Tait Electronics (Aust) Pty Ltd

A2000-UIT Ver 1.2

T201X Universal

Interface Telemetry

(AM2K-UIT)

Contents

1.0 Introduction

Please read through this instruction in its entirety prior to installing this product.

The A2000-UIT is a T201X Universal Interface for telemetry purposes. It has primarily been designed for the Tait T2010 and T2015 radios, and in particular the T2015-XXX-A61 & A62 telemetry radios. The A2000-UIT's default link setting are to set suit the T2015-XXX-A61 & A62 telemetry radios.

The A2000-UIT provides buffering and control over the radios control board signals, which helps to protect the radio and external equipment connected to it. The audio amplifier stages provide a wide range of audio level adjustment. Muting of the audio paths in sympathy with its associated gate or PTT signal is carried out automatically, and does not need to be setup

The A2000-UIT supports the T201X radios BCD channel control lines and provides internal channel control via a dip switch and external channel control via external lines.

All of the parts used on the A2000-UIT board are commonly available. The parts list has details of the supplier for each part and the suppliers part number. For external connection, a 9 Way D-range Male connector and cover are provided with each A2000-UIT board.

The A2000-UIT board also has an I/O Signals matrix to enable the I/O connector S21 to have its pins rearranged. This enables the S21 pin configuration to be rearranged to match existing or special requirements.

2.0 Specifications

Supply Voltage	10.8V to 16V DC (Supplied from radio control board)
Supply Current	100mA Max, 10mA Nominal Supplied from radio control board. Current is over and above the normal radio current drain.
Operating Temp	-30 °C to +60 °C ambient
LINE OUT Level	-30dBm to +0 dBm
LINE OUT Impedance	600 ohms
LINE IN	-30dBm to +10 dBm
LINE IN Impedance	50K with LK9 Out (default), 600 ohms with LK9 In
PTT IN	Active Low (Pull to Ground)
GATE OUT	Active Low, Open Collector Transistor, 50mA max.
BCD channel control selectable	T2010 - 4 channels switch selectable internally and 4 channels externally T2015 - 24 channels switch selectable internally and 4 channels selectable externally
+13.8 Supply Output	500mA maximum. In-line resetable circuit protector.
Austel Approval	The A2000-UIT is *Not* Austel Approved

3.0 Components Required

The A2000-UIT kit should contain the components shown here in Table 1.

Table 1 A2000-UIT Packaged Parts

Quantity	Description
1	AM2K-UIT - A2000-UIT Service Manual
3	M3 x 8mm Pozi Drive Taptite Screws
1	DB9 Male Connector Solder Pot
1	DB9 Male Cover

4.0 Fitting

The A2000-UIT mounts inside a T201X mobile radio, at the rear, in the space provided for option board's.   The board has two Micro-MaTch™ connectors, P13A and P14A, that plug into connectors S13 and S14 on the T201X radio control board. The A2000-UIT also has a 16 way Micro-MaTch™ loom (P15A to P15B) that plugs into S15 on the A2000-UIT and to S15 on the T201X radio control board. If the A2000-UIT is to be installed in any other model of T2000 (such as a T2020), the P15A to P15B loom is not used.

Other Tait T2000 option boards often supply two SMD Micro-MaTch™ connectors for the T2000 radio control board's connectors S13 and S14. Because the A2000-UIT is made for the T201X radio, these SMD Micro-MaTch™ connectors are not supplied, as the T201X already has these parts fitted.

4.1 Installation

1. Remove the top cover of the radio by unscrewing the 4 bottom cover screws, unscrew the radio control board and fold it out. Remover the D-range blanking plate in the rear of the T2000 radio. This plate is not normally fitted to Tait T2015-XXX-A61 & A62 telemetry radios.

2. Position the A2000-UIT board behind the radio control board, and connect the Micro-MaTch™ connectors P13, P14, and the loom P15A to P15B, onto the radio control board. The loom P15A to P15B is only used on the T201X radio.

3. On the radio control board, remove the 0 Ohm resistor R513 (if fitted). Refer to the appropriate T2000 service manual to locate R513. Note that the T2010 & T2015 normally has the resistor R513 fitted, even on Series II radios. Not removing it can have various strange effects, such as the mic mute not operating correctly.

4. On the A2000-UIT, remove the two screw locks from the D-range connector S21 and keep for Step 5.a.

T2000 Series II Chassis (longer rear heat sink fins)

5.   a. Carefully fold the radio control board and the A2000-UIT back into position, guiding the 9 way D-range connector S21 through the hole provided in the rear of the T2000 chassis. Screw the radio control board and the A2000-UIT down with the M3 x 8 mm Taptite screws. Fit the two screw locks from Step 4. back into the connector S21 but from the outside of the radio. Refer to Figure 1. below.

T2000 Series I Chassis (shorter rear heat sink fins)

5.   b. Using a 4x40 tap tool, tap the two holes on the rear of the T2000 chassis adjacent to the larger hole for D-range plug. Discard the two screw locks from Step 4. Carefully fold the radio control board and the A2000-UIT back into position, guiding the 9 way D-range S21 through the hole provided in the rear of the T2000 chassis. Screw the radio control board and the A2000-UIT down with the M3 x 8 mm Taptite screws. Refer to Figure 1. below.

Screw Locks for Series II Chassis

Holes Tapped to 4/40 for Series I Chassis

REAR POWER PLUG

S21 Female 9 Way D-range   **A2000-UIT**   **VR1** **LINE OUT**

VR2 **LINE IN**

P15A to P15B Loom   **S15**   **P14**   **P13**

S15   **S14**   **S13**

T2000 RADIO CONTROL PCB
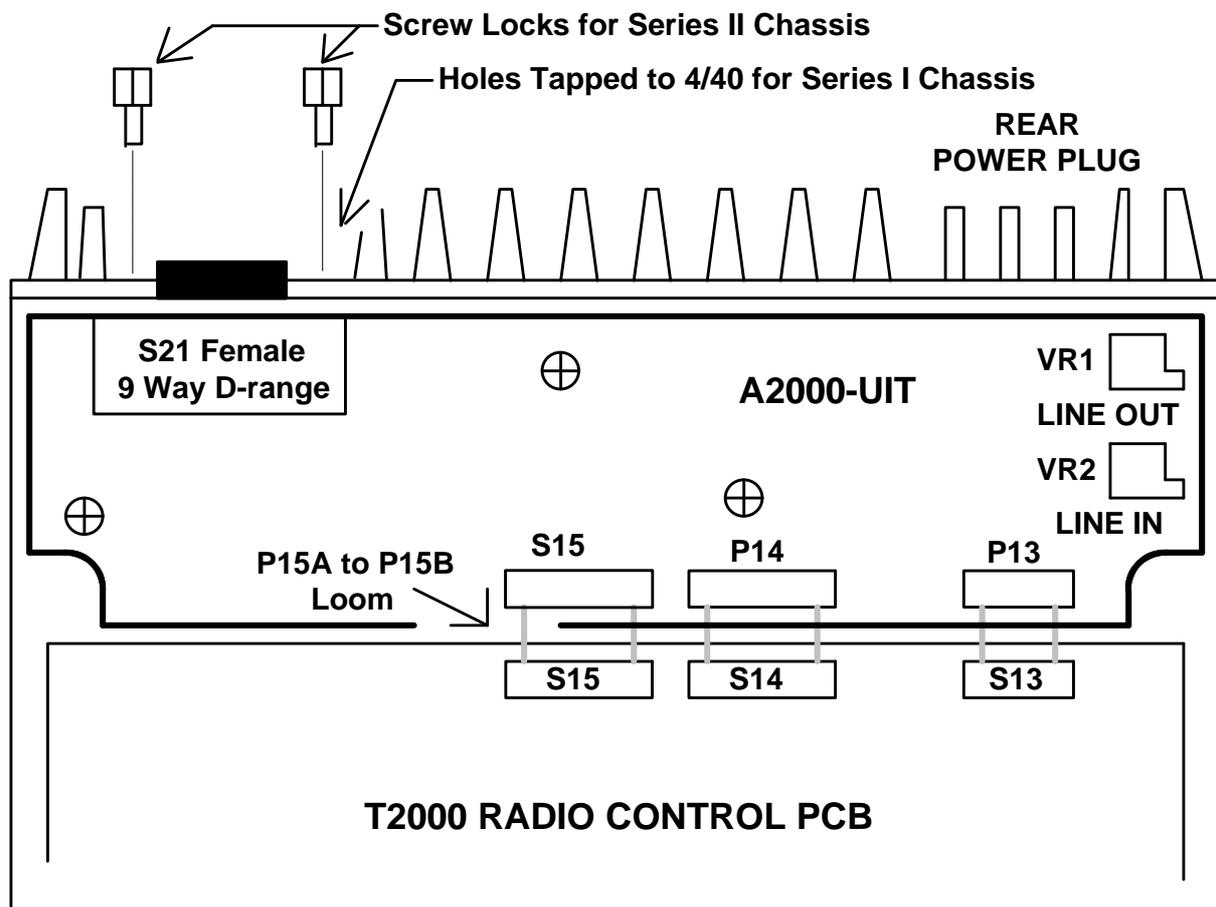
Figure 1.

6.   For details on how to setup the line levels, consult section 4.3. Alignment. For details on how to make external connections, consult section 4.4 External Connections. For details on how to choose the link settings, consult section 4.5 Link Settings. For details on how to implement BCD channel control, consult section 4.6 BCD Channel Control.

Note that the default link settings are setup for the T2015-XXX-A61 & A62 telemetry radios. If the A2000-UIT is being fitted to another T2000 model which does have a control head, link LK7 and LK8 will normally always need to be removed. Please consult section 4.5 Link Settings for more information.

4.2 Installation Options

Listed below are some of the possible options when fitting a A2000-UIT to a Tait T2000 radio.

A2000-RAD Standard Configuration

To configure an A2000-UIT for the A2000-RAD Radtel operation, complete the following steps.

1. Remove all of the solder links from the A2000-UIT solder matrix. Refit new solder links as per Table 2 below.

2. If the A2000-UIT is being used in a radio which does have a control head fitted to it, remove links LK7 and LK8. These are the power switch and volume control bypass links.

3. Fit the solder link LK17. This will route the Spare 16 line to P14/4 RX-GATE.

4. Leave all other solder links on the board as default.

5. The A2000-UIT's serial data lines are in different pin positions now. Refer to section 5.0 Radio Programming for more information.

6. To setup the A2000-UIT line levels, refer to the section 4.3 Alignment – A2000-RD Radtel Alignment.

Table 2 A2000-RAD Matrix Setup

S21 I/O Pin	I/O Signal	Signal
1	3	GROUND
2	16	RX-GATE
3	2	/GATE OUT (Busy)
4	18	+13.8V SW
5	5	LINE IN
6	7	RXD
7	1	LINE OUT
8	8	TXD
9	4	/PTT IN

Remote Radio ON/OFF Control (T201X Only)

Remote Radio ON/OFF is no longer supported on the A2000-UIT Ver 1.1 or greater.

Fitting to T2020, T2030, T2035 or T2040

To fit a A2000-UIT to a T2020, T2030, T2035 or T2040 radio, follow the steps as listed in section 4.1 Installation, but do not use the P15A to P15B 16 way Micro-MaTch™ loom provided with the A2000-UIT board. The T2020, T2030, T2035 and T2040 radios do not support BCD channel control.

The RXD and TXD lines that are normally connected to the T201X radio control board via the loom P15A to P15B, can still be used for the T2020, T2030, T2035 and T2040 radios, but they need to be hard wired from the A2000-UIT board to the radio control board. This only needs to be carried out if you wish to use the data lines for something, e.g. for 'Control Head Simulation'.

The RXD line is available on the A2000-UIT board, at S1 pad marked '1' adjacent IC3. Wire this to #S8 pin 11 on the radio control board. The TXD line is available on the A2000-UIT board, at S1 pad marked '1' adjacent IC3. Wire this to #S8 pin 10 on the radio control board. Refer to the appropriate T2000 service manual to locate these parts.

4.3 Alignment

The alignment of the A2000-UIT should be simple in most cases. All of the boards links are on the bottom of the board, and can be accessed while the board is screwed down. The line level adjusting trim pots can be accessed at the side of the board, near the rear power connector.

LINE OUT Level

1. Apply an on channel RF carrier, modulated with a 1KHz tone to the receiver, at the required nominal system deviation (normally 60%). Normally 1.5 kHz for 12.5KHz Narrow band, or 3 kHz for 25KHz Wide band.

2. Terminate the LINE OUT into equipment the radio is being used with, or terminate the line with the same impedance. The default impedance for alignment is 600 Ohms.

3. Set VR1 for the required line level out. The default level for alignment is -10dBm.

LINE IN Level

1. Inject a 1KHz tone into the LINE IN pin of the I/O connector S21, at the required line level. The default level for alignment is -10dBm

2. Connect a suitable modulation meter to the radio.

3. Set VR2 for the required nominal system deviation (normally 60%). Normally 1.5 kHz for 12.5KHz Narrow band, or 3 kHz for 25KHz Wide band.

A2000-RD Radtel Alignment

1. Apply an on channel carrier to the receiver, with a 1kHz tone at 1.5kHz deviation(NB) or 3.0 KHz(WB) and set VR1 LINE OUT level for 0.4 Volts p-p at LINE OUT S21 pin 7, into a 10K ohm load.

2. Apply a 1KHz tone at 1.2V p-p (0.3v RMS) to LINE IN S21 pin 5. Key the transmitter by grounding PTT S21 pin 9. On the A2000-UIT, set VR2 LINE IN level for 1.5KHz(NB) or 3.0 kHz(WB) transmitted deviation (not including any CTCSS encode deviation).

4.4 External Connections

The external connections on the A2000-UIT board are via a 9 way D-range female connector S21. A 9 way D-range male connector and cover are provided with each A2000-UIT board for making these external connection.

The default S21 DB9F I/O Signals can be seen on Table 3 below and on the circuit diagram. The actual connection of the A2000-UIT to the outside world depends somewhat on its particular application. If required, the S21 pin out can be rearranged, using the I/O Signals matrix. The signals which are available on the I/O Signals matrix can be seen on Table 4 below. Remember, don't rearrange the I/O Signals matrix unless you really need to, as you will have to be doing it every time you setup a radio for the same application every time.

Being able to rearrange the signals on the I/O connectors allows the pin out to be setup to match other equipment if required. Refer to section 4.2 for some of the various installation options.

Table 3 S21 DB9F Default Pin Out

Pin	Signal
1	LINE OUT
2	/GATE OUT
3	GROUND
4	/PTT IN
5	LINE IN
6	RXD
7	TXD
8	BCD0
9	+13.8V SW

Table 4 I/O Signals Matrix Lines

Pin	Signal
1	LINE OUT
2	/GATE OUT
3	GROUND
4	/PTT IN
5	LINE IN
6	LINE IN 2 (N/C)
7	RXD
8	TXD
9	LINE OUT2 (N/C)
10	BCD0
11	BCD1
12	BCD2
13	BCD3
14	/EMRGNCY
15	RSSI
16	SPARE
17	SPARE
18	+13.8V

Table 5 Default Matrix Link Setup

S21 I/O PINS

I/O SIGNALS

9	8	7	6	5	4	3	2	1	
								■	1
							■		2
						■			3
					■				4
				■					5
									6
			■						7
		■							8
									9
	■								10
									11
									12
									13
									14
									15
									16
									17
■									18

4.5 Link Settings

The A2000-UIT's available link setting can be seen on Table 6 below.

Table 6 Links   The default link settings are shown in ***Italic & Underlined***

Link	Function	Choices
LK1	LINE OUT Flat / De-emphasised	***1 to 2 Flat*** / 2-3 De-emphasised
LK2	LINE IN Flat / Pre- emphasised	***1 to 2 Flat*** / 2-3 Pre-emphasised / 2-4 TX LF Input (Flat and Unprocessed)
LK3	LINE IN Input Impedance	IN = 600 Ohms / ***OUT = 50K Ohms***
LK4	RXD Input Phase	IN = Binary 1 a High / ***OUT = Binary 1 a Low***
LK5	TXD Output Phase	IN = Binary 1 a High / ***OUT = Binary 1 a Low***
LK6	+13.8 V OUT	IN = +13.8V Un-Switched / ***OUT = +13.8V Switched***
LK7	Power On Link	***IN = Radio On*** / Out = Radio Not On
LK8	Volume Control Bypass	***IN = Active*** / OUT = Not Active
LK9	Emergency Line to External Line	IN = Yes / ***Out = No***
LK10	GATE OUT Line Source	***1 to 2 BUSY*** / 2-3 RX-GATE / 2-4 CALL-SW (Trunked NPD)
LK11	MIC PTT out the /PTT IN line	IN = Yes / ***Out = No***
LK12	RXD Input Pull Up/Dn Resistor	***1 to 2 Pulled to Ground*** / 2-3 Pulled to +5V
LK13	LINE OUT Mute Control	***IN = LINE OUT is muted*** / Out = LINE OUT is unmuted
LK14	GATE OUT Phase	***1 to 2 Active Low*** / 2-3 Active High
LK15	Spare 16 Pad Routing	IN = Spare16 to P14/9 /Sig-Squlch / ***OUT = N/C***
LK16	Spare 16 Pad Routing	IN = Spare16 to P15/3 N/U / ***OUT = N/C***
LK17	Spare 16 Pad Routing	IN = Spare16 to P14/4 RX-Gate / ***OUT = N/C***

Link Descriptions

LK1 & LK2 are for setting whether the LINE OUT and LINE IN audio lines are for flat or pre/de-emphasised audio. The 2-4 selection is for flat audio input that bypassed the audio processing (limiter).

LK3 is for changing the input impedance of the LINE IN line from 50K Ohms to 600 Ohms.

LK4 & LK5 are for changing the phase of the RXD and TXD data lines. This is only required when the data lines are being used for direct data line control of the radio, and the phase of the data lines need to be reversed. By default the RXD and TXD lines are RS232 logic with TTL voltage levels. For TTL logic with TTL levels, fit LK4, LK5 & LK12. Note that LK12 must always be set to 2-3 whenever LK4 is fitted

LK6 selects whether the I/O Signals matrix line number 18 (+13.8V) has +13.8V Switched or +13.8V Un-Switched on it.

LK7 is the radio power on link. This link is in by default for the Tait T2015-XXX-A61 & A62 telemetry radios. It is required for the telemetry radio to switch on, as it does not have a control head. Remove this link if the A2000-UIT board is used in a normal T201X radio fitted with a control head.

LK8 is the volume control bypass link. This link is in by default for the Tait T2015-XXX-A61 & A62 telemetry radios. It is required for the telemetry radio to bypass the volume control, as it does not have a control head. This provides a fixed volume level out the speaker. Remove this link if the A2000-UIT board is used in a normal T201X radio fitted with a control head.

LK9 is the Emergency Line to External Line link. Fit this link if you want the T201X radio control boards Emergency Line to be routed out to the External Line which goes to the radios rear power connector.

LK10 is the GATE OUT Line Source link. This link selects the source of the GATE OUT line signal. When set to 1-2, the GATE OUT signal comes from the BUSY line, normal for data use. When set to 2-3, the GATE OUT signal comes from the RS-GATE line, normal for voice use or if the receiver has CTCSS decode programmed. When set to 2-4, the GATE OUT signal comes from the CALL-SW line. The CALL-SW line is used for trunking radios and is the 'GO' line to indicate that a non prescribed data call is in progress.

LK11 is the MIC PTT out the /PTT IN line link. Fit this link if you want the local microphones PTT signal to be routed out the /PTT IN line. This allows an external device to look at the state of the local mic PTT when it is not keying the radio itself via the same line. This allows the external device to know if the radio is busy being used by the local operator.

LK12 is the RXD Input Pull Up/Dn Resistor link. Note that LK12 must always be set to 2-3 whenever LK4 is fitted. If not, the radios internal RXD line will be permanently pulled low & the radio will not operate correctly.

LK13 is the LINE OUT Mute Control link. This link can be removed if you require unmuted RX audio to be available at the LINE OUT line. This is sometimes required by certain modems for its internal data carrier detect to operate correctly.

LK14 is the GATE OUT Phase link. The GATE OUT line is active low when this link is set to 1-2 and active high when it is set to 2-3.

LK15, LK16 & LK17 are links that will connect the "Spare 16" pad to various signals. LK15 will connect the "Spare 16" pad to P14/9 which is the /SIG-SQULCH line from the control board. LK16 will connect it to P15/3 N/U which is a not used line on a T201X control board. This enables routing of a spare miscellaneous signals to a T201X control board via connector loom S15/P15 which can then be hard wired to the required place on the control board. This could prevent having to trail a wire between the two PCB's. LK17 will connect it to P14/4 which is the RX-GATE line. Obviously only one of these three links should ever be fitted at the same time.

0 Ohm resistor links are also used on various lines on the A2000-UIT board to allow certain signals to be permanently disabled. Removing the resistor R25 disables the Mic Mute line that goes to S14 pin 8. This then leaves the radios local microphone permanently live.

4.6 BCD Channel Control

BCD channel control on the T201X requires radio firmware version 2.22 or later. If you have a Series II radio control board (PCB IPN 220-01377-0X) with radio firmware before version 2.22, contact you nearest Tait dealer. After upgrading to version 2.22, it is necessary to move the link resistor from #R714 to #R714A on the radio control board. Consult the T2000 Series II service manual to locate these components. The T2010 can have BCD channel control of up to 4 Channels, the T2015 can have up to 24 Channels.

The A2000-UIT board connects to S15 on the T201X radio control board. S15 has the radios BCD channel control lines on it, BCD0 to BCD5. Across these BCD lines the A2000-UIT has an in-line dip switch, SW1. This switch can be used to internally set the radios operating channel.

The last two BCD lines, BCD0 and BCD1 are by default routed via the I/O Signals matrix, to 9 Way D-range connector S21 pins 8 and 9 respectively. This allows up to 4 channels to be selected externally, by hardwire links to ground. BCD lines BCD2 and BCD3 can also be routed via the I/O Signals matrix to the I/O connector S21, but this means sacrificing some of the other default signals on S21. For example, BCD2 and BCD3 could be routed out S21 pins 6 and 7, but then the default signals RXD and TXD would no longer be available externally on these two pins for radio programming. Using BCD lines BCD0 to BCD3, up to 9 channels can be selected externally.

Table 6 below shows the BCD channel control settings. For the internal switch SW1, 1 = On and 0 = Off, for external channel control, 1 = Low and 0 = High.

Table 6 BDC CHANNEL CONTROL TABLE

BCD NUMBER	CHANNEL NUMBER	BCD5	BCD4	BCD3	BCD2	BCD1	BCD0
0	1	1	1	1	1	1	1
1	2	1	1	1	1	1	0
2	3	1	1	1	1	0	1
3	4	1	1	1	1	0	0
4	5	1	1	1	0	1	1
5	6	1	1	1	0	1	0
6	7	1	1	1	0	0	1
7	8	1	1	1	0	0	0
8	9	1	1	0	1	1	1
9	10	1	1	0	1	1	0
10	11	1	0	1	1	1	1
11	12	1	0	1	1	1	0
12	13	1	0	1	1	0	1
13	14	1	0	1	1	0	0
14	15	1	0	1	0	1	1
15	16	1	0	1	0	1	0
16	17	1	0	1	0	0	1
17	18	1	0	1	0	0	0
18	19	1	0	0	1	1	1
19	20	1	0	0	1	1	0
20	21	0	1	1	1	1	1
21	22	0	1	1	1	1	0
22	23	0	1	1	1	0	1
23	24	0	1	1	1	0	0

Table 7 BCD on I/O Signals matrix and S21 Connector

BCD Line	I/O Signals Matrix No	Default S21 Pin No
BCD0	10	8
BCD1	11	9
BCD2	12	N/A
BCD3	13	N/A
BCD4	Not Available	Not Available
BCD5	Not Available	Not Available

5.0 Radio Programming

To enable programming of the T201X radio through the A2000-UIT board make up one of the following programming cable adapters. A RS Components DB9 Male to RJ11 Socket Adapter Part No. 447-623 is used to make up the adapter. Once complete the adapter can be used to connect the standard T2000 programming lead to the A2000-UIT.

If the A2000-UIT's I/O Signals matrix has been altered to provided a different pin out on the I/O connector S21, then the wiring of the programming lead may change. For example, if the I/O Signals matrix is setup to match the A2000-RD board, the TXD program line is moved from pin 7 to pin 8, so any external programming lead would need to be wired to suit this pin configuration.

Figure 4 below shows the programming adapter for the standard A2000-RAD Radtel configuration.
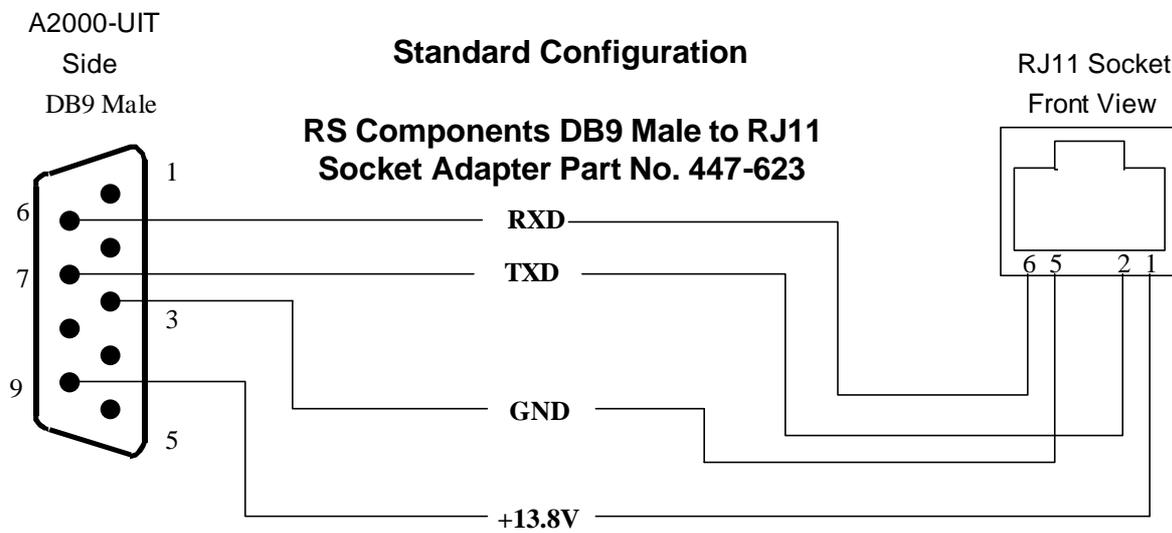

Figure 3
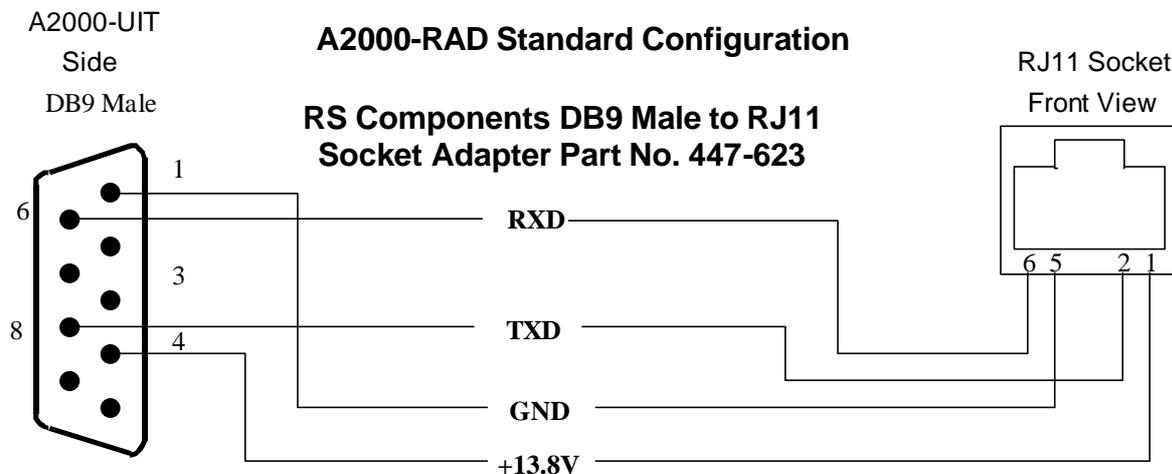
Figure 4

6.0 Circuit Description

The A2000-UIT's main function is to provide easy external interfacing to the T201X radio and to provide buffering and control over the available signals from the T201X radio control board.

The A2000-UIT's interface to the outside world is via the 9 way D-range connector **S21**. All of the lines on S21 are de-coupled to chassis ground via capacitors C1 to C9. Connector S21 pins 1 to 9 go to the **I/O Signals matrix** lines 1 to 9 respectively. The I/O Signals matrix has links placed onto it which determine which I/O Signal go to which S21 pin. The default settings and the available signals for the I/O Signal matrix can be found in section 4.3 External Connections.

LINE IN audio comes from I/O Signal matrix line 5, through 0 Ohm resistor R10. R11 sits across this line to ground and provides this line with an input impedance of approximately 50K Ohms. Link LK3 also sits across this line. If LK3 is installed, 560 Ohm resistor R12 provides this line with an input impedance of approximately 600 Ohms.

LINE IN audio is then presented to IC2d which acts as a impedance stabilising buffer stage, with a gain of 1. LINE IN audio then goes to IC2c which provides audio level control with VR2. The output of IC2c goes via DC blocking capacitor C19, to IC1c quad switch, which switches the audio in sympathy with the PTT IN signal. The output of IC1c is then feed to LK2/2. LK2 selects whether the LINE IN audio is feed to the flat audio input of the radio, S13 pin 8, or to the pre-emphasised audio input, S13 pin 6.

IC2d and IC2c are DC coupled. The bias voltage for all four of IC2's op-amps is provided by 100K Ohm resistor R3, and filtered by capacitors C12 and C18.

LINE OUT audio first begins at LK1. LK1 selects whether the LINE OUT audio comes from the flat audio output of the radio, S13 pin 1, or from the de-emphasised audio output, S13 pin 3. LINE OUT audio then goes to IC1a quad switch, which switches the audio in sympathy with the radios RX GATE signal from S14 pin 4. Audio then goes via DC blocking capacitor C10 to IC2a audio control amplifier. IC2a provides the function of a buffer, but also a gain control amplifier. 100K Ohm trim pot VR1 sits across IC2a and provides a wide range of gain control. The LINE OUT then goes via DC blocking capacitor C14 to 560 Ohm resistor R4. R4 sets the LINE OUT output impedance to approximately 600 Ohms. Audio is then fed to I/O Signal matrix line 1.

PTT IN line comes in via I/O Signals matrix line 4 to diode D4. Diode D4 blocks DC levels which are above 5 volts. The PTT IN signal then goes to the buffer transistor Q2. Transistor Q2 inverts the signal to active high. The Q2 collector is then routed through IC1B switch. This switch is normally on if the radios local microphone PTT is inactive. If the local microphone PTT is active, the signal from Q2 collector is isolated from the rest of the UIT circuit. The output signal from the IC1B switch drives the audio switch IC1c pin 5. It also is fed via 100K Ohm resistor R24 to the Mic Mute line on S14 pin 8. This mutes the radio's local microphone audio when a transmission is coming in via the A2000-UIT board. Lastly the signal also goes to the base of transistor Q3. Q3 drives the radios PTT FRM OPT (PTT from options) line at S14 pin 6. Diode D2a provides a path for the radios local microphone PTT signal. Diode D2b pulls the Mic Mute line low (off) when the local microphone PTT is active.

GATE OUT first begins at S14 pin 4 RX GATE line. This line is feed to IC1a pin 13 via 0 Ohm resistor R19. This line also goes to transistor Q1. Q1 buffers the signal and inverts it. The GATE OUT line signal then comes from Q1 collector and goes via the solder link LK14 and then to I/O Signals matrix line 2.

BCD channel control come from S15 pins 9 to 14. These BCD lines are then fed to the on board in line dip switch SW1. SW1 switch 1 represents BCD0, up to SW1 switch 6 which represents BCD5. Section 4.5 BCD channel control explains BCD channel control and setup. BCD lines BCD0 to BCD3 are then buffered via resistors R40 to R43 and then feed to I/O Signals matrix lines 10 to 13 respectively.

RXD signal starts at I/O Signals matrix line 7 and goes to IC3a pin 1 via resistors R30, R31 and R32. The diode D3 protect this line from voltages above +5.6 volts and -0.6 volts, by dropping any excess voltage across 100K Ohm resistor R32. The RXD signal comes from IC3a pin 2 and goes to IC3b pin 3, and from IC3b pin 4 via 100K Ohm resistor R33 to IC3c pin 5. The link LK4 across IC3b enables the phase of this incoming RXD signal to be reversed. The RXD signal comes out IC3c pin 6 to S15 pins 1, via diode D4. D4 acts as a buffer to allow the radios existing RXD data line to operate normally with the A2000-UIT board fitted. This is because the T201X may have a control head fitted, and therefore it will have programming lines also coming in via the mic socket. RXD then.

TXD signal first comes from S15 pin 2 to IC3f pin 13. The TXD signal comes from IC3f pin 12 and goes to IC3e pin 11, and from IC3e pin 10 via 100K Ohm resistor R35 to IC3d pin 9. The link LK5 across IC3e enables the phase of this outgoing TXD signal to be reversed. The TXD then comes out IC3d pin 8 and goes via 0 Ohm resistor R36 and 470 Ohm resistor R37 to I/O Signals matrix line 8.

SPARE I/O Signals matrix lines 16 and 17 are routed from the I/O Signals matrix via pie filters C24, R26, C23 and C26, R27, C25 to PCB pads marked '16' and '17'. These spare lines can be hard wired to the pad provided adjacent to connectors P13, P14 and S15. This allows signals to be used externally, other than the standard signals already available on the I/O Signals matrix. The are three solder links provide to route Spare 16 to some particular places. These links are LK15 to LK17. Refer to the links section elsewhere in this manual for more information.

7.0 PCB Information

7.1 Parts List   **A2000-UIT PCB**

Ref. No.	Description	Part No.	Supplier	Qty
A2000-UIT PCB	PCB Board	A2K-UIT-P1-04.pcb	Oz Elec.	1
C1, 2, 3, 4, 5, 6, 7, 8, 9, 21, 22, 23, 24, 25, 26, 33, 34, 35, 60	1nF Ceramic Chip Cap, 0805	499-201	Farnell	19
C12, 15, 18, 20, 27, 29, 31, 101, 102, 103, 104	100nF Ceramic Chip Cap, 0805	499-687	Farnell	11
C11, 16, 17, 30	100pF Ceramic Chip Cap, 0805	499-171	Farnell	4
C10, 14, 19, 28	10uF Tant 16V, SMD, TAJ Series, Case B	498-737	Farnell	4
C13	2.2.uF Tant 25V, SMD, TAJ Series, Case B (or any 20-25V CaseB from 1uF to 10uF)	498-853	Farnell	1
D1, 3	BAV99 Diode, SOT-23 (D3 mounts upside down on Ver 1.0 PCB)	743-136	Farnell	2
D2, 4, 5	BAV70 Diode, SOT-23	743-150	Farnell	3
F1	RXE075 Polyswitch 0.75A Resttable Circuit Protector	608-877	Farnell	1
IC1	CD4066BCM, SMD, SO-14	505-353	Farnell	1
IC2	TL074CD, SMD, SO-14	401-365	Farnell	1
IC3	MM74C04, SMD, SO-14	379-220	Farnell	1
P13	12 Way Micro-MaTch™ Paddle Board Connector	8-215570-2	AMP	1
P14	16 Way Micro-MaTch™ Paddle Board Connector	8-215570-6	AMP	1
Q1, 3, 5, 6	BC817-40 NPN Transistor, SMD, SOT-23	506-308	Farnell	4
Q2	BC857B PNP Transistor, SMD, SOT-23	506-229	Farnell	1
Q4	MJD2955 Transistor PNP, SMD, TO-252	MJD2955	St Lucia	1
R1	5K6 Chip Resistor 0805 5%	515-218	Farnell	1
R2, 15, 16, 17, 21, 22, 23, 29, 45, 47, 61, 62	10K Chip Resistor 0805 5%	109-318	Farnell	12
R3, 11, 13, 14, 24, 28, 32, 33, 35, 44	100K Resistor 0805 5%	109-324	Farnell	12
R4, 12, 60	560E Chip Resistor 0805 5%	515-152	Farnell	3
R5, 7, 10, 31, 36	0E Chip Resistor 0805 5%	109-299	Farnell	5
R18, 34	1M Resistor 0805 5%	109-330	Farnell	2
R8, 9, 26, 27, 30, 37	470E Chip Resistor 0805 5%	109-310	Farnell	6
R20	18K Chip Resistor 0805 5%	515-243	Farnell	1
R38, 40, 41, 42, 43	1K Chip Resistor 0805 5%	109-312	Farnell	5
R63	680E Chip Resistor 0805 5%	109-311	Farnell	1
S15	16 Way Micro-MaTch™ PCB Mount Paddle Board Socket	8-0215079-6	AMP	1
S21	9 Way D-range R/A Female, PCB Connector	892-452	Farnell	1
SW1	6 Way Inline Dip Switch	665-118	RS	1
VR1, VR2	100K Multi Turn Trim Pot, SMD	514-860	Farnell	2

Cables and Connectors

Ref. No.	Description	Part No.	Supplier	Qty
Ribbon Cable	16 Way Ribbon Cable. For Micro-MaTch™ connector looms. Three looms, P13 to P13A, P14 to P14A, and P15A to P15B	-	Oz Elec.	3*30mm
P13A (for P13 to P13A Loom)	12 Way Micro-MaTch™ Male on Wire Connector	8-215083-2	AMP	1
P14A (for P14 to P14A Loom)	16 Way Micro-MaTch™ Male on Wire Connector	8-215083-6	AMP	1
P15A to P15B Loom	16 Way Micro-MaTch™ Male on Wire Connector	8-215083-6	AMP	2

Parts Packaged with A2000-UIT Board

Description	Part No.	Supplier	Qty
A2000-UIT Service Manual	AM2K-UIT.PDF	Oz Elec.	1
M3 x 8 Pozi Drive Taptite Screw (alt. 349-00020-32 Tait)	HSM38PHT	OEM	3
DB9 Male Connector Solder Pot	CODE9P	St Lucia	1
DB9 Grey Plastic Connector Cover with screw locks, not thumb screw locks.	CODE9COVER	St Lucia	1

Parts not populated on the A20000-UIT PCB

Ref. No.	Description	Part No.	Supplier	Qty
C32	10uF Tant 16V, SMD, TAJ Series, Case B	498-737	Farnell	1
#IC4	IC MAX202ECSE, SMD, SOL-16	639-345	Farnell	1
#R6	10K Chip Resistor 0805 5%	109-318	Farnell	1
#R46	100K Resistor 0805 5%	109-324	Farnell	1
#T1 (1-2)	ETAL P2781 Transformer 600:600 Ohms SMD	523-100	Farnell	2
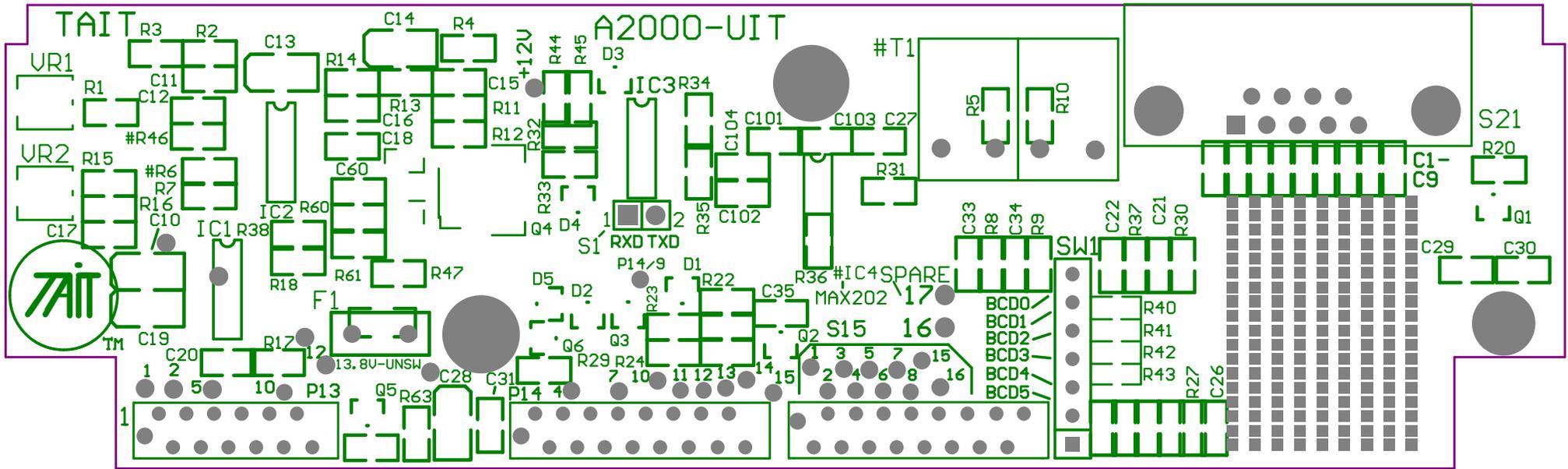
A2000-UIT Ver 1.2 Top Overlay
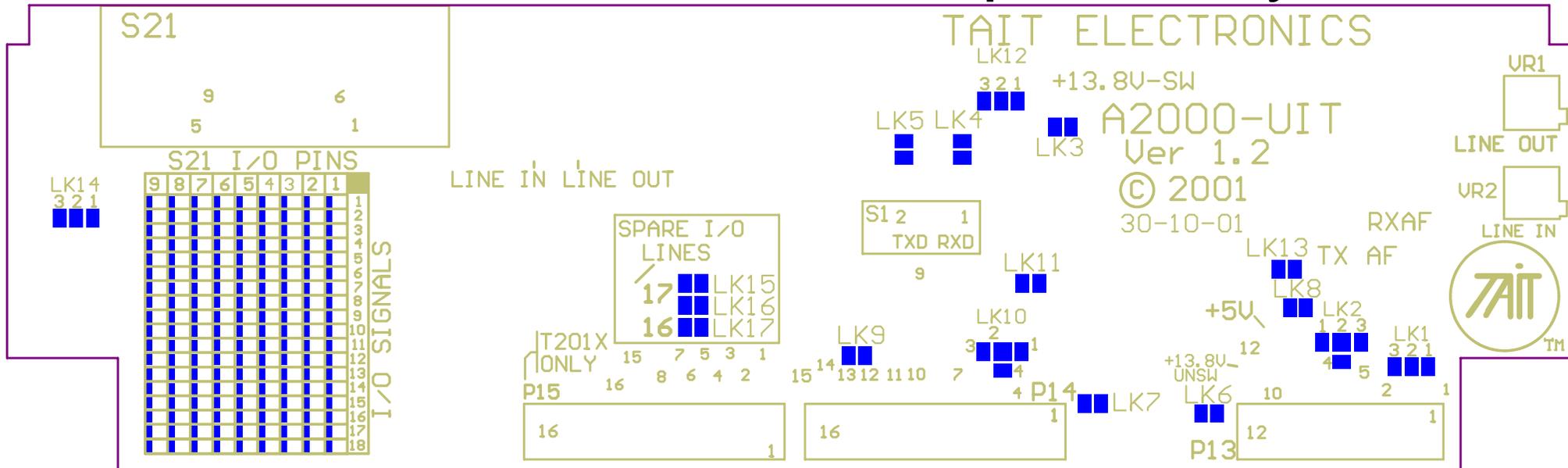
A2000-UIT Ver 1.2 Bottom Overlay

Tait Electronics (Aust) Pty Ltd

Title: T201X Universal Interface Telemetry

Size: A3	Number: A2000-UIT	Revision: V 1.2
Drawn By: M.O'B.	Checked By: M.O'B.	
Date: 31-10-01		Sheet 1 of 1
File: A2K-UIT-C1-04.sch		

CONNECTS TO: T2000 CONTROL PCB

P15 for T201X Only

S21 DB9F DEFAULT PINOUT:

1. LINE OUT
2. /GATE OUT
3. GROUND
4. /PTT IN
5. LINE IN
6. RXD
7. TXD
8. BCD0
9. +13.8V SW

I/O Signals Matrix

1. LINE OUT
2. /GATE OUT
3. GROUND
4. LINE IN
5. LINE IN 2 (N/C)
6. RXD
7. TXD
8. LINE OUT 2 (N/C)
9. BCD0
10. BCD1
11. BCD2
12. BCD3
13. /EMRGNCY
14. RSSI
15. SPARE
16. SPARE
17. +13.8V

S21 DB9F

MATRIX

S21 I/O PINS

I/O Signals

Note this +13.8V output still has 0.5A current limit.

F1 0.75A RXE075 Resettable Circuit Protector

Volume Control Bypass

Power Switch Bypass

Chassis Ground

RSSI Buffer

BCD Channel Select

for Radtel — LK17
for KDT5000 CTCSS — LK16
for KDT5000 COS — LK15

P13 MICRO12W

1. DET-AF-OUT
2. ALC-IN
3. RX-LINE-OUT
4. /PTT-IN
5. TX-LINE-OUT
6. RX-LINE-IN
7. TX-LINE-IN
8. RX-GTD-AF
9. TX-SIG-IN
10. RX-BEEP
11. TX-LF-SIG
12. OPTIONS GND
13. +13.8V-UNSW

P14 MICRO16W

1. +13.8V-SW
2. +5V
3. BUSY
4. RX-GATE
5. PTT-TO-OPT
6. PTT-FRM-OPT
7. /IN-LOCK
8. MIC-MUTE
9. /SIG-SQULCH
10. /EMRGNCY
11. CALL-SW
12. HUSH
13. AUX-ON/OFF
14. HORN
15. RSSI
16. EXTERNAL

P15 MICRO16W

1. RXD
2. TXD
3. N/U
4. N/U
5. N/U
6. Q5
7. Q6
8. GND
9. BCD-0
10. BCD-1
11. BCD-2
12. BCD-3
13. BCD-4
14. BCD-5
15. N/U
16. N/U

SW1 SW-DIP6A

1. BCD0
2. BCD1
3. BCD2
4. BCD3
5. BCD4
6. BCD5

NOTE: 1. Components marked # are not normally fitted.
2. All links are shown in their default positions.

Tait Electronics (Aust) Pty Ltd

Australia
Head Office
Brisbane

Tait Electronics (Aust) Pty Ltd
186 Granite St.,
Geebung, Qld., 4043
P.O. Box 679,
Virginia, Qld., 4014

Phone:	07 3865 7799
Fax:	07 3865 7990

Purchase Orders Fax	1800 998 288
Delivery Enquiry Phone	1800 778 248

Email:
Sales   sales@tait.com.au
Help Desk   helpdesk@tait.com.au

Internet Home   http://www.taitworld.com/australia/

Branches

Perth
Phone: 1300 304 344
Fax: 08 9321 7338

Sydney
Phone: 1300 304 344
Fax: 02 9634 7835

Melbourne
Phone: 1300 304 344
Fax: 03 9532 2358

Tait Electronics (Aust) Pty Ltd   A2000-UIT V1.2 Setup Sheet

Customer	
Job No	
Date	
T2000 Model No & Serial No	

A2000-UIT Setup   Default Link Settings Shown as *Underlined*

Links	Function	Choices	Setting
LK1	LINE OUT Flat / De-emphasised	*1 to 2 Flat* / 2-3 De-emphasised	
LK2	LINE IN Flat / Pre- emphasised	*1 to 2 Flat* / 2-3 Pre-emphasised	
LK3	LINE IN Input Impedance	IN = 600 Ohms / *OUT = 50K Ohms*	
LK4	RXD Output Phase	IN = Binary 1 a High / *OUT = Binary 1 a Low*	
LK5	TXD Output Phase	IN = Binary 1 a High / *OUT = Binary 1 a Low*	
LK6	+13.8 V OUT	IN = +13.8V Un-Switched / *OUT = +13.8VSwitched*	
LK7	Power On Link	*IN = Radio On* / Out = Radio Not On	
LK8	Volume Control Bypass	*IN = Active* / OUT = Not Active	
LK9	Emergency Line to External Line	IN = Yes / *Out = No*	
LK10	GATE OUT Line Source	*1 to 2 BUSY* / 2-3 RX-GATE / 2-4 CALL-SW (Trunked)	
LK11	MIC PTT out the /PTT IN line	IN = Yes / *Out = No*	
LK12	RXD Input Pull Up/Dn Resistor	*1 to 2 Pulled to Ground* / 2-3 Pulled to +5V	
LK13	LINE OUT Mute Control	*IN = LINE OUT is muted* / Out = Unmuted	
LK14	GATE OUT Phase	*1 to 2 Active Low* / 2-3 Active High	
LK15	Spare 16 Pad Routing	IN = Spare16 to P14/9 /Sig-Squlch / *OUT = N/C*	
LK16	Spare 16 Pad Routing	IN = Spare16 to P15/3 N/U / *OUT = N/C*	
LK17	Spare 16 Pad Routing	IN = Spare16 to P14/4 RX-Gate / *OUT = N/C*	
VR1	LINE OUT Level	In dBm or Volts Peak to Peak *(-10dBm)*	
VR2	LINE IN Level	In dBm or Volts Peak to Peak *(-10dBm)*	

S21 I/O Signals matrix
Check Mark the boxes to denote setting

S21 I/O PINS

9	8	7	6	5	4	3	2	1		I/O SIGNALS
										1
										2
										3
										4
										5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18

Setup Details / Modifications Carried Out, Detail Below:

Technician _____   Date _____