DECCA COMMUNICATIONS

SINGLE SIDE-BAND TRANSCEIVER

KW 2000 CAT

S.S.B.

RADIO TELEPHONE

Issue 2

DANGER

DANGEROUS VOLTAGE ALWAYS PRESENT IN THE EQUIPMENT WHEN CONNECTED TO THE A.C. LINE SUPPLY.

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KW2000CAT SSB TRANSCEIVER

SECTION 1

GENERAL DESCRIPTION AND SPECIFICATION

1.1 Introduction

The KW2000CAT Transceiver is a complete unit for single sideband transmission and reception in the band 2-12 MHz of A3J (SINGLE SIDEBAND SUPPRESSED CARRIER) EMISSIONS. By virtue of an internal tone oscillator, it is also capable of A2J emissions (CW). Separate power units are available for AC Mains (200-250v or 100-125 volt 45-65 Hz AC) or 12v DC negative earth supplies giving provision for fixed or mobile operation. The KW2000CAT is available for USB, LSB or both types of emission which are front panel selectable.

1.2 Receiver

The Receiver section of the KW2000CAT is a single conversion superheterodyne with a 1.4 MHz IF. The injection to the first mixer is 1.4 MHz higher than the signal frequency and is crystal controlled. Crystal filters are used for optimum performance. A 'CLARIFIER' control which varies the injection frequency to the 1st mixer, is available on receive.

1.3 Transmitter

The Transmitter section of the KW2000CAT uses the same oscillators and filters as the Receiver. The PA and driver stages are the only valves in the equipment, and a STANDBY switch is provided to remove the heater power to these stages for battery economy when on receive for long periods. The transmitter output is 100 watts PEP on voice in 50 Ohm, and about 70 watts on A2J (CW). A VOGAD (Voice operated Gain Adjusting Device) is fitted to give optimum modulation with varying input levels.

1.4 Power Supplies

These are separate units to the Transceiver and are either for mains or battery operation. Minor re-adjustment of the equipment may be necessary when changing from mains to battery operation.

1.5 Antennae

The Antenna System used should present a load of between 40 and 80 Ohms (resistive) to the Transceiver. A pi-network output circuit is used, but for optimum performance, the load should be as stated below.

1.6 Specification

General

Mode	A3J (SSB Suppressed Carrier) Upper or Lower Sideband.
Frequency Range	2-12 Mhz.

Operation may be extended with some loss of performance. Consult factory for details.

Ambient Temperature Range

-10° to $+50^{\circ}$C.

The equipment will operate over this range, but for best results should be set up in its normal operating ambient temperature.

Power Requirements

Fixed:	200-250 or 100-125 volts 45-65 Hz at 350VA peak.
	This Supply MUST BE SUBSTANTIALLY SINUSOIDAL.
Mobile:	12 volts nominal DC negative earth at 24A peak.

Cabinet Dimensions

Transceiver	355mm x 160mm x 335mm
AC PSU	320mm x 95mm x 163mm
DC PSU	202mm x 119mm x 127mm

Weight

Transceiver	7.5 Kg
AC PSU	5 Kg
DC PSU	2.75 Kg

Receiver

Reception Modes:	A3J, A3A upper or lower sideband.
	A2J offset carrier CW
Input Impedance:	Nominal 50 Ohms
Sensitivity:	1 microvolt for 500mW O/P.
Signal to Noise Ratio:	Better than 10dB at 1 microvolt I/P.
Output Impedance:	
Selectivity:	Nominal 300 Hz to 2900 Hz at -6dB.
	Greater than -60dB at 700 Hz in unwanted sideband and above 3900 Hz.
AF Output:	1 Watt
Image Rejection:	Greater than -50dB below 9 MHz and greater than -40dB above 9 MHz.

Transmitter

Emission:	A3J USB or LSB
	A2J USB or LSB

Service	A3J - VOICE.	15 minutes with 1:1 TRANSMIT-RECEIVE RATIO.
	A2J - CW.	50% duty cycle. As voice.
Carrier Suppression:	-43dB rel PEP.	
Unwanted Sideband	-45dB at 1 KHz.	
Mic Input	Low Impedance (150 Ohm).	
AF Response	300 Hz - 2800 Hz $\pm$3dB.	
Output Load	40-80 Ohms resistive.	
Intermodulation	-25dB (3rd order).	
Power Output	SSB (VOICE)	100 watts PEP.
	CW (A2J)	70 watts.

1.7 Valves and Semiconductors

Receiver

I.C.1	RF Amplifier	Plessey	SL611C
D2-5	Rx Mixer	H.P.	5082-6734
D6-22	Filter Switching	Mullard	BA182
I.C.2,I.C.3	Rx IF Amplifiers	Plessey	SL612C
I.C.4	Product Detector	Plessey	SL641C
TR12	AF Amp.		BC108
TR13	AF Driver	R.C.A.	40309
TR14	AF Output	R.C.A.	2N5296
D.33	(AF) Switching		AA119

Carrier Oscillator

TR9	Oscillator	R.C.A.	40673
TR10	Buffer	R.C.A.	40673
TR11	Source Follower	Texas	BF244B
I.C.5	Level Control	Fairchild	uA741
D31, 32	Level Detectors	Mullard	BAX13
D1, D23	Stabiliser		BZY88 C6V2

Channel Oscillator

TR1	Oscillator	R.C.A.	40673
TR2	Amplifier	Texas	BF244C
TR3, 4, 5	Amplifier/Limiter	Mullard	BF115
TR6	Emitter Follower	R.C.A.	2N3866
TR7, TR8	Clarifier Control		BC108
D24, D25	Channel Switching Diodes	Mullard	BA182

1.7 Valves and Semiconductors (Cont'd)

Transmitter

I.C.10	AF Amp/VOGAD	Plessey	SL622C
TR17	AF Drive		BC108
TR18	Tone Osc.		BC108
TR19	T. Osc. Amplifier		BC108
D39-42	Balanced Modulator	Hewlett Packard	5082-6734
I.C.8	Tx. IF Amp	Plessey	SL612C
D47-50	Tx. Mixer	H-P	5082-6734
I.C.9	Tx. Amp	Plessey	SL611C
TR16	Tx. Pre Driver		2N3886
D37	Drive Control 'OR' Gate		AA119
D38	Drive Control Temperature Compensator		AA119
D43, 44	Tx. IF Switching		1N914
D45	Oscillator Switching		BA182
D46,52,53	Stabiliser		BZY93 C8V2
D54	PA Screen Stabiliser		BZY93 C75
D55	PA Screen Stabiliser		1N1811A
D34	Rx. Control Gate		AA119
D35	Rx. Control Gate		1N914

Control & AGC

D36	Rx. RF AGC Delay		BZY88 C3V0
I.C.6	Rx. AGC	Plessey	SL612C
I.C.7	Regulator	National Semiconductor	LM305H
TR15	Regulator Boost	Motorola	MJE521

Valves

V1	Tx. Driver		12BY7A
V2, V3	P.A.	R.C.A.	6146B

SECTION 2

CIRCUIT DESCRIPTION

2.1 Transmitter Circuits

1. A.F. Stages

The microphone input is connected via RF Filter C120, C121 and L5 to I.C.10, which is an SL622C integrated circuit VOGAD (Voice operated gain adjusting device). The output from this stage is at a level of about 90mV, and is amplified by TR17, BC108, to give a 500mV signal (rms) input to transformer T6. The sidetone output of I.C.10 feeds the VOX circuitry when fitted.

2. Balanced Modulator

The secondary of T6 applies the audio signal to the balanced modulator diodes D39-42. These diodes are a matched quad of Schottky Carrier diodes, giving very good balance without adjustments.

3. Filters and IF Amplifier

The diodes D7-D22 switch the filters between transmit and receive and also provide for filter selection. The USB emission requires a LSB Filter and vice-versa. This is because of frequency inversion in the mixing process. The signal from the output of the filter is amplified by I.C.8, a Plessey SL612C integrated circuit, and converted to final frequency in D47-50, which is another Schottky diode quad.

4. Drive Amplifiers

The signal at final frequency is amplified in I.C.9, a Plessey SL611C. Drive control is applied to this stage from VR9a-d, via a gate consisting of D37a-d. Thermistors Th1a-d and diode D38 give a first degree temperature compensation.

The output is matched to the tuned circuit L7, C147, C148 by emitter follower TR16, a 2N3866. The signal across L7 is applied to the grid of V1, 12BY7 and via C153, L8 to the grids of V2, V3, which are type 6146B. The anode network of V2, V3 is a conventional pi-network.

Tone Oscillator

An L-C oscillator consisting of TR18 (BC108) C141, C145 and L6 provides an audio tone which is coupled via TR19 (BC108) to the transmitter AF section.

2.2 Receiver

1. RF Amplifier

The RF Amplifier input is tuned by L1, L2, C1, C2, C3, C4 and C5, which provide a bandpass coupled pair. The signal is then amplified by I.C.1, which is a Plessey SL611C integrated circuit. Delayed AGC is applied to this stage.

2. Rx Mixer

This is a further Schottky barrier diode quad, giving very good intermodulation performance.

2.2 Receiver (Cont'd).

3. IF Amplifier and Detector

The signal passes through D7-D22 to provide send-receive and sideband switching. The signal is amplified by I.C.2 and I.C.3 (Plessey SL612C) and detected in I.C.4 (Plessey SL641C).

4. Rx. Audio Amp.

The signal is passed via Low Pass Filter L3, C48, C49, C50 and amplified by TR12, 13 and 14. The output from TR14 is fed to the loudspeaker via T5.

2.3 Oscillators

1. Channel Oscillator

A dual gate MOSFET, TR1, functions as a crystal controlled oscillator. The crystals are switched by diodes D24 and 25 a-d, and are adjusted to frequency by trimmers VC1 a-d. The frequency of the oscillator is variable over a small range by the clarifier control, which applies a variable voltage when in receive, to the varactor D26. On transmit, the varactor is fed with a pre-set voltage from VR3, which corresponds to the mid point of the clarifier control. TR2, 3, 4, 5 and 6 provide amplification and limiting of the oscillator signal.

2. Carrier Oscillator

A dual gate MOSFET, TR9, functions as a crystal oscillator at 1.4 MHz. The signal is amplified in TR10 and passed via tuned transformer T4 to the balanced modulator and detector. TR11, D31 and 32 and I.C.5 provide level control.

2.4 Power Supplies

1. AC P.S.U.

The dual primary toroidal transformer provides AC to rectifiers D1-4, 5-8 & 9-12. These provide outputs of +750, -120 and +18v respectively. A 300 volt output is obtained from a centre tap on the 750 volt supply winding.

2. DC Power Supply

This is a 4 transistor 2 transformer type inverter with rectification and smoothing. RFI/EMC filtering is provided on the input and output circuits.

3.3. (3) Cont'd.

should be spaced by at least 5 feet below the dipole wire above and the lowest frequency antenna should be the trap dipole. A similar arrangement can be done in the case of vertical (or semi-vertical) antennae with the feed point at the bottom providing the "bunched" feed connection (fig. 2). The formula for each quarter-wave length is $\frac{233800}{\text{freq. in KHz.}}$ = ... feet. (slightly longer than the half-wave length in free space). This can be fed by a short piece of wire (say 6 inches) directly from the centre of the co-axial connector at the rear of the Transceiver. As an alternative, the antenna feed point can be connected to the centre conductor of 52 ohm co-axial cable and the outer of the co-axial cable must be "grounded" to a good earth stake or earth connection.

4. The use of a long wire or random length of wire as an antenna is not recommended unless a suitable Antenna Tuning Unit is employed.

3.4 Initial Checks Fixed Station

Connect the transceiver, antenna and microphone as shown in fig. 7, connect an AVOMETER to the Jack Socket on the rear drop of the equipment. Check the AC PSU is wired to suit the supply voltages. Put the CW SEND/RECEIVE SWITCH to RECEIVE, set the VOLUME control to vertical, the FUNCTION SWITCH to LSB, SSB the CLARIFIER to vertical, the CHANNEL SWITCH to the require channel, allow the transceiver 60 seconds to warm up, a rushing noise will be heard from the loudspeaker. Put the CW SEND/RECEIVE SWITCH to SEND and adjust the potentiometer VR1 on the AC PSU for a reading to 50mA. Switch back to CW receive.

CAUTION

DO NOT SET STANDING CATHODE CURRENT TOO LOW; AMPLIFIER LINEARITY WILL BE DEGRADED. DO NOT SET TOO HIGH; PA PLATE DISSIPATION WILL BE EXCEEDED AND VALVES DAMAGED.

3.5 Power Amplifier Tuning

After doing the initial checks it will be necessary to TUNE and LOAD the P.A. into the antenna system.

a) Set the equipment up as in 3.4.

b) Plug a MORSE KEY into the socket on the rear drop of the transceiver, switch to CW SEND, a reading of 50mA should be noted on a AVO meter connected to the jack socket on the rear chassis drop.

c) Press the key, the PA milliamps should rise to approximately 200mA, adjust the PA TUNE capacitor for a dip in P.A. milliamps, then adjust the PA LOAD capacitor for an increase in P.A. milliamps, re-adjust the P.A. TUNE capacitor for a dip in P.A. milliamps, continue to adjust the PA TUNE and P.A. LOAD capacitors until with the P.A. TUNE capacitor tuned for a dip the P.A. milliamps are 200. Adjust capacitors on each channel as follows, see fig. 4 for location.

3.5 (Cont'd).

CHANNEL	P.A. TUNE	P.A. LOAD
1	VC5a	VC6a
2	VC5b	VC6b
3	VC5c	VC6c
4	VC5d	VC6d

d) The above adjustments should be carried out as quickly as possible, allow 1 minute only with key down.

e) If it is not possible to obtain 200 milliamps of P.A. Current, advance the correct drive control until 200mA is obtained with key down. This control is VR9 a, b, c or d, as applicable to Channels 1-4.

3.6 Testing SSB Channel

Set the CHANNEL SWITCH to the desired channel, the FUNCTION SWITCH to the required sideband, arrange with the distant station for a test transmission to be made and adjust the CLARIFIER for best speech quality. Press the PRESS TO TALK button on the microphone, and speak into the microphone at a normal conversation level. The P.A. milliamps on the AVO should rise to an average level of 100mA on speech. If it is not possible to get good speech quality see section 4.

3.7 Testing CW

To transmit CW, plug the MORSE KEY into the socket on the rear drop of the 2000CAT, put the CW SEND/RECEIVE SWITCH to CW SEND and the FUNCTION SWITCH to SSB, USB or SSB LSB. P.A. milliamps should now read 50mA. Key the transmitter and the P.A. milliamps should now rise to 200mA.

3.8 Emission

Stations employing single sideband can normally only operate in conjunction with other stations similarly equipped. Single sideband signals are not readable on an ordinary (AM) radio receiver unless a carrier signal is introduced. Communications cannot be made with AM stations.

Two communicating stations must use the same sideband. C.C.I.R. recommended the use of USB only. A change of sideband may be made to avoid interference with other stations.

3.9 (1) Mobile Installation

Connect the transceiver, power supply, antenna and microphone as shown in fig. 8. The most practical installation is to place the transceiver under the instrument panel of the vehicle, with the DC Power supply unit located under the bonnet. A shallow U shaped bracket is available for mobile installation and is intended to be bolted upside-down beneath the instrument panel. The transceiver is then slung fro the downward projecting arms of the U bracket.

3.10 (2) Mobile Electrical Installation Procedure

a) Check that the polarity of vehicle is NEGATIVE EARTH.

b) The cable available for connection between the DC power supply and transceiver is six feet long, this should be remembered when installing in other than a normal passenger vehicle.

c) A fuse block containing a 25A fuse is available and should be installed as close to the battery as possible. Install the fuse block in the LIVE side of the battery.

LEAVE THE FUSE OUT UNTIL THE INSTALLATION IS COMPLETE

d) Use cable capable of carrying 30A, for connecting the power supply to the battery. Ensure that no chafing to cables can occur while the vehicle is moving.

3.11 Mobile Antenna Installation

One of the most efficient antennas for mobile operation is the Helically wound whip. These antennas use an insulated bumper or body mount, with provision for co-axial feed from the base. This type can be supplied by Decca Communications Ltd. Frequency of operation must be notified to the manufacturer when ordering.

3.12 Mobile Antenna Tuning

It is essential for the best performance, that the mobile whip is cut accurately to the frequency used. The helically wound whips supplied, when installed will resonate at a frequency lower than the required operation frequency, to resonate the antenna proceed as follows:

a) Check that the antenna will operate on the required frequency by referring to TABLE 3.1.

b) Insert a SWR meter between the KW2000CAT and the co-axial feeder cable to the antenna, using a short length of 52 ohm coaxial cable.

c) Set the KW2000CAT up on the required channel, put the FUNCTION switch to TUNE, adjust for full scale deflection on the FORWARD reading of the SWR meter, switch the SWR meter to read REFLECTED power and note the reading, the whip antenna is now cut carefully to reduce this reading to a minimum. A SWR of 2-1 or less is satisfactory.

d) Cut the antenna by no more than $\frac{1}{4}$" at a time, switching the KW2000CAT to RECEIVE whilst each adjustment is made. When the REFLECTED power is at minimum, check the tuning of the POWER AMPLIFIER as in 3.5. The antenna is now correctly tuned. Any excess feeder cable should be coiled neatly in the trunk compartment. Do NOT cut off any portion of this cable after the antenna is tuned.

3.13 Noise Suppression

a) A motor vehicle generates a considerable amount of electrical noise and to permit satisfactory reception by a mobile installation it is necessary to reduce this noise to a low level.

b) The ignition system is responsible for a considerable amount of the electrical noise. The sparking plug caps should be of a type with built-in suppression, or plug suppressors should be used. It is beneficial to use sheathed cable for the leads from the distributor to the sparking plugs and from the ignition coil to the rotor terminal on the distributor, the sheathing being securely bonded to the car frame. There are two terminals on the ignition coil, the one marked 'SW' should be by-passed to the car frame through 0.1-0.5uF capacitor.

3.13 Noise Suppression (Cont'd).

c) Dynamo whine can be identified by the following procedure. Run the engine at a fast idling speed. Tune the transceiver to a frequency where there are no signals. Switch the ignition off. If the noise persists for a short time after the ignition has been switched off, then it is due to the dynamo. This type of noise can often be eliminated by connecting a capacitance of about 0.5uF from the 'D' terminal on the dynamo to the car frame. In no circumstances should the field terminal 'F' be by-passed or the regulator action will be impaired and the unit damaged.

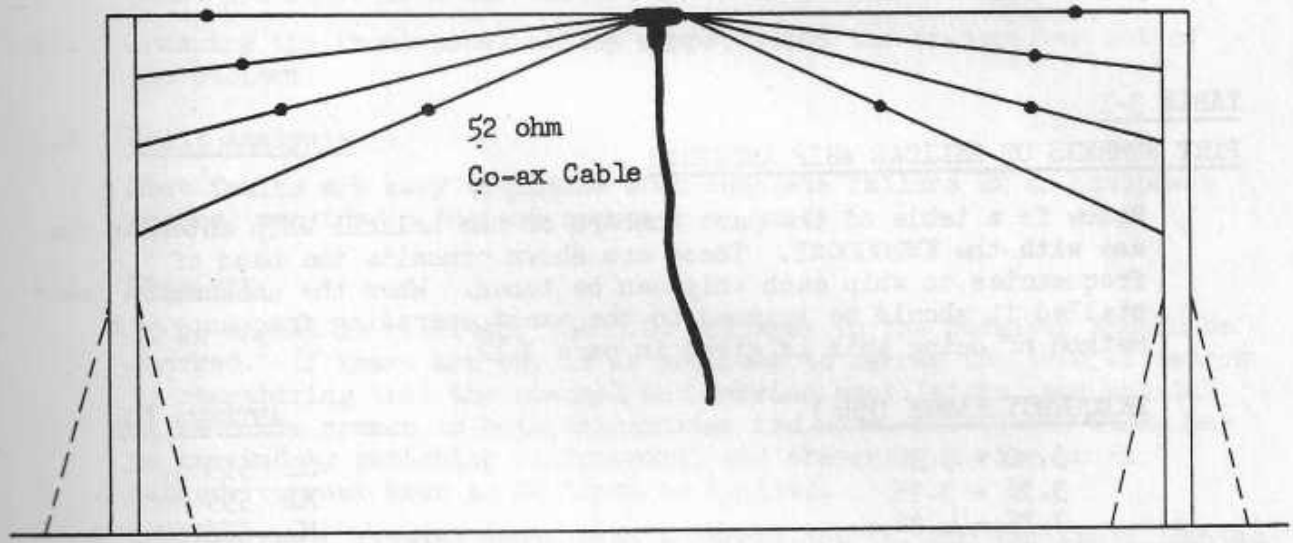
3.14 Initial Checks Mobile Operation

The initial checks are the same as for fixed station operation, the potentiometer RV1 is adjustable through the rubber grommet on the side of the DC P.S.U.

3.15 Power Amplifier Tuning Mobile Operation

The Power Amplifier tuning should be carried out as in section 3.5. It is very important when loading into a mobile antenna that the antenna is resonant on the required frequency.

ANTENNAE (Fixed Station)



Example of Multiband dipole for 4 frequencies.

FIG. 1

Example of 4 frequency Vertical antenna (or Semi-Vertical). A good earth must be provided such as an 8ft. earth stake or ground mat.

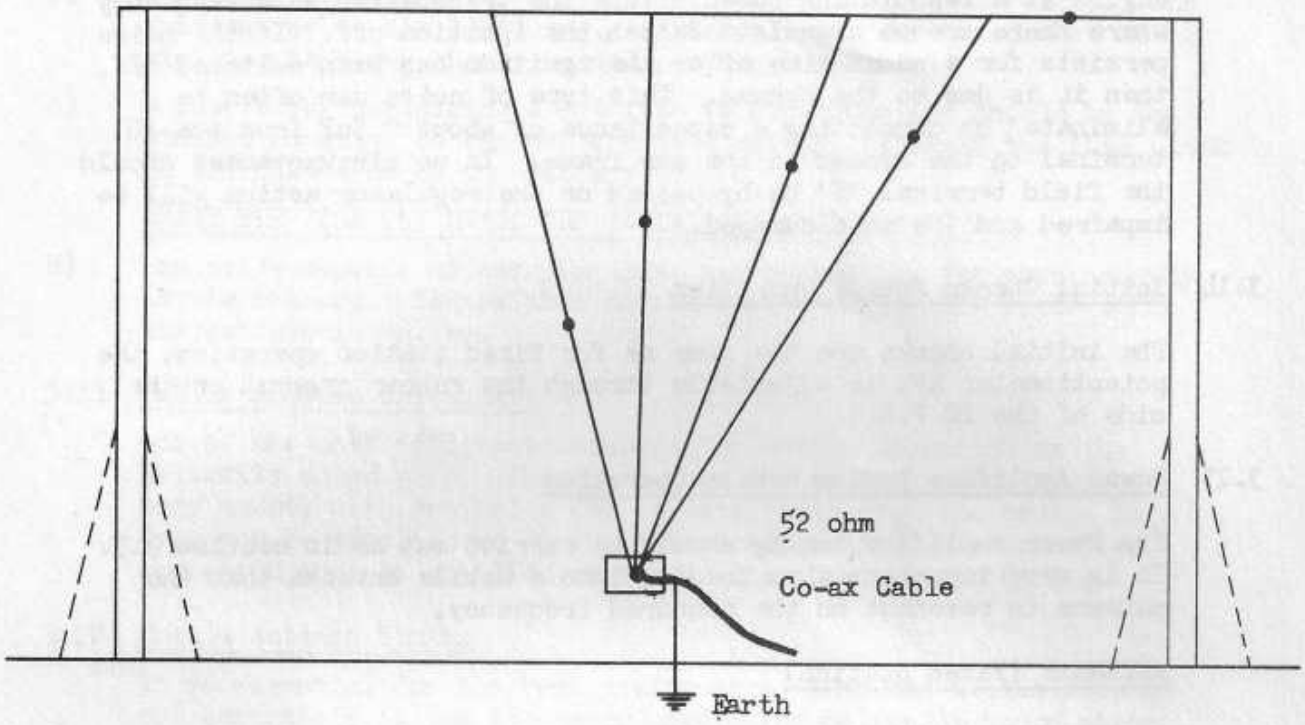


FIG. 2

TABLE 3-1

PART NUMBERS OF HELICAL WHIP ANTENNAS

Below is a table of the part numbers of the helical whip antennas for use with the KW2000CAT. These are shown opposite the band of frequencies to whip each whip can be tuned. When the antenna is installed it should be trimmed to the exact operating frequency. A method of doing this is given in para 3.12.

FREQUENCY RANGE (MHz)	ANTENNA NO.
3. 0 - 3.36	M1 555656 - 1
3.36 - 3.75	M1 555656 - 2
3.75 - 4.22	M1 555757 - 3
4.22 - 4.74	M1 555656 - 4
4.74 - 5.28	M1 555656 - 5
5.28 - 5.93	M1 555656 - 6
5.90 - 6.63	M1 555656 - 7
6.56 - 7.38	M1 555656 - 8
7.32 - 8.23	M1 555656 - 9
8.23 - 9.26	M1 555656 - 10
9.23 -10.40	M1 555656 - 11
10.33 -11.65	M1 555656 - 12
11.60 -13.06	M1 555656 - 13
13.00 -14.56	M1 555656 - 14
14.50 -16.28	M1 555656 - 15

The M1 number is clearly marked at the base of each whip and on its container.

SECTION 4

SERVICE INSTRUCTIONS

D A N G E R

EXTREME CARE MUST BE TAKEN WHEN SERVICING THIS EQUIPMENT ESPECIALLY IF ANY COVERS ARE REMOVED, SINCE POTENTIALS AS HIGH AS 900 VOLTS ARE PRESENT.

4.1 General

This section covers maintenance and service of the KW2000CAT SSB Transceiver. It includes information on trouble analysis, signal tracing procedures, voltage and resistance measurements and alignment procedures. The usefulness of signal level and alignment data given depends upon the accuracy of the test equipment used. Except for an occasional adjustment to compensate for possible component ageing, alignment normally will be necessary only if frequency determining components have been replaced. If servicing requires that the cabinet be removed, proceed as follows:

1. Disconnect all power and external connections.
2. Remove the two rear feet and the two front feet from the bottom of the cabinet.
3. From the rear, push the transceiver chassis forward until the front panel protrudes from the cabinet about an inch.
4. Grasping the front panel at the edges, slide the transceiver out of the cabinet.

4.2 Fault Analysis

Most faults are easy to locate when complete failure of an equipment occurs, provided a logical approach is used.

4.3 Receiver

If no signal is received, the D.C. voltages in the receiver should be checked. If these are ok, it is possible to narrow the area of search by remembering that the channel and carrier oscillators, and crystal filters are common to both transmitter and receiver. These items may be checked by switching to transmit, and observing a rise in PA cathode current when an AF input is applied.

Further fault finding would need a signal source, and the fault located by working from the AF stages to the RF stages.

4.4 Transmitter

There will be no output from the transmitter unless there is an audio signal present at the input. Again voltage checks should be made through the equipment, followed by signal tracing until the faulty stage is found.

Note that a fault in the carrier oscillator could cause poor carrier balance if an asymmetric waveform is applied to the balanced modulator carrier part.

4.5 Alignment

The only tuned circuits that need to be aligned are the driver grid, PA grid, PA anode and the coupled pair in the receiver front end. All these circuits are tuned to the operating frequency.

TEST EQUIPMENT REQUIRED

52 ohm 100 watt RF Power Meter
52 ohm Signal Generator
20 MHz Frequency Counter
A.F. Output Power Meter
VTVM with RF probe
2 Tone AF Sig. Gen.
Trimming Tools
AVO Meter
25 MHz Oscilloscope

Receiver Alignment

a. Feed the output of a signal generator into the aerial socket of the equipment. (It is suggested that the 250/300 volt HT line fuse be removed to prevent damage to the generator if the equipment is inadvertently switched to transmit).

Set the generator to the frequency of operation and increase the level until a weak signal can be heard in the loudspeaker.

Adjust the cores of L1 and L2 (on chassis) and T3 (on PC64 underneath chassis) for maximum signal, decreasing the generator output as necessary to keep the output level low.

b. Plug in the AF power meter and with an input signal OF NOT MORE THAN 1 MICROVOLT, adjust VR2 (PC70) until there is little change in output as it is varied.

Set VR6 (PC71) fully anti-clockwise. Remove 1.4 MHz xtal. Connect a AVO meter between the slider of VR6 and VR5. Set VR5 for zero voltage. Replace the 1.4 MHz crystal and set VR6 to give between 3.5 and 4.5 volts at its slider.

Attach the valve voltmeter to the white lead of the twisted pair on PC71. The VC3 for max. Attach a frequency counter to this point and after 15 minute warm up, adjust VC2 to set the oscillator on 1.400000 MHz.

4.6 Transmitter Alignment

Feed a two-tone AF signal with non harmonically related frequencies into the microphone socket, at a level of 30mV per tone. Switch to transmit. Remove one tone, and adjust VR10 on PC69 for 1.7v pk-pk at the collector of TR17. Set the AC PSU bias pot to give -70v on Pin 5 of V2 when in transmit. Attach the VTVM to pin 5 of V2. Remove the 750 volt HT line fuse. Adjust VR9 fully anti-clockwise. Switch to transmit and the L7 and L8 for maximum on the VTVM on the 10v range. Adjust VR9 as necessary to keep the reading on scale.

Remove the VTVM and replace the 750 volt HT fuse. Connect the AVO to the jack socket on the rear drop of the chassis. Unplug the Tx crystal oven. Switch to transmit, and set the PSU bias pot for a current of 50 $\pm$5mA on the AVO.

4.6 (Cont'd.)

Turn VR9 fully clockwise, replace the crystal oven and switch to transmit. Apply the 2 tone signal and adjust VR9 until the PA cathode current starts to rise. Trim L7 and L8 for maximum current, adjusting VR9 as required to keep the cathode current below 75mA. Set the cathode current to 100mA by adjusting VR9. Tune VC5 for a dip in cathode current. Tune VC6 for maximum output. Increase the drive by means of VR9 until a cathode current of 180mA is obtained. Tune VC5 and VC6 for max. output. Using the oscilloscope, adjust VR9 until the peaks of the 2 tone signal are just flateening. Switch to receive. Connect a frequency counter to the output of PC70. Remove the AF input to the Tx. Set the clarifier to mid-position and note the frequency. Set the crystal on frequency in transmit by adjusting VC1. Switch to CW transmit and press the key. Set VR11 on PC69 to give 75-80 watts output. Set VR7 for an acceptable side-tone level.

Note VR9, VC1, VC5 and VC6, L7 and 8 are suffixed a, b, c and d corresponding to channel numbering. Adjust only the applicable component.

Switch to tune and set up VR9, VC1, VC5, L7 and L8 for the other channels, as shown.

VOLTAGE MEASUREMENTS - INTEGRATED CIRCUITS

I.C.		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10
1.RX	DCV	-	6.2	1.6	-	0.8	0.8	-	-	-	-
1.TX	DCV	-	6.0	3.4	-	1.6	1.6	-	-	-	-
2.RX	DCV	-	6.2	1.8	-	0.7	0.7	-	-	-	-
2.TX	DCV	-	5.9	3.0	-	1.8	1.8	-	-	-	-
3.RX	DCV	-	6.2	1.85	-	0.75	0.75	-	-	-	-
3.TX	DCV	-	5.9	1.80	-	0.75	0.75	-	-	-	-
4.RX	DCV	-	2.8	-	-	3.2	-	2.8	-	-	-
4.TX	DCV	-	2.6	-	-	3.0	-	2.6	-	-	-
5.RX	DCV	-	4.1‡	4.1‡	-	-	5.0*	8.2	-	-	-
6.RX	DCV	1.2	-	1.1	6.2	1.1	1.5	-	-	-	-
6.TX	DCV	0	-	0	0	1.0	1.0	-	-	-	-
7.RX	DCV	-	7.6	11.0	-	1.7	1.7	7.0	6.2	-	-
7.TX	DCV	-	0	0	-	0.7	0	0	0	-	-
8.TX	DCV	-	7.4	-	1.6	0.9	0.9	2.9	-	-	-
9.TX	DCV	-	8.2	3.0	-	1.0	1.0	3.4	-	-	-
10.TX	DCV	7.0	2.0	5.0	3.8	0.85	0.85	-	1.2	1.2	0

‡ Dependant on VR5.

* Dependant on VR6

RX. Measured on Receive

TX. Measured on Transmit

VOLTAGE MEASUREMENTS - TRANSISTORS

Transistor	Collector/ Drain	Base/ Gate 1.	Emitter/ Source	Gate 2.
TR1	5.5	0	0.6	1.1
TR2	6.0	0	2.5	-
TR3	4.2	0.8	0.1	-
TR4	7.4	4.2	3.6	-
TR5	8.3	5.3	4.6	-
TR6	8.3	4.6	4.0	-
TR7 RX	8.3	0	0	-
TR7 TX	8.3	8.7	8.2	-
TR8 RX	8.3	8.8	8.3	-
TR8 TX	8.3	0	0	-
TR9	8.2	3.4	3.8	3.7
TR10	8.2	3.8	4.3	5.3
TR11	8.2	0	1.4	-
TR12	2.5	0.9	0.24	-
TR13	6.8	2.5	1.8	-
TR14	11.0	1.1	0.5	-
TR16 TX	7.7	3.8	3.1	-
TR17 TX	6.5	1.3	0.7	-
TR18 *	5.9	2.5	2.1	-
TR19 *	7.0	3.3	2.7	-

RX. Measured on Receive. TX. Measured on Transmit

* Measured in Tune position.

VOLTAGE MEASUREMENTS - VALVES

Valve	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Top Cap
V1 Driver 12BY7A	3.6	0	-	11.0AC	0	-	280	205	-
V2 P.A. 6146B	-	11.0AC	220	-	-52*	-	5.5AC	-	770
V3 P.A. 6146B	-	5.5AC	220	-	-52*	-	0	-	770

* Dependant on P.A. Bias Control Setting

SIGNAL LEVELS - RECEIVER

Signal Injection Point	Generator O/P Freq.	Generator O/P Voltage	Normal Indication
TR13 Base	1 KHz	640mV	1W A.F. Output
TR12 Base	1 KHz	12mV	1W A.F. Output
No. 3 Screened Lead	1 KHz	130mV	1W A.F. Output *
I.C.4. Pin 7	1.4 MHz	50mV	Set RV1 for 1W AF. O/P
I.C.3. Pins 5 & 6	1.4 MHz	600uV	1W A.F. Output
I.C.2. Pins 5 & 6	1.4 MHz	10uV	1W A.F. Output
No. 4 Screened Lead (C14)	1.4 MHz	10uV	1W A.F. Output
No.10 Screened Lead (C32)	1.4 MHz	40uV	1W A.F. Output
I.C.1. Pin 2	Chan. 1	2-3uV	1W A.F. Output
Antenna	Chan. 1	2uV	1W A.F. Output

* Dependant on setting of VR1.

Signal Generator terminal impedance 52 ohms, injection via 0.1uF capacitor except Antenna measurement.

Transceiver on Channel 1.

A.F. measurements taken with volume control fully clockwise.

SIGNAL LEVELS - TRANSMITTER

Transmit sensitivity for 60W R.F. output into 52 ohm Dummy Load.

Transceiver in tune position. Adjust VR11 for 50mV output on collector TR17. Measurements taken with VVM type Marconi TF2604.

T9 175mV (Output of Carrier Oscillator).

I.C.8 Tx IF Amp Pin 3. 190mV.

R.F. Co-ax No. 8 (C106) 400mV. (Output of Channel Oscillator).

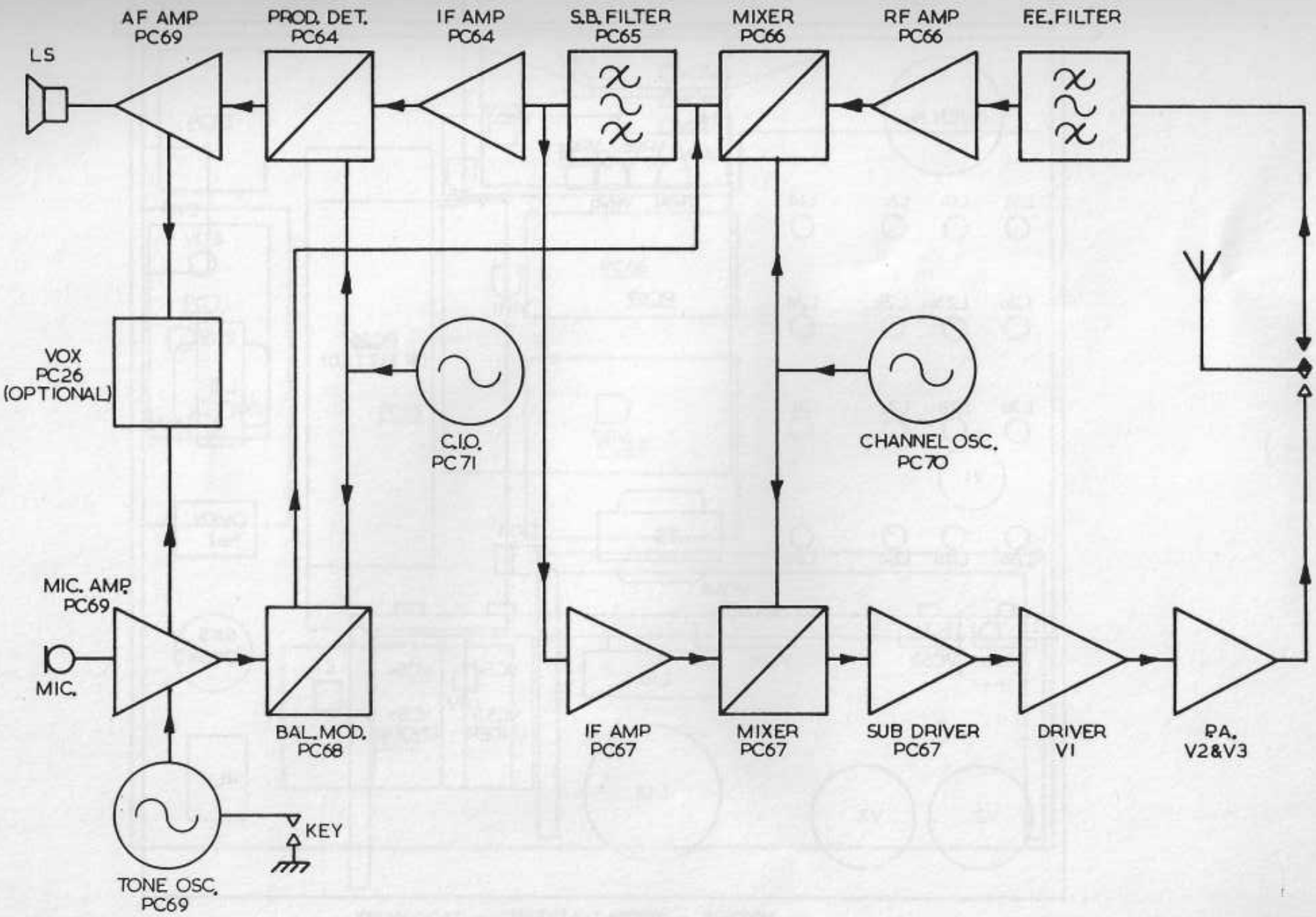
I.C.9 Pin 3. 840mV.

TR16 Emitter. 800mV.

C114 250mV.

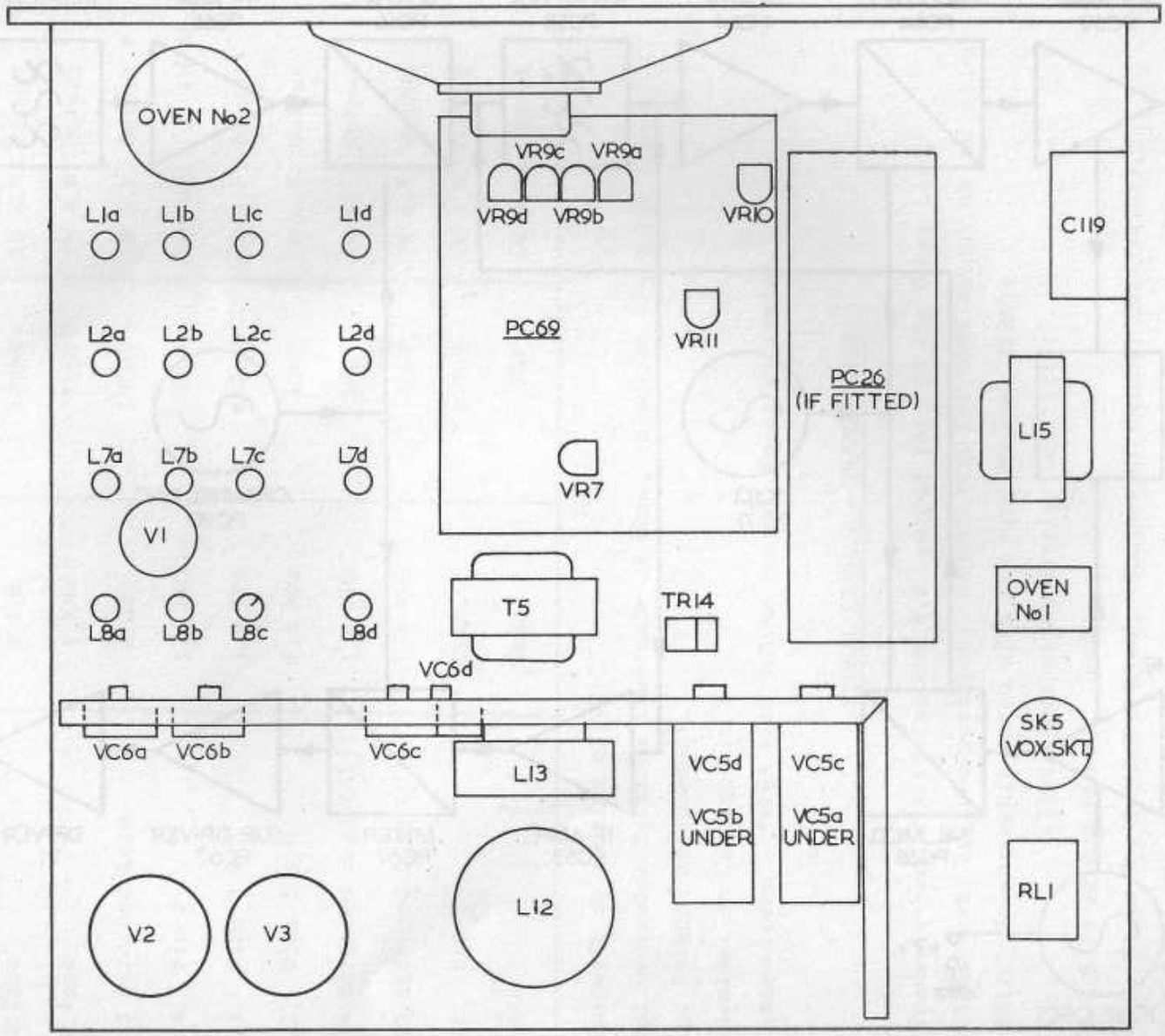
Grid Driver Pin 2. 2.5V.

Anode Driver Pin 7. 35V.



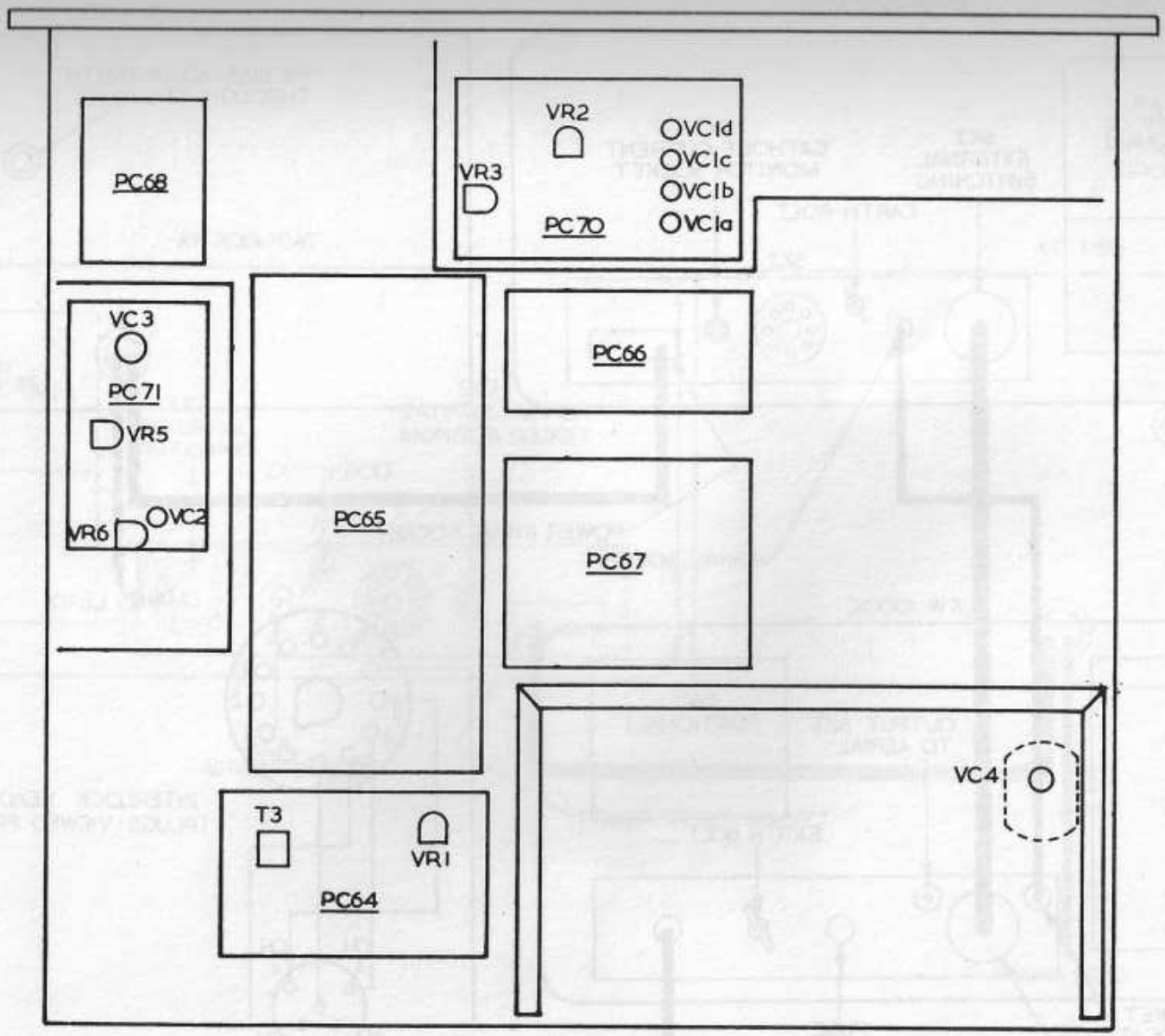
KW2000CAT - BLOCK DIAGRAM

Fig. 3



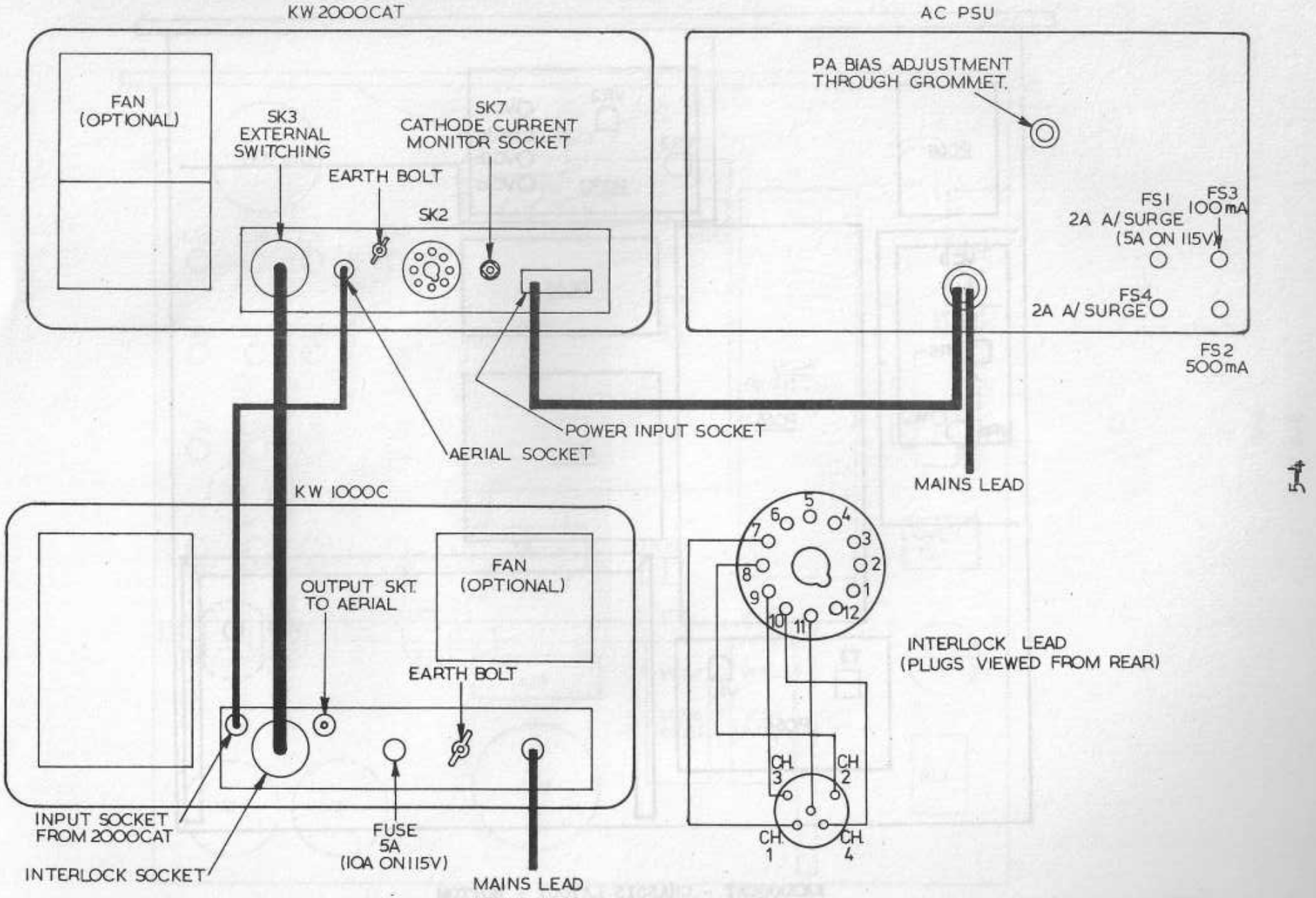
KW2000CAT - CHASSIS LAYOUT - TOP

Fig. 4



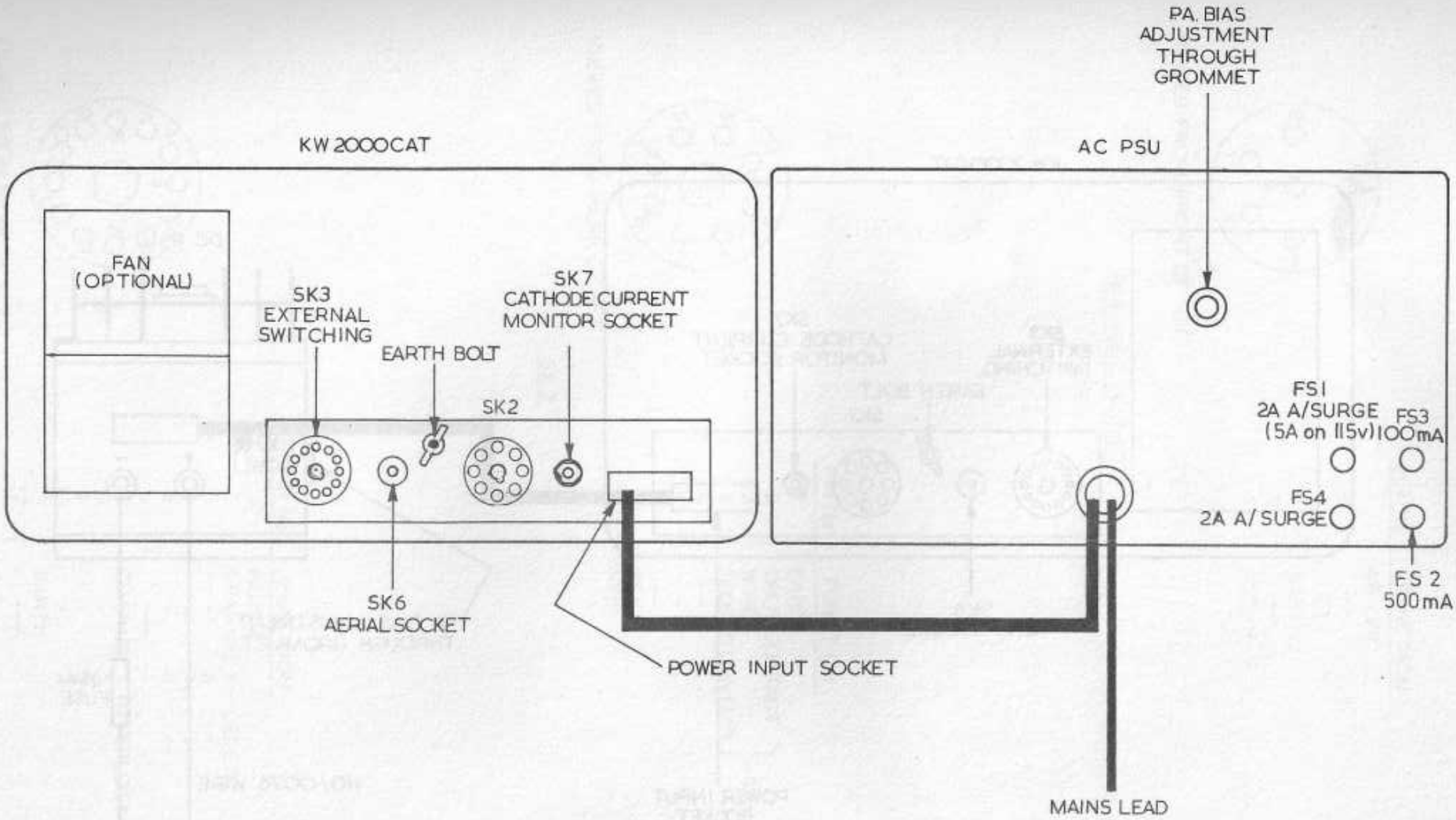
KW2000CAT - CHASSIS LAYOUT - BOTTOM

Fig. 5



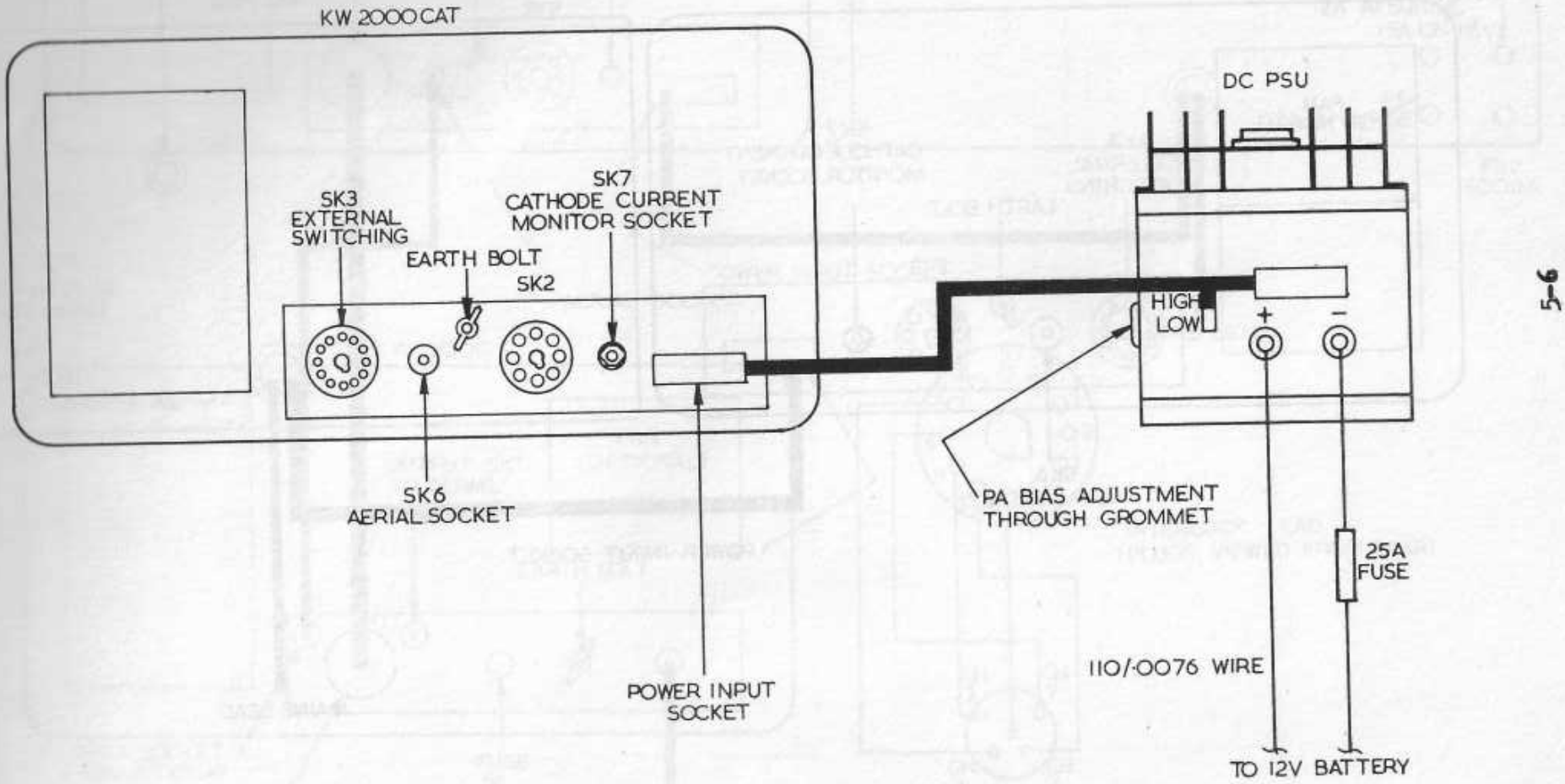
KW2000CAT/KW1000C - SYSTEM INTERCONNECTION

Fig. 6



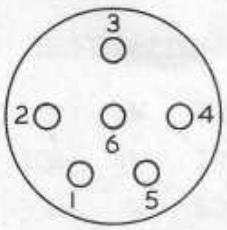
KW2000CAT - AC SYSTEM INTERCONNECTION

Fig. 7



KW2000CAT - DC SYSTEM INTERCONNECTION

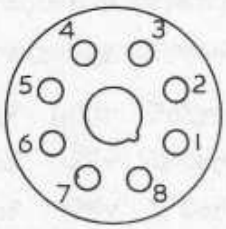
Fig. 8



VIEWED FROM FRONT OF SET

PIN No.	FUNCTION
1	AF O/P
2	—
3	P.T.T.
4	EARTH
5	—
6	MIC. IN

SK4 – MIC. SOCKET



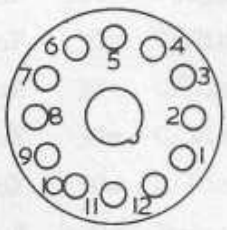
VIEWED FROM REAR OF SET

PIN No.	FUNCTION	
1	EARTH	
2	OPEN CONTACT	RL1/4
3	WIPER	
4	CLOSED CONTACT	
5	—	
6	—	
7	—	
8	KEY	

SK2

KW2000CAT - EXTERNAL SOCKET CONNECTIONS

Fig. 9



VIEWED FROM REAR OF SET

PIN No.	FUNCTION
1	EARTH
2	CHANNEL 1 – LEDEX
3	" 2 "
4	" 3 "
5	" 4 "
6	—
7	CHANNEL 1 INTERLOCK
8	" 2 "
9	" 3 "
10	" 4 "
11	EARTH
12	—

SK3 – EXTERNAL SWITCHING

COMPONENT LIST - KW2000CAT

APC

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
APC 1	10R ½W 10%	Type S	Morganite	Driver Valve
APC 2	10R ½W 10%	Type S	Morganite	Driver Valve
APC 3	33R 2W 10%	Type O	Radio Resistors	P.A. Valve
APC 4	33R 2W 10%	Type O	Radio Resistors	P.A. Valve
APC 5	10R ½W 10%	Type S	Morganite	P.A. Valve
APC 6	10R ½W 10%	Type S	Morganite	P.A. Valve

CAPACITORS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
C 1	Frequency Dependant			F.E. Coils
C 2	Frequency Dependant			" "
C 3	Frequency Dependant			" "
C 4	Frequency Dependant			" "
C 5	Frequency Dependant			" "
C 6	0.1uF 400v Polyester	PMT2R	I.T.T.	PC66
C 7	0.1uF 25v D/Ceramic	831/T/25	Erie	"
C 8	0.1uF 25v D/Ceramic	831/T/25	Erie	"
C 9	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C10	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C11	0.1uF 400v Polyester	PMT2R	I.T.T.	PC65
C12	0.1uF 30v C/Disc	811/T/30	Erie	"
C13	0.1uF 30v C/Disc	811/T/30	Erie	"
C14	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C15	0.1uF 30v C/Disc	811/T/30	Erie	"
C16	0.1uF 30v C/Disc	811/T/30	Erie	"
C17	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C18	0.1uF 30v C/Disc	811/T/30	Erie	"
C19	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C20	0.1uF 30v C/Disc	811/T/30	Erie	"
C21	0.1uF 30v C/Disc	811/T/30	Erie	"
C22	0.1uF 30v C/Disc	811/T/30	Erie	"
C23	0.1uF 30v C/Disc	811/T/30	Erie	"
C24	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C25	0.1uF 30v C/Disc	811/T/30	Erie	"
C26	0.1uF 400v Polyester	PMT2R	I.T.T.	"
C27	0.1uF 30v C/Disc	811/T/30	Erie	"
C28	0.1uF 30v C/Disc	811/T/30	Erie	"

CAPACITORS (Cont'd)

CIRCUIT REF.	DESCRIPTION			PART NO.	SUPPLIER	LOCATION
C29	0.1uF	30v	C/Disc	811/T/30	Erie	PC65
C30	0.1uF	400v	Polyester	PMT2R	I.T.T.	"
C31	0.1uF	30v	C/Disc	811/T/30	Erie	"
C32	0.1uF	400v	Polyester	PMT2R	I.T.T.	"
C33	0.01uF	25v	C/Disc	831/T/25	Erie	PC64
C34	2000pF	63v	Polystyrene	HS2000/2½-7/63	Suflex	"
C35	0.01uF	25v	C/Disc	831/T/25	Erie	"
C36	100uF	10v	Tantalum	TAG 100/10	I.T.T.	"
C37	0.01uF	25v	C/Disc	831/T/25	Erie	"
C38	100pF	63v	Polystyrene	HS 100/2½-7/63	Suflex	"
C39	0.01uF	25v	C/Disc	831/T/25	Erie	"
C40	0.01uF	25v	C/Disc	831/T/25	Erie	"
C41	1000pF	100v	Wee-Con	8101A/100	Erie	"
C42	0.01uF	25v	C/Disc	831/T/25	Erie	"
C43	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C44	0.01uF	25v	C/Disc	831/T/25	Erie	"
C45	0.01uF	25v	C/Disc	831/T/25	Erie	"
C46	0.1uF	35v	Tantalum	TAG 0.1/35	I.T.T.	"
C47	0.1uF	35v	Tantalum	TAG 0.1/35	I.T.T.	"
C48	0.01uF	400v	Polyester	PMT2R	I.T.T.	PC69
C49	0.047uF	400v	Polyester	PMT2R	I.T.T.	"
C50	0.047uF	400v	Polyester	PMT2R	I.T.T.	"
C51a-d	0.01uF	100v	Wee-Con	8121A-100	Erie	PC70
C52	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C53	47pF	350v	S/Mica	MR1106/I/RU	Lemco	"
C54	180pF	350v	S/Mica	MR1510/I/RU	Lemco	"
C55		S.O.T.				"
C56	180pF	350v	S/Mica	MR1510/I/RU	Lemco	"
C57	120pF	350v	S/Mica	MR1510/I/RU	Lemco	"
C58	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C59	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C60	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C61	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C62	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C63	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C64	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C65	0.01uF	100v	Wee-Con	8121A-100	Erie	"
C66	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C67	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	C.I.O. Screen

CAPACITORS (Cont'd)

CIRCUIT REF.	DESCRIPTION			PART NO.	SUPPLIER	LOCATION
C68	30pF	350v	S/Mica	MR1106/I/RU	Lemco	PC71
C69	150pF	63v	Polystyrene	HS 150/2½-7/63	Suflex	"
C70	100pF	63v	Polystyrene	HS 100/2½-7/63	Suflex	"
C71	620pF	63v	Polystyrene	HS 620/2½-7/63	Suflex	"
C72	0.01uF	400v	Polyester	PMT2R	I.T.T.	"
C73	0.01uF	25v	C/Disc	831/T/25	Erie	"
C74	0.01uF	400v	Polyester	PMT2R	I.T.T.	"
C75	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	C.I.O. Screen
C76	10uF	16v	Tantalum	TAG 10/16	I.T.T.	PC69
C77	2.2uF	35v	Tantalum	TAG 2.2/35	I.T.T.	"
C78	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C79	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C80	0.005uF	500v	C/Disc	CD13K 700	Lemco	"
C81	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C82	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C83	100uF	10v	Tantalum	TAG 100/10	I.T.T.	"
C84	1000pF	16v	Electrolytic	017 15102	Mullard	"
C85	22uF	16v	Tantalum	TAG 22/16	I.T.T.	"
C86	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C87	22uF	25v	Electrolytic	015 16229	Mullard	"
C88	0.1uF	35v	Tantalum	TAG 0.1/35	I.T.T.	"
C89	100uF	10v	Tantalum	TAG 100/10	I.T.T.	"
C90	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C91	100uF	10v	Tantalum	TAG 100/10	I.T.T.	"
C92	22uF	25v	Electrolytic	015 16229	Mullard	"
C93	470pF	63v	Polystyrene	HS 470/2½-7/63	Suflex	"
C94	2.2uF	35v	Tantalum	TAG 2.2/35	I.T.T.	"
C95	4.7uF	16v	Tantalum	TAG 4.7/16	I.T.T.	"
C96	2.2uF	35v	Tantalum	TAG 2.2/35	I.T.T.	"
C97a-d	0.01uF	100v	Wee-con	8121A-100	Erie	"
C98	0.01uF	100v	Wee-con	8121A-100	Erie	"
C99	0.1uF	30v	C/Disc	811/T/30	Erie	PC68
C100	10uF	16v	Tantalum	TAG 10/16	I.T.T.	PC67
C101	1000pF	100v	Wee-con	8101A/100	Erie	"
C102	0.01uF	25v	C/Disc	831/T/25	Erie	"
C103	0.01uF	25v	C/Disc	831/T/25	Erie	"
C104	1000pF	100v	Wee-con	8101A/100	Erie	"
C105	0.01uF	25v	C/Disc	831/T/25	Erie	"
C106	0.01uF	25v	C/Disc	831/T/25	Erie	"
C107	0.01uF	100v	Wee-con	8121A/100	Erie	"

CAPACITORS (Cont'd)

CIRCUIT REF.	DESCRIPTION			PART NO.	SUPPLIER	LOCATION
C108	10uF	16v	Tantalum	TAG 10/16	I.T.T.	PC67
C109	1000pF	100v	Wee-con	8101A/100	Erie	"
C110	0.01uF	100v	Wee-con	8121A/100	Erie	"
C111	0.01uF	100v	Wee-con	8121A/100	Erie	"
C112	0.1uF	30v	C/Disc	811/T/30	Erie	"
C113	0.01uF	25v	C/Disc	831/T/25	Erie	"
C114	0.01uF	25v	C/Disc	831/T/25	Erie	"
C115	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	Screen
C116	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	"
C117	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	"
C118	1000pF		Feed Thro	CLT 310K 3000/B2NL	Lemco	"
C119	2200uF	25v	Electrolytic	2222-071-16222	Mullard	Chassis
C120	0.01uF	100v	Wee-con	8121A-100	Erie	PC69
C121	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C122	0.01uF	100v	Wee-con	8121A-100	Erie	"
C123	0.01uF	100v	Wee-con	8121A-100	Erie	"
C124	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C125	50uF	10v	Electrolytic	015 14479	Mullard	"
C126	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C127	2.2uF	20v	Tantalum	1500-80-20	T.C.C.	"
C128	4700pF	100v	Wee-con	8111A/100	Erie	"
C129	22uF	16v	Tantalum	TAG 22/16	I.T.T.	"
C130	0.01uF	100v	Wee-con	8121A/100	Erie	"
C131	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C132	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C133	0.01uF	100v	Wee-con	8121A-100	Erie	"
C134	0.001uF	100v	Wee-con	8101A-100	Erie	"
C135	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C136	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C137	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C138	22uF	16v	Tantalum	TAG 22/16	I.T.T.	"
C139	0.1uF	30v	C/Disc	811/T/30	Erie	"
C140	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C141	0.68uF	100v	Polyester	PMT2R	I.T.T.	"
C142	10uF	16v	Tantalum	TAG 10/16	I.T.T.	"
C143	0.01uF	400v	Polyester	PMT2R	I.T.T.	"
C144	47uF	6.3v	Tantalum	TAG 47/6.3	I.T.T.	"
C145	0.47uF	100v	Polyester	PMC1R	I.T.T.	"

CAPACITORS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
C146	10uF 16v Tantalum	TAG 10/16	I.T.T.	PC69
C147a-d	Frequency Dependant			
C148a-d	Frequency Dependant			
C149	0.01uF 25v C/Disc	831/T/25	Erie	Driver Valve Base
C150	0.01uF 25v C/Disc	831/T/25	Erie	" " "
C151	0.01uF 25v C/Disc	831/T/25	Erie	" " "
C152	0.01uF 25v C/Disc	831/T/25	Erie	" " "
C153	Frequency Dependant			
C154	470pF 350v S/Mica	MR1510/I/RU	Lemco	" " "
C155	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	Screen
C156	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	"
C157	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	"
C158	120pF 350v S/Mica	MR1510/I/RU	Lemco	"
C159	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	"
C160	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	"
C161	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	P.A. Screen
C162	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	" "
C163	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	" "
C164	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	" "
C165	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	" "
C166	0.1uF 30v C/Disc	811/T/30	Erie	Oven No. 2
C167		NOT USED		
C168	0.01uF 25v C/Disc	831/T/25	Erie	
C169	0.01uF 25v C/Disc	831/T/25	Erie	
C170	0.01uF 750v C/Disc	CD16K 7000/I	Lemco	
C171	0.02uF 1.5kV C/Disc	CP3E 20KP K 800011	Erie	
C172	0.02uF 1.5kV C/Disc	CP3E 20KP K 800011	Erie	
C173	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	
C174	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	
C175	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	
C176	1000pF Feed Thro	CLT 310K 3000/B2NL	Lemco	
C177	0.01uF 100v Wee-con	8121A/100	Erie	PC70
C178	10uF 16v Tantalum	TAG 10/16	I.T.T.	"
C179	0.01uF 100v Wee-con	8121A/100	Erie	PC69
C180	22uF 16v Tantalum	TAG 22/16	I.T.T.	"
C181	0.01uF 400v Polyester	PMT2R	I.T.T.	"
C182	0.01uF 25v C/Disc	831/T/25	Erie	Driver Cathode
C183a-d	Frequency Dependant			S1k
C184a-d	Frequency Dependant			S1n

CAPACITORS (CONT'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
C185	0.01uF 25v C/Disc	831/T/25	Erie	PC69
C186	0.01uF 25v C/Disc	831/T/25	Erie	SK2
C187	1000pF F/Thro C/Disc	CLT 310K 3000/B2NL	Lemco	P.A.

DIODES

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
D 1	Diode	BZY88C6V2	Mullard	PC66
D 2)	Diode	(5082-6734	Hewlett Packard	"
)		(Matched		
D 3)	Diode	(5082-6734	Hewlett Packard	"
)		(Matched		
D 4)	Diode	(5082-6734	Hewlett Packard	"
)		(Matched		
D 5)	Diode	(5082-6734	Hewlett Packard	"
		(Matched		
D 6	Diode	BA 182	Mullard	"
D 7	Diode	BA 182	Mullard	PC65
D 8	Diode	BA 182	Mullard	"
D 9	Diode	BA 182	Mullard	"
D10	Diode	BA 182	Mullard	"
D11	Diode	BA 182	Mullard	"
D12	Diode	BA 182	Mullard	"
D13	Diode	BA 182	Mullard	"
D14	Diode	BA 182	Mullard	"
D15	Diode	BA 182	Mullard	"
D16	Diode	BA 182	Mullard	"
D17	Diode	BA 182	Mullard	"
D18	Diode	BA 182	Mullard	"
D19	Diode	BA 182	Mullard	"
D20	Diode	BA 182	Mullard	"
D21	Diode	BA 182	Mullard	"
D22	Diode	BA 182	Mullard	"
D23	Diode	BZY88C6V2	Mullard	PC64
D24a-d	Diode	BA 182	Mullard	PC70
D25a-d	Diode	BA 182	Mullard	"
D26	Diode	MV1404	Motorola	"
D27	Diode	BZY88C8V2	Mullard	"
D28	Diode	1N4148	Texas	"
D29	Diode	1N4148	Texas	"
D30	Diode	BZY88C8V2	Mullard	PC71
D31	Diode	BAX13	I.T.T.	"
D32	Diode	BAX13	I.T.T.	"
D33	Diode	AA119	Mullard	PC69
D34	Diode	AA119	Mullard	"
D35	Diode	1N4148	Texas	"
D36	Diode	BZY88C3V0	Mullard	"

DIODES (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
D37a-d	Diode	AA119	Mullard	PC69
D38	Diode	AA119	Mullard	"
D39	Diode	5082-6734 Matched	Hewlett Packard	"
D40	Diode	5082-6734 Matched	Hewlett Packard	"
D41	Diode	5082-6734 Matched	Hewlett Packard	"
D42	Diode	5082-6734 Matched	Hewlett Packard	"
D43	Diode	1N4148	Texas	PC67
D44	Diode	1N4148	Texas	"
D45	Diode	BA 182	Mullard	"
D46	Diode	BZY88C8V2	Mullard	"
D47	Diode	5082-6734 Matched	Hewlett Packard	"
D48	Diode	5082-6734 Matched	Hewlett Packard	"
D49	Diode	5082-6734 Matched	Hewlett Packard	"
D50	Diode	5082-6734 Matched	Hewlett Packard	"
D51	Diode	BZY88C10V0	Mullard	VOX Socket
D52	Diode	BZY88C8V2	Mullard	PC69
D53	Diode	BZY88C8V2	Mullard	"
D54	Diode	BZY93C75	I.R.	
D55	Diode	1N1811A	I.R.	
D56	Diode	1N4148	Texas	

FILTERS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
FL 1	Filter	BP4708-2	Cathodeon	PC65
FL 2	Filter	BP4707-2	Cathodeon	"

INTEGRATED CIRCUITS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
IC 1	Integrated Circuit	SL611C	Plessey	PC66
2	Integrated Circuit	SL612C	Plessey	PC64
3	Integrated Circuit	SL612C	Plessey	"
4	Integrated Circuit	SL641C	Plessey	"
5	Integrated Circuit	uA741	Distributors	"
6	Integrated Circuit	SL621C	Plessey	PC69
7	Integrated Circuit	LM305H	N.S.C.	"
8	Integrated Circuit	SL612C	Plessey	PC67
9	Integrated Circuit	SL611C	Plessey	"
10	Integrated Circuit	SL622C	Plessey	PC69

COILS & CHOKES

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
L1a-d	Drg. B.1037/43A			Chassis
L2a-d	Drg. B.1037/43A			Chassis
3	Choke 68mH	3635/59	Cambion	PC69
4	Choke 100uH	58/10/0017/10	Painton	PC67
5	Choke 100uH	58/10/0017/10	Painton	PC69
6	Choke 68mH	3635/59	Cambion	"
L7a-d	Drg. B.1037/43A			Chassis
8a-d	Drg. B.1037/43A			"
9	Choke 270uH	FCC270	Electronique Tech.	
10	Choke 270uH	FCC270	Electronique Tech.	
11	Drg. A.575			Chassis
12	Drg. B.1019/69A			"
13	Drg. B.1019/69A			"
14	Choke 470uH	CCC2	Electronique Tech.	
15	Choke LF	FM1175	Ferromag	Chassis

LOUDSPEAKERS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
LS 1	5" x 3" 3ohm	358E68	ELAC	Front Panel

LAMPS

CIRCUIT REF.	DESRIPTION	PART NO.	SUPPLIER	LOCATION
LP 1	Lilliput Lamp 14v 0.56w	LES 690	RS Components	Front Panel
LP 2	Lilliput Lamp 14v 0.56w	LES 690	RS Components	Front Panel

OVENS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
No. 1	Oven Crystal 12/24v 75°C	MCO-2M	Cathodeon	Chassis
No. 2	Oven Crystal 12v 75°C	SO17/4	Snelgrove	"

PLUGS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
PL 1	15 way Chassis Mtg with clips	74/10/1506/10	Painton	Rear Chassis

RESISTORS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
R 1	150R ±5% ⅓w	CR25	Mullard	PC66
R 2	68R ±5% ⅓w	CR25	Mullard	"
R 3	3k3 ±5% ⅓w	CR25	Mullard	"
R 4	3k3 ±5% ⅓w	CR25	Mullard	"
R 5	470R ±5% ⅓w	CR25	Mullard	PC65
R 6	680R ±5% ⅓w	CR25	Mullard	"
R 7	470R ±5% ⅓w	CR25	Mullard	"
R 8	390R ±5% ⅓w	CR25	Mullard	"
R 9	390R ±5% ⅓w	CR25	Mullard	"
R10	390R ±5% ⅓w	CR25	Mullard	"
R11	390R ±5% ⅓w	CR25	Mullard	"
R12	390R ±5% ⅓w	CR25	Mullard	"
R13	390R ±5% ⅓w	CR25	Mullard	"
R14	470R ±5% ⅓w	CR25	Mullard	"
R15	390R ±5% ⅓w	CR25	Mullard	"
R16	390R ±5% ⅓w	CR25	Mullard	"
R17	470R ±5% ⅓w	CR25	Mullard	"
R18	680R ±5% ⅓w	CR25	Mullard	"
R19	100R ±5% ⅓w	CR25	Mullard	PC64
R20	1K ±5% ⅓w	CR25	Mullard	"
R21a-d	1K ±5% ⅓w	CR25	Mullard	PC70
R22a-d	15K ±5% ⅓w	CR25	Mullard	"

RESISTORS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
R23	18K ±5% ⅓w	CR25	Mullard	PC70
R24	2K7 ±5% ⅓w	CR25	Mullard	"
R25	47K ±5% ⅓w	CR25	Mullard	"
R26	560R ±5% ⅓w	CR25	Mullard	"
R27	100K ±5% ⅓w	CR25	Mullard	"
R28	120K ±5% ⅓w	CR25	Mullard	"
R29	8K2 ±5% ⅓w	CR25	Mullard	"
R30	330R ±5% ⅓w	CR25	Mullard	"
R31	330R ±5% ⅓w	CR25	Mullard	"
R32	6K8 ±5% ⅓w	CR25	Mullard	"
R33	3K3 ±5% ⅓w	CR25	Mullard	"
R34	100R 5% ⅓w	CR25	Mullard	"
R35	22K 5% ⅓w	CR25	Mullard	"
R36	100R 5% ⅓w	CR25	Mullard	"
R37	1K5 5% ⅓w	CR25	Mullard	"
R38	2K7 5% ⅓w	CR25	Mullard	"
R39	56R 5% ⅓w	CR25	Mullard	"
R40	4K7 5% ⅓w	CR25	Mullard	"
R41	22K 5% ⅓w	CR25	Mullard	"
R42	22K 5% ⅓w	CR25	Mullard	"
R43	22R 2.5w	Wirewound	R.S.	"
R44	4K7 5% ⅓w	CR25	Mullard	"
R45	100K 5% ⅓w	CR25	Mullard	PC71
R46	47K 5% ⅓w	CR25	Mullard	"
R47	100K 5% ⅓w	CR25	Mullard	"
R48	33K 5% ⅓w	CR25	Mullard	"
R49	27K 5% ⅓w	CR25	Mullard	"
R50	1K8 5% ⅓w	CR25	Mullard	"
R51	47K 5% ⅓w	CR25	Mullard	"
R52	1K5 5% ⅓w	CR25	Mullard	"
R53	100K 5% ⅓w	CR25	Mullard	"
R54	470R 5% ⅓w	CR25	Mullard	"
R55	1K 5% ⅓w	CR25	Mullard	"
R56	10K 5% ⅓w	CR25	Mullard	"
R57	82R 5% ⅓w	CR25	Mullard	"
R58	4K7 5% ⅓w	CR25	Mullard	"
R59	10K 5% ⅓w	CR25	Mullard	PC69
R60	8K2 5% ⅓w	CR25	Mullard	"
R61	3K9 5% ⅓w	CR25	Mullard	"
R62	1K 5% ⅓w	CR25	Mullard	"

RESISTORS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
R63	1K 5% ⅓w	CR25	Mullard	PC69
R64	56K 5% ⅓w	CR25	Mullard	"
R65	1K8 5% ⅓w	CR25	Mullard	"
R66	1K8 5% ⅓w	CR25	Mullard	"
R67	100R 5% ⅓w	CR25	Mullard	"
R68	1K8 5% ⅓w	CR25	Mullard	"
R69	150R 5% ⅓w	CR25	Mullard	"
R70	1R 5% 1w	Wirewound	Radio Resistors	"
R71	22R 10% ½w	Type S	Morganite	Output Tran.
R72	560R 5% ⅓w	CR25	Mullard	PC69
R73	6K8 .4w Metal Film	MR25	Mullard	"
R74	2K7 .4w Metal Film	MR25	Mullard	"
R75	3R3 5% ⅓w	CR25	Mullard	"
R76a-d	2K2 5% ⅓w	CR25	Mullard	"
R77a-d	1K8 5% ⅓w	CR25	Mullard	"
R78a-d	1K2 5% ⅓w	CR25	Mullard	"
R79	2K2 5% ⅓w	CR25	Mullard	PC67
R80	1K8 5% ⅓w	CR25	Mullard	"
R81	S.O.T. 5% ⅓w	CR25	Mullard	"
R82	39R 5% ⅓w	CR25	Mullard	"
R83	8K2 5% ⅓w	CR25	Mullard	PC69
R84	1K2 5% ⅓w	CR25	Mullard	PC67
R85	5K6 5% ⅓w	CR25	Mullard	"
R86	100R 5% ⅓w	CR25	Mullard	"
R87	1K 5% ⅓w	CR25	Mullard	"
R88	18R 5% ½w	CR37	Mullard	"
R89	120R 5% ⅓w	CR25	Mullard	"
R90	270R 5% ⅓w	CR25	Mullard	"
R91	330R 5% ⅓w	CR25	Mullard	"
R92	56R 5% ⅓w	CR25	Mullard	"
R93	27R 5% ⅓w	CR25	Mullard	"
R94	5K6 2.5w	Vitreous	R.S.Components	VOX Skt.
R95	1M 5% ⅓w	CR25	Mullard	PC69
R96	120R 5% ⅓w	CR25	Mullard	"
R97	10K 5% ⅓w	CR25	Mullard	"
R98	2K7 5% ⅓w	CR25	Mullard	"
R99	100R 5% ⅓w	CR25	Mullard	"
R100	1K 5% ⅓w	CR25	Mullard	"
R101	1K8 5% ⅓w	CR25	Mullard	"

RESISTORS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
R102	47K 5% ⅓w	CR25	Mullard	PC69
R103	47K 5% ⅓w	CR25	Mullard	"
R104	27K 5% ⅓w	CR25	Mullard	"
R105	22K 5% ⅓w	CR25	Mullard	"
R106	22K 5% ⅓w	CR25	Mullard	"
R107	470R 5% ⅓w	CR25	Mullard	"
R108	270R 5% ⅓w	CR25	Mullard	"
R109	15K 5% ⅓w	CR25	Mullard	"
R110	12K 10% 2w	Type O	Radio Resistors	
R111	100R 10% ½w	Type S	Morganite	
R112	15K 5% ⅓w	CR25	Mullard	
R113	100R 10% ½w	Type S	Morganite	
R114	2K2 10% 2w	Type O	Radio Resistors	
R115	100R 10% ½w	Type S	Morganite	
R116	560R 5% ⅓w	CR25	Mullard	PC69
R117	39R 5% ⅓w	CR25	Mullard	Driver Cathode
R118	820R 5% ⅓w	CR25	Mullard	PC69
R119	10K 10% ½w	Type S	Morganite	P.A.

RELAYS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
RL 1	Relay	RA400012	Shrack	Chassis
RL 2	Relay 12v DC	KMk3	Keyswitch	Chassis
RL 3	Relay Reed 1k7R	CPR1/B	Alma	PC67

SWITCHES

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
S 1	Drg. B1037/22A-26A & 37A		AB Electronics	
S 2	Drg. B1037/33A		AB Electronics	
S 3	Part of S 2			
S 4	S Pole ON-OFF	SM259 PD	Bulgin	Front Panel
S 5	S Pole ON-OFF	SM259 PD	Bulgin	" "

SOCKETS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
SK 1	Jack	R326-400-5	Rendar	Front Panel
SK 2	Valve Holder Octal Int	79/921/M	Cinch	Chassis Rear

SOCKETS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
SK 3	12 way	77M1P12	Amphenol	Chassis Rear
SK 4	Mic	91PC6	Amphenol	Front Panel
SK 5	Valve Holder Octal Int	77M1P12	Amphenol	Chassis
SK 6	Co-ax	83GB-74/1050	Amphenol	Chassis Rear
SK 7	Jack	R26/1	Re-an	Chassis Rear

THERMISTORS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
Th1a-d	Thermistor	KR 681CW	S.T.C.	PC69
TH2	Thermistor	KR 681CW	S.T.C.	PC67

TRANSFORMERS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
T 1	Drg. B.1037/42A			PC66
T 2	Drg. B.1037/42A			"
T 3	Drg. B.1037/40A			PC64
T 4	Drg. B.1037/39A			PC71
T 5	Audio Output	FM1978	Ferromag	Chassis
T 6		T/T1	R.S. Components	PC68
T 7	Drg. B.1037/42A			"
T 8	Drg. B.1037/42A			"
T 9	Drg. B.1037/41A			"
T10	Drg. B.1037/42A			PC67
T11	Drg. B.1037/42A			"

TRANSISTORS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
TR1	Transistor	40673	R.C.A.	PC70
TR2	Transistor	BF 244C	Texas	"
TR3	Transistor	BF 115	Mullard	"
TR4	Transistor	BF 115	Mullard	"
TR5	Transistor	BF 115	Mullard	"
TR6	Transistor	2N3866	R.C.A.	"
TR7	Transistor	BC 108	Mullard	"
TR8	Transistor	BC 108	Mullard	"
TR9	Transistor	40673	R.C.A.	PC71
TR10	Transistor	40673	R.C.A.	"

TRANSISTORS (Cont'd)

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
TR11	Transistor	BF 244B	Texas	PC71
TR12	Transistor	BC 108	Mullard	PC69
TR13	Transistor	40309	R.C.A.	"
TR14	Transistor	2N5296	R.C.A.	Chassis
TR15		NOT USED		
TR16	Transistor	2N3866	R.C.A.	PC67
TR17	Transistor	BC 108	Mullard	PC69
TR18	Transistor	BC 108	Mullard	"
TR19	Transistor	BC 108	Mullard	"

VALVES

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
V 1	Valve	12BY7A	R.C.A.	Driver
V 2	Valve	6146B	R.C.A.	P.A.
V 3	Valve	6146B	R.C.A.	P.A.

VAR. CAPS.

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
VC1a-d	3-15pF R Triko	109-05-MG	Steatite	PC70
VC 2	3-15pF R Triko	109-05-MG	Steatite	PC71
VC 3	10-60pF 10S Triko	10-60	Steatite	"
VC 4	Double Spaced 15pF Pre-set	C301-4645/15	Jackson	PA Screen
VC5a-d	2 x 100pF Pre-set	C733-Drg. 5631	Jackson	" "
VC6a-d	Frequency Dependant			

VAR. RESISTORS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
VR 1	2K2 Lin O/Skel	C62H	Morganite	PC64
VR 2	500R Lin Cermet	VA05H 20%	Bourns	PC70
VR 3	4K7 Lin O/Skel	PN10B	Guest	"
VR 4	5K Lin	Type 45	A.B.	Front Panel
VR 5	4K7 Lin O/Skel	PN10B	Guest	PC71
VR 6	1K Lin O/Skel	62H	Morganite	"
VR 7	47K Lin O/Skel	62H	Morganite	PC69
VR 8	10K Log	Type 45	A.B.	Front Panel
VR9a-d	4K7 Lin O/Skel Cermet	VA05H	Bourns	PC69
VR10	2K2 Lin O/Skel	VA05H	Bourns	"
VR11	47K Lin O/Skel	62H	Morganite	"

X/TALS

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER	LOCATION
X1a-d	Frequency Dependant	SO17/4	Brookes	Oven No. 2
X 2	Crystal 1.4MHz	HC6U	Brookes	Oven No. 1

COMPONENTS LIST - KW2000CAT AC PSU

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER
C 1	100uF 450v Electrolytic	KB609TT	Erie
C 2	100uF 450v Electrolytic	KB609TT	Erie
C 3	47uF 160v Electrolytic	21103-100	Erie
C 4	47uF 160v Electrolytic	21103-100	Erie
C 5	2200uF 25v Electrolytic	EN12.12	I.T.T.
C 6	0.1uF 160v Polyester	C296AA100K	Mullard
C 7	0.47uF 125v Polyester	TFM0.47	Waycom

DIODES

CIRCUIT REF.	PART NO.	SUPPLIER
D 1	BY238	Guest
D 2	BY238	Guest
D 3	BY238	Guest
D 4	BY238	Guest
D 5	BYX36-150	Mullard
D 6	BYX36-150	Mullard
D 7	BYX36-150	Mullard
D 8	BYX36-150	Mullard
D 9	BYX36-150	Mullard
D10	BYX36-150	Mullard
D11	BYX36-150	Mullard
D12	BYX36-150	Mullard

FUSES - 230V SUPPLY

CIRCUIT REF.	DESCRIPTION	SUPPLIER
FS 1	2 amp A/Surge 20mm x 5mm	R.S. Components
FS 2	500mA 20mm x 5mm	R.S. Components
FS 3	100mA 20mm x 5mm	R.S. Components
FS 4	2 amp A/Surge 20mm x 5mm	R.S. Components

FUSES - 115V SUPPLY

CIRCUIT REF.	DESCRIPTION	SUPPLIER
FS 1	5 amp A/Surge 20mm x 5mm	R.S. Components

VOLTAGE REGULATOR

CIRCUIT REF.	DESCRIPTION	PART NO.	SUPPLIER
IC 1	12v	UGJ 782393	Fairchild

RESISTORS

CIRCUIT REF.	DESCRIPTION				PART NO.	SUPPLIER
R 1	30R	± 5%	5W	WW		R.S. Components
R 2	150K	±10%	2W	Carbon	Type O	Radio Resistors
R 3	1K5	±10%	9W	WW	KKA9	Radio Resistors
R 4	150K	±10%	2W	Carbon	Type O	Radio Resistors
R 5	30R	± 5%	5W	WW		R.S. Components
R 6	10R	±10%	½W	Carbon	Type S	Morganite
R 7	220R	±10%	½W	Carbon	Type S	Morganite
R 8	6K8	±10%	½W	Carbon	Type S	Morganite
R 9				NOT USED		
R10	1K	±10%	½W	Carbon	Type S	Morganite
R11	10R	±10%	½W	Carbon	Type S	Morganite

TRANSFORMER

CIRCUIT REF.	DESCRIPTION	SUPPLIER
T 1	Drg. B1049/9A	Avel Lindberg

TRANSISTOR

CIRCUIT REF.	PART NO.	SUPPLIER
TR 1	2N3055	Motorola

POTENTIOMETER

CIRCUIT REF.	DESCRIPTION			PART NO.	SUPPLIER
VR 1	10K Lin	Cermet	PC Mtg.	VA05H	Bourn's