Figure 3: T2000-A80 Test Set-up

Line Output Level

1. Check that the **auxiliary** LED, 🔆, is on (**function** LED, 🔆, on trunked radios).

2. Monitor the line output (S21 pin 5).

   Apply an on-channel signal from the RF signal generator at an output level of -70dBm, modulated to ±3kHz [±1.5kHz] deviation, at 1kHz AF.

   Adjust the RV1 (line output control) for the required output level.

Note: If the line output level is to be less than -15dBm, short LINK6 (600Ω output) and remove LINK5, to select 15dB of attenuation.

Line Input Sensitivity

1. Monitor the line input (S21 pin 15).

   Ensure the **BUSY** indicator is off, and key the transmitter via the opto input (+8V).

2. Adjust RV2 (line input sensitivity control) until ±3kHz [±1.5kHz] deviation at 1kHz is achieved.

Note: For input signals of greater than -15dBm, set the line input attenuation for 15dB (LINK11 open).

Time Delay Circuit

This circuit delays audio gate turn on after PTT, to prevent squelch noise bursts in repeater applications.

1. Enable the time delay circuit by solder shorting LINK23.

2. Set the required time delay using RV3 (time delay control).

Servicing

Refer to the M2000-00 Series II Service Manual (issue 300, or later), Section 8.14. For additional information on external channel control of T201X radios, refer to Section 5.9.

Introduction

The T2000-A80 line interface kit enables connection of the T2000 receiver and transmitter audio circuitry to a two wire transmission line. The line interface PCB is mounted inside the T2000 Series II radio, and is application configurable using PCB links.

Parts Required

The T2000-A80 kit contains the following items:

Qty Description
- 1   T2000-A80 line interface PCB assembly
- 1   15 way high density D-range plug and shroud
- 1   1µ capacitor (*C64)
- 1   4µ7 capacitor (*C60)
- 28   0Ω chip resistors (for PCB links)
- 3   M3x8 pan Pozi Taptite screws
- 2   micromatch connectors (S13 & S14 on the logic PCB)
- 1   female screw lock kit (in plastic bag)
- 2   4-40x5/16 pan Pozi Taptite screws (black)

Fitting

Refer to Figure 1.

1. Remove the top cover of the radio by unscrewing the four bottom cover screws, unscrew the logic PCB and fold out.

   Unclip the D-range blanking plate in the rear of the T2000 chassis.

   Position the T2000-A80 PCB as shown, and connect the Micromatch connectors P13 and P14 to S13 and S14 on the T2000 logic PCB.
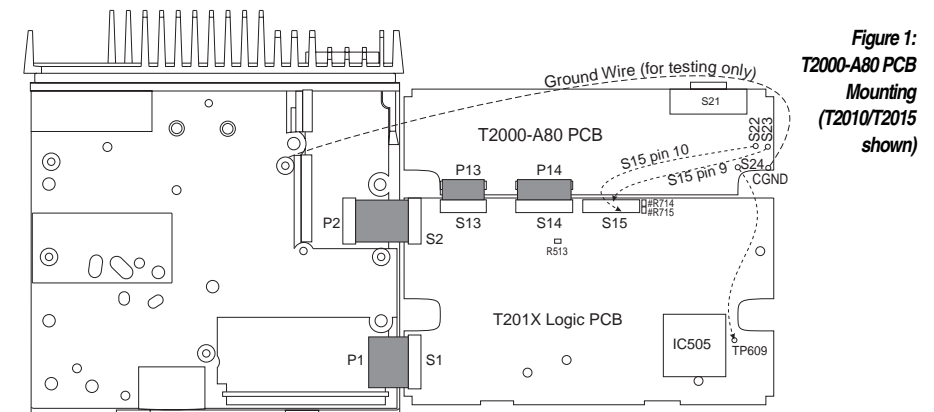
Figure 1: T2000-A80 PCB Mounting (T2010/T2015 shown)

2. T2010 & T2015: Remove R513 (0Ω resistor) on the top side of the logic PCB.

3. **External 4 Channel BCD Control** (T2010 & T2015 only)

   Connections between the logic PCB and the T2000-A80 PCB depend on the raio software version. The following table explains these connections and other logic PCB modifications.

Radio S/W Version	T2000-A80 BCD Connections:		Logic PCB Modifications
	S22 (BCD1)	S23 (BCD0)	
2.05	logic PCB S15 pin 4	logic PCB S15 pin 5	Fit #R714 (#R715* **not** fitted)
2.22 or later	logic PCB S15 pin 10	logic PCB S15 pin 9	Fit #R715 (#R714 **not** fitted)

* On logic PCB IPN 220-01377-00 or IPN 220-01377-01, "#R715" is designated "#R714A".

4. Tx/Rx Out Function

Connect a wire from S24 (TX REG) on the T2000-A80 PCB to TP609 on the logic PCB, as shown in Figure 1.

5. Select the T2000-A80 PCB link options, using the 0Ω resistors provided. Refer to "T2000-A80 Link Options" for a description of the PCB links.

6. Adjust RV1, RV2 and RV3 on the T2000-A80 PCB, as described in "T2000-A80 Set-Up".

7. Carefully fold the logic and T2000-A80 PCBs back in position, guiding the T2000-A80 D-range socket (S21) through the hole provided in the T2000 chassis.

Secure the PCBs using the three logic PCB retaining screws and the three M3x8 screws provided, and refit the top cover.

Fit the female screw lock kit to S21, and plug the D-range assembly provided in the kit into the T2000-A80 D-range socket.

Note: Holes are provided in the T2000 Series 1 chassis for the D-range screw locks. Use the two black 4-40 Taptite screws provided to form threads for the screw locks, and discard the screw lock kit nuts.

T2000-A80 Link Options

The following table explains the T2000-A80 PCB link options. Standard links for T2010 and T2020 models are shown as shaded.

Link	A	B	C	D	E	F	No Link	Option
LINK1	de-emphasis	flat						line output: audio response
LINK2	2 pole	6 pole						line output: filter response
LINK3	600Ω	150Ω						line output: impedance
LINK4	600Ω	150Ω						
LINK5	0dB						15dB	
LINK6	15dB						0dB	line output: attenuation pads
LINK7	0dB						15dB	
LINK8	15dB						0dB	
LINK9	linked						separated	line input: line output
LINK10	600Ω	150Ω					high	line input: impedance
LINK11	0dB						15dB	line input: attenuation
LINK12	flat	pre-emphasis						
LINK13	pre-emphasis							line input: audio response
LINK14	flat							
LINK15	bidirectional						unidirectional	keying input/output
LINK16	line PTT	none					permanent	microphone mute
LINK17	standard						trunked	Rx gate sense
LINK18	standard	T223						opto driver sense
LINK19	on aux	permanent	trunked				disabled	line circuit enable
LINK20	standard	trunked						PTT input
LINK21	key 0V	key 5V						PTT sense
LINK22	busy 5V	busy 0V	Rx-gate 5V	Rx-gate 0V	trunked busy 0V	trunked busy 5V		Rx gate/ busy output
LINK23	enabled						disabled	time delay
LINK24	Tx 5V/Rx 0V	Tx 0V/Rx 5V					disabled	Tx/Rx output
LINK25	enabled						disabled	Not clear to send (trunked only)

Link	A	B	C	D	E	F	No Link	Option
LINK26	locked 5V	locked 0V					disabled	in-lock output
LINK27	2 pole	6 pole						line output filter
LINK28	2 pole	6 pole						

Figure 2 shows the location of the links and I/O pads on the bottom side of the T2000-A80 PCB.
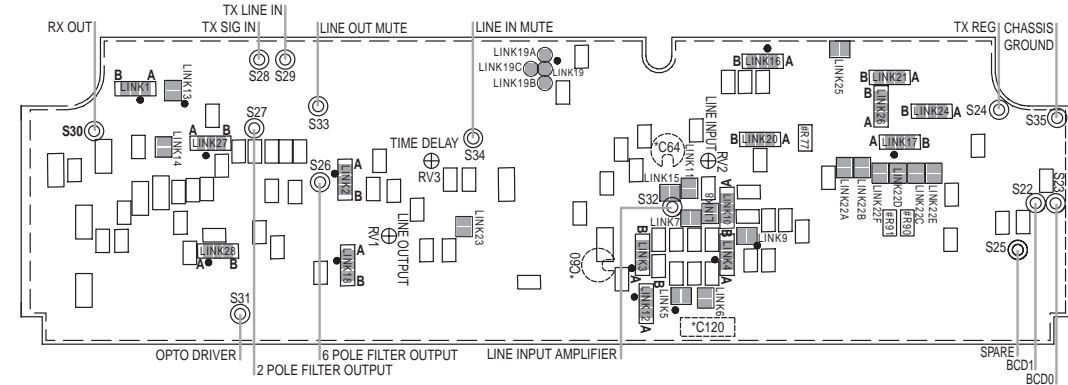

Figure 2: T2000-A80 PCB Links (PCB bottom side shown)

Component Changes

Refer to Figure 2 (components found on the top side of the PCB are shown with a 'dashed' outline).

Certain applications may require component changes. The following table describes these components, and their locations.

Component	Value	Function
*C60	4μ7 (provided in the kit)	Rx gate delay
*C64	1μ (provided in the kit)	Gives a short transmit release delay
*C120	4n7	Line matching
R77	4k7Ω	Remove for modem operation (trunked radios), or to remove 'external inhibit on busy' (conventional radios)
R90, R91	10Ω	Remove for 2 wire crossband when moulded cord sets are used (HD 15M-HD 15M). This is to avoid power supply conflicts between radios (+8V out, +13V out).

T2000-A80 Set-Up

- If the logic and T2000-A80 PCBs are unscrewed and folded out for adjustment, a wire must be temporarily fitted from the radio chassis to the options chassis ground pad (S35), as shown in Figure 1.

- This section assumes that the T2000 radio has been correctly aligned for normal operation. Refer to the M2000-00 Series II Service Manual (issue 300, or later), Section 8.14, for application details.

- Check that the **auxiliary** LED, ⌖, is on (**function** LED, ⌖, on trunked radios).

- Signals for balanced transmissions are generally less than 0dBm, and are typically between -10dBm and -20dBm.

- In the following instructions, deviation settings are given first for wide band radios, followed by settings for narrow band radios in brackets [ ].

- Set up the test equipment as shown in Figure 3.