Marconi

Technical Manual

T7374

HIGH - STABILITY COMMUNICATIONS RECEIVER

Type H2301

(EDDYSTONE 880/3)

THE MARCONI COMPANY LIMITED · Chelmsford · Essex · England

Telephone: Chelmsford 3221 · Telex 1953 · Telegrams: Expanse Chelmsford Telex
Printed in Great Britain

RECORD SHEET -

AMENDMENT AND MODIFICATION LEAFLETS

The incorporation of an amendment in this publication should be recorded in the table below, when making the amendment.

In the case of pages or drawings to be replaced, the obsolete sheets should be removed and their replacements inserted in the appropriate places. To open the binding clip, press together the levers at the bottom. To close the clip, press together the levers at the top.

Upon receipt of Modification Leaflets, any relevant information can be noted in the spaces provided overleaf.

Amendment No.	Amended by	Section, Chapter affected	Date
1	INCORPORATED		30 MAR 1965
2	INCORPORATED		4 MAY 1965
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

Cont. overleaf.

MODIFICATION LEAFLETS

Ref.No.	Date Received	Class	Remarks

Receiver Type H2301

EDDYSTONE 880/3

T7374

HIGH STABILITY COMMUNICATIONS RECEIVER

TYPE H2301

CONTENTS

Components List

The Master Components List at the end of this manual includes all electrical components and selected mechanical components used in the receiver.

Components shown on individual circuit diagrams may be identified in the master list by means of the cross-reference lists adjacent to the circuit diagrams to which they refer.

GS

Chapter 1

INTRODUCTION

List of Contents

GS

INTRODUCTION

OUTLINE

1. The Receiver Type H2301 is a high-stability communications receiver covering the frequency band 500 kc/s - 30.5 Mc/s in thirty switched ranges. Provision is made for reception of a.m., c.w. and s.s.b. signals with instant sideband selection in the latter mode; for the reception of f.s.k. signals a separate unit, Adaptor Type H5011 can be supplied. The carrier-insertion oscillator for s.s.b. reception is crystal-controlled: the receiver Edition -01 has crystals for 3 kc/s s.s.b. signals, Edition -02 is supplied with crystals for 6 kc/s signals.

2. High stability is achieved by means of the double-superheterodyne technique employed with crystal control of the first local oscillator. The first i.f. is gang-tuned with the r.f. section, its coverage being dependent on the r.f. range in use. The receiver functions as a single-conversion superhet when the r.f. range coincides with the first i.f.

TUNING

3. Each of the thirty tuning ranges has a nominal coverage of one megacycle so that the tuning rate is constant at all frequencies. The dial calibration is linear, accurate to within 1 kilocycle and is presented in such a manner that the tune frequency is obtained by combining the readings given on separate MEGACYCLE and KILOCYCLE scales. A 100 kc/s crystal calibrator is provided. The re-setting accuracy is within 500 c/s at any frequency. A fine tuning control is provided for use when making precise adjustments during c.w. and s.s.b. reception. This facility is achieved through use of a reactance control valve across the second local oscillator circuit and the same system also allows remote tuning from a distant listening point.

FACILITIES

4. The second i.f. operates at 500 kc/s and a cathode follower provides output at this frequency for connection to ancillary equipment. Five positions of selectivity are available, two of which employ bandpass crystal filters. An audio filter is fitted for selective c.w. reception.

5. Provision is made for diversity working in which two or three Type 2301 receivers can be operated with common oscillator control. The a.g.c. lines are linked in the normal manner and the common oscillator injection is obtained from the second oscillator unit in one of the receivers.

6. Great care has been taken to reduce oscillator radiation to an extremely low level and the receiver is therefore suitable for installations which employ a number of receivers working in close proximity to one another. This is especially true when the installation includes some receivers operating on channels in the v.h.f. region.

GS
VLM

CONSTRUCTION

7. The receiver is of robust construction and is housed in a strong protective cabinet. All panel controls are conveniently positioned for ease of operation and separate audio outputs are available for connection to an external loudspeaker, telephones and remote lines. Two separate audio channels are employed with the line output level adjustable independently of the speaker or telephone monitor outputs. A small built-in monitor speaker can be used in lieu of an external unit if so desired.

8. High-quality components are employed throughout and the receiver can be operated continuously in all areas under extreme climatic conditions. The receiver operates directly from all standard a.c. mains supplies or from any source capable of providing the necessary h.t. and l.t. voltages.

GS

Chapter 2

EQUIPMENT CHARACTERISTICS

List of Contents

List of Tables

List of Illustrations

GS

EQUIPMENT CHARACTERISTICS

EQUIPMENT LIST

1. The Receiver Type H2301-01, identity HH00-2301-01, has third oscillator crystals for 3 kc/s signals; on Edition -02 the crystals are for 6 kc/s signals. Either edition is self-contained in a cabinet and uses the valves listed in Table 1.

Table 1

Valve List

Circuit Ref.	Type		Function
	Commercial	Services	
V1	ECC189	CV5331	First R.F. Amplifier
V2	6BA6	CV454	Second R.F. Amplifier
V3	6AK5	CV850	First Mixer
V4	6BA6	CV454	Tuned I.F. Amplifier
V5	6AK5	CV850	Second Mixer
V6	5840, EF732	CV3929	Crystal First Oscillator
V7	5840, EF732	CV3929	Buffer First Multiplier
V8	6U8	CV5065	Variable Freq. Second Osc. & Reactance Control
V9	6C4	CV133	Variable Freq. Osc. Buffer.
V10	6BA6	CV454	First 500 kc/s I.F. Amplifier
V11	6BA6	CV454	Second 500 kc/s I.F. Amplifier
V12	6AM6	CV138	Third 500 kc/s I.F. Amplifier
V13	6AL5	CV140	Noise Limiter & A.G.C. Rectifier
V14	6489	CV469	A.M. Detector
V15	12AT7	CV455	I.F. Output and C.W./S.S.B. Detector Feed Cathode Followers
V16	12AT7	CV455	Meter Control & A.F. Amplifier
V17	6AJ8	CV2128	C.W./S.S.B. Detector & C.W. Oscillator
V18	12AU7	CV491	Line & Monitor A.F. Amplifiers
V19	6AM5	CV136	Monitor Output
V20	6AM5	CV136	Line Output
V21	OB2	CV1833	Voltage Stabiliser
V22	OB2	CV1833	Voltage Stabiliser
V23	12AT7	CV455	S.S.B. Crystal-Controlled Oscillator
D1	100SC2		B.F.O. Variable Capacity Diode
D2 to D5	DD006		H.T. Rectifier (silicon diodes)
V1 Calibrator	6AU6	CV2524	Crystal-Controlled Oscillator

FEATURES

Types of service — Telephone, c.w., s.s.b.
With adaptor, f.s.k.

EQUIPMENT CHARACTERISTICS

Frequencies

2. Frequency coverage	**0.5 to 30.5 Mc/s in 30 one-megacycle ranges.**
First Oscillator	Crystal controlled
First i.f.	2.5 to 3.5 Mc/s on odd ranges except Range 1. 3.5 to 4.5 Mc/s on even ranges & Range 1.
Second oscillator	3.0 to 4.0 Mc/s, l.c. controlled
Second i.f.	500 kc/s, variable selectivity
Third oscillator Edition -01 Edition -02	498.5 or 501.5 kc/s for 3 kc/s s.s.b. 496.5 or 503.5 kc/s for 6 kc/s s.s.b.
Beat frequency oscillator	500 kc/s, variable ±7 kc/s

Impedances

3. Aerial input	75Ω unbalanced.
Audio input	0.1 MΩ approximately.
Intermediate freq. output	250Ω nominal unbalanced, for terminating 75 to 300Ω impedances.
Audio output line	600Ω balanced or unbalanced.
Audio output monitoring	2.5 to 3Ω speaker. 2000Ω nominal telephone. Internal speaker switched.

Power Supply

4. Mains input	100 to 125V or 200 to 250V, 40 to 60 c/s. 1 phase 105 VA.
Fuse	1.5A thermal storage
Output for auxiliaries	+260V at 15 mA unsmoothed 6.3V at 1.5A.
Alternatively, input from external unit	+225V at 185 mA 6.3V at 6.8A switched and fused at source.

VLM

EQUIPMENT CHARACTERISTICS

Dimensions and Weight

5.

Height	Width	Depth	Weight
9.7/16 in.	19½.in.	20½ in.	99 lb.
239 mm.	495 mm.	521 mm.	44.9 kg.

PERFORMANCE DATA

This is not a rigid specification; the figures are typical only.

Radio signal

6. Sensitivity at 3 kc/s bandwidth and 15 dB signal/noise ratio	3 μV above 1.5 Mc/s 5 μV below 1.5 Mc/s 1 μV on c.w. but 2 μV at 0.5 to 1.5 Mc/s 1 μV absolute

7. Selectivity, switch selected:

Position		Overall Bandwidth in kc/s		
		6 dB down	30 dB down	60 dB down
14 kc/s broad		14	26	36
7 kc/s intermediate		7	15	27
3 kc/s narrow		3	9	15.5
CRYSTAL 2	C	3	6	11.5
CRYSTAL 1	B	1.2	4	9
	A	0.4	3	7.5

Crystals B and C are normally fitted in the CRYSTAL 1 and 2 positions respectively: to special order crystal A can be supplied in the CRYSTAL 1 position and crystal B or C for CRYSTAL 2.

8. Stability

Thermal drift	Less than 100 c/s in 1 hour after first 2 hours. Less than 50 c/s for 20 deg.C ambient, short term.
Supply voltage	Less than ±100 c/s for ±10% in supply voltage.

9. Calibration

Accuracy	Within 1 kc/s at all frequencies, FINE TUNING at zero.
Checking	Against 100 kc/s crystal calibrator
Resetting	Better than 500 c/s
10. Spurious Responses (1st and 2nd images and i.f. rejection)	1st and 2nd images are at least 90 dB down at all frequencies in the range 1.5 to 15 Mc/s. Above 15 Mc/s the rejection is greater than 60 dB. On Range 1 the i.f. rejection is greater than 60 dB except near 500 kc/s where the rejection figure becomes a function of the i.f. selectivity. At all other frequencies the i.f. rejection is greater than 90 dB.

11. Noise Factor

Range 1	Better than 15
Ranges 2 to 30	6 ±1 dB

12. Cross Modulation

With a desired signal 60 dB above 1 µV, A.G.C. ON, the interference produced by a signal 10 kc/s off-tune and of strength 90 dB above 1 µV is more than 30 dB below the output of the desired signal.

With A.G.C. OFF and by careful adjustment of the R.F. GAIN control improved cross modulation figures can be obtained.

13. Intermodulation

Two signals whose sum or difference frequency is equal to either the intermediate frequency or the selected signal frequency, must each be of a level greater than 90 dB above 1 µV to produce an output equal to that produced by a normal signal 20 dB above 1 µV.

14. Blocking

With a desired signal 60 dB above 1 µV, an interfering carrier 10 kc/s off-tune must be of a level exceeding 100 dB above 1 µV to affect the output by 3 dB.

GS

EQUIPMENT CHARACTERISTICS

15. A.G.C. Characteristic

At frequencies above 2 Mc/s, the audio output level does not change by more than 6 dB for a carrier variation of 100 dB above 3 µV. At frequencies below 2 Mc/s, the audio output level is constant within 6 dB for a variation of 90 dB above 10 µV.

Three selectable a.g.c. time constants are provided. The approximate discharge times are as follows:

A.G.C. 'FAST': 0.05 sec.; A.G.C. 'SLOW': 0.5 sec.; A.G.C. 'S.S.B': 10 secs.

A.G.C. is available for diversity working. (Terminal at rear of set).

16. Radiation

Radiation does not exceed 5 µV into 75 ohm at any frequency.

17. Remote Frequency Control

A total swing of 1.5 kc/s is available.

18. I.F. Output

With A.G.C. in use, an output of 50 mV across a 75Ω load is obtained for an input signal of 3 µV.

Audio Signal

19. Output

Monitor	250 mW into 2.5Ω
Line	100 mW into 600Ω

20. Response

BASS switch	See Figure 1, A.F. FILTER OUT.
A.F. Filter	See Figure 2.

21. Distortion at 1000 c/s, 5% at 250 mW into 2.5Ω.
2% at 10 mW into 600Ω.

22. Hum more than 47 dB below 500 mW.

GS.

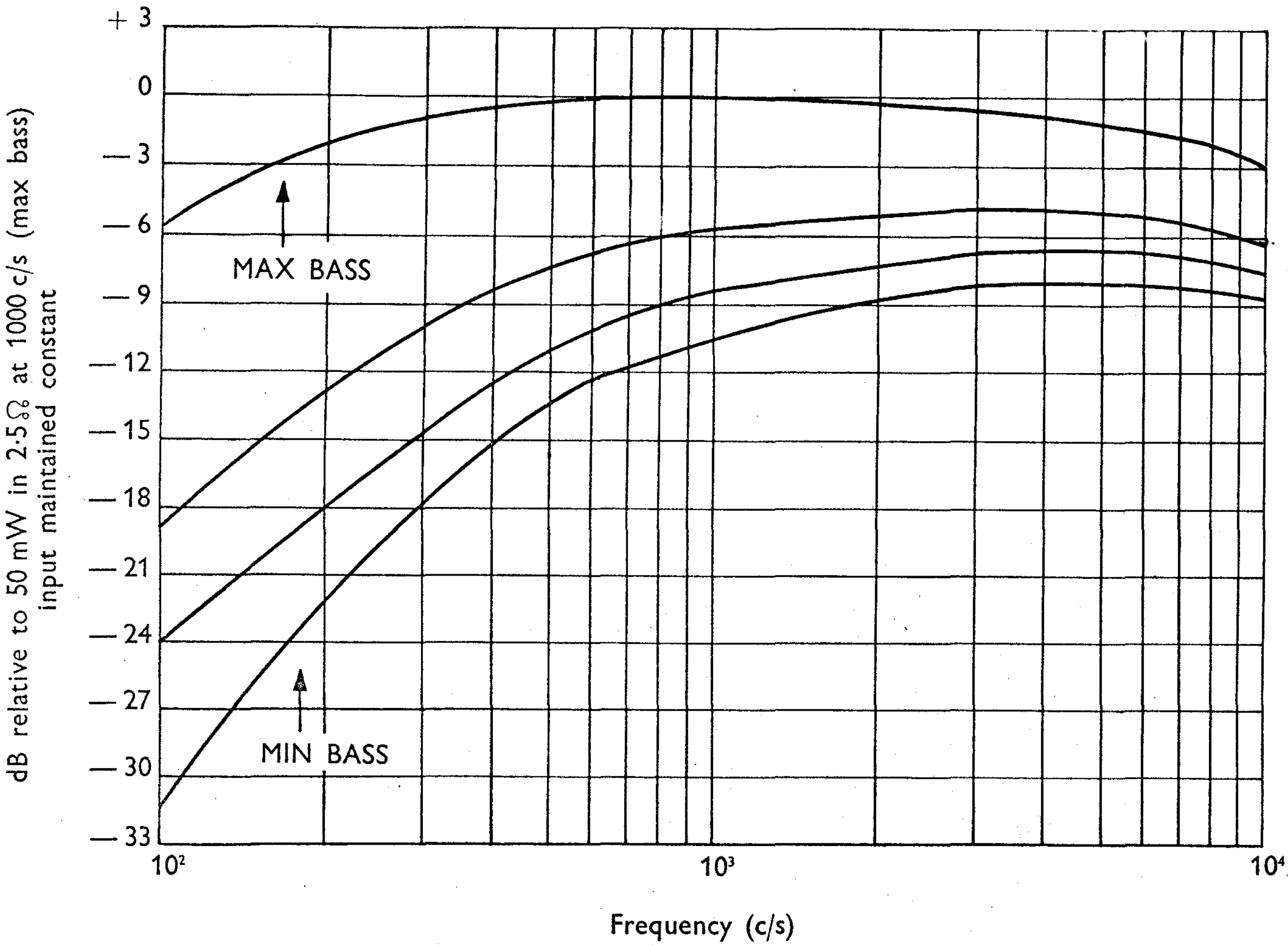


Fig.1 Audio Response at each position of Bass Switch

GS

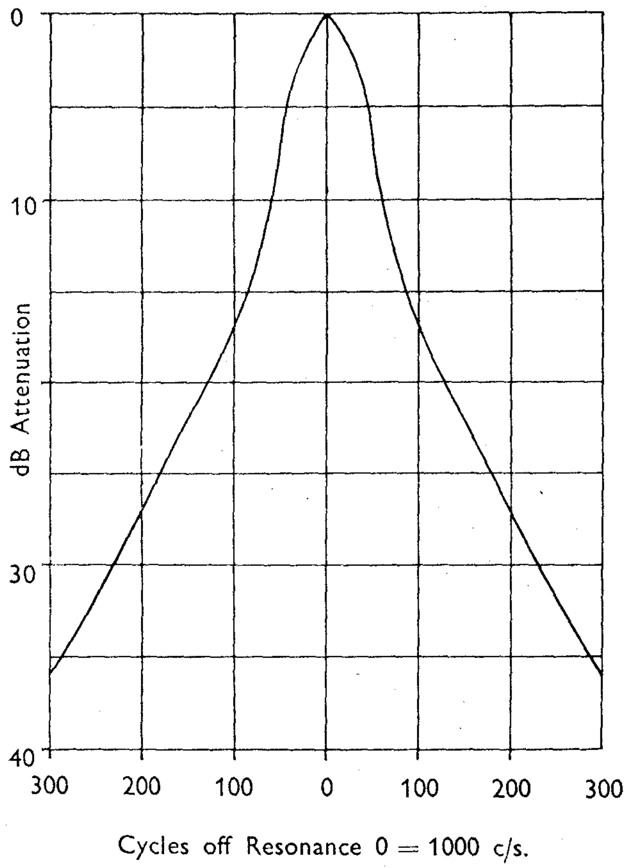


Fig.2 Overall Sensitivity
Bass Switch at Maximum

GS

Chapter 1

MECHANICAL CONSTRUCTION

List of Contents

List of Tables

GS

MECHANICAL CONSTRUCTION

PANEL and CABINET

1. A front view of the receiver is shown in the frontispiece. The 1/8-inch steel panel has a large aperture through which the tuning dial is visible; the aperture is framed by a diecast escutcheon.

2. The operator's controls are grouped below the dial and to the sides and are protected by a chromium-plated handle at each side. The control functions are shown on an anodised finger plate which also has an escutcheon; the latter covers the panel edges.

3. Ventilated rear, side, bottom and top covers constitute the cabinet which rests on polythene mounting feet. The top cover is held by two Oddie fasteners at the rear.

CHASSIS

4. The receiver is built on six sub-chassis and two oscillator units. The sub-chassis are secured to a central r.f. frame which in turn is bolted to the rear of two drive plates behind the front panel. The oscillator units are in double-screened boxes. The six sub-chassis are the first and the second r.f. amplifiers, the first mixer stage, the tuned first i.f. and second mixer stages, the second i.f. and a.f. chassis and the power unit chassis.

5. The power unit sub-chassis is of rustproofed enamelled steel; the other sub-chassis and the two oscillator units are of brass, silver-plated and lacquered.

TUNING DIAL and DRIVE MECHANISM

6. The tuning dial occupies a central position in the top half of the front panel and has two horizontal scales bearing calibration marks at 100 kc/s intervals. The top scale is printed in black and is for use on all ranges except 3 and 4. On these two ranges the lower scale is used, the red colouring being used to avoid confusion.

7. Direct frequency calibration is provided by three calibrated discs which are positioned behind apertures in the scale plate and rotated by the wavechange mechanism MEGACYCLES. Interpolation between the 100 kc/s points is achieved by means of the vernier scale located in the lower centre of the main scale.

8. The main tuning control KILOCYCLES operates a spring-loaded split-gear system which provides two main drive outlets together with a pulley drive for the scale pointer and a gear drive for the vernier scale.

GS

9. One of the main drive outlets is coupled to the rotor of the tuning capacitor in the second local oscillator unit, while the other drives a helical gear mechanism which raises and lowers the tuning platform carrying the cores for the r.f. mixer and tuned first i.f. stages.

10. The gear ratios are such that it requires twenty-four revolutions of the main tuning control to move the pointer from end to end of its traverse, a total distance of some ten inches. At the same time, the vernier scale makes a total of twelve revolutions, each of which corresponds to a frequency change of 100 kc/s. The resultant tuning rate of 50 kc/s per revolution is adequate for most applications but can be supplemented by adjustment of the FINE TUNING control when necessary.

INTER-UNIT WIRING

11. All units are inter-connected by means of cableforms terminated in suitable plugs and sockets to allow easy removal of individual units.

12. Four miniature 6-way sockets located on the power unit chassis distribute the h.t. and l.t. supplies to the various sections of the receiver, while a fifth socket allows connection to the dial lamps and mains switch. Six similar sockets are mounted on the rear of the front panel to facilitate connection to the panel controls.

13. The inter-unit connections are shown on Figure 102 at the end of this manual. In the interest of clarity the inter-connections are omitted from the main circuit diagram Figure 101.

CONTROLS

14. Table 1 shows the label, circuit reference and function of all controls used in the receiver.

Table 1

Controls and Function

Label	Cct.Ref.	Function	Remarks
MEGACYCLES	S1	Wavechange	Wafers S1a to S1r, S1r associated with c.w./s.s.b. detector.
A.G.C.	S2	Controls a.g.c. time-constant. Switches on calibrator	Wafers S2a to S2d
SELECTIVITY	S3	Controls second i.f. bandwidth.	Wafers S3a to S3m

GS

Table 1

Controls and Function (Cont'd.)

Label	Cct.Ref.	Function	Remarks
N.L.	S4	Shorts limiter diode at OFF.	Toggle, single-pole
	S5	Selects signal mode detector. Controls h.t. to c.w. and s.s.b. oscillators	Wafers S5a to S5d
A.F. FILTER	S6	Switches filter IN/OUT	Toggle, two-pole
BASS	S7	Selects high-pass net-work	Wafers S7a and S7b
MONITOR L.S.	S8	Connects internal speaker	Toggle, single pole
MAINS	S9	Connects mains supply	Toggle, two-pole
KILOCYCLES	-	Controls tuning plat-form and C54	Operates tuning drive mechanism.
AERIAL TRIMMER	C172	Matches input to aerial impedance	
-	M1	Indicates carrier level.	Inoperative with S2 at OFF or C.
R.F. GAIN	RV1	Controls cathode potential of V1 and V2	Inoperative with S2 at C.
FINE TUNING	RV2	Controls reactance valve V8A.	Adjusts second oscillator frequency.
I.F. GAIN	RV3	Adjusts gain of second i.f. valves V10 and V11	
METER ZERO	RV4	Balances meter against V16A cathode current	
B.F.O.	RV7	Controls frequency of b.f.o.	On c.w. position of S5 only.

MECHANICAL CONSTRUCTION

Table 1

Controls and Function (Cont'd.)

Label	Cct.Ref.	Function	Remarks
LINE LEVEL	RV8	Controls gain of line amplifier)	Independent
A.F. GAIN	RV9	Controls telephone or loud-speaker level)	
-	RV10	Controls dial lamp brilliance	Preset
PHONES	JK2	For high-resistance head-phones.	External speaker disconnected when plug is inserted.

Chapter 2

PRINCIPLES OF OPERATION

List of Contents

List of Illustrations

GS

PRINCIPLES OF OPERATION

Refer to the block diagram Fig.1 of this chapter.

SIGNAL and FIRST I.F. STAGES

1. The 0.5 to 30.5 Mc/s radio frequency band of the receiver is covered by thirty one-megacycle ranges with 100 kc/s overlap outside each end of each range. The signal is amplified in two signal-frequency stages and applied to the first mixer, to which is applied the crystal-controlled output of the first oscillator, except on Ranges 3 and 4.

2. The oscillator frequency is such that the first i.f. is either in the A range 2.5 to 3.5 Mc/s, used on all odd ranges except Range 1, or in the B range 3.5 to 4.5 Mc/s for all even ranges and Range 1. On Ranges 3 and 4 the signal and intermediate frequencies are the same and the mixer functions as an amplifier. The signal is then amplified by one stage at the first i.f.

3. The aerial, radio frequency and first i.f. intervalve coupling stages are all permeability tuned, the coil cores being mounted on a tuning platform; the movement of the platform is ganged to the tuning mechanism of the second oscillator capacitor. The first oscillator frequency is higher than that of the received signal; the tuned circuits of the first i.f. and the second oscillator are therefore at the high frequency end of each range when the scale pointer is at the left-hand side.

SECOND I.F. STAGES

4. The second oscillator is tuned over the range 3 to 4 Mc/s, by the KILOCYCLES control on all ranges, and the output applied to the second mixer. The second i.f. at 500 kc/s is amplified by three stages; the interstage coupling is switched to provide five overall bandwidths, crystal filters are used on the two narrowest. The upper and lower sidebands are interchanged on alternate ranges but are selected by a wafer of the wave-change switch associated with the c.w./s.s.b. detector.

5. An output from the second i.f. amplifier is rectified and applied as a.g.c. to the two r.f. amplifiers, the first i.f. amplifier and the first two stages of the second i.f. amplifier.

AUDIO FREQUENCY STAGES

6. For a.m. reception the output of the second i.f. amplifier is rectified by a diode, a diode noise limiter can be included, and the signal is amplified.

GS

7. For c.w. or s.s.b. reception the second i.f. signal is passed through a cathode follower and applied to the detector. On c.w. a beat oscillator is employed, the frequency being controlled by a capacity diode; the signal may then be passed through the audio filter. On s.s.b., crystal-controlled oscillators provide the carrier-insertion frequency for the upper or lower sidebands as required.

8. With any mode of reception the signal is applied in parallel to the line amplifier for 600 ohm output and to the monitor output amplifier which feeds the internal speaker and the telephones or the external speaker.

GS

Chapter 1

DETAILED CIRCUIT DESCRIPTION

List of Contents

List of Tables

List of Illustrations

GS

DETAILED CIRCUIT DESCRIPTION

The circuit diagrams follow the corresponding chapter in Part 2.

RADIO FREQUENCY STAGES

1. These stages comprise two stages of r.f. amplification together with the first mixer stage and its associated crystal-controlled local oscillator unit.

2. The first r.f. stage V1 employs a high-slope double-triode in a low-noise series-cascode circuit. This amplifier and the second r.f. stage V2 both operate with automatic and/or manual gain control and provide an excellent signal-to-noise ratio at all frequencies throughout the tuning range. A low-noise high-slope r.f. pentode functions as the first mixer V3 with cathode injection from the local oscillator. The mixer operates with fixed cathode bias and without a.g.c.

3. Permeability tuning is used in both the r.f. and mixer stages, a total of thirty-five variable inductors together with one preset inductor being required to cover the complete tuning range. The inductors are selected by the MEGACYCLE control wavechange switch which also introduces the appropriate preset 'tank' capacitors. It should be noted that some coils are used on more than one range and in this case range selection is by means of the switched capacitors only, see Detached Circuits Figs.1, 2 and 3 which give the complete r.f. and first mixer range switching.

4. Two image filters are fitted in the aerial input circuit to assist in maintaining the image signals at a low level on the higher tuning ranges of the receiver. Filter A, see Main Circuit Diagram, is of the lowpass type and has a cut-off frequency at about 30.6 Mc/s. It remains in circuit on all ranges but only functions as an image filter at signal frequencies above 23.5 Mc/s. The filter is kept in circuit on all ranges to provide a constant aerial input impedance of approximately 75 ohms at all frequencies to which the receiver may be tuned. Filter E see Detached Circuit Fig.1 is brought into circuit on Ranges 14-17 to ensure a spurious response of at least -90 dB at all frequencies up to 15 Mc/s. The cut-off frequency of Filter E is approximately 17.6 Mc/s and above 15 Mc/s the spurious response is at least -60 dB.

5. The input circuit of the first r.f. stage is provided with the AERIAL TRIMMER control C172 which allows accurate adjustment of the first tuned circuit when using aerials with impedances differing appreciably from 75 ohms.

GS

6. The a.g.c. bias is shunt-fed to the two r.f. stages via the feed resistors R1 and R11. The r.f. a.g.c. feed includes the filter R12/C9 to prevent interaction with the tuned i.f. stage.

7. Manual r.f. GAIN control is effected by taking the cathode bias resistors of the r.f. stages R2 and R13 to the junction of R14/R15 via S2b and the common variable cathode resistor RV1. In normal operation, R15 is shorted out by a wire strap or a relay contact across the desensitising terminals. This connects the R.F. GAIN control RV1 directly to earth and gives normal bias to V1 and V2. The receiver is desensitised by open circuiting the terminals referred to above and under these conditions, the voltage developed across R15 is applied in series with the normal cathode voltage. This increases the bias applied to the r.f. stages and so reduces their gain.

8. When S2b is set to C, calibrate, the cathodes of V1A and V2 are returned directly to chassis via R16. The R.F. GAIN control RV1 is inoperative under these conditions and the additional bias developed across R16 ensures that there is no signal breakthrough whilst calibrating. The calibrator is described in the next chapter.

9. Low-value grid stoppers R3, R10 and R20 are fitted in the r.f. and mixer stages to ensure freedom from instability due to parasitic resonances.

10. The first local oscillator unit employs two high-reliability sub-miniature r.f. pentodes as crystal oscillator V6 and buffer/multiplier V7. The whole unit is contained in a double-screened box to restrict direct radiation and so allow receivers to be operated in close proximity to one another without fear of interaction. A double-screened coaxial lead is used to feed the cathode of the first mixer V3. The inner screen of this lead is connected to the inner screening box which is insulated from the outer box. The inner box is earthed at the coaxial socket SKT3. The outer screen of the coaxial lead is bonded to the outer box and to the coaxial plug PL1 which mates with SKT3.

11. Both the crystal oscillator and buffer/multiplier stages operate from a 108-volt stabilised supply HT4, extensive filtering being incorporated in the supply feed to prevent radiation from wiring external to the unit. The same precaution is taken in the l.t. circuit and this, together with the extensive screening referred to above is responsible for the extremely low radiation and low spurious response.

12. The crystal oscillator always works on the fundamental crystal frequency and any multiplication that is required takes place in the following stage. Ten crystals are needed to cover the twenty-eight ranges when the receiver functions with double conversion and Table 1 gives a full summary of the frequencies used for the various ranges, multiplication factors being indicated where applicable.

GS

13. The appropriate crystal is selected by the MEGACYCLES control which also introduces the correct pretuned output circuit for the buffer/multiplier stage. Sixteen separate output circuits are used and these are shown in Detached Circuit Fig.5. Each output circuit is provided with a low-impedance coupling coil which provides output to the cathode of the first mixer stage. On Ranges 3 and 4, the 10 Mc/s crystal is switched into circuit to maintain V6 within its rating. No injection is required on these ranges so S1p is arranged to by-pass the output circuit. The lack of oscillator injection allows the first mixer to function as an r.f. amplifier in the range 2.5 to 4.5 Mc/s when the receiver operates with single conversion. The output trap L86/C326 is tuned to 12 Mc/s to attenuate severely the second harmonic output on Ranges 14 and 15.

Table 1

Crystal Frequencies and Multiplication Factors

Crystal Frequency Mc/s	Multiplication Factor		
	X1 Ranges	X2 Ranges	X3 Ranges
5	1	-	-
6	2	-	14 and 15
8	5	-	-
10	6 and 7	16 and 17	26 and 27
11	-	18 and 19	-
12	8 and 9	20 and 21	-
13	-	22 and 23	-
14	10 and 11	24 and 25	-
16	12 and 13	28 and 29	-
17	-	Range 30	

FIRST I.F. STAGES

14. These stages comprise the first i.f. and the second oscillator. The output from the r.f. section is applied to the tuned first i.f. stage V4 via low-pass Filter B having a cut-off frequency of 4.9 Mc/s. This filter attenuates the higher frequency components in the mixer output and so maintains the spurious response at a very low level.

15. The tuned i.f. stage feeds the second mixer which has cathode injection from the second local oscillator unit. Both V4 and V5 input circuits are permeability tuned and ganged to the tuning of the r.f. and first mixer stages, see Detached Circuit Fig.4.

GS

DETAILED CIRCUIT DESCRIPTION

16. No manual gain control is applied to either stage since adequate adjustment of the overall i.f. gain is provided in the stages operating at the second i.f. The a.g.c. is applied to V4 via the feed resistor R27. Grid stoppers are fitted to both V4 and V5, and these, together with extensive screening ensure stable operation.

17. The second local oscillator unit employs a triode-pentode as a combined electron-coupled oscillator V8B and reactance-control valve V8A, together with the triode V9 which functions as a cathode follower providing a low-impedance output to the second mixer stage V5. The total coverage of the oscillator is 2.9 to 4.1 Mc/s inclusive of the 100 kc/s band edge overlaps, and whereas all other tuned stages employ permeability tuning, the second local oscillator unit uses a high-quality variable capacitor which is ganged to the main tuning control KILOCYCLES. All the circuitry associated with V8 is built upon a printed wiring board which is attached directly to the oscillator tuning capacitor in the interest of greater mechanical stability.

18. To prevent harmonics of the oscillator from reaching the Mixer Stage, two low-pass filters C and D are incorporated in the second Local Oscillator Unit. The unit itself is housed in a double-screened box to prevent radiation of oscillator harmonics which would otherwise fall within the tuning range of the receiver. Radiation from wiring leaving the unit is avoided by filtering at the point of exit. A coaxial output lead is used for the same reason.

19. V8B operates from the 108-volt stabilised line HT4, while the main h.t. line HT1 supplies the buffer stage V9. V8A is fed from the other 108-volt stabilised supply HT3 via the FINE TUNING control RV2. The triode portion V8A is connected in parallel with the tuned circuit to provide the FINE TUNING and remote tuning facilities. The FINE TUNING control gives a total swing of ±800 c/s and is used when tuning c.w. and s.s.b. signals. Remote tuning over a range of 1.5 kc/s can be accomplished as explained in the Installation chapter.

SECOND I.F. STAGES

20. Output from the second mixer is fed to a three-stage amplifier operating at the second i.f. of 500 kc/s. High slope vari-mu pentodes are employed in the first two stages V10 and V11, while a 6AM6 is used in the final stage V12.

21. The amplifier can be switched to provide five degrees of selectivity, two of which involve the use of dual-crystal band-pass filters. These are arranged to take any two of three dual crystals which provide 6 dB bandwidths as follows:-

Crystal A:	400 c/s.
Crystal B:	1.2 kc/s.
Crystal C:	3 kc/s.

GS

DETAILED CIRCUIT DESCRIPTION

22. Crystals B and C are normally fitted in the XL1 and XL2 positions respectively; to special order, Crystal A can be supplied in the XL1 and crystals B or C in the XL2 position. The crystals employed in the filters are evacuated envelope types with B7G bases Style E. The phasing capacitors C87 and C88 are preset during initial alignment to give the characteristic steep-sided response associated with crystal filters of the bandpass type. There is no evidence of the rejection notches due to the crystals and side lobes are non-existent. All crystal units are shorted by the selectivity switching S3d, f, g and h except when actually in use. This simple precaution prevents stray excitation of the crystals giving rise to a peaky response when the filters are not in use.

23. Fig.A shows in simplified form, the i.f. circuit coupling arrangements in each position of the SELECTIVITY switch. Switched tertiary windings are used to vary the coupling while the gain is maintained sensibly constant by the switched taps on the circuit feeding the first stage.

24. The a.g.c. is applied to the first two stages V10 and V11 via the feed resistors R63 and R68; the I.F. GAIN control RV3 is in series with the common cathode return of the same two stages. The third stage operates at fixed gain and feeds V13B, V15A, V15B and the miniature diode V14.

25. V13B is the a.g.c. rectifier which controls the r.f. amplifiers V1 and V2 and the i.f. stages V4, V10 and V11 when a.g.c. is in use. The A.G.C. switch S2 provides a choice of three a.g.c. time constants and a.g.c. OFF. A fifth position of the switch applies h.t. to the internal crystal calibrator; a.g.c. is automatically switched off when calibrating and the two r.f. stages desensitised by S2b.

26. The a.g.c. is delayed by the voltage developed at the potential divider R83/R84. The normal delay voltage is of the order of 15 volts but in the s.s.b. position this delay is decreased by switching R82 in parallel with R84. The lower delay voltage maintains efficient a.g.c. action with the reduced average sideband power available for production of a.g.c. bias when taking s.s.b. signals.

27. The d.c. amplifier V16A is also controlled by the a.g.c. line and serves to actuate the CARRIER LEVEL meter when the a.g.c. is in use The METER ZERO control RV4 in the cathode of V16A allows the meter to be set accurately to zero under no-signal conditions.

GS

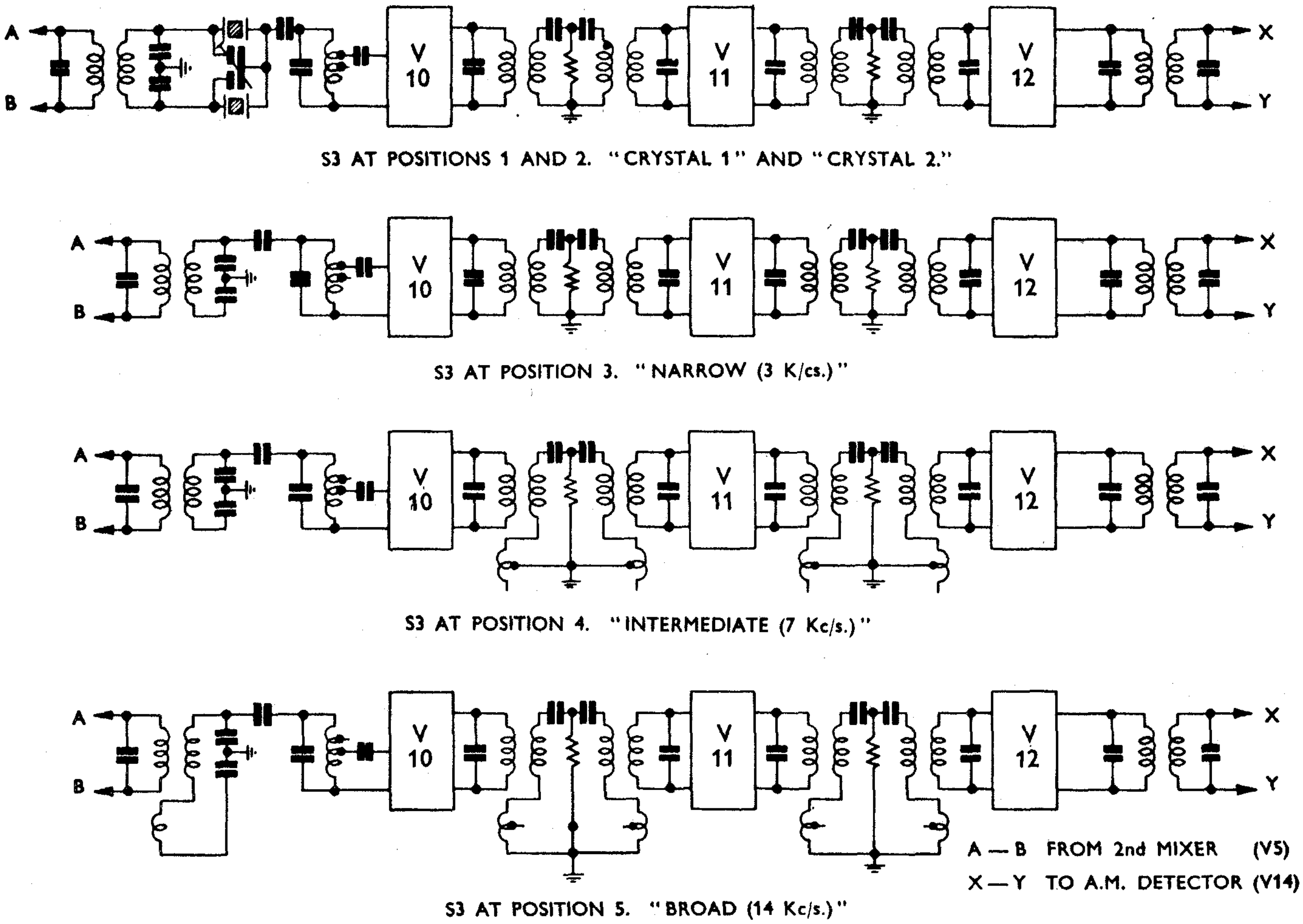


Fig.A Coupling Arrangements Provided by SELECTIVITY Switch S3

AUDIO FREQUENCY STAGES

28. Both halves of the double-triode V15A and V15B are fed in parallel from the secondary of T8; the triodes function as cathode followers. V15A provides a low impedance i.f. output for external use and V15B feeds the c.w./s.s.b. Detector V17A. This is the heptode part of the triode-heptode and operates as a product detector.

29. With the mode switch set to c.w., the wafer S5a connects the stabilised HT3 supply to the triode part V17B. This part then functions as the beat-frequency oscillator, the output being connected to the

GS

injector grid 3 of the heptode part. The frequency variation of ±7 kc/s is obtained by adjustment of the reverse bias applied to the capacity diode D1 connected across the oscillator coil L25: the bias is obtained from the B.F.O. control RV7 in a potential-divider chain across the h.t. supply.

30. With the mode switch set to S.S.B. UPPER or LOWER the stabilised HT3 supply is connected to one of the crystal-controlled oscillators V23A or V23B to provide the carrier-insertion frequency: receiver Edition -01 is fitted with 498.5 and 501.5 kc/s crystals respectively for reception of 3 kc/s bandwidth s.s.b. signals, the Edition -02 has 496.5 and 503.5 kc/s crystals for 6 kc/s signals. The output is taken from the cathodes of the oscillators via L25 to the injector grid of the heptode: this function of L25 is not materially affected by the setting of the B.F.O. control RV7. The selection of the s.s.b. carrier oscillator is made by wafers S1r of the wavechange switch and S5b and S5c of the mode switch: this arrangement counteracts the inversion on Ranges 1 and 3 and all even ranges except Range 4, which results from the double-mixing principle used in the receiver. Inversion is not corrected with the mode switch at c.w. and the high and low positions are consequently not marked on the B.F.O. control.

31. Output from V17A is taken via the coupling capacitor C139 to the c.w./s.s.b. positions of S5d, either directly or via the audio filter dependent on the position of the A.F. FILTER switch S6. Extensive filtering is included in the detector output circuit to prevent radiation of the oscillator signal from wiring external to the unit. Direct radiation is restricted by housing the complete detector unit in a screening can. Harmonics which would otherwise fall within the tuning range of the receiver are therefore adequately suppressed.

32. The miniature diode V14 is used as detector for the reception of a.m. signals. Incorporated in the detector circuit is a series pulse limiter V13A which may be used to reduce impulse noise during a.m. reception. When not required, the limiter can be taken out of circuit by means of the N.L. switch S4. The detected output across R77 is fed to the grid of V16B which provides additional audio amplification when receiving a.m. signals. This compensates for the higher gain of the c.w./s.s.b. detector and obviates the need for adjustment of the gain controls when changing from the a.m. to the c.w./s.s.b. positions of the mode switch. Output from V16B is taken directly to the a.m. position of S5d. This section of the mode switch feeds the bass filter which comprises C146 to C148 and R113 to R115. The BASS switch S7 connects the audio signal from the selected part of the filter to two independent controls LINE LEVEL RV8 and A.F. GAIN RV9.

33. The LINE LEVEL control RV8 has its slider connected directly to the grid of V18B which serves as the driver stage for the line output stage V20. The pentode employed in this position provides a 600-ohm line output via T11. An output of 100 mW is available and negative feedback is applied to both stages.

DETAILED CIRCUIT DESCRIPTION

34. A similar circuit is employed in the audio stages V18A and V19 which provide the monitor outputs. The circuit is arranged so that the external speaker is disconnected when telephones are plugged in but the internal monitor speaker remains in circuit and can be switched independently by means of the MONITOR L.S. switch S8. When telephones are in use a loading resistor R125 is connected across the secondary of T10. An output of 250 mW is available at the 2.5 ohm terminals.

POWER SUPPLY CIRCUIT

35. This portion of the receiver is of conventional design and employs a C-core mains transformer with one h.t. and three l.t. secondary windings. The h.t. winding is centre-tapped and feeds a full-wave rectifier which comprises two pairs of miniature silicon rectifiers. Output from the rectifier is smoothed by a capacitor input filter made up of C157, C158 and CH11. The smoothed output across C157 feeds the HT1 rail at 225 volts. Some of the audio stages are supplied from the HT1 rail via R133, decoupled by C156. This line becomes the HT2 supply and is of the order 165 volts.

36. Two voltage stabilisers V21 and V22 provide separate 108-volt supplies HT3 and HT4 for certain stages in the receiver. The distribution of these supplies is as follows:-

HT3: C.W. and S.S.B. oscillators V17B and V23.
Divider network providing control voltage for D1.
Voltage divider in meter circuit.
FINE TUNING control RV2 feeding anode of V8A.

HT4: V6 and V7 first local oscillator unit
V8B second local oscillator unit.

37. The three separate l.t. windings are rated as follows:-

LT1: 6.3V at 6A; LT2: 6.3V at 0.5A;
LT3: 6.3V at 3A; tapped at 5V.

All the valve heaters with the exception of V13 are fed from the LT1 winding, one side of which is earthed. Also fed from this source via the 5 ohm variable resistor RV10 are the two dial lamps 1LP1/2. RV10 provides a means of adjusting the brilliancy of the scale illumination and is located at the rear of the receiver. V13 is fed from the LT2 winding, the centre-tap of which is maintained at a positive potential by the voltage divider R135/R136. This method of supplying V13 eliminates hum in the noise limiter circuit and obviates the need for selection of the valve for use in this position. The remaining l.t. winding is connected to pins 3 and 6 of SKT9 and can be used as a heater supply for a small external unit. Up to 1.5 Amps can be taken from the winding LT3. An associated h.t. supply is also available at SKT9 pins 9 and 12. This supply is unsmoothed and should not be loaded to a greater drain than 15 mA. The unsmoothed voltage is approximately 260V. GS

38. The receiver can be operated from external h.t. and l.t. supplies when an a.c. mains supply is not available. Full details are given later in the Installation chapter.

39. The a.c. mains input is switched in both live and neutral poles by the double-pole MAINS switch S9. The live pole is fused at 1.5A by the cartridge fuse FS1.

GS

Chapter 2

CALIBRATOR DESCRIPTION

List of Contents

List of Illustrations

GS

CALIBRATOR DESCRIPTION

CALIBRATOR CIRCUIT

1. The built-in calibrator unit provides calibration markers at 100 kc/s intervals throughout the entire coverage of the receiver. The high stability of the receiver obviates the need for scale correction each time the receiver is tuned to a new frequency but at the same time it is convenient to have a means of checking rapidly the calibration accuracy so that re-alignment can be carried out immediately if any serious error is noted.

2. The unit employs a 100 kc/s crystal in a tuned-anode circuit in which the pentode screen is used as an anode. Harmonic output is taken from the anode circuit proper via a 10 pF blocking capacitor to an injection probe in close proximity to the anode circuit of V2.

CONNECTIONS

3. Switching of the calibrator is achieved by means of the a.g.c. switch which has an additional position marked C. In this position of the switch, S2a applies full HT1 to the calibrator unit via pin 4 of SKT2. Reduced h.t. is applied in the other positions of the a.g.c. switch to prevent cathode poisoning in the oscillator valve.

4. At the same time that h.t. is applied, a further section of the a.g.c. switch (S2b) returns the cathodes of V1A and V2 to chassis via resistor R16. This action takes the R.F. GAIN control out of circuit and desensitises the r.f. stages to prevent signal breakthrough whilst calibrating. The a.g.c. is switched off by S2d when the calibrator is in use.

STANDARDISATION

5. The 100 kc/s crystal fitted in the calibrator unit is a close-tolerance type in an evacuated envelope with a B7G base. A small air-spaced trimmer is connected across the crystal to permit minor adjustment of the crystal frequency when standardising the calibrator against a standard frequency transmission (MSF, WWV, etc).

6. The crystal should always be standardised before using the calibrator to check scale accuracy. Although a close-tolerance crystal is used, frequency change at the fundamental 100 kc/s is considerably multiplied when calibrating at the higher frequencies in the tuning range.

7. To standardise the crystal, tune to the most convenient standard transmission, switch to C.W. and, with the B.F.O. set to the centre of the i.f. passband, tune the signal to zero-beat. Now turn the a.g.c. switch to C. If the crystal frequency is correct then the calibrator signal will be at zero-beat. If not, adjust the small air trimmer C3, which is accessible through aperture in the top of the calibrator unit adjacent to the crystal holder. Set C3 for zero-beat and under this condition the calibrator is accurately standardised.

GS

CALIBRATOR UNIT
Part 1 Sect.3 Chap.2 Fig.1
(Refer to Master Components List T7374)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C1	33	C4	100					R2	187						
C2	98							R3	276	V1	267	XL1	113		
C3	99	L1	275	PL1	185	R1	217								

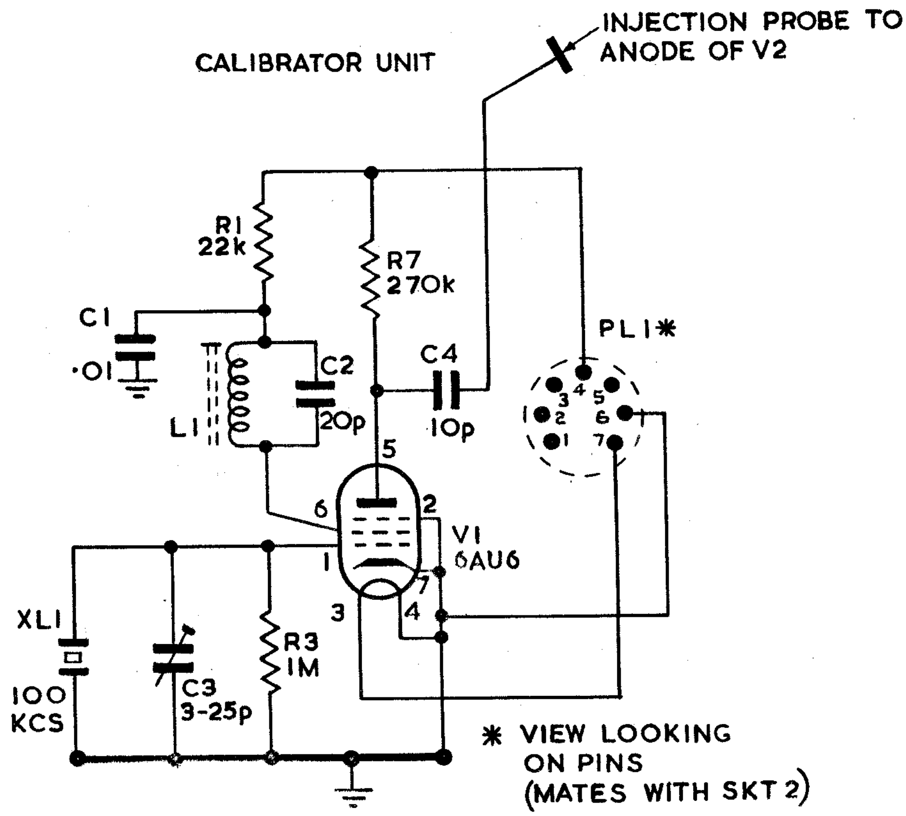


FIG. 1

Calibrator Unit

Chapter 1

OPERATION

List of Contents

GS

OPERATION

It is assumed that the receiver has been installed as described in Section 2, Chapter 1 of this Part 2.

MAINS SWITCH

1. With normal installation the receiver power supply is via the integral unit from the mains supply. The receiver is switched on or off by the bottom right-hand MAINS switch.

2. The MAINS switch is inoperative if the power supply is via an external unit; an external switch is used to control the supply.

3. When the receiver is switched on, the tuning scale is illuminated: set the illumination intensity, by the control at the rear of the receiver, to suit the ambient lighting level of the site.

TUNING

4. Set the MEGACYCLES control to select the range required, as shown in three apertures at the top of the tuning scale.

5. Turn the KILOCYCLES control so that the scale pointer indicates the frequency required, interpolation is provided in the bottom aperture in the tuning scale. The red figures apply to the ranges 2.5 to 3.5 and 3.5 to 4.5 Mc/s only. Set the FINE TUNING index mark to the top and tune in the signal to maximum meter reading, with the a.g.c. switch not at OFF or C.

6. Set the SELECTIVITY switch appropriately to the mode of reception and to the prevailing interference conditions. Adjust the AERIAL TRIMMER control for maximum output.

7. Adjust the R.F, I.F. and A.F. GAIN controls for a convenient output level with minimum background noise.

Calibrator

8. If desired the tuning-scale accuracy can be checked against the calibrator: set the B.F.O. index mark to the top, the mode switch to C.W. and the A.G.C. switch to C. A zero-beat output from the receiver should be obtained at each 0.1 Mc/s point on the tuning scale; allowance for any small discrepancy can be made when setting the KILOCYCLES control to the required frequency. Set the A.G.C. switch to another position to switch off the calibrator.

9. The calibrator itself may need to be set against a standard frequency transmission as described in Part 1, Section 3, Chapter 2, Paragraph 5.

GS

OPERATION

A.M. RECEPTION

10. Tune in the signal with the mode switch at A.M. Set the noise limiter switch NL to the left if impulse noise is troublesome.

11. If to avoid interference, a narrow position of the SELECTIVITY switch has to be used, the loss of high frequencies in the output can be balanced by setting the BASS switch towards MIN. Set the A.G.C. switch to FAST or SLOW according to the signal fading conditions.

C.W. RECEPTION

12. Tune in the signal to zero beat with the mode switch at C.W. and the B.F.O. index marks at the top. Turn the B.F.O. control to each side and select the setting with less interference and the stronger signal.

13. Interference can be further reduced by decreasing the bandwidth, using the SELECTIVITY control, and if necessary by setting the A.F. FILTER switch to the left; correct the tuning as required by adjustment of the FINE TUNING control. Set the A.G.C. switch to FAST or SLOW according to the fading conditions; the FAST position is required for high-speed telegraphy.

S.S.B. RECEPTION

14. Unless the incoming signal is of a level greater than about 5 μV it is necessary to make initial tuning adjustments, not by reference to the tuning meter, but by ear with the A.G.C. switched OFF. This is because the FAST A.G.C. position, which can be used to provide a meter indication on stronger signals, has too great a delay to give a usable indication on weaker signals. In the S.S.B. position of the A.G.C. switch the delay is reduced but at the same time the a.g.c. time constant is increased.

15. Ensure that the A.F. FILTER switch is set to OUT. On receiver Edition -01 set the SELECTIVITY switch to CRYSTAL 2 if the standard 3 kc/s crystal is fitted in this position, otherwise set to 3 kc/s; on receiver Edition -02, for 6 kc/s bandwidth s.s.b. signals, set the switch to 7 kc/s. Advance the R.F. and A.F. GAIN controls fully and control the signal level by means of the I.F. GAIN. An adequate range of control adjustment is found on all but the extremely strong signals when the control range of the i.f. gain can be supplemented by adjustment of the R.F. GAIN.

16. Place the mode switch at A.M. and adjust the KILOCYCLES control for maximum garbled output. Now move the mode switch in turn to the UPPER and LOWER S.S.B. positions: note the position that produces the greater intelligibility and leave the switch in this position. This check is of course unnecessary if the transmitted sideband is known beforehand.

GS

OPERATION

17. If the initial tuning adjustment is made carefully it is possible to resolve the signal by adjustment of the FINE TUNING control. Inability to achieve this end is an indication that the correct tuning point is outside the range of the fine control and a further slight adjustment of the KILOCYCLES control must be made.

18. Once the signal has been tuned to give natural-sounding speech, the A.G.C. switch can be set to S.S.B. and the I.F. and R.F. GAIN fully advanced to secure maximum a.g.c. action. The monitor output can be set to the desired level by adjustment of the A.F. GAIN.

METER ZERO

19. Set the A.G.C. switch to OFF. Adjust the METER ZERO control so that the meter indicates 0. Return the A.G.C. switch to the position in use.

OUTPUT LEVEL

20. The audio level into the 600-ohm line output is adjusted by the LINE LEVEL control.

21. The A.F. GAIN control adjusts the level at the built-in speaker, the external speaker and the telephones. The external speaker is muted when telephones are inserted in the PHONES jack; high-resistance telephones should be used. The built-in speaker is controlled by the MONITOR LS switch.

DIVERSITY OPERATION

This procedure applies to receivers with common-oscillator control.

22. Ensure that the receivers are isolated from remote line desensitising and fine tuning control.

23. Switch off the monitor speaker of the slave receiver and tune the control receiver to the required signal in the normal way.

24. Switch off the monitor speaker of the control receiver and tune the slave receiver to the same signal: both the KILOCYCLES and AERIAL TRIMMER controls function as peaking controls, adjust for maximum meter reading.

25. Balance the control settings on the receivers so that the switches and potentiometers are in corresponding positions.

26. Adjust the LINE LEVEL control on each receiver so that the required audio level is applied to the line output.

Chapter 1

INSTALLATION

List of Contents

List of Tables

List of Illustrations

GS

INSTALLATION

LOCATION

1. The receiver is intended to be mounted on a table or desk; the weight is considerable so that no fixings are required. The dimensions are given in Part 1, Section 1, Chapter 2 but additional space must be allowed at the sides and top so that ventilation is not impended, at the rear for the connections and at the front for access to the controls.

2. The location should be chosen for convenience of the operator and with regard to connection to the aerial, earth, land line and mains or other power supply.

INSPECTION

3. Inspect the receiver for any damage which may have occurred in transit: check that all the sub-chassis are secured firmly, that all plug and socket connections are firmly mated, that all valves and crystals are present and intact and that the movement of all controls is normal.

4. If the receiver is to be powered from the mains supply, check that the strap and input connections are suitable for the supply voltage as in Table 1. The receiver is normally supplied with the connections made for a 240-volt mains supply.

Table 1

Mains Transformer Connections

Voltage	Strap	Input to
100	C & D E & H	C & H
110	C & D F & G	C & G
115	A & B E & H	B & H
125	A & B F & G	A & G
200	D & E	C & H
210	D & F	C & H
220	D & F	C & G

GS

INSTALLATION

Table 1 (Cont'd.)

Voltage	Strap	Input to
230	A & E	B & H
240	A & E	B & G
250	A & F	B & G

CONNECTIONS

Mains Supply

5. Before connecting the mains supply ensure that the panel MAINS switch is at OFF and that the strap and connections on the transformers are made for the supply voltage as in Table 1.

6. The three-core P.V.C. insulated lead should be terminated in a suitable three-pin plug for connection to the local a.c. mains supply. The plug should be wired as follows:-

Red lead to live line.
Black lead to neutral line.
Green lead to earth.

7. A 12-way plug must be mated with SKT9. Pairs of pins 1,4 2,5 and 7,10 must be linked on the plug PL6 as shown on Figure 101 of Section 3, Chapter 1.

8. Power supplies for ancillary equipment may be connected as shown from PL6. The h.t. supply at 260 volts unsmoothed must not exceed 15 milliamperes and the l.t. supply at 6.3 volts must not exceed 1.5 amperes.

External Power Supplies

9. As an alternative to the mains supply, the receiver can be connected to an external power supply capable of providing h.t. at 225 volts 185 milliamperes and l.t. at 6.3 volts 6.8 amperes approximately. External provision must be made for switching and fusing the supplies. The negative h.t. and one of the l.t. leads are connected to earth in the receiver; the h.t. supply is smoothed by the circuit in the receiver power unit.

10. Connect the external supplies to the 12-way plug mating with SKT9 as shown at PL5 on Figure 101 of Section 3, Chapter 1; link pairs of pins 4,7 and 5,8. The current capacity of the l.t. cables must be sufficient to avoid appreciable voltage drop having regard to the length of cable run and the current conveyed; the connection to pin 8 is earthed in the receiver.

GS

Aerial

11. Use 75-ohm coaxial cable to connect the aerial to the plug provided with the receiver. The input impedance is nominally 75 ohms unbalanced but provision is made for satisfactory operation with other impedances.

Earth

12. This terminal should be taken to a suitable earthing point via a short direct heavy gauge conductor. In installations where the supply source includes an earth leakage trip, a check should be made to see that the operation of the trip is not affected by the direct earth connection.

Loudspeaker

13. If required, an external 2.5 to 3-ohm loudspeaker can be connected to the two quick-release terminals marked 2.5 OHMS. This loudspeaker is switched off when telephones are inserted in the PHONES jack on the receiver panel.

Telephones

14. If loudspeaker reception is not required, telephones can be plugged into the jack socket at the left hand side of the front panel. Although the output impedance is nominally 2,000 ohms, the circuit arrangements are such that higher or lower impedance 'phones can be used quite satisfactorily.

Line Output

15. Connection is made to the quick-release terminals marked 600 OHMS. If a balanced output is required, the middle terminal CT should be connected to earth.

I.F. OUTPUT

16. Connection should be made by means of a standard BNC coaxial plug terminating a 75 ohm coaxial line. The output available is an unrectified i.f. signal at 500 kc/s and may be connected to a suitable f.s.k. adaptor or other ancillary equipment.

Audio Input

17. If it is desired to use the audio section of the receiver to amplify audio signals derived from an external source, such signals can be introduced at JK1 using a standard GPO jack plug, the sleeve of which is the earth connection. Insertion of the plug automatically disconnects the audio output from the a.m. detector so that interference from received signals is avoided. The BASS switch and both a.f. gain controls function normally when the receiver is used in this way; the mode switch must be set to A.M.

GS

Remote Fine Tuning

18. Remove the normal link from between terminals G and E. Connect these terminals via a pair of lines to the remote point.

19. At the control point connect the line from terminal E, earth, to the junction of two 4.5 or 6-volt batteries connected in series. Connect a 10,000-ohm linear potentiometer across the batteries and the slider of the potentiometer to the line from terminal G.

20. Set the potentiometer to mid-travel while the receiver is being tuned to a station; subsequent adjustment of the potentiometer should give compensation for any normal drift in receiver or transmitter frequency.

21. The current drain from the batteries is very small so that the circuit need not be switched: periodically check the batteries for electrolyte seepage.

Desensitising

22. Remove the normal link from between terminals D and E. Connect a switch, or relay contacts for remote operation, across these terminals. The receiver is desensitised when the switch, or contacts, are open and should function normally when the circuit is completed between terminals D and E.

DIVERSITY OPERATION INTERCONNECTIONS

23. Receivers can be used with either independent or common-oscillator control to provide an extremely flexible high-stability diversity system. Fig.1 shows a pair of receivers interconnected with common-oscillator control for use as a single-channel diversity installation. Audio outputs can be combined as shown; the 150-ohm loading resistors are $\frac{1}{2}$-watt rating, or an external transformer having three separate 600-ohm windings can be used.

24. The A.G.C. terminals are connected by screened lead, the braid of which is earthed to the terminals E.

25. If desensitising is required, connections to the control switch or relay should be taken as shown. If this facility is not required, the D and E terminals must be strapped together.

26. Interconnect the two second mixer cathodes to provide common injection from the second local oscillator unit in the control receiver:

(a) Remove the cover from the r.f. section in the slave receiver. Remove plug PL3 and tie it securely to the adjacent cable of PL2; ensure that the plug cannot make contact with the chassis. Replace the cover.

GS

(b) Use a convenient length of 75-ohm coaxial cable to interconnect sockets SKT6 in the receivers: this cable is run along the left-hand side of the r.f. cover and through the outlet escutcheon of each receiver. Terminate each end of the cable with a coaxial plug, Belling-Lee Type L734 and mate the plugs to the sockets SKT6.

27. Remote fine tuning, if required, is connected as for a single receiver to the control receiver terminals G and E shown in Fig.1. With independent-oscillator control, remote fine tuning cannot be used: when not used link terminals G and E.

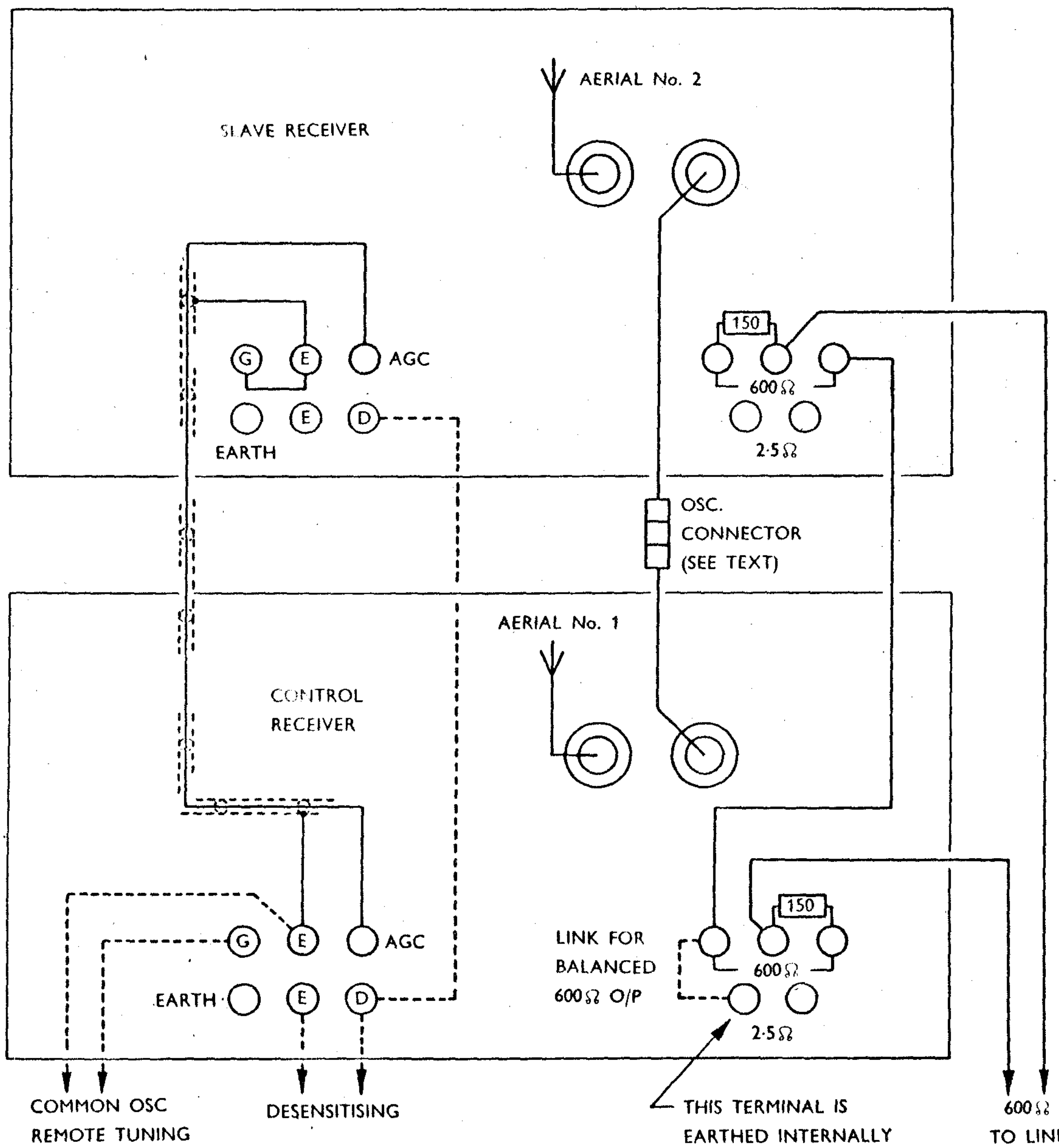


Fig.1 Interconnections for Dual Diversity Operation

GS

Chapter 2

MAINTENANCE

List of Contents

List of Tables

GS

MAINTENANCE

MECHANICAL

1. As with any piece of electronic equipment, periodic dust removal should be carried out, taking care not to disturb any of the preset adjustments.

2. All switches used in the receiver are of the self-cleaning type and should therefore require no attention. All moving parts are lubricated with a permanent lubricant, molybdenum disulphide, so that regular lubrication is entirely unnecessary. If after the adjustment has been in use for a considerable period of time, it is felt that additional lubrication is necessary, this can be carried out with any light mineral oil suitable for the temperature conditions under which the receiver is operated.

3. External connections, especially telephone leads should be checked from time to time to ensure that reliable connections are made.

Tuning Scale and Glass

4. The dial glass can be removed by taking out the four Phillips retaining screws at the corners of the dial escutcheon. Clean the glass in the normal way and take care not to finger-mark the rear of the glass after cleaning.

5. The scale plate can be cleaned by dusting lightly with a soft-lint-free cloth which has been very slightly moistened with warm water. Rub over the plate with a dry cloth to remove all traces of moisture before the dial glass is replaced.

DISMANTLING

Calibrator Unit and R.F. Cover

6. Disconnect the B7G connector from SKT2. Remove the four 4BA cheese-head screws. Remove the calibrator unit carefully to avoid damage to the probe projecting from it.

7. Removal of the r.f. cover can be accomplished without removing the calibrator unit. Unplug the B7G connector and remove the nine 4BA pan-head screws to allow the r.f. cover, complete with calibrator to be lifted clear. Slots are provided in the sides of the cover to accommodate the various cables which enter the r.f. section from the other units. Take care not to damage the probe of the calibrator unit.

Tuning Platform

8. First remove the r.f. cover (complete with calibrator) and disconnect the two oscillator output leads at their sockets on the central chassis assembly.

9. The tuning platform is attached by means of C-washers to four carrier bushes which are fitted on the four threaded rods driven by the helical gear mechanism. To release the platform, first set the main tuning control to centre scale and then remove the four C-washers. Underneath each is a plain washer and a spring washer; these should be carefully removed and stored with the C-washers until required for replacement. The platform can now be lifted clear, taking care not to exert any lateral strain which could distort the core support rods. Place the platform on blocks to avoid the possibility of damage to the core assembly while the platform is out of the set.

10. If the platform is to be out of position for any length of time, as for example in the case of removing one of the central chassis, secure the carrier bushes to the threaded rods so that their relative positions are not disturbed; small pieces of adhesive tape can be used for the purpose but a check should be made that no deposit of foreign matter is left on the threads when the tape is removed. If for any reason, the initial settings are lost, the carrier bushes can be re-positioned by checking the height of the top of the threaded rods above the platform. The measurement should be made from the two small plates on top of the platform and should be $\frac{7}{8}$ inch when the tuning is set to centre scale; great care should be taken to see that all bushes are at the same relative height since any slight error will distort the platform and increase the loading on the tuning control. When the relative heights of the carrier bushes are correct, secure the platform by means of the appropriate washers: replace the spring washer first, followed by the plain washer and then the C-washer.

11. A final check should now be made on the depth of penetration of certain cores associated with the permeability tuning system. Actual measurements are given in Section 3, Chapter 1, Paragraph 34 and it will be noted that the cores in question are not used for alignment in the normwal way since they are associated with certain coils which are employed on more than one range (i.e. alignment is by means of the appropriate trimmers).

PART REPLACEMENT

Dial Lamps

12. Release the two Oddie fasteners at the rear, take off the top cover and then remove the drive cover by taking out the two retaining screws. Lift the drive cover carefully to avoid damage to the lamp-supply connector which must be unplugged to allow complete removal of the cover.

GS

MAINTENANCE

13. To change a bulb, ease back one of the spring contacts, slip out the faulty bulb and fit the replacement. Replace the drive cover and the top cover.

Fuse

14. Unscrew the fuse holder located at the rear of the receiver on the left-hand side. Use a 1.5-ampere thermal-storage delay fuse for a replacement; two of these are provided in clips located on the platform cover.

15. If the replacement fuse blows immediately the receiver is switched on, or fuses burn out regularly over short periods of operation, checks should be made to ascertain the cause.

Drive Cord

16. In the event of the pointer drive cord either breaking or slipping from the pulley grooves, the procedure outlined below should be adopted. If the cord is unbroken it may be possible to replace it correctly without removing the panel; relevant information can be extracted from the instructions which follow. Disconnect externally the power supply of the receiver.

(a) Remove the top cover, drive cover and bottom cover.

(b) Slacken the four $\frac{1}{4}$" BSF Allen screws which are located behind the panel handles. Remove the shaped side covers.

(c) Remove the Allen screws completely and take off the panel escutcheon.

(d) Remove the finger plate as follows:-

(i) Remove all control knobs.

(ii) Remove all switch rings and any control nuts for which no clearance is provided in the finger plate. Remove the meter after disconnecting the leads at the rear.

(iii) Take out the four Phillips screws at the corners of the dial escutcheon so that this can be removed complete with the glass window.

(iv) Remove both panel handles.

(v) Lift the finger plate away from the front panel.

GS

(e) Locate the flexible coupler which joins the two extension spindles for the AERIAL TRIMMER control. Slacken the two screws which secure the coupler to the shorter of the two spindles.

(f) Unplug the six connectors situated at the rear of the lower edge of the panel.

(g) Free the MAINS switch from its fixing hole and position it clear of the panel.

(h) Take out the six panel-retaining screws and remove the panel.

(j) Remove the scale plate and right-hand wave dial to reveal the complete drive cord mechanism.

(k) Remove the old drive cord. Turn the KILOCYCLES control to its fully clockwise position, end of rotation.

(l) Secure the new cord to the left-hand drive pulley with the 8BA screw; press the cord into the pulley slot and wind approximately four turns in a counter-clockwise direction.

(m) Take the cord across to the left-hand guide pulley; pass the cord under the pulley, clockwise round the pulley and across towards the jockey pulley at right-hand side.

(n) Pass the cord over and clockwise round the jockey pulley and back across towards the right-hand drive pulley.

(p) Press the cord into the pulley groove, wind approximately one turn counter-clockwise, press into the slot and secure to the 8BA screw. Apply sufficient tension to the cord in operations n and p to cause the jockey pulley to take up a position slightly to the right of vertical.

(q) Operate the drive over full traverse and check that the cord runs smoothly in the pulley grooves.

(r) Replace the right-hand wavechange dial and scale plate.

(s) Turn the KILOCYCLES control to fully clockwise position, end of rotation.

(t) Fit the pointer at the right-hand end of the scale in line with the last calibration mark. Check for smooth and complete pointer travel.

(u) Refit the panel, covers, etc. by carrying out operations a to h in reverse.

Crystals

17. The two dual crystals XL1 and XL2 used in the bandpass filters are standard envelope types on B7G type bases. When replacements are fitted it is important to replace the screening cans and to ensure that the crystal unit with the closer crystal spacing is inserted in the left-hand socket as viewed from front. Re-alignment of the crystal coil and phasing capacitor is required when crystal units are changed; refer to Section 3, Chapter 1, Paragraphs 10 and 11.

18. The ten crystals XL3 to XL12 employed in the first Local Oscillator Unit are standard Style 'D' units. They are positioned in two rows of five crystals to the left of V6 and V7 see Section 3, Chapter 1, Fig.C. Correct positions for the crystals are:- top row, reading from left to right 17, 13, 11, 16 and 14 Mc/s, bottom row, 5, 6, 8, 10 and 12 Mc/s; the trimmer of any replaced crystal must be adjusted as in Section 3, Chapter 1, Paragraph 24. The s.s.b. carrier oscillator crystals XL13 and XL14 are located in the c.w./s.s.b. screening can on the left-hand sub-chassis see Fig.A, Section 3.

VALVE REPLACEMENT

19. Of the valves visible on removing the top cover, all except the two output valves can be removed without using an extraction tool; these two valves, V19 and V20, can be taken out quite easily with a suitable extraction tool. The c.w./s.s.b. detector oscillator valves V17 and V23 are located in a screening can on the left-hand sub-chassis. Replacement of the valves in the two local oscillator units is a little more involved but should present no difficulty if the instructions given below are carefully followed. The wired-in diode (V14), which is located beneath the i.f. chassis is accessible when the cover is removed.

20. When working on the first or second oscillator units, valve V6, V7 or V8,V9, avoid dropping screws or metal pieces into the gap between the inner and outer boxes: such material is likely to short circuit between the boxes and impair their screening properties.

First Local Oscillator Valves V6 and V7

21. Remove the right-hand shaped side cover to gain access to the alignment plate: slacken off the three 2BA screws at the rear of the cover and the two ¼-inch BSF Allen screws situated behind the panel handle. The cover is provided with slots which locate with the fixing points and allow it to be lifted clear without removing the screws completely.

22. Remove the alignment plate in the right-hand side plate by taking out the single screw and sliding towards the rear of the receiver.

GS

23. Remove the seven 6BA screws and remove the outer cover of the double-screened box by sliding it out from under the flange at the lower edge. This reveals the inner cover which is removed in the same way.

24. With the inner cover removed, the turret lugs, to which the valve connections are soldered, are clearly visible. V6 is above V7 when the crystals lie to the left of the valve positions.

25. Note the orientation of the lead-out wires of the faulty valve which is removed by unsoldering the connections to the turret lugs and withdrawing the valve from its clip.

26. When fitting the replacement valve, soldered connections must at least be 5mm from the glass seal and should be made using a thermal shunt; bends in the lead-out wires must be at least 1.5 mm from the glass seals. Valve connections are as follows:-

1.	G1	5.	A
2.	K, G3	6.	H
3.	H	7.	G2
4.	K, G3	8.	K, G3

27. When the replacement has been soldered in position, check the receiver before replacing the unit covers, alignment plate, etc. The crystal frequencies need not be adjusted after replacement of valve V6 but if valve V7 is changed the output inductors must be adjusted as in Section 3, Chapter 1, Paragraphs 25 to 28.

Second Local Oscillator Valves V8 and V9

28. These valves are inside the upper of the two double-screened boxes at the right-hand side of the receiver. First remove the four screws which secure the outer cover. There is some resistance in lifting the cover from the unit due to the sprung earthing strip along the inside edges.

29. Two inner covers are visible, one being hinged at the centre where the two covers meet. The hinged cover can be lifted after removing the two screws securing the strip carrying the feed-through capacitors and taking off the push-fit front cover. V8 is located beneath the front cover and V9 beneath the hinged cover. When lifting the rear cover, remove PL3 from SKT5 and feed the coaxial output lead through the hole in the left-hand side of the outer box and the hole in the inner cover so that the cable receives no strain when the cover is lifted.

30. Both V8 and V9 are secured by clips and these should be carefully replaced whenever a valve is changed.

31. In replacing the covers, do not omit to replace the two screws holding the feed-through strip and ensure that the edges of the outer cover and front inner cover which carry no earthing strip are towards the rear of the receiver.

GS

32. After replacement of valve V8, check the calibration accuracy; if necessary the calibration can be reset as in Section 3, Chapter 1, Paragraphs 17 to 22.

A.M. Detector Valve V14

33. Invert the receiver and remove the twelve 2BA screws securing the bottom cover. Remove the cover and identify valve V14, a sub-miniature wired-in diode near the side of the chassis.

34. Use the precautions as in Paragraph 26 when soldering the connections of the replacement valve. The connections are 1 and 4 heater, 2 and 5 anode and 3 cathode. Replace and secure the bottom cover.

FAULT LOCATION

35. Faults falling in the categories 'loss of output', 'low sensitivity' and in some cases 'faults of an intermittent nature' may be localised by application of straightforward signal-tracing techniques. The sectional construction of the receiver is convenient for fault location by this method.

36. Check that the inter-unit connectors are properly mated and that the various links, including those in PL5 or PL6, are correctly made. A careful visual check of the wiring may reveal a broken or shorting lead and save considerable time in fault location. The Inter-unit Connection diagram Fig.102 shows specific leads in the various cableforms which link the different units.

Audio Section

37. Check the audio section by introducing an a.f. signal at JK1. The output on both line and monitor channels and the operation of the BASS switch and GAIN controls should be the same as with a normal signal derived from either of the detectors.

38. Set the mode switch to A.M. and apply a signal at 1000 c/s and 7 mV level to JK1. The output at the 2.5-ohm terminals should be 50 mW into 2.5 ohms with the A.F. GAIN at maximum and the BASS switch at MAX. The output into the 600-ohm line should be approximately 1 mW with the LINE LEVEL control at maximum. Disconnect the audio input.

Detectors

39. Lack of output in any one position of the mode switch gives an indication of the stage or stages which is/are faulty. If there is no output in the A.M. position, the fault is in the mode switch wafer S5d or the circuitry associated with valves V13A, V14 and V16B. The diode V13A can be checked by placing the N.L. switch to OFF. V16B can be checked by placing the N.L. switch to OFF. V16B can be excluded if the audio section is known to be functioning normally with a signal introduced at JK1.

40. If the receiver functions normally in the A.M. and C.W. positions but fails to operate in both S.S.B. positions, the fault is in the mode switching, the range switch wafer S1r or may be caused by failure of V23. Failure to operate in one of the S.S.B. positions may be due to a fault in the mode switching, including S1r, or may be due to a defective crystal XL13 or XL14.

41. When operation is normal in the A.M. and S.S.B. positions but no output is obtained when switched to C.W. suspect lack of HT3 to V17B, to the B.F.O. potentiometer RV7 or an open circuit in the mode switching wafers S5a or S5d.

42. The c.w./s.s.b. detector unit as a whole can be suspected if operation is normal on A.M. but no output is obtained in the C.W. and S.S.B. positions.

Second Intermediate Frequency Section

43. Apply a modulated signal at 500 kc/s and 1 μV level to TP1 adjacent to valve V5. With the I.F. and A.F. GAIN controls at maximum, the A.G.C. and N.L. at OFF add the BASS switch at MAX. the 2.5-ohm output should be 50 mW. approximately.

First Intermediate Frequency Section

44. Disconnect the first local oscillator output from SKT3 and apply instead a modulated signal at 3 and 4 Mc/s at 5 μV level via a .01 μF capacitor. With the receiver tuned to the megacycle point in the centre of an odd and even range respectively the output should be 50 mW as before; if there is no output the fault may be in the first i.f. section or there may be no output from the second local oscillator.

Second Local Oscillator

45. Reconnect the first local oscillator output and disconnect the second local oscillator. Connect the signal generator at 75 ohms impedance to SKT5 at 100 mV level; with the normal aerial connected tune the receiver over a range, tuning the generator over the range 3 to 4 Mc/s at the same time, in the reverse direction to the receiver r.f. tuning (except on Ranges 3 and 4). If normal reception is made, the fault is in the second local oscillator.

First Local Oscillator

46. The correct function of this oscillator is checked by a procedure similar to Paragraph 45: connect the signal generator via a .01 μF capacitor to SKT3 at 500 mV level to simulate the fixed-frequency output required for the range being tuned. If normal reception is made, the fault is in the first local oscillator; otherwise if all the above checks are positive, the fault is in the r.f. section.

GS

Radio Frequency Section

47. If the fault has been traced to this section remove the underside rear cover of the r.f. sub-chassis to gain access to the valve base connections and apply a signal at the radio frequency to the grid of each valve in turn to localise the fault.

CIRCUIT VOLTAGE

48. Table 1 gives the d.c. voltages which should be obtained at the various valve electrodes with the receiver functioning normally. The voltages are measured to chassis on a 20,000 ohm/volt instrument, such as Avometer Model 8, a tolerance of ±10% is permitted.

49. Set the controls as follows:-

MEGACYCLES	Range 15, 14.5 to 15.5 Mc/s
Mode switch	A.M.
A.G.C. switch	OFF
R.F. & I.F. GAIN	Minimum
FINE TUNING and B.F.O.	Centre.

Disconnect the aerial and ensure that the desensitising and remote tuning links are in position.

50. First check the h.t. voltages:

HT1	HT2	HT3	HT4	across C158
225V	165V	108V	108V	260V

Measure the supply voltage and ensure that the connections on the mains transformer are suitable.

MAINTENANCE

Table 1

Circuit Voltages

Valve	Anode Voltage	Screen Voltage	Cathode Voltage
V1A	95	-	1.25 a
V1B	180	G1 :93	95
V2	215	42 b	0.27 c
V3	174	19	0.26
V4	202	75	0.7
V5	177	19	0.23
V6	64	97	0
V7	94	88	1.0
V8A	26 d	-	0.12
V8B	100	76	0
V9	187	-	5.2
V10 & 11	207	88 e	1.35 f
V12	195	195	1.42
V13A	-	-	-
V13B	-	-	15 g
V14	-	-	-
V15A	168	-	2.0
V15B	172	-	2.0
V16A	210	-	3.7
V16B	115	-	2.5
V17A	60	50	1.0
V17B	40	-	1.0
V18A & B	77	-	3.5
V19	215	208	9.5
V20	217	212	10.5
V21 & 22	108	-	-
V23A	70	-	4.3
V23B	70	-	4.3

a. 8.6V with R.F. GAIN at minimum.
b. 57V with R.F. GAIN at minimum.
c. 8.3V with R.F. GAIN at minimum.
d. 20-32V for full swing of FINE TUNING control.
e. 202V with I.F. GAIN at minimum.
f. 30V with I.F. GAIN at minimum.
g. 6V with A.G.C. switch in S.S.B. position.

51. With the mode switch at C.W. the diode control voltage, measured across resistor R102a, should be 11 to 26 volts over the range of the B.F.O. control, 15 volts at the centre.

GS

Chapter 1

RE-ALIGNMENT

List of Contents

List of Tables

List of Illustrations

RE-ALIGNMENT

TEST EQUIPMENT

1. To perform the adjustments described in this chapter, the following test equipment and tools are required:-

Signal generator 500 kc/s to 30 Mc/s.
Valve voltmeter, 5V f.s.d.
Output meter 2.5 to 3Ω 50 mV.
Neosid HS1 trimming tool
Screwdriver trimming tools, medium and narrow blades
5/64 inch diameter tommy bar.

SECOND INTERMEDIATE FREQUENCY AMPLIFIER

General

2. All the inductor cores have hexagonal holes and are adjusted with the Neosid HS1 tool. The location of all the inductors is shown on Figure A which shows also whether the upper winding is the primary or secondary; the lower winding in each case is the secondary or primary respectively and its core is adjusted by passing the Neosid tool right through the upper core. All cores are self-locking.

3. In adjusting the i.f. transformers, two points of resonance can be obtained with each core: the correct one to use is that which occurs when the core is further from the opposite core. The one exception is the top, secondary core of T8 which is adjusted to the inner peak.

4. Slacken the two $\frac{1}{4}$-inch BSF Allen screws behind the left-hand panel handle and the three 2BA screws at the rear and remove the left-hand side cover. This gives access to the two crystal-phasing capacitors C87 and C88 and the cores of inductors T2 and T3; the latter is adjusted through the core of T2.

Procedure

5. Switch on the power supplies of the receiver, signal generator and valve voltmeter half an hour before making any adjustments, so that temperature equilibrium is established.

6. Disconnect the aerial from the receiver. Connect the signal generator to the test point TP1, adjacent to V5, and disconnect PL3 from SKT5. Connect the valve voltmeter to the i.f. output socket at the rear of the receiver: throughout the procedure reduce the output from the signal generator when necessary so that the valve voltmeter reading does not exceed 1.5 volts.

GS

7. Set the receiver controls:

SELECTIVITY	CRYSTAL 1
Mode switch	A.M.
I.F. GAIN	Fully clockwise
N.L. and A.G.C.	OFF.

8. Set the generator to give an unmodulated output and adjust the frequency around 500 kc/s for maximum valve voltmeter reading: this must be very carefully adjusted if a 1 kc/s crystal is fitted in the CRYSTAL 1 position in the receiver. Check the frequency adjustment from time to time during the alignment to take up any relative drift.

9. Adjust the transformer cores, as in Paragraph 3, from the primary of T1 to the secondary of T8, each for maximum valve voltmeter reading.

10. Tune the generator frequency carefully through the i.f. band and note if the response is symmetrical; if it is asymmetrical adjust capacitor C87 to give equal response at ±3 kc/s and again check for symmetry.

11. Set the receiver SELECTIVITY switch to CRYSTAL 2 and adjust the generator frequency to the centre of the two crystal peaks. Adjust the core in T3 for maximum reading on the valve voltmeter. Detune by equal amounts as before and adjust C88 if necessary in the same manner as C87. T3 may require very slight re-adjustment after adjusting C88.

12. Check also for symmetrical response in the other positions of the SELECTIVITY switch: in the BROAD position a small adjustment of T8 secondary core, and possibly of T1, may be required to produce a flat top of the response.

Sensitivity

13. It is assumed that the gain of the audio section is normal as in Section 2 Chapter 2 Paragraph 38. Set the SELECTIVITY switch to NARROW, the A.F. GAIN and the BASS switch to maximum and connect the output meter to the 2.5-ohm terminals. An output of 50 mW should be obtained with the generator supplying approximately 1 μV, modulated 30% at 400 c/s and tuned to the centre of the band.

14. To trace any lack of sensitivity the same output should be obtained with the generator supplying 4 μV via C94 to V10, 60 μV via C102 to V11 or 1.2 mV directly to the grid of V12.

BEAT FREQUENCY OSCILLATOR

15. Set the MEGACYCLES range switch to Range 4, 3.5 to 4.5 Mc/s or any higher odd range. Set the mode switch to A.M, the SELECTIVITY to CRYSTAL 1 and the A.G.C. switch to FAST. Set the white mark on the B.F.O. control to the top after checking that this is mid-travel on the control.

GS

16. With the signal generator connected to TP1, tune the frequency around 500 kc/s for peak reading on the CARRIER level meter. Set the mode switch to C.W. and adjust L25, near V13 see Figure A, for zero beat output.

SECOND LOCAL OSCILLATOR

17. Remove the right-hand side cover by a similar procedure to Paragraph 4. Remove the outer top cover of the oscillator unit. Do NOT alter the adjustment of Filters C and D.

18. Switch on the receiver and allow about 15 minutes for thermal stability to be established. Standardise the calibrator against a standard frequency transmission as in Part 1, Section 3, Chapter 2.

19. Set the receiver controls:

MEGACYCLES	2.5 to 3.5 Mc/s
FINE TUNING and B.F.O.	Index marks at the top
Mode switch	C.W.
SELECTIVITY	CRYSTAL 2
A.F. GAIN and BASS	Maximum
A.G.C. switch	C
I.F. GAIN	To provide convenient output.

20. Set the KILOCYCLES control to exactly 3.5 on the tuning scale and adjust C55, see Figure B, using the Phillips tool for zero beat.

21. Set the KILOCYCLES control to exactly 2.5 on the scale and adjust L11, through the side of the screening boxes, for zero beat.

22. Repeat Paragraphs 20 and 21 until no further adjustment is required. Tune across the scale and check that at each 100 kc/s point the beat note is lower than approximately 1000 c/s; if this is not obtained the tuning capacitor is damaged and the receiver should be retuned to the factory for accurate adjustment.

FIRST LOCAL OSCILLATOR

23. It is assumed that the second oscillator is set correctly as in Paragraphs 17 to 22 and that the calibrator is still standardised.

24. Set the KILOCYCLES control to a calibration zero-beat on Range 3, 2.5 to 3.5 Mc/s, then select each of the following ranges: any range giving an audible note requires the adjustment of the corresponding capacitor.

GS

RE-ALIGNMENT

Range	1	2	5	6	8	10	12	18	22	30
Capacitor	C321	C320	C319	C318	C317	C316	C315	C314	C313	C312

The covers of the screening box must be removed as in Section 2 Chapter 2 Paragraph 23 and the location of the capacitors is given in Figure C. Set the respective capacitors to give zero beat against the calibrator signal.

Output Inductors

25. If valve V7 has been replaced the buffer/multiplier output inductors may need adjustment.

26. Connect PL1 to the valve voltmeter on 3-volt range instead of to SKT3. Select each of the following ranges and adjust the respective inductor for maximum reading on the valve voltmeter.

Range	Inductor	Range	Inductor
1	L70	16	L78
2	L71	18	L79
5	L72	20	L80
6	L73	22	L81
8	L74	24	L82
10	L75	26	L83
12	L76	28	L84
14	L77	30	L85

27. Restore the connection of PL1 to SKT3 and set the receiver tuning to 14.7 Mc/s. Remove the underside covers of the first oscillator unit. Connect the signal generator to the aerial socket and apply a signal at 15.3 Mc/s modulated and at sufficient level to be audible in the loudspeaker. Adjust rejector inductor L86 for minimum output.

28. Repeat Paragraph 26 for adjustment of L77 and Paragraph 27 alternately until no further adjustment is required. Replace the oscillator screening covers.

FIRST INTERMEDIATE FREQUENCY AMPLIFIER

29. Connect the signal generator via a .01 μF capacitor to SKT3 in place of the PL1 connection. Switch on the generator and receiver and allow time for establishment of thermal stability. Set the controls as in Paragraph 7 and connect the output meter to the 2.5-ohm terminals. No alteration may be made to the settings of Filter B.

30. With the generator output at 3.0 Mc/s modulated 30% at 400 c/s, tune the receiver and adjust the two 2.5-3.5 Mc/s cores, see Figure A, for maximum output.

31. Change the generator frequency to 4.0 Mc/s, and the receiver MEGACYCLES switch to the 3.5 to 4.5 Mc/s range without disturbing the KILOCYCLES control. Adjust the two 3.5 to 4.5 Mc/s cores for maximum output.

Sensitivity

32. With the conditions of Paragraphs 30 or 31 an output of 50 mW should be obtained with a generator level of 5 µV approximately.

RADIO FREQUENCY AMPLIFIER

33. No alterations may be made to the settings of the aerial Filters A or E. Alignment in this amplifier should only be required for a replaced inductor or capacitor or if the core positions have been disturbed while the tuning platform is removed from the receiver.

34. The cores of the inductors used on Ranges 9 to 30 inclusive are set by measurement. The location of the coils is shown on Figure A. Set the KILOCYCLES control to mid-scale, the cores should then be the following distances from the end of the coil former remote from the tuning platform:

Ranges	Inductors			Distance inches
	First R.F.	2nd R.F.	First Mixer	
9 and 10	L33	L45	L57	1.15/16
11 and 13	L32	L44	L56	1$\frac{7}{8}$
14 to 17	L31	L43	L55	2
18 to 30	L30	L42	L54	1$\frac{7}{8}$

35. Connect the signal generator to the aerial socket and allow time for the generator and receiver to reach thermal stability. Connect the output meter to the 2.5-ohm terminals and set the receiver controls:

SELECTIVITY Switch	NARROW
Mode Switch	A.M.
R.F. I.F. and A.F. GAIN	Maximum
A.G.C.	OFF
Noise Limiter	OFF
BASS Switch	MAX

Set the KILOCYCLES control to mid-scale so that the vernier reads zero.

36. Set the generator to supply a signal modulated 30% at 400 c/s and the frequency appropriate to each range as in Table 1. Adjust the appropriate cores and trimmers for maximum output; the grid reference for the trimmers in Ranges 9 to 30 are shown on Figure A and marked on the receiver. Do not adjust C207 or C263 marked X on Figure A. On Ranges 1 to 8 set the index mark of the AERIAL TRIMMER to the top; on the other ranges the ability of this control to resonate the input circuit verifies the correct setting of inductors L30 to L33.

Table 1

R.F. Tuning Adjustments

Range	Sig.Gen. Freq. Mc/s.	1st R.F. Stage		2nd R.F. Stage		1st Mixer Stage	
		No Trimmers	Core	Trimmer	Core	Trimmer	Core
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8		L41 L40 L39 L38 L37 L36 L35 L34	NIL NIL NIL NIL NIL NIL NIL NIL	L53 L52 L51 L50 L49 L48 L47 L46	NIL NIL NIL NIL NIL NIL NIL NIL	L65* L64 L63 L62 L61 L60 L59 L58
9 10	9 10		L33 +	C229 (A6) C228 (B6)	L45 +	C285 (E6) C284 (F6)	L57 +
11 12 13	11 12 13		L32 +	C227 (C6) C226 (D6) C225 (A5)	L44 +	C283 (G6) C282 (H6) C281 (E5)	L56 +
14 15 16 17	14 15 16 17		L31 +	C224 (B5) C223 (C5) C222 (D5) C221 (A4)	L43 +	C280 (F5) C279 (G5) C278 (H5) C277 (E4)	L55 +
18 19 20 21 22	18 19 20 21 22			C220 (B4) C219 (C4) C218 (D4) C217 (A3) C216 (B3)		C276 (F4) C275 (G4) C274 (H4) C273 (E3) C272 (F3)	

GS

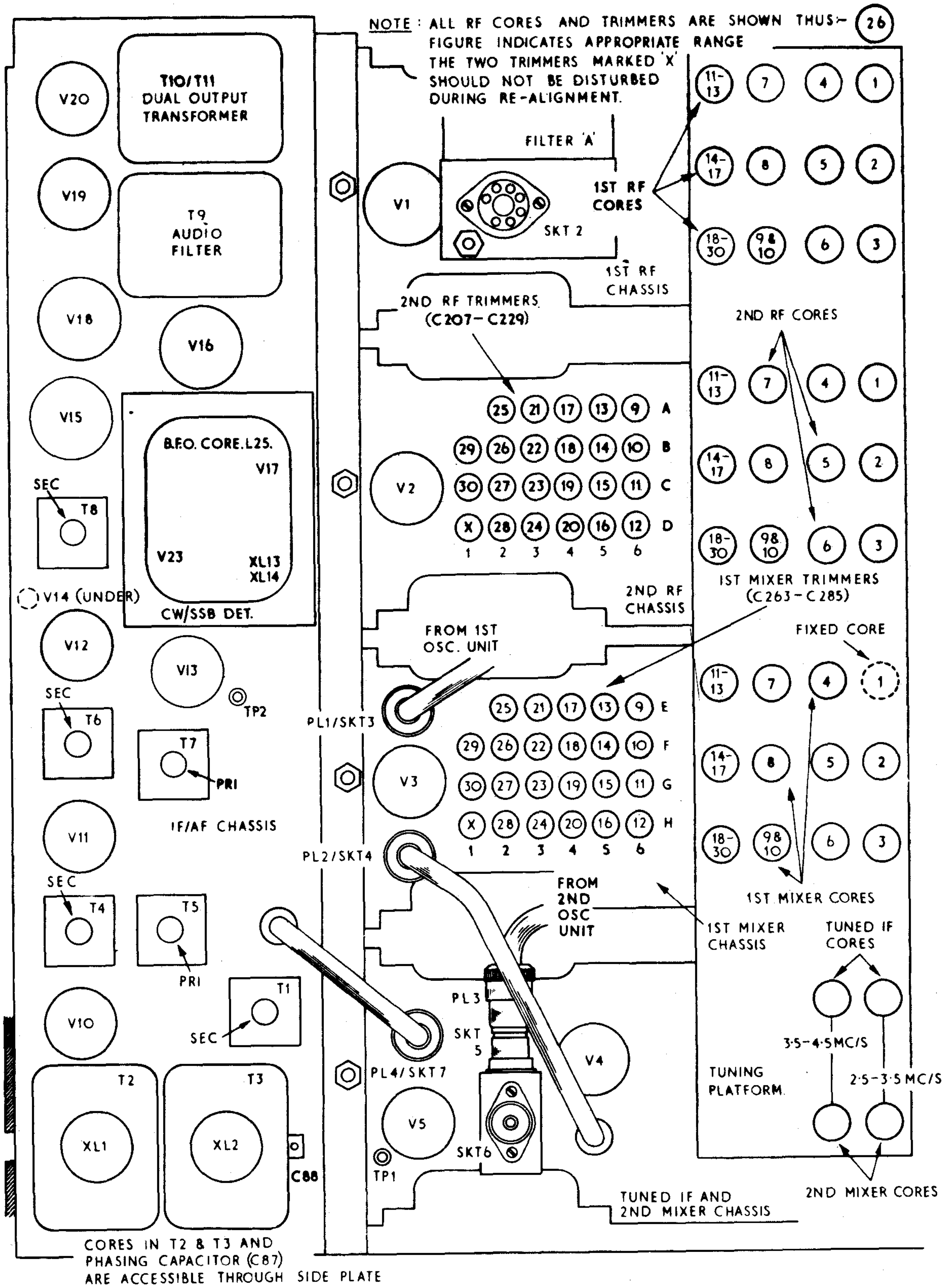
RE-ALIGNMENT

Table 1 (Cont'd.)

Range	Sig.Gen. Freq. Mc/s.	1st R.F. Stage		2nd R.F. Stage		1st Mixer Stage	
		No Trimmers	Core	Trimmer	Core	Trimmer	Core
23	23		L30 +	C215 (C3)	L42 +	C271 (G3)	L54 +
24	24			C214 (D3)		C270 (H3)	
25	25			C213 (A2)		C269 (E2)	
26	26			C212 (B2)		C268 (F2)	
27	27			C211 (C2)		C267 (G2)	
28	28			C210 (D2)		C266 (H2)	
29	29			C209 (B1)		C265 (F1)	
30	30			C208 (C1)		C264 (G1)	

* This core is preset during initial alignment and does not require adjustment.

+ These cores are adjusted by measurement of core position, Paragraph 34.



TOP VIEW LOCATION OF R.F. & I.F.
TRIMMERS & COMPONENTS
HH00-2301M Sh.1

FIG.A

RE-ALIGNMENT

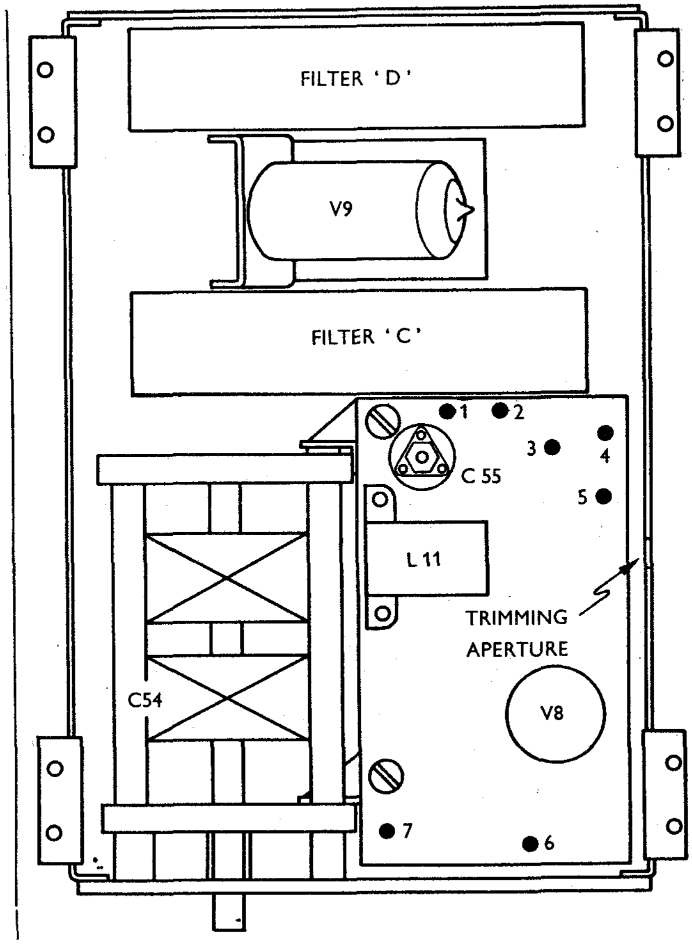
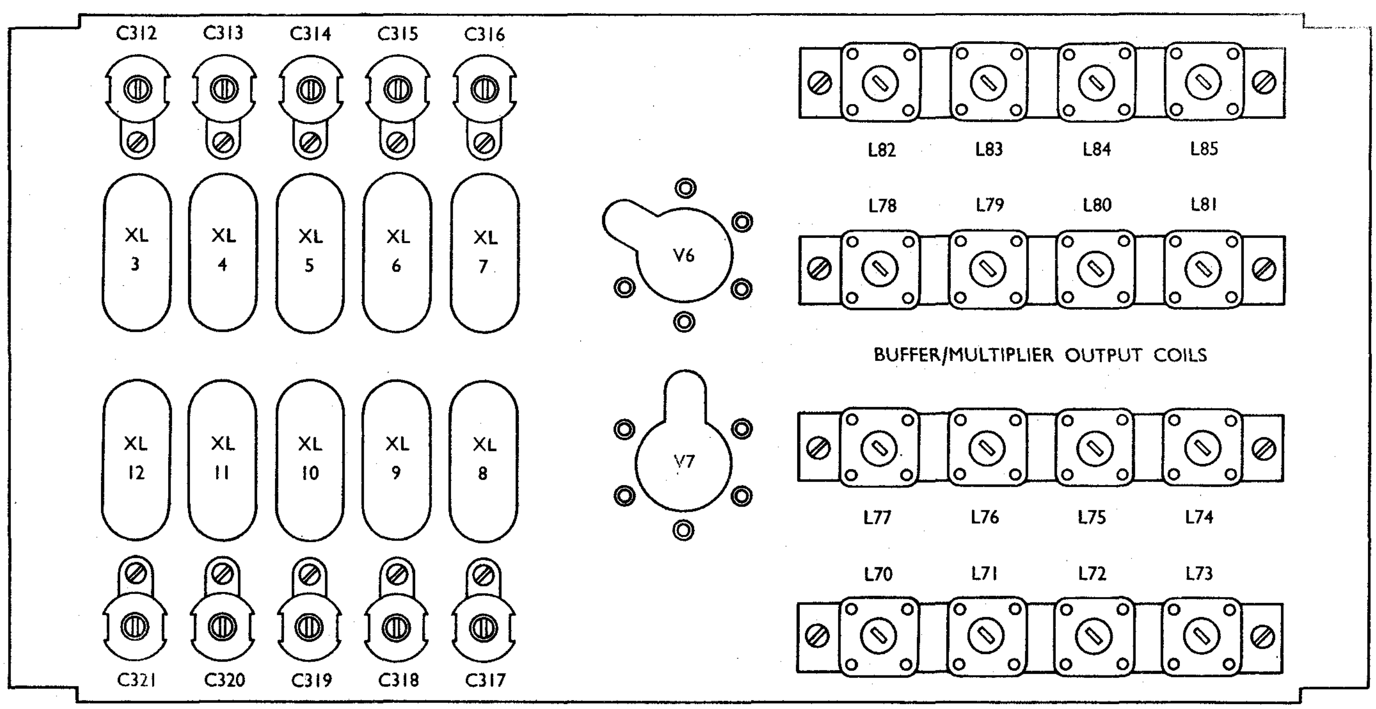


FIG. B

Top View Location of
Second Oscillator Components

FIG. C

Component Location
First Oscillator



GS

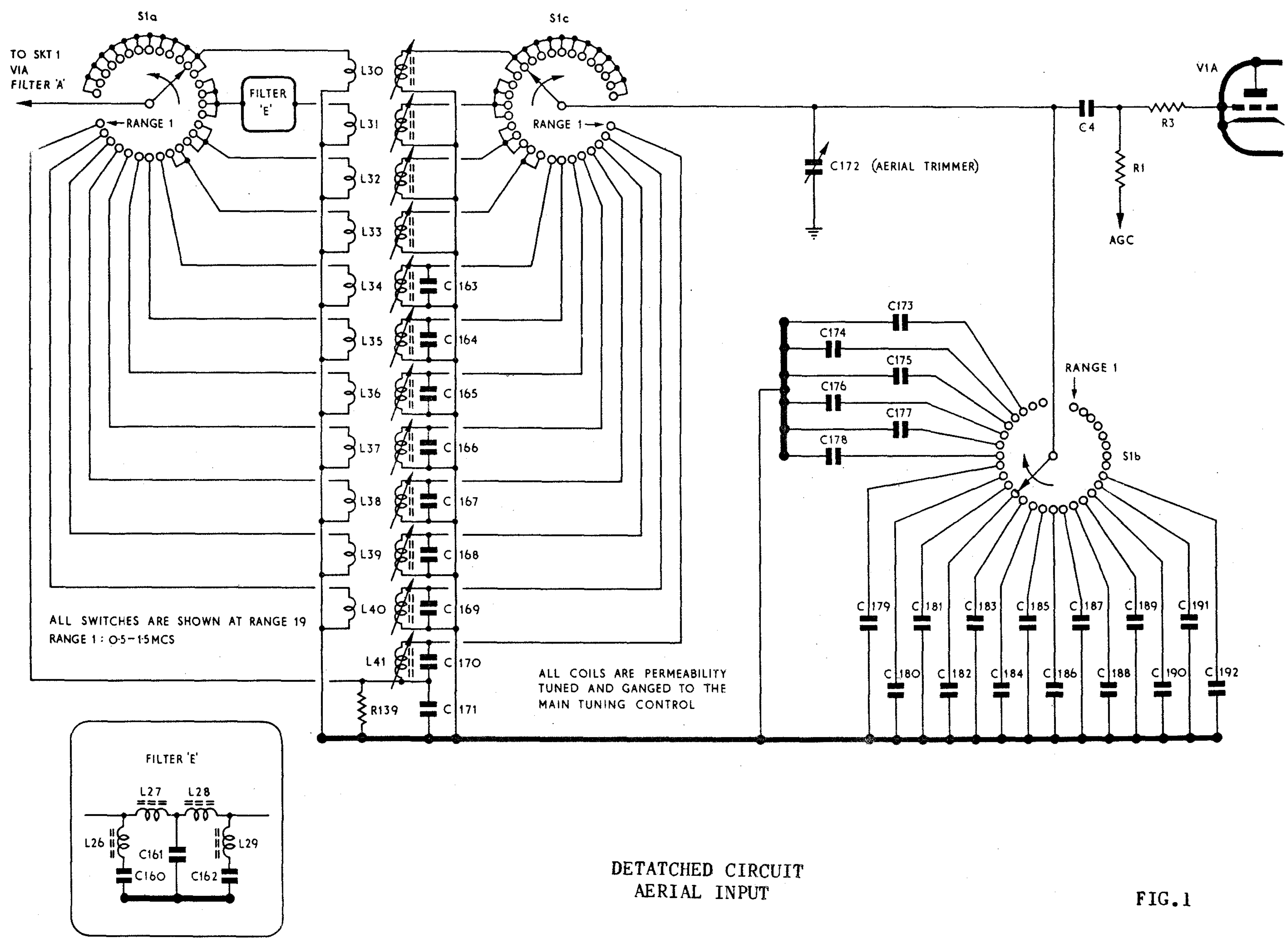
DETACHED CIRCUIT NO.1
AERIAL INPUT
Part 2 Sect.3 Chap.1 Fig.1
(Refer to Master Components List T7374 Issue 1)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C4	10	C167	70	C175	76	C183	80	C191	83	L27	∅2	L35	138		
C160	∅64	C168	71	C176	8	C184	26	C192	84	L28	∅2	L36	139		
C161	∅65	C169	72	C177	26	C185	77			L29	∅2	L37	140	R1	187
C162	∅64	C170	72	C178	77	C186	78			L30	133	L38	141	R2	189
C163	66	C171	73	C179	64	C187	81			L31	134	L39	142	R139	222
C164	67	C172	74	C180	78	C188	78			L32	135	L40	143		
C165	68	C173	75	C181	79	C189	30			L33	136	L41	144		
C166	69	C174	76	C182	30	C190	82	L26	∅2	L34	137				

MISCELLANEOUS ITEMS

Aerial Filter 'E' No.2

∅ Part of Filter 'E'

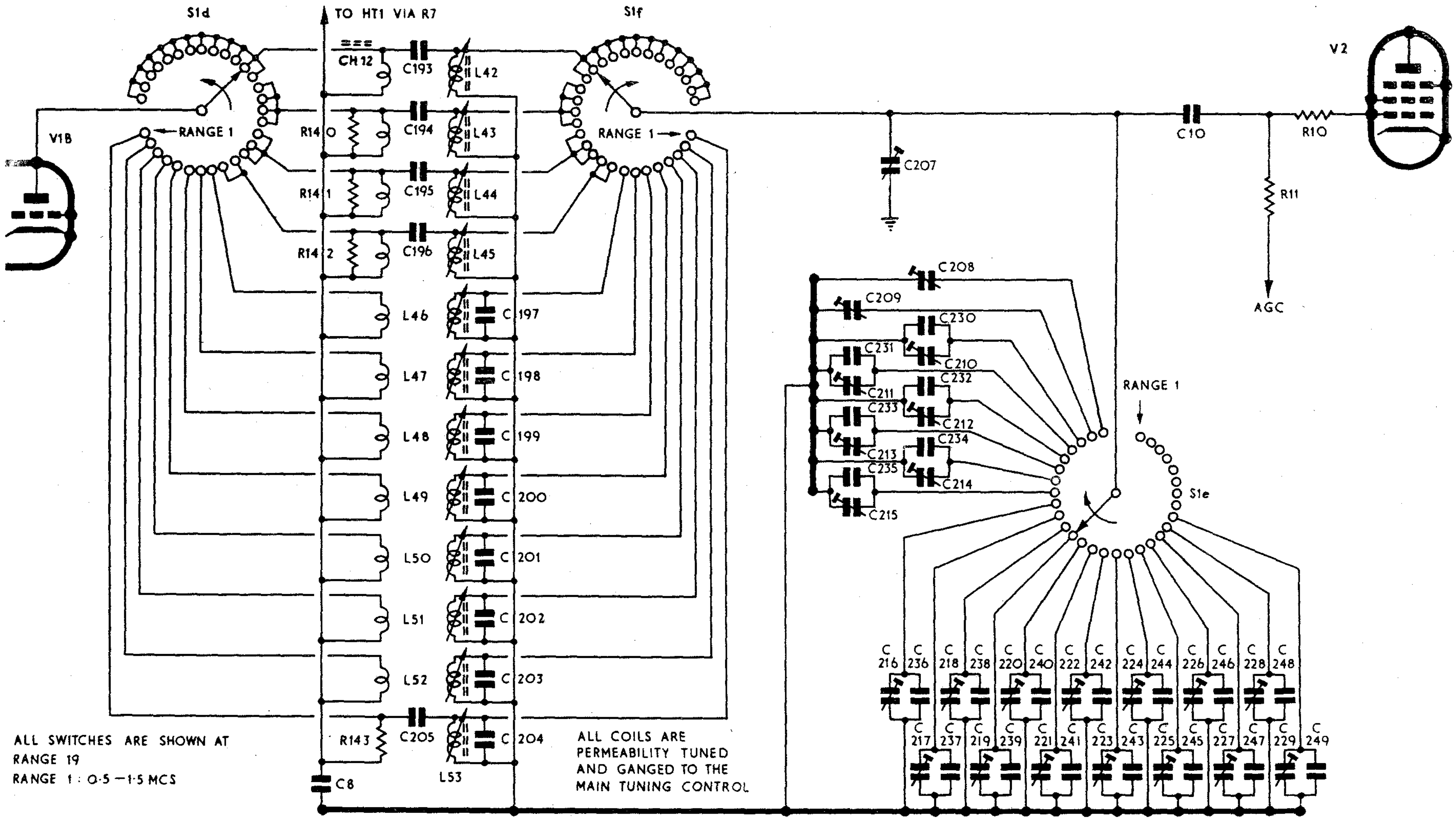


DETATCHED CIRCUIT
AERIAL INPUT

FIG.1

DETACHED CIRCUIT NO.2
1st R.F.COUPLING
Part 2 Sect.3 Chap.1 Fig.2
(Refer to Master Components List T7374 Issue 1)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C10	10	C204	72	C216	88	C228	88	C240	80			L46	149	R11	187
C193	85	C205	87	C217	88	C229	88	C241	26			L47	150	R140	223
C194	85	C206		C218	88	C230	75	C242	77			L48	151	R141	223
C195	86	C207	88	C219	88	C231	76	C243	78			L49	152	R142	223
C196	86	C208	88	C220	88	C232	76	C244	81			L50	153	R143	192
C197	66	C209	88	C221	88	C233	8	C245	78	CH12	105	L51	154		
C198	67	C210	88	C222	88	C234	26	C246	30			L52	155		
C199	68	C211	88	C223	88	C235	77	C247	82			L53	156	V2	255
C200	69	C212	88	C224	88	C236	64	C248	89	L42	145				
C201	70	C213	88	C225	88	C237	78	C249	84	L43	146				
C202	71	C214	88	C226	88	C238	79			L44	147				
C203	72	C215	88	C227	88	C239	30			L45	148	R10	189		

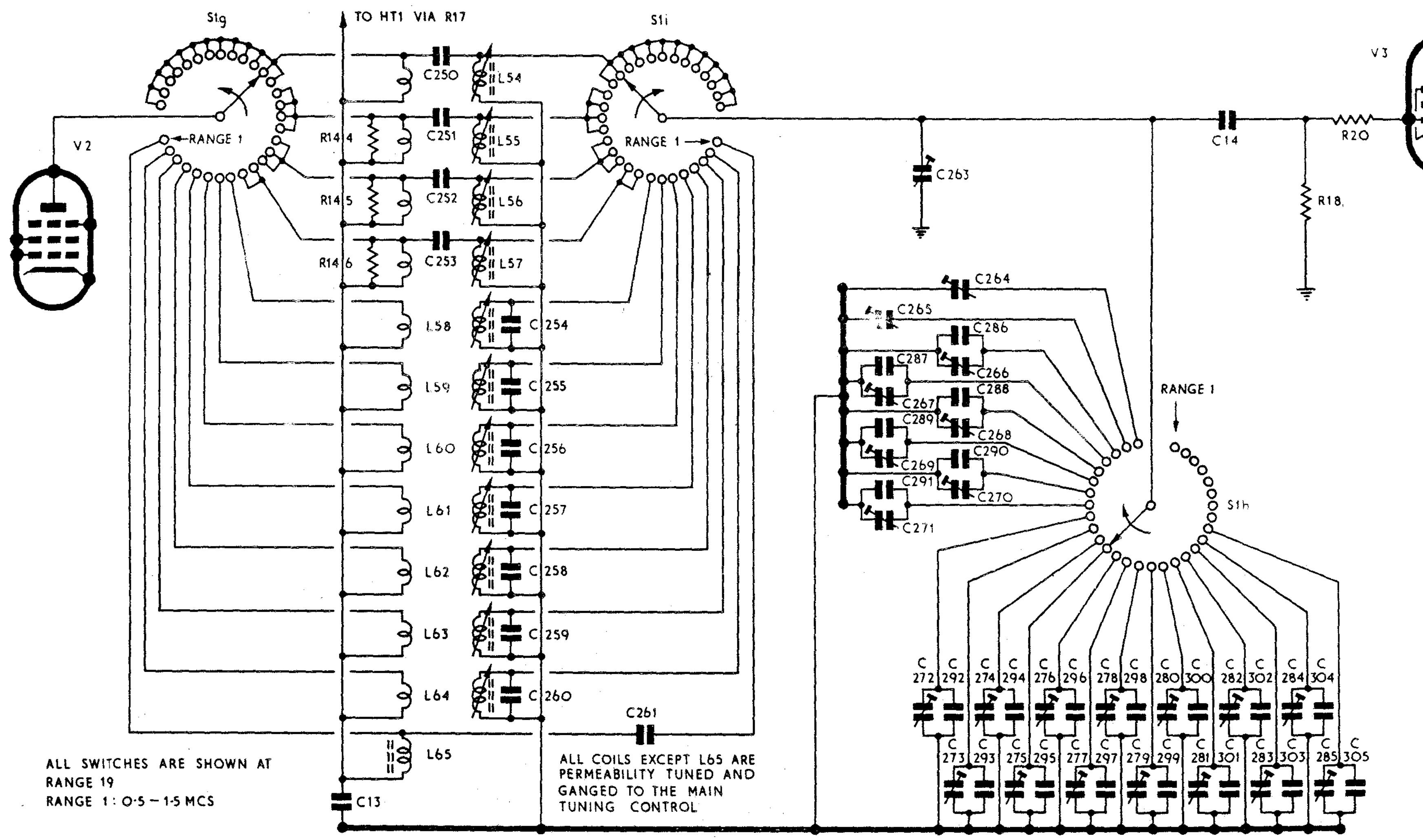


DETATCHED CIRCUIT
FIRST R.F. COUPLING

FIG.2

DETACHED CIRCUIT NO.3
2ND R.F.COUPLING
Part 2 Sect.3 Chap.1 Fig.3
(Refer to Master Components List T7374 Issue 1)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C13	11	C260	72	C273	88	C285	88	C297	26			L62	153		
C14	10	C261	90	C274	88	C286	75	C298	77			L63	154		
C250	85	C263	88	C275	88	C287	76	C299	78			L64	155	V2	255
C251	85	C264	88	C276	88	C288	76	C300	81			L65	157	V3	256
C252	86	C265	88	C277	88	C289	8	C301	81	L54	145				
C253	86	C266	88	C278	88	C290	26	C302	30	L55	146				
C254	66	C267	88	C279	88	C291	77	C303	82	L56	147				
C255	91	C268	88	C280	88	C292	64	C304	89	L57	148	R18	187		
C256	68	C269	88	C281	88	C293	78	C305	84	L58	149	R20	189		
C257	69	C270	88	C282	88	C294	79			L59	150	R144	223		
C258	70	C271	88	C283	88	C295	30			L60	151	R145	223		
C259	71	C272	88	C284	88	C296	80			L61	152	R146	223		

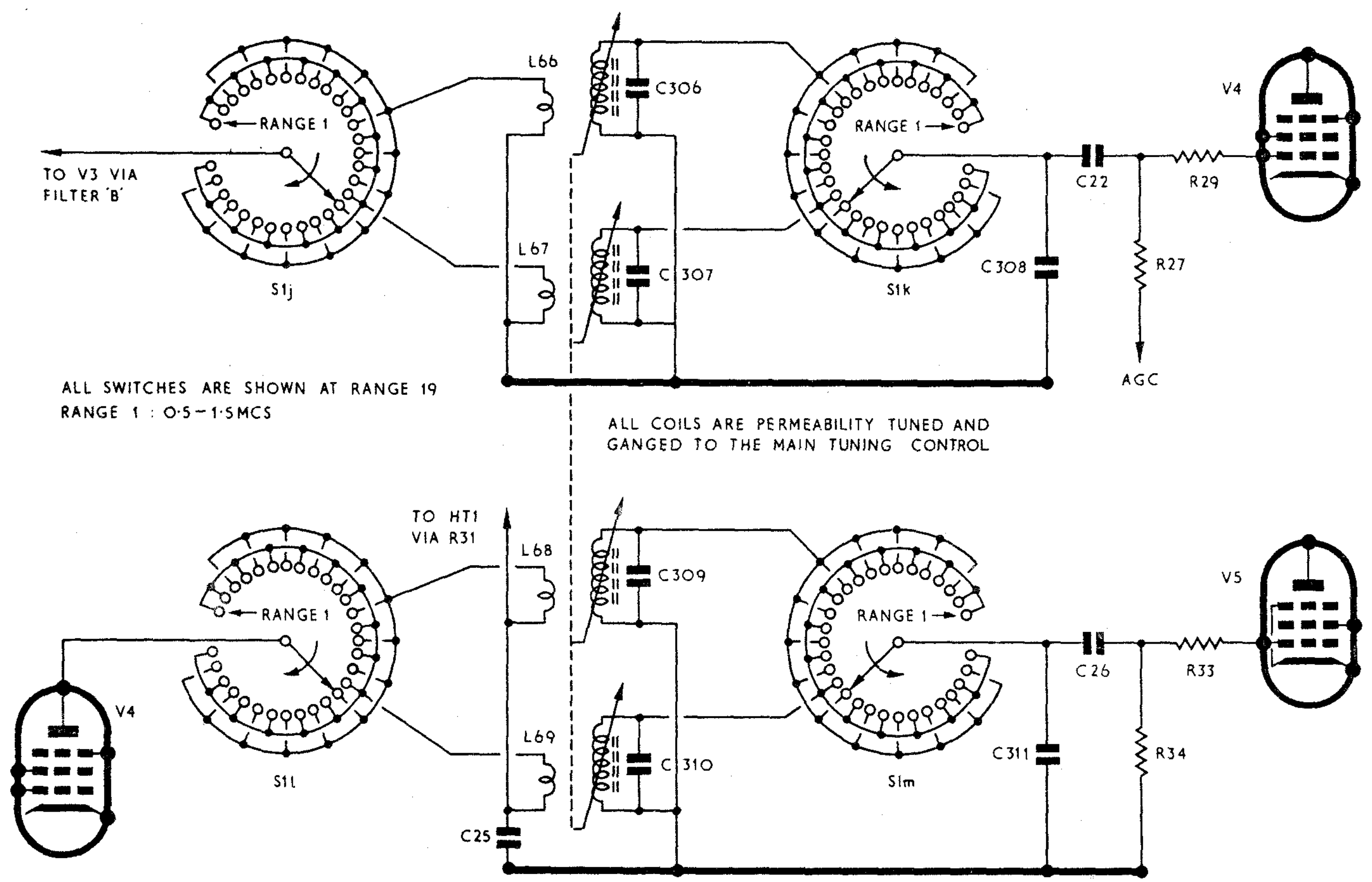


DETATCHED CIRCUIT
SECOND R.F. COUPLING

FIG.3

DETACHED CIRCUIT NO.4
1ST I.F.COUPLING
Part 2 Sect.3 Chap.1 Fig.4
(Refer to Master Components List T7374 Issue 1)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C22	10	C307	92	C311	43	L67	159			R34	187	V5	256		
C25	11	C308	43			L68	160	R27	187						
C26	10	C309	68			L69	161	R29	189						
C306	68	C310	67	L66	158			R33	189	V4	255				

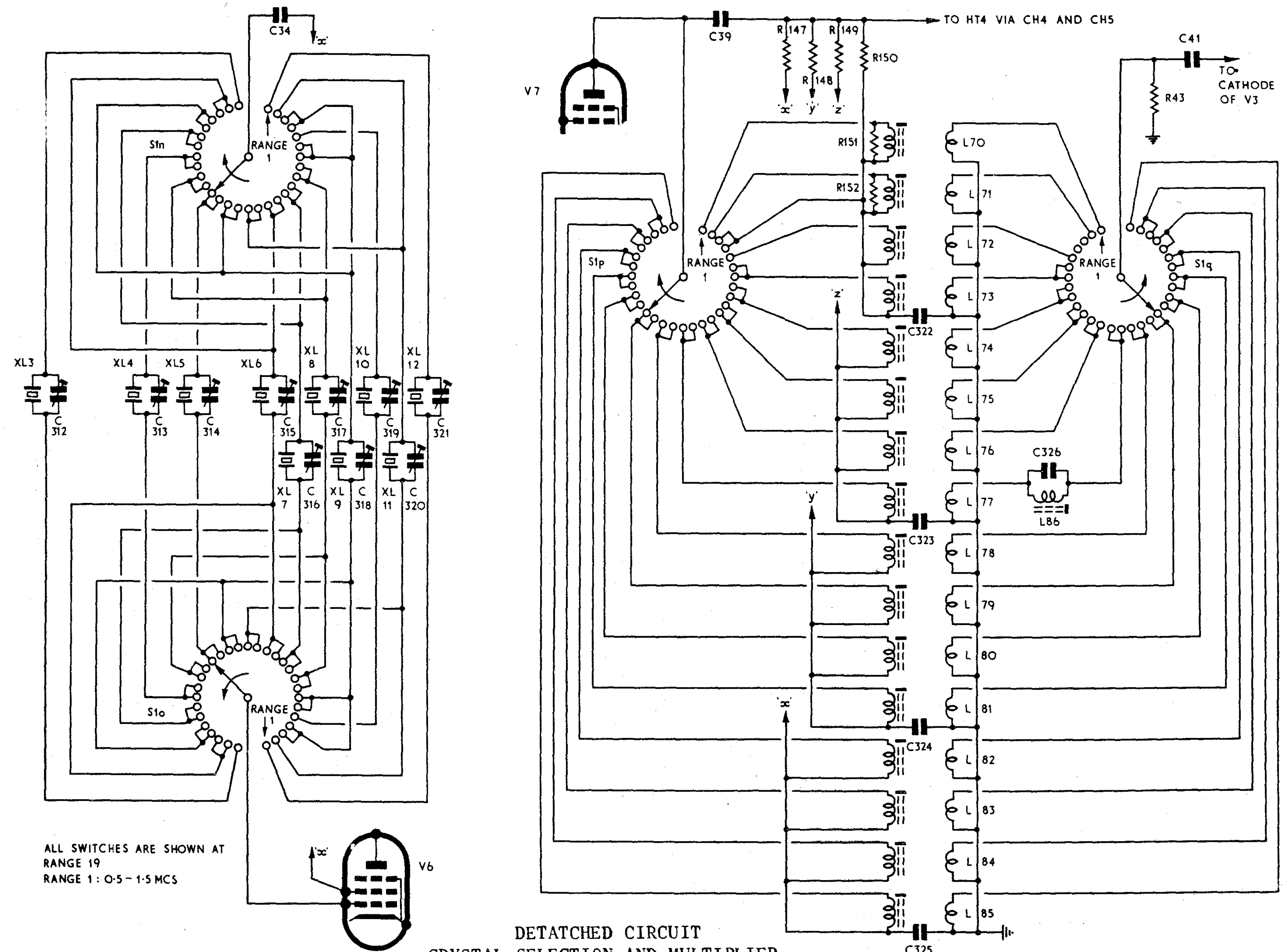


DETATCHED CIRCUIT
FIRST I.F. COUPLING

FIG.4

DETACHED CIRCUIT NO.5
CRYSTAL SELECTION & MULTIPLIER
Part 2 Sect.3 Chap.1 Fig.5
(Refer to Master Components List T7374 Issue 1)
Cross Reference List

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C34	20	C318	88			L76	163	L85	165	R150	192	XL3	123	XL12	114
C39	22	C319	88			L77	163	L86	166	R151	201	XL4	120		
C41	17	C320	88			L78	164			R152	201	XL5	118		
C312	88	C321	88	L70	162	L79	164					XL6	122		
C313	88	C322	17	L71	162	L80	164					XL7	121		
C314	88	C323	17	L72	162	L81	164	R43	195	V6	254	XL8	119		
C315	88	C324	17	L73	162	L82	165	R147	192	V7	254	XL9	117		
C316	88	C325	17	L74	163	L83	165	R148	192			XL10	116		
C317	88	C326	93	L75	163	L84	165	R149	192			XL11	115		



DETATCHED CIRCUIT
CRYSTAL SELECTION AND MULTIPLIER

FIG.5

MAIN CIRCUIT DIAGRAM

(Refer to Master Components List T7374)

Cross Reference List

for HH00-2301Z Sh.1 (Fig.101)

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
						CAPACITOR									
C1	*8	C23	11	C45	18	C67	33	C88	42	C110	45	C132	53	C153a	17
C2	*9	C24	11	C46	18	C68	17	C89	43	C111	45	C133	54	C154	48
C3	*8	C25	11	C47	18	C69	10	C90	44	C112	44	C134	55	C154a	38
C4	10	C26	10	C48	18	C70	34	C91	27	C113	46	C135	56	C155	53
C5	11	C27	11	C49	17	C71	x35	C92	44	C114	44	C136	39	C155a	11
C6	11	C28	17	C50	17	C72	x36	C93	11	C115	10	C137	39	C156	63
C7	12	C29	18	C51	17	C73	x37	C94	10	C116	47	C138	47	C157	63
C8	11	C30	18	C52	23	C74	38	C95	11	C117	48	C139	57	C158	63
C9	11	C31	17	C53	17	C75		C96	11	C118	45	C140	58	C159	50
C10	10	C32	17	C54	24	C76	17	C97	39	C119	17	C141	47	C327	94
C11	11	C33	19	C55	25	C77	18	C98	39	C120	17	C142	17	C328	17
C12	11	C34	20	C56	26	C78	18	C99	39	C121	11	C143	59	C329	10
C13	11	C35	21	C57	N̸27	C79	18	C100	39	C122	49	C144	60	C330	95
C14	10	C36	17	C58	28	C80	18	C101	11	C123	17	C145	60	C331	96
C15	11	C37	10	C59	17	C81	18	C102	10	C124	11	C146	61	C332	96
C16	13	C38	17	C60	23	C82	18	C103	11	C125	17	C147	61	C333	17
C17	11	C39	22	C61	29	C83	39	C104	11	C126	50	C148	61	C334	10
C18	ø14	C40	17	C62	⌿26	C84	11	C105	39	C127	51	C149	52	C335	95
C19	ø15	C41	17	C63	⌿30	C85	40	C106	39	C128	52	C150	62	C336	97
C20	ø16	C42	21	C64	⌿31	C86	40	C107	39	C129	48	C151	48	C337	97
C21	ø14	C43	18	C65	⌿26	C86a	41	C108	39	C130	17	C152	52		
C22	10	C44	18	C66	32	C87	42	C109		C131	11	C153	48		
						CHOKE									
CH1	102	CH3	104	CH5	103	CH7	102	CH9	102	CH11	101				
CH2	102	CH4	103	CH6	103	CH8	103	CH10	104						
						SILICON RECTIFIER									
				D2	186	D3	186	D4	186	D5	186				
						FUSE									
				FS1	127										
						INDUCTOR									
L1	*1	L5 ø	129	L9 ø	129	L13⌿	171	L17⌿	171	L21x	172	L26	132		
L2	*1	L6 ø	129	L10⌿	129	L14⌿	171	L18	131	L22x	172				
L3	*1	L7 ø	129	L11	130	L15ø	171	L19x	172	L23x	172				
L4	*1	L8 ø	129	L12⌿	171	L16⌿	171	L20x	172	L24x	172				

T7374 * ø N̸ ⌿ x See Notes on Sheet 4

CP

MAIN CIRCUIT DIAGRAM
(Refer to Master Components List T7374)
Cross Reference List
for HH00-2301Z Sh.1 (Fig.101)

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
							JACK								
				JK1	169	JK2	170								
							LAMP								
				1LP1	173	1LP2	173								
							METER								
				M1	174										
							PLUG								
PL1	179	PL2	179	PL3	179	PL4	179	PL5/6	182						
							RESISTOR								
R1	187	R20	189	R39	200	R58	206	R77	209	R96	191	R114	276	R133	197
R2	188	R21	192	R40	201	R59x	195	R78	187	R97	204	R115	276	R134	220
R3	189	R22	199	R41	193	R60	192	R79	202	R98	204	R116	204	R135	187
R4	190	R23	276	R42	202	R61	197	R80	191	R99	215	R117	200	R136	197
R5	191	R24	197	R43	195	R62	196	R81	276	R100	216	R118	191	R137	221
R6	191	R25	196	R44	201	R63	187	R82	210	R101	191	R119	209	R138	221
R7	192	R26ø	199	R45	203	R64	207	R83	191	R102	217	R120	204	R153	191
R8	193	R27	187	R46	192	R65	196	R84	211	R102a	191	R121	206	R154	191
R9	194	R28	195	R47	192	R66	208	R85	276	R103	205	R122	213	R155	210
R10	189	R29	189	R48	204	R67	189	R86	208	R104	193	R123	196	R156	191
R11	187	R30	196	R49	192	R68	187	R87	201	R105	212	R124	213	R157	191
R12	193	R31	192	R50	193	R69	188	R88	199	R106	212	R125	218	R158	210
R13	195	R32	191	R51	202	R70	196	R89	212	R107	209	R126	200	R159	212
R14	196	R33	189	R52	191	R71	208	R90	213	R108	193	R127	191	R160	212
R15	196	R34	187	R53	192	R72	189	R91	199	R109	193	R128	209	R161	209
R16	197	R35	198	R54	199	R73	208	R92	214	R110	193	R129	204	R162	209
R17	192	R36	191	R55	205	R74	191	R93	199	R111	197	R130	219		
R18	187	R37	192	R56	199	R75	191	R94	204	R112	200	R131	213		
R19	198	R38	192	R57	192	R76	276	R95	200	R113	276	R132	220		
							RESISTOR VARIABLE								
RV1	224	RV2	225	RV3	224	RV7	225	RV8	227	RV9	228	RV10	229		

ø x See Notes on Sheet 4

MAIN CIRCUIT DIAGRAM
(Refer to Master Components List T7374)
Cross Reference List
for HH00-2301Z Sh.1 (Fig.101)

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
							SOCKET								
SKT1*	231	SKT3	235	SKT5	235	SKT7	235	SKT9	234						
SKT2	‡	SKT4	235	SKT6	235	SKT8	231								
							SWITCH								
S1	242	S2	176	S3	240	S5	178	S9	245						
							TRANSFORMER								
T1	247	T3	246	T5	248	T7	248	T9	250	T11	251	T13			
T2	246	T4	248	R6	248	T8	249	T10	251	T12	252				
							VALVE								
V1	265	V4	255	V7	254	V10	255	V13	259	V16	257	V19	258	V22	263
V2	255	V5	256	V8	260	V11	255	V14	253	V17	262	V20	258	V23	257
V3	256	V6	254	V9	261	V12	266	V15	257	V18	264	V21	263		
							CRYSTAL								
XL1§	111	XL2	112	XL13	124	XL14	125								

MISCELLANEOUS ITEMS

Aerial Filter 'A'	No. 1
BFO Unit	No. 3
Can	No. 7
Can Screening	No. 5
Can Screening	No. 6
Crystal Holder	No.109
Calibrator Unit	No. 4
Fuse Clip	No.108
Fuseholder	No.128
Hub, Coupling	No.274

* ‡ § See Notes on Sheet 4

MAIN CIRCUIT DIAGRAM
(Refer to Master Components List T7374)
Cross Reference List
for HH00-2301Z Sh.1 (Fig.101)

MISCELLANEOUS ITEMS (Contd.)

Insulator Stand-Off	No.168
Insulator Feed Through	No.167
1st I.F. Filter 'B'	No.129
2nd L.O. Interstage Filter - Filter 'C'	No.171
2nd L.O. Output Stage - Filter 'D'	No.172
Plate Switch Spindle	No.175
Plug Coaxial for SKT1, SKT8	No.184
Retaining Clip	No.107
Spindle Switch	No.237
Spindle Switch	No.238
Switch Wafer	No.241
Switch Wafer	No.243
Valve Clip	No.106
Valve Retainer	No.273
Valve Retainer Spring	No.239
Variable Capacitance	No.126
Valveholder B9A	No.271
Valveholder B7G	No.268
Valveholder B7G	No.269
Valveholder B7G	No.270

ӿ Part of Filter A
p̸ Part of Filter B
-̸ Part of Filter C
x Part of Filter D
N̸ Temp.Coeff. adjusted on Test
S̸ Crystal 'A' 400 c/s No.110 on
Components List to special order.
‡ Part of No.270

INTERCONNECTIONS

Refer to Master Components List T7374)

Cross Reference List

for HH00-2301Z Sh.2 (Fig.102)

Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.	Ref.	No.
C9	11			PLG	181	R45	203	R123	196					V10	255
C126	50	1LP1	173	PLH	181	R64	207	R124	213	SKT1	236	S2	176	V11	255
C127	51	1LP2	173	PLI	181	R69	188	R125	218	SKTA	233	S4	244	V13	259
C129	48			PLJ	181	R82	210			SKTB	233	S5	178	V16	257
C146	61			PLK	181	R84	211			SKTC	233	S6	245	V18	264
C147	61	M1	174			R92	214			SKTD	233	S7	177		
C148	61					R93	199			SKTE	233	S8	244		
C153	48			R2	188	R96	191	RV1	224	SKTF	232	S9	245		
		PL1	183	R4	190	R107	209	RV2	225	SKTG	232				
		PLA	180	R12	193	R111	197	RV3	224	SKTH	232				
FS1	127	PLB	180	R13	195	R112	200	RV4	226	SKTI	232	T10/11	251		
		PLC	180	R14	196	R113	276	RV7	225	SKTJ	232				
		PLD	180	R15	196	R114	276	RV8	227	SKTK	232				
JK2	170	PLE	180	R16	197	R115	276	RV9	228			V1	265		
		PLF	181	R44	201	R116	204					V2	255		

MISCELLANEOUS ITEMS

Crystal Holder	No.109
Fuse Clip	No.108
Fuseholder	No.128
Valve Retainer	No.230
Valveholder B9A	No.272
Valveholder B7G	No.268
Valveholder B7G	No.269

MCL:- T7374
Issue:- 2
Date:- 7-1-65

MASTER COMPONENTS LIST

FOR

HIGH STABILITY COMMUNICATIONS RECEIVER

(HH00-2301-01)

NOTES:

1. Component schedules are presented in the form of a master components list, which includes all components used in this equipment. Each component is identified by means of a spares reference number, column 1. in addition to the normal part identity.
2. Components shown on individual circuit diagrams may be identified in the master list by means of the cross-reference tables associated with each circuit diagram. The numbers given are the spares reference numbers.
3. For spares ordering purposes it is only necessary to quote the exact reference at the top of this page together with the spares reference number. Individual part identities can be given as a cross check if desired, but not necessary.
4. Prices are subject to change without notice.
5. All items reference PC are standardised items and comply with Government specifications where these exist.
6. All items reference WIS are manufactured by component or other suppliers to a Marconi specification which, where appropriate, complies with a Government specification.
7. All items reference W are manufactured by MWT and while materials and practices are in accordance with appropriate Government specifications, these items cannot be regarded as 'Standard Items'.

P.T.O.

8. The following abbreviations are used throughout this Master List:

cap.	capacitor	uH	microhenry
carb.	carbon	pF	micromicrofarad
c.r.t.	cathode-ray tube	mH	millihenry
cer.	ceramic	mA	milliampere
c.o.	changeover	min	minute
coax.	coaxial	min.	minimum
coeff.	coefficient	m.c.	moving coil
CV	Common Valve	mld.	moulded
comp.	composition	neg.	negative
c/s	cycles per second	No.	number
dB	decibel	osc.	oscillator
dia.	diameter	pap.	paper
d.c.	direct current	%	per cent
d.p.	double pole	pos.	positive
d.t.	double throw	potr.	potentiometer
elyc.	electrolytic	prim.	primary (winding)
enam.	enamelled	r.f.	radio frequency
e.h.t.	extra high tension	rect.	rectifier
fig.	figure	ref.	reference
fil.	filament	res.	resistor
ft	foot (feet)	res.var.	resistor variable (potentiometer)
freq.	frequency		
f.s.d.	full scale deflection	rev/min	revolutions per minute
gal	gallon		
H	henry	sect.	section
h.s.	high stability	sil.mica	silver mica
h.p.	horse power	s.p.	single pole
h	hour	s.t.	single throw
in	inch	sp.gr.	specific gravity
indr.	inductance, self inductor	s.w.g.	standard wire gauge
		temp.	temperature
insul.	insulated	F	fahrenheit
insulr.	insulator	terml.	terminal
kc/s	kilocycles per second	transf.	transformer
k ohms	kilohm	tub.	tubular
kW	kilowatt	var.	variable
kV	kilovolt	vit.	vitreous
kVA	kilovolt-amp	V	volt
lin.	linear	VA	volt-ampere
lg.	long	W	watt
max.	maximum	w.w.	wirewound
Mc/s	megacycles per second	yd	yard
M ohms	megohms		
metd.	metallised		
u	micro		
uF	microfarad		

No.	Description and Identity	Qty.	Price Each † £. s. d.			Scale
1	Aerial filter 'A' Part No.D2738 S & Co.	1	5	2	0	
2	Aerial filter 'E' Part No.D2416 S & Co.	1	2	7	0	
3	B.F.O. unit Part No.D3445 S & Co.	1	6	7	6	
4	Calibrator unit Type LP2749 S & Co.	1	3	13	6	
5	Can screening Part No.6126P McMurdo	8		1	6	
6	Can screening Part No.6127P McMurdo	7		1	6	
7	Can Part No.2598-1	1				
8	Cap. mica 30pF ±5% 350V Type C22S Johnson Matthey	5		7	6	
9	Cap. mica 140pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
10	Cap. mica 100pF ±10% 350V Type 1510 Lemco	12		2	6	
11	Cap. tub. 0.05mfd ±20% 350V CP35N or Minicap T.C.C. or Dubilier	24		3	0	
12	Cap. tub. 3000pF ±20% 350V Type 700 Dubilier	1		2	0	
13	Cap. mica 400pF ±2% 350V Type 1510 Lemco	1		2	6	
14	Cap. mica 40pF ±1% 350V Type C22S Johnson Matthey	2		7	6	
15	Cap. mica 90pF ±1% 350V Type C22S Johnson Matthey	1		7	6	
16	Cap. mica 100pF ±1% 350V Type C22S Johnson Matthey	1		7	6	
17	Cap. tub. 0.01mfd ±20% 200V Type 700 Dubilier	27		2	6	
18	Cap. cer. 1500pF ±20% 350V Type K1700-362 Erie	14		3	0	
19	Cap. mica 3pF ±0.5pF 350V 310N-750 F.E.C.	1		2	6	
20	Cap. mica 800pF ±2% 350V Type 2515 Lemco	1		4	0	
21	Cap. cer. 1500pF ±20% 350V Type 310K F.E.C.	2		3	0	
22	Cap. mica 6pF ±10% 350V Type 1510 Lemco	1		2	6	
23	Cap. mica 400pF ±2% 350V Type C22S Johnson Matthey	2		7	6	
24	Cap. var. Type LP2636 Stratton	1	8	10	0	
25	Cap. trimmer 3-30pF Part No.6074P Mullard	1		4	6	
26	Cap. mica 40pF ±5% 350V Type C22S Johnson Matthey	9		7	6	
27	Cap. cer. 20pF ±10% Type between N120AD-N750AD Erie	2		2	0	
28	Cap. cer. 12pF ±1pF 750V Type 310N-750 F.E.C.	1		2	0	
29	Cap. tub. 0.01mfd ±10% 200V Type 700 Dubilier	1		2	6	
30	Cap. mica 100pF ±5% 350V Type C22S Johnson Matthey	7		7	6	
31	Cap. mica 130pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
32	Cap. cer. 1500pF ±20% 350V Type 310K Lemco	1		3	0	
33	Cap. tub. 0.01mfd 350V Type Metal Mite or Minicap T.C.C. or Dubilier	2		2	0	
34	Cap. mica 300pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
35	Cap. mica 770pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
36	Cap. mica 970pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
37	Cap. mica 300pF ±5% 350V Type C22S Johnson Matthey	1		7	6	
38	Cap. cer. 0.1mfd -20% +80% 200V Type PZ High K896 Erie	2		2	6	

†

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
39	Cap. polystyrene 390pF ±5% 125V Type PF G.E.C.	11	1 6	
40	Cap. polystyrene 790pF ±2% 125V Type PF G.E.C.	2	1 6	
41	Cap. mica 80pF ±5% Type 1510 Lemco	1	4 6	
42	Cap. trimmer 2-10pF Part No.LP2366 Stratton	2	17 0	
43	Cap. mica 25pF ±10% 350V Type 1510 Lemco	3	2 6	
44	Cap. polystyrene Type PF G.E.C.	4	1 6	
45	Cap. tub. 0.05mfd ±20% 400V Type L.68.G50 Hunts	3	2 6	
46	Cap. cer. 15pF ±10% 350V Type N750K Erie	1	2 0	
47	Cap. tub. 0.0005mfd ±20% 600V Type 700 Dubilier	3	2 0	
48	Cap. pap. 0.01mfd ±20% 400V Type G150 L68 Hunts	5	2 6	
49	Cap. mica 10pF ±2% 350V Type 1510 Lemco	1	2 0	
50	Cap. tub. 0.5mfd ±20% 150V Type J100358 (Z115566) T.M.C.	2	3 6	
51	Cap. elyc. 10mfd ±20% 25V Type TF Dubilier	1	12 0	
52	Cap. elyc. 15V Type CE254 Plessey	3	3 0	
53	Cap. pap. 0.25mfd ±20% 200V Type W45 BD601 Hunts	2	3 0	
54	Cap. 0.047mfd ±20% 200V Type PMX3 T.C.C.	1	1 6	
55	Cap. polystyrene 200pF ±5% 125V Type PF G.E.C.	1	1 6	
56	Cap. elyc. 10mfd 16V Type CE46 Mullard	1	2 6	
57	Cap. cer. 0.005mfd ±20% 350V Type 316K Lemco	1	2 0	
58	Cap. cer. 40pF ±10% 350V Type 310N 750 Lemco	1	2 0	
59	Cap. pap. 0.01mfd ±20% 200V Type 700 G.E.C.	1	2 6	
60	Cap. polystyrene 7000pF ±1% 125V Type PF G.E.C.	2	7 0	
61	Cap. cer. 1000pF ±10% 350V Type 310K F.E.C.	3	2 0	
62	Cap. pap. 0.0005mfd ±20% 600V Type 700 Dubilier	1	2 0	
63	Cap. elyc. 50mfd 450V Type GE.813 Plessey	3	11 0	
64	Cap. mica 60pF ±5% 350V Type C22S Johnson Matthey	5	7 6	
65	Cap. mica 250pF ±5% 350V Type C22S Johnson Matthey	1	7 6	
66	Cap. mica 195pF ±1% 350V Type C22S Johnson Matthey	3	7 6	
67	Cap. mica 225pF ±1% 350V Type C22S Johnson Matthey	3	7 6	
68	Cap. mica 275pF ±1% 350V Type C22S Johnson Matthey	4	7 6	
69	Cap. mica 340pF ±1% 350V Type C22S Johnson Matthey	3	7 6	
70	Cap. mica 425pF ±1% 350V Type C22S Johnson Matthey	3	7 6	
71	Cap. mica 540pF ±1% 350V Type C22S Johnson Matthey	3	7 6	
72	Cap. mica 640pF ±1% 350V Type C22S Johnson Matthey	5	7 6	
73	Cap. mica 2000pF ±5% 125V Type PF G.E.C.	1	1 6	
74	Cap. var. Part No.S553 Stratton	1	15 6	
75	Cap. mica 10pF ±1pF 350V Type C22S or 11068 Johnson Matthey, Lemco	3	7 6	
76	Cap. mica 20pF ±5% 350V Type C22S or 11068 Johnson Matthey, Lemco	6	7 6	
77	Cap. mica 50pF ±5% 350V Type C22S or 11068 Johnson Matthey, Lemco	6	7 6	
78	Cap. mica 70pF ±5% 350V Type C22S or 11068 Johnson Matthey, Lemco	8	7 6	

†

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
79	Cap. mica 80pF ±5% 350V Type C22S or 1106S Johnson Matthey, Lemco	3	7 6	
80	Cap. mica 120pF ±1% 350V Type C22S or 1106S Johnson Matthey, Lemco	3	7 6	
81	Cap. mica 90pF ±5% 350V Type C22S or 1106S Johnson Matthey, Lemco	4	7 6	
82	Cap. mica 130pF ±1% 350V Type C22S Johnson Matthey, Lemco	3	7 6	
83	Cap. mica 110pF ±1% 350V Type C22S Johnson Matthey, Lemco	1	7 6	
84	Cap. mica 150pF ±1% 350V Type C22S Johnson Matthey, Lemco	3	7 6	
85	Cap. mica 25pF ±5% 350V Type 1510 Lemco	4	3 6	
86	Cap. mica 6pF ±1% 350V Type 1510 Lemco	4	2 6	
87	Cap. mica 20pF ±10% 350V Type 1510 Lemco	1	2 0	
88	Cap. trimmer 1-23pF Type AC2002-22 Mullard	56	2 0	
89	Cap. mica 110pF ±5% 350V Type C22S or 1106S Johnson Matthey, Lemco	2	7 6	
90	Cap. tub. pap. 500pF ±20% 600V Type 700 Dubilier	1	2 0	
91	Cap. mica 255pF ±1% 350V Type C22S Johnson Matthey	1	7 6	
92	Cap. mica 225pF ±1% Type C22S or 1106S Johnson Matthey, Lemco	1	7 6	
93	Cap. mica 40pF ±10% Type C22S Johnson Matthey	1	7 6	
94	Cap. mica 100pF ±2% 350V Type 1510 Lemco	1	3 6	
95	Cap. polystyrene 51pF ±5% 125V Type PF G.E.C.	2	1 6	
96	Cap. tub. pap. 0.005mfd ±20% 250V Type 700 Dubilier	2	2 0	
97	Cap. pap. 25pF ±20% 200V Type W45 BD601 Hunts	2	2 6	
98	Cap. mica 20pF ±10% Type 1510 Lemco	1	2 0	
99	Cap. trimmer 3-23pF Type C31-11 Wingrove & Rogers	1	4 0	
100	Cap. cer. 10pF ±1pF Type N750 Erie	1	2 0	
101	Choke smoothing Part No.2451 S & Co.	1	2 19 6	
102	Choke L.T. Part No.2413 S & Co.	4	4 6	
103	Choke H.T. Part No.2414 S & Co.	4	4 6	
104	Choke Part No.2412 S & Co.	2	3 6	
105	Choke Type No.FX1115 Mullard	1	†3 6	
106	Clip valve Part No.5585P S & Co.	1	1 0	
107	Clip retaining Type 77-621-3 Carr Fastener	11	1 0	
108	Clip fuse Part No.4083P S & Co.	1	1 0	
109	Crystal holder Part No.6375P McMurdo	12	1 0	
110	Crystal double filter Part No.6061P G.E.C. Brush	1	10 0 0	
111	Crystal double filter Part No.6062P G.E.C. Brush	1	10 0 0	
112	Crystal double filter Part No.6063P G.E.C. Brush	1	10 0 0	
113	Crystal unit Part No.6099P G.E.C. Brush	1	2 15 6	
114	Crystal unit Part No.6073P G.E.C.	1	2 15 6	
115	Crystal unit Part No.6072P G.E.C.	1	2 15 6	

† per doz

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
116	Crystal unit Part No.6071P G.E.C.	1	2 15 6	
117	Crystal unit Part No.6070P G.E.C.	1	2 15 6	
118	Crystal unit Part No.6066P G.E.C.	1	2 15 6	
119	Crystal unit Part No.6069P G.E.C.	1	2 15 6	
120	Crystal unit Part No.6065P G.E.C.	1	2 15 6	
121	Crystal unit Part No.6068P G.E.C.	1	2 15 6	
122	Crystal unit Part No.6067P G.E.C.	1	2 15 6	
123	Crystal unit Part No.6064P G.E.C.	1	2 15 6	
124	Crystal unit Type Style 'D' G.E.C. Brookes Crystals,Brush	1	2 15 6	
125	Crystal unit Type Style 'D' G.E.C. Brookes Crystals,Brush	1	2 15 6	
126	Diode var. capacitance Type 100SC2 I.R.C.	1	1 13 0	
127	Fuse link delay 1.5A Part No.6471P Bulgin	3	2 6	
128	Fuseholder Part No.6103P Belling Lee	1	5 0	
129	I.F. Filter 'B' Part No.D2419 S & Co.	1	2 7 0	
130	Indr. Part No.D2410A S & Co.	1	12 0	
131	Indr. Part No.D2411A S & Co.	1	10 0	
132	Indr. Part No.D3446 S & Co.	1	16 0	
133	Indr. Part No.D2402 S & Co.	1	13 0	
134	Indr. Part No.D2400 S & Co.	1	13 0	
135	Indr. Part No.D2398 S & Co.	1	11 0	
136	Indr. Part No.D2396 S & Co.	1	10 0	
137	Indr. Part No.D2394 S & Co.	1	1 0 0	
138	Indr. Part No.D2393A S & Co.	1	17 0	
139	Indr. Part No.D2392A S & Co.	1	18 6	
140	Indr. Part No.D2391A S & Co.	1	1 0 0	
141	Indr. Part No.D2390A S & Co.	1	1 2 0	
142	Indr. Part No.D2389A S & Co.	1	1 1 0	
143	Indr. Part No.D2388A S & Co.	1	19 6	
144	Indr. Part No.D2387A S & Co.	1	1 4 0	
145	Indr. Part No.D2401 S & Co.	2	14 0	
146	Indr. Part No.D2399 S & Co.	2	1 1 0	
147	Indr. Part No.D2397 S & Co.	2	1 1 6	
148	Indr. Part No.D2395 S & Co.	2	13 0	
149	Indr. Part No.D2394-1 S & Co.	2	1 0 6	
150	Indr. Part No.D2393-1A S & Co.	2	18 0	
151	Indr. Part No.D2392-1A S & Co.	2	18 6	
152	Indr. Part No.D2391-1A S & Co.	2	1 1 0	
153	Indr. Part No.D2390-1A S & Co.	2	1 3 6	
154	Indr. Part No.D2389-1A S & Co.	2	1 1 0	

F †

No.	Description and Identity	Qty.	Price Each † £.	s.	d.	Scale
155	Indr. Part No.D2388-1A S & Co.	2	1	0	6	
156	Indr. Part No.D2386A S & Co.	1	1	5	0	
157	Indr. Part No.D2473A S & Co.	1		16	6	
158	Indr. Part No.D2403A S & Co.	1	1	4	6	
159	Indr. Part No.D2404A S & Co.	1	1	4	6	
160	Indr. Part No.D2403-1A S & Co.	1		19	6	
161	Indr. Part No.D2404-1A S & Co.	1	1	4	0	
162	Indr. Part No.D2827 S & Co.	1	2	11	0	
163	Indr. Part No.D2828 S & Co.	1	2	11	0	
164	Indr. Part No.D2829 S & Co.	1	4	9	6	
165	Indr. Part No.D2830 S & Co.	1	3	4	0	
166	Indr. Part No.D2592B S & Co.	1		13	6	
167	Insulr. feed through Part No.6476P B.A.P.	11		+3	6	
168	Insulr. stand-off Part No.D2361 S & Co.	51		1	0	
169	Jack Part No.6090P Igranic	1		7	6	
170	Jack phone Part No.6091P	1		16	0	
171	L.O. 2nd interstage filter 'C' Part No.D2417A S & Co.	1	4	5	0	
172	L.O. 2nd output stage filter 'D' Part No.D2418A S & Co.	1	5	6	6	
173	Lamp festoon 6V 3W Cryselco	2		3	0	
174	Meter tuning Part No.5931P Butler	1	5	15	0	
175	Plate switch spindle clicker Part No.5625P N.S.F. or A.B.	1		6	0	
176	Plate clicker Part No.5935P N.S.F. or A.B.	1		19	6	
177	Plate clicker Part No.5936P N.S.F. or A.B.	1		19	6	
178	Plate clicker Part No.5935-1P N.S.F. or A.B.	1	1	6	6	
179	Plug coax. Part No.6079P Belling Lee	4		1	6	
180	Plug 6-way Part No.6081 McMurdo	5		2	6	
181	Plug 6-way Part No.6082P McMurdo	6		2	6	
182	Plug 12-way Part No.6080P Elcom	1		14	6	
183	Plug Part No.6083P Electro Methods	1		2	0	
184	Plug coax. Part No.6084P Greenpar	2		14	6	
185	Plug B7G Part No.6100P	1		3	0	
186	Rect. Type FST-400-E1 or DD006 S.T.& C.	4		9	6	
187	Res. 0.27M ohms ±10% 0.5W Type No.BTT Dubilier	10		1	0	
188	Res. 100 ohms ±10% 0.5W Type No.BTT Dubilier	2		1	0	
189	Res. 12 ohms ±10% 0.5W Type No.BTT Dubilier	7		1	0	
190	Res. 3.3M ohms ±10% 0.5W Type No.BTT Dubilier	1		1	0	

+ per doz

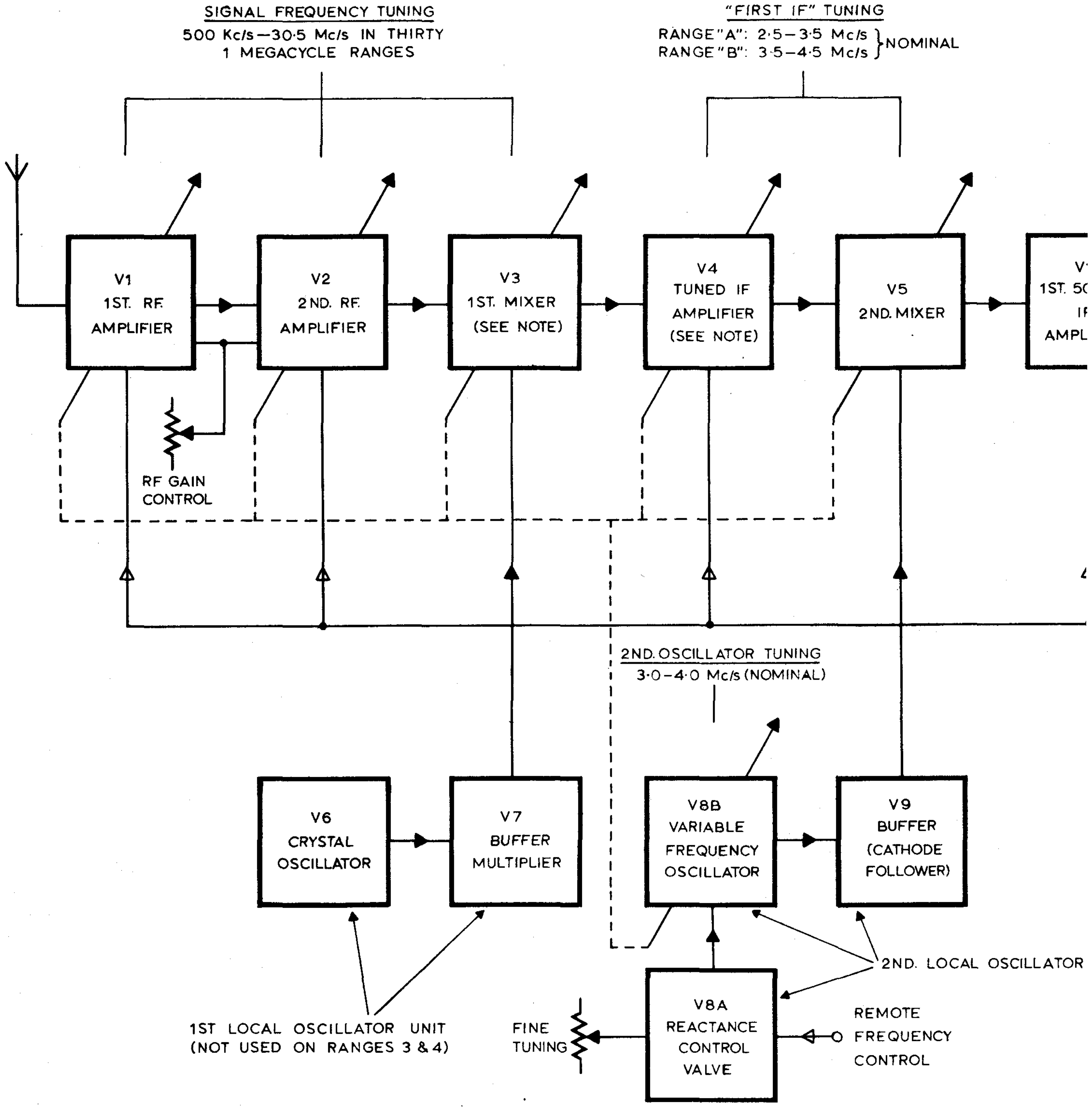
No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
191	Res. 0.1Mohms ±10% 0.5W Type No.BTT Dubilier	18	1 0	
192	Res. 2200 ohms ±10% 0.5W Type No.BTT Dubilier	17	1 0	
193	Res. 47000 ohms ±10% 0.5W Type No.BTA Dubilier	8	1 0	
194	Res. 15000 ohms ±10% 0.5W Type No.BTA Dubilier	1	1 0	
195	Res. 68 ohms ±10% 0.5W Type No.BTT Dubilier	4	1 0	
196	Res. 47000 ohms ±10% 1W Type No.BTA Dubilier	8	1 0	
197	Res. 10000 ohms ±10% 1W Type No.BTA Dubilier	6	1 0	
198	Res. 270 ohms ±10% 0.5W Type No.BTT Dubilier	2	1 0	
199	Res. 470 ohms ±10% 0.5W Type No.BTT Dubilier	7	1 0	
200	Res. 3300 ohms ±10% 0.5W Type No.BTT Dubilier	5	1 0	
201	Res. 10000 ohms ±10% 0.5W Type No.BTT Dubilier	5	1 0	
202	Res. 150 ohms ±10% 0.5W Type No.BTT Dubilier	3	1 0	
203	Res. 15000 ohms ±10% 1W Type BTA Dubilier	1	1 0	
204	Res. 0.47M ohms ±10% 0.5W Type No.BTT Dubilier	7	1 0	
205	Res. 33000 ohms ±10% 0.5W Type No.BTT Dubilier	2	1 0	
206	Res. 680 ohms ±10% 0.5W Type No.BTT Dubilier	2	1 0	
207	Res. 100 ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
208	Res. 2200 ohms ±10% 1W Type No.BTA Dubilier	4	1 0	
209	Res. 2200 ohms ±10% 1W Type No.BTA Dubilier	6	1 0	
210	Res. 4700 ohms ±10% 0.5W Type No.BTT Dubilier	3	1 0	
211	Res. 8200 ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
212	Res. 1000 ohms ±10% 0.5W Type No.BTT Dubilier	5	1 0	
213	Res. 4700 ohms ±10% 1W Type No.BTA Dubilier	4	1 0	
214	Res. 22000 ohms ±10% 1W Type No.BTA Dubilier	1	1 0	
215	Res. 0.22M ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
216	Res. 220 ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
217	Res. 22000 ohms ±10% 0.5W Type No.BTT Dubilier	2	1 0	
218	Res. 10 ohms w.w. ±5% 3W Type AW3101 Welwyn	1	6 0	
219	Res. 820 ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
220	Res. 3300 ohms w.w. ±5% 6W Type No.AW3112 Welwyn	2	5 0	
221	Res. 140 ohms w.w. ±5% 6W Type No.AW3115 Welwyn	2	4 6	
222	Res. 560 ohms ±10% 0.5W Type No.BTT Dubilier	1	1 0	
223	Res. 6800 ohms ±10% 0.5W Type No.BTT Dubilier	6	1 0	
224	Res. var. 10000 ohms Part No.5937P Plessey	2	7 0	
225	Res. var. 20000 ohms Part No.5938P Plessey	2	7 0	
226	Res. var. 1000 ohms Part No.6076P Plessey	1	4 6	
227	Res. var. 0.47M ohms Part No.6077P Plessey	1	6 6	
228	Res. var. 0.5M ohms Part No.4103PB Plessey	1	8 0	
229	Res. var. 5 ohms Part No.6078P Colvern	1	9 6	
230	Retainer valve Part No.5311P Lewis Spring	2	1 6	
231	Socket B.N.C. Part No.6085P Greenpar	2	14 6	

†

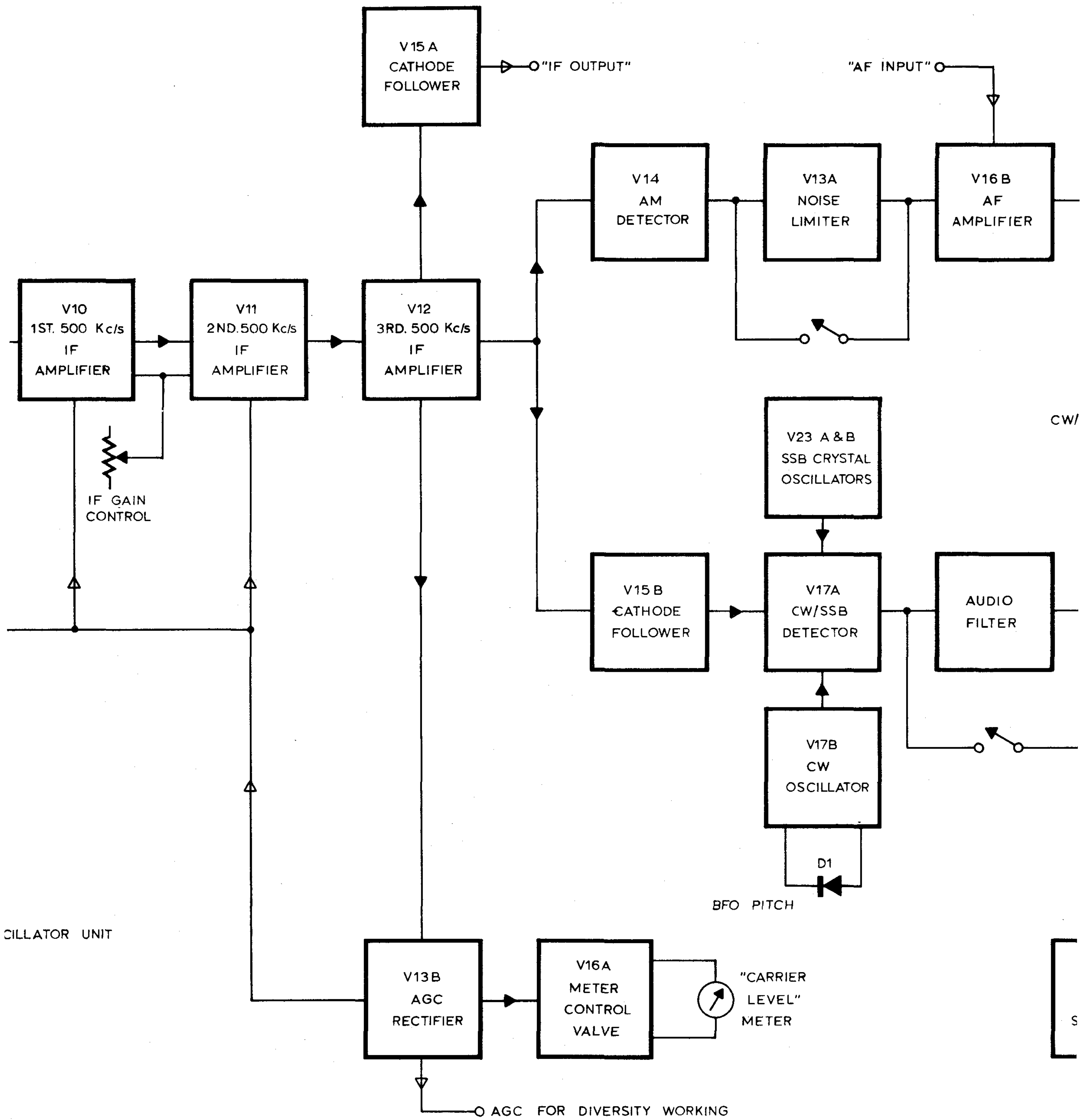
No.	Description and Identity	Qty.	Price Each † £. s. d.	Scale
232	Socket Part No.6081P McMurdo	6	2 6	
233	Socket Part No.6082P McMurdo	5	2 6	
234	Socket Part No.6088P Elcom	1	10 6	
235	Socket Part No.6087P Belling Lee	5	1 6	
236	Socket Part No.6089P Electro Methods	1	2 0	
237	Spindle switch Part No.5626P N.S.F. or A.B.	1	6 6	
238	Spindle switch Part No.5928P	1	6 6	
239	Spring valve retaining Type No.180639-2 Plessey	1	+3 6	
240	Switch selectivity comprising Nos.241-175,237,274			
241	Switch wafer Part No.5393PA N.S.F.	7	3 0	
242	Switch wavechange comprising Nos.243,238		1 13 6	
243	Switch wafer Part No.5414P N.S.F.	18	1 7 0	
244	Switch s.p. s.t. Part No.4771PB N.S.F.	2	8 0	
245	Switch d.p. d.t. Part No.4772PC N.S.F.	2	9 0	
246	Transf. Part No.D2734 S & Co.	2	4 5 0	
247	Transf. Part No.D2405C S & Co.	1	1 10 0	
248	Transf. Part No.2406C S & Co.	4	1 10 0	
249	Transf. Part No.2407A S & Co.	1	1 10 0	
250	Transf. Part No.2735 S & Co.	1	10 0 0	
251	Transf. combined Part No.2736B	1	3 16 6	
252	Transf. Part No.5339-1P	1	14 10 0	
253	Valve Type 6489 CV469	1		
254	Valve Type 5840 EF732	2		
255	Valve 6BA6	4		
256	Valve 6AK5	2		
257	Valve 12AT7	3		
258	Valve 6AM5	2		
259	Valve 6AL5	1		
260	Valve 6U8	1		
261	Valve 6C4	1		
262	Valve 6AJ8	1		
263	Valve OB2	2		
264	Valve 12AU7	1		
265	Valve ECC189	1		
266	Valve 6AM6	1		
267	Valve 6AU6	1		
268	Valveholder B7G Part No.6684P McMurdo	13	1 6	
269	Valveholder B7G Part No.6086P McMurdo	3	1 6	
270	Valveholder B7G Part No.6686P McMurdo	4	1 6	

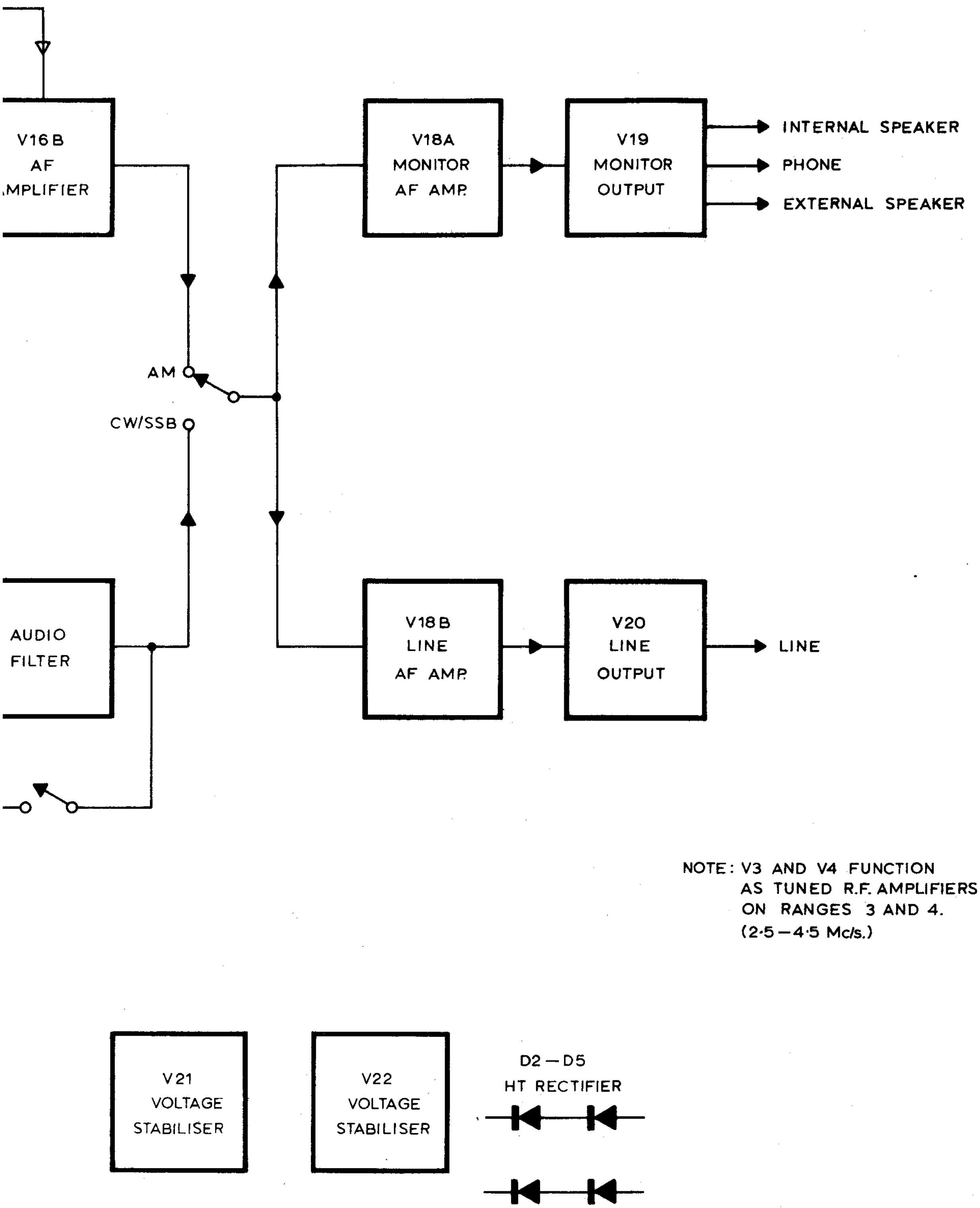
+ per doz

No.	Description and Identity	Qty.	Price † Each £. s. d.	Scale
271	Valveholder B9A Part No.411-1-08011 Plessey	1	2 0	
272	Valveholder B9A Part No.6685P McMurdo	2	1 6	
273	Valve retainer Part No.5311P Lewis Spring	5	1 6	
274	Hub coupling Part No.5627P	1	2 0	
275	Indr. Part No.D2178 S & Co.	1	10 0	
276	Res. 1M ohms ±10% 0.5W BTT Dubilier	8		



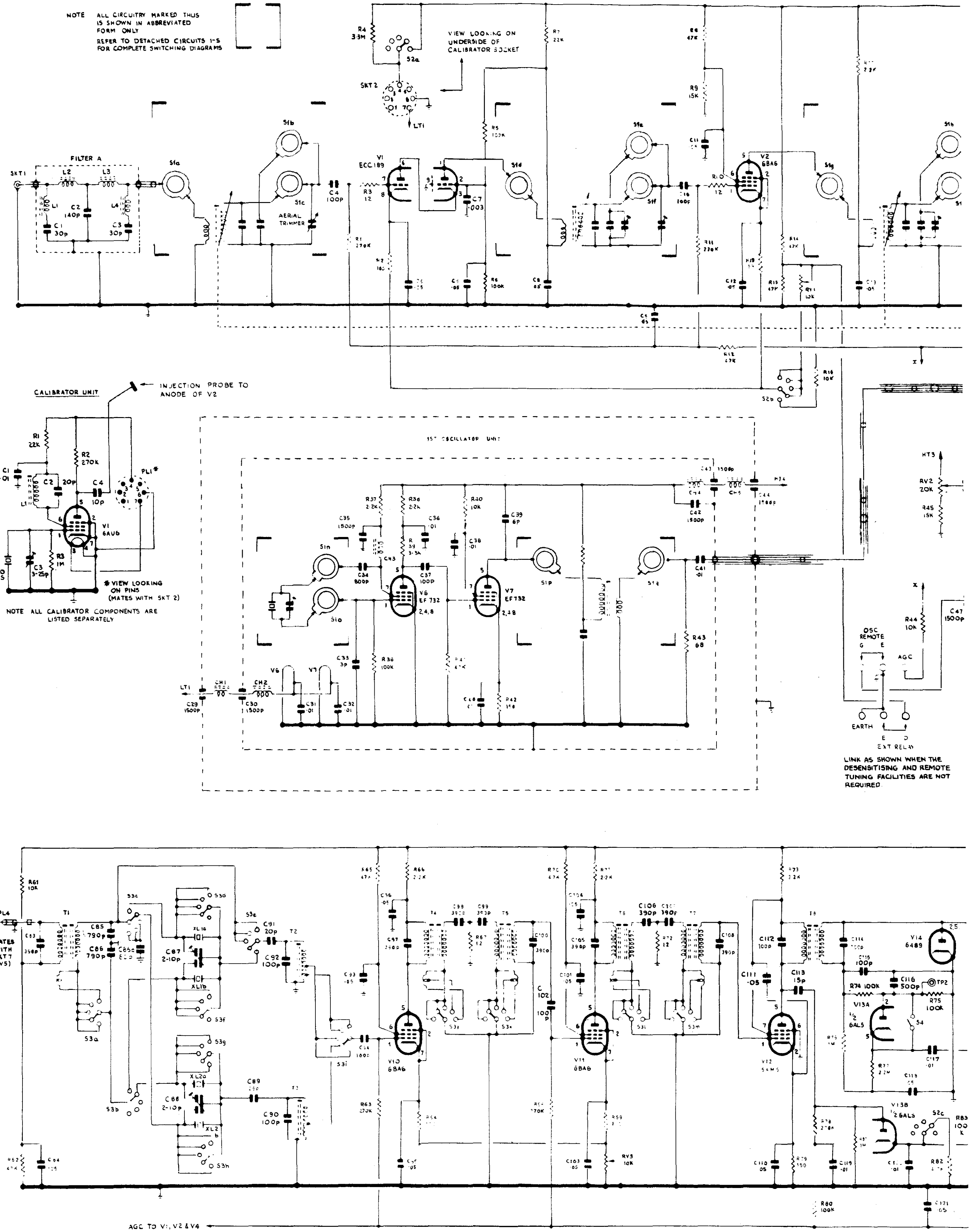
HH00-2301Z SH.3
ISSUE. I


V15A CATHODE FOLLOWER
"IF OUTPUT"
"AF INPUT"
V14 AM DETECTOR
V13A NOISE LIMITER
V16B AF AMPLIFIER
V10 1ST. 500 Kc/s IF AMPLIFIER
V11 2ND. 500 Kc/s IF AMPLIFIER
V12 3RD. 500 Kc/s IF AMPLIFIER
IF GAIN CONTROL
CW/
V23 A & B SSB CRYSTAL OSCILLATORS
V15B CATHODE FOLLOWER
V17A CW/SSB DETECTOR
AUDIO FILTER
V17B CW OSCILLATOR
D1
BFO PITCH
CILLATOR UNIT
V13B AGC RECTIFIER
V16A METER CONTROL VALVE
"CARRIER LEVEL" METER
S
AGC FOR DIVERSITY WORKING

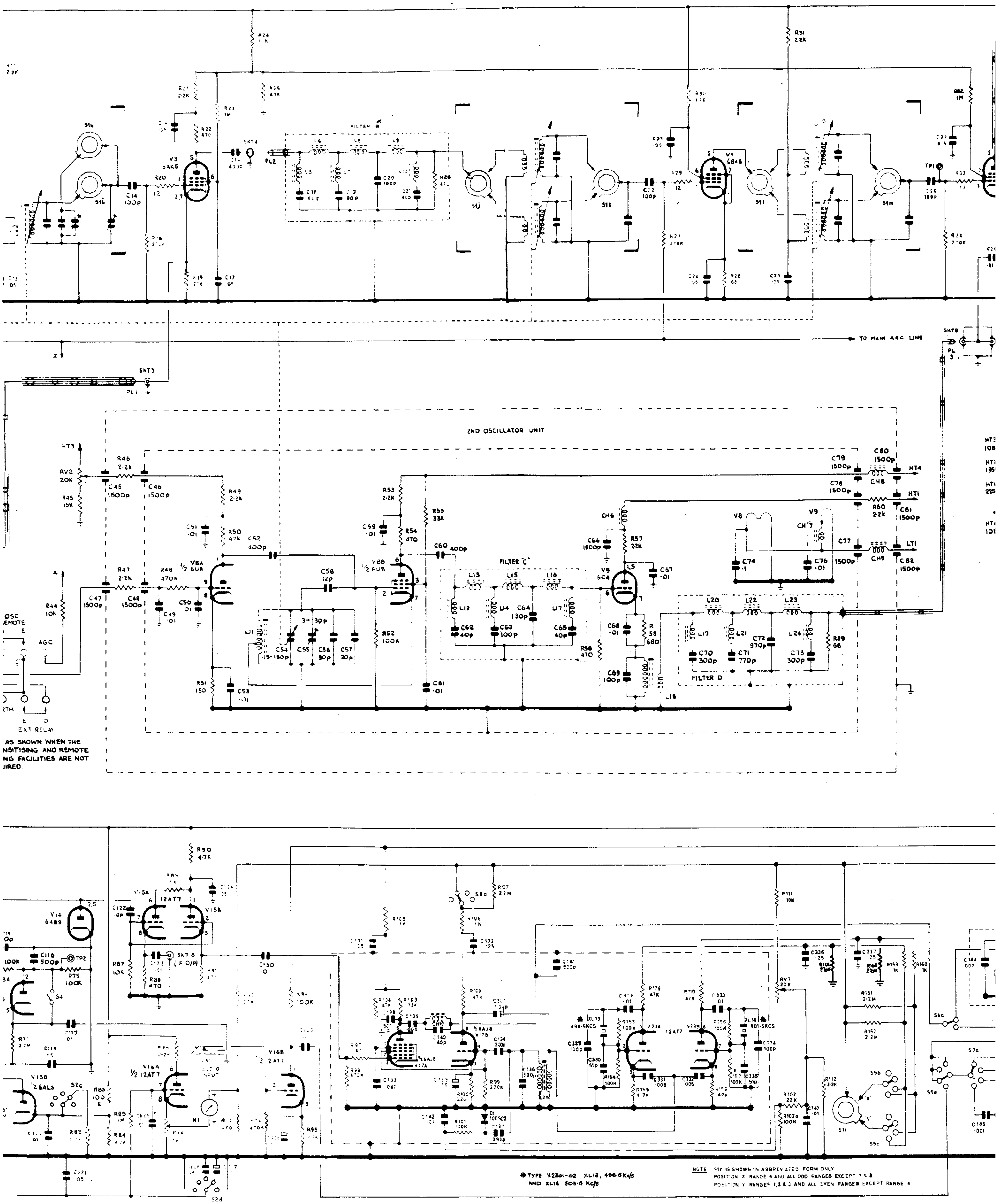


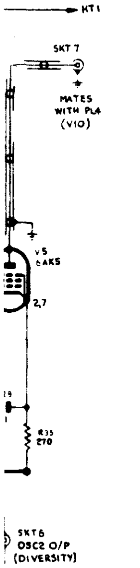
NOTE: V3 AND V4 FUNCTION AS TUNED R.F. AMPLIFIERS ON RANGES 3 AND 4. (2·5 — 4·5 Mc/s.)

RECEIVER H2301 BLOCK DIAGRAM FIG.1



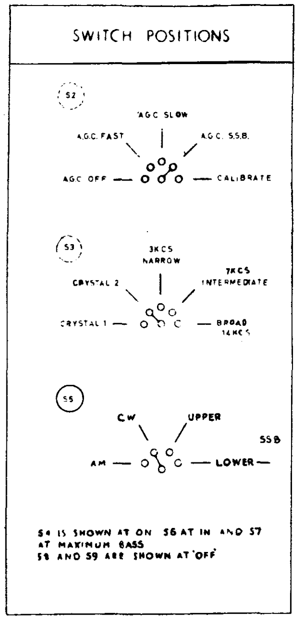
NOTE ALL CIRCUITRY MARKED THUS IS SHOWN IN ABBREVIATED FORM ONLY
REFER TO DETACHED CIRCUITS 1-5 FOR COMPLETE SWITCHING DIAGRAMS
VIEW LOOKING ON UNDERSIDE OF CALIBRATOR SOCKET
SKT 2
LT1
FILTER A
SKT1
AERIAL TRIMMER
V1 ECC189
V2 6BA6
CALIBRATOR UNIT
INJECTION PROBE TO ANODE OF V2
V1 6AU6
XL1 100 KCS
PL1*
* VIEW LOOKING ON PINS (MATES WITH SKT 2)
NOTE ALL CALIBRATOR COMPONENTS ARE LISTED SEPARATELY
1ST OSCILLATOR UNIT
V6 EF732
V7 EF732
HT4
HT3
OSC REMOTE
AGC
EARTH
EXT RELAY
LINK AS SHOWN WHEN THE DESENSITISING AND REMOTE TUNING FACILITIES ARE NOT REQUIRED.
PL4
MATES WITH SKT 7 (V5)
V10 6BA6
V11 6BA6
V12
V13A ½ 6AL5
V13B ½ 6AL5
V14 6489
TP2
AGC TO V1, V2 & V4

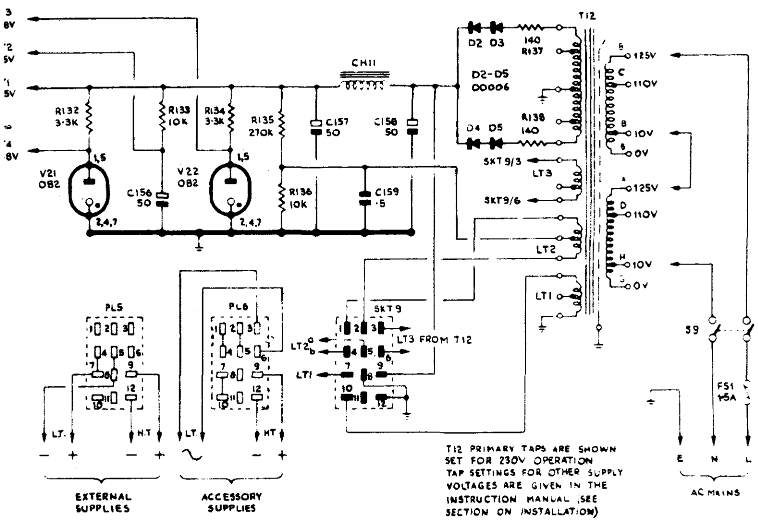

FILTER 'B'
TO MAIN A.G.C. LINE
2ND OSCILLATOR UNIT
FILTER 'C'
FILTER D
HT3
HT4
HT1
LT1
RV2 20K
V8A ½ 6U8
V8B ½ 6U8
V9 6C4
V3 6AK5
V4 6BA6
V14 6489
V15A 12AT7
V15B
V16A ½ 12AT7
V16B ½ 12AT7
V23A 12AT7
V23B
EXT RELAY
* TYPE H2301-02 XL13, 496·6 Kc/s AND XL14 503·6 Kc/s
NOTE S1r IS SHOWN IN ABBREVIATED FORM ONLY
POSITION X RANGE 4 AND ALL ODD RANGES EXCEPT 1 & 3
POSITION Y RANGES 1, 2 & 3 AND ALL EVEN RANGES EXCEPT RANGE 4

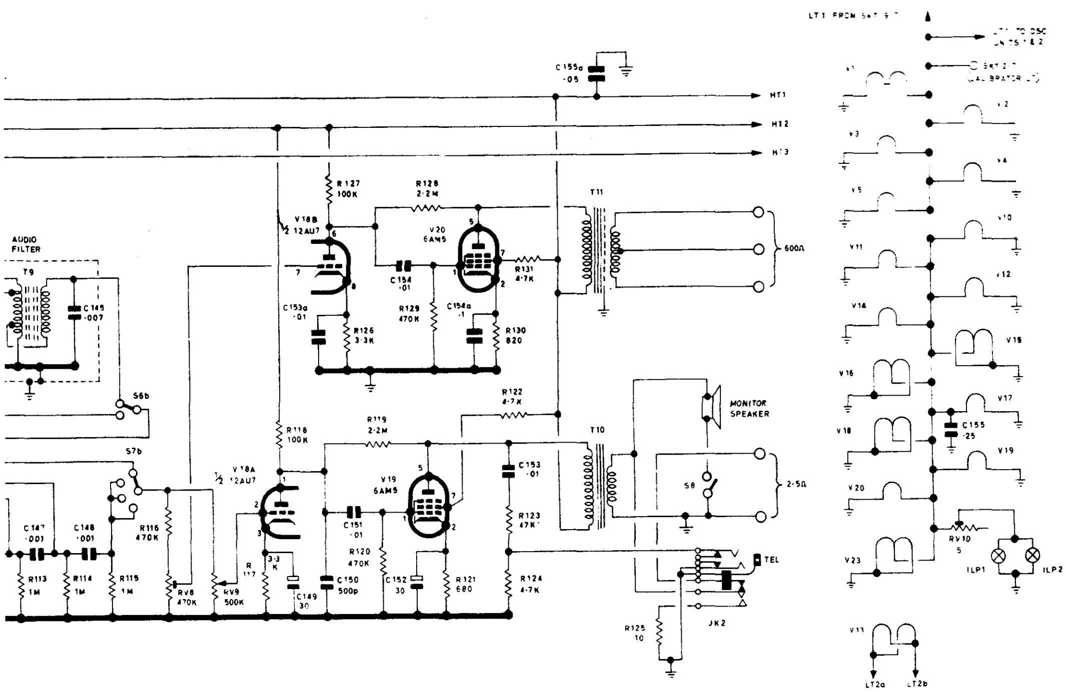


CONTROL FUNCTIONS

S1	WAVECHANGE
S2	A.G.C./CALIBRATOR
S3	SELECTIVITY
S4	NOISE LIMITER
S5	SIGNAL MODE
S6	AUDIO FILTER
S7	BASS FILTER
S8	MONITOR SPEAKER
S9	MAINS
RV1	R.F. GAIN
RV2	FINE TUNING
RV3	I.F. GAIN
RV4	METER ZERO
RV5	(U.S.B.) CARRIER INSERTION
RV6	L.S.B. CARRIER INSERTION
RV7	B.F.O. PITCH
RV8	A.F. GAIN (LINE)
RV9	A.F. GAIN (MONITOR)
RV10	DIAL LAMP BRILLIANCY

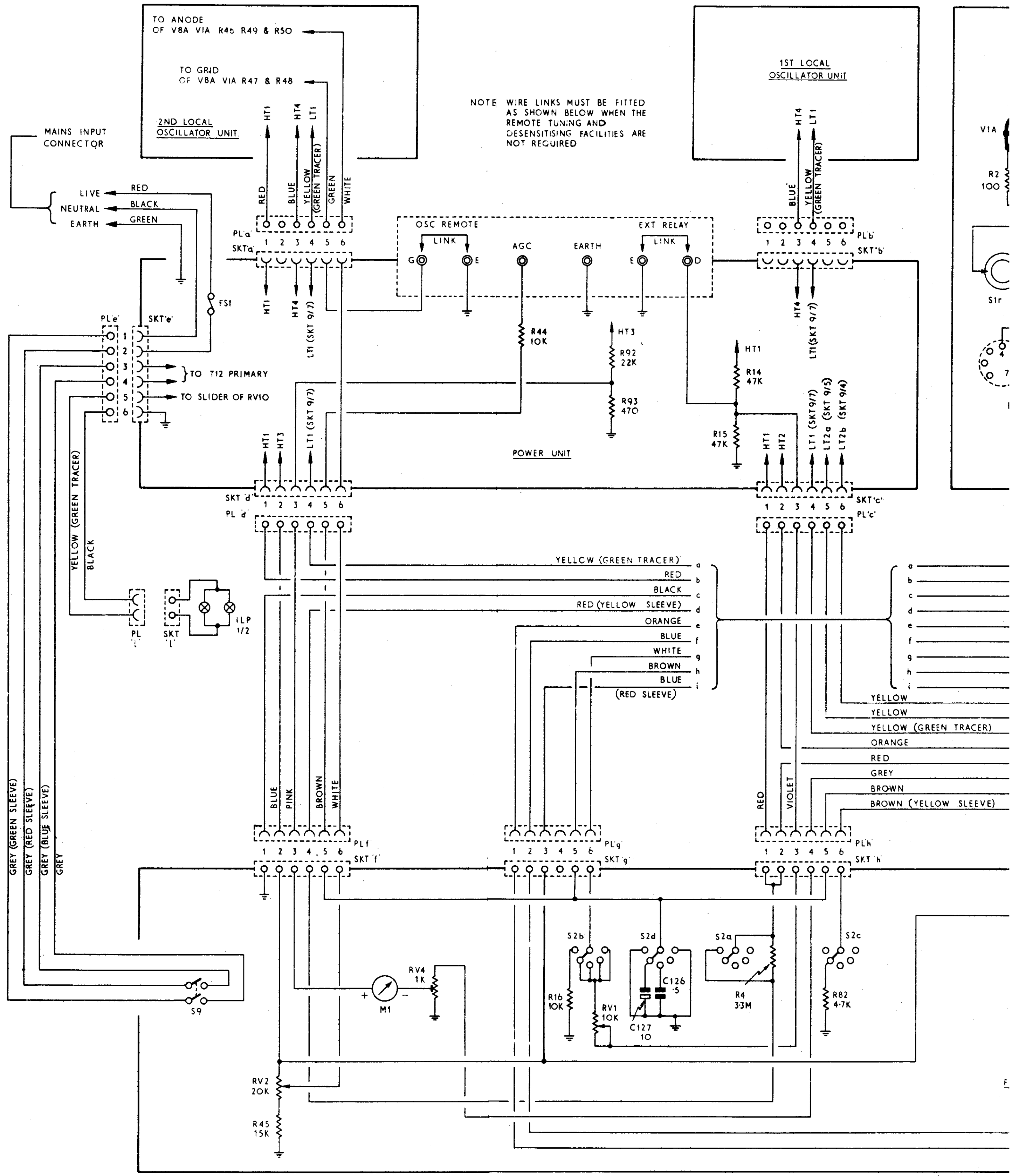




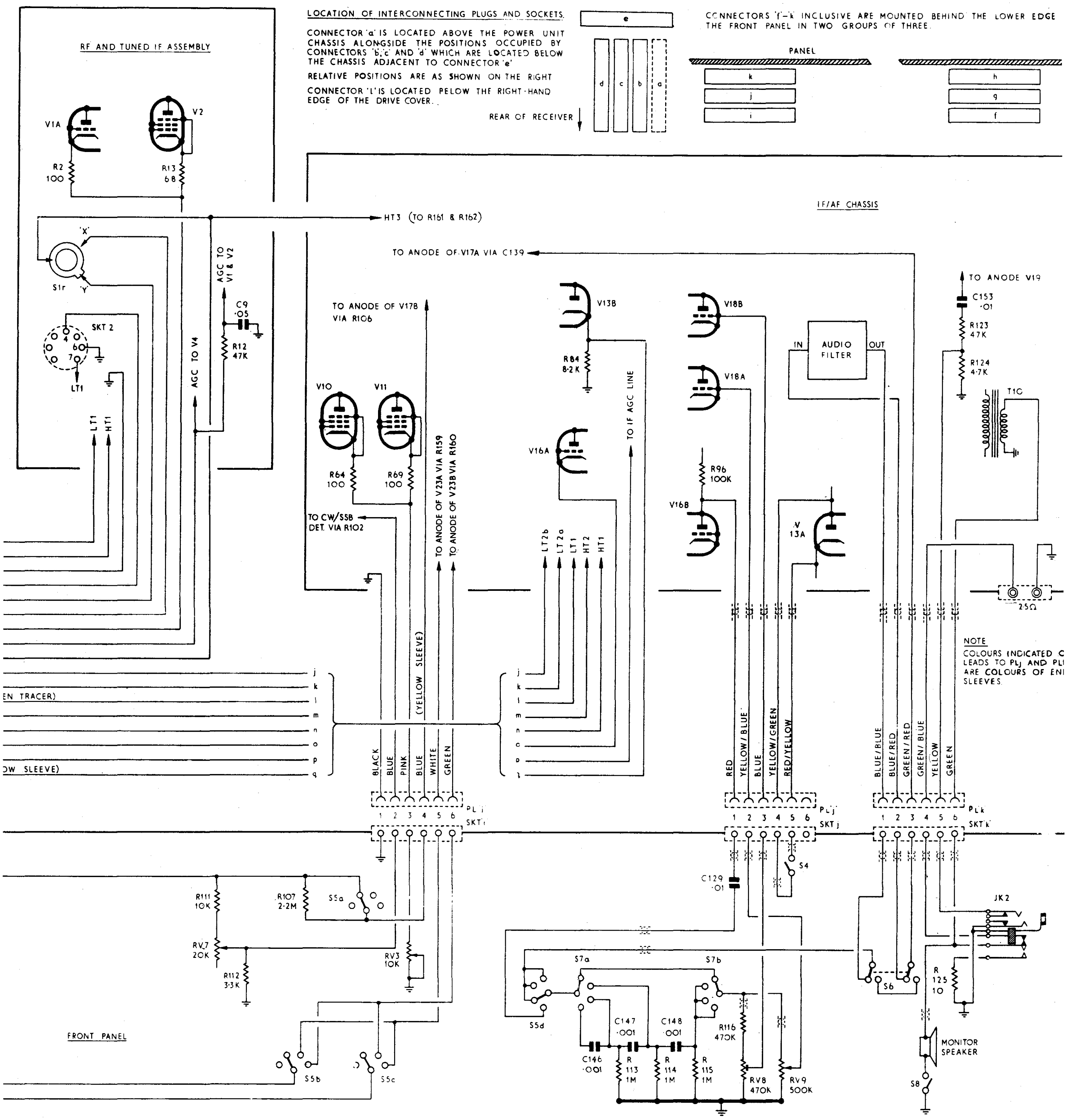


MAIN CIRCUIT DIAGRAM
RECEIVER H2301
HH00-2301Z Sh.1 Iss.2

FIG.101

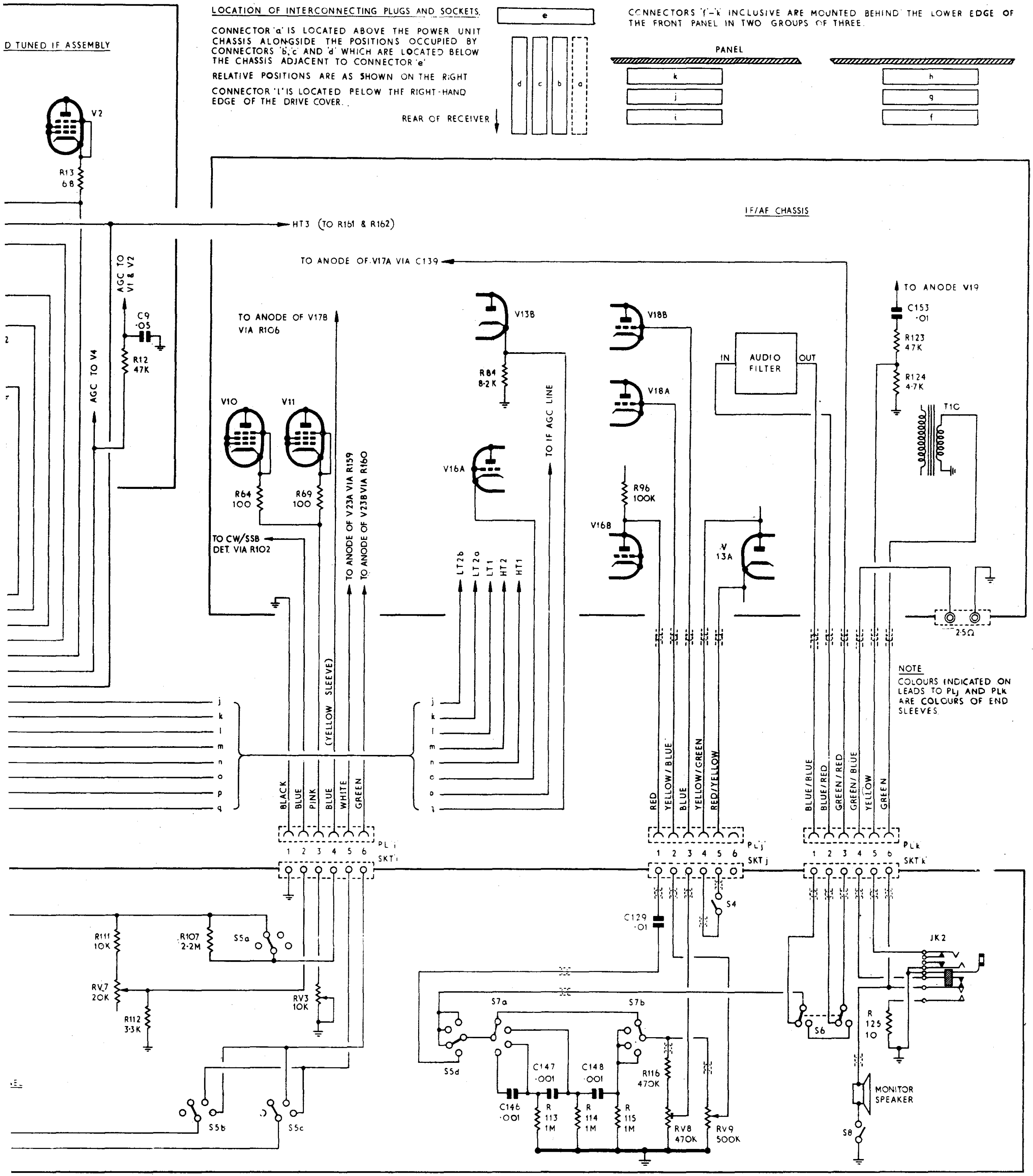


INTERC
RECEI
HHOO-



INTERCONNECTIONS
RECEIVER H2301
HH00-2301Z Sh.2

FIG.1



:CTIONS
H2301
Z Sh.2

FIG.102