A800-SIM3a System Splitting (Using SEL_REC)

Issue No.: AN012-03

Author: TEA Projects

NOTE: 7/9/2001 – Previously the A800-SIM used a Sigtec S1530 when system splitting was required. Sigtec no longer manufacture the S1530 selcall board (see AN003-02). Therefore a replacement selcall board that can be used instead is as follows:

SEL_REC - 2 Channel Site Management Unit,

Supplier: Lardley Electronic Designs

10 Delvin Crt, Arana Hills, QLD, 4054

Paul Hopely (0421 315 500), Fax: 07 3851 2138

General

System splitting on the A800-SIM allows ports 4, 5 & 6 to be split (disabled) from ports 1, 2, 3, 7 & 8, by sending selcall tones. The functions of system splitting are provided by the use of a SEL_REC selcall module. Using the features of a SEL_REC, the A800-SIM3a can receive Selcall tones from the radio repeaters and links connected to any of the SIM ports. By sending different selcall codes, it is possible to either link all the ports together or split ports 4, 5 & 6 from the other ports.

The A800-SIM System Splitting relies on a few things to operate correctly. The first is the use of the RX Disable signal on ports 4, 5, & 6. This signal is used to inhibit the T8X5 receiver modules audio output and its CTCSS decode output on pin 12. The second thing is that it requires the T8X5 receivers RX Gate output on ports 4, 5, & 6 pin 11 to continue to operate. These signals are used to control relays in the A800-SIM which switch audio to the S1530 selcall module, allowing it to receive selcall sequences even when 'Split'. Because of these two points detailed above, it is not possible to connect equipment other than T8X5 receiver modules, unless the same behaviour can be emulated.

Note:

This job instruction is only applicable to A800-SIM version A8-SIM3a PCB rev. # A8-SIM3a 23-09-98. This job instruction assumes the technician has a sound working knowledge of the Tait A800-SIM, Tait T800 modules & SEL_REC Selcall modules. For more information on these products, refer to the relevant service manuals.

Parts

The parts required for standard A800-SIM System Splitting (without any Options) are as per Table 1.

Table 1.

Part No.	Description	Supplier	Qty.
A800-SIM	A800-SIM version A8-SIM3a (A800-SIM3a)	Tait	1
SEL_REC	Selcall signaling board	Lardley	1
179-351	Relay, DPDT, 12Volt Coil	Farnell	7
368-106	Diodes, IN4148	Farnell	3
356-943	BC327 PNP TO-92 General Purpose Transistor	Farnell	1
543-421	1K5 ohm Resistor	Farnell	1
912-098	SMD 0805 100k ohm resistor	Farnell	1
Misc.	Miscellaneous workshop consumables, e.g. solder, wire, silicon etc	N/A	-

Procedure

1. All T800 modules must be modified as per Section 3 of the current A800-SIM Service Manual (AM8-SIM). Ensure step 3.3.4 is done (Fast CTCSS Keying Option). This will ensure that the T8X5 Receiver modules RX Disable and Rx Gate function is operating correctly. The RX Disable function is used for the A800-SIM System Splitting operation.
2. On the A800-SIM3a PCB, remove links LK1, LK2 and LK3.
3. On the A800-SIM3a PCB, set LK4 for the desired default power up split status, split or joined. The normal setting for most systems is for a default power up status of joined which is a setting of LK4 1-2.

Table 2.

LK4 Setting	Default Power Up Split Status
1-2	*Joined (Ports 4, 5 & 6 connected)*
2-3	Split (Ports 4, 5 & 6 disconnected)

4. The RX Ports that are split (ports 4,5 or 6) usually have to be CTCSS decode guarded. *(Note: If carrier gating is required then see the section - Option: Enable System Split Link to Operate as Carrier Gate in System Linked Mode).* Setting links LK74, LK75 and LK76 to 2-3 does this.
5. Remove the A800-SIM3a PCB from its A800-SIM 2RU 19" rack enclosure. This is done by unplugging the 16 way ribbon cables from ports RX1 to RX8 and TX1 to TX8. Then remove the six M3 x 6mm Pan Pozi screws holding the PCB down.
6. On the A800-SIM3a PCB, fit the following seven relays: #RL1, #RL2, #RL3, #RL4, #RL10, #RL11, #RL24.
7. On the top of the PCB, cut the three tracks shown in Fig. 1.

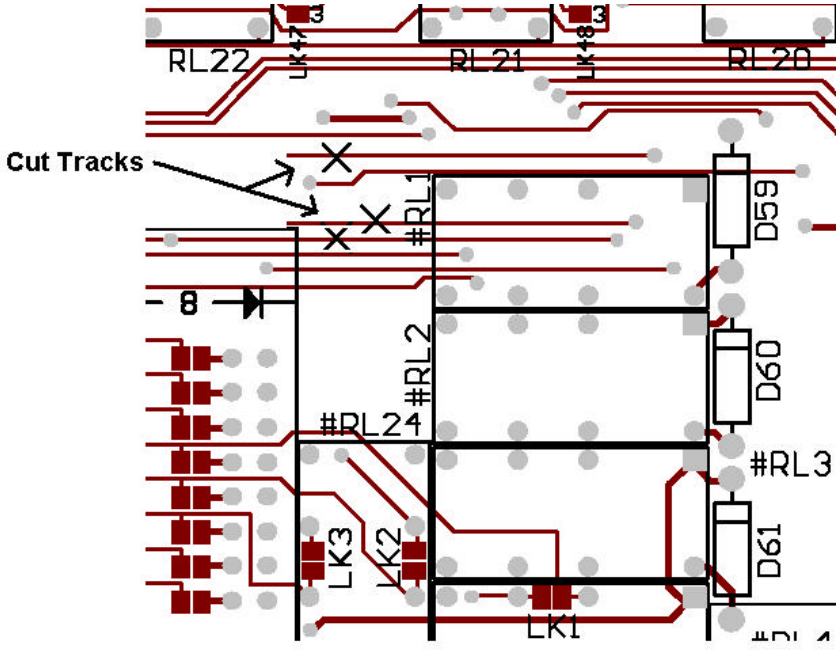


Fig: 1.

8. On the A800-SIM3a PCB, place the wire jumpers as shown in Fig 2. These links connect the coils of relays RL1, 2 & 3 to the RX Gate inputs on pin 11 of ports 4, 5 & 6, which allows the RXGATE inputs to directly control these relays and switch audio to the SEL_REC selcall module. Connections should be made on the solder side. These links are equivalent to making connections between the following points;

    - RX4/11 to the anode of D59
    - RX5/11 to the anode of D60
    - RX6/11 to the anode of D61

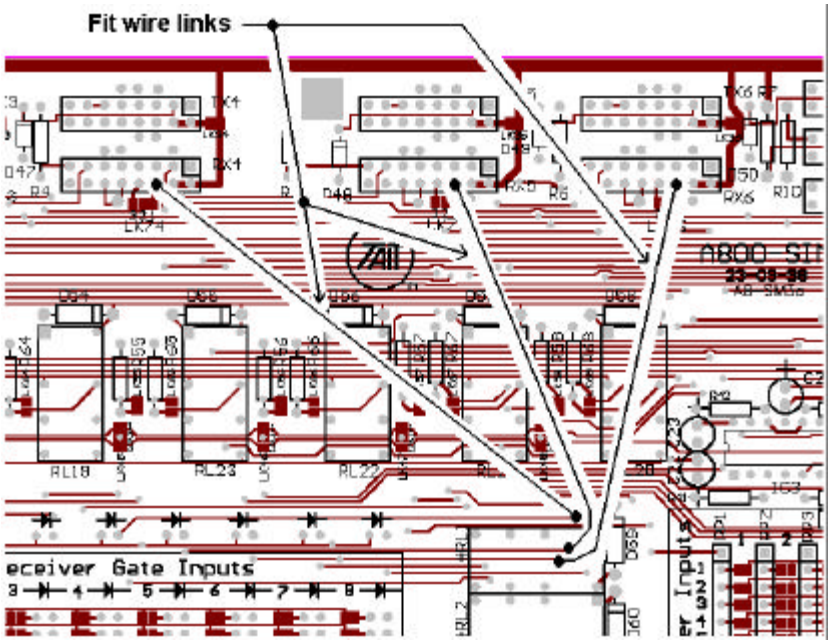


Fig 2.

9. On the bottom of the A800-SIM3a PCB, cut the three tracks and add the three diodes as indicated in Fig 3. This isolates the Port 4, 5, & 6 RX Disable lines from each other and the system splitting circuity. This is important if any of these ports need to have their RX Disable active for other purposes.

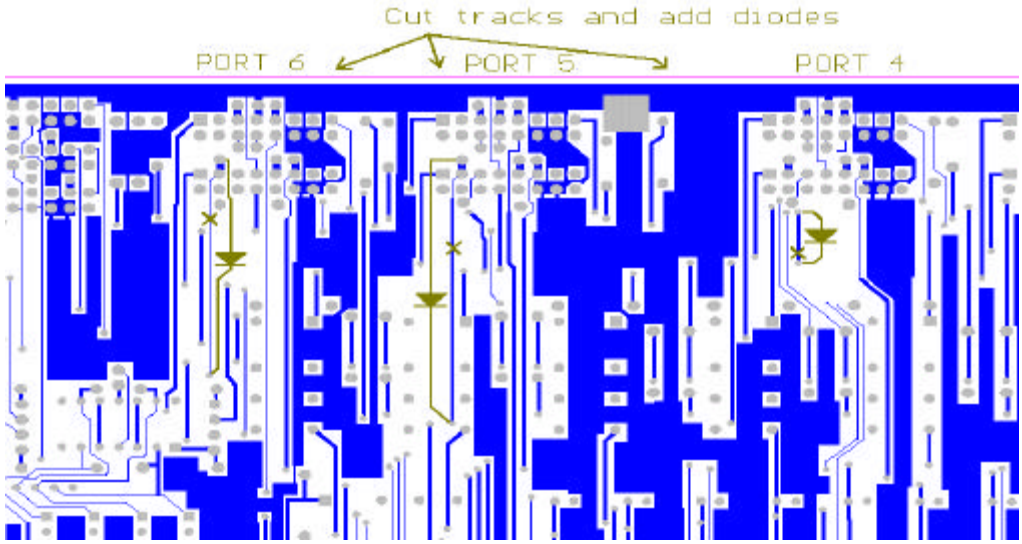


Fig 3.

10. Modify the SEL_REC in the following way (see Fig 4.):

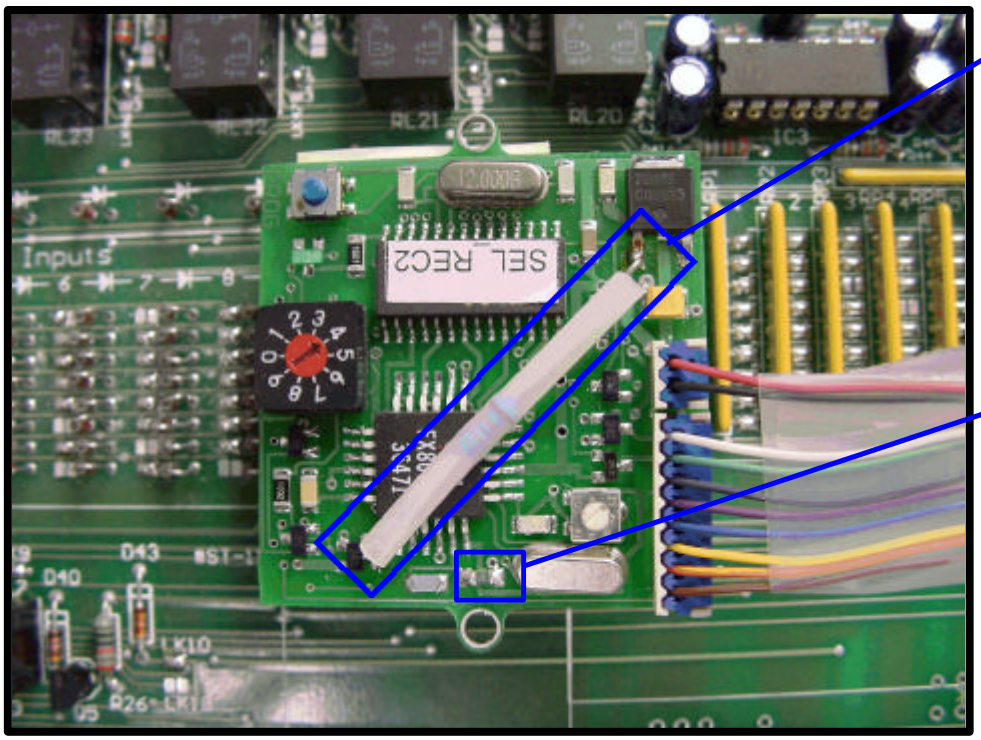
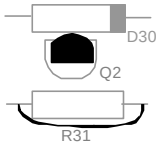


Fig 4.

11. Replace Q2 (BC548) with a BC327 (or BC376). The BC327 will need to be placed in the Q2 position the 'wrong' or opposite way around to the screen-printed marking (see below) as the BC327 collector goes to ground, and emitter goes to #RL10 coil. Short across R31 as well.



12. Fit the SEL_REC PCB, using the supplied double sided tape, onto the top of relays #RL1, #RL2, #RL3, #RL4 and #RL24. Make sure that you position it so that you can still get a soldering iron to column 8 of the diode matrix and to column 1 of the resistor matrix (see Fig 4.).

13. The SEL_REC will connect to the A800-SIM via the '#S1530 Selcall' PL1 and PL2 connection pads marked on the A800-SIM as follows:

Table 3

SEL_REC Pin #	SEL_REC Wire Color	SEL_REC Function	A800-SIM '#S1530 Selcall' Connection Pin #
SK1:1	Black	GND	PL1:2
SK1:2	Red	+Ve	PL1:1
SK2:1	White	PTT Output	PL1:3
SK2:3	Grey	CH. 1 Mon. Input	PL2:3
SK2:4	Purple	CH. 1 Output	PL2:7
SK2:5	Blue	Audio Input	PL1:8
SK2:6	Yellow	Audio Output	PL1:5

Programming the SEL_REC

Please refer to the attached SEL_REC Installation Manual for details on how to program the SEL_REC. Basically programming is done by sending the desired 5 tone selcall sequence to the SEL_REC (using a communications test set or radio with selcall fitted), no PC programming is required. The SEL_REC can be programmed while fitted to a working A800-SIM connected to base station equipment.

The SEL_REC stores 9 selcall sequences in positions 1 to 8.

There are already default sequences programmed into the unit (see the specifications section of the SEL_REC Installation Manual).

The selcall sequences that will be used by the A800-SIM for system splitting are as follows :

- Position 2 – decode sequence sets channel 1 output LOW
- Position 3 – decode sequence sets channel 1 output to HIGH
- Position 4 – decode sequence acknowledges with BOOOOP (low-pitched tone) or BEEEEP (high-pitched tone) depending on the current state of channel 1 output.

Table 4 and Table 5 list the functions of each A800-SIM Splitting Modes. This is only an example using the default selcall sequences programmed into the SEL_REC.

The sense of the BEEEEP or BOOOOP is reversed depending on if the A800-SIM is set up for default power up in the joined or split mode.

Table 4 - LK4 Set to 1-2 Default Power Up State is Joined

Label/Function	Function	Code
Split	A800-SIM has Port 4, 5, & 6 split from all other Ports.	10001
Join	A800-SIM has Port 4, 5, & 6 joined to all other Ports	10002
Status	A800-SIM acknowledges with a : BEEEEP = Joined or BOOOOP = Split	10003

Table 5 - LK4 Set to 2-3 Default Power Up State is Split

Label/Function	Function	Code
Join	A800-SIM has Port 4, 5, & 6 joined to all other Ports.	10001
Split	A800-SIM has Port 4, 5, & 6 split from all other Ports.	10002
Status	A800-SIM acknowledges with a: BEEEEP = Split or BOOOOP = Joined	10003

Testing

To test an A800-SIM which has been set up for System Splitting, it is necessary to be able to send the correct selcall sequences to the unit. This can be achieved in a number of ways. The primary method of doing this is to use a Signal Generator that is capable of generating selcall tone sequences. The signal generator can then be connected to any of the receivers connected to any of the A800-SIM ports, and used accordingly. An alternative method could be to use a Tait T2020 mobile radios suitably programmed with the required selcall codes and set to the same frequencies as one of the bases connected to the A800-SIM.

The testing of an A800-SIM with System Splitting will somewhat depend on the programming of the SEL_REC module and the setting of the A800-SIM link LK4. As such, you should keep this in mind when completing any of the following steps

1. Set up the A800-SIM for testing. This means connect power to the A800-SIM, and whatever other radio modules, test equipment, etc, that you are going to use.
2. Test that the A800-SIM is operating in a normal manner. Refer to the A8M-SIM service manual for standard information on the A800-SIM.
3. Take note of the position of LK4 to determine the power up state of the SIM, split or joined.
4. Generate a selcall sequence for a ‘Split’ command to the A800-SIM via ports 1, 2, 3, 7, and 8.
5. Test that the A800-SIM has now disabled any T800 modules connected to ports 4, 5 or 6.
6. Test that any T800 module connected to ports 1, 2, 3, 7, and 8 is working normally.
7. Generate a selcall sequence for a ‘Status’ command into port 1 and ensure the correct acknowledge is returned (BEEEEP or BOOOOP)
8. Generate a selcall sequence for a ‘Join’ command to the A800-SIM via ports 1, 2, 3, 7, and 8.
9. Test that the A800-SIM is operating in a normal manner.
10. Generate a selcall sequence for a ‘Status’ command into port 1 and ensure the correct acknowledge is returned (BEEEEP or BOOOOP)
11. Generate a selcall sequence for a ‘Split’ command to the A800-SIM via ports 4, 5, & 6.
12. Test that the A800-SIM has now disabled any T800 modules connected to ports 4, 5 or 6.
13. Test that any T800 module connected to ports 1, 2, 3, 7, and 8 is working normally.
14. Generate a selcall sequence for a ‘Status’ command into port 1 and ensure the correct acknowledge is returned (BEEEEP or BOOOOP)
15. Generate a selcall sequence for a ‘Join’ command to the A800-SIM via ports 4, 5, & 6.
16. Test that the A800-SIM is operating in a normal manner.
17. Generate a selcall sequence for a ‘Status’ command into port 1 and ensure the correct acknowledge is returned (BEEEEP or BOOOOP)
18. Generate a selcall sequence for a ‘Join’ command to the A800-SIM via ports 1, 2, 3, 7, and 8.
19. Test that the A800-SIM is operating in a normal manner.
20. Generate a selcall sequence for a ‘Status’ command into port 1 and ensure the correct acknowledge is returned (BEEEEP or BOOOOP)

Options

The following are optional configurations that can be set up on a A800-SIM with System Splitting. When an A800-SIM is being configured for System Splitting for a standard A800-SIM system setup the following 3 options should be included as standard and ***not regarded as optional****:*

Option 1 – Fit to all link receivers connected to Ports 4-6 on the A800-SIM

Option 4 – Fit to any of Ports 4 to 6 on the A800-SIM that have links connected to them.

Option 5 – Fit to any of Ports 4 to 6 on the A800-SIM that have links connected to them.

Option 1: Improved SEL_REC Selcall Decoding

When an A800-SIM is set up for System Splitting, the SEL_REC module provides selcall encoding and decoding for all of the A800-SIM ports. As such, the SEL_REC can receive audio from up to eight different sources (ports 1 to 8). When an A800-SIM has multiple receivers connected to its ports, audio can come from multiple sources at once. If the SEL_REC is receiving audio from multiple sources, it can sometimes have trouble decoding. This is most evident with audio from ports 4 to 6, as this audio normally comes from the receiver's discriminator and has CTCSS tone on it. When this tone is present (along with other possible in-band audio), the SEL_REC module may not decode selcall every time. This does not normally pose a problem, as a selcall not acknowledged can always be resent.

If you wish to improve the SEL_REC decoding, a modification can be carried out in the T800 receiver modules connected to the A800-SIM ports 4, 5, & 6. This modification changes the audio supplied to the A800-SIM from discriminator audio to clean audio. This is to improve the SEL_REC selcall module decoding, even if other receivers on the A800-SIM are currently receiving a carrier.

For information on the T8X5 Receivers, refer to the relevant service manuals.

Table 6 – Parts (Per T8X5 Receiver).

Part No.	Description	Supplier	Qty.
228-618	10uF 35V Electrolytic Capacitor	Farnell	1
Misc.	Miscellaneous workshop consumables, e.g. solder, wire, silicon tubing, etc.	N/A	-

1. In the T8X5 Receiver module, lift pin 6 on the 1st D Range.
2. Connect the positive leg of a 10uF 35V electrolytic capacitor to the now disconnected pin 6 of the 1st D Range.
3. Connect a wire to the negative leg of the 10uF capacitor from Step 2. Insulate the connection with silicon tubing.
4. For a T800 Series II T8X5 Receiver, connect the other end of the wire to pad P256 (speech no tone).
5. For a T800 Series I T8X5 Receiver, connect the other end of the wire to AUDIO2 pad PAD122 (speech no tone).
6. Fully test the operation of the A800-SIM and its System Splitting. Refer to the section 'Testing'.

Option 2: Front Panel Visual Indicator for System Split Status

This details how to install a LED to the front of the A800-SIM to provide a visual indication of the current status of the A800-SIM splitting. The exact details of this modification are left up to the technician installing it, as it somewhat depends on the parts being used.

1. Dismantle the A800-SIM.
2. Drill a suitably sized hole in the front on the A800-SIM to mount a LED bezel.
3. Install the LED bezel and fit a LED to it.
4. Connect a wire to the cathode of the LED. Insulate the connection with silicon tubing. Connect the other end of the wire to ground on the A800-SIM PCB. Refer to Fig 5.
5. Connect the anode of the LED to a 1K8 resistor.
6. Connect a wire to the other side of the 1.8K resistor. Insulate the connection with silicon tubing. Connect the other end of the wire to the through hole via to the right of #RL13. Refer to Fig 5.

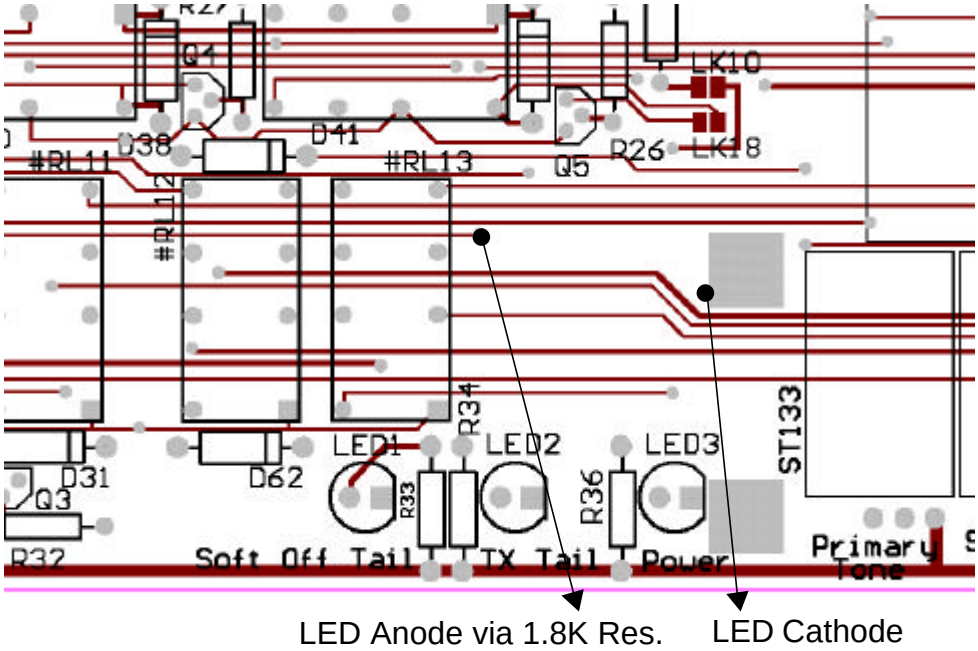


Fig 5.

7. On the front of the A800-SIM, adjacent to the installed LED, fit a label with the words:

SYSTEM JOINED (LED ON)

8. Fully test the operation of the A800-SIM and its System Splitting. Test the A800-SIM in split and un-split modes to ensure correct operation of the LED. The LED should be on when A800-SIM is joined. Refer to the section 'Testing'.

Option 3: Enable/Disable the TX Tail & Vote Pulse Timer in Sympathy with System Splitting.

This section details modifications to enable/disable the TX Tail & Vote Pulse timer in sympathy with system splitting. This modification is to allow an A800-SIM to effectively assume a hub mode of operation when it is split off from the systems real hub/master site. In other words, the TX Tail Timer & Vote Pulse Generator would not work if the A800-SIM was linked, but would work if it was split.

An important thing to understand with a system that would operate as described above, is that there may be some strange effects on mobile that are voting. If a mobile is in a vote group of all of the channels in a system, and the system is split into two separate parts, the mobile will not necessarily vote onto the correct part of the system. Each mobile would need to be changed from that vote group to a different channel or vote group to keep operating in a controlled fashion.

If the A800-SIM to be modified will operate as a stand-alone site once it is split then it is not necessary to do the part of the modification for the vote pulse timer.

Table 7 – Parts

Part No.	Description	Supplier	Qty.
368-106	IN4148 Diode	Farnell	2
Misc.	Miscellaneous workshop consumables, e.g. solder, etc.	N/A	-

The following steps assume the link LK4 is set 1-2 position and refer to connections made to LK4 pad 3. If the link LK4 is set to 2-3 position, make all connections to LK4 pad 1 instead. For more information on LK4, refer to the A800-SIM service manual.

1. Add a diode to the top of the A800-SIM PCB, cathode to link LK4 pad 3 and the anode to D28 anode. Refer to Fig. 6. Adding this diode makes the splitting relay #RL10 control the relay RL8. When #RL10 is inactive (system joined) it pulls relay RL8 on permanently via the diode. While relay RL8 is on the SIM TX Tail circuits are disconnected from the PTT Outputs.

2. Add a diode to the top of the A800-SIM PCB, cathode to link LK4 pad 3 and anode to D39 anode. Refer to Fig. 6. Adding this diode makes the splitting relay #RL10 control the voting pulse timer reset line. When #RL10 is inactive (system joined) its normally closed contact pulls the voting pulse timer reset line permanently low via the diode. This prevents the vote pulse timer from generating voting pulses.

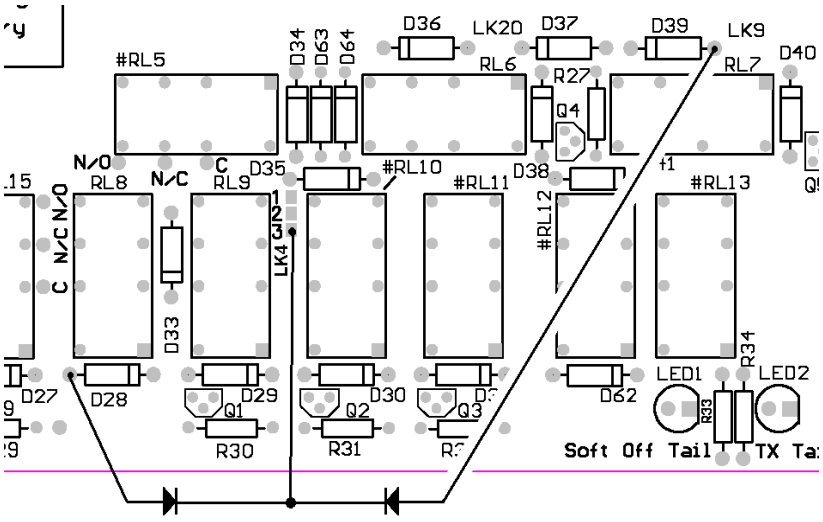


Fig 6

3. Configure the A800-SIM as a hub system, i.e. setup the links for TX Tail operation and if required, for voting pulses. For information on setting up the A800-SIM, refer to the A800-SIM service manual AM8-SIM.pdf.

Option 4: Enable System Split Link to Operate as Carrier Gate in System Linked Mode

Under some circumstances, it may be necessary to make a link connected to one of the splitting ports (Ports 4, 5, & 6) to operate in carrier mode, as opposed to CTCSS tone guarded mode as described in the section Procedures Step 4. For example, when system splitting is used, the soft off from a remote hub site will not pass through a split link (Ports 4, 5, or 6), even when the A800-SIM splitting is in the Joined mode. This is because the split link is setup as CTCSS tone guarded, so it will not pass carriers without CTCSS.

If a split link needs to operate in carrier mode, carry out the following steps for the Port that that link is connect to. Do the following steps 1 to 5 **if one port only is to be split** (Port 4 in this case). *(If Port 5 or 6 are to be used instead, then substitute the appropriate links etc for those ports)*

1. In the A800-SIM, remove all solder links from the link LK74 *(LK75 for Port 5, LK76 for Port 6)*.
2. Remove the A800-SIM3a PCB from its A800-SIM 2RU 19" rack enclosure. This is done by unplugging the 16 way ribbon cables from Ports RX1 to RX8 and TX1 to TX8. Then remove the six M3 x 6mm Pan Pozi screws holding the PCB down. On the bottom of the A800-SIM PCB, solder a wire from Port 4 RX4 pin 11 *(Port 5 RX5 pin 11, Port 6 RX6 pin 11*). This is the RXGATE input for Port 4 *(Port 5, Port 6)* and is equivalent to LK74 pad 1*(LK75 pad 1 for Port 5, LK76 pad 1 for Port 6)*
3. Connect the other end of this wire to RL10 N/C2. Refer to Fig 7a.
4. On the bottom of the A800-SIM PCB, solder a wire to the anode of the diode D54 *(D55, D56)*. This is equivalent to LK74 pad 2 *(LK75 pad 2, LK76 pad 2)*
5. Connect the other end of this wire to RL10 C2. Refer to Fig 7a.

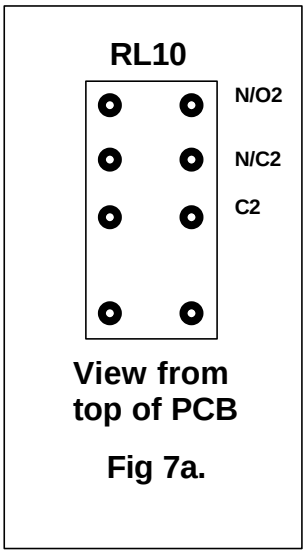


Fig 7a.

If more than one port is to be split, ie. Ports 4, 5 and 6, then do the following:

(a) A relay will need to be fitted to position #RL14. Solder a wire jumper between the anodes of D30 and D26. So that both RL10 & #RL14 can be controlled by the SEL_REC TX key output (PL1:3)

(b) For Port 4, 5 & 6 do as in steps 1 and 2, as above. However instead of following step 3 for Port 5 & 6, run a wire from Port 5 RX5 pin 11 to #RL14 N/C1 and another wire from Port 6 RX6 pin 11 to #RL14 N/C2. Refer to Fig 7b.

(c) For Port 4 do as steps 4 & 5, above. For Port 5, solder a wire to the anode of diode D55 and connect the other end of this wire to #RL14 C1. For Port 6 solder a wire to the anode of the diode D56 and connect the other end of this wire to #RL14 C2. Refer to Fig 7b.

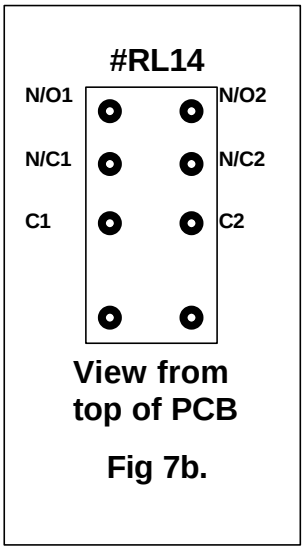


Fig 7b.

- Refit the A800-SIM3a PCB to the A800-SIM 2RU 19" rack enclosure, in the reverse sequence to Step 2.
- Fully test the operation of the A800-SIM and its System Splitting. Refer to the section 'Testing'.

Option 5: SEL_REC Selcall Acknowledge Tones on Split Links

This allows the SEL_REC selcall board to send back it's acknowledge tones on any of the A800-SIM ports whenever an Un-Split or Split selcall command is issued to the A800-SIM. This acknowledgment is an indication that the command has been performed correctly.

As standard the A800-SIM only routes the TX Key signal from the SEL_REC Selcall module to the TX Tail Timer & Soft Off Timer circuits. As such, this signal will only apply a TX Key signal to any of the A800-SIM ports if they are selected on the PTT Outputs (Tail) matrix. Ports are only normally selected on the PTT Outputs (Tail) matrix at hub sites.

As such, this modification can be carried out for any A800-SIM port that has equipment connected to it, and is not selected on the PTT Outputs (Tail) matrix.

The following steps describe the modification for port 4. To modify other ports, substitute the appropriate points for those ports.

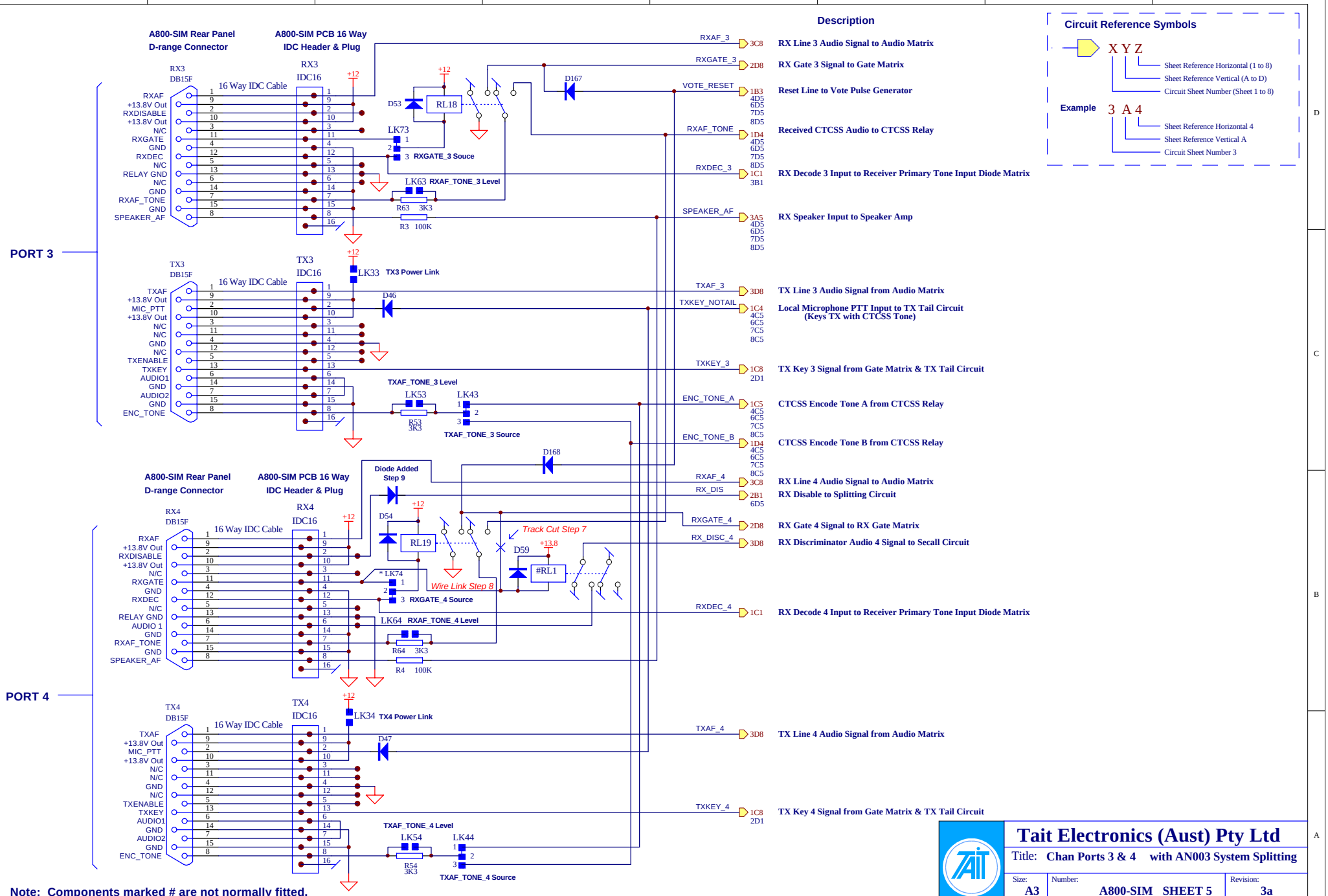
Table 8 – Parts (Per A800-SIM port being done)

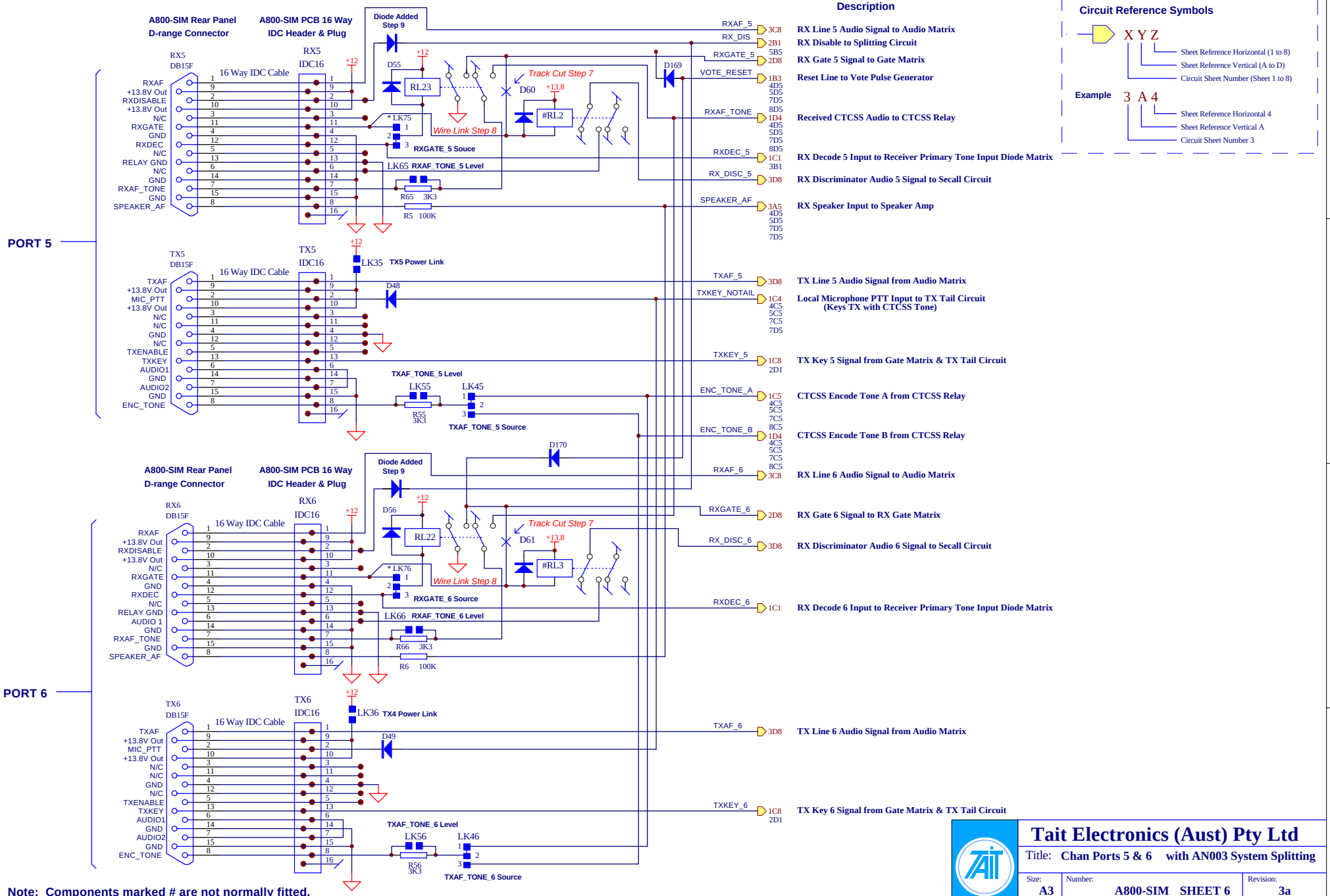
Part No.	Description	Supplier	Qty.
368-106	IN4148 Diode	Farnell	1
Misc.	Miscellaneous workshop consumables, e.g. solder, etc.	N/A	-

1. Remove the A800-SIM3a PCB from its A800-SIM 2RU 19" rack enclosure. This is done by unplugging the 16 way ribbon cables from ports RX1 to RX8 and TX1 to TX8. Then remove the six M3 x 6mm Pan Pozi screws holding the PCB down.
2. On the bottom of the A800-SIM PCB, connect the cathode of a 1N4148 diode to the cathode of diode D41. The diode D41 can be found just behind the relay #RL12.
3. Connect a wire to the anode of the diode. Insulate the connection with silicon tubing.
4. Connect the other end of the wire to port 4 TX4 pin 13 TXKEY.
5. Parallel diodes can be installed from D41 to any of the other A800-SIM ports where acknowledgment tones are required. Standard procedure is to send selcall acknowledgments on all used ports of the A800-SIM.
6. Refit the A800-SIM3a PCB to the A800-SIM 2RU 19" rack enclosure, in the reverse sequence to Step 1.
7. Fully test the operation of the A800-SIM and its System Splitting. Refer to the section 'Testing'.
8. ***NOTE: Alternative to above procedure.*** *In some cases where the SIM is not used on a hub site you can try solder blobbing the PTT Outputs (LK100-LK107) on the ports that you have connected. Then adjust the SOFT OFF TAIL and CTCSS TAIL pots. all the way down (even all the way down there is a very slight tail). Whichever method is selected, test the system for unwanted mute crash's on selcall acknowledges from the A800-SIM, if there seems to be mute crash's try the other method.*

Attachments

A8-SIM3a-05-01_AN003.pdf	A800-SIM3a Circuit 5. With AN003 Procedure steps shown.
A8-SIM3a-06-01_AN003.pdf	A800-SIM3a Circuit 6. With AN003 Procedure steps shown.
SEL_REC manual.pdf	SEL_REC Installation Manual


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
D167
LK63 RXAF_TONE_3 Level
R63 3K3
R3 100K
TX3
DB15F
TX3
IDC16
TXAF
MIC_PTT
TXENABLE
TXKEY
AUDIO1
AUDIO2
ENC_TONE
LK33 TX3 Power Link
D46
TXAF_TONE_3 Level
LK53
LK43
R53 3K3
TXAF_TONE_3 Source
Diode Added Step 9
D168
PORT 4
RX4
DB15F
RX4
IDC16
D54
RL19
Track Cut Step 7
D59
#RL1
Wire Link Step 8
* LK74
RXGATE_4 Source
LK64 RXAF_TONE_4 Level
R64 3K3
R4 100K
TX4
DB15F
TX4
IDC16
LK34 TX4 Power Link
D47
TXAF_TONE_4 Level
LK54
LK44
R54 3K3
TXAF_TONE_4 Source
RXAF_3
RXGATE_3
VOTE_RESET
RXAF_TONE
RXDEC_3
SPEAKER_AF
TXAF_3
TXKEY_NOTAIL
TXKEY_3
ENC_TONE_A
ENC_TONE_B
RXAF_4
RX_DIS
RXGATE_4
RX_DISC_4
RXDEC_4
TXAF_4
TXKEY_4
Description
RX Line 3 Audio Signal to Audio Matrix
RX Gate 3 Signal to Gate Matrix
Reset Line to Vote Pulse Generator
Received CTCSS Audio to CTCSS Relay
RX Decode 3 Input to Receiver Primary Tone Input Diode Matrix
RX Speaker Input to Speaker Amp
TX Line 3 Audio Signal from Audio Matrix
Local Microphone PTT Input to TX Tail Circuit
(Keys TX with CTCSS Tone)
TX Key 3 Signal from Gate Matrix & TX Tail Circuit
CTCSS Encode Tone A from CTCSS Relay
CTCSS Encode Tone B from CTCSS Relay
RX Line 4 Audio Signal to Audio Matrix
RX Disable to Splitting Circuit
RX Gate 4 Signal to RX Gate Matrix
RX Discriminator Audio 4 Signal to Secall Circuit
RX Decode 4 Input to Receiver Primary Tone Input Diode Matrix
TX Line 4 Audio Signal from Audio Matrix
TX Key 4 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 3 & 4 with AN003 System Splitting
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-05-01_AN003.sch



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 with AN003 System Splitting

Size:	Number:	Revision:
A3	A800-SIM SHEET 6	3a

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

Date: 21-12-99 Sheet 6 of 8

File: A8-SIM3a-06-01_AN003.sch

TWO CHANNEL SITE MANAGEMENT

SEL_REC Installation Manual

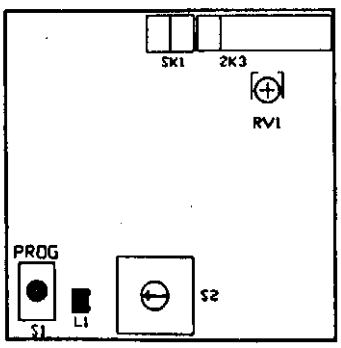
OPERATION

The SEL_REC is a selcall controlled two channel site management unit capable of remotely turning ON and OFF two output channels, monitoring two input channels for a change of state as well as having the capability of remotely reading the condition of the input channels at any time. Devices connected to the unit such as motors and pumps can thereby be controlled remotely and monitored via a selcall fitted radio.

Its' unique On Air Programming and Tone Retrieval features allows for easy programming, installation and diagnostics. Users may store a selcall tone set for each control function by placing the SEL_REC into programming mode and injecting their desired tone set into the radio directly on air, using another radio or communications test set. The unit is capable of storing eight user selectable tone sets in non volatile EEPROM.

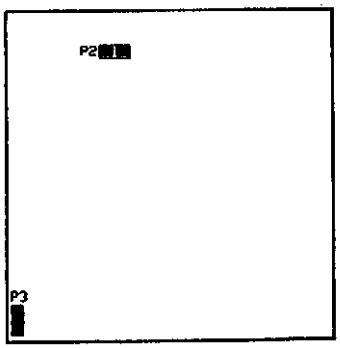
The SEL_REC will decode five sequential tones as well as Electrophone tone formats (One preamble followed by nine or ten sequential tones). Any preamble (greater than 80ms) will be ignored and the first five tones of the incoming tone set will be accepted.

It complies with standard CCIR tone formats and can be used in conjunction with most communications networks.



TOP VIEW

ACTUAL SIZE



BOTTOM VIEW

OUTPUT ON / OFF CONTROL

The two outputs channels are controlled by four separate command tone sets. One tone set to turn ON and one to turn OFF, for each channel. When a valid tone set is received by the unit, the following sequence will occur.

- The channel Decode output will be set as per the received tone set.
- PTT output will go active.
- A tone acknowledgment is sent to confirm receipt of the command tone as per Table Four below
- PTT output will go low.

Decode Channel	ON / OFF	Tone acknowledgment
ONE	ON	BOOP
ONE	OFF	BEEP
TWO	ON	BOOP BOOP
TWO	OFF	BEEP BEEP

Table Four

INPUT MONITOR

A change of condition on a Monitor input will activate an encode transmit sequence as follows:

- PTT output will be activated
- The stored encode tone set for that input is sent.
- 1 second delay.
- A tone is sent to indicate the Monitor input status (High or Low) as per Table Five below
- PTT output will be disabled.

Encode Channel	Input	Tone indication
ONE	LOW going	BOOOOP
ONE	HIGH going	BEEEEP
TWO	LOW going	BOOOOP BOOOOP
TWO	HIGH going	BEEEEP

Table Five

ACQUIRE INPUT ONE CONDITION

Should a valid Aquire tone set be received, the SEL_REC will read the input condition of the Monitor input and send a status tone to indicate the condition of the input. The sequence is as follows:

- PTT output will be be enabled
- The condition of Monitor input is sent via a status tone as per Table Three
- PTT output will be disabled.

CHANNEL	MONITOR INPUT CONDITION	STATUS TONE
ONE	LOW	BOOOOP
ONE	HIGH	BEEEEP
TWO	LOW	BOOOOP BOOOOP
TWO	HIGH	BEEEEP BEEEEP

Table Three

FACTORY DEFAULT

The unit may be reset to factory defaults by holding down the Program switch while applying power to the unit. The unit will flash the diagnostic LED twice, one short one long to acknowledge that the default tone sets have been restored.

RETRIEVING STORED TONE SETS

The programmed tone sets may be retrieved by a single press of the Program button (less than two seconds duration). Once the button is released the unit will send the stored tone set according to the BCD switch setting as shown in table one below.This allows confirmation that the stored tones sets are correct as programmed. Retrieved tone sets can be displayed using a communications analyser or similar.

BCD #1	TONE SET BEING RETRIEVED	CHANNEL	OUTPUT
1	Stored Encode	ONE	
2	Stored Decode	ONE	LOW
3	Stored Decode	ONE	HIGH
4	Stored Aquire	ONE	
5	Stored Encode	TWO	
6	Stored Decode	TWO	LOW
7	Stored Decode	TWO	HIGH
8	Stored Aquire	TWO	
9	Stored Test Tone		
0			

Table One

TEST TONE

Setting the BCD switch to position nine and pressing the Program button momentarily (less than two seconds duration) will activate a five second test sequence as follows:

- PTT output will be enabled.
- A test tone will be transmitted for five seconds.
- PTT output will be disabled.

RV1 can be used to adjust the tone output level.

PROGRAMMING COMMAND TONE SETS

User command tone sets may be programmed into the units non volatile EEPROM memory. The program mode is entered by holding down the Program button continuously for 2 seconds. The LED will flash to indicate the unit has entered program mode. Selecting the command tone set to be stored is done by setting the BCD switch as per table two below.

BCD #1	TONE SET BEING PROGRAMMED
1	Encode tone set channel **one**
2	Decode tone set channel **one** output Low
3	Decode tone set channel **one** output High
4	Aquire channel **one** input condition
5	Encode tone set channel **two**
6	Decode tone set channel **two** output Low
7	Decode tone set channel **two** output High
8	Aquire channel **two** input condition
9	Not Valid - Pre set to test tone
0	Not Valid - Idle mode

Table Two

NOTE:- Transmitter will be keyed during programming

Once program mode has been entered, radio tones can be injected from a communications test set or from a radio fitted with a Selcall option (5 tone format or 9/10 tones - preamble will be ignored).

Once the unit has received the tone set the LED will extinguish and a short Beep will be transmitted to indicate the unit has accepted and stored the five tones. The unit will then return to normal run mode operation.

If a programming tone set is not received within four minutes, the unit will automatically exit the programming mode and return to normal run mode operation.

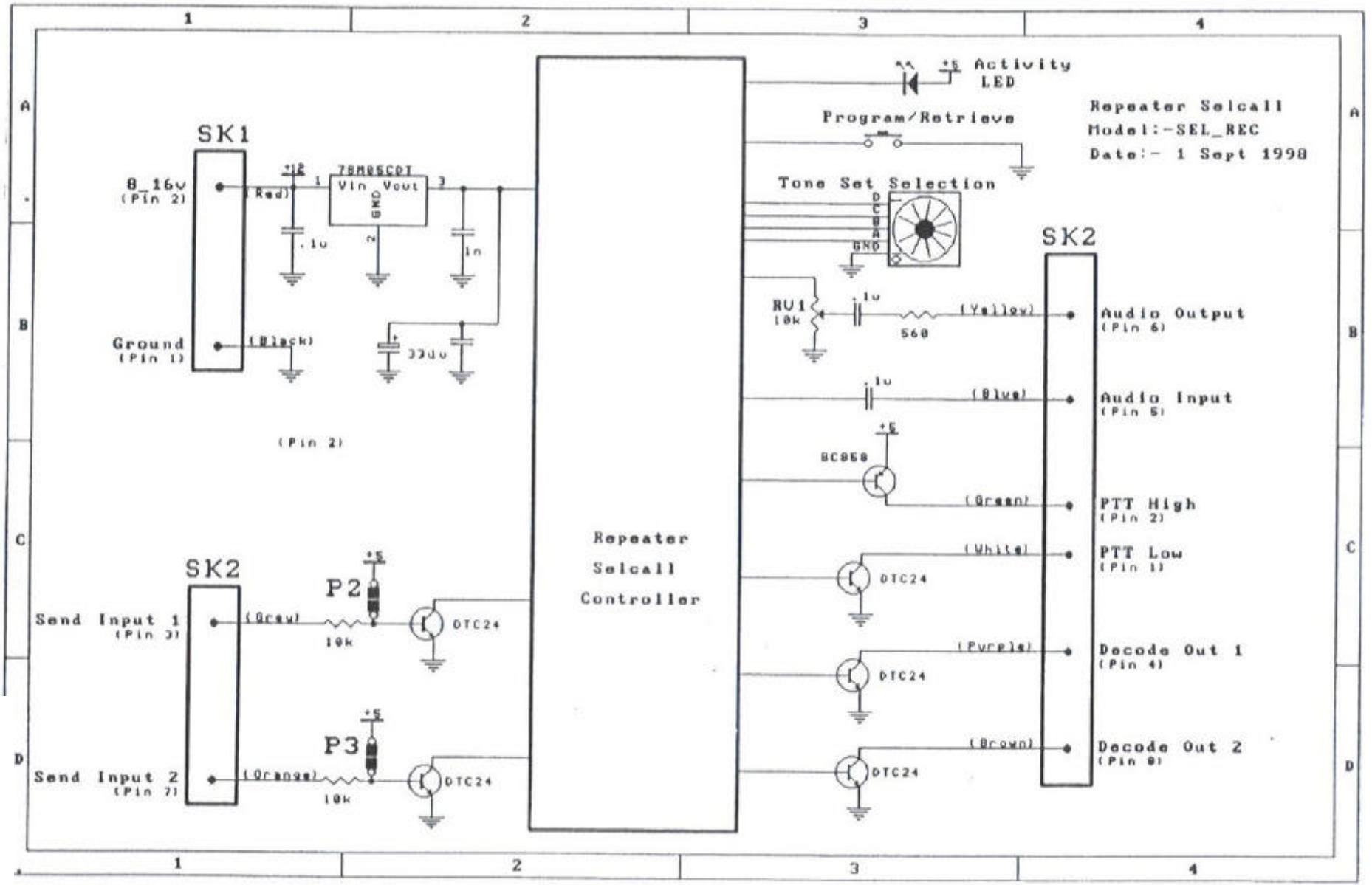
CONNECTION INFORMATION

Power Connector (SK1)

Black (Pin 1) 0 volts Input Connect this wire to O Volts of the equipment.
Red (Pin 2) Positive Input Voltage input (8-16v)

Interface Connector (SK2)

White (Pin 1) PTT Output (Low)
This wire or the green wire should be connected to the PTT control circuitry of the radio equipment.
Green (Pin 2) PTT Output (High)
This wire or the white wire should be connected to the PTT control circuitry of the radio equipment.
Grey (Pin 3) Channel One Monitor Input
This wire requires a low or high going transition to transmit a sequence of tones (stored tone set 1). These tones will be transmitted on the leading edge of the pulse. This input is pulled up to five volts via a 10k resistor if **Pad 2** is bridged.
Purple (Pin 4) Channel One Output
When a valid decode tone set (stored tone set 2) is received this output will toggle low. When valid decode tone set (stored tone set 3) is received this output will toggle high. Power up default is high.
Blue (Pin 5) Audio Input
This wire is connected to the audio output of the receiver, normally the discriminator.
Yellow (Pin 6) Audio Output
This wire outputs the transmitted encode tone set and is connected to the transmit audio path.
Orange (Pin 3) Channel Two Monitor Input
This wire requires a low or high going transition to transmit a sequence of tones (stored tone set 5). These tones will be transmitted on the leading edge of the pulse. This input is pulled up to five volts via a 10k resistor if **Pad 3** is bridged.
Brown (Pin 4) Channel Two Output
When a valid decode tone set (stored tone set 6) is received this output will toggle low. When valid decode tone set (stored tone set 7) is received this output will toggle high. Power up default is high.


Repeater Selcall
Model:-SEL_REC
Date:- 1 Sept 1998
SK1
8_16V
(Pin 2)
Ground
(Pin 1)
(Red)
(Black)
78M05CDT
Vin Vout
GND
.1u
1n
33u
(Pin 2)
Repeater
Selcall
Controller
Activity
LED
Program/Retrieve
Tone Set Selection
D
C
B
A
GND
RV1
10k
.1u
(Yellow)
560
SK2
Audio Output
(Pin 6)
(Blue)
Audio Input
(Pin 5)
BC858
(Green)
PTT High
(Pin 2)
(White)
PTT Low
(Pin 1)
DTC24
(Purple)
Decode Out 1
(Pin 4)
(Brown)
Decode Out 2
(Pin 8)
SK2
P2
Send Input 1
(Pin 3)
(Grey)
10k
P3
Send Input 2
(Pin 7)
(Orange)
10k

SPECIFICATIONS

Supply Voltage:	8 to 16 volts DC	
Current drain:	15 Milliamps @ 12 Volts DC supply	
Decode output	Power On / Default - High state (Open Collector)	
Audio input Impedance	20 meg ohm	
Audio input level	> 200 mV RMS	
Audio output impedance	4k7 ohms (Mid Pot)	
Audio output level	450mV Max (Adjustable by RV1)	
Open collector outputs	50ma sink current	
Transmit timing	Set Decode Output	
	Delay 450 ms, Set PTT active, Delay 300 ms	
	Tone transmitted	
	Set PTT passive	
Dimensions	43mm x 43mm	
Factory settings	Channel one Encode input	-10000
	Channel one output ON	-10001
	Channel one output OFF	-10002
	Channel one Aquire input	-10003
	Channel two Encode input	-10004
	Channel two output ON	-10005
	Channel two output OFF	-10006
	Channel two Acquire input	-10007
	Test Tone	-800hz
LED flash codes	Audio processor error	5 flashes
	EEPROM error	4 flashes
	Program mode	2 flashes

PRODUCT INFORMATION

Lardley Electronic Designs offers a variety of solutions for signalling and radio communications. For more information regarding products and services please BROWSE the WEB site at:

www.lardley.com.au

E-mail - sales@lardley.com.au

Lardley Electronic Designs