This service manual is for the maintenance of Pye Telecommunications equipment. The performance figures quoted are typical and are subject to normal manufacturing and service tolerances.

The right is reserved to alter the equipment described in this manual in the light of future technical development.

PYE

SINGLE SIDEBAND

H.F. RADIOTELEPHONE

TYPE SSB130 M & F

ISSUE 4 : OCTOBER 1974

PYE TELECOMMUNICATIONS LIMITED. CAMBRIDGE. ENGLAND.

Printed in England (c) 1970 TP453

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SSB 130M MOBILE STATION TRANSCEIVER

SSB 130F FIXED STATION TRANSCEIVER

SL587/801
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AMENDMENT No. 4
TO
SINGLE SIDEBAND HF RADIOTELEPHONE
TYPE SSB 130 M & F
Service Manual
Issue 4
(TP 453)

September 1976

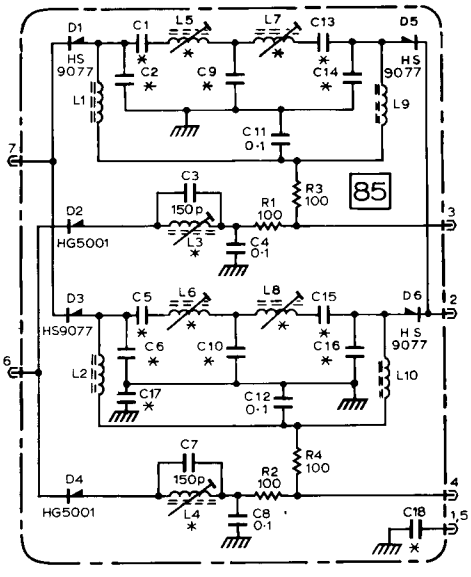
SECTION 3 – TECHNICAL DESCRIPTION

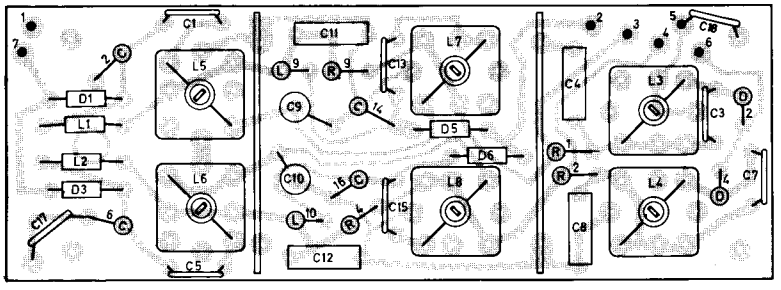
3.6 RF AMPLIFIER

Circuit diagram – amend TR2 type number to BF244B

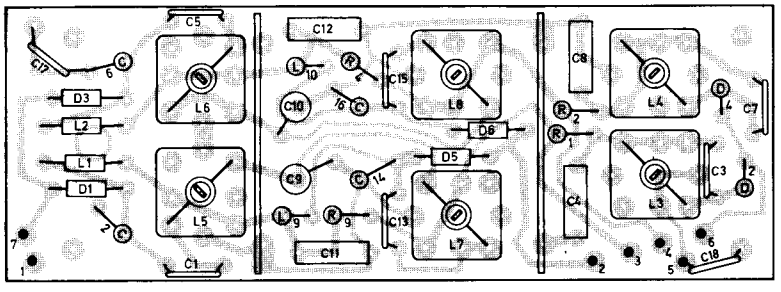
3.11 COMMON TUNED CIRCUITS

Circuit and layout diagrams – replace with those given below





TOP VIEW

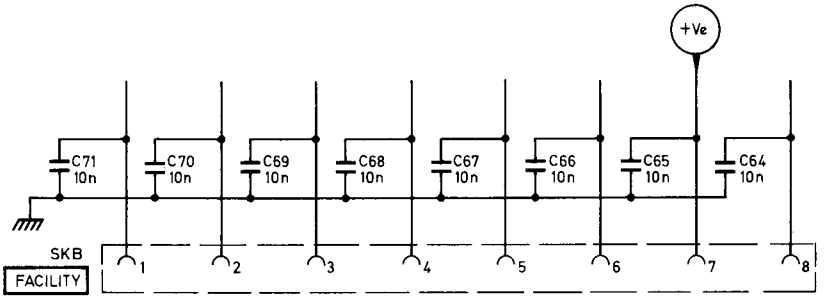


BOTTOM VIEW

SECTION 4 – ALIGNMENT AND SERVICING

SSB 130 TRANSCEIVER CIRCUIT DIAGRAM

Add capacitors to FACILITY socket SKB as shown below



SECTION 5 – ADDITIONAL FACILITIES

5.3 ANTENNA TUNING UNITS

Add, after Mobile Station installation information,

NOTE: A cable assembly for effecting interconnections between the antenna tuning unit and the transceiver is available under Part No. 9638498

SECTION 6 – PARTS LISTS

ANCILLARY ITEMS

Add Transceiver/ATU interconnection cable 9638498

CHASSIS MOUNTED COMPONENTS INCLUDING POWER AMPLIFIER

Add, under CAPACITORS,

C64–71	10nF	PN99612

RF AMPLIFIER AT27106

Amend TR2 detail to read : BF244B FV05827

COMMON TUNED CIRCUITS AT27112 series

Amend C11 detail to read :	C11	/01,/02,/03	100nF	PQ99501
		/04,/06	100nF	PQ32000
Amend C12 detail to read :	C12	/01,/02,/03	100nF	PQ99501
		/04,/06	100nF	PQ32000
Add :	C17	/04,/06	100nF	PQ32000
	C18	/04,/06	100nF	PQ32000

RECEIVER AF UNIT AT27116

Amend Part Nos. of the following R16 values to those given:

127	PL42644	154	PL42648
133	PL42645	162	PL42650
140	PL42646	169	PL42651
147	PL42647		

SECTION 1

INTRODUCTION AND SUMMARY OF DATA

1.1 INTRODUCTION

The Pye single sideband radiotelephone Type SSB 130 provides for single frequency simplex operation in the h.f. band from 2 - 15 MHz at a power of 100W p.e.p.

With the exception of the transmitter power amplifier, which employs two r.f. tetrode valves, solid state devices are used throughout the equipment.

The transceiver may be used for r.t. or c.w. communication; microphone, key and headphone sockets are mounted on the front panel. The equipment can be switched to operate with amplitude modulated radiotelephones and incorporates an adjustable electronic squelch circuit which mutes the receiver in the absence of a received signal. The thermostatically controlled crystal oven allows operation over a wide range of ambient temperatures.

Both transmitter and receiver are incorporated in one compact unit, making the equipment suitable for mounting either on a desk top for fixed station use or in a vehicle for mobile service. Both a.c. and d.c. power supply units are available.

The SSB 130 F fixed station installation can be operated fron either an externally mounted a.c. power supply unit, or, if a suitable a.c. supply is not available, from a d.c. power supply unit fitted in a recess at the rear of the transceiver. A meter is mounted on the front panel to facilitate monitoring and maintenance, a chassis at the rear of the meter panel carrying printed circuit boards providing a Phone Patching facility when required.

The SSB 130M mobile transceiver may be operated from either 12V or 24V d.c. supplies, positive or negative ground, the appropriate d.c. power supply unit fitting into a recess at the rear of the transceiver. If required, the mobile transceiver may be mounted in the body of the vehicle and controlled from an extension control unit carrying OFF/ON/STANDBY and VOLUME controls. An additional loudspeaker is available for mounting under the vehicle dashboard.

1.2 SUMMARY OF DATA

General

Operation	Simplex in the following modes : A3J Single sideband with suppressed carrier A3H Compatible A.M. (carrier + one sideband) A2J Keyed tone
Frequency bands	2 - 4MHz (Low); 4 - 8MHz (Mid); 8 - 15MHz (High)
Number of channels	2, 4 or 6 Channels are provided in pairs and combinations of 2 low, 2 mid, 2 high, low/mid and mid/high bands are available
Sidebands	Upper or lower
Operating temperature range	-20^{o}C to $+50^{o}$C ambient
Frequency stability	Better than 70Hz -20^{o}C to $+50^{o}$C
Power requirements	12V or 24V d.c. (nominal) or 100-150, 190-240V a.c. 50-60Hz

Power consumption

	Receive	Standby	Transmit
A.C.	100W	100W	260W(peak)
12V d.c.	0,5A (av)	2A	18A (peak)
24V d.c.	0,4A (av)	1,2A	10A (peak)

Crystal requirements

(a) Balanced modulator

One crystal to Pye Spec. P34, 1400,00kHz

(b) Channel oscillator

One crystal to Pye Spec. P.51A for each channel in use, with a maximum of six.
Crystal frequencies (1400,00 + chann. freq.) kHz

When re-ordering crystals, please quote equipment serial number and crystal frequency (in kHz to two decimal places).

Sideband filters

(a) Upper sideband working

LOWER sideband filter used since frequency conversion stages invert sideband.

50db filter, Pye Part No. FC03237
60db filter, Pye Part No. FC03242

(b) Lower sideband working

UPPER sideband filter used since frequency conversion stages invert sidebands.

50db filter, Pye Part No. FC03238
60db filter, Pye Part No. FC03243

Dimensions, fixed station	411mm wide x 389mm deep x 149mm high (16,2 x 15,3 x 5,8 inches)
Dimensions, mobile station	318mm wide x 389mm deep x 149mm high (12,5 x 15,3 x 5,8 inches)
Dimensions, A.C. P.S.U.	155mm wide x 263mm deep x 130mm high (6,1 x 10,3 x 5,1 inches)
Weight, fixed station	11kg (24,2 lb)
Weight, mobile station	10kg (22 lb) including 12/24V p.s.u.
Weight, A.C. P.S.U.	6,8kg (15 lb)
Weight, D.C. P.S.U.	1,8kg (4 lb)

Transmitter.

Power Output	100W (p.e.p.) into 50Ω The equipment is designed for intermittent operation and the transmit/receive ratio should be approx. 1:4. Maximum continuous transmit time 5 minutes.
Load impedance	30 - 80 Ω resistive
Spurious outputs	Not less than 50db below max. p.e.p. at antenna socket.
Suppressed sideband	-50db with reference to radiated sideband
Carrier suppression	-50db

Receiver

Sensitivity	2 - 8MHz : 1μV (p.d.) signal input for 1W output 8 - 15MHz : 1-2μV (p.d.) signal input for 500mW output
Signal/noise ratio	2 - 8MHz : 15db at 1μV (p.d.) signal input 8 - 15MHz : 15db at 1-2μV (p.d.) signal input
Selectivity (Standard)	2,5kHz at -3db; 7,5kHz at -50db
Selectivity (Optional)	2,5kHz at -3db; 5kHz at -60db
Spurious response attenuation	At least -60db
Audio output	2,5W maximum in 3 Ω
A.F. distortion	Less than 5% (800Hz at 500mW output)
Automatic gain control	The output does not change by more than +1db when the input is increased from 5μV to 10mV

SECTION 2

INSTALLATION AND OPERATION

2.1 PRELIMINARIES

Carefully unpack all items, inspecting for any external damage caused in transit. Remove the transceiver top and bottom covers, check that there is no internal transit damage and that the Power Amplifier coil taps are secure. Since the equipment is normally supplied pre-set to the required operating frequencies, the setting of these taps must not be disturbed. Refit transceiver top and bottom covers.

Ensure that the power supply unit, supplied complete with suitable connecting cables, is fully compatible with the appropriate a.c. or battery supply.

2.2 FIXED STATION INSTALLATION

The SSB 130F transceiver may be located in any conveinient position. Switching of the a.c. power supply unit is controlled from the receiver over a 6ft (1,8m) cable to enable the power supply unit to be mounted close to the a.c. supply outlet. Where a d.c. supply is used, the corresponding power supply unit is mounted in a recess at the rear of the transceiver.

It is essential to ensure that both the transceiver and the a.c. power supply unit are adequately ventilated and that their cooling louvres are never obstructed.

Connect the a.c. power supply unit (if used) to PLA on the transceiver; connect the appropriate supply to the power supply unit input socket SKA. Connect the antenna(s) to the transceiver antenna socket(s). Where an antenna tuning unit is used in conjunction with a single antenna, the centre contacts of the transceiver antenna sockets should be connected together; the antenna tuning unit may then be connected to whichever antenna socket is most convenient. The Pye Antenna Tuning Unit ATU 1 is described in Section 5 of this Service Manual.

The factors affecting selection of a suitable fixed station antenna are extremely complex and are outside the scope of this manual. Information on h.f. antennas will be found in the following publications :-

Pye Engineering Notes - High Frequency Antenna Systems - TSP 116

R.S.G.B. Radio Communications Handbook

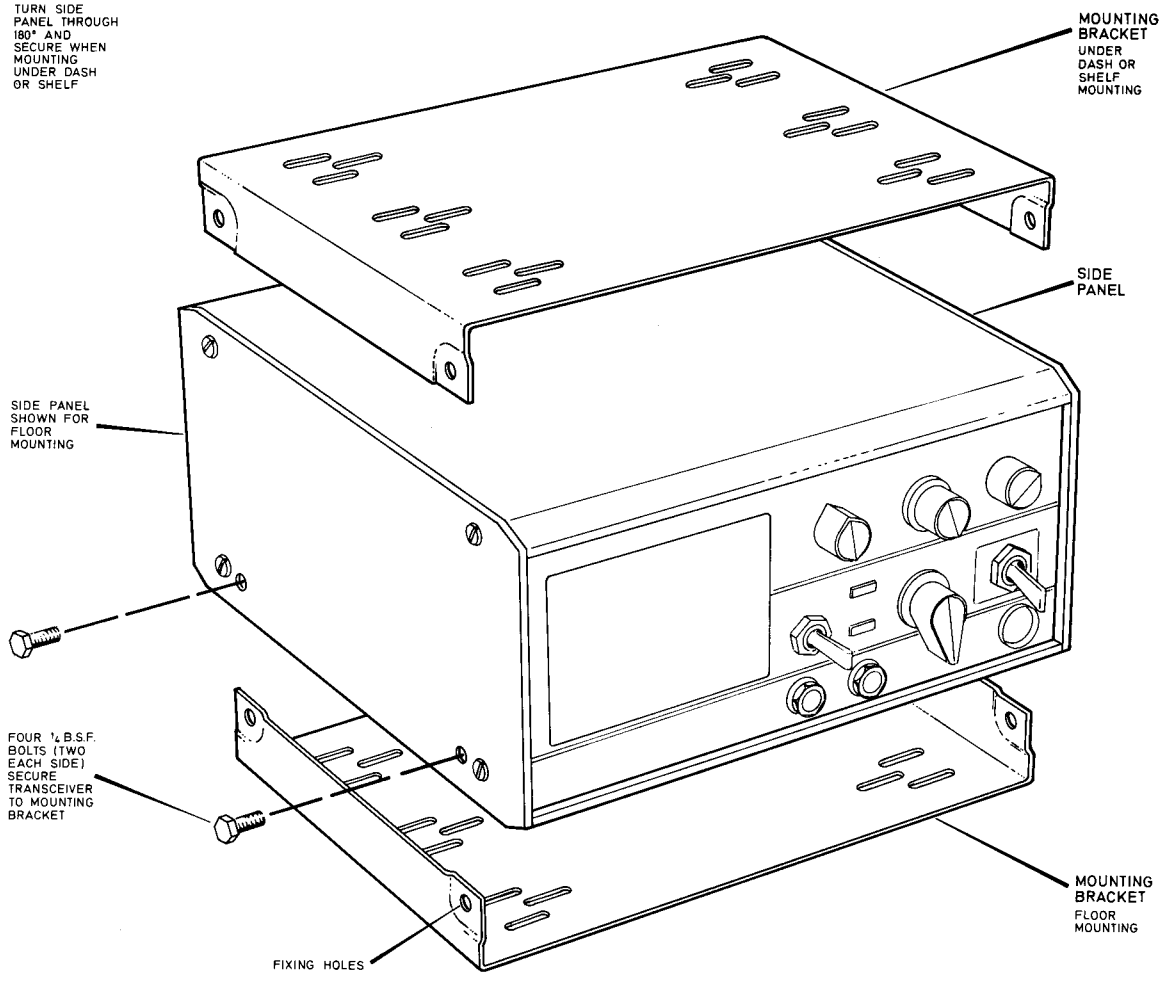
Antenna Engineering Handbook by H. Jasik

Radio Antenna Engineering by A.E. Laport

2.3 MOBILE INSTALLATION

Floor Mounting.

Bolt the mounting bracket to the floor of the vehicle ensuring that the position of the bracket allows at least 4" (10 cm) at the rear of the transceiver unit for power leads and antenna connections. Place the transceiver in the bracket and align the two holes in each side panel with the 'fixing holes' in the bracket. Fasten the bracket to the transceiver using the four $\frac{1}{4}$ BSF bolts provided. Slotted holes are machined in the bracket to allow some lateral adjustment.



Mobile Installation Diagram

Under dash or shelf mounting

Bolt the mounting bracket beneath the instrument panel or shelf ensuring that the position of the bracket allows at least 4" (10 cm) at the rear of the transceiver unit for power leads and antenna connections. Turn the side panels through 180^{o} to align the side panel fixing holes with the top mounted anchor rivet bushes.

Place the transceiver in the mounting bracket and align the side panel and mounting bracket fixing holes. Secure the bracket to the transceiver using the four $\frac{1}{4}$ BSF bolts provided. Slotted holes are machined in the brackets to allow some lateral adjustment.

Extension Control and Loudspeaker Units

If the extension control and loudspeaker units are to be used, proceed as follows:-

Mount the control and loudspeaker units in the required positions using the mounting brackets provided.

Connect the 18ft (6m) flying lead from the extension control unit to socket SKA on the transceiver.

Connect the lead from the loudspeaker to the short extension lead available at the rear of the control unit.

Plug the microphone into the socket on the front of the extension control unit.

Mount the microphone holder in a convenient position.

Electrical Connections

Check the polarity of the vehicle electrical system for positive or negative earth and adjust the links on the power unit accordingly.

The installation kit, provided with both types of d.c. power unit, consists of:-

Terminal Block
Fuse Block containing 35A fuse for 12V P.S.U. or 25A fuse for the 24V P.S.U.
1 lead for connection between Terminal Block and P.S.U.
1 lead for connection between Terminal Block and Fuse Block
1 lead for connection between Fuse Block and the Battery

Mount the terminal block in a position which permits easy connection between the terminal block and the transceiver. Mount the fuse block as close to the battery as possible. Install the power cable from the terminal block to the Fuse Block keeping the cable clear from the vehicle wiring as much as is practicable. Ensure that the fuse is out and make the connection between the fuse block and the battery. Finally, re-check all connections for correct polarity. This is most important as serious damage could result if any lead is short circuited or incorrectly connected.

Insert the Fuse
Place the OFF/ON/S'BY switch to ON
Check the POWER light is on.

Note: If the POWER indicator does not light, switch OFF, remove the fuse and recheck the electrical installation.

The ideal mobile antenna is omnidirectional, has a low angle of radiation and is physically small. These requirements are generally met by a loaded vertical $\lambda/4$ antenna which is adaptable to most applications.

HF antennas are necessarily long and a compromise has to be reached to obtain an antenna of acceptable physical proportions with an adequate radiating efficiency.

Compressed Helical Antennas

Usually comprises a fibre glass rod 8 ft. ($2\frac{1}{2}$m) in length supporting a deposited helical coil along its length. This system is used where no loading or tuning is employed and only single outlet from the radio installation is used.

The effective length of the helical coil is $\lambda/4$ but its radiating efficiency is less than that of a physical $\lambda/4$ antenna.

The top 18 inches are suitable for trimming the whip to resonate at the required frequency. At the lower end of the whip is a metal fitting which screws into the spring mountings that are available for fixing to the vehicle bumper or body.

Base Loaded Helical Antennas

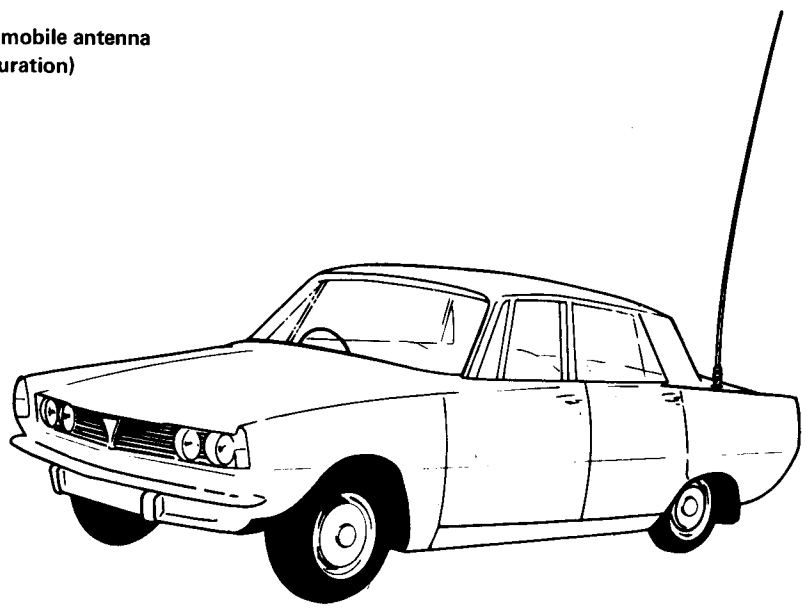
Used with multi frequency mobile transmitter/receivers. The helical whip is cut to $\lambda/4$ at the highest frequency to be used and is tuned with a variable inductance to operate at lower frequencies. (See ATU in Section 5).

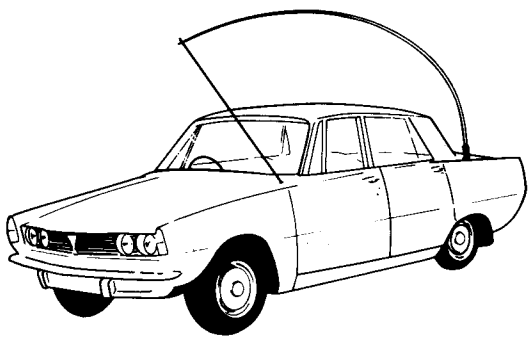
Part Numbers of Helical Whip Antennas

Frequency Range MHz	Antenna No.	Part No.
3.0 - 3.36	M1 555656-1	FA00540
3.36-3.75	M1 555656-2	FA00541
3.75-4.22	M1 555656-3	FA00542
4.22-4.74	M1 555656-4	FA00543
4.74-5.28	M1 555656-5	FA00544
5.28-5.93	M1 555656-6	FA00545
5.90-6.63	M1 555656-7	FA00546
6.56-7.38	M1 555656-8	FA00547
7.32-8.23	M1 555656-9	FA00548
8.23-9.26	M1 555656-10	FA00549
9.23-10.40	M1 555656-11	FA00550
10.33-11.65	M1 555656-12	FA00551
11.60-13.06	M1 555656-13	FA00552
13.00-14.56	M1 555656-14	FA00553
14.5 -16.28	M1 555656-15	FA00554

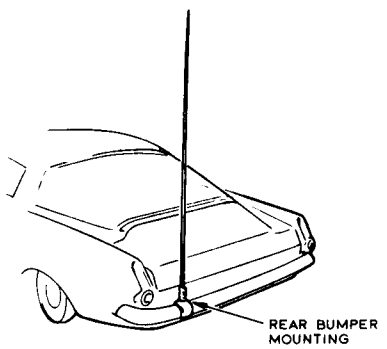
The M1 number is clearly marked at the base of each whip and on its container. Full cutting instructions are also provided.

Rear-mounted mobile antenna (normal configuration)





Rear-mounted mobile antenna. Antenna bowed for sky-wave working



Rear-mounted mobile antenna

Antenna Tuning

It is essential for the best performance that the mobile whip is cut accurately to the frequency used.

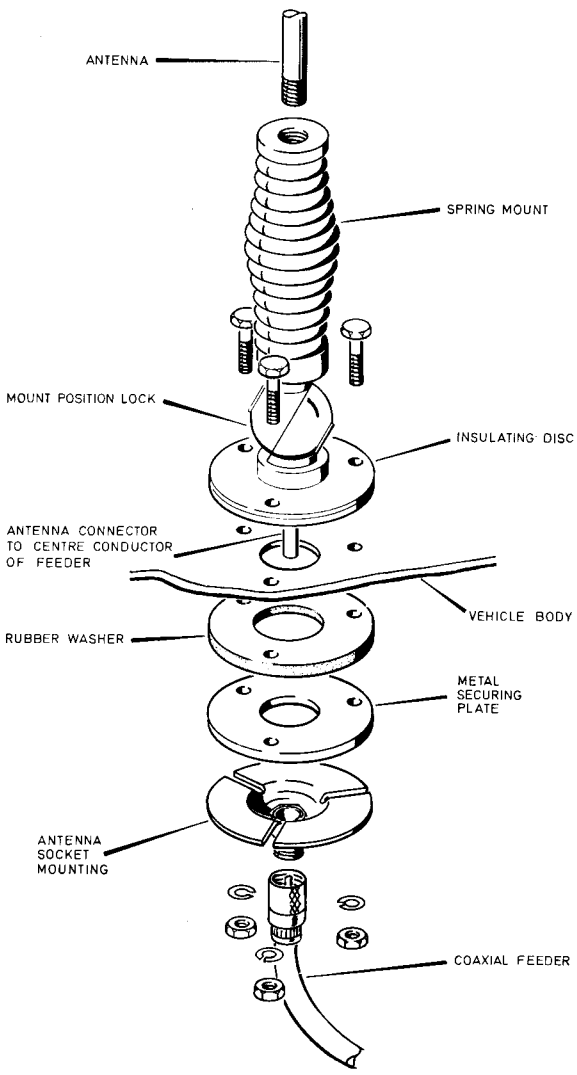
Do not attempt to check or tune the antenna when the vehicle is parked close to other vehicles, buildings or trees. The presence of large stray capacitance caused by other objects close by will seriously affect tuning.

Test Equipment Required.

Reflectometer	Pye RFL 3 or similar
Multimeter	Avo model 8 or similar
Grid Dip meter	Philips GM3121/04 or similar

As a preliminary procedure, to check that the selected antenna is approximately correct, its resonant frequency can be determined with a grid dip meter.

To check the antenna resonance proceed as follows:-



Mobile Antenna Body Mounting

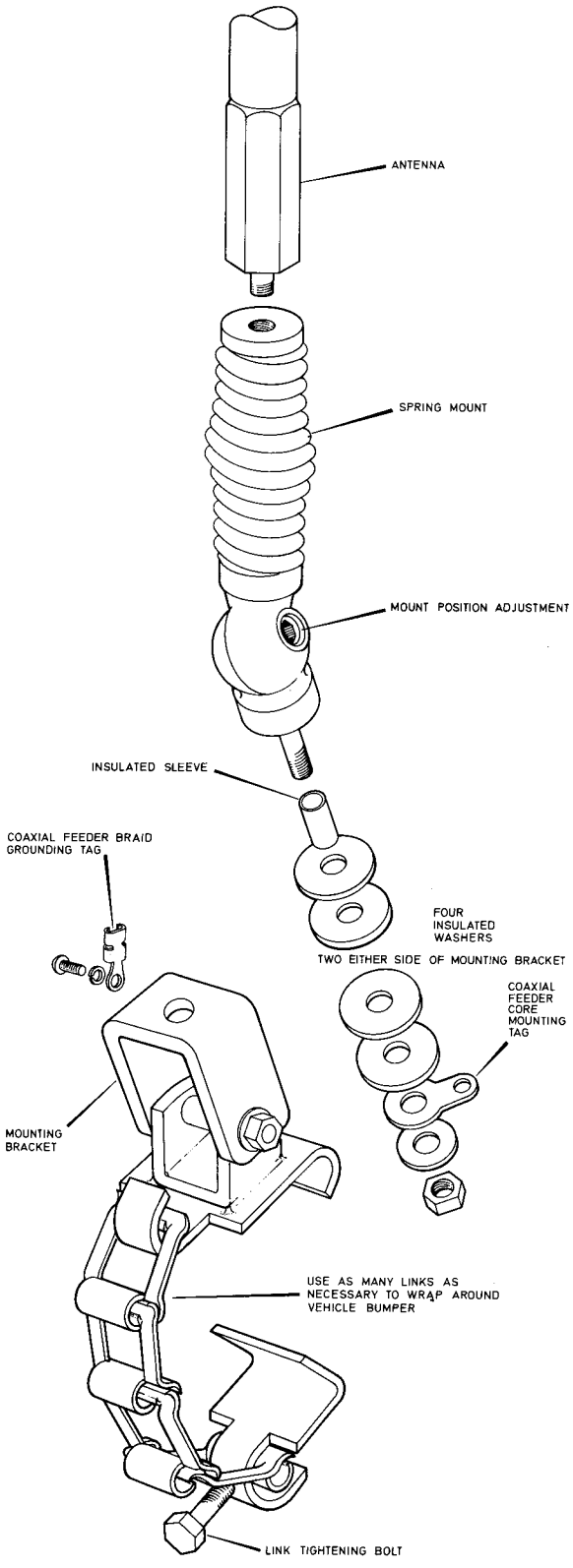
1. With the antenna correctly installed set the SSB 130M CHANNEL switch to the operating channel.

2. Make up a small coil of two or three turns of 18 swg copper wire of the same diameter as the base of the antenna. Connect one end of the coil to earth i.e. under one of the mount fixing bolts. Connect the other end to the antenna connection at the centre of the spring base.

3. Insert the probe of the grid dip meter into this coil and vary the meter frequency until a pronounced dip is obtained, indicating the resonant frequency.

4. If the frequency is slightly lower than the required channel frequency tuning can proceed if not, fit another antenna. When this is checked remove the coil.

5. Insert the reflectometer between the antenna coaxial feeder cable and the transceiver, fitting temporary



Mobile Antenna Bumper Mounting

coaxial plugs and sockets as necessary to permit coupling.

6. Connect the avometer set to the 10V d.c. range between the power supply unit sockets TP1 and TP2.

7. Remove the transceiver top cover and PA cover.

8. Set the MODE switch to AM. Set the OFF/ON/S'BY switch to S'BY.

   Allow 1 minute for the P.A. stage to warm up.

9. Operate the microphone Press-to-talk button.

10. Adjust the appropriate loading capacitor C24-C29 anticlockwise until the avometer indicates a reading of less than 3 volts (3V approx. equal to 300mA.)

11. Adjust the appropriate Pi network tuning capacitor C12-C22 for a dip in the avometer reading. Note the avometer reading must not exceed 3V.

12. Repeat items 10 and 11 until the reflectometer forward power reading is at a maximum.

13. Switch the reflectometer to reflected power and note the reading.

14. Release the press-to-talk button.

    Note: The transmitter has now been tuned to deliver maximum forward power to the antenna. A VSWR of 2:1 or better is satisfactory, if this has not been obtained proceed as follows:-

15. Cut the antenna by no more than $\frac{1}{4}$".

16. Operate the press-to-talk switch. Set the reflectometer to forward power and adjust the reading for full scale deflection. Switch the RFL3 to reverse power and check that the reflected power indication has decreased from that obtained in item 13.

17. Repeat items 14 to 16 until the reflected power indication is at a minimum.

18. Switch the reflectometer to forward power. Repeat items 9-13.

19. Switch to reflected power and repeat items 14 to 16 if necessary.

20. Repeat items 9-13 and 14 to 16 until the requisite VSWR of 2:1 or better is obtained.

21. Remove all test equipment and replace transceiver covers.

The antenna is now tuned to the frequency of operation. Any excess feeder should be coiled in the trunk of the vehicle. Do not cut off any portion of this cable after the antenna has been tuned.

2.4 OPERATING TECHNIQUE

The following procedure will ensure optimum results from the SSB 130.

Set the OFF/ON/S'BY switch to the ON position. The POWER lamp will indicate the presence of supply.

Set the MODE and CHANNEL selection switches to the required function and frequency.

Adjust the SQUELCH control until a noise is heard in the transceiver loudspeaker.

Rotate the VOLUME control to give a suitable level from the loudspeaker.

Set the OFF/ON/S'BY switch to the S'BY position.

IN THE CASE OF A D.C. POWERED TRANSCEIVER
ALLOW UP TO ONE MINUTE FOR THE POWER AMPLIFIER VALVES TO WARM UP.

Operate the microphone press-to-talk switch. Speak clearly into the microphone and check that the MOD. indicator flashes in sympathy with the operators speech pattern.

Release the press-to-talk button on completion of the call.
(Maximum continuous transmit time should not exceed 5 minutes).

On receipt of a call, adjust the SQUELCH control to mute the receiver and then advance the SQUELCH control to allow the receiver to 'just' operate. This will ensure that the receiver is fully muted when no signal is received.

Note: Incoming signal levels will vary according to distance from the transmitter, time of day, frequency etc. and in consequence the SQUELCH control will require frequent adjustment. In the absence of signal, the squelch control should be set to just mute the receiver.

The TRIM control (operative in the receive mode only) may be adjusted to provide the most natural quality of received speech.

A.M. Operation

To operate in conjunction with stations employing amplitude modulation it is necessary to insert a carrier for transmission. This is effected by setting the MODE switch to the A. M. position on the selected sideband.

C.W. Operation

An 800 Hz oscillator incorporated in the equipment provides for c.w. operation.

Place the Mode switch to CW on the selected sideband and insert the key jack into the KEY socket. Transmit/Receive switching is then controlled by the front panel Tx/Rx switch.

During c.w. operation the microphone is internally disconnected.
To revert to voice communication the mode switch must be re-set to SSB or AM and the key removed.

SECTION 3

TECHNICAL DESCRIPTION

An overall circuit summary, followed by detailed information on each individual unit, is given in this Section. In each case the unit information includes the following:-

Circuit purpose, controls, inputs and outputs

Circuit description

Circuit diagram

Component location diagram

NOTES

1. Unit Identification

To facilitate identification, each unit is allocated a component prefix number shown thus [86] on circuit and layout diagrams. It is emphasised that prefix numbers are only for inter-unit reference within this manual; for all other purposes the Part Number given in the Parts List is the true identification. Chassis mounted components are allocated the prefix "O".

2. Component Values

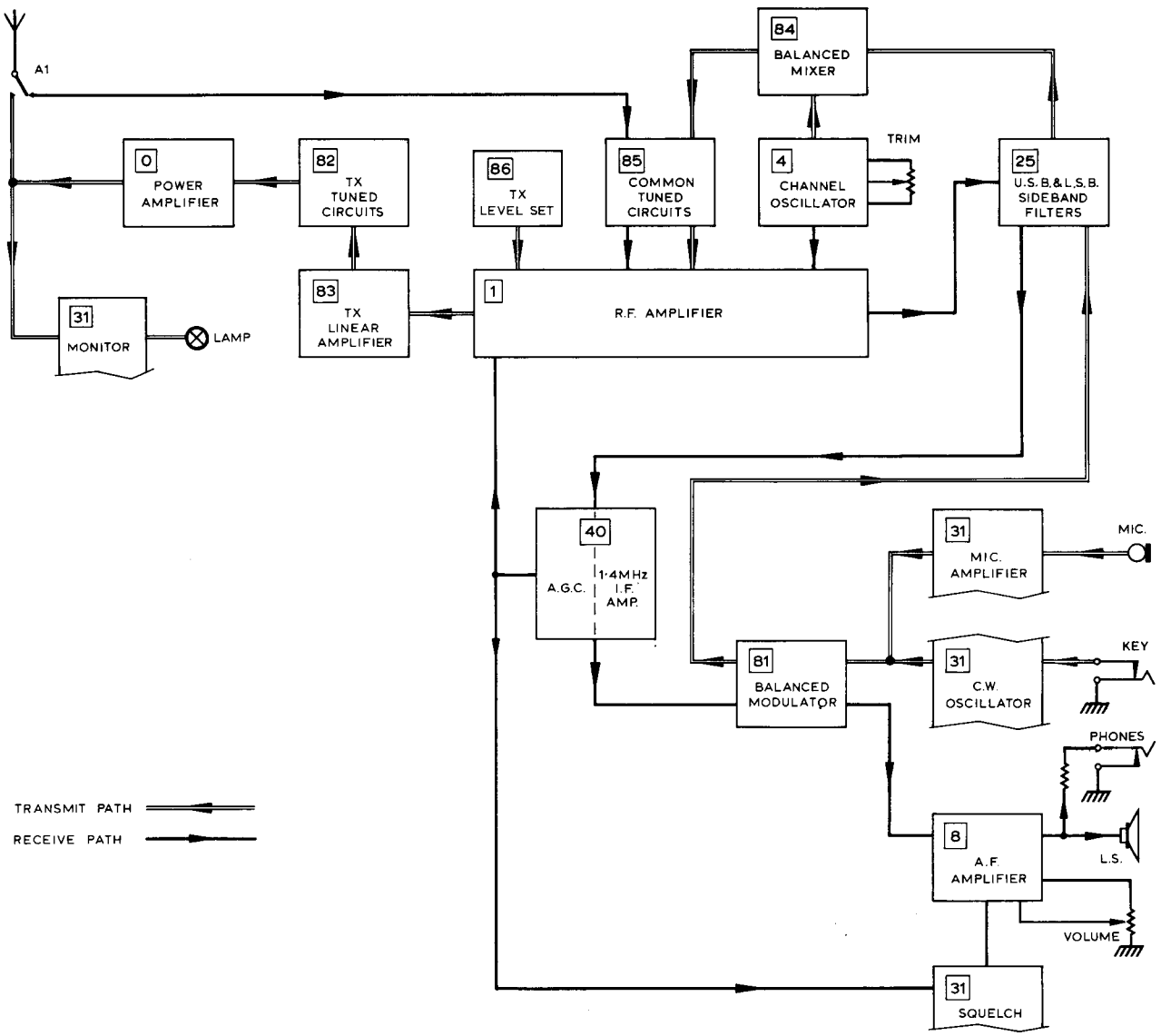
Reference should be made to the Parts List for details of those components marked with an asterisk on the circuit diagram.

3. Semi-conductor Type Numbers

Where any one of a number of directly equivalent semiconductor types is used, type numbers are not quoted in the Parts List. Suitable replacement components may be ordered under the Part Number given against the appropriate circuit reference. Where type numbers are shown on circuit diagrams, they are intended only to provide guidance regarding the electrical parameters of the device concerned; alternatives of similar, or improved, specification may be fitted in the equipment.

4. Signal Levels

Values given are typical levels across the quoted impedance; loading of the circuit by the measuring instrument must be taken into account when measurements are made.



SSB130 Transceiver Block Diagram

3.1 INTRODUCTION

The frequency band between 2 and 15 MHz is heavily populated. Single sideband operation offers the advantages of requiring only half the bandwidth of a conventional a.m. signal and providing a much greater effective signal power. Overall transmitter efficiency is high, since a high level modulator is dispensed with and there is no output from the transmitter until an audio input is applied.

The s.s.b. signal is generated by the filter method using a 1,4 MHz carrier. One of the two 1,4 MHz crystal sideband filters is switched into circuit to suppress the unwanted sideband and the carrier. The remaining sideband signal is converted to the required transmission frequency by heterodyning it with the output of a crystal controlled channel oscillator and then amplified to a level of 100W p.e.p. A carrier signal is not normally transmitted, but may be inserted to allow reception by conventional a.m. receivers if required.

The single superheterodyne receiver is crystal controlled, using the common channel oscillator to provide a signal which is mixed with the incoming r.f. to produce a 1,4 MHz intermediate frequency. The sideband filter provides the necessary selectivity, the i.f. signal being demodulated by mixing it with the output of the 1,4 MHz carrier oscillator.

A number of circuits are common to both the transmitter and the receiver. The required mode of operation is selected by a system of gating diodes, the polarity of their switching potential being determined by subsidiary contacts of the antenna changeover relay.

3.2 CIRCUIT SUMMARY

Transmit

When the press-to-talk button on the microphone is operated or, when c.w. operation is employed, the Tx/Rx switch on the front panel is set to TX, contacts of the antenna changeover relay connect the antenna to the output of the Power Amplifier and also apply an appropriate switching potential to the gating diodes in those units which are used in both transmit and receive modes.

An audio signal from the Mic. Amp. and Facility board is applied to the Balanced Modulator where the audio signal is mixed with the output of a 1,4 MHz oscillator. The output of the Balanced Modulator, consisting of upper and lower sideband signals with the 1,4 MHz component suppressed by approximately 40dB, is taken to the Sideband Filter Board which affords further attenuation of the 1,4 MHz carrier component and 50dB rejection of the unwanted sideband. The selected sideband is passed, together with an output from the Channel Oscillator, to the Balanced Mixer the output of which consists of sum and difference frequency signals. The difference frequency signal is selected by the Common Tuned Circuit and applied to the R.F. Amplifier. The gain of this amplifier is controlled from the Transmitter Level Set Unit to provide an output at a level suitable for application to the Transmitter Linear Amplifier which provides a 500mW r.f. input to the Transmitter Tuned Circuit. The r.f. signal from this tuned circuit is applied to the Power Amplifier at approximately 100V peak to peak.

Two power tetrodes in parallel, operating in Class AB, provide power amplification and furnish 100W p.e.p. at the antenna socket. A power monitor circuit provides visual indication of an output from the p.a. stage.

Receive

In the receive condition, contacts of the antenna changeover relay connect the antenna to the R.F. Amplifier and apply switching potentials of appropriate polarity to the gating diodes in those units which are used in both transmit and receive modes. The received signal is passed from the antenna to the tuned R.F. Amplifier where it is amplified and mixed with a signal fron the Channel Oscillator. The difference frequency, centered on 1,4 MHz, is selected by a band pass filter and applied via the Sideband Filter board to the I.F. Amplifier. An a.g.c. circuit ensures that the I.F. Amplifier output is held at a constant level, the amplified i.f. signal being demodulated by heterodying it with the output of a 1,4 MHz crystal oscillator on the Balanced Modulator board. The resulting audio signal is fed to the Receiver A.F. Unit where, provided that the incoming r.f. signal exceeds the squelch level, an audio amplifier provides an output of up to 2,5W to the loudspeaker. The squelch circuit mutes the output of the A.F. Unit under 'no signal' conditions or when the transceiver is operating in the transmit mode.

3.3 FREQUENCY CONVERSION AND SIDEBAND SELECTION

Since the carrier oscillator, channel oscillator and sideband filter are common to transmit and receive modes of operation, the same channel and sideband are used for transmission and reception at all times. Although the transceiver input signals will normally consist of a band of frequencies extending from approximately 250 Hz to 3,0 kHz, the following examples assume, for simplicity, that a single 1,0 kHz audio frequency is used.

Transmission - Lower Sideband at Channel Frequency 10,0 MHz

The 1,0 kHz audio signal modulates a 1,4 MHz carrier in the balanced modulator, the output of which consists of a 1,4 MHz carrier (almost completely suppressed by the balanced action of the modulator) and two sidebands at 1401 and 1399 kHz. A crystal filter rejects the lower sideband and passes the upper sideband (1401 kHz) to the balanced mixer. The balanced mixer is also fed with the output of a channel oscillator which operates 1,4 MHz above the required channel frequency, i.e. 11.4 MHz when a channel frequency of 10 MHz is selected. The output of the balanced mixer embodies components at 11,4 MHz and 1401 kHz which, due to the action of the mixer circuit, are at a very low level, together with higher level signals at frequencies equal to the sum of (11,4+1,401=12,801 MHz) and the difference between (11,4 - 1,401 = 9,999MHz) the frequencies of the two applied signals. The r.f. amplifier, tuned by the common tuned circuit board, responds to the difference frequency signal which is passed to the transmitter power amplifying stages. The transmitter output is, therefore at 9,999 MHz, corresponding to the lower sideband of a 10,0 MHz signal modulated by 1,0 kHz. It should be noted that, since the difference signal from the balanced mixer is selected, sideband inversion occurs and therefore an UPPER sideband filter is used at the output of the balanced modulator when a LOWER sideband transmission is required and vice versa.

Reception - Upper Sideband at Channel Frequency 12,0 MHz

The incoming r.f. signal, at a frequency of 12,001 MHz, is mixed with the output of the Channel Oscillator, operating at 13,4 MHz. The resulting sum (12,001 + 13,400 = 25,401 MHz) and difference (13,400 - 12,001 = 1,399MHz) frequency signals are applied to the r.f. amplifier where a 1,4 MHz band pass filter rejects the sum signal and passes the difference signal to the lower sideband crystal filter. From this filter the signal is taken by way of the i.f. amplifier to the balanced modulator where it is heterodyned with the output of a 1,4 MHz crystal oscillator, producing a 1,0 kHz a.f. output. As in the transmission case, sideband inversion occurs during frequency conversion and consequently the LOWER sideband filter is used during the reception of an UPPER sideband signal and vice versa.

3.4 MICROPHONE AMPLIFIER & FACILITY BOARD

The Microphone Amplifier & Facility Board carries the following four circuits:-

1. Microphone Amplifier.
2. C.W. Oscillator.
3. Squelch.
4. R.F. Power Monitor.

MICROPHONE AMPLIFIER

Purpose To provide the correct level of audio signal for the balanced modulator board.

Input From the microphone at pin 10. (10mV) (Z 2kΩ).

Output The amplified signal is available at pin 12. (700mV) (Z 2kΩ).

Circuit Description The input from the microphone at pin 10 is fed to the base of TR5 which with TR6 forms a feedback amplifier. The output at the collector of TR6 is fed via C8, D3, D4 and pin 12 to the externally mounted MODE switch. The MODE switch connects the microphone amplifier to the balanced modulator when in the A.M. or SSB positions.

Diodes D3 & D4 in conjunction with R17, R19 and R20 form a clipper circuit.

The amplifier is disabled in the receive mode by reversing the supply potential at pin 16.

C.W. OSCILLATOR

Purpose To produce an 800 Hz sinewave which can be externally keyed at pin 17.

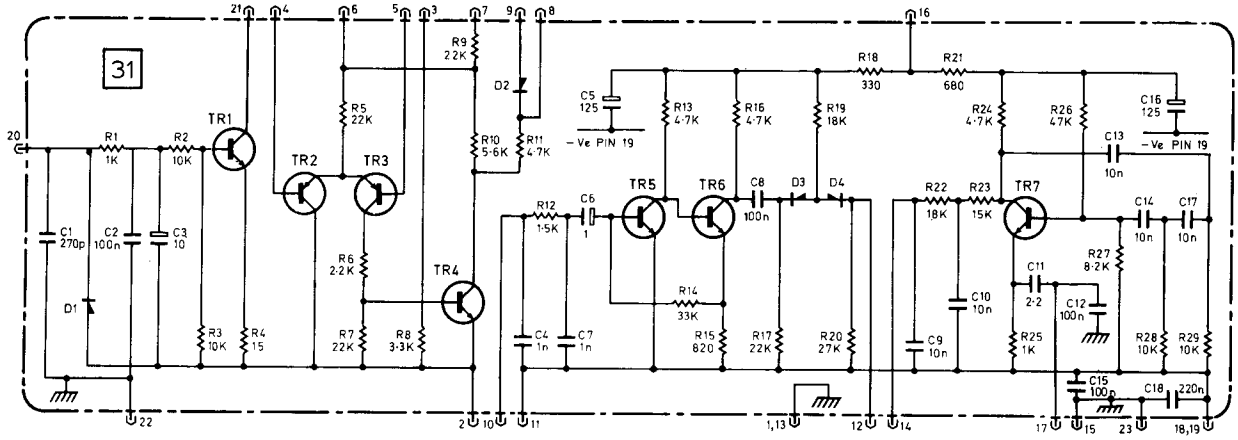
Output 800 Hz sinewave (700mV) (Z 30kΩ)

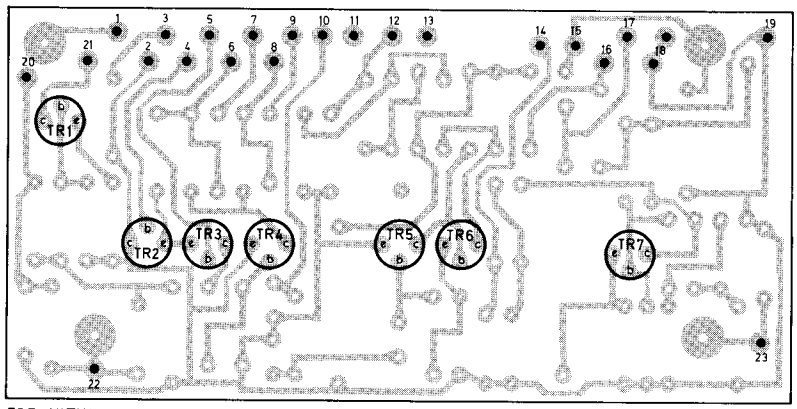
Circuit Description TR7 is connected as an RC phase shift oscillator, the frequency being determined by C13, C14, C17, R27 and R29.

When pin 7 is open circuit the gain of TR7 is insufficient to maintain oscillation and there is no output at pin 14. With pin 17 short circuited to earth the gain of TR7 exceeds the attenuation of the phase shift network and oscillation ensues. The 800 Hz sinewave is available at pin 14.

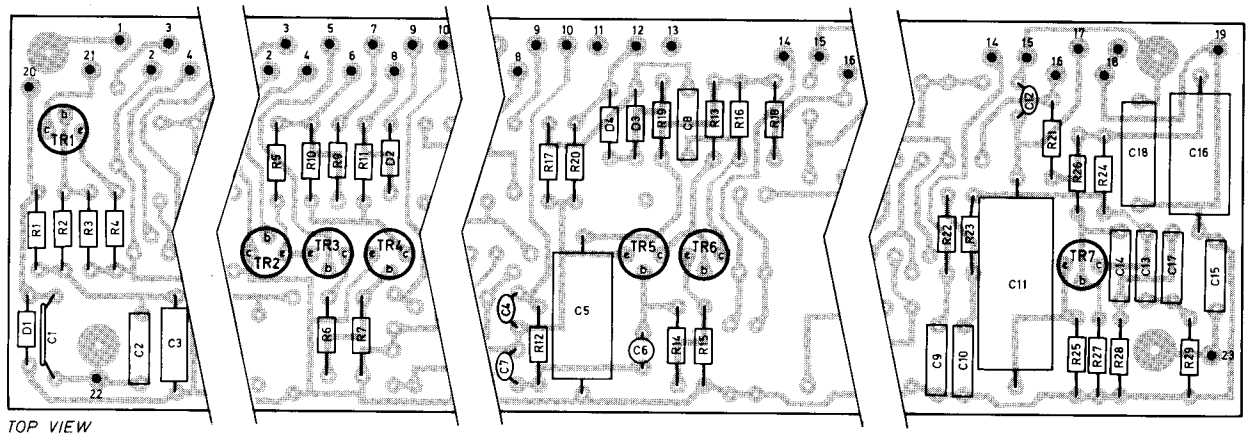
SQUELCH CIRCUIT

Purpose To provide automatic muting of the receiver during periods of 'no signal' reception.

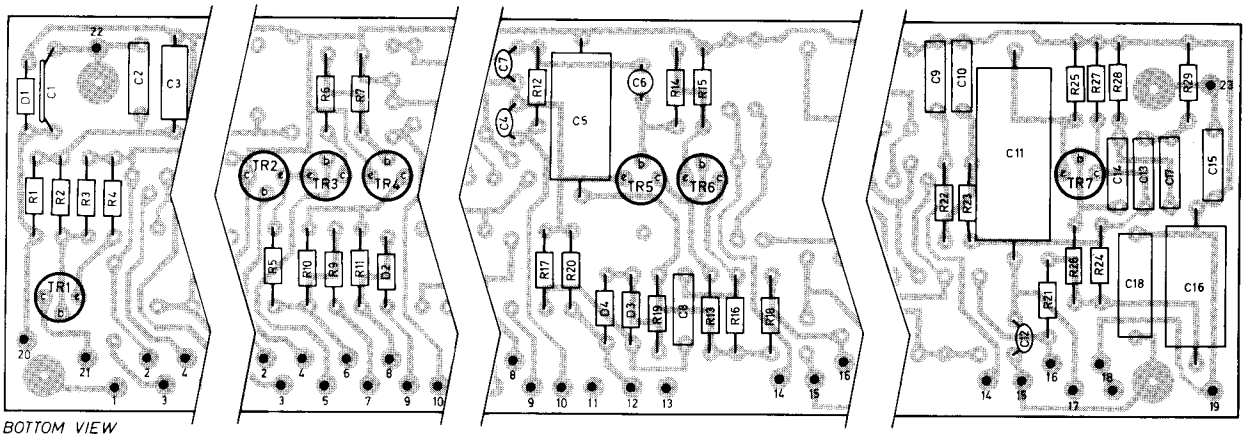




TOP VIEW



TOP VIEW



BOTTOM VIEW

Input — A.G.C. at pin 4 from the I.F. Amplifier Board (between +ve 1.5 and 5V).

Outputs — At pin 8 whilst muted approximately 8 volts.
Unmuted approximately 0.1V.

Controls — The SQUELCH control RV2 (front panel) is adjusted to give the required mute threshold level.

Circuit Description — The conventional long tailed pair comparator circuit formed by TR2, TR3 compares the a.g.c. line voltage with that set by the SQUELCH control. When the voltage on the base of TR2 is more negative than that on the base of TR3, TR2 conducts, TR3 is cut off and no current flows into the base of TR4. The resultant potential at the collector of TR4 available at pin 8, is fed to the A.F. amplifier board and used to switch OFF the audio amplifiers.

On recipt of a signal the a.g.c. line, and in consequence the base of TR2 becomes more positive than the base of TR3. TR2 is cut off, TR3 conducts heavily passing current into the base of TR4 which becomes saturated. TR4 collector potential falls to near zero volts and is used to open the amplifier circuit on the A.F. amplifier board.

D2 permits muting of the audio amplifier during the transmit function by passing +ve 9V from pin 9 to pin 8.

On receive, pin 9 is at a negative potential therefore D2 is reverse biased and has no influence on the circuit action.

R.F. POWER MONITOR

Purpose — To provide the operator with an indication that transmitter power output is present.

Input — An attenuated output from the anodes of the power amplifier valves V1, V2. (0-5V RMS, Z10kΩ)

Output — A d.c. current proportional to the r.f. power output.

Circuit Description — RF output from the anodes of the power amplifier valves is sampled by the 10pF capacitor C32 and passed into pin 20. C32 and C1 form a potential divider network. The r.f. is rectified by D1, smoothed by R1, C2 and C3 to provide a d.c. voltage at the junction R1, R2 proportional to the r.f. power output. The capacitor C3 discharges via R2, TR1 base/emitter junction and R4 (R3 takes negligible current). The base current and hence the collector current varies in sympathy with the r.f. output.

Since the MOD. lamp on the front panel of the equipment is connected in series with the +ve supply and the collector of TR1, variations in collector current will vary the brilliance of the lamp.

3.5 TRANSMITTER LINEAR AMPLIFIER

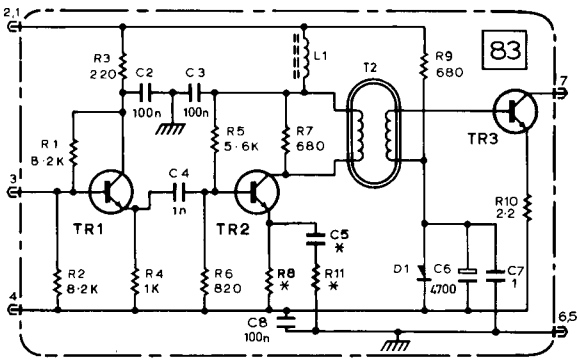
PURPOSE To linearly amplify the low level single sideband final frequency output from the r.f. amplifier to a level sufficient to drive the power amplifier valves to full output.

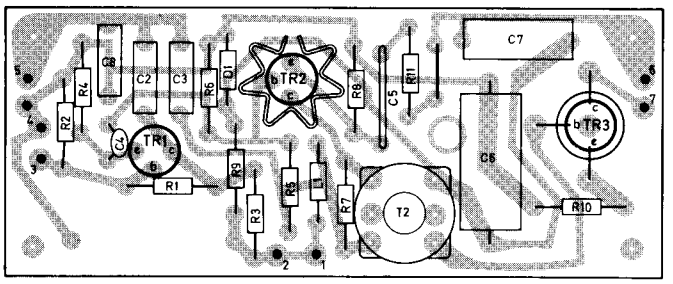
INPUT Low level single sideband at pin 3 from the R.F. Amplifier (Board 1). (500mV PEV, Z 1kΩ)

OUTPUT Approximately $\frac{1}{2}$ watt peak envelope power at pin 7 to the Transmitter Tuned Circuit Board. (7V PEV, Z 180Ω)

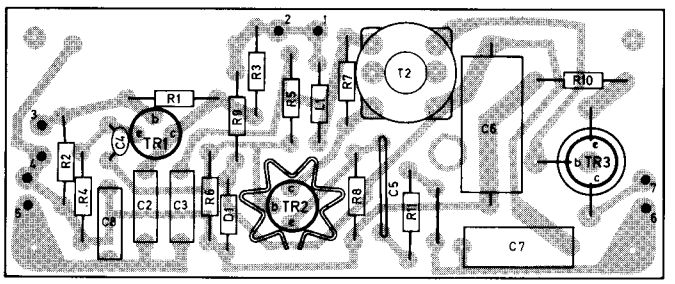
CIRCUIT DESCRIPTION The input from the R.F. Amplifier board at pin 3 is fed to the base of an emitter follower TR1, which provides a low impedance input for TR2. The toroidal transformer in the collector of the class A amplifier TR2 provides constant matching in the range 2 - 15 MHz. The r.f. output from T2 is fed to TR3, a class A/B amplifier. TR3 collector is connected via pin 7 to the Transmitter Tuned Circuit board, through which the collector d.c. supply is obtained.

To prevent crossover distortion a quiescent current, set by R9 and D1, flows in TR3.





TOP VIEW



BOTTOM VIEW

3.6 RF AMPLIFIER

Purpose The unit is employed in both the transmit and receive modes providing:-

1. Transmit - The amplified single sideband at final frequency.
2. Receive - The 1.4 MHz I.F.

Inputs

1. Transmit - The output from the Balanced Mixer at pin 3 (300mV PEV, Z 50Ω)
2. Receive - R.F. Signals from the antenna changeover relay at pin 2 (10μV, Z 50Ω)

Outputs

1. Transmit - Single Sideband at final frequency at pin 13. (500mV PEV, Z 500Ω)
2. Receive - 1.4 MHz I.F. at pin 17. (50μV, Z 1kΩ)

Controls RV1, is adjusted for maximum signal on the highest frequency channel in the receive mode.

Circuit Description

TRANSMIT

The polarity of the switching points is as follows:-

Pin 1	Negative
Pin 19	Positive

Diodes D1, D4 & D6 are forward biased, D2, D3 & D5 are reverse biased.

The input from the Balanced Mixer at pin 3 is fed via C2, D1, pin 5, the selected common tuned circuit, pin 6 and C5 to the emitter of TR1, a common base amplifier. Further selectivity is provided by the collector tuned circuit (via pin 11) also on the common tuned circuit board, through which the collector supply is obtained. The output of TR1 is coupled via C9 to the gate of the field effect transistor TR2 operating as a source follower. The output from the source of TR2 is fed via D4, C16 and pin 13 to the Linear Amplifier 83.

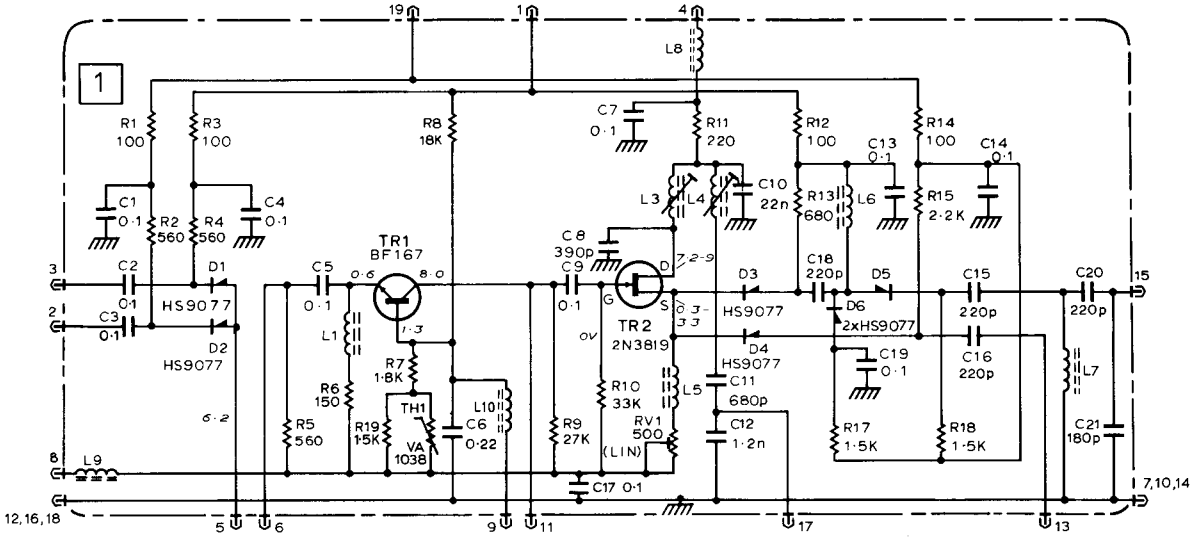
RECEIVE

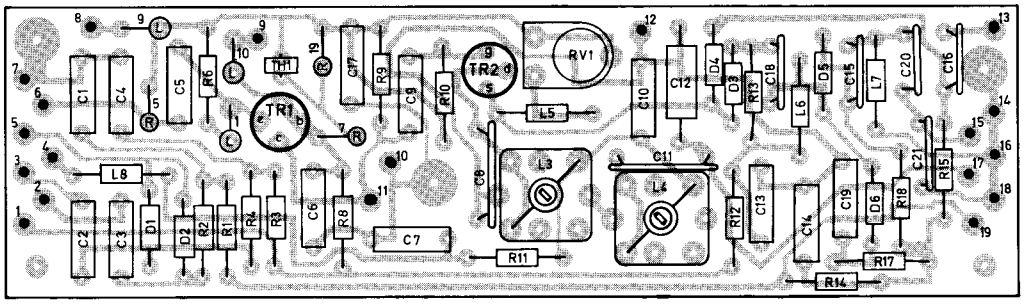
The polarity of the switching points is as follows:-

Pin 1	Positive
Pin 19	Negative

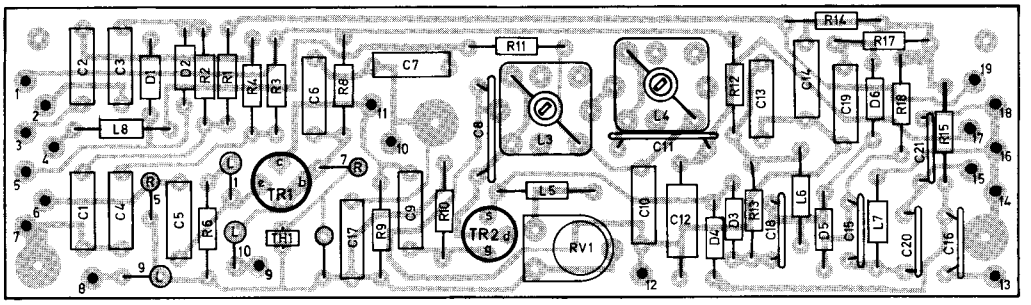
Diodes D2, D3 and D5 are forward biased, D1, D4 and D6 are reverse biased. RF signals from contacts of the antenna changeover relay are fed via pin 2, C3, D2 and are amplified by TR1 and associated tuned circuits as described for the transmit mode. TR2 operates as a mixer, the channel oscillator signal at pin 15 being fed via L7, C20, C15, D5, C18 and D3 to the source of TR2. The difference frequency of 1.4 MHz, present at the drain of TR2 is fed via the bandpass pair of tuned circuits, the impedance matching components and pin 17 to the side band filters.

R.F. AMPLIFIER





TOP VIEW



BOTTOM VIEW

3.7 I.F. AMPLIFIER

Purpose To provide an a.g.c. controlled constant level 1,4 MHz output.

Input Low level 1,4 MHz at pin 9. (25μV, Z 1kΩ)

Outputs Amplified 1,4 MHz, maintained at a constant level by a.g.c., available at pin 3. (300mV, Z 2kΩ) AGC for the R.F. Amplifier at pin 7 and at pin 8 for the squelch circuit.

Circuit Description The low level 1,4 MHz input signal at pin 9 is applied to the four stage i.f. amplifier comprising TR1-TR4, the gain of the last three stages being controlled by the A.G.C. line. TR1 has an input impedance of 1kΩ to match the sideband filter. The output from the collector of TR4 is passed via C12 and pin 3 to the Balanced Modulator and via C14 and R24 to the A.G.C. circuit.

The a.g.c. voltage is produced by the action of D1, D2, TR5 and TR6; the emitter follower TR7 provides a low impedance output to the a.g.c. line.

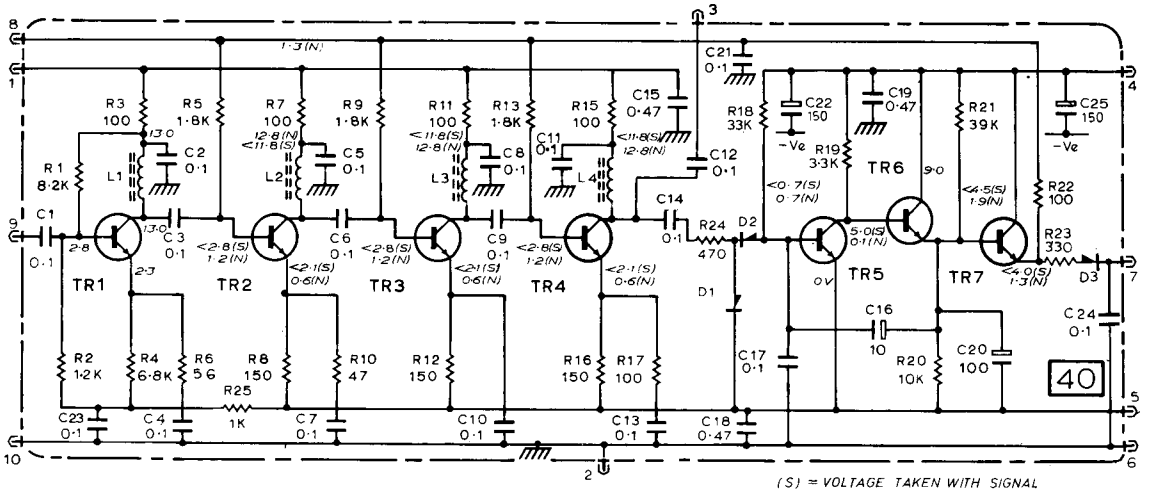
In the quiescent condition TR5 is saturated and TR6 is cut off. The a.g.c. threshold is set by the base and emitter potentials of TR6. With TR5 saturated, the base of TR6 is at approximately 0,1V (with respect to the -ve line) and the emitter potential is at approximately 2,2V, set by R20, R21.

On receipt of a signal, diodes D1, D2 produce a negative d.c. which proportionately biases back the base of TR5. When the base potential of TR6 exceeds the emitter potential by 0,7V approx. (i.e. the input signal level exceeds the a.g.c. threshold level) TR6 conducts, raising the base of TR7. The a.g.c. potential at the emitter of TR7 becomes proportionately more positive as the input signal increases and is applied to the i.f. stages via R5, R9 and R13.

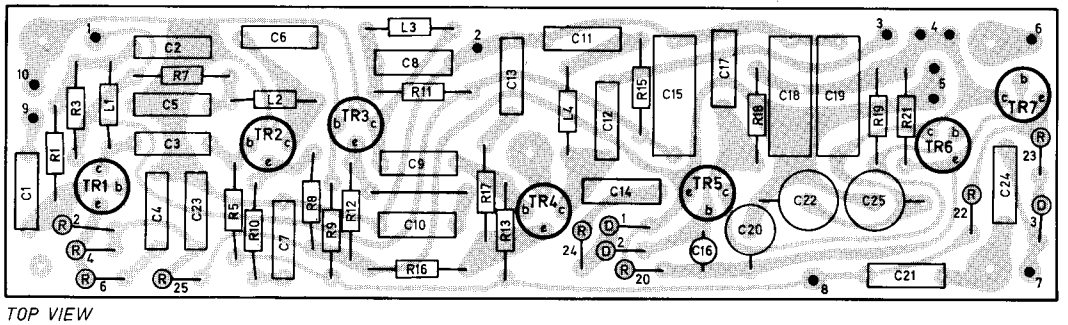
While a signal is received C20 is charged to the potential of TR6 emitter. On cessation of a signal input TR5 is again saturated and TR6 cut off, but C20 maintains the base potential of TR7 until C20 discharges through R20. This delayed a.g.c. provides a constant output signal level during short breaks in reception.

The a.g.c. line is taken to pin 8 for the Squelch circuit and to pin 7 for the Amplifier Board.

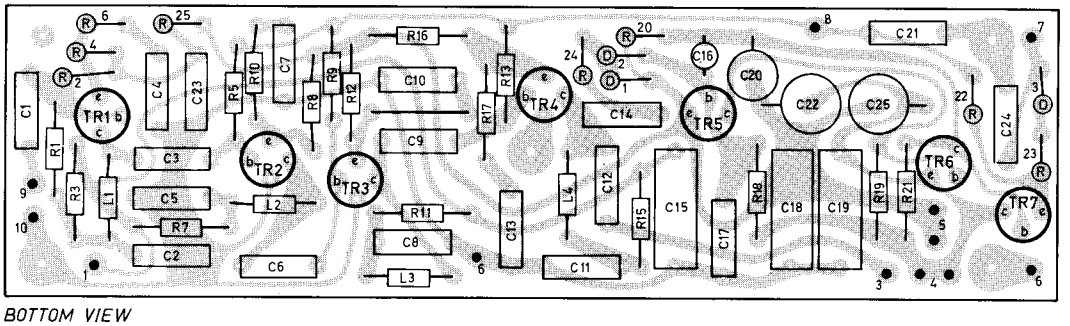
I.F. AMPLIFIER



(S) = VOLTAGE TAKEN WITH SIGNAL
(N) = " " " NO SIGNAL



TOP VIEW



BOTTOM VIEW

3.8 BALANCED MODULATOR

Purpose

To act as a modulator in the transmit mode and as a demodulator when switched to receive. Switching is achieved by reversing the polarity of potentials applied to a system of gating diodes.

Inputs

Transmit - Audio signals from the microphone amplifier or an 800 Hz tone from the C.W. oscillator at pin 11 (700mV p.e.v., Z 5,0 kΩ)

Receive - 1,4 MHz single sideband signal from the I.F. Amplifier at pin 8 (300mV, Z 1,0 kΩ)

Outputs

Transmit - Double sideband, suppressed carrier, signal at pin 6 (50mV p.e.v., Z 1,0 kΩ)
1,4 MHz carrier at pin 4 (25mV, Z1,0 kΩ)

Receive - Demodulated audio at pin 7 (10mV)

Controls

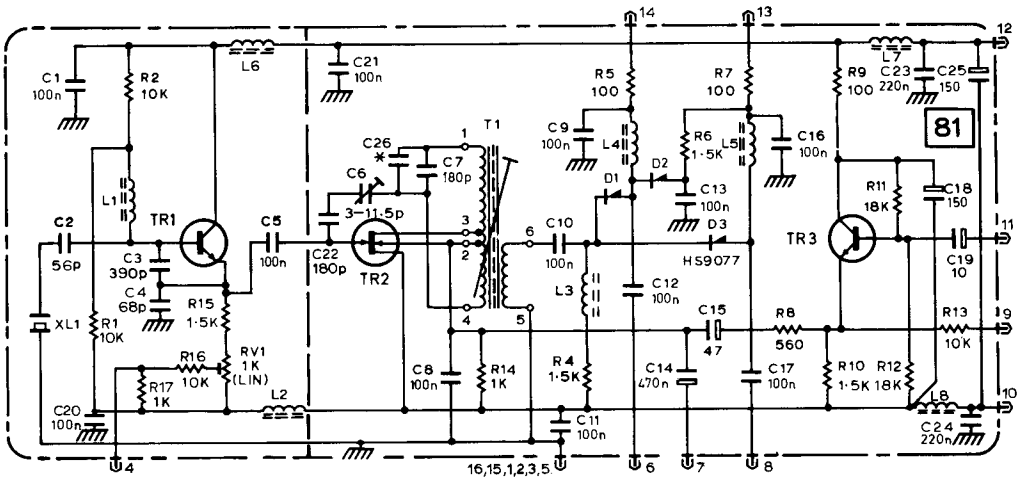
RV1 Controls the level of the 1,4 MHz carrier passed to the Balanced Mixer for carrier insertion (when required)

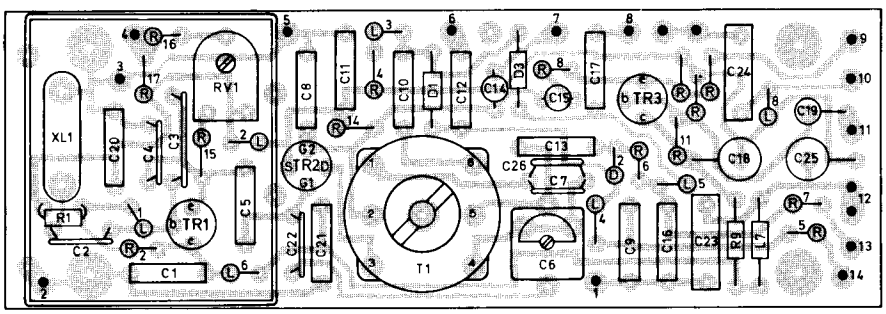
C6 Adjusted for minimum 1,4 MHz carrier signal at pin 6 in the transmit mode.

Circuit Description

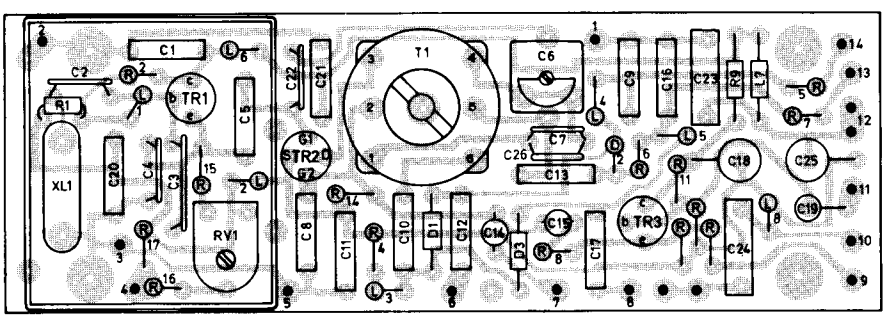
Transmit - Switching potentials are negative at pin 13 and positive at pin 14. D1 is conducting, D2 and 3 are reverse biased. The a.f. input at pin 11 fed via C9 to the base of TR3, an emitter follower which provides a low impedance source to drive the balanced modulator. The signal at TR3 emitter is applied by way of R8 and C15 to Gate 2 of the dual gate field effect transistor TR2.
A 1,4 MHz carrier signal from the crystal controlled oscillator TR1 is applied to TR2 Gate and also, via C22, C6, C7 and C26, to both ends of T1 primary winding. C6 is adjusted so that the 1,4 MHz carrier signals in T1 primary winding cancel, leaving only the sum and difference frequency signals resulting from the mixing of the 1,4 MHz and a.f. signals. The double sideband suppressed carrier signal at pin 6 of T1 is passed via C10, D1 and C12 to pin 6 for application to the Sideband Filter board.

Receive - Switching potentials are positive at pin 13 and negative at pin 14. D1 is reversed biased, D2 and D3 conduct. The single sideband i.f. signal at pin 8 is taken by way of C17, D3 and C10 to pin 6 of T1. TR2 functions as a balanced demodulator in which the single sideband signal is heterodyned with the carrier signal from TR1. The resulting sum and difference frequencies at T1 pin 2 are at approximately twice i.f. frequency and at the frequency of the received audio respectively; C8 grounds the higher frequency signal, the a.f. across C8 and R14 being passed via C14 to pin 7 for application to the Receiver Audio Amplifier.





TOP VIEW



BOTTOM VIEW

3.9 BALANCED MIXER

Purpose To convert a 1,4 MHz single sideband signal to final frequency single sideband signal.

Inputs

1. 1,4 MHz ssb at pin 2. (25mV PEV, Z 1kΩ)
2. Channel oscillator signal at pin 5. (600mV PEV, Z 300Ω)
3. 1,4 MHz carrier at pin 7. (for carrier insertion only) (25mV PEV, Z 700Ω)

Output 2-15 MHz (dependent on channel oscillator frequency) at pin 11. (300mV PEV, Z 50Ω)

Controls The balance control RV1 sets the channel oscillator level at the bases of TR2 & 3 such that their collector outputs are equal.

Circuit Description The 1,4 MHz single sideband signal at pin 2 is fed via C7 to the base of TR1, a common emitter amplifier. The secondary winding of T1 in the collector tuned circuit is effectively centre tapped by RV1 slider, thus providing a 1,4 MHz push-pull input signal for the balanced mixer pair TR2 and TR3.

The channel oscillator signal is applied to the bases of TR2 and TR3, in phase, at levels set by RV1. The collector circuit of this balanced mixer pair is a wide band toroidal transformer which is electrically centre tapped by R14 and R15 to provide a push-pull output circuit. Mixing occurs between the channel oscillator and 1,4 MHz single sideband signals.

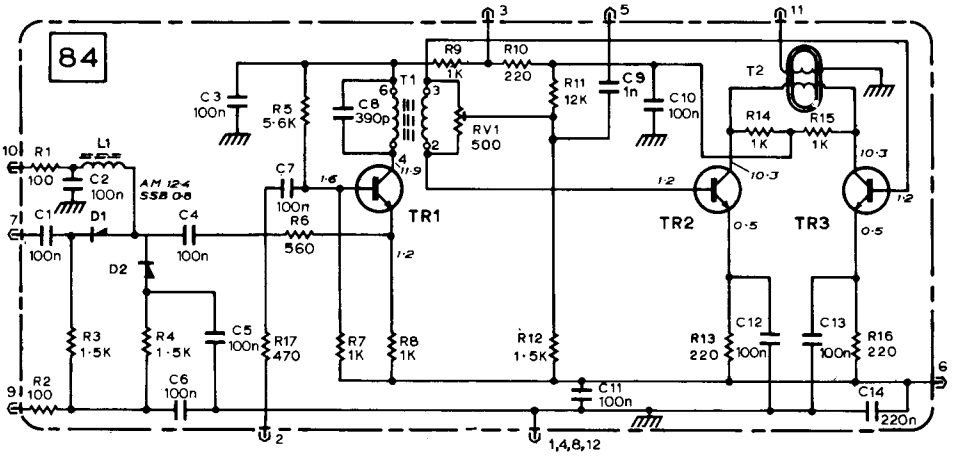
Since the channel oscillator signals at TR2 and TR3 bases are in phase, the channel oscillator frequency outputs across R14 and R15 are equal and have no effect on T2 primary current. The 1,4 MHz ssb signals and the sum and difference frequencies resulting from these signals mixing with that from the channel oscillator are, however, in anti-phase across R14 and R15, producing corresponding outputs at pin 11 from T2 secondary winding.

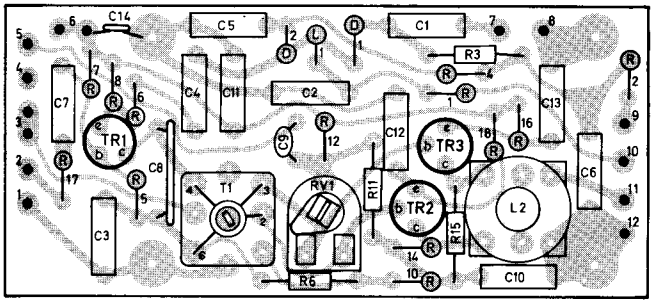
The switching potential at pin 3 disables the circuit in the receive mode.

Carrier Insertion

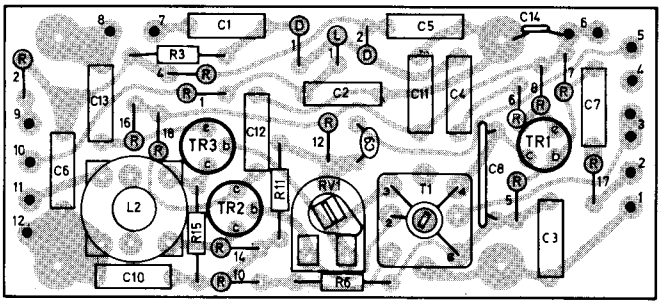
With the front panel MODE switch in the AM position a +ve potential at pin 10 causes D1 to be forward biased and D2 to be reverse biased. The 1,4 MHz carrier input at pin 7 is fed via C1, C4 and R6 to TR1 emitter and added to the 1,4 MHz single sideband signal in TR1, making the signal compatible with a.m. receivers.

BALANCED MIXER





TOP VIEW



BOTTOM VIEW

3.10 TRANSMITTER TUNED CIRCUITS

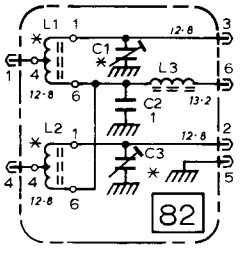
Purpose To provide the collector of TR3 in the Transmitter Linear Amplifier with a tuned circuit such that the output is suitably matched to the grid circuits of the Power Amplifier valves.

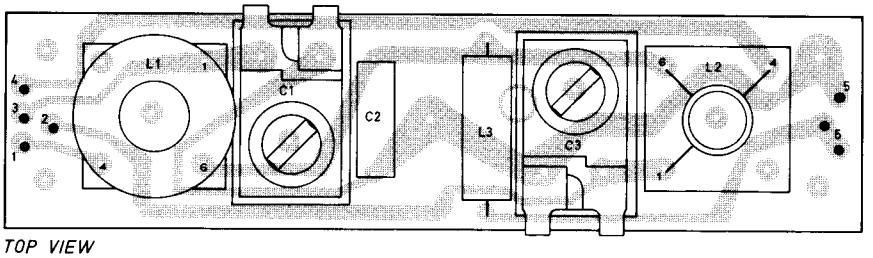
Input Final frequency r.f. at low impedance from TR3 (Board 83) (7V PEV, Z 180Ω)

Output A high voltage r.f. drive for the power amplifier valves. (33V PEV, Z 2,7 kΩ)

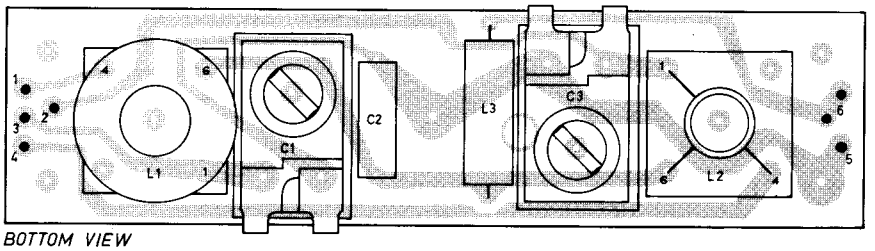
Controls C1 or C3 (one for each channel). Adjusts the tuned circuit for resonance.

Circuit Description The board carries only two tuned circuits and therefore three boards are required for a six channel equipment. Setting the CHANNEL switch to a selected channel connects the tuned circuit at pins 1 or 4 to the Linear Amplifier, and at pin 3 or 2 to the Power Amplifier stage. Note that the +ve potential applied to pin 6 provides the collector supply for TR3 in the Linear Amplifier.





TOP VIEW



BOTTOM VIEW

3.11 COMMON TUNED CIRCUITS

PURPOSE To provide the necessary selectivity and a minimum of 60 db image frequency rejection for TR1 of the RF Amplifier Board, in both the transmit and receive modes.

INPUTS

Transmit - From the Balanced Mixer board via the R.F. Amplifier board at pin 7. (300mV PEV, Z 50Ω)

Receive - From the antenna via the R.F. Amplifier board at pin 7. (10μV, Z 50Ω)

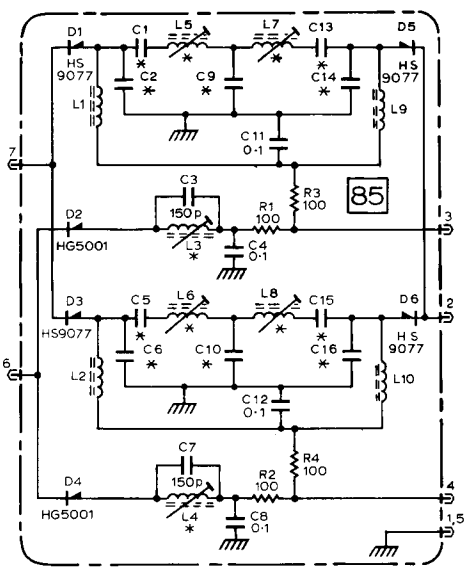
OUTPUTS

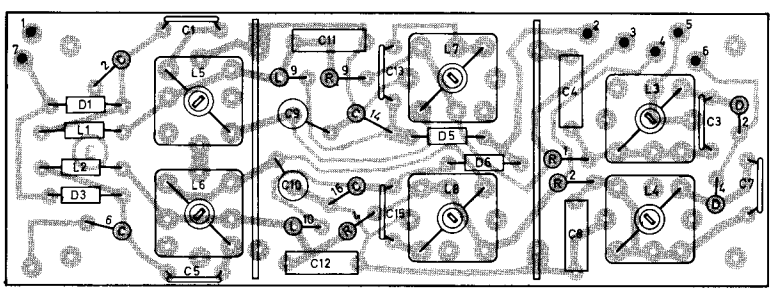
Transmit - Signal frequency at pin 2. (150mV PEV, Z 30Ω)

Receive - Signal frequency at pin 2. (5μV, Z 30Ω)

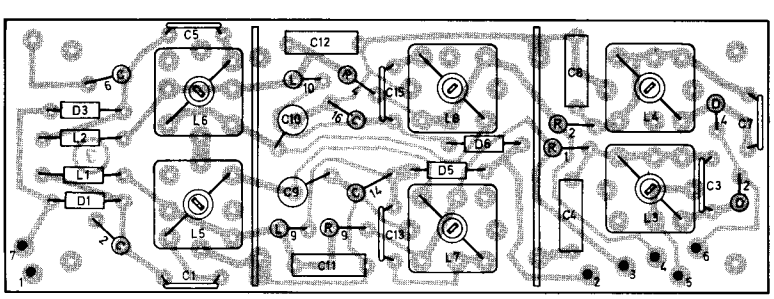
CIRCUIT DESCRIPTION The board consists of two pairs of bandpass filters and two tuned circuits; i.e. one pair of bandpass filters and one tuned circuit for each channel. Thus three boards are required for a six channel equipment.

Setting the CHANNEL switch to a selected channel applies a d.c. switching potential to pins 3 and 4, at the appropriate polarities for the required pair of tuned circuits. For example, if channel 1 is selected the polarity of the applied switching potential will be positive to pin 3 and negative to pin 4. The positive path is via R3 to D1, D5 and via R1 to D2 resulting in these diodes being forward biased. The remaining diodes, including those on the other Common Tuned Circuit boards are reverse biased. In this condition the series tuned bandpass filters are connected between pins 5 and 6 of the R.F. Amplifier and the parallel tuned circuit is connected to pin 11 of the R.F. Amplifier. Note that the switching potential passed by D2 is also the collector supply for TR1 in the R.F. Amplifier.





TOP VIEW



BOTTOM VIEW

3.12 RECEIVER A.F. UNIT

Purpose To provide a 3Ω audio output of at least 2 Watts for the loudspeaker.

Input Audio from the balanced modulator board at pin 4 (10mV). (Z 10 kΩ).

Output At least 2 Watts with less than 10% distortion at pin 11 (Z 0.2 Ω feeding a 3 Ω speaker)

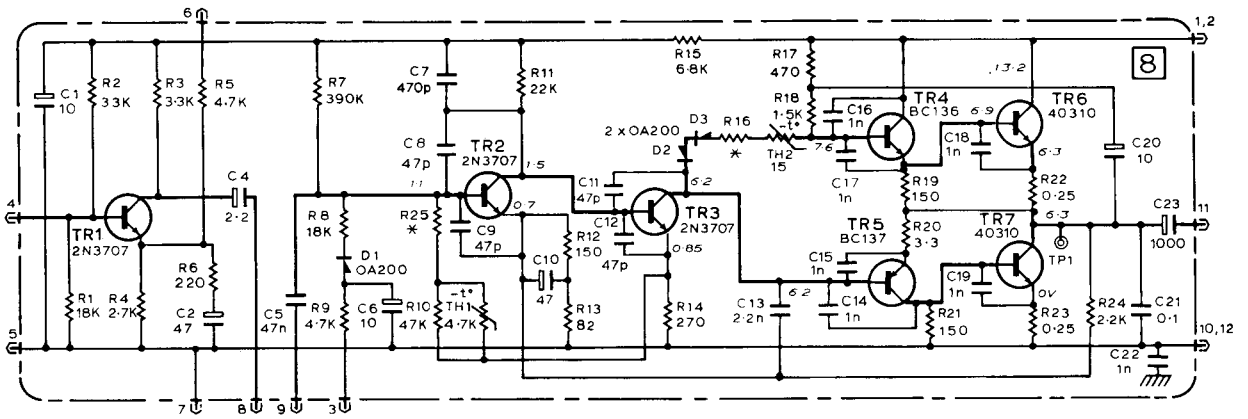
Circuit Description The audio input at pin 4 is fed via the R.C. amplifier TR1 and the external volume control to a complementary pair Class B phase inverter TR4, TR5, directly coupled to a single ended Class B output pair TR6, TR7.

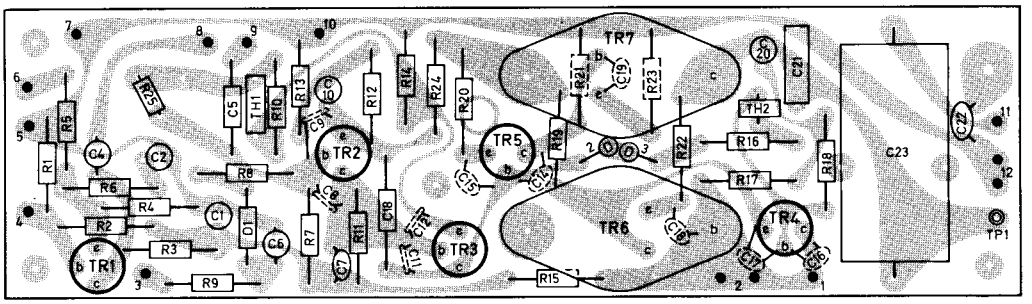
Negative feedback from the output to the base of TR4 is provided by C20. Diodes D2 and D3, thermally connected to TR6 and TR7, in series with TH2 and R16 form a temperature compensating bias network for quiescent current control. In the muted condition a positive potential is applied via pin 3 to the base of TR2 to cut off TR3 and the Class B stages.

A positive switching potential at pin 6 cuts off TR1 in the transmit mode, pin 4 presenting a high impedance to the Balanced Modulator.

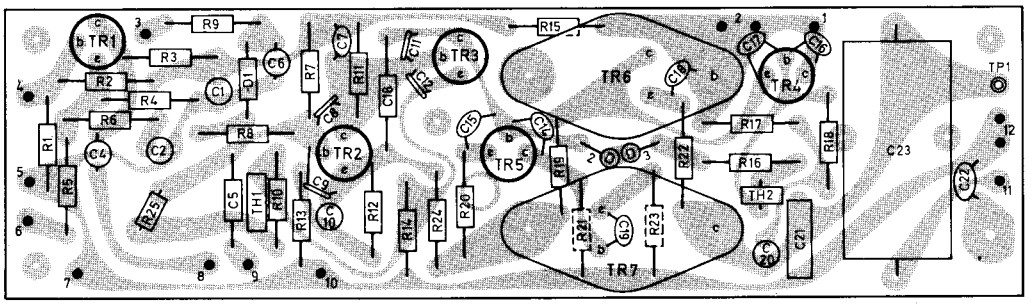
The d.c. level at TP1 is set to between 7,3V and 7,8V by selecting the value of R25.

RECEIVER A.F. UNIT





TOP VIEW



BOTTOM VIEW

3.13 CHANNEL OSCILLATOR

Purpose

To provide the heterodyning signal for both the transmit and receive mixers for up to six channels.

Outputs

3,4 to 16,4 MHz depending on channel selected. (600mV) (Z 100Ω)

Controls

TRIM control on front panel RV3.

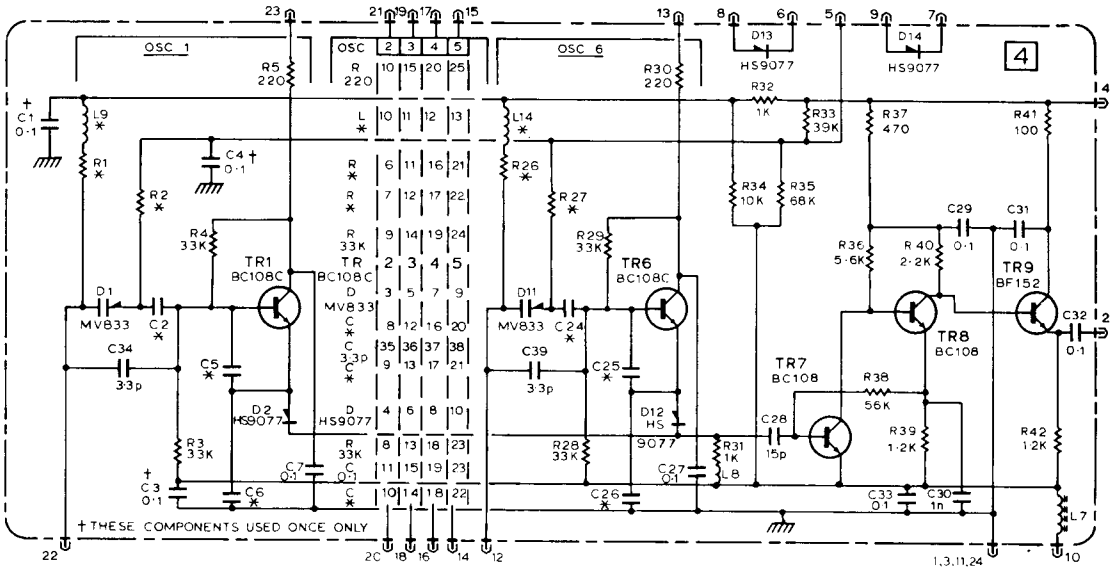
Circuit Description

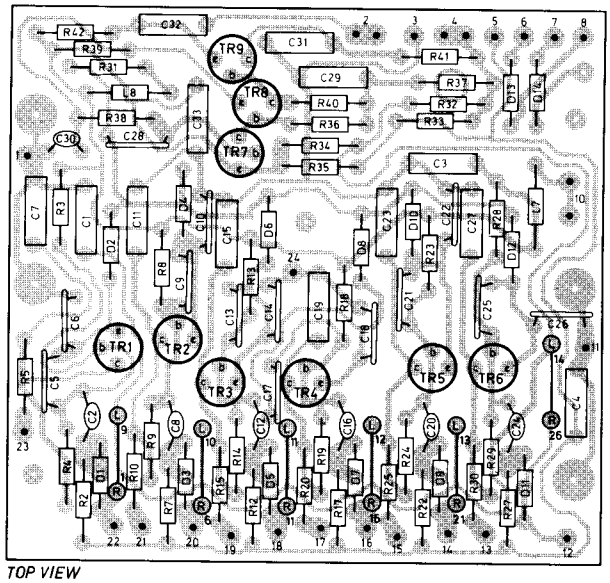
TR1-TR6 are connected as six identical grounded-collector Colpitts oscillator circuits. The crystals and associated trimming capacitors for each oscillator are connected in the base circuits of TR1-TR6 via pins 12, 14, 16, 18, 20 and 22.

The oscillator for the selected channel is activated by applying 9 V to the collector via the CHANNEL switch, the collectors of the oscillators not required being connected to the negative line. The TRIM control RV3 operates in the receive condition only and provides slight variation of the oscillator frequency. With D13 and D14 forward biased RV3 is in parallel with R23-R35. Operating RV3 changes the d.c. potential across the varicap diode D1 thereby varying the oscillator frequency.

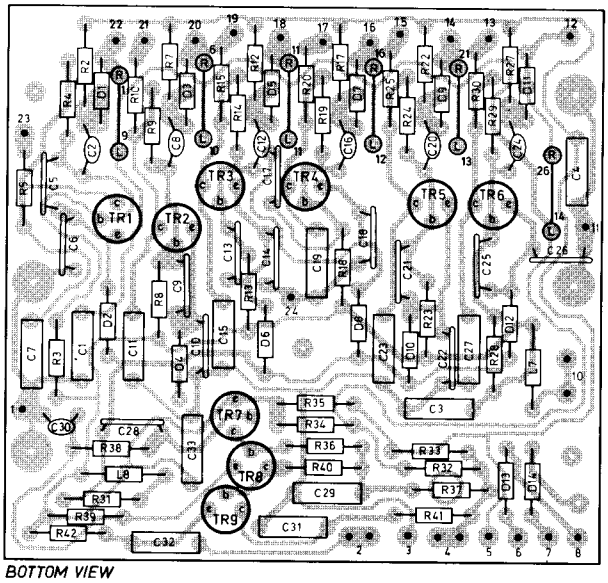
The oscillator output is fed via C28 to the base of TR7, which with TR8 forms a d.c. coupled amplifier pair. The amplified output at TR8 collector is fed directly to the base of TR9, an emitter follower. This emitter follower provides a low output impedance for the signal which is connected via C32 and pin 2 to the R.F. Amplifier and Balanced Mixer Boards.

CHANNEL OSCILLATOR





TOP VIEW



BOTTOM VIEW

3.14 SIDEBAND FILTER BOARD

Purpose

This board, employed in both transmit and receive modes, provides for selection of appropriate sideband signals. It may be equipped to cater for upper sideband working only, lower sideband working only or for switch selected USB/LSB working with a choice of standard (50dB) or high selectivity (60dB) filters in each case. Transmit/receive switching (and filter selection if appropriate) is effected by a system of gating diodes.

Inputs

TRANSMIT - Balanced Modulator output applied at pin 2 (50mV pev, Z 1 kΩ)

RECEIVE - RF Amplifier output applied at pin 1 (50μV, Z 1 kΩ)

Outputs

TRANSMIT - Single sideband signal for the Balanced Mixer at pin 8 (25mV pev, Z 1 kΩ)

RECEIVE - Single sideband signal for the IF Amplifier at pin 10 (25μV, Z 1 kΩ)

Circuit Description

TRANSMIT (Upper sideband working, lower sideband filter selected)

Transmit/receive switching potentials applied from the antenna changeover relay are positive at pin 4, negative at pin 5 while the MODE switch selects the lower sideband filter by applying a positive potential to pin 6, negative to pin 7. Diodes D2, D4, D5, D7, D10 and D12 are forward biased, with reverse bias on the remaining diodes.

The double sideband signal at pin 2 is fed to the lower sideband filter by way of D2 and D4 and the filter output, a 1,4 MHz lower sideband signal, passed via D10 and D12 to pin 8.

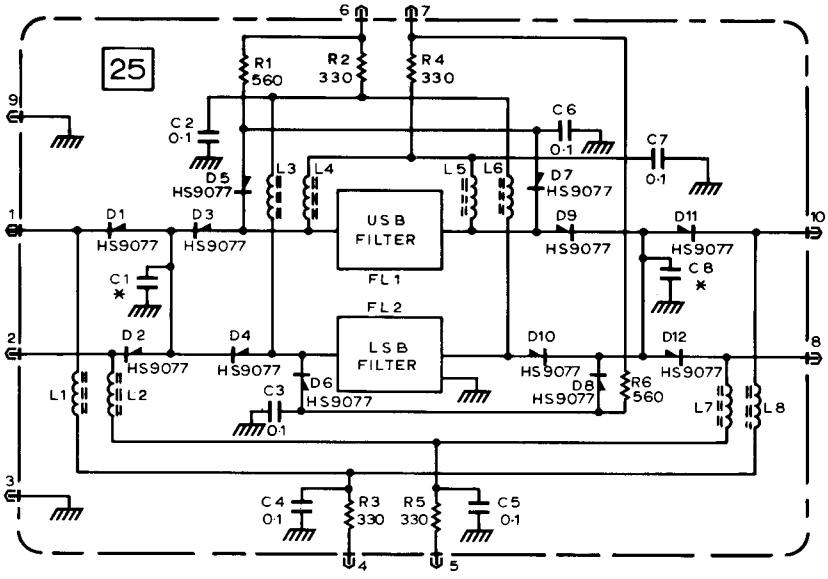
The upper sideband filter is short circuited to earth by D5, D7 and C6.

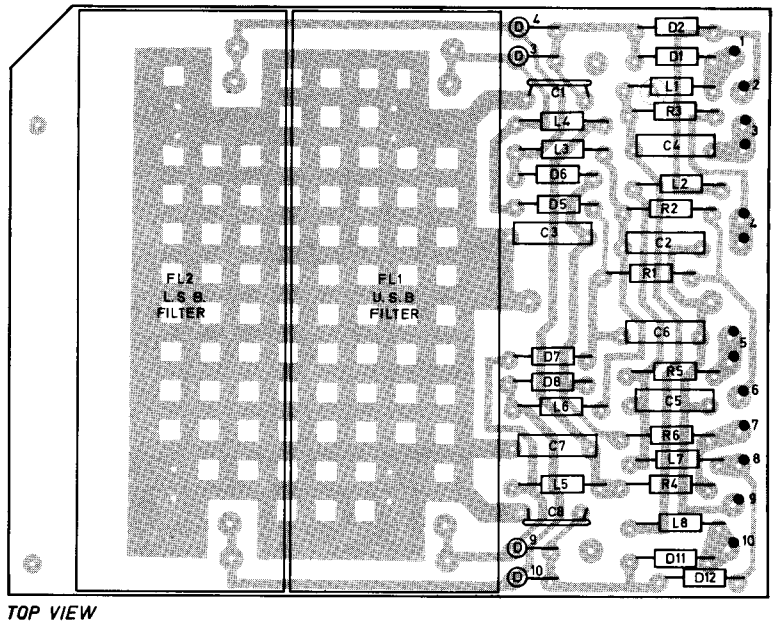
RECEIVE (Upper sideband working, lower sideband filter selected)

The switching potentials from the antenna changeover relay are negative at pin 4, positive at pin 5; the lower sideband filter is again selected by the application of a positive potential to pin 6, negative to pin 7 from the MODE switch. Forward bias is applied to diodes D1, D4 D10 and D11 and the remaining diodes are reverse biased.

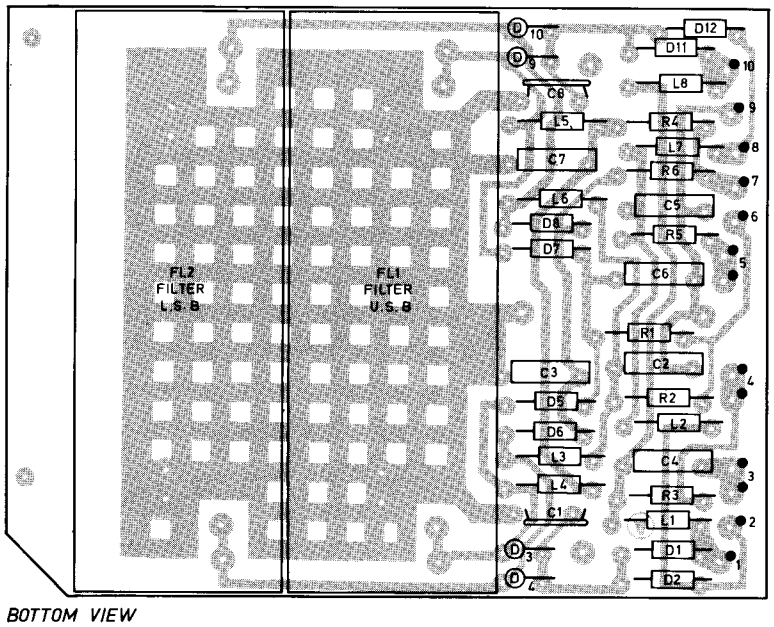
The r.f. input at pin 1 is fed via D1 and D4 to the lower sideband filter and the filter output, a 1,4 MHz lower sideband signal, passed by way of D10 and D11 to pin 10. As in the transmit case, the upper sideband filter is short circuited to earth by D5, D7 and C6.

SIDEBAND FILTER BOARD - AT27118/1&/2





TOP VIEW



BOTTOM VIEW

3.15 TRANSMITTER LEVEL SET UNIT

PURPOSE To provide the correct level of base bias on each channel in the transmit mode for TR1 in the R.F. Amplifier (1). (Independent gain adjustment for each channel).

INPUTS 9V d.c. applied by the CHANNEL switch to pins 1-6.

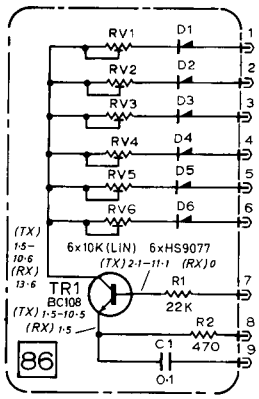
OUTPUTS The pre-set base current for each operative channel at pin 8 (1.5V-6V).

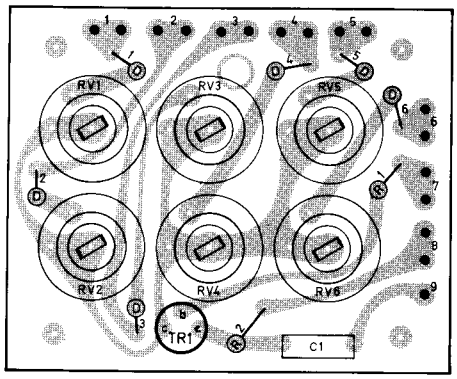
CONTROLS RV1-6 Set level components

CIRCUIT DESCRIPTION Assuming channel 1 is selected: D1 is forward biased, D2-D6 are reverse biased. Pin 7 is positive during the transmit function which permits current to flow through R1 and TR1 base-emitter junction thus turning on TR1.

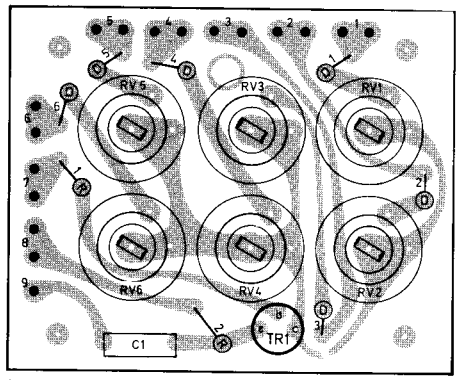
Since TR1 is saturated by the base current the collector potentiometer RV1 controls the collector and hence the emitter current that acts on TR1 (R.F. Amplifier) base which is subject to forward a.g.c. Thus the setting of RV1 controls the transmitter drive.

In the receive condition pin 7 is negative. TR1 is cut-off and the base potential of TR1 (RF Amp) is set by R7 and R8, (on the RF board).





TOP VIEW



BOTTOM VIEW

3.16 POWER AMPLIFIER

PURPOSE To produce 100 Watts Peak Envelope Power into the antenna.

INPUT 33V (PEV) final frequency single sideband from the transmitter tuned circuit board 82. (Z 2.7kΩ)

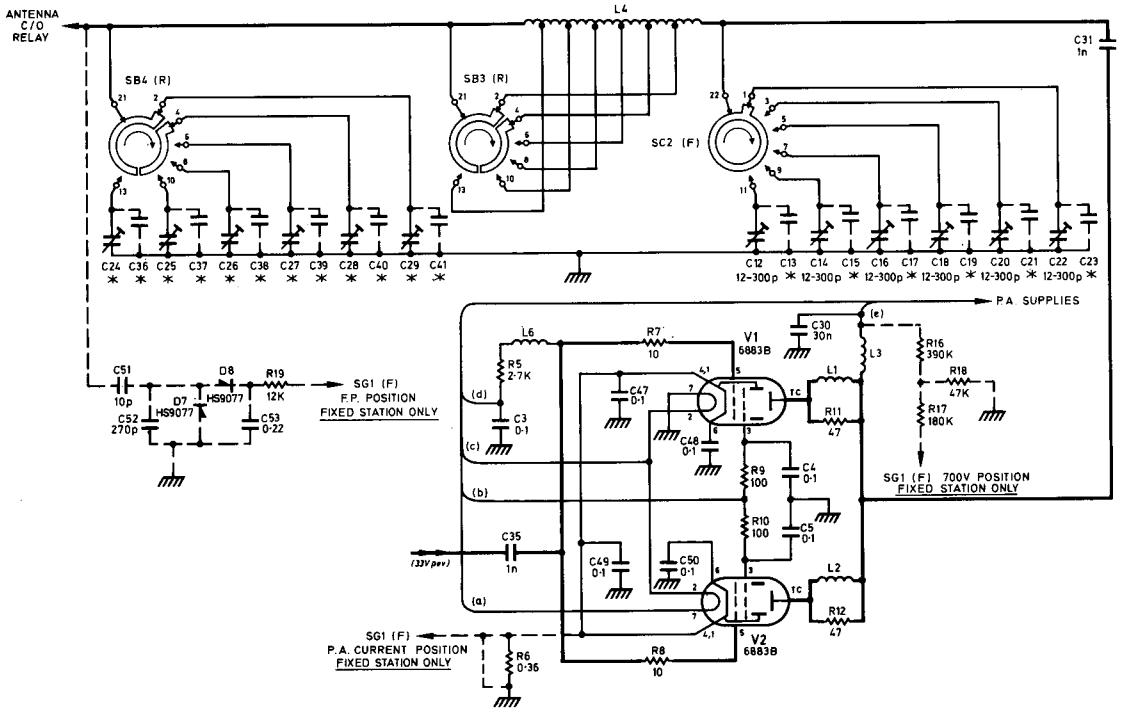
OUTPUT 100 Watts (P.E.P.) into the antenna (Z 30-80Ω depending on load).

CONTROLS RV4 "Grid Bias" control-sets the quiescent anode current of the power amplifier valves to 60mA total.

C24-29 Power amplifier anode circuit tuning capacitors.

C12, 14, 16, 18, 20, 22 Power amplifier loading. Adjusts the power amplifier circuit for antenna matching.

CIRCUIT DESCRIPTION The input from the Transmitter Tuned Circuits Board pin 3 is fed via SC1F, R7 and R8 to the grids of the two power tetrode valves. The anode circuit output of 100 Watts Peak Envelope Power is fed via the pi tank circuit and relay contact Tx/Rx4 to the antenna.



SECTION 4

ALIGNMENT AND SERVICING

4.1 TEST EQUIPMENT REQUIRED

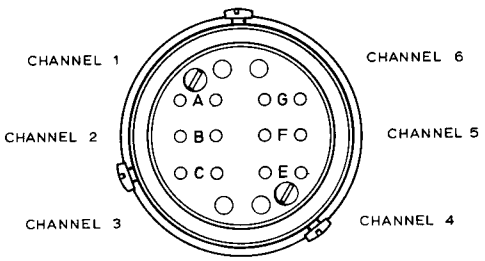
Description	Suitable Type
H.F. Signal Generator	Marconi TF2002
R.F. Power Meter	Marconi TF2503
A.F. Power Meter	Marconi TF893A
Frequency Counter	Marconi TF2424
or	
Suitably crystalled H.F. Receiver	See Item 4.5.b
Electronic Voltmeter	Marconi TF2604
Multimeter, 20 kΩ/V	Avo Model 8
Jack Plug	Rendar JP/500

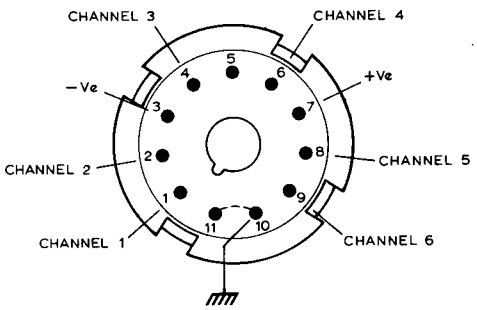
4.2 INITIAL CHECKS

1. Check that the resistance between PLA pins 5 and 13 is not less than 2MΩ.

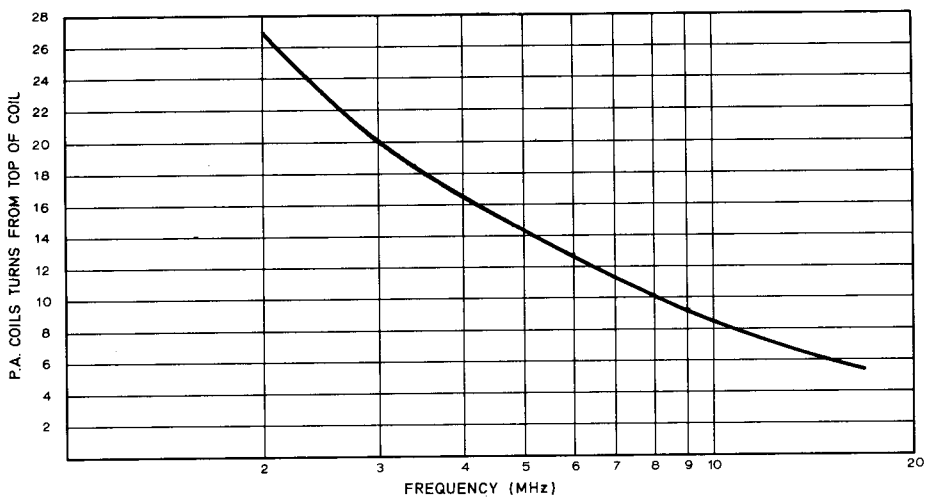
2. Check that the resistance between the junction of OD1/OR2 and chassis is not less than 2MΩ.

3. Insert channel crystals in the positions shown below.





4. Set the PA coil taps to the appropriate positions for the channel frequencies employed.



5. Set Mode switch to USB or LSB and set VOLUME and SQUELCH controls fully clockwise.

6. Set LOCAL/REMOTE switch (SSB 130F) or EXT/LOCAL switch on rear panel (SSB 130M) to LOCAL and ensure that the OFF/ON/S'BY switch is set to OFF.

7. Set 86RV6 fully clockwise.

8. Connect power supply to PLA, set OFF/ON/S'BY switch to ON and check that the POWER lamp lights.

9. After a 10 minute warm-up period, connect the multimeter set to the 30V range (d.c. for d.c. power supply unit, a.c. for a.c. p.s.u.) to pins 3 and 7 of the crystal oven base. Check that the multimeter reading alternates between zero and 12,5V as the thermostat operates.

10. Check that the Receiver Audio Amplifier TP1 is between 7,3V and 7,8V positive to board pin 10.

4.3 RECEIVER ALIGNMENT

1. Set HF Signal Generator output to CW, 100mV and connect to the antenna socket corresponding to the highest frequency channel.

2. Set the Channel selector to the highest frequency channel and adjust HF Signal Generator output frequency to give an audio tone at approximately 800Hz from the transceiver loudspeaker.

3. Connect the AF Power meter, set to 3Ω impedance 10W fsd, to the PHONE socket OJK1.

4. Tune L4, L6 and L8 (Channels 1, 3 or 5) or L3, L5 and L7 (Channels 2, 4 or 6) on the appropriate Common Tuned Circuit board for maximum audio output level, reducing HF signal generator output level as necessary to keep the audio level below 0,5W.

5. Tune 1L3 and 1L4 for maximum reading on the AF output meter.

6. Adjust 1RV1 for maximum reading on the AF Output meter.

7. Adjust 81T1 for maximum reading on the AF Output meter.

8. Repeat Operation 4 for all other crystalled channels; disconnect and remove test equipment.

4.4 TRANSMITTER ALIGNMENT

NOTES

(a) Operations 1 and 2 of this procedure are only applicable to a transmitter channel which has not previously been aligned, i.e. on change of channel frequency. In other instances, such as a check of alignment following component replacement, they should be omitted.

(b) It is important that a 50Ω load is connected to the appropriate antenna socket on the transceiver while transmitter alignment is effected. Connection of the RF Power meter specified at para. 4.1 provides a suitable termination, but if an alternative meter is used care must be taken to ensure that it provides a 50Ω load capable of dissipating 100W p.e.p.

1. Depending on the channel being aligned, set the following variable capacitors to the maximum capacity position :

Channel 1 :	Transmitter Tuned Circuit 1	C1; OC22; OC29
2 :		1 C3; OC20; OC28
3 :	Transmitter Tuned Circuit 2	C1; OC18; OC27
4 :		2 C3; OC16: OC26
5 :	Transmitter Tuned Circuit 3	C1; OC14; OC25
6 :		3 C3; OC12; OC24

2. Set the Transmitter Level Set unit potentiometer associated with the channel being aligned (Channel 1-RV1, Channel 2-RV2 etc.) fully clockwise.
3. Connect the RF Power meter to the appropriate antenna socket on the transceiver and the multimeter, set to the 10V d.c. range, positive to TP1 (red) and negative to TP2 (black) on the Power Supply unit.
4. Set the transceiver Mode switch to USB, CHANNEL selector to the appropriate channel and OFF/ON/S'BY switch to S'BY; allow a five minute warm up period.
5. Key the transmitter by short-circuiting pins 3 and 5 of the MIC socket OSKC and adjust the BIAS control ORV4 as necessary to set the multimeter reading to 0,8V.
6. Remove short circuit from pins 3 and 5 of the MIC socket and connect microphone or handset.
7. Operate press-to-talk switch and adjust 86RV1 for peak multimeter reading.
8. Set Mode switch to CW, operate press-to-talk switch and adjust C1 (Channels 1,3 or 5) or C3 (Channels 2, 4 or 6) on the appropriate Transmitter Tuned Circuit board to give a multimeter reading of 1,5V.
9. Operate press-to-talk switch and, turning the appropriate Transmitter Level Set potentiometer counter-clockwise as necessary, adjust OC22 (Chan.1), OC20 (Chan.2), OC18 (Chan.3), OC16 (Chan.4), OC14 (Chan.5) or OC12 (Chan.6) for a 'dip' in the multimeter reading.
10. Repeat Operations 8 and 9 as necessary to obtain a maximum 'dip' in the multimeter reading.
11. Operate press-to-talk switch and adjust OC29 (Chan.1), OC28 (Chan.2) OC27 (Chan.3), OC26 (Chan.4), OC25 (Chan.5) or OC24 (Chan.6) for maximum reading on the R.F. Power meter.
12. Operate press-to-talk switch and, while adjusting the appropriate Transmitter Level Set unit potentiometer to maintain a multimeter reading of approximately 2,6V (d.c. operated power supply unit) or 2,9V (a.c. operated power supply unit), tune 84T1 for maximum multimeter reading.
13. Note exact multimeter reading, then turn the appropriate Transmitter Level Set unit potentiometer counter-clockwise to reduce multimeter reading by 0,1V.

    NB: Although the RF Power meter may indicate less than 100W, the p.e.p. will be 100W or greater under dynamic conditions. The appropriate potentiometer on the Transmitter Level Set unit may be adjusted slightly clockwise to increase the effective microphone sensitivity if necessary, but care must be taken to ensure that the voltage between TP1 and TP2 on the Power Supply unit does not exceed 3,0V.

14. Set the Mode switch to AM, 81RV1 fully clockwise, then turn 81RV1 counter-clockwise to give a RF Power meter reading of 25W.
15. Repeat this alignment procedure for all crystalled channels.
16. Set the transceiver OFF/ON/S'BY switch to OFF; disconnect and remove all test equipment.

4.5 FREQUENCY TRIMMING

The six crystal trimming capacitors OC6 - 11 mounted above the Channel Oscillator board are pre-set at the factory and should not normally require adjustment. If, however, Channel Oscillator components or channel crystals are changed, carry out the following procedure:-

a. Using a Frequency Counter

1. Loosely couple the frequency counter to the transceiver P.A. tank circuit.
2. Connect R.F. Power meter to the appropriate ANTenna socket.
3. Set the Mode switch to AM and the Channel selector to the required Channel.
4. Set the OFF/ON/S'BY switch to S'BY, operate the press-to-talk switch and adjust the appropriate trimming capacitor for a frequency counter reading of f_x - 1,4 MHz where f_x is the channel oscillator crystal frequency.

b. Using a Monitor SSB Receiver

1. Place the monitor receiver and the transceiver under test in close proximity to one another.
2. Connect the R.F. Power meter to the appropriate ANTenna socket on the transceiver under test, select the corresponding channel, set the Mode switch to either USB AM or LSB AM and set the OFF/ON/S'BY switch to S'BY.
3. Switch on the monitor SSB receiver, select corresponding channel and sideband and ensure that the Trim control is set to the mid-position of its travel.
4. Operate the press-to-talk switch on the transceiver under test and adjust the appropriate crystal frequency trimming capacitor for zero beat in the monitor receiver loudspeaker.
5. Disconnect and remove test equipment, connect antenna to transceiver under test and establish two-way communication with an associated station to check that communication is free from distortion.

4.6 CARRIER SUPPRESSION

Carrier suppression is pre-set at the factory and will not normally require adjustment. If, however, components of the Balanced Modulator are disturbed in any way the following procedure should be carried out.

1. Connect an Electronic Voltmeter to the tag on OTS1 corresponding to the highest frequency channel and connect the RF Power meter to the appropriate ANTenna socket.
2. Set Mode switch to either USB or LSB, Channel switch to the highest frequency channel, OFF/ON/S'BY switch to S'BY and allow a five minute warm up period.

3. Insert Morse key plug in OJK2, set TX/RX switch to TX and adjust 81C6 for minimum reading on electronic voltmeter.
4. Disconnect and remove test equipment.

4.7 CHANNEL OSCILLATOR SUPPRESSION

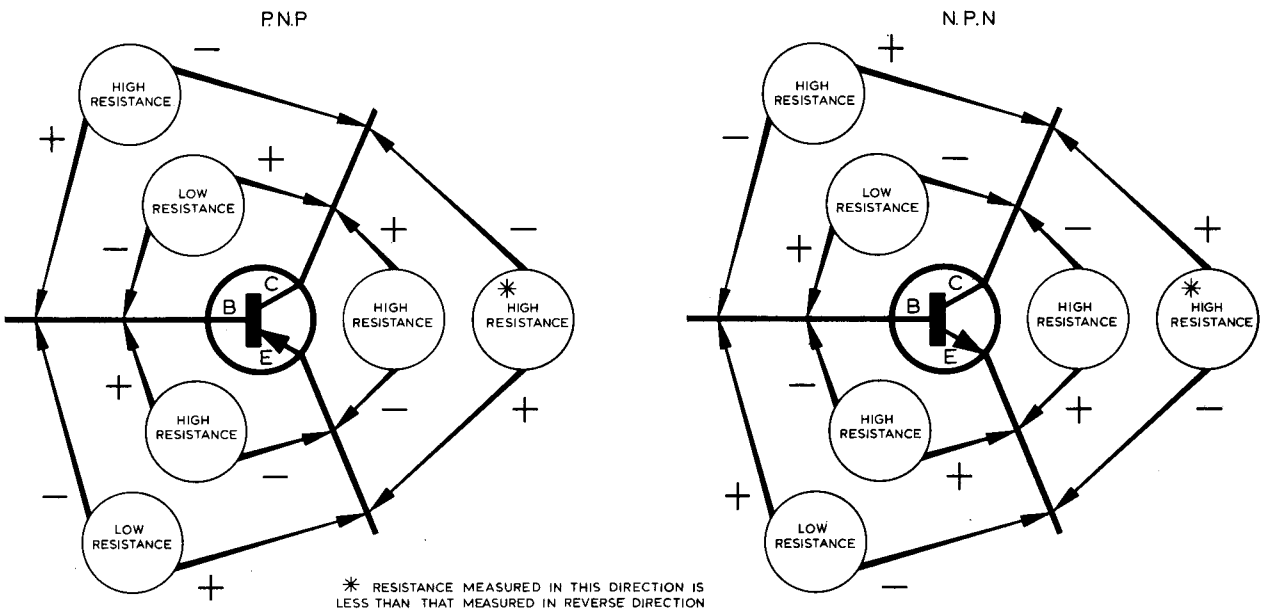
Channel oscillator suppression is pre-set at the factory and will not normally require adjustment. If, however, components of the Balanced Mixer are disturbed in any way the following procedure should be carried out.

1. Connect an Electronic Voltmeter to the tag on OTS1 corresponding to the highest frequency channel and connect the RF Power meter to the appropriate ANTenna socket.
2. Set the Mode switch to either USB or LSB, Channel selector to the highest frequency channel, OFF/ON/S'BY switch to S'BY and allow a five minute warm up period.
3. Insert Morse key plug in OJK2, set TX/RX switch to TX and adjust 84RV1 for minimum reading on electronic voltmeter.
4. Disconnect and remove test equipment.

4.8 SEMICONDUCTOR NOTES

Transistors

Should a transistor be suspected of failure, this may be confirmed by reference to the typical voltages shown on the appropriate circuit diagram. When it is necessary to check each junction with a multimeter, it must be borne in mind that it is possible for a junction to be destroyed by an excessive applied voltage. When used for these checks, a multimeter should be set to the resistance range which applies a test voltage not greater than 1,5V (Ω x1 on an Avo Model 8).



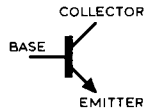
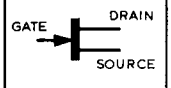
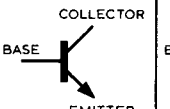
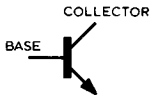
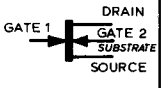
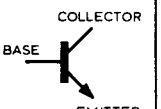
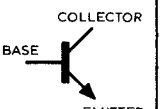
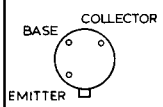
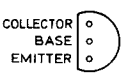
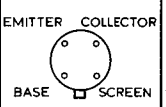
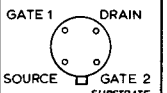
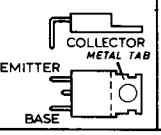
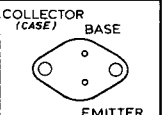
✳ RESISTANCE MEASURED IN THIS DIRECTION IS LESS THAN THAT MEASURED IN REVERSE DIRECTION

IF A STANDARD AVOMETER IS USED FOR CONTINUITY CHECKS, THE RED LEAD IS NEGATIVE

Diodes

The switching diodes used in the SSB130 have a forward voltage drop of approximately 0,7V when conducting. A serviceable diode will have a low forward impedance (approximately 1 kΩ when measured by an Avo Model 8 set to the Ω x1 range) and a high reverse impedance. Since the forward conduction characteristic of a diode is non-linear, misleadingly high forward impedance readings will be obtained if the applied potential is insufficient to make the diode conduct fully.

TRANSISTOR CONNECTIONS

TRANSISTOR	BC108 BF152 BFY52 2N3553	2N3819	PBC108	BF167	3N126	2N5295	2N3055 2N3771
SCHEMATIC							
CASE OUTLINE							

SECTION 5

ADDITIONAL FACILITIES

5.1 FIXED STATION PHONE PATCHING FACILITY MODULE

The module employs the following units:

600Ω Attenuator
600Ω Amplifier
VOX and Anti-Trip Unit
Compressor
Switch and Amplifier Unit

General Description

When a telephone subscriber wishes to be connected to the SSB transceiver, the local operator with the SSB LOCAL/REMOTE switch in the LOCAL position, establishes the radio link and then places the LOCAL/REMOTE switch to the REMOTE position. The local microphone is disconnected from the transmitter and the telephone subscriber is connected to the transceiver.

Audio signals from the telephone subscriber are fed via the hybrid transformer and 600Ω attenuator to the Compressor which provides a reasonably constant output to the transmitter modulator for variations in input of up to 30db. The Compression amplifier output is fed to the transceiver modulator via SF (a contact of the local/remote switch) and the VOX section of the VOX and Anti Trip circuit. On receipt of audio signals from the telephone subscriber the voice operated switch produces an output to energise the VOX relay a contact of which is employed to energise the trans/receive relay of the SSB transceiver.

The voice operated switch has an adjustable delay incorporated so that the VOX relay remains energised during natural pauses in speech (0-4 secs).

Audio signals from the SSB receiver are fed via the 600Ω amplifier and the receive leg of the hybrid transformer to the telephone subscriber. The hybrid transformer is balanced to provide approximately 26db of isolation between the transmit and receive paths. However, due to the performance capabilities of the compressor it is possible that a receive signal could cause the VOX and trans/receive relays to be energised. Operation of the VOX relay during the receive functions is inhibited by use of the Anti-Trip circuit. The audio output from the transceiver Balanced Modulator is fed to the first stage of the Switch and amplifier unit, outputs are taken to the 600Ω amplifier and the second stage of the Switch unit, TR2. The output from TR2 is fed to the Anti Trip unit, rectified to produce a d.c. potential which is used to prevent the VOX circuit from operating during the receive function.

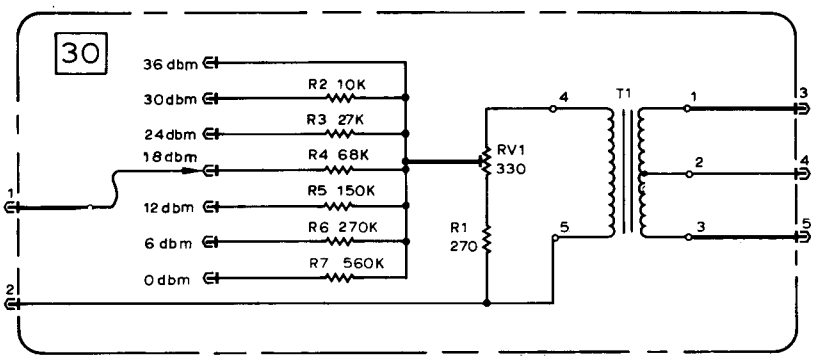
5.1.1 600Ω INPUT ATTENUATOR

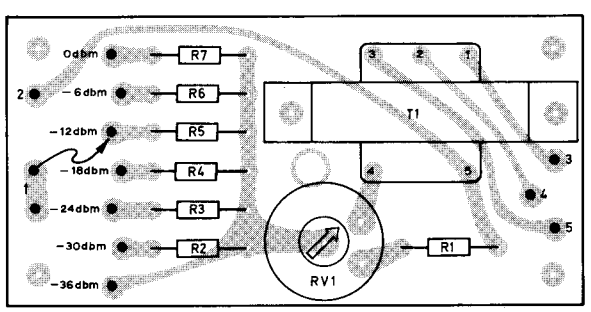
Attenuation is selected by the connection of a flying lead between pin 1 and tappings 1-7 as follows:-

Tappings 1-7	Level Setting
1	-36 dbm
2	-30 dbm
3	-24 dbm
4	-18 dbm
5	-12 dbm
6	-6 dbm
7	0 dbm

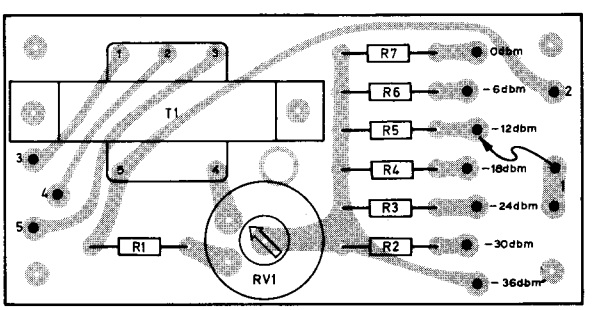
Fine Attenuation of between 0-6 db can be set by RV1.

Transformer T1 provides impedance matching between the unit input (balanced hybrid transformer) and the 600Ω attenuator.





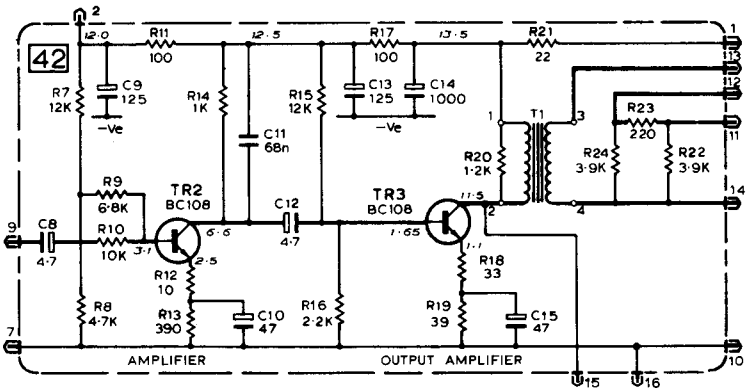
TOP VIEW

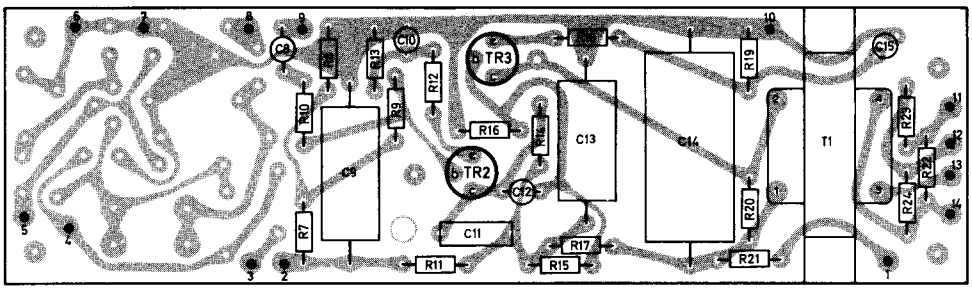


BOTTOM VIEW

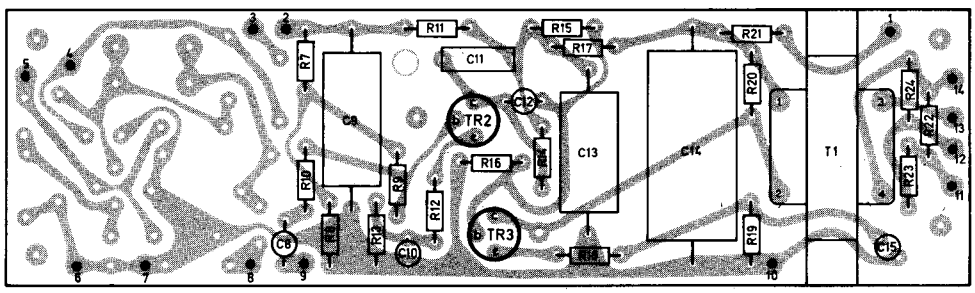
5.1.2 600Ω AUDIO AMPLIFIER

An audio frequency input is applied to pin 9 from the chassis-mounted 600Ω LEVEL control, ORV7, by-passing the pre-amplifier stage TR1 which is not used in this application. The signal is amplified by a two-stage R-C coupled amplifier TR2, TR3, the un-decoupled emitter resistors R12 and R18 providing negative feedback, and passed via a 600Ω output impedance matching transformer T1 to pins 13 and 14. When required, a 3dB attenuator pad R22-24 may be inserted in the output line by linking pins 12 and 13 and taking the attenuated output from pins 11 and 14.





TOP VIEW



BOTTOM VIEW

5.1.3 VOX AND ANTI-TRIP UNIT

VOX

Audio enters the unit via the externally mounted VOX SENSitivity control ORV6 at pin 3 and is fed to the base of emitter follower TR3. With no audio input, TR4 is saturated by base current through R12; the resulting low potential at TR6 base cuts off TR6 and TR7.

When an a.f. signal is applied, the output across TR3 emitter resistor is rectified by TR4 base/emitter junction. TR4 base potential moves towards OV, reducing TR4 collector current and allowing TR6 base potential to rise. TR6 is turned on, allowing TR7 to conduct, regenerative feedback via R16 causing both transistors to be saturated. The Vox relay connected between pins 5 and 6 is energised, switching on the transmitter.

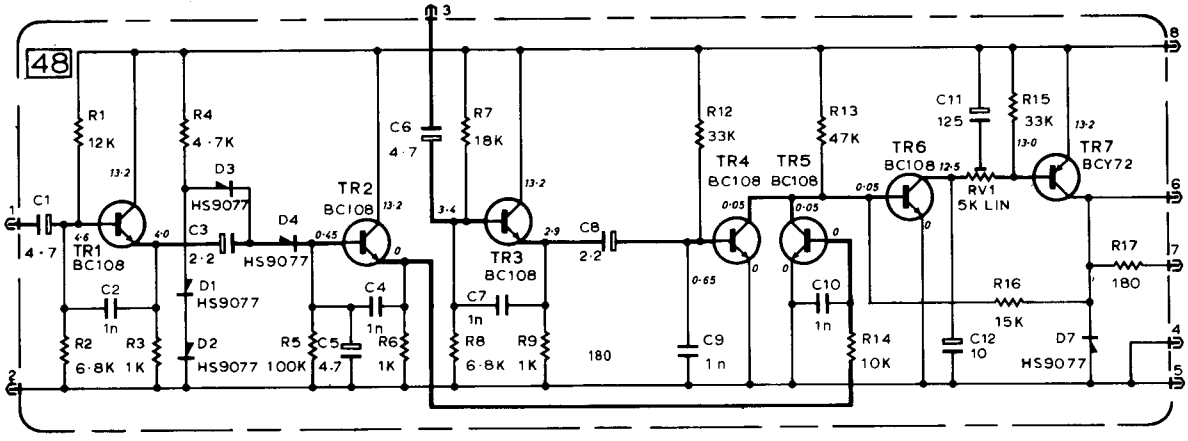
RV1 in conjunction with C11, delays TR6 and TR7 cut-off on cessation of the audio signal input to ensure that the transmitter remains operative during short pauses in speech.

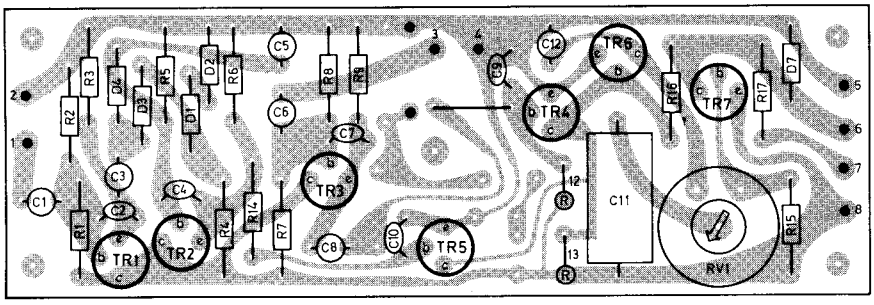
ANTI-TRIP

Received audio is applied via pin 1 to the base of TR1, an emitter follower, the output of which is applied via C3 to detector diodes D3, D4. Under no signal conditions, D3 and D4 are not sufficiently forward biased by the potential at the junction of R4 and the temperature compensating diodes D1, D2 for the potential across R5 to cause TR2 to conduct. TR5 is also cut off and has no effect on the operation of the Vox circuit.

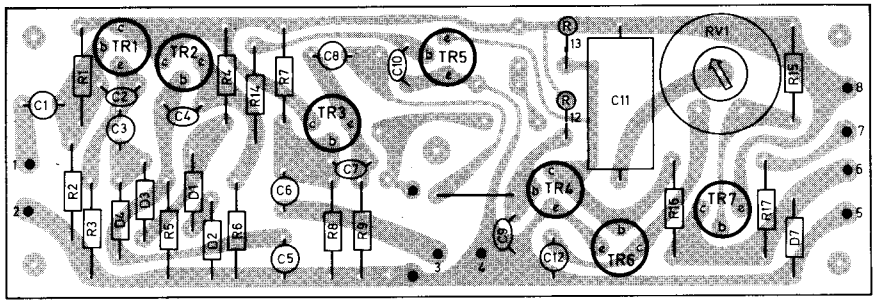
On receipt of a signal, the resulting positive potential across R5 turns on TR2. The potential across R6 is fed via R14 to the base of TR5 which conducts, holding TR4 collector potential at approximately OV and inhibiting the Vox circuit.

VOX AND ANTI-TRIP UNIT





TOP VIEW



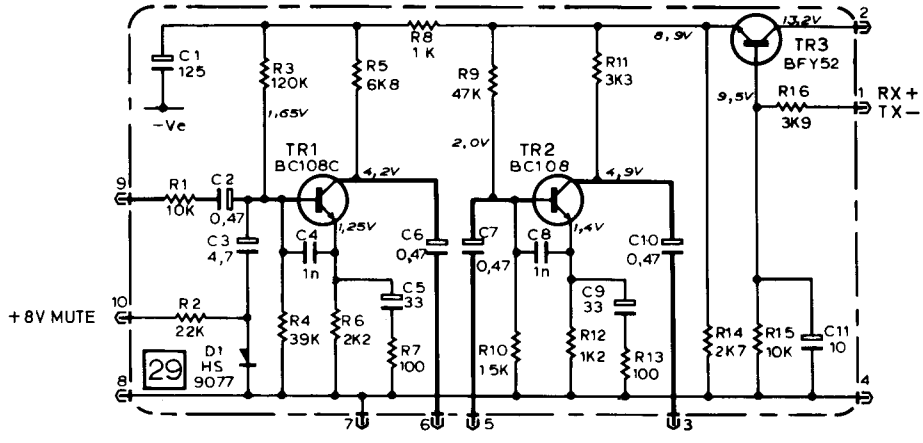
BOTTOM VIEW

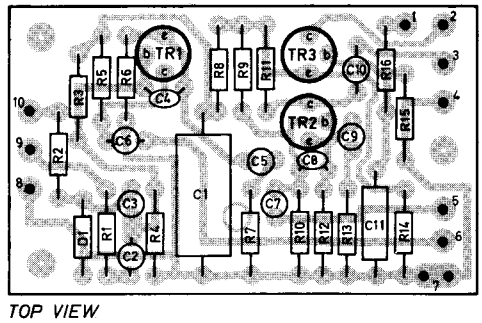
5.1.4 SWITCH AND AMPLIFIER UNIT

The unit carries two amplifier stages with their power supply controlled from the transceiver transmit/receive switching circuits. Provision is made for muting the a.f. input to TR1 by means of an input from the Squelch circuit.

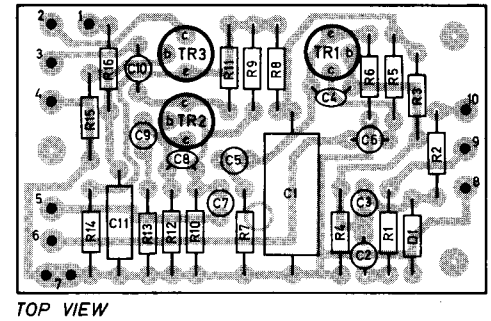
When the transceiver is in the transmit mode, pin 1 is connected to negative. TR3 is cut off, open circuiting the power supply from pin 2 to TR1 and TR2. In the receive mode, the polarity of pin 1 switching potential is reversed and +ve13,2V applied. C11 charges through R16, delaying the application of power to TR1 and TR2 so that the "received audio" path is inoperative until all receive circuit switching is complete. When C11 is charged, TR3 base potential is held at +ve 9,5V by potential divider R16/R15 and TR3 emitter provides a positive supply at approximately 9,0V for the amplifier circuits. Provided that a signal above the squelch level is being received, the potential applied to pin 10 from the Squelch unit is at OV and the signal from the Receiver A.F. unit at pin 9 is applied to TR1 via R1 and C2. The amplified a.f. at pin 6 is taken to ORV7, the 600Ω O/P LEVEL control and to ORV5 which controls the ANTI TRIP LEVEL. The slider of ORV5 is connected to pin 5, applying an audio signal at a level determined by the setting of the control to TR2 base. The amplified output at TR2 collector is passed by way of C10 to pin 3 for application to the Vox and Anti-trip unit.

Under no-signal conditions, or when the transmit mode is selected, the Squelch unit output applied to pin 10 is at approximately +ve 8V. D1 conducts and any a.f. at TR1 base is shunted to the negative line via C3 and the conducting diode.





TOP VIEW



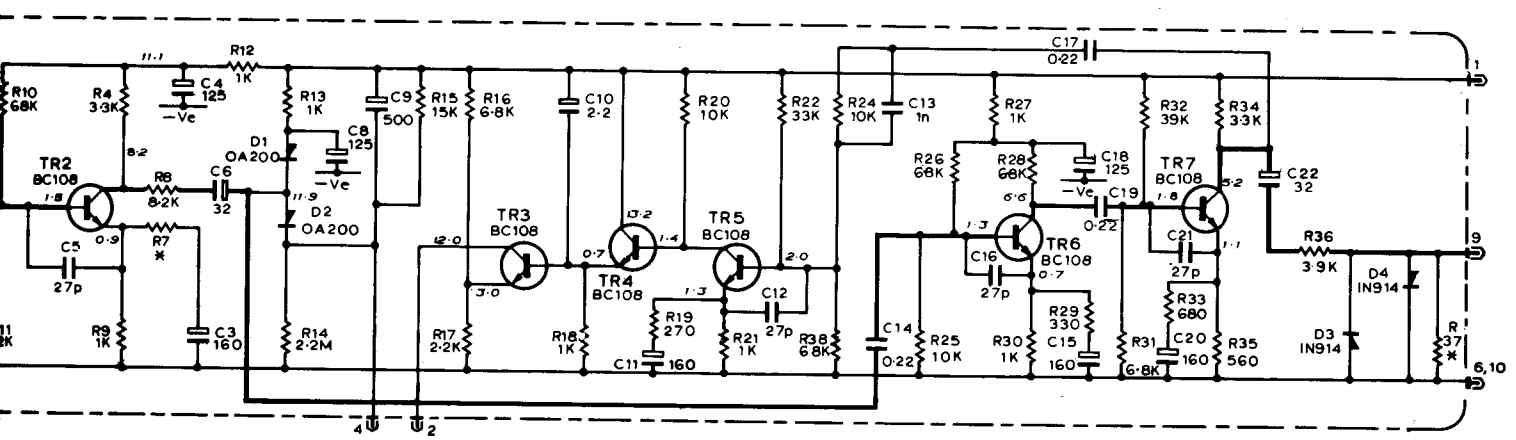
TOP VIEW

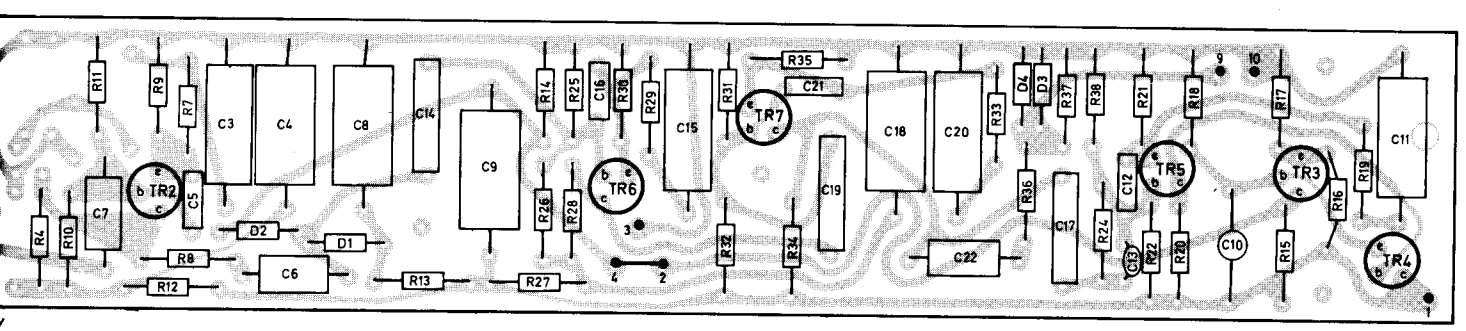
5.1.5 COMPRESSOR UNIT

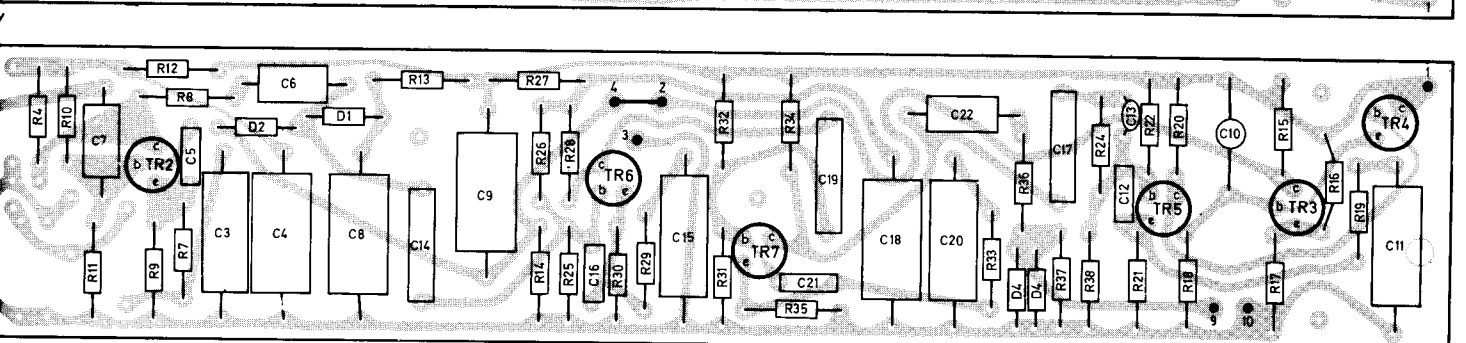
he compressor unit will maintain a substantially constant output level
riations in input of up to 30 db.

he input to the unit at pin 5 is applied to the base of the pre-amplifier
TR2. Signals developed across the collector load R4 are passed via
6 and C14 to the base of TR6. The common emitter amplifiers
nd TR7 are connected in cascade.

he output at the collector of TR7 is passed out of the board at pin 9
e peak clipping circuit D3, D4; and via C17, C13 and R24 to the
ession amplifier control circuits. The feedback signal is amplified
5 and applied to the base of the emitter follower TR4. TR4 emitter
ial charges C10 to a potential dependant on the signal amplitude.
otential controls the d.c. amplifier TR3 which in turn controls the
t through the network R13, D1, D2 & R14. This network in
ction with R8 forms a potential divider whose attenuation is
tional to signal amplitude thereby producing the compression
teristic.







VIEW

5.1.6 PHONE PATCH FACILITY MODULE - SETTING UP PROCEDURE

The equipment is despatched from the factory with the Phone Patch Facility Module adjusted to cater for the following line levels:-

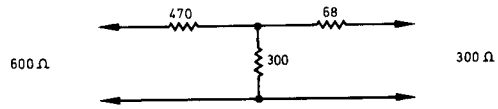
Receiver to line	350mV into 300Ω
Line to transmitter	170mV from 300Ω

The 300Ω impedance corresponds to two active telephone instruments in parallel, i.e., local operator and subscriber.

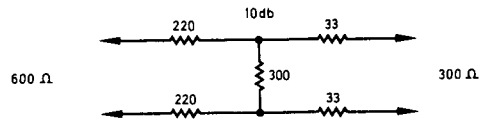
Test Equipment Required

Description	Suitable Type
H.F. Signal Generator	Marconi TF2002
R-C Oscillator	Marconi TF1101
Electronic Voltmeter	Marconi TF2604
Oscilloscope	Telequipment D52
R.F. Power Meter	Marconi TF2503
Matching Pad	See below

Matching pad for use with test equipment with input/output isolated from earth:



Matching pad for use with test equipment with unbalanced (one side connected to earth) input/output :-



All resistors 2%, 0,25W, Pye Part Numbers as follows:-

33Ω	PL99136
68Ω	PL99140
220Ω	PL99146
300Ω	2x 150Ω PL99144 in series
470Ω	PL99150

Preliminaries

1. Connect the 300Ω side of the matching pad to pins 1 and 3 of the facility module 600Ω input/output plug OPLD.
2. Connect the R-C Oscillator, set to give zero output, to the 600 Ω side of the matching pad.
3. Set the transceiver Channel selector to the highest frequency channel and connect the R.F. Signal Generator to the corresponding ANTenna socket.
4. Unsolder the lead connected to pin 9 of the VOX relay.
5. Link pin 1 of the 600Ω Attenuator board to R4 (18dBm input point) and set 30RV1 fully clockwise.

Setting Up Procedure

1. Set the transceiver OFF/ON/S'BY switch to ON, SQUELCH control fully clockwise, and adjust R.F. Signal Generator output frequency to produce a tone at approximately 800 Hz in the loudspeaker. Set R.F. Signal Generator output level to 20μV e.m.f.
2. Set the transceiver LOCAL/REMOTE switch to REMOTE.
3. Connect the Electronic Voltmeter, set to the 3,0V a.c. range, to pins 13 and 14 of the 600Ω Amplifier and adjust the 600Ω O/P LEVEL control to give a voltmeter reading of 2,5V (+10 dBm).
4. Set the ANTI TRIP LEVEL control fully clockwise and 48RV1 fully counter-clockwise.
5. Transfer the Electronic Voltmeter to pins 3 and 5 of the 600Ω Input Attenuator and adjust the hybrid balance control ORV8 for minimum voltmeter reading. Check that this reading is not greater than 125mV.
6. Transfer the Electronic Voltmeter to the 300Ω side of the matching pad and check that the meter reading is not less than 350mV (-4 dBm).
7. Adjust the 600Ω O/P LEVEL control to set meter reading to 350mV, set VOX SENSITIVITY control fully clockwise, ANTI TRIP LEVEL control fully counter-clockwise and check that the front panel VOX lamp is lit.
8. Transfer Electronic Voltmeter to pins 3 and 4 of the Switch and Anplifier board and turn the ANTI TRIP LEVEL control clockwise until the VOX lamp is just extinguished.
9. Note the Electronic Voltmeter reading (V) and turn the ANTI TRIP LEVEL control further clockwise to increase the Electronic Voltmeter reading by 10 db (3,2V).
10. Disconnect the R.F. Signal Generator and connect the R.F. Power meter to the vacated ANTenna socket.
11. Reduce the Electronic Voltmeter voltage range setting to produce a large meter deflection and note the meter reading (V).

12. Turn the SQUELCH control counter-clockwise until the transceiver loudspeaker is just muted and check that the reading on the Electronic Voltmeter is reduced by at least 20 dB (maximum acceptable reading $\frac{V}{10}$).

13. Connect the Electronic Voltmeter and oscilloscope Y input in parallel to pins 9 and 10 of the Compressor.

14. Set the R-C Oscillator output to 800 Hz, adjust level so that the Compressor is operating at the compression threshold and note R-C Oscillator output level.

15. Set R-C Oscillator output level 30 dB above that noted at Operation 14 and check that the Electronic Voltmeter reading is between 200mV and 250mV.

16. Set R-C Oscillator output level 6 dB above that noted at Operation 14 and check that the VOX lamp is lit.

17. Rotate the VOX SENSITIVITY control counter-clockwise until the VOX lamp is just extinguished and check that the control is less than 110^{o} (approximately three divisions) from the fully counter-clockwise position.

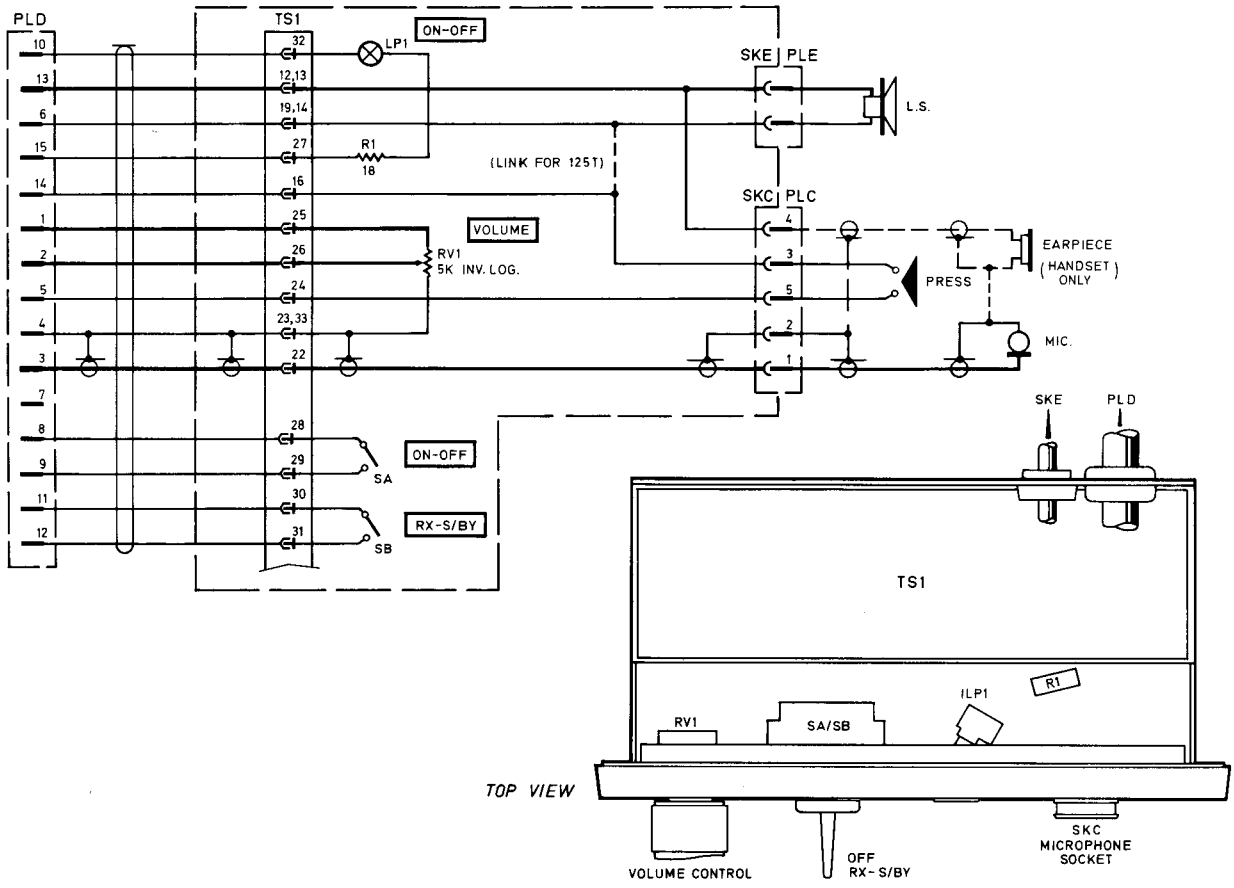
18. Increase R-C Oscillator output level until VOX lamp lights. Adjust 48RV1 so that VOX lamp remains lit for approx. 2 seconds after R-C Oscillator output is switched off.

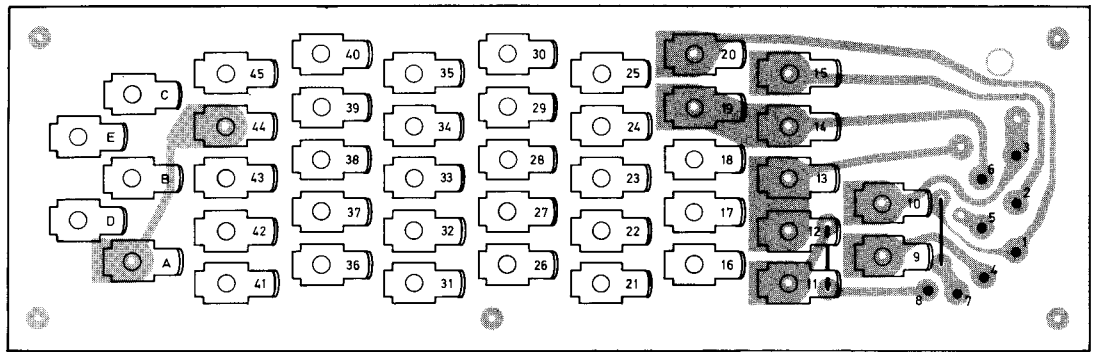
Conclusion

1. Set the transceiver OFF/ON/S'BY switch to OFF.

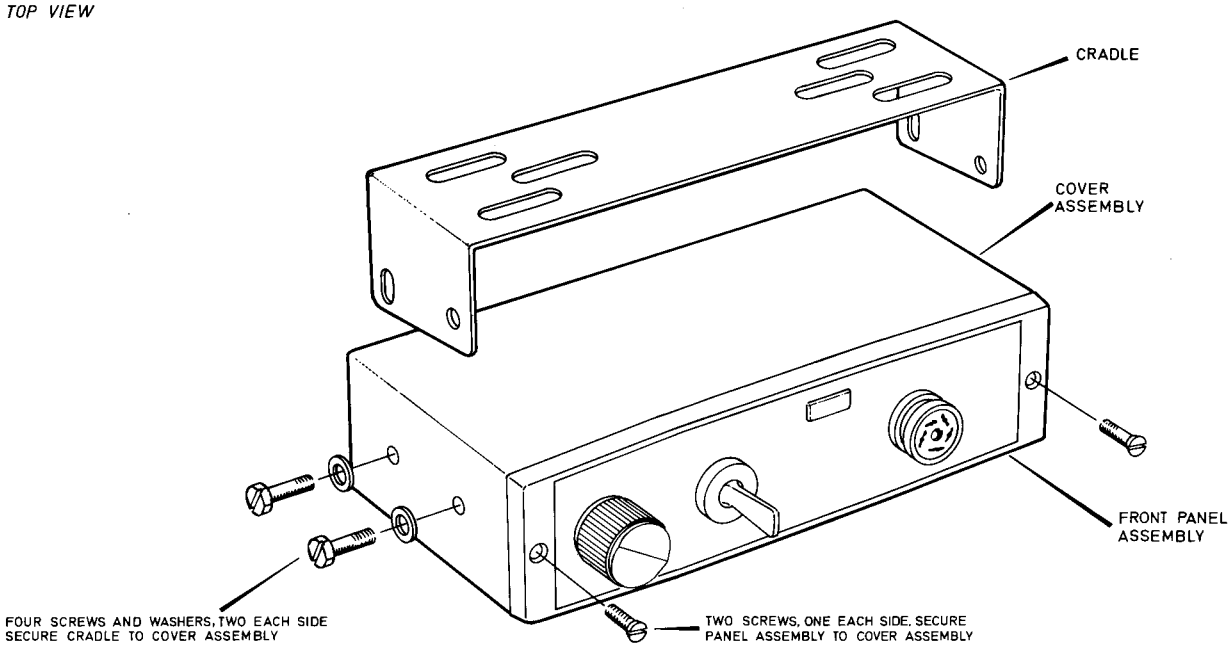
2. Disconnect and remove all test equipment, re-connect lead to pin 9 of VOX relay.

5.2 EXTENSION CONTROL UNIT FOR MOBILE SSB





TOP VIEW



5.3 ANTENNA TUNING UNITS

Three antenna tuning units are available, each covering part of the 2-16 MHz frequency band, enabling a single antenna to operate effectively over a relatively wide band of frequencies.

ATU 1L - 2-4 MHz in conjunction with whip antenna FA00543 or a vertical wire antenna of similar electrical length.

ATU 1M - 3-8 MHz in conjunction with whip antenna FA00549 or a vertical whip antenna of similar electrical length.

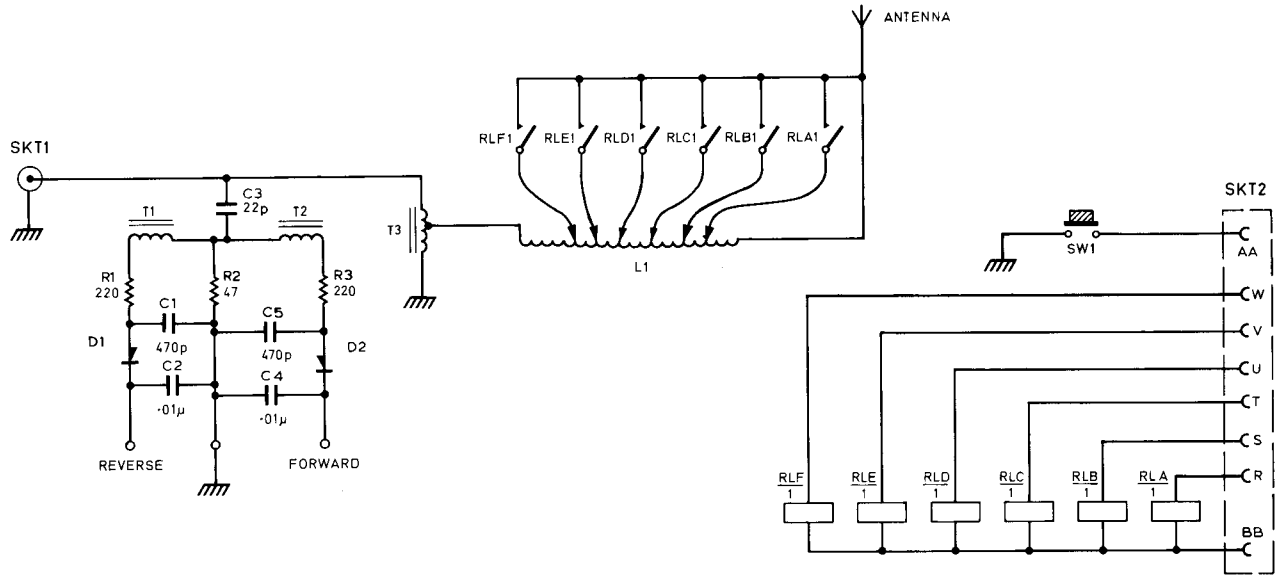
ATU 1H - 6-16 MHz in conjunction with whip antenna FA00554 or a vertical whip antenna of similar electrical length.

All three units have a power handling capacity of 150W and are mounted in a weatherproof case of the following dimensions :

Height	330mm (13 inches)
Width	183mm (73/16 inches)
Depth	133mm ($5\frac{1}{4}$ inches)

The units weigh approximately 2,5 kg ($5\frac{1}{2}$ lb).

The tuning unit incorporates a reflectometer, an impedance matching transformer and a tapped loading coil. Relays, controlled from the transceiver channel selection switch, are used to connect the antenna to the appropriate tap for each channel. Push-button switch SW1 provides a 'press-to-transmit' facility for use during the setting up procedure when L1 tapping points are adjusted to give a quarter-wave resonance condition in an antenna which is physically shorter than a quarter of the channel wavelength.



Installation

Fixed Station

Attatch the antenna tuning unit, using the 6mm (3/16 in.) holes drilled in the mounting straps, to a metal or wooden stake close to the antenna.
Ensure that the transceiver antenna sockets corresponding to the channels to be used with the antenna are wired in parallel and connect one of these sockets to SKT1 on the antenna tuning unit by way of a suitably terminated co-axial cable.

Connect an 8-way cable between transceiver SKB and SKT2 on the antenna tuning unit; connect the antenna to the insulated terminal on top of the unit. Where a wire antenna is employed, an insulated strain relief link should be used to prevent mechanical loading of the tuning unit antenna terminal.

A good ground system, to which the antenna tuning unit case may be connected by a length of copper braid, should be used wherever possible. Ideally, up to 120 radial ground wires, each approximately equal to a half wavelength at the lowest frequency in use, should be employed. The gauge of wire is of secondary importance, 1,25mm (18 swg) being adequate, but it should be noted that a large number of short wires is preferable to a few long ones. It is not necessary to bury the wires if they are unlikely to be disturbed on the surface.

Mobile Station

Ensure that the transceiver antenna sockets are wired in parallel.

Mount the antenna on the vehicle as described in Section 2 of this Service Manual and mount the antenna tuning unit as close as possible to the antenna base.

Connect the antenna to the insulated terminal on top of the antenna tuning unit; and connect a length of copper braid between the unit case and the vehicle chassis.

Using suitably terminated co-axial and 8-way cables, connect antenna tuning unit sockets SKT1 and SKT2 to the transceiver antenna socket and SKB respectively.

Setting Up Procedure

Test equipment required : Multimeter, 20 kΩ/V (PYE TM1A or AVO Model 8)

NOTE: This procedure must be repeated following any change of channel frequency allocation or if the length of wire between the antenna and the antenna tuning unit is changed.

1. Set the transceiver OFF/ON/S'BY switch to S'BY, mode selector to 'CW' and channel selector to '1'.

2. Refer to the ATU Coil Tapping Chart and connect channel 1 tap to the position on L1 appropriate to channel 1 frequency.

3. Connect multimeter, set to 2,5V d.c. range, negative to earth and positive to the antenna tuning unit forward power terminal (identified by a red dot).

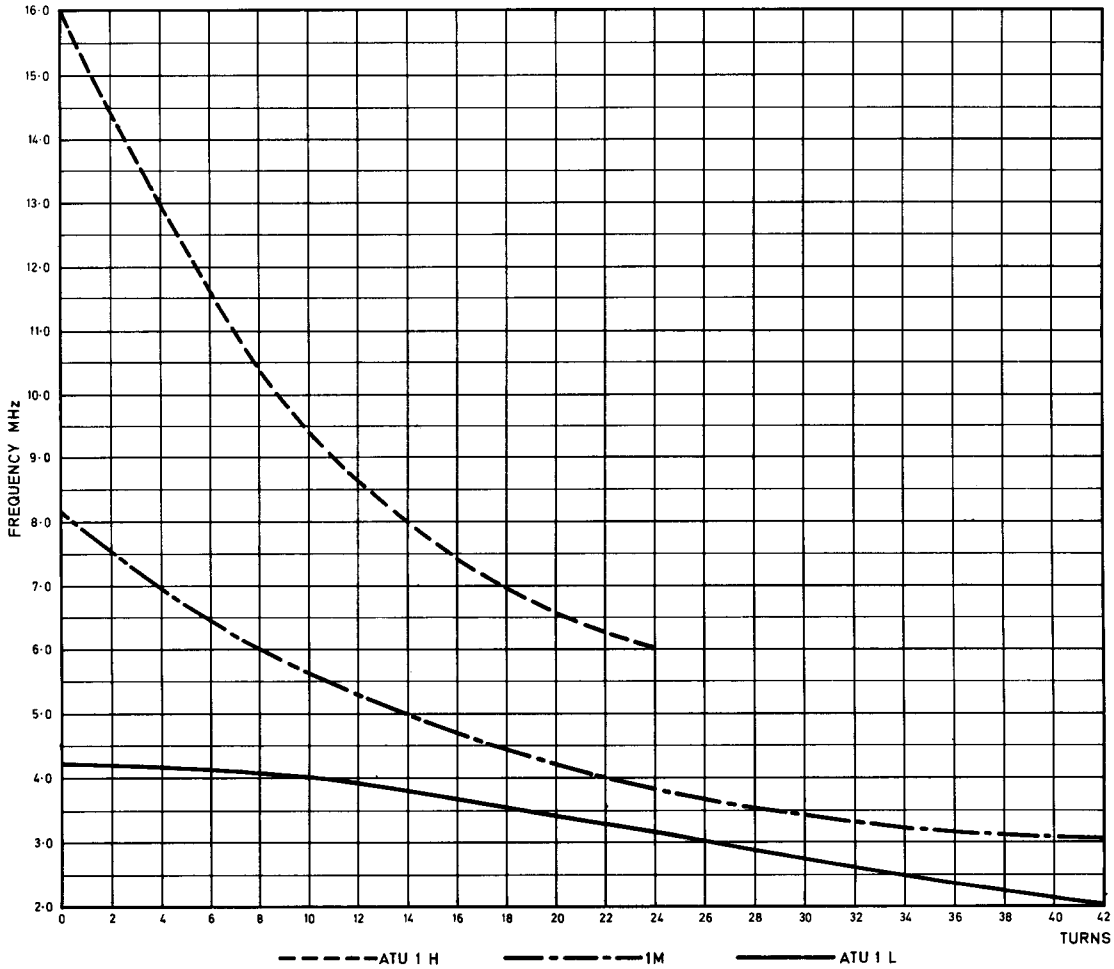
4. Momentarily operate ATU SW1 to key the transmitter and note the multimeter reading obtained.

5. Transfer the multimeter positive lead to the ATU reverse power terminal (identified by a black dot), momentarily key the transmitter and again note the multimeter reading.

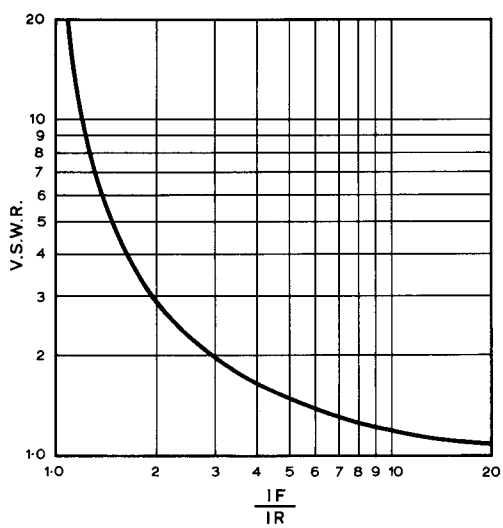
6. Connect ATU channel 1 tap to adjacent turns on L1, repeating operations 3., 4. and 5. in each case until the maximum ratio of forward to reverse power, i.e. minimum V.S.W.R., is obtained.

7. Repeat operations 1. to 6. for all operative channels.

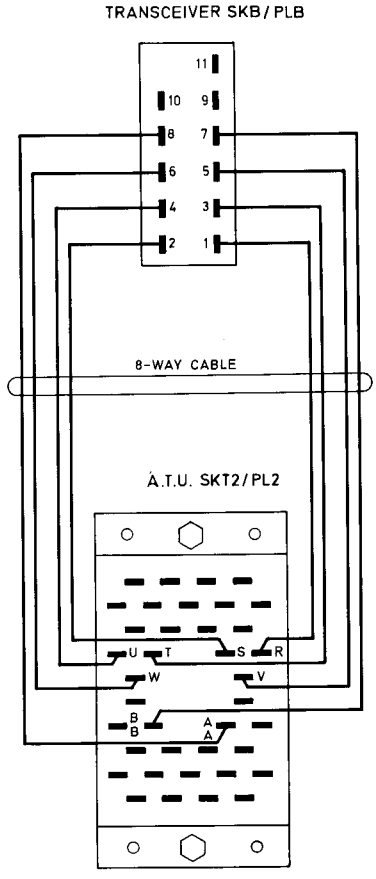
8. Switch off transceiver, disconnect and remove multimeter.



ATU Coil Tapping Chart



Standing Wave Ratio Graph



INTERCONNECTIONS SSB 130 TO A. T. U.

SINGLE SIDEBAND H.F. RADIOTELEPHONE

Fixed station, SSB130F Part No. AT04434
Mobile station, SSB130M Part No. AT04433

SUB-ASSEMBLIES

	Part No.
Microphone Amplifier and Facility Unit	AT27104
Transmitter Linear Amplifier	AT27105
Radio Frequency Amplifier	AT27106
I.F. Amplifier	AT27107
Balanced Modulator	AT27108
Balanced Mixer	AT27109
Transmitter Tuned Circuit	AT27111 Series
Common Tuned Circuit	AT27112 Series
Transmitter Level Set Unit	AT27113
Receiver Audio Amplifier	AT27116
Channel Oscillator	AT27250
Sideband Filter Board	AT27118 Series
P.A. Coil & Switch Assembly	AT11599

POWER SUPPLY UNITS

A.C. Power Supply Unit	AT04432
D.C. Power Supply Unit (12V input)	AT04431/01
D.C. Power Supply Unit (24V input)	AT04431/02

MECHANICAL ITEMS

Cover Assembly (SSB130M)		AT11523/01
Lid Assembly Top (SSB130F)		AT11523/02
Lid Assembly Bottom (SSB130F)		AT11523/03
Side Plate Assembly Left		AT11508/01
Side Plate Assembly Right		AT11508/02
Side Plate Assembly Outer		BT19860
Rear Panel Assembly		AT11644/03
P.A. Cover Assembly		AT11526
P.A. Screen Assembly		AT11504
Transmitter Screen Assembly		AT11510
Transmitter Cover		BJ30182
Front Panel Complete	(SSB130M)	AT11597
Front Panel Complete	(SSB130F)	AT11625
Escutcheon	(SSB130M)	BJ30537
Escutcheon	(SSB130F)	BT17177
Foot, front	(SSB130F)	FR06010
Foot, rear	(SSB130F)	FR011602

ANCILLARY ITEMS

Fist microphone & lead assembly	AT29660/26
Stand microphone	284318/14
Handset & lead assembly	AT29669
Headphone assembly	AT29672
Morse Key assembly	AT12149

CHASSIS MOUNTED COMPONENTS INCLUDING POWER AMPLIFIER

Components marked*
LOW (2-4MHz) channels ONLY;
Components marked**
MID & HIGH (4-8,8-15MHz) channels ONLY

CAPACITORS

Code	Value/Description	Part No.
C1	1000uF	PS51131
C2	Not used	
C3	100nF	PR19666
C4	100nF	PR19666
C5	100nF	PR19666
C6-11	1-12pF	PV05018
C12	12-300pF	ET98000
C13	*150pF	PN18394
C14	12-300pF	ET98000
C15	*150pF	PN18394
C16	12-300pF	ET98000
C17	*150pF	PN18394
C18	12-300pF	ET98000
C19	*150pF	PN18394
C20	12-300pF	ET98000
C21	*150pF	PN18394
C22	12-300pF	ET98000
C23	*150pF	PN18394
C24-29	*2000pF variable	PV05201
	**1400pF variable	PV05200
C30	30nF	PN56305
C31	1nF	PN26304
C32	10pF	PP09317
C33	47nF	PR18411
C34	1000uF	PS51131
C35	1nF	PN99610
C36-41	*680pF	PP12205
C42	220nF	PQ33069
C43	100nF	PQ99501
C44	100nF	PQ99501
C45	220nF	PQ33069
C46	100nF	PQ99501
C47	100nF	PQ99501
C48	100nF	PQ99501
C49	100nF	PQ99501
C50	100nF	PQ99501
C51	10pF	PP04503
C52	270pF	PP10400
C53	220nF	PQ33069

INDUCTORS

L1	AT31606
L2	AT31606
L3	AT30012
L4	278568
L5	AT30009
L6	FT05618

RESISTORS (Ohms)

R1	10		PM01412
R2	39		PM00015
R3	Not used		
R4	Not used		
R5	2,7k		PM00530
R6	0,36		PL40108
R7	10		PM01412
R8	10		PM01412
R9	100		PM00024
R10	100		PM00024
R11	47	} Part of L1,L2	
R12	47	}	
R13	10k		PM01448
R14	10k		PM01448
R15	10		PM00001
R16	390k		PM00256
R17	180k		PM01463
R18	47k		PM00088
R19	12k		PM01449
RV1A	5k	Squelch }	PL01226
RV1B	5k	Volume }	
RV3	5k	Trim	PL09065
RV4	10k	PA/Bias	PL09061

SEMICONDUCTORS

D1	BZY96C9V1	FV05311
D2	Not used	
D3		FV05852
D4		FV05839
D5		FV05839
D6		FV05852
D7		FV05839
D8		FV05839

VALVES

V1	6883B	FV03697
	or YL1370	FV02706
V2	6883B	FV03697
	or YL1370	FV02706
	Valveholder	FH02606
	Anode cap lead assy.	AT11529

MISCELLANEOUS

	Switch assy. TX/RX	FS03762
	Switch assy. OFF/ON/SBY	FS03801
	Switch assy. CHANNEL	FS07096
	Knob for above	AT25805/01
	Switch assy. MODE	FS07099
	Knob for above	AT25803/01
	Switch assy. METER	FS07100
	Knob for above	AT25803/01
	Switch assy. LOCAL/REMOTE	FS53902
	Knob assy. TRIM	AT25802/01
	Knob assy. VOLUME	AT25802/05
	Knob assy. SQUELCH	BT18080
	Squelch knob spacer	BT27141
	Plug, 18-way	FP00018
	Socket, 15-way	FS17322
	Socket, 11-way	FS46834
	Socket, 5-way	FS47512
JK1	Jack socket	FS47887
JK2	Jack socket	FS47886
	Antenna socket	FS43706
	Loudspeaker	ET99601
	Meter (SSB130F)	ET13776
	Lamp, 14V 0,75W	FL01063
	Lampholder	FH03000
	Lens (Amber)	ET13550
	Lens (Red)	ET13550/01
	Lens (Green)	ET13550/02
	Crystal Oven	FC03127
Tx/Rx	Changeover relay	FR08047

12V D.C. POWER SUPPLY UNIT

Complete Assembly Part No. AT04431/01

Main Chasis

Code	Value/Description	Part No.
	CAPACITORS	
C1	100nF	PQ99501
C2	100nF	PQ99501
C3	100nF	PQ99501
C4	1500uF	PS52018
C5	1uF	PS99502
C6	1uF	PS99502
C7	150uF	PS99525
C8	100nF	PQ99501
C9	500nF	PR24056
C10	1uF	PR25573
C11	2,2uF	PR27080
C12	1nF	PN26535
C13	1nF	PN26535
C14	220nF	PQ33069
	RESISTORS (Ohms)	
R1	1k	PM00048
R2	1k	PM00048
R3	0,5	PL99700
R4	100	PM01124
R5	0,25	PL40550
R6	0,25	PL40550
R7	10	PM00501
	SEMICONDUCTORS	
D1		FV05839
D2		FV05839
D3	TRC50P	FV07262
D4	TRC50P	FV07262
TR1	16602	FV08855
TR2	16602	FV08855
	MISCELLANEOUS	
L1		279059/01
L2		279059/01
L3		279059/01
S1	Relay	FR02241/03
T1		AL21353
FS1	2,5A	FF00832
FS2	500mA	FF00902
FS3	42SWG (1A)	FW05200
FS4	40SWG (1A)	FW05199
SKA	DC INPUT	FS17043
SKB	OUTPUT	FS17304
	Earth sel. plate assy.	274308
TP1	Red	FS17003
TP2	Black	FS17040
	Fuseholder (FS1,2)	FH02758

D.C. Rectifier Assembly AT27100

Code	Value/Description	Part No.
	COMPONENTS	
R1	47 ohms	PM01220
R2	47 ohms	PM00016
R3	47 ohms	PM00016
D1-4	RF200B	FV08362
D5-9	5D6	FV09742

Invertor Suppression Assembly AT27101/01

Code	Value/Description	Part No.
	COMPONENTS	
L1-3	Choke assembly	279059/01
L4,5	Not used	
L6-10	Coil assembly	278568

24V D.C. POWER SUPPLY UNIT

Complete Assembly Part No. AT04431/02

Main Chassis

Code	Value/Description	Part No.
	CAPACITORS	
C1	100nF	PQ99501
C2	100nF	PQ99501
C3	100nF	PQ99501
C4	1500uF	PS52018
C5	1uF	PS99502
C6	1uF	PS99502
C7	100uF	PS38113
C8	100nF	PQ32000
C9	500nF	PR24056
C10	1uF	PR25573
C11	2,2uF	PR27080
C12	1nF	PN26535
C13	1nF	PN26535
C14	220nF	PQ33069
	RESISTORS (Ohms)	
R1	1k	PM00048
R2	1k	PM00048
R3	1	PM01103
R4	560	PM00522
R5	2,2	PM01106
R6	2,2	PM01106
R7	10	PM00501
R8	Not used	
R9	180	PM01127
	SEMICONDUCTORS	
D1		FV05839
D2		FV05839
D3	TRC50P	FV07262
D4	TRC50P	FV07262
TR1		FV09573
TR2		FV09573
TR3	2N5295	FV08818
	MISCELLANEOUS	
L1		279059/01
L2		279059/01
L3		279059/01
T1		AL21354
FS1	2,5A	FF00832
FS2	500mA	FF00902
FS3/4	40SWG (1A)	FW05199
S1	Relay	FR02244/03
SKA	DC INPUT	FS17043
SKB	OUTPUT	FS17304
	Earth sel plate assy.	274308
TP1	Red	FS17003
TP2	Black	FS17040
	Fuseholder (FS1,2)	FH02578

DC Rectifier Assembly AT27100

Code	Value/Description	Part No.
	COMPONENTS	
R1	47 ohms	PM01220
R2	47 ohms	PM00016
R3	47 ohms	PM00016
D1	RF200B	FV08362
D2	RF200B	FV08362
D3	RF200B	FV08362
D4	RF200B	FV08362
D5	5D6	FV09742
D6	5D6	FV09742
D7	5D6	FV09742
D8	5D6	FV09742
D9	5D6	FV09742

Invertor Suppression AT27101/02

Code	Value/Description	Part No.
L1-4	Choke assembly	279059/01
L5	Not used	
L6-9	Coil assembly	278568
C1	125uF	PS99525
D1	LMZ13AX	FV08363

A.C. POWER SUPPLY UNIT

Complete Assembly Part No. AT04432

Main Chassis

Code	Value/Description	Part No.
	CAPACITORS	
C1	140uF	PS38800
C2	140uF	PS38800
C3a	40uF)	PS77750
C3b	80uF)	
C4	100uF	PS38110
C5	100uF	PS38110
C6	2500uF	PS54025
	RESISTORS (Ohms)	
R1	10	PM00501
R2	47	PM01220
R3	33k	PM01354
R4	33k	PM01354
R5	47k	PL22704
R6	20k	PE20303
	MISCELLANEOUS	
TR1	40250	FV07563
T1		AL21382
FS1	2A (240V)	FF03116
	4A (110V)	FF03111
FS2	500mA	FF00902
FS3	2A	FF03116
FS4	3A	FF03129
	Fuseholder (FS2)	FH02756
	Fuseholder (FS1,3,4)	FH02758
SKA	MAINS	FS16009
SKB	18-way	FS46878
TSA		FT16026
TP1	Black	FS17040
TP2	Red	FS17003
	Top cover	BT15417
	Bottom cover	BT15418

AC Rectifier Assembly

Code	Value/Description	Part No.
	COMPONENTS	
C1	150uF	PS99525
R1	82 ohms	PM00022
R2	220 ohms	PM00032
R3	47 ohms	PM00016
R4	Not used	
R5	1k ohms	PM01436
R6	27 ohms	PM00011
TR1		FV05803
D1-4	EG250	FV09186
D5-9		FV05852
D10-13		FV05853
D14		FV05817

EXTENSION CONTROL UNIT

Complete Assembly Part No. AT04621

Mounting bracket assembly	AT10801
Frame assembly	AT10802/03
Tag board assembly	AT10803
Cover assembly	AT10804
Front panel assembly	AT10805/02
Interconnection lead assembly	AT26150
Loudspeaker lead assembly	AT10765/04
Potentiometer 5k ohms (Volume)	PL07521
Volume control knob assembly	AT275802/01
Switch ON/OFF/S'BY	FS03801
Switch locating plate	BT19861
Lamp 14V 0,75W	FL01063
Lampholder	FH03032
Lens, amber	ET13550
Socket, 5-way (Mic)	FS47512
Label	BT18501
Cradle	BT16735
Resistor, 18 ohms	PM00007

PHONE PATCHING FACILITY MODULE

Complete Assembly Part No. AT11527/03

SUB ASSEMBLIES

600 ohm amplifier	AT26887/02
Compressor	AT26909
Line Input Attenuator	AT27114
Vox and Anti-trip Unit	AT27115
Switch and amplifier	AT27119

COMPONENTS

Code	Value/Description	Part No.
CAPACITORS		
C60	1000uF	PS51080
C61	2,2uF	PS38183
C62	1uF	PR25565
C63	10nF	PN99612
RESISTORS (Ohms)		
R30	18	PM00007
R31	820	PM00046
R32	15k	PM01450
R33	100	PM01424
R34	120k	PM01461
R35	120k	PM01461
R36	1,2k	PM01437
R37	1,5k	PM01438
R38	330	PM01430
RV5	10k Lin.	PL09033
RV6	10k Lin.	PL09033
RV7	25k Log.	PL09028
RV8	600 Lin.	PL06021
SEMICONDUCTORS		
D9		FV05839
D10		FV05839
D11		FV05839
MISCELLANEOUS		
VOX/2	Relay	FR08007
T1	Hybrid transformer	AL21342
PLD	3-way plug	FS46400
SF	Switch	FS53902
SG1	Switch	FS03798
	Knob assembly	AT25802/01
LP3	Lamp, 14V 0,75W	FL01063
	Lampholder	FH03000
M1	Meter	ET113776

600 ohm AMPLIFIER

Complete Assembly Part No. AT26887/02

Code	Value/Description	Part No.
CAPACITORS		
C1	10uF	PS99505
C2	1nF	PN26350
C3	Not used	
C4	47uF	PS99509
C5	10nF	PR14083
C6	Not used	
C7	4,7uF	PS99504
C8	4,7uF	PS99504
C9	125uF	PS38206
C10	47uF	PS99509
C11	68nF	PQ30461
C12	4,7uF	PS99504
C13	125uF	PS38206
C14	1000uF	PS51080
C15	47uF	PS99509
RESISTORS (Ohms)		
R1	10k	PM01448
R2	10k	PM01448
R3	3,3k	PM01442
R4	270	PM01429
R5	2,7k	PM01441
R6	4,7k	PM01444
R7	12k	PM01449
R8	4,7k	PM01444
R9	6,8k	PM01446
R10	10k	PM01448
R11	100	PM01424
R12	10	PM01412
R13	390	PM01431
R14	1k	PM01436
R15	12k	PM01449
R16	2,2k	PM01440
R17	100	PM01424
R18	33	PM01418
R19	39	PM01419
R20	1,2k	PM01437
R21	22	PM01416
R22	3,9k	PM01443
R23	220	PM01428
R24	3,9k	PM01443
MISCELLANEOUS		
T1	Transformer	AL21300
TR1		FV05800
TR2		FV05800
TR3		FV05800

COMPRESSOR

Complete Assembly Part No. AT26909

Code	Value/Description	Part No.
CAPACITORS		
C1	Not used	
C2	Not used	
C3	160uF	PS39205
C4	125uF	PS38206
C5	27pF	PN99526
C6	33uF	PS29045
C7	32uF	PS29045
C8	125uF	PS38206
C9	500uF	PS46062
C10	2,2uF	PS99503
C11	160uF	PS39205
C12	27pF	PN99526
C13	1nF	PN26350
C14	220nF	PR33079
C15	160uF	PS39205
C16	27pF	PN99526
C17	220nF	PR33079
C18	125uF	PS38206
C19	220nF	PR33079
C20	160uF	PS39205
C21	27pF	PN99526
C22	33uF	PS29045
RESISTORS (Ohms)		
R1-3	Not used	
R4	3,3k	PM00060
R5,6	Not used	
R7	Selected on manufacture from:–	
	560	PM00042
	680	PM00044
	820	PM00046
	1k	PM00048
	1,2k	PM00050
	1,5k	PM00052
	1,8k	PM00054
	2,2k	PM00056
	2,7k	PM00058
	3,3k	PM00060
	3,9k	PM00062
	4,7k	PM00064
	5,6k	PM00066
	6,8k	PM00068
	8,2k	PM00070
	10k	PM00072
R8	8,2k	PM00070
R9	1k	PM00048
R10	68k	PM00092
R11	12k	PM00074
R12	1k	PM00048
R13	1k	PM00048
R14	2,2M	PM00128
R15	15k	PM00076
R16	6,8k	PM00068
R17	2,2k	PM00056
R18	1k	PM00048
R19	270	PM00034
R20	10k	PM00072
R21	1k	PM00048
R22	33k	PM00084
R23	Not used	
R24	10k	PM00070
R25	10k	PM00070
R26	68k	PM00092
R27	1k	PM00048
R28	6,8k	PM00068
R29	330	PM00036
R30	1k	PM00048
R31	6,8k	PM00068
R32	39k	PM00086
R33	680	PM00044
R34	3,3k	PM00060
R35	560	PM00042
R36	3,9k	PM00062
R37	Selected on manufacture from:–	
	1,2k	PM00050
	1,5k	PM00052
	1,8k	PM00054
	2,2k	PMC0056
	2,7k	PM00058
	3,3k	PM00060
	3,9k	PM00062
R38	6,8k	PM00068
SEMICONDUCTORS		
D1-4		FV05808
TR1	Not used	
TR2-7		FV05800

MICROPHONE AMPLIFIER AND FACILITY BOARD

Complete Assembly Part No. AT27104

Code	Value/Description	Part No.
CAPACITORS		
C1	270pF	PP10400
C2	100nF	PQ99501
C3	10uF	PS23143
C4	1nF	PN99610
C5	125uF	PS99525
C6	1uF	PS99502
C7	1nF	PN99610
C8	100nF	PQ99501
C9	10nF	PQ99500
C10	10nF	PQ99500
C11	2,2uF	PR27080
C12	100nF	PQ32000
C13	10nF	PQ99500
C14	10nF	PQ99500
C15	100nF	PQ99501
C16	125uF	PS99525
C17	10nF	PQ99500
C18	220nF	PQ33069
RESISTORS (Ohms)		
R1	1k	PM01436
R2	10k	PM01448
R3	10k	PM01448
R4	15	PM01414
R5	22k	PM01452
R6	2,2k	PM01440
R7	22k	PM01452
R8	3,3k	PM01442
R9	22k	PM01452
R10	5,6k	PM01445
R11	4,7k	PM01444
R12	1,5k	PM01438
R13	4,7k	PM01444
R14	33k	PM01454
R15	820	PM01437
R16	4,7k	PM01444
R17	22k	PM01452
R18	330	PM01430
R19	18k	PM01451
R20	27k	PM01453
R21	680	PM01434
R22	18k	PM01451
R23	15k	PM01450
R24	4,7k	PM01444
R25	1k	PM01436
R26	47k	PM01456
R27	8,2k	PM01447
R28	10k	PM01448
R29	10k	PM01448
SEMICONDUCTORS		
D1-4		FV05839
TR1		FV05803
TR2,3	2N4125	FV07747
TR4-7		FV05800

TRANSMITTER LINEAR AMPLIFIER

Complete Assembly Part No. AT27105

Code	Value/Description	Part No.
CAPACITORS		
C1	Not used	
C2	100nF	PQ99501
C3	100nF	PQ99501
C4	1nF	PN99610
C5	390pF	PP10905
C6	470uF	PS99522
C7	1uF	PQ37514
C8	100nF	PQ99501
RESISTORS (Ohms)		
R1	8,2k	PM01447
R2	8,2k	PM01447
R3	220	PM01428
R4	1k	PM01436
R5	5,6k	PM01445
R6	820	PM01435
R7	680	PM01434
R8	100	PM01424
RESISTORS (Ohms) Cont.		
R9	680	PM01434
R10	2,2	PM01404
R11	56	PM01421
INDUCTORS		
L1	150uH	FT05621
T1	Not used	
T2		AL21359
SEMICONDUCTORS		
D1	1N4022	FV05853
TR1		FV05800
TR2		FV05803
TR3	2N3553	FV07557

R.F. AMPLIFIER

Complete Assembly Part No. AT27106

Code	Value/Description	Part No.
CAPACITORS		
C1	100nF	PQ99501
C2	100nF	PQ99501
C3	100nF	PQ99501
C4	100nF	PQ99501
C5	100nF	PQ99501
C6	220nF	PQ99508
C7	100nF	PQ99501
C8	390pF	PP10905
C9	100nF	PQ99501
C10	22nF	PQ27000
C11	680pF	PP12201
C12	1,2nF	PQ14011
C13	100nF	PQ99501
C14	100nF	PQ99501
C15	220pF	PP10116
C16	220pF	PP10116
C17	100nF	PQ99501
C18	220pF	PP10116
C19	100nF	PQ99501
C20	220pF	PP10116
C21	180pF	PP09689
RESISTORS (Ohms)		
R1	100	PM01424
R2	560	PM01433
R3	100	PM01424
R4	560	PM01433
R5	560	PM01433
R6	150	PM01426
R7	1,8k	PM01439
R8	18k	PM01451
R9	27k	PM01453
R10	33k	PM01454
R11	220	PM01428
R12	100	PM01424
R13	680	PM01434
R14	100	PM01424
R15	2,2k	PM01440
R16	Not used	
R17	1,5k	PM01438
R18	1,5k	PM01438
R19	1,5k	PM01438
RV1	500	PL03633
TH1	VA1038	PL23078
INDUCTORS		
L1	150uH	FT05621
L2	Not used	
L3	Coil assembly	AL03108
L4	Coil assembly	AL03108
L5	150uH	FT05621
L6	4,7uH	FT99003
L7	4,7uH	FT99003
L8	1000uH	FT99008
L9	1000uH	FT99008
L10	1000uH	FT99008
	Ferrite core for L3,4	FC02882
SEMICONDUCTORS		
D1-6		FV05839
TR1	BF167	FV05150
TR2	T1S88A	FV08241

I.F. AMPLIFIER

Complete Assembly Part No. AT27107

Code	Value/Description	Part No.
CAPACITORS		
C1-14	100nF	PQ99501
C15	470nF	PQ34037
C16	10uF	PS99505
C17	100nF	PQ99501
C18	470nF	PQ34037
C19	470nF	PQ34037
C20	100uF	PS38193
C21	100nF	PQ32000
C22	150uF	PS99525
C23	100nF	PQ99501
C24	100nF	PQ99501
C25	150uF	PS99525
RESISTORS (Ohms)		
R1	8,2k	PM01447
R2	1,2k	PM01437
R3	100	PM01424
R4	6,8k	PM01446
R5	1,8k	PM01439
R6	56	PM01421
R7	100	PM01424
R8	150	PM01426
R9	1,8k	PM01439
R10	47	PM01420
R11	100	PM01424
R12	150	PM01426
R13	1,8k	PM01439
R14	Not used	
R15	100	PM01424
R16	150	PM01426
R17	100	PM01424
R18	33k	PM01454
R19	3,3k	PM01442
R20	10k	PM01448
R21	39k	PM01455
R22	100	PM01424
R23	330	PM01430
R24	470	PM01432
R25	1k	PM01436
INDUCTORS		
L1-4	1000uH	FT99008
SEMICONDUCTORS		
D1-3		FV05839
TR1		FV05800
TR2-4	BF167	FV05150
TR5-7		FV05800

BALANCED MODULATOR

Complete Assembly Part No. AT27108

Code	Value/Description	Part No.
CAPACITORS		
C1	100nF	PQ32000
C2	56pF	PP07237
C3	390pF	PP10905
C4	68pF	PP07682
C5	100nF	PQ32000
C6	3–11,5pF	PV07528
C7	180pF	PP09689
C8–13	100nF	PQ32000
C14	470nF	PS99501
C15	47uF	PS99509
C16	100nF	PQ99501
C17	100nF	PQ32000
C18	150uF	PS99525
C19	10uF	PS23143
C20	100nF	PQ32000
C21	100nF	PQ32000
C22	180pF	PP09689
C23	220nF	PQ99508
C24	220nF	PQ99508
C25	150uF	PS99525
C26	select on test from:–	
	5,6p	PP99204
	6,8p	PP99205
	8,2p	PP99206
RESISTORS (Ohms)		
R1	10k	PM01448
R2	10k	PM01448
R3	Not used	
R4	1,5k	PM01438
R5	100	PM01424
R6	1,5k	PM01438
R7	100	PM01424
R8	560	PM01433
R9	100	PM01424
R10	1,5k	PM01438
R11	18k	PM01451
R12	18k	PM01451
R13	10k	PM01448
R14	1k	PM01436
R15	1,5k	PM01438
R16	10k	PM01448
R17	1k	PM01436
RV1	1k Lin.	PL03635
INDUCTORS		
L1-8	1000uH	FT99008
T1		AL03107
	Ferrite core for T1	FC02858
SEMICONDUCTORS		
D1-3		FV05839
TR1		FV05800
TR2	3N126	FV09283
TR3		FV05800
CRYSTAL		
XL1	1,4MHz to Spec. P34	

BALANCED MIXER UNIT

Complete Assembly Part No. AT27109

Code	Value/Description	Part No.
CAPACITORS		
C1-7	100nF	PQ99501
C8	390pF	PP10905
C9	1nF	PN99610
C10-13	100nF	PQ99501
C14	220nF	PQ33069
RESISTORS (Ohms)		
R1	100	PM01424
R2	100	PM01424
R3	1,5k	PM01438
R4	1,5k	PM01438
R5	5,6k	PM01445
R6	560	PM01433
R7	1k	PM01436
R8	1k	PM01436
R9	1k	PM01436
R10	220	PM01428
R11	12k	PM01449
R12	1,5k	PM01438
R13	220	PM01428
R14	1k	PM01436
R15	1k	PM01436
R16	220	PM01428
R17	470	PM01432
RV1	500 Lin.	PL03633
INDUCTORS		
L1	1000uH	FT99008
T1		AL03106
	Ferrite core for T1	FC02882
T2		AL21358
SEMICONDUCTORS		
D1,2		FV05839
TR1		FV05800
TR2,3		FV05819

TRANSMITTER TUNED CIRCUIT

Channel Frequency Bands: LOW 2-4MHz
MID 4-8MHz
HIGH 8-15MHz

Complete Assembly Part Nos.

LOW + LOW channel frequencies	AT27111/01
MID + MID channel frequencies	AT27111/02
LOW + MID channel frequencies	AT27111/03
MID + HIGH channel frequencies	AT27111/04
HIGH + HIGH channel frequencies	AT27111/06

COMPONENTS

Code	Variant	Value/Description	Part No.
C1	/01,/03	450pF trimmer	PV05710
	/02,/04, /06	250pF trimmer	PV05711
C2	All	1uF	PQ37514
C3	/01	450pF trimmer	PV05710
	/02,/03, /04,/06	250pF trimmer	PV05711
L1	/01,/03	Coil assembly	AL03109
	/02,/04	Coil assembly	AL03112
	/06	Coil assembly	AL03113
L2	/01	Coil assembly	AL03109
	/02,/03	Coil assembly	AL03112
	/04,/06	Coil assembly	AL03113
L3	All	200mH	FT05598

COMMON TUNED CIRCUITS

Complete Assembly Part Nos.

Channel Frequency Range

2-4MHz/2-4MHz	AT27112/01
4-8MHz/4-8MHz	AT27112/02
2-4MHz/4-8MHz	AT27112/03
4-8MHz/8-15MHz	AT27112/04
8-15MHz/8-15MHz	AT27112/06

Code	Variant	Value/Description	Part No.
CAPACITORS			
C1	/01	196pF	PP09920
	/02,/03	180pF	PP09964
	/04,/06	220pF	PP10054
C2	/01	1,8nF	PP16015
	/02,/03	1,5nF	PP15525
	/04,/06	1nF	PP13046
C3	All	150pF	PP09459
C4	All	100nF	PQ99501
C5	/01	196pF	PP09920
	/02	180pF	PP09964
	/03	196pF	PP09920
	/04	180pF	PP09964
	/06	220pF	PP10054
C6	/01	1,8nF	PP16015
	/02	1,5nF	PP15525
	/03	1,8nF	PP16015
	/04	1,5nF	PP15525
	/06	1nF	PP13046
C7	All	150pF	PP09459
C8	All	100nF	PQ99501
C9	All	3,9nF	PP19505
C10	All	3,9nF	PP19505
C11	All	100nF	PQ99501
C12	All	100nF	PQ99501
C13	/01	196pF	PP09920
	/02,/03	180pF	PP09664
	/04,/06	196pF	PP09920
C14	/01	2,2nF	PP17019
	/02,/03	1,8nF	PP16015
	/04,/06	1,2nF	PP14014
C15	/01	196pF	PP09920
	/02	180pF	PP09664
	/03	196pF	PP09920
	/04	180pF	PP09664
	/06	196pF	PP09920
C16	/01	2,2nF	PP17019
	/02	1,8nF	PP16015
	/03	2,2nF	PP17019
	/04	1,8nF	PP16015
	/06	1,2nF	PP14014
RESISTORS (Ohms)			
R1–4	All	100	PM01424
INDUCTORS			
L1	All	150uH	FT05621
L2	All	150uH	FT05621
L3	/01	Coil assembly	AL03108
	/02,/03	Coil assembly	AL03110
	/04,/06	Coil assembly	AL03111
L4	/01	Coil assembly	AL03108
	/02	Coil assembly	AL03110
	/03	Coil assembly	AL03108
	/04	Coil assembly	AL03110
	/06	Coil assembly	AL03111
L5	/01	Coil assembly	AL03108
	/02,/03	Coil assembly	AL03110
	/04,/06	Coil assembly	AL03111
L6	/01	Coil assembly	AL03108
	/02	Coil assembly	AL03110
	/03	Coil assembly	AL03108
	/04	Coil assembly	AL03110
	/06	Coil assembly	AL03111
L7	/01	Coil assembly	AL03108
	/02,/03	Coil assembly	AL03110
	/04,/06	Coil assembly	AL03111
L8	/01	Coil assembly	AL03108
	/02	Coil assembly	AL03110
	/03	Coil assembly	AL03108
	/04	Coil assembly	AL03110
	/06	Coil assembly	AL03111
L9	All	150uH	FT05621
L10	All	150uH	FT05621
	All	Ferrite core for	

600 OHM INPUT ATTENUATOR

Complete Assembly Part No. AT27114

Code	Value/Description	Part No.
R1	270 ohms	PM01429
R2	10k ohms	PM01448
R3	27k ohms	PM01453
R4	68k ohms	PM01458
R5	150k ohms	PM01462
R6	270k ohms	PM01465
R7	560k ohms	PM01469
RV1	330 ohms Lin. pot.	PL09602/02
T1	Transformer	277946

VOX AND ANTI-TRIP UNIT

Complete Assembly Part No. AT27115

Code	Value/Description	Part No.
	CAPACITORS	
C1	4,7uF	PS99504
C2	1nF	PN26328
C3	2,2uF	PS99503
C4	1nF	PN26328
C5	4,7uF	PS99504
C6	4,7uF	PS99504
C7	1nF	PN26328
C8	2,2uF	PS99503
C9	1nF	PN26328
C10	1nF	PN26328
C11	125uF	PN99525
C12	10uF	PS99505
	RESISTORS (Ohms)	
R1	12k	PM01449
R2	6,8k	PM01446
R3	1k	PM01436
R4	4,7k	PM01444
R5	100k	PM01460
R6	1k	PM01436
R7	18k	PM01451
R8	6,8k	PM01446
R9	1k	PM01436
R10	Not used	
R11	Not used	
R12	33k	PM01454
R13	47k	PM01456
R14	10k	PM01448
R15	33k	PM01454
R16	15k	PM01450
R17	180	PM01427
RV1	5k Lin.	PL07713/00
	SEMICONDUCTORS	
D1-4		FV05839
D5,6	Not used	
D7		FV05839
TR1-6		FV05800
TR7		FV06662

RECEIVER A.F. UNIT

Complete Assembly Part No. AT27116

Code	Value/Description	Part No.
	CAPACITORS	
C1	10uF	PS99505
C2	47uF	PS99509
C3	Not used	
C4	2,2uF	PS99503
C5	47nF	PR18484
C6	10uF	PS99505
C7	470pF	PN22401
C8	47pF	PN13311
C9	47pF	PN13311
C10	47uF	PS99509
C11	47pF	PN13311
C12	47pF	PN13311
C13	2,2nF	PR05007
C14-19	1nF	PN26328
C20	10uF	PS99505
C21	100nF	PQ99501
C22	1nF	PN99610
C23	1000uF	PS51131
	RESISTORS (Ohms)	
R1	18k	PM01451
R2	33k	PM01454
R3	3,3k	PM01442
R4	2,7k	PM01441
R5	4,7k	PM01444
R6	220	PM01428
R7	390k	PM01467
R8	18k	PM01451
R9	4,7k	PM01444
R10	47k	PM01456
R11	22k	PM01452
R12	150	PM01426
R13	82	PM01423
R14	270	PM01429
R15	6,8k	PM01446
R16	Selected on manufacture from:–	
	120	PM01425
	127	PL41708
	130	NE13190
	133	PL41709
	140	ND14122
	150	PM01426
	154	PL41711
	160	NE16190
	162	PL41712
	169	PL41713
	180	PM01427
	200	NE20190
	210	NE21190
	220	PM01428
R17	470	PM01432
R18	1,5k	PM01438
R19	150	PM01426
R20	3,3	PL21103
R21	150	PM01426
R22	0,25	PL21149
R23	0,25	PL21149
R24	2,2k	PM01442
R25	Selected on test from:–	
	39k	PM01455
	47k	PM01456
	56k	PM01457
	68k	PM01458
	THERMISTORS	
TH1	4,7k ohms	PL23057
TH2	15 ohms	PL23058
	SEMICONDUCTORS	
D1-3		FV05842
TR1-3		FV05800
TR4		FV05825
TR5		FV05826
TR6,7	40310	FV07594

SIDEBAND FILTER BOARD

Complete Assembly Part Nos.:

Upper sideband working ONLY, standard 50dB filter AT27118/01
Upper or lower sideband working, standard 50dB filters AT27118/02
Upper or lower sideband working, high sel, 60dB filters AT27118/03
Upper sideband working ONLY, high sel, 60dB filter AT27118/4
Lower sideband working ONLY, standard 50dB filter AT27118/05
Lower sideband working ONLY, high sel. 60dB filter AT27118/06

COMPONENTS

Code	Variant	Value/Description	Part No.
C1	/03,/04,/06	6,8pF	PP02610
	/01,/02,/05	68pF	PP07682
C2-7	All	100nF	PQ32000
C8	/03,/04,/06	Not used	
	/01,/02,/05	10pF	PP04550
R1	All	560	PM01433
R2-5	All	330	PM01430
R6	All	560	PM01433
D1-12	All		FV05839
L1-8	All	1000uH	FT99008
FL1	/02,/05	USB filter, LSB working, 50dB	FC03238
	/03,/06	USB filter, LSB working 60dB	FC03243
	/01,/04	Not used	
FL2	/01,/02	LSB filter, USB working 50dB	FC03237
	/03,/04	LSB filter, USB working, 60dB	FC03242
	/05,/06	Not used	

SWITCH AND AMPLIFIER

Complete Assembly Part No. AT27119

Code	Value/Description	Part No.
C1	125uF	PS99525
C2	470nF	PS99501
C3	4,7nF	PS99504
C4	1nF	PN26328
C5	33uF	PS99508
C6	470nF	PS99501
C7	470nF	PS99501
C8	1nF	PN26328
C9	33uF	PS99508
C10	470nF	PS99501
C11	10uF	PS23143
	RESISTORS (Ohms)	
R1	10k	PM01448
R2	22k	PM01452
R3	120k	PM01461
R4	39k	PM01455
R5	6,8k	PM01446
R6	2,2k	PM01440
R7	100	PM01424
R8	1k	PM01436
R9	47k	PM01456
R10	15k	PM01450
R11	3,3k	PM01442
R12	1,2k	PM01437
R13	100	PM01424
R14	2,7k	PM01441
R15	10k	PM01448
R16	3,9k	PM01443
	SEMICONDUCTORS	
D1		FV05839
TR1	BC108C	FV05328
TR2		FV05800
TR3	BFY52	FV06621

CHANNEL OSCILLATOR

Complete Assembly Part No. AT27250

Code	Value	Part No.
	Components marked* LOW and MID (2-4,4-8MHz) channels ONLY	
	Components marked** HIGH (8-15MHz) channels ONLY	

NOTE: Oscillator frequency = channel frequency + 1,4MHz

CAPACITORS

C1	100nF	PQ32000
C2	*27pF	PN11117
	**33pF	PN12077
C3	100nF	PQ32000
C4	100nF	PQ32000
C5	*220pF	PP10054
	**100pF	PP99219
C6	*150pF	PP99221
	**82pF	PP99218
C7	100nF	PQ32000
C8	*27pF	PN11117
	**33pF	PN12077
C9	*220pF	PP10054
	**100pF	PP99219
C10	*150pF	PP99221
	**82pF	PN99218
C11	100nF	PQ32000
C12	*27pF	PN11117
	**33pF	PN12077
C13	*220pF	PP10054
	**100pF	PP99219
C14	*150pF	PP99221
	**82pF	PP99218
C15	100nF	PQ32000
C16	*27pF	PN11117
	**33pF	PN12077
	*220pF	PP10054
	**100pF	PP99219
C18	*150pF	PP99221
	**82pF	PP99218
C19	100nF	PQ32000
C20	*27pF	PN11117
	**33pF	PN12077
C21	*220pF	PP10054
	**100pF	PP99219
C22	*150pF	PP99221
	**82pF	PP99218
C23	100nF	PQ32000
C24	*27pF	PN11117
	**33pF	PN12077
C25	*220pF	PP10054
	**100pF	PP99219
C26	*150pF	PP99221
	**82pF	PP99218
C27	100nF	PQ32000
C28	15pF	PP99209
C29	100nF	PQ32000
C30	1nF	PN99610
C31	100nF	PQ32000
C32	100nF	PQ99501
C33	100nF	PQ32000
C34 to C39	3.3pF	PN02319

RESISTORS (Ohms)

R1	*10k	PM01448
	**22k	PM01452
R2	*33k	PM01454
	**100k	PM01460
R3	33k	PM01454
R4	33k	PM01454
R5	220	PM01428
R6	*10k	PM01448
	**22k	PM01452
R7	*33k	PM01454
	**100k	PM01460
R8	33k	PM01454
R9	33k	PM01454
R10	220	PM01428
R11	*10k	PM01448
	**22k	PM01452
R12	*33k	PM01454
	**100k	PM01460
R13	33k	PM01454
R14	33k	PM01454
R15	220	PM01428
R16	*10k	PM02448
	**22k	PM01452
R17	*33k	PM01454
	**100k	PM01460
R18	33k	PM01454
R19	33k	PM01454
R20	220	PM01428
R21	*10k	PM01448
	**22k	PM01452
R22	*33k	PM01454
	**100k	PM01460
R23	33k	PM01454
R24	33k	PM01454
R25	220	PM01428
R26	*10k	PM01448
	**22k	PM01452
R27	*33k	PM01454
	**100k	PM01460
R28	33k	PM01454
R29	33k	PM01454
R30	220	PM01428
R31	1k	PM01436
R32	1k	PM01436
R33	39k	PM01455
R34	10k	PM01448
R35	68k	PM01458
R36	5,6k	PM01445
R37	470	PM01432
R38	56k	PM01457
R39	1,2k	PM01437
R40	2,2k	PM01440
R41	100	PM01424
R42	1,2k	PM01437

INDUCTORS

L1-7	Not used	
L8	470µH	FT05597
L9-14	*470µH	FT05597

SEMICONDUCTORS

TR1-6	BC108C	FC05328
TR7		FV05800
TR8		FV05800
TR9		FV05819
D1	MV833	FV09295
D2		FV05839
D3	MV833	FV09295
D4		FV05839
D5	MV833	FV09295
D6		FV05839
D7	MV833	FV09295
D8		FV05839
D9	MV833	FV09295
D10		FV05839
D11	MV833	FV09295
D12		FV05839
D13		FV05839
D14		FV05839

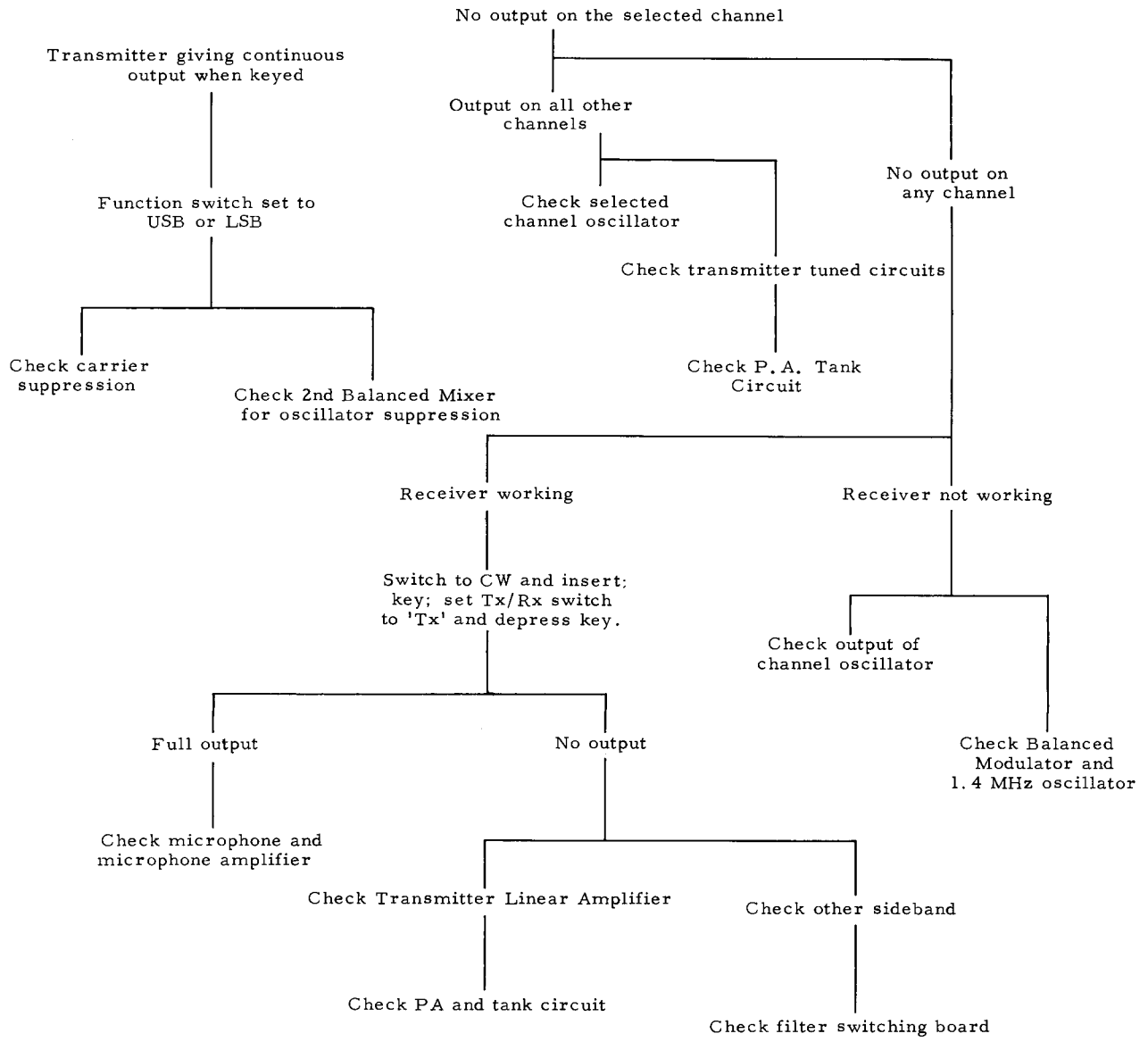
ANTENNA TUNING UNIT

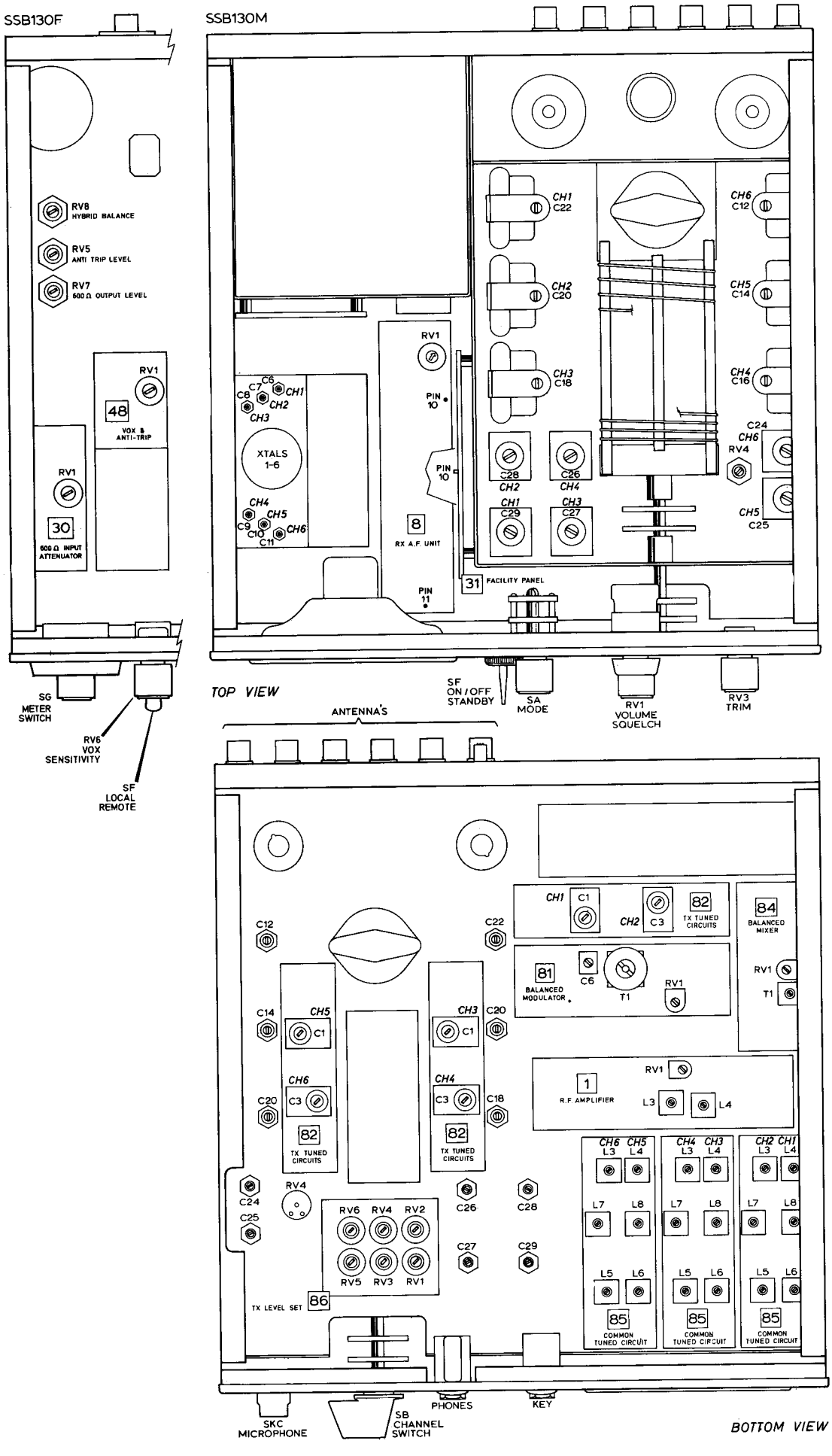
Complete Assembly Part Nos.

ATU 1L : 2–4 MHz : 9681360
ATU 1M : 3–8 MHz : 9681355
ATU 1H : 6–16MHz : 9681361

Code	Value/Description	Variant	Part No.
	COMPONENTS		
C1	470pF	All	266289
C2	10nF	All	660006
C3	22pF	All	9627129
C4	10nF	All	660006
C5	470pF	All	266289
R1	220 ohms	All	NG22130
R2	47 ohms	All	9630066
R3	220 ohms	All	NG22130
D1	0A91	All	9634454
D2	0A91	All	9634454
T1	Toroid, R.H.	All	9648472
T2	Toroid, L.H.	All	9648475
T3	Toroid	1L,1M	9648481
		1H	9648489
L1	Coil assembly	1L	9637839
		1M	9637695
		1H	9637840
S1	Push-button switch	All	9660040
SKT1	UHF panel socket	All	272332
SKT2	38-way connector	All	9634558
	Mating plug for SKT2	All	9634557
	Mating plug for SSB130 Facilities socket SKB	All	FP16823
RLA-RLF	Relay	All	9634535

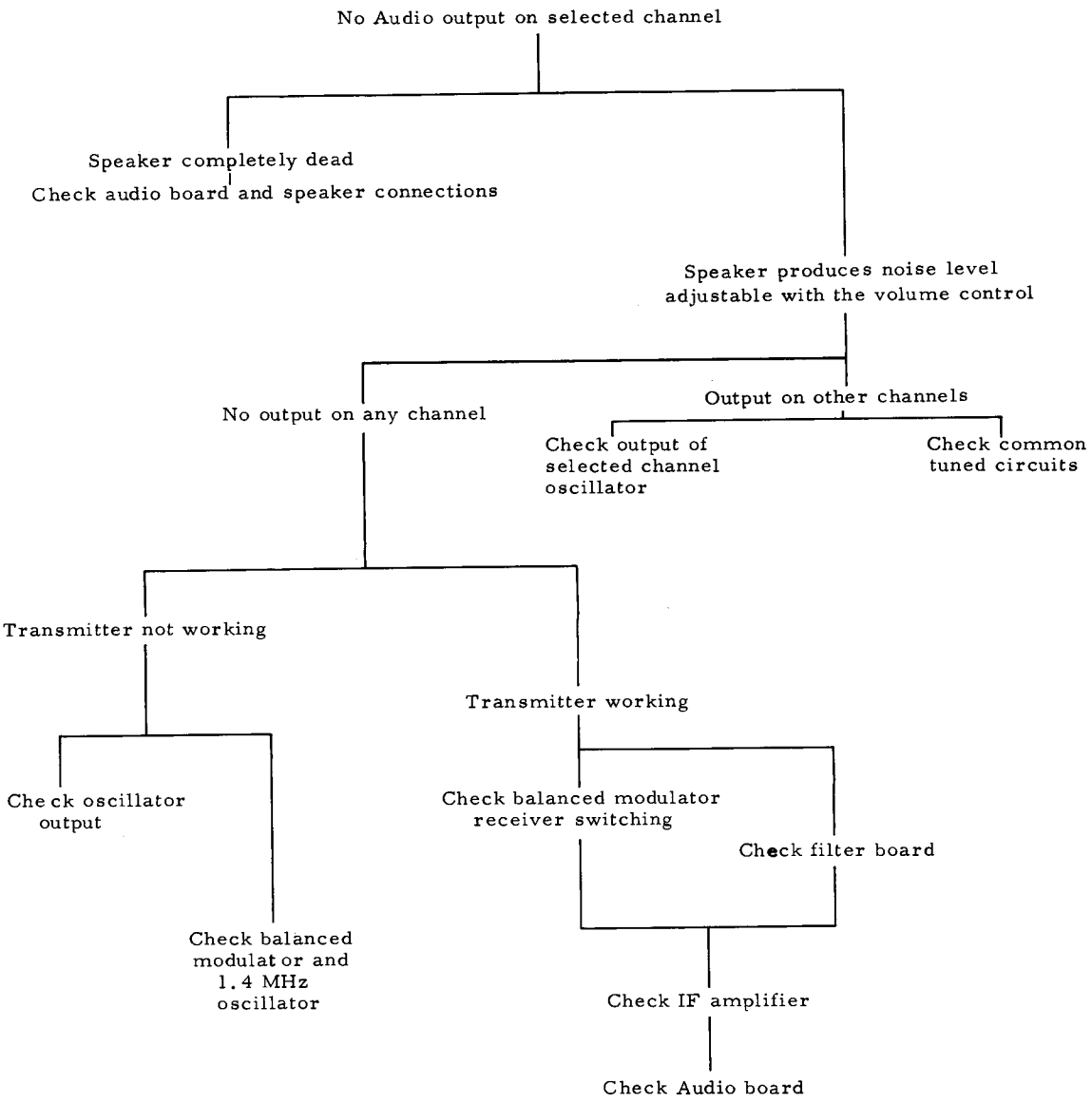
Transmitter

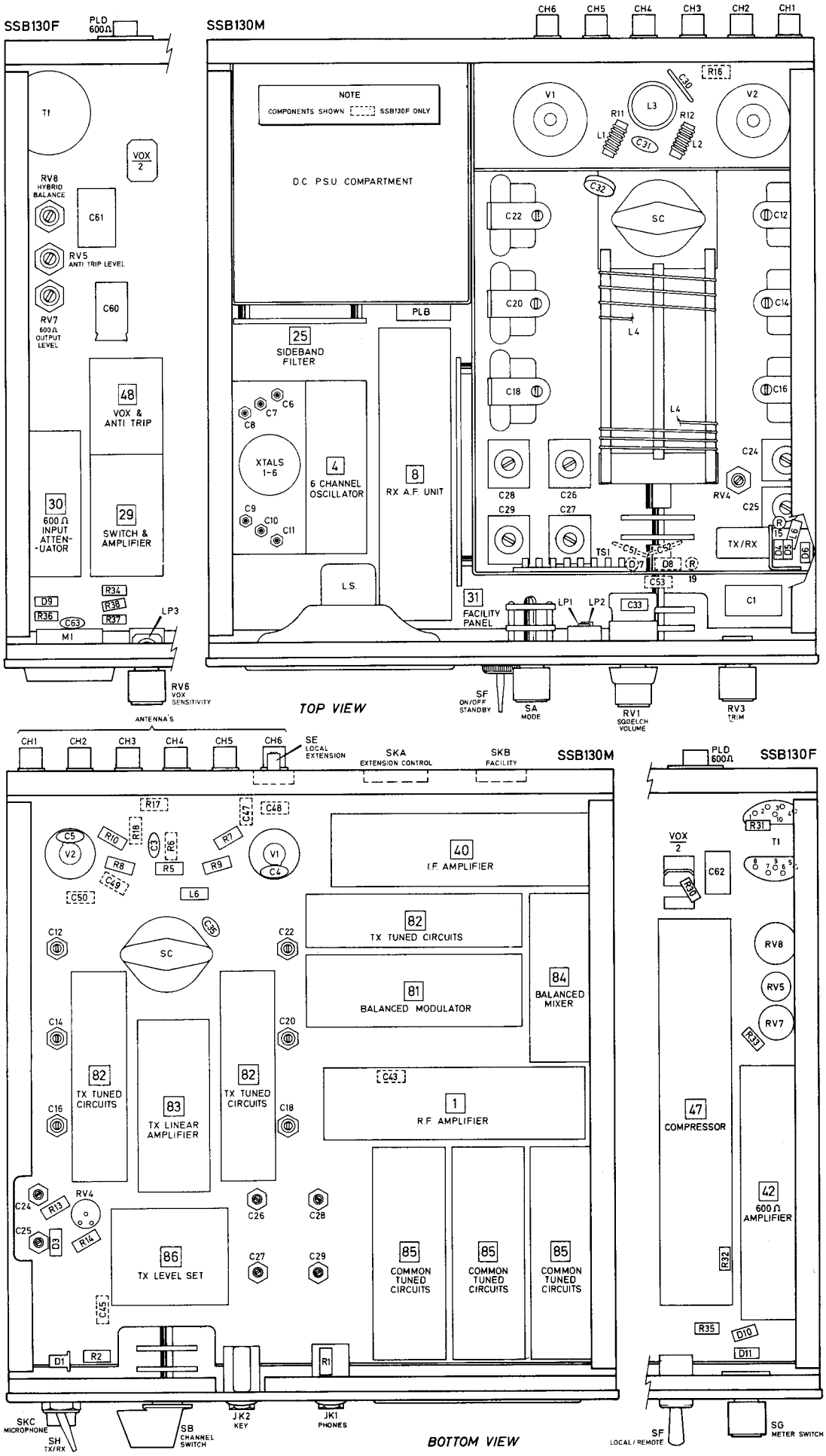




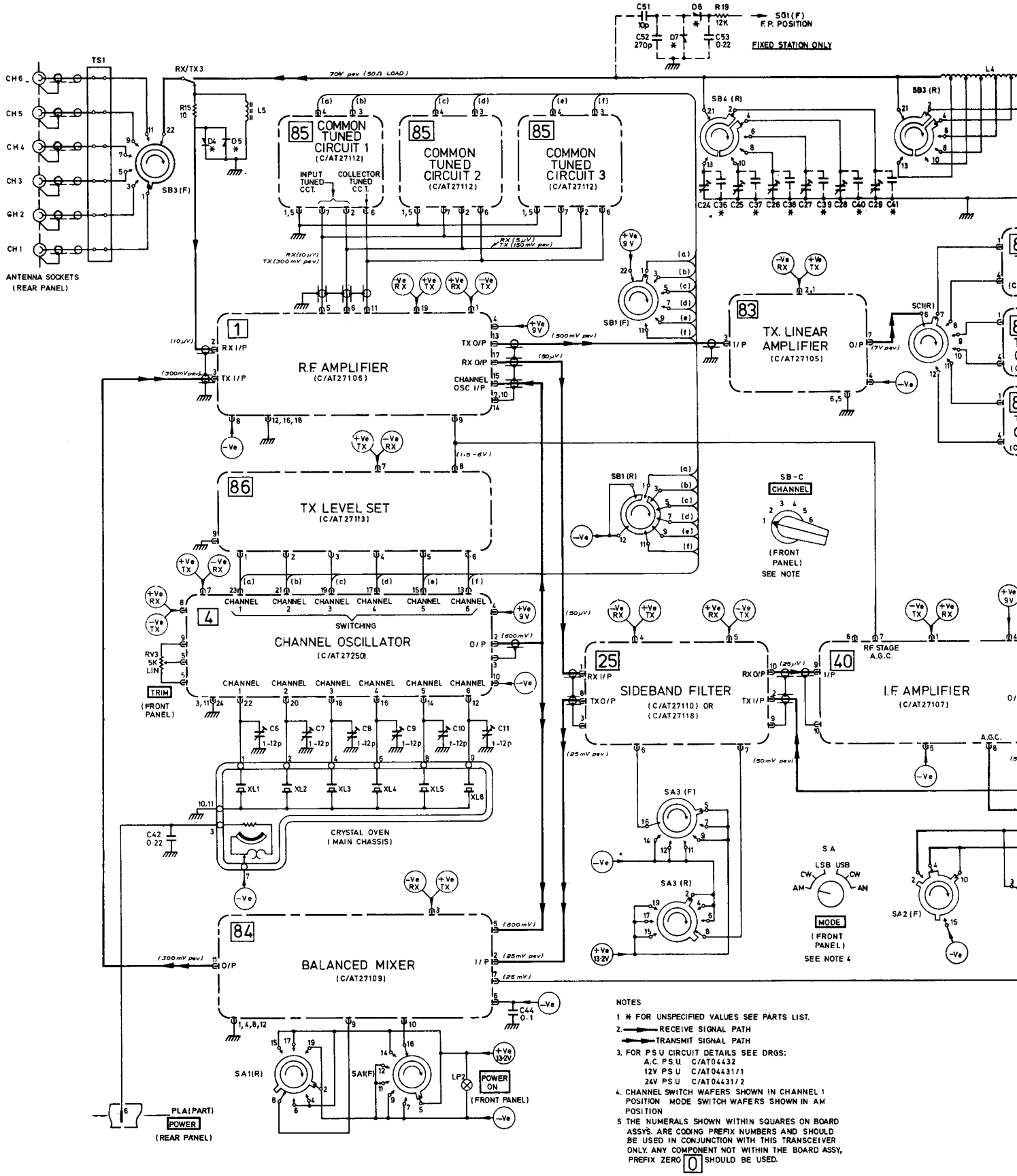
ALIGNMENT DIAGRAM.

Receiver


No Audio output on selected channel
Speaker completely dead
Check audio board and speaker connections
Speaker produces noise level adjustable with the volume control
No output on any channel
Output on other channels
Check output of selected channel oscillator
Check common tuned circuits
Transmitter not working
Transmitter working
Check oscillator output
Check balanced modulator receiver switching
Check filter board
Check balanced modulator and 1.4 MHz oscillator
Check IF amplifier
Check Audio board

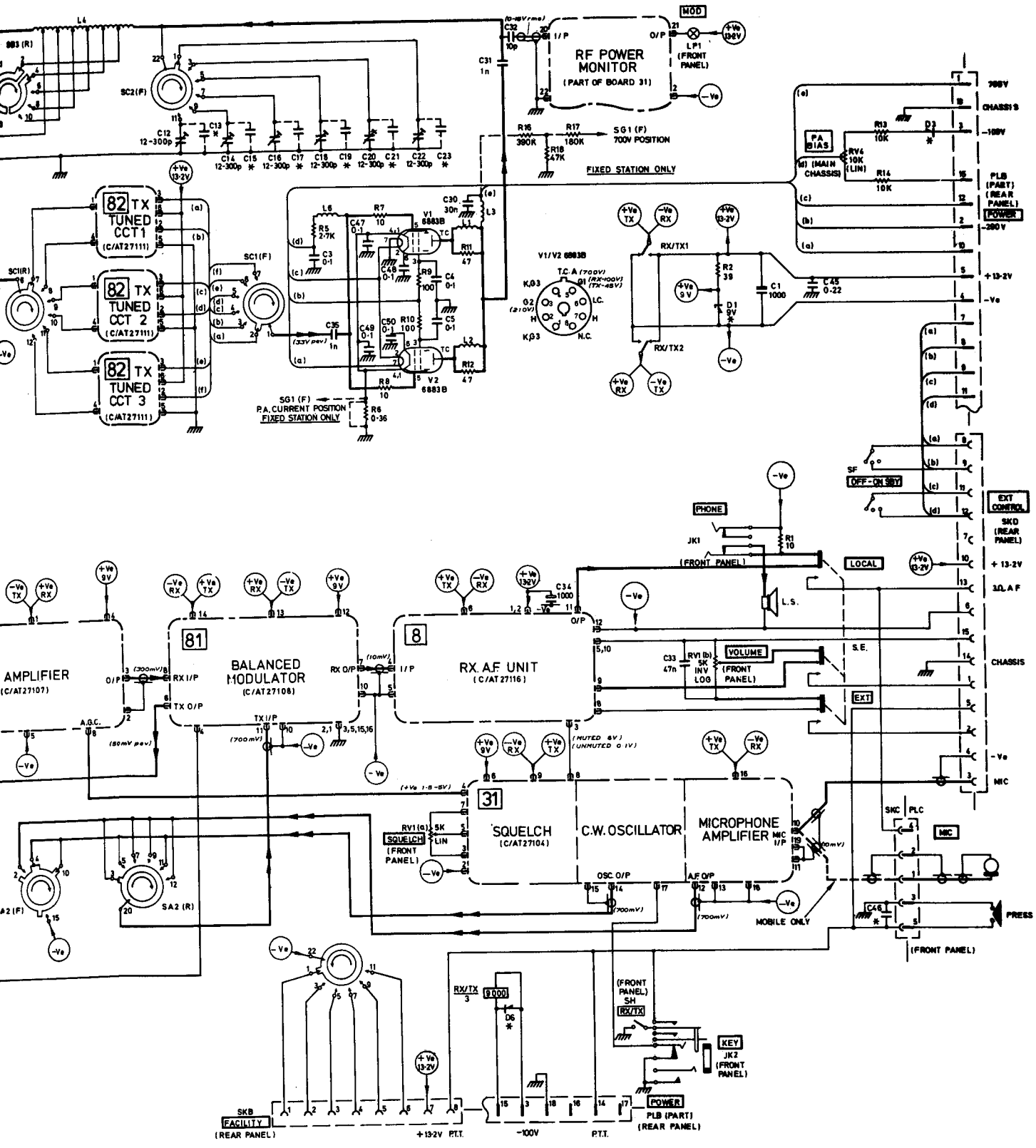


SSB130 Transceiver Component Location Diagram

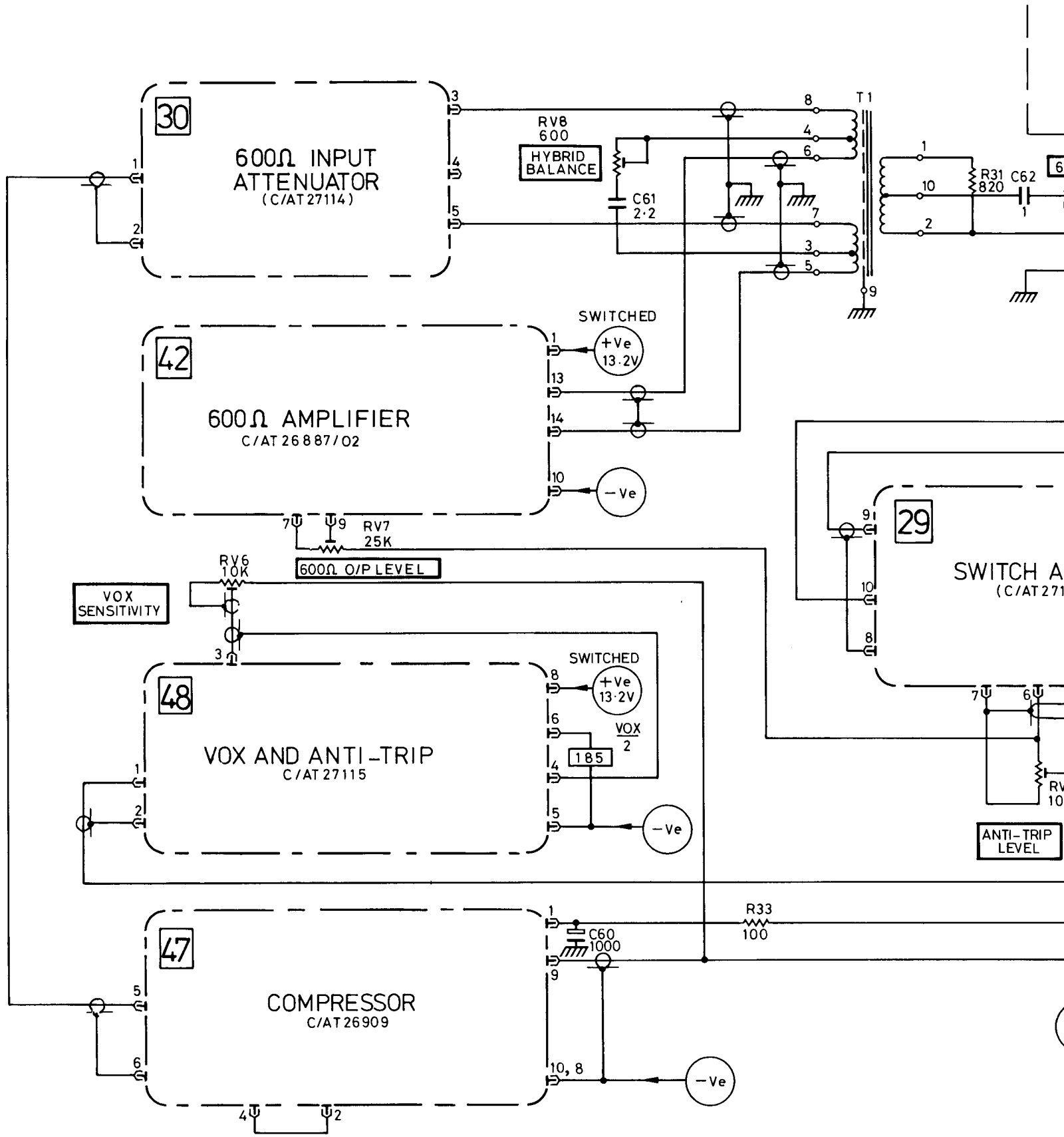


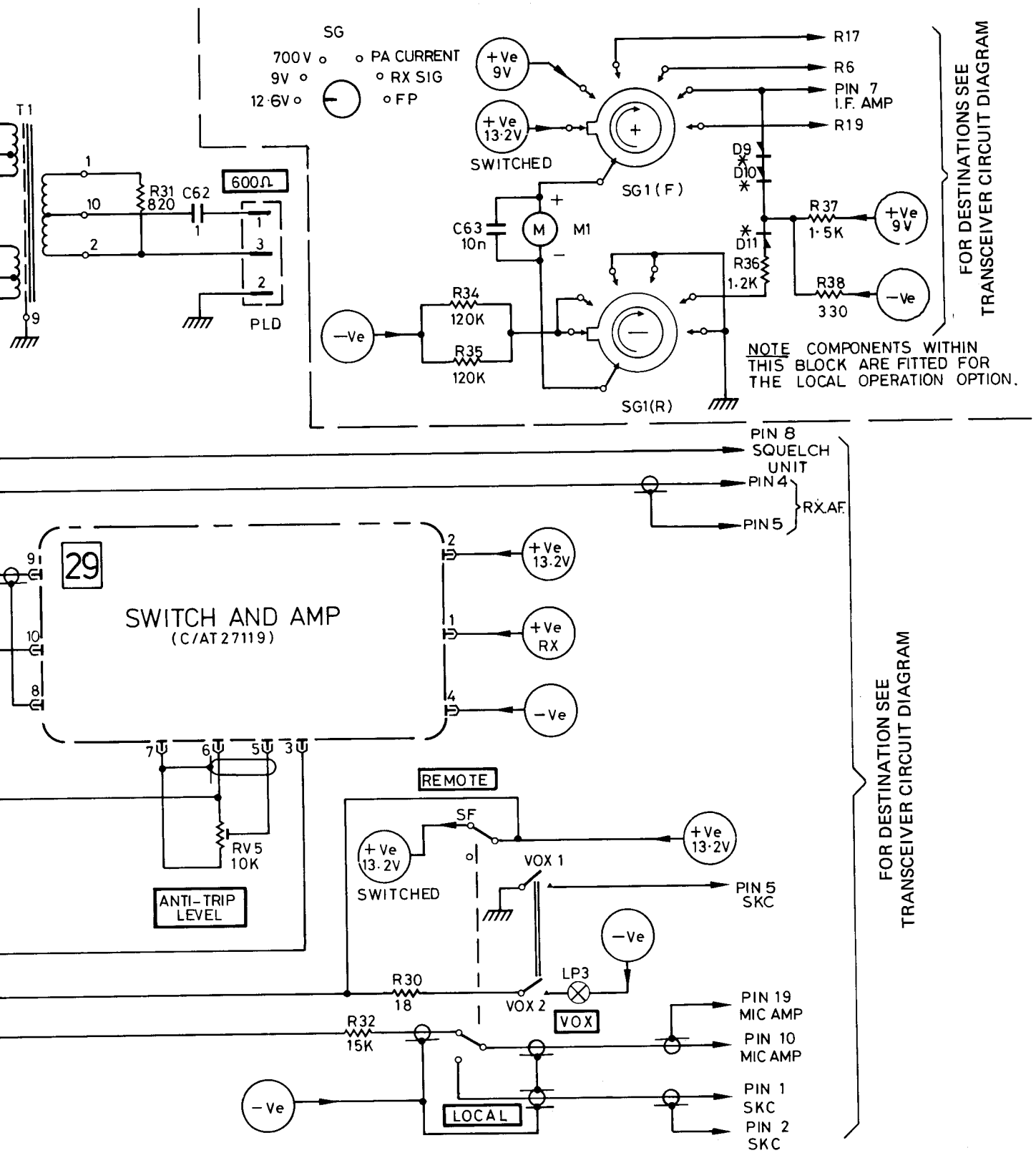
NOTES

1. * FOR UNSPECIFIED VALUES SEE PARTS LIST.
2. ——▶ RECEIVE SIGNAL PATH
   ——▶ TRANSMIT SIGNAL PATH
3. FOR P.S.U. CIRCUIT DETAILS SEE DRGS:
   A.C. P.S.U. C/AT04432
   12V P.S.U. C/AT04431/1
   24V P.S.U. C/AT04431/2
4. CHANNEL SWITCH WAFERS SHOWN IN CHANNEL 1 POSITION MODE SWITCH WAFERS SHOWN IN AM POSITION
5. THE NUMERALS SHOWN WITHIN SQUARES ON BOARD ASSYS. ARE CODING PREFIX NUMBERS AND SHOULD BE USED IN CONJUNCTION WITH THIS TRANSCEIVER ONLY. ANY COMPONENT NOT WITHIN THE BOARD ASSY, PREFIX ZERO [0] SHOULD BE USED.



SSB 130 TRANSCEIVER CIRCUIT DIAGRAM.


30
600Ω INPUT ATTENUATOR
(C/AT27114)
RV8 600
HYBRID BALANCE
C61 2·2
T1
R31 820
C62
42
600Ω AMPLIFIER
C/AT26887/02
SWITCHED
+Ve 13·2V
−Ve
RV7 25K
600Ω O/P LEVEL
RV6 10K
VOX SENSITIVITY
29
SWITCH A
(C/AT271
48
VOX AND ANTI-TRIP
C/AT27115
VOX 2
185
ANTI-TRIP LEVEL
47
COMPRESSOR
C/AT26909
C60 1000
R33 100



FIXED STATION PHONE PATCHING FACILITY CIRCUIT DIAGRAM.

3.17 A.C. POWER SUPPLY UNIT

Purpose To provide the power requirements of the SSB type 130 from an a.c. supply of 100-240V a.c. 40-60 Hz.

Input A.C. supply 100-240V

Output +700V d.c. at pin 1 for P.A. Anodes

+200V d.c. at pin 2 for P.A. Screens

-ve 100V d.c. at pin 3 for P.A. Grids and Antenna relay

+13.2V d.c. at pin 5 for common +ve line supply and ovens

12V a.c. at pins 6 & 12 for P.A. heaters

Ground at pin 10 & 13 & 4

Circuit Description A.C. supply applied at SKA is fed to the primary of transformer T1 whose secondary windings provide outputs as follows:-

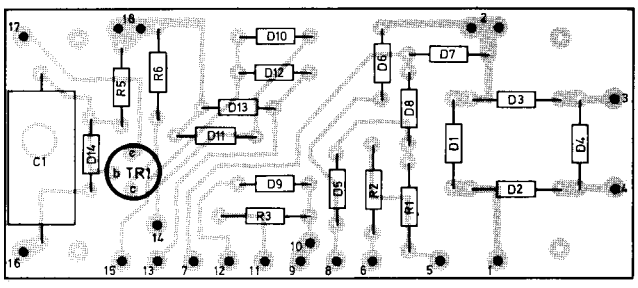
700V dc Rectified by the full wave bridge rectifier D1-D4 smoothed by the chassis mounted components R2, R3, R4, C1 and C2. The output of 700V is available at pin 1.

200V dc Rectified by the full wave bridge rectifier D5 to D8, smoothed by the board components R1, R2 and the chassis mounted components R5, C3 a and b. The 200V output is available at pin 2.

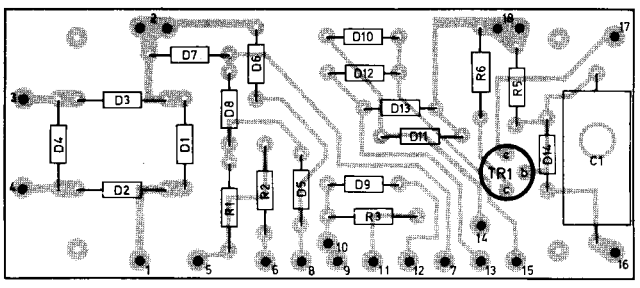
-100V dc T1 secondary voltage is fed to the half wave rectifier D9. The rectifier output smoothed by board component R3, chassis components R6, C5 and C4 is available at pin 3 of SKB.

+13.2V dc Rectified by the full wave rectifier D10-D13 smoothed by board component R4, chassis component C6 and applied to the voltage regulator transistor TR1. The output voltage from TR1 is determined by the base voltage which is set by R5 and D14, C1 provides additional smoothing and the +13V is available at pin 5.

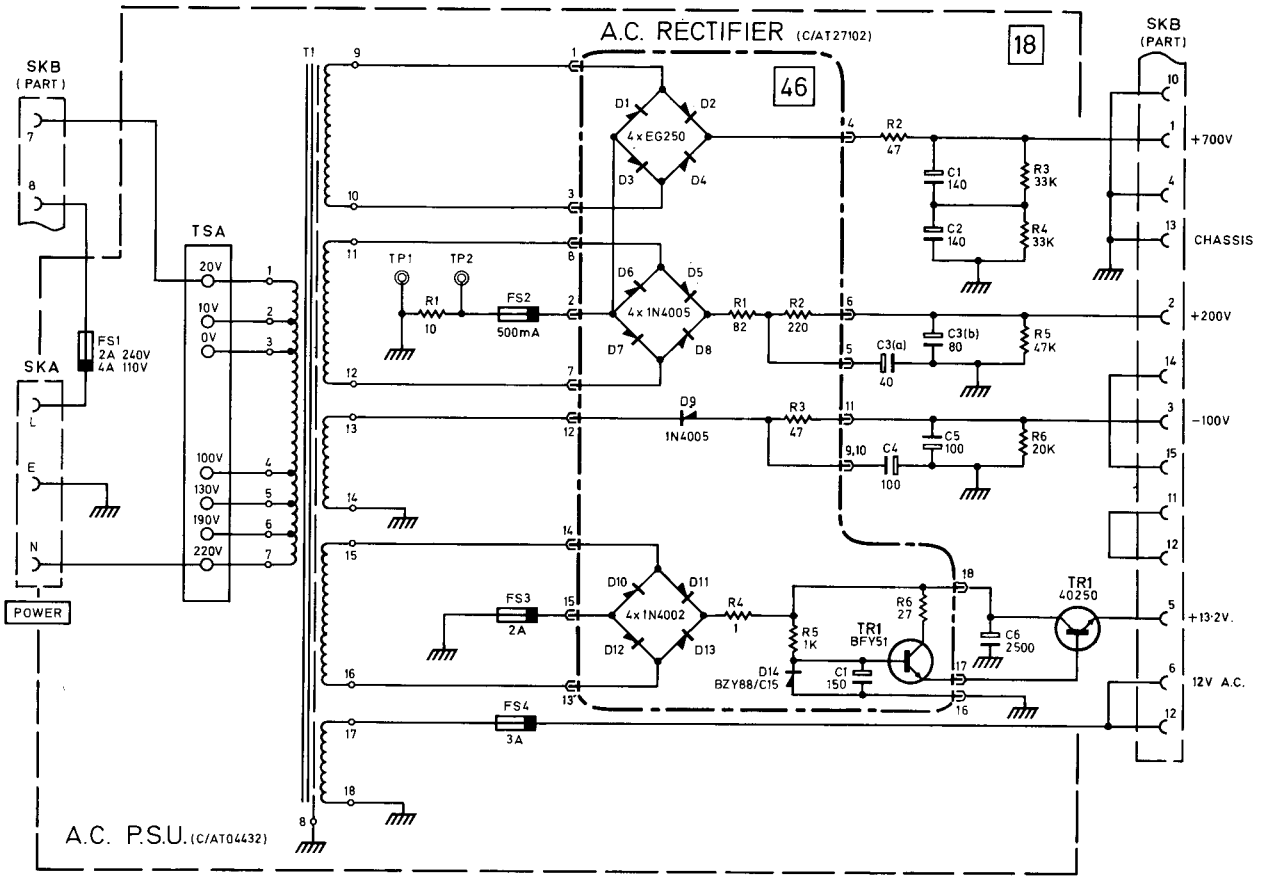
12V ac 12V for the heaters is taken via the 3A fuse FS4 to pins 6 and 12.

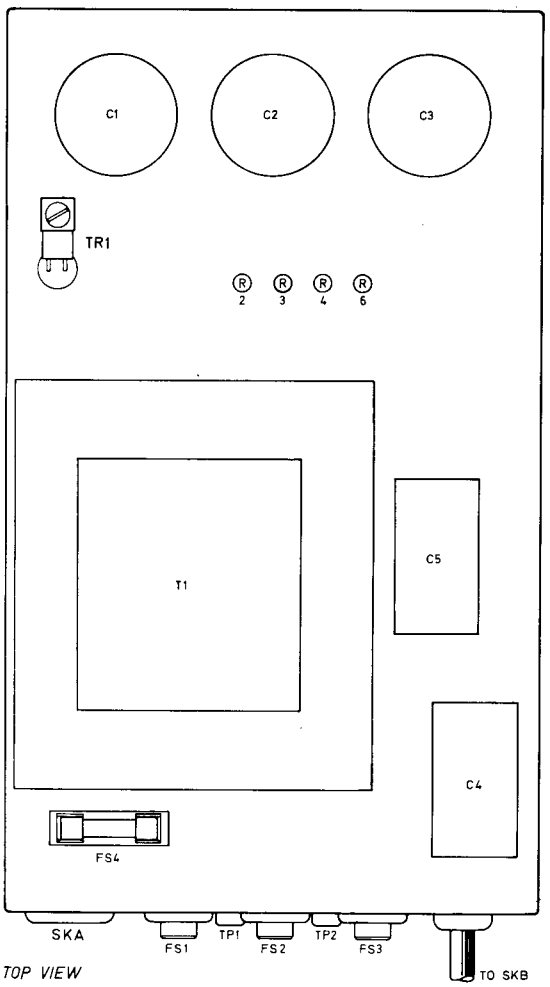


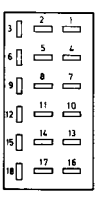
TOP VIEW

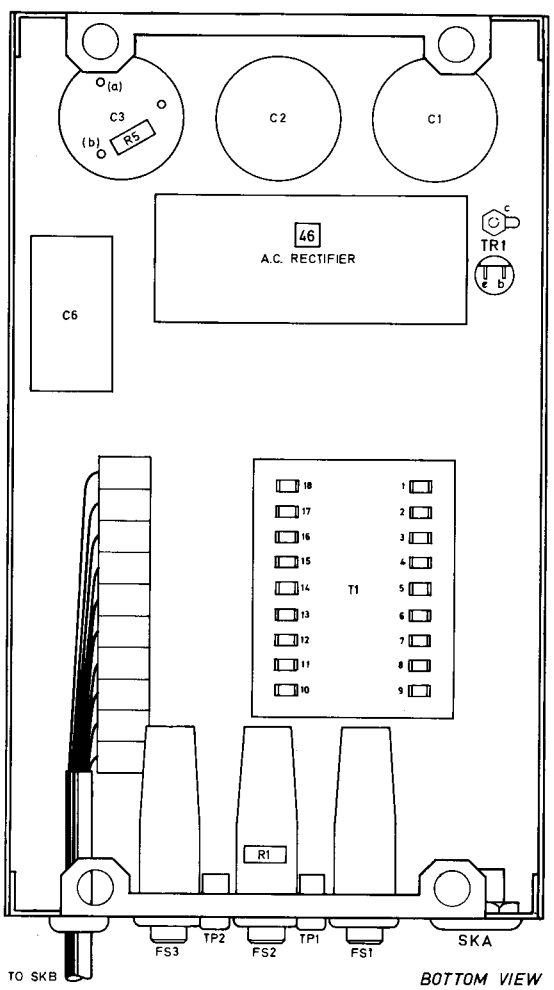


BOTTOM VIEW


A.C. RECTIFIER (C/AT27102)
18
46
SKB (PART)
SKA
TSA
T1
POWER
FS1 2A 240V 4A 110V
20V
10V
0V
100V
130V
190V
220V
TP1
TP2
R1 10
FS2 500mA
4 x EG250
D1
D2
D3
D4
4 x 1N4005
D5
D6
D7
D8
R1 82
R2 220
R2 47
C1 140
C2 140
R3 33K
R4 33K
C3(a) 40
C3(b) 80
R5 47K
D9 1N4005
R3 47
C4 100
C5 100
R6 20K
FS3 2A
4 x 1N4002
D10
D11
D12
D13
R4 1
R5 1K
R6 27
TR1 BFY51
C6 2500
TR1 40250
D14 BZY88/C15
C1 150
FS4 3A
+700V
CHASSIS
+200V
-100V
+13·2V.
12V A.C.
A.C. P.S.U. (C/AT04432)

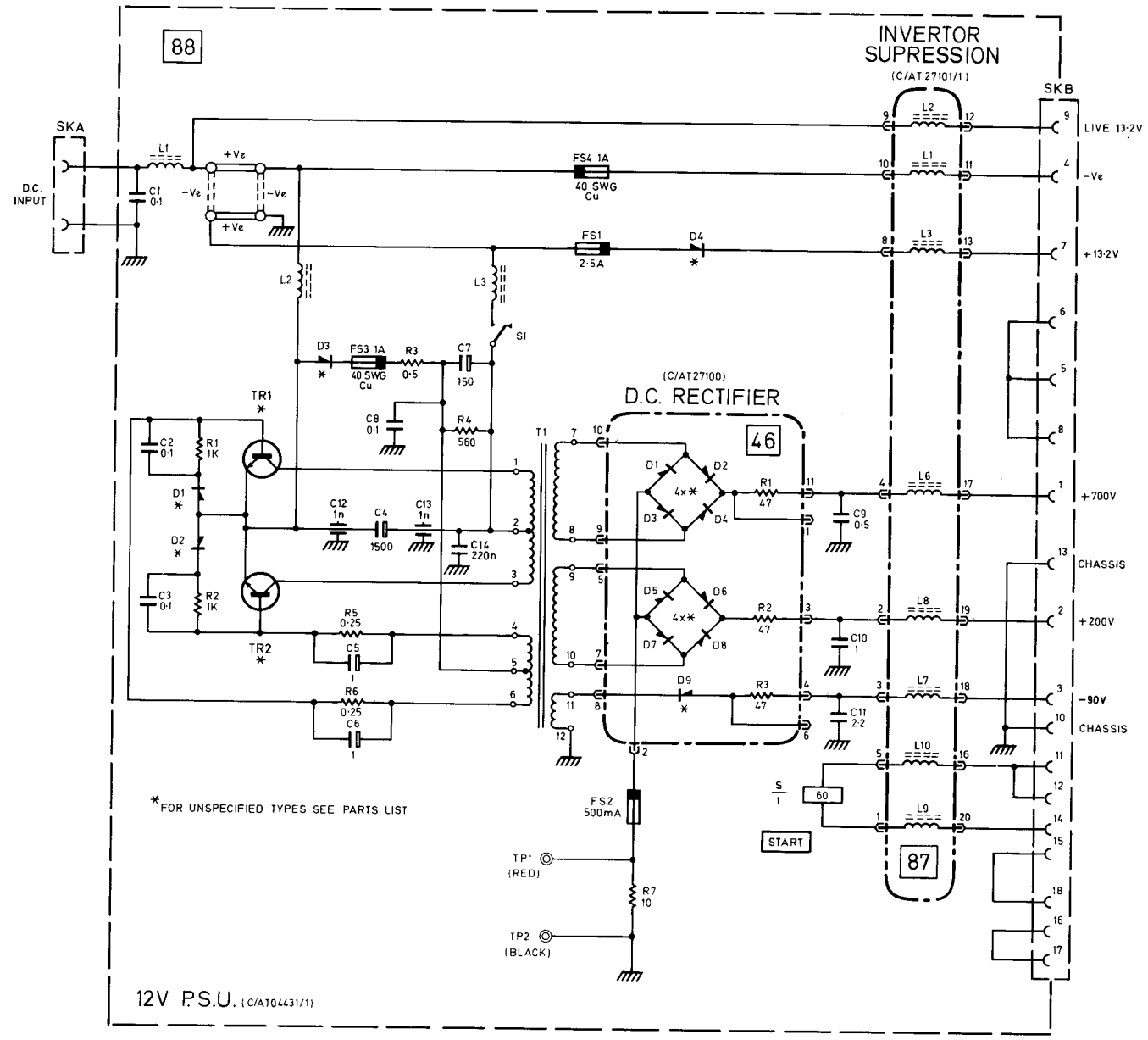

C1
C2
C3
TR1
T1
C5
C4
FS4
SKA
FS1
TP1
FS2
TP2
FS3
TO SKB
TOP VIEW


SKB
(REAR VIEW)

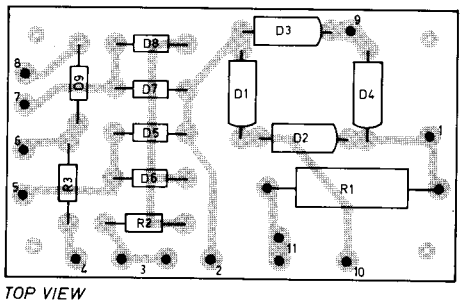

C3
(a)
(b)
R5
C2
C1
46
A.C. RECTIFIER
TR1
C6
T1
R1
FS3
TP2
FS2
TP1
FS1
SKA
TO SKB
BOTTOM VIEW

3.18 12V D.C. POWER SUPPLY UNIT

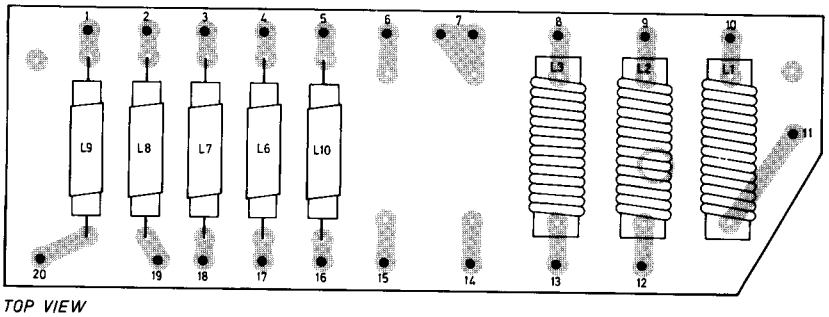
PURPOSE	To provide the power requirements of the SSB type 130 from a 12 volt dc supply.
INPUT	12V dc at SKA
OUTPUT	+700V dc at pin 1 for PA Anodes +200V dc at pin 1 for PA Screens -100V dc at pin 3 for PA Grids and Antenna Relay +13.2V dc at pin 5 & 6 for common supply line and ovens +13.2V dc at pin 9 for heaters in parallel Ground at pins 13 & 10.
CIRCUIT DESCRIPTION	12V dc applied at SKA is fed via L1 to the positive earth/negative earth selector plate and thence via L2/L3 and relay S contact 1 to the inverter circuit TR1 and TR2 which provides a high frequency a.c. voltage input to the primary of T1. T1 secondary winding outputs are as follows:-
700V dc	Rectified by the full wave rectifier D1-D4 smoothed by R1, C9 and available at pin 1 of SKB.
200V dc	Rectified by the full wave rectifier D5 to D8, smoothed by R2, C10 and available at SKB2.
-100V dc	Rectified by the half wave rectifier D9, smoothed by R3, C11 and available at pin 3 SKB.
+13.2V dc	Taken from the positive pin of the polarity selector plate, and available at pins 6 & 5.



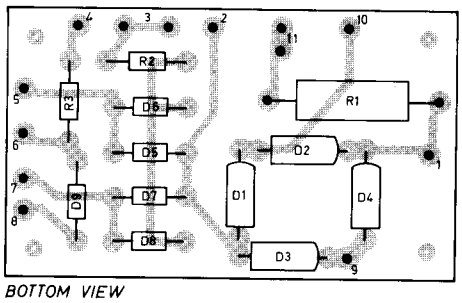
AT27100



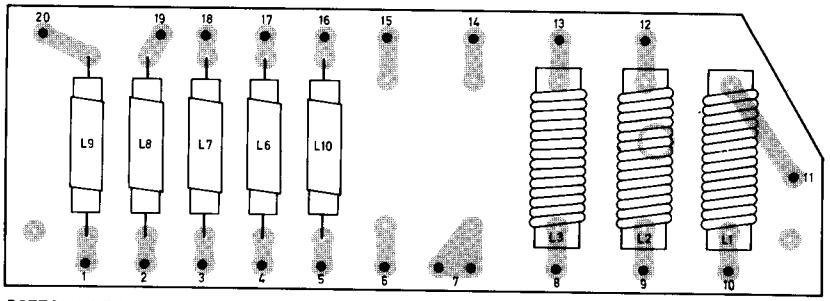
TOP VIEW



TOP VIEW



BOTTOM VIEW



BOTTOM VIEW

3.19 24V D.C. POWER SUPPLY UNIT

PURPOSE To provide the power requirements of the SSB type 130 from a 24V d.c. supply.

INPUT 24V d.c. at SKA 1 and 2

OUTPUT

+700V d.c. at pin 1	for P.A. Anodes
+200V d.c. at pin 2	for P.A. Screens
-ve 100V d.c. at pin 3	for P.A. Grids and Antenna Relay
+13.2 d.c. at pins 5 & 6	for common supply line and ovens
24V d.c. at pin 9	for heaters in series earth at pin 13

CIRCUIT DESCRIPTION 24V d.c. supplied at SKA is fed via L1 to the negative earth/positive earth selector plate and thence via L2, L3 and relay S contact 1 to the inverter circuit TR1 and TR2 which provides a high frequency a.c. voltage input to the primary winding of transformer T1. T1 secondary outputs are as follows:-

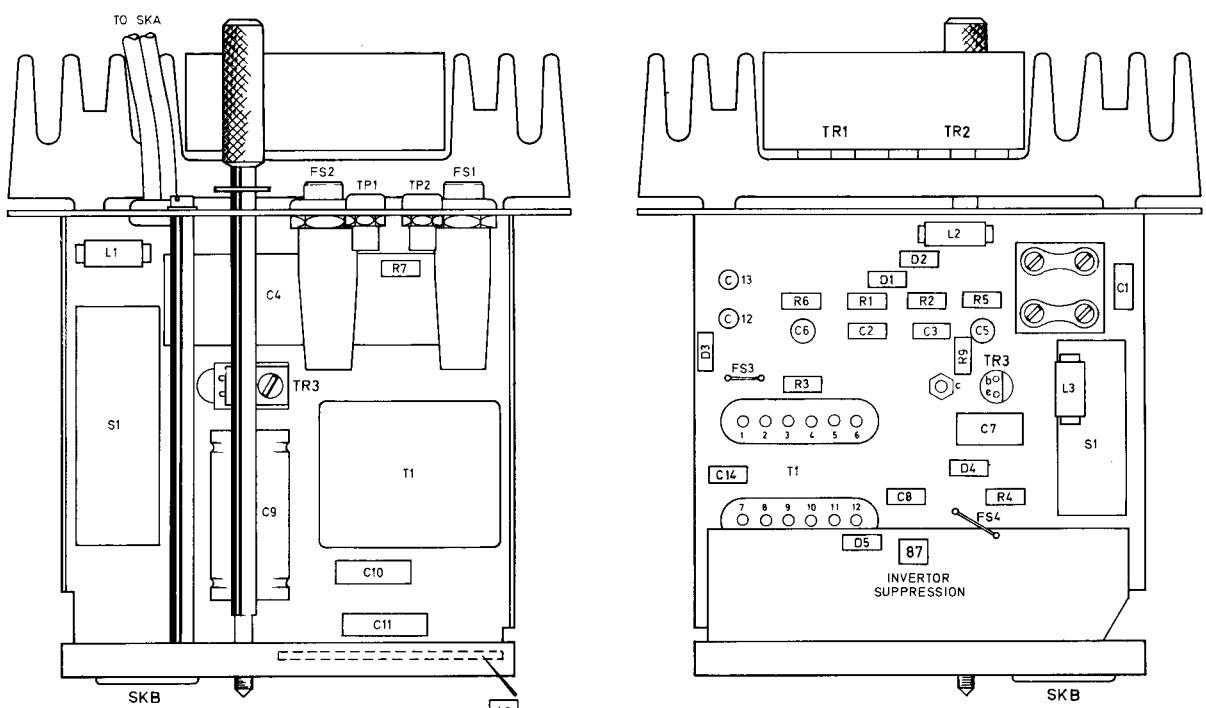
700V d.c. Rectified by the full wave rectifier D1-D4 smoothed by R1, C9 and available at pin 1 of SKB.

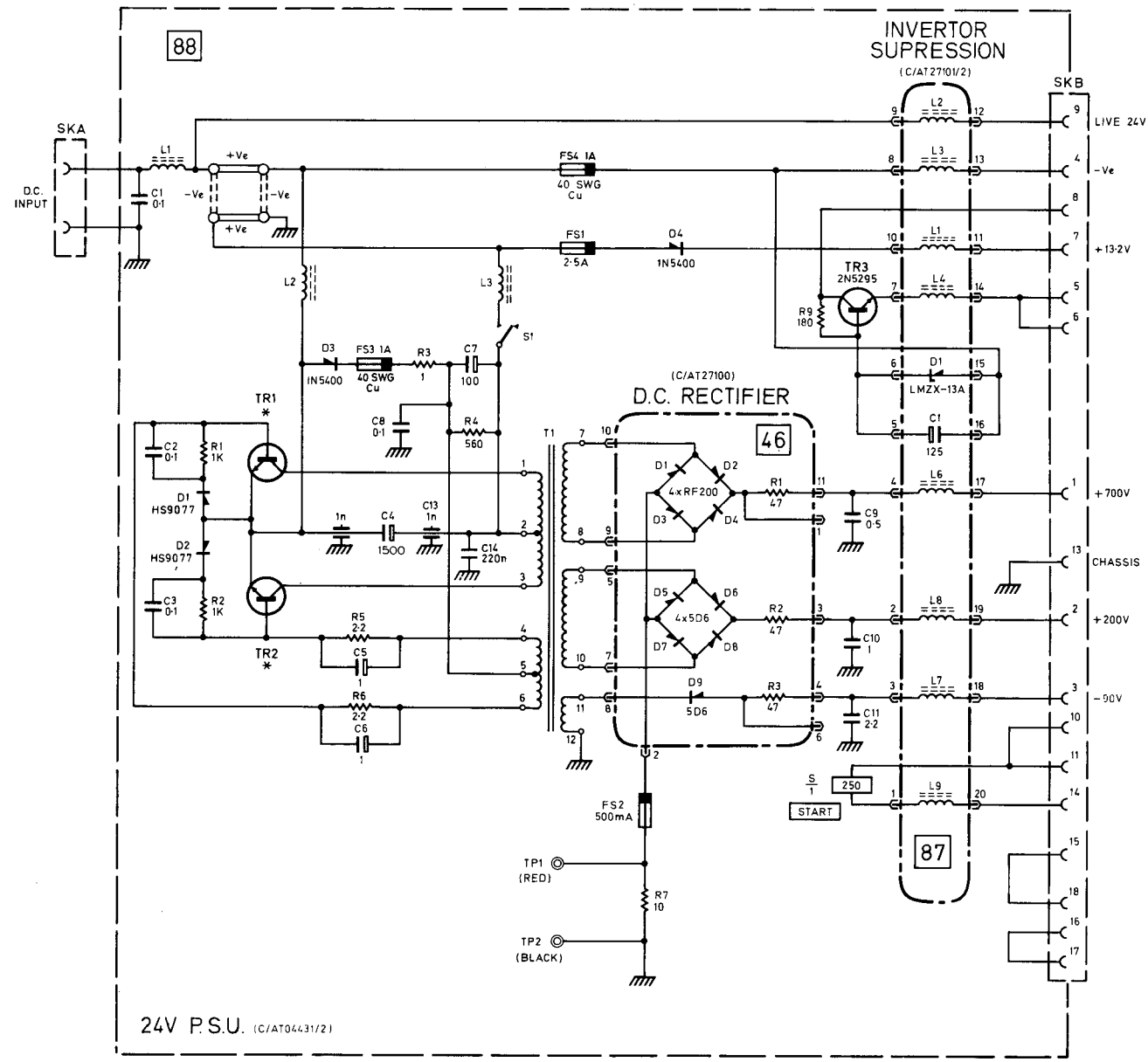
200V d.c. Rectified by the full wave rectifier D5 to D8, smoothed by R2, C10 and available at SKB 2.

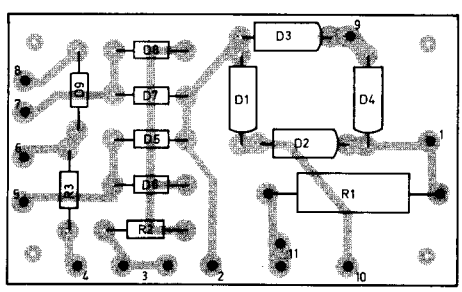
-100V d.c. Rectified by the half wave rectifier D9, smoothed by R3, C11 and available at pin 3 SKB.

+13.2V d.c. Taken from the positive 24 volt pin of the polarity selector plate regulated by TR3 providing 13.2V at pins 5 and 6 of SKB.

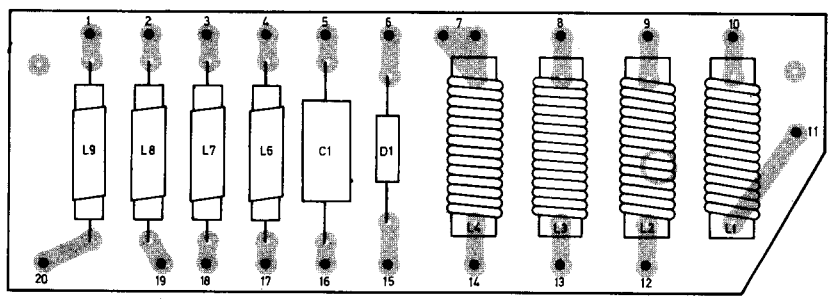
24V d.c. Taken from pin 1 of the polarity selector plate i.e. battery live terminal and is available at pin 9 SKB. Relay S connected between pins 10, 11 and 14 will be energised when the installation is in the standby mode and the press to transmit switch is operated.



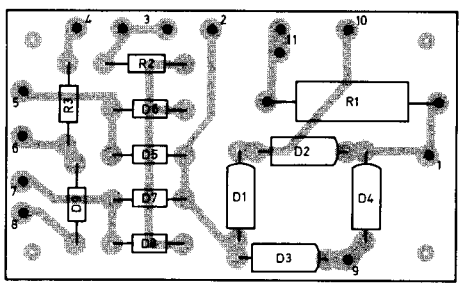




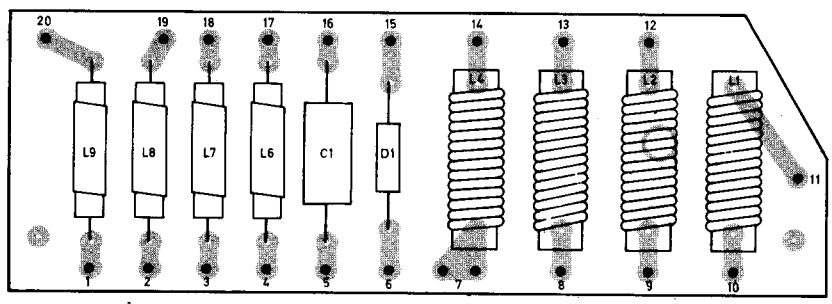
TOP VIEW



TOP VIEW



BOTTOM VIEW



BOTTOM VIEW