



Unilab/Stanilite/ADI KL Series Base Station Connection to A800-SIM

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Updates - Note that any amendments/updates that are new to this document are indicated with a red line | symbol in the left boarder of the page. Note: The previous general release was AN002-01. AN002-02 was provisional and not generally released.

1 General

This Application Note details the connection of a Unilab/Stanilite/ADI KL 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, KL Base Station will provide the signals to the A800-SIM that it requires for most SIM configurations.

This Application Note assumes that the KL Base Station has a KL Option 5 CTCSS fitted and that it does not have a KL Option 8 fitted. This procedure is not suitable for KL Bases Stations with the KL Option 8 fitted.

This Application Note assumes the technician has a sound working knowledge of the Unilab/Stanilite/ADI KL 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. It will be necessary to refer to a KL Series Service Manual to complete the procedure detail in this Application Note.

This Application Note is not suitable for use in conjunction with Application Note AN003 System Splitting. The KL base station does not have a readily available RX Disable line without modifications. The RX Disable line is required for System Splitting operation. If System Splitting is required, then it is recommended that Tait T800 equipment be used in the system.

2 Parts

Table 1 Parts Required

*Part Number	Description	Supplier	Qty.
A800-SIB	GP I/O Interface Board	Tait	1
400-00020-05	Silicon Tubing 1.5mm SIL Rubber	Tait	400mm
933-727	BC337 Transistor	Farnell	1
CART350N	Cable Tie Nylon White 100*2.6mm	Prime Electronics	4
477-849	10K Resistor 1/8 Watt	Farnell	1
CODA15P	DB15 Male Connector Solder Pot	Prime Electronics	2
CODA15COVERLONING	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
147-748	24 Way IEEE 488 Connector. Note this is the standard Unilab/ Stanilite/ ADI KL Series of Base Station connector for the external REMOTE-1 Connector	Farnell	1
Misc.	Miscellaneous workshop consumables, e.g. solder, wire, etc.	N/A	N/A

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

3 Procedure

3.1 KL Base Station

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

1. Remove the KL Base Station cover. Remove the RX Unit lid. Remove the KL Option 5 board.

Note: Steps 2 to 5 are as per Unilab Application Note 5. This AN detailed modification to a KL Base to get a CTCSS Decode + Gate signal out the rear REMOTE-1 connector. This type of signal is required in the A800-SIM to indicate the receipt of a carrier and a valid CTCSS decode.

2. On the Option 5 board, replace the BC547 transistor Q2 with a BC337. This increases the current driving capability of the KL Base CTCSS Decode + Gate output.
3. On the bottom of the KL Option 5 board (solder side), place a wire link from the collector of Q2 to CN105S pin 9. CN105S pin 9 is adjacent to the diode D6. This routes the KL Base Decode + Gate output out of the receiver module.
4. Set the KL Option 5 board dip switches as per Table 5 & Table 6.
5. On the KL Base motherboard, place a wire link from CNOP2 pin 19 to CNOP1 pin 8. Place silicon tubing over the solder joints. This routes the KL Base Decode + Gate output to the bases rear REMOTE-1 connector pin 14 (AUX 3).
6. On the KL Option 5 board, place a 10K resistor from CN107 pin 2 to the junction of SW1 dip 8 and R27. Place silicon tubing over the resistor. This routes the external CTCSS encode tone into the KL Option 5 tone circuits.
7. On the KL Base motherboard and inside the RX Unit, set all dip switches and jumper links correctly. Refer to Table 3 and Table 4.
8. In the KL Base TX Unit section, locate and remove the resistor R345B. This resistor can simply be cut from the topside of the board. The resistor R345B can be found to the right of IC309. Removing this resistor isolates the '5 Tone' line from the transmitter circuit. The 5 Tone line is used to route the external CTCSS encode audio back up onto the KL Option 5 board.

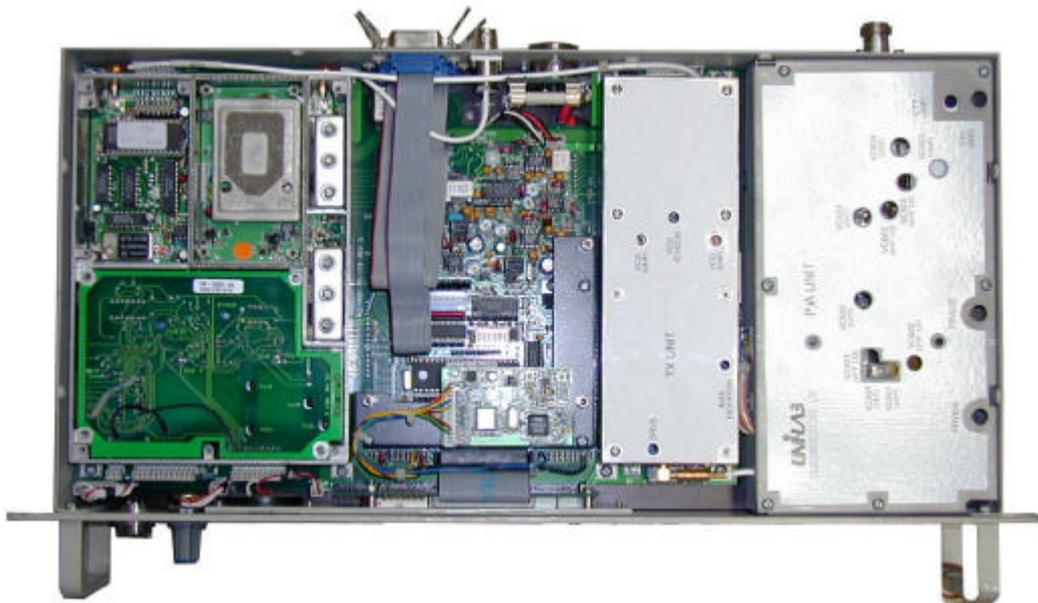


Figure 1

- In the KL Base motherboard section, fit the A800-SIB board. The A800-SIB board should be mounted with the supplied double-sided tape, and fixed to the KL Option metal mounting bracket at the front of the base. Refer to Figure 2 and 3.

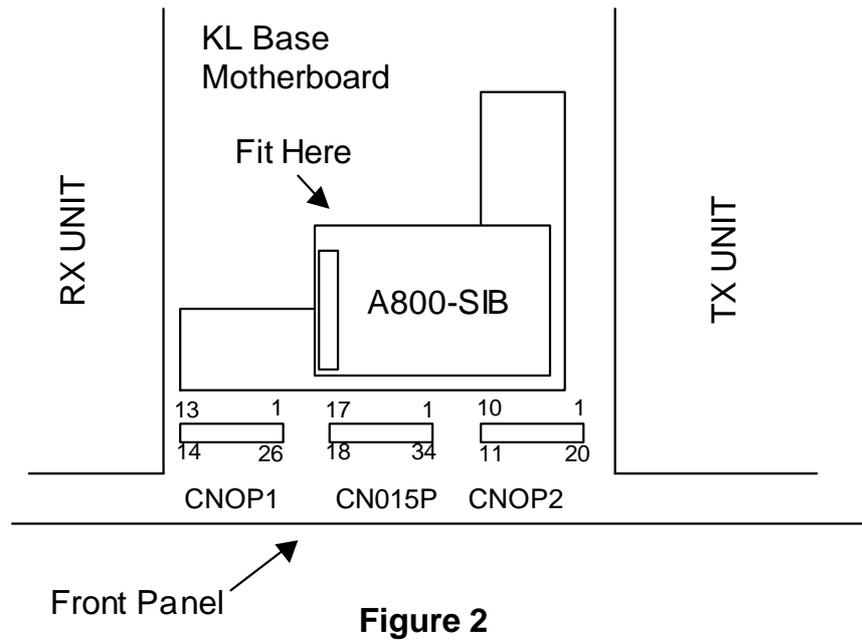


Figure 2

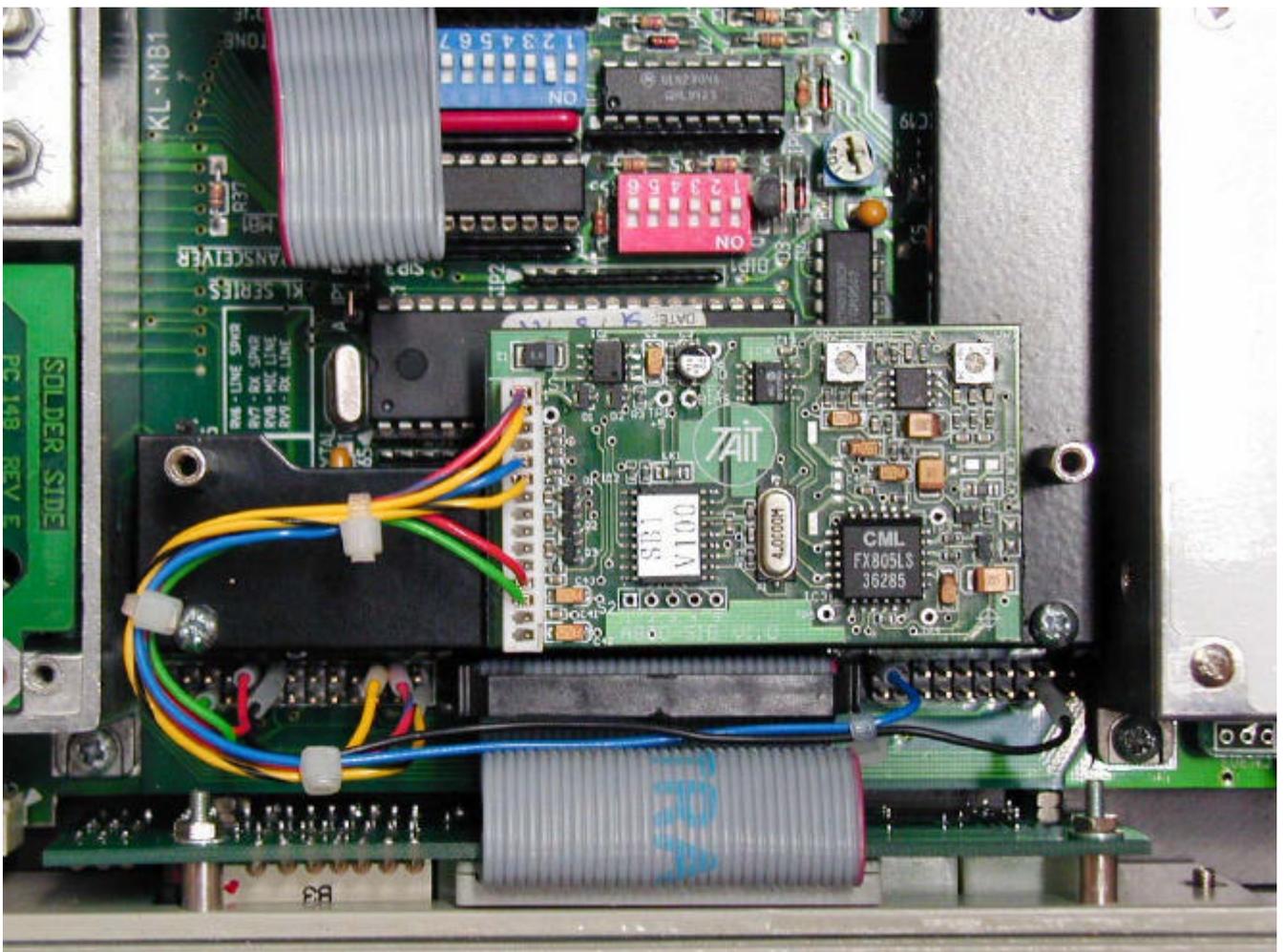


Figure 3.

10. Refer to Table 2 or 2a. Note that Table 2 is only shown here as a reference as to the previous connection method (described in AN002-01). When using either a V1.02 or V1.03 A800-SIB in future use the connection methods shown in Tables 2a. Refer to Figure 1 for the location and pin orientation of the connectors CNOP1, CNOP2 & CNO15P. Place silicon tubing over all solder joints. 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 KL Base external connector REMOTE-1. 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	Colour	KL Motherboard	Function
1	Red/Blue	CNOP1 Pin 2	+12 Volts
2	Yellow	CNOP1 Pin 3	Ground
5	Blue	CNOP2 Pin 10	SIB Gate Signal In
6	Yellow/Black	CNOP1 Pin 26	SIB Decode Signal In ** Note(1)
12	Red	CNOP1 Pin 9	SIB Received CTCSS 'Live Tone' Out
13	Green	CNOP1 Pin 16	SIB Discriminator Audio In

**** Note(1)** : a diode (1N4148) may have been fitted between the Yellow/Black wire (Pin 6) of the A800-SIB and CNOP2 Pin 26 on the KL motherboard, with the anode towards the A800-SIB. This diode stopped the CTCSS LED from remaining dimly lit all the time

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

Pin	Colour	KL Motherboard	Function
1	Red/Blue	CNOP1 Pin 2	+12 Volts
2	Yellow	CNOP1 Pin 3	Ground
5	Blue	CNO15P Pin 25	SIB Gate Signal In ** Note(2)
9	Lt. Pink	CNOP1 Pin 26	SIB Decode Signal Out
12	Red	CNOP1 Pin 9	SIB Received CTCSS 'Live Tone' Out
13	Green	CNOP1 Pin 16	SIB Discriminator Audio In

**** Note(2)** : The SIB Gate In signal has been changed from CNOP2 pin 10 (see Table 2) to CNO15P pin 25 (see Table 2a) to alleviate the problem of the SIB gate In line occasionally holding the TX Key low and therefore cause the transmitter to lock on.

11. Lift the C1116 Orange DEC OUT wire (pin 9) that goes to CN109-9 on the Option 5 board.
12. **Upgrading from Original V1.02 Configuration to V1.03+ A800-SIB** - When upgrading an existing A800-SIB (V1.02) in the KL to an A800-SIB (V1.03+), the A800-SIB can be used as the CTCSS decoder instead of the C1116. . The only extra modifications required are to remove the wire that goes from Pin 6(A800-SIB) to CNOP1 Pin 26(KL motherboard) and instead fit a wire from Pin 9(A800-SIB) to CNOP1 Pin 26(KL) and also to lift the C1116 Orange DEC OUT wire (pin 9) that goes to CN109-9 on the Option 5 board. This enables the A800-SIB (V1.03+) to provide a Decode Out signal so that the decoding is now carried out by the A800-SIB instead of the C1116. Also in a KL base with a previously installed A800-SIB (V1.02) a diode (1N4148) may have been fitted between the Yellow/Black wire (Pin 6) of the A800-SIB and CNOP2 Pin 26 on the KL motherboard. This diode stopped the CTCSS LED from remaining dimly lit all the time. This diode is not required if the A800-SIB (V1.03+) is fitted as per the above Table 2a.

A800-SIB (V1.03+) in Links - The use of the A800-SIB (V1.03+) in the above way (see 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 C1116 CTCSS De-encoder in the KL 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 C1116 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.

A800-SIB (V1.03+) in Repeaters - The A800-SIB (V1.03+) should also be used on Talk Through Repeaters (TTR) in the above way (see Table 2a).

3.2 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.
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.

3.3 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 6.9 'Improved PTT Output Performance'. This modification is to ensure the A800-SIM reliably keys the KL 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 KL Bases are to be connected. The setting of these links is not required. These are links LK51 to LK58 for ENC_TONE_CTCSS and LK61 to LK68 for RX_AF_TONE. Refer to AM8-SIM.pdf Service Manual for more information.

3.4 Cabling

Make up the KL to A800-SIM cable as detailed in Section 5 Cabling.

3.5 Setup

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

1. The KL Base Station should be programmed and aligned in accordance with the KL Base Station service manuals. Refer to these manuals for more information.
2. Connect the KL 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 KL Base Station should be done in the same manor 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 KL receiver with an invalid CTCSS tone. Use a tone which is close to, but not the same as the tone programmed onto the KL Option 5 CTCSS decoder.
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 KL Base Station that is fed to the A800-SIM.
6. Generate a carrier into the KL 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 KL Base TX carrier.
9. On the KL Option 5 board in the KL Base, adjust trim-pot VR1 fully anti clockwise. This turns off the KL Option 5 boards own CTCSS encode tone. Adjust the trim-pot VR2 for the required CTCSS deviation on the transmitter, i.e. 300Hz for narrow band and 600Hz for wide band.

4 KL Links and Dip Switches

In the KL Base station, set the following jumper links and switches.

Table 3 – KL Motherboard & Receiver Links

Link	Setting	Description
JMP1	IN (A)	Selects internal PTT
JMP2	Doesn't Matter	Unbalances Mic Input
JMP3	IN (A)	Connects Internal Speaker
JMP4	IN (A)	Connects VF to line
JMP5	OUT (B)	Disconnects Discriminator VF when Option 5 Installed. Disc AF routes through the Option 5 board.
JMP6	IN (A)	IN – Disables RX for Simplex , OUT – For Duplex, except if CTCSS installed This link should be IN always, refer to JP101.
JMP7	OUT (B)	Bypass Line Compressor
JMP8	IN (A)	Connects line in VF
JMP9	OUT (A) 5 TONE	This routes the external CTCSS into the 5 Tone line (goes to the KL Option 5)
JMP10	Depends →	IN =Enables Display, OUT = Disable Display (solar powered site)
JMP11	Doesn't Matter	Selects PTT and tail to rear (this PTT line is not used with A800-SIM)
JMP12	Doesn't Matter	Fist microphone or handset
JMP13	Doesn't Matter	Fist microphone or handset
JMP101 (In RX Unit)	Depends →	IN for simplex (IN for End Site Links. Refer to the A800-SIM manual Section 6.7 RX Disable for a description of an End Site Link. A800-SIM RX Disable mod is not required), OUT for duplex (OUT for all other bases)
JMP102 (In RX Unit)	OUT	Normally not fitted

Note: Link settings shown as 'Doesn't Matter' indicate link that will not affect the KL Bases operation when used with an A800-SIM.

Table 4 – KL Motherboard Dip Switch Settings – Dip Switch 1 (6 Way Dip Switch)

Switch	Setting	Description
#1	OFF	Front Panel Scan Only
#2	OFF	Duplex or Simplex (not Talk through repeater)
#3	ON	TX TOT. Switches 3, 4, & 5 setup this up. With setting shown here, a TX TOT period of 7 minutes will be setup. For other setting, refer to the KL service manual. The TX TOT should be set as required.
#4	ON	TX TOT
#5	ON	TX TOT
#6	OFF	No PTT Delay

Table 5 – KL Option 5 Dip Switch Settings – Dip Switch SW1

Switch	1	2	3	4	5	6	7	8
Setting	0	0	0	1	1	0	0	0

Where 1 = ON and 0 = OFF

Note: Table 5 and 6 detail the standard KL Option 5 'b' configuration for 'Quiet base CTCSS decoder only. No TX Encode'.

Table 6 – KL Option 5 Dip Switch Settings – Dip Switch SW2

Switch	1	2	3	4
Setting	0	0	0	1

Where 1 = ON and 0 = OFF

5 Cabling

Make up a 1m Y Cable as per Table 7, Table 8 and Figure 4. Note that if 1m is not enough to run between the KL 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 insulated at the connector end with a suitable length of 1.5mm silicon tubing.

The two DB15 ends of the cable should be appropriately labelled as either RX Port or TX Port.

Table 7 RX Port Cable

KL Base Station			A800-SIM RX Port		
Description	Pin	Wire Colour	Pin	Label	Description
Mute	4	Red	11	RXGATE	Carrier Gate into SIM
Earth	5	Braid	15	GND	Ground
VF Output to Line	11	Blue	1	RXAF	RX Audio into SIM
FSK Tone Out	13	Green	7	RXAF_TONE	Received CTCSS Audio (Live Tone)
AUX3 (DEC + GATE)	14	Yellow	12	RXDEC	CTCSS Decode + Gate
VF Output to Line	23	Black	4	GND	Ground

Table 8 TX Port Cable

KL Base Station			A800-SIM TX Port		
Description	Pin	Wire Colour	Pin	Label	Description
PTT with no Tail	2	Red	13	TXKEY	PTT Signal from SIM
Earth	5	Braid	15	GND Ground	Ground
VF Input from Line	12	Blue	1	TXAF	TX Audio from SIM
LF/5 Tone mod in	17	Green	8	ENC_TONE	CTCSS tone from SIM
VF Input from Line	24	Black	4	GND	Ground

A800-SIM to KL Base Station Connection

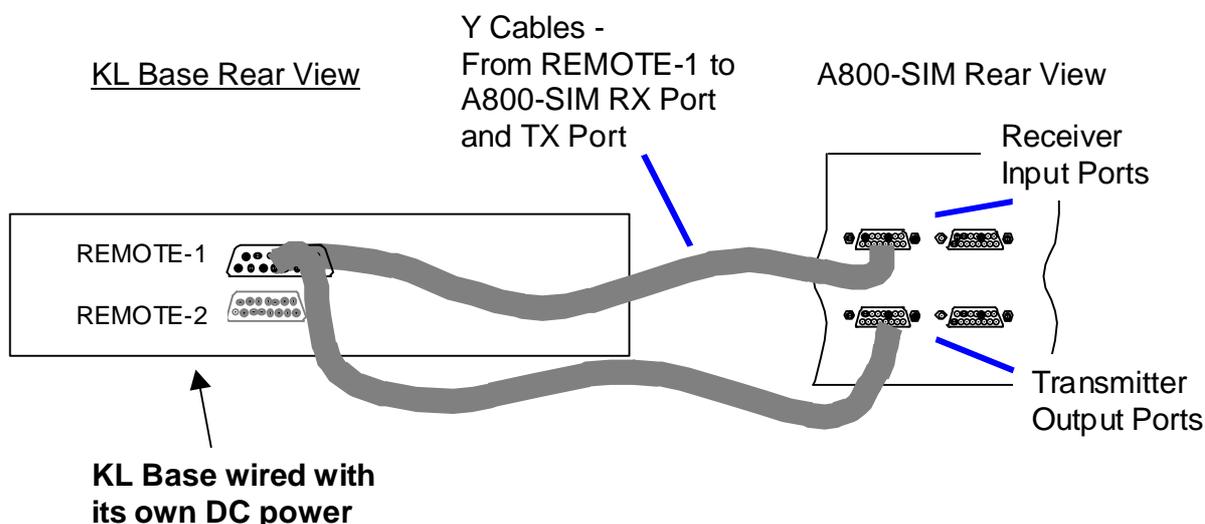


Figure 4.