



Combining Third Party Equipment With The T800 Series II Radio Platform

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Any enquiries regarding this Application Note should be addressed in the first instance to your nearest approved Tait Dealer or Subsidiary. Further assistance may be obtained from the Customer Support Group, Radio Systems Division, Tait Electronics Ltd, Christchurch, New Zealand.

Introduction

This Application Note provides guidelines on combining third party equipment with the Tait T800 Series II radio platform. It shows pin inputs and outputs available on T800 module and backplane D-range connectors and provides information on integrating third party equipment into a Tait rack frame, using the T800 ancillary chassis and rack frame guides.

Third party equipment can be combined with Tait T800 Series II equipment in the following ways.

- You can interface equipment to T800 radio units via the D-range on individual modules (T800 receiver, transmitter/exciter, power supply), or via the backplane PCB which interconnects the modules at the rear of the T800 rack frame.
- You can integrate third party PCBs into a T800 rack frame by using a T800 ancillary module chassis.

This document is split into three main sections.

- **T800 Series II Equipment**
Gives guidelines for combining the Tait T800 Series II radio platform with third party equipment. It describes the standard Tait rack frame, the T800 radio modules and location of the D-range on the modules and the backplane PCB (which is fitted to the rear of the rack frame).
- **T800 Series II Module Inputs And Outputs**
Gives pin inputs and outputs for interfacing third party equipment with the T800 receiver, transmitter/exciter and power amplifier (PA), and the modules matching pin inputs and outputs on the backplane PCB.
- **Integrating Third Party PCBs**
Gives specific dimensions for integrating third party PCBs into the ancillary chassis, and information on single, double and triple guide kits.

T800 Series II Equipment

Rack Frame

The T800-22-0000 is a standard 5U high, 19" wide base station/repeater rack frame. The rack frame can house the range of T800 Series II modules within the frequency range 66-960MHz, with power outputs ranging from 1-100W. Changing links on the backplane PCB allows the Tait equipment in the rack frame to be configured as either a base station or a repeater.

Figure 1 shows the mechanical layout of the T800-22-0000 rack frame. Modules slide into the rack frame along guides (single, double or triple) and can interface to third party equipment through the backplane PCB.

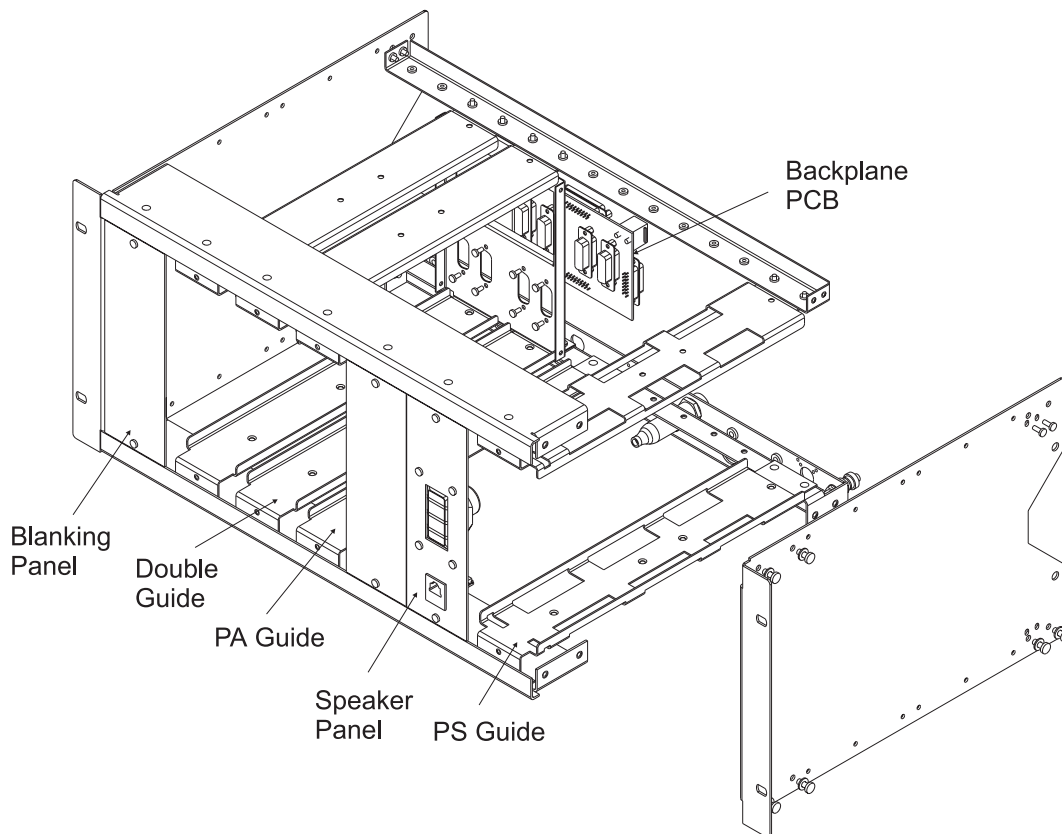


Figure 1 Mechanical Layout Of The T800-22-0000 Rack Frame

T800 Radio Modules

Third party equipment can be interfaced with the T800 receiver, transmitter/exciter or power amplifier through the 15-way D-range on the rear of the modules. An auxiliary D-range (normally fitted as D-range 2) can be bought as an additional kit (T800-03-0000) for all modules except the PA. This provides you with additional D-range inputs and outputs. Typical uses of the T800-03-0000 are in paging, multichannel and remote control applications and where external channel control is required.

The D-range location on the module is shown in Figure 2. Available pin inputs and outputs are described for the T800 receiver, transmitter/exciter and power amplifier modules individually later in this document. Modules can be interfaced with the backplane PCB by way of the D-range sockets as shown on Figure 3.

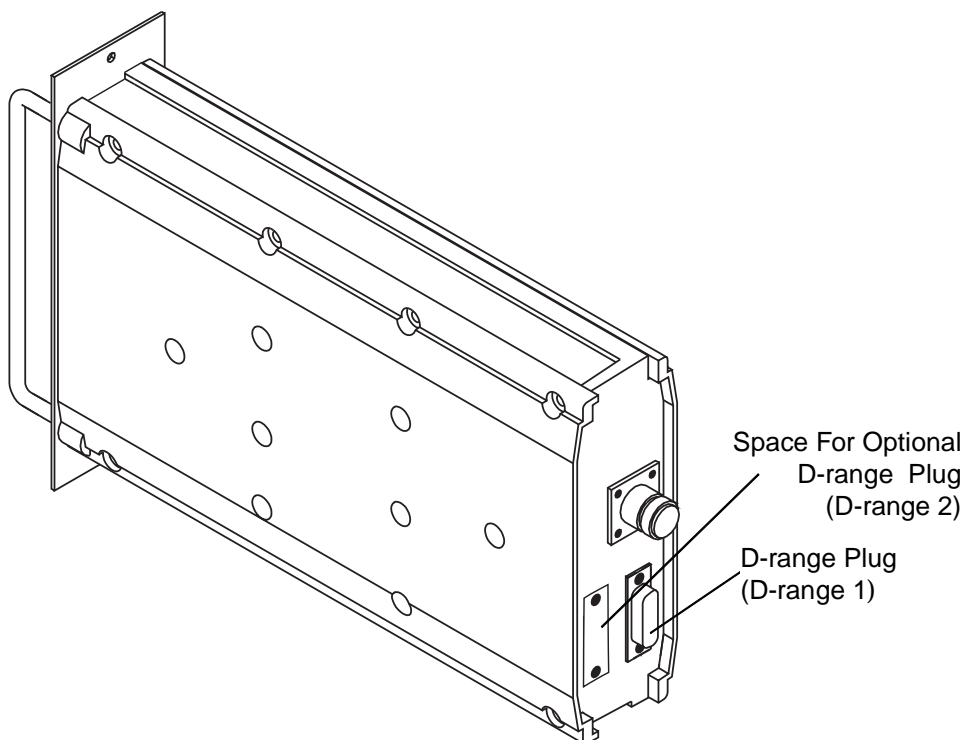


Figure 2 D-range Location

Backplane PCB

The backplane PCB (T800-50-0000) has been laid out with OEM (Original Equipment Manufacturer) products in mind, and has sockets for the T800 module D-range. The PCB mounts across the rear panel of the rack frame guides, enabling a T800 Series II radio module to plug directly into the D-range sockets provided on the inner side of the PCB.

The two 25-way D-ranges (shown enlarged in Figure 3) can be used to interface third party equipment, for example tone remote boards, with the T800-22-0000 rack frame. Most D-range inputs/outputs are made available on the two 25-way D-ranges (SK6 and SK7) and are described in following tables.

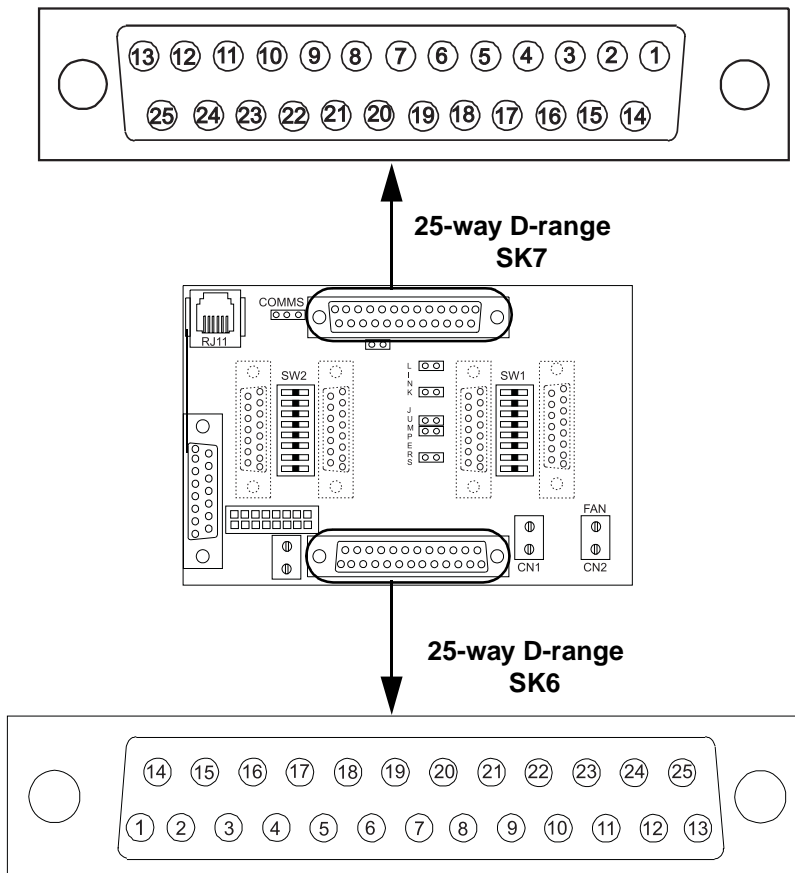


Figure 3 T800-50-0000 Backplane PCB Showing D-range Location

T800 Series II Module Inputs And Outputs

Receiver : Standard Inputs And Outputs

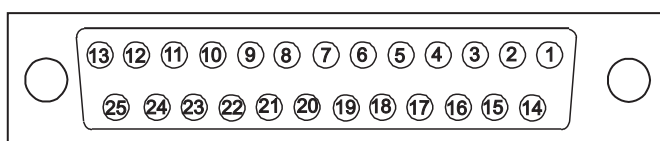
Table 1 shows standard inputs and outputs for the T800 receiver and corresponding inputs and outputs on the backplane PCB (SK7).

Signal	DR1 Pin	BKPL (SK7)	I/P O/P	Function
Line O/P	1-4	1-4	O/P	Audio output from a 600Ω balanced line transformer. Output level adjustable from -50 to +10dBm via a potentiometer on the front panel. Pins 2 & 3 are usually linked for normal operation.
RSSI	5	5	O/P	Receiver Strength Signal Indicator. Provides a DC voltage proportional to the signal strength of the received signal. Values are: VHF 4.5V @ -100dBm; 1V/15dB (-115 to -70dBm) UHF 2V @ -110dBm; 1V/10dB (-115 to -70dBm). For UHF, optional board must be fitted.
Audio 1	6	6	O/P	Audio 1 allows access to audio before it passes through the squelch circuitry. The output will provide frequencies down to 5Hz when the audio processor is linked for flat response. From Audio 1, audio can be passed to external CTCSS and signalling decoders.
Serial Com/ Audio 2	7	7	I/O	Serial programming input for programming the module. Can be configured as Audio 2 by internal link resistors if required. Audio 2 is an input and when used in conjunction with Audio 1 allows the audio path to be broken so that external audio processing can be used.
Speaker	8	19	O/P	Provides up to 1W into a 4Ω speaker.
Supply Voltage	9-10	-	I/P	DC Supply Voltage input. Nominal 13.8V, can operate from 10.8 to 16V DC.
Gate O/P	11	14	O/P	Pulls low when a signal is received. In a repeater, configuration can be used to key the transmitter by directly connecting it to the Tx Key pin.
Receiver Gate Relay	12 13	15 16	O/P	Relay Common Relay Normally Open A normally open relay contact that closes when a signal is received. The relay will only operate when PL270 is linked.
Ground	14-15	-	I/P	Power supply earth, negative ground.

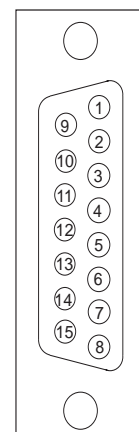
Table 1 Standard Receiver Pin Inputs & Outputs

Notes:

DR1 = D-range 1 BKPL = Backplane



Backplane SK7



Receiver D-range 1

Receiver : Additional Inputs And Outputs

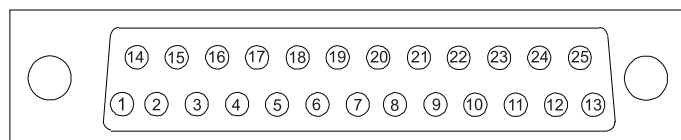
Table 2 shows additional inputs and outputs for the T800 receiver and corresponding inputs and outputs on the backplane PCB (SK6).

Signal	DR2 Pin	BKPL (SK6)	I/P O/P	Function
Channel Select 0-6	1 2 3 4 5 6 7	22 9 21 8 20 7 19	I/P	External channel select pins (including Channel Select 7 on pin 11). Normally high, these pins are pulled low to select logic 0. To select a channel the binary equivalent must be applied to the pins. when all pins are left floating (i.e. high) then the selected channel is determined by software (PGM800Win). Note: When using external channel selection, pin 11 must be pulled low.
Ground	8	6	I/P	Power supply earth, negative ground.
Rx Disable	9	18	I/P	When pulled low disables receiver audio output. Usually used in a base station application to ensure there is no interference when the transmitter is operating.
CTCSS Disable	10	5	I/P	Disables CTCSS (Continuous Tone Controlled Squelch System).
Channel Select 7	11	23	I/P	Function as for other channel select lines. Must be pulled low when using external channel selection.
Serial Comm	12	24	I/O	Serial programming input for programming the module. Can be used if it is not possible to program the radio from D-range 1.
Aux-Out 0-2	13 14 15	15 10 11	O/P	Open drain type; capable of sinking 2.25mA via 2k2Ω; V_{ds} max.=5V. Logic state can change when the channel is changed. User definable by using PGM800Win software.

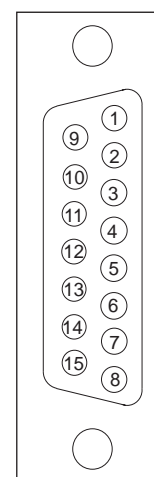
Table 2 Additional Receiver Pin Inputs & Outputs

Notes:

DR2 = D-range 2 BKPL = Backplane



Backplane SK6



Receiver
D-range 2

Transmitter/Exciter : Standard Inputs And Outputs

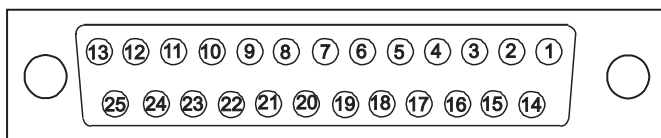
Table 3 shows standard inputs and outputs for the T800 transmitter/exciter and corresponding inputs and outputs on the backplane PCB (SK7).

Signal	DR1 Pin	BKPL (SK7)	I/P O/P	Function
Line I/P	1-4	22-25	I/P	Audio input to a 600Ω balanced line transformer. For an unbalanced line connect the line I/P 4 to ground. Accepts audio levels as low as -30 dBm. Pins 2 & 3 are usually linked for normal operation.
Tx Enable	5	21	O/P	Pulls low when the transmitter is keyed. Usually connected directly to Tx Key on the PA to activate the PA alarm circuitry.
Audio 2	6	20	I/P	Audio 2 allows audio to be input to the audio processor bypassing the 600Ω line transformer. Ideal place to re-inject audio such as a voice scrambler after external processing.
Serial Com/ Audio 1	7	7	I/O O/P	Serial programming input for programming the module. Can be configured as Audio 1 by internal link resistors if required. Audio 1 allows access to the audio directly after the 600Ω line transformer. When used in conjunction with Audio 2 it allows the audio path to be broken so that external audio processing can be used.
CTCSS	8	18	I/P	An external input for CTCSS or DCS (Digital Coded Squelch).
Supply Voltage	9-10	-	I/P	DC Supply Voltage input. Nominal 13.8V, can operate from 10.8 to 16V DC.
Opto Keys	11 (+) 12 (-)	9 8	I/P	A high isolation keying option. A DC voltage between 6V and 50V applied to these inputs will key the transmitter. The inputs may be used to key the transmitter via a DC remote.
Tx Key	13	17	I/P	A high impedance input which is pulled low to key the transmitter. Must be <0.7V or connected directly to Ground.
Ground	14-15	-	I/P	Power supply earth, negative ground

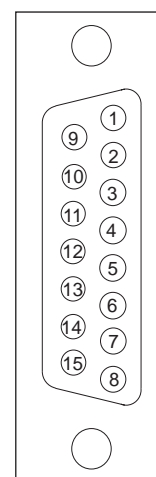
Table 3 Standard Transmitter/Exciter Pin Inputs & Outputs

Notes:

DR1 = D-range 1 BKPL = Backplane



Backplane SK7



Transmitter/Exciter
D-range 1

Transmitter/Exciter : Additional Inputs And Outputs

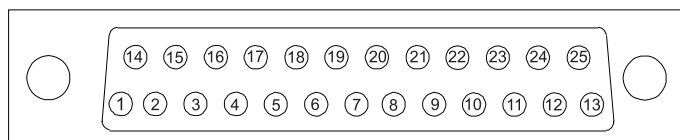
Table 4 shows the additional pin inputs and outputs for the T800 transmitter/exciter and corresponding inputs and outputs on the backplane PCB (SK6).

Signal	DR2 Pin	BKPL (SK6)	I/P O/P	Function
Channel Select 0-6	1 2 3 4 5 6 7	22 9 21 8 20 7 19	I/P	External channel select pins (including Channel Select 7 on pin 11). Normally high, these pins are pulled low to select logic 0. To select a channel the binary equivalent must be applied to the pins. When all pins are left floating (i.e. high) then the selected channel is determined by software (PGM800Win). Note: When using external channel selection, pin 11 must be pulled low.
Ground	8	6	I/P	Power supply earth, negative ground.
Tx Relay Drive	9	18	I/P	Used for coaxial relay switching. Pulls to ground when the transmitter is keyed.
CTCSS Disable	10	17	I/P	Disables CTCSS (Continuous Tone Controlled Squelch System).
Channel Select 7	11	23	I/P	Function as for other channel select lines. Must be pulled low when using external channel selection.
Serial Comm	12	24	I/O	Serial programming input for programming the module. Can be used if it is not possible to program the radio from D-range 1.
Aux-Out 0-2	13 14 15	16 4 3	O/P	Open drain type; capable of sinking 2.25mA via 2k2Ω; V_{ds} max.=5V. Logic state can change when the channel is changed. User definable by using PGM800Win software.

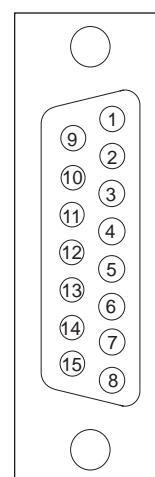
Table 4 Additional Transmitter/Exciter Pin Inputs & Outputs

Notes:

DR2 = D-range 2 BKPL = Backplane



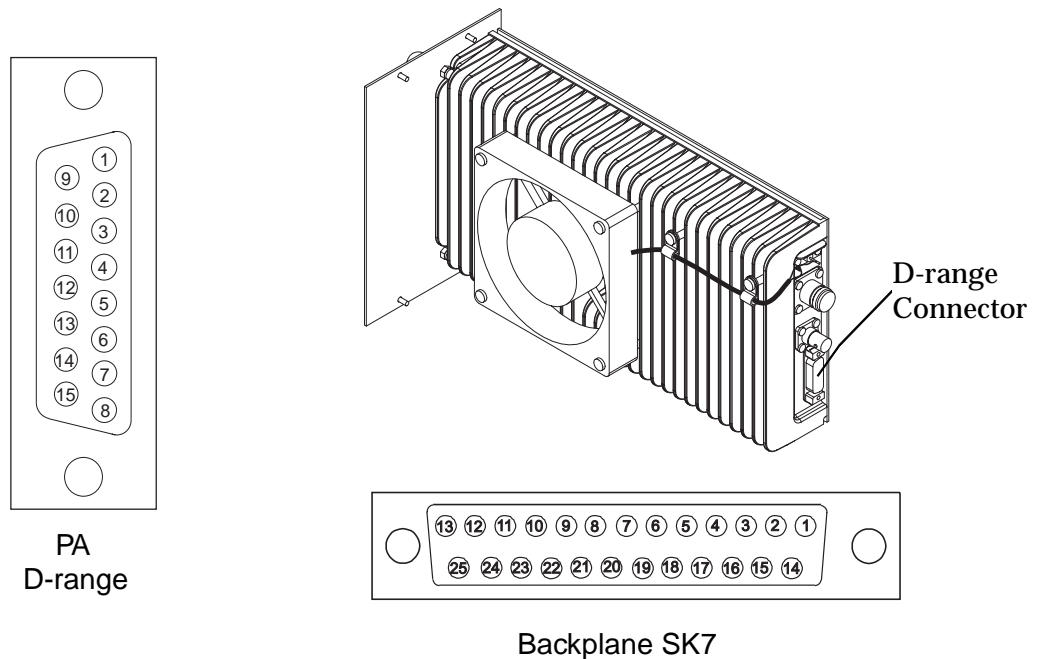
Backplane SK6



Transmitter/Exciter
D-range 2

Power Amplifier : Standard Inputs And Outputs

The location of the D-range on the T800 PA is shown on the diagram below. Available pin inputs and outputs for the PA are shown on Table 5.



Signal	DR1 Pin	BKPL (SK7)	I/P O/P	Function
Supply Voltage	1-2	-	I/P	DC Supply Voltage input. Nominal 13.8V, can operate from 10.8V to 16V DC. Connected to pins 9, 10 and 11.
Forward Power Alarm	3	10	O/P	These are normally low and float if forward power drops below, or reverse power rises above, pre-set limits. They have a 500mA sink capability. A signal is only provided when the Tx Key line on the PA is being pulled low.
Reverse Power Alarm	4	11	O/P	
Forward Power Metering	5	12	O/P	Voltage outputs proportional to the levels of forward and reverse power are available at these pins for metering purposes. There is enough output to drive a coil meter.
Reverse Power Metering	6	13	O/P	
Ground	7-8	-	I/P	Power supply earth, negative ground. Connected to pins 13, 14 and 15.
Supply Voltage	9-11	-	I/P	Function as for Pins 1 and 2.
Tx Key	12	21	I/P	Keys the PA when ground is applied. This line is usually taken to the Tx Enable line on the Exciter.
Ground	13-15	-	O/P	Power supply earth, negative earth.

Table 5 Power Amplifier Pin Inputs & Outputs

Integrating Third Party PCBs

This section gives guidelines on integrating third party PCBs with Tait equipment using the T800 ancillary module chassis and rack frame guides.

There are two types of PCB which will fit into the T800 ancillary module chassis, a primary PCB and a front panel PCB.

Primary PCB

You can fit the primary PCB into the body of the T800 ancillary module chassis by sliding it along one of the grooves (the grooves are shown in the diagram of the chassis, Figure 7). PCBs can be fitted into any of the three grooves in the chassis.

Third party PCBs must be made to specific dimensions to ensure they integrate with the T800 ancillary module chassis. The dimensions of the main PCB are shown in Figure 4. All measurements are shown in millimetres.

The grey shaded area represents the part of the PCB where components are unplaceable as it is the area at the edge of the PCB covered by the chassis. This is a 3mm wide area. The black area represents the part of the PCB where components should be of a restricted height. The maximum height for components in this area is 3.2mm. The maximum component height for the rest of the PCB area is 42mm. The length of the primary PCB is 260mm, but longer PCBs can be fitted if a front panel PCB is not required.

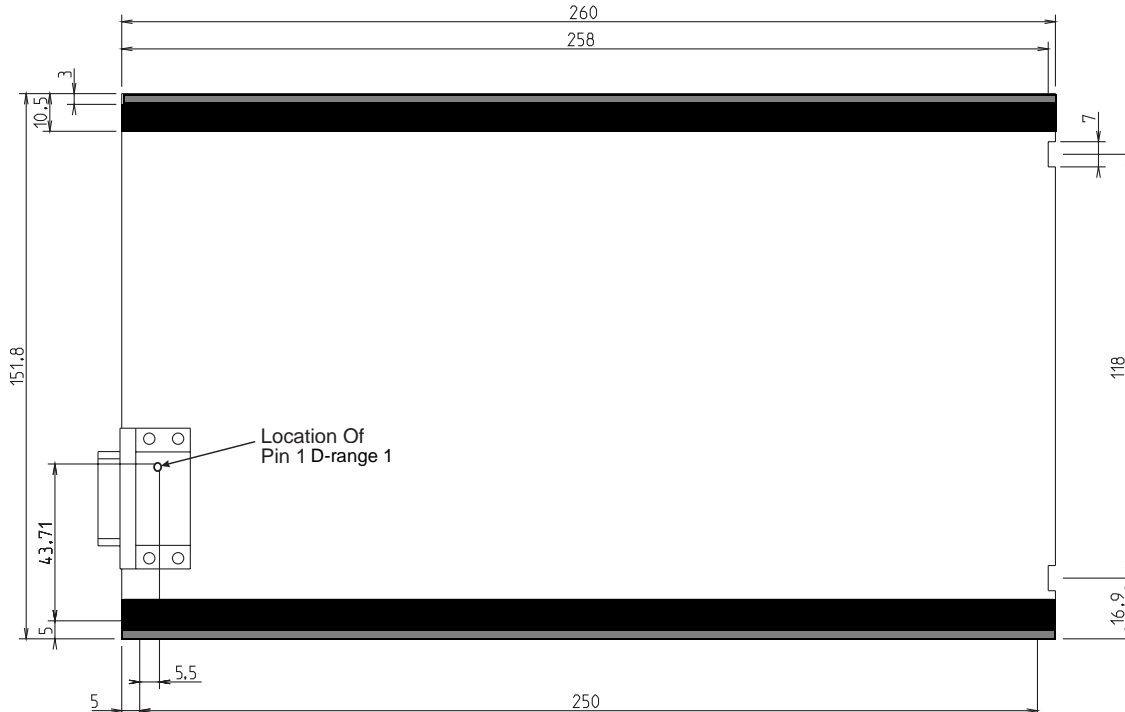


Figure 4 Main PCB Dimensions

Figure 5 shows the footprint and spacing dimensions of the 15-way double D-range connector. The location of pin 1 on both D-range 1 and D-range 2 is also shown. All dimensions are shown in millimetres.

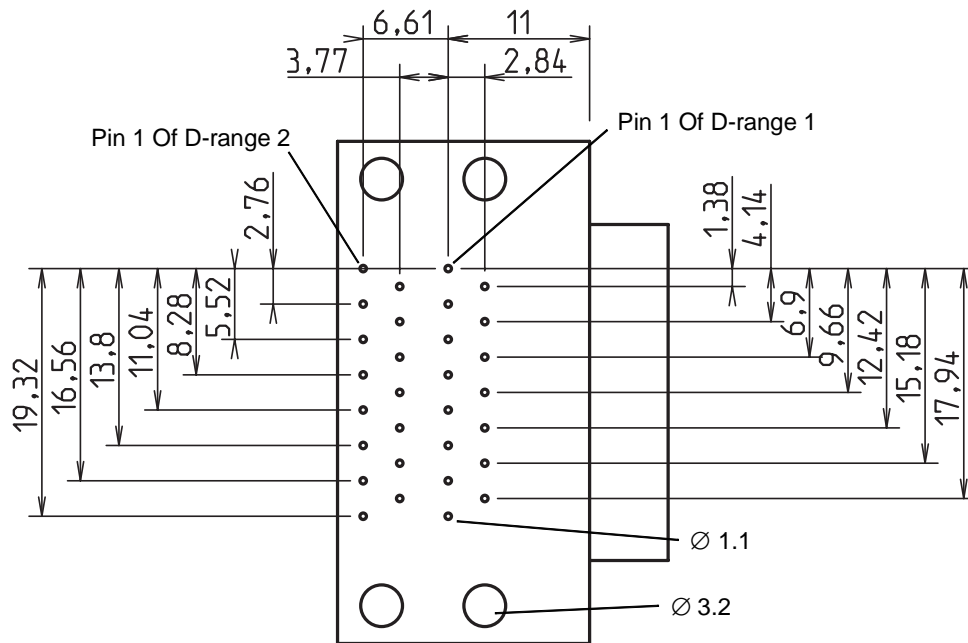


Figure 5 D-range Connector Dimensions

Front Panel PCB

Figure 6 below shows the dimensions necessary for a third party PCB to fit behind the front panel of the ancillary chassis. All measurements are shown in millimetres. The maximum height of components on this PCB is 8mm.

The PCB fits in behind the front panel and is screwed to a sub-chassis panel using M3x8 Pan Torx Taptite screws. The T800 ancillary module chassis is shown in Figure 7.

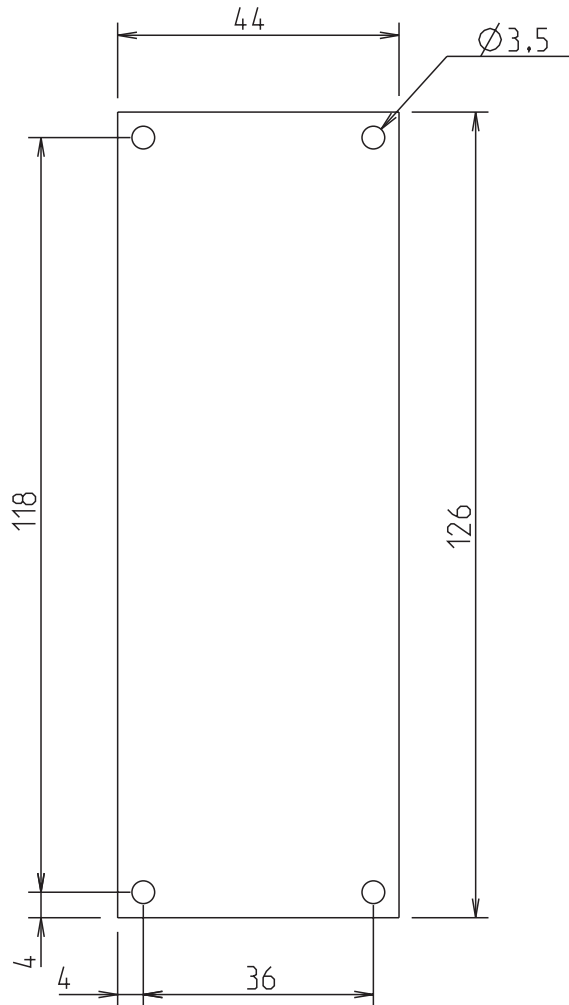


Figure 6 Front Panel PCB Dimensions

Ancillary Module Chassis

The mechanical design of the T800-08-0000 ancillary module chassis is shown in Figure 7. Third party PCBs can be fitted into the chassis, either as a primary PCB (shown in Figure 4) or as a smaller PCB which fits behind the front panel (shown in Figure 6).

The primary PCB slides into a groove in the T800 ancillary module chassis and the front panel PCB screws in behind the front panel using the sub-chassis panel (shown in Figure 7).

The T800 ancillary module chassis is held in the rack frame by the rack frame guides. The rack frame guides are described on following pages.

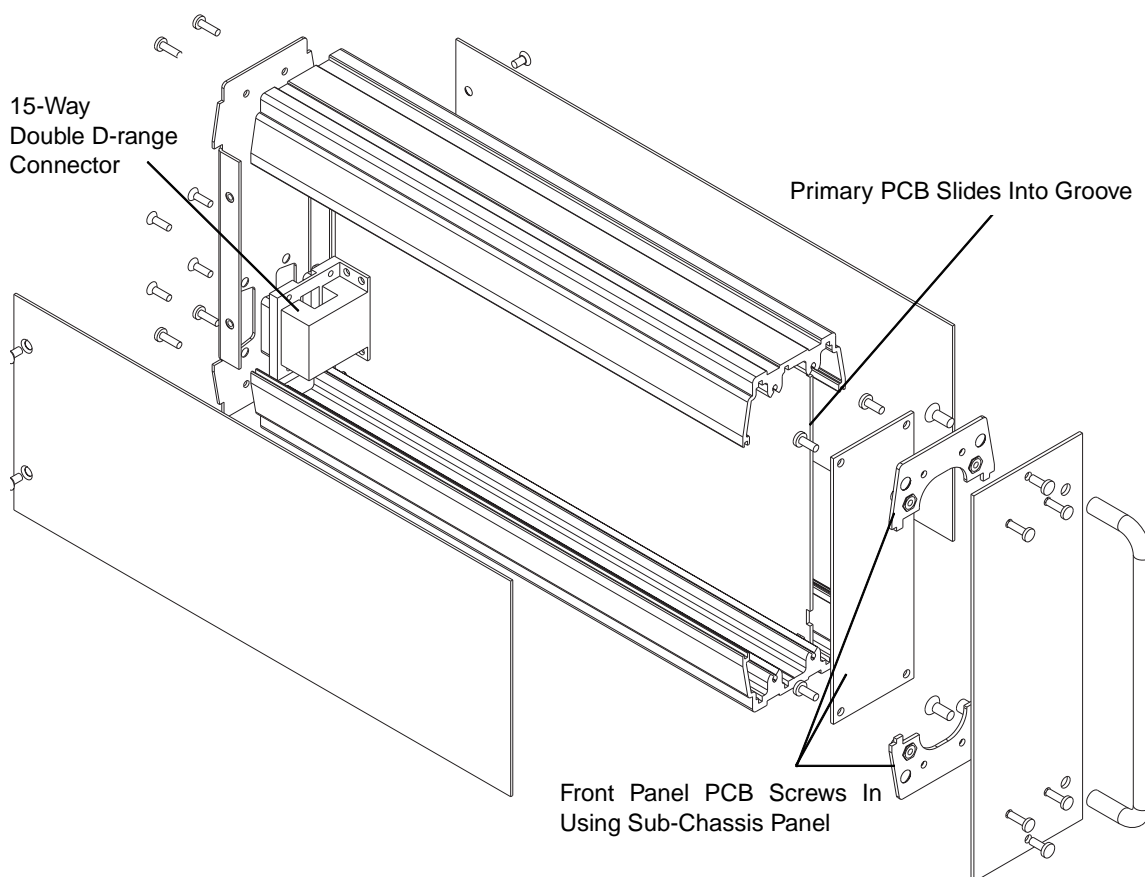


Figure 7 T800-08-0000 Ancillary Module Chassis

All parts shown on Figure 7 excluding the PCBs are included in the T800 ancillary module chassis kit.

T800-41-0001 - Single Guide Kit

The T800-41-0001 rack frame guide shown in Figure 8 is designed to fit into the T800 Series II rack frame (T800-22-0000). The single guide accepts the T800-08-0000 ancillary chassis or a T800 Series II module (except for power supplies and power amplifiers which must use their own guides).

The single guide kit is supplied disassembled and comprises a top and bottom rail, a rear panel, two D-range sockets and mounting screws.

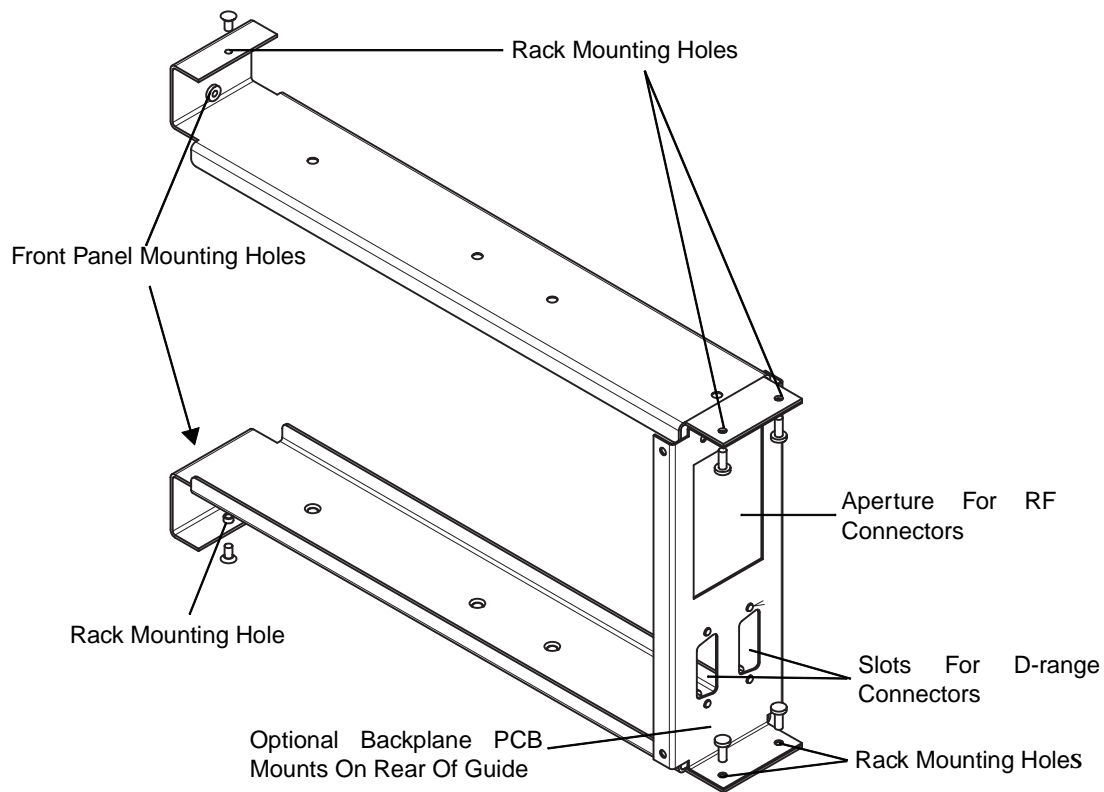


Figure 8 T800-41-0001 Single Guide

T800-41-0002 - Double Guide Kit

The T800-41-0002 rack frame guide shown in Figure 9 is designed to fit into the T800 Series II rack frame (T800-22-0000). The double guide accepts any combination of the T800-08-0000 ancillary chassis and T800 Series II modules (except for power supplies and power amplifiers which must use their own guides).

The double guide kit is supplied disassembled and comprises two top and bottom rails, a double width rear panel, four D-range sockets and mounting screws.

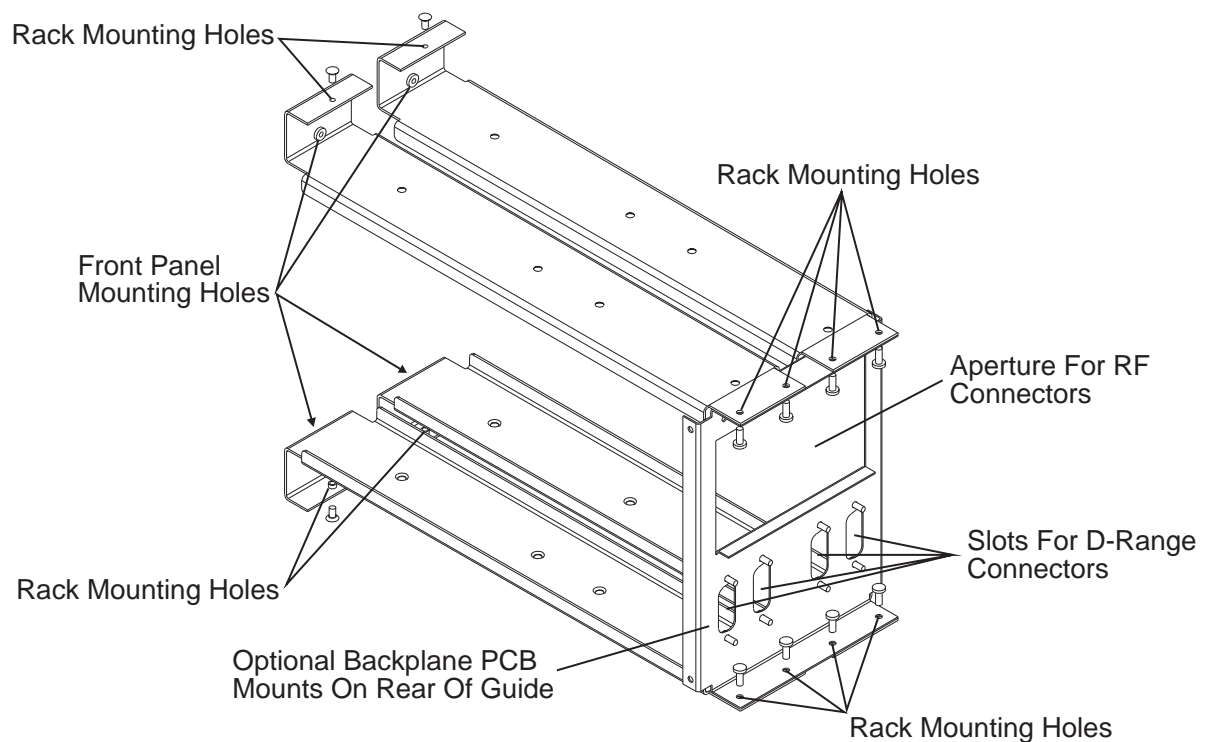


Figure 9 T800-41-0002 Double Guide

T800-41-0003 - Triple Guide Kit

The T800-41-0003 rack frame guide shown in Figure 10 is designed to fit into the T800 Series II rack frame (T800-22-0000). The triple guide accepts any combination of the T800-08-0000 ancillary chassis and T800 Series II modules (except for power supplies and power amplifiers which must use their own guides).

The triple guide kit is supplied disassembled and comprises three top and bottom rails, a triple width rear panel, six D-range sockets and mounting screws.

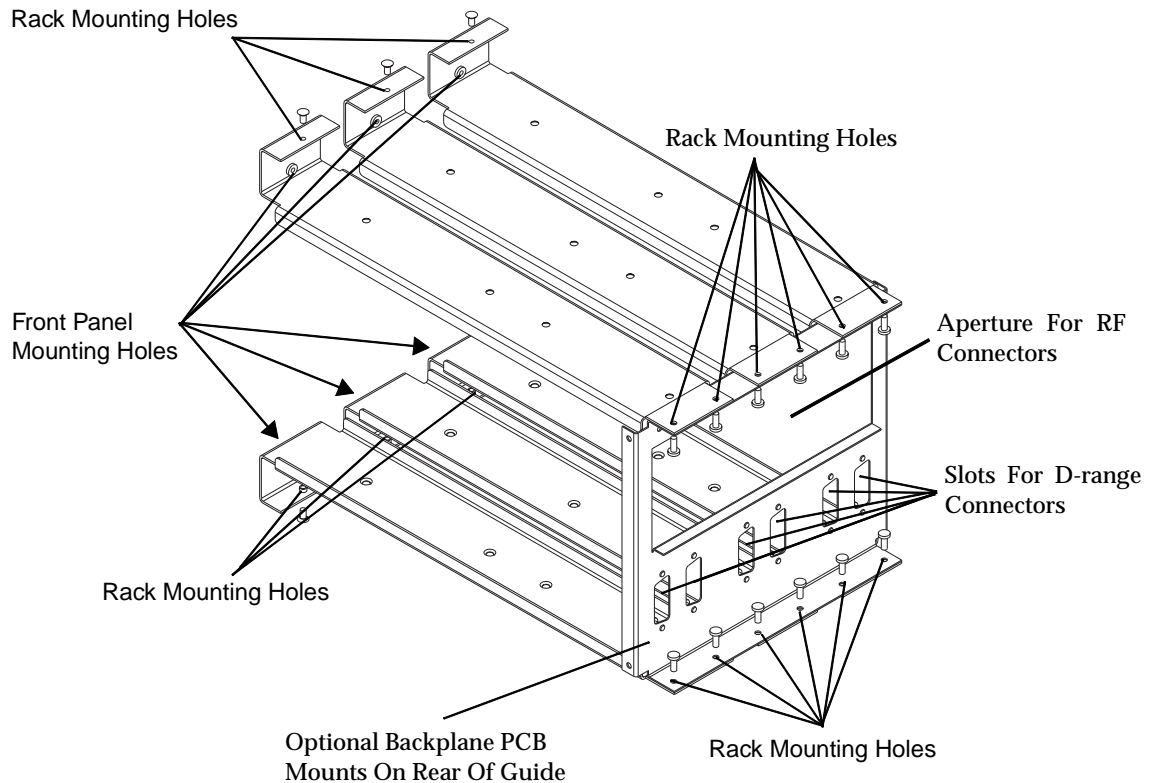


Figure 10 T800-41-0003 Triple Guide