Eclipse 70/150/500 Base Station Connection to A800-SIM

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Author: TEA Engineering

Updates - Note that any amendments/updates that are new to this document are indicated with a ▌ symbol in the left boarder of the page. The previous general release was AN004-03. AN004-04 was provisional and not generally released.

1 General

This Application Note details the connection of an Eclipse 70/150/500 Series Base Station to an A800-SIM3a. This includes the general setup of the base station as well as the physical connection to the A800-SIM. Once complete, Eclipse Base Station will provide the signals to the A800-SIM that it requires for most SIM configurations.

This Application Note assumes the technician has a sound working knowledge of the Eclipse 70/150/500 Series of Base Station equipment as well as the Tait A800-SIM. For more information on these products, please refer to the relevant service manual.

2 Parts

The parts required are as per Table 1.

Table 1.

*Part Number	Description	Supplier	Qty.
A800-SIB	GP I/O Interface Board	Tait	1
400-00020-05	Silicon Tubing 1.5mm SIL Rubber	Tait	200mm
400-00020-07	Silicon Tubing 2mm SIL Rubber	Tait	200mm
CODA15P	DB15 Male Connector Solder Pot	Prime Electronics	2
CODA15COVER LONG	DB15 Grey Plastic Connector Cover with thumb screw locks	Prime Electronics	2
DMC6702	6 Way Multi-Core Cable 7/.20 Screened with Drain Wire	Tyco Aust (SECA)	2m
CART350N	Cable Tie Nylon White 100*2.6mm	Prime Electronics	4
Misc.	Miscellaneous workshop consumables, e.g. solder, wire, silicon tubing, etc.	N/A	N/A

* Suggested part numbers and supplier only. Equivalent items can be use for most parts.

3 Procedure

3.1 Eclipse Base Station

Detailed here is the configuration of the Eclipse Base Station and A800-SIM.

1. Remove the Eclipse Base Station receiver and transmitter module covers.
2. In the Eclipse receiver and transmitter, set all the jumper links correctly. Refer to Table 3 & 4.
3. In the Eclipse receiver, fit the A800-SIB board. The A800-SIB board should be mounted with the supplied double sided tape, and fixed to the space between the transistor Q18 and the 600 Ohm transformer T1. Refer to Figure 1, 2, and 3.

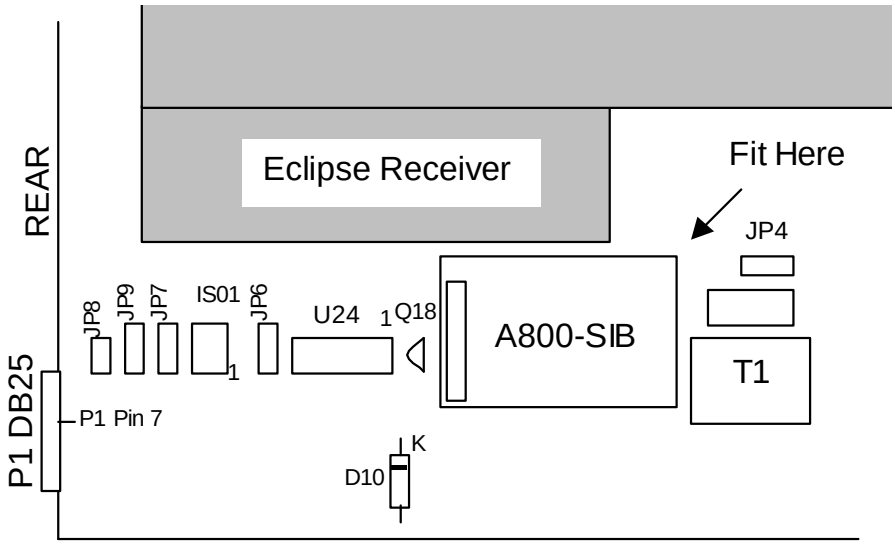


Figure 1

4. Wire the A800-SIB as per Table 2 or 2a. Also refer to Figure 1, 2, and 3. The location of some of the connection points is shown in Figure 1. At the rear of the receiver, pin 7 of P1 25 Way D Range should be cut and bent upwards. The GATE OUT White wire from the A800-SIB wires directly to pin 7 of P1. Place silicon tubing over the solder joint. Place cable ties around the wires to keep them tidy. The unused wires on the A800-SIB wiring loom can be removed from the board connector. Keep the removed wires in case they are required at a later date.

   The A800-SIB (V1.02) board conditions various signals and generates Live Tone (received CTCSS audio) for use with the A800-SIM. Furthermore the A800-SIB (V1.03+) adds CTCSS decoding. The Live Tone signal is fed to the Eclipse Rx external connector P1. The A800-SIM uses this signal for Fast CTCSS keying. Refer to the A800-SIM Service Manual (AM8-SIM.pdf) for more information.

Table 2 – A800-SIB (V1.02) Connections – Original V1.02 Configuration

Pin	Function	Colour	Eclipse RX
1	+9.4 Volts	Red/Blue	Diode D10 Cathode
2	Ground	Yellow	IC U24 Pin 8
5	GATE IN Signal	Blue	Diode D5 Anode (D5 is adjacent to U15 Pin 8 [the micro])
6	DECODE IN Signal	Yellow/Black	IC U24 Pin 4
8	GATE OUT Signal	White	P1 Pin 7 Rear 25 Way D Range Connector
9	DECODE OUT Signal	Lt. Pink	IC IS01 Pin 5 (4N35 Opto-Isolator)
12	CTCSS Encode Out	Red	Fit to vacant R80 pad (see below, pin 13)
13	Disc. Audio Input	Green	Lift R80(1K) leg joined to R79 & fit to lifted leg

Table 2a – A800-SIB (V1.03+) Connections – NEW Configuration

Pin	Function	Colour	Eclipse RX
1	+9.4 Volts	Red/Blue	Diode D10 Cathode
2	Ground	Yellow	IC U24 Pin 8
5	GATE IN Signal	Blue	Diode D5 Anode (D5 is adjacent to U15 Pin 8 [the micro])
6	DECODE IN Signal	Yellow/Black	IC U24 Pin 4
7	PTT OUT	Black	IC U17 Pin 5
8	GATE OUT Signal	White	P1 Pin 7 Rear 25 Way D Range Connector
9	DECODE OUT Signal	Lt. Pink	IC IS01 Pin 5 (4N35 Opto-Isolator)
12	CTCSS Encode Out	Red	Fit to vacant R80 pad (see below, pin 13)
13	Disc. Audio Input	Green	Lift R80(1K) leg joined to R79 & fit to lifted leg

5. **Upgrading from Original V1.02 Configuration to V1.03+ A800-SIB** - When upgrading an existing A800-SIB (V1.02) in the Eclipse Rx to an A800-SIB (V1.03+), the A800-SIB will be used as the CTCSS decoder instead of the on board Sigtec decoder. The only extra modification required is to fit a black wire from Pin 7(A800-SIB) to IC U17 pin 5 (Eclipse Rx) and to remove the JP6 link. The decoding is now carried out by the A800-SIB. See Table 2a.

   A800-SIB (V1.03+) in Links - The use of the A800-SIB (V1.03+) in the above way (Table 2a) is recommended for use on Links. This is because link receivers have the opportunity of receiving the same CTCSS tone sequentially. As an example a link receiver may receive 'live' CTCSS from a mobile and then encoded tone from the link, both come in quick succession from the previous site in the linking system. The Eclipse Rx on-board Sigtec CTCSS decoder has a habit of occasionally 'dropping' its Decode Out gate line during the transition from one CTCSS tone to another source of CTCSS. This could be due to the Reverse Tone Burst (RTB) circuitry of the Sigtec CTCSS decoder decoding the transition of CTCSS tones as a valid phase shift for an RTB decode to occur and therefore mute very quickly. The A800-SIB (V1.03+) on the other hand will allow a phase shift without dropping its Decode Out line, therefore eliminating any initial 'audio chop' that may other

wise occur in the mobile while voting. Connect the A800-SIB up as per Table 2a.

A800-SIB (V1.03+) in Repeaters- The use of the A800-SIB (V1.03+) in the above way (Table 2a) is recommended for use on repeaters as well.

A800-SIB Firmware Versions

Note: The firmware version of the A800-SIB is printed on a label on IC2 of the A800-SIB.

Following is the firmware history:

Date	Version	Description
7/3/00	V1.00	Initial pre-release version
14/3/00	V1.01	Updated pre-release version
21/3/00	V1.02	Initial release version. No CTCSS decode.
19/10/00	V1.03	Incorporates CTCSS decode functions. Note : the programmed CTCSS decode frequency is on a label on the A800-SIB
28/11/00	V1.04	Enhanced decode handling of switching transition between 2 like CTCSS tones from different sources.

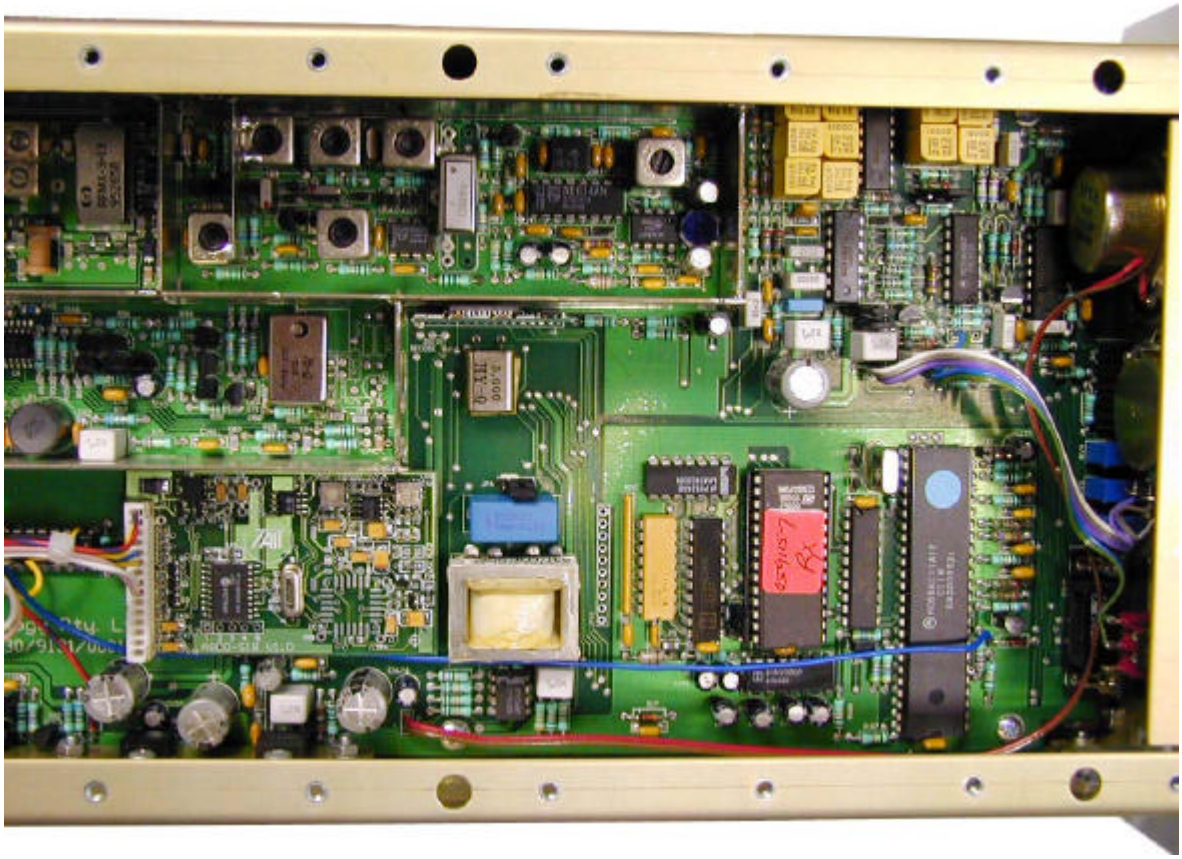


Figure 2

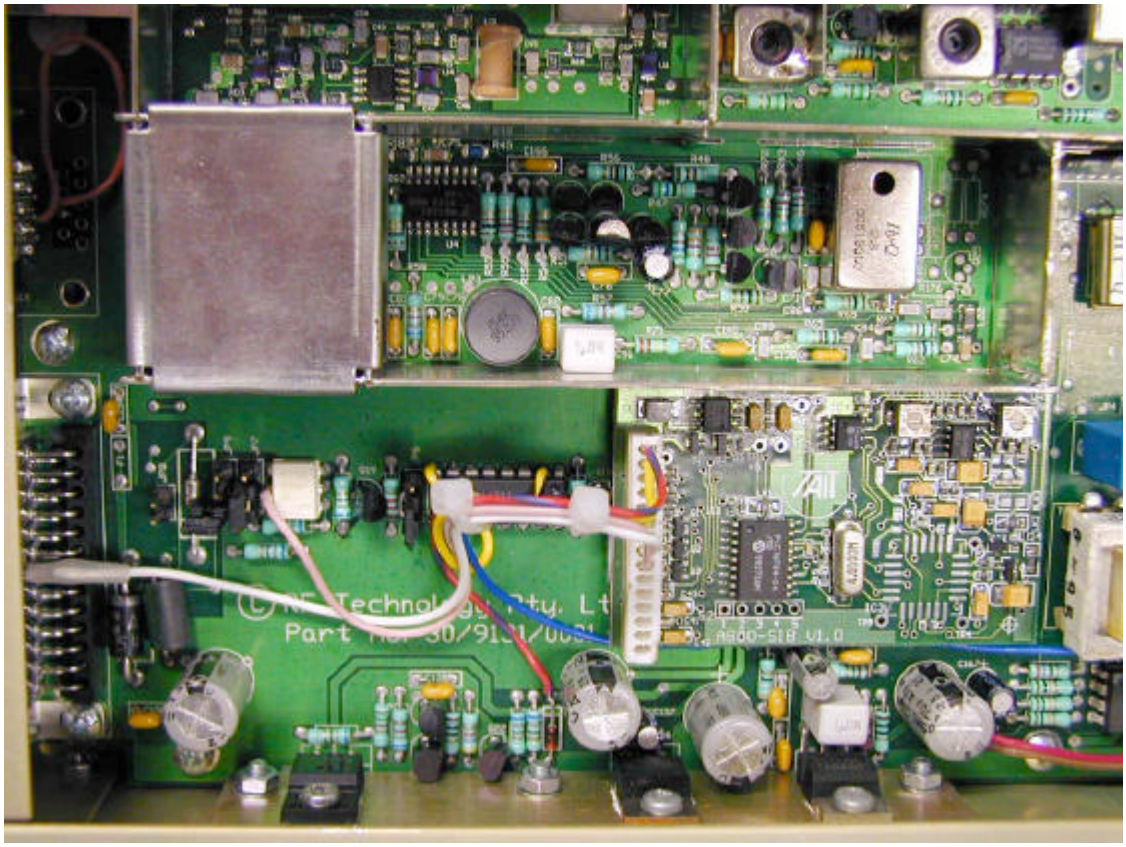


Figure 3

3.2 A800-SIM

In the A800-SIM, ensure the following.

1. Configure the A800-SIM as standard by following the AM8-SIM.pdf Service Manual, and any other associated application notes that may be required for the system.
2. Ensure that the PTT Output modification is completed, as detailed in the A800-SIM Service Manual (AM8-SIM.pdf) version 02-02-00 or later, the Section 6.8 'Improved PTT Output Performance'. This modification is to ensure the A800-SIM reliably keys the Eclipse Base Station.

   Note that this change has been implemented as standard in the A800-SIM Serial Number 3866231 onwards.
3. When configuring the A800-SIM, do not fit any of the ENC_TONE_CTCSS or RX_AF_TONE links for any of the ports that Eclipse Bases are to be connected. The setting of these links is not required. These are links to LK51 to LK58 for ENC_TONE_CTCSS and LK61 to LK68 RX_AF_TONE. Refer to AM8-SIM.pdf Service Manual for more information.

3.3 Cabling

1. Make up the Eclipse to A800-SIM cables as detailed in Section 5 Cabling.
2. Each cable should be labelled as either RX Port or TX Port as detailed in Section 5 Cabling.
3. Each cable should have its outer sheath striped back to approximately 50mm.
4. On each cable, strip the ends of each wire back and fit approximately with 10mm of 2.0mm silicon tubing.
5. Solder each wire onto its appropriate solder tag. Refer to Section 5 Cabling for details on the connection point for each wire. Note that the RX cable red wire that connects to pin 7 of the receiver backplane board is actually soldered to the DB25 pin 7, as there is no solder tag strip available for this signal.
6. Slide the silicon tubing from Step 4 down over each of the solder joints to the tag strips.
7. Place a cable tie around the RX & TX cables and the rear rail of the Eclipse base. This is to prevent any strain on the cables solder joints to the backplane boards.

3.4 Setup

To setup the Eclipse Base station with the A800-SIM, complete the following steps.

1. The Eclipse Base Station should be programmed and aligned in accordance with the Eclipse Base Station service manuals. Refer to these manuals for more information. Program the Eclipse Base (using the appropriate Eclipse programming software) for the correct receiver CTCSS decode tone and for No Tone encode on the transmitter. Tone is not programmed into the transmitter, as the encode tone source actually comes from the A800-SIM.
2. Connect the Eclipse Base Station to the A800-SIM.
3. Follow the setup detailed in the A800-SIM Service Manual (AM8-SIM.pdf) Section 5 'Installation, Set up and Adjustment'. The adjustment of the Eclipse Base Station should be done in the same manner as for a T800 Base Station. The only exception being for CTCSS tone level adjustment as detailed in Section 5.6.4 'CTCSS Encoder Tone Level'. Instead refer to the following steps.
4. Generate a carrier into the Eclipse receiver with an invalid CTCSS tone. Use a tone which is close to, but not the same as the programmed tone.

3.4 Setup Cont.

5. Using a CRO, measure the audio level of received sub audible tone (Live Tone) at A800-SIB S1 pin 12, and adjust the A800-SIB trim-pot VR1 for a level of 500mV P-P. This sets the Live Tone level from the Eclipse Base Station that is fed to the A800-SIM.
6. Generate a carrier into the Eclipse receiver with a valid CTCSS tone.
7. In the A800-SIM, use a CRO to measure the CTCSS encode tones at the Wt/Gn wires from each ST133 CTCSS encoder (if both encoders are fitted). In the A800-SIM, adjust the internal ST133 CTCSS encoders for a level of 500mV P-P.
8. Using a test set, monitor the Eclipse Base TX carrier.
9. In the Eclipse transmitter, adjust trim-pot VR3 for the required CTCSS deviation on the transmitter, i.e. 300Hz for narrow band and 600Hz for wide band.

4 Eclipse Links Settings

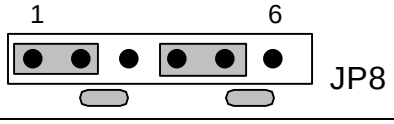
In the Eclipse Base station, set the following jumper links. All jumpers are marked on the PCB top overlays. Some can also be seen on Figure 1.

Table 3 – Eclipse Receiver Links

Link	Setting	Description
JP1	1-2*	240Hz Notch Filter In
JP2	1-2*	750uSec Audio Response De-emphasis
JP3	2-3*	Audio Filter In/Out – Hi Pass and Notch In
JP4	1-2*	600 Ohm Line DC Loop COS
JP6	OFF	COS Polarity Active on Signal
JP7	1-2	Direct Output COS Configuration, Free Switch Output (ie. not pulled high by R126 680E)
JP8	OFF	Direct Output COS Configuration, CT Disconnect
JP9	OFF	Direct Output COS Configuration, CT Disconnect
JP11	2-3*	Eprom Type 27C256 (1-2 for 27C64)

* Indicates the default Ex Factory Configuration.

Table 4 – Eclipse Transmitter Links

Link	Setting	Description
JP2	2-3*	Eprom Type 27C256 (1-2 for 27C64)
JP3	1-2*	DC Loop Connected
JP4	2-3*	600 Ohm Line Input
JP6	2-3*	0dB Input Level Attenuation
JP7	1-2*	750uSec Audio Frequency Response Pre-emphasis
JP8	1-2 & 4-5	External CTCSS Tone Input as tone source (Internal Encode Source 2-3 & 5-6*). **Important** - note that the Eclipse service manual circuit diagrams depict JP8 with reversed pin numbers. The correct JP8 pin layout is as per this diagram: 
JP9	ON*	Current Loop Input
JP10	OFF*	Current Loop Input
JP11	OFF*	Current Loop Input

* Indicates the default Ex Factory Configuration.

5 Cabling

Make up two 1m Cables as per Table 7, Table 8 and Figure 4. Note that if 1m is not enough to run between the Eclipse Base and the A800-SIM, then the cable should be made longer. The parts required for this cable can be found in Section 2 Parts. The solder connections to all connectors should be insulated with 10mm of 1.5mm silicon tubing. The drain (braid) wire from each cable should be insulted at the connector end with a suitable length of 1.5mm silicon tubing.

Each cable should be appropriately labelled as either RX Port or TX Port.

Table 7 RX Port Cable

Eclipse Receiver			A800-SIM RX Port		
Description	**Pin**	**Wire Colour**	**Pin**	**Label**	**Description**
LINE+	6	Blue	1	RXAF	RX Audio into SIM
LINE-	20	Black	4	GND	Ground
TONE	4	Green	7	RXAF_TONE	Received CTCSS Audio (Live Tone)
*LINE O/P2	7	Red	11	RXGATE	Carrier Gate into SIM
COS+	3	Yellow	12	RXDEC	CTCSS Decode + Gate
COS-	16	White	14	GND	Ground
GND	25	Braid	15	GND	Ground

***This line is internally connected to RX Gate. Refer to Section 3 Procedure.**

Table 8 TX Port Cable

Eclipse Transmitter			A800-SIM TX Port		
Description	**Pin**	**Wire Colour**	**Pin**	**Label**	**Description**
LINE+	6	Blue	1	TXAF	TX Audio from SIM
LINE-	20	Black	4	GND	Ground
TONE+	5	Green	8	ENC_TONE	CTCSS tone from SIM
PTT	3	Red	13	TXKEY	PTT Signal from SIM
GND	25	Braid	15	GND Ground	Ground

A800-SIM to Eclipse 70/150/500 Base Station Connection

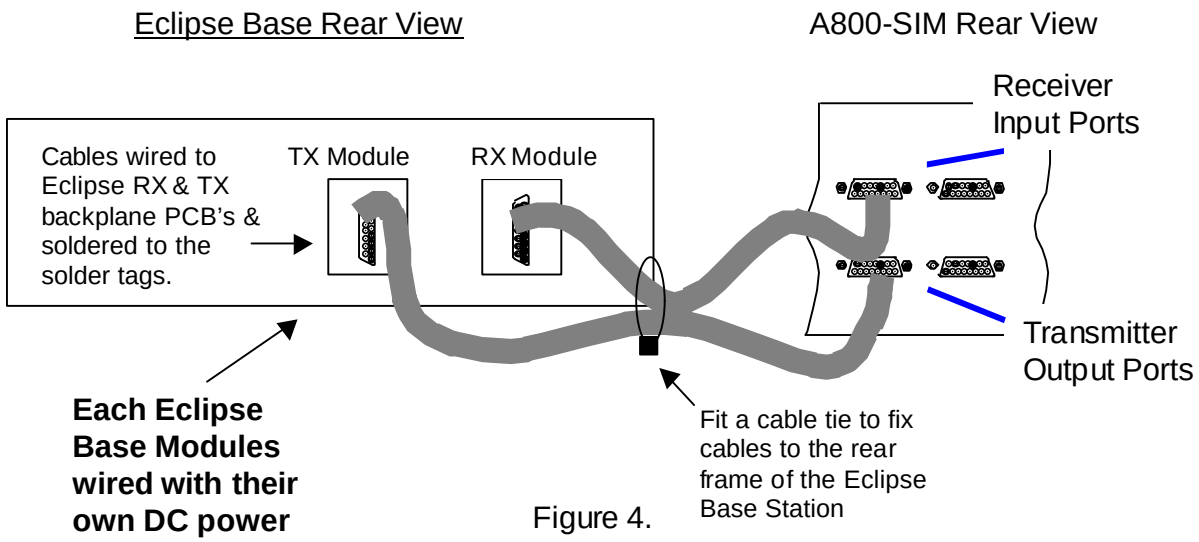


Figure 4.