TAIT ELECTRONICS LTD

Address: 558 Wairakei Road,
Christchurch,
New Zealand.

Postal Address: PO Box 1645,
Christchurch,
New Zealand.

Telegrams & Cables: 'Taitronics'

Telex: 4926

Telephone: 583 399

T366 Transmitter

UHF FM (820 to 902MHz)

(TM-366)

Issue B

TECHNICAL INFORMATION

For further information about this manual or the equipment it describes, contact Customer Services Division, Tait Electronics Ltd at the above address.

UPDATING EQUIPMENT & 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 covers General, Technical and Servicing Information on all versions of Tait T366 UHF FM Transmitter.

Date of Issue

T366 Service Manual TM-366 Issue B. First publication September 1983.

Ordering Service Manuals

When ordering the T366 Service Manual quote the Tait IPN and the version of your equipment, eg.

IPN TM-366 Version T366/06

CONTENTS

ILLUSTRATIONS

SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

The T366 is an angle modulated transmitter designed for single channel operation within the frequency range of 820 to 902MHz, with an output power capability of between 0.1 and 1 watt (continuous rating).

The circuitry of the T366 is built on three main printed circuit boards and consists of an exciter, a PA assembly and an audio processor.

The exciter board contains a crystal oscillator, phase modulator and limiter, followed by an 18 times multiplier and output amplifier. The PA assembly incorporates a two stage power amplifier and harmonic filter, which are screened and mounted on the rear panel.

A crystal oven has been used to give a frequency stability of $\pm$1.5ppm within the operating temperature range.

A wide selection of modulating characteristics may be obtained from the audio processor whose circuits include 'audio automatic gain control' (AGC), deviation limiting and filtering.

The T366 may be housed together with up to six similar modules in a standard 19 inch rack frame to produce an attractive and convenient installation.

1.2 SPECIFICATIONS

1.2.1 INTRODUCTION

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

The performance figures given are worst-case figures unless otherwise indicated.

Details of test methods and the conditions which apply for Type Approvals can be obtained from Tait Electronics Ltd.

1.2.2 GENERAL

Modulation Type	.. Angle
Frequency Range	.. 820 to 902MHz
Channel Separation	.. 25kHz
Number of Channels	.. one
Supply Voltage:	
Operating Range	.. 10.8 to 16 volts DC
Standard Test Voltage	.. 13.8 volts DC
Supply Current at 13.8V excluding crystal oven:	
Transmit	.. 0.4 amps
Stand-by	.. 75mA
Load Impedance	.. 50 ohm nominal
Operating Temperature Range	.. -10°C to +60°C
Dimensions & Weight (in sleeve):	
Height	.. 191mm
Length	.. 310mm
Width	.. 60mm
Weight (with guide)	.. 1.55kg

1.2.3 TRANSMITTER RF SECTION

Power Output	.. 1.0 watt maximum Adjustable 0.1 to 1.0 watts
Duty Cycle Rating:	
Up to 60°C/13.8V	.. Continuous
Spurious Emissions	.. 2.5µW

Mismatch capability at antenna socket
13.8V DC input .. 10:1 VSWR all phase angles

Transmitter Hum & Noise:
Below max. deviation,
with pre-emphasis .. 60dB

1.2.4 TRANSMITTER AUDIO PROCESSOR

Inputs available .. Line and Local Microphone (key-line switched).

Line Input:
Impedance .. 600 ohm balanced
Sensitivity for 60% of limiting deviation at 1kHz .. -40dBm

Local Microphone Input:
Impedance .. 600 ohm unbalanced.
Sensitivity for 60% of limiting deviation at 1kHz .. 0.5mV pd

Audio Frequency Characteristics .. Flat or pre-emphasised (+6dB/octave) (selected by internal link)

Audio Frequency Responses:
Line Input: 300Hz to 3400Hz (referenced to 1kHz) .. Within +1, -2dB (relative to selected characteristic)

Mic Input: 300Hz to 3400Hz (referenced to 1kHz) .. Within +1, -3dB (relative to selected characteristic)

CTCSS Input: 65Hz to 260Hz (referenced to 150Hz) .. Within ±1dB

Audio AGC:
Input Level Range .. 50dB.
Attack Time .. 20mS.
Decay Time .. 800mS typical.

Deviation Limiting .. ±10kHz adjustable ±5kHz to ±10kHz

Modulator type .. Phase

1.2.5 CRYSTAL

Tait Electronics Specification No.	.. TE/11
Crystal frequency	.. $f_X = f_t/18$ MHz where f_t is the transmit frequency
Crystal oven:	
Oven temperature	.. 60°C ±4°C
Oven temperature stability	.. ±1°C
Oven current	
at -30°C	.. 67mA at 13.5V
at +20°C	.. 30mA at 13.5V
Warm up	.. <160mA
Warm up time	
at -30°C	.. 10 minutes
at 0°C	.. 5 minutes
at +30°C	.. 2 minutes
Frequency stability	.. ±1.5ppm (typically ±0.75ppm)

1.3 VERSIONS

T366/06 TX FM 820-902MHz LINK 25kHz CH

The T366/06 is an FM linking transmitter in the frequency range of 820-902MHz at 25kHz channel spacing with an output power of between 0.1 and 1.0 watts. The audio processor provides a flat response for CTCSS and a pre-emphasised audio response. A guide is manufactured with each transmitter to mount in a standard 60mm rack frame assembly.
Crystal frequency = f/18

SECTION 2 CIRCUIT OPERATION

Refer Block Diagram (A2M 1515) Fold-Out 1, and Circuit Diagrams (A1C 386 and A2C 387)) Fold-Outs 2 and 3.

2.1 EXCITER BOARD

2.1.1 RF EXCITER CIRCUIT

The RF carrier is generated by a crystal controlled oscillator and a buffer amplifier (Q301, Q302). The output from the buffer is fed to a four stage phase modulator (Q303, D302, Q304, D303, Q305, D304, Q306, D305) where it is modulated by the output from the audio processor (see Section 2.3).

The modulated signal is amplitude limited by the limiting circuit consisting of Q307 and IC301, then raised to the channel frequency by the eighteen times multiplier chain.

The multiplier chain includes a tripler (Q308) followed by an amplifier (Q309), a tripler (Q310) and a doubler (Q311). The output from the doubler is applied, via the helical resonators (L334,L335) and a coaxial link, to the PA assembly.

To achieve the required frequency tolerance over a wide receiver operating temperature range, the crystal is housed in a constant temperature oven (see Section 2.1.4 for details).

A low level sample of the oscillator buffer output can be taken to a front panel connector to provide a frequency monitoring facility.

A link can be inserted across R314 to enable $\pm$10kHz deviation to be achieved.

2.1.2 TRANSMIT SWITCH & TIMER

When the 'Tx enable' line is taken low (approaching 0 volts) the output from IC302a goes low and removes the audio inhibit signal to the audio processor board; IC302d output provides the 9 volt switched regulator reference voltage which is on for the duration of the time the 'Tx line' is pulled low. When the low is removed R391 pulls the 'Tx line' high and immediately the output from IC302a goes high, inhibiting the audio. The 9 volt switched supply remains on for a time preset by RV395 and C402 (between IC302 b & c) to provide a 'silent tail' at the end of each transmission.

2.1.3 REGULATED 9 VOLT SUPPLIES

There are two regulated supplies on the exciter board. One is a continuous supply (Q317, Q318) which is applied to the audio processor PCB, and normally to the oscillator and modulator stages (Q301 to Q306). The second regulated supply is derived from the switched regulator reference output (IC302d) which is fed through Q321 and Q320 to lower the output impedance, and is normally applied to the multiplier stages. Q316 and D308 provide the regulated reference, and Q315 forms a current limit. As an option, the oscillator and modulator sections can be fed from the switched 9V regulated supply.

2.1.4 CRYSTAL OVEN

(See Figure 9, circuit diagram A4C 403).

The crystal oven components are mounted inside a copper heatsink and are isolated from ambient by a layer of polyurethane foam. Constantan is used for the output wires.

The positive temperature co-efficient resistor PTC, (R2) regulates the power transistor (Q2) current via an invertor amplifier, (Q1). The PTC used is most sensitive between 50°C and 80°C and, being biased by a 12k ohm resistor (R1), it just starts activating Q1 at 60°C.

The 9V regulated line is used as a stable reference for the PTC (R2) bias and power for Q1, keeping the internal power consumption, and consequent heating, down to 11mW.

2.2 PA ASSEMBLY

The modulated RF from the exciter is applied to this tuned two-stage RF power amplifier (Q501, Q502), where it is amplified to the required power level before being fed via a harmonic filter to the aerial.

The drive to the final transistor (Q504) is controlled by the 'power adjust' circuit (D501, Q501, Q502) in order to maintain a preset constant output. This circuit compares a rectified sample of the RF power output with a reference voltage, preset by RV401, then adjusts the supply voltage to the driver transistor (Q503) accordingly, to control the drive to the PA final transistor.

2.3 AUDIO PROCESSOR

2.3.1 GENERAL

The transmitter audio processor board contains circuits for processing the audio inputs to produce a wide variety of modulation characteristics to suit individual customer requirements. The required characteristics may be obtained by selecting the order of appropriate sections by means of 'wire in' links.

Each section is designed to give a standard output level of 500mV p-p at 1kHz to allow interconnection of all the sections in any order. A brief description of each section follows.

2.3.2 MICROPHONE PRE-AMPLIFIER

Audio from the microphone is amplified by Q1 to bring the level to the standard interconnection signal level.

2.3.3 PRE-EMPHASIS

IC3a and its associated components provide a pre-emphasised response from 300 to 3400Hz.

2.3.4 AUDIO SWITCH

The integrated circuit audio switch (IC1) selects either the local microphone or the line signals as the audio input source. It also provides the inhibit facility which is used to obtain a 'silent tail' at the end of each transmission.

2.3.5 AUDIO COMPRESSOR AND AMPLIFIER

Q3 in conjunction with R22 forms a variable potential divider which holds the audio level constant at its collector for a wide range of input amplitudes. The control loop consists of a precision rectifier (D7, D8, & IC2b), a comparator (IC2a) which compares the rectified output with a DC level (preset by RV27), and an invertor (Q5) which feeds the amplified error current to the emitter follower (Q4) and the control element (Q3). RV27 sets the reference level and thus the output level. Q6 and Q7 form a low noise amplifier. The gain is set to bring its output level to the standard inter-section level.

2.3.6 LIMITER/INTEGRATOR/LOW PASS FILTER

A two stage limiter (IC3b and IC4a) is employed to achieve the desired clean limiting consistent with sufficient gain. RV54 sets the maximum peak deviation.

CTCSS signals are inserted at this point to give a flat response.

IC4b and its associated components provide the integrating functions to compensate the phase modulators for frequency modulation. The signals are taken via the low pass filter and matching transistor (Q8) to the modulator.

2.3.7 KEYING

The transmitter keying circuit consists of an optional opto-coupler (for isolation between the keying circuits and the transmitter) and a 3 input OR gate (formed by D1, D2 and D3) such that any one of four inputs will key the transmitter:

(a) Tx key from a receiver or line when the appropriate line is earthed.

(b) Carrier Switch, a push button for testing purposes, which can also inhibit the audio switch if required.

(c Microphone Pressel, which switches IC1 to select the microphone input and disconnects the audio line.

(d) A suitable potential applied to the opto-coupler input.

SECTION 4 INSTALLATION

4.1 GENERAL

Tait Base Station transmitters and receivers may be assembled into a wide variety of base station systems, from a simple 'land mobile base' to a complex 'linking system' operating in the 'hot stand-by mode'.

4.2 BIDIRECTIONAL LINK

This installation provides simultaneous communication in both directions between the two radio sites. A typical block diagram of the installation is shown below.

At each site is a 600 ohm 4 wire Input/Output port, a key line (for the outgoing path) and a gate output (from the incoming path). The key lines can be connected for continuous linking. The gate outputs can then indicate loss of signal (continuous link) or incoming signal presence (keyed link).

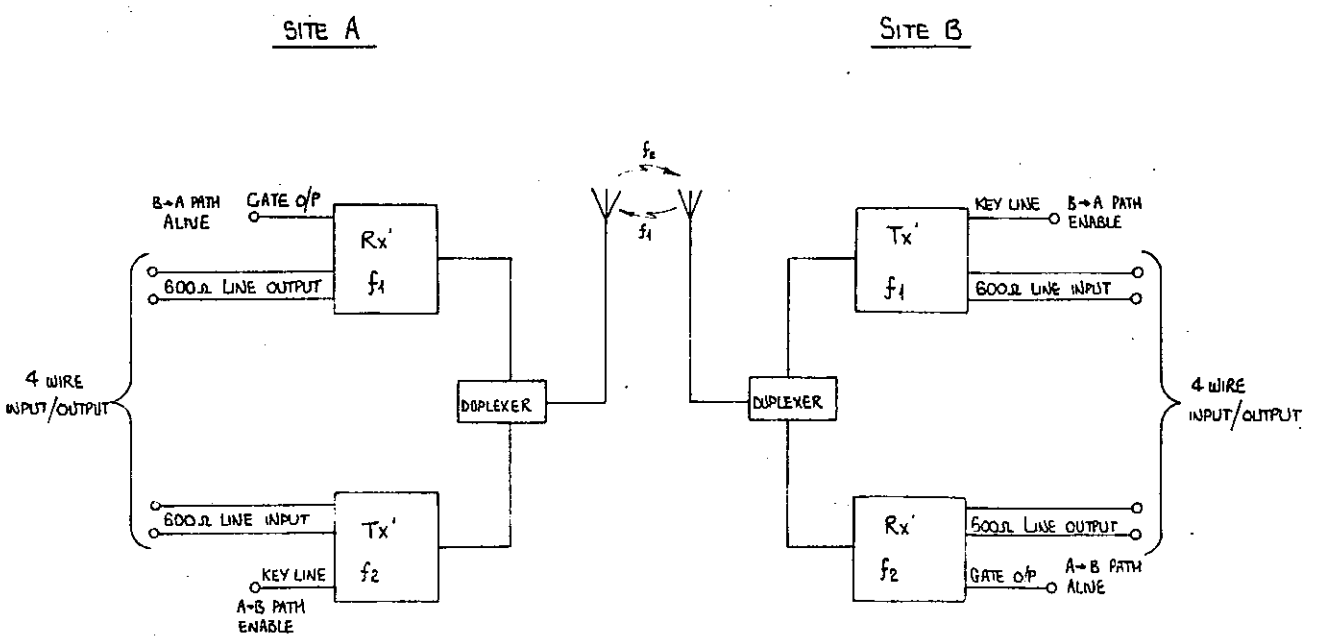


Figure 1: Block Diagram of Typical Bidirectional Link

SECTION 5 SERVICING

5.1 GENERAL

5.1.1 CAUTION

CMOS DEVICES

This 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 manufacturers' data books covering CMOS devices e.g. Philips Data Handbook Covering CMOS Devices; Motorola CMOS Data Book Section 5 (Handling Procedures), etc.

AERIAL LOAD

The equipment has been designed to operate safely under a wide range of aerial loading conditions. However, it is strongly recommended that the transmitter should not be operated in the absence of a suitable load. Failure to observe this warning may result in damage to the transmitter output power 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 opened, mutilated, filed, machined, or physically damaged in any way that can produce dust particles.

5.1.2 TECHNICAL INSTRUCTIONS (TI's)

From time to time 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, and are available from Tait Electronics Ltd, Customer Services Division.

5.2 MECHANICAL

5.2.1 POSIDRIV & SUPADRIV RECESS HEAD SCREWS

Posidriv, or the improved Supadriv recess head 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.

Posidriv screwdrivers will fit both posidriv and supadriv recess head screws. Phillips cross-head screwdrivers are not satisfactory for use on these screws.

The table below gives the recommended driver sizes for the screws most commonly used on Tait equipment:

Thread size	Driver size
M 2.5	1
M 3	1
M 4	2
M 5	2
M 6	3

Note Phillips cross-head screws are used in some locations which require very small screws. A Phillips cross-head driver must be used on these screws.

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). A 20k ohm/V (or better) multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

If an 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. The recommmended values can be obtained from either the circuit diagram or the component data catalogue.

5.3.2 COMPONENT REPLACEMENT

To avoid damaging the printed circuit track, the removal and replacement of components requires careful attention. If it is necessary to remove a component from the PCB, the recommended procedure is to first clear all solder from the component leads using a solder sucker or solder wick. The lead should then be free in the hole so that it can be withdrawn from the PCB.

Soldering operations should be kept to a minimum. Printed circuit tracks should be cleaned before applying the soldering iron or solder, and the amount of heat and solder applied kept to a minimum. A fine-tip thermally controlled soldering iron and the use of solder wick or a solder sucker is strongly recommended. Do not attempt to withdraw any component or lead from the PCB while the solder is still molten.

Ensure that the soldering iron is earthed back to the frame of the set.

5.3.3 INTER - BOARD WIRING

To assist circuit tracing all plugs and connections are shown on the outer edge of the circuit diagrams and on the wiring diagram.

5.4 SETTING UP

5.4.1 TEST EQUIPMENT REQUIRED

1. DC power supply capable of delivering 1 amp at 13.8 volts.
2. Oscilloscope (CRO) 10MHz bandwidth (eg Trio 1566a, Telequipment D61A).
3. Multimeter or DMM (eg Fluke 8012A).
4. DC electronic voltmeter (EVM) (eg Trio VT130, Tech TE65).
5. AC millivolt meter (eg Trio VT106).
6. RF power meter usable to 1 GHz (eg Bird 43 with 1 and 5 watt elements).
7. UHF frequency meter - accurate to better than 1ppm.
8. FM modulation meter - high resolution - usable to 1 GHz with at least 10kHz audio bandwidth (eg Marconi TF2304, HP8901, or Sayrosa 252).
9. Audio oscillator - low distortion - 10Hz to 10kHz (eg HP204C, Trio AG203).
10. RF coupling device 'sniff pad' (see Figure 4 page 5.12)
11. RF diode probe (see Figure 5 page 5.12)
12. 15 way 'D' range connector (see Figure 2 page 5.4 for wiring details).
13. 'BNC' to 'N' type adaptors (eg Amphenol, Greenpar).
14. Microphone and stereo jack plug for T366 mic. input.
15. Trimming tools (available from Tait Electronics Ltd)

WT9	Tait IPN 936-0110
WT10	Tait IPN 936-0111
WT11	Tait IPN 936-0112

16 BNC 'T' Connector.

5.4.2 TEST EQUIPMENT SET-UP

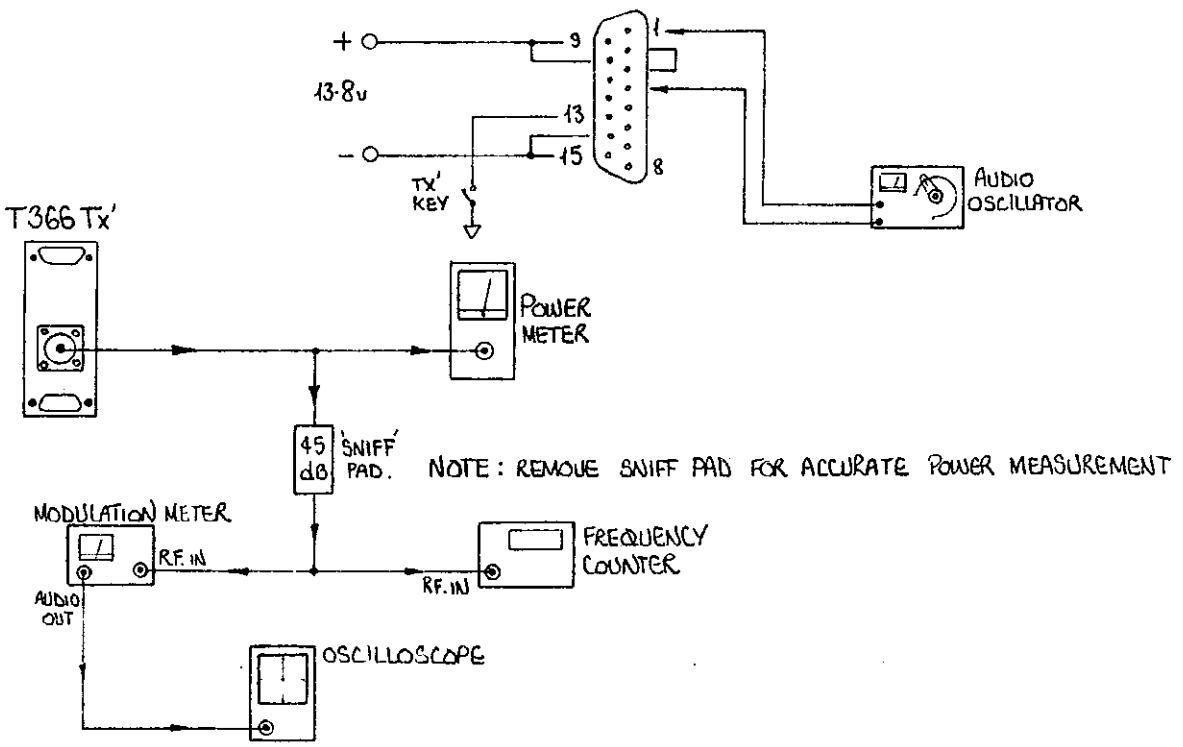


Figure 2

5.4.3 TUNING HINTS

1. When using an RF probe, the ground return lead should be kept as short as possible, and connected as close as possible to the point at which the measurement is being made. This is to minimize stray pick-up, which may affect readings.

2. When tuning coils on the Transmitter PCB all adjustments must be made from the top (component side) of the PCB. A non-metallic tuning tool should be used.

5.5 TRANSMITTER ADJUSTMENTS

5.5.1 FITTING OR REPLACING THE CRYSTAL

No soldering iron is necessary when replacing the crystal. The crystal leads are in sockets which are easily damaged, so the leads of replacement crystals should be cleaned of residual solder. Lead soldering causes a frequency deviation, which takes a few days to completely disappear.

1. Remove the long bolts.

2. Remove the case and the polyurethane foam.

3. Remove the rubber spacer.

4. Lift off the copper heatsink, taking care not to damage the insulating plate between the power transistor and the heatsink.

5. The crystal leads are in sockets, so the crystal can now be removed.

6. Ensure that the new crystal does not cause a short circuit to the adjacent resistors.
   N.B. Crystal leads must be 5mm long to prevent the can shorting to the crystal leads.

7. Replace the heatsink, making sure the positive temperature co-efficient resistor (PTC) is in close contact with the heatsink. If necessary use additional thermal grease.

8. Replace the rubber spacer in such a way that it presses the transistor, crystal and PTC on to the heatsink.

9. Be careful not to transpose the wires of pins 1 and 2. This will cause malfunction of the oven itself, and will cause the 9V line to go into current limit.

5.5.2 PRELIMINARY CHECKS

Check for short circuits between positive rail (D range pins 9 & 10) and earth (pins 14 & 15).

Set up test equipment as in Figure 2 with the RF wattmeter connected to the PA output using a short N type lead.

Connect the bench test plug to the transmitter while monitoring the supply current. (This should not exceed 150mA).

Key the transmitter by earthing the key line (pin 13).

Set the power output potentiometer RV401 (on the front panel) fully clockwise.

Remove the clamp securing the PA to the exciter PCB. Remove the two upper screws holding the PA to the chassis, and loosen the two lower screws. Fold the PA out to give access to the two variable capacitors in the PA and retighten the side screws to hold it in place. If necessary remove the PA shield for tuning. This will not affect tuning.

5.5.3 ALIGNMENT PROCEDURE

To carry out the following alignment procedures an EVM with diode probe is connected to the base of the transistors as indicated, and the appropriate coil slug or capacitor mesh is adjusted for a peak reading on the EVM.

Note: If the transmitter is being tuned at a frequency well away from the previous tuning, it may be necessary to 'pretune' L334 & L335. For 820MHz L334 & L335 are tuned fully in, for 902MHz they are nearly fully out.

Transistor Base	Coil Slug Or Capacitor Mesh
Q303	L305
Q308	L315
Q309	L318,L319
Q310	L322
Q311	*CV378,CV381
Exciter O/P (pad 11)	L334,L335

* If CV378 tunes at minimum C, shorten L324 slightly. If it tunes at maximum C, lengthen L324 slightly.

Remove R380 if fitted.

Some power should be measured on the power meter now.

Note: If no power is measured, or to check exciter operation, the coax between the exciter and PA may be replaced by a 'flying lead' connected directly to a sensitive power meter. Exciter output power should be 40-70mW.

Tune CV521, CV526a and CV527 (on PA PCB) for maximum power.

Retune L318, L319, L322, CV378, CV381, L334, L335, CV521, CV526a and CV527 for maximum power.

R380 is used to adjust PA power.

Note: L334, L335 & CV521, CV526a will need to be retuned after R380 is fitted.

(a) 1W Output Set

If power is above 1.5W, fit R380 (try 150 ohms initially) and adjust its value until power is between 1.2 and 1.5W.

Adjust RV401 (front panel) for 1.0W.

(b) 0.5W Output Set

If power is above 1.2W, fit R380 (try 100 ohms initially) and adjust its value until power is between 0.8 and 1.2W.

Retune CV521, CV526a and CV527 for maximum power.

Readjust R380 for 0.8 to 1.2W if necessary.

Note: PA Circuit Diagram, A2C 387, Issue A (Fold-Out 3) does not show CV526a which is fitted in parallel with C526 on the base of Q504.

Adjust RV401 (front panel) for 0.5W.

Note: For accurate power measurement at 800MHz:

1. Remove the 'sniff' pad.

2. Use short lengths of coax to the power meter.

3. Use 'N' connectors only, with no adaptors.

4. Check that your power meter is accurate to 800MHz.

5.5.4 TO SET THE TRANSMITTER ON FREQUENCY

Note: The oscillator and modulator sections may be fed from either the switched or unswitched 9V regulated supplies by links A-B or B-C.

(a) Test Equipment: Set up as in Figure 2.

(b) Method:

Fit the required crystal ($F_X = 1/18\ F_C$).

Allow approximately 10 minutes warm up time before carrying out the following procedure.

Earth the key line (pin 13).

Tune the oscillator trimmer coil L301 for the exact frequency on the frequency counter, if necessary change taps on the oscillator trim coil (L301). (Refer section 5.5.5).

If the optional front panel frequency trim is fitted adjust for 3 volts at the wiper before adjusting the frequency trim coil. (A sample of the oscillator/buffer output is available via the front panel BNC connector for frequency measurement).

5.5.5 OSCILLATOR TRIMMING

Tait coil type 617 covers the range of crystal frequencies used in the T366.

Initial taps to use for crystal frequencies between 40 and 50MHz are taps 1 & 6.

These taps are suggested for guidance only; in some circumstances the tap may need to be changed to trim the oscillator frequency.

In order to get the crystal frequency high enough, some crystals may require C306 to be changed to a value not less the 27pF.

Coil Type 617
Pin Connections Bottom View

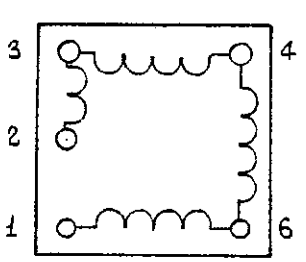


Figure 3

5.5.6 AUDIO PROCESSOR ADJUSTMENTS

(a) Test Equipment

Set up as in Figure 2.

(b) Method

Set the audio signal generator output at 1kHz at 0dBm into the line.

Turn the 'line sensitivity' control fully clockwise.

Earth the key line.

Turn RV27 (compression adjust) fully clockwise to remove compression.

Adjust RV54 (modulation adjust preset) for a peak reading in the modulation meter of ±5kHz deviation. (This sets up the limiter for maximum deviation).

Reduce the audio input to -38dBm.

Check that at least ±3kHz of deviation is still available at this input level. This ensures that the gain is correct through the audio board.

Slowly increase the input level until the demodulated waveform shows significant signs of clipping (±4.5kHz deviation).

Turn RV27 (compressor adjust preset) until the deviation reduces (approximately ±3.6kHz deviation) and the waveform is just below the point of clipping.

Increase the audio level to 0dBm and note that the sine wave test tone is held just below clipping.

Reduce the audio input to the desired operating level, typically -10 to -20dBm.

Turn the line level control on the front panel until the modulation meter reads ±3kHz deviation. (This sets the transmitter line sensitivity).

Open the key line.

Insert the microphone jack into the microphone socket.

Close the PTT switch.

Whistle steadily into the microphone.

Check that the deviation level is about ±3.6kHz and that the waveform on the oscilloscope is basically sinusoidal.

Speak into the microphone.

Check that the modulation peaks reach about ±5kHz deviation.

5.5.7 TO CHECK THE TRANSMIT DELAY TIMER

(a) Test Equipment

As in Figure 2.

(b) Method

Adjust RV395 ('set tail time' preset) fully clockwise.

Key the transmitter off, i.e. disconnect the 'key-line' from earth and check that the transmitter remains on for at least 1 second.

Reset RV395 fully anti-clockwise.

Key the transmitter on, then off, checking that the transmitter turns off immediately the key line is broken.

Re-adjust RV395 for required tail time.

5.5.8 TO TEST THE CRYSTAL OVEN

The proper functioning of the oven is easily checked by monitoring the current through pin 2.

After switch-on, the current should rise to about 130-150mA, then slowly drop to 0-20mA, and then rise again to a stable value which will depend on the actual voltage on pin 2 and on the ambient temperature, as described in the following formula:

$$I \text{ (steady state)} = 10 \frac{(60°C - T \text{ amb } (°C))}{V \text{ pin } 2} mA$$

Due to tolerances in PTC values the 60°C has a tolerance of ±4°C.

5.6 FAULT FINDING

5.6.1 GENERAL

If a fault is apparent, first check for simple causes such as shorts under the PCB, incorrect polarity or voltage, or trouble with the test set-up and ancillary equipment.

If a component failure is suspected, in most cases locating it will require little more than the usual systematic approach with the aid of the information given in this section.

A block diagram is included with all relevant information, as is a voltage table giving the DC conditions around each transistor measured with a 20k ohm/volt moving-coil meter and the supply rail to the set at 13.8 volts.

Refer to sections 5.3.1 and 5.3.2 before attempting the removal of any components.

5.6.2 PA MODULE - SPECIAL NOTES

(a) To Replace PA Transistors

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

Trim the tabs of the replacement device to make them similar to the faulty device, and tin the underside lightly. Smear the face of the device with heatsink compound and screw it securely to the heatsink. Then solder the tabs.

Caution: Do not solder the tabs before tightening the screws, otherwise the tabs may break.

(b) To Remove PCB from Heatsink

Most components are soldered topside only, but in some cases access to the underside of the PCB is necessary.

Remove the PCB retaining screws.

Remove Q504 stud nut and lift the board (complete with transistors) away.

CAUTION: Do not operate the PA with the heatsink unattached.

(c) To Remove Cased Mica Capacitors

These may be removed by applying a heavy-duty soldering iron to the top of the case, then lifting gently with a solder-resistant spike (or equivalent) once the solder around the capacitor is molten.

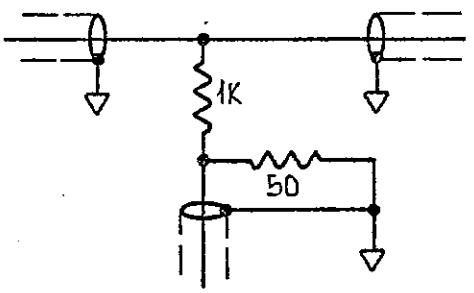
(d) Re-assembly

Reverse the order to replace the PCB.

5.6.3 VOLTAGE CHART

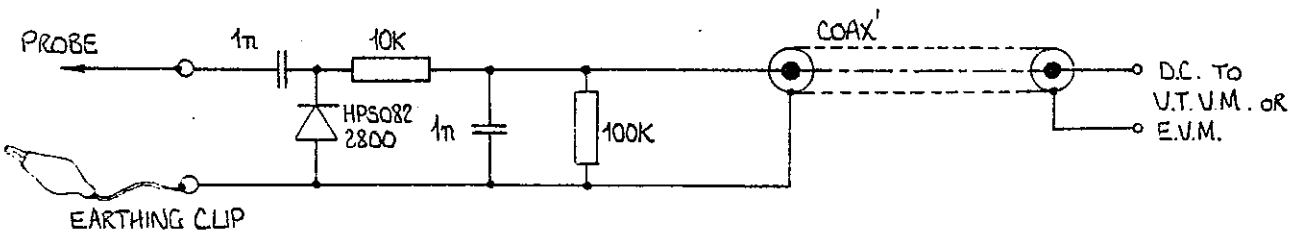
Typical DC voltages measured with digital multimeter and power supply voltage 13.8 at socket, crystal removed, Tx enable low (transmitter on).

Device	Emitter	Base	Collector
Exciter			
Q301	1.6	2.2	4.7
Q302	4.1	4.7	8.2
Q303	0.9	1.7	7.8
Q304	1.1	1.9	7.8
Q305	1.1	1.9	7.8
Q306	1.1	1.9	7.8
Q307	0.3	1.0	8.9
Q308	0	0.6	9.0
Q309	0.1	0.8	9.0
Q310	0	0	9.0
Q311	0	0	9.0
Q314	0	0	13.8
Q315	13.8	13.8	0.7
Q316	0	0.7	9.7
Q317 Not Tx	9.0	9.6	13.0
Tx	9.0	9.6	12.5
Q318 Not Tx	13.8	13.0	9.0
Tx	13.7	12.9	9.0
Q319 Not Tx	9.0	8.8	0
Tx	9.0	8.3	9.0
Q320 Not Tx	13.8	13.0	0
Tx	13.7	12.9	9.0
Q321 Not Tx	0	0	13.8
Tx	9.0	9.6	13.1
POWER AMPLIFIER			
Q501	0	0	13.8
Q502	0	0	13.8
Audio Processor (B3536)			
Q1	0	0.64	3.6
Q2	8.5	8.4	0
Q3	0	0.3	0
Q4	0.3	0.7	8.5
Q5	8.5	8.2	0.7
Q6	1.0	1.6	7.6
Q7	8.2	7.6	2.5



(Ideally constructed in a small metal box, using chassis-mounting co-axial sockets as the terminals.)

Figure 4 RF Coupling Device



The probe may be constructed in a plastic felt pen case

Figure 5 Low Voltage RF Probe Circuit

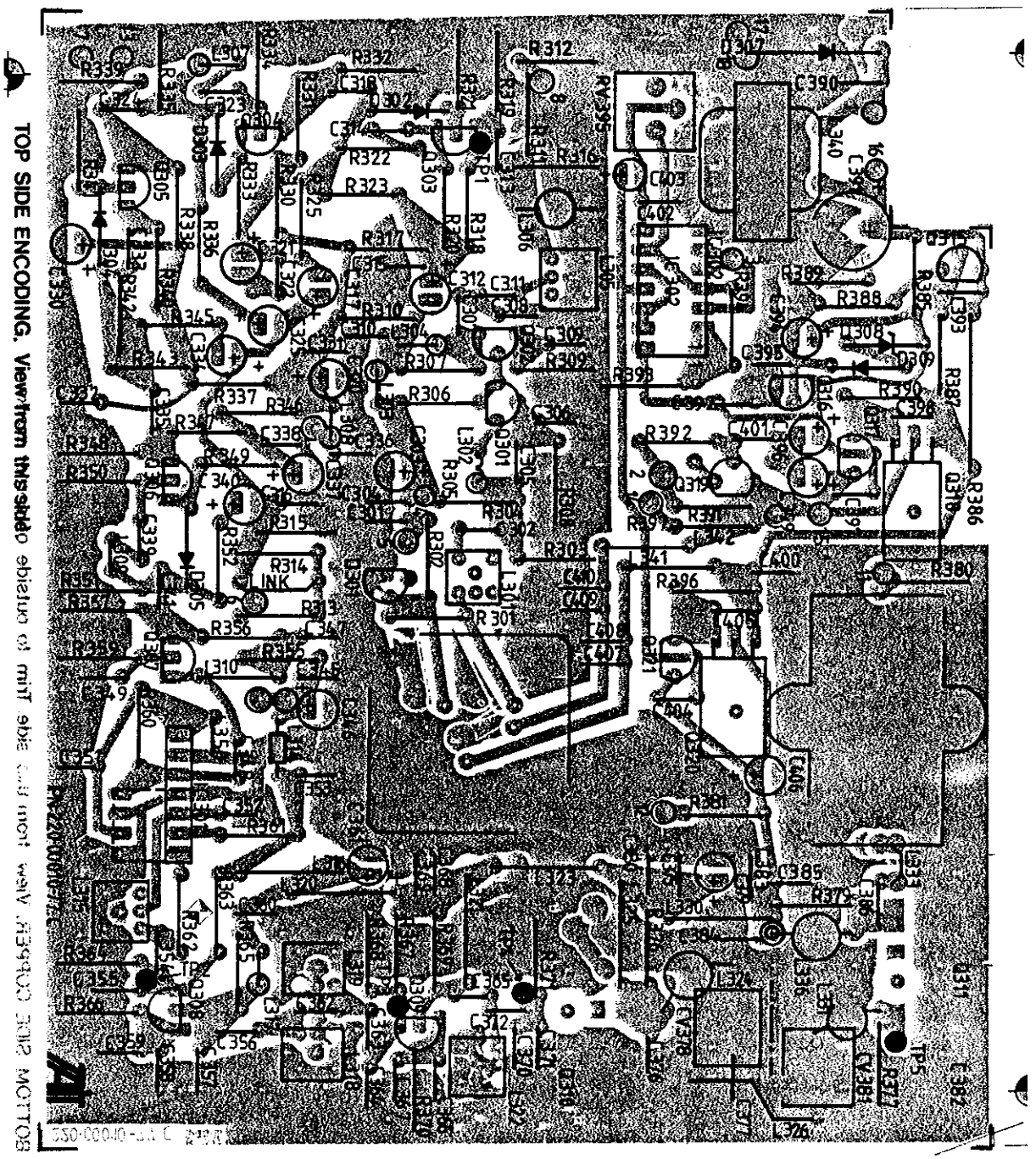


Figure 6 Exciter PCB Encoding

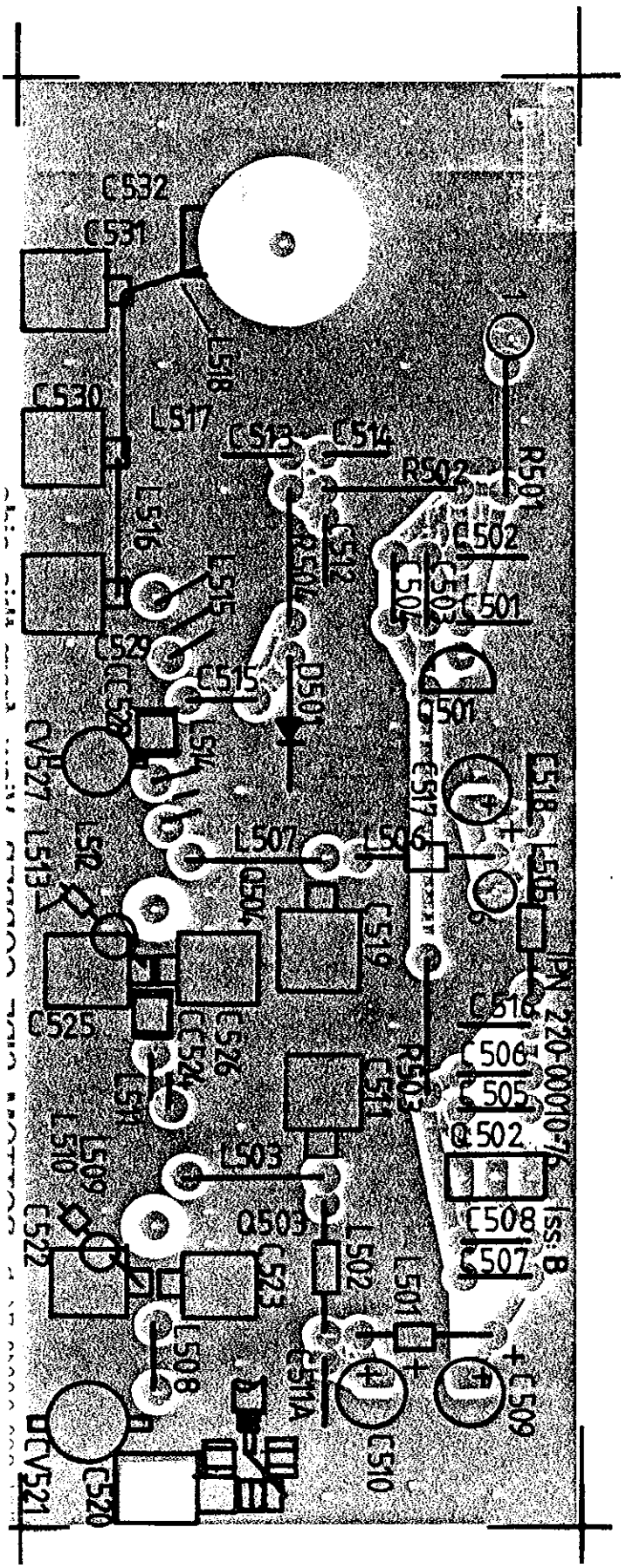


Figure 7 PA PCB Encoding

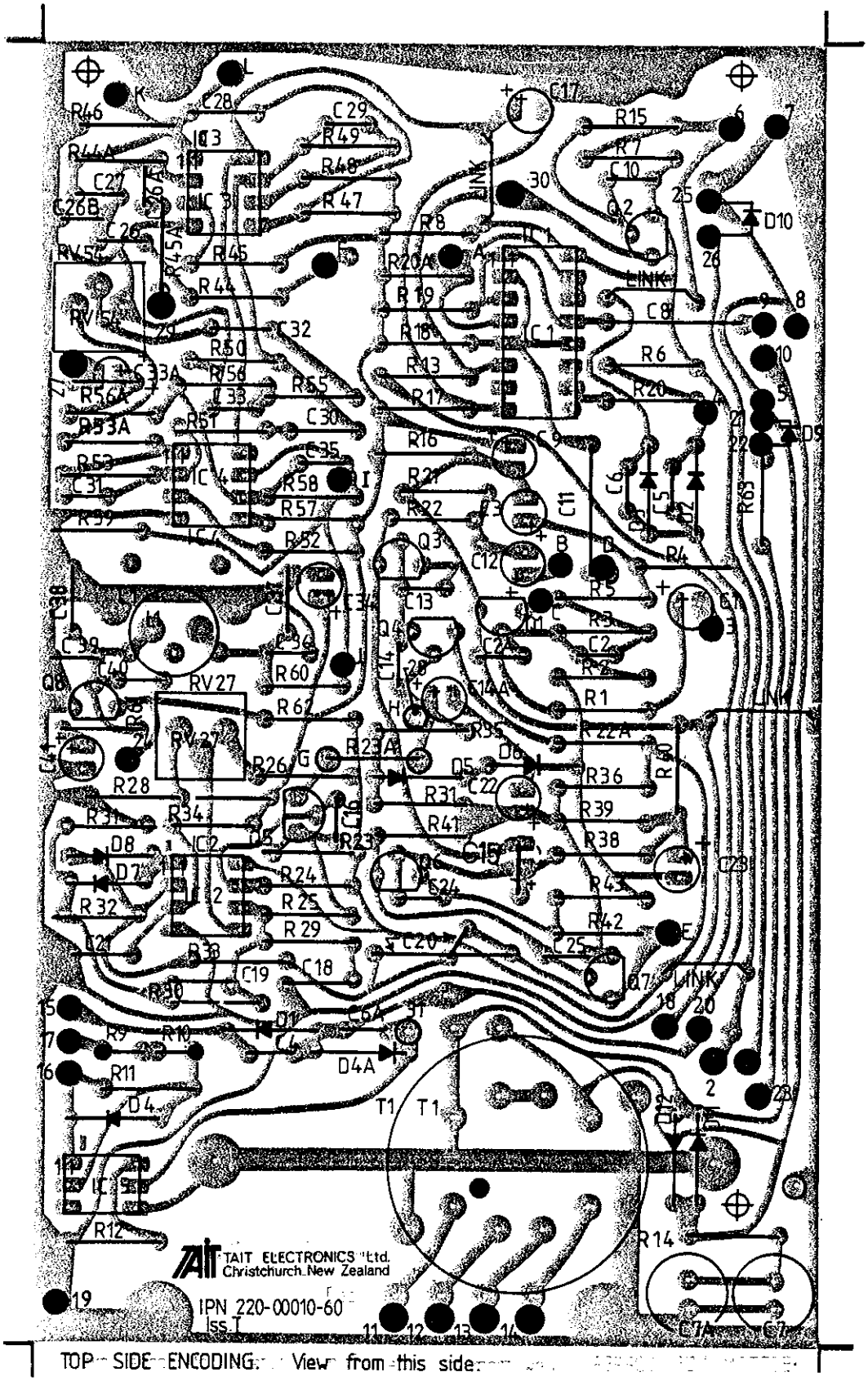
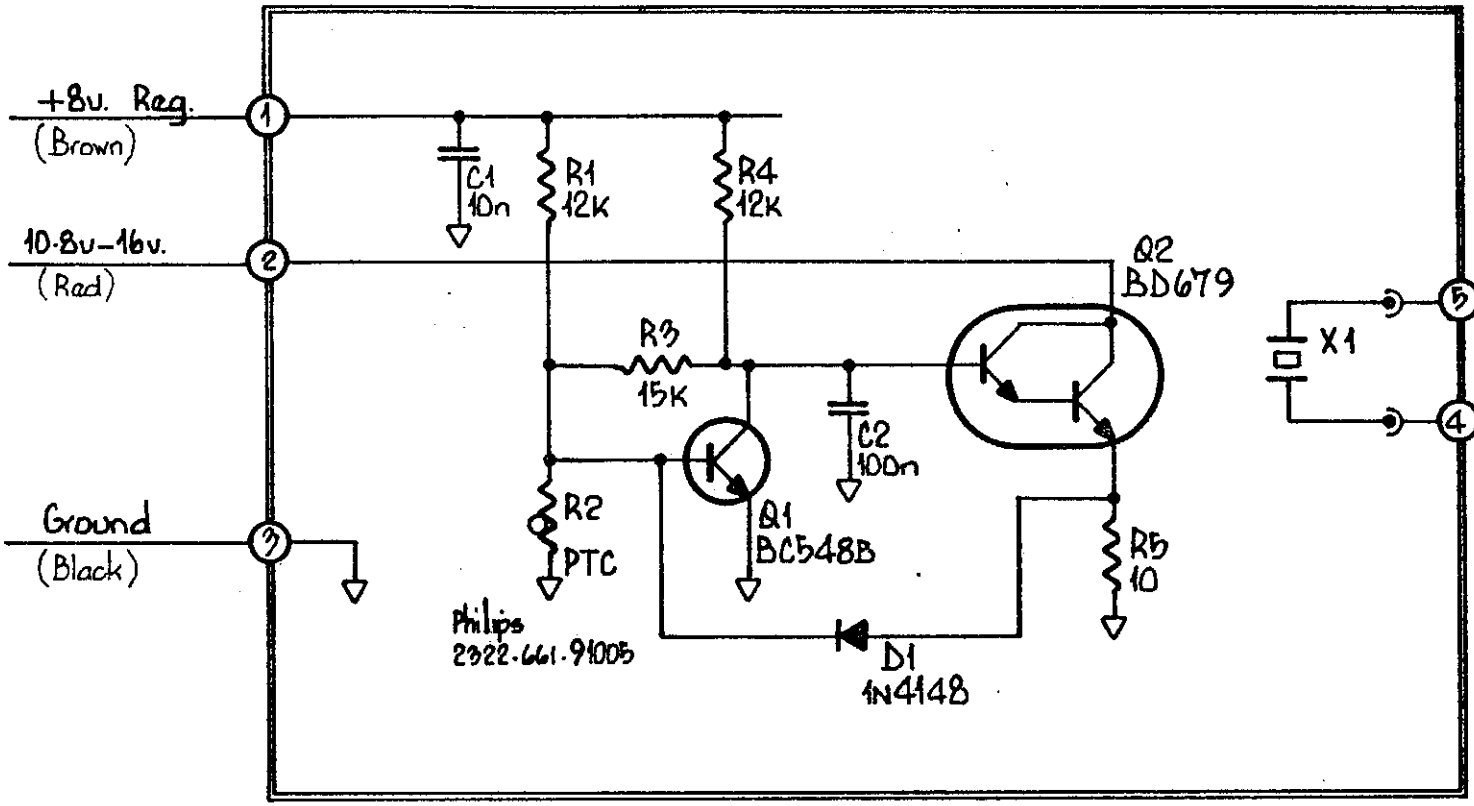
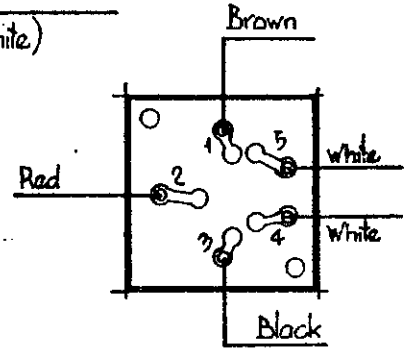


Figure 8 Audio Processor (B3536) PCB Encoding





UNDERSIDE OF EXTERNAL P.C.B. FOR OVEN

USED ON

SCALE :
MATERIAL :
FINISH :
GEN. LIMITS :

Figure 9

IPN

ISS	AMENDMENTS	DRN	CHKD	APVD	DATE
A	ORIGINAL	W.W.	H.O	K.J.F	13/8/82
B	Wire colours & PCB layout added	W.W.	R.R.C.	A.E.	24.2.83

CIRCUIT DIAGRAM—TA-076
CRYSTAL OVEN

TAIT ELECTRONICS LTD.

DRAWING NUMBER A4C403

ISSUE B

SECTION 6 PARTS LIST

6.1 GENERAL

The 10 digit numbers (000-00000-00) in this parts list are 'Internal Parts Numbers' (IPN's).

Your spare parts orders can be handled more efficiently if you quote equipment type, circuit reference, IPN and give a brief description of the part.

6.2 T366 EXCITER PCB ASSEMBLY COMPONENTS

6.2.1 TRANSISTORS

INTERNAL PART NO.	QTY/SET	DESCRIPTION	REFERENCE	CH/N
000-00011-10	3	BC548B TRANSISTOR	Q316, Q317, Q321	
000-00011-30	2	BC557B TRANSISTOR	Q315, Q319	
000-00011-70	2	BD136 TRANSISTOR	Q318, Q320	
000-00020-11	1	BF494 TRANSISTOR	Q301	
000-00031-90	5	MPSH11 TRANSISTOR	Q303, Q304, Q305, Q306 Q307	
000-00031-95	1	MPS3646 TRANSISTOR	Q302	
000-00032-15	1	BFR91A TRANSISTOR	Q310	
000-00032-30	2	2SC1730 TRANSISTOR	Q308, Q309	
000-00032-45	1	MRF261 TRANSISTOR	Q311	

6.2.2 DIODES

001-00011-60	1	SR2607 DIODE	D307	
001-00012-00	1	IN4148 DIODE	D309	
001-00012-55	1	BB204B VARICAP DIODE	D301	
001-00012-68	4	MA47600 DIODE	D302, D303, D304, D305 (DIODES TO BE SELECTED)	
001-00015-16	1	BZX79/C8V2 ZENER	D308	

6.2.3 INTEGRATED CIRCUITS

002-00014-80	1	UPC555 INT CCT	IC 301	
002-00014-91	1	4001B INT CCT	IC 302	

6.2.4 CAPACITORS

0 1 1 0 1 1 0 0 0 1	1	1P0 CAP P100 63V ±0.25P	C362
0 1 1 0 1 3 3 0 0 1	1	3P3 CAP NP0 63V ±0.5P	C376
0 1 1 0 1 6 8 0 0 1	6	6P8 CAP NP0 63V ±0.5P	C371, C377, C385, C400, C408 C410
0 1 1 0 2 1 0 0 0 1	2	10P CAP NP0 63V ±0.5P	C314, C333
0 1 1 0 2 1 8 0 0 1	1	18P CAP N150 63V 5%	C307
0 1 1 0 2 2 2 0 0 1	4	22P CAP N150 63V 5%	C323, C339, C354, C372
0 1 1 0 2 2 7 0 0 1	4	27P CAP N150 63V 5%	C311, C363, C380, C384
0 1 1 0 2 3 3 0 0 1	2	33P CAP N150 63V 5%	C306, C349
0 1 1 0 2 3 9 0 0 1	2	39P CAP N150 63V 5%	C356, C357
0 1 1 0 2 4 7 0 0 1	1	47P CAP N150 63V 5%	, C386
0 1 1 0 2 5 6 0 0 1	1	56P CAP N150 63V 5%	C355
0 1 1 0 2 6 8 0 0 1	2	68P CAP N150 63V 5%	C308, C370
0 1 1 0 2 6 8 0 0 6	1	68P CAP N750 63V 5%	C305
0 1 1 0 2 8 2 0 0 1	1	82P CAP N150 63V 5%	C364
0 1 1 0 3 1 0 0 0 1	1	100P CAP N150 63V 5%	C302
0 1 1 0 3 2 2 0 0 1	3	220P CAP N750 63V 10%	C358, C366, C369
0 1 1 0 4 1 0 0 0 1	19	1n CAP T/C B 63V 10%	C313, C318, C324, C335 C341, C348, C365, C375 C388, C393, C395, C397 C398, C401, C402, C404 C405, C407, C409
0 1 1 0 4 4 7 0 0 2	23	4n7 CAP T/C B 63V 10%	C301, C304, C309, C310 C315, C316, C332, C331 C332, C336, C338, C345 C347, C350, C361, C362 C353, C389, C340, C367 C368, C390, C392
0 2 0 0 5 1 0 0 0 3	14	10µ CAP 50V ELECTRO 5x11mm VERT	C303, C312, C317, C320 C321, C325, C330, C334 C337, C340, C346, C361 C379, C396,
0 2 0 0 9 2 2 0 0 1	1	220µ CAP 16V ELECTRO 10x12.5mm VERT	C391
0 2 5 0 7 3 3 0 0 2	2	3µ3 CAP 16V TANT 20% 4x7	C394, C403
0 2 5 0 8 1 0 0 0 1	2	10µ CAP 16V TANT 20% 5x8mm	C399, C406
0 2 8 0 2 1 0 0 0 0	2	2-10P CAP TRIM. JACKSON 5640/PM	CV378, CV381
0 2 9 0 2 1 5 0 0 2	1	15P CAP CASE MICA UNELCO 3HS	C382

6.2.5 RESISTORS

036021000 1	1	10E RESISTOR 3.2x1.6 CHIP 5% M/F	R378	83/4-653
036022200 1	1	22E RESISTOR 3.2x1.6 CHIP 5% M/F	R375	83/4-663
030024700 0	11	47E RESISTOR 7x2.5mm 5% C/F	R305, R317, R322, R330 R337, R342, R346, R355 R361, R362, R370	
030026200 0	3	62E RESISTOR 7x2.5mm 5% C/F	R311, R312, R316	
030031000 0	8	100E RESISTOR 7x2.5mm 5% C/F	R310, R320, R321, R359 R364, R397, R360, R387	
030032200 0	6	220E RESISTOR 7x2.5mm 5% C/F	R333, R334, R340, R341 R349, R350	
030033300 0	1	330E RESISTOR 7x2.5mm 5% C/F	R308	
030034700 0	3	470E RESISTOR 7x2.5mm 5% C/F	R377, R385, R389	
030035600 0	1	560E RESISTOR 7x2.5mm 5% C/F	R372	
030036800 0	1	680E RESISTOR 7x2.5mm 5% C/F	R306,	
030036802 0	1	680E RESISTOR 4x1.6mm 5% C/F	R381	83/4-699
030041000 0	9	1K RESISTOR 7x2.5mm 5% C/F	R301, R302, R364, R368, R369, R371, R376 R390, R396	
030042200 0	4	2K2 RESISTOR 7x2.5mm 5% C/F	R307, R313, R319, R365	
030043300 0	3	3K3 RESISTOR 7x2.5mm 5% C/F	R357, R360, R388	
030044700 0	9	4K7 RESISTOR 7x2.5mm 5% C/F	R319, R325, R332, R336 R339, R345, R348, R352 R393	
030046800 0	1	6K8 RESISTOR 7x2.5mm 5% C/F	R303	
030051000 0	4	10K RESISTOR 7x2.5mm 5% C/F	R302, R367, R391, R392	
030051500 0	6	15K RESISTOR 7x2.5mm 5% C/F	R304, R318, R331, R338 R347, R363	
030052200 0	2	22K RESISTOR 7x2.5mm 5% C/F	R315, R356	
030056800 0	1	68K RESISTOR 7x2.5mm 5% C/F	R343	SELECTED IN CONJUNCTION WITH PIN DIODES
030061000 0	1	100K RESISTOR 7x2.5mm 5% C/F	R335,	
030061200 0	1	120K RESISTOR 7x2.5mm 5% C/F	R351	
030061800 0	1	180K RESISTOR 7x2.5mm 5% C/F	R333,	
030064700 0	1	470K RESISTOR 7x2.5mm 5% C/F	R394	
035011200 1	1	1E2 RESISTOR 5x13mm 5% W/W	R386	83/01-694
042071000 8	1	1M PRE-SET RES FLAT CERMET (63P)	RV395	

6.2.6 COILS

050000161 7	1	COIL TRIT No 617	L301
050000162 2	2	COIL TRIT No 622	L305, L315
050000162 3	3	COIL TRIT No 623	L318, L319, L332
051000048 5	2	COIL TRIT No 485 (HELICAL RESONATOR)	L334, L335
051000048 7	1	COIL TRIT No 487 (2·5T/3mm VERT)	L324,
051000049 1	1	COIL TRIT No 491 (2·5T/3mm VERT)	L331
051000048 2	1	COIL A/W No 482 (HARBAN)	L333
051000111 8	1	COIL A/W 3½T/3mm VERT	L306
051000112 6	1	COIL A/W 5½T/4mm VERT	L336
056000021 00	4	FXD IND TYPE 100 3·3μH	L303, L304, L308, L310
056000021 01	6	FXD IND TYPE 101 1·5μH	L307, L309, L316, L317 L320, L321
056000021 04	5	FXD IND TYPE 104 330mH	L323, L325, L330, L341 L342
056000021 06	1	FXD IND TYPE 106 2mH	L340
065000010 04	3	FERRITE BEAD 4×2×5 F8	L302, L314, L322
065000020 03	3	GLASS BEAD	FIT WITH L302 & L332 (TO KEEP THE FERRITE OFF THE BOARD)
061000010 20	2	FORMER PTFE A4M765	
066000010 20	2	TUNING SLUG, BRASS A4M764	HELICAL RESONATOR
308000010 42	1	HOUSING, HELICAL RESONATOR A2M1451	
352000010 50	2	NUT ¼ UNF, TRIMMER SCREW NUT	

6.2.7 HARDWARE

220000010 77	1	PRINTED CCT BOARD T366 EX	AIC386
319000010 09	1	SHIELD A4M1000	
349000020 03	2	SCREW 4-40×¼ PAN POZI TAPTITE	RESONATOR MTG.
345000040 06	2	SCREW M3×8mm PAN POZI ST BZ	MTG Q318, Q320
352000010 08	2	NUT M3 HEX COLD FORM	
353000010 15	2	WASHER M3 FIBRE	
356000010 26	50	HARWIN TRACK PINS	
362000010 06	2	MICA INSULATOR TO-126	MTG Q318, Q320

6.3 T366 PA ASSEMBLY COMPONENTS

6.3.1 TRANSISTORS

0000001170	1	BD136 TRANSISTOR	Q502	
0000001110	1	BC548B TRANSISTOR	Q501	
0000003247	1	MRF 559 TRANSISTOR	Q503	
0000003255	1	MRF 870A TRANSISTOR	Q504	

6.3.2 DIODES

0010001350	1	2800 DIODE	D501

6.3.3 CAPACITORS

0111015001	1	1P5 CAP P100 63V ±0.25P	C515
0111016801	5	6P8 CAP NP0 63V ±0.5P	C501, C503, C505, C508 C514
0111022701	1	27P CAP N150 63V 5%	C513
0111041001	6	1n CAP T/C B 63V 10%	C502, C504, C506, C507 C512, C516
0111044701	2	4n7 CAP T/C B 63V 10%	C511A, C518
0115032201	2	220P CAP NP0 10% CHIP	C524, C528
0200071002	2	1µ CAP 50V ELECTRO 5×11mm VERT	C510, C517
0200073301	1	3µ3 CAP 50V ELECTRO 5×11mm VERT	C509
0280140001	2	1/4P TRIM CAP PTFE	CV521, CV527
0290139002	3	3P9 CAP CASE MICA UNELCO 3HS	C520, C529, C532
0290168002	2	6P8 CAP CASE MICA UNELCO 3HS	C530, C531
0290210002	3	10P CAP CASE MICA UNELCO 3HS	C522, C523, C525 93/4-649
0290212002	1	12P CAP CASE MICA UNELCO 3HS	C526
0290268002	2	68P CAP CASE MICA UNELCO 3HS	C511, C519

6.3.4 RESISTORS

0300368000	2	680E RESISTOR 7×2.5mm 5% C/F	TR502, TR503
0300422000	1	2K2 RESISTOR 7×2.5mm 5% C/F	TR501
0300447000	1	4K7 RESISTOR 7×2.5mm 5% C/F	TR504
0360210001	1	10E RESISTOR 3.2×1.6 CHIP 5% M/F	RC506 93/4-653
0360368001	2	680E RESISTOR 3.2×1.6 CHIP 5% M/F	RC505, RC507 93/4-653

6.3.5 COILS

0	5	1	0	0	0	0	4	8	2	1	COIL [illegible]	L508	
0	5	1	0	0	0	0	4	8	3	1	COIL [illegible]	L516, L517, L518	
0	5	1	0	0	0	1	0	1	2	1	COIL A/W 1½T/3mm HOR.	L507	83/01-544
0	5	1	0	0	0	1	0	1	0	2	COIL A/W 1½T/2.3mm HOR	L511, L514	
0	5	1	0	0	0	1	0	1	3	1	COIL A/W 1½T/3.5mm HOR	L515	
0	5	1	0	0	0	1	0	1	8	1	COIL A/W 3½T/3mm HOR	L503	83/01-544
0	5	1	0	0	0	1	1	1	5	2	COIL A/W 2½T/3mm VERT	L509, L512	
0	6	5	0	0	0	1	0	0	4	6	FERRITE BEAD 4×2×5 F8	L501, L502, L505, L506 L510, L513	
0	6	5	0	0	0	2	0	0	3	4	GLASS BEADS 4×3×1.2mm	TO KEEP L501, L502, L505, L506 BEADS OFF PCB.	83/04-695

6.3.6 HARDWARE

2	0	6	0	0	0	1	0	1	1	100mm	COAX CABLE RG316-U	Reel A4M1781/28	83/01/544
2	2	0	0	0	0	1	0	7	6	1	PRINTED CCT BOARD T366 PA	A2:287	
3	5	6	0	0	0	1	0	2	6	26	HARWIN TRACK PIN		

6.4 T366 MECHANICAL COMPONENTS

0	0	6	0	0	0	1	0	1	1	1	TLR 124 LED	TX	
0	0	8	0	0	0	1	0	1	5	1	TLG 124 LED.	SUPPLY	
0	1	2	0	4	1	0	0	0	1	17	CAP 1n CERAMIC FEED THRU		82/12-524
0	4	0	0	5	1	0	0	1	2	1	10K LOG POT LESS SW. SLOTTED SHAFT	LINE SENSITIVITY	
0	4	4	0	4	2	0	0	0	3	1	2K TRIM RES. 10T ANL MTG. 43P202.T601	TRIMMER CONTROL RV401.	
0	6	5	0	0	0	1	0	0	4	15	FERRITE BEAD F8 4×2×5		
0	6	5	0	0	0	2	0	0	3	17	GLASS BEAD		82/12-524
2	3	2	0	0	0	1	0	1	0	1	SWITCH, PUSH ON. SPST		
2	4	0	0	0	0	2	0	0	2	1	PLUG, STEREO		
2	4	0	0	0	0	2	0	5	5	1	PLUG 15WAY 'D' RANGE		
2	4	0	0	2	0	2	0	0	4	1	SKT STEREO PHONE		
2	4	0	0	2	1	0	0	0	1	1	SKT COAXIAL TYPE 'N' PANEL MTG	SE150451N	
2	5	2	0	0	0	1	0	1	2	1	MICROPHONE 600Ω		
3	0	2	0	0	0	5	1	6	4	1	PA SHIELD MTG BRACKET A4M1428		82/12-524
3	0	2	0	0	0	5	1	6	0	1	BRACKET FEED THRU A4M1450		83/2-592
3	0	2	0	0	0	5	1	6	5	1	PCB SUPPORT BRACKET A4M1499		82/12-524
3	0	3	0	0	1	1	1	4	0	2	CHASSIS SIDE PLATE A2M1125		

306	0001	10	10	2	FERRULE	A4M1948						
306	0001	10	07	1	HANDLE	A4M1949						
309	0001	10	32	1	INSULATION SHEET	A4M1507	UNDER PA BOARD					82/01-524
316	0006	29	11	1	FRONT PANEL A2A265	A3M1440						
316	0021	14	11	1	CHASSIS FRONT PANEL	A2M1285						
316	0085	00	90	1	PEM MTG PLATE	A4M1500						82/12-524
316	0021	15	21	1	CHASSIS REAR PANEL	A3M1452						
316	0085	01	15	2	PIN, LOCATING	A4M775						
319	0020	04	51	1	SLEEVE	A2M970						
319	0030	03	31	1	SPACER	A4M1339						
319	0001	08	61	1	SHIELD PA	A3M1497						82/12-524
345	0004	00	98	8	SCREW M3 x 6mm CSK POZI ST BZ.		SLEEVE					
345	0004	00	10	6	SCREW M3 x 6mm PAN POZI ST BZ.		PA ASSY MTG, SIDES TO CHASSIS REAR PCB SUPPORT BRKT MTG.					82/12-524
345	0004	00	11	2	SCREW M3 x 10mm PAN POZI ST BZ.		'N' CONNECTOR MTG & FEED THRU BRKT					82/12-524
345	0004	00	20	4	SCREW M3 x 8mm BUTTON SKT BLK		FRONT PANEL MTG.					
349	0002	00	24	4	SCREW 4-40 x 1/4" CSK POZI TAPTITE		SIDES TO CHASSIS FRONT					
349	0002	00	13	9	SCREW 4-40 x 1/4" PAN POZI TAPTITE		PCB TO CHASSIS, PA SHIELD					82/12-524
349	0002	00	29	3	SCREW 4-40 x 3/8" PAN POZI TAPTITE		PA SHIELD MTG BRKT - PCB SUPPORT. HEL PCB					82/12-524
352	0001	00	82	2	NUT M3 HEX		'N' CONNECTOR					82/12-524
352	0001	02	92	2	NUT M4 NYLOC		HANDLE					
352	0001	04	32	2	NUT M3, LOCATING PIN,	A4M793						
353	0001	01	02	3	WASHER M3 FLAT							82/12-524
353	0001	01	22	2	WASHER M3 SPRING		LOCATING PIN					
353	0001	01	32	4	WASHER M3 SHAKEPROOF		PA SHIELD MTG, PCB SUPPORT BKT MTG					
353	0002	04	42	1	WASHER, FIBRE	A4M779	STEREO SKT MTG					
354	0001	03	32	18	M3 PEM INSERTS		SUPPLY TO MANUFACTURER OF SIDE PLATES, CHASSIS FRONT & REAR					82/12-524
358	0001	01	72	2	EYELET M3 x 4mm FM3040		(PEM MTG PLATE)					82/12-524
360	0001	04	02	1	SNAP BUSHING BLK HEYCO		(LINE SENSITIVITY)					
360	0001	02	12	1	RUBBER GROMMET 1/4" AS 314/3		CONN FEED THRU					82/12-524
360	0001	04	12	1	SHORTY BUSH BLK HEYCO		(POWER)					
362	0001	03	02	2	LED MTG GROMMET							

6.5 T366 WIRE LIST

200	0001	02	05	1.25m	WIRE 1/0.5mm TINNED COPPER		750mm					
201	0003	00	01	950mm	WIRE 7/0.2mm PVC BROWN		260, 270, 420mm					
201	0003	00	02	1.050M	WIRE 7/0.2mm PVC RED		2x50, 100, 260, 270, 330mm					
201	0003	00	03	1.180M	WIRE 7/0.2mm PVC ORANGE		260, 2x270, 380mm					
201	0003	00	04	560mm	WIRE 7/0.2mm PVC YELLOW		260, 300mm					
201	0003	00	06	55mm	WIRE 7/0.2mm PVC BLUE		55mm					
201	0003	00	07	360mm	WIRE 7/0.2mm PVC VIOLET		360mm					

201000300 8	680mm	WIRE 7/0.2mm PVC GREY	320, 360mm	
201000301 0	380mm	WIRE 7/0.2mm PVC BLACK	2×50mm, 100mm, 180mm	
201000502	100mm	WIRE 27/0.2mm PVC RED (14$ AUTO)	100mm	
201000501 0	100mm	WIRE 23/0.2mm PVC BLACK (14$ AUTO	100mm	
400002001	750mm	0.7mm SILICON SLEEVING		
400002005	120mm	1.5mm SILICON SLEEVING	LED's	

6.6 TA-076 CRYSTAL OVEN COMPONENTS

000000111 0	1	BC548B TRANSISTOR	Q1	83/01-532
000000130 0	1	BD679 TRANSISTOR	Q2	
001000120 0	1	1N4148 DIODE	D1	
019051000 0	1	10m CAP 50V MONO	C1	
019061000 0	1	100m CAP 50V MONO	C2	
030021000 0	1	10E RESISTOR 10×4mm 5% C/F	R5	83/01-532
030051202 0	2	12K RESISTOR 4.5×1.6m 5% C/F	R4, R1	83/01-532
030051502 0	1	15K RESISTOR 4.5×1.6m 5% C/F	R3	83/01-532
046039000 1	1	P.T.C. PHILIPS 661-91005 (7.5mm RED)	TR2	
209001018	0.4gm	WIRE 0.5 CONSTANTAN	5 × 35mm LENGTHS	83/04-660
225000110 9	1	PRINTED CCT BOARD TA-076		
225000111 0	1	PCB, OVEN BASE		
240040202 2	2	SKT MINIATURE AMP 4-330808-9	XTAL	
303001115 1	1	CHASSIS A4M1454		
308001304 9	1	HEATSINK XTAL/TRANSISTOR A4M1459		83/12-527
309000103 5	4	THERMAL INSULATION SPACER BLOCK A4M1458		
309000103 6	2	THERMAL INSULATION SPACER BLOCK A4M1457		
312000100 9	1	LID A4M1455		
319003003 9	1	SPACER, RUBBER A4M1501		82/2-527
345000402 2	2	SCREW M3×40mm PAN SLOT ST BZ		
362000100 7	1	INSULATING SHEET SILICON RUBBER	— 2½ overall to fit	
352000100 8	2	NUT M3 HEX		
353000101 0	2	WASHER M3 FLAT BZ		
353000101 3	2	WASHER M3 SHAKEPROOF		
400002005	12 mm	1.5mm SILICON SLEEVING	(FIT OVER BODY OF R4 (5mm) 7mm " PTC LEADS	
365000110 6	1	LABEL TITLE & FREQ s/A. A9A271		

6.7 B3536 AUDIO PROCESSOR COMPONENTS

6.7.1 TRANSISTORS

0000001066		BC337-40 TRANSISTOR	Q3	1
0000001110		BC548B TRANSISTOR	Q1, Q4, Q6	3
0000001130		BC557B TRANSISTOR	Q2, Q5, Q7, Q8	4

6.7.2 DIODES

0010001170		1N4001 DIODE	D1, D2, D3, D4	4
0010001200	82/08-368	1N4148 DIODE	D5, D6, D7, D8, D9A	5

6.7.3 INTEGRATED CIRCUITS

0020001240		MLM358P INT CCT	Ic2, Ic3, Ic4	3
0020001530		CD4053 INT CCT	Ic1	1
0020002050		4N25A OPTO COUPLER	Ic5	1

6.7.4 CAPACITORS

0110122001		2P2 CAP NP0 63V	C31	1
0110247001	82/09-392	47P CAP N150 63V 5%	C29, C36B	2
0110310001	82/01-021 C/N 1702	100P CAP N150 63V 5%	C14, C16, C25, C40, C24	5
0110322001		220P CAP N750 63V 10%	C19	1
0110410001	82/01-021 82/08-368	1n CAP T/E B 10% 63V	C4, C5, C6, C10, C13, C28A C6A	7
0200071002	83/02-576 82/02-051	1µ CAP 50V ELECTRO 5x11mm VERT	C12, C15, C34	3
0200074702		4µ7 CAP 50V ELECTRO 5x11mm VERT	C41	1
0200074709	83/02-576	4µ7 CAP 50V ELECTRO NON BIARISED VERT	C7, C7A, C20	3
0200061003		10µ CAP 50V ELECTRO 5x11mm VERT	C1, C14A, C23	3
0200092201		22µ CAP 16V ELECTRO 5x11m.. VERT	C3, C9, C22	3
0200091003		100µ CAP 16V ELECTRO 8x11mm VERT	C17	1
0220422001		2n2 CAP 50V MYLAR VERT	C2	1
0220522001	83/02-576 82/02-051	22n CAP 50V MYLAR VERT	C35	1
0220547001		47n CAP 50V MYLAR VERT	C21, ~~C36, C39~~	1
0220568002	C/N 2115	68n CAP 50V MYLAR VERT	C32	1
0220610001		100n CAP 50V MYLAR VERT	C18, C28, C30	3
0220647001	83/02-576	470n CAP 100V PETP VERT	C8, C11,	2

6.7.5 RESISTORS

0300333000		330E RESISTOR 7x2.5mm 5% C/F	TR11	1
0300356000		560E " " " " "	TR1, , TR14	2
0300368000		680E " " " " "	TR23, , TR63	2
0300410000		1K " " " " "	TR4, TR32A, TR36, TR62	4
0300412001		1K2 " 10 x 4mm " "	TR9, TR10	2
0300422000	82/04-120	2K2 " 7 x 2.5mm	TR2, R24	2
0300427000		2K7 " " " " "	R46, R56	2
0300433000		3K3 " " " " "	TR59	1
0300439000		3K9 " " " " "	TR5	1
0300447000		4K7 " " " " "	TR29	1
0300468000	82/04-120 C/N 1702	6K8 " " " " "	, TR43 , R53A	2

0300510000	83/02-576 82/12-818	10K RESISTOR 7x2.5mm 5% C/F	TR3, TR6, TR7 , TR22, TR40, TR41, TR50 (LINK R33A G-H)	8
0300512000		12K " " " " "	, TR45	1
0300515000		15K " " " " "	TR42	1
0300518000		18K " " " " "	TR55	1
0300539000		39K " " " " "	TR39	1
0300547000	82/12-513	47K " " " " "	TR21, R16, , TR33, TR48	4
0300568000	82/12-513	68K " " " " "	, TR31, TR38	2
0300582000	82/12-513	82K " " " " "	TR26	1
0300610000	82/12-513	100K " " " " "	TR13, TR15, TR18, TR19, TR20 R20A, R28	7
0300612000		120K " " " " "	TR51	1
0300618000		180K " " " " "	TR47	1

0300622000		220K RESISTOR 7x2.5mm 5% C/F	TR35	1
0300639000		390K " " " " "	TR12, R49	2
0300710000		1M " " " " "	TR32, TR34, TR57, TR58	4
0300722030		2M2 " " " 10%	TR37, TR52, TR53	3
0320547000	82/12-513	47K RESISTOR 7x2.5mm 1% M/F	R25, R30	2
0320482000	82/12-513	8K2 RESISTOR 7x2.5mm 1% M/F	R17	1
0320510000	82/12-513	10K RESISTOR 7x2.5mm 1% M/F	R8	1
0420450008	82/12-513	5K RES. PRESET CERMET FLAT 63P	, RV54	1
0420547009	82/12-513	50K RES PRESET CERMET SP63P	RV27	1

6.7.6 PCB MISCELLANEOUS

0530000101 7		TRANSFORMER TRIT 4030	T1	1
0560000220 2	82/03-087	IND FXD TYPE 202 68 µH SHIELDED	L1	1
2200000106 0		PC B B3536		1

6.8 C3536/02 PARTS TO MAKE B3536/02 (3.4KHz FILTER)

0220415001	1	1n5 CAP 50V MYLAR VERT	C27	
0220510001	1	10n CAP 50V MYLAR VERT	C26	
0220515001	1	15n CAP 50V MYLAR VERT	C35	
0220547001	3	47n CAP 50V MYLAR VERT	C33A, C36, C32	2149
0300356000	1	560E RESISTOR 7x2·5mm 5% c/F	R44	
0300382000	1	820E " " " "	R60	
0300510000	1	10K " " " "	R61	
0300512000	1	12K " " " "	R44A	
0300615000	1	150K " " " "	R56A	2149

6.9 BASIC GUIDE

2400201054		SOCKET 15 WAY D RANGE DAF 15S		1
3070000201 2		GUIDE (STANDARD) A2M950		1
3160085068		FRONT PLATE A2M910	SKT BOX	1
3160085071		FLOAT PLATE A2M911	SKT BOX	1
	C/N 1979			
3450004009		SCREW M3x6 CSK POZI ST BZ		2
3450004011	C/N 1979	SCREW M3x10 PAN POZI ST BZ		4
3490002002	82/03-108	SCREW 4-40x¼ CSK POZI TAPTITE		8
3530001011		WASHER M3 FLAT ST BZ S.COOKS		2
	C/N 2007			
3990001051	C/N 2045	PLASTIC BAG 75 x 100 mm		1