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Tait Electronics (Aust) Pty Ltd

A800-SIM

T800 SITE INTERFACE MODULE

Service Manual
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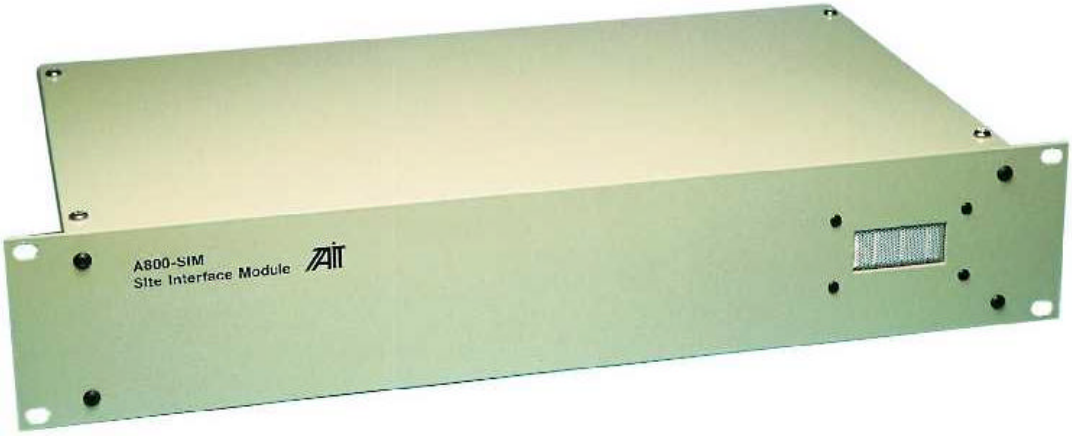

A800-SIM
T800 Site Interface Module

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To identify the version of A800-SIM service manual that you have, check the date that is on the bottom of most pages. To check to see if you have the latest version of A800-SIM service manual, visit the Tait Australia web site at http://www.taitworld.com/australia/ or contact your local Tait representative.

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Section 1 General Information

1.1 Introduction

The A800-SIM Site Interface Module is a compact and versatile 8 port radio site interface housed in a 2 RU 19" rack cabinet. The A800-SIM provides a simple and cost effective method of interfacing T800 series equipment as well as telephone interconnects and line controlled equipment.

Equipment is interfaced from the T800 series module to the A800-SIM via IDC cable fitted with 15 way 'D' range connectors. Separate TX and RX ports are provided with the option of configuring ports 7 & 8 to combine TX and RX lines onto the one 'D' range socket.

Transmit keying, audio distribution and TX tail allocation can be controlled on a 'per port basis'.

Wide area PMR systems can be easily built using the A800-SIM, with the Hub site performing all tail timing. This provides the satellite sites with equal length tails to enhance mobile voting. Large systems may also be broken up into vote groups with independent timing for tails.

Please read through this service manual in its entirety before installing or servicing this product.

1.2 Features

- Provides a simple method of building up complex radio systems
- Suitable for multiple Repeater/Link configurations
- Interfaces to third party equipment, such as Telephone Interconnect Panels and Line Keying Interfaces
- System Voting Pulse Generator
- System Tail Time control
- Squelch Tail Elimination - Soft Off
- Configurable Audio & Keying Paths
- Combined Receiver Speaker Amplifier
- Fast multi hop key-up circuits, suitable for systems with many link hops
- Mains Fail Alarm Option
- System Splitting Option

1.3 Specifications

Supply Voltage	+13.8V DC Nominal
Supply Range	+10.8 to +16 V DC
Supply Current	2A Maximum
Input Fuse	Internal 2 Amp, 3AG
Operating Temp	-10 to +60 degrees C.
Mounting	2 RU x 19” rack
Dimensions	482 mm x 256 mm x 88 mm.
Weight	3 Kg
Channel Capacity	8 TX and RX ports
Audio Input	-10dBm to +0dBm Nominal
Audio Insertion Loss	0dB Unity Gain (Ver 3+) (Ver 2 -20 dBm for a TTR, -25 dBm for TTR and Link)
Frequency Response	300 Hz to 3000 Hz
Receive Gate Input	Active Low, Pull to Ground
PTT Output	Active Low, Pull to Ground (via diode)

Section 2 Basic Operation

2.1 RX Gating and TX Keying Distribution

An active low receiver gate from the RX port appears on the Gate Matrix for that given channel. By 'solder blobbing' pads 1 to 8, an active low received gate can be sent to TX ports 1 to port 8.

Each channel is programmed in this manner.

The A800-SIM provides both a CTCSS key and a carrier key, so all outward bound link receivers from the A800-SIM must be carrier gated to provide Satellite site Exciters/ Transmitters with a carrier key. The carrier key is needed to provide the ' Soft Off ' to the remote site mobile radios.

2.2 Audio Distribution

Audio from the external radio equipment comes in via ports RX1 to RX8 pin 1. This audio is then routed to the Audio Matrix.

The Audio Matrix allows audio from the eight input ports RX1 to RX8 to be selected to be routed out to any of the output ports TX1 to TX8. To select an input audio to be routed out a particular output port, a solder blob is fitted to the matrix. For example, if receiver input 4 (RX port 4) is solder blobbed to transmitter output 2 (TX port 2) then all audio that comes in via port 4 will be sent out port 2.

2.3 CTCSS

An internal CTCSS encoder provides all output ports with a common CTCSS output signal. This CTCSS tone is then fed into each T800 transmitter/exciter.

If a second CTCSS encode tone is required on a port, another CTCSS encoder can be fitted to the A800-SIM and the solder links set up to route the other tone out to individual ports (A800-SIM Ver3.0 or greater). For more information on the secondary CTCSS encoder, refer to Section 6 Options.

2.4 TX Tail and Soft Off Tail Timers

The A800-SIM has two internal timers to provide transmitter tail functions. The first timer is the TX Tail timer which provides an adjustable transmitter hang on period, after the reception of a valid receive signal (ie valid CTCSS decode). During the TX Tail time, CTCSS encode tone is active.

The second timer is the Soft Off Tail timer which continues to be active for an adjustable period of time after the TX Tail timer has expired. During the CTCSS Soft Off time, CTCSS encode tone is not active. All of the transmitters connected to the A800-SIM ports continue to transmit, but with carrier only. This enables all receiving links and mobiles to mute off cleanly without the annoying squelch noise burst at the end the transmission. Hence the name 'Soft Off'. The duration of a Soft Off Tail is normally approximately 0.5 to 1 second.

Both timers are adjustable with internal trim pots.

The A800-SIM has internal visual indication of the status of the two timers. The TX Tail indicator is LED2 TX Tail (called Carrier tail for V2.0 SIM) and the Soft Off Tail indicator is LED1 Soft Off Tail (CTCSS tail V2.0 SIM).

Note that the terminology of these timers has been change in the A800-SIM Ver 3+ to make their functions clearer. Refer to Table 1. for an explanation of the terms and their functions.

Table. 1

Function	A800-SIM Version 2.0	A800-SIM Version 3.0 >
Transmitters Keyed Up with CTCSS Encode Tone	Carrier Tail	TX Tail
Transmitters Keyed Up without CTCSS Encode Tone	CTCSS Tail	Soft Off Tail

2.5 Voting Pulse Generator

For systems requiring mobile voting, the A800-SIM has an internal Voting Pulse Generator. The purpose of the voting pulse is to key up an entire radio system and allow all the mobile radios to vote onto the best available radio channel. This ensures that a mobile which has roamed from one channels (bases station) service area to another will default to transmit on the correct (best) channel next time it is used. Normally the voting pulse generation is implemented at one site in an entire system. This site is normally the “hub” site (master site). The hub site then controls & generates the voting pulses for the entire radio system.

The Voting Pulse Generator circuit monitors the RX Gate activity of all ports and resets itself when the system is in use. When the system is idle for a period of approximately 3 minutes, the Voting Pulse Generator keys up all of its ports for a period of about 2 seconds. This is the voting pulse. The period of the voting pulse and the period between voting pulses is fixed and cannot be adjusted.

Internal links are provided to control whether the voting pulse is transmitted with CTCSS tone or without. Voting pulses can be transmitted without CTCSS tone if required. The configuration of this depends on the operation of the mobile radios voting system.

An optional two tone encoder can be fitted to the A800-SIM to provide an audible two tone beep during the voting pulse.

2.6 Speaker Audio Amplifier

The A800-SIM has an on board speaker audio amplifier. The output of this is fed to a speaker on the front panel of the A800-SIM. The speaker amplifier is IC1 and it provides monitoring of speaker audio from all of the ports RX1 to RX8. The audio for the speaker amplifier comes from the signal SPEAKER_AF which is on ports RX1 to RX8 pin 8. This input is an actual ‘Speaker’ input. As such, it takes in speaker audio levels. Each of these lines are then isolated, mixed through 100K resistors and fed to the amp. The speaker amplifier then provides a fixed gain amplification and its output is fed to the speaker.

The A800-SIM does not have a volume control. As such, the volume control on the T800 receiver is used to adjust the audio level. The speaker amplifier does not monitor any of the Line In or Line Out lines (RXAF on ports RX1 to RX8 pin 1, or TXAF on ports TX1 to TX8 pin 1).

2.7 DC Supply

The A800-SIM DC supply is +13.8V DC negative ground. It comes in via a 5 pin chassis mount Din plug on the units rear. The DC supply is then routed to S4, a two way terminal block. DC is then filtered by capacitor C9 1000uF. Reverse polarity protection is provided by the diode D42. Fuse F1 (2 amp) provides over-current protection.

Section 3 T800 Module Modifications

3.1 Introduction

This section details the standard modifications required to T800 Series I & II modules for used with the A800-SIM (up to V3.0+).

Each of the following sections outlines modifications required of each main type of T800 module for repeater and link applications.

Before modifications are made, each module should be programmed, configured and aligned to suit its required mode of operation. For information on setting up T800 modules, refer to the relevant service manual.

The instructions here assume that the technician has a sound working knowledge of T800 modules and the A800-SIM. For information on these products, refer to the relevant service manuals.

3.2 Basic Mods - T800 Receivers, Transmitters/ Exciters

This section details the basic T800 module modifications which are required for A800-SIM use.

3.2.1 T800 Receivers T8X5

1. For a Series I receiver, set the audio processor link PL105 from its default of [2-3] to 4-5. For a Series II receiver, set the audio processor link PL240 from its default of [2-3] to 4-5. This means that the RX audio comes from internal CTCSS Speech Filter and CTCSS audio will be removed from the receive audio sent out the T8X5 Line Out.
2. For a Series I receiver, set the RX Disable link PL100 1-2. For a Series II receiver, set the RX Disable link PL260 to 1-2. Make sure that all other links are left at their default positions. For information on the default settings of T800 modules, refer to the relevant service manual. Although RX Disable is only used for link end sites and optional A800-SIM system splitting, it does not harm anything to set the link this way for all receivers. For more information, refer to Section 4 Link Settings and Section 6 Options.
3. For a Series II receiver, remove the 10 Ohm chip resistor R808. Check that the 10 Ohm chip resistor R160 is fitted. This frees the 'Serial Com' line on pin 7 of the 1st D Range for use with the A800-SIM. To locate R808 and R160, refer to the relevant service manual.
4. On the T8X5 1st D-range, lift pins 2 and 3 from the PCB. This frees these two pins from the transformers centre taps for use with the A800-SIM.
5. For a link receiver, run a wire from the RX DISABLE-A pad to the lifted leg of pin 2 on the D-range connector. RX disable is usually used at an end site link that is communicating with a TTR link (talk through repeater link). The use of RX Disable stops the end site link from receiving its own transmissions back from the TTR link. For more information on link LK19, refer to Section 6.7 RX Disable.
6. For a Series I receiver, install a T800-02 CTCSS De-encoder as per the T800-02 fitting instructions.

3.2.2 T800 Transmitters/ Exciters T8X6/7

1. On the 15 way D-range lift pins 2 and 3 from the PCB. This frees these two pins from the transformers centre taps for use with the A800-SIM.
2. All the transmitter/exciter links can be left at their default position. For information on the default settings of T800 modules, refer to the relevant service manual.
3. For a Series II transmitter, remove the 10 Ohm chip resistor R808. Check that the 10 Ohm chip resistor R160 is fitted and that 10 Ohm chip resistor %R150 is not fitted. This frees the 'Serial Com' line on pin 7 of the 1st D Range for use with the A800-SIM. To locate R808, R160 & %R150, refer to the relevant service manual.

3.3 Optional Mods/Settings

This section details various modifications which can be applied to T800 modules to provide certain extra functions. Refer to the sections below for a description of each function.

3.3.1 Series II Programming & the 2nd D Range

When a T800 Series II module is set up for operation on a A800-SIM (up to V3.0a), the Series-Comm line on the modules 1st D Range pin 7 is removed. This is for backwards compatibility and to free pin 7 to allow it to be used for the fast CTCSS keying system. This then means that to program the Series II module, the programming lead must be connected to the internal micro-match socket SK805. Another alternative is to fit the T800-03-0000 Aux. D-range kit, and then use the 2nd D Range for programming. If this is done, ensure that a suitable DB connector cover (eg. Farnell Part No596-073, 3M-4272-15P Plug Cover) is fitted externally over the 2nd D Range to discourage the A800-SIM ribbon cable being plugged into it, as this may cause damage to the T800 module.

3.3.2 Transmitter Fast Keying

To provide faster transmitter key up times on Series II modules, set link SL501 for fast key (under the VCO on the solder side of the PCB). This locks the synthesiser permanently on to speed up the TX key time. It also increases the stand-by current consumption by approximately 100 mA. To locate SL501, refer to the relevant service manual. Some T800 Series I module also supported fast keying, short the link across Q7 on the solder side of the PCB under the synthesiser compartment. This locks the synthesiser permanently on to speed up the TX key time. It also increases the stand-by current consumption by 100mAFor more information on Series I fast keying, refer to the relevant T800 service manual.

3.3.3 Receiver Fast Gating

To provide faster receiver gate opening times on link receiver modules, fit T800-04 RSSI board and configure the module for Carrier Level Mute operation. This speeds up the receiver gating time from approximately 20 ms to approximately 5 ms. Carrier Mute Level operation is only suitable for links (& not for repeaters). For more information on Carrier Mute Level, refer to the relevant T800 service manual.

3.3.4 Fast CTCSS Keying

Fast CTCSS Keying is a system used in larger radio systems to avoid the cumulative delays caused by successive link hops. The idea is that all link are basically carrier operated. This allows multiple hops of links to key up very quickly. CTCSS tones are still used on the links, but the CTCSS decoding on the links does not control the transmitters key lines. The CTCSS decode function controls the regeneration of the CTCSS tone (controls the encoders in the A800-SIM). In the period of time before a CTCSS decode, the A800-SIM will simply pass filtered CTCSS audio (RX_AF_TONE) from the receivers, directly back out all ports and to the transmitters. Upon a valid CTCSS decode, the A800-SIM switches over to its internal CTCSS encoders and passes these regenerated CTCSS tones out all ports to the transmitters.

The parts required are as follows:

Part Number	Description	Supplier	Qty.
286-606	Capacitor 10uF 65V Electrolytic	Farnell	1

1. For a Series II receiver, in the synthesiser section run a wire from IC830 pin 8 to +Ve leg of a 10uF 65V capacitor. Insulate the connection with silicon tubing. Solder the other leg of the 10uF capacitor into I/O PAD 170 (pin 7 of D-range 1). This allows the received CTCSS tone to pass through the CTCSS filter (IC830). This is required during the CTCSS decode period (approximately 150 ms) so that the receiver passes received CTCSS audio through to the transmitters (via the A800-SIM) thus allowing significantly quicker CTCSS gating times further down the link path and therefore quicker keying times through out the radio system. For information on these connection points in the T8X5 receiver, refer to the relevant T800 service manual.
2. For a Series I Link receiver, lift the anode of D107 (in the audio processor) and solder a wire in the vacant hole left by the anode, connect the other end of the wire to I/O PAD 101 (RX-GATE-OUT pad).
3. For a Series II Link receiver, lift the anode of D290 (in the audio processor) and solder a wire in the vacant hole left by the anode, connect the other end of the wire to I/O PAD 234 (RX-GATE-OUT pad). This allows the link to be carrier operated so that it can pass through unprocessed/non-decoded CTCSS to the transmitter for faster CTCSS decode times. For information on the location of these components, refer to the relevant T800 service manual.
4. For a Series I receiver, on the T800-02 run a wire from TP7 (IC8 pin 14) to a piece of track on the solder side of the PCB that runs to the top of the CTCSS tone level pot (RV1). Cut the track so that the top of the level pot is isolated from the circuit behind it so that only the wire link is connected to the top of the pot. This allows the received CTCSS tone to pass through the CTCSS board, importantly during the decode period (approximately 150 ms) so that the receiver passes CTCSS and carrier through the SIM and to the transmitters thus allowing significantly quicker CTCSS gating times and therefore quicker keying times through out the radio system. For more information on the T800-02, refer to the technical note TN-566 T800-02 CTCSS Encoder/Decoder.

3.3.5 Link Receiver Mute Crash

To remove the mute crash in a link receiver, do the following:

For a Series I link receiver, on the solder side of the PCB, remove the 100nf chip cap C105. To locate C105, refer to the relevant T800 service manual. For a Series II link receiver, set SL210 and SL220 to open. To locate SL210 and SL220, refer to the relevant T800 service manual.

It is recommended that this modification only be done to link receivers and not to repeater receivers.

3.3.6 CTCSS Encode Tone for Local Transmitter Microphone Operation

For Series I transmitter, solder a wire onto the lifted leg (pin 2) of the 1st D-range and run the other end of the wire (via the component side then through one of the holes in the audio processor section of the PCB) to the PTT point on the microphone socket (pin closest to Q101 SMT on the solder side of the PCB). This activates the CTCSS encoder in the SIM so that CTCSS can be transmitted when using the front panel microphone. For Series II transmitter, solder a wire onto the lifted leg (pin 2) of the 1st D-range and run the other end of the wire (via the channel on the right hand side of the module on the component side, then through one of the holes at the front of the module and into the audio processor section) to the PTT point (pin) on the front panel microphone socket (SK205). This activates the CTCSS encoder in the SIM so that CTCSS can be transmitted when using the front panel microphone.

Section 4 Link Settings

4.1 Introduction

This section details the descriptions and default setting for all the A800-SIM links. All of the links are solder link selectable.

4.2 Link Matrix's

In the A800-SIM there are four link matrix's. These are the Audio Matrix, the Gate Matrix, the Receiver Primary Tone Inputs, and the PTT Outputs. Refer to each of the following sections for a description of each matrix. The function of the links in the Link Matrix's is the same for A800-SIM's up to Version 3.0+. All of the Link Matrix's are shown in their default positions. The default settings here are to suit a hub site, with TTR's on ports 1 and 2 and links on ports 3 to 8.

4.2.1 Audio Matrix

The Audio Matrix selects where the audio inputs from ports RX1 to RX8 are routed to. Audio can be route out any of the ports TX1 to TX8. When a particular route is selected, then that audio path is always active. Although the default hub set up shown here is for a hub site, it is suitable for almost all applications. Just plug the repeater into ports 1, the repeating link into port 2, and any other links into ports 3 to 8.

Due to the design of the A800-SIM audio matrix, it is good practice to leave all audio paths active unless they specifically should not be, eg for a radio link. This then has most unused inputs to the audio matrix terminated and not left floating with no connection to them.

Receiver Inputs	Transmitter Outputs							
	1	2	3	4	5	6	7	8
1	✘	✘	✘	✘	✘	✘	✘	✘
2	✘	✘	✘	✘	✘	✘	✘	✘
3	✘	✘	-	✘	✘	✘	✘	✘
4	✘	✘	✘	-	✘	✘	✘	✘
5	✘	✘	✘	✘	-	✘	✘	✘
6	✘	✘	✘	✘	✘	-	✘	✘
7	✘	✘	✘	✘	✘	✘	-	✘
8	✘	✘	✘	✘	✘	✘	✘	-
TT_AF*	✘	✘	✘	✘	✘	✘	✘	✘

✘ = Solder Link in place - = No Solder Link

*TT_AF stands for Two Tone Audio. This is the two audio pulse that would be sent out during each voting pulse. Requires an optional ST202 Two Tone encoder (& misc parts). Refer to Section 6 Options for more information.

4.2.2 Gate Matrix

The Gate Matrix selects where the RXGATE inputs from ports RX1 to RX8 are routed to. The RXGATE signals can be route out any of the ports TX1 to TX8 TXKEY lines. Although the default hub set up shown here is for a hub site, it is suitable for almost all applications. Just plug repeaters into ports 1 and 2, and links into ports 3 to 8.

PTT Outputs	Receiver Gate Inputs							
	1	2	3	4	5	6	7	8
1	✘	✘	✘	✘	✘	✘	✘	✘
2	✘	✘	✘	✘	✘	✘	✘	✘
3	✘	✘	-	✘	✘	✘	✘	✘
4	✘	✘	✘	-	✘	✘	✘	✘
5	✘	✘	✘	✘	-	✘	✘	✘
6	✘	✘	✘	✘	✘	-	✘	✘
7	✘	✘	✘	✘	✘	✘	-	✘
8	✘	✘	✘	✘	✘	✘	✘	-

✘ = Solder Link in place - = No Solder Link

4.2.3 Receiver Primary Tone Inputs

This matrix selects where the RXDEC inputs from ports RX1 to RX8 are routed to. The RXDEC input is the CTCSS decode signal from a receiver. This signal is used to activate the A800-SIM's internal CTCSS encoders and tail timers. There are two possible setting that can be selected for each port. These are Tail or No Tail. When Tail is selected, that input will activate the TX Tail timer, Soft Off timer and the internal CTCSS encoders. When No Tail is selected, then that input will activate just the internal CTCSS encoders and the Soft Off timer.

The selection of these links are simple. At hub sites select all inputs to "Tail" and on all other sites select "No Tail". This then sets up the hub site to be the master site that will generate the TX Tails for the whole system.

	1	2	3	4	5	6	7	8
Tail	✘	✘	✘	✘	✘	✘	✘	✘
No Tail	-	-	-	-	-	-	-	

✘ = Solder Link in place - = No Solder Link

4.2.4 PTT Outputs (Tail)

This matrix selects where the TXKEY output from the tail timer circuit is routed. This TXKEY signal can be routed to each of the port TX1 to TX8.

The selection of these links are simple. At hub sites select all links to "Tail" and on all other sites leave all of these links out. This then sets up the hub site to be the master site that will generate the TX Tails for the whole system.

	1	2	3	4	5	6	7	8
Tail	✘	✘	✘	✘	✘	✘	✘	✘

✘ = Solder Link in place - = No Solder Link

4.3 Links LK1 to LK78

Link	Default	Description	Ver 2.0	Ver 3.0+
LK1	IN	IN when not set up for system splitting. OUT when fitting #RL1, 2, 3, 4, 24 for System Splitting. These links have no function and are always IN for Ver 2.0. For more information, refer to Section 6 Options.	✔	✔
LK2	IN	As above	✔	✔
LK3	IN	As above	✔	✔
LK4	1-2	1-2 Default power up as un-split operation. 2-3 Default power up as split operation. For more information, refer to application note AN003.	✔	✔
LK5 to LK8	IN	These links have no function and are always IN for Ver 2.0. These links are not present in Ver 3.0+.	✔	N/A
LK9	IN	CTCSS on Voting Pulse Enable. This link enables the ENC_TONE_A (Primary Tone) CTCSS tone during a voting pulse.	✔	✔
LK10	IN	Two Tone Audio on Voting Pulse Enable. This link is to enable the transmission of a two tone audible beep during a voting pulse. For more information, refer to Section 6 Options.	✔	✔
LK11	IN	Enables CTCSS tone onto ports 4, 5, & 6 (Ver 2.0 only). This link is not present in Ver 3.0+.	✔	N/A
LK12	IN	Unity Gain Port 7. When fitted port 7 TXAF audio amp will operate at unity gain. When removed port 7 TXAF audio amp has adjustable gain using the multi-turn trim pot RV3. Link LK13 must be set the same as this link. Refer to Section 5.6.1 Audio Levels.	N/A	✔
LK13	IN	Unity Gain Port 7. Refer to LK12.	N/A	✔
LK14	IN	Unity Gain Port 8. When fitted port 8 TXAF audio amp will operate at unity gain. When removed port 8 TXAF audio amp has adjustable gain using the multi-turn trim pot RV4. Link LK15 must be set the same as this link. Refer to Section 5.6.1 Audio Levels.	N/A	✔
LK15	IN	Unity Gain Port 8. Refer to LK14.	N/A	✔
LK16	OUT	#ST110 Enc. Audio to Speaker. The #ST110 refers to the burst tone encoder used for the Mains Fail alarm function. For more information, refer to Section 6 Options.	N/A	✔

✔ = Link is present in that model. N/A = Link does not exist in that model.

Link	Default	Description	Ver 2.0	Ver 3.0+
LK17	OUT	#S1530 Enc. Audio to Speaker. The #S1530 refers to the Selcall Encoder/Decoder used for System splitting operation. For more information, refer to application note AN003.	N/A	✔
LK18	OUT	Voting Pulse Link. Fit this link to enable the internal Voting Pulse Generator. For more information, refer to Section 6 Options.	N/A	✔
LK19	OUT	RX Disable Link between Port 1 RXDEC (pin 12) and Port 2 RX_DISABLE (pin 2). This link is no longer used. Refer to Section 6.7 RX Disable for more information.	N/A	✔
LK20	IN	Secondary CTCSS on Voting Pulse Enable. This link has same function as for link LK9 except it is for ENC_TONE_B (Secondary Tone). Note that it is not possible to have ports operating on one tone for normal voice and to use the Secondary tone during the voting pulse.	N/A	✔
LK21 to LK28	IN	600 Ohm terminate RX Line inputs. These links are used to terminate the RXAF inputs on each port. The RXAF inputs are the audio line in lines (RX1 to RX8 pin 1). Each link terminates one RXAF line, starting at LK21 for RX1 (port 1) up to LK28 for RX8 (port 8). When one of these links is not fitted, then that input would have an input impedance of approximately 10K.	N/A	✔
LK31 to LK38	IN LK31 OUT LK32-LK38	+13.8V Supply on Port 1 TX pins 9 & 10. This link is for supplying power to an external T8X6 exciter. Beware that the maximum current consumption of the A800-SIM is 2 amps. This must be taken into account before running any external equipment off the A800-SIM's own power source.	N/A	✔

✔ = Link is present in that model. N/A = Link does not exist in that model.

Link	Default	Description	Ver 2.0	Ver 3.0+
LK41 to LK48	1-2	1-2 ENC_TONE_A CTCSS encode on TX port pin 8 2-3 ENC_TONE_B CTCSS encode on TX port pin 8 These links select where each ports CTCSS encode output (TX1 to TX8 pin 8) is sourced from. The two possible selections are ENC_TONE_A (Primary Tone) and ENC_TONE_B (Secondary Tone). It is not possible to select both tones for a single output port (TXx). Link LK41 is for Port 1 through to LK48 for Port 8.	N/A	✔
LK51 to LK58	OUT	ENC_TONE CTCSS tone level link. Set link to IN for T800 Wide Band modules, and OUT for Narrow Band T800 modules. These links serve to trim the CTCSS encode output level to suit the type of T800 module being used (WB or NB). Note that there is no CTCSS tone level adjustment for each individual port, only the one common trim pot on the CTCSS module (ST133). For more information on the ST133 CTCSS Encoder, refer to Appendix A. Link LK51 is for Port 1 through to LK58 for Port 8.	N/A	✔
LK61 to LK68	OUT	RX_AF_TONE level link. Set link to IN for T800 Series I modules, and OUT for Series II modules. The signal RX_AF_TONE is the received CTCSS tone from receivers connected to any of the ports. This tone is used for Fast CTCSS keying. Refer to the Section '3.3.4 Fast CTCSS Keying' for more information. Link LK61 is for port 1 through to LK68 for Port 8.	N/A	✔
LK71 to LK78	1-2	RXGATE Source link. 1-2 RXGATE (RX Port pin 11- carrier gate). 2-3 RXDEC (RX Port pin 12 - CTCSS Decode Gate). These links select where the RXGATE signal to the GATE MATRIX is sourced from. The GATE MATRIX sets up the distribution of keying signals between ports 1 to 8. For more information on the GATE MATRIX, refer to Section '4.2.2 Gate Matrix'. If 1-2 RXGATE is selected, then signals that are effectively 'Carrier Operated' will be passed. If 2-3 RXDEC is selected then signals that are basically from the receivers CTCSS decoder are passed. It is also normal to select 2-3 RXDEC if only a single pin is to be used for a keying signal into the SIM. Example of this would be an Omnitronics 925 LKI, or a Tara/Tact Telephone interconnect. Devices such as these don't have CTCSS and decoders, and have just one PTT output signal to connect to the SIM. Link LK71 is for port 1 through to LK78 for Port 8.	N/A	✔

✔ = Link is present in that model. N/A = Link does not exist in that model.

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Section 5 Installation, Set up and Adjustment

5.1 Introduction

This section provides details on how to install, set up and adjust an A800-SIM. As the layout of most radio systems is unique, the information presented here is generic in nature and can serve as a guide.

5.2 Parts Supplied

Each A800-SIM standard should be supplied with the following ancillary parts.

Qty	Description
1	A800-SIM T800 Site Interface Module. 19" Rack Case, 2RU.
1	Power Cable. Length 900mm.
8	DB15Male to DB15 Female Ribbon Cables. Length 600mm. Used for connecting SIM I/O Ports to T800 modules.
4	A800-SIO T800 Module Adaptor PCB. Used on T800 modules. A800-SIO board breaks out the DC supply rails so they can be wired up locally on the T800 rack frame. The supplied ribbon cables then plug into the back of the A800-SIO board.

5.3 Installation

1. The A800-SIM is a 19" rack mount 2RU unit. It should be mounted in a suitable 19" rack. The unit needs to be mounted adjacent to the T800 rack frames that it will be interfacing to. DB15 ribbon cables 600mm in length are provided to interface the A800-SIM's I/O Ports to the T800 modules.
2. Figure 1. shows the layout of the connections on the rear of the A800-SIM.

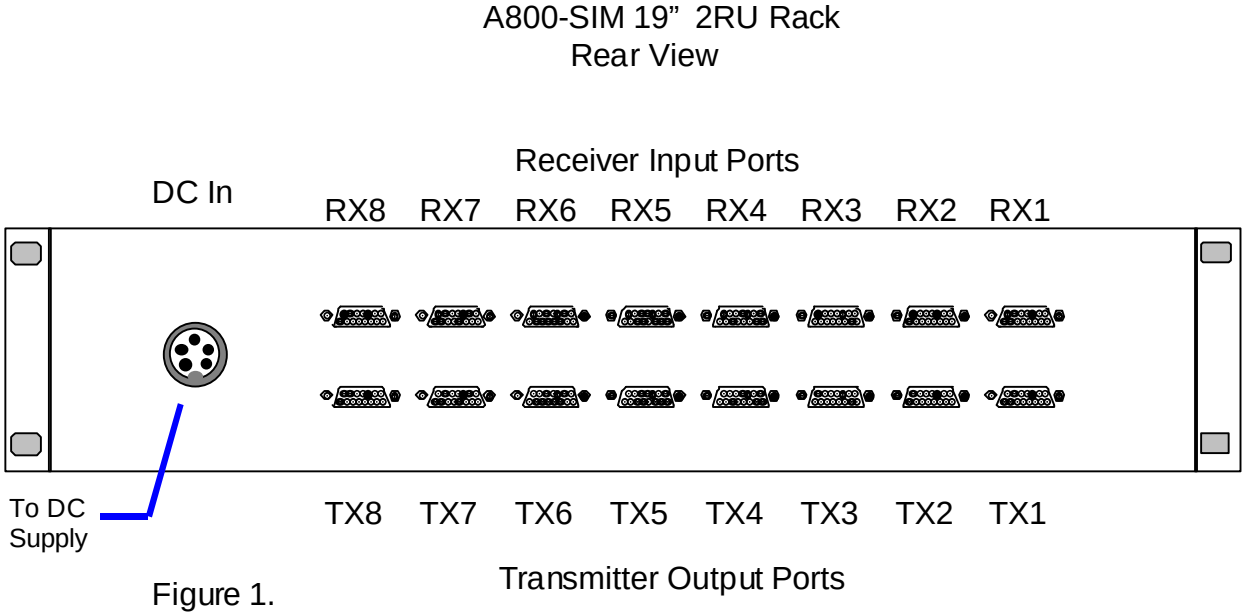

Figure 1.

3. Note that ports 7 and 8 can be configured to bring all of the relevant signals out one connector instead of the two separate input and output connectors. This is useful when connecting third party devices such as Tact/Tara Telephone interconnect units, or Omnitronics Line Keying Interface modules, etc. To do this, remove the A800-SIM top lid and reposition the RX7 and/or RX8 internal ribbon cable to the 16 way PCB mounted header pin block in front of the normal RX and TX 16 ways header blocks. On the PCB, these are labelled TARA for Port 7 and T802 for Port 8. When set up like this, only the top RX7 and/or RX8 Port is used and the bottom TX7 and/or TX8 Port is not used.

4. Figure 2. shows the wiring of the power lead supplied with the A800-SIM. Connect the red wire to +13.8V DC supply and the black to the return ground. The yellow wire is the optional 'Mains Fail' input to the A800-SIM and can be connected to a standard T807/T808 power supplies 'Fail Alarm' output. For more information on 'Mains Fail, refer to the Section 6 Options.

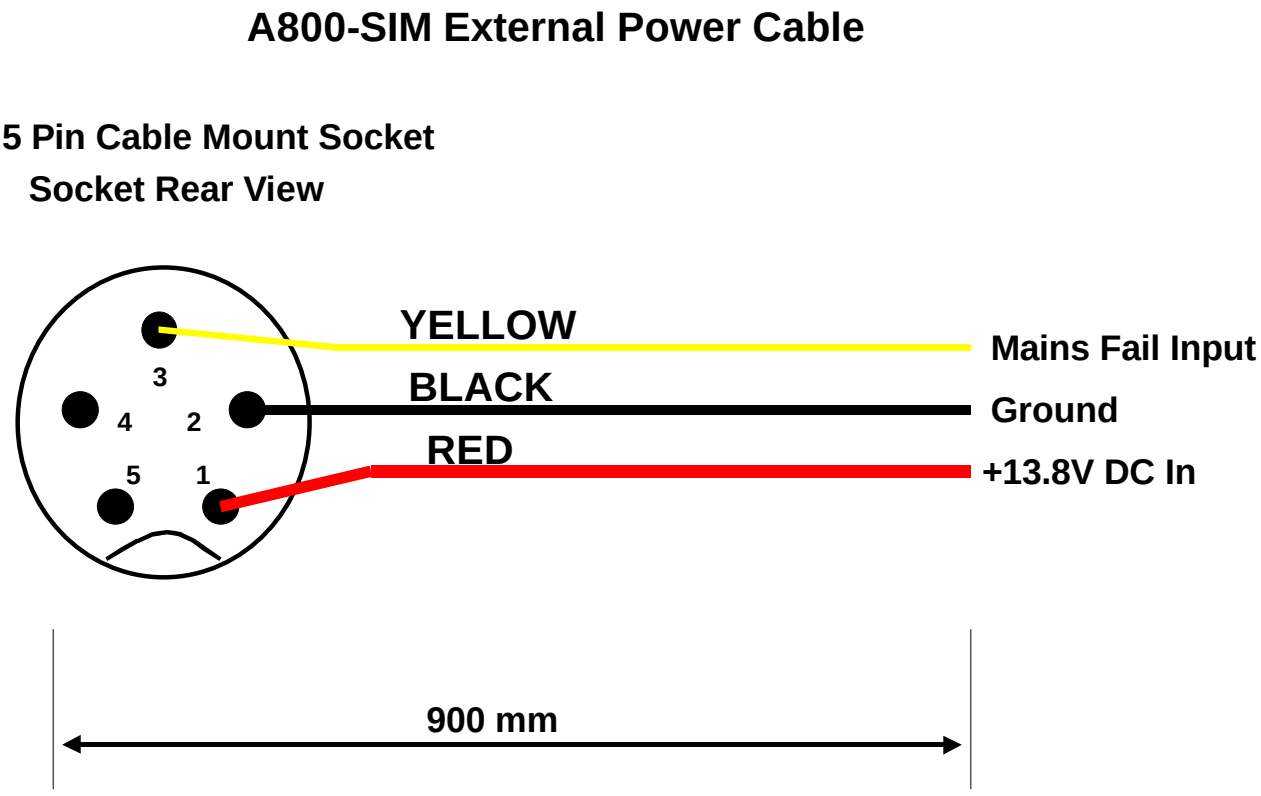

Figure 2.

5. Figure 3. shows the connection of the A800-SIM to T800 receiver and transmitter/exciter modules using the DB15 ribbon cables and A800-SIO modules supplied.

   Note the use of the A800-SIO module (PCB) on the transmitter or exciter to break out the DC supply for the module. This is required to ensure that the maximum current drain of the A800-SIM (2 Amps) is not exceeded. When connecting up external equipment, add up the total amount of external current that will be drawn from the A800-SIM I/O Ports. Allowing approximately 500mA for the A800-SIM's internal current draw, that leaves about 1.5 Amps to drive external equipment.

   Quantity 4 x A800-SIO modules are provided with each A800-SIM. These are intended to be used for transmitters and exciters.

   In the A800-SIM, ensure that the +13.8V Supply links LK31 to LK38 are set correctly to isolate a ports +13.8V Supply output on all ports using an A800-SIO board with power connected to it. For more information on links LK31 to LK38, refer to Section 4 Link Settings.

A800-SIM to T800 Module Connection

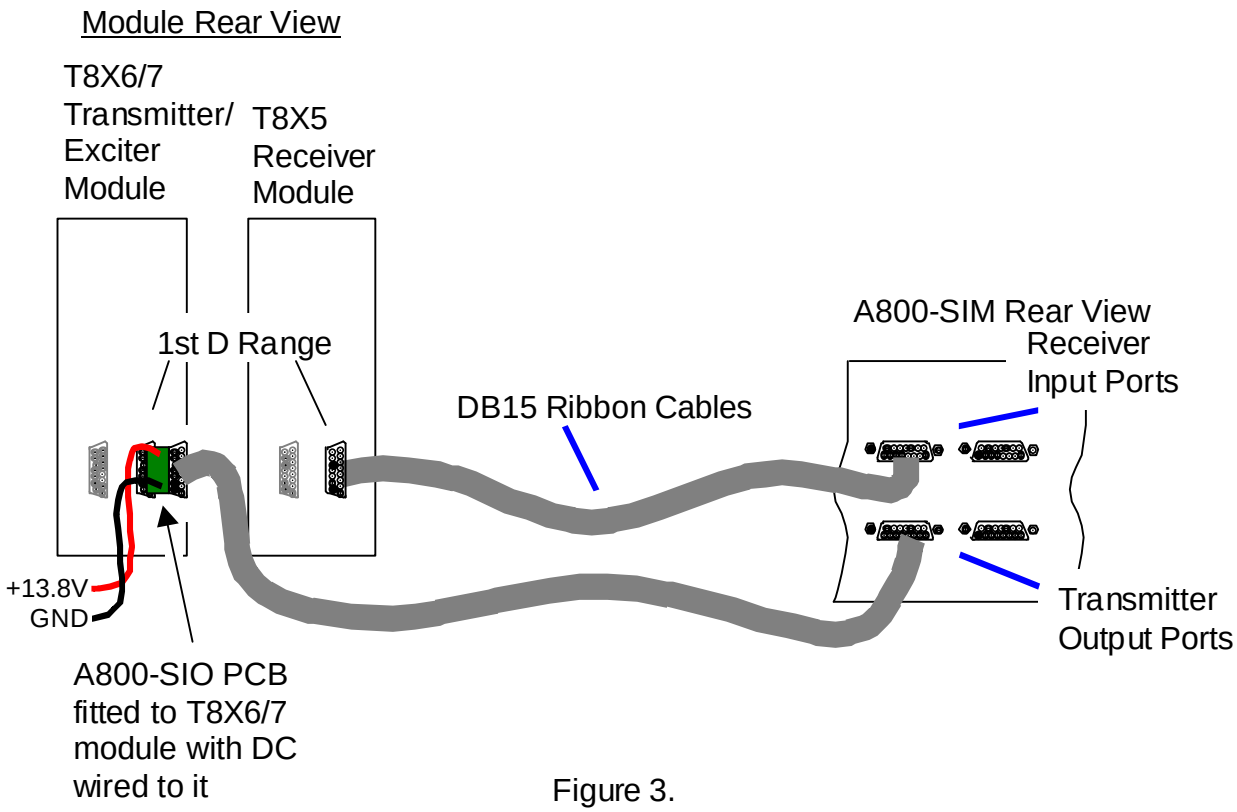

Figure 3.

5.4 Port Pin Outs

Listed here are the A800-SIM pin outs for Port 1 to Ports 8.

Ports RX1 to RX8

Pin	Label	Description
1	RXAF	Line In audio
2	RXDISABLE	RX Disable output.
3	N/C	-
4	GND	Ground
5	N/C	-
6	N/C or AUDIO1	AUDIO1 audio input for Ports 4, 5, & 6. Otherwise N/C.
7	RXAF_TONE	Received CTCSS audio (Live Tone)
8	SPEAKER_AF	Speaker Audio Input
9	+13.8V Out	+13.8 volts output
10	+13.8V Out	+13.8 volts output
11	RXGATE	Receiver Carrier Gate Input, active low.
12	RXDEC	Receiver CTCSS Decoder Input, active low.
13	RELAY GND	Ground for an external relay for pin 12 (RXDEC)
14	GND	Ground
15	GND	Ground

TX1 to TX8

Pin	Label	Description
1	TXAF	Line Out audio
2	MIC_PTT	Input from transmitters local microphone PTT line, active low
3	N/C	-
4	GND	Ground
5	TXENABLE	TX Enable input from transmitter, active low.
6	AUDIO1	T8X6/7 audio line. Only looped back to pin 7
7	AUDIO2	T8X6/7 audio line. Only looped back to pin 6
8	ENC_TONE	CTCSS Encode tone output
9	+13.8V Out	+13.8 volts output.
10	+13.8V Out	+13.8 volts output
11	N/C	
12	N/C	
13	TXKEY	TX Key/PTT output, active low.
14	GND	Ground
15	GND	Ground

Ports 7 and 8 set up for TARA & T802 (Refer to 5.3 Installation Step 3)

Pin	Label	Description
1	RXAF	Line In audio
2	N/C	-
3	N/C	-
4	TXAF	Line Out audio
5	N/C	-
6	N/C	-
7	N/C	-
8	SPEAKER_AF	Speaker Audio Input
9	+13.8V Out	+13.8 volts output.
10	+13.8V Out	+13.8 volts output
11	RXGATE	Receiver Carrier Gate Input, active low.
12	RXDEC	Receiver CTCSS Decoder Input, active low.
13	TXKEY	TX Key/PTT output, active low.
14	GND	Ground
15	GND	Ground

5.5 Set up

The set up for an A800-SIM should be simple in most cases. The following steps should be carried out.

1. Link Settings. The A800-SIM should have its links set to suit its mode of operation, eg hub/master site, slave site. For a detailed description of the A800-SIM links and their functions, refer to Section 4.0 Link Settings.
2. Options. The A800-SIM should be configured with any optional functions. Examples of these include RX Disable, Mains Fail, Secondary CTCSS Encode, System Splitting, etc. For more information on the various options, refer to the Section 6 Options.
3. T800 module modifications. The T800 modules that are to be connected to the A800-SIM should be modified and configured. For a detailed description of module modifications and their functions, refer to Section 3 T800 Module Modifications.

5.6 Adjustment

This section details the adjustments that are necessary for A800-SIM operation.

5.6.1 Audio Levels

In general, there are no adjustments for audio level setting. As the A800-SIM's main function is a T800 Site Interface Module, audio level setting is carried out on the receiver, transmitter/exciter modules.

The actual audio level used on all of the A800-SIM ports is not critical. What is crucial is that the equipment on all ports is set to the same level. The A800-SIM is optimised for –10dBm nominal line levels, so this is probably a good line level to pick for new systems. Nominal level is the level on a radio system at 60% deviation, eg 3KHz for a wide band system and 1.5KHz for a narrow band system.

The A800-SIM Ver3+ has unity gain on its audio circuits (+/- 1dBm). As such, the same audio output level should be obtained on any port as is being fed into any port. This level is not adjustable, except for ports 7 and 8 (see the following paragraph). This output level can be checked to ensure correct operation of the unit.

If third party equipment is connected to an A800-SIM then the audio level settings should be carried out on that equipment. For an A800-SIM Ver3+, Ports 7 and 8 do have provision for adjusting the line out level (TXAF) but not for adjusting the line input level. To enable this function, links LK12 to LK15 need to be set accordingly and then the trim pot RV3 is used to adjust Port 7 and RV4 is used to adjust Port 8. Refer to Section 4 Link Settings for more information. Refer to the PCB overlay to locate RV3 and RV4.

In large radio systems with many links and link hops, it is important that the line levels through out the system are set quite accurately. Small errors of line levels at each site can have a cumulative (additive) effect on system audio. Signals at nominal system levels fed into one end of a system could come out the other end of the system at too little a level or too high a level. This will compromise the integrity of the entire system and sometimes render it quite unusable.

Note that for A800-SIM V2, the audio circuitry is passive and routing achieved by a 10K resistor matrix. As such, all equipment should be connected to the A800-SIM during line level set up, because these line levels will vary if any one piece of equipment is removed. Audio input levels will need to be approximately 0dBm to overcome the loss in the audio matrix. As such, the transmitters line input levels will need to be set to deviate the correct level, with whatever audio level is recovered out of the audio matrix.

5.6.2 TX Tail and Soft Off Tail Timers

The adjustment of the TX Tail and Soft Off Tail Timers is required on a hub/master A800-SIM. The simplest way to adjust this is with the T800 modules connected to the A800-SIM. Failing that, the operation can be simulated by grounding RX1 pin 12 RXDEC input. The simplest place to access this point is to ground link LK71 pad 3. This assumes that the 'Receiver Primary Tone Inputs' for Port 1 is linked to 'Tail'. Refer to the Section 4 Links Setting for more information on the Receiver Primary Tone Inputs matrix. To carry out this adjustment, refer to the PCB overlay to locate the trim pots RV2 and RV1.

1. Generate an on carrier signal with the correct CTCSS tone into a receiver connected to RX1 Port 1. This should key up the tail circuits and light the PCB leds 'TX Tail' LED2 Green and 'Soft Off' LED1 Red. Remove the signal to the receiver and note the time period until 'TX
2. Repeat step 1 and adjust the trim pot RV2 until the required time period is attained. Note that there is a minimum time that the TX Tail can be adjusted to. This time is approximately 0.5 seconds.
3. Once again, generate an on carrier signal with the correct CTCSS tone into a receiver connected to RX1 Port 1. Remove the signal to the receiver and note the time period between when the 'TX Tail' LED2 extinguishes and when the 'Soft Off Tail' LED1 extinguishes. This period of time between the two leds turning off is the Soft Off time.
4. Repeat step 3 and adjust the trim pot RV1 until the required time period is attained. Note that there is a minimum time that the Soft Off Tail can be adjusted to. This time is approximately 0.5 seconds. The only method of removing the Soft Off Tail altogether, is to remove the capacitor C7 100uF.

Note that for an A800-SIM Ver 2, the terminology of the timers here is slightly different. Refer to Table 1. in Section 2.4 'TX Tail and Soft Off Tail' for an explanation of the terms and functions.

5.6.3 Voting Pulse Generator

The voting pulse generator can only be enabled and disabled. It cannot be adjusted. The voting pulse generator has a cycle time of approximately 3 minutes, and a pulse output time of approximately 2 seconds.

If the voting pulse generator had to have its times varied, then the various timing components would need to be changed. The components R20 and C6 form the timing constant for the cycle time. The capacitor C5 sets the pulse output time.

5.6.4 CTCSS Encoder Tone Levels

This section details the method of setting up the A800-SIM CTCSS Encoders. This includes the standard Primary CTCSS Encoder and the optional Secondary CTCSS Encoder. For more information on the optional Secondary CTCSS Encoder, refer to Section 6 Options.

The first thing to do when setting up the CTCSS Encoders is to ensure that the A800-SIM links are set up correctly for the types of T800 modules being connected. This is to ensure that CTCSS tone level can be successfully adjusted for all ports. The links that are important to set are LK41 to LK48, LK51 to LK58, and LK61 to LK68.

To adjust the tone levels, all the T800 modules need to be connected to the A800-SIM.

1. Program the ST133('s) for the required CTCSS encode tone. Some information on the ST133 encoder can be found in Appendix A at the back of this manual. For more information, contact your local Selectone supplier.
2. Due to the fact that the ST133 encoders provide tone to all the Exciters/ Transmitters, the subtone level should be adjusted with all transmitter modules connected to the A800-SIM to obtain the correct loading. Connect up all the required transmitters to the A800-SIM.
3. Generate an on carrier signal with the correct CTCSS tone into one of the receivers connected to the A800-SIM. This should key up the tail circuits and enable the on board CTCSS Encoders. If not, ensure that the port the receiver is connected to is configured correctly on the 'Receiver Primary Tone Inputs' matrix. For more information on the links and link matrix's, refer to Section 4 Link Settings.
4. Monitor each transmitters carrier in turn and adjust the trim pot on the appropriate ST133 until the required CTCSS tone deviation is achieved. If the A800-SIM links are set up correctly (as mentioned above) it should be possible to achieve approximately the required deviation for all transmitters, whether they be wide band (with 600Hz tone deviation) or narrow band (with 300Hz deviation). Because the same trim pot adjustment is used for each encoder for all A800-SIM ports on that tone, there will be some variation in level between transmitters. A compromised setting must be achieved to attain a satisfactory tone deviation level on all transmitters.

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Section 6 Options

6.1 Introduction

This section details some optional functions of the A800-SIM and how to implement them. Each of the options is not provided as a standard function, but can be easily enabled with the addition of a few extra components and a small amount of set up.

6.2 System Splitting

System Splitting in the A800-SIM is quite a complex issue. As such it is covered in a separate application note. This note is AN003. To obtain a copy of this application note, visit the Tait Australia web site at http://www.taitworld.com/australia/ or contact your local Tait representative.

6.3 Secondary CTCSS Encoder

6.3.1 Introduction

This section details the set up & configuration of the A800-SIM Secondary CTCSS Encoder option. This only applies to A800-SIM Ver3+. A800-SIM Ver2 had no provision for a second CTCSS encoder function that works.

The Secondary CTCSS Encoder option provides the A800-SIM with a second CTCSS encode tone that can be link selected to be used for any of the ports 1 to 8. This enables, for example, a repeater on one port to operate with one CTCSS encode tone and a link on another port to operate on another.

The use of the Secondary CTCSS Encoder option does not provide the function of two simultaneous CTCSS tones on all or any of the A800-SIM ports. In other words, it does not provide a multitone function like a multitone CTCSS panel would.

6.3.2 Parts

The following parts are required for the Secondary CTCSS Encoder option:

Part Number	Description	Supplier	Qty.
ST133	Selectone CTCSS Encoder	RPL Raedale	1
179-351	Relay, DPDT, 12Volt Coil	Farnell	1

6.3.3 Procedure

1. Remove the A800-SIM top lid and the six screws holding the PCB down. Fit the 12V relay to the A800-SIM board at the position marked #RL5. Refit the A800-SIM PCB.
2. Stick the ST133 encoder down to the A800-SIM board to the position marked #ST133 Secondary Tone, using the double sided tape supplied with the ST133.
3. Wire the ST133 to the A800-SIM PCB as per Figure 4:

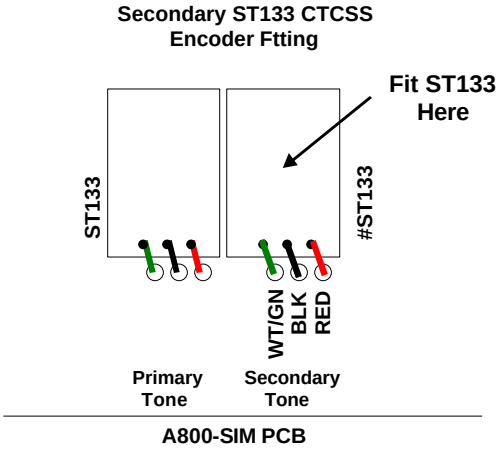


Figure 4.

4. Program the ST133 for the required CTCSS encode tone. Some information on the ST133 encoder can be found in Appendix A at the back of this manual. For more information, contact your local Selectone supplier.
5. Using links LK41 to LK48, you can select which ports will operate with the Secondary CTCSS Encode tone. Note that link LK20 must also be fitted if you are using CTCSS on Voting Pulse. For more information, refer to Section 4 Link Setting.
6. Align the CTCSS encode level in the same manner as for the Primary CTCSS Encoder. For more information, refer to Section 5 Installation, Set-up and Adjustment.

6.4 Mains Fail

6.4.1 Introduction

This section details the set up & configuration of the A800-SIM Mains Fail option. This applies to A800-SIM Ver3+. A800-SIM Ver2 had no provision for an internally mounted tone encoder for mains fail use.

The Mains Fail option provides an audible indication on a systems local repeater that mains power has been lost to the Tait T807/T808 power supply. The audible tone indicating the loss of mains power is placed at the beginning of all voice transmissions. The tones are only placed onto the transmitter on the A800-SIM Port 1, which is normally the local repeater. Tones are not sent out any of the other A800-SIM ports.

6.4.2 Parts

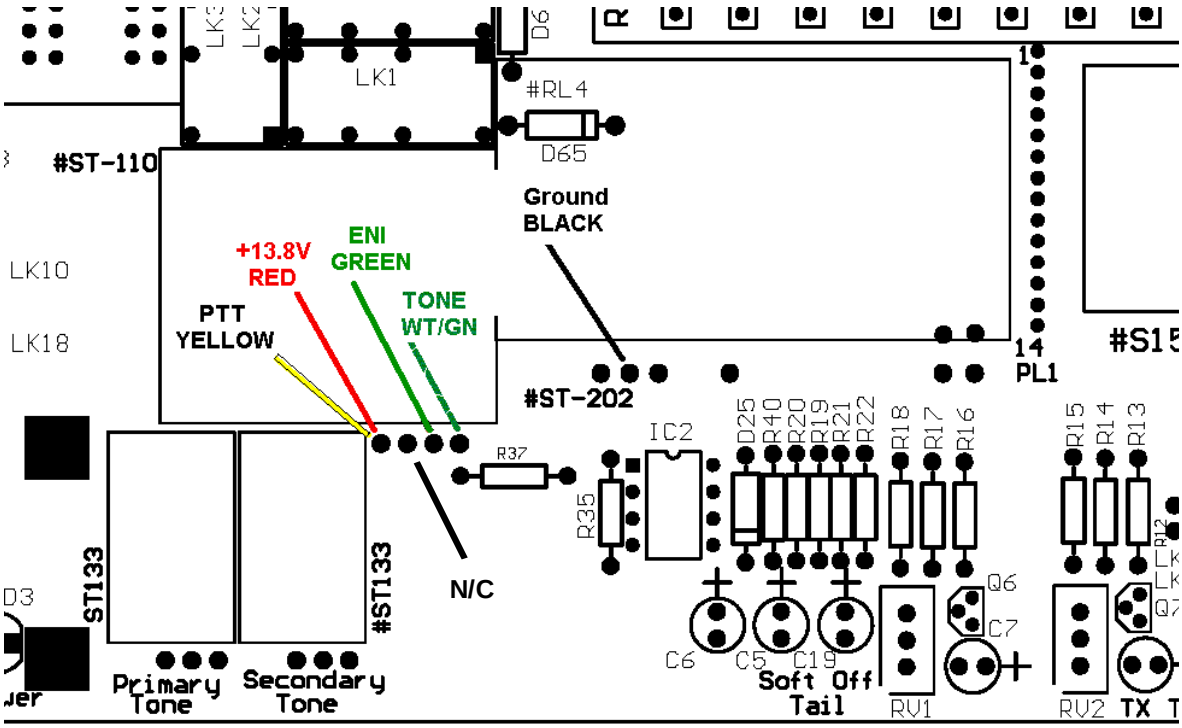
The following parts are required for the Mains Fail option:

Part Number	Description	Supplier	Qty.
ST804A	Selectone Programmable Burst Tone Encoder	RPL Raedale	1
509-280	Resistor, 10K, ¼ W, 5%	Farnell	1
179-351	Relay, DPDT, 12Volt Coil	Farnell	1

6.4.3 Procedure

7. Program the ST804A for burst tone operation, to the desired in-band frequency and duration. A tone duration of approximately 100mS is normal. Some information on the ST804A encoder can be found in Appendix A at the back of this manual. For more information & programming tools for the ST804A, contact your local Selectone supplier.
8. Remove the A800-SIM top lid and the six screws holding the PCB down.
9. Fit the 12V relay to the A800-SIM board at the position marked #RL12.

10. Fit the ST804A to the A800-SIM board as per the Figure 5.



A800-SIM Ver3+ PCB Top Overlay

Figure 5.

11. Refit the A800-SIM PCB.
12. Stick the ST804A down to the A800-SIM board to the position marked #ST110, using the double sided tape supplied with the ST804A.
13. Fit a 10K resistor across the two terminals of the two way terminal block S4 Mains Fail input.
14. Connect the external power leads yellow wire to the Fail Alarm output on the rear of the external Tait T807/T808 power supply. The Fail Alarm output is an active low signal.
15. To set up the ST804A's audio level it is necessary to simulate a mains fail situation. Connect a repeater TX & RX pair to the A800-SIM Port 1. Temporarily disconnect the yellow wire from the A800-SIM board two way terminal block S4. Monitor the local TX carrier. Generate an on channel RF carrier with the correct CTCSS tone to the receiver. When the carrier is applied to the receiver, a short tone burst should be present on the transmitters carrier. Keep doing this and adjust the trim pot on the ST804A until the required tone deviation is achieved.

6.5 Two Tone Audio on Voting Pulse

6.5.1 Introduction

This section details the set up & configuration of the A800-SIM Two Tone Audio on Voting Pulse option. This applies to A800-SIM up to Ver3+.

The Two Tone Audio on Voting Pulse option provides an audible indication on a system during a voting pulse. This can be used to provide the radio system users with confidence tones to let them know that the system is operating normally.

The audible tones can be set to go out any or all of the A800-SIM ports.

6.5.2 Parts

The following parts are required for the Two Tone Audio on Voting Pulse option:

Part Number	Description	Supplier	Qty.
ST804A	Selectone Programmable Burst Tone Encoder	RPL Raedale	1

6.5.3 Procedure

1. Program the ST804A for Two-Tone Sequential operation, to the desired in-band frequency and duration. A tone duration of approximately 100mS is normal. Some information on the ST804A encoder can be found in Appendix A at the back of this manual. For more information & programming tools for the ST804A, contact your local Selectone supplier.
2. Remove the A800-SIM top lid.
3. Place a wire link across the unused contacts of relay #RL13. Relay #RL13 should not be fitted. Figure 6. shows where the links should go:

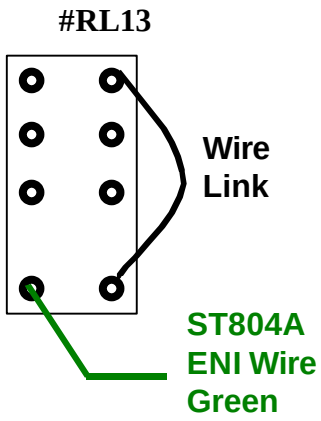
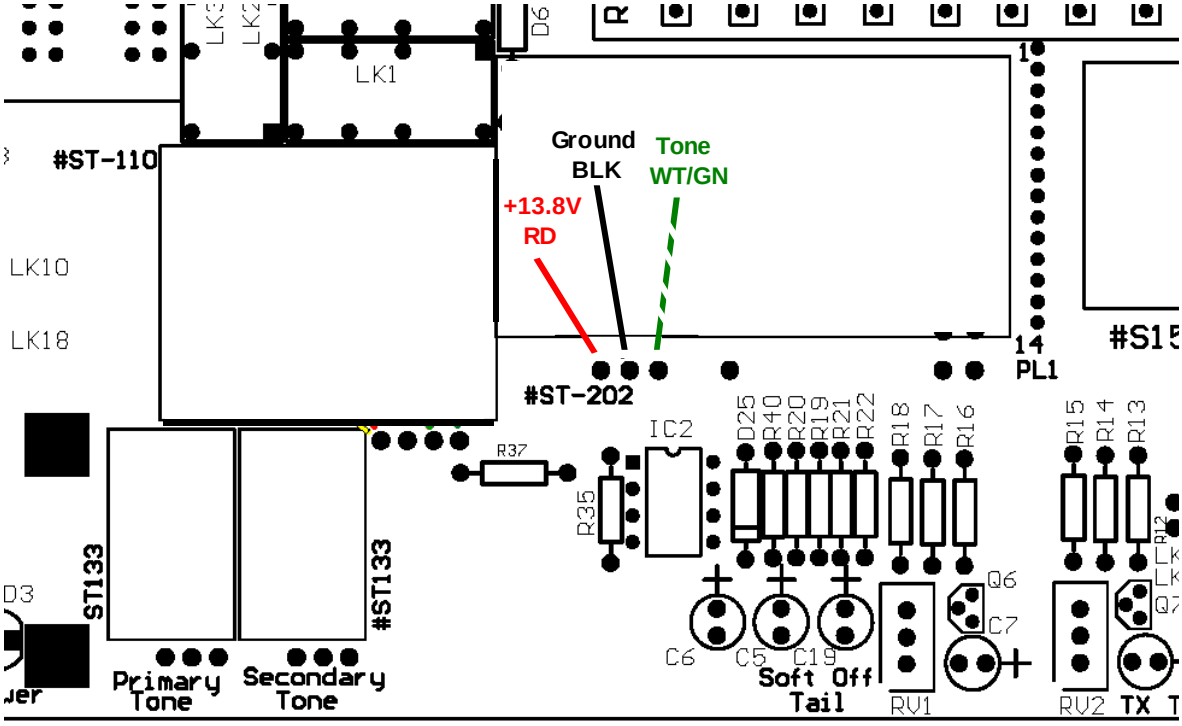


Figure 6.

4. Fit the ST804A to the A800-SIM board as per Figure 7. Note that the ST804A ENI Green wire connects to the coil pad of the unfitted relay #RL13. Look back at step 3 to see the position to connect this wire to.



A800-SIM Ver3+ PCB Top Overlay

Figure 7.

5. Stick the ST804A down to the A800-SIM board to the position marked #ST202, using the double sided tape supplied with the ST804A.
6. Fit the link LK10. LK10 is the 'Two Tone Audio on Voting Pulse Enable' link. Once the ST804A is fitted, the link LK10 can always be removed to disable this function.
7. Ensure that the Audio Matrix has links fitted to the TT_AF row to enable two tone audio out all of the TX1 to TX8 ports. By default, this row should all be fitted with links. If it is desired that the two tone audio only go out certain ports, then only those ports can be selected on the Audio Matrix. For more information on the Audio Matrix links, refer to Section 4 Link Settings.
8. To set up the ST804A's audio level, connect a transmitter to the A800-SIM Port 1. Monitor the local TX carrier. Wait for each voting pulse to occur and note the transmitters deviation. Adjust the trim pot on the ST804A until the required tone deviation is achieved.

6.6 Spare Relay Circuits

6.6.1 Introduction

This section details the fitting and use of the A800-SIM Spare Relay Circuits option. This applies to A800-SIM up to Ver3+.

The A800-SIM PCB has provision for two spare relays to be fitted for use in custom applications. These circuits come complete with transistor drivers for low current relay control. The two relays in question are #RL14 and #RL15. The position for these can be found in the front left of the PCB. The circuit details for these can be found on the circuit diagrams.

6.6.2 Parts

The following parts are required for the Spare Relay Circuits option:

Part Number	Description	Supplier	Qty.
179-351	Relay, DPDT, 12Volt Coil	Farnell	1 or 2

6.6.3 Procedure

1. Remove the A800-SIM top lid.
2. Remove the PCB by unscrewing the six fastening screw.
3. Locate the positions for #RL14 and #RL15. This is in the front left of the PCB.
4. Fit relays to the #RL14 and/or #RL15 positions as shown in Figure 8.

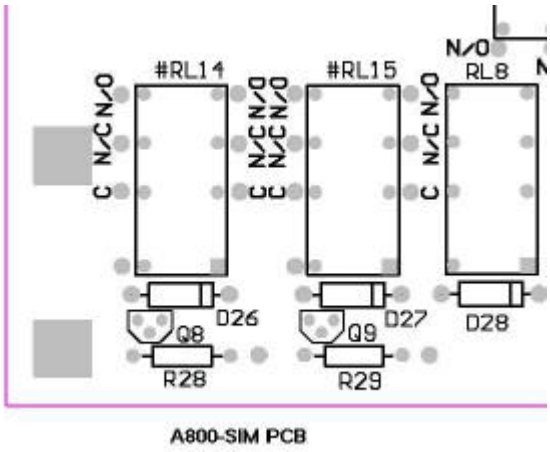


Figure 8.

5. Refit the PCB.
6. The relay contacts for both relays are then available adjacent to each relay. Pads are provided on the PCB for each contact. The PCB is marked with the function of each pad.

6.7 RX Disable

6.7.1 Introduction

This section details the fitting and use of the A800-SIM RX Disable option. This applies to A800-SIM up to Ver3+. This configuration replaces the use of the A800-SIM solder link LK19. The link LK19 is no longer used.

Common use of the RX Disable option is in systems with an End site link transmitting into a talk through repeating link (typically a hub site). In this case we don't want the returned audio of the end site link receiver mixing with the original audio of the Local TTR receiver. To achieve this the End site link receiver is disabled whenever the End site link transmitter is keyed. Refer to Figure 9.

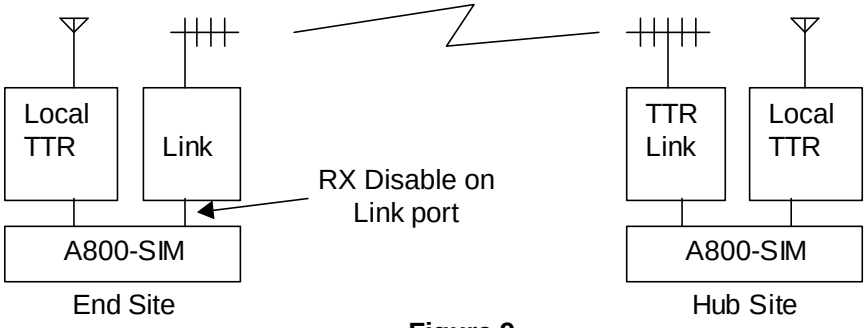


Figure 9

6.7.2 Parts

The following parts are required for each port with the RX Disable option:

Part Number	Description	Supplier	Qty.
368-106	1N4148 Diode	Farnell	1

6.7.3 Procedure

1. Remove the A800-SIM top lid.
2. Identify the port that requires the RX Disable option fitted. Unplug the 16 way ribbon cable looms from the TX and RX PCB headers for that that port.
3. On top of the A800-SIM PCB, connect the cathode of a diode to the TX port pin 5. Refer to Figure 10.
4. Cover the diode in silicon tubing.
5. Connect the anode of the diode to the RX port pin 2. Refer to Figure 10.
6. Repeat Steps 3 to 5 for any other ports that require the RX Disable option.
7. Refit any of the 16 Way ribbon cable looms that were unplugged.
8. Test the A800-SIM and associated T800 equipment to ensure correct operation.

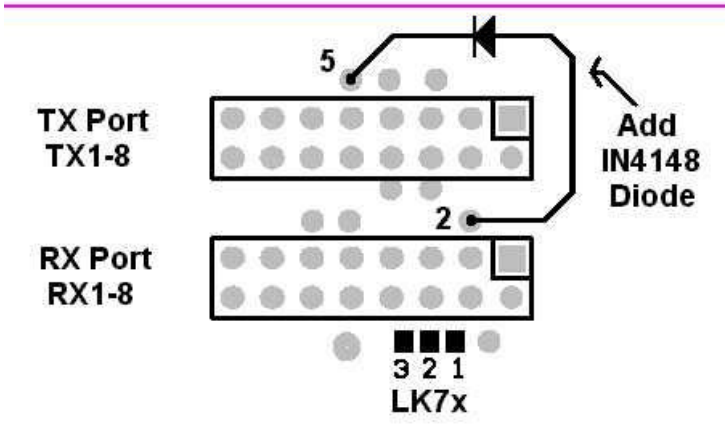


Figure 10

6.8 Improved PTT Output Performance

6.8.1 Introduction

Although the PTT Output circuit has proven to be perfectly reliable for use with Tait T800 equipment, it has be noted that when using certain other third party equipment with an A800-SIM, 100% reliable keying is not always achieved. This is due to the design of the PTT Tail/ Soft Off Tail circuit.

When the TX Tail/Soft Off Tail circuit is used, the PTT Outputs are pulled down to approximately 1.2 volts. In some circumstances, this is not low enough. This modification ensures that the A800-SIM can pull its PTT outputs down to at least 0.6 volts. This is important for equipment that has a TTL input for its PTT input line, as TTL inputs require less that 1V to recognize a 'low'.

***Note:** As this configuration is a general improvement of A800-SIM performance, this modification has now been implemented as standard in all A800-SIM product from Serial Number 3866231 onwards.*

6.8.2 Parts

No parts are required for this modification (apart from workshop consumables).

6.8.3 Procedure

1. Remove the A800-SIM top lid.
2. On the A800-SIM PCB, remove the diodes D35 and D33.
3. Place a wire link across the two pads where D33 was previously fitted. When active, the PTT Outputs will now be pulled down to 0.6 volts.
4. Test the A800-SIM and associated external equipment to ensure correct operation.

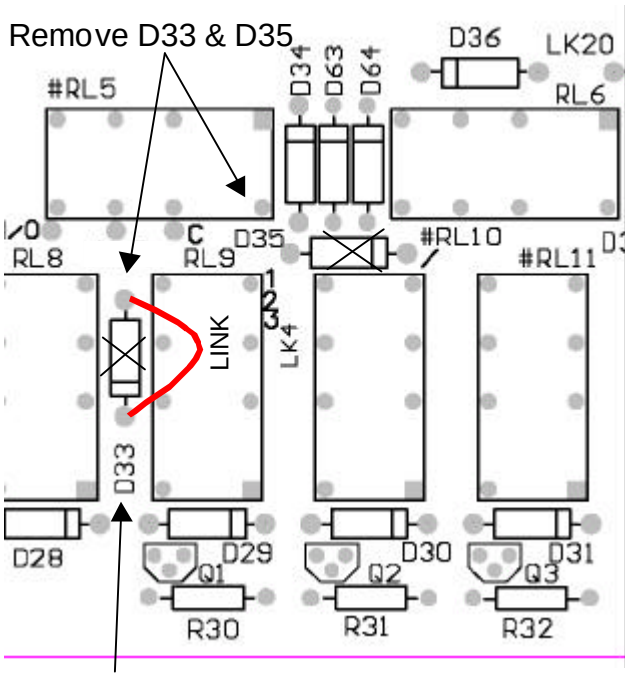


Figure 11

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Section 7 Parts List

7.1 A800-SIM3a Parts

7.1.1 A800-SIM3a PCB Parts

Ref. No.	Description	Part No.	Supplier	Qty
A800-SIM PCB Ver3 14/7/98	A800-SIM PCB Board	A8-SIM3a.pcb	OEM	1
C1, C2, C7	Capacitor, Electrolytic, 100uF, 25V	228-655	Farnell	3
C3, C4, C11 to C18, C30 to C32	Capacitor, 100nF Poly, 63V	146-079	Farnell	13
C5, C6, C8, C10	Capacitor, Electro, 220uF, 25V	228-667	Farnell	4
C9	Capacitor, Electro, 1000uF, 25V	228-692	Farnell	1
C19 to C29	Capacitor, Electro, 10uF, 35V	228-618	Farnell	11
D1 to D32, D34, D36 to D41, D43 to D65, D101 to D172	Diodes, 1N1418	368-106	Farnell	134
D33	Resistor 0E (Was Diode, 1N4148)	508-792	Farnell	1
D42	Diode, 1N5404	365-348	Farnell	1
F1	Fuse, 2 Amp, 3AG	534-950	Farnell	1
F1a & F1b	Fuse Clip, PCB Mount, 3AG	H-1700	DS	2
IC1	TDA7231 1.6 W Audio Amp	002-00014-05	Tait	1
IC2	LM358 Dual Op Amp	399-577	Farnell	1
IC3, IC4	TL074 QUAD OP AMP	401-377	Farnell	2
IC1 Socket, IC2 Socket	IC Socket, 8 Way, Turned Pins	738-517	Farnell	2
IC3 Socket, IC4 Socket	IC Socket, 14 Way, Turned Pins	738-529	Farnell	2
LED1, LED3	LED, Red, 3mm	472-281	Farnell	2
LED2	LED, Green, 3mm	178-304	Farnell	1
Q1 to Q5, Q8 to Q9	Transistor, BC548,	357-080	Farnell	7
Q6, Q7, Q10	Transistor, BC327,	356-943	Farnell	3
R1 to R6, R9 to R12, R40	Resistor, 100K, 1/4 W, 5%	509-401	Farnell	11
R7, R8, R13, R14, R16, R17, R26 to R32, R35, R37, R38, R41 to R48	Resistor, 10K, 1/4 W, 5%	509-280	Farnell	24
R15, R18, R21, R22, R25	Resistor, 1K, 1/4 W, 5%	509-164	Farnell	5

7.1.1 A800-SIM3a PCB Parts…Cont.

Ref. No.	Description	Part No.	Supplier	Qty
R19	Resistor, 10E, 1/4 W, 5%	508-925	Farnell	1
R20	Resistor, 1M, 1/4 W, 5%	509-528	Farnell	1
R23	Resistor, 4E7, 1/4 W, 5%	508-883	Farnell	1
R24	Resistor, 47K, 1/4 W, 5%	509-360	Farnell	1
R33, R34, R36	Resistor, 560E, 1/4 W, 5%	509-139	Farnell	3
R51 to R58	Resistor, 22K, 1/4 W, 5%	509-322	Farnell	8
R61 to R68	Resistor, 3K3, 1/4 W, 5%	509-220	Farnell	8
RL6 to RL9, RL12, RL16 to RL23	Relay, DPDT, 12Volt Coil	179-351	Farnell	13
RP1 to RP9, RP13	Resistor Pack, 10K, 4610X101	148-995	Farnell	10
RP10	Resistor Pack, 680E, 4609X101	447-407	Farnell	1
RV1 to RV4	24 Turn Variable Resistor, 100K	349-033	Farnell	4
RX1 to RX8	16 Way IDC Header, PCB Mnt	512-140	Farnell	8
S1 to S4	2 Way Terminal Block, PCB Mnt	151-789	Farnell	4
ST133 Primary	ST133 CTCSS Encoder	ST133	RPL Raedale	1
T802	16 Way IDC Header, PCB Mount	512-140	Farnell	1
TARA	16 Way IDC Header, PCB Mount	512-140	Farnell	1
TX1 to TX8	16 Way IDC Header, PCB Mount	512-140	Farnell	8

7.1.2 A800-SIMa PCB Parts Not Populated

Ref. No.	Description	Part No.	Supplier	Qty
D35	Diode 1N4148	368-106	Farnell	1
#RL1 to #RL4, #RL5, #RL10, #RL11, RL#13 to #RL15, #RL24	Relay, DPDT, 12Volt Coil	179-351	Farnell	11
#ST110	ST110 Burst Tone Encoder	ST110	RPL Raedale	1
#ST133 Secondary	ST133 CTCSS Encoder, Secondary	ST133	RPL Raedale	1
#ST202	ST202 Two Tone Encoder	ST202	RPL Raedale	1
#S1530	Selcall Encoder/Decoder	S1530	Sigtec	1

7.1.3 Cables and Connectors

Ref. No.	Description	Part No.	Supplier	Qty
Ribbon	15 Way Ribbon Cable, for internal & external cables	-	OEM	7.2m
Speaker Cable	Figure 8 Speaker Cable 702, for speaker wiring (Like Farnell 710-167), for wiring the speaker	710-167	OEM	100mm
Power Cable	4mm Auto Cable, as per sample, for external power cable and internal power wiring to PCB	-	OEM	1m
Hook-up Wire	Yellow 702 Hook-up Wire, as per sample, for external power cable and internal power wiring to PCB	-	OEM	1m
-	IDC 16 Way Cable Mount Connector, for internal cables	963-264	Farnell	16
-	DB15 Male Crimp Connector, for external cables	460-151	Farnell	8
-	DB15 Female Crimp Connector, for 16 internal & 8 external cables	460-199	Farnell	24
SOC1	5 Way Chassis Mount Plug	3036 4148	RPG	1
PLG1	5 Way Cable Mount Socket	3036 3848	RPG	1

7.1.4 Mechanical Parts

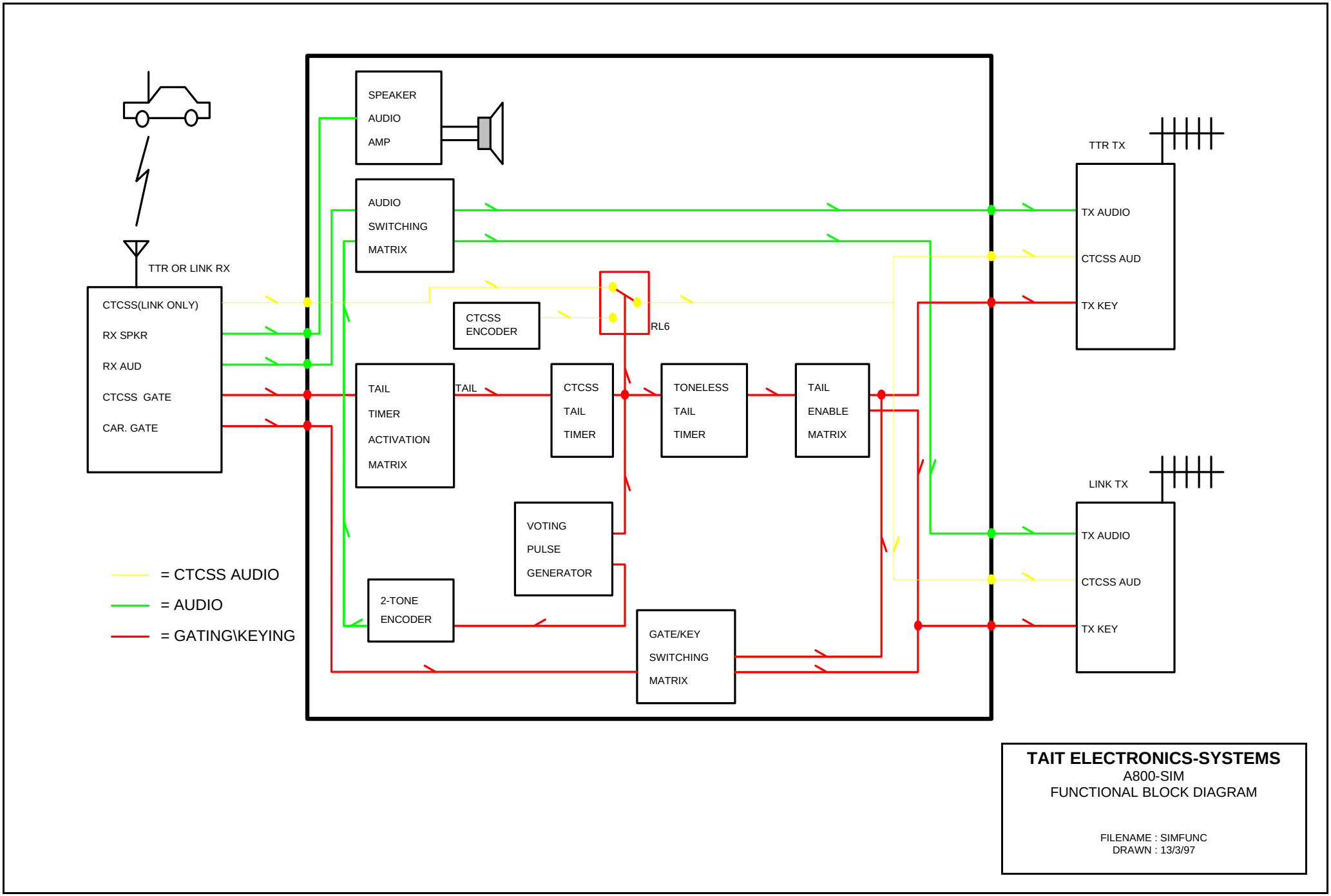
Description	Part No.	Supplier	Qty.
A800-SIM 19 Inch Equipment Box (Q11135)	213980	Tait	1
D Range Mounting Bush Kits, 16 Sets (1 set = 2 bushes). RPG P/No is for 10 sets of bushes	3057 6002	RPG	16
M3 x 6mm Pan Phillips Screws, Zinc Plated, for PCB mounting	-	Dent	6
M4 x 12mm Button Head Screws, Black Anodised, Front Panel mounting	-	Dent	4
M3 x 8mm Pan Phillips Screws, Zinc Plated, for Box Lid mounting	-	Dent	4
M3 x 8mm Button Head Cap Screws, Black Anodised, Spk. mounting	-	Dent	4
M3 Flat Washers, Zinc Plated, Spk. mounting	-	Dent	4
M3 Nuts Zinc Plated, Spk. mounting	-	Dent	4
M4 Flat Washers Zinc Plated, Spk. mounting	-	Dent	8
Serial No Label, Stick On, Metalized, for equipment box external. Note that there is a Qty 180 per packet of labels.	385-610	RS	1
Serial No Label, Stick On, Paper, for equipment box external. Qty 180/Pkt.	554-793	RS	1
Speaker, 4 Ohms, 2W, 71 x 41 mm	250-00010-19	Tait	1
Speaker Grill Black (alt. silver 307-01015-00)	307-01015-01	Tait	1

7.1.5 Parts Packaged with each A800-SIM

Ref. No.	Description	Part No.	Supplier	Qty
A800-SIO	A800-SIO T800 Module Adaptor PCB	A800-SIO	OEM	4
-	600mm D Range Cables. Parts as per Cable table above, and assembly instruction.	-	OEM	8
-	ZIP LOCK BAG		OEM	1
-	Power Cable. Parts as per Cable table above, and assembly instruction.	-	OEM	1

7.2 A800-SIM Ver 2 PCB Parts

PART	SUPPLIER	CIRCUIT REFERENCE	PART NUMBER	PART
RESISITORS				
10 OHM	RPG	R19	3755 1116	1
4R7	"	R23	3745 3186	1
560 OHM	"	R33, R34	3755 1442	2
1K	"	R25, R18, R15	3755 1490	3
10K (100 BUY PART #)	"	R7, R8, R13, R14, R16, R17, R26, R27, R28 , R29, R30, R31, R32	3755 1687	13
47K	"	R24	3755 1808	1
3K9	"	R21	3755 1600	1
5K6	"	R22	3755 1630	1
470K	"	R20	3755 2001	1
100K (100 BUY PART #)	"	R1, R2, R3, R4, R5, R6, R9, R10, R11, R12, R35	3755 1879	11
100K 20 TURN POT	"	RV1, RV2	3314 1072	2
10K RESISITOR PACKS	RS Components	RP1, RP2, RP3, RP4, RP5, RP6, RP7, RP8, RP9, RP10, RP11, RP12, RP13	140-530 13	
DIODES				
1N1418	RPG	D1, D2 D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20,D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D43, D44, D45, D46, D47, D48, D49, D50, D51	7000 1144	50
1N1418	"	RX GATE MATRIX	7000 1144	72
1N5404	"	D42	7000 1304	1
CAPACITORS				
100 nF	"	C3, C4	0660 0325	2
100 uF	"	C1, C2, C5, C7	0630 1336	3
220 uF	"	C6, C8	0630 1520	2
1000 uF	"	C9	0630 2200	1
TRANSISTORS				
BC 327	"	Q6, Q7	7080 2098	2
BS 548	"	Q1, Q2, Q3, Q4, Q5, Q8, Q9	7072 2177	7
IC's				
LM 358	"	IC2	7248 2861	1
TDA 7231	TAIT	IC1	002-00014-05	1
RELAYS				
MR62-12	RPG	RL1, RL2, RL3, RL4, RL5, RL6, RL7, RL8, RL9, RL10, RL11, RL12, RL13, RL14, RL15	3705 6265	15
LED's				
RED- LT511	"	LED1	7131 1001	1
GRN- LT521	"	LED2	7131 1005	1
MISC.				
TERMINALS	"	S1, S2, S3	4332 7002	3
IDC PCB MTG	"	IDC PCB 1-18	3068 7316	18
IDC CORD MTG	"	IDC CORD 1-16	3068 1016	16
IDC D SOCKET	"	IDC D SOC	3057 4415	16
FUSE HOLDER	"	FH1	1310 7438	1
5 PIN SOCKET	"	SOC1	3036 4148	1
5 PIN PLUG	"	PLG1	3036 3848	1
IC HOLDER	"	IC HOLDER	3097 6708	1
D RANGE BUSH KIT	"	D H/ WARE	3057 6002	3
FUSE	"	F1	1295 1974	1
A800-SIM PCB	TAIT/ TES	N/A	A800-SIM PCB	1
SPEAKER	TAIT	N/A	250-00010-19	1
19 " RACK UNIT	K & G	N/A	19 " RACK	1
ENCODERS/ OSCILLATORS				
S1530	SIGTEC	S530 SELCALL	S1530	1
C1000	"	C1012/ 01	C1000	1
ST202	RAEDALE	ST202	STS202	1



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A800-SIM
FUNCTIONAL BLOCK DIAGRAM

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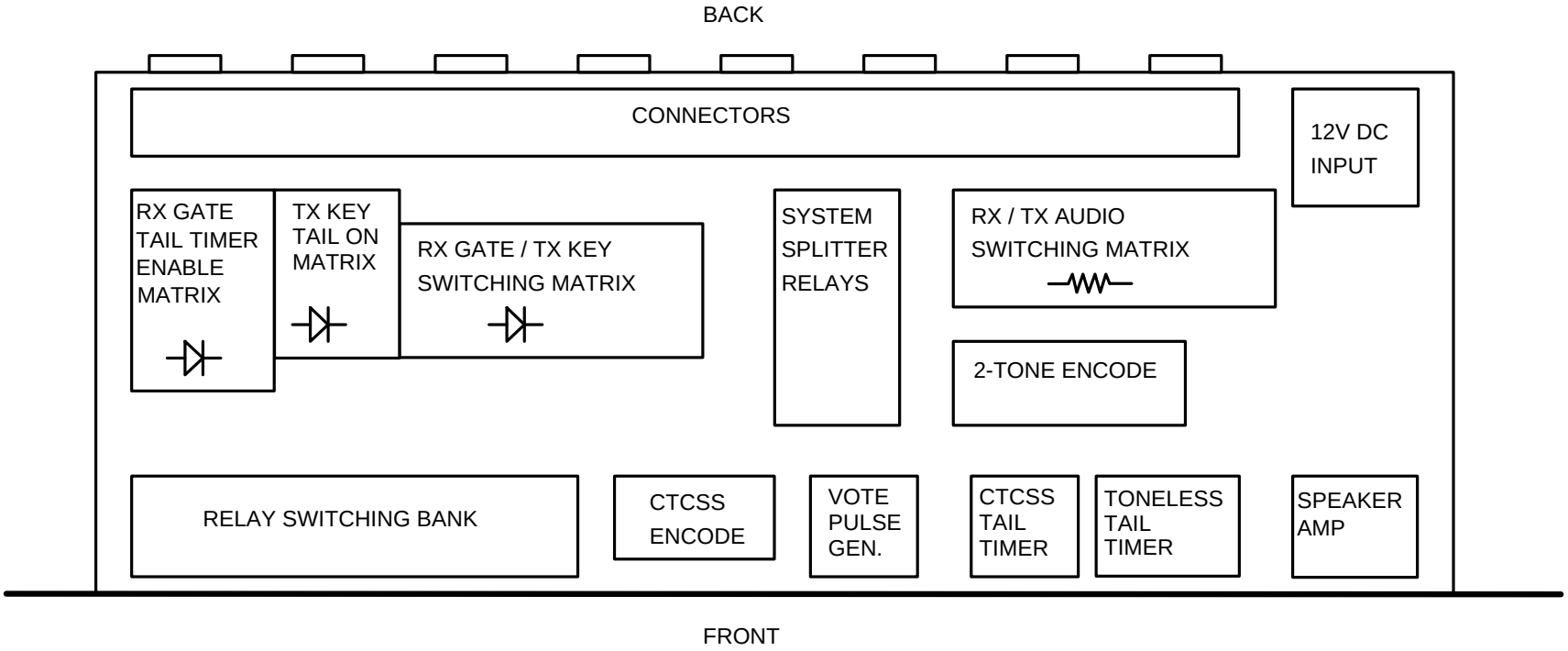

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A800-SIM LAYOUT

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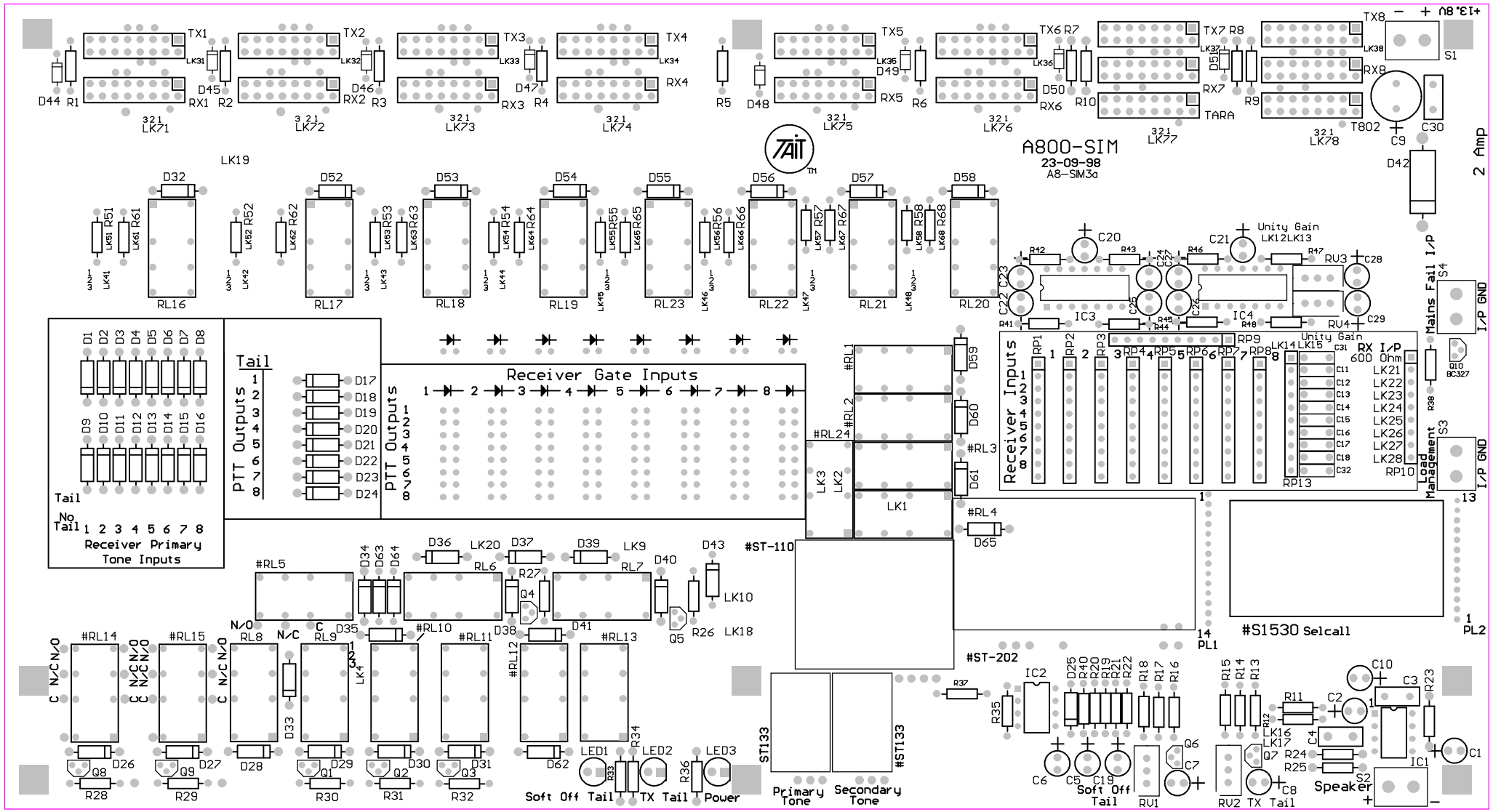
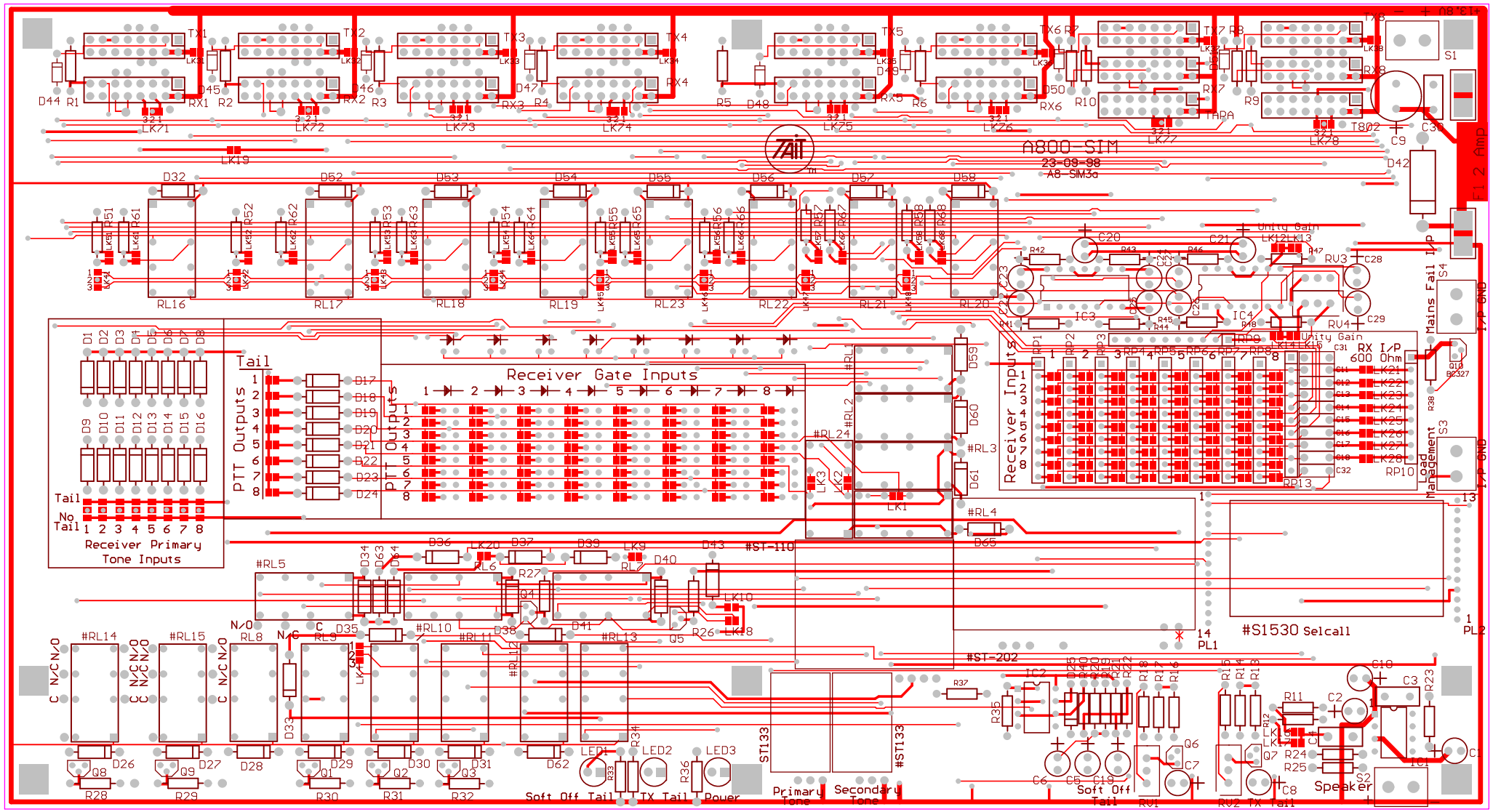

A800-SIM
23-09-98
A8-SIM3a
Tail
PTT Outputs
Receiver Gate Inputs
Receiver Primary Tone Inputs
Receiver Inputs
RX I/P 600 Ohm
Unity Gain
Mains Fail I/P
I/P GND
Load Management
#S1530 Selcall
#ST-110
#ST-202
#ST133
Primary Tone
Secondary Tone
Soft Off Tail
TX Tail
Power
Speaker
2 Amp
+13.8V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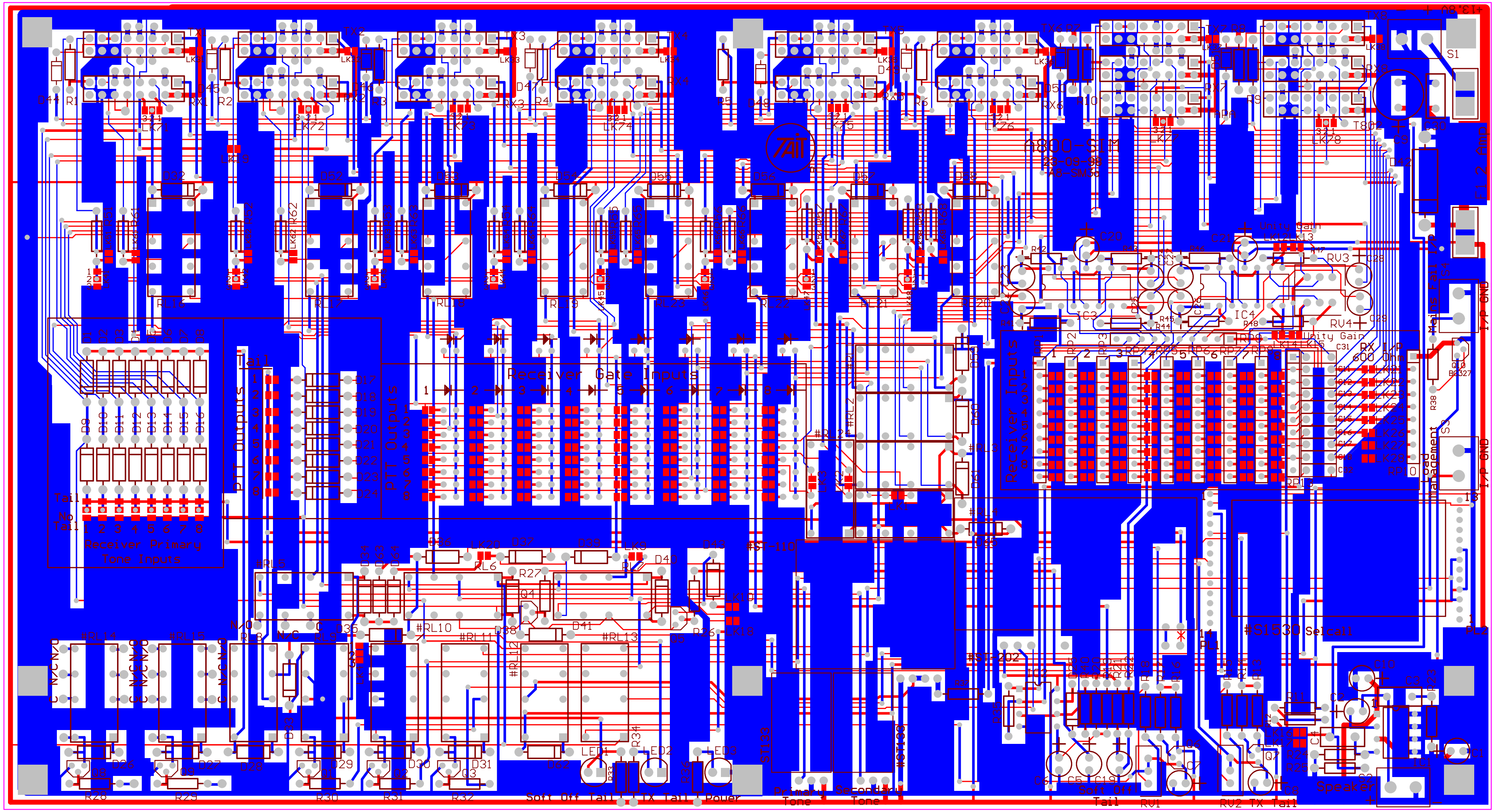
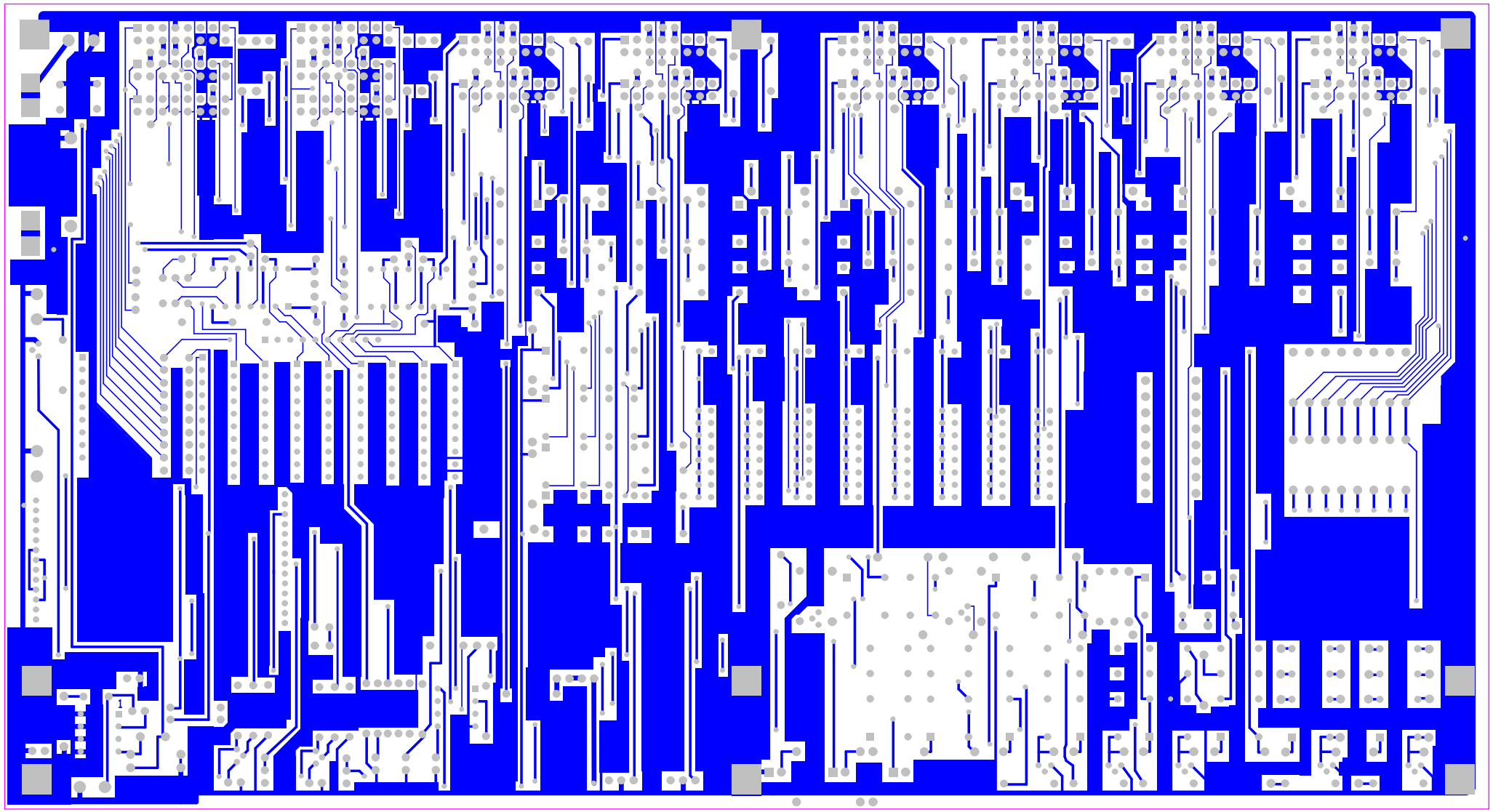
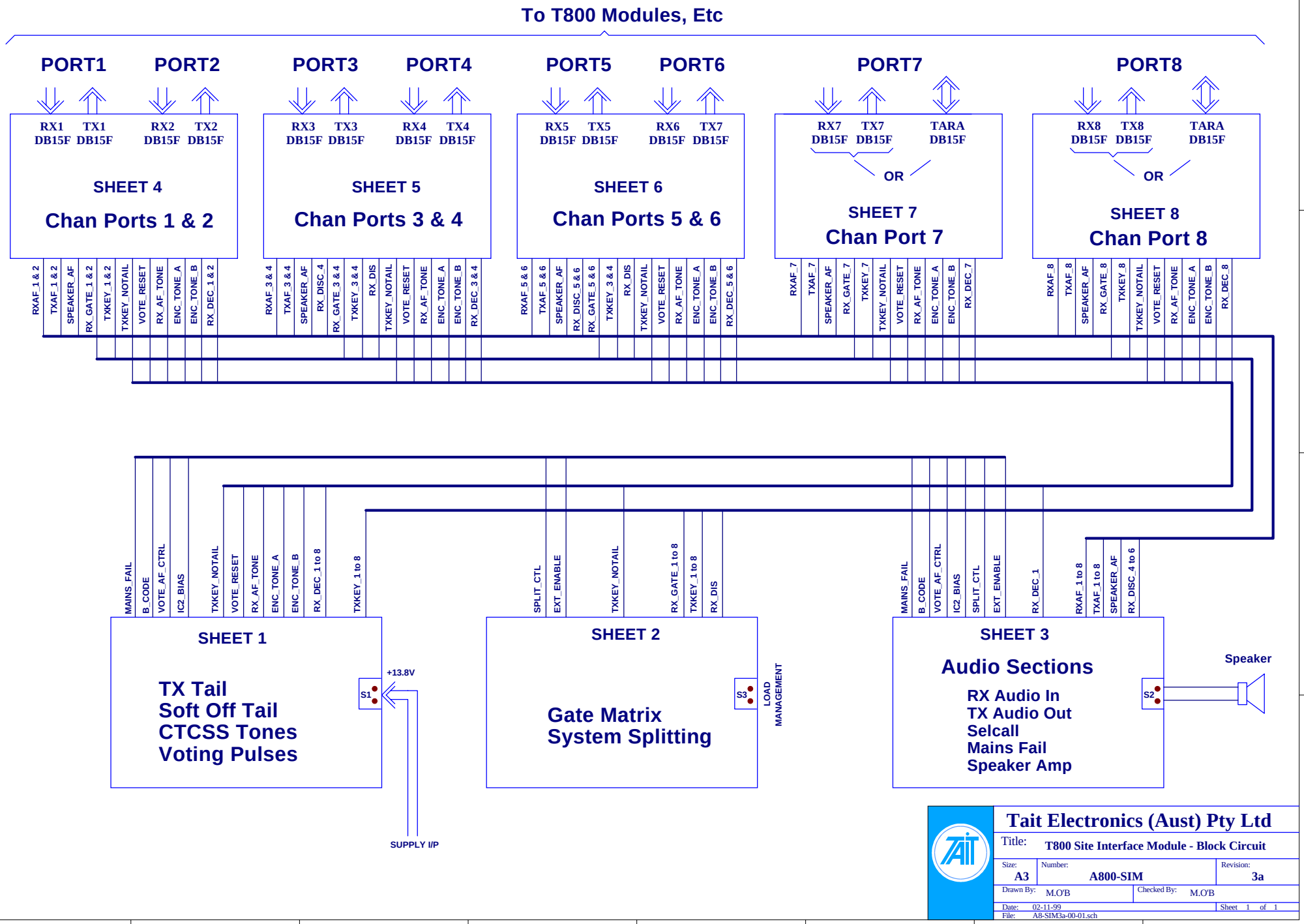
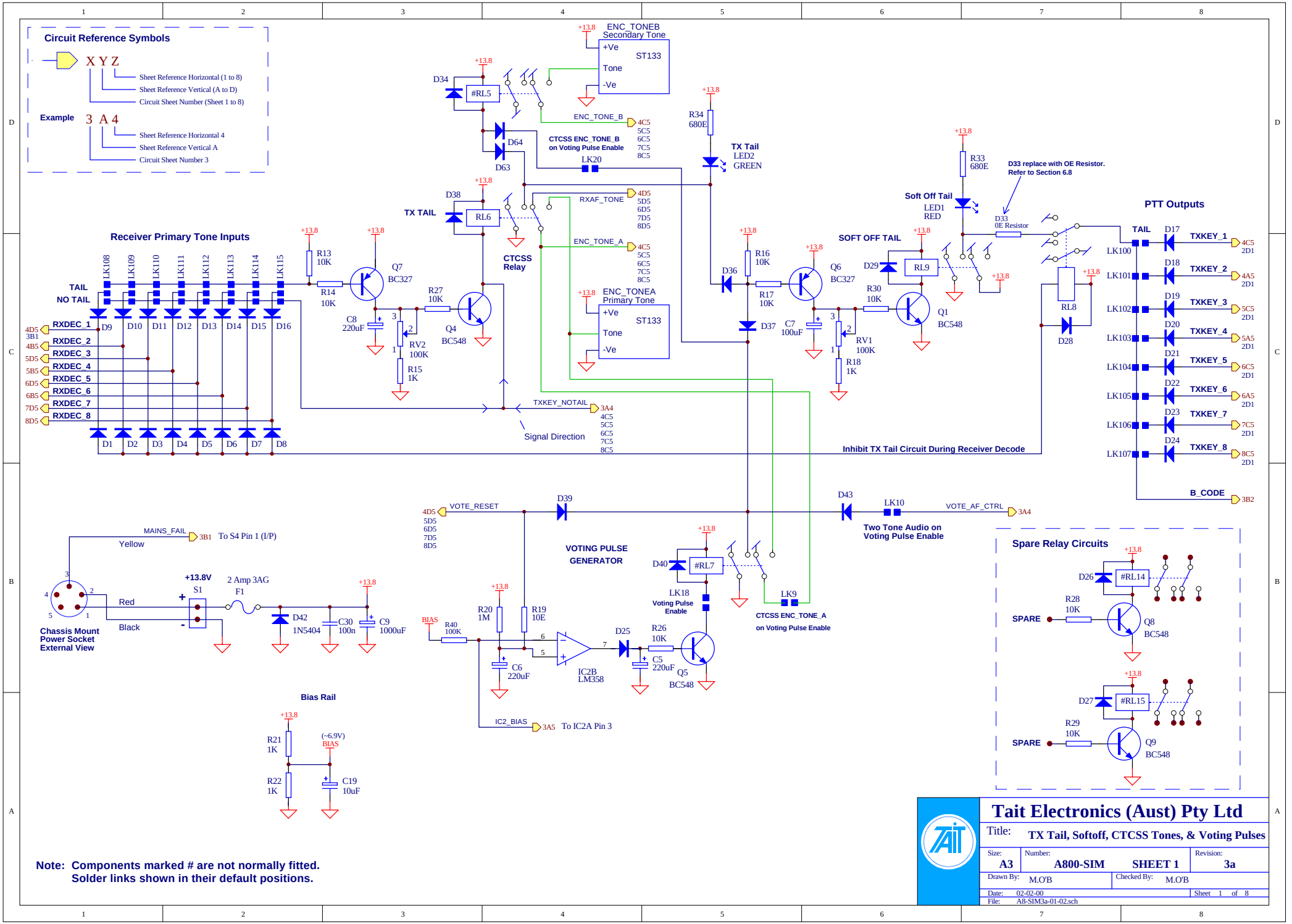
23-09-98
A8-SIM3a
Tail
PTT Outputs
Receiver Gate Inputs
Receiver Primary Tone Inputs
Receiver Inputs
RX I/P 600 Ohm
#S1530 Selcall
Soft Off Tail
TX Tail
Power
Primary Tone
Secondary Tone
Speaker
Mains Fail I/P
Load Management
Unity Gain
#ST-110
#ST-202
#ST133

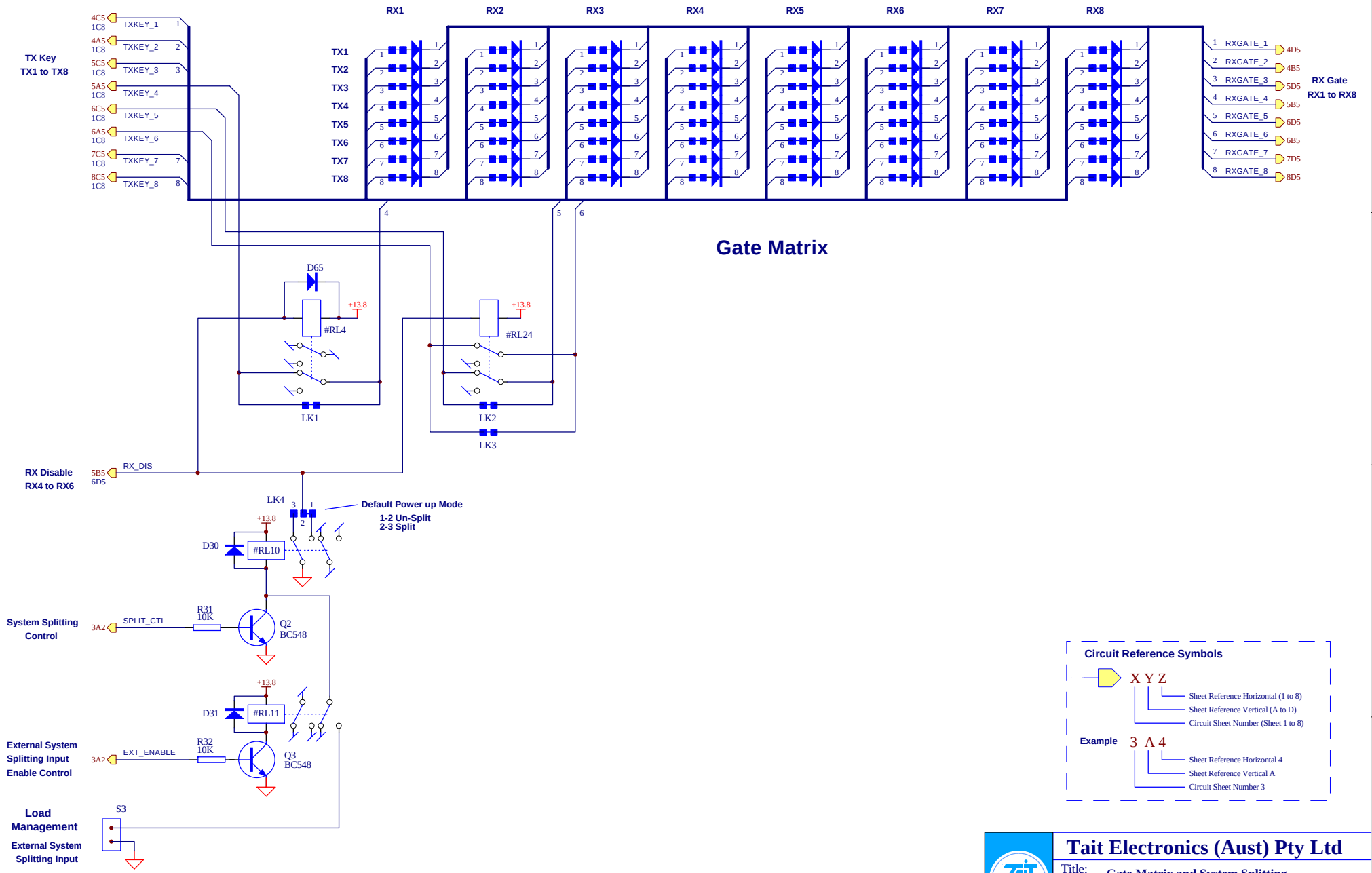

Receiver Gate Inputs
PTT Outputs
Receiver Inputs
Receiver Primary
Tone Inputs
Selcall
Speaker
Soft Off Tail
TX Tail
Power
Primary Tone
Secondary Tone





Tait Electronics (Aust) Pty Ltd	
Title:	T800 Site Interface Module - Block Circuit
Size: A3	Number: A800-SIM
Revision:	3a
Drawn By: M.O'B	Checked By: M.O'B
Date: 02-11-99	Sheet 1 of 1
File: A8-SIM3a-00-01.sch	


Circuit Reference Symbols
X Y Z
Sheet Reference Horizontal (1 to 8)
Sheet Reference Vertical (A to D)
Circuit Sheet Number (Sheet 1 to 8)
Example
3 A 4
Sheet Reference Horizontal 4
Sheet Reference Vertical A
Circuit Sheet Number 3
Receiver Primary Tone Inputs
TAIL
NO TAIL
LK108
LK109
LK110
LK111
LK112
LK113
LK114
LK115
RXDEC_1
RXDEC_2
RXDEC_3
RXDEC_4
RXDEC_5
RXDEC_6
RXDEC_7
RXDEC_8
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
D16
R13 10K
R14 10K
Q7 BC327
C8 220uF
R27 10K
RV2 100K
R15 1K
Q4 BC548
CTCSS Relay
RL6
TX TAIL
D38
D64
D63
#RL5
D34
ENC_TONEB Secondary Tone
+Ve
ST133
Tone
-Ve
ENC_TONE_B
CTCSS ENC_TONE_B on Voting Pulse Enable
LK20
RXAF_TONE
ENC_TONE_A
ENC_TONEA Primary Tone
TXKEY_NOTAIL
Signal Direction
R34 680E
TX Tail LED2 GREEN
D36
R16 10K
R17 10K
Q6 BC327
D37
C7 100uF
RV1 100K
R18 1K
Q1 BC548
R30 10K
D29
RL9
SOFT OFF TAIL
Soft Off Tail LED1 RED
R33 680E
D33 0E Resistor
D33 replace with OE Resistor. Refer to Section 6.8
RL8
D28
Inhibit TX Tail Circuit During Receiver Decode
PTT Outputs
TAIL
LK100
LK101
LK102
LK103
LK104
LK105
LK106
LK107
D17
D18
D19
D20
D21
D22
D23
D24
TXKEY_1
TXKEY_2
TXKEY_3
TXKEY_4
TXKEY_5
TXKEY_6
TXKEY_7
TXKEY_8
B_CODE
D39
D43
LK10
VOTE_RESET
VOTE_AF_CTRL
Two Tone Audio on Voting Pulse Enable
VOTING PULSE GENERATOR
D40
#RL7
LK18
Voting Pulse Enable
LK9
CTCSS ENC_TONE_A on Voting Pulse Enable
R20 1M
R19 10E
R40 100K
BIAS
C6 220uF
IC2B LM358
D25
R26 10K
C5 220uF
Q5 BC548
IC2_BIAS
To IC2A Pin 3
MAINS_FAIL
Yellow
To S4 Pin 1 (I/P)
Chassis Mount Power Socket External View
Red
Black
+13.8V
S1
2 Amp 3AG
F1
D42 1N5404
C30 100n
C9 1000uF
Bias Rail
R21 1K
R22 1K
(~6.9V) BIAS
C19 10uF
Spare Relay Circuits
D26
#RL14
R28 10K
SPARE
Q8 BC548
D27
#RL15
R29 10K
SPARE
Q9 BC548
Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
Tait Electronics (Aust) Pty Ltd
Title: TX Tail, Softoff, CTCSS Tones, & Voting Pulses
Size: A3
Number: A800-SIM
SHEET 1
Revision: 3a
Drawn By: M.O'B
Checked By: M.O'B
Date: 02-02-00
Sheet 1 of 8
File: A8-SIM3a-01-02.sch



Note: Components marked # are not normally fitted.
Solder links shown in their default positions.

Circuit Reference Symbols

X Y Z
- Sheet Reference Horizontal (1 to 8)
- Sheet Reference Vertical (A to D)
- Circuit Sheet Number (Sheet 1 to 8)

Example 3 A 4
- Sheet Reference Horizontal 4
- Sheet Reference Vertical A
- Circuit Sheet Number 3

Tait Electronics (Aust) Pty Ltd

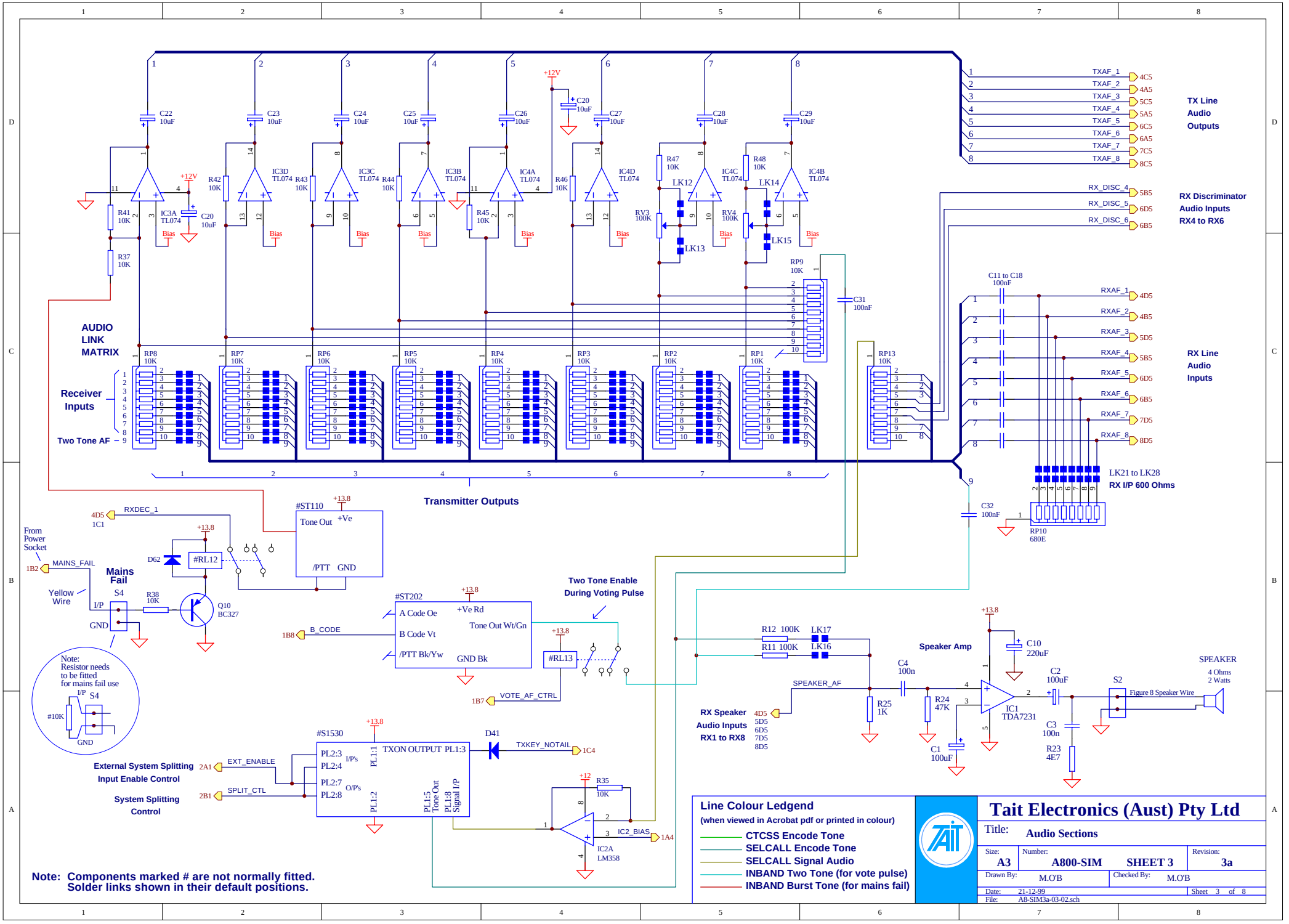
Title: **Gate Matrix and System Splitting**

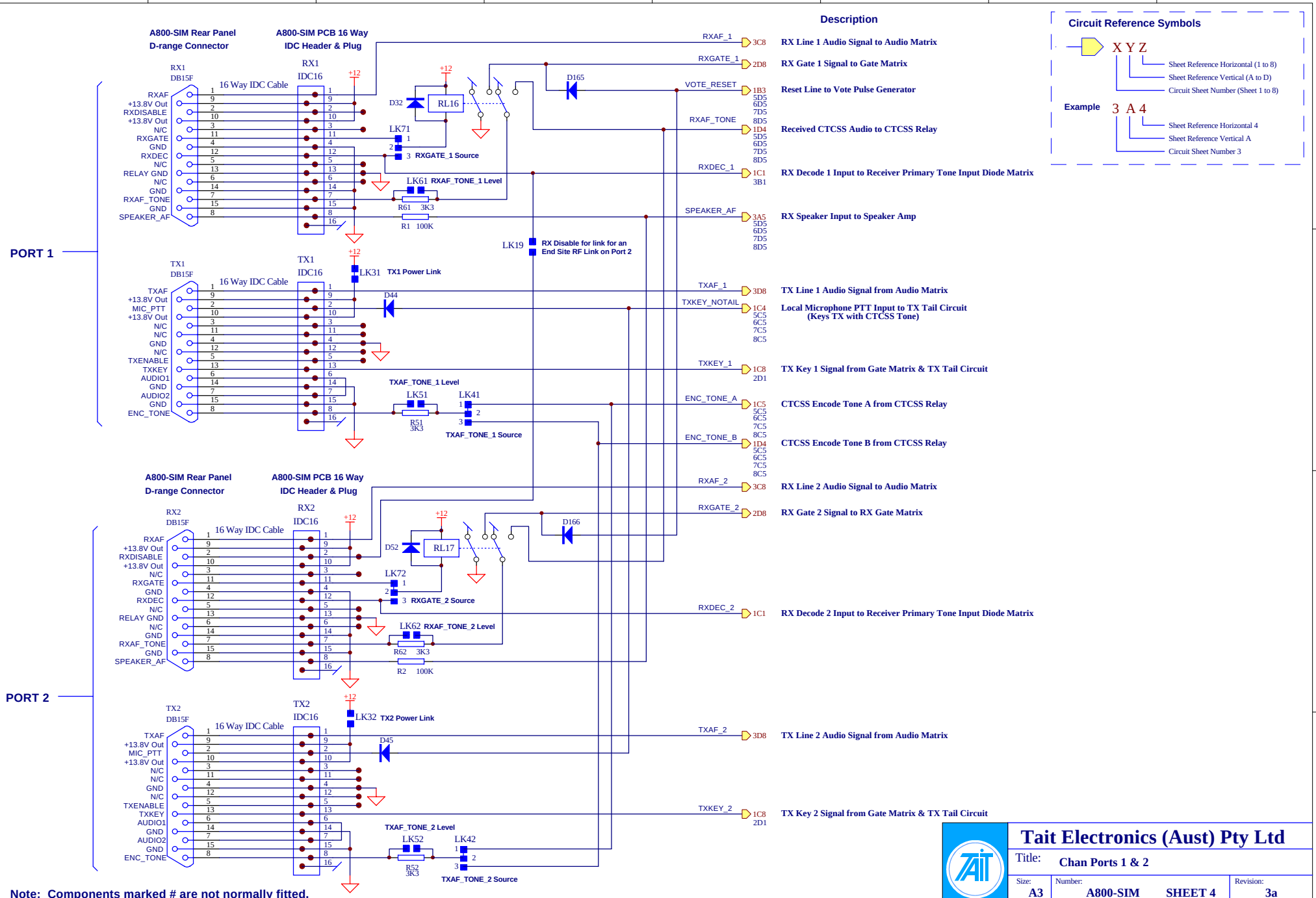
Size:	Number:		Revision:
A3	A800-SIM	SHEET 2	3a

Drawn By: M.O'B | Checked By: M.O'B

Date: 21-12-99 | Sheet 2 of 8

File: A8-SIM3a-02-02.sch


AUDIO LINK MATRIX
Receiver Inputs
Two Tone AF
Transmitter Outputs
TX Line Audio Outputs
RX Discriminator Audio Inputs RX4 to RX6
RX Line Audio Inputs
LK21 to LK28
RX I/P 600 Ohms
Two Tone Enable During Voting Pulse
Mains Fail
From Power Socket
Yellow Wire
Note: Resistor needs to be fitted for mains fail use
Speaker Amp
SPEAKER
4 Ohms 2 Watts
Figure 8 Speaker Wire
RX Speaker Audio Inputs RX1 to RX8
External System Splitting Input Enable Control
System Splitting Control
Note: Components marked # are not normally fitted. Solder links shown in their default positions.
Line Colour Ledgend
(when viewed in Acrobat pdf or printed in colour)
CTCSS Encode Tone
SELCALL Encode Tone
SELCALL Signal Audio
INBAND Two Tone (for vote pulse)
INBAND Burst Tone (for mains fail)
Tait Electronics (Aust) Pty Ltd
Title: Audio Sections
Size: A3
Number: A800-SIM SHEET 3
Revision: 3a
Drawn By: M.O'B
Checked By: M.O'B
Date: 21-12-99
File: A8-SIM3a-03-02.sch
Sheet 3 of 8



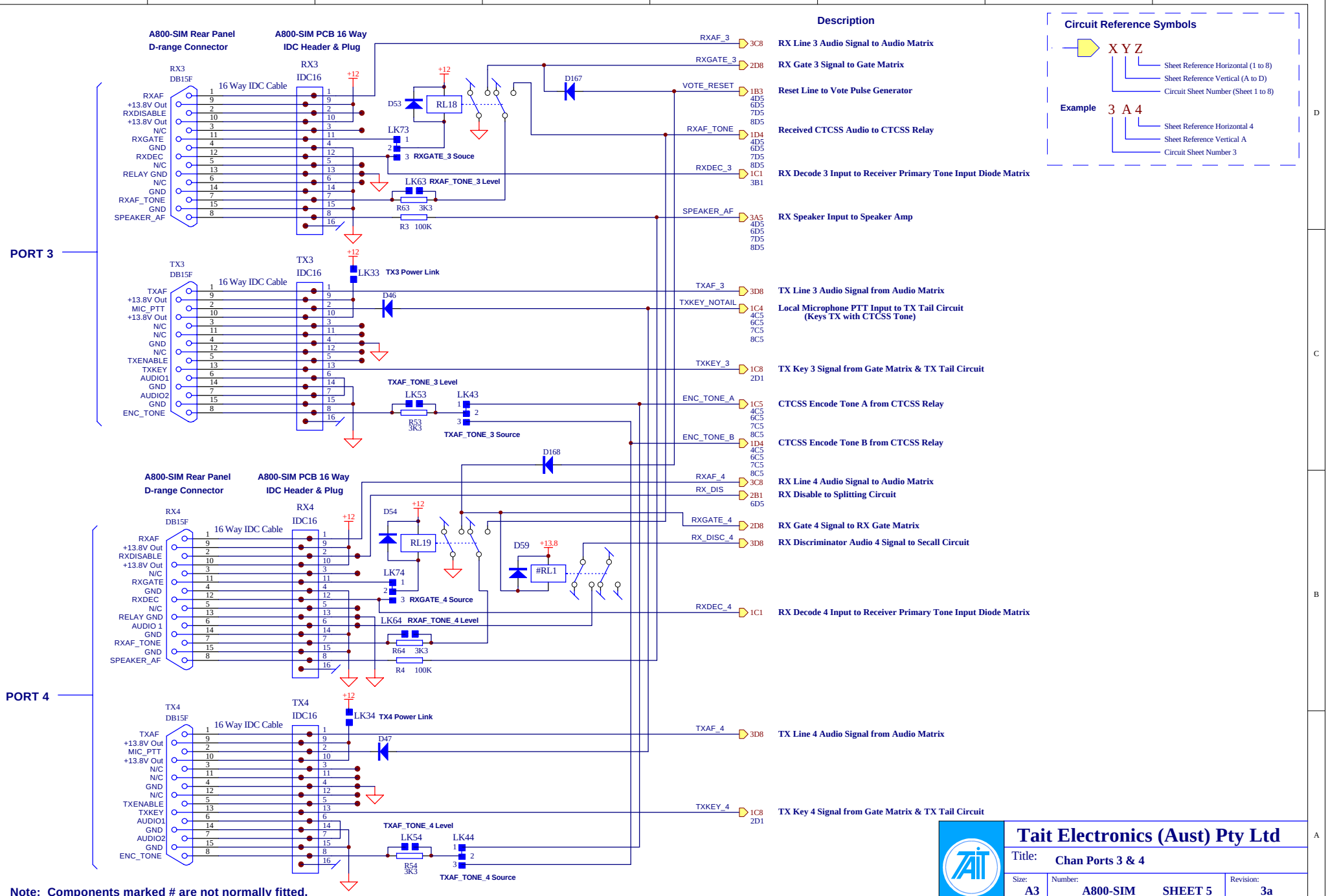
Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
The pin out patterns for the 16 Way IDC Connectors show a non standard pin layout to suit DB15 Connector Pin Layout.

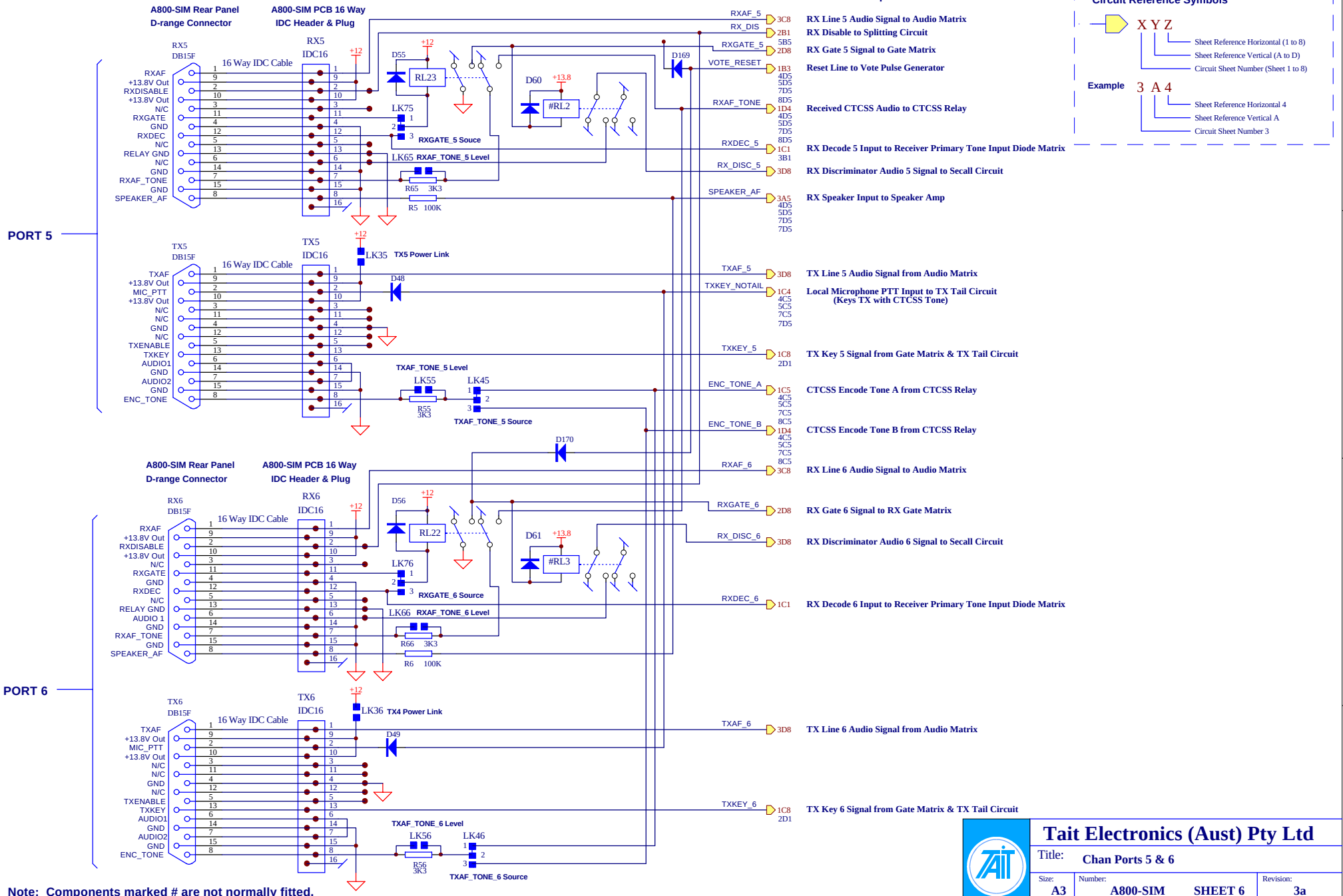
Tait Electronics (Aust) Pty Ltd

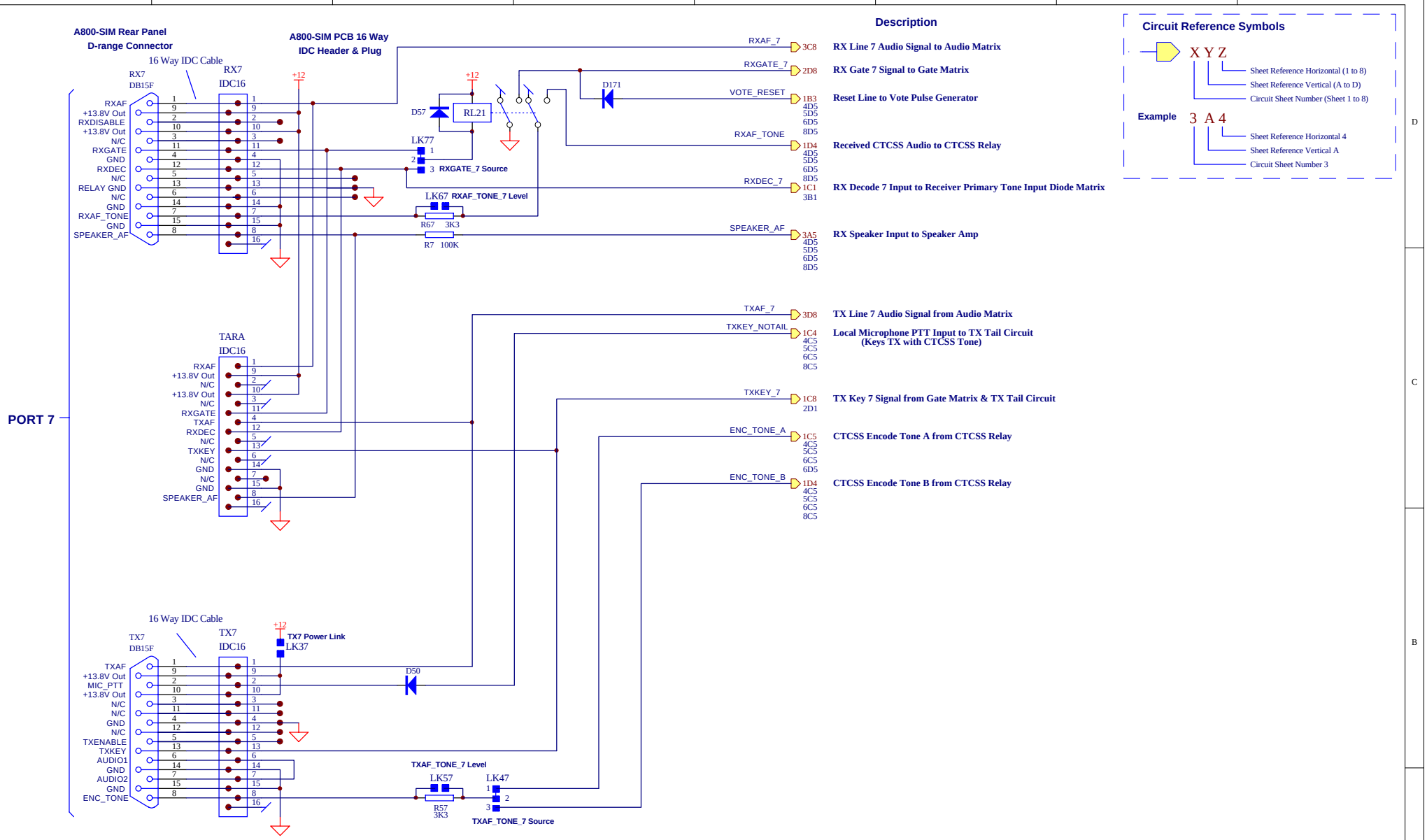
Title: **Chan Ports 1 & 2**

Size:	Number:		Revision:
A3	A800-SIM	SHEET 4	3a

Drawn By:	M.O'B	Checked By:	M.O'B
Date:	21-12-99	Sheet 4 of 8	
File:	A8-SIM3a-04-02.sch		

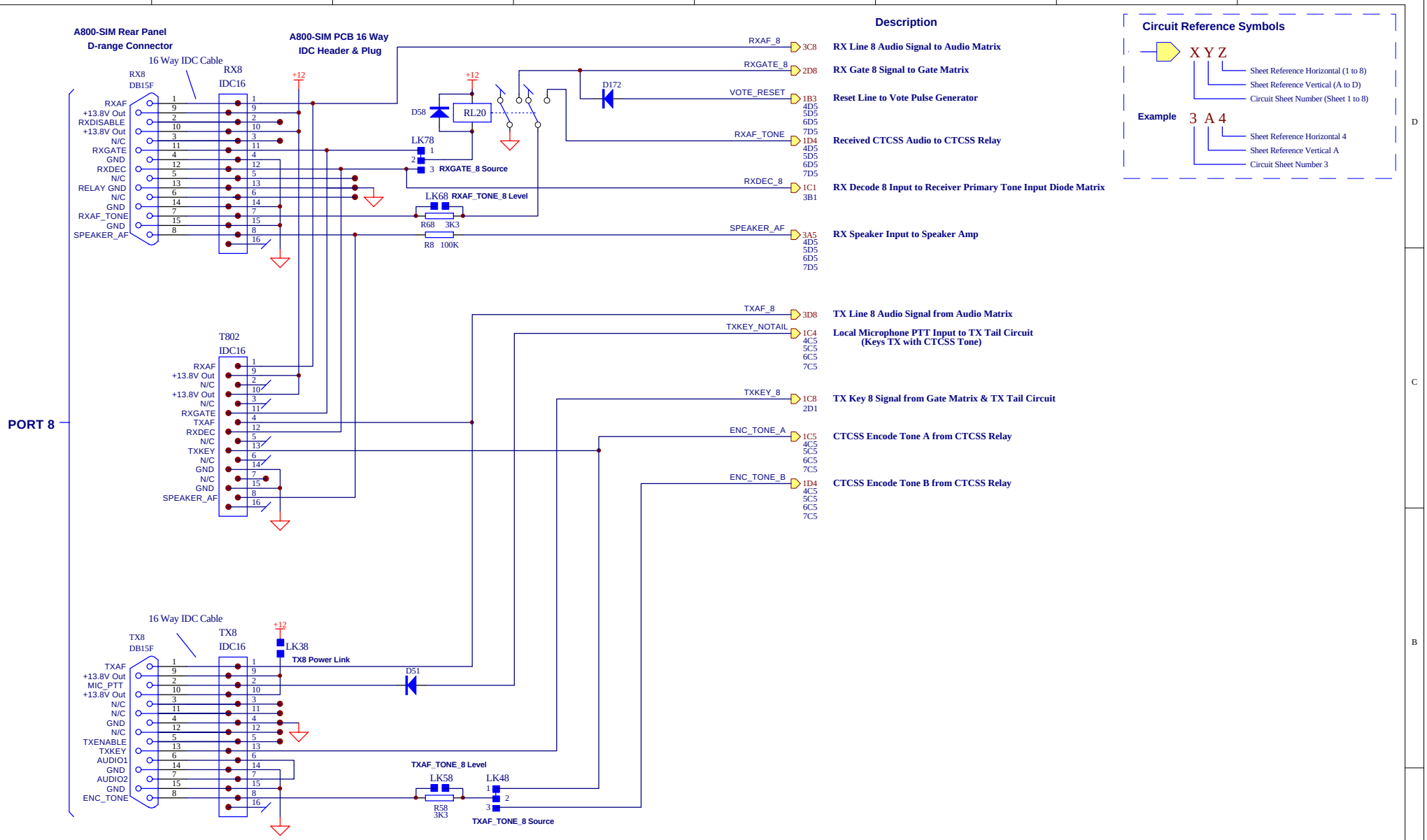

A800-SIM Rear Panel
D-range Connector
A800-SIM PCB 16 Way
IDC Header & Plug
PORT 3
RX3
DB15F
16 Way IDC Cable
RX3
IDC16
RXAF
+13.8V Out
RXDISABLE
+13.8V Out
N/C
RXGATE
GND
RXDEC
N/C
RELAY GND
N/C
GND
RXAF_TONE
GND
SPEAKER_AF
+12
D53
RL18
LK73
RXGATE_3 Souce
LK63
RXAF_TONE_3 Level
R63 3K3
R3 100K
D167
TX3
DB15F
TX3
IDC16
TXAF
+13.8V Out
MIC_PTT
+13.8V Out
N/C
N/C
GND
N/C
TXENABLE
TXKEY
AUDIO1
GND
AUDIO2
GND
ENC_TONE
LK33
TX3 Power Link
D46
TXAF_TONE_3 Level
LK53
LK43
R53 3K3
TXAF_TONE_3 Source
D168
A800-SIM Rear Panel
D-range Connector
A800-SIM PCB 16 Way
IDC Header & Plug
PORT 4
RX4
DB15F
16 Way IDC Cable
RX4
IDC16
RXAF
+13.8V Out
RXDISABLE
+13.8V Out
N/C
RXGATE
GND
RXDEC
N/C
RELAY GND
AUDIO 1
GND
RXAF_TONE
GND
SPEAKER_AF
D54
RL19
LK74
RXGATE_4 Source
LK64
RXAF_TONE_4 Level
R64 3K3
R4 100K
D59
+13.8
#RL1
TX4
DB15F
TX4
IDC16
TXAF
+13.8V Out
MIC_PTT
+13.8V Out
N/C
N/C
GND
N/C
TXENABLE
TXKEY
AUDIO1
GND
AUDIO2
GND
ENC_TONE
LK34
TX4 Power Link
D47
TXAF_TONE_4 Level
LK54
LK44
R54 3K3
TXAF_TONE_4 Source
RXAF_3
3C8
RX Line 3 Audio Signal to Audio Matrix
RXGATE_3
2D8
RX Gate 3 Signal to Gate Matrix
VOTE_RESET
1B3 4D5 6D5 7D5 8D5
Reset Line to Vote Pulse Generator
RXAF_TONE
1D4 4D5 6D5 7D5 8D5
Received CTCSS Audio to CTCSS Relay
RXDEC_3
1C1 3B1
RX Decode 3 Input to Receiver Primary Tone Input Diode Matrix
SPEAKER_AF
3A5 4D5 6D5 7D5 8D5
RX Speaker Input to Speaker Amp
TXAF_3
3D8
TX Line 3 Audio Signal from Audio Matrix
TXKEY_NOTAIL
1C4 4C5 6C5 7C5 8C5
Local Microphone PTT Input to TX Tail Circuit
(Keys TX with CTCSS Tone)
TXKEY_3
1C8 2D1
TX Key 3 Signal from Gate Matrix & TX Tail Circuit
ENC_TONE_A
1C5 4C5 6C5 7C5 8C5
CTCSS Encode Tone A from CTCSS Relay
ENC_TONE_B
1D4 4C5 6C5 7C5 8C5
CTCSS Encode Tone B from CTCSS Relay
RXAF_4
3C8
RX Line 4 Audio Signal to Audio Matrix
RX_DIS
2B1 6D5
RX Disable to Splitting Circuit
RXGATE_4
2D8
RX Gate 4 Signal to RX Gate Matrix
RX_DISC_4
3D8
RX Discriminator Audio 4 Signal to Secall Circuit
RXDEC_4
1C1
RX Decode 4 Input to Receiver Primary Tone Input Diode Matrix
TXAF_4
3D8
TX Line 4 Audio Signal from Audio Matrix
TXKEY_4
1C8 2D1
TX Key 4 Signal from Gate Matrix & TX Tail Circuit
Description
Circuit Reference Symbols
X Y Z
Sheet Reference Horizontal (1 to 8)
Sheet Reference Vertical (A to D)
Circuit Sheet Number (Sheet 1 to 8)
Example 3 A 4
Sheet Reference Horizontal 4
Sheet Reference Vertical A
Circuit Sheet Number 3
Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
The pin out patterns for the 16 Way IDC Connectors show a non standard pin layout to suit DB15 Connector Pin Layout.
Tait Electronics (Aust) Pty Ltd
Title: Chan Ports 3 & 4
Size: A3
Number: A800-SIM SHEET 5
Revision: 3a
Drawn By: M.O'B
Checked By: M.O'B
Date: 21-12-99
Sheet 5 of 8
File: A8-SIM3a-05-02.sch


A800-SIM Rear Panel
D-range Connector
A800-SIM PCB 16 Way
IDC Header & Plug
PORT 5
RX5
DB15F
16 Way IDC Cable
RX5
IDC16
RXAF
+13.8V Out
RXDISABLE
+13.8V Out
N/C
RXGATE
GND
RXDEC
N/C
RELAY GND
N/C
GND
RXAF_TONE
GND
SPEAKER_AF
D55
RL23
LK75
RXGATE_5 Souce
LK65
RXAF_TONE_5 Level
R65 3K3
R5 100K
D60
#RL2
D169
TX5
DB15F
TX5
IDC16
TXAF
+13.8V Out
MIC_PTT
+13.8V Out
N/C
N/C
GND
N/C
TXENABLE
TXKEY
AUDIO1
GND
AUDIO2
GND
ENC_TONE
LK35
TX5 Power Link
D48
TXAF_TONE_5 Level
LK55
LK45
R55 3K3
TXAF_TONE_5 Source
D170
PORT 6
RX6
DB15F
16 Way IDC Cable
RX6
IDC16
RXAF
+13.8V Out
RXDISABLE
+13.8V Out
N/C
RXGATE
GND
RXDEC
N/C
RELAY GND
AUDIO 1
GND
RXAF_TONE
GND
SPEAKER_AF
D56
RL22
LK76
RXGATE_6 Source
LK66
RXAF_TONE_6 Level
R66 3K3
R6 100K
D61
#RL3
TX6
DB15F
TX6
IDC16
TXAF
+13.8V Out
MIC_PTT
+13.8V Out
N/C
N/C
GND
N/C
TXENABLE
TXKEY
AUDIO1
GND
AUDIO2
GND
ENC_TONE
LK36
TX4 Power Link
D49
TXAF_TONE_6 Level
LK56
LK46
R56 3K3
TXAF_TONE_6 Source
RXAF_5
RX_DIS
RXGATE_5
VOTE_RESET
RXAF_TONE
RXDEC_5
RX_DISC_5
SPEAKER_AF
TXAF_5
TXKEY_NOTAIL
TXKEY_5
ENC_TONE_A
ENC_TONE_B
RXAF_6
RXGATE_6
RX_DISC_6
RXDEC_6
TXAF_6
TXKEY_6
Description
RX Line 5 Audio Signal to Audio Matrix
RX Disable to Splitting Circuit
RX Gate 5 Signal to Gate Matrix
Reset Line to Vote Pulse Generator
Received CTCSS Audio to CTCSS Relay
RX Decode 5 Input to Receiver Primary Tone Input Diode Matrix
RX Discriminator Audio 5 Signal to Secall Circuit
RX Speaker Input to Speaker Amp
TX Line 5 Audio Signal from Audio Matrix
Local Microphone PTT Input to TX Tail Circuit
(Keys TX with CTCSS Tone)
TX Key 5 Signal from Gate Matrix & TX Tail Circuit
CTCSS Encode Tone A from CTCSS Relay
CTCSS Encode Tone B from CTCSS Relay
RX Line 6 Audio Signal to Audio Matrix
RX Gate 6 Signal to RX Gate Matrix
RX Discriminator Audio 6 Signal to Secall Circuit
RX Decode 6 Input to Receiver Primary Tone Input Diode Matrix
TX Line 6 Audio Signal from Audio Matrix
TX Key 6 Signal from Gate Matrix & TX Tail Circuit
Circuit Reference Symbols
X Y Z
Sheet Reference Horizontal (1 to 8)
Sheet Reference Vertical (A to D)
Circuit Sheet Number (Sheet 1 to 8)
Example 3 A 4
Sheet Reference Horizontal 4
Sheet Reference Vertical A
Circuit Sheet Number 3
Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
The pin out patterns for the 16 Way IDC Connectors show a non standard pin layout to suit DB15 Connector Pin Layout.
Tait Electronics (Aust) Pty Ltd
Title: Chan Ports 5 & 6
Size: A3
Number: A800-SIM SHEET 6
Revision: 3a
Drawn By: M.O'B
Checked By: M.O'B
Date: 21-12-99
Sheet 6 of 8
File: A8-SIM3a-06-02.sch



Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
The pin out patterns for the 16 Way IDC Connectors show a non standard pin layout to suit DB15 Connector Pin Layout.

Tait Electronics (Aust) Pty Ltd			
Title: **Chan Port 7**			
Size: **A3**	Number: **A800-SIM**	**SHEET 7**	Revision: **3a**
Drawn By: M.O'B		Checked By: M.O'B	
Date: 21-12-99		Sheet 7 of 8	
File: A8-SIM3a-07-01.sch			



Description

RXAF_8 — RX Line 8 Audio Signal to Audio Matrix

RXGATE_8 — RX Gate 8 Signal to Gate Matrix

VOTE_RESET — Reset Line to Vote Pulse Generator

RXAF_TONE — Received CTCSS Audio to CTCSS Relay

RXDEC_8 — RX Decode 8 Input to Receiver Primary Tone Input Diode Matrix

SPEAKER_AF — RX Speaker Input to Speaker Amp

TXAF_8 — TX Line 8 Audio Signal from Audio Matrix

TXKEY_NOTAIL — Local Microphone PTT Input to TX Tail Circuit (Keys TX with CTCSS Tone)

TXKEY_8 — TX Key 8 Signal from Gate Matrix & TX Tail Circuit

ENC_TONE_A — CTCSS Encode Tone A from CTCSS Relay

ENC_TONE_B — CTCSS Encode Tone B from CTCSS Relay

Circuit Reference Symbols

X Y Z
- Sheet Reference Horizontal (1 to 8)
- Sheet Reference Vertical (A to D)
- Circuit Sheet Number (Sheet 1 to 8)

Example 3 A 4
- Sheet Reference Horizontal 4
- Sheet Reference Vertical A
- Circuit Sheet Number 3

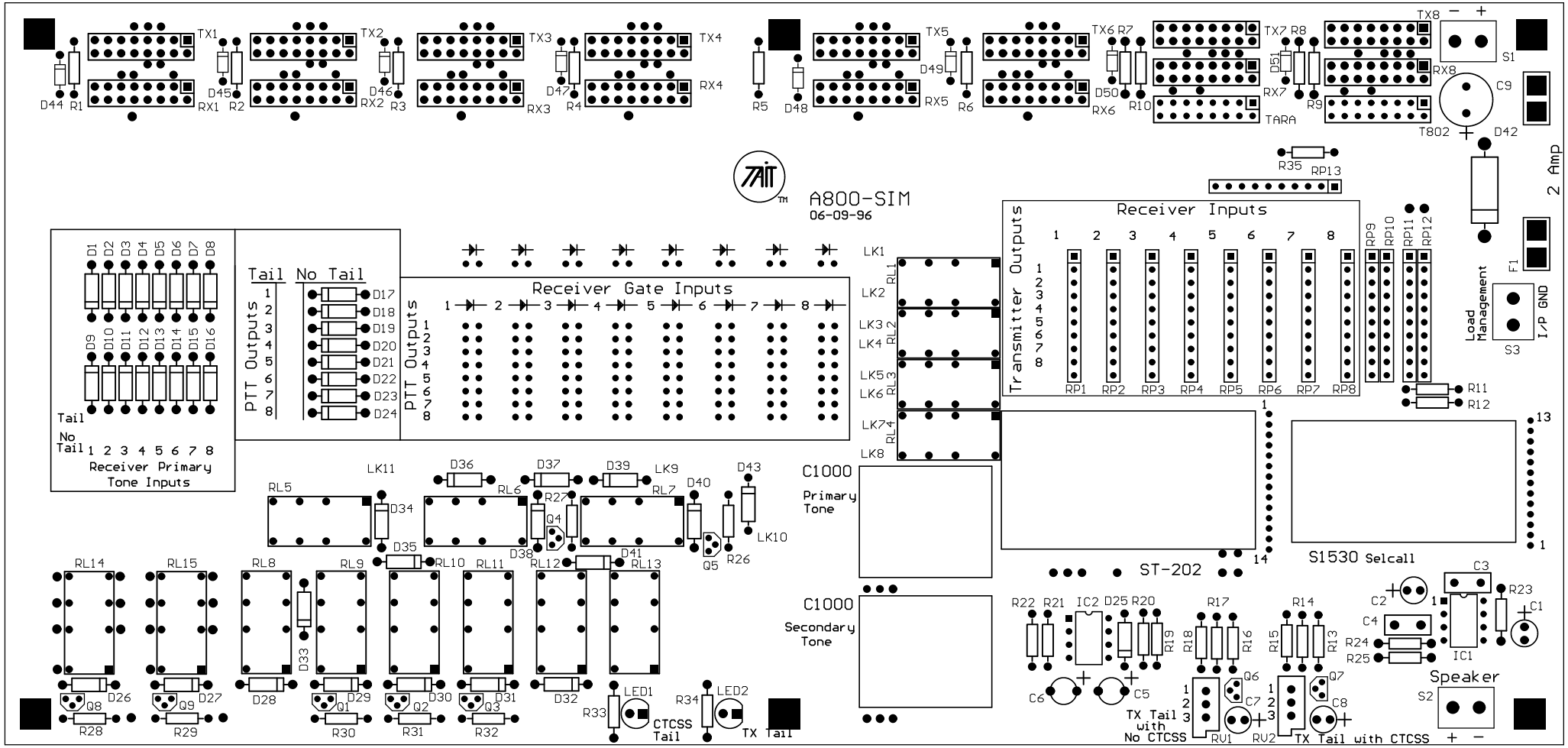
Note: Components marked # are not normally fitted.
Solder links shown in their default positions.
The pin out patterns for the 16 Way IDC Connectors show a non standard pin layout to suit DB15 Connector Pin Layout.

Tait Electronics (Aust) Pty Ltd

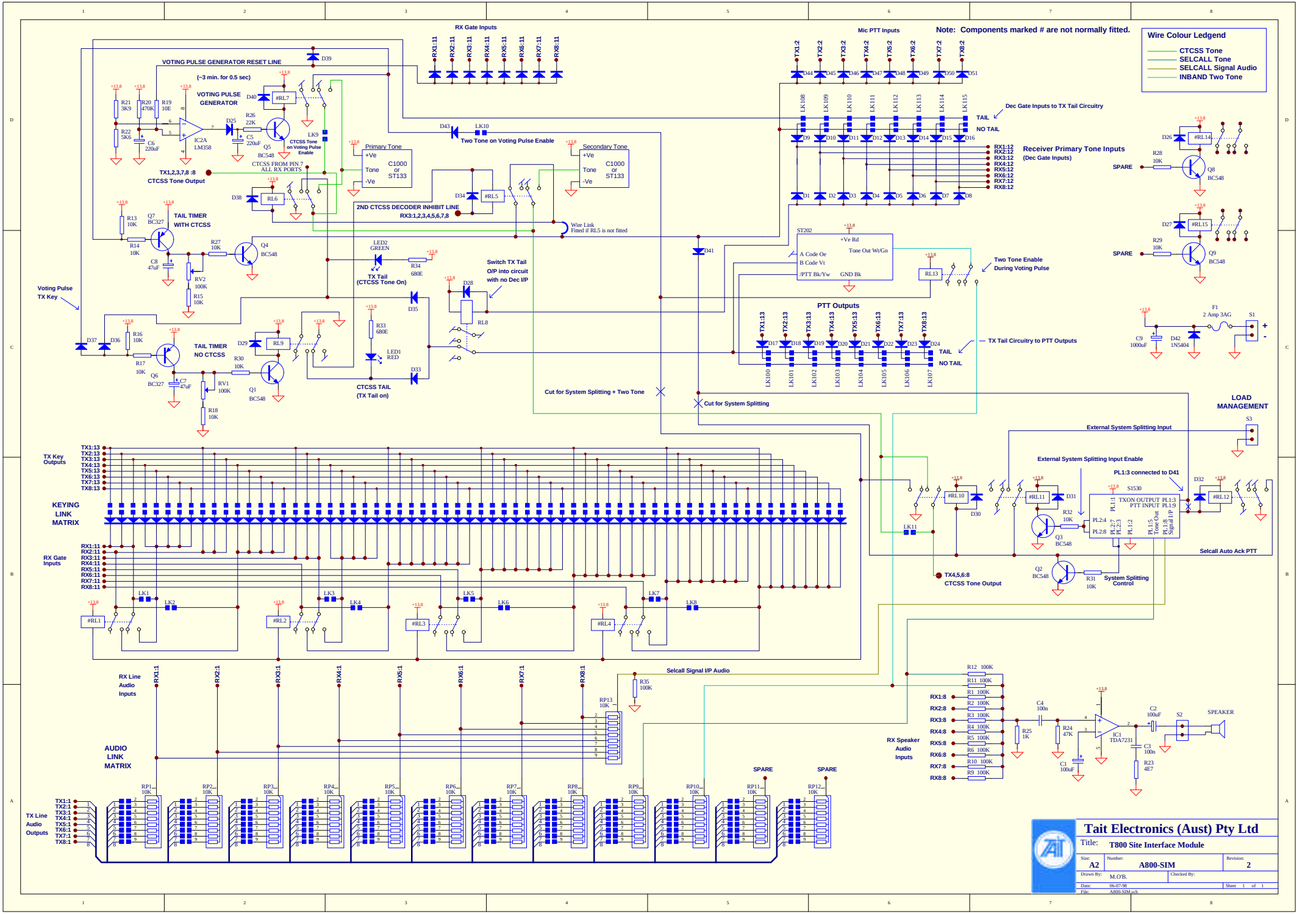
Title: **Chan Port 8**

Size:	Number:		Revision:
A3	**A800-SIM**	**SHEET 8**	**3a**

Drawn By:	M.O'B	Checked By:	M.O'B
Date:	21-12-99	Sheet 8 of 8	
File:	A8-SIM3a-08-02.sch		



A800-SIM PCB TOP OVERLAY


RX Gate Inputs
RX1:11
RX2:11
RX3:11
RX4:11
RX5:11
RX6:11
RX7:11
RX8:11
Mic PTT Inputs
TX1:2
TX2:2
TX3:2
TX4:2
TX5:2
TX6:2
TX7:2
TX8:2
Note: Components marked # are not normally fitted.
Wire Colour Ledgend
CTCSS Tone
SELCALL Tone
SELCALL Signal Audio
INBAND Two Tone
VOTING PULSE GENERATOR RESET LINE
(~3 min. for 0.5 sec)
VOTING PULSE GENERATOR
IC2A LM358
CTCSS Tone on Voting Pulse Enable
TX1,2,3,7,8 :8 CTCSS Tone Output
CTCSS FROM PIN 7 ALL RX PORTS
Primary Tone
Secondary Tone
C1000 or ST133
Two Tone on Voting Pulse Enable
2ND CTCSS DECODER INHIBIT LINE
RX3:1,2,3,4,5,6,7,8
Wire Link Fitted if RL5 is not fitted
TAIL TIMER WITH CTCSS
TAIL TIMER NO CTCSS
TX Tail (CTCSS Tone On)
CTCSS TAIL (TX Tail on)
Switch TX Tail O/P into circuit with no Dec I/P
Voting Pulse TX Key
Dec Gate Inputs to TX Tail Circuitry
TAIL
NO TAIL
RX1:12
RX2:12
RX3:12
RX4:12
RX5:12
RX6:12
RX7:12
RX8:12
Receiver Primary Tone Inputs
(Dec Gate Inputs)
SPARE
ST202
+Ve Rd
A Code Oe
B Code Vt
/PTT Bk/Yw
Tone Out Wt/Gn
GND Bk
Two Tone Enable During Voting Pulse
PTT Outputs
TX1:13
TX2:13
TX3:13
TX4:13
TX5:13
TX6:13
TX7:13
TX8:13
TAIL
NO TAIL
TX Tail Circuitry to PTT Outputs
F1
2 Amp 3AG
S1
Cut for System Splitting + Two Tone
Cut for System Splitting
LOAD MANAGEMENT
External System Splitting Input
External System Splitting Input Enable
PL1:3 connected to D41
S1530
TXON OUTPUT PL1:3
PTT INPUT PL1:9
Selcall Auto Ack PTT
TX4,5,6:8 CTCSS Tone Output
System Splitting Control
TX Key Outputs
KEYING LINK MATRIX
RX Gate Inputs
Selcall Signal I/P Audio
RX Line Audio Inputs
AUDIO LINK MATRIX
RX Speaker Audio Inputs
TX Line Audio Outputs
SPEAKER
Tait Electronics (Aust) Pty Ltd
Title: T800 Site Interface Module
Size: A2
Number: A800-SIM
Revision: 2
Drawn By: M.O'B.
Checked By:
Date: 06-07-98
File: A800-SIM.sch
Sheet 1 of 1

Selectone
PRODUCT GROUP

OPERATING INSTRUCTIONS
Model ST-133
Micro-Miniature CTCSS Encoder

Manual # 600-0801
Rev. A - 99035

Modified by Tait Electronics 20-11-99 to correct mistake on "Bottom View" JU4 to JU1 solder link positions.

June 17, 1999

GENERAL

The ST-133 is a digitally programmable CTCSS Encoder. It is small enough to be mounted in most mobile or portable radios where space is a factor.

Like all Selectone CTCSS products, the ST-133 is fully compatible with major CTCSS systems, including Motorola "Private Line", Ericsson/GE "Channel Guard", and E.F. Johnson "Call Guard".

Because of surface mount construction and our comprehensive warranty policy, field repair is usually not cost effective. Complete technical documentation is available through our applications department for customers with special requirements.

Application information is available or can be developed for most radio models. Documentation on ALL current products and many of our application notes are available for instant access on our website **www.selectone.com**. If you would like application details for a specific radio, please call us at 510-887-1950 or request assistance via E-mail at techsupport@selectone.com.

OPERATING SPECIFICATIONS

SPECIFICATION	DETAIL
Operating Voltage	5.5 to 16Vdc
Operating Current	Less than 3mAdc
Frequency Range	All EIA RS-220A tones (67.0 to250.3Hz)
Temperature Range	-30° C to +60° C
Encode Output level	Adjustable 0 to 1Vrms
Encode Distortion	Less than 5% THD
Interface	9" Flying leads
Size	.75L x .45W x .18H (19.1mm x 11.4mm x 4.6mm)

INSTALLATION

We have configured the ST-133 to require minimum installation effort for most radios. We recommend that you take advantage of the radio manufacturer's CTCSS connection points whenever possible. Frequency Programming and Output impedance for the ST-133 is adjusted with solder jumpers across closely spaced solder jumper pads. The required jumpers must be installed to accommodate each specific application.

ELECTRICAL INTERFACE

NEGATIVE (-) SUPPLY (BLACK): Connect to system Negative (-) Supply. If PTT switches to Negative (-) Supply to key the transmitter, this lead may be connected to PTT to minimize standby current.

POSITIVE (+) SUPPLY (RED): Connect to system positive (+) Supply.

TONE OUTPUT (WHT/GRN): Most FM two-way radios make provisions for CTCSS modulation. This point is near the voice deviation control. The impedance at this point varies from radio to radio. The ST-133 has provisions for three parallel resistors (1K, 51K, &150K) in series with its output circuit; the 1K or the 51K resistor is paralleled with the 150K resistor to lower the output impedance. Remove JU-7 or JU-8, to provide a correct tone output level without loading the radio modulator circuit and reducing voice modulation. Removal of JU-7 removes the 1K resistor and removal of JU-8 removes the 51K resistor from the circuit. CTCSS deviation is adjusted with R2. A CTCSS deviation level of ± 0.15 % of system deviation is recommended (±.75 KHz for systems with ±5KHz max. deviation).

MOUNTING

Use of a double-sided adhesive pad eliminates hardware requirements. Mount the ST-133 on a clean, dry surface oriented to allow future adjustments should they be necessary. Press firmly after mounting to insure good contact of adhesive. Do not touch the adhesive or attempt to reposition the unit after mounting.

PROGRAMMING

Frequency programming for the ST-133 is done by installation of one or more of six frequency programming solder jumpers. The frequencies and jumper requirements are listed in the Programming Chart below. A solder jumper applies a Negative (-) Supply (GND) level to the corresponding programming input line. Therefore, **digit 0 in the Programming Chart represents a solder jumper**, and represents a logic low condition. No solder jumper allows the internal pull-up circuitry to pull the corresponding programming input line to +5Vdc,a logic high condition. Therefore, **digit 1 in the Programming Chart represents NO jumper.** Frequency Programming is done by removing solder jumpers according to the following Programming Chart.

FREQUENCY PROGRAMMING CHART JUMPERS
JU1-JU6: (0=IN; 1=OUT)

Freq. in Hz	JU1	JU2	JU3	JU4	JU5	JU6	Freq. in Hz	JU1	JU2	JU3	JU4	JU5	JU6
67.0	1	1	1	1	1	1	131.8	1	0	0	1	0	0
69.3	1	0	0	1	1	1	136.5	1	0	0	0	1	0
71.9	1	1	1	1	1	0	141.3	1	0	0	0	0	0
74.4	1	1	1	0	1	1	146.2	0	1	1	1	1	0
77.0	1	1	1	1	0	0	151.4	0	1	1	1	0	0
79.7	1	1	0	1	1	1	156.7	0	1	1	0	1	0
82.5	1	1	1	0	1	0	162.2	0	1	1	0	0	0
85.4	1	1	0	0	1	1	167.9	0	1	0	1	1	0
88.5	1	1	1	0	0	0	173.8	0	1	0	1	0	0
91.5	1	0	1	1	1	1	179.9	0	1	0	0	1	0
94.8	1	1	0	1	1	0	186.2	0	1	0	0	0	0
97.4	1	0	1	0	1	1	192.8	0	0	1	1	1	0
100.0	1	1	0	1	0	0	203.5	0	0	1	1	0	0
103.5	1	1	0	0	1	0	206.5	1	0	0	0	1	1
107.2	1	1	0	0	0	0	210.7	0	0	1	0	1	0
110.9	1	0	1	1	1	0	218.1	0	0	1	0	0	0
114.8	1	0	1	1	0	0	225.7	0	0	0	1	1	0
118.8	1	0	1	0	1	0	233.6	0	0	0	1	0	0
123.0	1	0	1	0	0	0	241.8	0	0	0	0	1	0
127.3	1	0	0	1	1	0	250.3	0	0	0	0	0	0

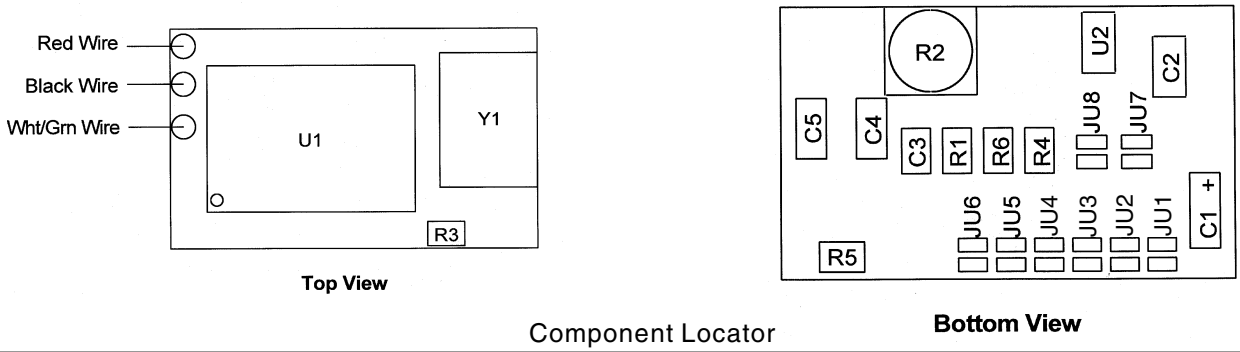
WARRANTY POLICY

All Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of two (2) years from date of purchase. Third party equipment such as radios, power supplies, antennas, etc., carry the factory warranty of their respective manufacturers.

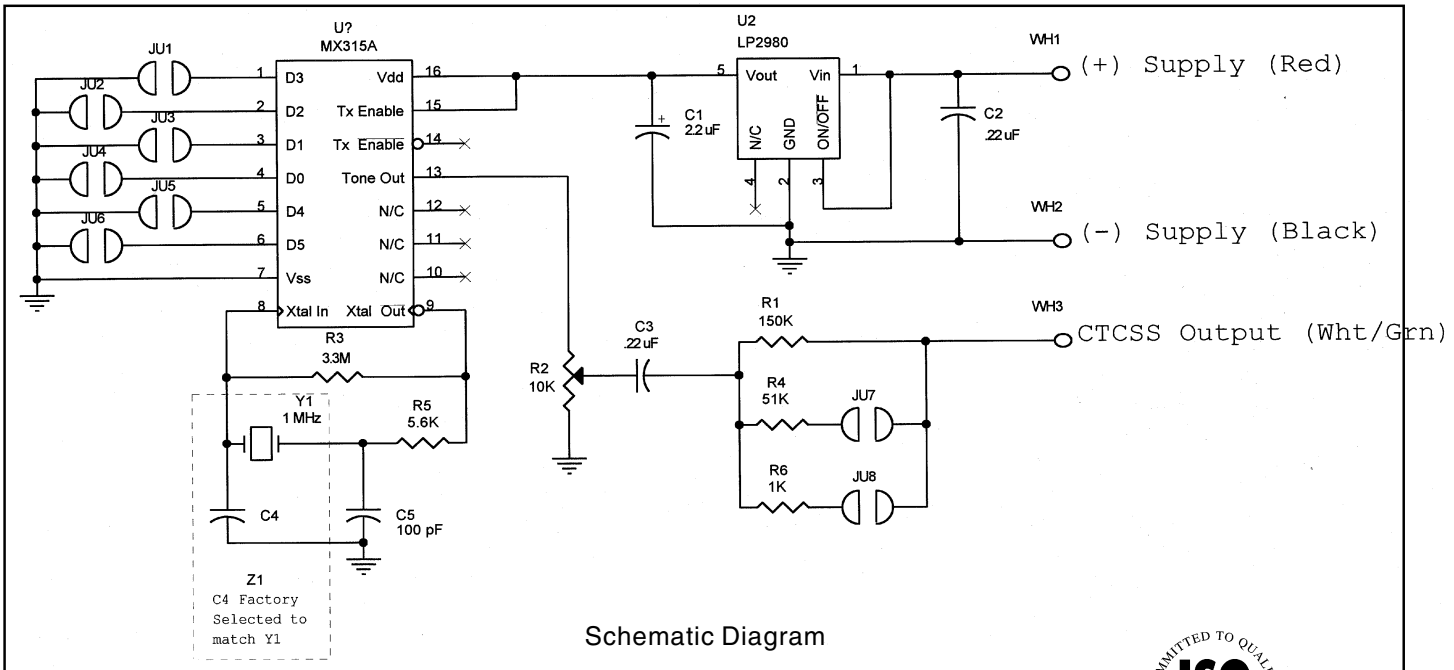
All warranty repairs must be performed at the SmarTrunk factory in Hayward, California, or other factory authorized repair depot. Any unauthorized repair attempted by the customer, alteration or modification of the equipment, damage by external sources, or removal or alteration of the serial number label or date code, will void the warranty. Specifically excluded from this warranty are batteries, fuses, lamps, and damage caused by lightning, power surges, or mechanical abuse.

Equipment for repair may be returned to the factory without prior written authorization; however, a note must be sent with the packing list briefly describing the nature of the defect. Repairs must be shipped freight prepaid and will be returned freight prepaid. Shipments should be directed to:

SmarTrunk Systems, Inc.
Attn: Repair Department
23278 Bernhardt Street
Hayward CA 94545, U.S.A.



Component Locator



Schematic Diagram

SmarTrunk Systems, Inc.
23278 Bernhardt Street• Hayward, CA 94545-1621 USA
Phone: +1-510-887-1950 - (- Fax: +1-510-887-4011
Email: salesinfo@smartrunk.com• Web Address: http://www.smartrunk.com

COMMITTED TO QUALITY ISO 9001 REGISTERED FIRM

Selectone
PRODUCT GROUP

OPERATING INSTRUCTIONS
Model ST-804A SUB-MINIATURE DTMF ANI/BURST/TWO-TONE ENCODER

Manual # 600-2201
Rev. A - 99032

June 15, 1999

GENERAL

The ST-804A is a microprocessor controlled, sub-miniature, ANI (Automatic Number Identification), Burst and Two-Tone Sequential encoder. The DTMF (Dual Tone Multi-Frequency) signaling format is intended for use with the Selectone Model ST-822 or ST-888 ANI decoder or a similar device. The Burst Tone encoder is intended for use with the ST-120 or similar decoders. The Two-Tone encoder is intended for use with the ST-200A/B or similar decoder.

Though the ST-804A is intended for use as a unit identification device or a paging encoder for two-way radio applications, its small size and user programmability provide flexibility that allow it to be used in a multitude of other applications including remote control and remote equipment status reporting.

The device is field programmable using a PC and the Windows based Product Manager Software for DTMF ANI and the DOS Product Manager Software for programming Burst and Two-Tone. The DOS product Manager also functions for programming ANI applications when Windows operation is un-stable. Product Manager is available on disk from Selectone at a nominal price, or it is available at no charge on the Selectone web page **www.selectone.com.**

OPERATING SPECIFICATIONS

Specification	Detail
Operating Voltage:	5.2 Vdc to 16.3 Vdc
Operating Current:	< 6mAdc
Open Collector Output:	40mAdc
Limit Timer Alert Tone:	CMOS logic , 10K series resistor
Tone Output Level:	Adjustable 0 to > 3 V p-p composite DTMF signal with < ±1dB twist; Burst Tone and Two-Tone from 300-3000 Hz
Temperature Range:	-30°C to +60°C
Tone Output Impedance:	
Non Signaling:	> 500K
Signaling:	< 30 Ohms
Input Logic Levels (All):	Logic HI =3.4Vdc Logic LO =.9Vdc
Interface:	18" flying leads terminated in a 13 pin low profile connector
Size:	0.84" W X 1.15" L X 0.15" H (21.3mm X 29.3mm X 3.8mm)

OPERATION

ANI - AUTOMATIC NUMBER IDENTIFICATION

When Programmed for DTMF ANI the ST-804A is triggered by the operation of the PTT (Push-To-Talk) switch of a host two-way radio transmitter. The ST-804A responds by sending a sequence of DTMF digits. Triggering of the ANI sequence may be programmed for activation upon closure and/or release of the PTT switch. The ST-804A connection to the host radio PTT circuit is used to insure transmitter keying is maintained to permit full ANI signaling even if the operator quickly releases PTT.

ENI - EMERGENCY NUMBER IDENTIFICATION

When The ST-804A is programmed for DTMF ANI and triggered by an input signal separate from the ANI trigger, the ST-804A keys the host transmitter and sends a second and independent sequence of DTMF digits. When properly programmed this sequence may be interpreted as an emergency code by the base station decoder. Once triggered, the ENI code is sent from 1 to 255 times or continuously based on setup programming. It is also possible to program the ST-804A to provide a period of "open microphone" transmit time after the first ENI sequence. This feature can be useful to a dispatcher who is trying to determine the nature of the emergency that is being declared.

BURST TONE

When the ST-804A is programmed as a Burst Tone encoder, grounding the ENI activate/ Page Code A wire causes a tone to be generated for the programmed duration or continuously until the Page Code line is released. This is a programmable feature.

TWO-TONE SEQUENTIAL

When the ST-804A is programmed as a Two-Tone Sequential encoder, grounding the ENI activate/ Page Code A wire causes a Two-Tone page of tone 1 then tone 2 for the programmed times and frequencies. If the PTT input/Page Code B is grounded, a Two-Tone page of tone 2 then tone 1is generated. If both the ENI activate/page code A and the PTT input/Page Code b wire are grounded at the same time, an all-call of tone 1 is generated for the programmed all-call duration.

MICROPHONE MUTING

To prevent voice corruption of the ANI or ENI sequence, the ST-804A TX AUDIO OUTPUT is normally high impedance (500K), and switches to a low impedance (30 Ohms) during an ANI/ENI/Burst/Two-Tone sequence. For non-powered microphones this provides a low impedance swamping load to effectively disable the microphone. For powered microphones an open collector output (MIC. MUTE OUTPUT) which conducts to (-)SUPPLY during the ANI/ENI sequence is also provided. This output is used to deprive the microphone element of current disabling the mic during the ANI/ENI sequence.

TIME-OUT TIMER

One of the many uses of the ST-804A is to prevent radio system abuse, not only by identifying abusers, but also by preventing a single user from monopolizing air time. For equipment not equipped with this feature, the time-out timer included in the ST-804A can be programmed to limit the

duration of any single transmission. When the limit time is exceeded, the transmitter is turned off. The ST-804A provides an alert tone which can be coupled to the receive audio section of the radio to notify a user that the transmission has been terminated. (This feature is only available when the ST-804A is programmed for DTMF ANI)

INSTALLATION

While it is possible to program the ST-804A after physical installation in the radio, it is recommended that you program the unit before installation. Refer to the PROGRAMMING section of this manual for programming instructions.

MOUNTING

Use of a double-sided adhesive pad eliminates hardware requirements. Mount the unit on a clean, dry surface, oriented to allow easy routing of the wiring to the radio. Press firmly after mounting to ensure good adhesive contact. Do not touch the adhesive or attempt to re-position the unit after mounting. If use of the adhesive pad is not practical, we have included a length of polyester tubing which may be used to insulate the unit from contact with other parts of the radio. This product has been designed for maximum immunity to RF interference. However, you should locate the unit as far as possible from the radio's RF power stages. To further minimize RF problems, twist the leads together and maintain all leads at minimum length.

INTERFACE TO THE RADIO

Interface to the host radio is made using a thirteen wire, color coded cable. This cable includes a sub-miniature connector to allow easy field programming or unit replacement as required. The electrical interface of the ST-804A is relatively simple and can be accomplished easily by a two-way radio service technician familiar with the host radio. Selectone also has application notes providing detailed installation instructions for many different radios. Selectone supports this product with application assistance via phone at (800) 227-0376, (510) 781-0376, FAX at (510) 781-5454, E-Mail at techsupport@selectone.com, or on the World Wide Web at **www.selectone.com**

[3] POSITIVE (+) SUPPLY (RED): Connect to (+) supply (5.2 to 16Vdc).

[9] NEGATIVE (-) SUPPLY (BLACK): Connect to system (-) supply (GND).

[13] TX AUDIO OUTPUT (WHT/GRN): Connect in parallel to the microphone at the audio amplifier input.

[6] PTT INPUT/PAGE CODE B (YELLOW): When the ST-804A is Programmed as a DTMF ANI encoder, connect to the transmitter PTT switch. This lead activates ANI and resets ENI.

When the ST-804A is programmed as a Two-Tone Sequential encoder, connect to a separate momentary switch connected to ground. When this line is grounded, a reverse Two-Tone page (tone 2, then tone 1) is generated.

When the ST-804A is programmed as a Burst Tone encoder, connect this wire to the Positive (+) Supply.

Note: *Operation of the ST-804A will be erratic if this input is allowed to float. If this point is open-circuit while not activated, a pull-up resistor to Positive (+) Supply must be added.*

[10] PTT OUTPUT (BLK/YEL): If the ST-804A Is programmed for DTMF ANI and the LIMIT TIMER function is not required, connect this wire to the same point as the PTT INPUT.

If the LIMIT TIMER function is used, the ST-804A must be placed in series between the PTT switch and the transmitter keying circuit. Break the existing connection between the PTT switch and the transmitter.

Connect this lead to the transmitter keying circuit and connect the PTT input lead to the actual PTT switch.

Note: *Factory programming sets the PTT input and output to operate from a common connection point. If the limit timer is required change the programming to operate separate.*

If programmed as a Burst Tone encoder: If the Page Code A lead is connected to the PTT circuit, do not connect this lead – remove the wire from the connector. If the Page Code A lead is connected to a switch separate from the PTT circuit, connect this lead to the PTT circuit of the radio.

If programmed as a Two-Tone Sequential encoder, connect this lead to the PTT circuit of the radio.

[5] MICROPHONE MUTE OUTPUT (BLK/ORG): This lead is used to mute powered microphone circuits. Before connection verify the need by speaking into the mic during an ANI sequence. If the ANI is corrupted, this lead is necessary. Replace the mic current limiting resistor with two values in series, totaling to near the original value. Connect this lead to the junction between these resistors.

[12] ENI ACTIVATE INPUT/ PAGE CODE A (GREEN): When the ST-804A is programmed for DTMF ANI, connect to a momentary switch which closes to ground to signal the presence of an emergency situation. An example would be a hidden foot switch for use in case of a robbery.

ENI is activated by a high to low transition followed by a constant low state for the programmed debounce time. Once activated the state of this lead is not a consideration until ENI is reset by a high to low transition on the PTT line.

When the ST-804A is programmed as a Burst Tone encoder, this lead may be connected to the PTT circuit to send a burst or continuous tone each time the transmitter is keyed (the PTT output lead must not be connected). This lead may be connected to a momentary switch which applies ground to initiate generation of the tone. If this is done, the PTT output lead must be connected.

When the ST-804A is programmed as a Two-Tone Sequential encoder, this lead should be connected to a momentary switch which applies ground to initiate a Two-Tone page (tone1, then tone 2).

[2] RS-232 IN (VIOLET): The Violet wire should be removed from the connector. (This input is only used during programming of the unit.)

[4] RS-232 OUT / SPEAKER BEEP (WHITE/ORANGE): When the limit timer feature is used, this lead provides a tone output to the radio speaker to indicate transmit limit has been reached. A series resistor is required. The value of the resistor is experimentally determined by consideration of the impedance of the speaker and the required loudness.

If the limit timer is not used, or the ST-804A is programmed for Burst or Two-Tone, the White/Orange wire should be removed from the connector.

[1] NOT USED (WHITE/BLUE): The White/Blue wire should be removed from the connector

[7] NOT USED (BROWN): The Brown wire should be removed from the connector

[8] NOT USED (BLACK/BROWN): The Black/Brown wire should be removed from the connector

[11] NOT USED (BLUE): The Blue wire should be removed from the connector

ADJUSTMENTS & PROGRAMMING

Set R5 to produce ±2/3 system deviation during the transmission of a DTMF sequence. (±2/3 system deviation = ±3.3 KHz when maximum deviation is ±5HKz)

Note: *To ease setting, the ST-804A will encode a DTMF 5 continuously when JU1 is shorted. Remember to open JU1 when setting is completed.*

PREFIX ANI CODE

The ANI CODE that is sent at the beginning of a transmission. Once triggered, the ST-804A holds the transmitter keyed long enough to send the entire ANI sequence even if the activation of the PTT input is only momentary.

ENI CODE

The code that is sent upon activation of the ENI input. The ENI CODE is sent repeatedly until reset by a high to low voltage transition on the PTT input or until the number of reports programmed have been sent.

SUFFIX ANI CODE

Sent at the END of a transmission. This code is may be used together with, or instead of, the PREFIX ANI CODE. It can be the same code as the prefix or a different code according to the system requirements.

IMPORTANT! *If you are using a Selectone ST-822 or ST-888 Desktop ANI/ENI Display Decoder, you must add an ANI PREFIX DIGIT or ENI ALARM PREFIX (ENI) to the beginning of the programmed code. The Display Decoder uses the PREFIX DIGIT, both for validation and to determine the nature of the code sequence, whether ANI or ENI. For the ST-804A and the Display Decoder to work properly together, the ST-804A must be programmed to encode the same PREFIX DIGIT as the Display Decoder is expecting to receive. For example; if you chose * as your PREFIX DIGIT to represent a normal ANI condition for the Display Decoder, and the required ANI code was 1 2 3 4, you would program the ST-804A for* 1 2 3 4.*

TRANSMIT DELAY TIME

This is the duration in milliseconds of the delay from activation of the PTT input until the ST-804A begins encoding the ANI or ENI sequence. This time is used to accommodate the delays of a particular system (repeater attack time, CTCSS decode time, etc.).

TONE-ON TIME

This is the time in milliseconds that each digit is generated. One divided by the duration of TONE-ON plus the duration of TONE-OFF equals the signaling rate in digits per second [1 / (Ton + Toff) = Signaling Rate].

The programmed signaling rate of the ST-804A must not exceed the maximum signaling rate of the decoder that is to be used.

TONE-OFF TIME

This is the time in milliseconds between successive digits in a sequence.

NOTE: *The tone-on and tone-off times must be set in accordance with the requirements of the associated decoder(s).*

ENI REPEAT TIME

This is the delay between each ENI transmission in seconds. After sending the initial ENI sequence, the ST-804A waits for the duration of the REPEAT TIME before another ENI sequence is sent.

ENI TALK WINDOW TIME

Duration in seconds of "open microphone" time following the transmission of the first ENI transmission. This feature allows a dispatcher to listen momentarily to the sounds at the site of the emergency and possibly gain some inkling of what is wrong without the help of the party in distress.

Note: *Microphone wiring may need modification to insure open Mic when PTT operates.*

ANI HOLD-OFF TIME

Time in seconds after an ANI sequence is sent before PTT will initiate another ANI sequence. This feature is used together with ANI HOLD-OFF COUNT to minimize the amount of air time lost to ANI if it is not absolutely necessary to send ANI with every transmission. If a transmission runs longer than the hold-off timer setting, ANI will be sent at the beginning of the next transmission if PREFIX ANI is used and at the end of the current transmission if SUFFIX ANI is used. If all transmissions are short, the ANI HOLD-OFF COUNT will likely elapse before the ANI HOLD-OFF TIME causing a normal suffix or prefix ANI sequence to be sent.

ANI HOLD-OFF COUNT

Maximum number of transmissions to be made before ANI data is again transmitted. This feature is used together with ANI HOLD-OFF TIME to minimize the amount of air time lost to ANI if it is not absolutely necessary to send ANI with every transmission. If a transmission runs longer than the hold-off timer setting, ANI will be sent at the beginning of the next transmission if PREFIX ANI is used and at the end of the current transmission if SUFFIX ANI is used. If all transmissions are short, the ANI HOLD-OFF COUNT will likely elapse before the ANI HOLD-OFF TIME causing a normal suffix or prefix ANI data burst to be sent.

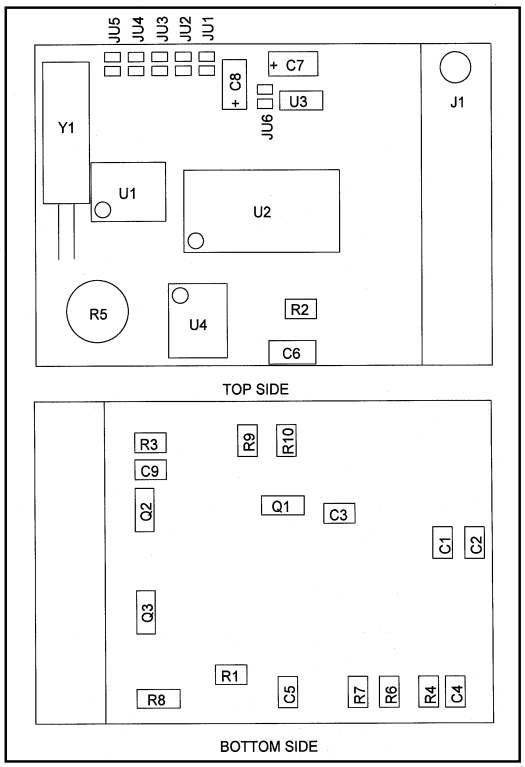
TRANSMIT LIMIT TIME

Duration in seconds the ST-804A will permit for any single transmission. If a microphone gets stuck or the radio system is subject to abuse from long winded users, the ST-804A will terminate any transmission that exceeds the duration of this timer. After the transmission ceases, the ST-804A will encode a warning from the TIME-OUT TIMER ALARM OUTPUT to signal the user that his transmission has ceased. Release of the PTT signal will reset the timer and permit another transmission.

PRODUCT MANAGER™ SOFTWARE

The ST-804A Product Manager is required to configure this product to accommodate the specific application requirement. The Windows based Product Manager Software is for ANI and the DOS Product Manager for ANI, Burst or Two-Tone. The DOS Product Manager may be useful for ANI applications if Windows operation is un-stable. The Windows based Product manager installs using normal Windows installation procedures.

The DOS based Product Manager is included on a separate disk. The DOS Product Managers may be transferred to the working directory (C:\Select.one), or run directly from the supplied disk. Many popular Windows programs access serial communications and lock access to COM ports by any other program, Windows or DOS. Before running 804DOS.EXE, shut down the computer and reboot in DOS mode. For DOS operation, press F8 immediately following the report "Starting Windows 95". Select "Command Prompt Only".



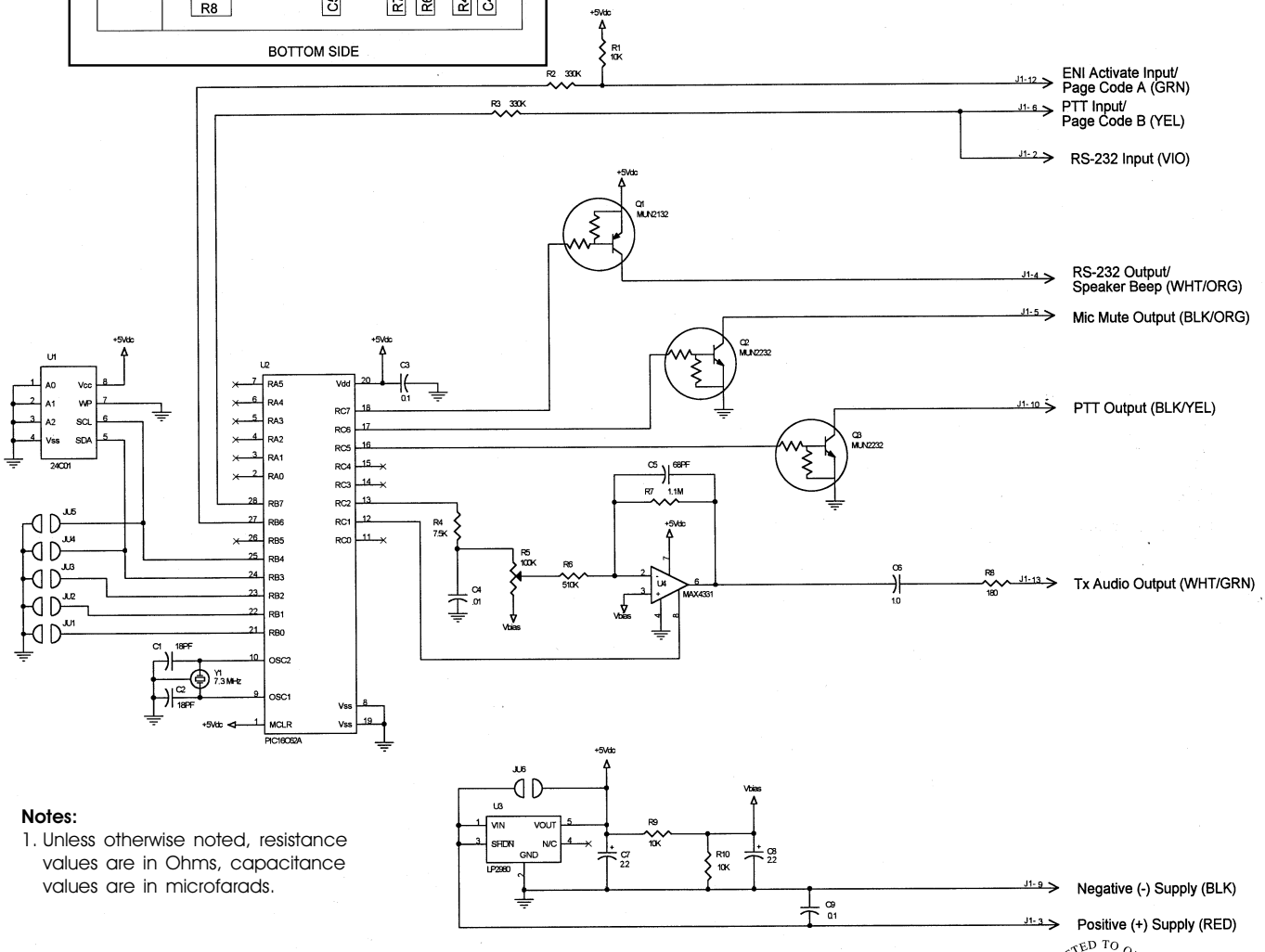
WARRANTY POLICY

All Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of two (2) years from date of purchase. Third party equipment such as radios, power supplies, antennas, etc., carry the factory warranty of their respective manufacturers.

All warranty repairs must be performed at the SmarTrunk factory in Hayward, California, or other factory authorized repair depot. Any unauthorized repair attempted by the customer, alteration or modification of the equipment, damage by external sources, or removal or alteration of the serial number label or date code, will void the warranty. Specifically excluded from this warranty are batteries, fuses, lamps, and damage caused by lightning, power surges, or mechanical abuse.

Equipment for repair may be returned to the factory without prior written authorization; however, a note must be sent with the packing list briefly describing the nature of the defect. Repairs must be shipped freight prepaid and will be returned freight prepaid. Shipments should be directed to:

SmarTrunk Systems, Inc.
Attn: Repair Department
23278 Bernhardt Street
Hayward CA 94545, U.S.A.



Notes:

1. Unless otherwise noted, resistance values are in Ohms, capacitance values are in microfarads.

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