CHAPTER 3

RECITER

Contents

	Paragraph
INTRODUCTION	1
CONSTRUCTION	2
Front Panel/Chassis Assembly	3
Reciter p.c.b. Assembly	4
THEORY OF OPERATION	5
Frequency Changing	7
Receive Path (SSB)	17
Transmit Path (SSB)	23
Receive Path (AM)	27
Transmit Path (AM)	31
FUNCTIONAL DESCRIPTIONS	32
Transceiver Modes	33
Intercom Facilities	51
CIRCUIT DESCRIPTIONS	63
Reciter PCB	64
Intercom Decoding Logic PCB	79
RF Attenuator PCB	95
Decoupling PCB	97
SERVICING AND TEST INSTRUCTIONS	98
Test Equipment	100
Preliminary Operations	101
Test Procedure	104
PARTS LIST	110

Illustrations

	Figure No.
Reciter/Control Panel Assembly	1
Reciter Upper View : Component Location	2a
Reciter Lower View : Component Location	2b
Reciter Assembly : Circuit Diagram	3

Reciter PCB : Circuit Diagram	4
Reciter PCB : Component Location	5
Balanced Modulator PCB: Component Location	6
Low Pass Filter PCB: Circuit Diagram and Component Location	7
Intercom Decoding Logic PCB : Circuit Diagram	8
Intercom Decoding Logic PCB : Component Location	9
RF Attenuator : Circuit Diagram	10
RF Attenuator : Component Location	11
Decoupling PCB : Circuit Diagram	12
Decoupling PCB : Component Location	13
Loudspeaker Switch PCB : Component Location	14

INTRODUCTION

1. The Reciter is an integral part of the HF SSB Radio Telephone Transceiver. In addition to the Reciter p.c.b., which contains both transmit and receive circuits, the unit incorporates the Transceiver Front Panel which includes the control switches, AUDIO and INTERCOM connectors, intercom loudspeaker and monitoring components.

CONSTRUCTION

2. The Reciter comprises the Transceiver Front Panel and a framework chassis assembly upon which the Reciter p.c.b. is fitted. For the purpose of this handbook separate descriptions are given for the Front Panel/Chassis Assembly and the Reciter p.c.b.

FRONT PANEL/CHASSIS ASSEMBLY

3. In addition to the control switches etc. the Front Panel/Chassis Assembly incorporates system ancillary printed circuit boards. These are located as follows:

(a) Intercom Decoding Logic PCB

The Intercom Decoding Logic p.c.b. is located on the rear of the Front Panel, behind the meter, loudspeaker and adjacent switches. It is mounted on six pillars.

(b) Audio Decoupling PCB

The Audio Decoupling p.c.b. is mounted immediately behind the Front Panel AUDIO and INTERCOM sockets. It is secured by screws onto four pillars.

(c) Loudspeaker Switch PCB

The Loudspeaker Switch p.c.b. is mounted on the rear of the LOUDSPEAKER switch.

(d) RF Attenuator Assembly

The RF Attenuator Assembly consists of the Attenuator p.c.b. and the RF ATTENUATOR Switch. The p.c.b. is fitted to the rear of the switch and is secured by means of the two switch assembly screws.

RECITER p.c.b. ASSEMBLY

4. The Reciter p.c.b. is located within the framework of the chassis assembly. This is secured to the side members of the chassis assembly by six screws. A Balanced Modulator Unit is located on the p.c.b. and secured by three screws. Direct electrical contact is made between the modulator and the Reciter p.c.b. by means of pins on the modulator assembly and the p.c.b. track.

THEORY OF OPERATION

5. The following externally generated signals are applied to the Reciter:

(a) 35,4MHz
(b) Any increment of 1kHz in the band 37MHz to 65,399MHz

The frequency of the second signal is determined by the Synthesiser FREQUENCY selectors and is equal to the selected frequency +35,4MHz.

6. In practice the Reciter incorporates a number of circuits that are common to both the transmit and receive functions. The mode in which the Transceiver operates and the functions for which these circuits are used is controlled by a p.t.t. switching circuit. In the quiescent condition, ie. receive, the circuit 9V TX and 9V RX outputs are at 0V and 9V respectively. To transmit the p.t.t. switch (or key) is depressed. The PTT LINE is then taken to 0V and the 9VTX and 9VRX outputs are switched to 9V and 0V respectively. Similary the reciter circuits are modified to accommodate AM operation through the application of 9V AM TX and 9V AM RX inputs. These are only generated when AM is selected.

FREQUENCY CHANGING

7. Before the basic operation of the reciter circuits are described the operation of the frequency changing stages is examined.

8. When the Transceiver is operating in the RECEIVE mode the signal detected at the antenna is passed via the initial diode TX/RX switch to the 1st mixer where it is mixed with the Synthesiser variable input (37MHz to 65,4MHz). The mixer selects the difference signal (35,4MHz) and applies it through FL3, an 8kHz bandpass filter centred on 35,4MHz, to a 35,4MHz i.f. amplifier. The amplifier output is switched by a further TX/RX switch to the 2nd mixer where it is mixed with 34,0000MHz or 33,9967MHz depending on the side-band selected. The difference frequency output is 1,4MHz.

9. Consider the products derived from the mixing process so far described:

The r.f. input signal = fa ± fs
where fa = suppressed carrier frequency
fs = sideband frequency
∴ USB = fa + fs
LSB = fa − fs
The Synthesiser (FCU) input into the 1st mixer
= fa + 35,4MHz
The mixer selects the difference between the Synthesiser and r.f. signal inputs
= (fa + 35,4MHz) − (fa ± fs)
= 35,4MHz ± fs
This process results in the inversion of the sideband frequencies such that at this stage
USB = −fs
and LSB = +fs
If the specified audio bandwidth
= 300Hz to 2700Hz
The USB and LSB signal ranges are as follows:

(a) USB

USB signal range = fa + 300Hz to fa + 2700Hz
After mixing with 35,4MHz and inversion of sidebands
USB signal range = 35,4MHz − 2,700kHz to 35,4MHz − 300Hz
= 35,3973MHz to 35,3997MHz

(b) LSB

LSB signal range = fa − 300Hz to fa − 2700kHz
After mixing with 35,4MHz and inversion of sidebands
LSB signal range = 35,4MHz + 300Hz to 35,4MHz + 2,700kHz
= 35,4003MHz to 35,4027MHz.

Frequencies within these ranges, derived from the sideband in the received r.f. signal, are applied to the 2nd mixer stage.

10. If it is required to receive USB signals the Reciter front panel LSB/USB selector is set to USB. This activates the 33,9967MHz oscillator.

11. Conversely if LSB reception is required the LSB/USB selector is set to LSB. The 34,000MHz oscillator is then operative.

12. Now consider USB and LSB selection separately.

(a) USB

The received and oscillator signals applied to the 2nd mixer are:

(i) Received signal = 35,3973MHz to 35,3997MHz
(ii) Oscillator signal = 33,9967MHz

The range of the difference frequencies selected in the mixer is therefore

= 35,3973MHz – 33,9967MHz to
35,3997MHz – 33,9967MHz
= 1,4006MHz to 1,4030MHz

(b) LSB

The received and oscillator signals applied to the 2nd mixer are:

(i) Received signal = 35,40003MHz to 35,4207MHz
(ii) Oscillator signal = 34,0000MHz

The range of the difference frequencies selected in the mixer is therefore

= 35,4003MHz – 34,000MHz to
35,4027MHz – 34,0000MHz
= 1,4003MHz to 1,4027MHz

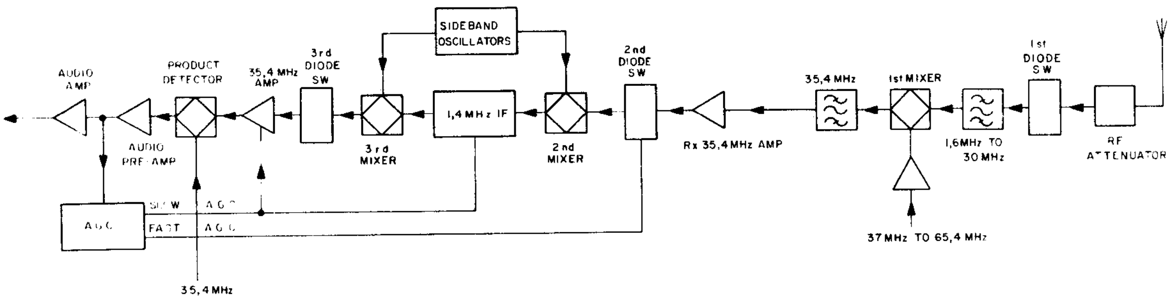
13. From these figures it can be seen that the frequency ranges for USB and LSB operation are not identical. In practie the USB oscillator is set to 33,997MHz to give the same difference frequencies for both USB and LSB (1,4003MHz to 1,4027MHz). The 2nd mixer output is then always within the same frequency range.

14. Finally the two bandpass filters in series with the third mixer (connected in cascade) have an overall bandpass characteristic of 2,4kHz. This covers the specified audio frequency range.

15. The TRANSMIT mode is similar to that described for RECEIVE except that the audio frequency MIC INPUT signal is mixed with 35,4MHz to produce a double sideband suppressed carrier signal. This is passed via the diode switch directly to the 2nd mixer. Here it is changed to 1,4MHz and the appropritate sideband is selected. The 3rd mixer operation returns the frequency to 35,4MHz.

16. The second diode switch output is amplified and applied in the reverse order through the 35,4MHz filter, 1st mixer, 1,6MHz to 30MHz filter and amplifier to give a PA input signal within the operational frequency range 1,6MHz to 30MHz.

RECEIVE PATH (SSB)



17. The signal received in the antenna is routed via connector PL15 to the r.f. attenuator circuit. Four attenuation levels, 0dB, −10dB, −20dB, and −30dB are available and are selected at switch S2.

18. The r.f. signal in the attenuator output circuit is routed through a TX/RX diode switch and the 1,6MHz to 30MHz bandpass filter (tuned for a 1dB flat response over the input signal frequency spectrum) to the 1st mixer. The mixer second input is derived from the Synthesiser 37MHz to 65,4MHz signal. The action of the mixer is such that the difference of the two input frequencies, i.e. 35,4MHz, is present in the output circuit. This is in turn applied to i.f. filter FL3.

19. FL3 output is amplified in the Rx 35,4MHz i.f. amplifier circuit. The amplifier output is passed through a further TX/RX diode switch to the 2nd mixer, which operates in a similar manner to that previously described to select the difference frequency. In this instance the second input to the mixer is derived from one of two crystal oscillators, selected by switch S8 for USB or LSB. The resultant mixer output is 1,03MHz to 1,4027MHz for a 300Hz to 2,700kHz audio bandwidth input signal.

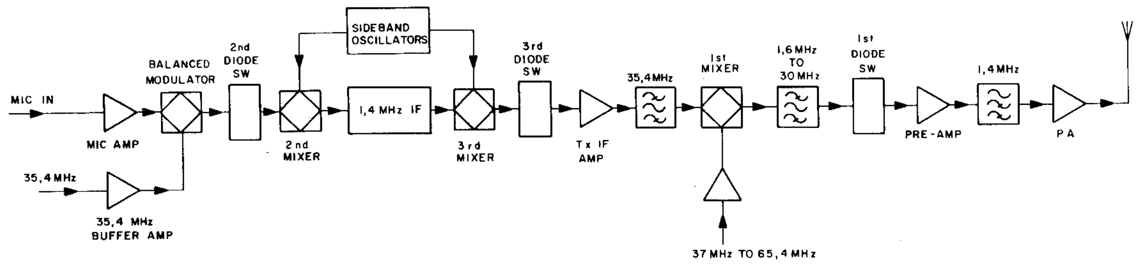
20. The 1,4MHz IF circuits, comprising amplifier, filter and limiter stages, further process the 1,4MHz signal prior to its application to the 3rd mixer. This mixer operates in the reverse manner to those previously described and the stage output is the sum of the two inputs, i.e.: 35,4MHz . This is routed via the diode switch to the 35,4MHz amplifier.

21. The 35,4MHz amplifier output signal is fed to the product detector where it is mixed with the Synthesiser 35,4MHz signal. The difference frequency (300Hz to 2,700kHz) is selected and, after amplification, is applied to the audio output circuits.

22. In addition to the amplification function the audio circuits also produce fast and slow a.g.c. signals. These are fed to diode TX/RX switches and to the first 1,4MHz and second 35,4MHz amplifiers respectively.

TRANSMIT PATH (SSB)

23. Audio signals, generated in the microphone or the tone oscillator and amplified in the microphone amplifier, are mixed in the balanced modulator with the Synthesiser 35,4MHz input. The balanced modulator operates to suppress the 35,4MHz carrier and pass upper and lower sideband signals only, i.e.: 35,4MHz + fs (USB) or 35,4MHz − fs (LSB). These are applied via the diode TX/RX switch to the 2nd mixer.

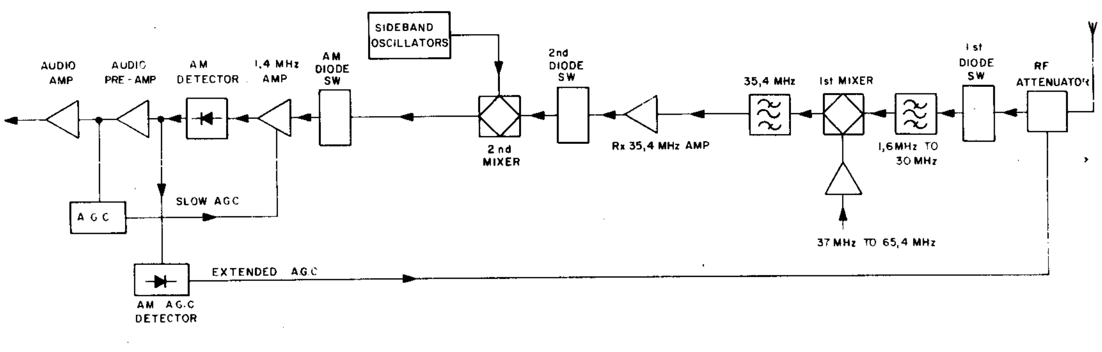


24. The required sideband is selected at the 2nd mixer stange by switching the crystal oscillator frequency to either 34,00MHz (LSB) to 33,997MHz (USB). The 1,4MHz mixer output is amplified in a high gain circuit and fed through a 1,4MHz filter to a limiter stage. The peaks of the signal waveform are then clipped to produce a compressed 1,4MHz signal. This is amplified and passed via a second filter, which removes 'out of band' spurious signals, to the 3rd Mixer where it is converted to a 35,4MHz signal containing only the required sideband.

25. The 3rd mixer output signal is routed via the diode TX/RX switch to the TX r.f. amplifier. The amplifier output is, in turn, passed via the 8kHz bandwidth 35,4MHz filter to the 1st mixer, where it is mixed with the Synthesiser 37MHz to 65,4MHz tuning signal input. The resultant 1,6MHz to 30MHz signal is then fed via the 1,6MHz to 30MHz bandpass filter, diode TX/RX switch and TX pre-amp to the r.f. power amplifier.

26. The 1,4MHz High Pass Filter prevents the transmission of spurious 1,4MHz signals.

RECEIVE PATH (AM)



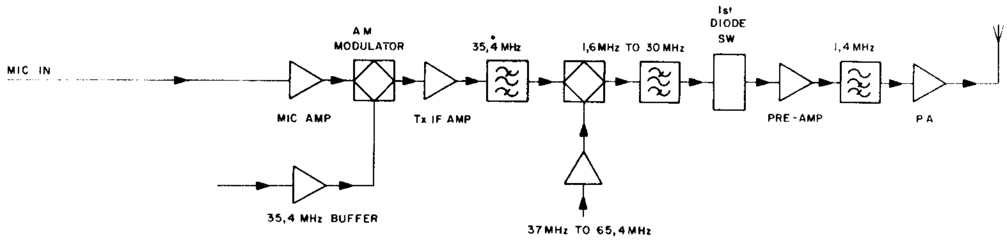
27. The signal detected in the antenna comprises fa ± fs, ie. the carrier plus and minus sidebands. This is routed via the 1st diode switch and 1,6MHz to 30MHz filter, FL4, to the 1st mixer. The mixer output, made up from signals within the frequency band 35,4MHz ± 4kHz, is applied to the i.f. filter FL3.

28. FL3 output is amplified and passed through a further TX/RX diode to the 2nd mixer.

29. The mixer operates to select the difference between the 35,4MHz signal and the selected sideband oscillator input. In this case the mixer output could be anywhere within the band 1,396MHz to 1,404MHz depending on the sideband used. This is immaterial however as the bandpass characteristics of the following AM circuits are sufficiently wide to accept either signal for processing.

30. The 1,4MHz signal is then applied to the AM circuits. The 1,4MHz amplifier output is applied to the AM detector, the output of which is in turn applied directly to the first audio amplifier. The signal level is measured in the AM a.g.c. detector which generates an extended a.g.c. signal for application to the RF Attenuator.

TRANSMIT PATH (AM).



31. The microphone amplifier output is connected to the amplitude modulator where it modulates the Synthesiser 35,4MHz input to produce a 35,4MHz i.f. signal plus and minus the modulating signal (fa ± fs). This is then passed through the Reciter circuits in a similar manner to SSB signals to provide a 1,6MHz to 30MHz amplitude modulated Power Amplifier input signal.

FUNCTIONAL DESCRIPTIONS

32. Functional descriptions are given for the transceiver modes and intercom facilities selected by means of the MODE and INTERCOM switches. These facilities are largely available through the operation of circuits included on the Intercom Decoding Logic p.c.b.

TRANSCEIVER MODES

33. Six transceiver modes may be selected using switch S7.

Position 1 – REMOTE

34. The MODE Switch output is decoded to inhibit LOCAL control and to enable the following REMOTE control facilities.

(a) MODE selections as follows:

  (i) KEY (CW)
  (ii) AM
  (iii) SSB
  (iv) TUNE
  For an appreciation of circuit operations in these modes refer to descriptions given later in this chapter.

(b) Application of REMOTE AUDIO IN signals to the Reciter MIC IN circuit and Reciter LOUD–SPEAKER signals to the REMOTE AUDIO OUT circuit.

(c) Synthesiser FREQUENCY selection.

(d) Sideband selection.

(e) PTT switching.

35. The Transceiver AUDIO control is disabled and volume control is transferred to the preset potentiometer R13 located on the Intercom Decoding Logic p.c.b.

36. When a Transceiver incorporating a Frequency Processing Unit is operated in the REMOTE mode, the control of frequency agile mode functions is not available to the remote operator.

Position 2 – KEY

37. The decoded MODE switch KEY input is used to control a transistor switch so that the Reciter PTT LINE is permanently connected to 0V. The Reciter TX/RX switch 9V TX and 9V RX outputs are therefore at 9V and 0V respectively and the Transceiver is switched to the 'transmit' mode.

38. Reciter MIC IN signals are inhibited by the intercom decoding logic circuits so that in the quiescent condition, ie. key not operated, the Transceiver is operating in a suppressed carrier SSB mode.

39. To transmit the key is depressed and the KEY input circuit is connected to ground. The resulting logic 'O' KEY input signal is switched via logic circuitry to enable the 1kHz tone oscillator, the output of which is connected to the MIC IN circuit. USB/LSB selections are made by the local operator and volume control is via the AUDIO control.

Position 3 – BK IN CW

40. The operation of the Transceiver is similar to that described for KEY except that the PTT LINE is not connected to 0V until the key is operated. Consequently in the quiescent condition the Transceiver operates in the receive mode.

41. The 0V KEY input signal, applied when the key is depressed now fulfils two functions. It controls the transceiver switch which connects the PTT line to 0V and enables the 1kHz tone oscillator. A time delay circuit in the transceiver switch control maintains the PTT LINE at 0V, and the Transceiver in the transmit mode, for a period of 1s after keying operations cease.

Position 4 – AM

42. The AM facility is not available when operating in the frequency agile mode.

43. When AM is selected a 0V (AM) output is generated and the USB/LSB output is switched to logic '1', overriding the setting of the USB/LSB switch, S8. The 0V (AM) signal is used on the Reciter p.c.b. to modify reciter circuits for AM operation, and as a LOW POWER INITIATE input to the Power Amplifier.

44. In the quiescent condition, ie. PTT not operated, the PTT LINE is at 12V and the Transceiver operates in the receive mode. The audio amplifier LOUDSPEAKER output is routed to local, extended or remote circuits as appropriate. Receiver gain is adjusted at the front panel AUDIO control.

45. When the operators p.t.t. switch is operated the PTT LINE is taken to 0V and the Transceiver functions as an transmitter.

46. Should FAM be selected at the Frequency Processing Unit a 0V HOPPING FLAG is connected to the Intercom Decoding Logic p.c.b. This inhibits the 0V (AM) output so that the Transceiver is returned to SSB operation. At the same time the USB/LSB switch, S8, becomes inoperative and sideband selection is forced to USB.

Position 5 – SSB

47. In this position the 0V (AM) signal is not generated and the Transceiver operates in the SSB mode. USB/LSB selections are made at the front panel sideband selector. Transceiver mode switching is achieved through local, extended or remote p.t.t. switching. Receiver gain is adjusted at the front panel AUDIO control.

Position 6 – TUNE

48. When the TUNE mode is selected a 0V (TUNE INITIATE) signal is generated. The Power Amplifier is then set to the low power condition and the external antenna tuning unit commences a tuning sequence.

49. At the same time the tone oscillator 1kHz output is enabled to provide the only Reciter MIC IN signal, and the Reciter PTT LINE is permanently connected to 0V.

50. The Transceiver, which is switched to the SSB transmit mode, then generates the nominal 25W 1kHz SSB signal required for tuning purposes.

INTERCOM FACILITES

51. The intercom facilites that are available between the radio and an associated ECU are described in the following paragraphs. These facilites are selected at the front panel INTERCOM switch S1.

Position 1 – LOCAL

52. In the quiescent (receive) condition the Reciter RX audio output (LOUDSPEAKER), connected to the Intercom Decoding Logic p.c.b. at pin 4, is applied to local phones and ECU circuits as follows:

(a) PHONES (LOCAL)
Directly via R3 and SK31/1.

(b) PHONES (ECU)
The RX audio signal is coupled via attenuator R21/R20/C11 and gate 1(d), which is enabled by a logic '1' control, signal, to the input of audio amplifier IC20. The amplified output of which is connected via RL1–1 (de-energised) and SK31/9 to line transformer T1 which is mounted on the Front Panel Assembly. T1 output signal is fed via the Transceiver rear panel screw terminals (and up to 1,5km 600 ohm twisted pair telephone wire) to the ECU.

The received audio signal may therefore be monitored by both the LOCAL and ECU operators.

53. When the local operator depresses his p.t.t. switch the PTT input circuit (SK31/2) is taken to 0V, gate 1 (d) is disabled and gates 2 (a) and (b) are enabled. The Reciter PTT LINE is then taken to 0V, switching the Transceiver to the transmit mode and the MIC LOCAL signal is applied to the Reciter MIC IN circuit and the intercom audio amplifier. As previously described the amplifier output is connected via RL1–1 (de-energised), SK31/9 and telephone wire to the ECU. The ECU operator may therefore monitor local transmissions.

54. If, when operating in this mode, the ECU operator wishes to contact the local operator, he depresses the ECU, p.t.t. switch. Current is then drawn from the Reciter +12V supply, via R58 on the Intercom Decoding Logic p.c.b., SK31/13, the secondary of line transformer T1 and the telephone wire, to energise a relay in the ECU. This causes comparator IC9 to change state and output a logic '1'. This in turn activates the bleep tone oscillator, the square wave output of which is applied to the bleep tone to provide an audio warning, and illuminates the INTERCOM CALL LED to provide a visual warning. The local operator then selects the INTERCOM position of S1 in order to communicate with the ECU operator.

Position 2 – CALL

55. Gate 1(c) is enabled by a logic '1' control signal and the 1kHz tone oscillator output is connected to the audio amplifier. As the amplifier output is connected to the ECU the tone is heard by the remote operator in both ECU STANDBY and OPERATE modes.

56. Normal Transceiver transmit and receive operations may continue via a local HMT or teleprinter terminal.

Position 3 – INTERCOM

57. Intercom facility is available, independent of normal Transceiver operations which may continue using a local HMT or teleprinter terminal.

58. It should be remembered that when the ECU operator depresses his p.t.t. switch RL1 on the Intercom Decoding Logic p.c.b. is energised through the operation of comparator IC9.

59. Let us examine the operation of the intercom circuits when the remote p.t.t. is pressed and when it is released.

(a) **ECU p.t.t. operated**

Current flowing from 12V to the ECU via R58 causes IC9 to output a logic '1' signal and, hence energise RL1.
Gate 1(b) is therefore enabled by the logic '1' developed at TR8 collector and gates 1 (a), (c) and (d) are inhibited.
The MIC (INTERCOM) signal, connected to the Intercom Decoding Logic p.c.b. from the line transformer and the Audio Decoupling p.c.b. and SK31/10, is therefore fed via RL1–2 and gate 1(b) to the intercom audio amplifier IC20.
The amplified signal is coupled via C22 and RL1–1 (energised) to local intercom handset and the Reciter front panel loudspeaker (INTERCOM selected).
The remote operator is therefore able to talk to the local operator.

(b) **ECU p.t.t. not operated**

Comparator IC9 returns to the quiescent condition, ie. IC9 pin 6 is at logic 'O' , RL1 is de-energised and TR8 collector is at 0V.
Gate 2(a) is enabled and the MIC (INTERCOM) signal connected to the p.c.b. at SK31/11 is fed to the intercom audio amplifier. As RL1 is de-energised the amplifier output is connected via the line transformer to the ECU PHONES circuit. The local operator is therefore able to reply to the remote operator.

Position 4 – EXTN

60. When the EXTN intercom function is selected the Transceiver is switched between the transmit and receive modes by the remote operator through the ECU p.t.t. switch.

61. The operation of the circuit is similar to that described for INTERCOM except that when the ECU p.t.t. is operated gate 1 (b) and gate 2 (c) only are enabled. Consequently the Reciter MIC IN signal is provided by the ECU via the line transformer SK31/10 and RL1–2 (energised).

62. In the received mode gate 1 (b) is inhibited and gate 1 (d) is enabled. The Reciter LOUDSPEAKER output is therefore fed to the intercom audio amplifier and, after amplification, via RL1–1, to the line transformer and ECU. The ECU operator is therefore able to monitor received signals.

CIRCUIT DESCRIPTIONS

63. The descriptions given in this section of the manual are for circuits contained on individual printed circuit boards or within assemblies.

RECITER PCB

64. Refer to Figure 3.

65. The Reciter p.c.b. functional stages as indicated on the circuit diagram are described in the following paragraphs in terms of the transmit and receive paths. Some stages are common to both paths and the function in which they operate at any given time is controlled by the RX/TX switch circuit. This circuit, together with others not directly used in the transmit or receive modes are described as miscellaneous.

Transmit Path (SSB)

66. The transmitter input is provided by the MIC IN signal connected to the p.c.b. at pin 23. In the transmit mode the 9V TX and 9V RX signal levels are at + 9V and 0V respectively. The circuits comprising the transmit path are as follows:

(a) **Microphone Amplifier**

Refer to Figure 4 Sht. 1.
The MIC AMP stage, which is incorporated in the Balanced Modulator Unit, is a two stage amplifier comprising transistors TR3 and TR2. The audio signal input is applied to TR3 base via the low pass pi filter network C17, R24, C20. The emitter follower second stage output is coupled via C7 to the balanced modulator integrated circuit element X1 (pin 3) and to the balance modulator unit output pin 6 (for AM use only).

(b) **35,4MHz Buffer.**

A stable 35,4MHz signal, generated in the external synthesised frequency control unit is connected to the Reciter via coaxial connector SK22 and applied to the 35,4MHz buffer amplifier (TR1). Input and output coupling is by transformers T2 and T1 respectively.

(c) **Balanced Modulator**

The two inputs of the balanced modulator element (X1) are the audio signal at pin 3, and 35,4MHz across pins 1 and 5. The modulator circuit operates to suppress the carrier frequency 35,4MHz and to provide a double sideband output (fc ± fs) across X1 pin 4 and 7. For the ideal audio frequency range of 300Hz to 2,700kHz, the modulator output is within the frequency ranges 35,3973 to 35,3997MHz and 35,4003MHz to 35,4027MHz.

(d) 2nd TX/RX Diode Switch

Refer to Figure 4 Sht. 1 and 2.
Diode D10 is fully conducting due to the bias received from 9V TX via R49 and potentiometer R50. Consequently diodes D11 and D12 are reverse biased and are non-conducting. The balanced modulator output signal only is applied to transformer T1. Potentiometer R50 connected across X1 pin 4 and 7 is adjusted to set the level of X1 output signal in T1 primary.

(e) 2nd Mixer

The mixing process, which is similar in both the transmit and receive modes, takes place in transformers T1 and T2. In the transmit mode the mixer operates to select the difference between the balanced modulator input (35,3973MHz to 35,3397MHz or 35,4003MHz to 35,4027MHz) applied to T1 and the LSB/USB oscillator signal applied to T2 primary. The operation of the circuit for LSB and USB selections is as follows:–

(i) LSB

Balanced Modulator input
- LSB : 35,4973MHz to 35,3997MHz
- USB : 35,4003MHz to 35,4027MHz

LSB oscillator input 34,0000MHz

Difference frequencies
- LSB : 1,3973MHz to 1,3997MHz
- USB : 1,4003MHz to 1,4027MHz

In effect the LSB and USB component frequencies are reversed in the 1st mixer so the frequency band required for LSB selection is 35,4003MHz to 35,4027MHz and for USB selection is 35,3937MHz to 35,3997MHz. The bandwidth of the 1,4MHz IF stage, to which the 2nd mixer output is applied, is limited to the frequency band 1,4003MHz to 1,4027MHz by filters FL2 and FL3. Consequently the higher frequency band is passed and the unwanted lower frequency band is rejected.

(ii) USB

Balanced modulator input
- LSB : 35,3973MHz to 35,3997MHz
- USB : 35,4003MHz to 35,4027MHz

USB oscillator input 33,9970MHz

Difference frequencies
- LSB : 1,4003MHz to 1,4027MHz
- USB : 1,4033MHz to 1,4050MHz.

In this instance the higher frequency band is rejected.

(f) 1,4MHz IF Circuit

The 1,4MHz i.f. circuit, connecting the 2nd and 3rd mixer stages, comprises an amplifier (TR13), filter (FL1), limiter (TR15) amplifier (TR20) and filter (FL2) stages connected in series. The 2nd mixer output is taken from the junction of C35 /C36 and connected to the base of the initial amplifier transistorTR13. The amplifier output is coupled by C40 to filter FL1 and hence by capacitor C47 to TR15 base. Transistor TR15 collector circuit incorporates a tuned circuit C62 connected in parallel with the primary of tunable transformer T6. Diodes D21 and D22 connected in parallel with this tuned circuit limit the amplitude of the i.f. signals developed across C62 during transmission to approximately ± 0,6V, thereby obtaining speech compression. Crystal filter elements FL1 and FL2 limit the bandwith of signals within the 1,4MHz i.f. circuit to 2,4kHz. From the description given in the previous paragraph it can be seen that for a.f. input signals within the range 300Hz to 2700Hz the frequency of signal applied to TR13, and therefore present in the i.f. circuit, are always within the range 1,4003MHz to 1,4027MHz irrespective of the sideband selection.

(g) 3rd Mixer

The mixing process, which is similar in both the transmit and receive modes, takes place in transformer T9. Signals with the frequency range 1,4003MHz to 1,4027MHz are coupled to the mixer from the i.f. stage by C78. The selected sideband oscillator output signal : LSB 34,000MHz and USB 33,9967MHz, is taken from the junction of R125/R126 and applied to the junction C78/C80/C81. The mixer reacts to sum these input frequencies to produce signal bands of 35,3973MHz to 35,4997MHz and 35,4003MHz to 35,4027MHz when transmitting USB and LSB signals respectively.

(h) 3rd TX/RX Diode Switch

In the transmit condition the +9V applied to R96 causes current to flow through T10 (1 turn winding) and via forward biased diodes D32 and D33 to T9 (2 turn winding). The current flowing in T9 secondary is modified by the signal applied to the primary. Consequently the 35,4MHz ± fs signals developed in T9 are repeated in T10. At the same time diodes D11/D12 and D33 are reverse biased and are non-conducting.

(j) TX IF amplifier (TR29)

The 35,4MHz ± fs signal induced in T10 secondary is transformer coupled via T11 (2 turn secondary winding) to the base of TR29. The amplifier is only operative in the transmit mode when current flows in TR29 from 9V TX through R138, T12 and D39. The gain of this stage is set in the quiescent condition at R135. The stage output is fed to the 1st mixer (X1) through the 35,4MHz filter FL3.

(k) 1st Mixer (X1)

The 1st mixer element (X1) is a passive balanced modulator integrated circuit which operates, in the transmit mode, to select the difference between the fa (carrier) +35,4MHz signal applied to X1 pin 6 and the 35,4MHz ± fs signal applied across X1 pins 1 and 5. The resulting output at pin 4 is therefore fa + fs or fa − fs.

(l) TX Output Circuit

The transmitter output circuit includes the 1,6MHz to 30MHz low pass filter and the TX pre-amplifier (TR36). The low pass filter functions to pass signals in either direction. During transmission however 9V RX is at 0V and diode D46 is reverse biased. The 1st mixer output from pin 4 is therefore applied via T16 to TR36 base. The pre-amplifier circuit is of a conventional design in which the signal output is transformer coupled by T18, 1,4MHz low pass filter and T21 to the TX OUT circuit.

Receive Path (SSB)

67. The receiver input, RX IN, is connected to the p.c.b. at pins 6 and 7. In the receive mode the 9V TX and 9V RX signal levels are 0V and +9V respectively. The circuits comprising the receive path are as follows:

(a) RX Input Circuit

The receiver input circuit comprises the 1st TX/RX diode switch and the low pass filter. +9V applied to R171 and T17 forward biases diodes D51 and D46 and reverse biases diode D44. The RX IN signal developed in T17 secondary is therefore applied via D51, D46 and T14 to the low pass filter (FL4) which provide a flat response (± 1dB) over the frequency range 1,6MHz to 30MHz with a sharp cut-off at the limits of this bandwidth. The low pass filter is connected the 1st mixer (X1) at pin 4.

(b) 1st Mixer (X1)

During reception the mixer operates in the opposite manner to that described for transmission. In this instance the RX IN signal (fa + fs) or (fa – fs) which is within the frequency band 1,6MHz to 30MHz is mixed with the fa + 35,4MHz signal applied to X1 pin 6. The mixer output, now taken from X1 pins 1 and 5 is 35,4MHz ± fs.

(c) RX IF Amplifier (TR30)

Mixer X1 output is connected via the 35,4MHz band pass filter (FL3) to transformer T12 primary. The two secondaries of this transformer connect the receiver signal to both the TX i.f. amplifier and the RX i.f. amplifier. The signal is inhibited in the TX circuit however because 9V TX is at 0V and TR29 is non-conducting. 9V RX is, however at + 9V and TR30 is biased on via R144 and transformer T12 3 turn secondary. TR11 therefore conducts, current flowing from + 9V to common through R137, T11 (3 turn winding), D38, TR30 and R98. The 35,4MHz signal in FL3 is therefore amplified in TR30 and coupled through transformers T11 and T10 to the TX/RX diode switch.

(d) 2nd TX/RX Diode Switch

The RX i.f. amplifier output is transformer coupled via the tuned circuit incorporating T11 (12 turn winding), C84, C85, C86 and T10 (12 turn winding) to T10 secondary circuits. In the RX mode 9V TX is at 0V. Consequently D11 and D12, no longer reverse biased as during transmission, are able to conduct due to the application of the voltage at TR27 emitter to D10 anode via R134, D30, R131, D34 and TR10 (4 turn winding). The i.f. signal then present in T10 is repeated in T1.

(e) 2nd Mixer

The i.f. amplifier output (ideally 35,3973MHz to 35,3997MHz when receiving USB and 35,4003MHz to 35,4027MHz when receiving LSB) is applied to T1 primary through T11, T10 and the diode switching circuit as described. These signals are repeated in T1 secondary. Transformer T2 primary is connected between the junction of C33 and C34, which are in series across T1 secondary, and TR11 sideband oscillator buffer amplifier output circuit. Components of both the i.f. and sideband oscillator signals are therefore present in T2 primary. The mixer operates to select the difference of these two frequencies and to couple the resulting signal to the 1,4MHz amplifier TR13 via T2 secondary.

(f) 1,4MHz IF Circuit

The 1,4MHz i.f. circuit operates in a similar manner to that previously described to present a 1,4MHz signal plus the selected sideband to the third mixer. In this instance however the gain of TR13 amplifier stage is determined by a bias voltage generated in the slow a.g.c. circuit and applied to TR13 base through R77.

(g) 3rd Mixer

The 3rd mixer operates as previously described.

(h) 3rd TX/RX Diode Switch

As 9V TX is at 0V D36, reverse biased during transmission, is forward biased from the fast a.g.c. circuit via R187 and T20 primary. The 3rd mixer output in T9 secondary is therefore repeated in T20 primary.

(j) **RX 20MHz IF Amplifier/20MHz Amplifier/product Detector**

The 3rd mixer output, repeated in T20, is composed of the 35,4MHz + sideband frequencies or 35,4MHz – sideband frequencies. The 'intelligence' of the signal is contained in the sidebands and it is this intelligence which is extracted for application to the audio circuit. This process is performed by the product detector. The 35,4MHz i.f. signal is transformer coupled by T20 to amplifier TR37. The gain of this stage is set by slow a.g.c. level signals applied via resistors R185, R186. The externally generated 35,4MHz signal is applied to buffer amplifier TR35 through R182 and C130. The output of this stage, developed in transformer T15, is used to drive the product detector, D49/D50. The product of the 35,4MHz i.f. SSB signals and the 35,4MHz signal appears as an a.f. voltage across T19 secondary. Low pass filter C117/C115/R164 removes any r.f. from the signal before it is applied to the audio amplification stages.

(k) **Audio Pre-amplifier**

The input to pre-amplifier TR33, which is a normal amplification stage, is taken from the product detector. The output of this stage is applied via p.c.b. pins 31 to the Frequency Processing Unit (which extracts FSK RX sync signals) and via C110 to the SSB a.g.c. amplifier and the audio amplifier.

(l) **Audio Amplifier**

The audio amplifier comprises operational amplifier IC3 and audio power amplifier IC2. The gain of IC3 is adjusted through a bias input applied to pin 5. The more positive the bias the greater the stage gain. This is utilised to provide a squelch facility from TR1 via R36/R37 and TR8 and a volume control via p.c.b. pin 27 and R27/R28. The squelch input is determined by the squelch circuit. Volume is controlled from the front panel AUDIO control. The power amplifier stage LOUDSPEAKER output is coupled to the output circuit by C3. A logic '1' TUNE TONE MUTE signal, generated on the control p.c.b. during tuning sequences, switches on TR5, thereby shorting IC2 input circuit to 0V.

Transmit Path (AM)

68. The amplitude modulation transmit and receive paths incorporate a number of stages that are common to the SSB transmit and receive paths. It is this circuitry only which is described.

69. When the AM function is selected 9V AM TX and 9V AM RX circuits are switched by 9V TX and 9V RX as applicable, and p.c.b. pin 15 (0V AM) is connected to 0V. Consequently in the transmit mode 9V AM TX and 9V AM RX are at 9V and 0V respectively. At the same time the 9V TX signal normally applied via TR17, R96, D35 and T10 (1 turn winding) to forward bias D32 and D33 is inhibited in TR17 by the 0V (AM) input. Consequently SSB transmit are not coupled from T9 to T10.

70. With 9V AM TX at 9V a current path is provided for the AM modulator which comprises transistors TR23 and TR24. The microphone amplifier output, taken from the balanced modulator unit pin 6 and applied to TR24 base, provides a modulation signal for the 35,4MHz, taken from the balanced modulator pin via forward biased diode D9 and applied to TR23 base. The signal therefore generated in T8 is amplitude modulated and comprises components within the frequency band fc +fs. This is coupled by T10 and T11 to the TX IF amplifier.

Receive Path (AM)

71. When receiving AM transmissions the signals in the antenna comprise fa ± fs, ie. the carrier ± sideband frequencies. The first mixer output is therefore made up from signals within the frequency band 35,4MHz ± 4kHz. This output is presented by FL3 and transformer T12 to the RX IF amplifier TR30. The amplifier, diode switch, sideband oscillator, buffer amplifier and second mixer circuits operate in a similar manner to that previously described for SSB.

72. TR11 output signal is passed through diodes D11 and D12,, which are forward biased from 9V AM RX via D26, R131, D34 and T10 (4 turn winding). The 35,4MHz signal in T1 secondary is mixed with either 34,000MHz (LSB) or 33,997MHz (USB) to give a carrier signal (fc) ± sidebands (fs). In this case fc may be anywhere in the band 1,396MHz to 1,404MHz depending on the sideband selected. This is immaterial however as the bandpass characteristics of the AM circuits are sufficiently wide to accept either signal for processing.

73. The 1,4MHz IF signal amplified in TR13 may be routed to either the SSB or AM IF circuits by the switching transistor TR12. For SSB operation TR12 base is taken to 0V via R65 the transistor then conducts and a signal is developed across L1. For AM operation however TR12 is cut-off and TR13 collector current path includes R66, T4 and D17 and the signal is developed in T4.

74. Transistor TR13 output signal induced in T4 secondary is applied to the high performance, gain controlled i.f. amplifier integrated circuit element IC5 (μA 757). The 1,4MHz input applied across pins 14 and 1 is amplified in the first stage, the load of which is a tuned circuit comprising C48, R78 and L2. The signal developed across this circuit is coupled by C52 to the second stage (pin 10). The output finally appears across pin 7 and 8.

75. The i.f. output is transformer coupled by T5 to the AM detector circuit. Detection is achieved through diode D24 and capacitor C46. The level of the AM audio signal output is set at R99. The integrated circuit gain is controlled by an a.g.c. bias applied to IC5 at pins 3 and 4. The i.f. signal developed in T5 secondary is sampled at R99 wiper. Negative swings of the sample signal, (clamped below 9V by diode D25) cause current pulses to flow in TR21. The transistor collector voltage, smoothed in C61 and C63 , is then applied to operational amplifier IC6 inverting input.

76. Under normal conditions IC6 output is at 9V due to the standing bias applied to the non-inverting (+) input (pin 5) from the junction of R108 and R109. Current then flows from the IC6 through pin diode D6, located on the r.f. attenuator, the characteristics of which are such that the impedance of the diode to r.f. is dependent on the d.c. current flowing through the diode. Consequently the diode r.f. impedance is low. Should the amplitude of the a.f. signal at TR21 collector exceed IC6 standing bias the operational amplifier output is switched to 0V. Current no longer flows in the pin diode, the r.f. impedance of which is maximum.

77. When operating in the AM mode, a.g.c. signals normally developed in the SSB circuits and passed via D30 and D27 are disabled by the 9V AM RX output which reverse biases the diodes.

Miscellaneous Circuits

78. The operation of circuits not included in the transmit or receive paths are described in the following paragraphs.

(a) 9V Regulator

The reciter power supplies (+12V d.c. and 9V d.c.) are derived directly from the 12V battery input and the 9V regulator. When power is connected to the Reciter p.c.b., pin 20 is taken to +12, TR2 is switched on and current flows from 12V to COMMON via R3, TR2, R10 and R11. A potential difference is therefore generated across potentiometer R10 and resistor R11 so that TR3 base, connected to R10 wiper is raised towards 12V until TR3 is switched on. The positive bias at TR2 base is then modified by the current in TR3 to bring the voltage at TR2 emitter, adjusted at R10 to 9V. As TR3 emitter is held at a stabilised +6,2V reference level by zener diode D2, variations in the 9V output level are sensed in TR3. The transistor reacts to these variations to modify the potential at TR2 base, and hence the impedance of TR2, to return the output towards the preset level.

(b) TX/RX Switch

In the quiescent condition, ie: receive, the PTT LINE, connected to the Reciter +12V d.c. via R2, is at approximately 11V. Current flows in the base circuit of TR4 and the transistor is switched hard on so that + 9V appears on the 9V RX line. Transistors TR9 and TR7, with base circuits connected to the 9V RX line, are also switched hard on. Consequently TR6 base is taken to approximately 0V via TR10 and the transistor is cut-off. At the same time the 9V TX line, together with TR9 base, is taken to 0V by TR7. Transistor TR9 is then non-conducting. To transmit the operator depresses the p.t.t. switch. The PTT LINE is then taken to 0V. If we examine the switching circuit it can be seen that 0V at pin 19 results in TR4 being cut-off so that the 9V RX circuit is also taken to 0V. Transistors TR9 and TR10 then cease to conduct and the base circuit of TR6 rises towards 12V via R13, to switch TR6 hard on, the 9V TX line is at 9V and transistor TR9 is switched hard on to hold the 9V RX line at 0V.

(c) Sideband Oscillators

The LSB and USB sideband oscillators consists of XL1/TR14 and XL2/TR19 respectively. These circuits are identical except for the crystal elements used, ie. XL1 has a natural frequency of 34,0000MHz and XL2 has a natural frequency of 33,9967MHz . Only one oscillator is used at a time, this is selected by means of the front panel USB/LSB switch. When LSB is selected p.c.b. pin 3 is connected to 0V, comparator IC4a output is switched to 0V and IC4b output to +9V. TR14 is then switched on and the LSB oscillator is activated. Conversely when USB is selected the input goes high, IC4a and IC4b outputs are reversed, TR19 is switched on and the USB oscillator is activated. The outputs of the oscillators are connected via a common circuit connecting the inputs of buffer amplifiers TR11 and TR22. The outputs of these buffers are fed to the second and third mixer circuits respectively.

(d) SSB AGC Amplifiers

Two a.g.c. bias levels are generated to control the dynamic sensitivity of the reciter, ie: fast and slow. The fast circuit incorporates short time constants and reacts to short duration pulses. The time constants in the slow a.g.c. circuits are longer and these circuits operate to average out signal levels. An audio frequency signal picked up from the collector of the audio pre-amplifier (TR33) is passed to the base of the a.g.c. amplifier TR32. This transistor forms the audio a.g.c. amplifier, the gain of which is preset at R150. The audio output signal generated at TR32 collector is rectified in diodes D42, D43. In the fast a.g.c. circuit an increase in the amplitude of the audio signal at TR32 collector, therefore results in an increase in the positive bias at TR31 base. Consequently the bases of the Darlington pair TR28 and TR27 swing in the opposite direction and the current in TR27 emitter circuit decreases. This current flows via T10 and T20 windings through switching diodes D11/D12 and D36, the effective resistance of which thereby increases to provide attenuation of up to 20dB . For slow a.g.c. the level resulting from the rectification of the audio signal in D42/D43 is fed to TR26 base via R142. An increase in this level produces a reduction in TR26 emitter current. As the operating bias potentials applied to the 1,4MHz IF amplifier (TR13) and the 35,4MHz IF amplifier (TR37) are determined by this current, the gain of these two stages is controlled. Although the gain of the receiving circuits is controlled dynamically through the operation of the a.g.c. circuits the quiescent level at which these circuits operate is set by the front panel SENSITIVITY control potentiometer. For maximum sensitivity the wiper of this potentiometer (connected to the Reciter p.c.b. at pin 1) is at 9V RX and transistor collector voltages are at a maximum. This voltage is progressively reduced as the sensitivity control is turned counter clockwise. The a.g.c. threshold is set by R150.

(e) Squelch Circuit

The squelch circuit operates, when the SQUELCH control is rotated clockwise from the OFF position and 9V is applied to the Reciter p.c.b. at pin 26, to reduce the level of background noise in the absence of received signals. The degree of squelch applied is adjusted at the SQUELCH control potentiometer, R7, which is connected across p.c.b. pins 24 and 25.

INTERCOM DECODING LOGIC PCB

79. Refer to Figure 8. The Intercom Decoding Logic p.c.b. contains the following functional circuits:

(a) Intercom decoding logic
(b) 1kHz tone oscillator
(c) Tone amplifier
(d) Intercom audio amplifier
(e) PTT switch
(f) Bleep tone oscillator
(g) Meter circuit
(h) AM inhibit

These are described in the following paragraphs.

Intercom Decoding Logic

80. The function of the intercom decoding logic circuitry is to provide an interface between the front panel MODE and INTERCOM switches and the remainder of the functional circuits that comprise the Reciter. In addition it fulfils a similar function for modes selections made at a remote control unit when the REMOTE mode is selected. The operation of this circuitry is described in terms of the MODE and INTERCOM facilites that may be selected at S7 and S1 respectively. These switches are binary switches. For details of the codes output for specific switch positions refer to the truth tables included in Figure 3.

81. Switch S7 MODE selections are:

(a) Position 1 – REMOTE

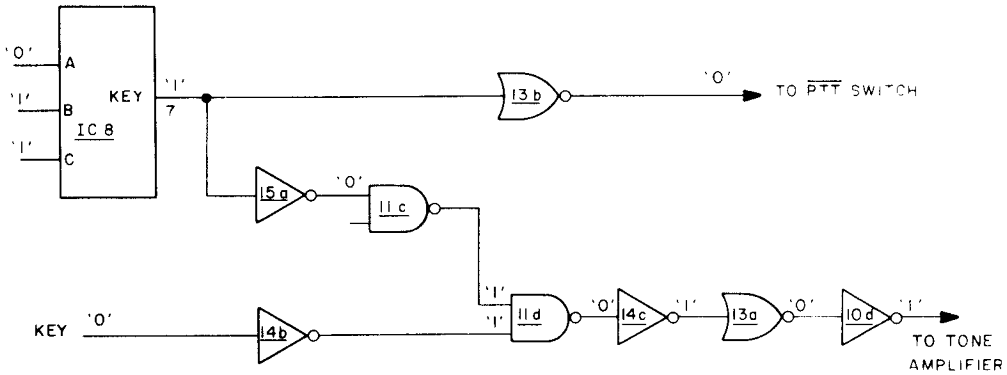
S7 A, B and C contacts are open circuit and the A, B and C input circuits are held at logic '1' via resistors R8, R9 and R10.
IC1b output is therefore at logic '1'.
This is applied to inverter IC14d and the control inputs of tri-state gates IC3a-f, which effectively inhibits the associated input signals.
IC14d logic '0' output enables remote control signals in tri-state gates IC2a-f and switches on TR1. The Reciter audio gain is therefore set at potentiometer R13.
IC14e logic '1' output is applied to TR2 base, as a LOCAL/REMOTE control signal to the synthesiser frequency selection circuits and to the control input of gate 2(d) analog switch.
TR2 is therefore cut-off so that the Reciter front panel AUDIO control is inoperative, synthesiser frequency selection is transferred to the remote unit and REMOTE AUDIO input signals are connected to the Reciter p.c.b. MIC IN circuit via gate 2 (d).
The Reciter p.c.b. LOUDSPEAKER output, connected at pin 4, is applied via R4 to line transformer T1, the output of which is connected to the REMOTE AUDIO output circuit.

For an understanding of the circuit operations that enable functions available to the remote operator, refer to the descriptions given later in this paragraph. As the outputs of the remote control and local control tri-state gates are wired in parallel these descriptions may be applied to remote operation.

(b) Position 2 – KEY

S7 contact A is connected to 0V, contacts B and C are open circuit and the B and C input circuits are held at logic '1' via resistors R9 and R10.
IC1b output is therefore at logic '0'. Thus the local control tri-state gates, IC3af, are enabled and the remote control tri-state gates, IC2a-f, are disabled. Audio gain is set at the front panel AUDIO control and frequency selections are made at the Synthesiser.

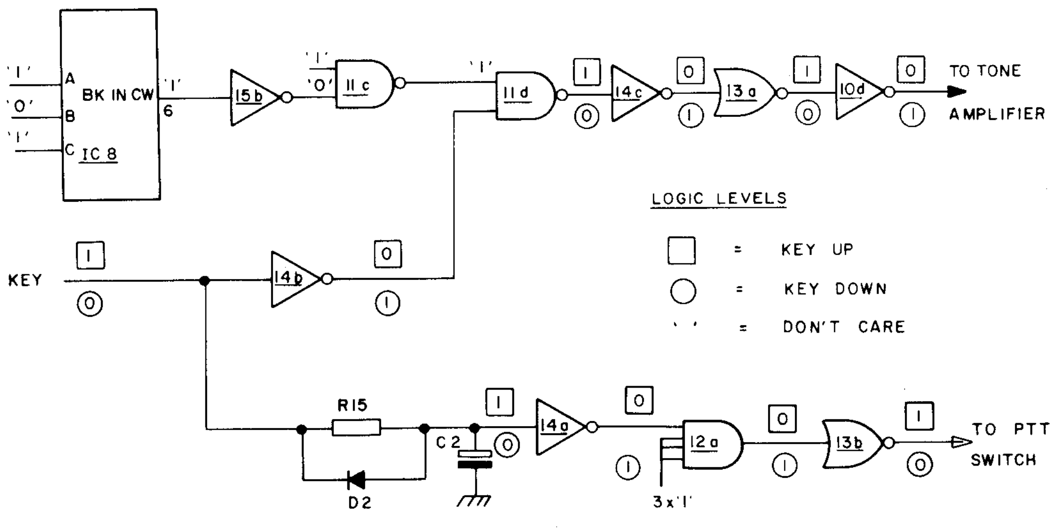
The logic '0' and logic '1' inputs at IC8 pin 10 and IC8 pins 13 and 12 respectively, are decoded to give a logic '1' at IC8 pin 7. The circuit operation resulting from this output and a 0V (KEY) input applied to the p.c.b. at SK31/2 is illustrated below.



The logic '0' applied to the PTT switch activates the switch so that the PTT LINE is taken to 0V and the Reciter is permanently switched to transmit.
When the key is depressed the KEY input circuit is connected to 0V, resulting in the application of a logic '1' to the tone amplifier, IC17, bias input. The 1kHz tone is then enabled in IC17, the output of which is connected to the Reciter p.c.b. MIC IN circuit. The tone is inhibited in IC17 when the key is released and the circuit input level is pulled to logic '1' via R12.

(c) Position 3 – BK IN CW

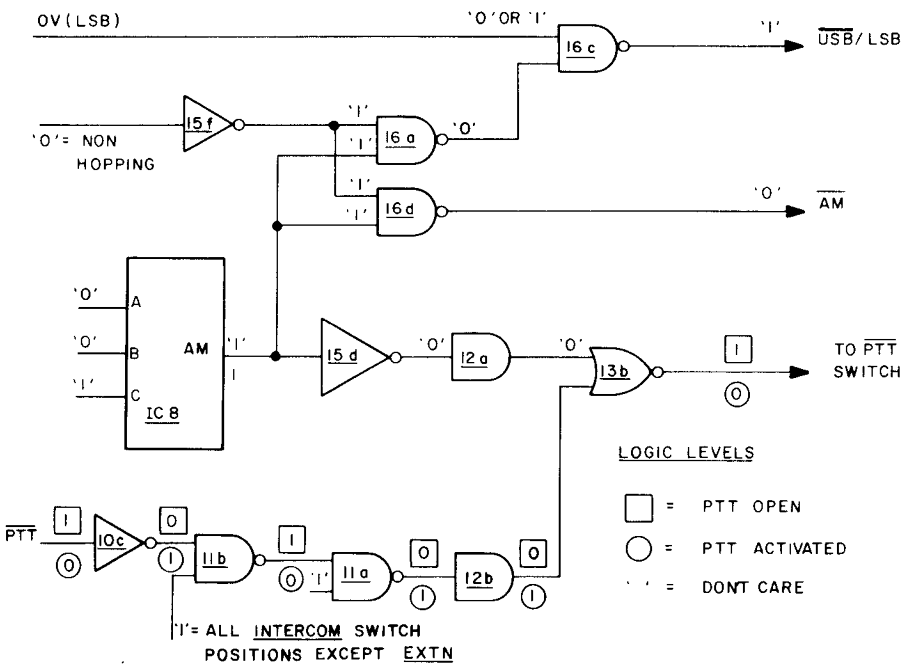
S7 contact B is connected to 0V, contacts A and C are open circuit and the A and C input circuits are held at logic '1' via resistors R8 and R10.
IC1b output is therefore at logic '0'. Thus the local control tri-state gates, IC3a-f, are enabled and the remote control tri-state gates, IC2a-f, are disabled.
Audio gain is set at the front panel AUDIO control and frequency selections are made at the Synthesiser.
The logic '0' and logic '1' inputs at IC8 pin 13 and IC8 pins 10 and 12 respectively, are decoded to give a logic '1' at IC8 pin 6. The circuit operations resulting from this output for both logic '1' and logic '0' KEY inputs are illustrated below



IC8 pin 6 logic '1' output is inverted in IC15b and IC11c to present a logic '1' input to IC11d. Consequently the tone amplifier and PTT switch are controlled by key operation. In the key 'up' condition the KEY input circuit is held at logic '1', the tone amplifier and PTT switch are inhibited and the Reciter functions as a receiver.
In the key 'down' condition the KEY input circuit is connected to 0V. A logic '1' is then applied to tone amplifier IC17 bias input and the 1kHz tone is enabled in the amplifier.
At the same time IC14a input is rapidly taken to 0V. Consequently a logic '0' is applied to the PTT switch, the switch is activated and the PTT LINE is taken to 0V. The Reciter therefore functions in the transmit mode, generating a 1kHz SSB output signal.
When the key is released the KEY input circuit is once again pulled up to logic '1'. The application of this 'high' to IC14a is, however, delayed by R15 and C2 so the logic '1' output to the PTT switch, and subsequent return to the receive condition, only occurs 1s after key operations cease. Diode D2 is included to enable C2 to discharged rapidly in the key 'down' state.

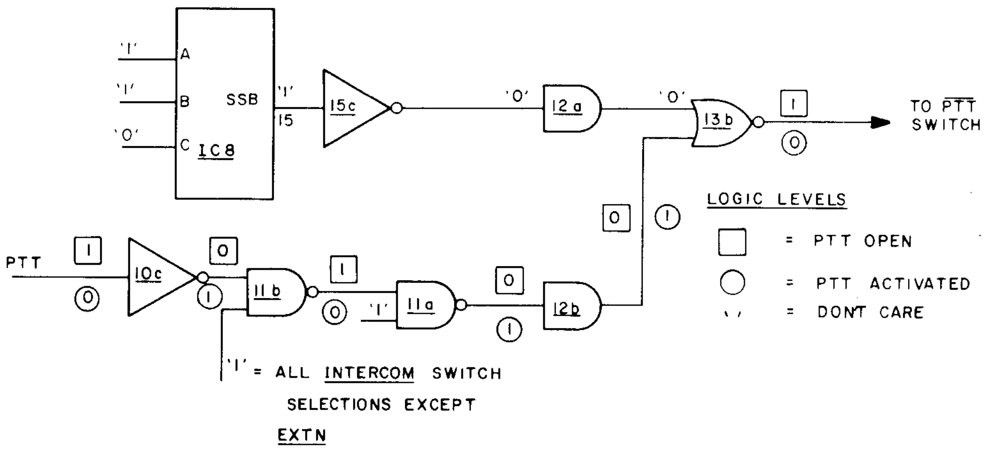
(d) Position 4 – AM

S7 contacts A and B are connected to 0V, contact C is open circuit and the C input circuit is held at logic '1' via resistor R10.
IC1b output is therefore at logic '0', and tri-state gates (IC3), audio gain control and synthesiser frequency selections are as described in (c).
The logic '0' and logic '1' inputs at IC8 pins 10 and 13 and IC8 pin 12 respectively, are decoded to give a logic '1' at IC8 pin 1. The circuit operations resulting from this output for both transmit and receive modes are illustated below.
The logic '0' applied to IC15f in the non-hopping state is inverted and presented as a logic '1' to IC16a and IC16d. As the second input to these two NAND gates is provided by IC8 logic '1' AM signal, IC16a and IC16d outputs are at logic '0'.
IC16a logic '0' is inverted in IC16c thereby driving the mode selection to LSB.
IC16d logic '0' is used to modify the Reciter p.c.b. circuits, thereby preparing for operation in the AM mode.
IC18 logic '1' AM output is inverted in IC15d placing a '0' onto the input of IC12a, which effectively prevents key operations switching PTT via IC14a. The output of IC13b is therefore controlled by the PTT input signal. In the quiescent (receive) condition this is held at logic '1' via R11. Consequently IC13b inputs are all at logic '0' and the PTT LINE is at logic '1', ie. the Reciter is switched to 'receive'. When the p.t.t. is activated the PTT input circuit is connected to 0V and, providing the EXTN position of S1 has not been selected, IC13b output is switched to logic '0'.
The Transceiver is therefore switched between transmit and receive modes from the operators p.t.t. switch to transmit and receive AM signals.



(e) Position 5 – SSB

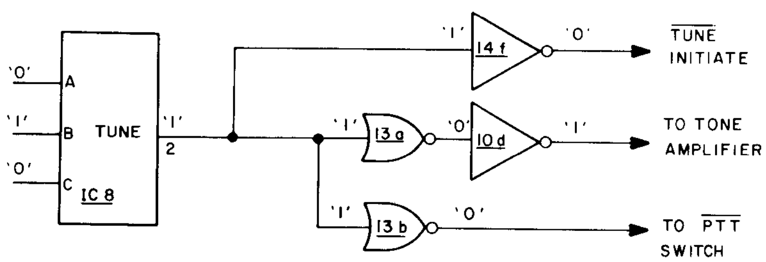
S7 contact C is connected to 0V, contacts A and B are open circuit and the A and B input circuits are held at logic '1' via resistors R8 and R9.
IC1b output is therefore at logic '0' and tri-state gates (IC3) audio gain control and synthesiser frequency selections are as described in (c).
The logic '1' and logic '0' inputs at IC8 pins 10 and 13 and IC8 pin 12 respectively are decoded to give a logic '1' at IC8 pin 15. The circuit operations resulting from this output for both transmit and receive modes are illustrated below:



As the Transceiver normal mode of operation is SSB the Reciter circuitry does not have to be set up when this mode is selected. Consequently the only facility required is PTT switching.
IC8 logic '1' output, inverted in IC15c and presented as a logic '0' to IC13b via IC12a ensures that the PTT switch can only be activated from the PTT input signal.
The Transceiver is therefore switched between transmit and receive modes from the operators p.t.t. switch to transmit and receive SSB signals.
Both USB and LSB selections are available. These are selected from the front panel USB/LSB switch (S8) via IC16c.

(f) Position 6 – TUNE

S7 contacts A and C are connected to 0V, contact B is open circuit and the B input circuit is held at logic '1' via resistor R9.
IC1b output is therefore at logic '0' and tri-state gates (IC3) audio gain control and synthesiser frequency selections are as described in (c).
The logic '0' and logic '1' inputs at IC8 pins 10 and 12 and IC8 pin 13 respectively are decoded to give a logic '1' outout at IC8 pin 2. The circuit operation resulting from this output is illustrated below:



IC8 pin 2 logic '1' output results in the following output signals:

(i) Logic '0' TUNE INITIATE – this initiates an external ATU tuning sequence and, via the operation of the Control Logic Unit circuitry, switches the Transceiver to the low power mode.

(ii) Logic '0' to the PTT switch which connects the PTT LINE to 0V and switches the Transceiver permanently to transmit.

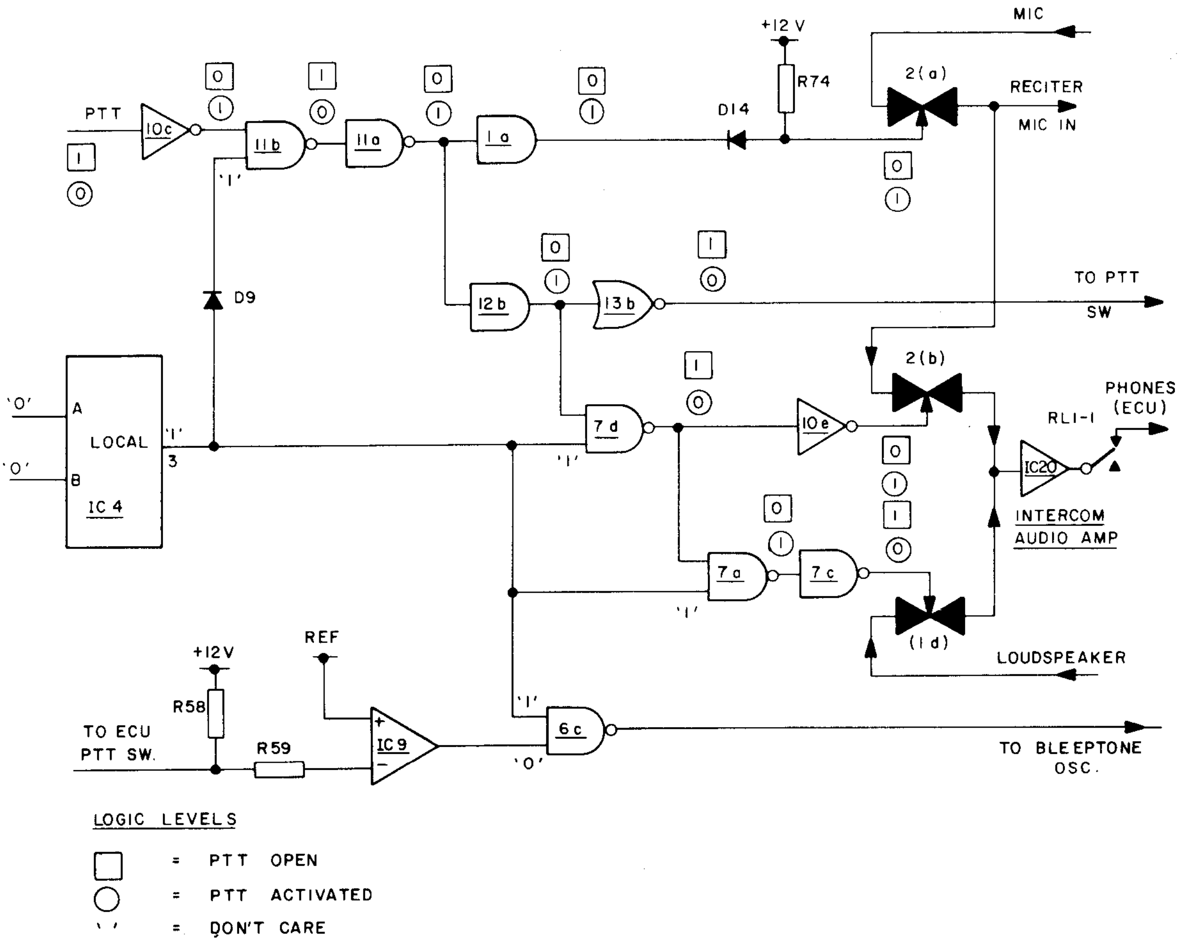
(iii) Logic '1' to the tone amplifier, IC17, bias input. This enables the amplifier, the 1kHz tone output of which is connected to the Reciter MIC IN circuit.

The Transceiver is therefore switched to the low power transmitter mode, the nominal 25W 1kHz SSB output being used for tuning purposes.

82. Switch S1 INTERCOM selections are:

(a) **Position 1 – LOCAL**

S1 contacts A and B are connected to 0V. IC4 A and B input circuits are therefore both a logic '0'. This is decoded to give a logic '1' output at IC4 pin 3. The circuit operation resulting from this output is illustrated below.



Consider the operation of the circuit under the following conditions:

(i) Receive – PTT Open

The input to IC10c is held at logic '1' via R11.
The input to the PTT switch and, hence, the PTT LINE is at logic '1'.
The Transceiver is therefore switched to the receive mode.
Gates 2(a) and 2(b) control lines are at logic '0' and the MIC and Reciter MIC IN signals are inhibited.
Gate 1(d) control line is at logic '1' and the Reciter LOUDSPEAKER output, in addition to being connected to the front panel loudspeaker and AUDIO connectors, is applied to the intercom audio amplifier. In the condition shown, RL1 de-energised, IC20 output is applied the ECU PHONES circuit via the ECU line transformer (T1) located on the Reciter chassis assembly. The ECU operator is therefore able to monitor received traffic.

(ii) Transmit – PTT Closed

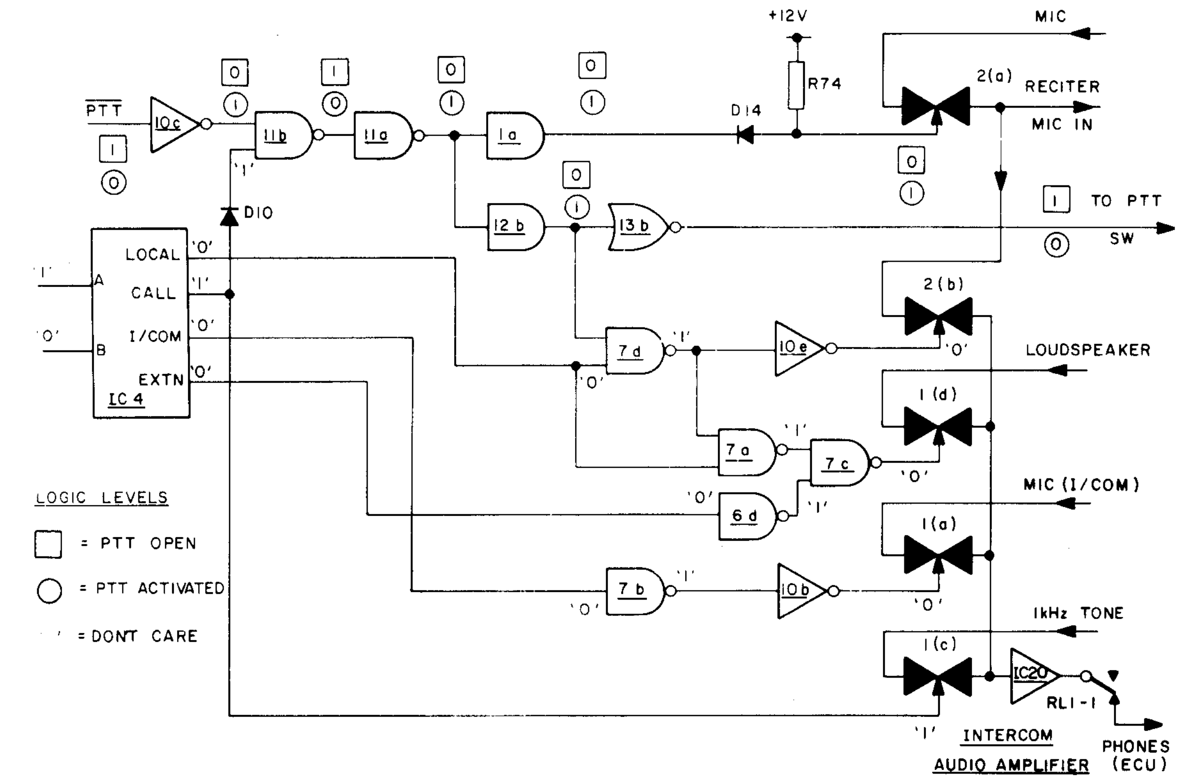
The input to IC10c is connected to 0V.
The input to the PTT switch and the PTT LINE is therefore at logic '0' and the transceiver is switched to the transmit mode.
Gate 1(d) control line is now at logic '0' and LOUDSPEAKER signals are inhibited.
Gates 2(a) and 2(b) control lines are at logic '1'. The local MIC signal is therefore connected via gate 2(a) to the Reciter MIC IN circuit and via gates 2(a) and 2(b) to the intercom audio amplifier IC20, the output of which is, as previously described, applied to the ECU. The ECU operator in this instance is able to monitor local transmissions.

(iii) ECU Call

If the ECU operator requires to contact the local Transceiver when it is operating in the LOCAL mode, he depresses the ECU p.t.t. switch.
Current then flows from + 12V to ground via R58, SK31/13, the ECU line transformer, telephone wire, ECU relay and p.t.t. switch. Comparator IC9 output, normally held at logic '0' by the 12V inverting input which exceeds the 11V standing bias taken from R60/R61 junction and applied to the non-inverting input (pin 3), is then switched to logic '1'. NAND gate IC6c inputs are therefore both at logic '1' and IC6c pin 10 is at logic '0'. This logic '0' enables the bleep tone oscillator, the 1Hz output of which activates the bleep tone. At the same time the front panel CALL LED is illuminated from 12V via TR9 which is switched on. The local operator is thus alerted to an ECU call.

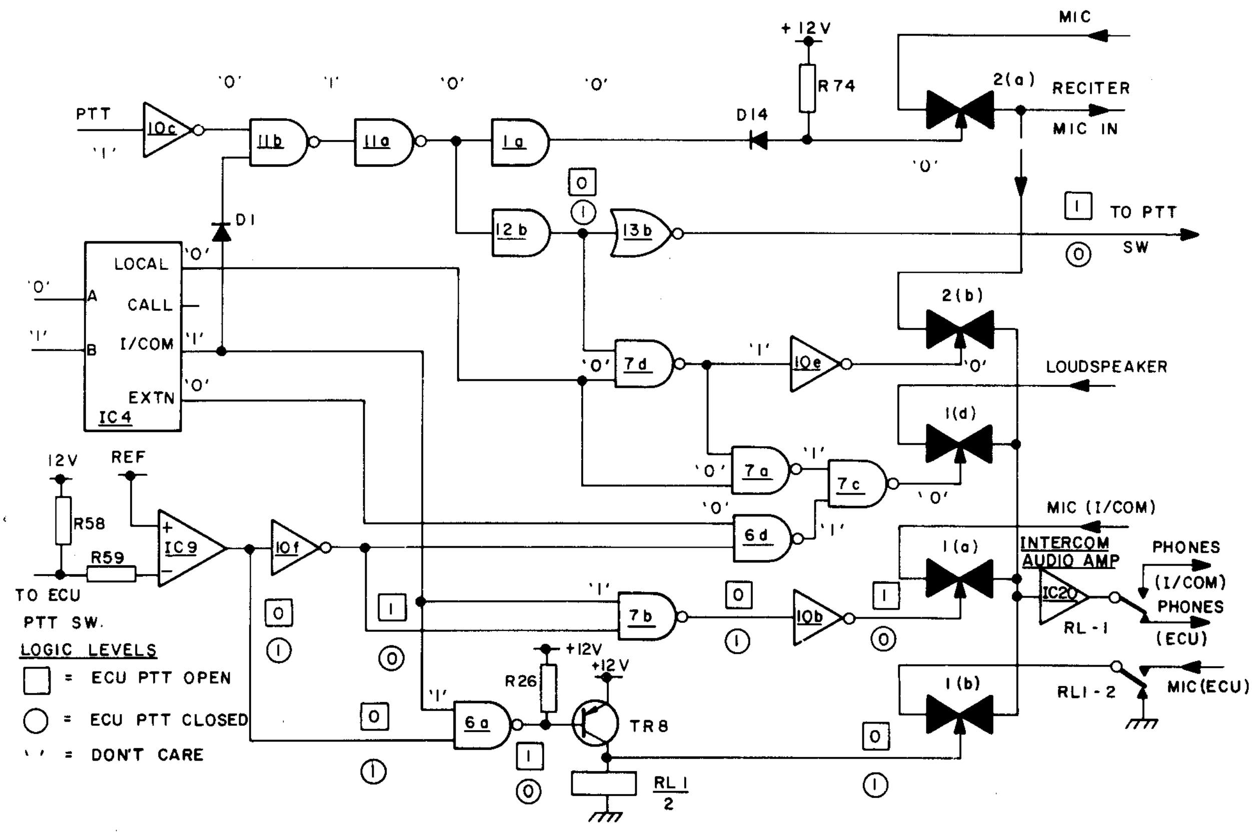
(b) Position 2 – CALL

S1 contact A is open circuit and contact B is connected to 0V. IC4 A and B inputs are therefore at logic '1' and logic '0' respectively. This is decoded to give a logic '1' at IC4 pin 14. The circuit operation resulting from this output is illustrated opposite.
Logic '0' LOCAL, INTERCOM and EXTN outputs result in logic '0' inhibit signals on gates 1 (a), 1(d) and 2 (b) control inputs.
The logic '1' CALL output is applied directly to gate 1(c) control input and via D10 to IC11b. The 1kHz tone is therefore applied via the intercom audio amplifier and RL1–1 (de-energised) to the ECU PHONES circuit. The ECU operator is therefore alerted by the tone signal.
The logic '1' applied to IC11b enables the Transceiver to be switched between the transmit and receive modes in the normal manner. The Reciter MIC IN signal is enabled in gate 2(a) as required. The ECU operator is not able to monitor local traffic however as gates 2(b) and 1(d) are open.



(c) Position 3 – INTERCOM

S1 contact A is connected to 0V and contact B is open circuit. IC4 A and B inputs are therefore at logic '0' and logic '1' respectively. This is decoded to give a logic '1' at IC4 pin 2. The circuit operation resulting from this output is illustrated below.



The logic INTERCOM signal applied via D1 to IC11b enables the Transceiver to be swtiched between the transmit and receive modes in the normal manner. The Reciter MIC IN signals are enabled in gate 2(a) as required. The ECU operator is not able to monitor local traffic however as gates 2(b) and 1(d) are open.

Consider the circuit operation under the following conditions.

(i) ECU PTT Open

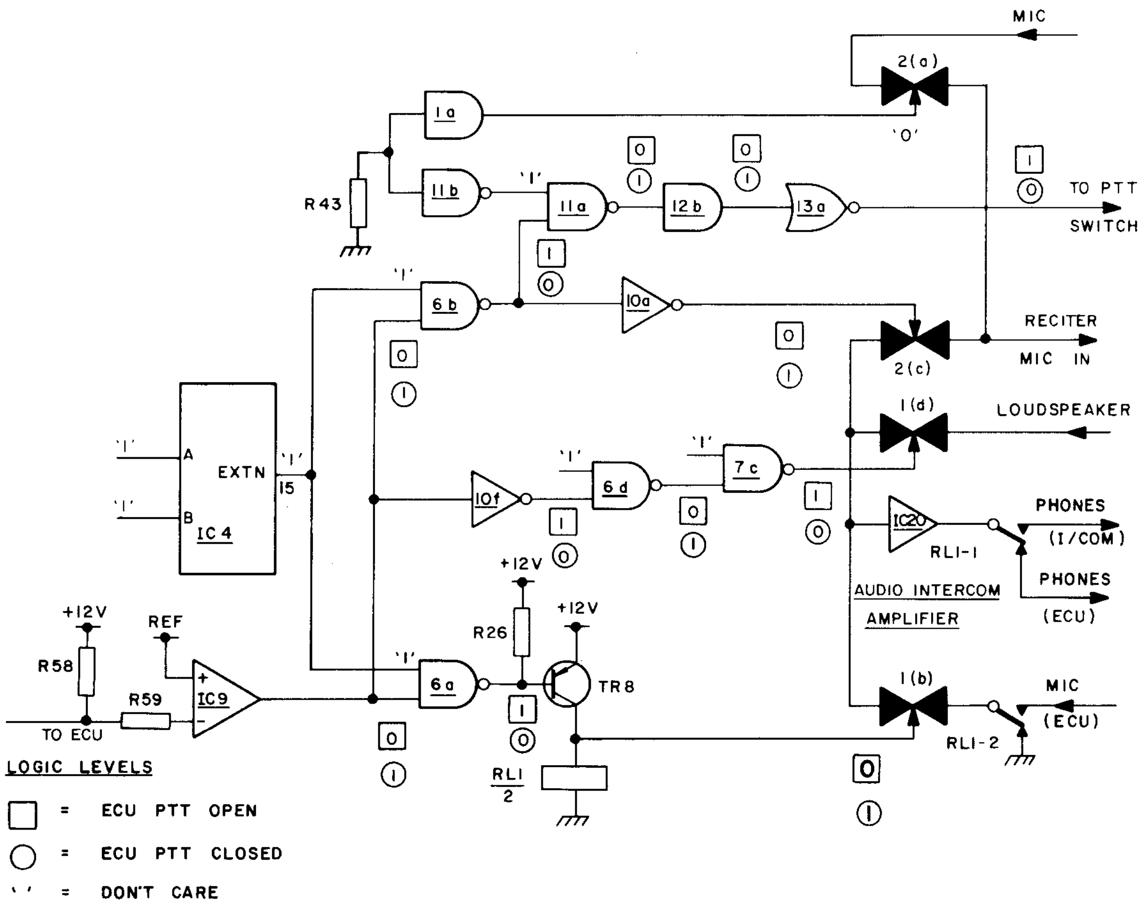
Comparator IC9 output is at logic '0', TR8 is cut off (and RL1 de-energised), gate 1(a) is closed and gate 1(b) is open.
Local MIC (INTERCOM) signals are applied via gate 1(a) to the intercom audio amplifier IC20, the output of which is connected via RL1–1 to the ECU PHONE circuit. The local operator is therefore able to talk to the ECU operator.

(ii) ECU PTT Closed

Comparator IC9 is switched due to current flowing in R58 to present a logic '1' to IC10f and IC6a. This results in gate 1(a) being opened, TR8 switched on (and RL1 energised), and gate 1(b) closed.
Audio signals generated in the ECU (MIC ECU) are applied via RL1–2, gate 1(b), intercom audio amplifier IC20 and RL1–1 to the INTERCOM PHONES circuit. The ECU operator is therefore able to talk to the local operator.

(d) Position 4 – EXTN

S1 contacts A and B are open circuit IC4 A and B inputs are therefore both at logic '1'. This is decoded to give a logic '1' at IC4 pin 15. The circuit operation resulting from this output is illustrated below.



In the EXTN mode the ECU operator switches the Transceiver between transmit and receive and controls the application of audio signals to the Reciter MIC IN circuit. LOCAL MIC signals are permanently inhibited in gate 2(a).
Consider the circuit operation under the following conditions.

(i) **ECU PTT Open**

This is the quiescent condition.
A logic '1' is applied to the PTT switch, the PTT LINE is at logic '1' and the Transceiver is in the receive mode.
The Transceiver LOUDSPEAKER output is applied via gate 1(d), the intercom audio amplifier (IC20) and relay contact RL1–1 (de-energised) to the ECU PHONES circuit. The ECU operator may therefore monitor received traffic.

(ii) **ECU PTT Closed**

Comparator IC9 is switched due to current flowing in R58 to present a logic '1' to IC6a, IC6b, and IC10f. This results in gate 1(b) and gate 2(c) being closed, gate 1(d) opened, RL1 being energised and the application of a logic '0' to the PTT switch. The Transceiver is therefore switched to transmit. LOUDSPEAKER signals are inhibited in gate 1(d).
Audio signals generated in the ECU (MIC ECU) are applied via RL1–2 and gate 1(b) to the intercom audio amplifier and via gate 2(c) to the Reciter MIC IN circuit. The amplifier output is applied by RL1–1 (energised) to the INTERCOM PHONES circuit. The local operator is therefore able to monitor transmissions using the INTERCOM handset.

1kHz Tone Oscillator

83. The 1kHz tone oscillator is a conventional RC oscillator comprising TR3 and associated components. When + 12V is applied TR3 commences to conduct. Positive feedback occurs in the twin T network, R18/R19/C3/C4/R17, and the circuit oscillates at a natural frequency of 1kHz. The tone output signal is coupled by C12 to gate 1(c) and by C7 to the tone amplifier.

Tone Amplifier

84. The tone amplifier, IC7, is an integrated operational amplifier circuit element. The gain of this element is variable, control being by a bias input to pin 5. In this application signals are only passed when the bias input is raised to + 12V, ie. IC10d output is switched to logic '1'. The amplifier outout is connected to the Reciter MIC IN circuit.

Intercom Audio Amplifier

85. The intercom audio amplifier, IC20, is an 8W power amplifier integrated circuit element, the output of which provides local (INTERCOM) or remote (ECU) headphone signals as switched by relay RL1.

PTT Switch

86. The PTT switch comprises transistors TR4 and TR5.

87. In the quiescent (receive) state TR4 base is taken towards +12V via R33, and the transistor is switched on. TR5 base is then at 0V, TR5 is cut off and the PTT LINE is held at +12V.

88. The Transceiver is switched to transmit when IC13b output is taken to 0V. TR4 is then switched off, TR4 collector rises towards +12V and TR5 is switched hard on to connect the PTT LINE to 0V.

Bleep Tone Oscillator

89. IC18, which comprises four NOR gates, is configured ina manner which causes it to become astable if either of the inputs (IC18.2 or IC18.12) is taken to logic '0'. IC18.12 is controlled by the RC network RC65/ C29 which determines the frequency of the circuit. IC18, pins 1 and 2 are normally held at logic '1' by IC6c, which is only activated when the local intercom mode is selected (logic '1' at IC4.3) and IC9 switched to logic '1' from the ECU, ie. p.t.t. is operated. When IC6c is activated, IC18.1 and 2 is taken to '0' causing the cct to oscillate. Potentiometer R63 is adjusted so that IC18.13 is at logic '0' if the supply voltage of + 24V falls to a predetermined level. This causes the circuit to oscillate and serves to give an audible warning if a low voltage supply condition should occur.

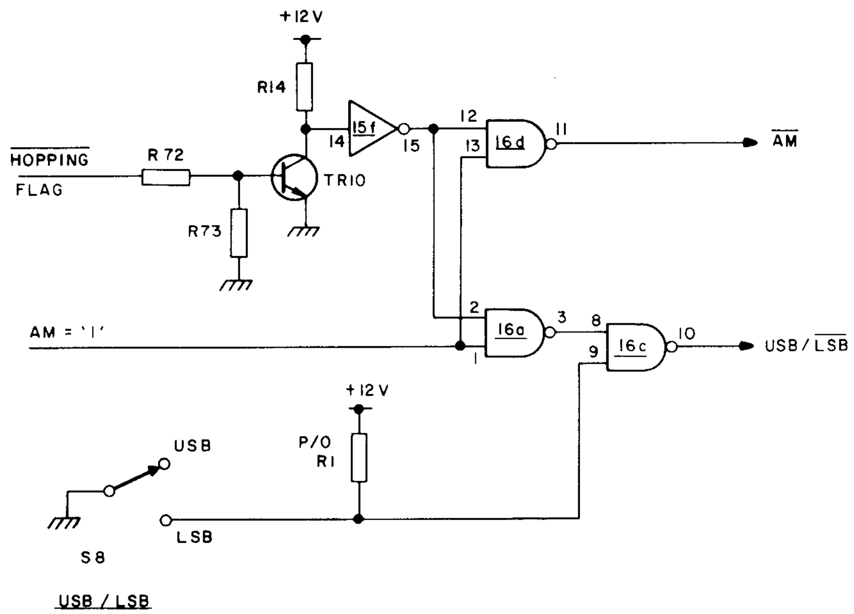
Meter Circuit

90. When the Transceiver is operating in the receive mode the meter circuit operates independant of the METER switch to provide an indication of received signal strength. This is achieved by placing logic '1' levels (+ 9V RX) onto IC5 AO and A1 address inputs via diodes D5 and D6. This ensures that only the Y3 inputs connected across IC5 pins 11 and 4, are applied to the meter.

91. When SSB is selected the meter is driven from the emitter of the last IF stage on the Reciter p.c.b. (TR37). The potential divider R55/R54 is used to adjust the meter zero and R53 sets full scale deflection. When AM is selected D7 is reverse biased by a 0V connected to the anode. The meter is then driven from TR21 located on the Reciter p.c.b.

92. The signal levels applied to IC5 A0 and A1 inputs are switched via the front panel meter switch S6, when the transmitter is operating in the TX mode. The inputs then applied to the meter relate to the switch position.

AM Inhibit



93. The function of this circuit is to ensure that the following facilities are available when the Reciter MODE switch is at AM and the Frequency Processor Unit is switched to the non-hopping and hopping modes

(a) Non hopping
AM is selected
USB is selected.

(b) Hopping
AM inhibited – set to SSB.
USB or LSB available – depending on S8 position.

RF ATTENUATOR PCB

95. Refer to Figure 10. The transceiver input signal is connected to the Reciter Unit (RF Attenuator) through co-axial connector PL15.

96. The function of the circuits on the Attenuator p.c.b. is to provide protection to the receiver input circuits, and input signal attenuation levels of –30dB, –20dB, –10dB and 0dB. The input circuit is protected against excess voltage spikes resulting from lightning, static, interference etc., by diodes D1 to D4 which limit the amplitude of such spikes to ± 1,3V. During transmission the 9V TX line is at +9V and the RX IN circuit is effectively earthed. The four attenuation levels are selected at the front panel control S2. Levels of –20dB and –30dB are provided by resistive pi networks R3/R5/R7 and R4/R6/R8 respectively. The broadband amplifier TR1 introduces a gain of 0dB when this position is selected. Pin diode D5 provides variable impedance to r.f. when operating in the AM mode.

DECOUPLING PCB

97. The Decoupling p.c.b. provides the interconnections required between accessories connected to the front panel AUDIO, INTERCOM and JACK connectors and the Intercom Decoding Logic p.c.b. Resistors R1, R3 and R2 adjust the level of the FSK TX signal to make it compatible with the Reciter MIC IN circuit Capacitors C1 to C10 provide r.f. decoupling on incoming audio signal lines.

SERVICING AND TEST INSTRUCTIONS

98. Refer to Figure 3.

99. Operational checks are detailed in the following paragraphs together with the relevant setting up procedures. For the test results obtained to be valid it must be ensured that the Synthesiser (or Frequency Processing Unit) fitted must be free of faults and working correctly, ie. fully operational. If a Frequency Processing Unit is used the FUNCTION switch must be set to OFF.

TEST EQUIPMENT

100. The items of test equipment required to perform the check and alignment procedures detailed are listed below together with recommended models where applicable.

OSCILLOSCOPE	:	Tektronix 465
RF SIGNAL GENERATOR	:	HP 8640B
FREQUENCY COUNTER	:	Local 9839
AC MILLIVOLTMETER	:	Leader
AUDIO SIGNAL GENERATOR	:	Dymar
SPECTRUM ANALYSER	:	HP
MULTIMETER	:	AVO Model 8
POWER SUPPLY 13,5V 2A (A)	:	Kingshill 18V10
POWER SUPPLY 30V, 1A (B)	:	Farnell L30V
RESISTOR 300Ω 0,5W		
RESISTOR 51Ω 0,25W.		

The following accessories may also be required.

EXTENDED CONTROL UNIT (ECU)
HANDSETS (2 off).

PRELIMINARY OPERATIONS

Dismantling

101. Access to the Reciter/Control Panel Assembly is provided as follows:

(1) Remove the four screws securing the top cover to the mainframe and lift the top cover off.

(2) Release the rear panel fasteners and remove the panel.

(3) Release the two screws at the rear of the Synthesiser (or FCU).
NOTE . Access to the component side of the Reciter p.c.b. may now be obtained by lifting off the Synthesiser. The Transceiver remains fully operational if the Synthesiser is not disconnected but is supported clear of the Reciter p.c.b.. Should it be necessary the Reciter/Control Panel Assembly may be removed from the Mainframe and reconnected as follows:

(4) Remove the two screws located on the bottom rail of the Transceiver.

(5) Release all plug/socket connections at the rear of the Reciter and Synthesiser Units.

(6) Release the two screws securing the rear of the Reciter assembly to the mainframe.

(7) Remove the two screws securing the Control Panel to the Mainframe.

(8) Remove the two screws on each side of the Reciter.

(9) Withdraw the Reciter Assembly from the Mainframe.

Test Connections

102. The Reciter/Control Panel and Synthesiser Units may be reconnected for test purposes using extension leads as detailed below:

(1) Coaxial lead : Reciter SK21 to Synthesiser PL21 (37MHz to 65,4MHz)

(2) Coaxial lead : Reciter SK22 to Synthesiser PL22 (35,4MHz).

(3) 25-way multicore connector : Synthesiser PL5 to Interface p.c.b. PL6.

(4) 9-way multicore connector : Synthesiser PL19 to Mainframe connector SK19. (for use with Hopping Synthesiser only).

(5) 5-way multicore connector : Reciter PL20 to Mainframe connector SK20.

(6) Coaxial lead : Reciter PL13 to Mainframe connector SK13. (RF OUT).

(7) Coaxial lead : Reciter PL15 to Mainframe connector SK15 (RF IN).

Power Supplies

103. For test purposes PSU (A) and PSU (B) are connected as follows:

(1) Disconnect PL18 from SK18.

(2) Connect PSU (A) to the Reciter p.c.b. as follows:
12V d.c. +ve : PCB pin 20
−ve : PCB BB1

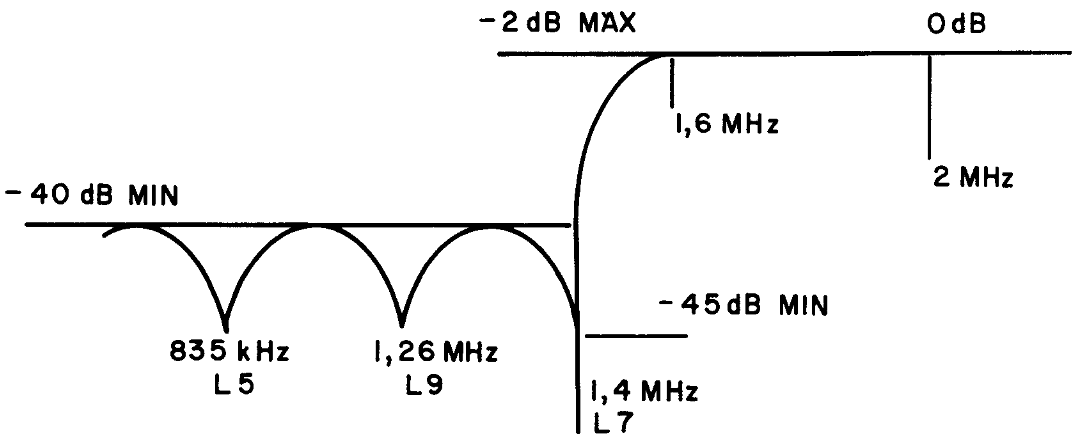
(3) Connect PSU (B) to the Intercom Decoding Logic p.c.b. as follows:
24V d.c. +ve : PCB pin 34
− ve : PCB pin 30

TEST PROCEDURE

Initial Test

104. (1) Set all the preset potentiometers on the Reciter and Intercom Decoding Logic p.c.b.'s to the mid positions.
(2) Set PSU (A) otuput to +12V d.c.
(3) Set PSU (B) output to +20V d.c.
(4) Adjust R63 on Intercom Decoding Logic p.c.b. so that the bleep tone is just not operating.
(5) Set the Front Panel MODE switch to KEY.
(6) Set the Front Panel METER switch to SUPPLY.
Hold in this position.
(7) Adjust R48 on Intercom Decoding Logic p.c.b. until the meter pointer is just at the left hand edge of the GREEN band.
(8) Release the METER switch.

(9) Set the MODE switch to SSB.
(10) Adjust R10 on the Reciter p.c.b. for 9V ± 0,05V on emitter of TR2.
(11) Set the Front Panel SENSITIVITY control to maximum (fully clockwise)
(12) Adjust R54 on the Intercom Decoding Logic p.c.b. to obtain a meter reading of 0dB on the red scale.
(13) Set the SENSITIVITY control to minimum (fully counterclockwise).
(14) Adjust R53 on the Intercom Decoding Logic p.c.b. to obtain a full scale meter reading
(15) On the Reciter p.c.b. use the oscilloscope to check FL5 output at the following frequencies: 1,6MHz, 8MHz, 16MHz, 29,999MHz.
The output level must be 1V to 1,5V peak-to-peak for each frequency.
(16) Connect the oscilloscope to the wiper of R56.
(17) Adjust R56 for minimum sideband oscillator buffer amplifier output as displayed by the oscilloscope.
(18) Connect the oscilloscope to the cathode of product detector diode D49.
(19) Adjust T15 for maximum displayed signal level.
This should be 1,2V peak-to-peak ± 200mV
Note the level
(20) Remove the link at TP1
(21) Connect the sweep generator to TP1 (junction of L4 and L5) and ground.
(22) Connect the spectrum analyser to the RF OUT connector PL13.
(23) Adjust L5, L7 and L9 to obtain nulls as illustrated below:



(24) Measure loss at 1,6MHz relative to 2MHz.
This must be less than 2dB.
(25) Measure 1,4MHz rejection relative to 2MHz.
This must be greater than 45dB.
(26) Remove spectrum analyser and sweep generator
(27) Replace TP1 link.

Receiver SSB

105. (1) Set the Reciter Front Panel controls as follows:

INTERCOM	:	LOCAL
RF ATTENUATOR	:	0dB
SENSITIVITY	:	maximum (fully clockwise)
SQUELCH	:	OFF (fully counterclockwise)
AUDIO	:	maximum (fully clockwise)
MODE	:	SSB
USB/LSB	:	USB
SPEAKER	:	RECEIVE

(2) Connect the multimeter and oscilloscope between Reciter p.c.b. pin 28 (LOUDSPEAKER) and 0V

(3) Set the Synthesiser FREQUENCY selectors to 1,600MHz.
VF0 to OFF

(4) Connect the RF signal generator to the RF IN connector PL15
Set the signal generator frequency to 1,601MHz.
Adjust the input signal level until the multimeter reading is approximately 250mV r.m.s. and a 1kHz
tone can be heard from the loudspeaker.

(5) Set R150 on the Reciter p.c.b. to minimum (to disable a.g.c.)

(6) Adjust IF transformers in the following sequence for maximum output T19, T9, T6, T2, T11 and T12
Reduce the r.f. signal generator output as necessary to maintain the multimeter reading between 250mV to 500mV.

(7) Set the signal generator signal level to 1μV (e.m.f.)
Note the multimeter reading
This must be greater than 1,3V r.m.s.
Adjust R95 as required (normally at maximum)

(8) Reduce AUDIO gain by 20dB
Note the output level.

(9) Increase the r.f. signal generator output to 3μV (e.m.f.)
Adjust R150 to set the output to 6db ± 1dB above the level noted in Step (8).

(10) Increase the signal input level to 1mV.
Note the audio output signal level.
This must be less than 2dB greater than the level noted in Step (9).

(11) Reduce the r.f. signal generator input level by 20dB (100μV)
Adjust R53 on Intercom Decoding Logic p.c.b., if necessary, to obtain an 'S' meter reading on the 40dB line (± 1mm)

(12) Increase AUDIO gain
Check that the waveform peaks clip within 10% of each other and that there is not distortion or instability.

(13) Reduce AUDIO gain until the output is just clipping.
Note the output level.
This must be greater than 2,4V r.m.s.

(14) Insert the 300Ω, 0,5W resistor between SK26/C and D.
Measure the audio signal level across the resistor.
This must be greater then 770mV r.m.s.

(15) Repeat Step (14) at SK27.

(16) Check that audio signals are present at the PHONE jack.

(17) Reduce the r.f. signal generator input to 10μV.
Check that the 'S' meter reading is approximately 20dB.

(18) Reduce the r.f. signal generator input to 3μV
Check that the 'S' meter reading is approximately 10dB.

(19) Reduce the r.f. signal generator input to 1μV
Adjust the AUDIO control for a comfortable listening level.

(20) Set the RF ATTENUATOR switch to –10dB.
Increase the signal generator input to obtain the audio level measured in Step (14).
Note the increase in r.f. signal level.
This should be 13dB ± 1dB.

(21) Set the RF ATTENUATOR switch to –20dB.
Increase the signal generator input to obtain the audio level measured in Step (14).
Note the increase in r.f. signal level.
This should be 13dB ± 1dB.

(22) Set the RF ATTENUATOR switch to –30dB and repeat Step (21).

(23) Reset the r.f. signal generator inptut level to 1μV and RF ATTENUATOR switch to 0dB.
Note the audio output level.

(24) Increase the r.f. signal generator output level by 6dB.

(25) Increase the r.f. signal generator frequency above 1,601MHz until the signal level noted in Step (23) is repeated.
Note the frequency.

(26) Decrease the r.f. signal generator frequency below 1,601MHz until the signal level noted in Step (23) is repeated.
Note the frequency.
The frequencies noted in Steps (25) and (24) define the audio bandwidth.
Relative to 1kHz audio output this should be:

lower point – 320 to 410Hz
upper point – 2600 to 3100Hz.

(27) Reset the r.f. signal generator to 1,601MHz at 1μV

(28) Sweep the signal generator through the audio band.
Note the audio output signal level.
The ripple observed should not exceed ± 2dB.

(29) Reset the r.f. signal generator to 1,601MHz at 1μV.

(30) Set the Front Panel USB/LSB selector to LSB.

(31) Increase the r.f. signal generator output until the audio signal level noted in Step (23) is repeated.
Note the r.f. signal generator output level.
This should not be less than 45dB above 1μV.

(32) Return the r.f. signal generator output level to 1μV.
Set the frequency to 1,599MHz.

(33) Repeat Steps (23), (24), (25) and (26) for 1,599MHz.

(34) Set the USB/LSB selector to USB.

(35) Repeat Step (31).

(36) Set the Synthsiser FREQUENCY selectors sequentially to the following frequencies.
1,6MHz, 4MHz, 8MHz, 16MHz and 29,990MHz.
Adjust the r.f. signal generator frequency at each step for a 1kHz audio output.
Set the r.f. signal level to 1μV.
Check the signal-to-noise ratio across the Reciter p.c.b. LOUDSPEAKER output at each frequency setting.
This should not be less than 12dB.

(37) Reset the Synthesiser FREQUENCY selectors to 1,600MHz.
Return the r.f. signal generator output to 1,601MHz at 1μV.
Note the audio signal output level.

(38) Adjust the r.f signal generator frequency to 72,399MHz.

(39) Increase the r.f. signal generator output level until the audio signal output level noted in Step (37) is repeated.
Noted the increase in r.f. signal generator output level.
This must be greater than 60dB.

(40) Set the r.f signal generator frequency to 1,601MHz and output level to 1μV.
Note the audio output signal level.

(41) Adjust the r.f. signal generator frequency to 35,399MHz (USB selected) or 35,401MHz (LSB selected).

(42) Increase the r.f. signal generator output level until the audio signal output level noted in Step (40) is repeated.
Note the increase in r.f. signal generator output level.
This must be greater than 65dB.

(43) Set the r.f. signal generator frequency to 4,201MHz at 1μV.

(44) Set the USB/LSB selector to USB.

(45) Set the Synthesiser FREQUENCY selectors to 4,201 MHz.

(46) Set the Front Panel. SQUELCH control to the mid position.
The receiver must mute in 2s to 4s.

(47) Increase the r.f. signal generator frequency rapidly by approximately 1kHz.
The receiver must recover immediately.

(48) Set the SQUELCH control to OFF.

Receiver AM.

106. (1) Set the Front Panel MODE switch to AM

(2) Set the RF ATTENUATOR to 0dB.

(3) Set the Synthesiser FREQUENCY selectors to 29,990MHz.

(4) Set the r.f. signal generator frequency to 29,999MHz and level to 10mV e.m.f.

(5) Connect the oscilloscope to the Reciter p.c.b. pin 11.
Set the controls to d.c. and 1V/div.

(6) Adjust T5, L2 and T4 in the given sequence for minimum voltage on the scope.

(7) Connect the multimeter to the junction of R157/C79.
Set to 100mV a.c. FSD.

(8) Set the r.f. signal generator controls to modulate the output signal (1kHz 30%).

(9) Adjust R99 for a 100mV multimeter reading.

(10) Set the r.f. signal generator output level to 10μV.

(11) Adjust R69 for a multimeter reading 2dB below 100mV.

(12) Connect the multimeter between Reciter p.c.b. pin 28 (LOUDSPEAKER) and 0V.
Note the multimeter reading.

(13) Increase the r.f. signal generator output level to 100mV.
Note the increase in multimeter reading.
This must not be greater than 3dB above the level noted in Step (12).

(14) Set the Synthesiser FREQUENCY and r.f signal generator output frequency for the following 1,6MHz, 4MHz, 8MHz, 16MHz and 29,990MHz.
Using the oscilloscope (connected to Reciter p.c.b. pin 28) check the AM signal-to-noise ratio at each setting.
This must be better than 12dB.

(15) Adjust the Front Panel AUDIO control to set the multimeter reading to a convenient reference level.

(16) Increase the frequency of modulation above 1kHz until the multimeter reading decreases to 6dB below the reference level.
Note the modulation frequency.
This must be greater than 2,5kHz.

(17) Decrease the frequency of modulation below 1kHz until the multimeter reading once again decreases to 6dB below the reference level.
Note the modulation frequency.
This must be less then 350Hz.

Transmitter SSB

107. (1) Set the Front Panel MODE switch to SSB.

(2) Connect the audio signal generator to SK26 pins A and C (0V).
Set the signal frequency to 1kHz.
Using the multimeter set the signal level to 30mV.

(3) Connect a 51Ω 0,25W resistor to PL13 (RF OUT).

(4) Connect the oscilloscope across the resistor

(5) Set the Synthesiser FREQUENCY selectors to 29,990MHz.

(6) Insert a link between SK26 (or SK27) pins B and C (to operate PTT).

(7) Check that R50 is set to the mid position.

(8) Adjust R135 for 300mV peak-to-peak oscilloscope display.

(9) Reduce the audio input signal level to 3mV.

(10) Adjust R50 for 250mV peak-to-peak oscilloscope display.

(11) Set the Synthesiser FREQUENCY selectors sequentially for the following frequencies.
16MHz, 8MHz, 4MHz and 1,6MHz.
Note the oscilloscope display at each frequency setting.
This should be 250mV or greater.
Adjust R135 if necessary.

(12) Set the USB/LSB selector to USB.

(13) Connect the spectrum analyser to PL13.
Set the spectrum analyser controls for a long persistance display and manual sweep operation.

(14) Increase audio input signal level to 30mV.

(15) Press the manual sweep control and set the r.f. signal on the spectrum analyser to a convenient reference level.

(16) Switch OFF the audio signal generator.
Press the manual sweep control.
Note the carrier signal response.
Check that the carrier suppression is better than −45dB relative to the reference.

(17) Set the USB/LSB selector to LSB.

(18) Repeat Steps (15) and (16).

(19) Set the Front Panel MODE switch to BK IN CW.

(20) Replace the 51Ω resistor and oscilloscope at PL13.

(21) Check key operation at SK26, SK27 and jack connector.
Note that the following occurs when the key is operated.

(a) A TX output of 300mV appears immediately at PL13.
(b) Side tone is heard in the loudspeaker.
(c) Receiver is muted,

and on release of the key, the following happens:

(i) TX output disappears immediately.
(ii) Side tone disappears immediately.
(iii) Receiver un-mutes after 1 to 2 seconds.

(22) Set the MODE switch to KEY and check the following.

(a) Receiver mutes.
(b) 1kHz side tone is generated when the key is depressed.
(c) 300mV RF OUT signal is generated when the key is depressed.

Transmitter AM

108. (1) Set the Front Panel MODE switch to AM.

(2) Set the Synthesiser FREQUENCY selectors to 29,990MHz.

(3) Connect a 51Ω, 0,25W resistor to PL13 and connect the oscilloscope across the resistor.

(4) Insert a link between SK26 (or SK27) pins B and C (to operate PTT).

(5) Adjust R90 for a carrier signal level of 150mV peak-to-peak.

(6) Connect the audio signal generator to SK26 (or SK27) pins A and C.
Set the output signal frequency to 1kHz.
Using the multimeter set the signal level to 30mV.

(7) Adjust R120 so that the trough of the modulated waveform is just not clipping.

Intercom.

109. (1) Connect an ECU to the Transceiver.

(2) Connect a telephone handset to the Transceiver (SK26 or SK27) and to the ECU .

(3) Set the Front Panel INTERCOM switch to LOCAL.

(4) Set the ECU control switch to OPERATE.

(5) Operate the Transceiver in the TX mode (audio and CW).
Check that transmissions may be monitored at the ECU.

(6) Operate the p.t.t. switch at the ECU.
Check that the Transceiver bleep tone and Front Panel CALL LED operate.
Check that the Transceiver is not switched to TX.

(7) Set the ECU control switch to STANDBY.

(8) Set the Front Panel INTERCOM switch to CALL .
Check that a call tone is heard at the ECU.

(9) Set the INTERCOM switch to INTERCOM.

(10) Set the ECU control switch to OPERATE.

(11) Check communications between the Transceiver and the ECU.
These must be clear and not distorted.

(12) Set the Front Panel SPEAKER switch to INTERCOM.
Check that ECU communications can be heard on the loudspeaker.

(13) Set the INTERCOM switch to EXTN.
Check that the ECU can transmit and receive through the Transceiver.
Check that the Transceiver cannot be switched to TX by local p.t.t. operations.

PARTS LIST

110. The component tolerances and ratings given in this parts list are optimum. However if such components are not immediately available alternatives with closer tolerances and/or higher wattage or voltage ratings may be used in manufacture or supplied as replacements.

111. When ordering replacements please quote the full description including the circuit reference and the Order No.

RECITER ASSEMBLY

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0969		**ASSEMBLY**	**RECITER**	
				Sub–Assemblies		
		1300-0960			Reciter PCB	
		1300-0877			Intercom Decoding Logic PCB	
		1300-0967			RF Attenuator PCB	
		1300-0722			Loudspeaker Switch PCB	
		1300-0879			Decoupling PCB	
				Capacitors		
	C1	2400-3201			Electrolytic 1000uF 25V	
	C2	2600-3266			Ceramic 10nF 10p.c. 100V	
				Diodes		
	D1	3600-1322			LED, Green	
	D2	3600-1321			LED, Yellow	
	D3	3600-1320			LED, Red	
				Miscellaneous		
	BT1	3500-0594			Bleep tone	
	LS1	3500-0585			Loudspeaker 6 Ohm 5cm x 5cm	
	M1	3500-0433			Meter 24V Type 131	
	T1	3000-0094			Transformer	
				Plugs		
	PL13	3300-0337			Coaxial, Skt, Bulkhead Mounting UG 1455U	
	PL15	3300-0337			Coaxial, Skt, Bulkhead Mounting UG 1455U	
	PL17	3300-0096			Painton, Free, Side Entry 6W	
	PL20	3300-1084			D–Series, DD50P 50W	

Reciter Assembly (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
				Resistors		
	R5	2200-0108			Variable 10k	
	R6	2200-0126			Variable 1k	
	R7	2200-0421			Variable, with switch 500 ohms.	
	R8	2000-5414			Metal film 120ohms 2p.c. 1W	
				Sockets		
	SK21	3300-0349			Coaxial, Skt, Free Straight Snap On. Alt. 3300-0349	
	SK22	3300-0349			Coaxial, Skt, Free Straight Snap On. Alt. 3300-0349	
	SK23	3300-1016			Jack Socket	
	SK24	3300-1016			Jack Socket	
	SK25	3300-0865			8-way	
		3300-0885			5-way	
	SK26	3300-0865			8-way	
		3300-0885			5-way	
	SK27	3300-0865			8-way	
		3300-0885			5-way	
	SK38	3300-1822			Terminal Housing Molex 22-01-2075	
		3300-1823			Crimp Terminal Molex 08–50–0136 (6 off).	
				Switches		
	S1	3200-0633			Rotary, 6-pole, 4-option OAK 10-a/01194AM	
	S4				Included with R7, STSP	
	S5	3200-0026			Toggle, DPOT	
	S6	3200-0985			Rotary, SP, 3-way (1 pos. biased) OAK 10-a/000-0086	
	S7	3200-0632			Rotary, 10–01/01162 AM	
	S8	3200-0984			Rotary, SP, 2-way	
	S9	3200-0608			Slide, DPOT	
				Toroids		
	X1	4200-0006			Ferrite Core FX 3011	
	X2	4200-0006			Ferrite Core FX 3011	
	X3	4200-0006			Ferrite Core FX 3011	

Reciter PCB

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0960		**PCB**	**RECITER**	
				Sub Assemblies		
		1300-0962			Balanced Modulator PCB	
		1300-0818			Low Pass Filter PCB	
				Capacitors		
	C1	2600-2534			Ceramic 10nF 10p.c. 100V	
	C2	2400-3601			Electrolytic 2200uF 25V	
	C3	2400-2412			Electrolytic 220uF 16V	
	C4	2600-3418			Ceramic 680nF 20p.c. 50V	
	C5	2500-4014			Tantalum 100uF 16V Non-Std.	
	C6	2600-3227			Ceramic 220nF 20p.c. 50V	
	C7	2500-6026			Tantalum 4,7uF 20p.c. 10V	
	C8	2500-4602			Tantalum 220uF 20p.c. 10V	
	C9	2600-2912			Ceramic 47nF 10p.c. 100V	
	C10	2600-2534			Ceramic 10nF 10p.c. 100V	
	C11	2500-6042			Tantalum 10uF 20p.c. 16V	
	C12	2500-6042			Ceramic 1nF 10p.c. 100V	
	C13	2500-6064			Tantalum 1uF 20p.c. 35V	
	C14	2500-6064			Tantalum 1uF 20p.c. 35V	
	C15	2500-6042			Tantalum 10uF 20p.c. 16V	
	C16	2600-2912			Ceramic 47nF 10p.c. 100V	
	C17	2600-2534			Ceramic 10nF 10p.c. 100V	
	C18	2600-3123			Ceramic 100nF 10p.c. 100V	
	C19	2600-2026			Ceramic 1nF 10p.c. 100V	
	C20	2600-2534			Ceramic 10nF 10p.c. 100V	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C21	2500-6042			Tantalum 10uF 20p.c. 16V	
	C22	2500-6064			Tantalum 1uF 20p.c. 35V	
	C23	2500-6057			Tantalum 33uF 20p.c. 25V	
	C24	2600-2912			Ceramic 47nF 10p.c. 100V	
	C25	2600-2534			Ceramic 10nF 10p.c. 100V	
	C26	2500-6042			Tantalum 10uF 20p.c. 16V	
	C27	2500-6026			Tantalum 4,7uF 20p.c. 16V	
	C28	2600-1244			Ceramic 120pF 5p.c. 200V	
	C29	2600-2644			Ceramic 22nF 20p.c. 50V	
	C30	2500-4014			Tantalum 100uF 16V Non-Std.	
	C31	2600-2026			Ceramic 1nF 10p.c. 100V	
	C32	2600-1244			Ceramic 120pF 5p.c. 200V	
	C33	2600-1107			Ceramic 68pF 5p.c. 200V	
	C34	2600-1107			Ceramic 68pF 5p.c. 200V	
	C35	2600-1218			Ceramic 100pF 5p.c. 200V	
	C36	2600-2247			Ceramic 2n2 5p.c. 100V	
	C37	2600-2534			Ceramic 10nF 10p.c. 100V	
	C38	2600-2912			Ceramic 47nF 10p.c. 100V	
	C39	2600-2534			Ceramic 10nF 10p.c. 100V	
	C40	2600-2534			Ceramic 10nF 10p.c. 100V	
	C41	2600-2534			Ceramic 10nF 10p.c. 100V	
	C42	2600-2912			Ceramic 47nF 10p.c. 100V	
	C43	2600-1146			Ceramic 82pF 5p.c. 200V	
	C44	2600-2912			Ceramic 47nF 10p.c. 100V	
	C45	2600-1563			Ceramic 330pF 5p.c. 200V	
	C46	2600-2026			Ceramic 1nF 10p.c. 100V	
	C47	2600-1364			Ceramic 180pF 5p.c. 200V	
	C48	2600-1563			Ceramic 330pF 5p.c. 200V	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C49	2600-2912			Ceramic 47nF 10p.c. 100V	
	C50	2600-1520			Ceramic 270pF 5p.c. 200V	
	C51	2600-2912			Ceramic 47nF 10p.c. 100V	
	C52	2600-2535			Ceramic 10nF 10p.c. 200V	
	C53	2600-2912			Ceramic 47nF 10p.c. 100V	
	C54	2600-2534			Ceramic 10nF 10p.c. 100V	
	C55	2500-4014			Tantalum 100uF 16V Non-Std.	
	C56	2600-2912			Ceramic 47nF 10p.c. 100V	
	C57	2600-2912			Ceramic 47nF 10p.c. 100V	
	C58	2600-2912			Ceramic 47nF 10p.c. 100V	
	C59	2600-2912			Ceramic 47nF 10p.c. 100V	
	C60	2600-1563			Ceramic 330pF 5p.c. 200V	
	C61	2500-4602			Tantalum 220uF 20p.c. 10V	
	C62	2600-1218			Ceramic 100pF 5p.c. 200V	
	C63	2600-2912			Ceramic 47nF 10p.c. 100V	
	C64	2600-2534			Ceramic 10nF 10p.c. 100V	
	C65	2600-2912			Ceramic 47nF 10p.c. 100V	
	C66	2500-6064			Tantalum 1uF 20p.c. 35V	
	C67	2600-2026			Ceramic 1nF 10p.c. 100V	
	C68	2600-2912			Ceramic 47nF 10p.c. 100V	
	C69	2600-2534			Ceramic 10nF 10p.c. 100V	
	C70	2600-2912			Ceramic 47nF 10p.c. 100V	
	C71	2600-2534			Ceramic 10nF 10p.c. 100V	
	C72	2600-2534			Ceramic 10nF 10p.c. 100V	
	C73	2600-1146			Ceramic 82pF 5p.c. 200V	
	C74	2500-6057			Tantalum 33uF 20p.c. 25V	
	C75	2600-2534			Ceramic 10nF 10p.c. 100V	
	C76	2600-1508			Ceramic 220pF 10p.c. 200V	
	C77	2500-6064			Tantalum 1uF 20p.c. 35V	
	C78	2600-1308			Ceramic 150pF 5p.c. 200V	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C79	2600-2912			Ceramic 47nF 10p.c. 100V	
	C80	2600-1107			Ceramic 68pF 5p.c. 200V	
	C81	2600-1107			Ceramic 68pF 5p.c. 200V	
	C82	2600-2534			Ceramic 10nF 10p.c. 100V	
	C83	2600-2912			Ceramic 47nF 10p.c. 100V	
	C84	2600-0204			Ceramic 6,8pF ± 0,5pF 200V	
	C85	2600-0906			Ceramic 33pF 5p.c. 200V	
	C86	2600-0906			Ceramic 33pF 5p.c. 200V	
	C87	2600-2912			Ceramic 47nF 10p.c. 100V	
	C88	2600-3227			Ceramic 220nF 20p.c. 50V	
	C89	2600-2534			Ceramic 10nF 10p.c. 100V	
	C90	2600-2912			Ceramic 47nF 10p.c. 100V	
	C91	2600-2534			Ceramic 10nF 10p.c. 100V	
	C92	2600-0906			Ceramic 33pF 5p.c. 200V	
	C93	2600-2534			Ceramic 10nF 10p.c. 100V	
	C94	2500-3601			Tantalum 47uF 20p.c. 20V	
	C95	2600-2534			Ceramic 10nF 10p.c. 100V	
	C96	2500-6042			Tantalum 10uF 20p.c. 16V	
	C97	2600-2912			Ceramic 47nF 10p.c. 100V	
	C98	2600-2534			Ceramic 10nF 10p.c. 100V	
	C99	2600-2534			Ceramic 10nF 10p.c. 100V	
	C100	2600-2534			Ceramic 10nF 10p.c. 100V	
	C101	2600-2912			Ceramic 47nF 10p.c. 100V	
	C102	2600-2534			Ceramic 10nF 10p.c. 100V	
	C103	2600-2912			Ceramic 47nF 10p.c. 100V	
	C104	2600-2534			Ceramic 10nF 10p.c. 100V	
	C105	2500-6064			Tantalum 1uF 20p.c. 35V	
	C106	2600-2534			Ceramic 10nF 10p.c. 100V	
	C107	2600-3407			Ceramic 470nF 20p.c. 50V	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C108	2600-2534			Ceramic 10nF 10p.c. 100V	
	C109	2500-6042			Tantalum 10uF 20p.c. 16V	
	C110	2600-3227			Ceramic 220nF 20p.c. 50V	
	C111	2600-2534			Ceramic 10nF 10p.c. 100V	
	C112	2500-3601			Tantalum 47uF 20p.c. 20V	
	C113	2600-2534			Ceramic 10nF 10p.c. 100V	
	C114	2500-6064			Tantalum 1uF 20p.c. 35V	
	C115	2600-2026			Ceramic 1nF 10p.c. 100V	
	C116	2600-2534			Ceramic 10nF 10p.c. 100V	
	C117	2600-2026			Ceramic 1nF 10p.c. 100V	
	C118	2600-2534			Ceramic 10nF 10p.c. 100V	
	C119	2600-2534			Ceramic 10nF 10p.c. 100V	
	C120	2600-2534			Ceramic 10nF 10p.c. 100V	
	C121	2600-2912			Ceramic 47nF 10p.c. 100V	
	C122	2600-3227			Ceramic 220nF 10p.c. 50V	
	C123	2600-2534			Ceramic 10nF 10p.c. 100V	
	C124	2500-6064			Tantalum 1uF 20p.c. 35V	
	C125	2600-0906			Ceramic 33pF 5p.c. 200V	
	C126	2600-2534			Ceramic 10nF 10p.c. 100V	
	C127	2600-2534			Ceramic 10nF 10p.c. 100V	
	C128	2500-3601			Tantalum 47uF 20p.c. 20V	
	C129	2600-2912			Ceramic 47nF 10p.c. 100V	
	C130	2600-2534			Ceramic 10nF 10p.c. 100V	
	C131	2600-0906			Ceramic 33pF 5p.c. 200V	
	C132	2600-2534			Ceramic 10nF 10p.c. 100V	
	C133	2600-2534			Ceramic 10nF 10p.c. 100V	
	C134	2600-2534			Ceramic 10nF 10p.c. 100V	
	C135	2700-3661			Polystyrene 1800pF 5p.c. 63V	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C136	2700-4001			Polystyrene 3300pF 1p.c. 63V	
	C137	2700-2302			Polystyrene 270pF 10p.c. 63V	
	C138	2700-3706			Polystyrene 2200pF 10p.c. 63V	
	C139	2700-3361			Polystyrene 820pF 5p.c. 63V	
	C140	2600-2534			Ceramic 10nF 10p.c. 100V	
	C141				Tantalum 10uF 20p.c. 16V	
	C142				Tantalum 4,7uF 20p.c. 16V	
				Diodes		
	D1	3600-0288			Zener 4V7 5p.c. 0,4W BZX79C4V7	
	D2	3600-0334			Zener 6V2 5p.c. 0,4W BZX79	
	D3	3600-0404			IN4153	
	D4	3600-0404			IN4153	
	D5	3600-0404			IN4153	
	D6	3600-0404			IN4153	
	D7	3600-0404			IN4153	
	D8	3600-0404			IN4153	
	D9	3600-0368			BA482	
	D10	3600-0404			IN4153	
	D11	3600-1243			HP5082-3080	
	D12	3600-1243			HP5082-3080	
	D13	3600-0404			IN4153	
	D14	3600-0404			IN4153	
	D15	3600-0404			IN4153	
	D16	3600-0404			IN4153	
	R17	3600-0404			IN4153	
	D18	3600-0404			IN4153	
	D19	3600-0404			IN4153	
	D20	3600-0404			IN4153	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	D21	3600-0404			IN4153	
	D22	3600-0404			IN4153	
	D23	3600-0404			IN4153	
	D24	3600-0404			IN4153	
	D25	3600-0404			IN4153	
	D26	3600-0404			IN4153	
	D27	3600-0404			IN4153	
	D28	3600-0404			IN4153	
	D29	3600-0404			IN4153	
	D30	3600-0404			IN4153	
	D31	3600-0404			IN4153	
	D32	3600-0404			IN4153	
	D33	3600-0404			IN4153	
	D34	3600-0404			IN4153	
	D35	3600-0404			IN4153	
	D36	3600-1243			HP5082-3080	
	D37	3600-0404			IN4153	
	D38	3600-0404			IN4153	
	D39	3600-0404			IN4153	
	D40	3600-0404			IN4153	
	D41	3600-0404			IN4153	
	D42	3600-0404			IN4153	
	D43	3600-0404			IN4153	
	D44	3600-0368			BA 482	
	D45	3600-0368			BA 482	
	D46	3600-0368			BA 482	
	D47	3600-0368			BA 482	
	D48	3600-0368			BA 482	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	D49	3600-0404			IN4153	
	D50	3600-0404			IN4153	
	D51	3600-0368			BA 482	
	D52	3600-0404			IN4153	
	D53	3600-0404			IN4153	
	D54	3600-0404			IN4153	
	D55	3600-0404			IN4153	
	D56	3600-0404			IN4153	
	D57	3600-0368			BA 482	
	D58	3600-0368			BA 482	
	D59	3600-0404			IN4153	
				Integrated Circuits		
	IC1	3600-0626			LM 324N Quad, Op-Amp, 14 DIL	
	IC2	3600-6107			LM 383 AT, Op-Amp, TO220	
	IC3	3600-6106			LM 3080 N, P-Amp, 8 DIL	
	IC4	3600-6041			LM 358 N, Op-Amp, 8 DIL	
	IC5	3600-0494			uA 757 C , 14 DIL	
	IC6	3600-6041			LM 358 N, Op-Amp, 8 DIL	
				Coils		
	L1	3100-1049			Inductor 1mH, Signal SC 30	
	L2	3100-0149			Coil Assy	
	L3	3100-1049			Inductor 1mH, Signal SC30	
	L4	3100-0708			Coil Assy , HPF	
	L5	3100-0711			Coil Assy	
	L6	3100-0709			Coil Assy., HPF	
	L7	3100-0712			Coil Assy , HPF	
	L8	3100-0743			Coil Assy	
	L9	3100-0744			Coil Assy	
	L10	3100-0710			Coil Assy , HPF	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
				Resistor		
	R1	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R2	2000-0337			Carbon 1k 5p.c. 0,25W	
	R3	2000-0405			Carbon 2,2 ohms 5p.c. 0,5W	
	R4	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R5	2000-0337			Carbon 1k 5p.c. 0,25W	
	R6	2000-0371			Carbon 680k 5p.c. 0,25W	
	R7	2000-0373			Carbon 1M 5p.c. 0,25W	
	R8	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R9	2000-0328			Carbon 180 ohms 5p.c. 0,25W	
	R10	2200-0189			Variable 5k	
	R11	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R12	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R13	2000-0337			Carbon 1k 5p.c. 0,25W	
	R14	2000-0371			Carbon 680k 5p.c. 0,25W	
	R15	2000-0365			Carbon 220k 5p.c. 0,25W	
	R16	2000-0365			Carbon 220k 5p.c. 0,25W	
	R17	2000-0355			Carbon 33k 5p.c. 0,25W	
	R18	2000-0373			Carbon 1M 5p.c. 0,25W	
	R19	2000-0373			Carbon 1M 5p.c. 0,25W	
	R20	2000-0355			Carbon 33k 5p.c. 0,25W	
	R21	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R22	2000-0361			Carbon 100k 5p.c. 0,25W	
	R23	2000-0349			Carbon 10k 5p.c. 0,25W	
	R24	2000-0337			Carbon 1k 5p.c. 0,25W	
	R25	2000-0353			Carbon 22k 5p.c. 0,25W	
	R26	2000-0337			Carbon 1k 5p.c. 0,25W	
	R27	2000-0358			Carbon 56k 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R28	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R29	2000-0364			Carbon 180k 5p.c. 0,25W	
	R30	2000-0334			Carbon 560 ohms 5p.c. 0,25W	
	R31	2000-0358			Carbon 56k 5p.c. 0,25W	
	R32	2000-0353			Carbon 22k 5p.c. 0,25W	
	R33	2000-0353			Carbon 22k 5p.c. 0,25W	
	R34	2000-0369			Carbon 470k 5p.c. 0,25W	
	R35	2000-0359			Carbon 68k 5p.c. 0,25W	
	R36	2000-0349			Carbon 10k 5p.c. 0,25W	
	R37	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R38	2000-5736			Metal film 39k 2p.c. 0,33W	
	R39	2000-0351			Carbon 15k 5p.c. 0,25W	
	R40	2000-0351			Carbon 15k 5p.c. 0,25W	
	R41	2000-0343			Carbon 3k3 5p.c. 0,25W	
	R42	2000-0357			Carbon 47k 5p.c. 0,25W	
	R43	2000-0373			Carbon 1M 5p.c. 0,25W	
	R44				Not Used	
	R45	2000-0349			Carbon 10k 5p.c. 0,25W	
	R46	2000-0330			Carbon 270 ohms 5p.c. 0,25W	
	R47	2000-0357			Carbon 47k 5p.c. 0,25W	
	R48	2000-0357			Carbon 47k 5p.c. 0,25W	
	R49	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R50	2200-0190			Variable 100 ohms	
	R51	2000-0348			Carbon 8k2 5p.c. 0,25W	
	R52	2000-0373			Carbon 1M 5p.c. 0,25W	
	R53	2000-0355			Carbon 33k 5p.c. 0,25W	
	R54	2000-0341			Carbon 2k2 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R55	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R56	2200-0173			Variable 500 ohms	
	R57	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R58	2000-0329			Carbon 220 ohms 5p.c. 0,25W	
	R59	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R60	2000-0321			Carbon 47 ohms 5p.c. 0,25W	
	R61	2000-0337			Carbon 1k 5p.c. 0,25W	
	R62	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R63	2000-0349			Carbon 10k 5p.c. 0,25W	
	R64	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R65	2000-0361			Carbon 100k 5p.c. 0,25W	
	R66	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R67	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R68	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R69	2200-0189			Variable 5k	
	R70	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R71	2000-0334			Carbon 560 ohms 5p.c. 0,25W	
	R72	2000-0349			Carbon 10k 5p.c. 0,25W	
	R73	2000-0349			Carbon 10k 5p.c. 0,25W	
	R74	2000-0349			Carbon 10k 5p.c. 0,25W	
	R75	2000-0339			Carbon 1k5 5p.c. 0,25W	
	R76	2000-0349			Carbon 10k 5p.c. 0,25W	
	R77	2000-0347			Carbon 6k8 5p.c. 0,25W	
	R78	2000-0337			Carbon 1k 5p.c. 0,25W	
	R79	2000-0317			Carbon 22 ohms 5p.c. 0,25W	
	R80	2000-0351			Carbon 15k 5p.c. 0,25W	
	R81	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R82	2000-0337			Carbon 1k 5p.c. 0,25W	
	R83	2000-0349			Carbon 10k 5p.c. 0,25W	
	R84	2000-0349			Carbon 10k 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R85	2000-0349			Carbon 10k 5p.c. 0,25W	
	R86	2000-0337			Carbon 1k 5p.c. 0,25W	
	R87	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R88	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R89	2000-0337			Carbon 1k 5p.c. 0,25W	
	R90	2200-0190			Variable 100 ohms	
	R91	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R92	2000-0349			Carbon 10k 5p.c. 0,25W	
	R93	2000-0349			Carbon 10k 5p.c. 0,25W	
	R94	2000-0349			Carbon 10k 5p.c. 0,25W	
	R95	2200-0189			Variable 5k	
	R96	2000-0337			Carbon 1k 5p.c. 0,25W	
	R97	2000-0337			Carbon 1k 5p.c. 0,25W	
	R98	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R99	2200-0176			Variable 10k	
	R100	2000-0351			Carbon 15k 5p.c. 0,25W	
	R101	2000-0369			Carbon 470k 5p.c. 0,25W	
	R102	2000-0337			Carbon 1k 5p.c. 0,25W	
	R103	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R104	2000-0337			Carbon 1k 5p.c. 0,25W	
	R105	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R106	2000-0349			Carbon 10k 5p.c. 0,25W	
	R107	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R108	2000-0357			Carbon 47k 5p.c. 0,25W	
	R109	2000-0349			Carbon 10k 5p.c. 0,25W	
	R110	2000-0321			Carbon 47 ohms 5p.c. 0,25W	
	R111	2000-0349			Carbon 10k 5p.c. 0,25W	
	R112	2000-0359			Carbon 68k 5p.c. 0,25W	
	R113	2000-0357			Carbon 47k 5p.c. 0,25W	
	R114	2000-0341			Carbon 2k2 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R115	2000-0346			Carbon 5k6 5p.c. 0,25W	
	R116	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R117	2000-0349			Carbon 10k 5p.c. 0,25W	
	R118	2000-0329			Carbon 220 ohms 5p.c. 0,25W	
	R119	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R120	2200-0174			Variable 1k	
	R121	2000-0344			Carbon 3k9 5p.c. 0,25W	
	R122	2000-0354			Carbon 27k 5p.c. 0,25W	
	R123	2000-0346			Carbon 5k6 5p.c. 0,25W	
	R124	2000-0349			Carbon 10k 5p.c. 0,25W	
	R125	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R126	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R127	2000-0339			Carbon 1k5 5p.c. 0,25W	
	R128	2000-0349			Carbon 10k 5p.c. 0,25W	
	R129	2000-0346			Carbon 5k6 5p.c. 0,25W	
	R130	2000-0365			Carbon 220k 5p.c. 0,25W	
	R131	2000-0337			Carbon 1k 5p.c. 0,25W	
	R132	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R133	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R134	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R135	2200-0189			Variable 5k	
	R136	2000-0349			Carbon 10k 5p.c. 0,25W	
	R137	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R138	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R139	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R140	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R141	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R142	2000-0349			Carbon 10k 5p.c. 0,25W	
	R143	2000-0357			Carbon 47k 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R144	2000-0351			Carbon 15k 5p.c. 0,25W	
	R145	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R146	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R147	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R148	2000-0367			Carbon 330k 5p.c. 0,25W	
	R149	2000-0337			Carbon 1k 5p.c. 0,25W	
	R150	2200-0189			Variable 5k	
	R151	2000-0337			Carbon 1k 5p.c. 0,25W	
	R152	2000-0340			Carbon 1k8 5p.c. 0,25W	
	R153	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R154	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R155	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R156	2000-0367			Carbon 330k 5p.c. 0,25W	
	R157	2000-0359			Carbon 68k 5p.c. 0,25W	
	R158	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R159	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R160	2000-0321			Carbon 47 ohms 5p.c. 0,25W	
	R161	2000-0337			Carbon 1k 5p.c. 0,25W	
	R162	2000-0339			Carbon 1k5 5p.c. 0,25W	
	R163	2000-0333			Carbon 470 ohms 5p.c. 0,25W	
	R164	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R165	2000-0349			Carbon 10k 5p.c. 0,25W	
	R166	2000-0322			Carbon 56 ohms 5p.c. 0,25W	
	R167	2000-0337			Carbon 1k 5p.c. 0,25W	
	R168	2000-0337			Carbon 1k 5p.c. 0,25W	
	R169	2000-0349			Carbon 10k 5p.c. 0,25W	
	R170	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R171	2000-0341			Carbon 2k2 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R172	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R173	2000-0329			Carbon 220 ohms 5p.c. 0,25W	
	R174	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R175	2000-0335			Metal film 620 ohms 2p.c. 0,25W	
	R176	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R177	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R178	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R179	2000-0351			Carbon 15k 5p.c. 0,25W	
	R180	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R181	2000-0321			Carbon 47 ohms 5p.c. 0,25W	
	R182	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R183	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R184	2000-0335			Carbon 680 ohms 5p.c. 0,25W	
	R185	2000-0349			Carbon 10k 5p.c. 0,25W	
	R186	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R187	2000-0344			Carbon 3k9 5p.c. 0,25W	
	R188	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R189	2000-0331			Carbon 330 ohms 5p.c. 0,25W	
	R190	2000-0313			Carbon 10 ohms 5p.c. 0,25W	
	R191	2000-0340			Carbon 1k8 5p.c. 0,25W	
	R192	2000-0348			Carbon 8k2 5p.c. 0,25W	
	R193	2000-0345			Carbon 4k7 5p.c. 0,25W	
	R194	2000-0337			Carbon 1k 5p.c. 0,25W	
	R195	2000-0321			Carbon 47 ohms 5p.c. 0,25W	
	R196	2000-0351			Carbon 15k 5p.c. 0,25W	
	R197	2000-0337			Carbon 1k 5p.c. 0,25W	
	R198	2000-0361			Carbon 100k 5p.c. 0,25W	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
				Transformers		
	T1	3100-0095			2t/12t	
	T2	3100-0111			14t/83t	
	T3	3100-0810			2t/2t, 6t	
	T4	3100-0150			48t/24t	
	T5	3100-0150			48t/24t	
	T6	3100-0114			83t/4t	
	T7	3100-0810			2t/2t, 6t	
	T8	3100-0817			6t/2t	
	T9	3100-0820			12t/2t	
	T10	3100-0098			4t/1t, 12t	
	T11	3100-0184			2t/3t, 12t	
	T12	3100-0816			12t/3t, 4t	
	T13	3100-0813			3t/8t	
	T14	3100-0812			3t/3t	
	T15	3100-0172			3t/12t	
	T16	3100-0811			2t/6t	
	T17	3100-0812			3t/3t	
	T18	3100-0818			5t/3t	
	T19	3100-0095			2t/12t	
	T20	3100-0819			1t/2t	
	T21	3100-0812			3t/3t	
				Transistors		
	TR1	3600-0874			MPSA65 or (62, 64, 66), PNP, Darlington	
	TR2	3600-0210			2N5190 (Motorola only), NPN	
	TR3	3600-0167			2N3704 , NPN	
	TR4	3600-0167			2N3704, NPN	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	TR5	3600-0185			2N3904 , Si, NPN	
	TR6	3600-0167			2N3704 , NPN	
	TR7	3600-0167			2N3704, NPN	
	TR8	3600-0185			2N3904, Si, NPN	
	TR9	3600-0167			2N3704, NPN	
	TR10	3600-0167			2N3704, NPN	
	TR11	3600-0037			BF 115 , NPN	
	TR12	3600-0187			2N3906 , Si, PNP	
	TR13	3600-0037			BF 115, NPN	
	TR14	3600-0187			2N3906, Si, PNP	
	TR15	3600-0037			BF 115, NPN	
	TR16	3600-0187			2N3906, Si, PNP	
	TR17	3600-0185			2N3904, Si, NPN	
	TR18	3600-0187			2N3906, Si, PNP	
	TR19	3600-0187			2N3906, Si, PNP	
	TR20	3600-0037			BF115, NPN	
	TR21	3600-0187			2N3906 , Si, PNP	
	TR22	3600-0037			BF115, NPN	
	TR23	3600-0040			BF224, NPN	
	TR24	3600-0037			BF115, NPN	
	TR25	3600-0185			2N3904, Si, NPN	
	TR26	3600-0185			2N3904, Si, NPN	
	TR27	3600-0185			2N3904, Si, NPN	
	TR28	3600-0185			2N3904, Si, NPN	
	TR29	3600-0037			BF115, NPN	
	TR30	3600-0037			BF115, NPN	

Reciter PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	TR31	3600-0185			2N3904	
	TR32	3600-0185			2N3904	
	TR33	3600-0024			BFX 17	
	TR34	3600-0041			BFX 17, NPN	
	TR35	3600-0037			BF 115, NPN	
	TR36	3600-0089			BFW 92, NPN	
	TR37	3600-0037			BF 115, NPN	
	TR38	3600-0185			BFX 17, NPN	

Balanced Modulator PCB

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0962		**PCB**	**BALANCED MODULATOR**	
				Capacitors		
	C1	2600-0903			Ceramic 33pF 5p.c. 500V	
	C2	2600-2502			Ceramic 10nF 10p.c. 50V	
	C3	2600-2502			Ceramic 10nF 10p.c. 50V	
	C4	2600-2502			Ceramic 10nF 10p.c. 50V	
	C5	2600-0903			Ceramic 33pF 5p.c. 500V	
	C6				Not Used	
	C7	2500-6042			Tantalum 10uF 20p.c. 16V	
	C8				Not Used	
	C9	2500-6034			Tantalum 100uF 20p.c. 10V	
	C10	2600-2001			Ceramic 1nF 20p.c. 500V	
	C11	2600-6084			Mylar 47nF 100V	
	C12	2600-2534			Ceramic 10nF 10p.c. 100V	
				Diode		
	D1	3600-0404			IN4153	
				Miscellaneous		
	X1	3600-0482			Balanced Modulator Summit NP 77	
				Resistors		
	R1	2000-0325			Carbon 100 ohm 5p.c. 0,25W	
	R2	2000-0329			Carbon 220 ohm 5p.c. 0,25W	
	R3	2000-0351			Carbon 15k 5p.c. 0,25W	
	R4	2000-0345			Carbon 4k7 5p.c. 0,25W	

Balanced Modulator PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R5	2000-0325			Carbon 100 ohm 5p.c. 0,25W	
	R6				Not Used	
	R7				Not Used	
	R8	2000-0337			Carbon 1k 5p.c. 0,25W	
	R9	2000-0321			Carbon 47 ohm 5p.c. 0,25W	
	R10	2000-0369			Carbon 470k 5p.c. 0,25W	
	R11	2000-0313			Carbon 10 ohm 5p.c. 0,25W	
	R12	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R13	2000-0337			Carbon 1k 5p.c. 0,25W	
	R14	2000-0421			Carbon 47 ohm 5p.c. 0,5W	
				Transformers		
	T1	3100-0173			12t, 2t	
	T2	3100-0174			1t/12t, 5t	
				Transistors		
	TR1	3600-0037			BF 115, NPN	
	TR2	3600-0167			2N3704, NPN	
	TR3	3600-0033			BC 109 B , NPN	

Low Pass Filter PCB

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0818		**PCB**	**LOW PASS FILTER**	
				Capacitors		
	C1	2600-1216			Ceramic 100pF 2p.c. 100V	
	C2	2600-0504			Ceramic 12pF 5p.c. 200V	
	C3	2600-1308			Ceramic 150pF 5p.c. 200V	
	C4	2600-0312			Ceramic 8,2pF ±1/2pF 200V	
	C5	2600-1146			Ceramic 82pF 5p.c. 200V	
	C6	2600-1216			Ceramic 100pF 2p.c. 100V	
	C7	2600-0607			Ceramic 15pF 5p.c. 200V	
	C8	2600-1216			Ceramic 100pF 2p.c. 100V	
	C9	2600-0414			Ceramic 10pF 5p.c. 200V	
	C10	2600-0312			Ceramic 8,2pF ±1/2pF 200V	
	C11	2600-1244			Ceramic 120pF 5p.c. 200V	
	C12	2600-1028			Ceramic 47pF 5p.c. 200V	
	C13	2600-1146			Ceramic 82pF 5p.c. 200V	
				Coils		
	L2	3100-0828				
	L4	3100-0825				
	L6	3100-0826				
	L8	3100-0827				

Intercom Decoding Logic PCB

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0877		**PCB**	**INTERCOM DECODING LOGIC**	
				Capacitors		
	C1	2500-4014			Tantalum 100uF 16V	
	C2	2500-3016			Tantalum 22uF 20p.c. 25V	
	C3	2600-2534			Ceramic 10nF 10p.c. 100V	
	C4	2600-2534			Ceramic 10nF 10p.c. 100V	
	C5	2600-3640			Ceramic 22nF 10p.c. 50V	
	C6	2600-3228			Ceramic 220nF 20p.c. 50V	
	C7	2600-3123			Ceramic 100nF 10p.c. 100V	
	C8	2600-3228			Ceramic 220nF 20p.c. 50V	
	C9	2600-3407			Ceramic 470nF 20p.c. 50V	
	C10	2600-3228			Ceramic 220nF 20p.c. 50V	
	C11	2600-3228			Ceramic 220nF 20p.c. 50V	
	C12	2600-3228			Ceramic 220nF 20p.c. 50V	
	C13	2500-4014			Tantalum 100uF 16V	
	C14	2600-3228			Ceramic 220nF 20p.c. 50V	
	C15	2500-6042			Tantalum 10uF 20p.c. 16V	
	C16	2600-1507			Ceramic 220pF 2p.c. 100V	
	C17	2500-6064			Tantalum 1uF 20p.c. 35V	
	C18	2600-2912			Ceramic 47nF 10p.c. 100V	
	C19	2600-3228			Ceramic 220nF 20p.c. 50V	
	C20	2400-2412			Electrolytic 220uF 16V	
	C21	2500-4014			Tantalum 100uF 16V	
	C22	2400-2412			Electrolytic 220uF 16V	
	C23	2600-3418			Ceramic 680nF 20p.c. 50V	
	C24	2600-3407			Ceramic 470nF 20p.c. 50V	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	C25	2600-3228			Ceramic 220nF 20p.c. 50V	
	C26	2600-3228			Ceramic 220nF 20p.c. 50V	
	C27	2600-3123			Ceramic 100nF 10p.c. 100V	
	C28	2600-3123			Ceramic 100nF 10p.c. 100V	
	C29	2600-3228			Ceramic 220nF 20p.c. 50V	
	C30	2600-3228			Ceramic 220nF 20p.c. 50V	
	C31	2600-2534			Ceramic 10nF 10p.c. 100V	
	C32				Not Used	
	C33	2500-6042			Tantalum 10uF 20p.c. 16V	
				Diodes		
	D1	3600-0404			IN4153	
	D2	3600-0404			IN4153	
	D3	3600-0404			IN4153	
	D4	3600-0404			IN4153	
	D5	3600-0404			IN4153	
	D6	3600-0404			IN4153	
	D7	3600-0404			IN4153	
	D8	3600-0404			IN4153	
	D9	3600-0404			IN4153	
	D10	3600-0404			IN4153	
	D11	3600-0404			IN4153	
	D12	3600-0404			IN4153	
	D13	3600-0404			IN4153	
	D14	3600-0404			IN4153	
	D15	3600-0404			IN4153	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
				Integrated Circuit		
	IC1	3600-0757			4082, Dual, 4I/P, AND	
	IC2	3600-6100			40097, Tri–Buffer, Non–Inv.	
	IC3	3600-6100			40097, Tri–Buffer, Non–Inv.	
	IC4	3600-0779			4028, BCD–To–Decimal Decoder	
	IC5	3600-6111			4052, Analog Multiplexer / Demultiplexer	
	IC6	3600-6145			4011, Quad, 2I/P NAND	
	IC7	3600-6145			4011, Quad 2I/P NAND	
	IC8	3600-0779			4028, BCD–To–Decimal Decoder	
	IC9	3600-0701			LM741, Op–Amp	
	IC10	3600-6085			4049, Hex, Inv. Buffer	
	IC11	3600-6145			4011, Quad, 2I/P NAND	
	IC12	3600-0757			4082, Dual, 4I/P, AND	
	IC13	3600-0550			4002, Dual, 4I/P, NOR	
	IC14	3600-6085			4149, Hex, Inv. Buffer	
	IC15	3600-6085			4049, Hex, Inv. Buffer	
	IC16	3600-6145			4011, Quad, 2I/P, NAND	
	IC17	3600-6106			LM3080, Transconductance Amp.	
	IC18	3600-0549			4001, Quad, 2I/P NOR	
	IC19	3600-6099			4016, Bilateral Switch	
	IC20	3600-6107			LM383 AT, Audio Amp.	
	IC21	3600-6099			4016, Bilateral Switch	
				Relay		
	RL1	3400-0174			12V, 1TT SM–12V D1012	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
				Resistors		
	R1	2300-0986			Network, 10k x 7, 8 Sil. 4308R-101-103	
	R2	2000-0323			Carbon 68 ohm 5p.c. 0,25W	
	R3	2000-0332			Carbon 390 ohm 5p.c. 0,25W	
	R4	2000-0323			Carbon 68 ohm 5p.c. 0,25W	
	R5	2000-0333			Carbon 470 ohm 5p.c. 0,25W	
	R6	2000-0349			Carbon 10k 5p.c. 0,25W	
	R7	2000-0349			Carbon 10k 5p.c. 0,25W	
	R8	2000-0349			Carbon 10k 5p.c. 0,25W	
	R9	2000-0349			Carbon 10k 5p.c. 0,25W	
	R10	2000-0349			Carbon 10k 5p.c. 0,25W	
	R11	2000-0349			Carbon 10k 5p.c. 0,25W	
	R12	2000-0349			Carbon 10k 5p.c. 0,25W	
	R13	2200-0165			Variable 10k	
	R14	2000-0349			Carbon 10k 5p.c. 0,25W	
	R15	2000-0357			Carbon 47k 5p.c. 0,25W	
	R16	2000-0347			Carbon 6k8 5p.c. 0,25W	
	R17	2600-0343			Carbon 3k3 5p.c. 0,25W	
	R18	2000-0354			Carbon 27k 5p.c. 0,25W	
	R19	2000-0354			Carbon 27k 5p.c. 0,25W	
	R20	2000-0334			Carbon 560 ohm 5p.c. 0,25W	
	R21	2000-0361			Carbon 100k 5p.c. 0,25W	
	R22	2000-0353			Carbon 22k 5p.c. 0,25W	
	R23	2000-0329			Carbon 220 ohm 5p.c. 0,25W	
	R24	2000-0352			Carbon 18k 5p.c. 0,25W	
	R25	2000-0353			Carbon 22k 5p.c. 0,25W	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R26	2000-0337			Carbon 1k 5p.c. 0,25W	
	R27	2000-0356			Carbon 39k 5p.c. 0,25W	
	R28	2000-0337			Carbon 1k 5p.c. 0,25W	
	R29	2000-0349			Carbon 10k 5p.c. 0,25W	
	R30	2000-0337			Carbon 1k 5p.c. 0,25W	
	R31	2000-0325			Carbon 100 ohm 5p.c. 0,25W	
	R32	2000-0361			Carbon 100k 5p.c. 0,25W	
	R33	2000-0349			Carbon 10k 5p.c. 0,25W	
	R34	2000-0349			Carbon 10k 5p.c. 0,25W	
	R35				Not Used	
	R36	2000-0361			Carbon 100k 5p.c. 0,25W	
	R37	2000-0332			Carbon 390 ohm 5p.c. 0,25W	
	R38				Not Used	
	R39	2000-0343			Carbon 3k3 5p.c. 0,25W	
	R40	2000-0313			Carbon 10 ohm 5p.c. 0,25W	
	R41	2000-0329			Carbon 220 ohm 5p.c. 0,25W	
	R42	2000-0335			Carbon 680 ohm 5p.c. 0,25W	
	R43	2000-0349			Carbon 10k 5p.c. 0,25W	
	R44	2000-0349			Carbon 10k 5p.c. 0,25W	
	R45	2000-0349			Carbon 10k 5p.c. 0,25W	
	R46	2000-0349			Carbon 10k 5p.c. 0,25W	
	R47	2000-0362			Carbon 120k 5p.c. 0,25W	
	R48	2200-0166			Variable 50k	
	R49	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R50	2200-0165			Variable 10k	
	R51	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R52	2200-0165			Variable 10k	
	R53	2200-0164			Variable 5k	
	R54	2200-0163			Variable 1k	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R55	2000-0340			Carbon 1k8 5p.c. 0,25W	
	R56	2000-0361			Carbon 100k 5p.c. 0,25W	
	R57	2000-0361			Carbon 100k 5p.c. 0,25W	
	R58	2000-0425			Carbon 100 ohm 5p.c. 0,25W	
	R59	2000-0349			Carbon 10k 5p.c. 0,25W	
	R60	2000-0337			Carbon 1k 5p.c. 0,25W	
	R61	2000-0349			Carbon 10k 5p.c. 0,25W	
	R62	2000-0349			Carbon 10k 5p.c. 0,25W	
	R63	2200-0165			Variable 10k	
	R64	2000-0349			Carbon 10k 5p.c. 0,25W	
	R65	2000-0373			Carbon 1M 5p.c. 0,25W	
	R66	2000-0361			Carbon 100k 5p.c. 0,25W	
	R67	2000-0347			Carbon 6k8 5p.c. 0,25W	
	R68	2000-0337			Carbon 1k 5p.c. 0,25W	
	R69	2000-0349			Carbon 10k 5p.c. 0,25W	
	R70	2000-0359			Carbon 68k 5p.c. 0,25W	
	R71	2000-0162			Variable 200 ohm	
	R72	2000-0349			Carbon 10k 5p.c. 0,25W	
	R73	2000-0357			Carbon 47k 5p.c. 0,25W	
	R74	2000-0353			Carbon 22k 5p.c. 0,25W	
	R75	2000-0345			Carbon 4k7 5p.c. 0,25W	
				Transformers		
	T1	3000-0022			270t / 270t, 270t	
	T2	3000-0022			270t / 270t, 270t	
				Transistors		
	TR1	3600-0187			2N3906, Si, PNP	

Intercom Decoding Logic PCB (Cont.)

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	TR2	3600-0187			2N3906, Si, PNP	
	TR3	3600-0024			BC107B, NPN	
	TR4	3600-0185			2N3904, Si, NPN	
	TR5	3600-0185			2N3904, Si, NPN	
	TR6	3600-0185			2N3904, Si, NPN	
	TR7	3600-0185			2N3904, Si, NPN	
	TR8	3600-0187			2N3906, Si, PNP	
	TR9	3600-0187			2N3906, Si, PNP	
	TR10	3600-0185			2N3904, Si, NPN	

RF Attenuator PCB

FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0967		**PCB**	**RF ATTENUATOR**	
				Capacitors		
	C1	2600-2913			Ceramic 47nF 20p.c. 100V	
	C2	2600-2913			Ceramic 47nF 20p.c. 100V	
	C3	2600-2913			Ceramic 47nF 20p.c. 100V	
	C4	2600-2913			Ceramic 47nF 20p.c. 100V	
	C5	2600-2913			Ceramic 47nF 20p.c. 100V	
	C6	2600-2913			Ceramic 47nF 20p.c. 100V	
	C7	2600-2913			Ceramic 47nF 20p.c. 100V	
	C8	2600-2913			Ceramic 47nF 20p.c. 100V	
	C9	2600-2913			Ceramic 47nF 20p.c. 100V	
	C10	2600-2913			Ceramic 47nF 20p.c. 100V	
				Diodes		
	D1	3600-0398			IN4004	
	D2	3600-0398			IN4004	
	D3	3600-0398			IN4004	
	D4	3600-0398			IN4004	
	D5	3600-1219			IN5767/HP5082-3080	
	D6	3600-0404			IN4153	
				Resistors		
	R1	2000-0337			Carbon 1k 5p.c. 0,25W	
	R2	2000-0337			Carbon 1k 5p.c. 0,25W	
	R3	2000-0324			Carbon 82 ohm 5p.c. 0,25W	
	R4	2000-0322			Carbon 56 ohm 5p.c. 0,25W	

RF Attenuator PCB (Cont.)

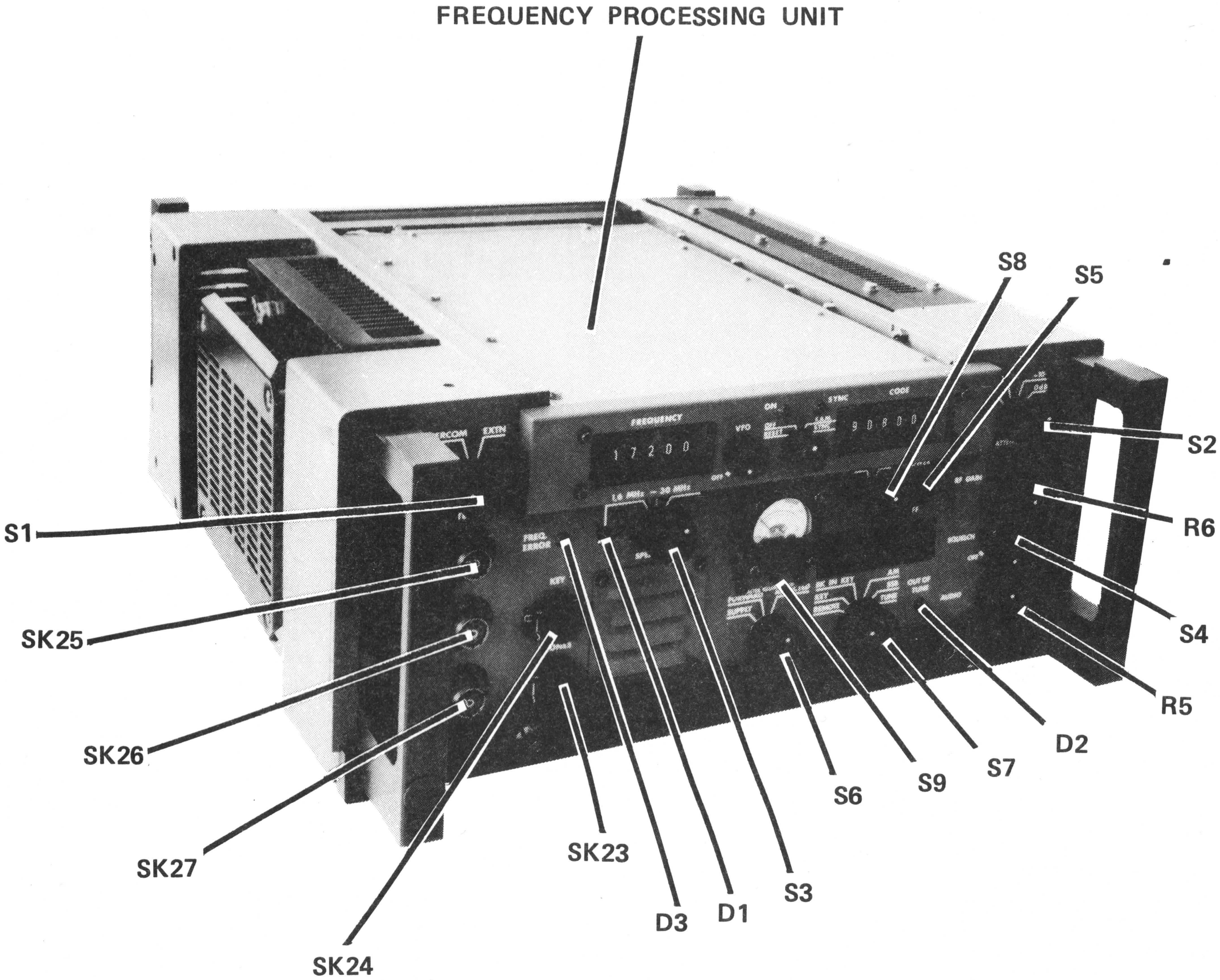
FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
	R5	2000-0325			Carbon 100 ohm 5p.c. 0,25W	
	R6	2000-0330			Carbon 270 ohm 5p.c. 0,25W	
	R7	2000-0324			Carbon 82 ohm 5p.c. 0,25W	
	R8	2000-0322			Carbon 56 ohm 5p.c. 0,25W	
	R9	2000-0337			Carbon 1k 5p.c. 0,25W	
	R10	2000-0349			Carbon 10k 5p.c. 0,25W	
	R11	2000-0341			Carbon 2k2 5p.c. 0,25W	
	R12	2000-0325			Carbon 100 ohm 5p.c. 0,25W	
	R13	2000-0322			Carbon 56 ohm 5p.c. 0,25W	
				Switch		
	S2	3200-0990			Rotary 2P, 4 -way, OAK 100/ 000-0101	
				Transformers		
	T1	3100-0182			3t, 3t	
	T2	3100-0185			3t, 2t	
	T3	3100-0184			8t, 2t	
				Transistor		
	TR1	3600-0183			2N3866, NPN	

Loudspeaker Switch PCB

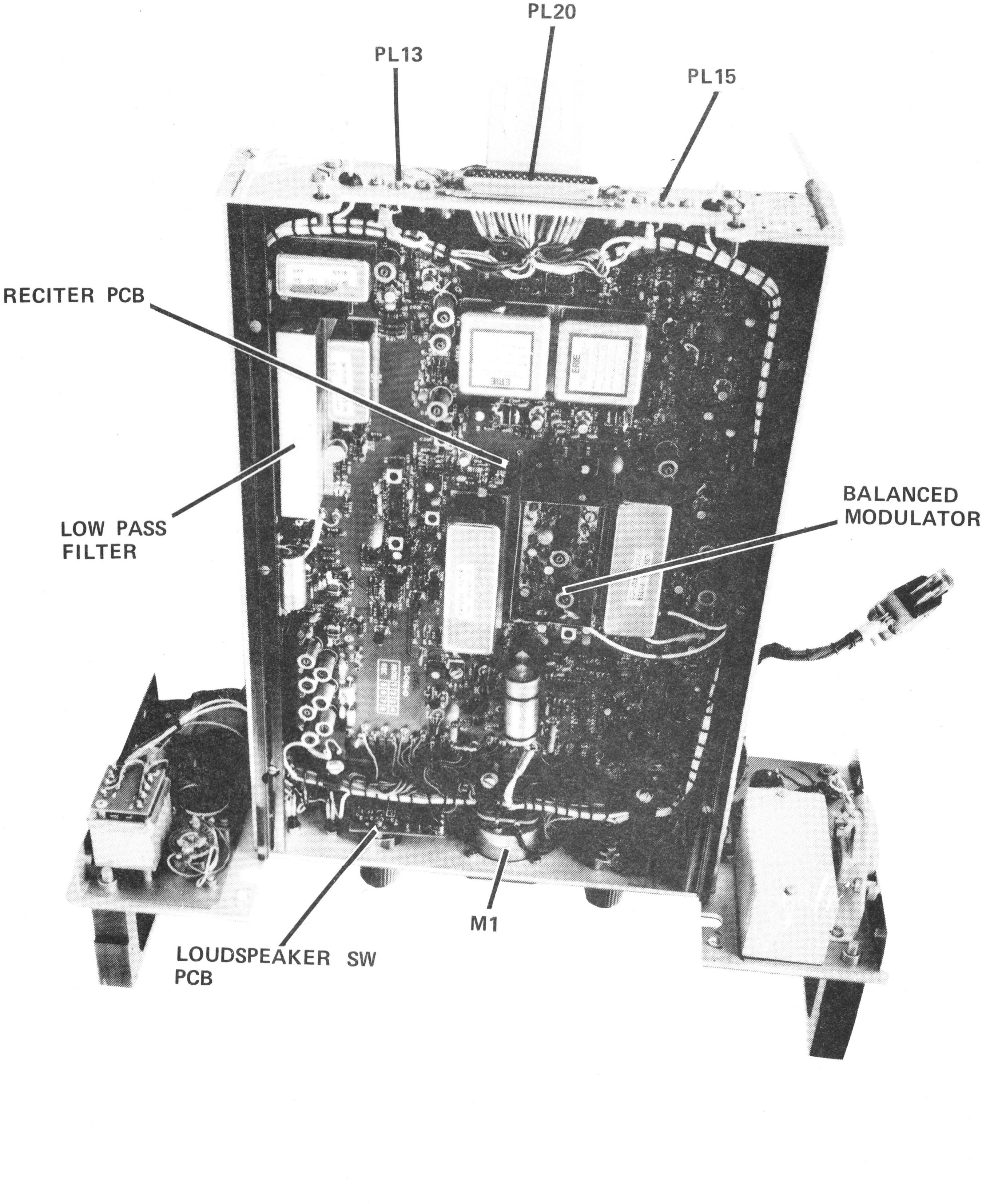
FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0722		**PCB**	**LOUDSPEAKER SWITCH**	
				Resistors		
	R1	2000-0358			Carbon 56k 5p.c. 0,25W	
	R2	2000-0517			Carbon 22 ohm 5p.c. 1W	
	R3	2000-0517			Carbon 22 ohm 5p.c. 1W	
	R4	2000-1929			Metal film 6k8 2p.c. 0,25W	
				Switch		
	S3	3200-0983			Rotary, 2P, 3 -way, OAK 1001/000-0085	

Decoupling PCB

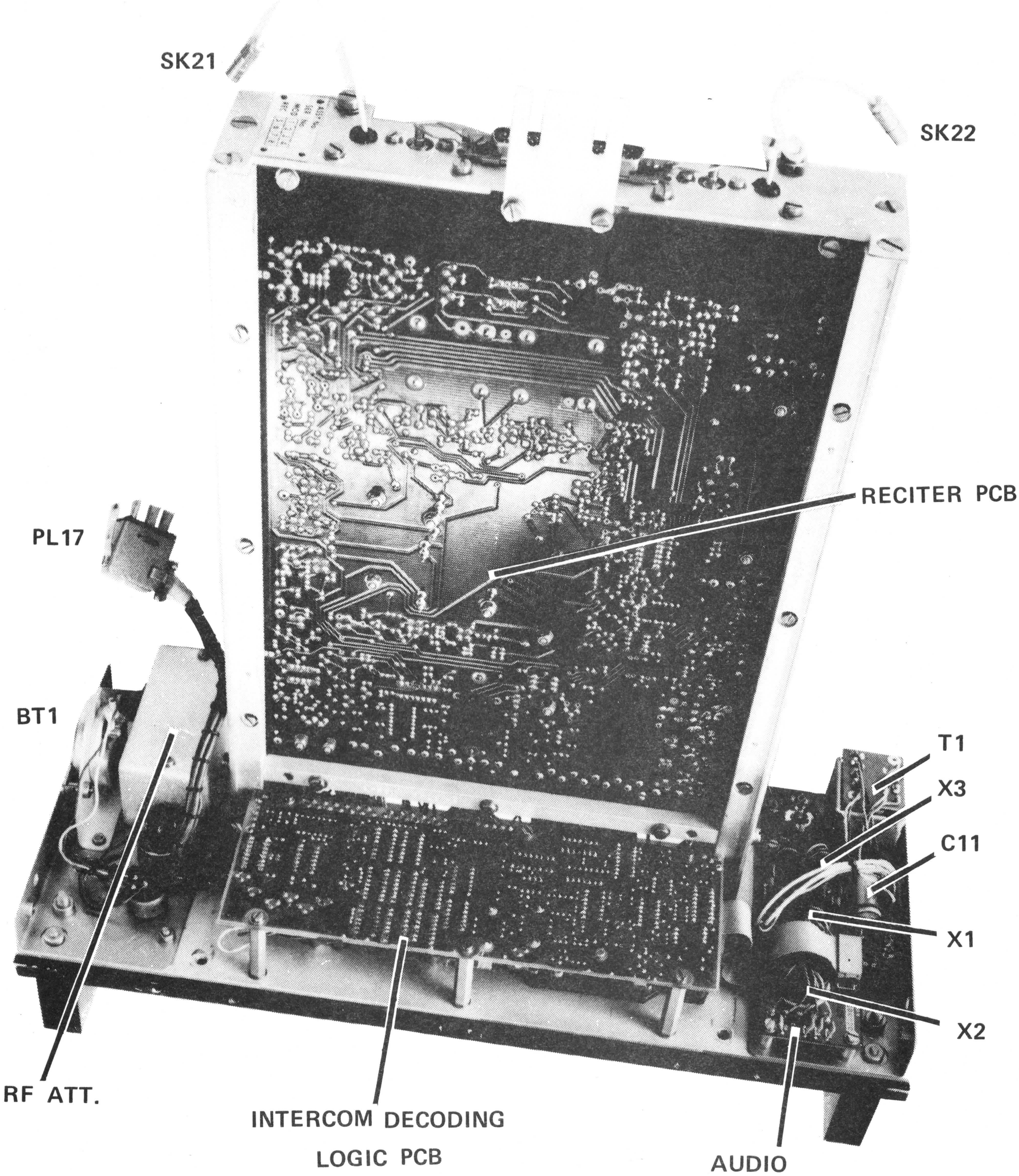
FIG. NO.	REF.	ORDER NO.	CODIFICATION	ITEM	DESCRIPTION	NO/UNIT
		1300-0879		**PCB**	**Decoupling**	
				Capacitors		
	C1	2600-2535			Ceramic 10nF 10p.c. 200V	
	C2	2600-2535			Ceramic 10nF 10p.c. 200V	
	C3	2600-2535			Ceramic 10nF 10p.c. 200V	
	C4	2600-2535			Ceramic 10nF 10p.c. 200V	
	C5	2600-2535			Ceramic 10nF 10p.c. 200V	
	C6	2600-2535			Ceramic 10nF 10p.c. 200V	
	C7	2600-2535			Ceramic 10nF 10p.c. 200V	
	C8	2600-2535			Ceramic 10nF 10p.c. 200V	
	C9	2600-2535			Ceramic 10nF 10p.c. 200V	
	C10	2600-2535			Ceramic 10nF 10p.c. 200V	
	C11	2400-3201			Electrolytic 1000uF 25V	
	C12	2600-2535			Ceramic 10nF 10p.c. 200V	
	C13	2600-2535			Ceramic 10nF 10p.c. 200V	
	C14	2600-2535			Ceramic 10nF 10p.c. 200V	
				Plug		
	PL38	3300-1821			6-way, Molex, 22-29-2071	
				Socket		
	SK30	3900-0433			16-way, DIL	
				Resistors		
	R1	2000-0335			Carbon 680 ohms 5p.c. 0,25W	
	R2	2000-0325			Carbon 100 ohms 5p.c. 0,25W	
	R3	2000-0337			Carbon 1k 5p.c. 0,25W	
	R4	2100-0126			Wirewound 120 ohms 5p.c. 6W	



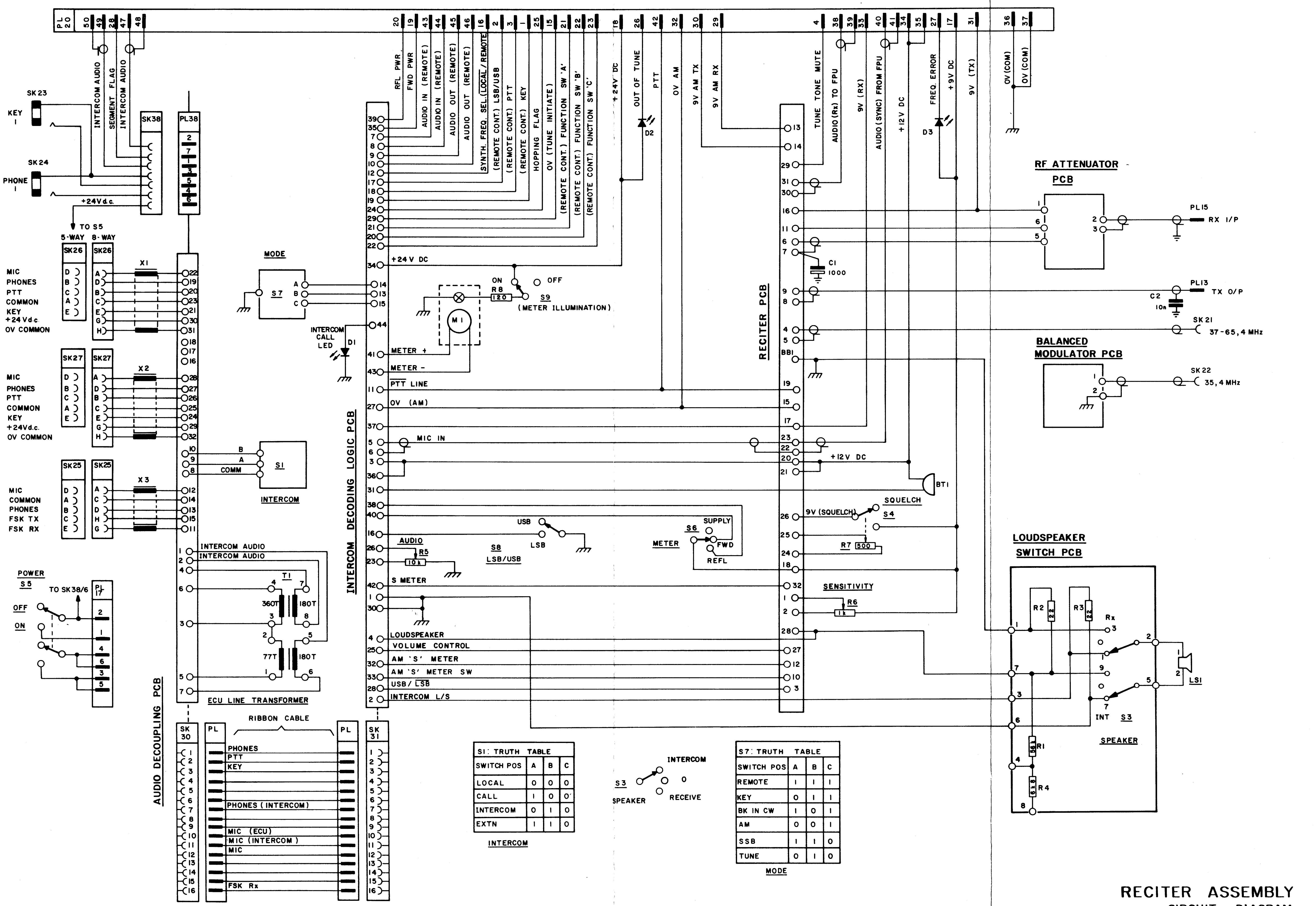
RECITER/CONTROL PANEL ASSEMBLY



RECITER UPPER VIEW
COMPONENT LOCATION



RECITER LOWER VIEW
COMPONENT LOCATION



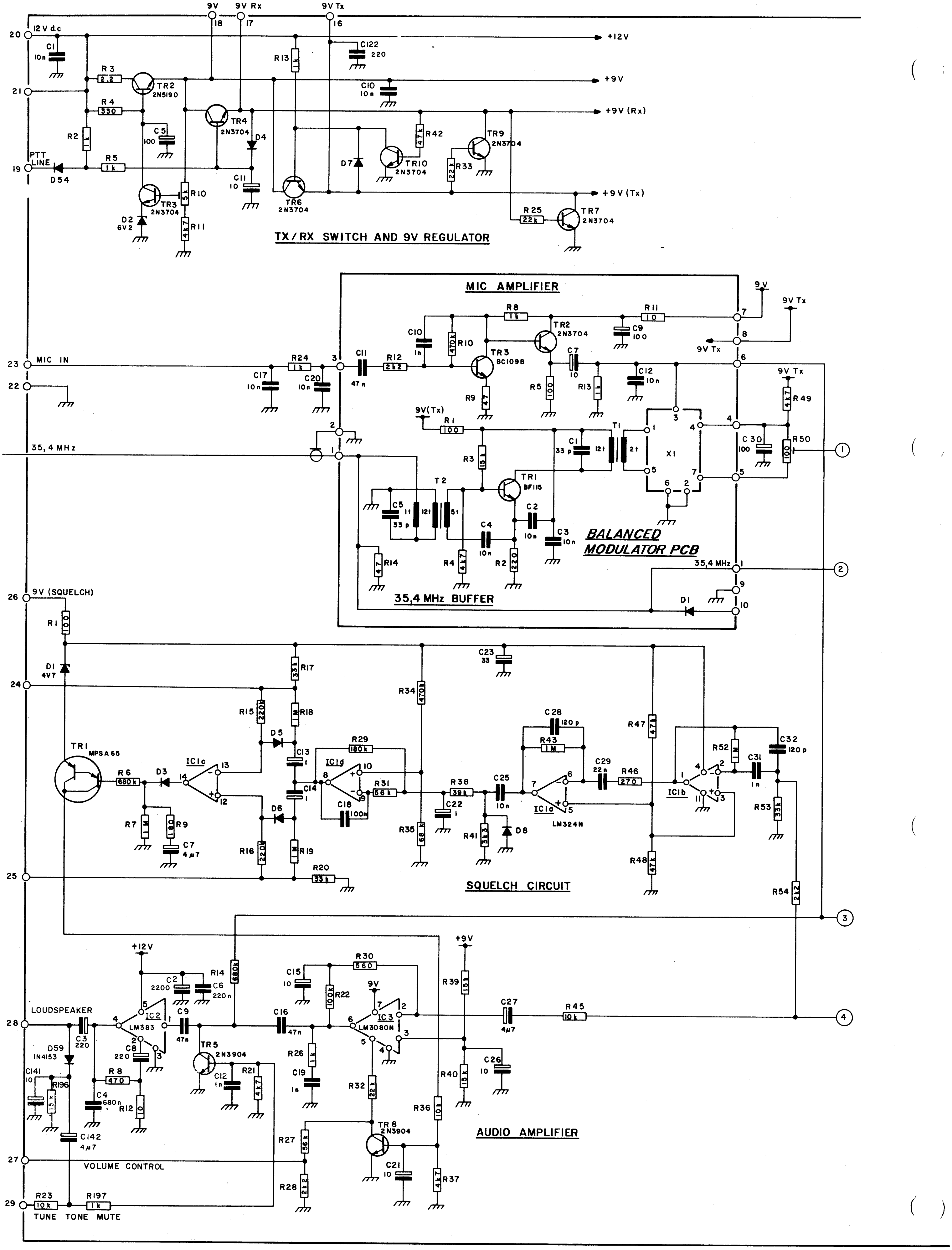
S1: TRUTH TABLE			
SWITCH POS	A	B	C
LOCAL	0	0	0
CALL	1	0	0
INTERCOM	0	1	0
EXTN	1	1	0

INTERCOM

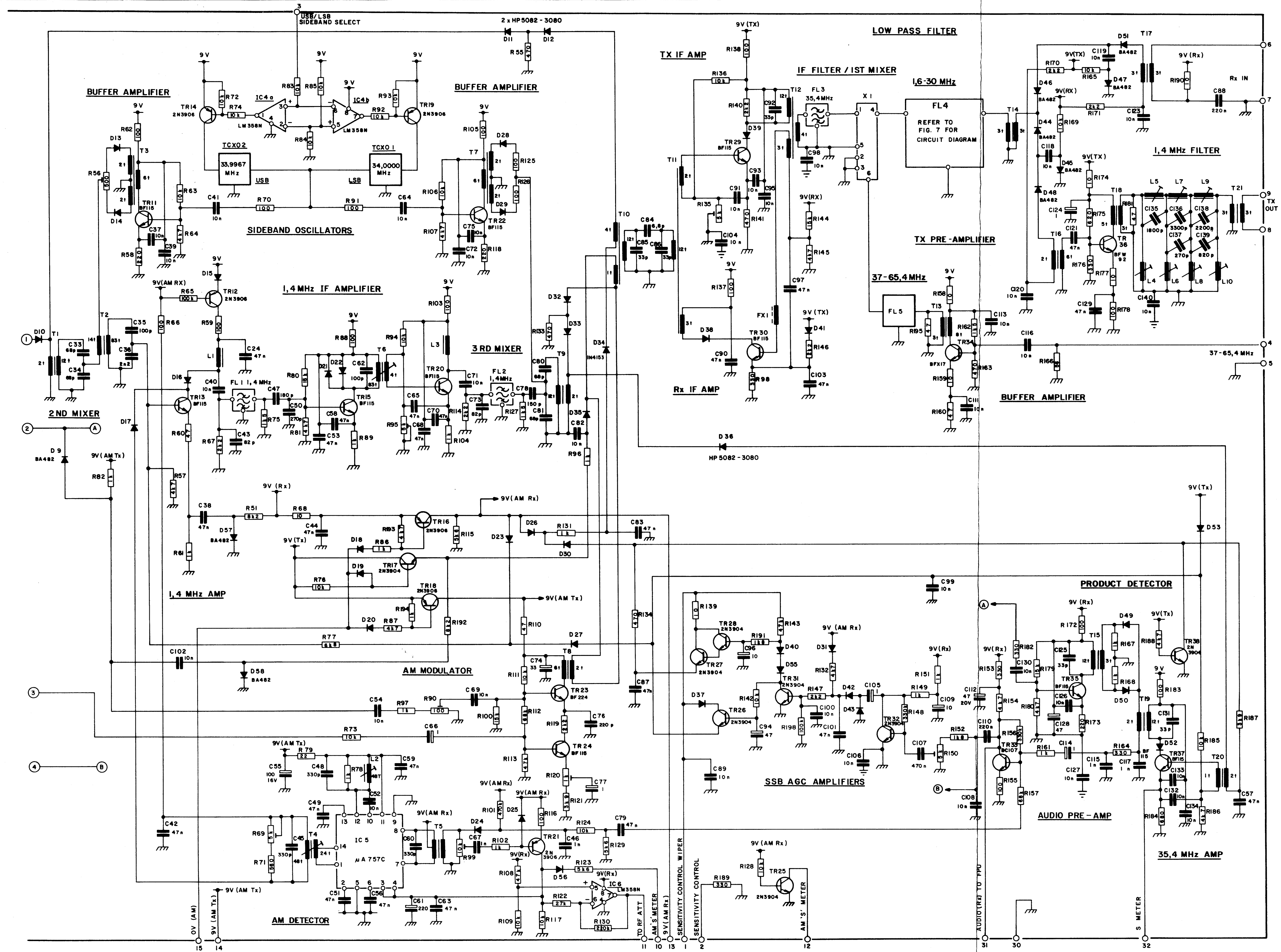
S7: TRUTH TABLE			
SWITCH POS	A	B	C
REMOTE	1	1	1
KEY	0	1	1
BK IN CW	1	0	1
AM	0	0	1
SSB	1	1	0
TUNE	0	1	0

MODE

RECITER ASSEMBLY
CIRCUIT DIAGRAM

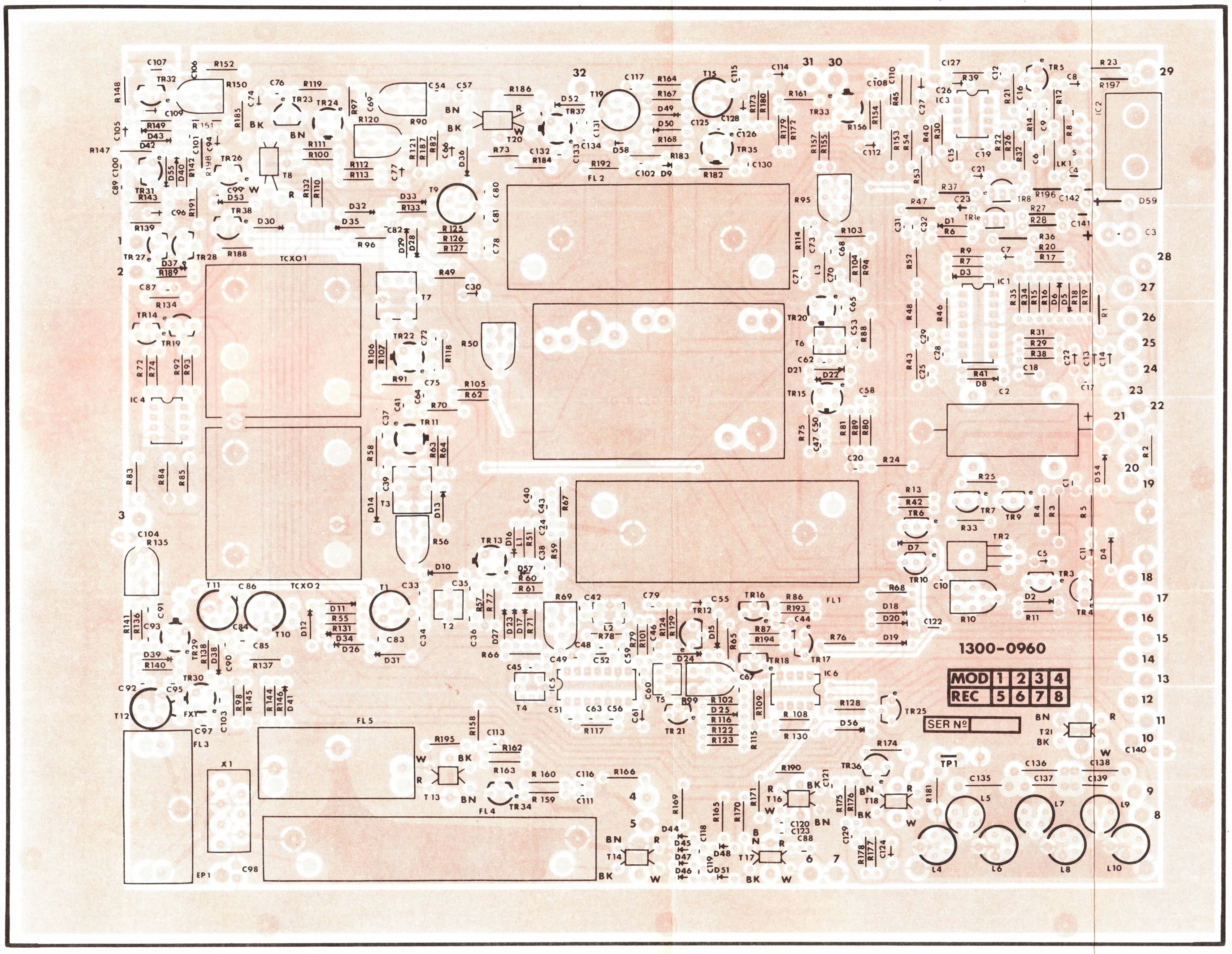


RECITER PCB
CIRCUIT DIAGRAM



RECITER PCB
CIRCUIT DIAGRAM
FIG. 4 SHT. 2

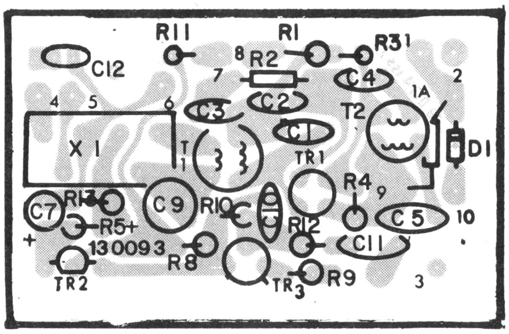
GE003.1085



PCB Component Side:

PCB Track Side:

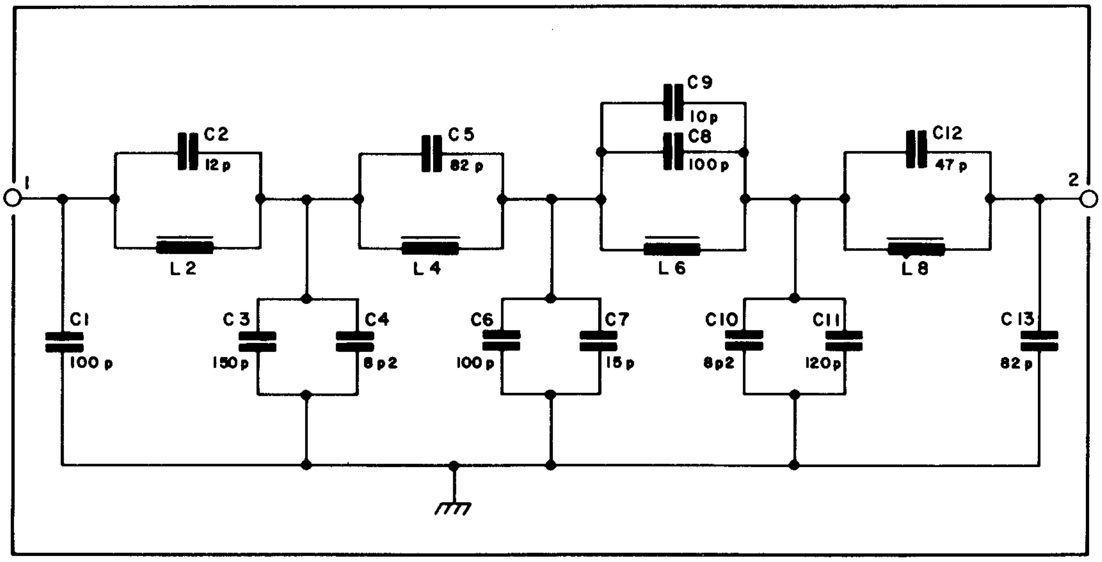
RECITER PCB
COMPONENT LOCATION

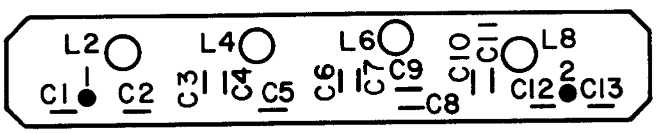


PCB Track Side:

BALANCED MODULATOR PCB

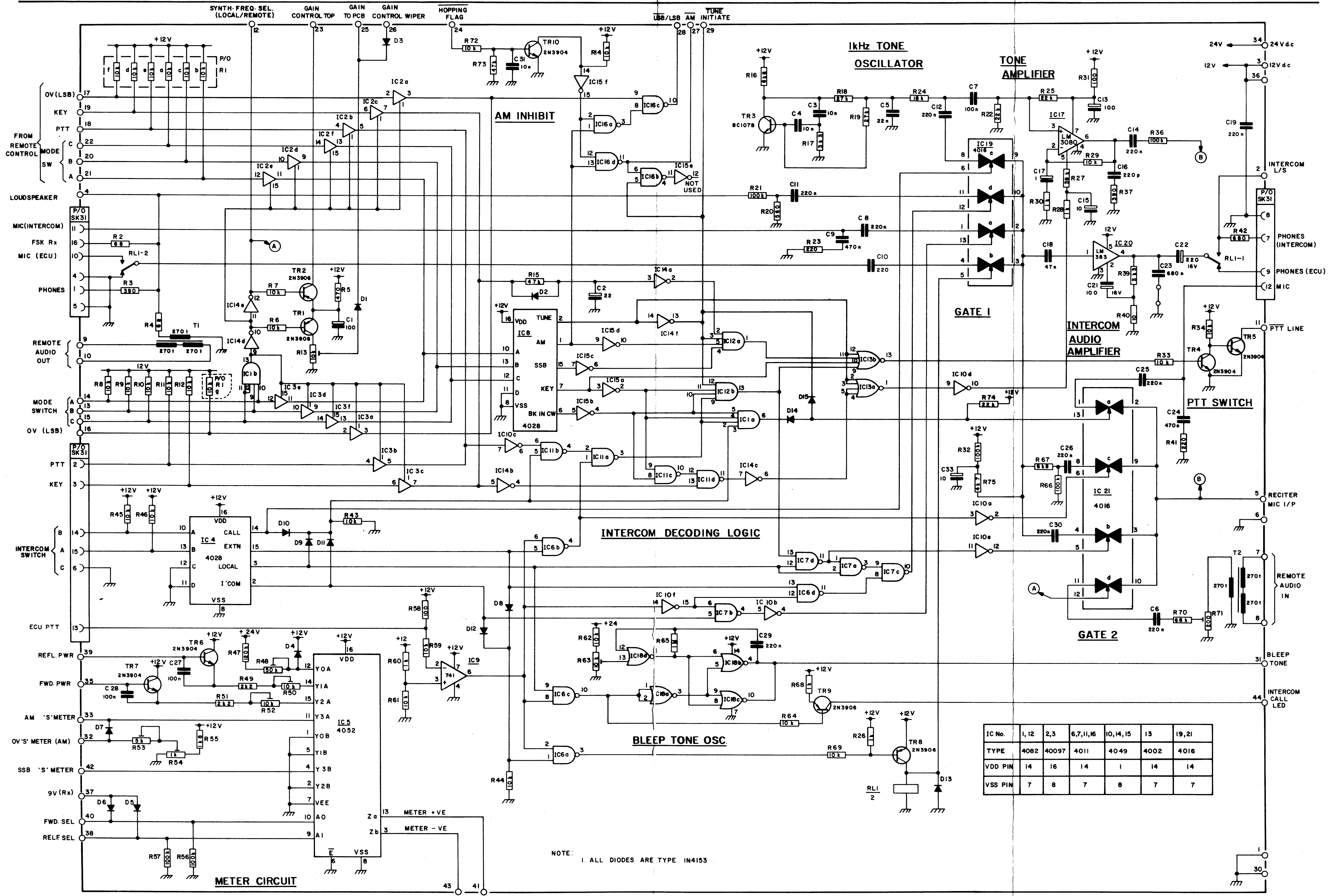
Component Layout



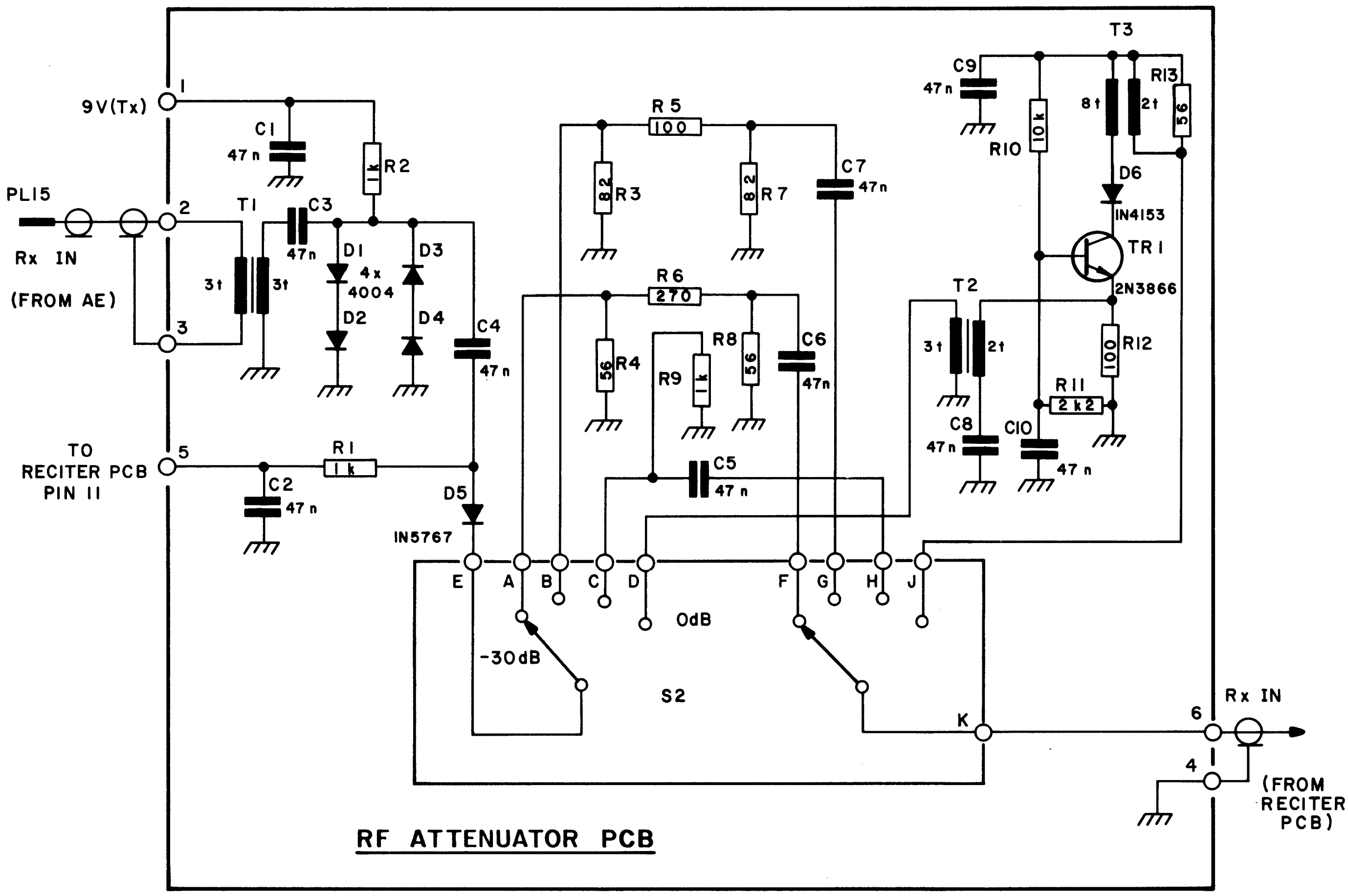


LOW PASS FILTER PCB

Circuit Diagram and Component Location



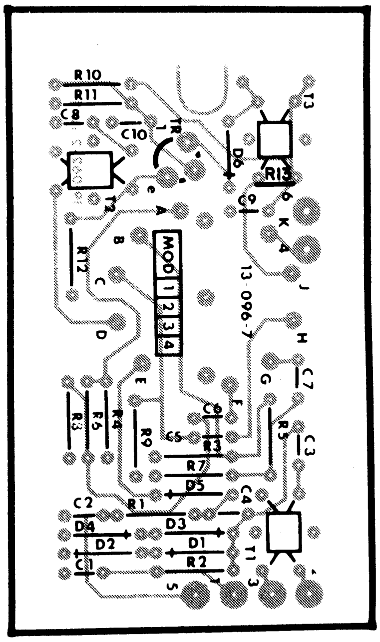
INTERCOM DECODING LOGIC PCB
CIRCUIT DIAGRAM



RF ATTENUATOR
CIRCUIT DIAGRAM

GE003.1085

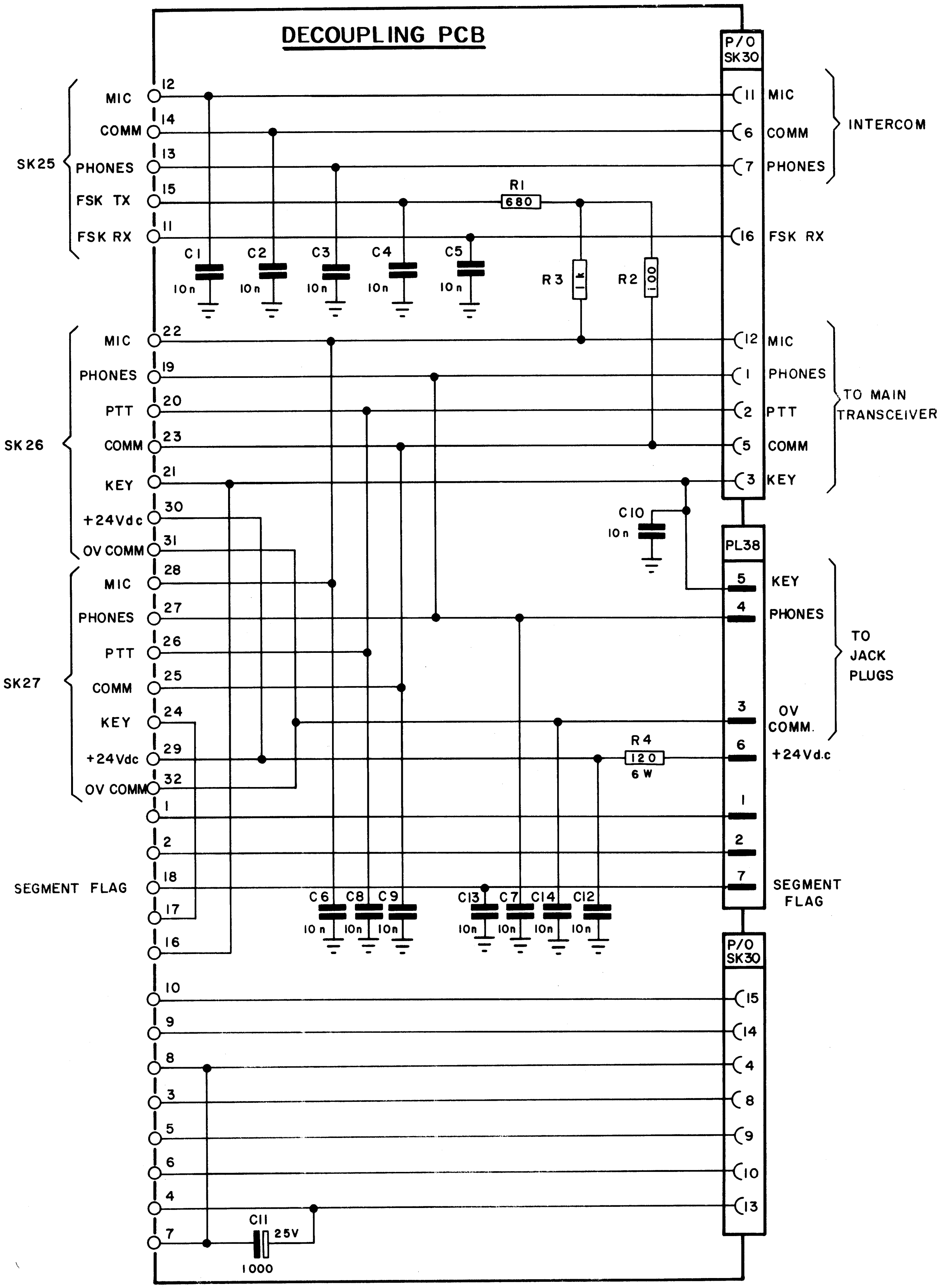
FIG. 10



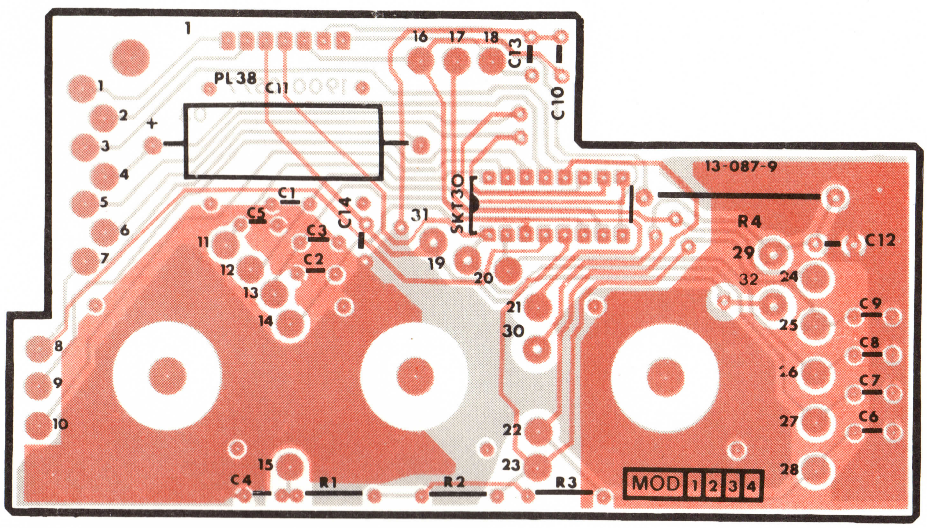
PCB Track Side:

RF ATTENUATOR PCB

Component Layout



DECOUPLING PCB
CIRCUIT DIAGRAM

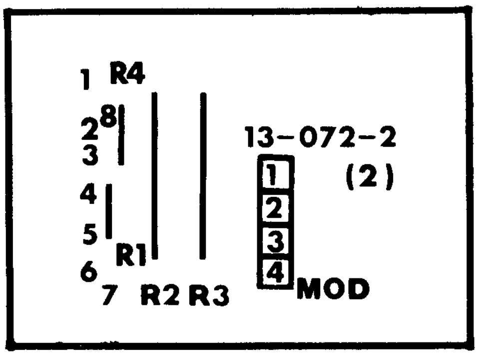


PCB Component Side:

PCB Track Side:

DECOUPLING PCB

COMPONENT LOCATION



LOUDSPEAKER SWITCH PCB
COMPONENT LOCATION