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T535 Mobile Two Way Radio

VHF FM 136-174MHz

(M535-00)

Issue B

TECHNICAL INFORMATION

For further information about this Manual or the equipment it describes, contact the Product Distribution Group, Tait Electronics Ltd, at the above address.

UPDATING EQUIPMENT AND SERVICE MANUALS

In the interests of improving performance, reliability or servicing, Tait Electronics Ltd reserve the right to update their equipment and/or Service Manuals without prior notice.

SCOPE OF MANUAL

This Manual contains general, technical and servicing information on the T535 mobile two way radio.

Ordering Tait Service Manuals

When ordering Tait Service Manuals, quote the Tait Internal Part Number (IPN) and, where applicable, the version.

Date Of Issue

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Manual Revisions

This Tait Service Manual may incorporate textural revisions and, where necessary, updated Parts Lists and Diagrams.

Those portions of the text that have been changed from the previous issue Manual are indicated by a vertical line in the outer margin of the page.

CONTENTS

	Page
<u>SECTION 1 GENERAL INFORMATION</u>	
1.1 Introduction	1.1
1.2 Specifications	1.2
1.2.1 General	1.2
1.2.2 Receiver	1.3
1.2.3 Transmitter	1.3
1.2.4 Frequency Reference	1.4
1.3 Versions	1.5
1.4 Operating Instructions	1.6
<u>SECTION 2 CIRCUIT OPERATION</u>	
2.1 Synthesiser	2.1
2.2 Receiver	2.1
2.3 Squelch	2.1
2.4 Transmitter	2.2
2.4.1 RF Stages	2.2
2.4.2 Audio Processor	2.2
2.5 Power Supply	2.2
2.5.1 General	2.2
2.5.2 Continuous Supplies	2.2
2.5.3 Receive	2.2
2.5.4 Transmit	2.3
2.5.5 Frequency Information	2.3
<u>SECTION 3 ANCILLARY EQUIPMENT</u>	
3.1 T508-01/02 Power Supply	3.1
3.2 T508-21/22 Switch Mode Regulator	3.1
3.3 T220-02 Remote Speaker Assembly	3.1
3.4 T500-01 CTCSS	3.1
3.5 T500-11 CTCSS	3.1
3.6 T500-02 Multichannel CTCSS	3.2
3.7 T500-03/04 Multichannel	3.2
3.8 T500-55 Multichannel	3.2
3.9 T500-58 Scanning Multichannel	3.3
3.10 T500-07 Rugged Cradle	3.3
3.11 T500-26/27 TCXO	3.3
3.12 T500-56/57 Multichannel TCXO	3.3

SECTION 4 INSTALLATION

4.1 Vehicle Installation

4.1

SECTION 5 SERVICING

5.1	General	5.1
5.1.1	Notes	5.1
5.1.2	Technical Instructions	5.1
5.2	Mechanical	5.1
5.2.1	Pozidriv Recess Head Screws	5.1
5.2.2	Disassembly Instructions	5.2
5.2.2.1	To Gain Access To The Component Side Of The PCB	5.2
5.2.2.2	To Gain Access To The Track Side Of The PCB	5.2
5.2.2.3	To Remove The Front Panel	5.2
5.2.2.4	To Gain Access To The PA Components	5.2
5.2.2.5	Speaker Removal/Refitting	5.2
5.2.3	VCO Can	5.3
5.2.4	Reassembly	5.3
5.3	Repair	5.4
5.3.1	Component Checks	5.4
5.3.2	Leaded Component Replacement	5.4
5.3.3	Chip Component Removal/Replacement	5.4
5.3.3.1	Component Removal	5.4
5.3.3.2	Replacement	5.5
5.3.4	Component Removal From PTH PCB's	5.5
5.3.4.1	Desoldering Iron Method	5.5
5.3.4.2	Component Cutting Method	5.6
5.3.5	Crystal Filter Replacement	5.6
5.3.6	PA - Special Instructions	5.6
5.3.6.1	To Replace The PA Transistors	5.6
5.4	Setting Up	5.7
5.4.1	Test Equipment Required	5.7
5.4.2	Tuning Hints	5.7
5.4.3	Operation Below 150MHz - VCO	5.8
5.4.4	Channel Programming	5.8
5.4.4.1	Reference Frequency Selection	5.8
5.4.4.2	Programming	5.8
5.5	VCO Alignment	5.12
5.5.1	General	5.12
5.5.2	Single Channel Operation	5.12
5.5.3	Dual Channel Operation	5.12
5.6	Reference Frequency Adjustment	5.12
5.7	Transmitter Adjustments	5.13
5.7.1	Alignment	5.13
5.7.1.1	Single Channel Alignment	5.13
5.7.1.2	Dual Channel Alignment	5.13
5.7.2	Modulation Adjustment	5.13
5.8	Receiver Alignment	5.14

5.9	Fault Finding	5.15
5.9.1	General	5.15
5.9.2	Receiver Performance Tests	5.15
5.9.2.1	Squelch	5.15
5.9.2.2	To Check The Audio Output Level	5.15
5.9.2.3	To Check The Sinad Sensitivity	5.16
5.9.2.4	To Check The Signal+Noise To Noise Ratio	5.16
5.9.2.5	To Check The Ultimate Signal To Noise Ratio	5.16
5.9.3	Transmitter Performance Tests	5.17
5.9.3.1	Audio Processor	5.17
5.9.3.2	Modulation Characteristics	5.18
5.9.3.3	To Check The RF Power Control Circuit	5.18
5.9.3.4	To Check The Transmission Timer	5.19
5.9.3.5	To Check The VCO Voltage Control Range	5.19
5.9.4	Synthesiser Fault Finding	5.19
5.9.4.1	If The VCO Gives No Output	5.19
5.9.4.2	If The Synthesiser Does Not Lock Up	5.19
5.9.4.3	To Check The VCO Output Frequency Stability	5.20
5.9.4.4	To Check Transmitter Switch-On	5.20
5.9.4.5	Microphonics	5.20

SECTION 6 PARTS LIST

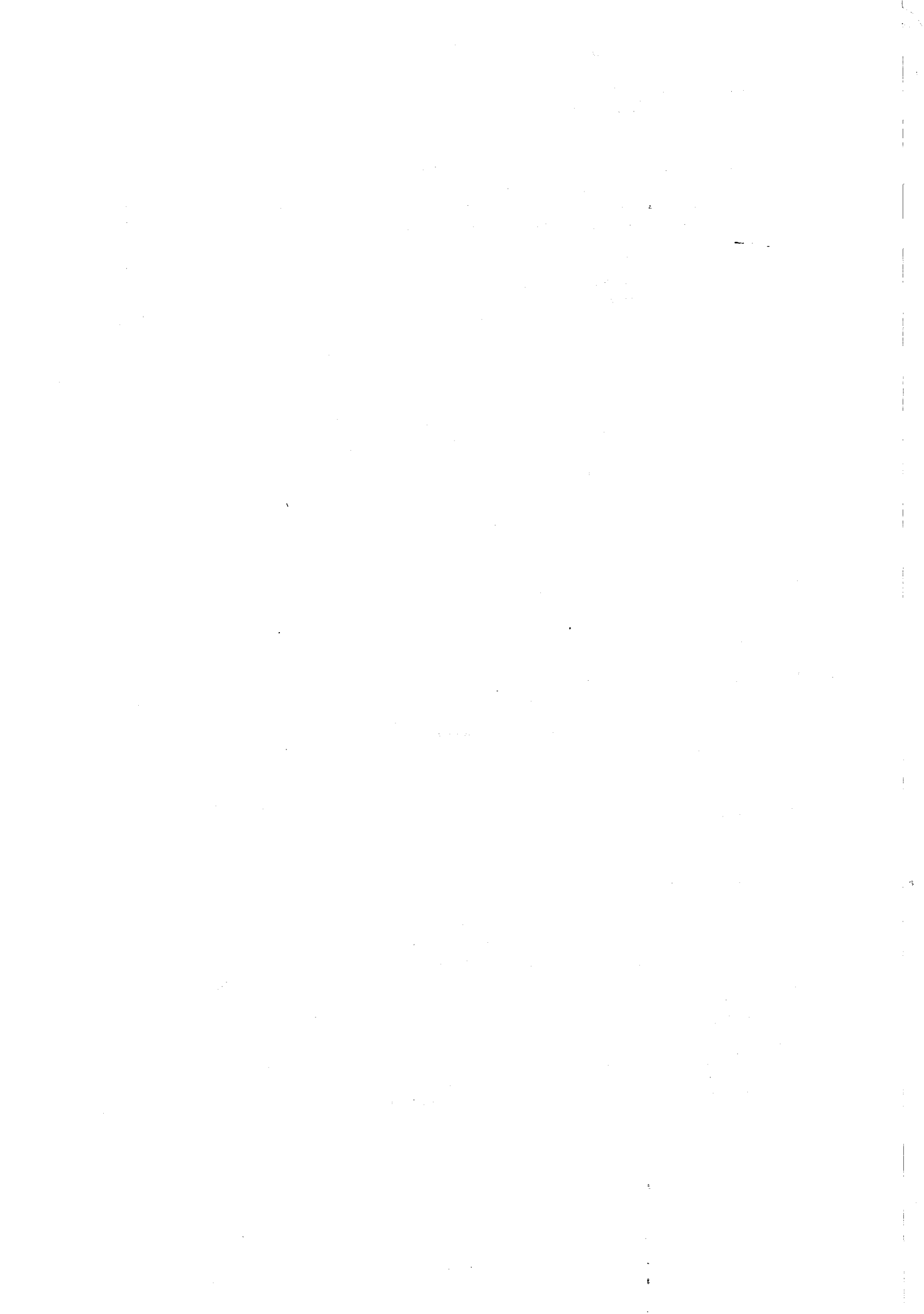
Refer to page 6.2 for index

LIST OF ILLUSTRATIONS

Figure 1.	Front Panel Layout	1. 6
Figure 2.	Chip Component Removal	5. 5
Figure 3.	Chip Component Replacement (Soldering)	5. 5
Figure 4.	Chip Component Replacement (Component Placement)	5. 5
Figure 5.	Channel Programming	5.10

DIAGRAMS

1.	Suggested Test Set-Up	
2.	Tuning Points	
3.	T535 PCB Layout - Top Side	
4.	T535 PCB Layout - Bottom Side	
5.	T500 Diode Matrix/LED/Crystal Heater PCB Layout - Top Side	
6.	T500 Diode Matrix/LED/Crystal Heater PCB Layout - Bottom Side	
7.	T500 LED and Crystal Heater PCB Layout	
8.	T535 Block Diagram	A2C638
9.	T535 Wiring Diagram	A2C632
10.	T500 Diode Matrix/LED/Crystal Heater Circuit Diagram	C726
11.	T500 LED & Crystal Heater Circuit Diagram	A4C509
12.	T500-22 Diode Matrix Circuit Diagram	C621
13.	T535 Audio & Regulators Circuit Diagram	C591/1 (Fold-out)
14.	T535 Transmitter & Receiver Circuit Diagram	C591/2 (Fold-out)



SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

The T535 is a high performance FM synthesised mobile two way radio with a nominal RF power output of 25 watts. It is intended for operation in the 136 to 174MHz frequency range with 25kHz channel spacing at ± 5 kHz deviation, or 12.5kHz channel spacing and ± 2.5 kHz deviation. The standard set has a two channel capacity.

Operation of the T535 is by hand held microphone and press-to-talk switch, plus five front panel mounted controls: 'Volume', 'Squelch', 'Channel Change', 'Call' and an 'On/Off' switch. Visual indication of 'Channel Selected', 'Transmit', 'Busy' and 'Call' (if selective calling is fitted) is by illuminated front panel display.

Provision is made for selective calling and CTCSS to be incorporated within the case of the T535.

The two injection moulded plastic covers and the plastic front panel can be easily removed to expose both sides of the printed circuit board for ease of servicing.

The T535 employs the dual modulus system of frequency synthesis. Channel information is held on a plug-in diode matrix board which can be field programmed with a soldering iron.

The dual conversion receiver employs both discrete components and integrated circuits. It also includes a signal-to-noise ratio operated squelch circuit. The receiver delivers approximately 2 watts of audio power to an 8 ohm speaker.

The VCO provides about 10 milliwatts of frequency modulated RF drive to the four stage broad band RF power amplifier. An audio processor contains modulation level control and deviation limiting circuits. A timer limits transmission duration to approximately one and a half minutes.

The T535 is light and compact and is supplied with a versatile mounting system to allow easy installation in any vehicle. Mains operation is possible when the T535 is used with the Tait T508 power supply.

The DC supply to the T535 must be negative earth and must be between 10.8 and 16 volts. The T535 is protected against reversal of the DC supply polarity.

1.2 SPECIFICATIONS

1.2.1 GENERAL

The performance figures given are typical figures, unless otherwise indicated, for equipment tuned with the maximum switching band and operating at standard room temperature (+22°C to +28°C).

Two versions of the T535 are available (Wide Band and Narrow Band) and separate performance figures are provided for several parameters.

Where applicable, the test methods used to obtain the following performance figures are those described in the New Zealand Post Office Specification RTA25.

Details of test methods and the conditions which apply for type approval testing in all countries can be obtained from Tait Electronics Ltd.

Modulation Type	.. frequency modulation
Frequency Range	.. 136 to 174MHz
Channel Separation	.. 12.5kHz (minimum)
Frequency Increment	.. 5 or 6.25kHz
Number Of Channels	.. 2, 10, 40 or 80 (to order)
Switching Range:	
Receiver	.. 4MHz
Transmitter	.. 6MHz
Supply Voltage:	
Operating Range	.. 10.8 to 16V DC
Standard Test Voltage	.. 13.8V DC
Polarity	.. negative earth only
Protection	.. internal crow-bar diode
Supply Current:	
Receiver - Squelched	.. 200mA
Receiver - Full Audio	.. 700mA
Transmitter	.. 4.5A (at 25W)
Antenna Impedance	.. 50 ohms (nominal)
T/R Changeover Switching	.. relay
Operating Temperature Range (refer to Section 1.2.4)	.. -30°C to +60°C
Dimensions:	
Length	.. 238mm
Width	.. 150mm
Height	.. 45mm
Weight	.. 1.2kg

1.2.2 RECEIVER

Type	.. dual conversion superhet
12dB Sinad Sensitivity	.. -119dBm
IF Amplifiers:	
Frequencies	.. 21.4Mhz and 455kHz
Bandwidth:	
Narrow Band	.. 7.5kHz
Wide Band	.. 15kHz
Signal+Noise-to-Noise Ratio:	
Narrow Band	.. 32dB
Wide Band	.. 35dB
Selectivity: (adjacent channel)	
Narrow Band	.. 75dB
Wide Band	.. 80dB
Spurious Response Attenuation	.. 85dB
Intermodulation Response Attenuation	.. 75dB
Spurious Emissions:	
Conducted	.. -65dBm
Radiated ($\frac{1}{2}$ -wavelength dipole)	.. -57dBm
Audio:	
Output into internal 8 ohm speaker	.. 2W
Output into external 3.5 ohm speaker	.. 4W
Distortion (at 4 watts)	.. 2%
Minimum Load Impedance	.. 2 ohms
Audio Response	.. within +1, -3dB of a 6dB/octave de-emphasis characteristic (ref. 1kHz)
Audio Bandwidth	.. 300Hz to 3kHz
Squelch:	
Threshold	.. -120dBm (0.22 μ V pd)/6dB Sinad
Hard Setting	.. -104dBm (1.4 μ V pd)/26dB Sinad
Ratio	.. 70dB

1.2.3 TRANSMITTER

Power Output	.. 25W
Transmit Timer	.. 1.5 minutes
Mismatch Capability:	
Stability	.. VSWR <5:1 (all phase angles)
Ruggedness	.. 2 minute transmit into infinite VSWR (all phase angles)
Spurious Emissions:	
Conducted	.. -36dBm
Radiated ($\frac{1}{2}$ -wavelength dipole)	.. -26dBm

T535 General Information

Adjacent Channel Power:

Narrow Band .. -70dBc
Wide Band .. -80dBc

Modulation System:

Type .. direct FM
Deviation Limiting .. ± 5 kHz (peak) maximum
Bandwidth .. 300Hz to 3kHz
Responses:
 In Limiting .. within +0, -4dB of maximum system deviation
 Below Limiting .. within +1, -3dB of 6dB/octave pre-emphasis (ref. 1kHz)
 Frequencies Above 3kHz .. greater than 25dB/octave roll-off

Audio:

Input For 60% Maximum Deviation (at 1kHz) .. 6mV rms
Distortion .. 2%
Hum & Noise .. 45dB

1.2.4 FREQUENCY REFERENCE

Stability:

± 5 ppm (-10°C to +60°C) .. TE/9 or TE/37
 ± 5 ppm (-30°C to +60°C) .. TE/9 or TE/37 + crystal heater (after 1 minute)

Heater Warm-Up Time

.. 1 minute

Oscillator Frequency:

5kHz Reference Frequency .. 10.24MHz
6.25kHz Reference Frequency .. 12.8MHz

1.3 VERSIONS

Description	Version																
	20	21	22	23	24	26	30	31	32	33	34	35	36	37	60*	72#	90
7.5kHz IF Bandwidth		+		+						+		+		+			
15kHz IF Bandwidth	+		+		+		+		+		+		+		+	+	+
5kHz Freq. Increments	+	+	+	+	+										+		+
6.25kHz Freq. Increments							+	+	+	+	+	+	+	+		+	
CTCSS			+			+			+	+			+	+			
Standard Cradle					+	+					+	+		+	+		
Rugged Cradle	+	+	+	+			+	+	+	+			+			+	+
Crystal Heater															+		+

* CMC Front Panel

Intron Front Panel

1.4 OPERATING INSTRUCTIONS

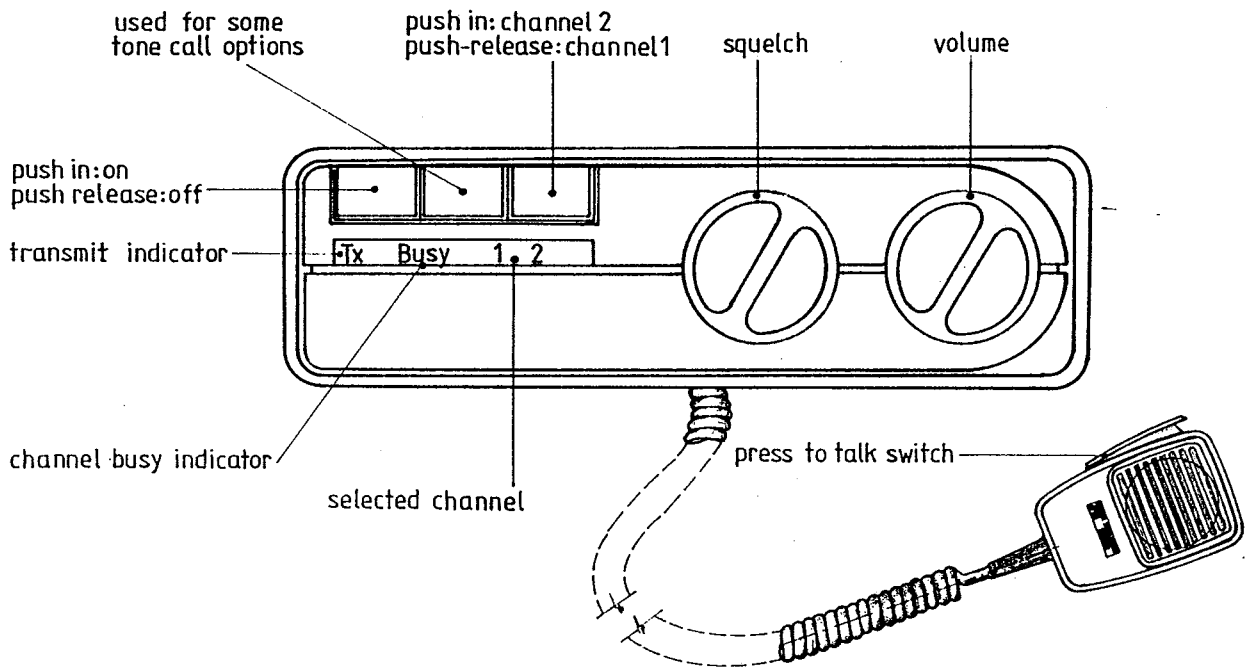


Figure 1 Front Panel Layout

To Receive:

- (a) Turn the volume control fully anticlockwise, then switch on the T535.
- (b) Turn the squelch control fully clockwise and adjust the volume control for a comfortable listening volume. Either channel traffic or receiver noise will be heard.
- (c) When the channel is vacant, turn the squelch control anticlockwise until the receiver quietens.

To Transmit:

- (a) Check that the channel is vacant before transmitting.
- (b) Hold the press-to-talk switch closed and speak into the microphone. Release the press-to-talk switch to revert to receive.
- (c) The T535 will automatically revert to receive if the transmission time exceeds one and a half minutes. To continue transmitting, momentarily release the press-to-talk switch.
- (d) Always place the microphone in its clip when not in use.

SECTION 2 CIRCUIT OPERATION

Refer to the Block and Circuit Diagrams at the rear of this Manual.

2.1 SYNTHESISER

The T535 employs the dual modulus system of frequency synthesis.

The synthesiser chip, IC8, contains a reference oscillator, frequency dividers and a phase comparator. The reference oscillator is controlled by a 12.8MHz (or 10.24MHz) quartz crystal and the output from the reference oscillator is divided internally to 6.25kHz (or 5kHz) and fed to the phase comparator.

The VCO frequency is divided by the 40/41 prescaler, IC9, and then further divided within IC8 to provide the other input to the phase comparator. The division ratio in IC8, and hence the channel frequency, is determined by the diode matrix board.

The phase comparator output (pins 7 & 8 of IC8) is fed to the VCO tuning varicaps via the speedup circuit (Q27, Q28) and the loop filter.

2.2 RECEIVER

The VCO output is fed in antiphase to the gates of the two balanced mixer J-FETs, Q16 and Q17. The RF signal from the Tx/Rx relay is amplified by Q15 and fed to the mixer via a double tuned circuit.

The 21.4MHz IF output from the mixer passes through crystal filter XF1 and is amplified by Q18 before being fed to IC7. IC7 contains a second mixer and 455kHz second IF stages, a demodulator and squelch control circuits.

The audio at pin 9 of IC7 is de-emphasised by R68 and C55 and fed through the audio processor (see Section 2.4.2) to the audio output amplifier, IC4.

2.3 SQUELCH

An input signal to the squelch circuit is obtained from the audio output of IC7 via RV149. This signal has a noise level which is inversely related to the level of the RF signal at the receiver input.

An op-amp within IC7 is used in a band pass filter configuration to select and amplify noise frequencies above the audio band. The centre frequency is approximately 8kHz in the wide band T535 and 4.5kHz in the narrow band T535.

This signal is rectified by Q20 to give a positive going DC voltage which is an inverse function of the RF signal strength.

This DC voltage is then fed to a threshold detector within IC7, in such a way that the voltage at pin 14 of IC7 is high in the presence of noise and low in the absence of noise. The threshold point occurs at approximately 0.7 volts.

The switching signal from the threshold detector is then inverted by Q7. C17 and R26 prevent squelch closure during rapid fades, while maintaining a fast opening time.

Q6 drives the squelch switch and the 'Busy' LED.

2.4 TRANSMITTER

2.4.1 RF STAGES

The VCO output is amplified to a level of 25 watts by a 4 stage broad band amplifier (Q40, Q44, Q45, Q46). The power amplifier output passes via the relay through a low pass filter to the antenna connector.

The transmit power output is set at 25 watts by RV260 which controls the collector voltage of Q44, and hence the gain of the broad band amplifier. The circuit utilises a power detector (D50) and a feed back loop to hold the transmitter power to 25 watts under conditions of varying supply voltage.

Transistor Q41 prevents the power amplifier turning on when the synthesiser is out of lock.

2.4.2 AUDIO PROCESSOR

Transistor Q10 is a microphone preamplifier. IC2 provides the necessary gain limiting and filter functions for the audio signal. An automatic level control (ALC) function is performed by detector Q11 and shunt elements D15 and D16. The analogue switches within IC3 allow either transmit or receive audio to be directed through the audio processor. Connection points for CTCSS or selective calling options are shown on the Circuit Diagram.

2.5 POWER SUPPLY

2.5.1 GENERAL

Note: The T535 is suitable for negative earth applications only.

The unit is protected by a crowbar diode (D1) which will blow the fuse if the supply is reverse connected.

DC is connected to the audio output IC and the transmitter final and driver whenever the T535 is connected to a supply, regardless of the position of the on/off switch.

2.5.2 CONTINUOUS SUPPLIES

DC from the on/off switch enables the audio output IC and supplies the power turn down stage and short circuit protected 9 volt regulator. Output from this regulator powers the audio processor and synthesiser.

2.5.3 RECEIVE

The switched Rx 9V and Tx 9V lines are controlled by Q5 and Q4 respectively.

The Rx 9V line is high only on receive and powers the following:

- that part of the diode matrix board containing receive channel information;
- the receiver RF, IF and demodulator stages;
- the squelch control circuit;
- an analogue switch in the audio output circuit.

2.5.4 TRANSMIT

When the PTT switch is closed, the Tx 9V supply is switched on. This powers the following:

- that part of the diode matrix board containing transmit channel information;
- the low power transmitter stages;
- the antenna changeover relay;
- the analogue switches in the audio processor.

2.5.5 FREQUENCY INFORMATION

The diode matrix/LED PCB has four rows of diodes. A row is selected by D44 to D47 and R216 to R219 according to the channel switch position and whether the T535 is in the receive or transmit mode. The channel frequency is selected by soldering pads as described in Table 1 or Table 2 such that the correct pattern of 0's and 1's is presented to IC8.

SECTION 3 ANCILLARY EQUIPMENT

3.1 T508-01/02 POWER SUPPLY

The T508 Power Supply will allow the operation of a T500 Series I or II two way radio from a 230V (nominal) 50Hz or a 115V (nominal) 60Hz mains supply. The radio can be mounted on the T508 to give a compact desk top installation, or they can be separately wall mounted to save desk space.

The T508 provides a 13.8V DC 5.5A (intermittent) regulated supply for the T500 Series I and II two way radios and incorporates current limiting and thermal protection.

Type Numbers:

230V Supply	.. T508-01 (previously designated T508)
115V Supply	.. T508-02 (previously designated T508/115)

3.2 T508-21/22 SWITCH MODE REGULATOR

The T508-21/22 Power Supply uses switch mode technology to control the regulation of the output voltage. This results in a power supply with a higher temperature rating, improved efficiency and greater reliability.

The T508-21/22 provides a 13.8V DC 6.5A (intermittent) regulated supply for the T500 Series I and II two way radio and incorporates current limiting and thermal protection.

Type Numbers:

230V Supply	.. T508-21
115V Supply	.. T508-22

3.3 T220-02 REMOTE SPEAKER ASSEMBLY

The T220-02 (previously designated the T220/2) is a remote speaker assembly which may be used with the T535. It comprises a heavy duty speaker mounted in a rugged enclosure which pivots on its mounting bracket. The 3.5 ohm voice coil of the speaker is connected by a short lead terminated in a 2 pin cord mounted connector. The enclosure is compact and easily mounted in any convenient position.

3.4 T500-01 CTCSS

The T500-01 CTCSS unit (previously designated the TA-500/CTCSS) is a plug-in option designed to fit T500 Series I and II two way radios.

It requires no wiring to install and will encode and decode CTCSS tone frequencies within the range 67Hz to 250Hz with separate adjustment for each channel. Hook switch monitoring and transmit inhibit on "busy" may be field selected.

Refer to TI-343 for fitting and servicing details.

3.5 T500-11 CTCSS

The T500-11 is a plug-in CTCSS encoder/decoder designed to fit T500 Series II radios. All functions and specifications of the T500-11 are the same as the T500-01, but the T500-11 has an additional alert tone ("beep") circuit.

This feature gives an audible indication of a busy channel when transmit inhibit is active. The operator no longer needs to look at the radio for a busy indication (which may be unsafe in a motor vehicle), as is the case with the T500-01.

Refer to TI-336B for fitting and servicing details.

3.6 T500-02 MULTICHANNEL CTCSS

The T500-02 (previously designated TA-500MC/CTCSS) is a high performance CTCSS encoder/decoder for use with T500 Series I and II radios equipped with any one of the following multichannel conversion kits:

- T500-03 (previously designated TA-500/10)
- T500-04 (previously designated TA-500/40)
- T500-55
- T500-58

It will encode and decode all 37 standard tones from groups A, B and C, permitting the use of all 37 tones on one repeater. Encode and decode tones may be the same or different on each radio channel programmed. No tone on transmit and no CTCSS mute on receive may also be programmed on any radio channel.

Hook switch monitoring is also programmable on any channel. Transmit inhibit on busy is fitted as standard.

Refer to TI-328 for fitting and servicing details.

3.7 T500-03/04 MULTICHANNEL

The T500-03 and T500-04 (previously designated TA-500/10 and /40 respectively) are add-on kits which convert a T500 Series I or II two way radio to 10 or 40 channel operation. Compatibility is maintained with all other Tait T500 accessories.

An Erasable Programmable Read Only Memory (EPROM) is used to store channel and CTCSS data. The EPROM is field programmable using a Tait T601 Programmer.

Refer to TI-292B for fitting and servicing details.

3.8 T500-55 MULTICHANNEL

The T500-55 is a retrofit kit which converts a T500 Series II two way radio to 10, 20, 40 or 80 channel operation. Compatibility is maintained with all other Tait T500 Series II accessories.

An Erasable Programmable Read Only Memory (EPROM) is used to store channel and CTCSS data. The EPROM is field programmable using a Tait T601 Programmer.

Channel selection is made by the front panel mounted up/down push buttons. A squelch defeat button is also provided.

Refer to TI-323 for fitting and servicing details.

3.9 T500-58 SCANNING MULTICHANNEL

The T500-58 is a retrofit kit which converts a T500 Series II two way radio to 10, 20, 40 or 80 channel operation with the capability of scanning up to 10 channels. If priority scanning is required, this is reduced to 5 scanning channels plus the priority channel.

An Erasable Programmable Read Only Memory (EPROM) is used to store channel, scanning and CTCSS data. The EPROM is field programmable using the T500-25 Tait programming kit and a user supplied EPROM programmer.

Channel selection is made by the front panel mounted up/down push buttons. A squelch defeat button is also provided.

Refer to TI-352A for fitting and servicing details.

3.10 T500-07 RUGGED CRADLE

The T500-07 (previously designated the TA-500/RC) is a rugged cradle affording a higher level of environmental and mounting security than the standard cradle. It comes complete with mounting screws and cradle unlocking key.

3.11 T500-26/27 TCXO

The T500-26 or -27 TCXO PCB's are 12.8MHz reference oscillators with ± 3.0 ppm temperature stability over the temperature range of -10°C to $+60^{\circ}\text{C}$. The T500-27 is additionally specified to be within ± 5.0 ppm from -30°C to -10°C .

These optional PCB's are fitted in place of the T500 LED PCB, and employ temperature sensing and compensation techniques to achieve the ± 3.0 ppm stability without the high current consumption normally associated with crystal heaters.

Refer to TI-316B for fitting and servicing details.

3.12 T500-56/57 TCXO

The T500-56 or -57 TCXO PCB's are 12.8MHz reference oscillators with ± 3.0 ppm temperature stability over the temperature range of -10°C to $+60^{\circ}\text{C}$. The T500-57 is additionally specified to be within ± 5.0 ppm from -30°C to -10°C .

These add-on PCB's are used when the T500 Series II two way radio is fitted with a combined T500 Diode Matrix and LED, a T500-55 Multichannel or a T500-58 Scanning Multichannel PCB. The TCXO employs temperature sensing and compensation techniques to achieve the ± 3.0 ppm stability without the high current consumption normally associated with crystal heaters.

Refer to TI-338B for fitting and servicing details.

SECTION 4 INSTALLATION

4.1 VEHICLE INSTALLATION

Installation instructions (IPN 409-50001-00) are packed with each radio.

CAUTION: The T535 is suitable for negative earth installation only.



SECTION 5 SERVICING

5.1 GENERAL

5.1.1 NOTES

If further information is required about the T535 or this Manual, it may be obtained from Tait Electronics Ltd or accredited agents. When requesting this information, please quote either the equipment type number (eg. T535-31), or serial number (found adjacent to the aerial connector at the back of the set). In the case of the Circuit Diagrams quote the 'Title' and 'Issue' and for the Service Manual quote the internal part number (IPN) and 'Issue', e.g. M535-00, Issue A.

CAUTION: CLEANING

This is a plastic based product with a secondary finish on the front panel. Use a cloth dampened with warm, soapy water to clean. If solvent cleaners are to be used for stubborn stains, test first on a part of the set normally out of sight. Do not use solvent cleaners on the front panel.

CAUTION: AERIAL LOADING

The equipment has been designed to operate over a wide range of aerial loading conditions. However, it is strongly recommended that the transmitter is not operated in the absence of a suitable load. Failure to observe this precaution may result in damage to the transmitter power output stage.

CAUTION: BERYLLIUM OXIDE & POWER TRANSISTORS

The RF power transistors in current use all contain some beryllium oxide. This substance, while perfectly harmless in its normal solid form, can become a severe health hazard when it has been reduced to dust. For this reason the RF power transistors should not be scratched, mutilated, filed, machined, or physically damaged in any way that can produce dust particles.

CAUTION: CMOS DEVICES

The equipment contains CMOS devices which are susceptible to damage from static charges. Care when handling these devices is essential. For correct handling procedures refer to the manufacturers data books, e.g. Philips data books covering CMOS devices, or Motorola CMOS data books, Section 5 'Handling', etc.

5.1.2 TECHNICAL INSTRUCTIONS

From time to time 'Technical Instructions' (TI's) are issued by Tait Electronics Engineering Division. These TI's may be used to update equipment or information, or to meet specific operational requirements.

5.2 MECHANICAL

5.2.1 POZIDRIV RECESS HEAD SCREWS

Pozidriv screws are the preferred standard on all Tait manufactured equipment. The very real advantages of this type of screw will not be realised unless the correct screwdrivers are used by servicing personnel.

Pozidriv No 1 screwdrivers will fit the pozidriv screws used in the T535. Philips cross-head screwdrivers are not satisfactory for use on these screws.

5.2.2 DISASSEMBLY INSTRUCTIONS

Note: To assist in separating the top and bottom covers, a thin plastic strip (such as a plastic rule) may be inserted between the covers and used as a lever.

5.2.2.1 To Gain Access To The Component Side Of The PCB

Place the T535 upside down on the bench.

Remove the 4 bottom cover retaining screws.

Gently lift both ends of the bottom cover until it clears the front panel and heatsink.

Lift away the bottom cover.

5.2.2.2 To Gain Access To The Track Side Of The PCB

Remove the bottom cover as in 5.2.2.1 above.

Turn the T535 over on the bench.

Remove the 2 top cover retaining screws.

Gently raise both ends of the top cover until it clears the front panel and heatsink.

5.2.2.3 To Remove The Front Panel

Remove the bottom and top covers as instructed above.

Slide the front panel forward.

It is not necessary to remove the knobs, they may be left in situ.

5.2.2.4 To Gain Access To The PA Components

To gain access to the PA, remove the screws retaining the two PA cavity lids.

Remove the component side lid towards the right hand side of the PCB (as viewed from the front of the set) so that it clears the power supply feedthrough capacitor.

5.2.2.5 Speaker Removal/Refitting

The speaker in the T535 is held in place with four "push-on fix" spring clips (IPN 357-00010-09, Spire No. SFP 3253) which may cause problems when the speaker is removed.

To remove the speaker, cut the spring clips off the plastic locating pegs with wire cutters. Do not attempt to prise off the spring clips as this will damage the pegs.

Fit four new clips when refitting the speaker.

5.2.3 VCO CAN

CAUTION: When loosening or tightening the 4 retaining screws of the VCO can, support the can from the component side as undue pressure on the PCB may fracture some of the chip capacitors.

5.2.4 REASSEMBLY

Reassembly is carried out in the reverse order of the above.

Replace the PA covers.

Slide on the front panel, taking care to guide the four LEDs into their respective channels in the plastic moulding.

Press the microphone cord into its retaining slot.

Fit the top cover:

Gently press the cover into position, taking care to position the rim at the rear of the cover into the heatsink groove. Ensure that the rim of the front panel fits into the groove round the front of the top cover.

Replace the two "Taptite" screws at the rear of the cover.

Fit the bottom cover:

Invert the T535.

Gently press the cover into position, taking care to position the rim at the rear of the cover into the heatsink groove. Ensure that the rim of the front panel fits into the groove round the front of the bottom cover.

While fitting the bottom cover, check that the right hand retaining screw pillar slides into the hole in the diode matrix/LED PCB.

Replace the two "Taptite" screws at the rear of the cover and the two "Plastite" screws at the front of the cover.

5.3 REPAIR

5.3.1 COMPONENT CHECKS

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely unsoldered). An AVO model 8 or equivalent meter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multijunction transistors is a further guide to their operating performance.

If an integrated circuit (IC) is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. These values can be found on the Circuit Diagram, or in the component data catalogue.

5.3.2 LEADED COMPONENT REPLACEMENT

Whenever components are removed from, or fitted to the printed circuit track, care must be taken to avoid damage to the track. If it is necessary to remove a component from the track, the following procedure is recommended:

- Remove the solder from the component leads using a solder wick.
- Loosen the individual leads from the printed track.
- Withdraw the component from the top of the PCB.

Because of the delicate nature of the printed track, the use of solder suckers is not recommended.

Do not remove the component from the PCB while the solder is still molten.

Keep all soldering operations, and the heat and solder applied, to a minimum. A thermally controlled, fine tip soldering iron should be used. Ensure that the iron is earthed back to the frame of the set.

5.3.3 CHIP COMPONENT REMOVAL/REPLACEMENT

Note 1: The following procedure applies only to chip capacitors, resistors and transistors. Do not attempt to remove surface mount IC's by hand with a soldering iron. These devices must be serviced only with appropriate desoldering equipment or by an Approved Tait Dealer.

Note 2: The temperature of the soldering iron must be maintained at 320-370°C (600-700°F) and a low temperature solder should be used.

5.3.3.1 Component Removal

1. Place the soldering iron tip directly on the component in order to melt the solder and glue as shown in Figure 2. Remove the component with tweezers or long nose pliers.
2. Completely remove the old solder from the PCB, using a solder wick. Application of a small amount of flux will greatly aid in the removal of old solder. The use of 'solder suckers' is not recommended.

5.3.3.2 Replacement

1. After a component has been removed and the PCB pattern cleaned, apply a small amount of solder on the PC pattern and allow to cool, as shown in Figure 3.
2. Insert the new components and apply the soldering iron tip to the PC pattern as shown in Figure 4 (a), (b) and (c).

CAUTION: As patterns and components are close to each other, extreme care must be exercised when soldering so as not to damage components or bridge the PCB pattern paths. High soldering iron temperatures can cause component damage. Do not apply the soldering iron tip to the new component during installation.

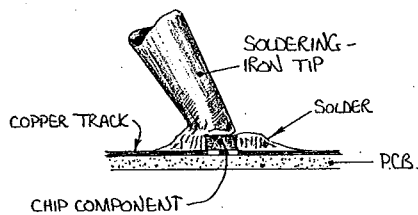


Figure 2

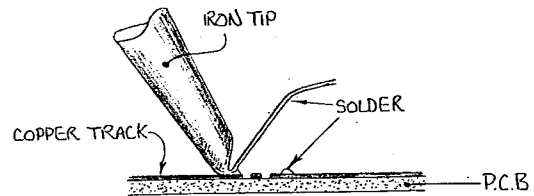


Figure 3

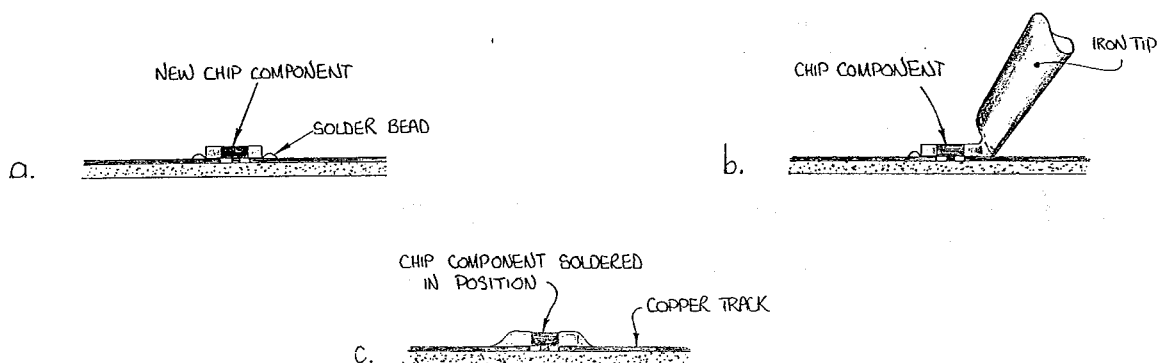


Figure 4

5.3.4 COMPONENT REMOVAL FROM PTH PCB'S

The two satisfactory methods of removing components from PTH PCB's are detailed below.

Note: The first method requires the use of a desoldering station, e.g. Philips SBC 314 or Pace MBT-100E.

5.3.4.1 Desoldering Iron Method

Place the tip over the lead and, as the solder starts to melt, move the tip in a circular motion.

Start the suction and continue the movement until 3 or 4 circles have been completed.

Remove the tip while continuing suction to ensure that all solder is removed from the joint, then stop the suction.

Before pulling the lead out, ensure it is not stuck to the plating.

If the lead is still not free, resolder the joint and try again.

Note: The desoldering iron does not usually have enough heat to desolder leads from the ground plane. Additional heat may be applied by holding a soldering iron on the tip of the desoldering iron (this may require some additional help).

5.3.4.2 Component Cutting Method

Cut the leads on the component side of the PCB.

Heat the solder joint sufficiently to allow easy removal of the lead by drawing it out from the component side: do not use undue force.

Fill the hole with solder and then clear with solderwick.

5.3.5 CRYSTAL FILTER REPLACEMENT

Should it become necessary to replace the crystal filter, both cans should be replaced together as the new parts are supplied as matched pairs. Each can is marked with a dot and the correct polarity should be maintained when the replacement crystal filter pair is fitted.

5.3.6 PA - SPECIAL INSTRUCTIONS

CAUTION: As the location of certain components in the PA is critical to performance, it is important that any components removed or disturbed be refitted in exactly the same location.

5.3.6.1 To Replace The PA Transistors

Unsolder the tabs by heating them with a soldering iron, then lifting them up towards the transistor with a thin stainless steel spike or screwdriver. Unscrew the transistor mounting screws or stud nuts and remove the transistor.

Trim the tabs of the replacement to make them similar to the faulty item, then lightly tin the underside of the tabs.

Smear the underside of the transistor with heatsink compound.

Screw the transistor tightly to the heatsink then solder the tabs.

CAUTION: Do not solder the tabs before tightening the screws or nut, as this will fracture the device.

5.4 SETTING UP

5.4.1 TEST EQUIPMENT REQUIRED

1. Multimeter (e.g. AVO Model 8)
2. DC electronic voltmeter (e.g. Tech TE65)
3. RF power meter 30 watts FSD usable to 520MHz with 5 and 30 watt elements (e.g. Bird Model 6154 or 611).
4. Power Supply - output adjustable between 9 and 16 volts DC with a capacity of at least 8 amps.
5. Modulation meter (e.g. Sayrosa 252)
6. Sinad meter (e.g. Helper Instruments Sinadder)
7. VHF signal generator. Good quality FM. Useable from 0.1 μ V (-127dBm) to 200mV (0dBm) pd. (e.g. HP 8640B).
8. VHF frequency counter accurate to within 2ppm.
9. 10.7MHz Crystal marker (second harmonic gives beat for 21.4MHz IF)
10. Audio oscillator, 10Hz to 10kHz (e.g. HP 204C/D)
11. Tone Box: Audio amplifier, with about 1.5 watts output, to drive a small speaker which can be coupled to the T535 microphone. An adaptor should be made which will hold the speaker and microphone close together.
12. AC millivoltmeter
13. Calibrated oscilloscope
14. Speaker 3.5 ohm voice coil
15. RF power attenuator, total attenuation 50dB (e.g. Weinschel 40-40-33 30dB 150W, plus Coline 1200 85 20dB 1w)
16. RF diode probe (e.g. Coline M12 DM modular RF detector probe)

5.4.2 TUNING HINTS

1. Diagram 1 shows a suggested test set-up for receiver and transmitter alignment and Diagram 2 shows tuning points.
2. For accurate tuning, the test cable connecting the signal generator or power meter to the T535 should be as short as practical and fitted with a 'mating' BNC or UHF connector. Do not use adaptors, 'sniffer' couplings, etc, which introduce changes to cable impedance and errors in test results.
3. Non-metallic tuning tools must be used for the alignment of all coil slugs to avoid the tuning errors introduced by the use of metallic tools. Tuning tools need to be of correct size to avoid the damage to slugs which results from the use of incorrect tuning tools.

4. When using the RF diode probe, the earth return should be kept as short as possible and connected as close as possible to the point at which the measurement is being taken. This is to minimise stray pick-up which may affect the reading.
5. The front panel 'on/off' switch removes power from the regulated supplies only. The RF power amplifier, the audio output IC and the DC hash filter are not controlled by this switch.
6. Check for obvious mechanical faults in the printed circuit board, controls, microphone etc.

5.4.3 OPERATION BELOW 150MHz - VCO

When operating the T535 on frequencies below 150MHz, connect CC326 in circuit.

For frequencies above 150MHz, leave CC326 out of circuit.

5.4.4 CHANNEL PROGRAMMING

5.4.4.1 Reference Frequency Selection

Refer to Section 1.3.

A 6.25kHz reference is used for 12.5kHz or 25kHz channel spacing (12.8MHz crystal).

A 5kHz reference is used for 30kHz channel spacing (10.24MHz crystal).

5.4.4.2 Programming

(a) INTRODUCTION

Note 1: VCO operation is restricted to a 4MHz switching range on receive and a 6MHz switching range on transmit within the band 136 to 174MHz. Do not programme frequencies outside these limits.

The switching range is defined as the change in frequency for a loop voltage of between 1.75 and 6.5 volts.

Note 2: For single channel applications, channel 2 should be programmed to the same frequencies as channel 1.

Tables 1 and 2 show how, when starting with A0, each successive diode influences the synthesiser frequency by a multiple of 6.25kHz, 5kHz or 12.5kHz in an ascending binary sequence. Note that it is sometimes possible to have two correct solutions for one particular frequency.

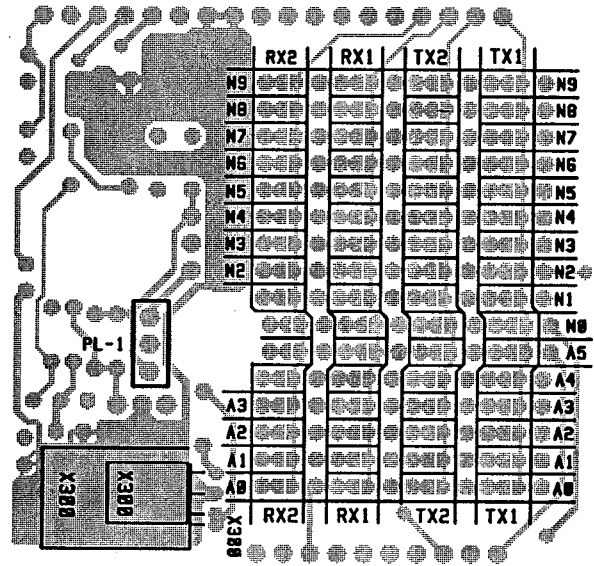
(b) COMBINED DIODE MATRIX/LED PCB

The programming of each of the two transmit and receive channels is accomplished by soldering between the required pads, shown as LK1 to LK64 in Diagram 6. A connected pad pulls IC8 input low and deletes the frequency increment. An unconnected pad allows IC8 input to go high and adds the frequency increment.

Note: It is not necessary to remove the combined diode matrix/LED PCB from the radio for programming.

Table 1

Frequency Increment (MHz)		Code
6.25kHz Ref.	5kHz Ref.	
128.0	102.4	N9
64.0	51.2	N8
32.0	25.6	N7
16.0	12.8	N6
8.0	6.4	N5
4.0	3.2	N4
2.0	1.6	N3
1.0	0.8	N2
0.5	0.4	N1
0.25	0.2	N0
0.2	0.16	A5
0.1	0.08	A4
0.05	0.04	A3
0.025	0.02	A2
0.0125	0.01	A1
0.00625	0.005	A0



When a pad is solder bridged, its corresponding N or A value is subtracted from the maximum frequency count.

When a pad is left open, the corresponding value is incremented from zero.

The following examples show a simple method of calculating the correct diode programme.

Example 1

Tx frequency = 153.0MHz, 6.25kHz reference frequency.

VCO frequency:	153	
Subtract	$\frac{128}{25}$	pad N9 unconnected
subtract	$\frac{16}{9}$	pad N6 unconnected
subtract	$\frac{8}{1}$	pad N5 unconnected
subtract	$\frac{1}{0}$	pad N2 unconnected

In each case subtract the largest value from Table 1 which yields a positive result.

Continue the process until zero is reached.

To check: The sum of the extracted values should equal the required VCO frequency.

$$N9 + N6 + N5 + N2 = VCO$$

$$128 + 16 + 8 + 1 = 153$$

Note: All these N values have pads left open. The remainder, i.e. N8, N7, N4, N3, N1, N0, A5, A4, A3, A2, A1 & A0 are all solder shorted.

Example 2

Rx frequency = 147.865, 5kHz reference frequency. The receiver has a 21.4MHz IF and low side injection.

$$f_{VCO} = f_{Rx} - 21.4 = 126.465$$

VCO frequency:	126.465	
subtract	102.4	pad N9 unconnected
	<u>24.065</u>	
subtract	12.8	pad N6 unconnected
	<u>11.265</u>	
subtract	6.4	pad N5 unconnected
	<u>4.865</u>	
subtract	3.2	pad N4 unconnected
	<u>1.665</u>	
subtract	1.6	pad N3 unconnected
	<u>0.065</u>	
subtract	0.040	pad A3 unconnected
	<u>0.025</u>	
subtract	0.020	pad A2 unconnected
	<u>0.005</u>	
subtract	0.005	pad A0 unconnected
	<u>0.000</u>	

In each case subtract the largest value from Table 1 which yields a positive result.

Continue the process until zero is reached.

Check: $N9 + N6 + N5 + N4 + N3 + A3 + A2 + A0 = VCO$

$$102.4 + 12.8 + 6.4 + 3.2 + 1.6 + 0.040 + 0.020 + 0.005 = 126.465$$

$$126.465 + 21.4 = 147.865$$

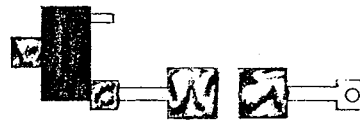
Note: All the above N and A values have pads left open. The remainder, i.e. N8, N7, N2, N1, N0, A5, A4 & A1, are solder shorted.

(c) T500-22 DIODE MATRIX PCB

The programming of each of the two transmit and receive channels is accomplished by soldering between the required pads on each row of surface mount diodes (see Figure 5).



A connected pad pulls IC8 input low and deletes the frequency increment.

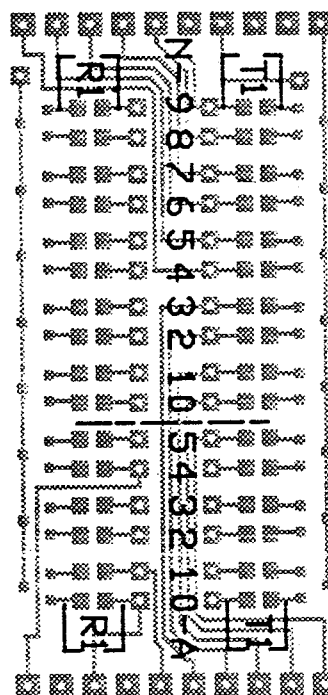


An unconnected pad allows IC8 input to go high and adds the frequency increment.

Figure 5

Table 2

Frequency Increment		Code
6.25kHz Ref.	5kHz Ref.	
128.0	102.4	N9
64.0	51.2	N8
32.0	25.6	N7
16.0	12.8	N6
8.0	6.4	N5
4.0	3.2	N4
2.0	1.6	N3
1.0	0.8	N2
0.5	0.4	N1
0.25	0.2	N0
0.2	0.16	A5
0.1	0.08	A4
0.05	0.04	A3
0.025	0.02	A2
0.0125	0.01	A1
0.00625	0.005	A0



When a pad is solder bridged, its corresponding N or A value is subtracted from the maximum frequency count.

When a pad is left open, the corresponding value is incremented from zero.

Examples 1 and 2 in Section 5.4.4.2 (b) show a simple method of calculating the correct diode programme.

Once the correct diode programme has been calculated, remove the diode matrix board from the T535 and solder the pads as required.

Figure 5 shows where to solder the diode programming pads and Table 2 shows the matrix board with one channel. The other channel is identical and is on the other side of the board.

When programming is complete, replace the diode matrix board in the T535.

5.5 VCO ALIGNMENT

5.5.1 GENERAL

Connect the T535 to the RF power meter.

Ensure that a correctly programmed diode matrix PCB is fitted.

Connect 13.8 volts with the correct polarity.

Monitor the loop voltage (centre pin of TP2) with a high impedance voltmeter (0-10 volt range).

5.5.2 SINGLE CHANNEL OPERATION

1. Receive mode:
 - Adjust CV292 for 4 volts at TP2.
 - Check the frequency at TP3.
2. Transmit mode (PTT switch closed):
 - Adjust CV291 for 4 volts at TP2.
 - Check the frequency at TP3.
3. Repeat steps 1 and 2 above until the voltage is stable at 4 volts for both transmit and receive.

5.5.3 DUAL CHANNEL OPERATION

1. Receive mode:
 - Adjust CV292 so that when switching between channel 1 and channel 2, the loop voltages are symmetrically placed around 4 volts, but within the limits of 1.75 and 6.5 volts.
2. Transmit mode (PTT switch closed):
 - Adjust CV291 so that when switching between channel 1 and channel 2 the loop voltages are symmetrically placed around 4 volts, but within the limits of 1.75 and 6.5 volts.

Note: A loop voltage of less than 0.5V or more than 7.5V indicates the VCO is out of lock.

5.6 REFERENCE FREQUENCY ADJUSTMENT

The 6.25kHz (5kHz) reference frequency must be accurately set. This is measured indirectly by monitoring the VCO frequency.

Connect a frequency counter to the VCO output (TP3).

Select channel 1.

Adjust L30 for the correct VCO frequency ($\pm 100\text{Hz}$).

Repeat this measurement for receive and transmit on both channels to verify the diode programming.

5.7 TRANSMITTER ADJUSTMENTS

5.7.1 ALIGNMENT

Note: In this and following Sections, measurements are given which differ for wide band and narrow band sets. In these cases the figures for wide band sets are given first followed by figures for the narrow band versions in square brackets [].

5.7.1.1 Single Channel Alignment

Connect a power meter to the aerial socket.

Set RV260 (power control) fully clockwise (viewed from component side).

Close the PTT switch.

Tune CV273, CV289 and CV290 for maximum power.

Repeat the above tuning.

Set RV260 for 25W output.

Slightly adjust CV290 (in the direction which produces a decrease in current) to set the total current to between 4.0 and 4.5 amps.

Readjust RV260.

5.7.1.2 Dual Channel Alignment

Carry out the single channel alignment procedure on the lowest frequency channel.

Check the RF power output on the highest frequency channel and, if necessary, increase it to approximately 25W by slightly adjusting the capacitance of CV289.

Check that the power output on the lowest frequency channel has not dropped significantly.

Check that the total current does not exceed 4.5 amps on either channel.

Note: Some variation in power output can be expected as channel separation extends towards 6MHz.

5.7.2 MODULATION ADJUSTMENT

Connect the T535 antenna output through a 50dB RF power attenuator (see Section 5.4.1, item 15) to a modulation meter.

Short circuit C49 to disable the ALC circuitry (link the pads of TP-1).

Connect the microphone to the tone box (see Section 5.4.1, item 11) or connect the audio oscillator to the microphone pads on the PCB.

T535 Servicing

Apply a 1kHz sine wave to give -30dBm (25mV rms) at the microphone pads.

Set the channel switch to the lowest frequency channel.

Set the modulation meter to read '-' deviation.

Close the PTT switch and adjust RV79 for approximately -5kHz [-2.5kHz] deviation.

Reduce the audio input to obtain -3kHz [-1.5kHz] deviation, and then increase it by 20dB.

Sweep the audio frequency 300Hz to 3kHz and find the frequency of maximum '-' deviation.

Set RV79 to give -5kHz [-2.5kHz] deviation at this frequency.

Set the modulation meter to read '+' deviation.

Sweep the audio signal 300Hz to 3kHz and readjust RV79 if a peak exceeding +5kHz [+2.5kHz] is found.

Set the channel switch for the other channel and check that ± 5 kHz [± 2.5 kHz] deviation is not exceeded for any modulation frequency.

Remove the short from C49 (i.e. remove the link between the pads of TP-1).

5.8 RECEIVER ALIGNMENT

Connect a signal generator modulated to ± 5 kHz [± 2.5 kHz] at 1kHz AF.

Connect a sinad meter across the speaker terminals.

Select the lowest frequency channel.

Increase the signal generator output until 12dB sinad is reached.

Tune L19, L15, L13, L12 and L10 for best sinad while reducing the signal generator output level to maintain approximately 12dB sinad.

Note: The signal generator frequency must be accurately set when tuning L19.

Repeat the above tuning.

Reduce the signal generator deviation to ± 3 kHz [± 1.5 kHz].

Check that the signal generator output does not exceed -119dBm for a 12dB sinad.

For dual channel operation, readjust L10, L12 and L13 for equal sensitivity on both channels.

Note: Sensitivity will degrade towards -117dBm (worst case) as the channel separation extends to 4MHz.

5.9 FAULT FINDING

5.9.1 GENERAL

During servicing it may be necessary to measure specific performance parameters as a means of verifying the presence of a fault condition.

The following performance tests provide a means for checking the various two way radio parameters.

To assist circuit tracing, all plugs and connections are shown on the outer edge of the Wiring Diagram, where the 'Function' is shown.

5.9.2 RECEIVER PERFORMANCE TESTS

Carry out the following checks only after the alignment has been completed.

5.9.2.1 Squelch

(a) TO CHECK THE SQUELCH OPERATION

Connect a sinad meter across the speaker terminals.

Connect a VHF signal generator to the aerial input terminal.

Set the signal generator output level to zero and the modulation to $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] deviation at 1kHz.

Adjust the front panel squelch control until the noise just disappears.

Slowly increase the signal generator output level until the squelch gate 'opens'; this should be at about 6 to 8dB sinad.

(b) TO CHECK THE SQUELCH RATIO

Set the signal generator output level to -47dBm (20mV), modulated to $\pm 5\text{kHz}$ [$\pm 2.5\text{kHz}$] deviation at 1kHz.

Replace the sinad meter with a mV/meter across the speaker terminals.

Turn the squelch control fully anticlockwise.

Adjust the volume control to give a reading of 3 volts on the mV/meter.

Reduce the signal generator output level to -127dBm .

The fall in output is the 'squelch ratio' and this should be at least 70dB.

5.9.2.2 To Check The Audio Output Level

Connect an AC mV/meter and an oscilloscope across the speaker terminals.

Connect a VHF signal generator to the aerial input socket, with the output set to -107dBm (1 μV) modulated to $\pm 5\text{kHz}$ [$\pm 2.5\text{kHz}$] deviation at 1kHz.

Set the volume control to the onset of clipping.

The receiver output should be 4 volts across 8 ohms at +13.8V supply.

Check the distortion with the aid of a distortion analyzer connected across the speaker terminals.

The distortion should not exceed 5%.

5.9.2.3 To Check The Sinad Sensitivity

Connect a sinad meter across the speaker terminals.

Connect the signal generator to the aerial input terminal.

Set the signal generator accurately on the receive frequency.

Couple a 10.7MHz (second harmonic) reference oscillator loosely into the receiver IF stage, tune the signal generator for a zero beat, then uncouple the reference oscillator.

Set the signal generator deviation to $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] at 1kHz.

Note: It is important that the modulating frequency matches the notch of the sinad meter.

Set the signal generator output level to zero.

Increase the signal generator output level until a sinad of 12dB is reached.

The signal generator output should not be greater than -119dBm and is typically -121dBm for single channel use or two channels separated by less than 1MHz. As the channel separation extends towards 4MHz, the sinad sensitivity will degrade towards -117dBm.

5.9.2.4 To Check The Signal+Noise to Noise Ratio

Set up the signal generator and mV/meter as in Section 5.9.2.1 (b).

Set the squelch control fully clockwise.

Set the volume control for a reading of 0dB on a convenient scale on the mV/meter.

Switch the signal generator modulation off.

Note the reading on the mV/meter.

The fall in reading when the modulation is switched off should be at least 35dB [32dB] for single channel use or two channels separated by less than 1MHz. As the channel separation extends towards 4MHz, the signal + noise to noise ratio will degrade towards 32dB [29dB].

5.9.2.5 To Check The Ultimate Signal To Noise Ratio

Note: A good quality low noise RF signal generator should be used for this check (eg, HP8640B or 8656).

Set the signal generator to give an 'on channel' signal, modulated to $\pm 5\text{kHz}$ [$\pm 2.5\text{kHz}$] with a 1kHz tone.

Set the signal generator output level to -47dBm.

Connect an AC mV/meter across the speaker terminals.

Adjust the volume control for a reading of 0.8V (0'dBm) on a convenient scale.

Turn the signal generator modulation off.

Note the reading on the mV/meter.

The fall in reading when the modulation is switched off should be at least 45dB. (A low reading could be caused by a faulty IC6 or a noisy VCO.)

5.9.3 TRANSMITTER PERFORMANCE TESTS

5.9.3.1 Audio Processor

(a) TO CHECK THE LIMITER CIRCUIT

Connect an oscilloscope to monitor the waveform at pin 14 of IC2.

Provide an audio signal to the audio processor as in Section 5.7.2.

Set the frequency of the audio signal generator to 1kHz.

Slowly increase the signal generator output level until the waveform begins to distort (squaring), indicating that limiting has commenced.

Any further increase in signal generator output level should not increase the amplitude of the waveform.

(b) TO CHECK THE AUDIO ALC OPERATION

Set up the audio signal as described above (Section 5.7.2).

Set the oscilloscope to monitor the waveform at pin 1 of IC2.

Connect an EVM to the junction of C49/R52.

Increase the output level of the signal generator to 10dB above the limiting level [Section 5.9.3.1(a)]. Note the amplitude on the oscilloscope, then increase the signal generator output level by another 10dB.

Check that the amplitude of the waveform does not increase or distort significantly.

The EVM should show a 'positive DC' reading.

(c) TO CHECK THE GAIN OF THE AUDIO PROCESSOR

Provide an audio signal to the audio processor as in Section 5.7.2.

Connect the T535 antenna output through a 50dB RF power attenuator (see Section 5.4.1, item 15) to a modulation meter.

T535 Servicing

Connect a mV/meter across the microphone terminals on the PCB. (To monitor the input to the audio processor.)

Set the frequency of the audio signal generator to 1kHz.

Check the deviation control, RV79, as in Section 5.7.2.

Slowly increase the output level of the audio signal generator until a deviation of $\pm 3\text{kHz}$ [$\pm 1.5\text{kHz}$] is reached.

Check that the mV/meter reads approximately 6mV rms.

Note: The audio processor gain must be checked at a level below that at which the audio ALC or limiting are influencing the measurements.

5.9.3.2 Modulation Characteristics

(a) TO CHECK THE ABOVE LIMITING RESPONSE

Connect the T535 aerial output via a 50dB RF power attenuator to a modulation meter.

Provide an audio signal to the audio processor.

Increase the audio signal generator output level to 20dB above the limiting level [Section 5.9.3.1 (a)].

Vary the frequency of the signal generator between 0.3 and 10kHz

Note the deviation on the modulation meter.

Between the specified bandwidth for the version of T535 the deviation should be within 4dB of maximum.

Above 3kHz the deviation should decrease in excess of 25dB/octave.

(b) TO CHECK THE BELOW LIMITING RESPONSE

Decrease the audio signal generator output level to 10dB below the limiting level [Section 5.9.3.1 (a)].

Vary the frequency of the audio signal generator between 0.3 and 10kHz.

Note the reading on the modulation meter.

Within the specified bandwidth for the version of T535, the deviation should increase at the rate of 6dB/octave (+1, -3dB relative to 1kHz).

Above 3kHz the deviation should decrease in excess of 25dB/octave.

5.9.3.3 To Check The Power Control Circuit

Connect an RF power meter to the transmitter output.

Close the PTT switch.

Ensure that the transmitter is correctly tuned (Section 5.7).

Vary the supply voltage between 10 and 16 volts.

Above 13.8 volts the RF power output should not increase by more than 2 watts.

At 10.8 volts the RF power output should be more than 10 watts.

5.9.3.4 To Check The Transmission Timer

Connect an RF power meter to the transmitter output.

Close the PTT switch.

Check that the T535 reverts to 'receive' after approximately 1.5 minutes (+15, -45 seconds) of transmission time.

The transmission time may be set accurately by changing the value of either C16 (100 μ F) and/or R17 (1M).

To increase the transmission time increase the value of resistance or capacitance as required.

5.9.3.5 To Check The VCO Control Range

Plug a frequency counter onto the VCO test plug (TP3).

Short the middle pin on TP2 alternately to each of the outer pins of TP2.

The frequency shift should be more than 6MHz on transmit and more than 4MHz on receive.

5.9.4 SYNTHESISER FAULT FINDING

5.9.4.1 If The VCO Gives No Output

Check the supply voltages at R290 (6.5V) and L93 (8V) for the Rx VCO and at R291 (6.5V) and L94 (8V) for the Tx VCO.

Remove the VCO box and check for shorts inside.

Check the gate and source voltages as per the Circuit Diagram.

5.9.4.2 If The Synthesiser Does Not Lock Up

Check the VCO control range following the instructions in Section 5.9.3.5.

If the control range is low, check the circuit for faults between TP2 and the varicaps. The voltage on the varicaps must be the same as the loop voltage.

Tune the VCO until its programmed frequency is within the switching range.

If the loop voltage is still either less than 0.6V or more than 7.5V, check pin 7 and pin 8 of the synthesiser (IC 8):

(Under normal operating conditions the loop voltage is between 1.75 and 6.5V and both pin 7 and pin 8 are high, except for very narrow pulses [100ns] at the same rate as the reference frequency.)

- (a) If pin 7 pulses low and the loop voltage is low (TP2), or if pin 8 pulses low and the loop voltage is high, check the circuitry between R176/D32 and TP2. The voltage at C176 (use a 10M ohm probe) and TP2 should differ by no more than 200mV. If not, check the behaviour of the buffer amplifier (Q29, Q30).
- (b) If both stay high and the loop voltage is high, check the crystal oscillator.

Measure the VCO frequency.

Measure the prescaler output frequency (pin 3).

Check that $f_{\text{prescaler}} = f_{\text{VCO}}/40$

Note: The prescaler should not be loaded with 50 ohms - a 1M ohm input counter must be used.

Check that the input voltage of the synthesiser (pin 1) is more than 500mV pp around half-rail voltage.

5.9.4.3 To Check The VCO Output Frequency Stability

If the synthesiser locks up but does not reach a stable VCO output frequency, or if the VCO output frequency is a few channels off frequency:

- (a) Check that the input power to the prescaler from the VCO is not too low.
Check the VCO output power and the circuitry between the VCO and the prescaler.
- (b) Check that the modulus control pulse (pin 1 of the prescaler) is more than 4.0V.

5.9.4.4 To Check The Transmitter Switch-On

If the synthesiser locks up but there is no transmitter power:

- (a) Check that, if the synthesiser is locked, the lock detect output (IC8, pin 28) is high.
(This output pulses low if the synthesiser is out of lock.)
- (b) Check that the voltages around Q25 and Q41 are as shown in the Circuit Diagram.

5.9.4.5 Microphonics

If the set shows a high level of microphonics:

- (a) Check that all components inside the VCO box are flush mounted to the PCB, paying special attention to the trimmer capacitors. (Resoldering may be attempted, but a solvent cleaner must never be used inside the VCO box.)
- (b) Check the sensitivity of the VCO coils L87 and L89.
- (c) Remove any excess solder where the VCO box touches the PCB.
- (d) Ensure that all screws are securely tightened.

SECTION 6 PARTS LIST

INTRODUCTION

The 10 digit numbers (000-00000-00) in this Parts List are "internal part numbers" (IPN's). Your spare parts orders can be handled more efficiently if you quote: equipment type, circuit reference and IPN, along with a brief description of the part.

The components listed in this Parts List are divided into two main types: those with a circuit reference (e.g. C2, D6, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped firstly by PCB, then by component type in numerical order. Each component entry comprises four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this particular component is fitted only to that variant (note that some components are not fitted to all variants; refer to the tables in the Circuit Diagrams).

The miscellaneous and mechanical section lists common and variant parts in IPN order.

INDEX

T535 Main PCB	6.3
Main PCB Miscellaneous & Mechanical Parts	
Variant Parts	6.8
Common Parts	6.11
T500 Combined Diode Matrix/LED/Xtal Heater PCB	6.12
T500 LED PCB	6.13
T500-22 Diode Matrix PCB	6.13

T535 MAIN BOARD PARTS LIST

REF	VAR	IPN	DESCRIPTION
RC245		036-10000-00	RESISTOR M/F 0805 CHIP ZERO OHM
RC246		036-10000-00	RESISTOR M/F 0805 CHIP ZERO OHM
RC248		036-14330-00	RESISTOR M/F 0805 CHIP 3K3 5%
R249		030-53270-20	RESISTOR FILM AUTOINSERT 270E 5% 0.4W 4X1.6MM
R250		030-53560-20	RESISTOR FILM AUTOINSERT 560E 5% 0.4W 4X1.6MM
R251		030-51820-20	RESISTOR FILM AUTOINSERT 8E2 5% 0.4W 4X1.6MM
R252		030-53560-20	RESISTOR FILM AUTOINSERT 560E 5% 0.4W 4X1.6MM
R253		030-54120-20	RESISTOR FILM AUTOINSERT 1K2 5% 0.4W 4X1.6MM
R254		030-54470-20	RESISTOR FILM AUTOINSERT 4K7 5% 0.4W 4X1.6MM
R255		030-54220-20	RESISTOR FILM AUTOINSERT 2K2 5% 0.4W 4X1.6MM
R256		030-52330-20	RESISTOR FILM AUTOINSERT 33E 5% 0.4W 4X1.6MM
R257		030-52470-20	RESISTOR FILM AUTOINSERT 47E 5% 0.4W 4X1.6MM
R258		030-54100-20	RESISTOR FILM AUTOINSERT 1K 5% 0.4W 4X1.6MM
R259		030-54120-20	RESISTOR FILM AUTOINSERT 1K2 5% 0.4W 4X1.6MM
RV260		042-04220-01	RESISTOR PRESET 2K2 CARBON 10MM FLAT
R261		030-54220-20	RESISTOR FILM AUTOINSERT 2K2 5% 0.4W 4X1.6MM
R262		030-53680-20	RESISTOR FILM AUTOINSERT 680E 5% 0.4W 4X1.6MM
R263		030-53680-20	RESISTOR FILM AUTOINSERT 680E 5% 0.4W 4X1.6MM
R264		030-54100-20	RESISTOR FILM AUTOINSERT 1K 5% 0.4W 4X1.6MM
R265		030-53220-20	RESISTOR FILM AUTOINSERT 220E 5% 0.4W 4X1.6MM
R266		030-53220-20	RESISTOR FILM AUTOINSERT 220E 5% 0.4W 4X1.6MM
R267		030-52220-20	RESISTOR FILM AUTOINSERT 22E 5% 0.4W 4X1.6MM
R269		032-33180-00	RESISTOR M/F POWER 180E 5% 1W 12X4.5MM
R270		032-32100-00	RESISTOR M/F POWER 10E 5% 1W 10X4MM
R271		032-32100-00	RESISTOR M/F POWER 10E 5% 1W 10X4MM
R272		030-55220-20	RESISTOR FILM AUTOINSERT 22K 5% 0.4W 4X1.6MM
R273		030-54470-20	RESISTOR FILM AUTOINSERT 4K7 5% 0.4W 4X1.6MM
R274		030-55220-20	RESISTOR FILM AUTOINSERT 22K 5% 0.4W 4X1.6MM
R275		030-55150-20	RESISTOR FILM AUTOINSERT 15K 5% 0.4W 4X1.6MM
R276		030-54100-20	RESISTOR FILM AUTOINSERT 1K 5% 0.4W 4X1.6MM
R277		030-54560-20	RESISTOR FILM AUTOINSERT 5K6 5% 0.4W 4X1.6MM
R278		030-54560-20	RESISTOR FILM AUTOINSERT 5K6 5% 0.4W 4X1.6MM
R279		030-54560-20	RESISTOR FILM AUTOINSERT 5K6 5% 0.4W 4X1.6MM
R280		030-57100-20	RESISTOR FILM AUTOINSERT 1M 5% 0.4W 4X1.6MM
R281		030-54560-20	RESISTOR FILM AUTOINSERT 5K6 5% 0.4W 4X1.6MM
RC282		036-13100-00	RESISTOR M/F 0805 CHIP 100E 5%
R283		030-54150-20	RESISTOR FILM AUTOINSERT 1K5 5% 0.4W 4X1.6MM
RC284		036-13100-00	RESISTOR M/F 0805 CHIP 100E 5%
RC285		036-16100-00	RESISTOR M/F 0805 CHIP 100K 5%
R286		030-55220-20	RESISTOR FILM AUTOINSERT 22K 5% 0.4W 4X1.6MM
R287		030-54330-20	RESISTOR FILM AUTOINSERT 3K3 5% 0.4W 4X1.6MM
R288		030-55220-20	RESISTOR FILM AUTOINSERT 22K 5% 0.4W 4X1.6MM
R289		030-54330-20	RESISTOR FILM AUTOINSERT 3K3 5% 0.4W 4X1.6MM
R290		030-53100-20	RESISTOR FILM AUTOINSERT 100E 5% 0.4W 4X1.6MM
R291		030-53100-20	RESISTOR FILM AUTOINSERT 100E 5% 0.4W 4X1.6MM
RC292		036-12470-00	RESISTOR M/F 0805 CHIP 47E 5%
RC293		036-13220-00	RESISTOR M/F 0805 CHIP 220E 5%
RC294		036-12470-00	RESISTOR M/F 0805 CHIP 47E 5%
RC295		036-13220-00	RESISTOR M/F 0805 CHIP 220E 5%
RC296		036-15220-00	RESISTOR M/F 0805 CHIP 22K 5%
RC297		036-15220-00	RESISTOR M/F 0805 CHIP 22K 5%
RC298		036-15220-00	RESISTOR M/F 0805 CHIP 22K 5%
RC299		036-15220-00	RESISTOR M/F 0805 CHIP 22K 5%
RC300		036-12470-00	RESISTOR M/F 0805 CHIP 47E 5%
R301		030-53680-20	RESISTOR FILM AUTOINSERT 680E 5% 0.4W 4X1.6MM
R302		030-53680-20	RESISTOR FILM AUTOINSERT 680E 5% 0.4W 4X1.6MM
RC303		036-12470-00	RESISTOR M/F 0805 CHIP 47E 5%
RC304		036-14100-00	RESISTOR M/F 0805 CHIP 1K 5%
SW1		232-00010-19	SWITCH PUSH DPDT LATCHING PCB MOUNT
SW2		232-00010-20	SWITCH PUSH DPDT MOMENTARY PCB MOUNT
SW3		232-00010-19	SWITCH PUSH DPDT LATCHING PCB MOUNT
SKT4		240-04020-57	SOCKET 10 WAY 1ROW PCB MTG TOP ENTRY
TP2		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
TP3		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
X1		274-00010-02	CRYSTAL 20.945MHZ SPEC TE/15
XF1	20	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	21	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	22	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	23	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	24	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	26	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	30	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	31	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	32	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	33	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	34	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	35	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	36	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	37	276-00010-44	FILTER XTAL ONE PAIR 21.4MHZ 7.5KHZ B/W 4 POLE 21N
XF1	60	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	72	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XF1	90	276-00010-43	FILTER XTAL ONE PAIR 21.4MHZ 15KHZ 2*POLE 21N15B
XL1	20	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	21	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	22	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	23	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	24	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	26	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
XL1	30	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	31	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	32	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9

REF	VAR	IPN	DESCRIPTION
XL1	33	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	34	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	35	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	36	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	37	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9
XL1	72	274-00010-07	CRYSTAL 12.8MHZ SPEC TE/9

FEEDTHRU CAPACITORS

REF	IPN	DESCRIPTION
CFL_1	012-04100-01	CAPACITOR CERAMIC FEEDTHRU 1N LESS LEAD
CFL_2	012-04100-01	CAPACITOR CERAMIC FEEDTHRU 1N LESS LEAD
CFL_3	012-04100-02	CAPACITOR CERAMIC FEEDTHRU 1N 300V LEADED

T535 PARTS LIST MECHANICAL & MISCELLANEOUS

IPN	DESCRIPTION
### VARIANT T535-20 17 TRANSCEIVER FM 136-174MHZ 5KHZ DEV 5K INC RC AUS	
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-21 15 TRANSCEIVER FM 136-174MHZ 2.5KHZ DEV 5K INC RC	
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-22 22 TRANSCEIVER FM 136-174M 5K DEV 5K INC CTCSS RC	
T500-11	CTCSS DECODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES

IPN	DESCRIPTION
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-23 22 TRANSCEIVER FM 136-174M 2.5K DEV 5K INC CTCSS R	
T500-11	CTCSS DECODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-24 15 TRANSCEIVER FM 136-174MHZ 5K DEV 5K INC SC AUS	
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-26 22 TRANSCEIVER FM 136-174M 5K DEV 5K INC CTCSS SC	
T500-11	CTCSS DECODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.

T535 PARTS LIST MECHANICAL & MISCELLANEOUS

IPN	DESCRIPTION
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814

VARIANT T535-30 17 TRANSCEIVER FM 136-174MHZ 5KHZ DEV 6.25K INC RC

240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814

VARIANT T535-31 17 TRANSCEIVER FM 136-174MHZ 2.5KHZ DEV 6.25K INC

240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814

VARIANT T535-32 22 TRANSCEIVER FM 136-174M 5K DEV 6.25K INC CTCSS

T500-11	CTCSS DECODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76

IPN	DESCRIPTION
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814

VARIANT T535-33 22 TRANSCEIVER FM 136-174M 2.5K DEV 6.25 INC CTCSS

T500-11	CTCSS DECODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814

VARIANT T535-34 15 TRANSCEIVER FM 136-174MHZ 5KHZ DEV 6.25KHZ INC

240-00100-10	PLUG COAXIAL BNC CORD MTG CAPTIVE & CLAMPED
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.
316-06376-00	PANEL FRONT COMPLETE NON-METALISED A4M2310 T5X5 S
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK

T535 PARTS LIST MECHANICAL & MISCELLANEOUS

IPN	DESCRIPTION
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-35 17 TRANSCEIVER FM 136-174MHZ 2.5K DEV 6.25K INC SC	
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-36 22 TRANSCEIVER FM 136-174M 5K DEV 6.25 INC CTCSS R	
T500-11	CTCSS DENCODER 2CHAN TX INHIBIT ALERT 500 SERIES
240-00100-13	PLUG COAXIAL BNC CORD MTG CRIMP URM76
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-37 22 TRANSCEIVER FM 136-174 2.5K D 6.25INC SC CTCSS	
T500-01	CTCSS 2 CHANNEL 500 SERIES
240-00100-35	PLUG COAXIAL UHF CORD MTG
240-02100-35	SOCKET COAXIAL UHF PANEL MOUNTING OPEN TERMINATIO
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5

IPN	DESCRIPTION
303-20044-00	COVER BTTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### VARIANT T535-60 22 TRANSCEIVER FM 136-174M 5K DEV 5K INC X-HTR CMC	
240-00100-35	PLUG COAXIAL UHF CORD MTG
240-02100-35	SOCKET COAXIAL UHF PANEL MOUNTING OPEN TERMINATIO
252-00010-23	MICROPHONE 600 OHM CMC LABEL LOW TEMP CURLY COR
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30043-00	CLIP A3M1656 PLASTIC CRADLE T500
303-30044-00	CLAMP A3M1657 PLASTIC CRADLE LOCK T500 put in poly packaging with kit and cradle assembly.
303-30046-00	CRADLE A3M1887 BRACKET SHORT T500 place in poly packaging with packed set.
316-06323-00	PANEL FT COMPLETE MARCONI T500 NON METAL A4M2309
357-00010-09	FIX PUSH ON SFP 3253
410-00010-34	SLEEVE CARD BLANK 500 SERIES A4M1814
### VARIANT T535-72 15 TRANSCEIVER FM 136-174M 5K DEV 6.25K INC RUGGED	
240-00100-10	PLUG COAXIAL BNC CORD MTG CAPTIVE & CLAMPED
240-02100-11	SOCKET COAXIAL BNC 3.5MM BULKHEAD LESS EARTH TA
252-00010-12	MICROPHONE 600 OHM WITH HANGER CONNECTION FOSTE
303-20041-00	COVER TOP A1M2375 TEXTURED NON METALISED T5X5
303-20043-00	COVER BOTTOM A1M2376 TEXTURED NON METALISED T5X5
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06329-00	PANEL FT COMPLETE INTRON-102 T500 NONMETAL A4M2308
316-85094-00	PLATE A4M2160 BNC MTG UK 5X5 SERIES
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
365-00012-36	LABEL INTRON T500 MIC A4A440
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-34	SLEEVE CARD BLANK 500 SERIES A4M1814
### VARIANT T535-80 22 TRANSCEIVER FM 136-174M 5K DEV 5K INC XHTR RC U	
240-00100-35	PLUG COAXIAL UHF CORD MTG
240-02100-35	SOCKET COAXIAL UHF PANEL MOUNTING OPEN TERMINATIO
252-00010-24	MICROPHONE 600 OHM TAIT LABEL LOW TEMP CURLY COR

T535 PARTS LIST MECHANICAL & MISCELLANEOUS

IPN	DESCRIPTION
303-20042-00	COVER TOP COMPLETE A1M2375 TEXTURED METALISED 5X5
303-20044-00	COVER BTM COMPLETE A1M2376 TEXTURED METALISED 5X
303-30047-00	CRADLE A2M1920 A3M1955 RUGGED ASSEMBLY T500
303-30049-00	CLIP A2M1922 RUGGED CRADLE T500
303-30052-00	KEY A4M1925 RUGGED CRADLE T500
316-06359-00	PANEL FRONT MTLSD COMPLETE SERIES 2 A4M2295 T5X
319-01097-00	SHIELD A2M1589 FRONT 505 SERIES
319-01151-00	SHIELD A3M2236 SOLDER SIDE T535
319-01155-00	SHIELD A3M2304 LID TOP T535
319-01156-00	SHIELD A3M2303 WALL T535
357-00010-09	FIX PUSH ON SFP 3253
359-00010-37	RIVET 3*5MM FLAT HD ST TINMENS NO 7
409-50000-00	HANDBOOK 500 SERIES OPERATORS HANDBOOK
410-00010-37	SLEEVE CARD 500 SERIES A1A361 A4M1814
### COMMON PARTS	
051-00006-03	LEAD FEEDTHRU 0.7MM TCW A4M2230
205-00010-06	CABLE TWIN AUTO 153 2/28/0.3 RED & BLAC
220-01111-01	PRINTED CIRCUIT BOARD T535
240-00010-60	PLUG HOUSING 4 WAY MOLEX
240-00010-61	PLUG TERMINAL MALE SOLDER TAG MOLEX
240-02010-60	SOCKET HOUSING 4 WAY MOLEX
240-02010-61	SOCKET RECEPTACLE 152 AUTO CRIMP MOLEX
240-02010-62	SOCKET RECEPTACLE 70.2 WIRE CRIMP MOLEX
240-04020-72	SOCKET HOUSING 2 WAY CORD MTG ULTREX
240-04020-74	SOCKET HOUSING 4 WAY CORD MTG ULTREX
240-04020-76	SOCKET RECEPTACLES WIRE CRIMP FOR ULTREX HOUSING
250-00010-14	SPEAKER 8 OHM 92MM SQ A3M1799
252-00010-02	CLIP MICROPHONE MTG
265-00010-17	FUSE 10A CARTRIDGE 6*32MM 32V NON SPEC
302-40042-00	BUTTON A3M1585 PUSH MOULDED PLASTIC T500
302-45035-00	BOSS A4M2148 THREADED M5 OD M3 ID 5X5 SERIES heatsink-bottom of PA
303-50071-00	CLIP A4M2008 FEEDTHRU MTG 5*5 SERIES
306-01041-00	CLIP - PLASTIC WIRE HARNESS
308-13065-00	HEATSINK A4M1816 DRIVER T530/535
308-13071-00	HEATSINK A1M1931 DIECAST 500 SERIES solder to Trans. MRF237
311-01033-00	KNOB COMPLETE WITH DOT A4M1831 T500 SERIES
312-01014-00	LID A2M1932 DIECAST PA SOLDER SIDE 5X5 SERIES
312-01015-00	LID A2M1933 DIECAST PA COMPONENT SIDE 5X5 SERIES
312-01035-00	LENS COMPLETE A4M1586 A4A630 T500 SERIES
319-01109-00	SHIELD A2M1655 VCO LID 500/5X5 SERIES VCO bottom
319-01110-00	SHROUD A4M1587 INDICATOR 500/5X5 SERIES
319-01132-00	SHIELD A4M1951 POWER SKT 5X5 SERIES
319-01149-00	SHIELD BOX A1M2229 VCO T5X5 SERIES VCO top
340-00010-10	FUSEHOLDER INLINE BOOK HOUSING
340-00010-11	TERMINAL CRIMP BOOK FUSEHOLDER

IPN	DESCRIPTION
345-00040-08	SCREW M3*12MM PAN POZI ST BZ IC4
349-00010-25	SCREW NO.4*3/8 PAN SUPA POLYMATE
349-00010-49	SCREW SELFTAP NO 10X1/2 IN TYPE AB PAN POZI BZ
349-00020-31	SCREW TAPTITE M3X10MM PAN POZI BZ
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ
353-00010-11	WASHER M3 FLAT ST BZ 9.5MM OD A4M1216 IC4 BZ O.D 9.5
353-00010-32	WASHER M5 SHAKEPROOF EXT BZ
356-00010-01	TAG SOLDER 3MM SHORT M6132/3.2 from IC4 to C2 black wire.
356-00010-01	TAG SOLDER 3MM SHORT M6132/3.2 screw to component side P.A. cover and solder to power
362-00010-08	GASKET SILICONE INSULATING TO-5 TO-39 Q44 under 2N4427
365-00011-54	LABEL WHITE QUIKSTIK RW1556/2
365-00013-47	LABEL T5X5 SERIES SCREW DETAILS A4A603
365-00100-04	LABEL BLANK 30X6.7MM S/A METALLISED POLYESTER serial no. label for side of heatsink.
365-00100-10	BARCODE LABEL & LAMINATE 2 PARTS 3/8 WIDE
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4 L69 x 40mm L67a & L67b x 40mm.
369-00010-12	FOOT FURNITURE RUBBER BLACK on coil 633 in VCO
369-00010-27	TIE CABLE NYLON 140*2.6MM
369-01028-00	BUMPER RUBBER A4M2509
369-01029-00	PAD RUBBER A4M2510
399-00010-51	BAG PLASTIC 75*100MM
399-00010-56	BAG PLASTIC 200*250MM
409-50001-00	INSTALLATION GUIDE T500 SERIES 2
410-00010-50	PACKAGING POLY FOAM 2 PCS 5*5 SERIES A1M2027
410-00010-55	PACKAGING CARTON 10 T500 RADIOS UEB 31561

T500 PARTS LIST COMBINED DIODE MATRIX/LED/XTAL HEATER PCB

REF	VAR	IPN	DESCRIPTION
C300	20	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	21	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	22	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	23	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	24	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	26	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	60	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	90	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
D1-D64		001-50012-05	DIODE AUTO INSERT 1N4531 SI SMALL SIG
D302		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D303		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D304		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D305		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
PL4		240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
SKT3		240-04020-60	SOCKET 18 WAY 1ROW PCB MTG TOP ENTRY
SKT7		240-04020-69	SOCKET 3WAY 1ROW PCB MTG GOLD PLATE SKTS TOP ENTRY
		220-01198-01	PCB COMBINED T500 DIODE MATRIX AND L

PARTS TO BE ADDED FOR XTAL HEATER OPTION

REF	IPN	DESCRIPTION
D300	001-50012-05	DIODE AUTO INSERT 1N4531 SI SMALL SIG
D301	001-50012-05	DIODE AUTO INSERT 1N4531 SI SMALL SIG
D306	001-50015-09	DIODE ZENER AUTOINSERT 3V9 0.4W BZX79/C3V9
Q300	000-50011-10	TRANSISTOR AUTO INSERT BC547B NPN TO-92 AF S/SIG
Q301	000-00011-70	TRANSISTOR BD136 PNP TO-126 AF POWER
R300	030-55270-20	RESISTOR FILM AUTOINSERT 27K 5% 0.4W 4X1.6MM
R301	045-04470-01	RESISTOR NTC 4K7 20% 5MM DISC
R302	030-55150-20	RESISTOR FILM AUTOINSERT 15K 5% 0.4W 4X1.6MM
R303	030-53560-20	RESISTOR FILM AUTOINSERT 560E 5% 0.4W 4X1.6MM
R304	030-51220-20	RESISTOR FILM AUTOINSERT 2E2 5% 0.4W 4X1.6MM
R305	030-51220-20	RESISTOR FILM AUTOINSERT 2E2 5% 0.4W 4X1.6MM
X300	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
X300	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
	303-50063-00	CLIP A4M1648 TRANSISTOR HEAT TRANSFER T500-20

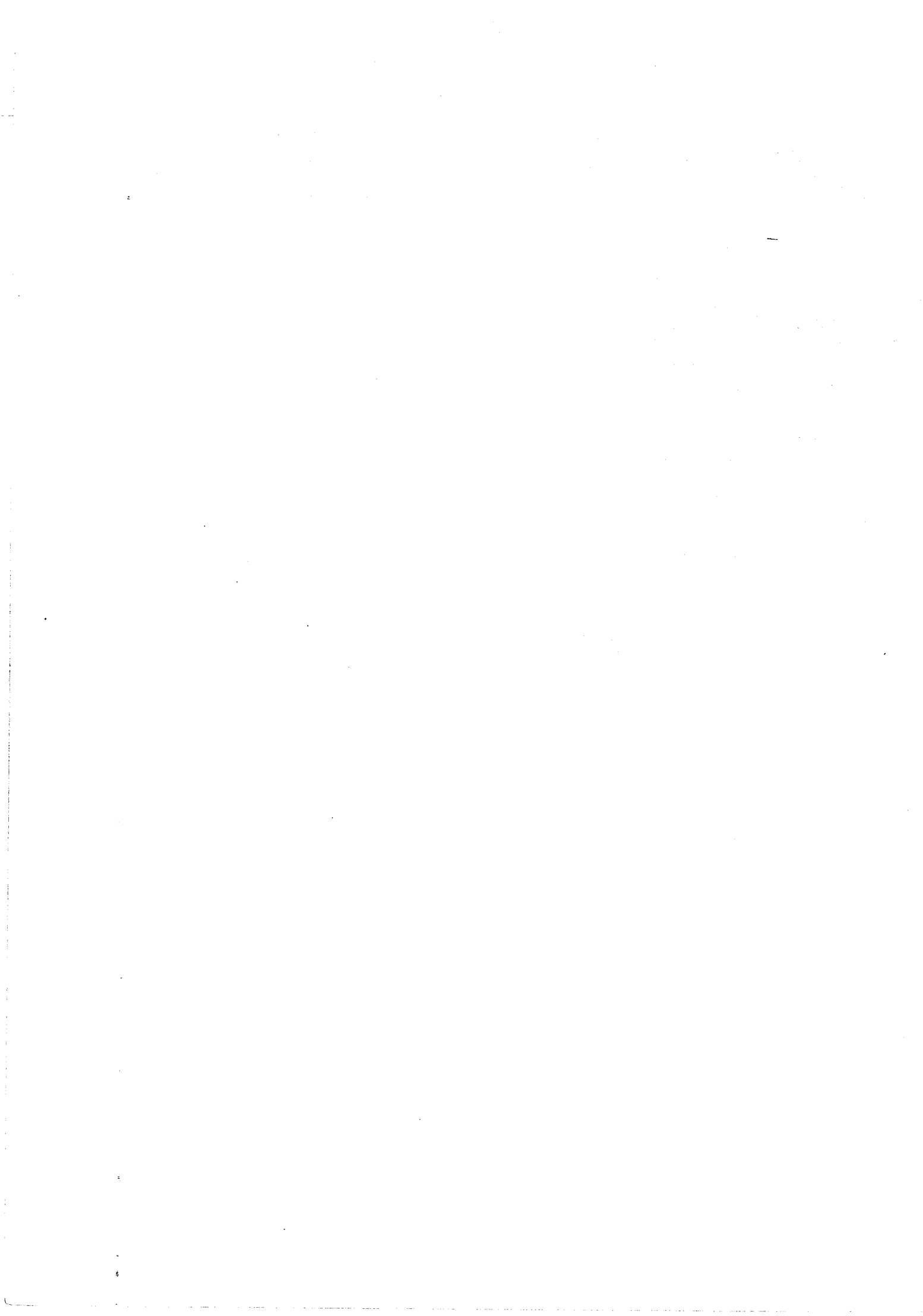
T500 LED & T500-22 DIODE MATRIX PARTS LISTS

T500 LED PCB

REF	VAR	IPN	DESCRIPTION
C300	20	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	21	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	22	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	23	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	24	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	26	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	60	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
C300	90	011-01100-02	CAPACITOR CERAMIC 1PO +/-0.25P P100 50V 5MM L/S
D300	60	001-00012-00	DIODE 1N4148 SILICON SMALL SIGNAL GENERAL PURPOSE
D300	90	001-00012-00	DIODE 1N4148 SILICON SMALL SIGNAL GENERAL PURPOSE
D301	60	001-00012-00	DIODE 1N4148 SILICON SMALL SIGNAL GENERAL PURPOSE
D301	90	001-00012-00	DIODE 1N4148 SILICON SMALL SIGNAL GENERAL PURPOSE
D302		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D303		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D304		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D305		008-00010-11	LED 3MM RED HLMP1385 DIFFUSED 2.2V 10MCD LESS MTG
D306	60	001-00015-09	DIODE ZENER 3V9 0.4W BZX79/C3V9
D306	90	001-00015-09	DIODE ZENER 3V9 0.4W BZX79/C3V9
Q300	60	000-00011-10	TRANSISTOR BC548B NPN TO-92 AF SMALL SIG
Q300	90	000-00011-10	TRANSISTOR BC548B NPN TO-92 AF SMALL SIG
Q301	60	000-00011-70	TRANSISTOR BD136 PNP TO-126 AF POWER
Q301	90	000-00011-70	TRANSISTOR BD136 PNP TO-126 AF POWER
R300	60	030-05270-00	RESISTOR FILM 27K 5% 0.25W 7X2.5MM
R300	90	030-05270-00	RESISTOR FILM 27K 5% 0.25W 7X2.5MM
R301	60	045-04470-01	RESISTOR NTC 4K7 20% 5MM DISC
R301	90	045-04470-01	RESISTOR NTC 4K7 20% 5MM DISC
R302	60	030-05150-00	RESISTOR FILM 15K 5% 0.25W 7X2.5MM
R302	90	030-05150-00	RESISTOR FILM 15K 5% 0.25W 7X2.5MM
R303	60	030-03560-20	RESISTOR FILM 560E 5% 0.4W 4X1.6MM
R303	90	030-03560-20	RESISTOR FILM 560E 5% 0.4W 4X1.6MM
R304	60	030-01100-00	RESISTOR FILM 1E 5% 0.25W 7X2.5MM
R304	90	030-01100-00	RESISTOR FILM 1E 5% 0.25W 7X2.5MM
SKT1		240-04020-69	SOCKET 3WAY 1ROW PCB MTG GOLD PLATE SKTS TOP ENTR
SKT2		240-04020-61	SOCKET 7 WAY 1 ROW PCB MTG TOP ENTRY
X300	60	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
X300	90	274-00010-08	CRYSTAL 10.24MHZ SPEC TE/9
		225-01136-00	PRINTED CIRCUIT BOARD T500 SERIES LED & XTG
	60	303-50063-00	CLIP A4M1648 TRANSISTOR HEAT TRANSFER T500-24
	90	303-50063-00	CLIP A4M1648 TRANSISTOR HEAT TRANSFER T500-24

T500-22 DIODE MATRIX PCB

REF	IPN	DESCRIPTION
D1 - D32	001-10000-70	DIODE SMD BAV70 DUAL SWITCH SOT-23 COMMON CATHODE
PL1	240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
SK1	240-04020-57	SOCKET 10 WAY 1ROW PCB MTG T ENTRY
	225-01171-00	PRINTED CIRCUIT BOARD T



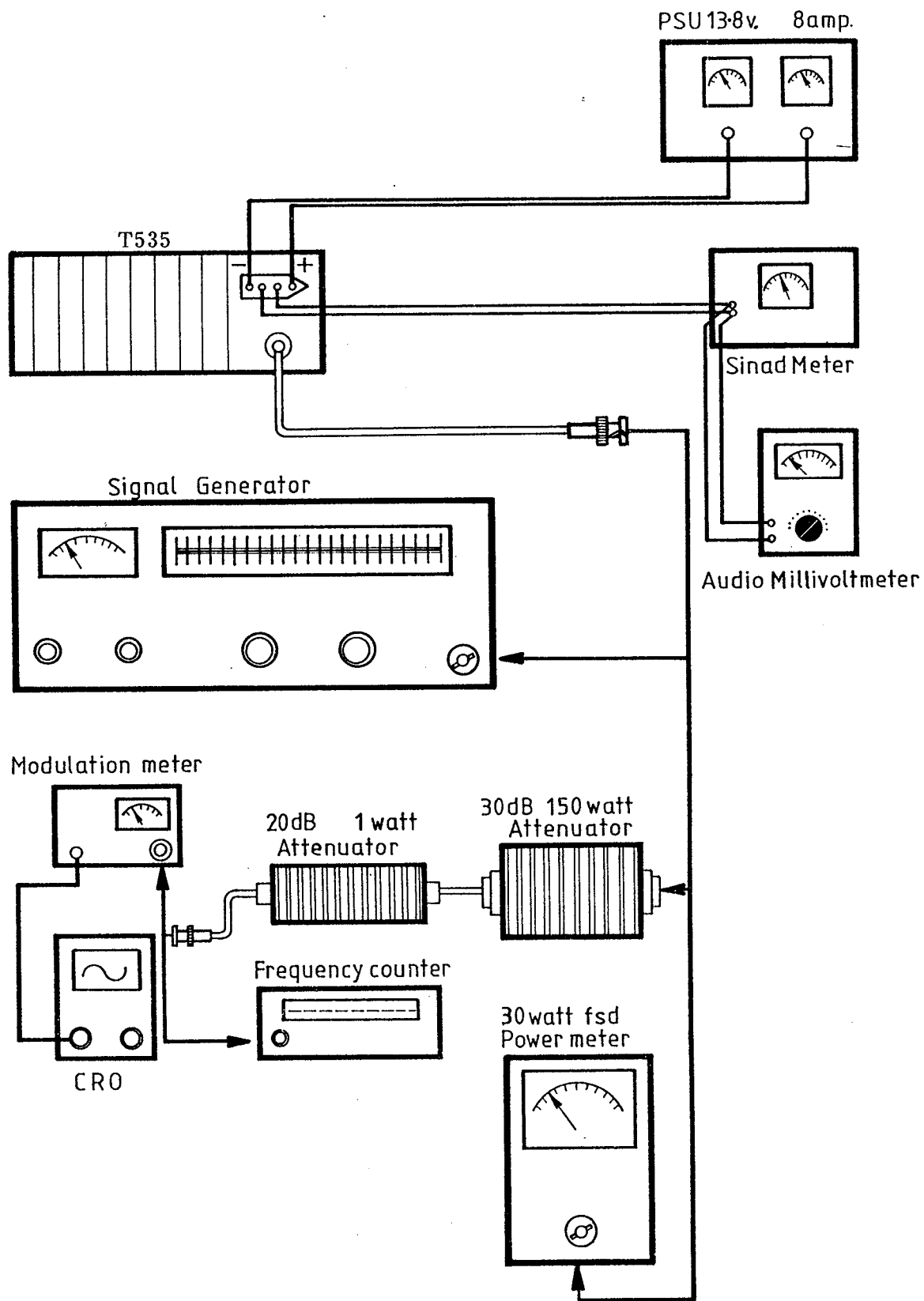


Diagram 1 Suggested Test Equipment Set-Up



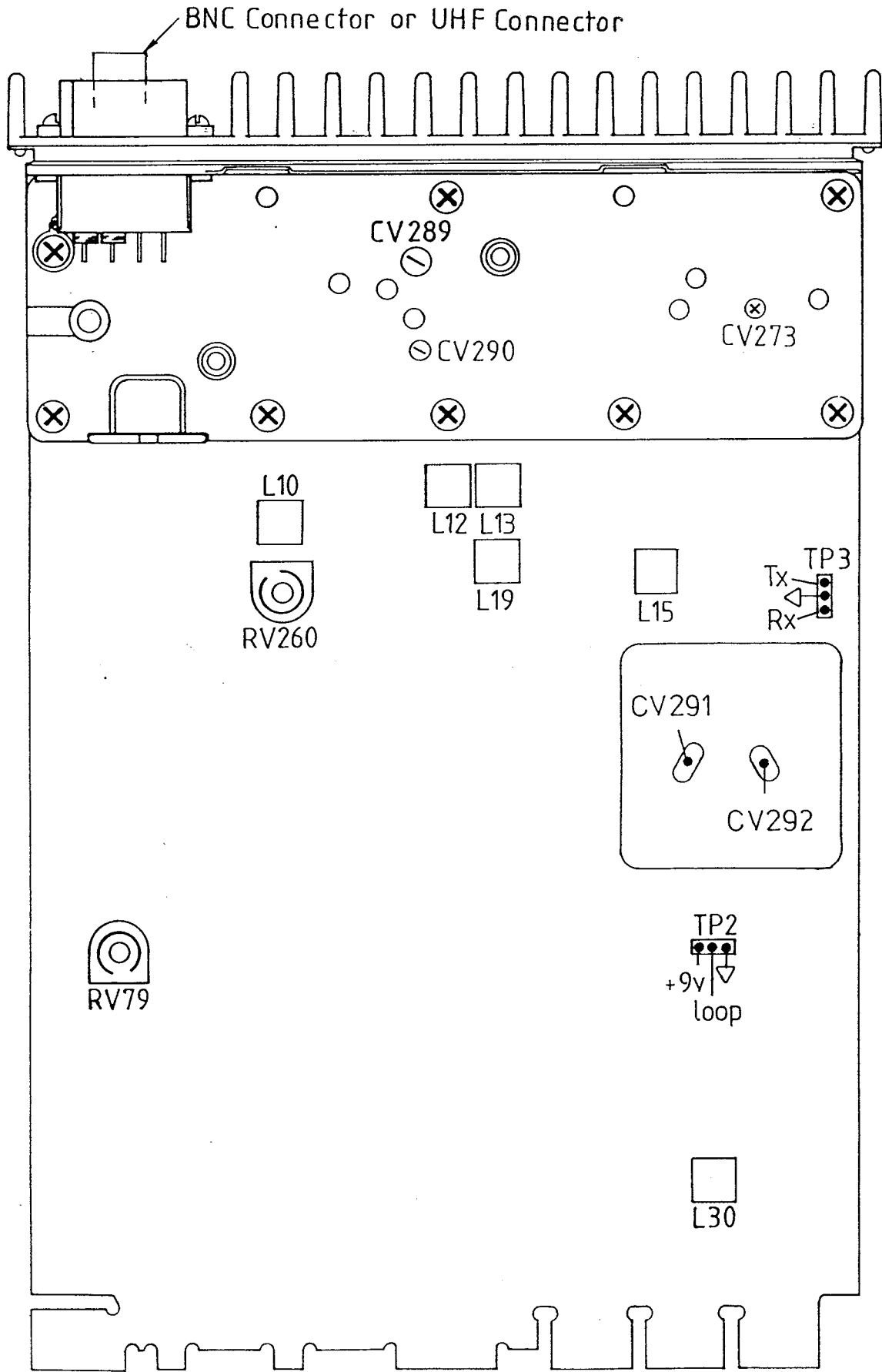


Diagram 2 Tuning Points



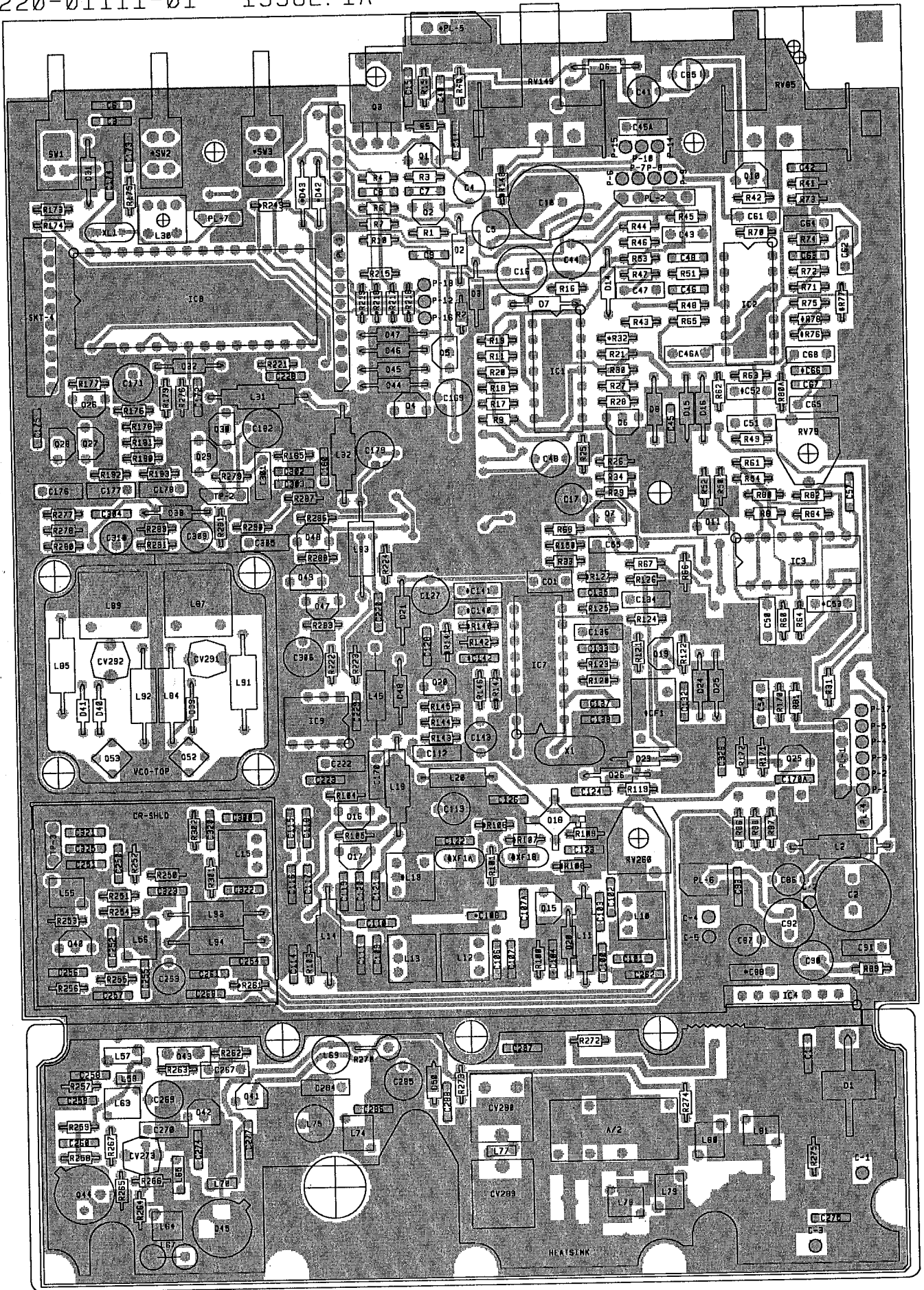


DIAGRAM 3 - T535 PCB LAYOUT - TOP SIDE

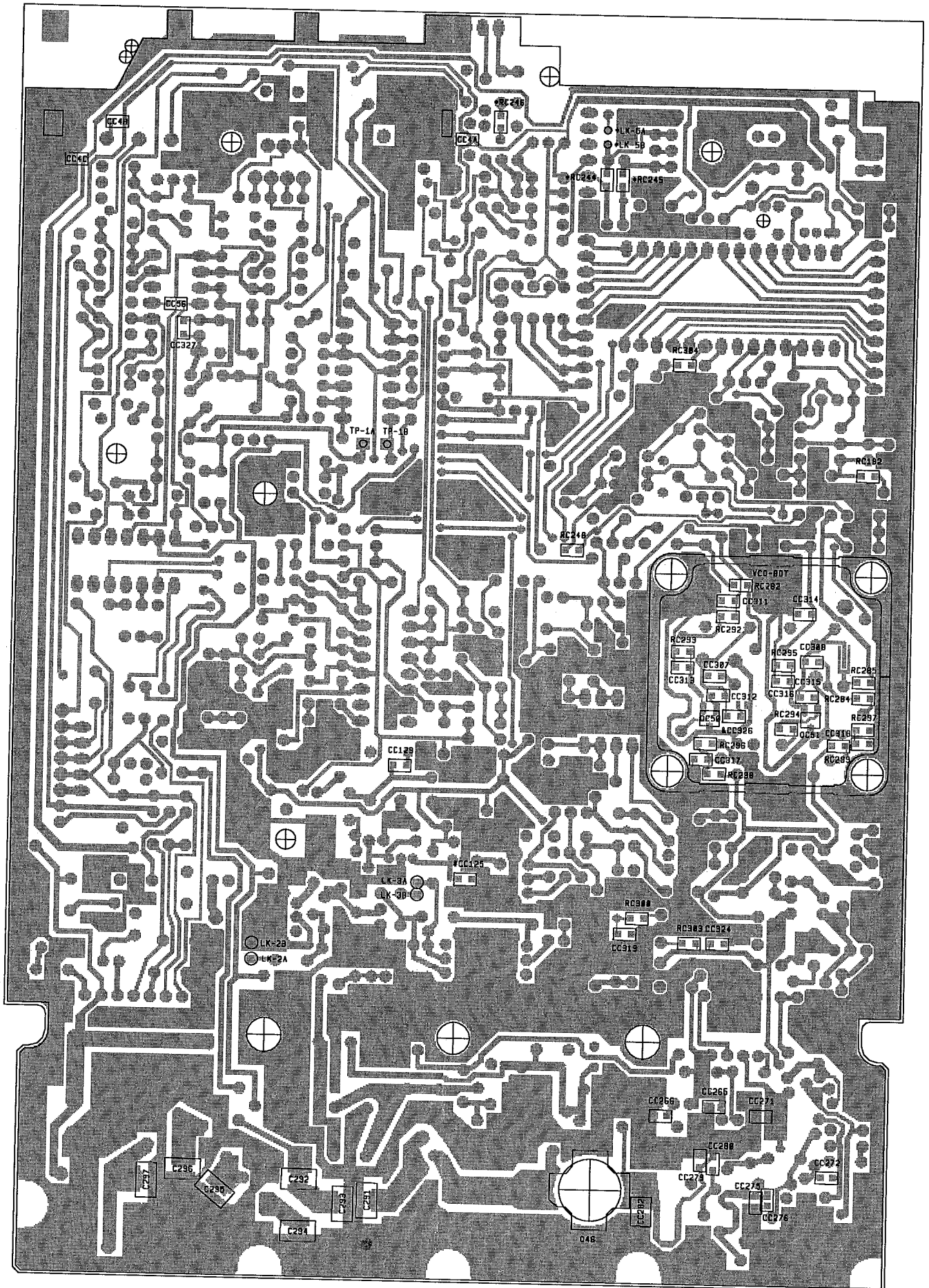


DIAGRAM 4 - T535 PCB LAYOUT - BOTTOM SIDE

IPN: 220-01198-01
ISSUE: A

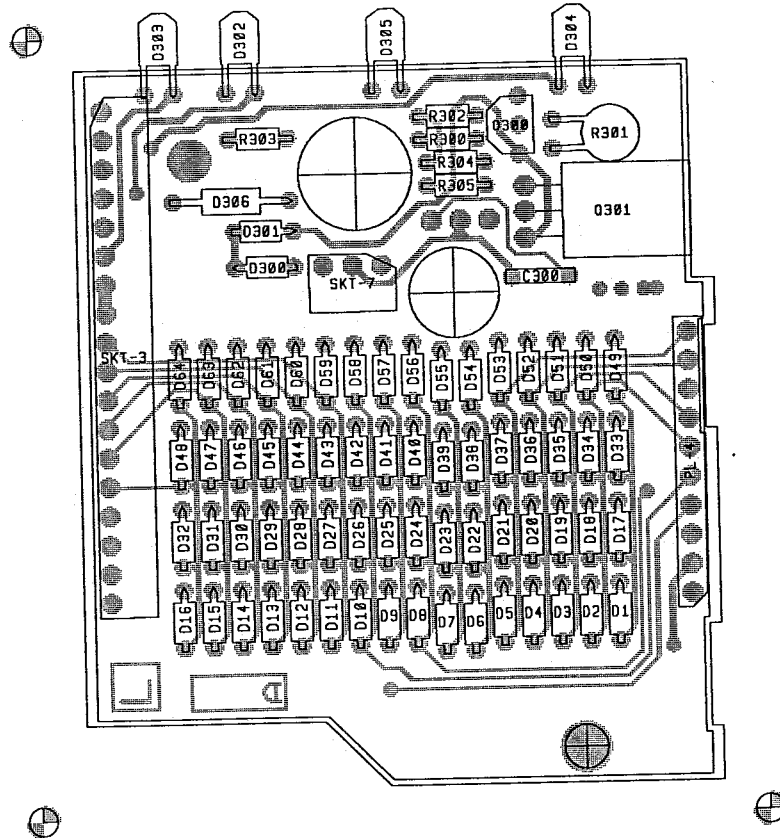


Diagram 5 T500 Diode Matrix/LED/Crystal Heater PCB Layout - Top Side

IPN: 220-01198-01
ISSUE: A

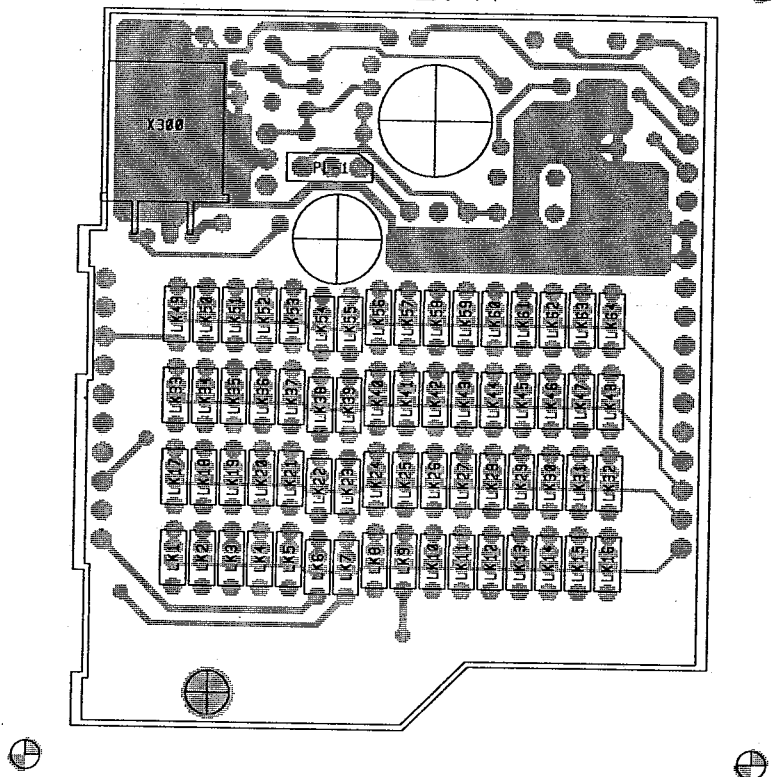


Diagram 6 T500 Diode Matrix/LED/Crystal Heater PCB Layout - Bottom Side

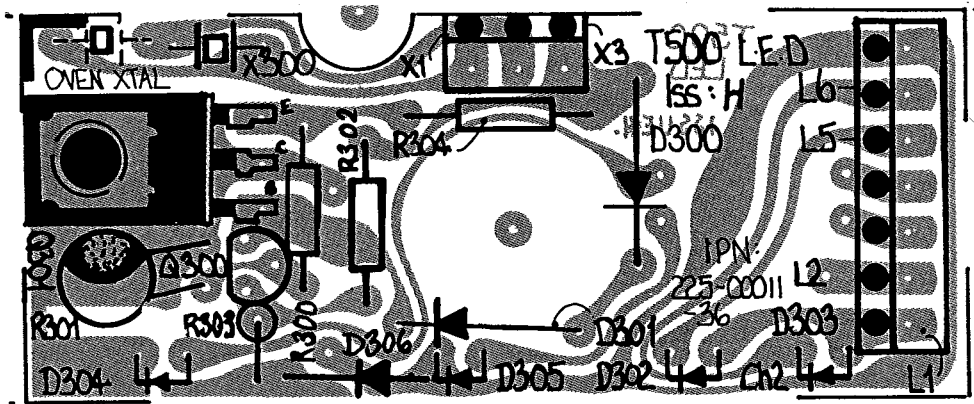
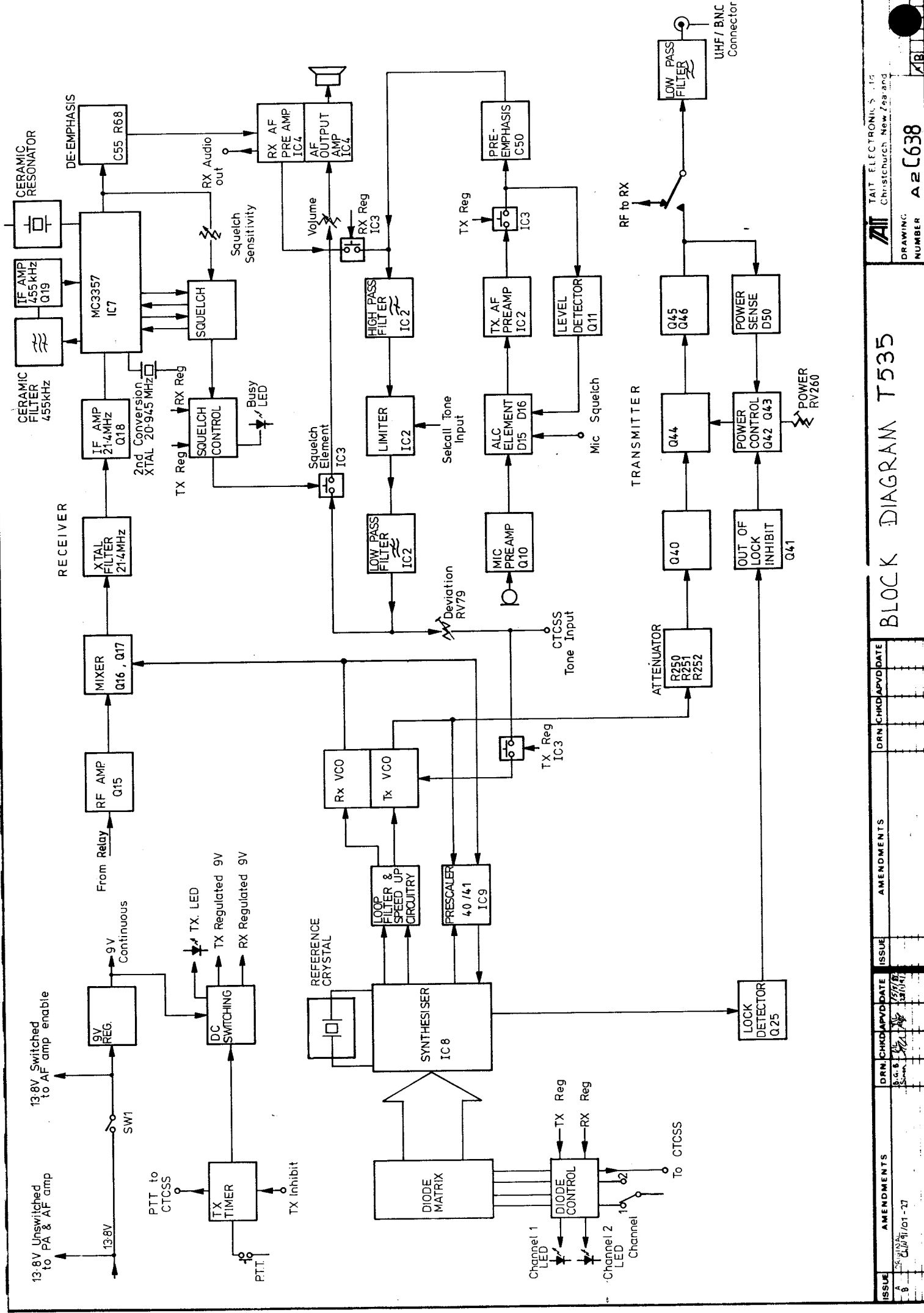


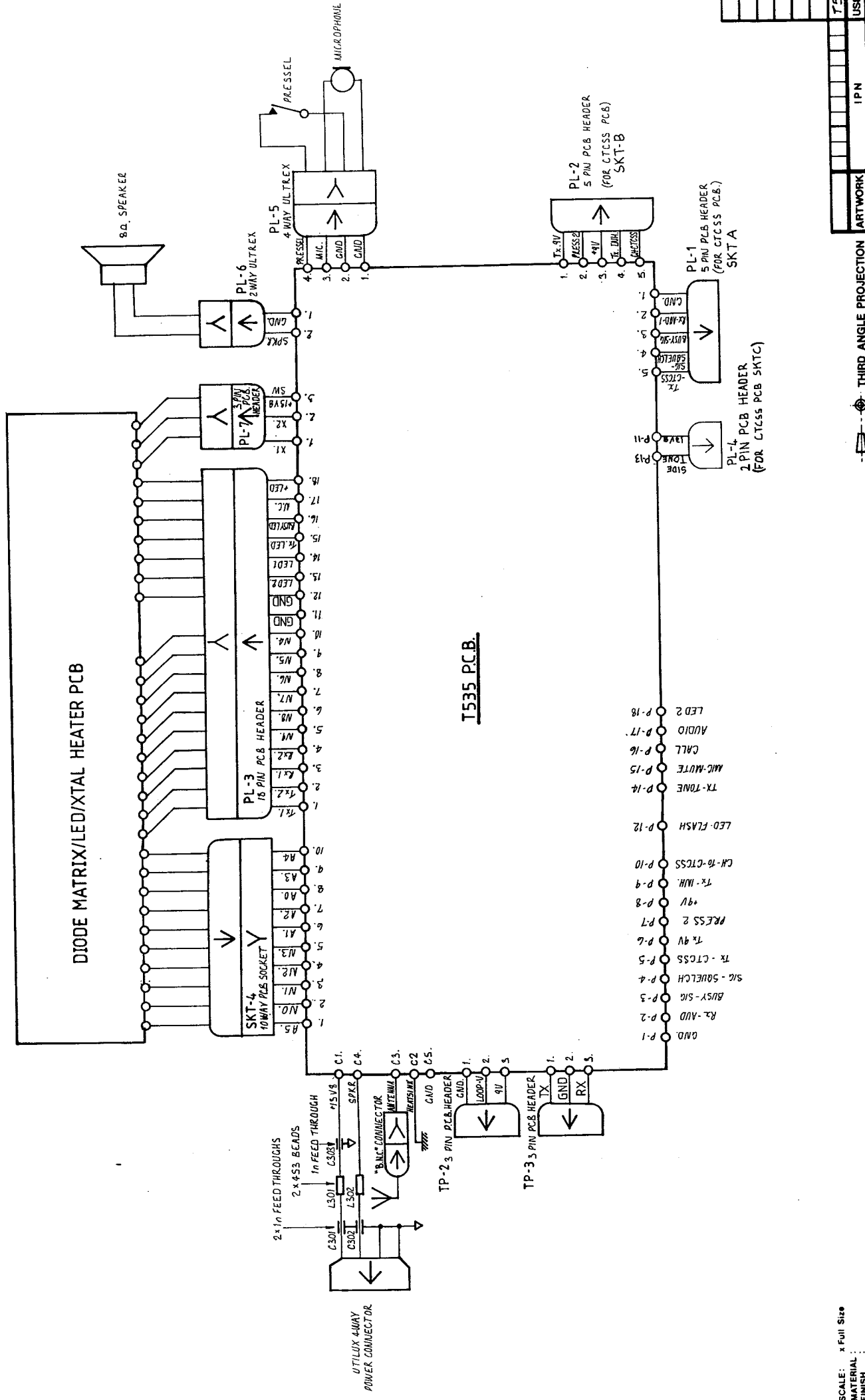
Diagram 7 T500 LED & Crystal Heater PCB Layout





BLOCK DIAGRAM T535

ISSUE	AMENDMENTS	DRN	CHKD	APVD	DATE	ISSUE	AMENDMENTS	DRN	CHKD	APVD	DATE
1					15/11/17						
2					15/11/17						
3					15/11/17						
4					15/11/17						
5					15/11/17						
6					15/11/17						



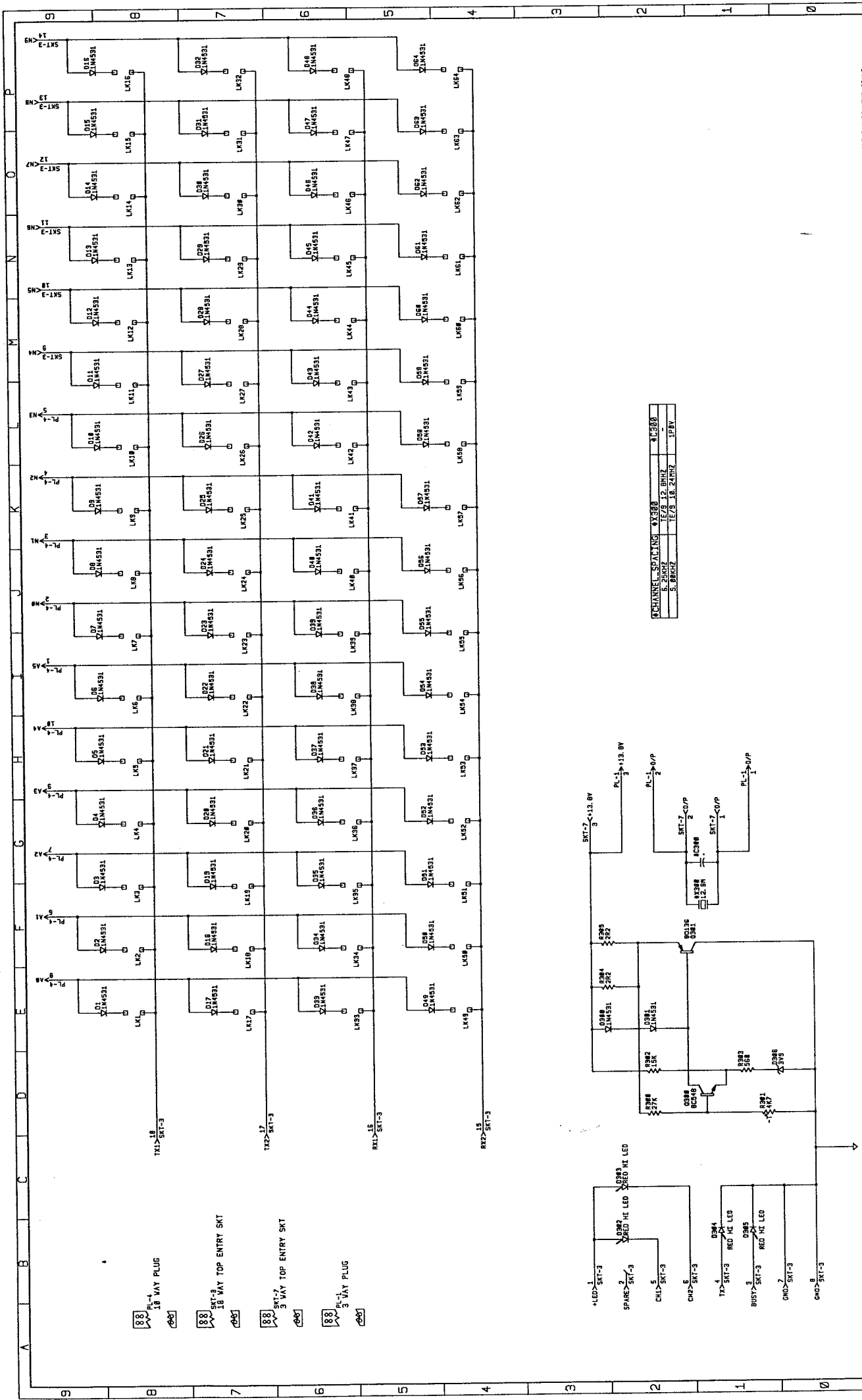
T535 PCB

SCALE: x Full Size
 MATERIAL:
 FINISH:
 GEN LIMITS:
 ISSUE:
 AMENDMENTS:
 DRN:
 CHKD:
 APVD:
 DATE:
 IF:
 SALE:
 AMENDMENTS:
 DRN:
 CHKD:
 APVD:
 DATE:
 IF:
 SALE:
 AMENDMENTS:
 DRN:
 CHKD:
 APVD:
 DATE:
 IF:
 SALE:

T535 WIRING DIAGRAM

THIRD ANGLE PROJECTION

USED	T53
ARTWORK	IPN
TAIT ELECTRONICS Ltd. Christchurch New Zealand	
DRAWING NUMBER	A2 C 632
ISSUE	1



CHANNEL SPACING	WAVELENGTH	WAVELENGTH
5.000	12.000	12.000
5.000	12.000	12.000
5.000	12.000	12.000

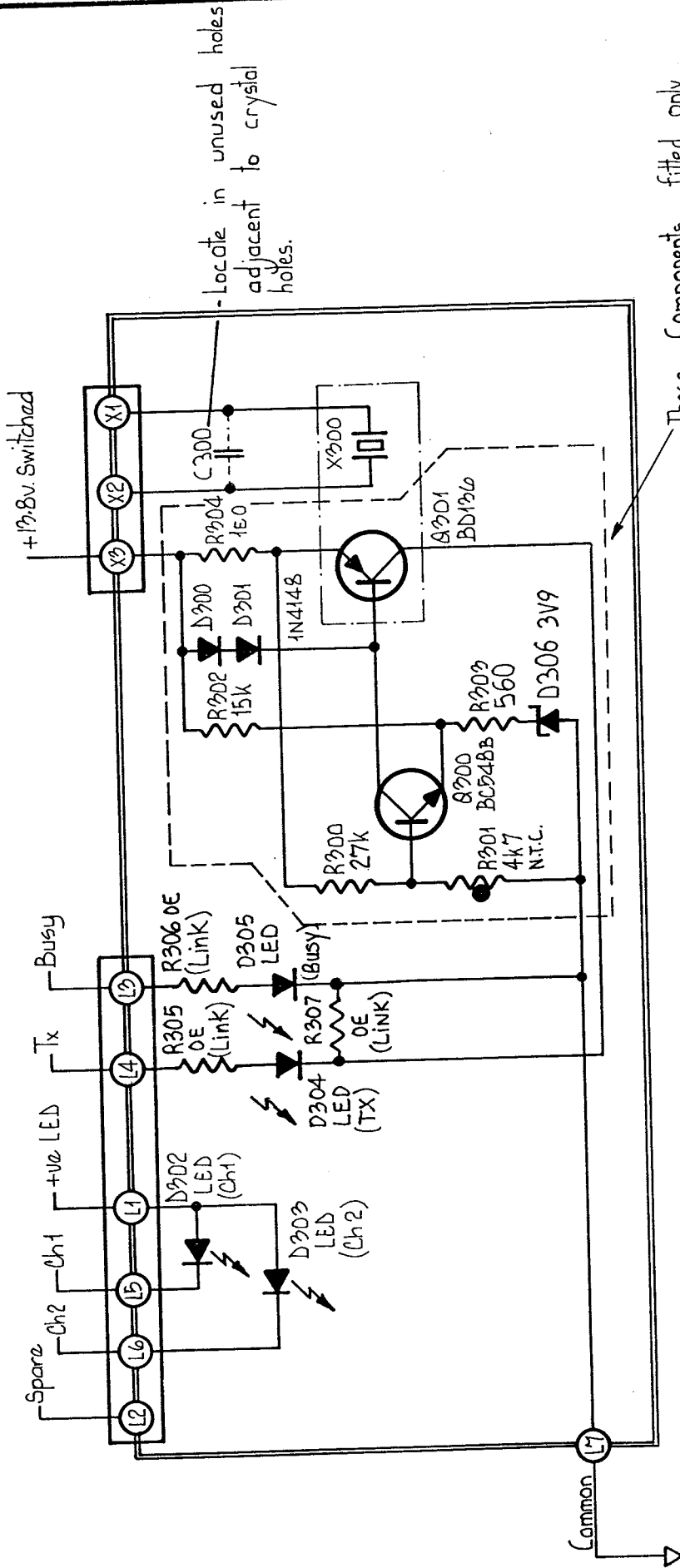
ASSEMBLY DRAWING SCALE:

TAIT ELECTRONICS NEW ZEALAND	
DRAWING NO: C726	SHEET 1
IPN: 220-01198-01	OF 1
FILE NAME: SMTD101B	ISSUE 1B

TITLE	
T500	
DIODE MATRIX LED XTAL HEATER	

18	GENERATED ASSEMBLY DRAWINGS	D.W.	10/02/51
A	UPDATE TO ISSUE A	D.W.	17/12/58
P	UPDATE FOR ISSUE P	D.W.	
18	ANALOGISATION OF HEATER DIODE LAS LED BOARD	DRAWN:	DATE:
ISSUE:	REVISIONS:	D-HKD:	APVD:





These Components fitted only to low temperature versions.

USED ON
T510
T520
T530
T540
T550

CH. SPACE	X300	C300
6.25 KHz	12.8	not fitted
5kHz ₂	10.24	1p0

SCALE: E ChN: 86-12-379
 MATERIAL: F Ch/N: 88/05-237
 FINISH:
 GEN. LIMITS:

DRN	CHKD	APVD	DATE
18.6.8	MM	19.1.87	30.11.84
H.O.	H.O.	9.5.88	21.10.85
10.3.74	40.384	5.3.89	5.3.89
Ch.N: 86-07-175		5.3.89	7.10.82
Ch.N: 86-07-165			

IPN

DRAWING NUMBER **A4C509**

ISSUE

A	B	C	D	E	F
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TAIT ELECTRONICS LTD.

CIRCUIT DIAGRAM - T500/LED & OPTIONAL CRYSTAL HEATER.

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DO NOT SCALE OFF DRAWING



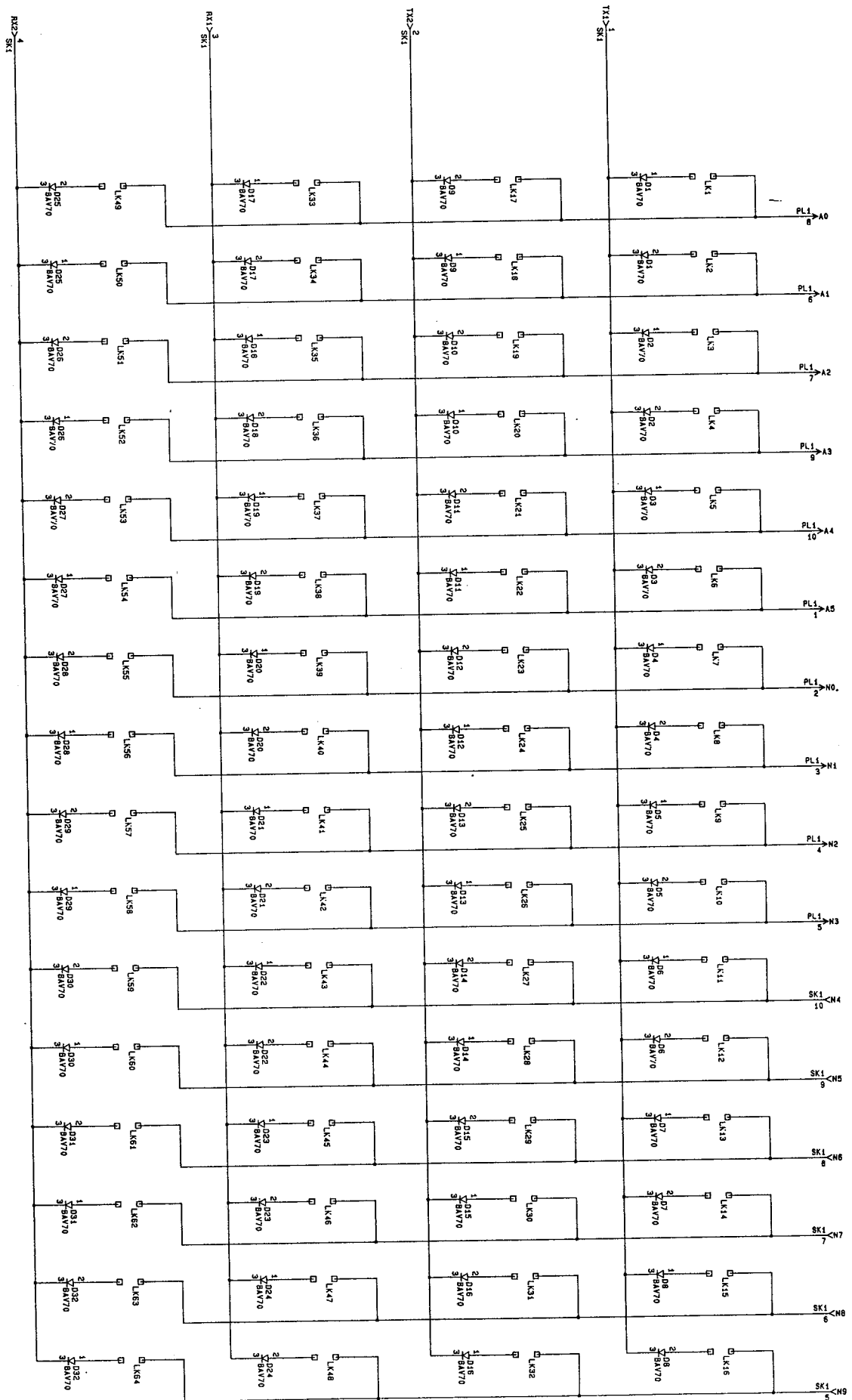


Diagram 12 T500-22 Diode Matrix Circuit Diagram

