V.H.F. F.M. TRANSMITTER/RECEIVER
TYPE CC2/8 Mk. II

COSSOR

TECHNICAL HANDBOOK

for

V.H.F. F.M. TRANSMITTER/RECEIVER
TYPE CC2/8 Mk. II

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FIGURE 1

POCKET SET CC 2/8 Mk.II

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CERTIFICATE OF RECEIPT

Please sign and return this certificate to the Technical Publications Department of A.C. Cossor Ltd.,

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POCKET V.H.F. F.M. RADIOTELEPHONE

TYPE CC2/8 MK.II

AMENDMENT RECORD

AMENDMENT NUMBER	DATE OF ISSUE	AMENDED BY

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POCKET V.H.F. F.M. RADIOTELEPHONE

TYPE CC2/8 MK.II

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POCKET V.H.F. F.M. RADIOTELEPHONE

TYPE CC2/8 MK.II

CHAPTER 1

INTRODUCTION AND SPECIFICATION

INTRODUCTION

1. The V.H.F./F.M. Companion Set CC2/8 MK.II is fully transistorised and designed for simplex radio telephony with either single or double-frequency facilities. Both the transmitter and receiver are pre-set to an operating frequency which is selected according to customer requirement, to be within the range 71.5 to 104 Mc/s or 140 to 174 Mc/s. The combined microphone/loudspeaker is plugged into the top panel of the unit.

The High Band and Low Band alternatives of the equipment are designed for operation either above or below 120 Mc/s respectively. Either alternative may be obtained with 25 kc/s or 50 kc/s channel spacing.

Power is provided by a rechargeable 13.4 volt battery, housed in a cylindrical container accommodated in one side of the case. The battery gives approximately 8 hours operation with a transmit/receive duty cycle of 1:10.

This V.H.F./F.M. set conforms to the British Post Office Specification W6346.

SPECIFICATION

2. <u>General</u>

Service:	F3 simplex telephony, single- or double-frequency working.
Frequency Range:	Low band 71.5Mc/s - 104 Mc/s High band 140 Mc/s - 174 Mc/s
Frequency Stability:	Not more that ± 2.5 kc/s drift over the temperature range - 10°C to + 40°C.
Channel Separation:	Versions for either 25 kc/s or 50 kc/s channel spacing.

	Aerial Impedance:	50 Ω.
	Aerials:	Quarter-wave whip aerial with telescopic or wire alternative options.
	Controls:	Combined On/Off switch and receiver Volume control fitted on front of the case. Send/Receive push switch, fitted at the top of the combined microphone/loudspeaker.
	Size and Weight: (with Battery but excluding aerial)	Height 6 in. (15.2 cm) Width $4\frac{3}{4}$ in. (12.1 cm) Depth $1\frac{3}{8}$ in. (3.5 cm) Weight $1\frac{3}{4}$ lbs (795 gms)

Transmitter

2.1	R.F. Output:	Low Band 500 mW (nominal) High Band 300 mW (nominal)
	Modulation:	Phase-modulation. Deviation adjustable by internal pre-set control up to 15 kc/s.
	Spurious Radiation:	Not more than 25 μW.

Receiver

2.2	Sensitivity:	For a signal-to-noise ratio of 20 dB. Low Band 0.75 μV p.d. High Band 1.0 μV p.d.
	Spurious Responses:	At least 60 dB down.
	Audio Output:	At least 150 mW into a 50 Ω load. Distortion not more than 10%.
	Squelch:	Adjustable by internal pre-set control.

I.F. Stages:	10.7 Mc/s and 470 kc/s double conversion.

Power Supply

2.3 One 13.4 V rechargeable nickel-cadmium sealed battery type DEAC 11/225 DKZ. Life 8 hours with 1:10 transmit:receive duty cycle.

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CHAPTER 2

OPERATING INSTRUCTIONS

PROCEDURE

1. (1) Insert the quarter-wave rod aerial (high or low band, as required) into the socket in the top panel of the set. Tighten the knurled locking ring. Telescopic aerials must be extended.

(2) Plug in the loudspeaker/microphone. Tighten the knurled locking ring.

(3) Switch on by rotating the front-panel Volume control in a clockwise direction. Set this control to obtain a satisfactory level for listening-in.

This action puts the pocketset into operation ready to receive signals on the pre-set frequency of the transmitter/receiver.

(4) To transmit, depress the button-switch at the top of the loudspeaker/ microphone and speak into the microphone grill at normal voice level. Release the button-switch at the end of each transmission.

(5) Switch off by rotating the Volume control fully counter-clockwise.

(6) If transmission or reception is weak, check the battery voltage as instructed in Section 4.

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CHAPTER 3

TECHNICAL DESCRIPTION

INTRODUCTION

1. Figure 2 is the block diagram of the V.H.F./F.M. Transmitter/Receiver Series CC2/8 MK.II. The transmitter and receiver units are electrically separate and printed-circuit boards are employed in both. During reception the aerial, battery supply, and loudspeaker are connected to the receiver, and the transmitter is switched off. During transmission, operation of the send/receive switch connects these three items to the transmitter.

The receiver is pre-set to operate on one frequency channel. This unit is a double-conversion superheterodyne receiver operating with intermediate frequencies of 10.7 Mc/s and 470 kc/s, both local oscillators being crystal controlled. Output from the final i.f. amplifier is detected and amplified to provide 200 mW audio output into the loudspeaker. A noise amplifier and squelch stage mute the audio output when no r.f. input signals are being received.

In the transmitter, a crystal oscillator and four multiplying stages are used to give an overall frequency multiplication of 24; a final power stage supplies 500 mW (or 300 mW on high band units) r.f. signal to the aerial. Audio signals from the microphone are amplified and then used to phase-modulate the output of the crystal oscillator. A pre-set control allows the maximum frequency-deviation of the final output to be set at between 5 kc/s and 15 kc/s.

RECEIVER

2.

R.F. Amplifier

2.1 Signals received at the aerial are fed via a relay contact (as described in section 3.4) to the input circuit. This circuit is tuned by C1 and capacitivelycoupled to the r.f. amplifier TR1, which is operated in grounded-base configuration. The collector circuit of TR1 is inductively coupled to the band-pass filter to ensure optimum matching. Tuned r.f. circuits give a spurious-response attenuation factor of at least 60 dB.

Local Oscillator 1

2.2 The first oscillator is an overtone type with the crystal XL1 inserted in the feedback path between the collector and emitter of TR3. Second or third overtone crystals may be used depending on the input signal frequency. Both inductive and capacitive tuning are provided in the collector of TR3 to pull the oscillator on to the required frequency. The oscillator output is inductively coupled to mixer 1 by L5.

Crystal XL1 Frequency

2.3 The crystal XL1 operates on its third overtone in high band units, or on its second overtone in low band units. The fundamental crystal frequency may be calculated from the following relationship:

$$\text{Crystal frequency} = \frac{fs - 10.7}{3} \text{ Mc/s for high band units}$$

$$\text{or} \quad \frac{fs + 10.7}{2} \text{ Mc/s for low band units.}$$

where fs = rf signal input frequency in Mc/s.

Mixer 1

2.4 Transistor TR2 operates as a mixer. The 10.7 Mc/s intermediate frequency is selected and fed to the i.f. amplifier by a fixed tuned crystal filter FL1. Two versions of this filter are available to suit the channel spacing required by the customer.

10.7 Mc/s I.F. Amplifier

2.5 This is a two-stage amplifier with d.c. coupling to prevent the transistors from bottoming under large-signal conditions. The pass-bands of the tuned circuits are sufficiently wide to ensure non-critical tuning. Output from the amplifier is inductively coupled to mixer 2.

Local Oscillator 2

2.6 The second oscillator is a Pierce type, using fundamental-mode crystal XL2 to provide an output at 10.23 Mc/s. Output is fed via C36 to the base of the second mixer.

Mixer 2

2.7 The second mixer receives the 10.7 Mc/s intermediate frequency and the second oscillator output of 10.23 Mc/s. The second intermediate frequency of 470 kc/s is selected by the tuned circuit L8 in the collector of TR6. The i.f. signal is fed into the base of TR7 via capacitive impedance matching. Decoupling of the battery supply line is provided by R24 and C24.

470 kc/s I.F. Amplifier

2.8 This is a four-stage direct-coupled amplifier employing two p-n-p and two n-p-n transistors. High value emitter resistors ensure that the d.c. operating points are well stabilised. Decoupling of the battery supply line is provided by R27 and C25.

Discriminator

2.9 Output from the 470 kc/s i.f. amplifier is taken to the discriminator, consisting of transistors TR12 and TR13 and their associated circuits. The resonant circuits in the emitters of these transistors are tuned above and below the mean i.f. of 470 kc/s, L10 being tuned high and L9 low. The resulting discriminator action reproduces a facsimile of the original audio-modulation signal across the output resistor R53.

A.F. Amplifiers

2.10 Audio output from the discriminator is applied to a two-stage direct-coupled amplifier formed by transistors TR14 and TR15. A de-emphasis characteristic is introduced by C46 which increases the negative feedback on TR15 as the audio frequency increases. At frequencies above 300 c/s the reduction in gain is 6 dB/octave.

Output from the amplifier is taken via a manual gain control, which forms the collector load of TR15, and fed to a driver stage TR16. This transistor feeds a complementary p-n-p/n-p-n output stage formed by transistors TR17 and TR18 to drive the loudspeaker. Thermistor TH1 stabilises the output stages against changes in temperature.

In the absence of a signal the squelch amplifier, described in section 2.11, applies a negative bias to the base of TR14, thus effectively reducing the gain of the audio amplifier and thereby muting the output.

Noise Amplifier and Squelch

2.11 The output of the discriminator is applied to a four-stage noise-amplifier, TR19, TR20, TR21, and TR22, in which negative feedback is employed to stabilise the gain of the stages. Maximum gain within the frequency band 10 kc/s to 20 kc/s, and a falling response of 6 dB/octave above and below these frequency limits, are achieved by C51 and C52 which attenuate the lower frequencies, and C58, C59, and C53, which attenuate the higher frequencies by applying negative feedback. Thus, audio signals within the normal speech band are attenuated, whilst noise, which occurs within the range 10 kc/s to 20 kc/s, is amplified.

The output of the noise amplifier is detected by D4 and used to develop a voltage across R77. In the absence of noise, no voltage is developed across R77 and hence TR23 is switched off. When noise is present at the output of the discriminator, it is amplified in the noise amplifier, and then detected and used to develop a voltage across R77 which switches the squelch amplifier TR23, to the "on" state. When TR23 conducts, a negative potential is applied to TR14 via R65, thus the gain of TR14 is reduced which consequently attenuates the audio amplifier.

TRANSMITTER

3

A.F. Stages

3.1 The microphone is connected, via C40, to a two-stage direct-coupled amplifier formed by transistors TR9 and TR10. Shunt capacitor C58 removes any r.f. component in the input signal. The amplifier employs both a.c. and d.c. feedback to achieve a uniform response of $\pm$ 3 dB over the range 300 c/s to 3 kc/s, with a low level of distortion. Output from the LIMITER CONTROL, R23, is fed via the differentiator C41/R31, which acts as a pre-emphasis network. The output from the collector of amplifier TR11 increases with frequency at a rate of 6 dB/octave. Transistor TR12 acts as a limiter, the clipping level being determined by the setting of R23.

The integrator stage, formed by the components in the base of TR13, acts as a 6 dB/octave de-emphasis network. Over the normal speech frequency band, 300 c/s to 3 kc/s, the pre-emphasis and de-emphasis networks tend to cancel each other, thus maintaining a level response. Outside the range 300 c/s to 3 kc/s the frequency response falls at the rate of 6 dB/octave.

Emitter follower TR13 provides a low impedance drive to the low-pass filter formed by C50, LFC1 and C51. The filter attenuates all frequencies above 2.7 kc/s and its output is applied to the phase modulator TR2.

Master Oscillator and Phase Modulator

3.2 The master oscillator is a Pierce type using a fundamental mode crystal XL1. The crystal frequency is given by the relationship:

$$\frac{\text{Final carrier frequency}}{24} \text{ Mc/s}$$

The oscillator output is applied to the base of the phase modulator TR2, whilst the audio modulation is fed to the emitter. The audio signal varies the base-emitter capacitance of TR2 causing amplitude and phase modulation of the collector waveform. Subsequently, the phase modulated component is amplified and radiated, but the amplitude modulated component is progressively attenuated. Network R9, C62 and C3, decouples the battery supply line, Zener diode D1 stabilizing the line at -8 V. An audio signal at the emitter of TR2 produces a frequency deviation of the final carrier output. The phase modulated signal is inductively coupled to the first multiplying stage via the tuned circuit L1/C5 in the collector of TR2.

Multiplying Stages: x3, x2, x2

3.3 The three multiplying stages, TR3, TR4, and TR5, are very similar; in each one an LC collector load is tuned to the appropriate multiple of the crystal frequency. The circuit in the collector of TR5 is double-tuned to select the required signal. Inter-stage decoupling, provided by R47 and C15, R49 and C19, R50 and C24, prevents V.H.F. interference on the supply rail from reaching the multiplier circuits.

Driver, Doubler and Power Output Stages

3.4 The output of TR5, at half the transmitted frequency, is inductively coupled to driver stage TR6. The collector load of this transistor consists of a double-tuned band-pass circuit. Output from the series-parallel tuned circuit L5, C26, C37, is applied to the emitter of the grounded base frequency doubler TR7. Choke RFC5 is included to provide a d.c. path between the emitter and base of TR7, whilst maintaining a high impedance to r.f. signals.

On low band versions the collector circuit of TR7 consists of a tuned load with the output taken from a tap on L6 to provide impedance matching. On high band versions the collector circuit of TR7 is double-tuned, output from the secondary of L6 being fed direct to the emitter of TR8.

The r.f. power output stage, TR8, operates in grounded base configuration, the output of L6 being applied to the emitter of TR8. Choke RFC7 performs a similar function to RFC5. The output of TR8 is double-tuned at transmission frequency and couples the signal to the aerial via a band-pass filter.

The band-pass filter, consisting of RFC10, RFC12, RFC14, C53, C54, and C56, with the addition of RFC11, RFC13, and C55 on high-band versions, prevents any harmonics of the transmission frequency from arriving at the aerial.

TRANSMITTER-RECEIVER SWITCHING CIRCUITS

4. The pocketset is switched on by clockwise rotation of the combined volume/on-off control. As soon as it is switched on, the pocketset will function as a receiver; when it is required that the pocketset should transmit information, then it will be necessary to press the switch which is mounted on the microphone/loudspeaker.

When the set is in the 'receive' condition, then relay RLA is de-energised and its two sets of contacts are in the positions shown on the circuit diagram (figure 6). Contacts RLA1 and RLA2 feed the aerial and the -13.4 V battery supply respectively, to the receiver only. When the microphone/loudspeaker switch is pressed, RLA is energised causing the two contacts to change over and connect the aerial and battery supply to the transmitter.

The combined microphone/loudspeaker is always connected to both the receiver output and the transmitter input. Connection of the battery supply to either the transmitter or receiver circuits causes either microphone or loudspeaker functions to be performed.

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CHAPTER 4

MAINTENANCE INSTRUCTIONS

BATTERY CHARGING

1. Whenever weak transmission or reception is experienced, or when the set has been unused for a long period, then the battery must be recharged. To remove the battery, loosen the large-headed chromed bayonet cap which is located on the top side of the case, and then remove the battery from the holder.

The battery voltage can be measured between its two contacts and it should be within the following limits:

13.4 V fully charged
12.1 V discharged

Directly after charging the voltage may rise to 16 V, but it will quickly fall to the working level. To ensure long life from the battery, it must not be allowed to discharge to below 12.1 V.

The set uses one Deac battery type 11/225 DKZ. When charging, the battery should be taken out of the set, and charged at 22 mA for 14 hours.

When a battery has been unused for a considerable time, or when new, it should be charged and discharged (10-14 hours each) two or three times before use.

GENERAL MAINTENANCE

2.

Crystal/R.F. Circuit Alignment

2.1 The pocketset is supplied with the transmitter and receiver preset to the operating frequencies required by the user and in accordance with the relevant specifications. To change the operating frequencies it is necessary to insert new crystals and re-align the r.f. circuits as detailed in section 4.3.

Crystal frequencies are determined as follows:

Crystal frequency for master oscillator in transmitter $= \frac{fs}{24}$ Mc/s

Crystal frequency for first oscillator in receiver:

Low band $= \frac{fs + 10.7}{2}$ Mc/s

High band $= \frac{fs - 10.7}{3}$ Mc/s

Crystal frequency for second oscillator in receiver = 10.23 Mc/s

fs = operating frequency in Mc/s.

THE SETTINGS OF THE R.F. CIRCUITS SHOULD NOT BE ALTERED UNLESS NEW CRYSTALS OR OTHER R.F. COMPONENTS HAVE BEEN FITTED OR THERE IS OTHER EVIDENCE THAT THE CIRCUITS ARE OUT OF ALIGNMENT. DURING ALIGNMENT THE UNIT MUST BE FITTED INSIDE A DUMMY CASE PROVIDED WITH ACCESS HOLES FOR TRIMMING PURPOSES, COSSOR ALIGNMENT JIG IPSK.167 IS RECOMMENDED.

Removal of Case

2.2 To remove the transmitter and receiver from the case, proceed as follows:

(a) Unplug the microphone/loudspeaker and the aerial from the top of the case.

(b) Remove the small screw in the centre of the volume control and pull the knob away.

(c) Remove the countersunk headed screw from the bottom of the case.

(d) Apply slight pressure to the case so as to free the locating spigot from its hole in the top panel, then withdraw the set, complete with top panel, out of the case.

Component Replacement on Printed Circuits

2.3 The printed-circuit boards can be repaired using standard workshop practices. Access to the soldered connections of resistors, capacitors, and similar small components, can be obtained as follows:

(a) Remove the three chromed Phillips head screws from the top of the case. One of these screws holds the bayonet-cap retaining chain.

(b) Remove the battery container from the unit, taking care not to break the single lead.

(c) Open-out the hinged chassis assembly and remove the insulating sheet from between the circuit boards.

ALIGNMENT PROCEDURES

3. Alignment procedures for the receiver and transmitter are shown in tabular form in figures 5 and 8. In these figures the left-hand and right-hand columns give details of the instruments which have to be connected to the input and output of the circuit under test. The centre column gives details of the actual adjustments in the correct order.

All tests should be carried out at a battery supply potential of 13.4 ± 0.3 V.

Typical transistor operating voltages are stated on the circuit diagrams.

Transmitters and receivers intended for 25 kc/s channel spacing are checked and aligned to different frequency-deviation values to those intended for 50 kc/s spacing. In the performance and alignment tables the two versions are referred to as '25 kc/s set' and '50 kc/s set'.

The performance and alignment procedures entail the use of the test instruments listed below:

Description	Recommended Model
V.H.F. Signal Generator	Marconi Instruments Type 995A/5
H.F. Signal Generator	Marconi Instruments Type TF144G
A.F. Signal Generator	Airmec Types 252 or 702
V.H.F. Power Output Meter (up to 1 W f.s.d.)	Bird Termaline Model 61
A.F. Power Output Meter	Marconi Instruments Type TF 893

Description	Recommended Model
Valve-Voltmeter	Furzehill V200A
Universal Meter (20 kΩ/V)	Avometer Model 8
Secondary Frequency Standard	Hewlett Packard Type 124 ME28
Modulation Meter	Airmec Type 210
Oscilloscope	Cossor Type 1035 or 1059
Centre-Zero Valve-Voltmeter ± 0.5 V	Marconi TF 1041C
Absorption Wavemeter	Marconi Instruments Type TF 975

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CHAPTER 5

COMPONENTS LIST

RECEIVER

1.

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Resistors, Fixed				
R1	Erie	Type 15	1 kΩ	10	0.1 W
R2	Erie	Type 15	4.7 kΩ	10	0.1 W
R3	Erie	Type 15	22 kΩ	10	0.1 W
R4	Erie	Type 15	4.7 kΩ	10	0.1 W
R5	Erie	Type 15	1 kΩ	10	0.1 W
R6	Erie 25 kc/s Channel Spacing	Type 15	820	10	0.1 W
	50 kc/s Channel Spacing	Type 15	2.2 kΩ	10	0.1 W
R7	Erie 25 kc/s Channel Spacing	Type 15	820	10	0.1 W
	50 kc/s Channel Spacing	Type 15	2.2 kΩ	10	0.1 W
R9	Erie	Type 15	18 kΩ	10	0.1 W
R10	Erie	Type 15	3.3 kΩ	10	0.1 W
R11	Erie	Type 15	1 kΩ	10	0.1 W
R12	Erie	Type 15	5.6 kΩ	10	0.1 W
R13	Erie	Type 15	56 Ω	10	0.1 W
R16	Erie	Type 15	15 kΩ	10	0.1 W
R18	Erie	Type 15	1 kΩ	10	0.1 W
R19	Erie	Type 15	2.7 kΩ	10	0.1 W
R20	Erie	Type 15	4.7 kΩ	10	0.1 W
R22	Erie	Type 15	1 kΩ	10	0.1 W
R23	Erie	Type 15	1 kΩ	10	0.1 W
R24	Erie	Type 15	4.7 kΩ	10	0.1 W
R25	Erie	Type 15	220 Ω	10	0.1 W

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Resistors, Fixed				
R26	Erie	Type 15	2.2 kΩ	10	0.1 W
R27	Erie	Type 15	3.9 kΩ	10	0.1 W
R28	Erie	Type 15	33 kΩ	10	0.1 W
R29	Erie	Type 15	27 kΩ	10	0.1 W
R30	Erie	Type 15	4.7 kΩ	10	0.1 W
R31	Erie	Type 15	5.6 k	10	0.1 W
R32	Erie	Type 15	5.6 k	10	0.1 W
R33	Erie	Type 15	5.6 k	10	0.1 W
R34	Erie	Type 15	5.6 k	10	0.1 W
R35	Erie	Type 15	5.6 k	10	0.1 W
R36	Erie	Type 15	5.6 k	10	0.1 W
R37	Erie	Type 15	2.2 kΩ	10	0.1 W
R38	Erie	Type 15	100 Ω	10	0.1 W
R39	Erie	Type 15	15 kΩ	10	0.1 W
R40	Erie	Type 15	10 kΩ	10	0.1 W
R41	Erie	Type 15	5.6 kΩ	10	0.1 W
R42	Erie	Type 15	10 kΩ	10	0.1 W
R43	Erie	Type 15	10 kΩ	10	0.1 W
R44	Erie	Type 15	1 kΩ	10	0.1 W
R45	Erie	Type 15	47 kΩ	10	0.1 W
R46	Erie	Type 15	22 kΩ	10	0.1 W
R47	Erie	Type 15	10 kΩ	10	0.1 W
R48	Erie	Type 15	10 kΩ	10	0.1 W
R49	Erie	Type 15	10 kΩ	10	0.1 W
R50	Erie	Type 15	10 kΩ	10	0.1 W
R51	Erie	Type 15	10 kΩ	10	0.1 W
R52	Erie	Type 15	10 kΩ	10	0.1 W
R53	Erie	Type 15	15 kΩ	10	0.1 W
R54	Erie	Type 15	10 kΩ	10	0.1 W
R55	Erie	Type 15	10 kΩ	10	0.1 W
R56	Erie	Type 15	10 kΩ	10	0.1 W
R57	Erie	Type 15	1 kΩ	10	0.1 W
R58	Erie	Type 15	33 kΩ	10	0.1 W
R59	Preh	Type 1-7451 (less knob)	5 kΩ		
R60	Erie	Type 15	470 Ω	10	0.1 W

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Resistors, Fixed				
R61	Erie	Type 15	47 kΩ	10	0.1 W
R62	Erie	Type 15	6.8 kΩ	10	0.1 W
R63	Erie	Type 15	560 Ω	10	0.1 W
R64	Erie	Type 15	330 Ω	10	0.1 W
R65	Erie	Type 15	10 kΩ	10	0.1 W
R66	Erie	Type 15	10 Ω	10	0.1 W
R67	Erie	Type 15	10 Ω	10	0.1 W
R68	Erie	Type 15	4.7 kΩ	10	0.1 W
R69	Erie	Type 15	22 kΩ	10	0.1 W
R70	Erie	Type 15	33 kΩ	10	0.1 W
R71	Erie	Type 15	5.6 kΩ	10	0.1 W
R72	Erie	Type 15	470 Ω	10	0.1 W
R73	Erie	Type 15	22 kΩ	10	0.1 W
R74	Erie	Type 15	33 kΩ	10	0.1 W
R75	Erie	Type 15	5.6 kΩ	10	0.1 W
R76	Erie	Type 15	470 Ω	10	0.1 W
R77	Morganite	62H (Variable)	47 kΩ		
R78	Erie	Type 15	1 kΩ	10	0.1 W
	Capacitors, Fixed				
C1	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C2	Erie	831/K350081	1000 pF	+80-20	500 V
C3	Erie	831/K350081	1000 pF	+80-20	500 V
C4	Erie	831/K350081	1000 pF	+80-20	500 V
C5	Erie	831/K350081	1000 pF	+80-20	500 V
C6	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C7	Erie	831/P100	0.1-0.5 pF		500 V
C8	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C9	Erie	831/P100	0.1-0.5 pF		500 V
C10	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C11	Erie	831/K350081	1000 pF	+80-20	500 V
C12	Erie 25 kc/s Channel Spacing	831/N470	10 pF	10	500 V
	50 kc/s Channel Spacing	831/N470	27 pF	10	500 V

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Capacitors, Fixed				
C13	Erie	831/K350081	1000 pF	+80-20	500 V
C14	Erie	831/N750	27 pF	10	500 V
C15	Steatite	7S-TRIKO-02-N750	4.5-20 pF		160 V
C16	Erie	831/K350081	1000 pF	+80-20	500 V
C17	Erie	831/K350081	1000 pF	+80-20	500 V
C18	Erie	831/K350081	1000 pF	+80-20	500 V
C19	Erie	831/K350081	1000 pF	+80-20	500 V
C20	Siemens	Styroflex B31110	200 pF		125 V
C21	Erie	831/K350081	1000 pF	+80-20	500 V
C22	Siemens	Styroflex B31110	200 pF		125 V
C23	Erie	831/K350081	1000 pF	+80-20	500 V
C24	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C25	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C26	Erie	831/K7004	3000 pF	+80-20	300 V
C27	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C28	Erie	831/K350081	1000 pF	+80-20	500 V
C29	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C30	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C31	Erie	831/K350081	1000 pF	+80-20	500 V
C33	Erie	831/T/18 V	0.01 μF	+50-25	18 V
C34	Erie	831/K350081	1000 pF	+80-20	500 V
C35	Erie	831/N750	27 pF	10	500 V
C36	Erie	831/K350081	1000 pF	+80-20	500 V
C37	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C38	Siemens	Styroflex B31110	200 pF		125 V
C39	Siemens	Styroflex B31110	200 pF		125 V
C40	Erie	831/K350081	1000 pF	+80-20	500 V
C41	Erie	831/K350081	1000 pF	+80-20	500 V
C42	Erie	831/T/18 V	0.01 μF	+50-25	18 V
C43	Mullard	C426 AS/D4	4 μF	+100-10	10 V
C44	Mullard	C426 AS/D4	4 μF	+100-10	10 V
C45	Mullard	C426 AR/F6.4	6.4 μF	+50-10	25 V
C46	Erie	811/T/30 V	0.047 μF	-25 +50	30 V

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Capacitors, Fixed				
C47	Mullard	C426 AR/F6.4	6.4 μF	+50-10	25 V
C48	Mullard	C426 AS/D4	4 μF	+100-10	10 V
C49	Erie	831/T/18 V	0.01 μF	+50-25	18 V
C50	Mullard	C426 AR/E20	20 μF	+50-10	16 V
C51	Erie	831/K350081	1000 pF	+80-20	500 V
C52	Erie	831/K350081	1000 pF	+80-20	500 V
C53	Erie	831/K7004	3000 pF	+80-20	300 V
C54	Erie	811/T/30 V	0.1 μF	-25+50	30 V
C55	Mullard	C426 AS/D4	4 μF	+100-10	10 V
C56	Mullard	C426 AR/F6.4	6.4 μF	+50-10	25 V
C57	Siemens	Styroflex B31110	200 pF		125 V
C58	Erie	831/K7004	3000 pF	+80-20	300 V
C59	Erie	831/K120051	220 pF	-20+80	500 V
	Transistors				
TR1	Mullard	AFZ-12			
TR2	Mullard	AFZ-12			
TR3	Mullard	AFZ-12			
TR4	Mullard	2N987 or AF124			
TR5	Mullard	2N987 or AF124			
TR6	Mullard	2N987 or AF124			
TR7	Mullard	2N987 or AF124			
TR8	Mullard	OC139			
TR9	Mullard	2N987 or AF124			
TR10	Mullard	OC139			
TR11	Mullard	2N987 or AF124			
TR12	Mullard	2N987 or AF124			
TR13	Mullard	2N987 or AF124			
TR14	Mullard	2N987 or AF124			
TR15	Mullard	2N987 or AF124			

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Transistors				
TR16	Mullard	2N987 or AF124			
TR17	Newmarket (or Mullard)	(NKT213(or AC132)	Matched Pair		
TR18		(NKT713(or AC127)			
TR19	Mullard	2N987 or AF124			
TR20	Mullard	2N987 or AF124			
TR21	Mullard	2N987 or AF124			
TR22	Mullard	2N987 or AF124			
TR23	Texas	2N3704			
	Diodes				
D1	Phillips	0A90			
D2	Phillips	0A90			
D3	Phillips	0A90			
D4	Phillips	0A90			
	Inductors				
L1	Cossor High Band Version	A/GA31646			
	Low Band Version	A/GA31654			
L2	Cossor High Band Version	A/GA31647			
	Low Band Version	A/GA31655			
L3	Cossor High Band Version	A/GA31648			
	Low Band Version	A/GA31657			
L4	Cossor High Band Version	A/GA31646			
	Low Band Version	A/GA31654			
L5	Cossor	B/GA31473			
L6	Cossor	B/SA80390/58			
L7	Cossor	B/SA80390/58			
L8	Cossor	B/SA80390/59			
L9	Cossor	B/SA80390/59			
L10	Cossor	B/SA80390/59			
	Miscellaneous				
FL1	STC 25 kc/s Channel Spacing	445 LQU920B			
	50 kc/s Channel Spacing	445 LQU920A			
XL1	Cossor	KSK12103			
XL2	Cossor	KSK12102	10.230 Mc/s		
TH1	Mullard	VA1064	150 Ω		

TRANSMITTER
2.

Cot. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Resistors, Fixed				
R1	Erie	Type 15	15 kΩ	10	0.1 W
R2	Erie	Type 15	10 kΩ	10	0.1 W
R3	Erie	Type 15	680 Ω	10	0.1 W
R4	Erie	Type 15	4.7 kΩ	10	0.1 W
R5	Erie	Type 15	15 kΩ	10	0.1 W
R6	Erie	Type 15	10 kΩ	10	0.1 W
R7	Erie	Type 15	1 kΩ	10	0.1 W
R8	Erie	Type 15	3.3 kΩ	10	0.1 W
R9	Erie	Type 15	560 Ω	10	0.1 W
R10	Erie	Type 15	15 kΩ	10	0.1 W
R11	Erie High Band Version	Type 15	10 kΩ	10	0.1 W
	Low Band Version	Type 15	4.7 kΩ	10	0.1 W
R12	Erie	Type 15	1 kΩ	10	0.1 W
R13	Erie	Type 15	2.2 kΩ	10	0.1 W
R14	Erie	Type 15	15 kΩ	10	0.1 W
R15	Erie	Type 15	10 kΩ	10	0.1 W
R16	Erie	Type 15	2.7 kΩ	10	0.1 W
R17	Erie	Type 15	15 kΩ	10	0.1 W
R18	Erie	Type 15	10 kΩ	10	0.1 W
R19	Erie	Type 15	2.7 kΩ	10	0.1 W
R20	Erie	Type 15	15 kΩ	10	0.1 W
R21	Erie	Type 15	10 kΩ	10	0.1 W
R22	Erie	Type 15	680 Ω	10	0.1 W
R23	Morganite (Variable)	Type 62H	10 kΩ	20	
R24	Erie	Type 15	4.7 kΩ	10	0.1 W
R25	Erie	Type 15	39 kΩ	10	0.1 W
R26	Erie	Type 15	220 Ω	10	0.1 W
R27	Erie	Type 15	1 kΩ	10	0.1 W
R28	Erie	Type 15	100 kΩ	10	0.1 W
R29	Erie	Type 15	1 kΩ	10	0.1 W
R30	Erie	Type 15	1 kΩ	10	0.1 W
R31	Erie	Type 15	10 kΩ	10	0.1 W
R32	Erie	Type 15	100 kΩ	10	0.1 W
R33	Erie	Type 15	8.2 kΩ	10	0.1 W
R34	Erie	Type 15	220 Ω	10	0.1 W
R35	Erie	Type 15	1 kΩ	10	0.1 W

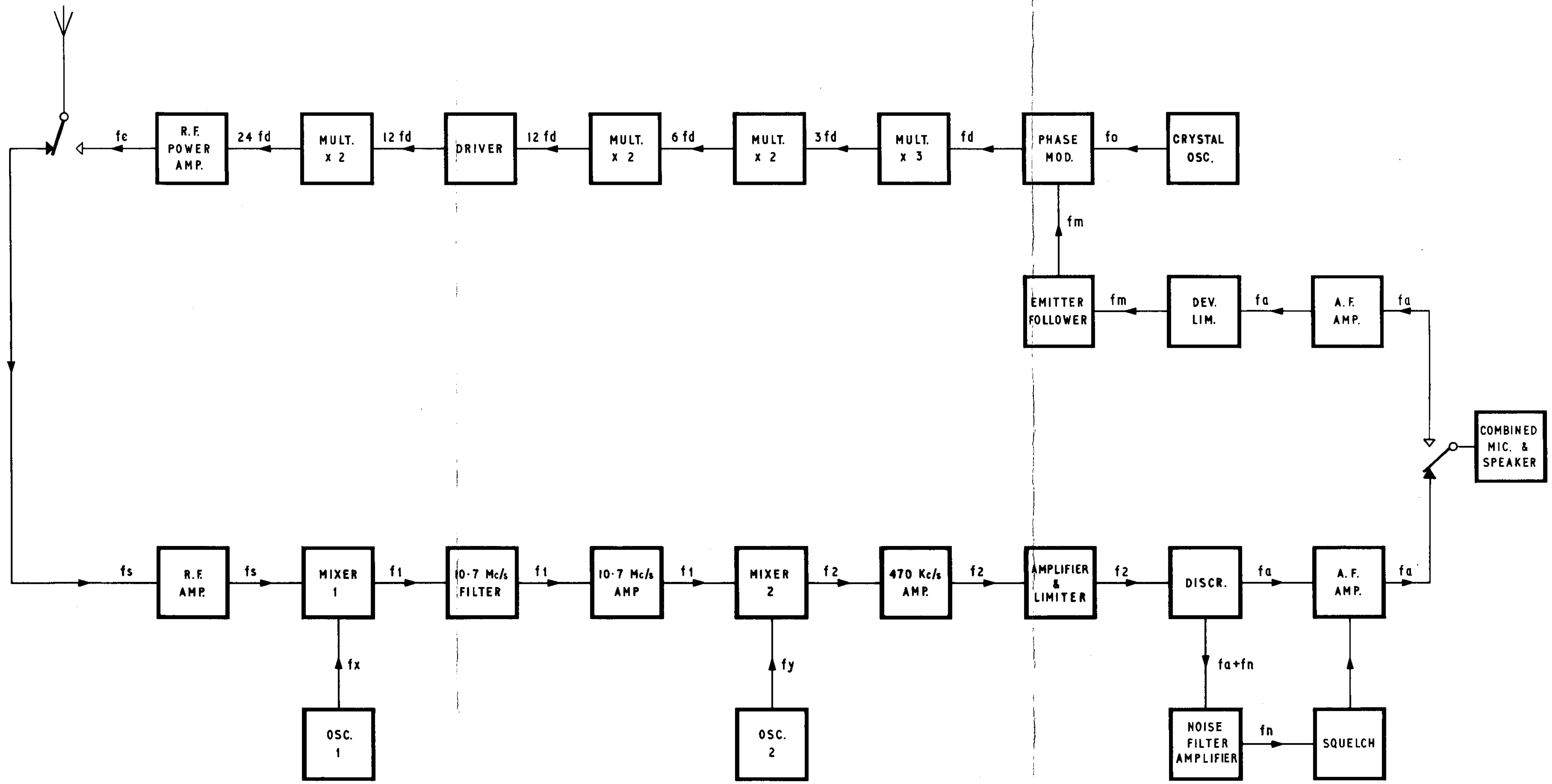
Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Resistors, Fixed				
R36	Erie	Type 15	1 kΩ	10	0.1 W
R37	Erie	Type 15	10 kΩ	10	0.1 W
R38	Erie	Type 15	33 kΩ	10	0.1 W
R39	Erie	Type 15	220 Ω	10	0.1 W
R40	Erie	Type 15	1 kΩ	10	0.1 W
R41	Erie	Type 15	10 kΩ	10	0.1 W
R42	Erie	Type 15	47 kΩ	10	0.1 W
R43	Erie	Type 15	47 kΩ	10	0.1 W
R44	Erie	Type 15	560 Ω	10	0.1 W
R45	Erie	Type 15	560 Ω	10	0.1 W
R46	Morganite (Variable)	Type 62H	10 kΩ	20	
R47	Erie	Type 15	100 Ω	10	0.1 W
R48	Erie	Type 15	220 Ω	10	0.1 W
R49	Erie	Type 15	100 Ω	10	0.1 W
R50	Erie	Type 15	47 Ω	10	0.1 W
R51	Erie	Type 15	47 Ω	10	0.1 W
R52	Erie Low Band Only	Type 15	10 Ω	10	0.1 W
	Capacitors, Fixed				
C1	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C2	Erie High Band Versions	831/N750	27 pF	10	500 V
	Low Band Versions	Y/SN1100	100 pF	10	200 V
C3	Erie	831/K7004	3000 pF	-20 +80	500 V
C4	Mullard	C280 AE/P47K	0.047 μF	20	250 V
C5	Erie High Band Versions	Y/SN1100	68 pF	10	200 V
	88-104 Mc/s Versions	Y/SN1100	120 pF	10	200 V
	78-88 Mc/s Versions	Y/SN1300	150 pF	10	200 V
	70-78 Mc/s Versions	Y/SN1600	180 pF	10	200 V
C6	Erie	831/K7004	3000 pF	-20 +80	500 V
C7	Erie	831/K7004	3000 pF	-20 +80	500 V
C8	Siemens	B4131-A0-505-Z	5 μF	-20 +100	10-12 V
C9	Erie	831/K7004	3000 pF	-20 +80	500 V
C10	Erie 156-174 Mc/s Versions	Y/SN1100	100 pF	10	200 V
	140-156 Mc/s Versions	Y/SN1100	120 pF	10	200 V
	88-104 Mc/s Versions	Y/SN1100	120 pF	10	200 V
	78-88 Mc/s Versions	Y/SN1300	150 pF	10	200 V
	70-78 Mc/s Versions	Y/SN1600	180 pF	10	200 V

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Capacitors, Fixed				
C11	Erie	831/K7004	3000 pF	-20 +80	500 V
C12	Erie	831/K7004	3000 pF	-20 +80	500 V
C13	Erie	831/K7004	3000 pF	-20 +80	500 V
C14	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C15	Erie	831/K7004	3000 pF	-20 +80	500 V
C16	Erie	831/K7004	3000 pF	-20 +80	500 V
C17	Erie	831/K7004	3000 pF	-20 +80	500 V
C18	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C19	Erie	831/K7004	3000 pF	-20 +80	500 V
C20	Erie	831/K7004	3000 pF	-20 +80	500 V
C21	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C22	Erie	831/K7004	3000 pF	-20 +80	500 V
C23	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C24	Erie	831/K7004	3000 pF	-20 +80	500 V
C25	Erie	831/K7004	3000 pF	-20 +80	500 V
C26	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C27	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C28	Erie	831/K7004	3000 pF	-20 +80	500 V
C29	Steatite High Band Only	10S-TRIKO-06-N750	4-20 pF		250 V
C30	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C31	Erie	831/K7004	3000 pF	-20 +80	500 V
C32	Steatite	10S-TRIKO-06-N470	4-20 pF		250 V
C34	Erie	831/K7004	3000 pF	-20 +80	500 V
C35	Erie	831/K7004	3000 pF	-20 +80	500 V
C36	Erie	831/K7004	3000 pF	-20 +80	500 V
C37	Erie High Band Version	831/N750	27 pF	10	500 V
	Low Band Version	Y/SN1300	150 pF	10	200 V
C39	Mullard	C426 AR/E20/3N	20 µF	-10 +50	16 V
C40	Siemens	B41313	10 µF	-20 +50	15-18 V

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Capacitors, Fixed				
C42	Siemens	B41313	10 μF	-20 +50	15-18 V
C44	Siemens	B41313	10 μF	-20 +50	15-18 V
C45	Erie	831/K7004	3000 pF	-20 +80	500 V
C46	Siemens	B41313	10 μF	-20 +50	15-18 V
C47	Siemens	B41313	10 μF	-20 +50	15-18 V
C48	Mullard	C426 AR/G4 Size 2N	4 μF	-10 +50	40 V
C49	Siemens	B41313	10 μF	-20 +50	15-18 V
C50	Ferroperm	9/0145, 9	0.1 μF	-20 +80	12 V
C51	Ferroperm	9/0145, 9	0.1 μF	-20 +80	12 V
C52	Ferroperm	9/0145, 9	0.1 μF	-20 +80	12 V
C53	Erie High Band version	831/NPO	10 pF	5	500 V
	Low Band Version	831/N750	15 pF	10	500 V
C54	Erie High Band Version	831/N750	27 pF	10	500 V
	Low Band Version	831/N1500	43 pF	10	500 V
C55	Erie High Band Only	831/N750	27 pF	10	500 V
C56	Erie High Band Version	831/NPO	10 pF	5	500 V
	Low Band Version	831/N750	15 pF	10	500 V
C58	Erie	831/K7004	3000 pF	-20 +80	500 V
C59 C60	Erie	831/K7004	3000 pF	-20 +80	500 V
C61	Erie Low Band Only	831/K120051	470 pF	-20 +80	500 V
C62	Ferroperm	9/0145,9	0.1 μF	-20 +80	12 V
	Transistors				
TR1	Mullard	2N987 or AF124			
TR2	Mullard	2N987 or AF124			
TR3	Mullard	2N987 or AF124			
TR4	Mullard	2N987 or AF124			
TR5	Mullard	2N987 or AF124			
TR6	Mullard	2N987 or AF124			
TR7	Mullard	AFY19			
TR8	Mullard	AFY19			
TR9	Mullard	2N987 or AF124			
TR10	Mullard	2N987 or AF124			
TR11	Mullard	2N987 or AF124			
TR12	Mullard	2N987 or AF124			
TR13	Mullard	2N987 or AF124			

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Diodes				
D1	S.T.C. Zener	ZF8.2			
	Inductors				
LFC1	Cossor	B/GA31356			
L1	Cossor High Band Version	A/SA80391/54			
	Low Band Version	A/SA80391/61			
L2	Cossor High Band Version	A/SA80391/55			
	Low Band Version	A/SA80391/62			
L3	Primary High Band Version	A/SA80391/74			
	Low Band Version	KA31649			
L3	Secondary Cossor	A/SA80391/69			
L4	Primary Cossor High Band Version	A/SA80391/57			
	Low Band Version	KA31650			
L4	Secondary Cossor High Band Version	A/SA80391/56			
	Low Band Version	KA31651			
L5	Primary Cossor High Band Version	A/SA80391/57			
	Low Band Version	KA31650			
L5	Secondary Cossor High Band Version	A/SA80391/58			
	Low Band Version	KA31650			
L6	Primary Cossor High Band Version	A50391/2			
	Low Band Version	A50391/12			
L6	Secondary Cossor High Band Only	A50391/2			
L7	Primary Cossor High Band Version	A50391/2			
	Low Band Version	A50391/13			
L7	Secondary Cossor High Band Version	A50391/3			
	Low Band Version	A50391/17			

Cct. Ref.	Description	Ref.No.	Value	Tol. ± %	Rating
	Inductors				
RFC5	Cossor	A/SA80391/68			
RFC7	Cossor	A/SA80391/68			
RFC10	Cossor High Band Version	A50391/4			
	Low Band Version	A/GA31653			
RFC11	Cossor High Band Only	A50391/5			
RFC12	Cossor High Band Version	A50391/6			
	Low Band Version	A/GA31652			
RFC13	Cossor High Band Only	A50391/5			
RFC14	Cossor High Band Version	A50391/4			
	Low Band Version	A/GA31653			
	Crystals				
XL1	Cossor	KSK12102			
RLA	Gruner	957. 2-pole			12 V



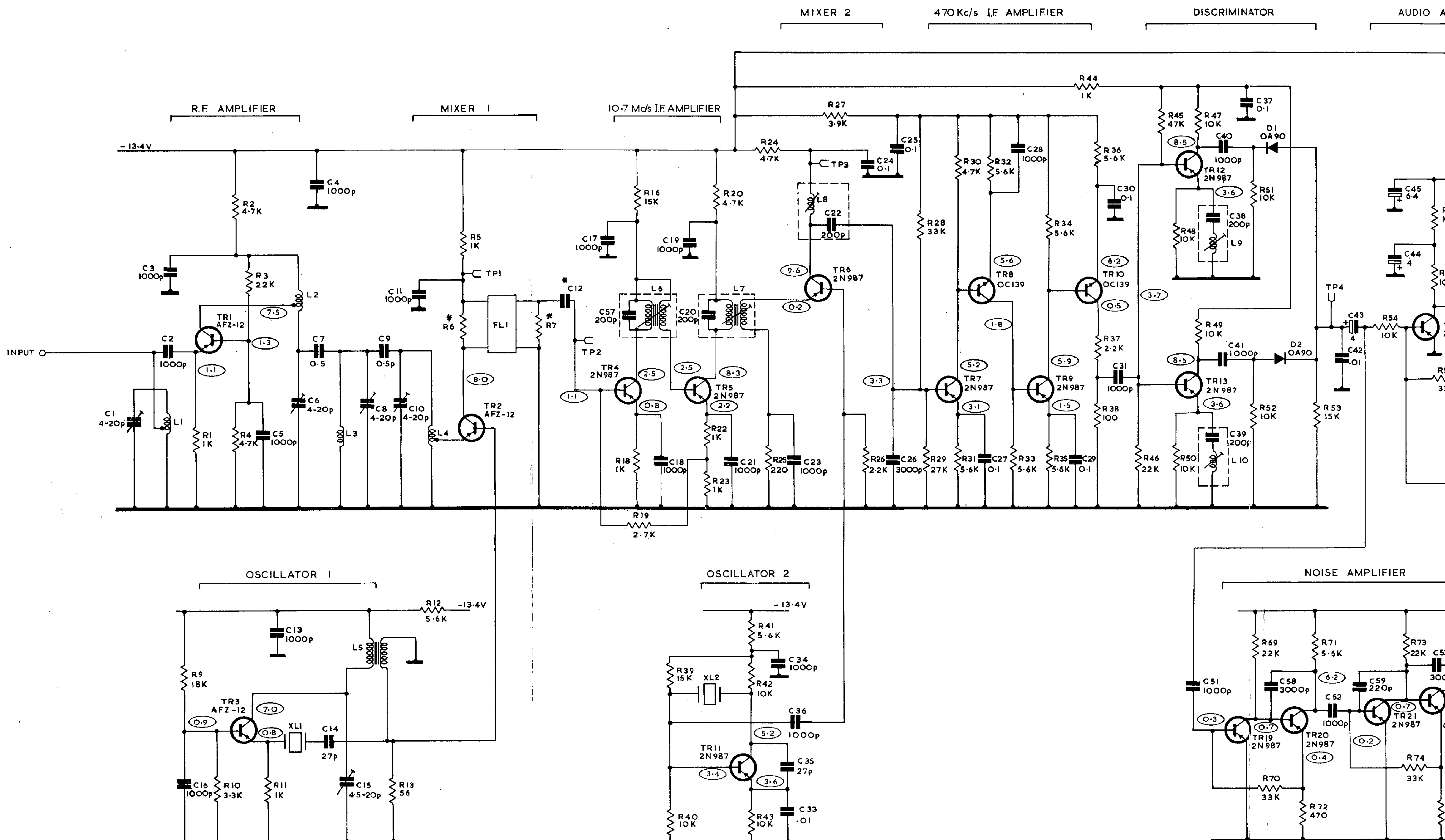
TRANSMITTER: fa = AUDIO FREQUENCY
fm = MODULATING FREQUENCY
fo = OSCILLATOR FREQUENCY
fd = MODULATED OSCILLATOR FREQUENCY
fc = TRANSMITTER CARRIER FREQUENCY = 24 fd

RECEIVER: fs = RECEIVER SIGNAL FREQUENCY
fx = FREQUENCY OF OSCILLATOR 1
fy = FREQUENCY OF OSCILLATOR 2
f1 = 10·7 Mc/s
f2 = f1 − fy = 470 kc/s
fa = AUDIO FREQUENCY
fn = NOISE FREQUENCY

V.H.F. F.M. TRANSMITTER - RECEIVER SERIES CC 2/8 MK II
BLOCK DIAGRAM

CC 125
ISSUE 1

FIG. 2



COMPONENTS MARKED * ARE VARIANTS FOR VALUES REFER TO APPROPRIATE ITEMS LIST.

TR17 AND TR18 ARE A MATCHED PAIR.

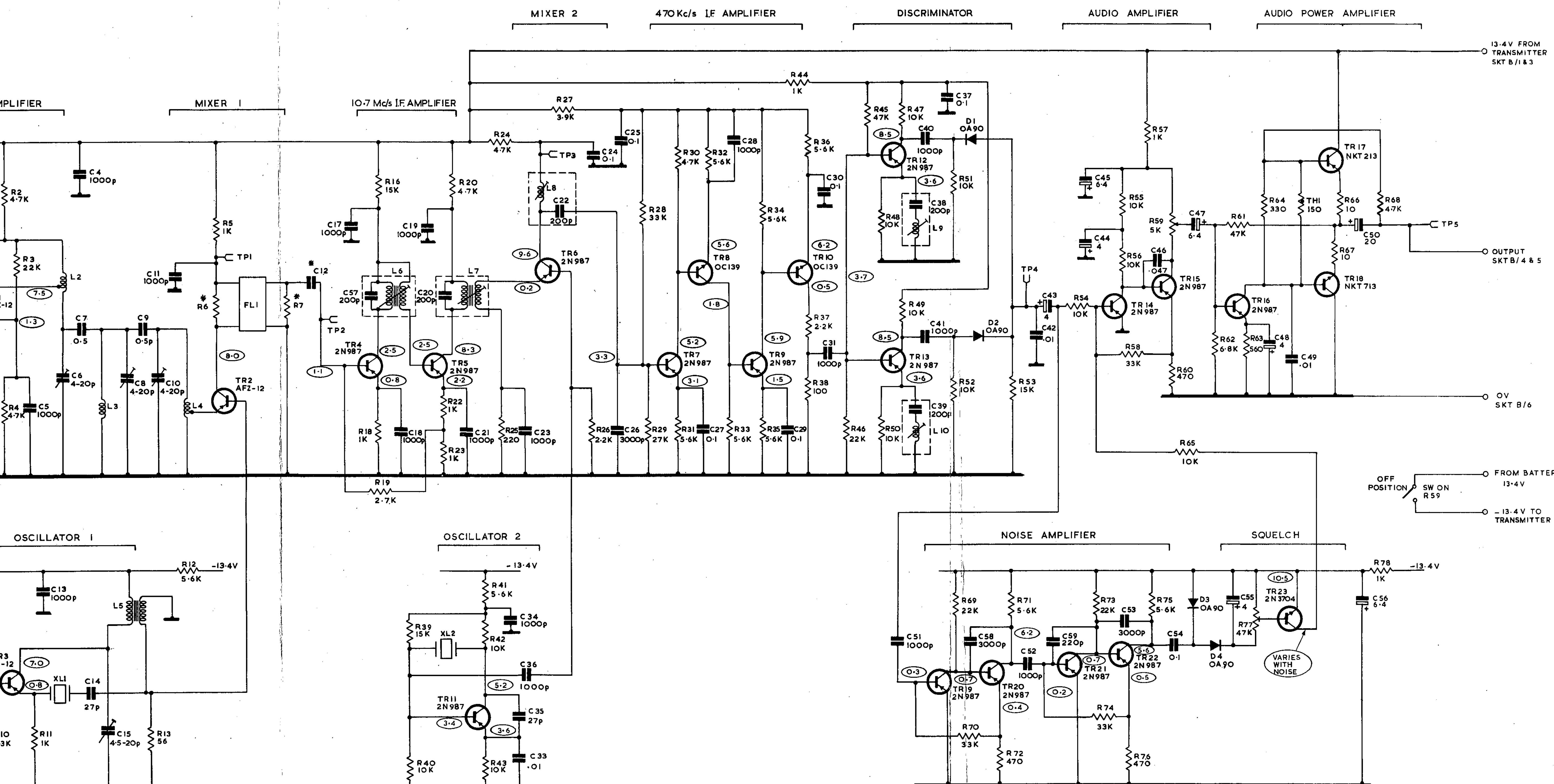
TR17 MAY BE TYPE AC132
TR18 MAY BE TYPE AC127

FIGURES SHOWN THUS (5·6) ARE TYPICAL TRANSISTOR ELECTRODE VOLTAGES, NEGATIVE W.R.T. CHASSIS, AS MEASURED WITH A 20 KΩ/V METER.

TRANSISTOR TYPE AF 124

CC 125
E/CD 80435/1-/4 ISSUE B

RECEIVER CC2 MK II CIRCUIT DIAGRAM



ARIANTS FOR VALUES
LIST.

TR17 AND TR18 ARE A MATCHED PAIR.

TR17 MAY BE TYPE AC132
TR18 MAY BE TYPE AC127

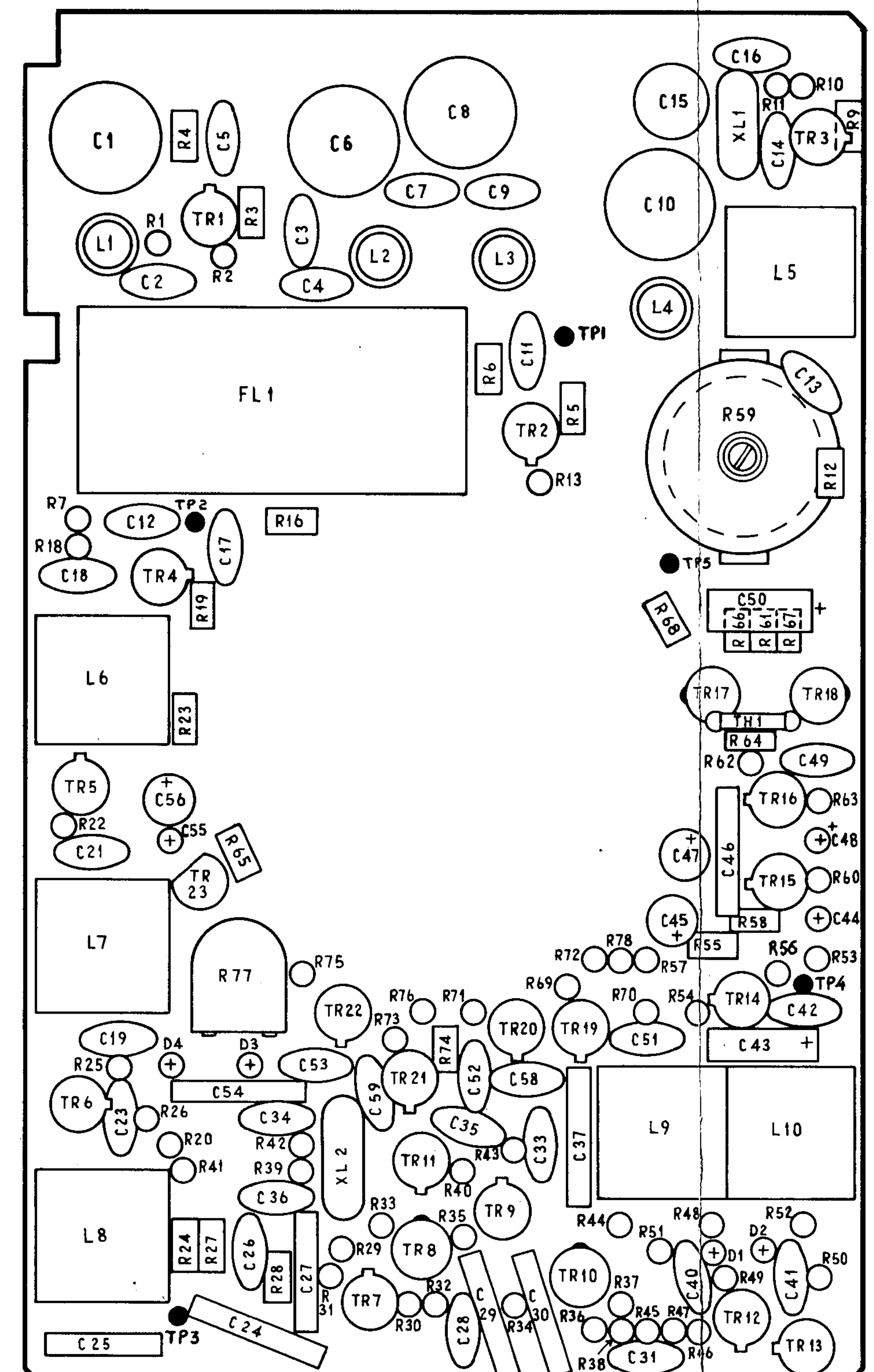
FIGURES SHOWN THUS (5·6) ARE TYPICAL TRANSISTOR ELECTRODE VOLTAGES, NEGATIVE W.R.T. CHASSIS, AS MEASURED WITH A 20 KΩ/V METER.

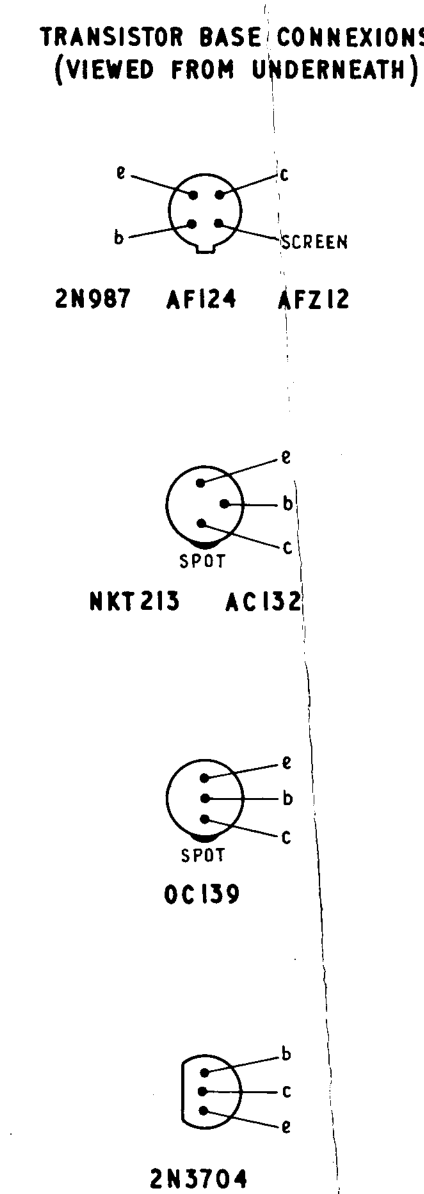
TRANSISTOR TYPE AF 124 IS ALTERNATIVE TO TYPE 2N 987

SUE B

RECEIVER CC2 MK II CIRCUIT DIAGRAM

FIG. 3





CC125
C/SA 80435/53 ISSUE E

COMPONENT LAYOUT: RECEIVER

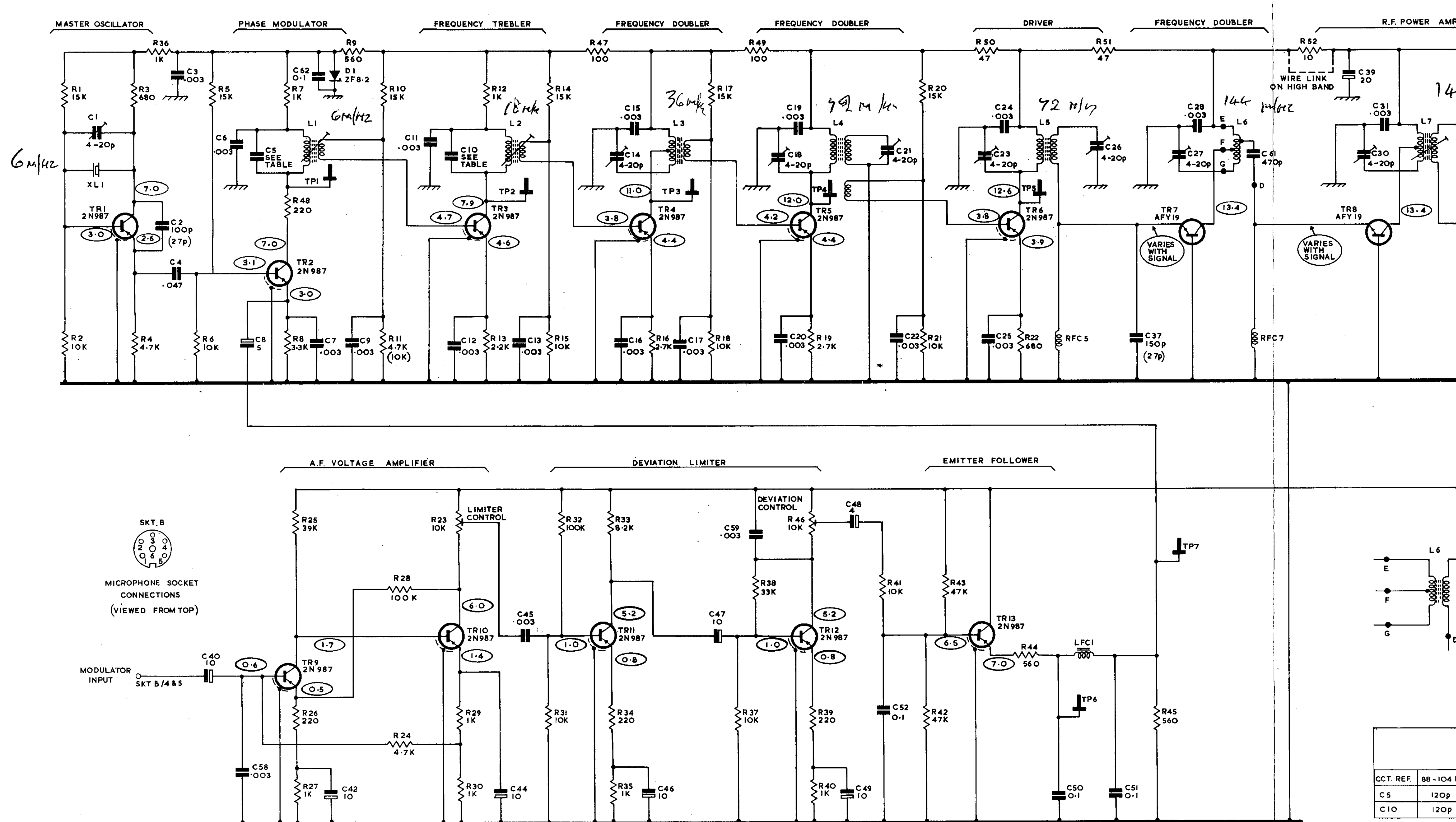
FIGURE 4

CIRCUIT SECTION	INPUT INSTRUMENT TYPE	CONNECTED	SET TO	ADJUSTMENTS & OUTPUT READINGS — OPERATION SEQUENCE	
A.F. STAGES	A.F. Signal Generator	TP4 and earth	1 kc/s Level as in next column	(1) Set the A.F.GAIN control (R59) fully clockwise. (2) Adjust the Signal Generator level to obtain 200 mV on the Audio Power Meter. (3) Check that the input is not greater than 20 mV.	
DISCRIMINATOR	H.F. Signal Generator	Junction of R7-C12 and earth		(4) Set SQUELCH control (R77) fully clockwise	
			10.715 Mc/s (25 kc/s set) 10.725 Mc/s (50 kc/s set) 1 mV	(5) Adjust L10 for maximum positive output (should be at least 120 mV).	
			10.685 Mc/s (25 kc/s set) 10.675 Mc/s (50 kc/s set) 1 mV	(6) Adjust L9 for maximum negative output (should be at least 120 mV).	
			10.700 Mc/s 1 mV	(7) Check that output is zero. If not, slightly readjust L9 and L10.	
I.F. STAGES			10.7 Mc/s Level 2 mV Modulation 1 kc/s Deviation : ±5 kc/s (25 kc/s set) ±12 kc/s (50 kc/s set)	(8) Set A.F.GAIN control (R59) for an output of 20 mW. (9) Adjust L8 for maximum output. (10) Adjust L7 for maximum output. (11) Adjust L6 for maximum output (12) Repeat adjustments (9) to (11) inclusive.	As the tuning proceeds, maintain of approximately 20 mV by succes ducing the input level to 3.1 µV tuning is completed then signal- ratio should be more than 20 dB.
OSCILLATOR 1				(13) Adjust L5 and C15 to give the correct frequency within ±50 c/s. Oscillator frequency = $\frac{fs-10.7}{3}$ for high band versions or $\frac{fs+10.7}{2}$ for low band versions	fs = Receiver input frequency
R.F. AMPLIFIER	V.H.F. Signal Generator	Aerial socket	1.25 µV emf (low band) or 2 µV emf (high band) unmodulated at signal frequency	(14) Adjust C1 for minimum output. (15) Adjust C6 for minimum output. (16) Adjust C8 for minimum output. (17) Adjust C10 for minimum output.	Successively reduce the input le 1.25 µV (low band) or 2.0 µV (hi tuning proceeds.
			1.25 µV emf (low band) or 2 µV emf (high band) at signal frequency. Modulation 1 kc/s, deviation ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(18) Trim C1 for maximum output. (19) Trim C6 for maximum output. (20) Trim C8 for maximum output. (21) Trim C10 for maximum output.	
SIGNAL / NOISE RATIO				(22) Set the A.F.GAIN control (R59) to give 150 mW output. (23) Remove the modulation and check that the output reduces by at least 20 dB.	
OUTPUT POWER			100 µV emf at signal frequency Modulation 1 kc/s, deviation ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(24) Adjust the A.F.GAIN control (R59) to achieve 150 mW audio output.	
DISTORTION				(25) With 150 mW audio output, check that there is no undue distortion of the waveform.	
CURRENT DRAIN				(26) Check that the current consumption is within the limits 10 - 40 mA.	
SQUELCH SETTING			1.6 µV emf (low band) or 2 µV emf (high band) at signal frequency. Modulation 1 kc/s, Deviation : ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(27) Set the A.F.GAIN control (R59) to give 150 mW output. (28) Set the SQUELCH control (R77) such that the squelch is just 'open'. (29) Finally adjust the SQUELCH control (R77) until : with no input signal the squelch 'closes' with the signal applied the squelch just 'opens'.	Squelch 'open steady output Squelch 'clos steady output than 0.1 mW.

ION	INPUT INSTRUMENT TYPE	CONNECTED	SET TO	ADJUSTMENTS & OUTPUT READINGS (↓ OPERATION SEQUENCE)	OUTPUT INSTRUMENT TYPE	CONNECTED	SET TO
	A.F. Signal Generator	TP4 and earth	1 kc/s Level as in next column	(1) Set the A.F.GAIN control (R59) fully clockwise. (2) Adjust the Signal Generator level to obtain 200 mV on the Audio Power Meter. (3) Check that the input is not greater than 20 mV.	Audio Power Meter	Across loudspeaker output Disconnect loudspeaker	50 Ω impedance
R	H.F. Signal Generator	Junction of R7-C12 and earth		(4) Set SQUELCH control (R77) fully clockwise	Valve Voltmeter (centre-zero)	Between TP4 and earth	300 mV range
			10.715 Mc/s (25 kc/s set) 1 mV 10.725 Mc/s (50 kc/s set)	(5) Adjust L10 for maximum positive output (should be at least 120 mV).			
			10.685 Mc/s (25 kc/s set) 1 mV 10.675 Mc/s (50 kc/s set)	(6) Adjust L9 for maximum negative output (should be at least 120 mV).			
			10.700 Mc/s 1 mV	(7) Check that output is zero. If not, slightly readjust L9 and L10.			
			10.7 Mc/s Level 2 mV Modulation 1 kc/s Deviation : ±5 kc/s (25 kc/s set) ±12 kc/s (50 kc/s set)	(8) Set A.F.GAIN control (R59) for an output of 20 mW. (9) Adjust L8 for maximum output. (10) Adjust L7 for maximum input. (11) Adjust L6 for maximum output (12) Repeat adjustments (9) to (11) inclusive. As the tuning proceeds, maintain an output of approximately 20 mV by successively reducing the input level to 3.1 μV. When tuning is completed then signal-to-noise ratio should be more than 20 dB.	Audio Power Meter	Across loudspeaker output Disconnect Loudspeaker	50 Ω impedance
l				(13) Adjust L5 and C15 to give the correct frequency within ±50 c/s. Oscillator frequency = $\frac{fs-10.7}{3}$ for high band versions or $\frac{fs+10.7}{2}$ for low band versions fs = Receiver input frequency	Frequency Meter	Between TR2 emitter and earth via 1kΩ resistor	
ER	V.H.F. Signal Generator	Aerial socket	1.25 μV emf (low band) or 2 μV emf (high band) unmodulated at signal frequency	(14) Adjust C1 for minimum output. (15) Adjust C6 for minimum output. (16) Adjust C8 for minimum output. (17) Adjust C10 for minimum output. Successively reduce the input level down to 1.25 μV (low band) or 2.0 μV (high band) as tuning proceeds.	Audio Power Meter	Across loudspeaker output Disconnect loudspeaker	50 Ω impedance
			1.25 μV emf (low band) or 2 μV emf (high band) at signal frequency. Modulation 1 kc/s, deviation ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(18) Trim C1 for maximum output. (19) Trim C6 for maximum output. (20) Trim C8 for maximum output. (21) Trim C10 for maximum output.			
SE				(22) Set the A.F.GAIN control (R59) to give 150 mW output. (23) Remove the modulation and check that the output reduces by at least 20 dB.			
			100 μV emf at signal frequency Modulation 1 kc/s, deviation ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(24) Adjust the A.F.GAIN control (R59) to achieve 150 mW audio output.			
				(25) With 150 mW audio output, check that there is no undue distortion of the waveform.	Oscilloscope	Across loudspeaker output Disconnect loudspeaker	
N				(26) Check that the current consumption is within the limits 10 - 40 mA.	Current Meter	In series with the negative supply	
ING			1.6 μV emf (low band) or 2 μV emf (high band) at signal frequency. Modulation 1 kc/s, Deviation : ±5 kc/s (25 kc/s set) ±15 kc/s (50 kc/s set)	(27) Set the A.F.GAIN control (R59) to give 150 mW output. (28) Set the SQUELCH control (R77) such that the squelch is just 'open'. (29) Finally adjust the SQUELCH control (R77) until : with no input signal the squelch 'closes' with the signal applied the squelch just 'opens'. Squelch 'open' means a steady output of 150 mW. Squelch 'closed' means a steady output of less than 0.1 mW.	Audio Power Meter	Across loudspeaker output Disconnect loudspeaker	50 Ω impedance

RECEIVER ALIGNMENT PROCEDURE

FIG. 5



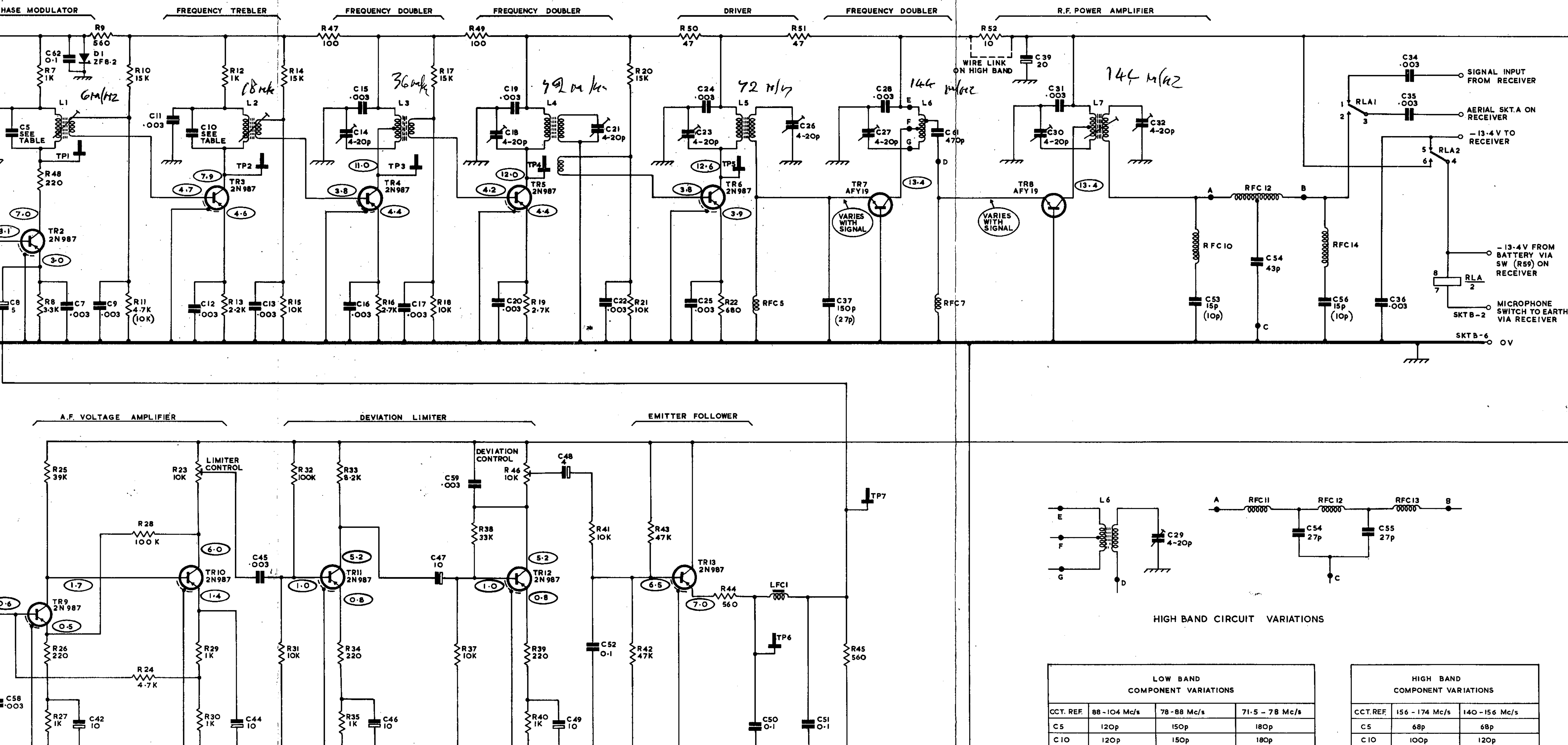
TRANSISTOR TYPE AF 124 IS ALTERNATIVE TO TYPE 2N 987.

COMPONENT VALUES SHOWN THUS (10K) REFER TO HIGH BAND VERSIONS.

FIGURES SHOWN THUS (5·6) ARE TYPICAL TRANSISTOR ELECTRODE VOLTAGES, NEGATIVE W.R.T. CHASSIS, AS MEASURED WITH A 20K Ω/V METER.

CC125
E/CD80436/4, 5, & 6 ISSUE B

TRANSMITTER CC8 MK II CIRCUIT DIAGRAM



LOW BAND COMPONENT VARIATIONS			
CCT. REF.	88 – 104 Mc/s	78 – 88 Mc/s	71·5 – 78 Mc/s
C5	120p	150p	180p
C10	120p	150p	180p

HIGH BAND COMPONENT VARIATIONS		
CCT. REF.	156 – 174 Mc/s	140 – 156 Mc/s
C5	68p	68p
C10	100p	120p

4 IS ALTERNATIVE

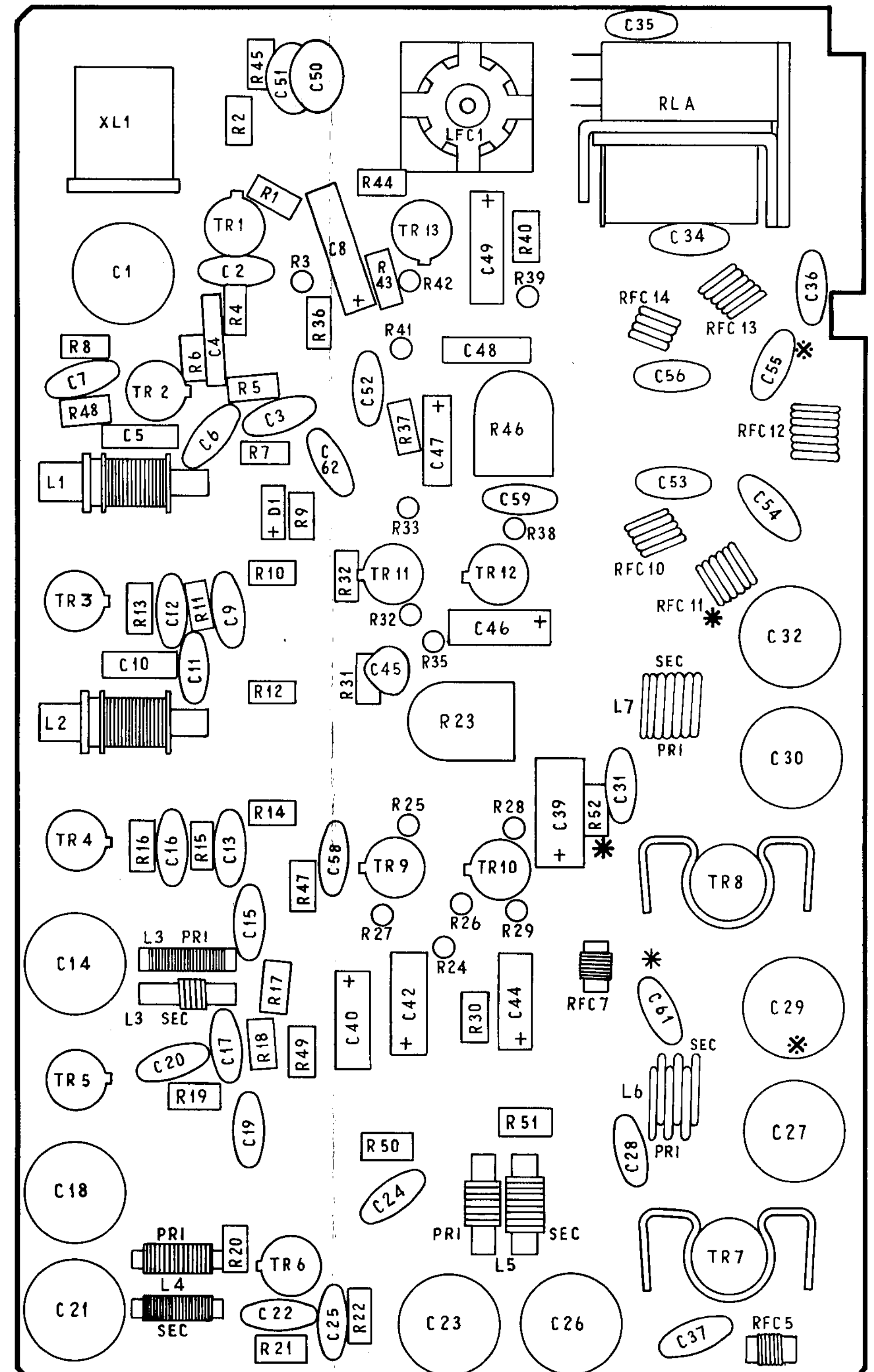
COMPONENT VALUES SHOWN THUS (10K) REFER TO HIGH BAND VERSIONS.

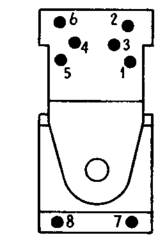
FIGURES SHOWN THUS (5·6) ARE TYPICAL TRANSISTOR ELECTRODE VOLTAGES, NEGATIVE W.R.T. CHASSIS, AS MEASURED WITH A 20K Ω/V METER.

ISSUE B

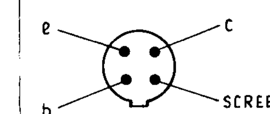
TRANSMITTER CC8 MK II CIRCUIT DIAGRAM

FIG. 6

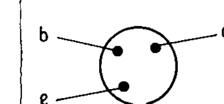




RLA PIN CONNEXIONS



2N987, AF124



AFY19

TRANSISTOR BASE CONNEXIONS
(VIEWED FROM UNDERNEATH)

COMPONENTS MARKED ✱ ARE FITTED ON LOW-BAND VERSION ONLY
COMPONENTS MARKED ⁜ ARE FITTED ON HIGH-BAND VERSION ONLY

CC125
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COMPONENT LAYOUT: TRANSMITTER

FIGURE 7

CIRCUIT SECTION	INPUT INSTRUMENT			ADJUSTMENTS & OUTPUT READINGS
	TYPE	CONNECTED TO	SET TO	OPERATION SEQUENCE
PREPARATION				(1) Disconnect the microphone. (2) Connect a shorting-link between pins 2 and 6 (chassis) of microphone socket (SKT.B)
OSCILLATOR, MULTIPLIER, AND OUTPUT STAGES				Hold Wavemeter near coil: / Adjust for maximum Wavemeter reading: / Check crystal frequency multiplication (3) L1 / L1 / x1 (4) L2 / L2 / x3 (5) L3 / C14 / x6 (6) L4 / C18 / x12 (7) L5 / C21 and C23 / x12 (8) L6 / C26 and C27 / x24 (9) L7 / C30(and C29 on high band) / x24 (10) Adjust C29, C30 and C32 for maximum indication on the R.F. Power Meter. Ensure that the Current Meter indicates not greater than 200 mA.
DEVIATION AND LIMITER STAGES	A.F. Signal Generator	Between pins 5 and 6(chassis) of microphone socket (SKT.B) via 25μF blocking capacitors	2.5 kc/s ±500 c/s 5 mV	(11) Set LIMITER control (R23) fully counter-clockwise. (12) Adjust DEVIATION control (R46) to give a deviation output of ±5 kc/s (25 kc/s set) or ±15 kc/s (50 kc/s set). (13) If necessary, re-trim L1 to obtain a 'clean' distortion-free waveform on the oscilloscope. (14) Adjust the LIMITER control until the signal on the oscilloscope is just limiting.
			Increase level to 50 mV	(15) Ensure that the deviation remains within the limits 4.5 to 5 kc/s (25 kc/s set) or 13.5 to 15 kc/s (50 kc/s set).
			5 mV 1 kc/s	(16) Note the Valve Voltmeter indication. Let this voltage be termed 'X'
			5 mV 300 c/s	(17) Check that the Valve Voltmeter indicates X - (10.5 to 15) dB.
			5 mV 2 kc/s	(18) Check that the Valve Voltmeter indicates X + (3 to 7) dB.

…ON	INPUT INSTRUMENT TYPE	INPUT INSTRUMENT CONNECTED TO	INPUT INSTRUMENT SET TO	ADJUSTMENTS & OUTPUT READINGS (OPERATION SEQUENCE)	OUTPUT INSTRUMENT TYPE	OUTPUT INSTRUMENT CONNECTED TO	OUTPUT INSTRUMENT SET TO
				(1) Disconnect the microphone. (2) Connect a shorting-link between pins 2 and 6 (chassis) of microphone socket (SKT.B)			
				Hold Wavemeter near coil: / Adjust for maximum Wavemeter reading: / Check crystal frequency multiplication (3) L1 / L1 / x1 (4) L2 / L2 / x3 (5) L3 / C14 / x6 (6) L4 / C18 / x12 (7) L5 / C21 and C23 / x12 (8) L6 / C26 and C27 / x24 (9) L7 / C30(and C29 on high band) / x24 (10) Adjust C29, C30 and C32 for maximum indication on the R.F. Power Meter. Ensure that the Current Meter indicates not greater than 200 mA.	Wavemeter R.F. Power Meter Current Meter	Hold adjacent to the appropriate coil Aerial socket In series with the negative supply	Adjust distance between coil and Wavemeter to give approximately 75% F.S.D.
	A.F. Signal Generator	Between pins 5 and 6(chassis) of microphone socket (SKT.B) via 25μF blocking capacitors	2.5 kc/s ±500 c/s 5 mV	(11) Set LIMITER control (R23) fully counter-clockwise. (12) Adjust DEVIATION control (R46) to give a deviation output of ±5 kc/s (25 kc/s set) or ±15 kc/s (50 kc/s set). (13) If necessary, re-trim L1 to obtain a 'clean' distortion-free waveform on the oscilloscope. (14) Adjust the LIMITER control until the signal on the oscilloscope is just limiting.	Deviation Meter Oscilloscope	Aerial socket Connect to the output of deviation meter	
			Increase level to 50 mV	(15) Ensure that the deviation remains within the limits 4.5 to 5 kc/s (25 kc/s set) or 13.5 to 15 kc/s (50 kc/s set).	Valve Voltmeter	Connect to the output of deviation meter	
			5 mV, 1 kc/s	(16) Note the Valve Voltmeter indication. Let this voltage be termed 'X'			
			5 mV, 300 c/s	(17) Check that the Valve Voltmeter indicates X - (10.5 to 15) dB.			
			5 mV, 2 kc/s	(18) Check that the Valve Voltmeter indicates X + (3 to 7) dB.			

TRANSMITTER ALIGNMENT PROCEDURE

Fig. 8