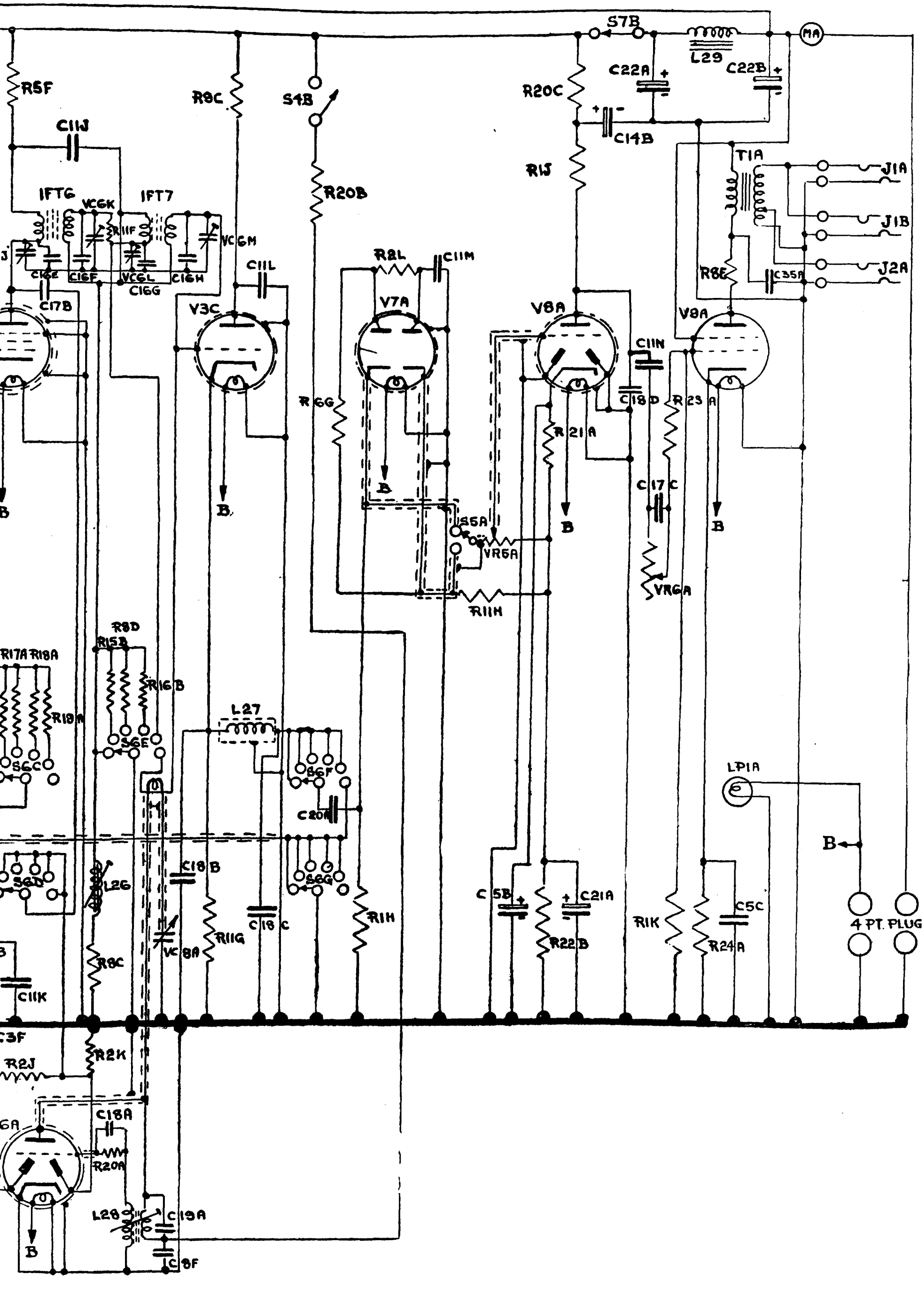
CI

RECEPTION S



CIRCUIT DIAGRAM.

RECEPTION SET DST. 100 Mk III & Mk III*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C11J
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J1A
J1B
J2A
IFT6
VC6K
IFT7
R11F
VC6M
R20B
R8L
C11M
C16E
C16F
VC6L
C16G
C16H
C11L
R8E
C35A
C17B
V3C
V7A
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V9A
C11N
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R23A
R21A
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L26
S6D
S6G
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C5B
C21A
C5C
R1K
R24A
R22B
R11G
C18C
R1H
VC8A
R8C
C11K
4 PT. PLUG
C3F
R2K
R2J
C18A
R20A
L28
C19A
C8F

COMPONENT LIST

FIXED CONDENSERS

C1	2,000 μμF. Silvered Mica 0·5%	C13	·0002 μF. Moulded Mica 15%	C25	300 μμF. Silvered Mica 1%
C2	200 μμF. Silvered Mica 15%	C14	8 μF. Electrolytic 500 v.w.	C26	30 μμF. Silvered Mica 5%
C3	·04 μF. Paper Tubular 350 v.w.	C15	2,000 μμF. Silvered Mica 5%	C27	180 μμF. Silvered Mica 1%
C4	·1 μF. Paper Tubular Ex. T.F.	C16	350 μμF. Silvered Mica 2·5%	C28	50 μμF. Silvered Mica 5%
C5	25 μF. Elec. Tubular 25 v.w.	C17	·0005 μF. Moulded Mica 15%	C29	100 μμF. Silvered Mica 2%
C6	·005 μF. Moulded Mica 10%	C18	·0003 μF. Moulded Mica 15%	C30	120 μμF. Silvered Mica 2%
C7	100 μμF. Silvered Mica 15%	C19	250 μμF. Silvered Mica 2·5%	C31	85 μμF. Silvered Mica 2%
C8	·01 μF. Moulded Mica10%	C20	·025 μF. Paper Tubular 350 v.w.	C32	200 μμF. Silvered Mica 1%
C9	600 μμF. Silvered Mica 5%	C21	50μ F. Elec. Tubular 12 v.w.	C34	20 μμF. Silvered Mica 5%
C10	100 μμF. Silvered Mica 2·5%	C22	32 μμF. Electrolytic 500 v.w.	C35	·005 μF. Paper Tubular 2000 v.w.
C11	·1 μF. Paper Tubular 350 v.w.	C23	500 μμF. Silvered Mica 2·5%		
C12	·0001 μF. Moulded Mica 15%	C24	560 μμF. Silvered Mica 0·5%		

VARIABLE CONDENSERS

VC1	3–30 μμF. Air Dielectric Trimmer
VC2	430 μμF. 3-Section Gang
VC3	20 μμF. Air Dielectric Trimmer
VC4	2–8 μμF. Air Dielectric Trimmer
VC5	1–2 μμF. Air Dielectric Trimmer
VC6	220 μμF. Compression Mica Trimmer
VC7	50 μμF. Air Dielectric Trimmer
VC8	100 μμF. Air Dielectric Trimmer

PILOT LAMP

LP1	M.E.S., 6v. 0·3A.

FIXED RESISTORS

R1	·25 meg Ω ½ watt 15%	R13	25,000 Ω 1 watt 15%
R2	·5 meg Ω ½ watt 15%	R14	40,000 Ω ½ watt 15%
R3	5,000 Ω 1 watt 15%	R15	12·5 Ω ½ watt 15%
R4	200 Ω ½ watt 15%	R16	300 Ω ½ watt 15%
R5	3,000 Ω 1 watt 15%	R17	390 Ω ½ watt 15%
R6	50,000 Ω ½ watt 15%	R18	560 Ω ½ watt 15%
R7	25 Ω ½ watt 15%	R19	4,000 Ω ½ watt 15%
R8	50 Ω ½ watt 15%	R20	25,000 Ω ½ watt 15%
R9	10,000 Ω 1 watt 15%	R21	5,000 Ω ½ watt 15%
R10	15 000 Ω 2 watt 15%	R22	1,000 Ω ½ watt 15%
R11	100,000 Ω ½ watt 15%	R23	3,000 Ω ½ watt 15%
R12	3·50 3 watt Wire Wound	R24	270 Ω 1 watt 15%

INDUCTANCES

L1	'A' Band Aerial Coil	L13	'F' Band R.F. Coil	L25	Oscillator Coil (2nd Mixer)
L2	'B' Band Aerial Coil	L14	'G' Band R.F. Coil	L26	Selectivity Loading Coil
L3	'C' Band Aerial Coil	L15	'A' Band Osc. Coil	L27	110 Kc/s Filter Choke
L4	'D' Aerial Coil	L16	'B' Band Osc. Coil	L28	B.F.O. Coil
L5	'E' Band Aerial Coil	L17	'C' Band Osc. Coil	L29	H.T. Smoothing Choke
L6	'F' Band Aerial Coil	L18	'D' Band Osc. Coil	L30	Cathode R.F. Choke
L7	'G' Band Aerial Coil	L19	'E' Band Osc. Coil		
L8	'A' Band R.F. Coil	L20	'F' Band Osc. Coil		
L9	'B' Band R.F. Coil	L21	'G' Band Osc. Coil		
L10	'C' Band R.F. Coil	L22	Relay Winding		
L11	'D' Band R.F. Coil	L23	2 Mc/s Filter Choke		
L12	'E' Band R.F. Coil	L24	Filter Choke (Heater)		

TRANSFORMERS

T1	Output Transformer

VARIABLE RESISTANCES

VR1	5,000 Ω Wire Wound Potentiometer
VR2	50,000 Ω Wire Wound Potentiometer
VR3	2,000 Ω Wire Wound Potentiometer
VR4	50 Ω Wire Wound Potentiometer
VR5	·5 meg Ω Carbon Potentiometer
VR6	·5 meg Ω Carbon Potentiometer

JACKS

J1	Jack Telephone No. 2
J2	Jack Microphone No. 2

SWITCHES

S1	Turret Switch
S2	Relay Switch S.P. On-Off
S3	S.P. On-Off
S4	D.P. On-Off
S5	S.P. Changeover
S6	2 Pole 6-way 4-Gang
S7	D.P. On-Off

VALVES

V1	CV21
V2	ARTH2
V3	6J5G
V4	ARP34
V5	6B8G
V6	6R7G
V7	6H6G
V8	6Q7G
V9	6V6G

I.F. TRANSFORMERS

IFT1	2 Mc/s and 110 Kc/s Link Winding
IFT2	2 Mc/s and 110 Kc/s Link Winding
IFT3	2 Mc/s
IFT4	110 Kc/s
IFT6	110 Kc/s
IFT7	110 Kc/s
IFT5	110 Kc/s with Regen. Winding

RECEPTION SETS

D.S.T. 100.

Mk. II, Mk. III, & Mk. III*

CONTENTS.

PART I.

CHAPTER I.

CHAPTER II.

CHAPTER III.

PART II.

CHAPTER IV.

CONTENTS—*continued.*

CHAPTER V.

PERFORMANCE FIGURES.

CHAPTER VI.

CIRCUIT ALIGNMENT DETAILS.

CHAPTER VII.

FAULT FINDING.

ILLUSTRATIONS.

Prefatory Note.

Reception Sets D.S.T. 100 Mk. II employ different Aerial and 1st oscillation circuits from Mks III and III*.

Marks II and III are semi-tropical finish.

Mark III* is fully tropical finish.

PART I.

CHAPTER I.

GENERAL DESCRIPTION.

1.—PURPOSE.

The Set is a high sensitivity receiver designed to be used in fixed stations and to give a high degree of intelligibility to the reception of weak R/T and C.W. signals.

2.—FREQUENCY RANGE.

The receiver has a continuous tuning range between the frequencies of 50 Kc/s and 30 Mc/s, this spectrum being divided into seven bands (see *Chapter II, Paragraph* 2(*d*)). Blind spots will occur in the region of the intermediate frequencies, which are 2 Mc/s and 110 Kc/s.

3.—POWER SUPPLY.

The set is designed to operate from A.C. mains by connection to Supply Unit Rectifier No. 8 (Cat. No. Z.B.0327). Coupling between the receiver and supply unit is effected by a Connector 4-point No. 42. (Cat. No. Z.A.15990).

The total consumption from the supply unit is approximately 110 milliamps at 250 volts and 4.75 amps. at 6·3 volts.

To operate in an emergency where A.C. supplies are not available, suitable D.C. sources may be connected direct to the plug 4 point at the back of the set.

4.—BRIEF CIRCUIT SPECIFICATION.

The receiver employs a double superheterodyne circuit comprising the followi g valves :—

	Valve Type.		*Function.*	*Position*
(1)	CV21	(V1A)	Radio Frequency Amplifier.	In R.F. Chassis.
(2)	ARTH2	(V2A)	First Frequency Changer.	In R.F. Chassis.
(3)	6J5G	(V3A)	R.F. Regenerator.	In R.F. Chassis.
(4)	6J5G	(V3B)	First Local Oscillator.	In R.F. Chassis.
(5)	ARP34	(V4A)	First 2 Mc/s I.F. Amplifier.	In I.F./A.F. Chassis.
(6)	ARTH2	(V2B)	Second Frequency Changer (Combined Mixer-Oscillator).	In I.F./A.F. Chassis.
(7)	6B8G	(V5A)	Second 2 Mc/s I.F. Amplifier, 2 Mc/s AVC Rectifier and Signal Detector.	In I.F./A.F. Chassis.
(8)	ARP34	(V4B)	110 Kc/s I.F. Amplifier.	In I.F./A.F. Chassis.
(9)	6J5G	(V3C)	110 Kc/s Signal Detector.	In I.F./A.F. Chassis.
(10)	6R7G	(V6A)	Beat Frequency Oscillator. 110 Kc/s AVC Rectifier.	In I.F./A.F. Chassis.
(11)	6H6G	(V7A)	Noise Limiter.	In I.F./A.F. Chassis.
(12)	6Q7G	(V8A)	First A.F. Amplifier.	In I.F./A.F. Chassis.
(13)	6V6G	(V9A)	Output Stage.	In I.F./A.F. Chassis.

5.—AERIALS.

Open or dipole aerials of 75 or 600 ohms impedance may be used, and the appropriate aerial coil input impedances are selected as indicated on the engraved plate fixed to the back panel.

NOTE : On Mark II sets, " A " and " B " bands are matched to 75 ohms only.

6. RECEIVER OUTPUT.

The output of the receiver is terminated at 4,000 ohms for H.R. phones (Receivers, Headgear CHR. Double Mk. IV., Cat. No. Z.A.5474) and provision is also made for a LINE output at 600 ohms.

7. WEIGHT AND DIMENSIONS.

The overall dimensions of the receiver are : length 24½ in., height 15½ in., depth 15½ in.

The weight is approximately one hundredweight.

CHAPTER II.

OPERATION.

1. CONNECTING UP.

(*a*) Connecting the Supply Unit Rectifier No. 8.

The Supply Unit Rectifier No. 8 should be connected by means of a Connector, 4-point No. 42 (Cat. No. Z.A.15990) to the appropriate socket at the back of the receiver case.

(*b*) Connecting Aerial and Earth.

Connect aerial and earth to appropriate terminals at the back of the receiver as explained in Chapter I, Paragraph 5. Make certain that the connections are sound.

(*c*) Connecting Headphones.

Use Receivers Headgear CHR. Double Mk. IV in the PHONES socket.

Use Plug Single No. 10 for the 600 ohms LINE socket.

2. CONTROLS AND THEIR FUNCTIONS (*see Fig.* 5).

(*a*) Main Tuning.

The main tuning control consists of a 7 in. diameter cast wheel which has a knurled edge to facilitate rotation by hand and is calibrated in degrees. The reduction ratio between this tuning wheel and the ganged condensers is 24 : 1, so that it provides an effective scale length of 22 ft. and considerable mechanical bandspread. Fitting concentrically within this tuning wheel is a 6 in. dial calibrated in frequencies. The size of the wheel enables the operator to travel rapidly from one end of the tuning scale to the other, but for especially fine tuning over a limited band a vernier knob provides still further reduction. This vernier knob is held in tension against the tuning wheel by a spring and to avoid excessive wear it should be disengaged by swinging to the right when not in use.

(*b*) Electrical Bandspread.

Intended for use only on the high frequency bands, this control will give an approximate spread of ± 7 Kc/s at 5 Mc/s. When not in use the dial should be kept at zero.

(*c*) R.F. Trimmer.

Adjust carefully for peak sensitivity with each setting of main tuning control.

(*d*) Frequency Range Selector.

The combined knob and handle must be pulled out and rotated one revolution to change from band to band. The letter denoting the band selected will appear behind the indicator window.

The seven bands cover the following frequency ranges :—

"A"	30 Mc/s	—	12 Mc/s.
"B"	12 Mc/s	—	4·8 Mc/s.
"C"	4·8 Mc/s	—	1·9 Mc/s.
"D"	1·9 Mc/s	—	0·78 Mc/s.
"E"	780 Kc/s	—	310 Kc/s.
"F"	310 Kc/s	—	126 Kc/s.
"G"	126 Kc/s	—	50 Kc/s.

The overlap is approximately 5 per cent. on each band.

When changing from one band to another care should be taken to see that the locating pin on the handle returns firmly to its locking position.

(e) **R.F. Sensitivity.**

Rotation of this control in a clockwise direction increases sensitivity. It is advisable to keep this control at maximum, turning it back only when incoming signals are strong enough to cause overload distortion.

(*f*) **Tone.**

Low audio frequencies are progressively attenuated when the tone control is rotated in an anti-clockwise direction.

(*g*) **Regeneration (R.F.).**

This control will increase R.F. sensitivity when rotated in a clockwise direction. It should be used only on the weakest signals when the maximum possible sensivity of the receiver is required *and then only in direct conjunction with the R.F. trimmer.* It is important that this control should be kept at zero when not in use.

(*h*) **Volume.**

Volume increases with rotation in a clockwise direction.

(*j*) **I.F. Sensitivity.**

Sensitivity increases with rotation in a clockwise direction. To minimise the inherent noise of the receiver it is advisable always to operate the set with the lowest practicable I.F. sensitivity.

(*k*) **Variable Selectivity.**

A six position switch gives the following approximate band-widths for 6 dbs· attenuation.

Sharp	1 Kc/s
2	1·4 Kc/s
3	1·6 Kc/s
4	1·8 Kc/s
5	2 Kc/s
Broad	12—25 Kc/s

On Frequency Ranges A to F the receiver operates as a double superhet in the first five positions of selectivity, but in the " Broad " position it is a single superhet with an intermediate frequency of 2 Mc/s.

On Frequency Range G the receiver operates as a single superhet with an intermediate frequency of 110 Kc/s, and the " Broad " position of selectivity is inoperative on this band.

(*l*) **B.F.O. On/Off and Pitch Control.**

When the Beat Frequency Oscillator is switched on, by rotating the dial in a clockwise direction, A.V.C. is automatically switched off and the signal meter comes into circuit.

The B.F.O. does not operate with selectivity switched to the " BROAD " position.

(*m*) **H.T. Current Meter.**

This meter records the total H.T. consumption of the set. It should read 100 milliamps. under no signal conditions with A.V.C. off, and maximum R.F. and I.F. sensitivity.

If, under operating conditions, the reading should fall below 65 M.A. or rise above 125 M.A. switch off the set as soon as possible and report the matter (*see paragraph* (*p*) *below*).

(*n*) **Signal Meter.**

This meter comes into circuit when the A.V.C. is switched off or the B.F.O. is switched on.

The scale, calibrated in microvolts input, is arbitrary and is intended to give a comparison between the field strengths of weak or medium signals.

(*p*) **Power On/Off Switch.**

This switch controls only the H.T. and the pilot lamp. Heater voltage should be switched off by use of the main switch on the Supply Unit Rectifier No. 8.

On Mark III and Mark III* sets this switch does not disconnect the H.T. supply to *the output valve, nor does it control the pilot lamp. With the switch in the* "OFF" position, therefore, the H.T. current meter will read approximately 50 M.A.

(*q*) **Noise Silencer, On/Off Switch.**

The noise silencer will limit intermittent peak noise when this exceeds the general level of the received signal.

(*r*) **Switch for A.V.C. On/Off and Signal Meter Off/On.**

(*s*) **Phone Jack Escutcheon.**

Two sockets provide parallel outputs for H.R. phones.
One socket *provides* a *line output* at *600 ohms.*

3. OPERATING THE RECEIVER.

(*a*) **Recommended aerial arrangements.**

(i) On A, B or C bands use a dipole aerial resonated to the required frequency and matched through a 75 ohms line to the 75 ohms aerial terminals.

(ii) On D, E, F or G bands use a directional Rhombic aerial terminated at 600 ohms.

(b) **R.F. Overloading.**

R.F. overloading will cause cross-modulation and the consequent spurious whistles. When the received signal is powerful enough to cause overloading despite correct adjustment of the receiver controls (See *paragraph* 2(e)), steps should be taken to attenuate the aerial input.

(*c*) **Signal Handling Capacity.**

The receiver is not designed for signal inputs much in excess of 10 millivolts, but it is capable of handling approximately 1 volt without serious cross modulation if correctly adjusted.

(d) Obtaining the Optimum Signal to Noise Ratio with Maximum Intelligibility.

(i) Telegraphy.

Always use the optimum R.F. and minimum practical I.F. sensitivity, utilising the volume control to obtain the required output level.

If the required signal is adjacent to a more powerful signal, it may be necessary to avoid cross modulation by decreasing R.F. sensitivity. The requisite sensitivity may then be produced by judicious use of the regeneration control.

Use maximum selectivity unless searching.

(ii) Telephony.

The adjustments described in the above paragraph apply also to the reception of weak telephony signals with the exception that the selectivity and tone controls can be varied to increase intelligibility. When a powerful adjacent signal is present A.V.C., should be switched off, and the R.F. sensitivity reduced to counter any cross modulation that occurs.

On powerful telephony signals the I.F. sensitivity should be set at maximum so that the A.V.C. system is in full operation.

(e) R.F. Regeneration.

In general the use of this control should be limited to the high frequency bands when it will effectively perform two main functions ; (i) increase the gain of the R.F. amplifier and (ii) increase the selectivity of the R.F. tuned circuits.

(i) On A, B and C Bands careful application of regeneration will improve the signal/noise ratio of very weak signals. Furthermore, if a telephony signal is prone to serious fading, regeneration will afford some improvement through the greater A.V.C. action resulting from the increased R.F. gain.

(ii) The advantages of increasing the R.F. selectivity are two-fold, reduction of cross modulation and improvement of image rejection ratio at the higher frequencies. This latter point applies also to " G " Band where the intermediate frequency is 110 Kc/s.

Regeneration must always be applied in conjunction with the R.F. trimmer, which should be rocked as regeneration is increased and left in the position of maximum gain. The control setting should be checked to make sure that regeneration has not been increased beyond the point of oscillation.

(f) Single Signal Selectivity (Rejection of an interfering signal on Telegraphy).

To obtain the greatest attenuation of an interfering signal the B.F.O. pitch control should be adjusted to the highest beat note consistent with comfortable reception ; if the interfering signal persists, the B.F.O. pitch should be adjusted to the opposite side of the carrier. For example, an interfering signal which is present with the B.F.O. pitch set at + 3 Kc/s should be eliminated when the pitch is readjusted to — 3 Kc/s.

(g) The use of Variable Selectivity in Searching.

When searching it is advisable to switch selectivity to position 5, where the bandwidth is approximately 2 Kc/s. This will cover several channels of telegraphy simultaneously and therefore reduce the possibility of missing the required signal.

(h) Frequency Stability, Calibration and Resetting Accuracy.

(i) Electrical Stability.

The total drift, which does not exceed 1,500 c.p.s. at 6 Mc/s, occurs within twenty minutes of the receiver being switched on. The power ON/OFF switch controls H.T. only, so that if the set is switched off for short periods no further time is needed for warming up.

(ii) Mechanical Stability and Resetting Accuracy.

The main tuning dial is manufactured with a maximum tolerance of two degrees of backlash and allowance should be made for this when logging.

It is advisable to take readings with the dial rotated always from the same direction, and in these circumstances the resetting accuracy will be approximately 100 c.p.s. at 5 Mc/s.

Backlash between the pinion and gear driving the turret may cause a small resetting error at the highest frequencies of operation, but this error should never exceed one degree on the mechanical bandspread scale.

(iii) Calibration.

The direct reading scale is accurate within ± 1 per cent. in frequency.

4. DON'TS.

DON'T use regeneration without using the R.F. trimmer in conjunction with it.

DON'T forget to return regeneration control to zero when it is not in use.

DON'T lean or roll the receiver over on its face. The protection bars provided will enable the set to be stood on its face, but care must be taken that the R.F. trimmer and vernier knobs are not damaged when so doing.

DON'T spin the tuning dial as though it were a flywheel. It is more delicate than it looks.

DON'T switch receiver off by the power switch for long periods and forget to switch off the power supply unit. You will be imposing unnecessary wear on the valves and might damage the power unit itself.

DON'T be deceived by the size and weight of the receiver. It is a delicate instrument and should be treated as such.

CHAPTER III.

OPERATORS' ROUTINE MAINTENANCE.

DAILY AND WEEKLY MAINTENANCE.

In general very little maintenance work should be required of the operator other than that detailed below :—

(*a*) Ensure that the aerial and earth terminals are clean and continue to make good contact. A dirty aerial contact can cause serious apparent loss of sensitivity.

(*b*) Occasionally it may be necessary to drop a little oil on the spindle of the R.F. trimmer and the locating ring under the frequency range selector handle.

(*c*) Examine the headphones, jack plugs and sockets regularly. These should be kept clean to ensure good contact.

(*d*) Keep the receiver clean and dry.

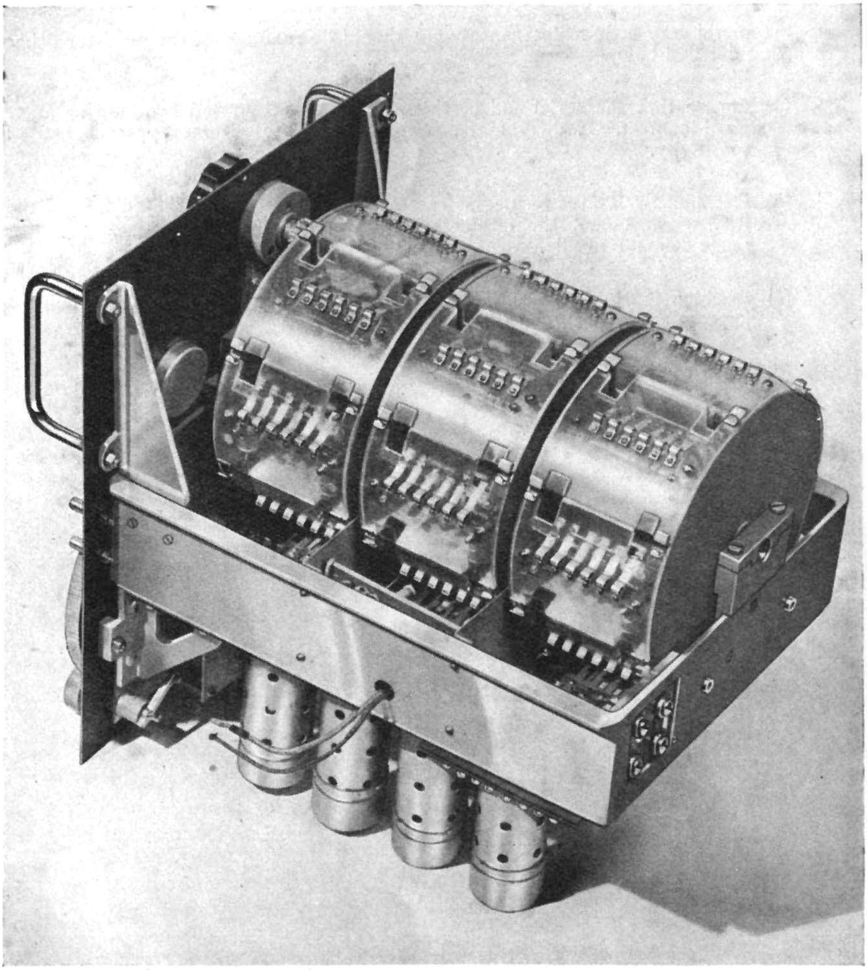


Fig. 2. THE R.F. CHASSIS.

PART II.

For the information of Skilled Personnel only.

CHAPTER IV.

TECHNICAL DESCRIPTION.

1. CONSTRUCTION.

The reception set DST.100 is constructed upon two chassis, R.F. and I.F./A.F., both of which are arranged to slide into a single steel case.

Considerable attention has been paid to the needs of the servicing mechanic for accessibility of components and simplicity of layout. The top, bottom, rear and side panels of the case are all removable and it is thereby possible to effect most repairs without separating the two chassis or removing them from the case.

The R.F. coil switching is accomplished by means of a rotating turret. The coils are mounted on polystyrene platforms which clip into the turret, so that they can be examined or replaced without the use of soldering iron or other tools.

The I.F. transformers and the B.F.O. coil are fitted with International octal valve bases and locating keys. They are plugged into standard octal valve holders and can be replaced without difficulty.

Under-chassis components have been made as accessible as the electrical requirements of the circuit permit.

2. CIRCUIT DESCRIPTION.

BLOCK CIRCUIT DIAGRAMS.

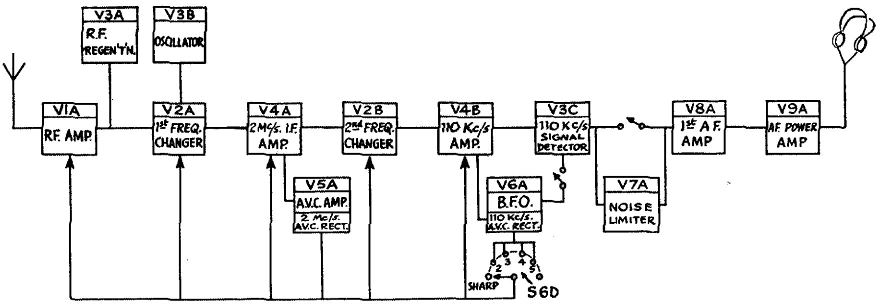


Fig. 3. (a) Wavebands A to F. Selectivity positions "SHARP" to 5.

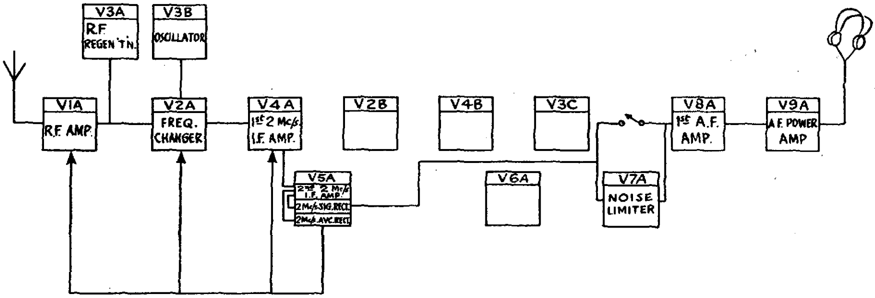


Fig. 3. (*b*) Wavebands A to F. Selectivity position " BROAD."

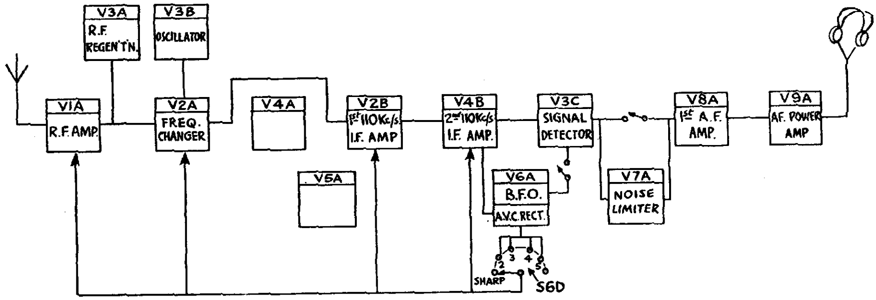


Fig. 3. (c) Waveband G. Selectivity positions " SHARP " to 5.

The receiver embodies a double superheterodyne circuit with intermediate frequencies of 2 Mc/s and 110 Kc/s and covers a continuous tuning range between 30 Mc/s and 50 Kc/s.

For simplicity of description the various stages of the receiver may be grouped under six principal headings, as follows :—

(*a*) R.F. circuits and first frequency changer.

(*b*) 2 Mc/s I.F. amplifier, second frequency changer, and branch 2 Mc/s channel to the audio stage.

(*c*) 110 Kc/s I.F amplifier.

(*d*) A.V.C. system.

(*e*) Signal detector and associated circuits.

(*f*) Audio frequency amplifier.

(A) R.F. Circuits and First Frequency Changer.

(i) **Aerial Coils.** On Mark II sets the aerial coils are wound with 600 and 75 ohms primaries, except in the cases of "A" and "B" bands where the 600 ohms winding is omitted. Provision is made for the use of double or single ended aerials at either of these impedances.

On Mark III and Mark III* sets there are no separate primary windings on the aerial coils. The coils are tapped and provision is made for single-ended or dipole aerials of 75 to 600 ohms impedance. (*See Circuit Diagram, Fig.* 1b). It should be noted that Mark II coils are not interchangeable with Mark III and Mark III* types.

A pentode R.F. amplifier (V1A) is employed in a tuned grid-tuned anode circuit with its gain controlled by both A.V.C. and a variable cathode bias potentiometer, manually controlled from the panel (VR1A : R.F. Sensitivity Control).

(ii) **R.F. Regeneration.** The maximum gain of this stage is increased by the introduction of variable regeneration applied through a separate triode (V3A), which operates in a Hartley oscillator circuit with its cathode reaction coil coupled to the tuned anode coil of the R.F. amplifier. The extent of regeneration is controlled by varying the H.T. volts applied to the triode anode.

(*iii*) **R.F. Trimmer.** The manual trimmer across the tuned anode coil ensures that the latter can be resonated with the other R.F. circuits at all frequencies and with any degree of regeneration. This is made necessary by the variations which occur in the inter-electrode capacities of valves to which variable regeneration is applied.

(iv) **First Frequency Changer.** On Mk. II Sets a Triode Hexode (V2A) is used as the first frequency changer in conjunction with a separate triode oscillator of the Hartley type (V3B). The frequency changer normally converts to the first intermediate frequency of 2 Mc/s, but on "G" band, with the receiver operating as a single superheterodyne, the frequency changer converts the signal frequencies direct to 110 Kc/s. This is further explained in paragraph 2(c).

V2A is fed direct from the anode of the R.F. amplifier through a small grid condenser and its gain is controlled by A.V.C. The heterodyne voltage developed by the oscillator (V3B) is fed into the injection grid of the frequency changer (V2A).

Reference to the circuit diagram will show that the Mark III and Mark III* sets employ a different oscillator system in which the injection grid of the frequency changer is fed from the anode of the triode oscillator.

(v) **Electrical Bandspread.** A small manual trimmer across the oscillator section of the ganged tuning condenser provides a degree of electrical bandspread intended for use only at the higher frequencies of operation.

(B) 2 Mc/s I.F. Amplifier, Second Frequency Changer and Branch 2 Mc/s channel to the audio stage.

The signal from the anode of the first frequency changer is fed through a 2 Mc/s I.F. transformer (I.F.T.1) into a pentode amplifier (V4A), whose output is fed through a second transformer (I.F.T.2) to both a triode hexode second frequency changer (V2B) and the pentode section of a double diode pentode (V5A). In the anode circuit of V5A is a third 2 Mc/s transformer (I.F.T.3).

In the BROAD position of selectivity, when the receiver is operating as a single superhet with an intermediate frequency of 2 Mc/s, the voltage developed across the secondary of I.F.T.3 is rectified by one of the diodes in V5A and passed to the audio stages through the A.F. selector section of the selectivity switch (S6F and S6G).

On Band G. broad position is not operative, see page 7. (k).

In all other positions of selectivity the 2 Mc/s signal voltage across the secondary of I.F.T.2 is converted to 110 Kc/s by the second frequency changer (V2B) and passed to the 110 Kc/s I.F. amplifier.

The gain of V4A is controlled by both A.V.C. and a variable cathode bias potentiometer (VR3A : I.F. Sensitivity Control) ; V5A and V2B are subject to A.V.C. only.

(C) 110 Kc/s I.F. Amplifier.

The 110 Kc/s signal voltage from V2B is passed through four tuned circuits to a pentode amplifier (V4B), thence through a further four tuned circuits to the 110 Kc/s signal detector. The gain of V4B is manually controlled by cathode bias potentiometer (VR3A) and is subject to A.V.C. Five degrees of selectivity are obtained from this amplifier, the variations being obtained by :—

(i) Negative feedback.

(ii) Staggering the eight tuned circuits to the high and low frequency side by switching in series capacity and inductance respectively.

(iii) Variation of coupling between the tuned circuits.
The degree of negative feedback and bias applied to the amplifying valve is varied in each succeeding selectivity position so that the gain remains approximately constant.

In the SHARP selectivity position a preset degree of regeneration can be applied through the screen of V4B from a reaction winding coupled to its grid circuit. The extent of regeneration is controlled by a potentiometer (VR4A) which, however, is normally set at zero.

When the receiver is operating on " G " band as a single superhet the first frequency changer converts to 110 Kc/s and the signal is fed through separate 110 Kc/s windings in transformers I.F.T.1 and I.F.T.2 to the grid circuit of the second frequency changer, which under these conditions operates as an additional amplifier.

On Bands A to F the 110 Kc/s winding in I.F.T.1 is short-circuited by a relay switch (S2A) whose energising coil is in series with the H.T. line to the 2 Mc/s stages. On G band this H.T. line is disconnected by contacts on the turret and the switch S2A is then opened.

(D) The A.V.C. System.

A.V.C. voltages are provided by both the 2 Mc/s and 110 Kc/s amplifiers and are fed through a common line to control the valves V1A, V2A, V2B, V4A, V4B and V5A. (A.V.C. is not applied to V2A on " A " band.)

The 2 Mc/s system, providing A.V.C. voltage over a broad bandwidth, utilises the second diode in V5A. With selectivity in positions " Sharp," 2, 3, 4 and 5 the 2 Mc/s signal across the secondary of I.F.T.2 is amplified by the pentode section of V5A.

rectified by the diode, and the resulting D.C. potential, delayed by approximately 2 volts, is fed to the common A.V.C. line. With selectivity in the " Broad " position, however, the 110 Kc/s amplifier is out of circuit, and the pentode section of V5A functions as a second I.F. amplifier at 2 Mc/s with its output rectified and fed to the audio stages. Under these latter conditions the A.V.C. component is provided only by the 2 Mc/s stages and is not amplified with respect to the signal voltage.

The 110 Kc/s A.V.C. component is derived from a potential fed from the anode of V4B and rectified by one of the diodes in V6A with the second diode in parallel across the circuit. This A.V.C. system is inoperative on both SHARP and BROAD positions of selectivity. (*See Chapter* V(4).)

(E) Signal Detectors and their associated Circuits.

It will have been noted that there are two signal detectors, the one taking the signal from the branch 2 Mc/s channel for broad bandwidth reception, the other rectifying the signal from the 110 Kc/s selective circuits and in operation on all other bandwidth positions.

The first, a diode in valve V5A has already been described ; the second is a triode negative feedback detector (V3C) which imposes a minimum of damping on the preceding tuned circuit and is capable of handling considerable modulation depth without distortion. The triode section of a double diode triode valve (V6A) is used as a tuned anode variable pitch Beat Frequency Oscillator for 110 Kc/s I.F. ; the beat frequency is injected from the anode of V6A into the grid circuit of the triode detector through a small coupling capacity (twisted wire loop).

The noise silencer consists of a double diode valve (V7A) used in an attenuator network immediately preceding the audio stage. The two diodes themselves constitute the variable impedance automatically controlled by the incoming signal. This circuit is particularly effective in limiting high amplitude noise impulses of short duration.

(F) Audio Frequency Amplifier.

The A.F. amplifier consists of a high impedance triode (V8A) resistance capacity coupled to a 3 watt pentode (V9A) ,whose output is terminated through a transformer at 4,000 ohms and 600 ohms. The tone control, which attenuates bass, is inserted in the coupling between the two valves.

CHAPTER V.

PERFORMANCE FIGURES.

I. SENSITIVITY.

The figures quoted in the following table are typical of an average receiver for an output of 50 milliwatts.

Conditions of test :—

Input from standard signal generator.

Modulation : 400 c.p.s. to depth of 30 per cent.

Output meter : Connected to 4,000 ohms phones socket.

Set Receiver Controls :—

R.F. Sensitivity :	Maximum.
Electrical Bandspread :	Zero.
R.F. Trimmer :	Trim to peak for R.F. measurements.
Regeneration :	Zero.
Tone :	Maximum bass.
Selectivity :	Sharp.
B.F.O. :	Off.
Noise Silencer :	Off.
A.V.C. :	Off.
I.F. Sensitivity : Volume :	Use as directed in " Remarks " column of tables.

Section.	Input in Microvolts		Frequency.	Input to	Remarks.
	Mk. II Sets.	Mk. III & III* Sets.			
2nd I.F.	6,000	10,000	110 Kc/s.	Grid of V4B.	Volume and I.F. Sensitivity controls at maximum.
	1,500	1,500	110 Kc/s.	Grid of V2B.	Output from generator direct to grid of valve and ground. Disconnect receiver grid lead from valve grid cap when injecting test signal.
	90	70	110 Kc/s.	Grid of V2A.	Remove first oscillator valve V3B and switch turret to " G " band when taking measurements from V2A.

Section	Input in Microvolts		Frequency	Input to	Remarks
	Mk. II Sets	Mk. III & III* Sets.			
1st I.F.	3,000	6,000	2 Mc/s.	Grid of V2B.	Volume and I.F. sensitivity controls at maximum.
	60	120	2 Mc/s.	Grid of V4A.	Output of generator direct to grid of valve and ground. Disconnect receiver grid lead from valve grid cap when injecting test signal.
	2	4	2 Mc/s.	Grid of V2A. (Sel. SHARP).	Remove first oscillator valve V3B when taking measurement from V2A.
	10	15	2 Mc/s.	Grid of V2A. (Sel. BROAD).	Turret on any band except "G."
R.F.	2	2	A and B Bands. All frequencies.	Aerial terminal.	Output from generator direct between aerial terminal and chassis.
	1	1	C, D and E Bands. All frequencies.	Primaries selected to 75 ohms open aerial connection on panel.	On some bands it may be found necessary to decrease R.F. sensitivity slightly to obtain maximum output. This would be due to the output of the R.F. amplifier overloading the first frequency changer.
	1·5	1·5	F Band. All frequencies.		Adjust output to 50 milliwatts by first decreasing I.F. sensitivity to minimum, and thereafter setting volume control to give required output. Only increase I.F. sensitivity if output is below 50 milliwatts with volume control at maximum.
	2·5	2·5	G Band. All frequencies.		

Quoted input figures should give signal/noise ratio of 20 dbs. when modulation of test signal is switched off.

NOTE : When taking Signal/Noise measure- ments above 2 Mc/s it should be remembered that with most Signal Generators a slight shift of carrier occurs when modulation is switched off. Correction should be made by tuning the receiver to the centre of the carrier, using the vernier tuning control only.

2. SELECTIVITY.

The following table gives the average overall bandwidth for the six positions of the selectivity switch :—

Atten. in dbs.	Selectivity in Kc/s.	
	SHARP.	Pos. 5.
6	1·0	2·0
10	1·6	3·0
20	2·15	6·0
30	2·75	9·0

In switch positions 2, 3 and 4 the bandwidth is increased in steps between the above figures.

In the BROAD position the bandwidth is approximately 12/25 Kc/s for not more than 6 dbs. attenuation.

3. SECOND CHANNEL RATIO.

The ratio of image to a 1 microvolt signal input is never less than — 42 dbs. and at most frequencies it is greater than — 80 dbs.

4. CHARACTERISTICS OF A.V.C. SYSTEM.

The two A.V.C. systems, the functions of which are explained in Chapter IV (*d*), are in operation as follows :—

	Selectivity	
A, B, C, D, E & F Bands.	SHARP.	2 Mc/s delayed amplified A.V.C. on. 110 Kc/s A.V.C. off.
	2, 3, 4 & 5.	2 Mc/s delayed amplified A.V.C. on. 110 Kc/s A.V.C. on.
	BROAD.	2 Mc/s delayed A.V.C. on (not amplified). 110 Kc/s A.V.C. off.
G Band.	SHARP.	No A.V.C.
	2, 3, 4 & 5.	110 Kc/s A.V.C. on. 2 Mc/s A.V.C. off.

The following test shows the average A.V.C. characteristics with both 110 Kc/s and 2 Mc/s systems in operation.

Conditions of Test :—

Standard signal generator directly connected to 75 ohms aerial terminals.
Test signal of desired frequency (not on " G " Band) modulated 400 c.p.s. to depth of 30 per cent.

Output meter connected to 4,000 ohms phone socket.
Inject 1 microvolt and adjust volume control to 50 milliwatts output level.
Increase signal input in 20 dbs. steps up to 100 dbs. above 1 microvolt.

Set receiver controls :—

Frequency Range :	Desired range (not " G " Band).	B.F.O. :	Off.
R.F. Sensitivity :	Maximum.	Noise Silencer :	Off.
I.F. Sensitivity :	Maximum.	A.V.C. :	On.
Audio Gain :	Adjusted.	Tone :	Max. bass response.
Regeneration :	Off.	Selectivity :	Position 2.

VARIATION IN OUTPUT LEVEL SHOULD NOT EXCEED A MAXIMUM OF 10 dbs., FOR A VARIATION IN INPUT OF 100 dbs. (1 microvolt to 0·1 volt).

CHAPTER VI.

CIRCUIT ALIGNMENT DETAILS.

If it is found necessary to re-align the receiver the following procedure should be adopted.

1. ADJUSTMENT OF 110 Kc/s I.F. TRANSFORMERS. *(See Figs. 7 and 8 for location of trimmers.)*

(*a*) Set receiver controls as follows :—

Frequency Range :	Any Band except " G."
Volume :	Maximum.
I.F. Sensitivity :	Maximum.
Selectivity :	" Sharp " except where otherwise stated.
Tone :	Maximum bass response.
B.F.O. :	Off.
A.V.C. :	Off.
Noise Silencer :	Off.
Regeneration (R.F.) :	Off.

(*b*) Connect output meter to " Phones " socket, matching to 4,000 ohms.

Generator must provide test signal of 110 Kc/s, amplitude modulated 30 per cent. at 400 c.p.s. The carrier frequency must be kept within a maximum tolerance of ± 0·3 per cent.

It is advisable to use a test signal of the lowest workable amplitude.

(*c*) Inject test signal into the grid of V4B.

Adjust trimmers, VC6M, VC6L, VC6K and VC6J in that order for maximum deflection of the output meter.

(*d*) Set VR4A (I.F. regeneration potentiometer) to zero, i.e., full anti-clockwise rotation.

Inject test signal into hexode control grid of V2B.

Adjust trimmers VC6H, VC6G, VC5F and VC6E in that order for maximum deflection.

Readjust all the above trimmers in the order VC6M, VC6E, VC6L, VC6F, VC6K, VC6G, VC6J and VC6H, and repeat until no further improvement is possible.

(e) Inject test signal into hexode control grid of V2A.

Switch turret control to " G " band.

Adjust trimmers VC6D/VC6C and VC6B/VC6A for maximum deflection. These double trimmers should be so adjusted that the capacity is shared about equally between the two sections to ensure maximum mechanical stability.

Return turret to any band other than " G."

2. ADJUSTMENT OF SELECTIVITY LOADING COIL (VL1A). *(See Fig. 7 for location of trimmer).*

(*a*) Use a frequency modulated signal to view the response of the 110 Kc/s I.F. amplifier on an oscilloscope. The test signal of 110 Kc/s frequency modulated ±

3 Kc/s should be injected into the hexode control grid of V2B and the oscilloscope connected to the selector arm of the audio frequency switch (S6F).

Switch selectivity control to position 5.

The pattern obtained on the oscilloscope should be made as symmetrical as possible by adjustment of the variable iron core of the loading coil (L26).

(*b*) If an oscilloscope is not available, use instead the output meter connected to the phones socket, and adjust the trimmer of L26 for maximum symmetry of deflection when tuning the generator slowly through the test signal frequency.

3. ADJUSTMENT OF BEAT FREQUENCY OSCILLATOR. (*See Fig.* 8 *for location of trimmer.*)

Inject an unmodulated signal of 110 Kc/s into the hexode control grid of V2B and switch selectivity to the SHARP position.

Switch on B.F.O. and tune to zero on the dial.
Adjust trimmer of L28 to give zero beat with the test signal.

4. ADJUSTMENT OF 2 Mc/s I.F. TRANSFORMERS. (*See Fig.* 7 *for location of trimmers.*)

(*a*) Set controls as in 1(*a*).

(*b*) Use output meter as in 1(*b*).

Generator must provide test signal of 2 Mc/s modulated 30 per cent. at 400 c.p.s., the carrier frequency tolerance being ± 0·3 per cent.

(*c*) Inject test signal into grid of V4A.

Switch to BROAD position of selectivity and adjust trimmers, VC7D, VC7C, VC7F and VC7E in that order for maximum deflection of output meter.

Switch to SHARP position of selectivity and adjust trimmer VC1Z for maximum deflection.

(*d*) Inject test signal into grid of V2A.

Adjust trimmers VC7B, VC7A, VC7D and VC7C in that order for maximum deflection and check trimmer VC1Z.
Switch to BROAD position of selectivity and check trimmers VC7F and VC7E.

5. ADJUSTMENT OF R.F. CIRCUITS. (*See Fig.* 9 *for location of trimmers.*)

(*a*) Check that the calibrated dial and cursor line are set up accurately in relation to the full rotation of the ganged condenser.

(*b*) Set receiver controls as follows :—

Electrical bandspread :	Zero.
R.F. trimmer :	Centre.
R.F. sensitivity :	Maximum.
Selectivity :	Sharp.
B.F.O. :	Off.
Tone :	Maximum bass response.
Regeneration (R.F.) :	Zero.
Noise Silencer :	Off.
A.V.C. :	Off.
Volume : I.F. sensitivity :	Adjusted to give suitable output, always using the lowest workable signal input.

(c) Use output meter connected to phone jack and matched to 4,000 ohms.

Test signal modulated 30 per cent. at 400 c.p.s. and adjusted to the tracking frequencies specified below.

Tracking frequencies for Mark II sets :

A	1	28·0 Mc/s	2	13·0 Mc/s
B	1	11·12 Mc/s	2	5·15 Mc/s
C	1	4·48 Mc/s	2	2·07 Mc/s
D	1	1,810 Kc/s	2	827 Kc/s
E	1	720 Kc/s	2	331 Kc/s
F	1	289 Kc/s	2	132·8 Kc/s
G	1	116 Kc/s	2	53·5 Kc/s

NOTE : On all bands the high frequency tracking points (1) will correspond with a dial setting of 28 Mc/s ; the low frequency tracking points (2) correspond with a dial setting of 13 Mc/s.

Tracking frequencies for Mark III and Mark III* sets :

A	1	30·0 Mc/s	2	12·0 Mc/s
B	1	12·0 Mc/s	2	4·8 Mc/s
C	1	4·8 Mc/s	2	1·9 Mc/s
D	1	1·8 Mc/s	2	780 Kc/s.
E	1	280 Kc/s	2	310 Kc/s
F	1	300 Kc/s	2	126 Kc/s
G	1	126 Kc/s	2	50 Kc/s

Set aerial terminal panel for 75 ohms " Open Antenna " connection.

The test signal should be injected into the aerial terminal through a non-inductive series resistance of a value which, together with the terminating impedance of the signal generator, totals 75 ohms.

(d) **Adjustment of " A " Band.**

Inject test signal of frequency A1.

Set receiver tuning dial exactly to this frequency and adjust trimmer VC1K to approximately half capacity and trimmer VC1L until test signal is heard.

Adjust trimmer VC4A for maximum response, trimmer VC1A to approximately half capacity and trimmer VC1B for maximum response.

Inject signal of frequency A2 and rotate tuning dial until signal is heard. If the dial reading is higher than the signal frequency, the inductance of the oscillator coil must be reduced and this is effected by gently opening out the turns of the coil. If the dial reading is lower than the signal frequency, the oscillator coil inductance must be increased, i.e., the turns gently closed up. These two operations must be carried out with extreme caution as a very small adjustment will cause a considerable change in inductance.

After each adjustment of inductance the trimmers VC1L, VC4A and VC1B must be retrimmed at frequency A1 and this process repeated until correct calibration is achieved.

It is now necessary to check the aerial and R.F. trimmers, VC1B and VC4A at frequency A2. If an increase of capacity (clockwise rotation of trimmer) is needed to obtain resonance, the inductance of the appropriate coil should be increased by gently closing the turns ; if the capacity requires to be decreased the turns should be opened. After each adjustment retrim at frequency A1 and repeat the process until alignment at both frequencies is achieved with one setting of the trimmers.

(e) **Adjustment of " B " Band.**

Inject signal frequency B1 and set tuning dial exactly.

Adjust trimmer VC1N until signal is heard.

Adjust VC4B for maximum response, VC1C to approximately half capacity and VC1D for maximum response.

Inject signal of frequency B2, set dial to this frequency, and adjust VC1M until signal is heard.

Readjust trimmers VC1N, VC4B and VC1D at frequency B1 and continue this process until the calibration of the tuning dial is correct at both frequencies, B1 and B2

(*f*) **Adjustment of " C " Band.**

Inject signal frequency C1 and set tuning dial exactly.

Adjust trimmer VC1Q until signal is heard.

Adjust trimmer VC4C and VC1E for maximum response.

Inject signal frequency C2, set the dial to this frequency, and adjust trimmer VC1P until signal is heard.

Readjust trimmers VC1Q, VC4C and VC1E at frequency C1 and repeat this process until the dial calibration is correct.

(g) **Adjustment of D, E, F and G Bands.**
Proceed as for C band but using frequencies D1 and 2, E1 and 2, F1 and 2, G1 and 2 respectively with appropriate trimmers as shown in Fig. 9.

Reference should be made to the table on pages 18 and 19 to check that the sensitivities at all stages of the receiver conform to the specification.

CHAPTER VII.

FAULT FINDING.

I. FAULT LOCATION AND ANALYSIS, TABLES I to IV.

By removing the top and bottom panels of the case every section of the wiring becomes accessible for testing purposes and the faults should be located before the receiver is further dismantled.

The following tables used in conjunction with the circuit diagram and Figs. 10 to 17 inclusive, will serve as a guide to the location of faults.

TABLE I.

POSSIBLE FAULTS : SYMPTOMS AND REMEDIES.

Symptom.	Possible Fault.	Remedy.
Low H.T. current indicated on M/A meter; or No current indicated.		
(1) Pilot lamp alight.	(*a*) Faulty on/off switch (H.T.)	Replace switch.
	(*b*) Faulty meter.	Replace meter.
	(*c*) Faulty valves.	Check valves.
	(*d*) Faulty H.T. supply or bad connection through socket.	Check H.T. volts from power pack and coupling leads.
(2) Pilot lamp out.	(*a*) Faulty L.T. supply or bad connection through socket.	Check L.T. volts from power pack and coupling leads.
Receiver " dead." H.T. current normal.	(*a*) Faulty phone socket.	Try second socket.
	(*b*) Faulty phones or plug.	Check phones and leads.
	(*c*) Faulty output transformer.	Check windings for continuity or short circuit. Replace transformer if necessary.
Receiver " alive," but signals weak or unobtainable.	(*a*) Aerial disconnected.	Reconnect.
	(*b*) Aerial connected incorrectly.	Check with diagram at back of receiver.
	(c) Turret contacts faulty.	Check turret contacts in oscillator section.
	(*d*) Valves in R.F. chassis faulty.	Replace valves where necessary.
	(*e*) Open or short circuit in oscillator section.	Check in conjunction with voltage and resistance, Table II.
	(*f*) Faulty coils.	Check for continuity and short circuit between primary and secondary. Check contacts
[Receiver " dead " on " G " band.	(*a*) Faulty turret contacts.	Check contacts and clean if necessary.
	(*b*) Faulty relay.	Check that contact is open.
	(*c*) Faulty link windings in IFT1 or IFT2.	Check windings for continuity using Table III.
[No regeneration.	(*a*) Faulty valve.	Replace V3A.
	(*b*) Faulty R.F. coil primary.	Test for continuity.
	(*c*) Faulty potentiometer.	Check resistance and connections.

TABLE I—*continued*

Symptom.	Possible Fault.	Remedy.
Electrical bandspread control or R.F. trimmer not working.	(*a*) Cord drive broken.	Replace cord as shown in Fig. 4.
Noise silencer not working.	(*a*) Faulty valve. (*b*) Faulty switch. (*c*) Short or open circuit in wiring.	Replace V7A. Replace switch. Check using Table II.
B.F.O. not working.	(*a*) No H.T. to valve. (*b*) Faulty valve. (*c*) Faulty coil. (*d*) Short circuit in screened leads.	Check switch and H.T. supply to anode of V6A. Replace V6A. Check for continuity, using Table III. Test insulation in screened leads.
B.F.O. working but " popping " noise breaking through.	(*a*) Faulty valve.	Replace V6A.
Motor boating.	(*a*) Faulty H.T. decoupling condenser.	Check all H.T. decoupling circuits by connecting a 0·1 μF condenser in parallel with each decoupling condenser in turn. Replace faulty condensers.
Receiver " dead " in BROAD position of selectivity, but working in other positions.	(*a*) Faulty switch. (*b*) Faulty I.F. transformer. (*c*) Faulty valve.	Check S6F and S6G. Check IFT3 for continuity, using Table III. Replace V5A.
Receiver working on BROAD position but " dead " in other positions.	(*a*) Faulty switch. (*b*) Faulty I.F. transformer. (*c*) Faulty valve. (*d*) Faulty second mixer Osillator assembly.	Check S6A to S6G, using Table IV. Check IFT 4, 5, 6 and 7, using Table III. Replace V2B and/or V4A, and/or V3C. Change sub-assembly unit.
Signal meter not working.	(*a*) Faulty meter. (*b*) Faulty switch. (*c*) Faulty A.V.C. line.	Replace meter. Replace switch. Check V5A and V6A. Test for resistance between A.V.C. line and chassis with signal meter and B.F.O. off. The resistance should be approximately 250,000 ohms on frequency range " A."

N.B.—Before measuring resistance across the A.V.C. line, short circuit the signal meter to avoid damage being caused by application of voltage from the test apparatus.

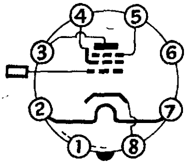
TABLE I—*continued.*

Symptom.	Possible Fault.	Remedy.
Distortion of loud signals.	(*a*) Faulty A.V.C.	Check resistance between A.V.C. line and earth.
	(*b*) Faulty A.V.C. diode rectifiers.	Replace V6A and/or V5A.
	(*c*) S.C. in signal meter switch.	Replace switch.
	(*d*) Faulty volume control.	Replace potentiometer (VR5A).
	(e) Faulty valves.	Replace V7A and/or V8A and/or V9A.
Signals weak.	(*a*) Valve or valves faulty.	Check valves and replace where necessary.
R.F. instability.	(*a*) Faulty 0·1 decoupling condenser on cathode or screen of V1A.	Replace condenser.
	(*b*) Faulty electrolytic condenser across R.F. sensitivity control.	Replace condenser
	(*c*) Potentiometer open circuit.	Replace potentiometer (VR1A).
I.F. instability.	(*a*) Faulty contact to metalizing of valves.	Replace V4A and/or V4B.
	(*b*) Faulty electrolytic across I.F. sensitivity control.	Replace condenser
	(*c*) Potentiometer open circuit.	Replace potentiometer (VR3A).
	(*d*) Reaction potentiometer faulty.	Replace potentiometer (VR4A).
L.F. instability.	(*a*) Faulty electrolytic condenser.	Check condensers C5B, C5C, C14B, C21A.
	(*b*) Faulty condenser between anode of V9A and earth.	Replace condenser.

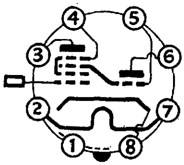
TABLE II.

VALVE VOLTAGES & POINT TO POINT RESISTANCE CHECK.

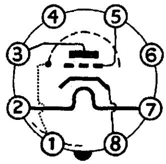
V1A CV21



V2A ARTH2



V3A 6J5G



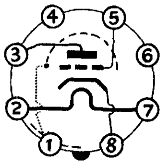
Pin	V1A CV21	Volts above Earth	Resistance To	Resistance Ohms	V2A ARTH2	Volts above Earth	Resistance To	Resistance Ohms	V3A 6J5G	Volts above Earth	Resistance To	Resistance Ohms
1	H—	—	CH	S.C.	M	—	CH	S.C.	—		CH	S.C.
2	C	3–15	CH	200–5,200	H+	6·3 A.C.	CH	Less than 1 Ohm	H+	6·3 A.C.	CH	Less than 1 Ohm
3	A	195	H.T.+2	3,000	A	230	H.T.+2	3,000	A	0–160	H.T.+2	10,000–60,000
4	G_2	215	H.T.+2	5,000	G_2	60	H.T.+2	50,000				
5	G_3	—	CH	S.C.	G_0	—	CH	50,200 (50,000)	G	—	CH	500,000
6	M	—	CH	S.C.	A_0	60	H.T.+2	50,000				
7					H—	—	CH	S.C.	H—	—	CH	S.C.
8	H+	4 A.C.	CH	Less than 1 Ohm	C	1·0	CH	200	C		CH	S.C.
Top Cap	G_1	—	CH	750,000	G_1	—	CH	250,000				

NOTE :—Figures in Brackets relate to Mk III and III* sets, when differing from Mk II.

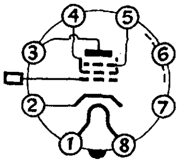
TABLE II—*continued.*

VALVE VOLTAGES & POINT TO POINT RESISTANCE CHECK.

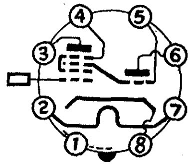
V3B 6J5G



V4A ARP34



V2B ARTH2



Pin	V3B 6J5G				V4A ARP34				V2B ARTH2			
		Volts above Earth	Resistance To	Resistance Ohms		Volts above Earth	Resistance To	Resistance Ohms		Volts above Earth	Resistance To	Resistance Ohms
1	—		CH	S.C.	M	—	CH	S.C.	M	—	CH	S.C.
2	H+	6·3 A.C.	CH	Less than 1 Ohm	H—	—	CH	S.C.	H—	—	CH	S.C.
3	A	135 (*110*)	H.T.+2	15,000	A	205	H.T.+3	3,000	A	225	H.T.+2	3,000
4					G_2	60	H.T.+3	100,000	G_2	70 (45)	H.T.+1	65,000 (140,000)
5	G	—	CH	50,000	G_3	—	CH	S.C.	G^0	—	CH	50,000
6									A_0	80 (85)	H.T.+1 (H.T.+3)	45,000
7	H	—	CH	S.C.	H+	6·3× AC	CH	Less than 1 Ohm	H+	6·3× AC	CH	Less than 1 Ohm
8	C	— (1·5)	CH	S.C. (200)	C	1–11		200–2,000	C	1·8 (1·75)	CH	200
TOP CAP					G_1			100,000	G_1		CH	250,000

Iuput Voltages to Receiver: 250 v. D.C. & 6·3 v. A.C.
All Voltages measured on 400 volt Range of "AVO" Model 7.
All resistances measured with H.T. & L.T. voltages "Off."
Receiver controls :

Frequency Range : "A" — Noise Limiter: Off.
A.V.C. : Off. — B.F.O. On — Selectivity : "Sharp."

CH. = Chassis.
S.C. = Short Circuit.
H.T. + 1 = Unsmoothed H.T. (coloured Red and White.)
H.T. + 2 = Smoothed H.T. (coloured Red).
H.T. + 3 = Switched H.T. to 2 Mc/s Stages (coloured Red & Yellow).

TABLE II—*continued.*

VALVES VOLTAGES & POINT TO POINT RESISTANCE CHECK.

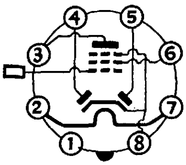
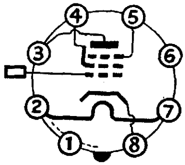
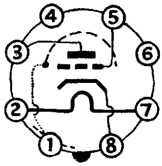
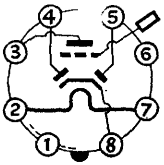
	V5A 6B8G				V4B ARP34				VC3 6J5G			
												
Pin		Volts above Earth	Resistance To	Resistance Ohms		Volts above Chassis	Resistance To	Resistance Ohms		Volts above Chassis	Resistance To	Resistance Ohms
1	—		CH	S.C.	M	—	CH	S.C.	—			
2	H—	—	CH	S.C.	H—	—	CH	S.C.	H+	6.3 A.C.	CH	Less than 1 Ohm
3	A	200	H.T.+3	3,000	A	205	H.T.+2	3,000	A	220	H.T.+2	10,000
4	D_1		CH	250,000	G_2	105	H.T.+2	50,000				
5	D_2		CH	50,000	G_3	—	CH	S.C.	G		CH	12·5
6	G_2	70	H.T.+3	100,000								
7	H+	6·3 A.C.	CH	Less than 1 Ohm	H+	6·3 A.C.	CH	Less than 1 Ohm	H—	—	CH	
8	C	1·25	CH	200	C	1·75—11	CH	190–2000	C	13	CH	100,100
Top Cap	G_1		CH	250,000	G_2	—		600,000				

TABLE II—*continued.*

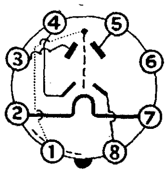
VALVE VOLTAGES & POINT TO POINT RESISTANCE CHECK.

V6A 6R7G



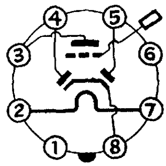
Pin		Volts above Earth	Resistance To	Resistance Ohms
1			CH	S.C.
2	H—	—	CH	S.C.
3	A	145	H.T.+2	25,000
4	D_1		CH	250,000
5	D		CH	S.C.
6				
7	H+	6·3 A.C.	CH	Less than 1 Ohm
8	C		CH	S.C.
Top Cap				

V7A 6H6G



Pin		Volts above Earth	Resistance To	Resistance Ohms
1				
2	H—	—	C.H.	S.C.
3	DA_1	—	C.H.	150,000
4	DC_1	—	C.H.	170,000
5	DA_2	—	C.H.	650,000
6				
7	H+	6·3 A.C.		Less than 1 Ohm
8	DC_2	—		100,000
Top Cap				

V8A 6Q7G



Pin		Volts Above Earth	Resistance To	Resistance Ohms
1				
2	H—	—	CH	S.C.
3	A	65	HT+2	275,000
4	D_1		CH	S.C.
5	D_2		CH	S.C.
6				
7	H+	6·3 A.C.	CH	Less than 1 Ohm
8	C	1·75	CH	6,000
Top Cap	G_1		CH	1,000—176,000

Input Voltages to Receiver : 250 v. D.C. & 6·3 v. A.C.
All Voltages measured on 400 volt Range of "AVO" Model 7.
All Resistances measured with H.T. & L.T. voltages "Off."
Receiver Controls :

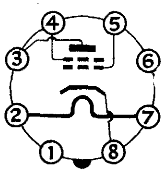
Frequency Range : "A." — Noise Limiter : "Off."
A.V.C. : Off. — B.F.O. : On. — Selectivity : "Sharp."

CH. = Chassis.
S.C. = Short Circuit.
H.T. + 1 = Unsmoothed H.T. (coloured red and white).
H.T. + 2 = Smoothed H.T. (coloured red).
H.T. + 3 = Switched H.T. to 2 Mc/s Stages (coloured Red and Yellow.

TABLE II—*continued.*

VALVE VOLTAGES & POINT TO POINT RESISTANCE CHECK.

V9A 6V6G



Pin		Volts above Earth	Resistance	
			To	Ohms
2				
2	H—	—	CH	S.C.
3	A	230	H.T.+1	500
4	G_2	250	H.T.+1	S.C.
5	G_1		CH	250,000
6				
7	H+	6·3 A.C.	CH	Less than 1 Ohm
8	C	12	CH	270

Input Voltages to Receiver : 250 v. D.C. & 6·3 v. A.C.
All Voltages measured on 400 volt Range of "AVO" Model 7.
All Resistances measured with H.T. and L.T. voltages "Off."
Receiver Controls :

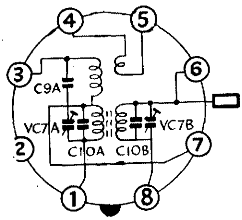
Frequency Range : "A." — Noise Limiter : Off.
A.V.C. : Off. — B.F.O. : On. — Selectivity : "Sharp."

CH. = Chassis.
S.C. = Short Circuit.
H.T.+1 = Unsmoothed H.T. (coloured Red and White).
H.T.+2 = Smoothed H.T. (coloured Red).
H.T.+3 = Switched H.T. to 2 Mc/s Stages (coloured Red and Yellow).

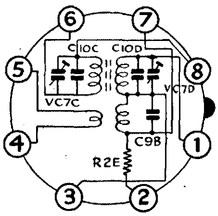
TABLE III.

I.F. TRANSFORMERS & B.F.O. COIL: VOLTAGES & POINT TO POINT RESISTANCE CHECK.

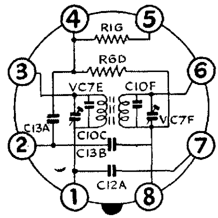
IFT.1



IFT.2



IFT.3



Pin	IFT.1	Volts above Earth	Resistance To	Resistance Ohms	IFT.2	Volts above Earth	Resistance To	Resistance Ohms	IFT.3	Volts above Earth	Resistance To	Resistance Ohms
1	Prim. (hot)	225	H.T.+2	3,000	Sec. (hot)	—	CH	250,000	Prim. (hot)	205	H.T.+3	3,000
2	Earth		CH	S.C.	Earth		CH	S.C.	Earth			
3	Prim. (2 Mc/s) (cold)	225	H.T.+2	3,000	Sec. (2 Mc/s) (cold)		CH	250,000	Prim. (cold)	205	H.T.+3	3,000
4	110 Kc/s Link	—	CH	S.C.	110 Kc/s Link		CH	S.C.	Audio		CH	S.C.
5	110 Kc/s Link	—	CH	Less than 1 Ohm	110 Kc/s Link		CH	Less than 1 Ohm	Audio		CH	200
6	Sec. (hot)	—	CH	100,000	Prim. (hot)	205	H.T.+3	3,000	Sec. (hot)		CH	50,000
7	Prim. (110 Kc/s) (cold)	225	H.T.+2	3,000	Prim. (110 Kc/s) (cold)		CH	250,000	Diode (A.V.C. Rectifier)		CH	250,000
8	Sec. (cold)		CH	100,000	Prim. (cold)	205	H.T.+3	3,000	Sec. (cold)		CH	50,000

Input Voltages to Receiver = 250 v. D.C. and 6·3 v. A.C.

All Voltages measured on 400-volt Range of "AVO" Model 7.

Receiver Controls:
Frequency Range "A" — Noise Limiter : Off.
A.V.C.: Off. — B.F.O.: On. — Selectivity: "Sharp"

CH. = Chassis.

S.C. = Short Circuit.

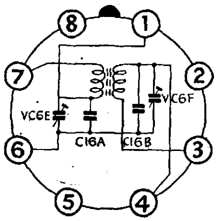
H.T.+2 = Smoothed H.T. (coloured Red).

H.T.+3 = Switched H.T. to 2 Mc/s Stages (coloured Red and Yellow).

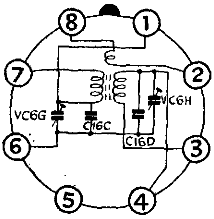
TABLE III—*continued.*

I.F. TRANSFORMERS & B.F.O COIL: VOLTAGES & POINT TO POINT RESISTANCE CHECK.

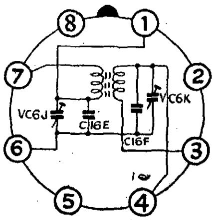
IFT.4



IFT.5



IFT.6

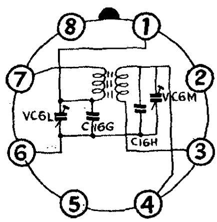


Pin	IFT.4	Volts above Earth	Resistance		IFT.5	Volts above Earth	Resistance		IFT.6	Volts above Earth	Resistance	
			To	Ohms			To	Ohms			To	Ohms
1	Prim. (hot)	225	H.T.+2	3,000	Prim. (hot)		CH	12·5	Prim. (hot)	205	H.T.+2	3,000
2					Reaction Winding	110	H.T.+2	50,000				
3	Sec. (cold)		CH	S.C.	Sec. (cold)		CH	S.C.	Sec. (cold)		CH	S.C.
4	Sec. (hot)		CH	12·5	Sec. (hot)		CH	12·5	Sec. (hot)		CH	12·5
5												
6	Trimmers (cold)		CH	S.C.	Trimmers (cold)		CH	S.C.	Trimmers (cold)		CH	S.C.
7	Prim. (cold)		H.T.+2	3,000	Prim. (cold)		CH	S.C.	Prim. (cold)	205	H.T.+2	3,000
8					Reaction Winding	110	H.T.+2	50,000				

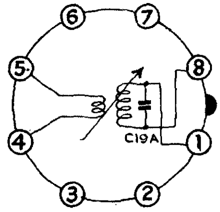
TABLE III—*continued.*

I.F. TRANSFORMERS & B.F.O COIL: VOLTAGES & POINT TO POINT RESISTANCE CHECK.

IFT.7



B.F.O. (L.28)



Pin	IFT.7	Volts above Earth	Resistance To	Resistance Ohms	B.F.O. (L.28)	Volts above Earth	Resistance To	Resistance Ohms
1	Prim. (hot)		C.H.	12 5	Tuned Winding (hot)	140	H.T.+2	25,000
2								
3	Sec. (cold)		C.H.	S.C.				
4	Sec. (hot)		C.H.	12·5	Reaction Winding (hot)		CH	10
5					Reaction Winding (cold)		CH	S.C.
6	Trimmers (cold)		C.H.	S.C.				
7	Prim. (cold)		C.H.	S.C.				
8					Tuned Winding (cold)	140	H.T.+2	25,000

Input Voltages to Receiver = 250 v. D.C. and 6·3 v. A.C.

All Voltages measured on 400-volt Range of "AVO" Model 7

Receiver Controls :

Frequency Range "A." — Noise Limiter : Off.
A.V.C. : Off. B.F.O. : On. Selectivity : "Sharp."

CH. = Chassis.
S.C. = Short Circuit.
H.T.+2 = Smoothed H.T. (coloured Red).
H.T.+3 = Switched H.T. to 2 Mc/s Stages (coloured Red & Yellow)

TABLE IV.

POINT TO POINT CHECK OF RESISTORS IN VARIABLE SELECTIVITY CIRCUITS.

Selectivity Switch Position.	Resitance to Earth in Ohms		
	From Pin No. 3 IFT.4.	From Pin No. 8 V4B.	From Pin No. 3 IFT.6.
SHARP	S.C.	195	S.C.
2	12·5	390	10
3	50	565	25
4	300	700	43
5	6·25	2,800	12·5
BROAD	O.C.	10,000	12·5

I.F. SENSITIVITY AT MAXIMUM.

S.C. = Short Circuit.

O.C. = Open Circuit.

2. VALVE REPLACEMENT.

To replace valves in the I.F. chassis it is necessary to remove the top panel of the receiver. (*See Fig.* 7.)

To replace valves in the R.F. chassis remove the bottom panel of the receiver (See *Fig.* 8.)

3. COLOUR CODE SYSTEM.

(*a*) Chassis Wiring.

The following colour code system is used throughout the chassis wiring :—

Red and White tracer :	H.T.+1 (unsmoothed).
Red :	H.T.+2 (main H.T. line, smoothed).
Red and Yellow tracer :	H.T.+3 (switched H.T. line to 2 Mc/s I.F. stages).
Red and Green tracer :	H.T. supply to R.F. regeneration valve.
Red and Blue tracer :	Valve screens.
Blue	Valve anodes.
Green :	Valve grids.
Brown :	Valve cathodes (not at earth potential).
Yellow :	6·3 v. heaters.
Orange :	4·0 v. heaters.
Black :	Earth.
White :	A.V.C.

(*b*) Chassis Connector.

The flexible connecting cable between the R.F./I.F. chassis is colour coded as follows :—

	—1.	Yellow.	6·3 v. heaters.
	—2.	Blue.	H.T.+3 (switched H.T. line to 2 Mc/s I.F. stages).
	—3.	Red.	H.T.+2 (main H.T. line).
Tag Nos.	—4.	Green.	H.T. supply to R.F. regeneration valve.
(See Fig. 14).	—5.	Grey.	A.V.C.
	—6.	—	—
	—7.	Brown.	4·0 v. heaters.
	—8.	Black.	Earth.

(c) **R.F. and Oscillator Coils.**

The platforms of oscillator coils are marked with three spots, R.F. coils with two spots, and aerial coils with one spot. The colour code is as follows :—

A Band	White.		E Band	Blue.
B ,,	Green.		F ,,	Red.
C ,,	Brown.		G ,,	Black.
D ,,	Yellow.			

This colour code is also shown on the dial cursor.

4. REPLACING R.F. AND OSCILLATOR COILS.

Coils can be removed from the turret by pressing back the spring clips and withdrawing the platform. The various components contained in the coil assemblies are illustrated in Fig. 17.

After replacing a faulty coil, realignment of the appropriate band will be necessary and should be carried out in accordance with the directions given in Chapter 6, paragraph 5.

5. REPLACING I.F. TRANSFORMERS.

All I.F. transformers are of plug-in type and can be readily examined or replaced. They become accessible when the top panel of the receiver is removed. (*See Fig.* 7.) When withdrawing or replacing the transformer cans great care must be taken to avoid fracturing leads from the windings. Realignment instructions are given in Chapter VI, paragraphs I and 4.

6. REPLACING THE B.F.O. COIL.

The B.F.O. coil is of plug-in type and is located on the underside of the I.F./A.F. chassis . (See *Fig.* 8.) Realignment instructions are given in Chapter VI, paragraph 3.

7. SUB-ASSEMBLIES.

The second mixer oscillator and B.F.O. stages are built on sub-assembly units and can be quickly removed in the event of breakdown of components occurring in their respective circuits. (*Figs.* I I(*a*), I I(*b*) *and* 12.)

8. ADJUSTMENT OF MAIN TUNING DRIVE.

If backlash in the main tuning dial should become excessive due to wear, adjustment may be made by tightening the bearing bushes situated at the back of the tuning wheel. By removing the cursor and the calibrated frequency scale (three screws under the centre dome nut) these bearings become accessible . (See *Fig.* 6.)

Care must be taken that the two bearings are adjusted to approximately equal tension and that this tension does not overcome the strength of the springs loading the split gears.

9. REMOVING THE RECEIVER FROM ITS CASE.

If a major repair necessitates the removal of the receiver chassis from the case, proceed as follows :—

(*a*) Disconnect the chassis coupling cable from the tag panel on the R.F. chassis.

(*b*) Disconnect the screened lead from the R.F. chassis to pin No. I on the base of IFTI.

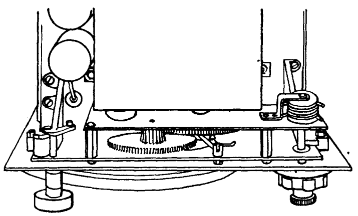
(*c*) Disconnect the blue lead running from the R.F. chassis to the relay in the I.F./A.F. chassis.

(*d*) Remove the four large bolts which lock the chassis to the back panel of the case.

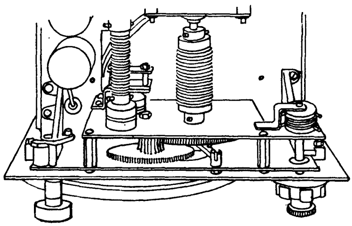
(e) Remove the cheese headed screws holding the front panels to the case and then the chassis can be withdrawn by the protection bars.

Fig 4.

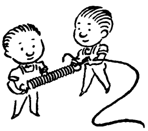
REPLACEMENT OF TRIMMER CORDS.



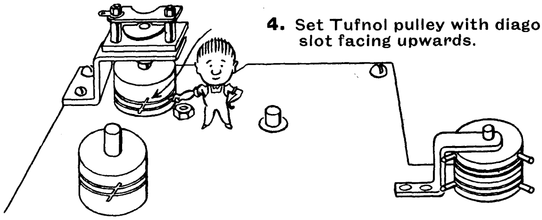
1. Remove R F chassis from case. Stand it upside down on bench.



2. Remove Condenser Cover.

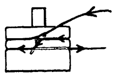


3. Tie spring to one end ofa cord 2 ft. long.

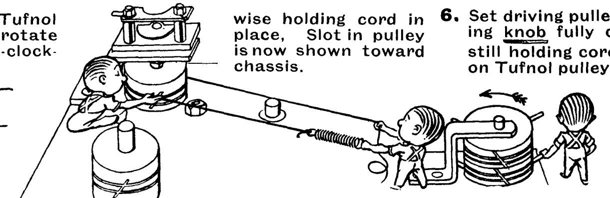


4. Set Tufnol pulley with diagonal slot facing upwards.

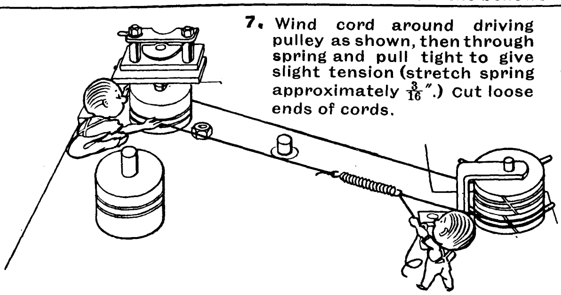
5. Wind cord around Tufnol pulley as shown, and rotate pulley 180°, anti-clockwise holding cord in place, Slot in pulley is now shown toward chassis.



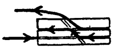
6. Set driving pulley by turning knob fully clockwise, still holding cord in place on Tufnol pulley.



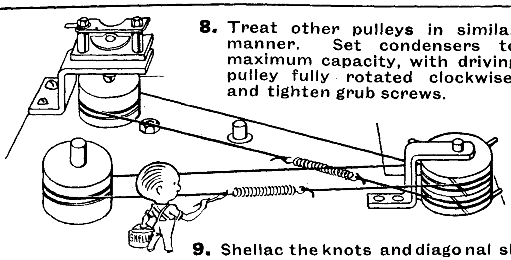
(Keep the spring near its driving pulley, so that in will not foul the bellows coupler.)



7. Wind cord around driving pulley as shown, then through spring and pull tight to give slight tension (stretch spring approximately $\frac{3}{16}$".) Cut loose ends of cords.



8. Treat other pulleys in similar manner. Set condensers to maximum capacity, with driving pulley fully rotated clockwise, and tighten grub screws.



9. Shellac the knots and diagonal slots.

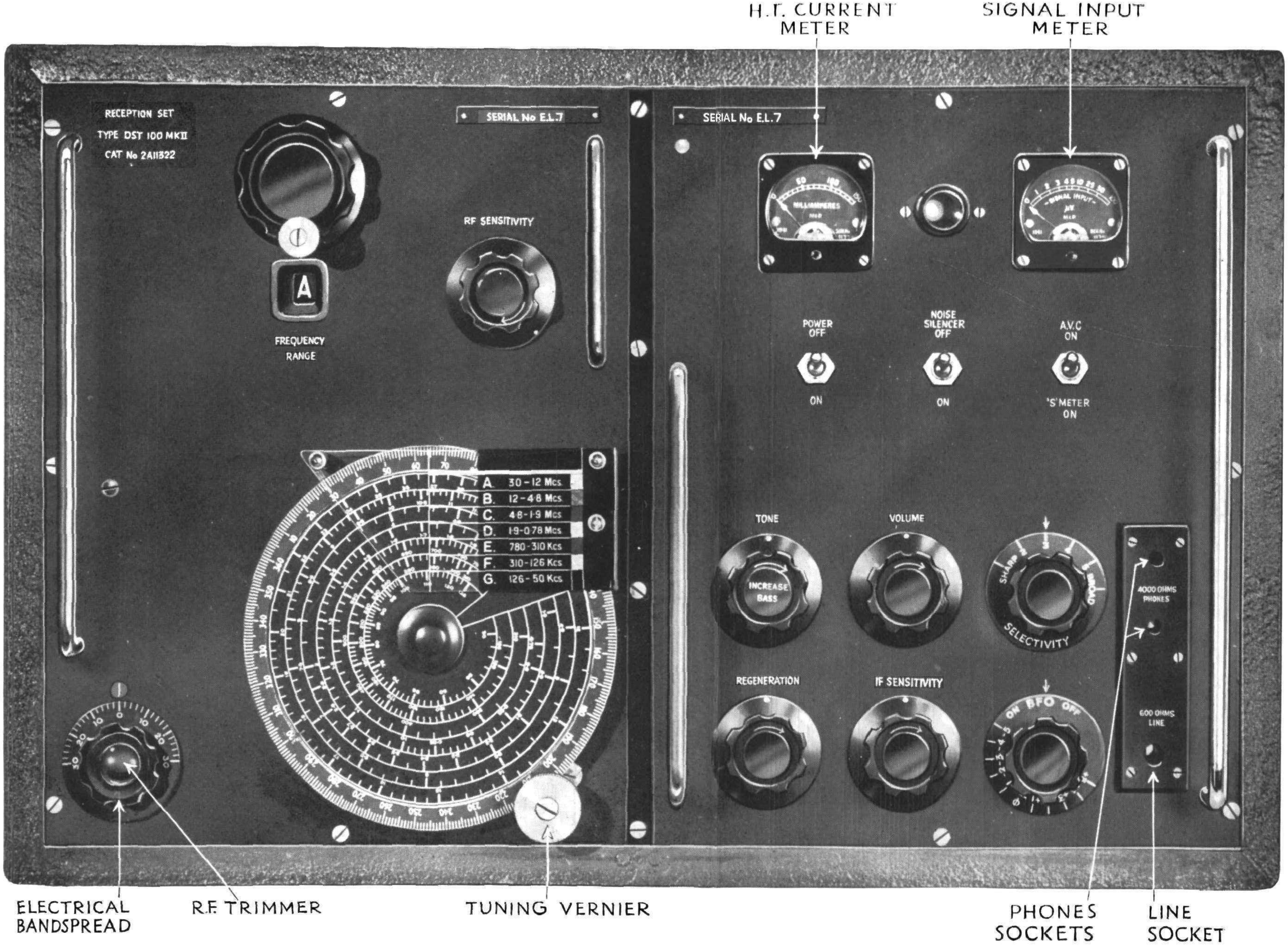
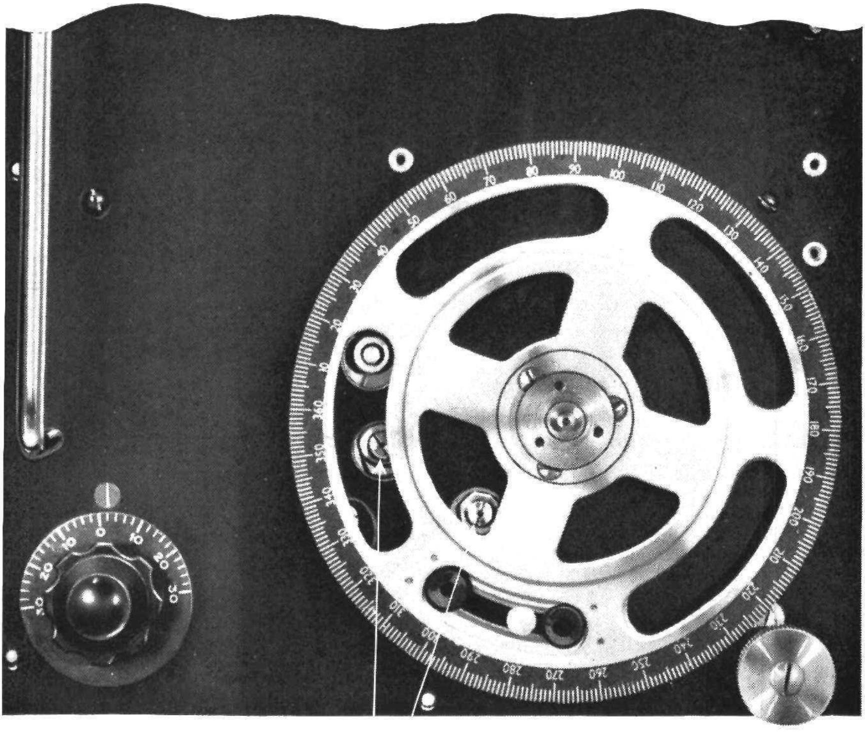


FIG. 5. RECEIVER CONTROL PANEL.



BEARING BUSHES.

FIG: 6. MAIN DIAL WITH FREQUENCY SCALE REMOVED.

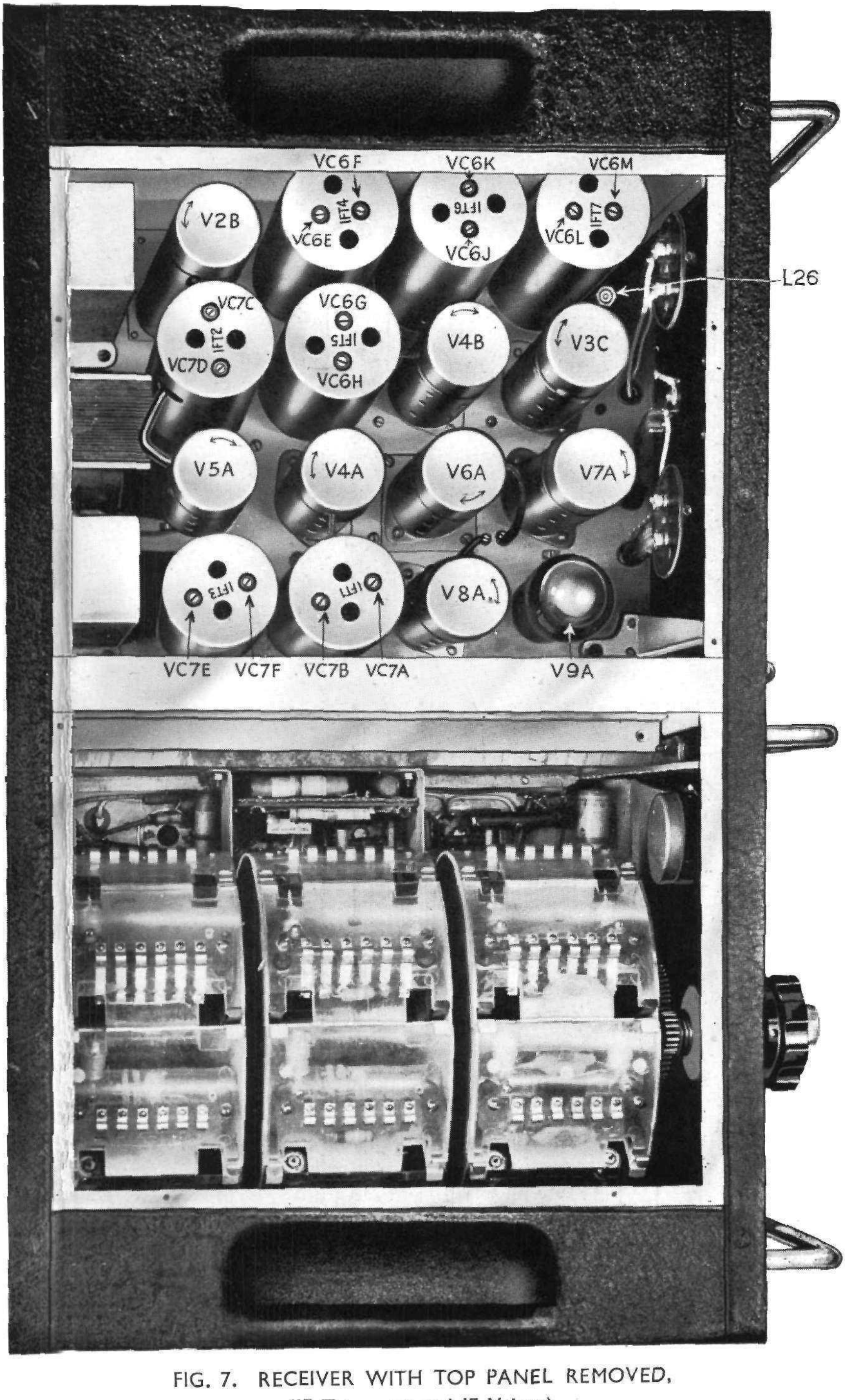


FIG. 7. RECEIVER WITH TOP PANEL REMOVED.
(IF Trimmers and IF Valves).

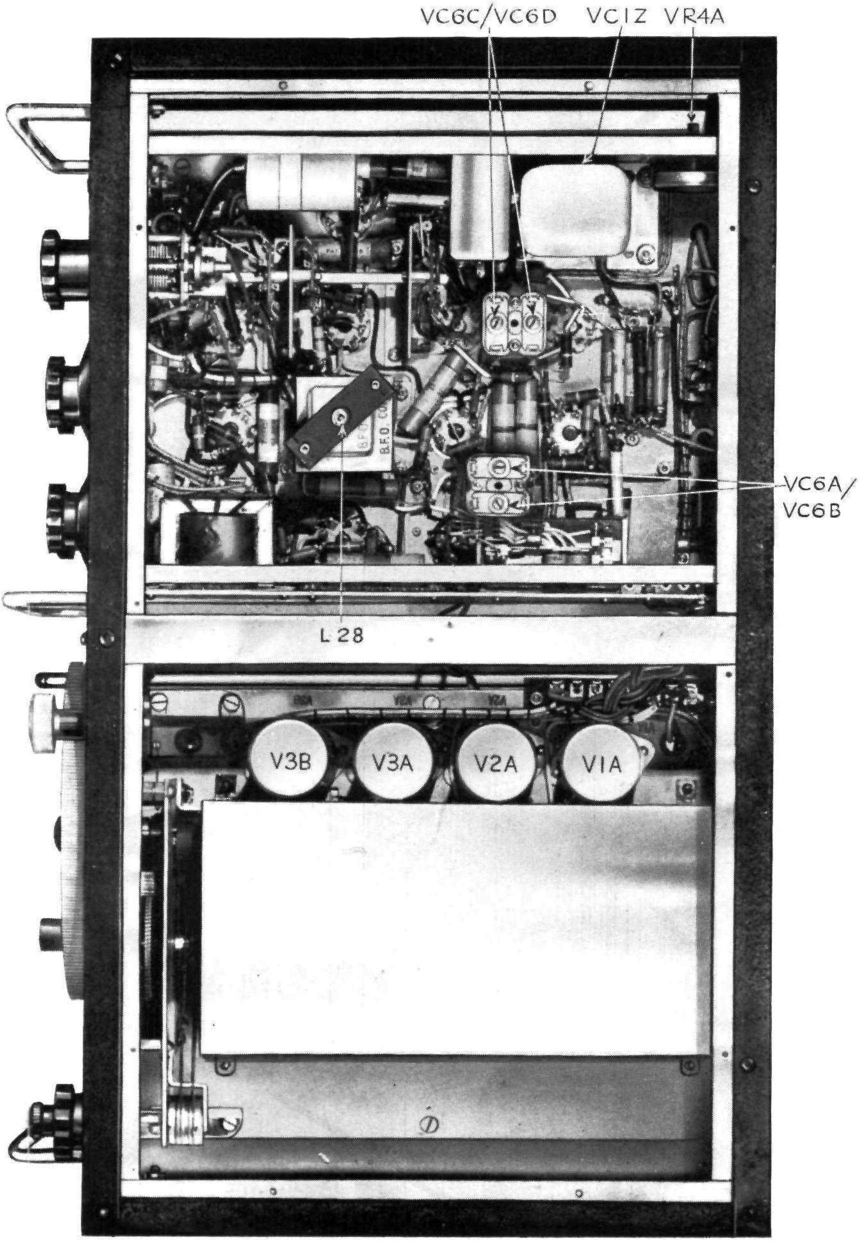


FIG. 8.
RECEIVER WITH BOTTOM PANEL REMOVED.
(IF Trimmers and RF Valves)

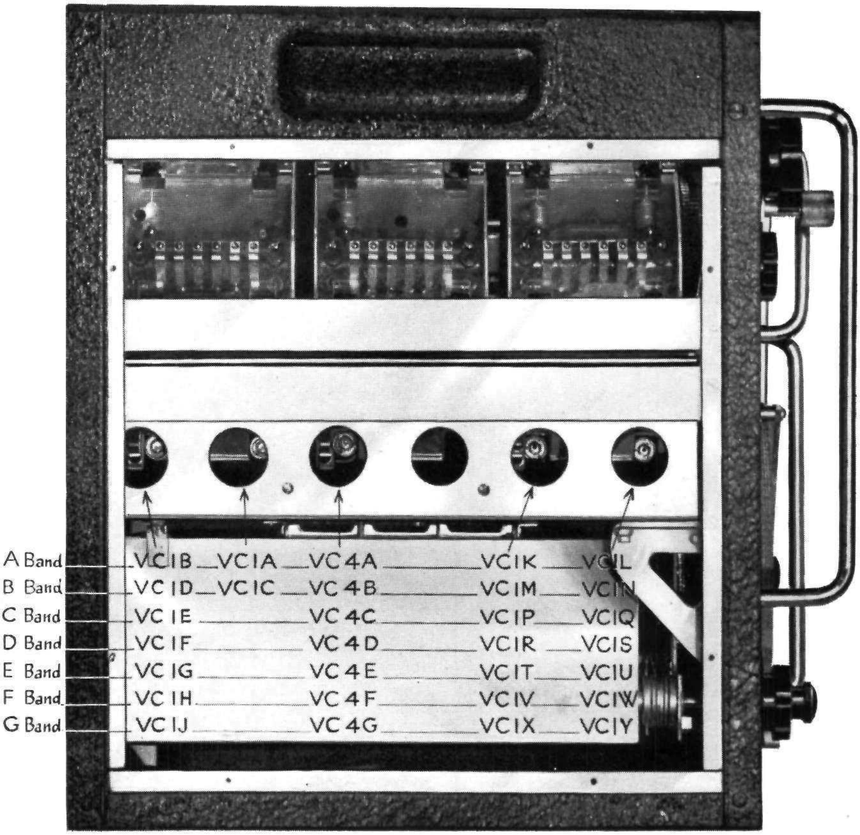


FIG. 9.

RECEIVER WITH LEFT SIDE PANEL REMOVED.

(R.F. Trimmers).

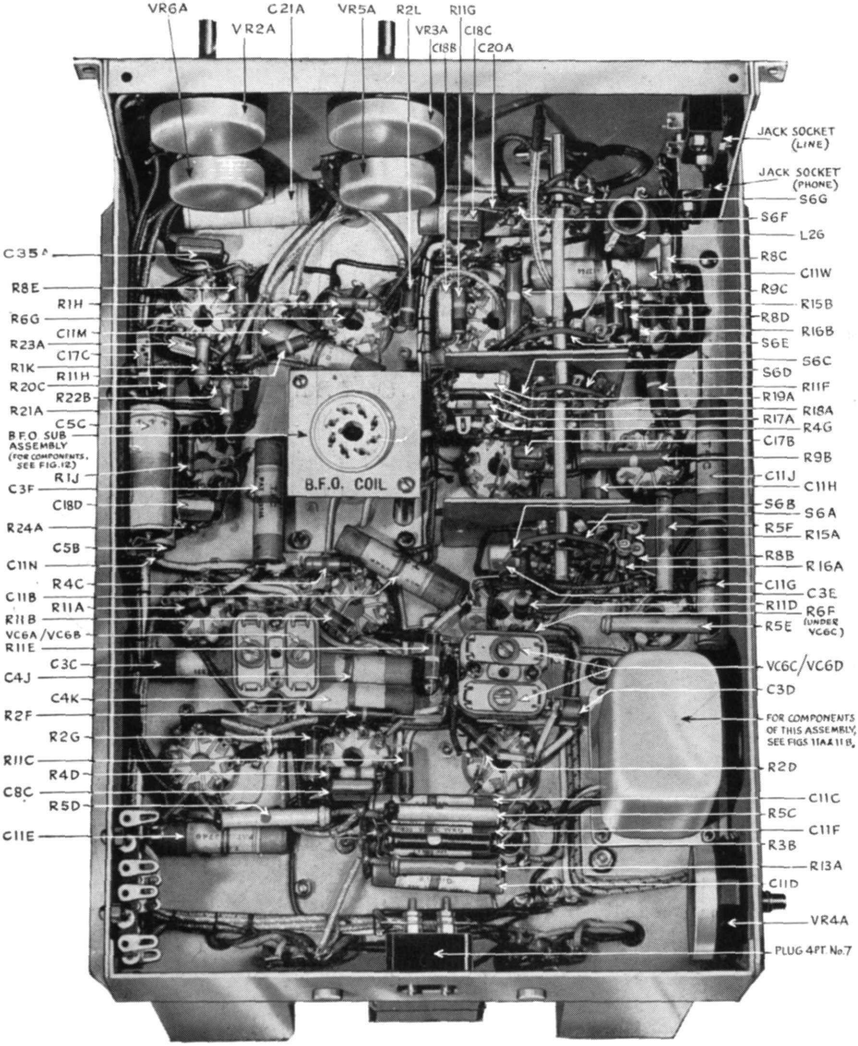


FIG. 10a. BOTTOM VIEW OF I.F. CHASSIS (Partly Assembled)

NOTE.—On Mk III and III* sets R13A is replaced by a 100,000 Ohm. Resistance.

(See Circuit Diagram Fig. 1 (b).

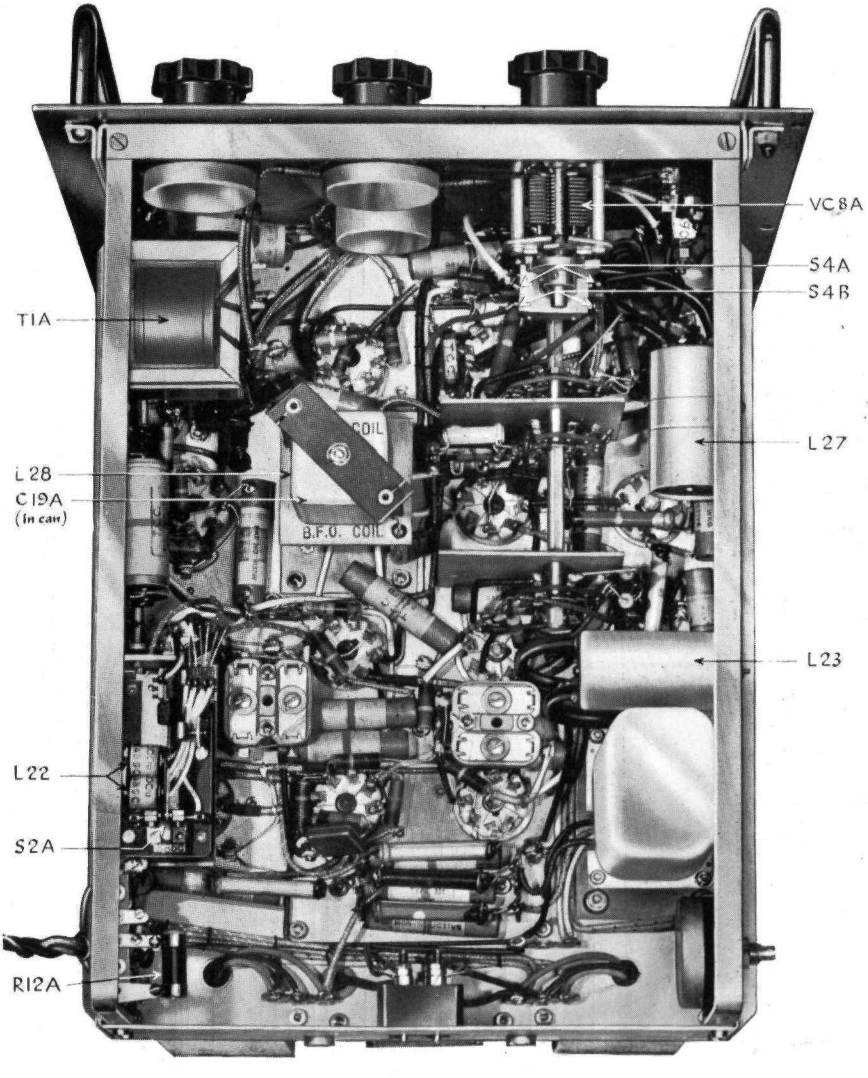


FIG. 10b. BOTTOM VIEW OF I.F. CHASSIS (Completely Assembled)

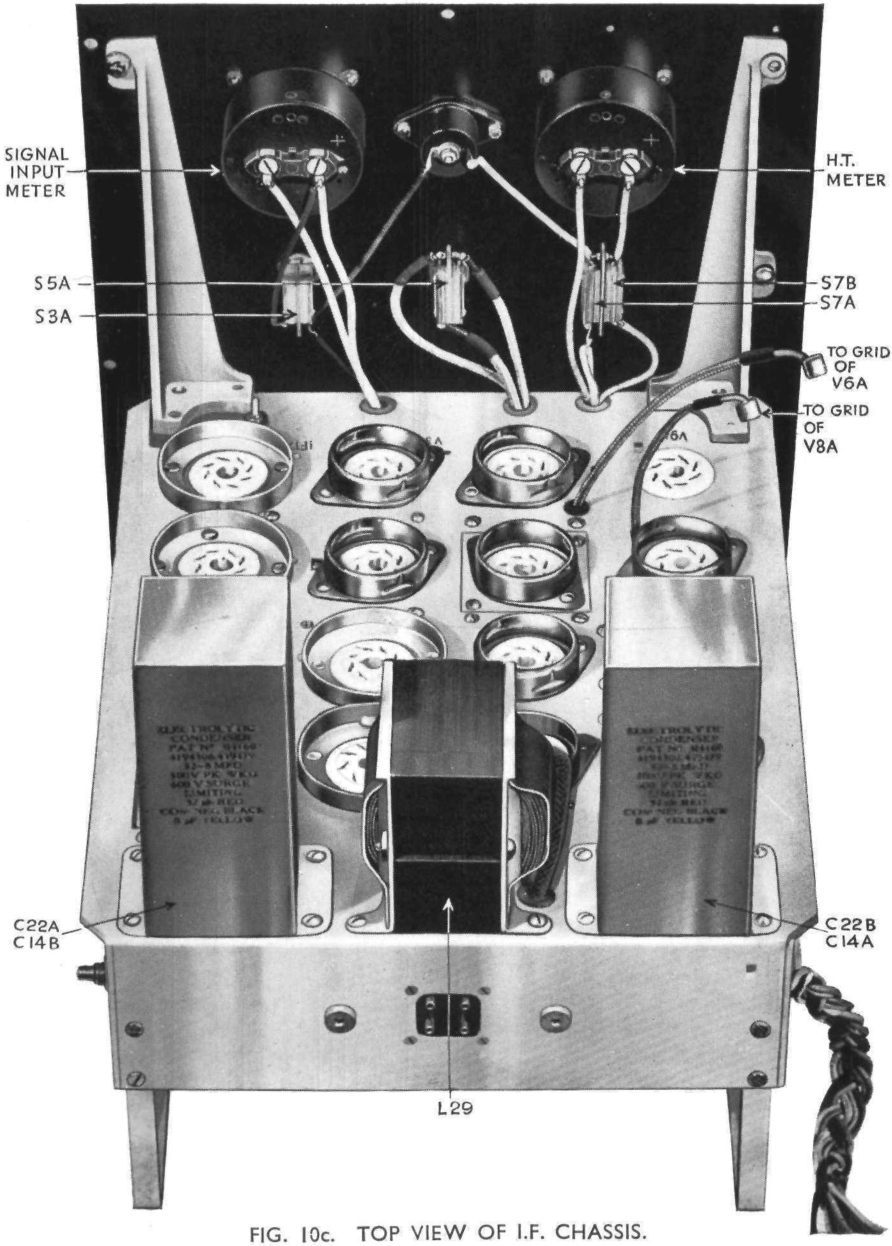
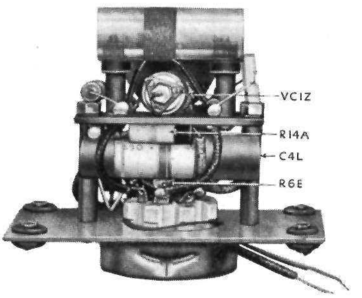
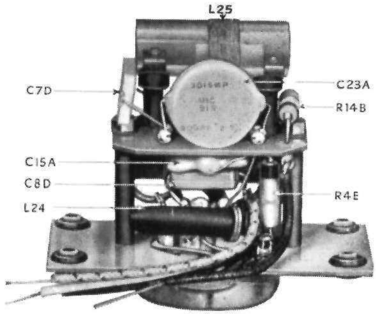


FIG. 10c. TOP VIEW OF I.F. CHASSIS.
(Valves and Transformers removed).



11a.



11b.

SECOND FREQUENCY CHANGER SUB-ASSEMBLY.

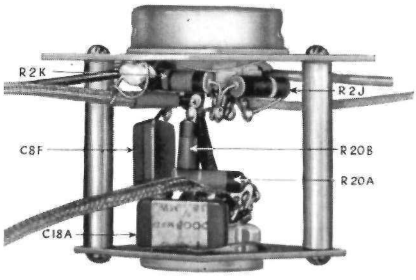


FIG. 12. B.F.O. SUB-ASSEMBLY.

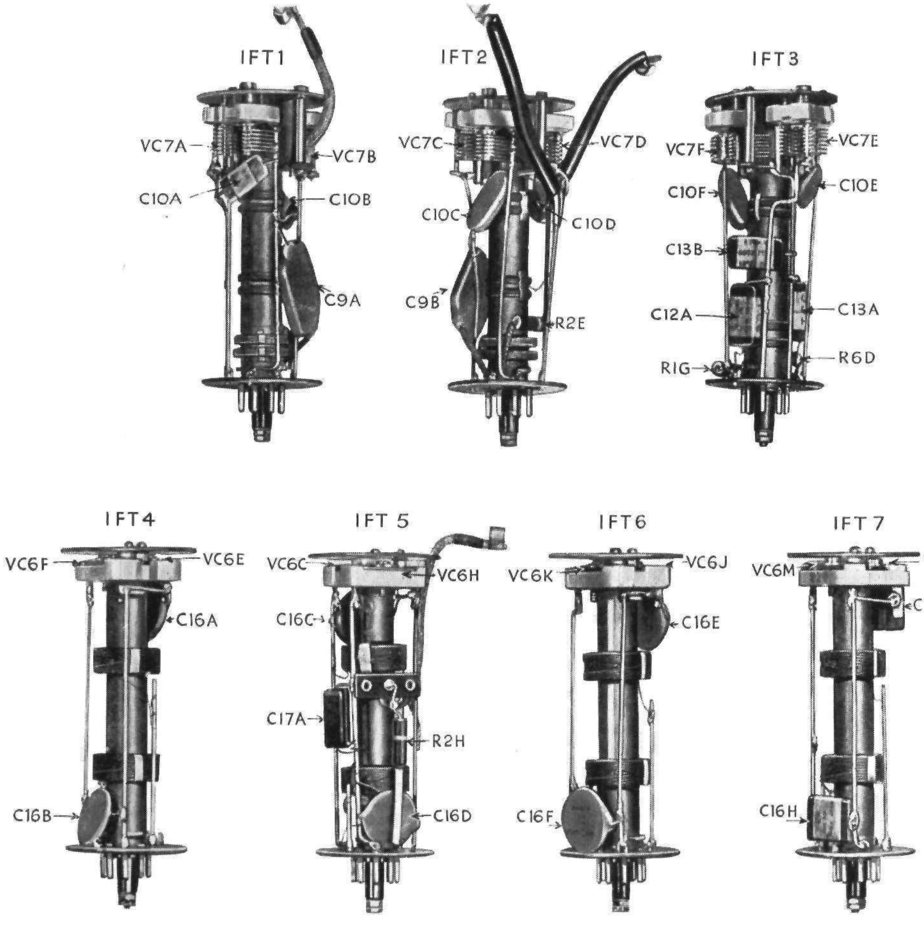


FIG. 13. I.F. TRANSFORMERS.

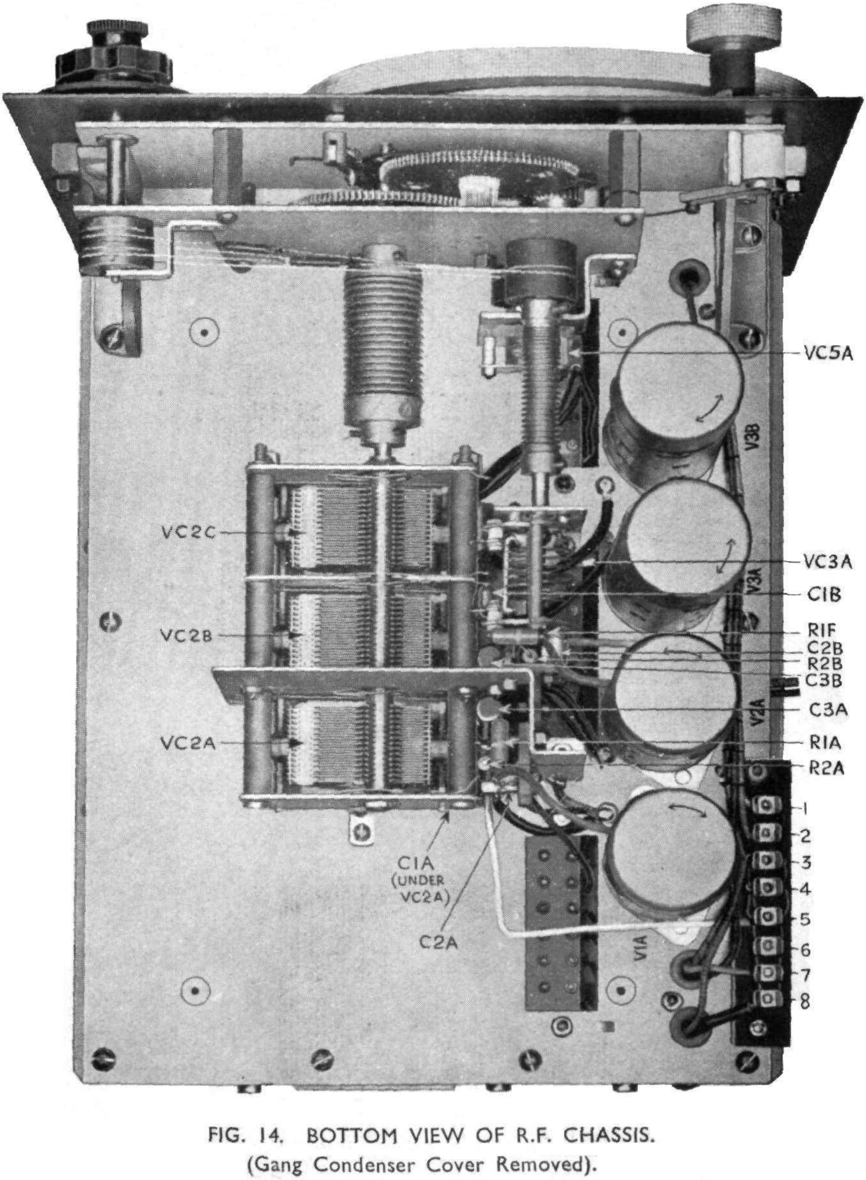


FIG. 14. BOTTOM VIEW OF R.F. CHASSIS.
(Gang Condenser Cover Removed).

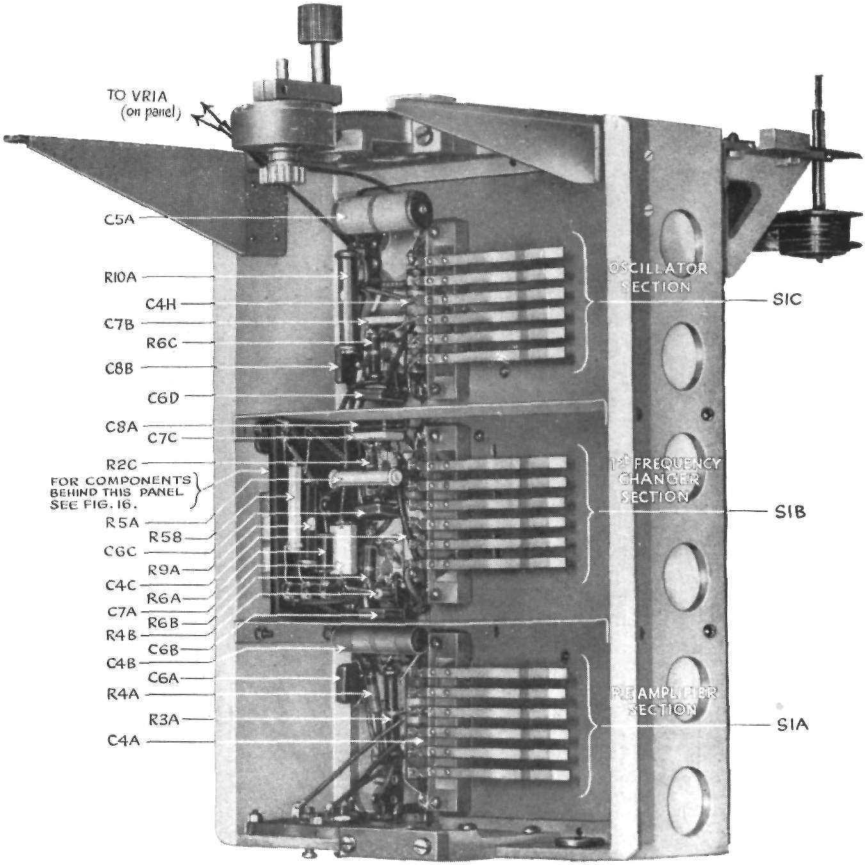


FIG. 15. TOP VIEW OF R.F. CHASSIS (Turret Removed).

On Mk. III and III* sets the Component Layout of the Oscillator Section differs from the Illustration. Reference should be made to the Circuit Diagram Fig. 1 (b).

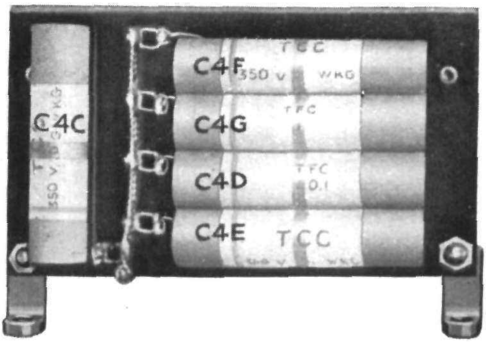


FIG. 16. SUB-ASSEMBLY PANEL.

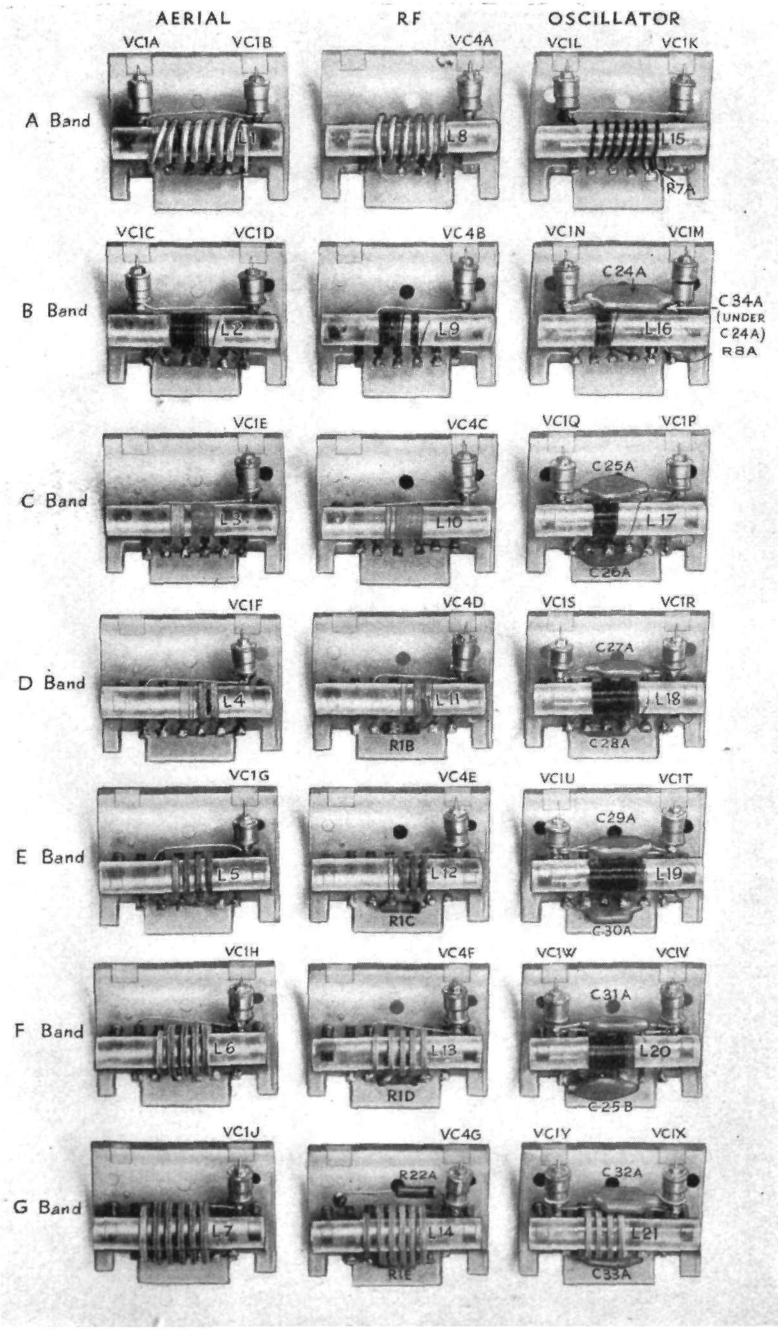
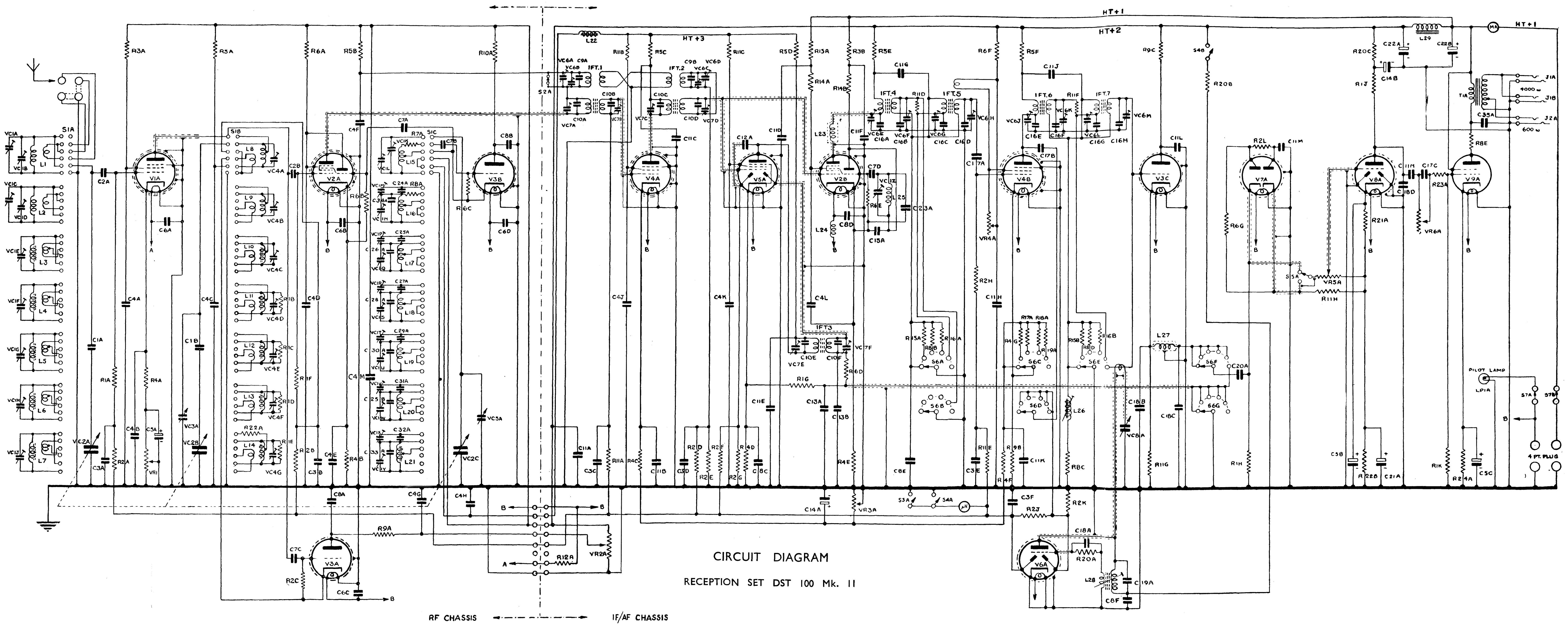


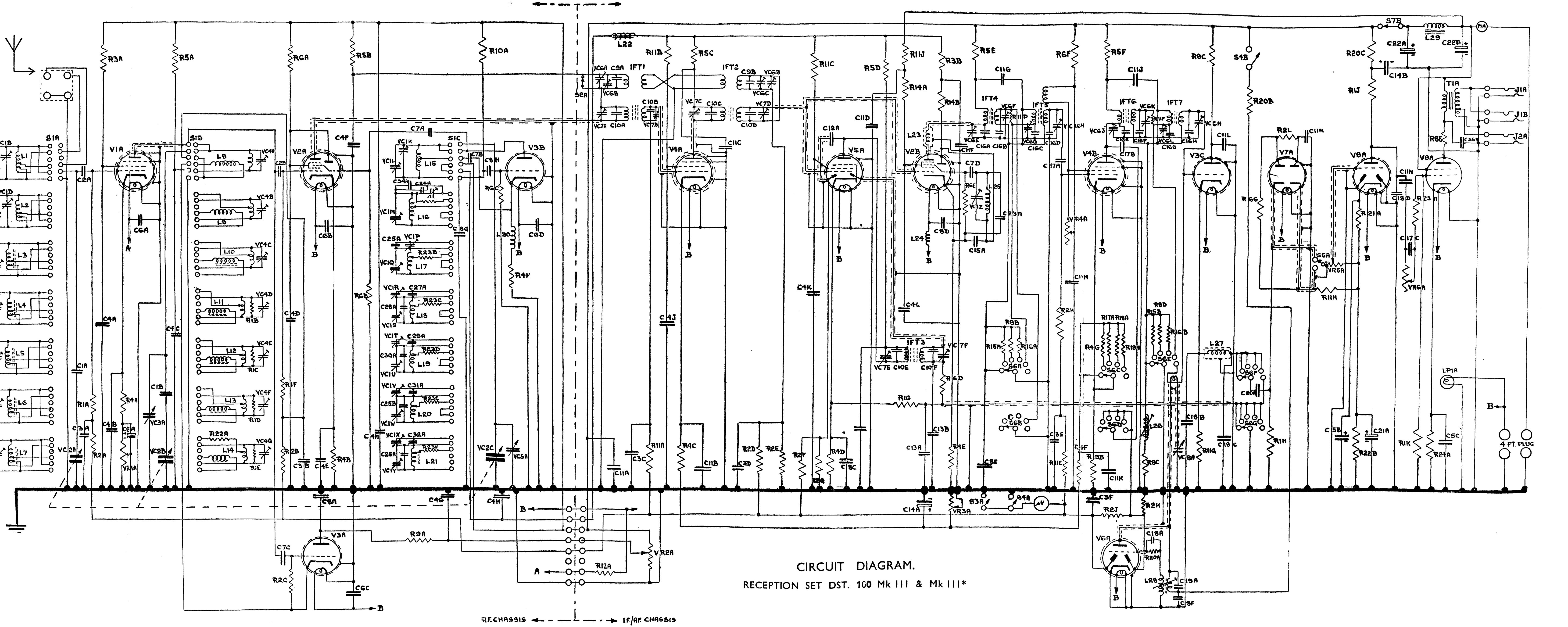
FIG. 17. COILS FOR Mk. II SETS.

For differences in Mk. III and Mk. III* Coils see Circuit Diagram Fig. 1 (b) and Chapter IV Paragraph 2 (a).



CIRCUIT DIAGRAM

RECEPTION SET DST 100 Mk. II



CIRCUIT DIAGRAM.

RECEPTION SET DST. 100 Mk III & Mk III*