

T6T VHF 100 W Transmitter
User Documentation

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A warning is used to indicate possible danger to personnel. Throughout Park Air handbooks, warnings are indicated by the following symbols:

- WARNING**  Indicates electrical danger to personnel.
- WARNING**  Indicates a hazardous material.
- WARNING**  Indicates a non-ionizing radiation hazard.
- WARNING**  Indicates a specified danger to personnel.

Cautions

A caution is used to indicate possible danger to the equipment.

- Caution**  Indicates the presence of electrostatic sensitive devices (ESSD).
- Caution**  Indicates a specified danger to the equipment.

Trademarks

The following tradenames are used in this handbook.

- | | |
|-----------|---|
| IBM | This is a registered trademark of International Business Machines. |
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| Windows | This is a registered trademark of Microsoft Corporation in the USA and other countries. |

List of Abbreviations

ac	alternating current	RF	radio frequency
AGC	automatic gain control	ROM	read-only memory
AM	amplitude modulation	RSE2	remote site equipment
ATC	air traffic control	RSSI	receiver signal strength indication
BER	bit error rate	V	volt
BIT	built-in test	VFP	virtual front panel
C	celsius	VHF	very high frequency
CD	compact disk	VOGAD	voice-operated gain adjusting device
dB	decibel	VSWR	voltage standing wave ratio
dc	direct current	W	watt
DSB	double sideband		
E-BIT	external bit signal		
ESSD	electrostatic sensitive devices		
Fig	figure		
FM	frequency modulation		
Hz	hertz		
IF	intermediate frequency		
kg	kilogramme		
kHz	kilohertz		
LCD	liquid crystal display		
m	metre		
mA	milliamp		
MARC	multi-access remote control		
mm	millimetre		
mW	milliwatt		
MHz	megahertz		
MSK	minimum shift keying		
PA	power amplifier		
PC	personal computer		
PCB	printed circuit board		
pk-pk	peak-to-peak		
ppm	parts per million		
PSU	power supply unit		
PTT	press to transmit		

Approvals and Standards T6T VHF 100 Watt Transmitters

Approvals:

The equipment is designed to meet the essential requirements of Directives 1999/5/EC, 89/336/EEC as amended by Directive 93/68/EEC, and 72/23/EEC.

Standards:

The following standards are applied:

EMC EN 301 489-1; EN 301 489-22.

Health & Safety, EN 60950, CAN/CSA-C22.2 No. 60950, UL 60950.

Radio EN 300 676, IC RSS141, FCC part 15 and 87.

Telecom CS-03.

This Class B digital apparatus complies with Canadian ICES-003

FCC Statement:

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the supplier or an experienced radio/TV technician for help.

Operation on 8.33 kHz channel spacing is restricted to European customers.

About This Hard Copy

This document, apart from the preface, is a hard copy of the files contained on the CD and comprises the following parts:

Preface (not on CD)

Introduction

Specification

Operation

Installation

Maintenance.



Introduction

This topic gives a brief introduction to the T6T VHF 100 W Multimode Transmitter.



Purpose

The T6T VHF multimode 100 W transmitter is intended for use in fixed ground environments such as airports and en-route centres. The transmitter operates in voice and ICAO defined data modes at frequencies between 118 and 136.975 MHz.

Dependent on the software loaded into the radio, the following operating modes can be selected:

- ❑ AM-Voice. All transmitters have this mode
- ❑ AM-MSK (optional)
- ❑ Mode 2 (optional)
- ❑ Mode 3 (optional).



Fig 1 T6T VHF 100 W Transmitter

Models and Part Numbers

The following table identifies the T6T VHF 100 W transmitters:

Description	Part Number	Frequency Range	Channel Spacing (AM-Voice)	Special Applications
T6T 100 W standard frequency coverage high stability transmitter	B63100HS/NB	118 to 136.975 MHz	25 kHz or 8.33 kHz	Supports 5-offset carrier operation

Mechanical Installation

The transmitter fits into an industrial standard 19 inch (483 mm) equipment cabinet and occupies 4U of space.

Frequency Selection

T6 radios operate with 8.33 kHz and 25 kHz channel spacing. The radios recognize frequencies entered in ICAO format and automatically adjust to the correct channel spacing. For multichannel operation up to 100 preset frequency channels can be stored in the radio for immediate recall; any combination of 8.33 kHz and 25 kHz channel spacing can be stored. Any valid operating frequency can be selected from the radio's front panel or a compatible remote control equipment.

Operating Parameters

The transmitter's operating parameters are set using the front panel multi-purpose Scroll/Select switch, or by using the Park Air Virtual Front Panel (VFP) software in conjunction with a Personal Computer (PC).

Virtual Front Panel

The Virtual Front Panel (VFP) software supplied on CD with the radio is compatible with any PC or laptop running Windows 2000™ or Windows XP™. The VFP allows changes to a radio's settings and channel information, it displays the current BIT state, displays BIT history, allows security locks to be set, and provides maintenance facilities. A typical VFP presentation is shown in Fig 2. Using the VFP has several advantages over setting a radio from the front panel; these are:

- ❑ A profile of the operational settings and channel information can be created, stored on disk, and then recalled to download into other radios.
- ❑ A print out of the radio's profile can be made from the VFP.
- ❑ The front panel controls can be locked. Front Panel Lock is available only when using the VFP.

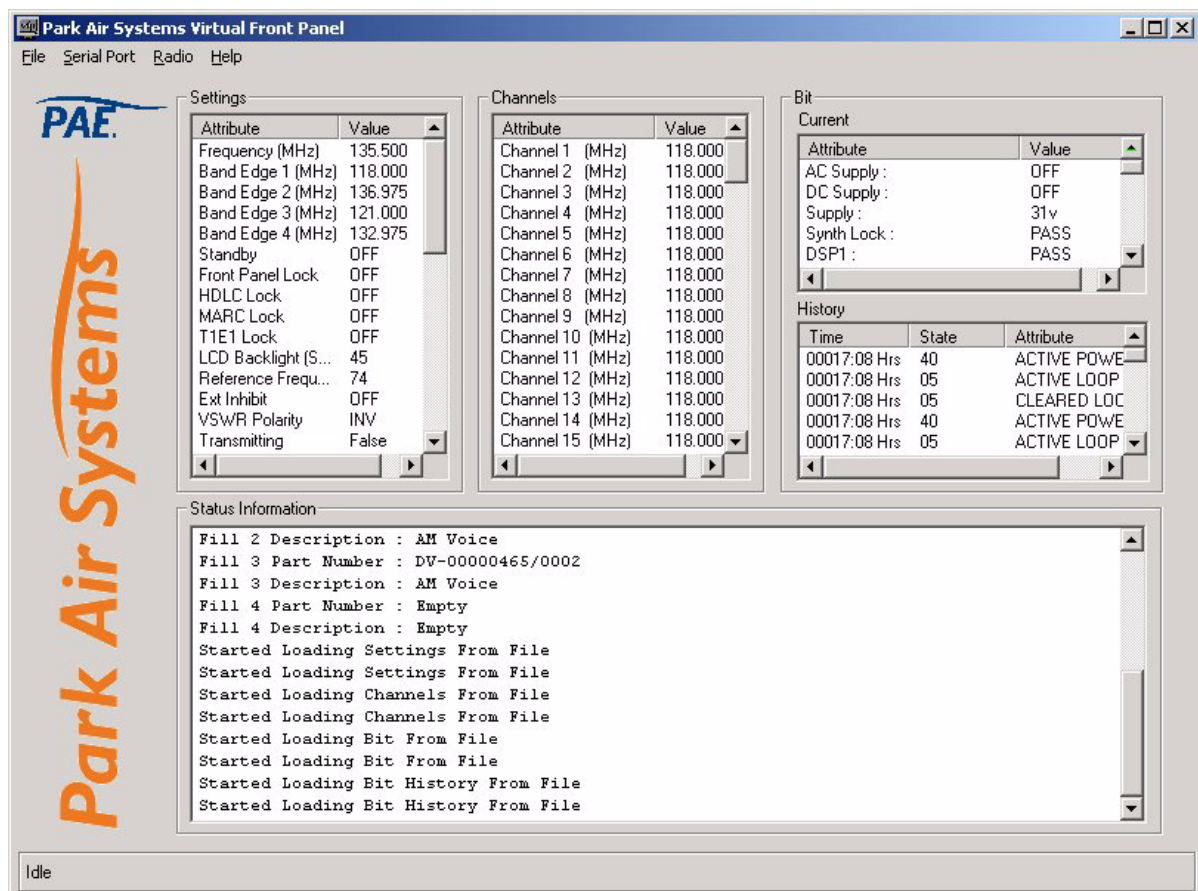


Fig 2 Typical VFP Presentation



Intentionally Blank



Specification

This section gives the specification applicable to the T6T VHF 100 W Multimode Transmitter operating in AM modes, Mode 2 and Mode 3.

All radios operate in AM-Voice mode. Additional software must be loaded to allow AM-MSK, Mode 2 and Mode 3 operation.



General Specification

The general specification applies to the T6T 100 watt transmitter irrespective of the selected operating mode. Separate listings are given for AM modes, Mode 2 and Mode 3. One model of the T6T VHF 100 W Multimode Transmitter is available as detailed in Table 1.

Table 1 100 Watt T6 Transmitter

Description	Part Number	Frequency Range	Special Applications
100 watt, high stability, standard frequency coverage transmitter	B63100HS/NB	118 to 136.975 MHz	Supports 5-offset carrier operation

Frequency accuracy

The frequency accuracy is better than 0.3 ppm.

Number of Channels

The transmitter has a multichannel capability. 100 channels can be stored and recalled.

Power Requirements

The transmitter operates from an ac mains supply, or a dc input supply. When both supplies are connected, the dc input acts as an automatic backup for the ac mains.

ac input supply The transmitter operates from a 48 to 62 Hz single-phase ac supply and automatically adjusts to operate from any supply voltage ranging from 110 Vac to 230 Vac $\pm 10\%$. The power consumption figures are given in Table 2.

dc input supply The transmitter operates from a dc input supply between 21.6 and 32 V (measured at the radio's input). Current loading is given in Table 2.

Table 2 Power Consumption

Requirement	100 Watt Transmitter Normal Operation	
	ac	dc
Maximum	1000 VA	24 A
Typical	600 VA	17 A
Not Transmitting	90 VA	1.5 A



Dimensions and Weight

The dimensions and weight of the 100 watt transmitter are:

Width	483 mm (19 inches).
Height	177.8 mm (7 inches). The height occupies 4U of equipment cabinet space.
Depth	430 mm (16.9 inches) measured from front panel to rear panel. 465 mm (18.3 inches) measured from front panel to rear RF connectors.
Weight	25 kg (55 pounds).

Environmental

Temperature range	The transmitter operates to specification across the temperature range of -20°C to +55°C. The transmitter can be stored at temperatures ranging from -30°C to +70°C without causing any damage.
Humidity	The transmitter operates to specification at a relative humidity between 5% and 90% non-condensing.
Altitude	The transmitter operates to specification up to 15,000 feet. Additionally it is capable of storage at altitudes up to 50,000 feet without damage.
Shock and vibration	The transmitter complies with shock and vibration protection MIL-STD-810E, method 516.4, procedure VI - Bench Handling.
Ventilation	The transmitter is cooled by integral fans, which normally runs at half speed. At an RF PA temperature of 45°C this is increased to full speed and at 40°C it reduces to half speed again. The transmitter power supply units also use internal fans.
Warm up time	The transmitter is fully operational within 20 seconds but can take up to 10 minutes to achieve frequency accuracy for offset carrier.



AM Modes

The transmitter can operate in AM-Voice mode (standard) and AM-MSK mode (optional). The following specifications apply to both modes unless stated otherwise.

Transmitter RF Characteristics

RF Power Output

The RF carrier output power is adjustable in 2 W steps from 10 W to 100 W. As an option, the maximum selectable power can be limited. Output power is automatically controlled under the following conditions:

Frequency range	Variations in power remain within 0 to +1 dB over the operational frequency range.
Low supply voltage	Variations in power remain within ± 1 dB for supply voltages between 24 Vdc and 32 Vdc.
High VSWR	Loop error can reduce power progressively by up to 3 dB. Variations in power remain within ± 1 dB into a VSWR of up to 2.5:1. At a VSWR greater than this the output power may be reduced by 10 dB ± 1 dB.
High RF PA temperature	If the RF PA temperature sensor exceeds 80°C the output power is reduced by 3 dB ± 1 dB. If the RF PA temperature sensor exceeds 90°C the transmitter is de-keyed and automatically re-keyed at 70°C.
PA Module Failure	If one of the two PA modules fails, the transmitter will continue to operate at half power, 50 watts.

Duty Cycle

Both modes	100% continuous operation.
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Channel Spacing

AM-Voice mode	The transmitter is capable of both 25 kHz channel spacing and 8.33 kHz channel spacing.
AM-MSK mode	25 kHz.

Offset Carrier

AM-Voice mode	The transmitter is capable of offsetting the carrier frequency to provide 2, 3, 4 and 5-carrier offset.
AM-MSK mode	Offset carrier is not available.

Harmonic Outputs

Both modes	Second harmonic outputs are less than -36 dBm, third harmonic outputs are less than -46 dBm and fourth harmonic outputs and above up to 4 GHz, are less than -56 dBm.
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Spurious Outputs

Both modes

The spurious outputs are less than -46 dBm for modulation depths up to 90%, measured at greater than 500 kHz from carrier in the frequency range 9 kHz to 4 GHz. There are no coherent spurious outputs above the spectral mask at less than 500 kHz.

Intermodulation

Both modes

Intermodulation products, caused by an interfering signal with the same power as the transmitter isolated by 30 dB, are at least -40 dBc at $\geq \pm 150$ kHz and -50 dBc at $\geq \pm 500$ kHz.

Transmitter Modulation Characteristics

The transmitter modulation characteristics are as follows:

Mode

AM-Voice

AM-Voice mode uses Double Sideband (DSB) Amplitude Modulation (AM) full carrier; emission designator 6K80A3EJN for 25 kHz channels and 5K00A3EJN for 8.33 kHz channels.

AM-MSK

AM-MSK mode uses Double Sideband (DSB) Amplitude Modulation (AM) full carrier; emission designator 13K0A2DJN.

Modulation Depth

Both modes

The transmitter is capable of modulation depths up to 95%.

Hum and Noise

Both modes

The hum and noise is more than 45 dB below the signal level for line input levels < -13 dBm, and more than 50 dB below the signal level for line input levels ≥ -13 dBm, for a carrier modulated by a 1 kHz signal with a modulation depth of 90%.

Frequency Response

25 kHz channel spacing

AM-Voice and AM-MSK: The variation in frequency response with reference to a 1 kHz signal is within +0.5 dB and -1.5 dB across the frequency range 300 to 3400 Hz. The response is also less than -20 dB at 100 Hz and below, and less than -30 dB at 4 kHz and above.

8.33 kHz channel spacing

AM-Voice only: The variation in frequency response with reference to a 1 kHz signal is within +0.5 dB and -1.5 dB across the frequency range 350 Hz to 2500 Hz. The response is also less than -10 dB at 100 Hz and below, and less than -30 dB at 3200 Hz and above.

Distortion

25 kHz channel spacing

The total harmonic distortion is less than 5% due to signals with a modulation depth of 90%, within the frequency range 300 Hz to 3400 Hz.

8.33 kHz channel spacing

AM-Voice only: The total harmonic distortion is less than 5% due to signals with a modulation depth of 90%, within the frequency range 350 Hz to 2500 Hz.



Residual FM

Both modes

For a test signal of 1 kHz set at 80% modulation depth applied to the line input of the transmitter, the unwanted peak frequency modulation does not exceed ± 500 Hz.

VOGAD

AM-Voice

The VOGAD has an operational range of 30 dB. The VOGAD can be disabled.

AM-MSK

The VOGAD is disabled.

Mute

AM-Voice

The mute level is set at 15 dB below the average speech line level setting. The mute can be disabled.

AM-MSK

The mute is disabled.

Differential Group Delay

AM-MSK

There is less than 60 μ s differential group delay for signals in the range 1200 to 2400 Hz.

Transmitter Control

Transmitter control characteristics are as follows:

Audio Inputs

Voice can be connected to the transmitter via the front panel microphone connector. Voice can also be connected via the line inputs. Line level setting from -30 to +10 dBm.

PTT Time Out

The time out period is adjustable from 2 to 510 seconds in 2 second steps or it can be disabled.



Mode 2

This section gives the transmitter specification applicable to Mode 2 operation. Mode 2 parameters are identical to AM-Voice mode parameters with the following exceptions:

RF Power Rise Time

The transmitter produces more than 90% of full power output within the first 2 symbols of the power stabilization segment, which is the first segment of the training sequence and consists of 4 symbols each representing 000.

RF Power Decay Time

The output power decays by more than 20 dB within 2.5 symbols of the middle of the final symbol.

Channel Spacing

25 kHz channel spacing only.

Transmitter Modulation Characteristics

Mode 2 uses Carrier Sense Multiple Access (CSMA) differentially encoded 8-phase shift keying (D8PSK), using a raised cosine filter with $\alpha=0.6$ (nominal value), emission designator 14K0G1DE. Information is differentially encoded with 3 bits per symbol transmitted as changes in phase rather than absolute phase. The data stream is divided into groups of 3 consecutive data bits, least significant bit first. Zeros are padded to the end of transmissions if needed for the final channel symbol.

Modulation Rate

The symbol rate is 10,500 symbols/second ($\pm 0.005\%$), resulting in a nominal bit rate of 31,500 bits/s.

RMS Phase Error

The RMS phase error is less than 3° . The error vector magnitude is less than 6%.

Phase Acceleration

The total frequency change during the transmission of the unique word is less than 10 Hz. After this, the phase acceleration is less than 500 Hz/s.



Mode 3

This section gives the transmitter specification applicable to Mode 3 operation. Mode 3 parameters are identical to AM-Voice mode parameters with the following exceptions:

RF Power Rise Time

The transmitter produces more than 90% of full power output within the first 2 symbols of the power stabilization segment, which is the first segment of the training sequence and consists of 4 symbols each representing 000.

RF Power Decay Time

The output power decays by more than 20 dB within 2.5 symbols of the middle of the final symbol.

Channel Spacing

25 kHz channel spacing only.

Transmitter Modulation Characteristics

Mode 3 uses Time Division Multiple Access (TDMA) differentially encoded 8-phase shift keying (D8PSK), using a raised cosine filter with $\alpha=0.6$ (nominal value), emission designator 14K0G7WET. Information is differentially encoded with 3 bits per symbol transmitted as changes in phase rather than absolute phase. The data stream is divided into groups of 3 consecutive data bits, least significant bit first. Zeros are padded to the end of transmissions if needed for the final channel symbol.

Modulation Rate

The symbol rate is 10,500 symbols/second ($\pm 0.005\%$), resulting in a nominal bit rate of 31,500 bits/s.

RMS Phase Error

The RMS phase error is less than 3° . The error vector magnitude is less than 6%.

Phase Acceleration

The total frequency change during the transmission of the unique word is less than 10 Hz. After this, the phase acceleration is less than 500 Hz/s.



Operation

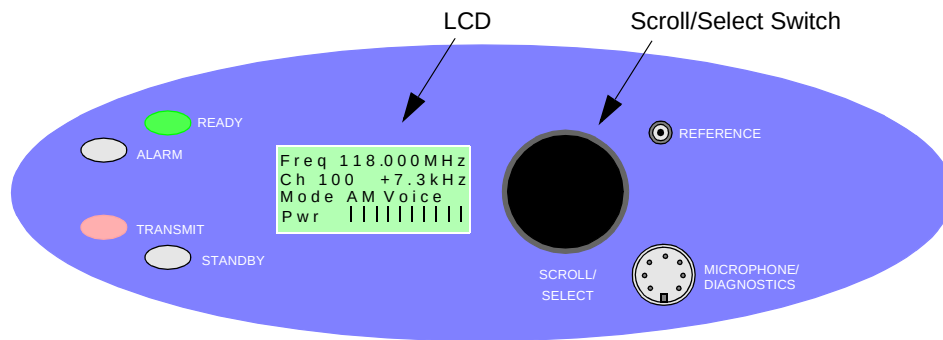
This topic describes the transmitter's operating controls and indicators.
It also details how to set up the transmitter's operating parameters.

Controls, Indicators and Front Panel Connectors

This section describes the transmitter's controls, indicators and front panel connectors.

Front Panel

The transmitter's front panel is illustrated below.



Scroll/Select Switch and LCD

The Scroll/Select switch is used in conjunction with the LCD to select most of the transmitter's operational settings. During normal operation, the LCD shows the operating frequency, the channel number (if the channel store facility is used), the carrier offset (if used), and displays a graphical representation of instantaneous peak power.

The example LCD screen above shows the transmitter operating on 118.000 MHz; the frequency has been preset as channel 100 and offset at +7.3 kHz.

Ready Indicator

A green indicator that lights when the transmitter is ready for use and no BIT faults have been detected.

Transmit Indicator

An amber indicator that lights when the transmit circuit is keyed and producing output power.

Alarm Indicator

A red indicator that either flashes, or lights, when a BIT fault has been detected. BIT indications are classified as either Alarms or Alerts.

If an 'alert' condition is detected, the Alarm indicator flashes, the Ready indicator remains lit, and the transmitter remains operational. A BIT 'alert' is indicated if:

- ❑ The transmitter RF output power has reduced from its setting by more than 1 dB but not more than 3 dB.
- ❑ The supply volts falls below a pre-defined level.

Any other BIT condition results in an alarm. When detected, the Alarm indicator lights and the Ready indicator becomes unlit; the transmitter cannot be used.

Standby Indicator

A red indicator that lights when the transmitter is in standby mode. When in standby mode, most of the radio's circuits are inactive, the front panel LCD is blanked, and the transmitter cannot be keyed.

Standby mode is selected and deselected using the front panel Scroll/Select switch and LCD, by initiating an instruction through a MARC system, through a T6 controller or through the VFP. For details of front panel selection and deselection [see page 14](#).

Reference Connector

An SMB jack socket that allows a frequency counter to monitor the transmitter's reference frequency. This connector is used only for maintenance purposes. The instructions for checking and adjusting the reference frequency are given in the Maintenance section.

Microphone/Diagnostics Connector

A dual purpose connector that allows either a microphone, or a PC, to be connected to the transmitter. The connector is a 7-pin self-locking DIN socket; the pin-out is shown in Table 1.

A microphone is fitted to this connector to enable the transmitter to be operated in AM local mode. The connections are detailed in Table 1. A PC can also be connected to allow the VFP to be displayed. Using the VFP is detailed in the Maintenance section. The PC connections at the transmitter are shown in Table 2 on the following page.

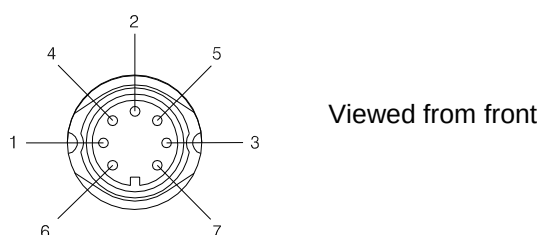


Table 1 Microphone/Diagnostics Connector - Audio Connections

Pin Number	Signal	Input or Output	Description
1	Microphone ground	-	0 V.
3	Microphone PTT	Input	0 V to PTT.
5	Sidetone	Output	0 to 3 V pk-pk.
6	Microphone input	Input	2 to 35 mV rms on Passive setting and 8 to 140 mV rms on Active setting to remain in VOGAD range.
7	Ground	-	0 V.

Table 2 Microphone/Diagnostics Connector - PC Connections

Pin Number	Signal	Input or Output	Description
2	Transmit data	Output	RS232, 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.

Table 2 Microphone/Diagnostics Connector - PC Connections

Pin Number	Signal	Input or Output	Description
4	Receive data	Input	RS232, 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
7	Ground	-	0 V.

Rear Panel Power Switch

The rear panel power switch is a 2-way rocker switch used to select between power on, and standby.



Dangerous Voltages

When the Power switch is set to the Standby position, dangerous voltages are still present in the transmitter's internal power supply circuitry. To ensure safe working, the transmitter must be isolated from the ac and dc input supplies.

| = On

 = Standby

Setting Up and Operation

Introduction

Setting up the transmitter involves using the front panel Scroll/Select switch to specify the operating parameters.

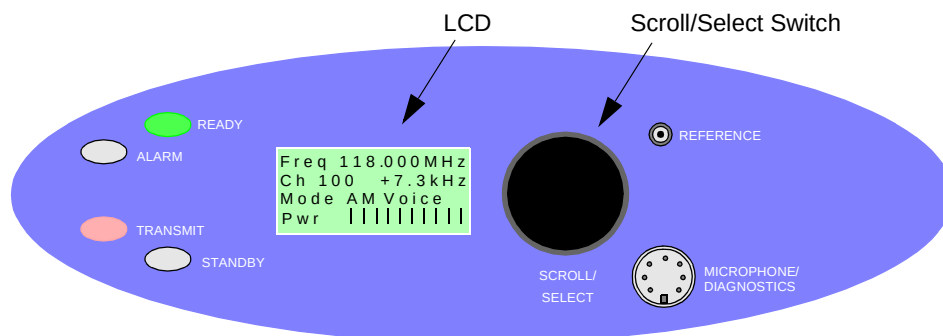
Operating parameters can also be set using the Virtual Front Panel (VFP), through a Multi-Access Remote Control (MARC) system, from an associated T6 controller. VFP operation is described on this disk under Maintenance; MARC and T6 controller functionality is described in separate handbooks.

Table 9 on page 32 details the functions and parameters that can be set from all sources.

No attempt to set up the transmitter should be made until the installation procedures, given in the Installation topic, are completed.

Normal Operation

During normal operation, the LCD displays the Main screen. This screen shows the operating frequency, the channel number (if the channel store facility is used), the carrier offset (if used), and displays a graphical representation of output power when the transmitter is keyed. If the transmitter has been set to Standby mode, which is shown by the front panel Standby indicator being lit, the LCD is blanked.



Using the Scroll/Select Switch

The Scroll/Select switch (referred to throughout this section as the 'Switch') is used to leave the Main screen and display the Control screen (see page 8). Further use of the Switch displays various selection menus and allows the required parameters to be set. The switch has three actions: it can be turned clockwise, anti-clockwise, or momentarily pushed in.

Screen Protocol

The following protocol is applicable to all screens described in this document.

Main Screen During normal operation, the Main screen (an example of which is shown below whilst the transmitter is transmitting) is displayed.

F r e q	1 1 8 . 0 0 0 M H z
C h 1 0 0	+ 7 . 3 k H z
M o d e	A M V o i c e
P w r	

Switch Refers to the front panel Scroll/Select switch. The switch is turned clockwise to scroll through fields from left to right, and from top to bottom. The switch is turned anti-clockwise to scroll through fields from right to left, and from bottom to top. The switch is pressed to make a selection.

Time out If during any setting up procedure the Scroll/Select switch is not operated for 30 seconds, the display returns to the Main screen. If editing any parameter has not been completed, the transmitter stays on the original setting.

>> Indicates more fields are available other than those currently displayed. To access those fields, turn the switch clockwise through the last displayed field.

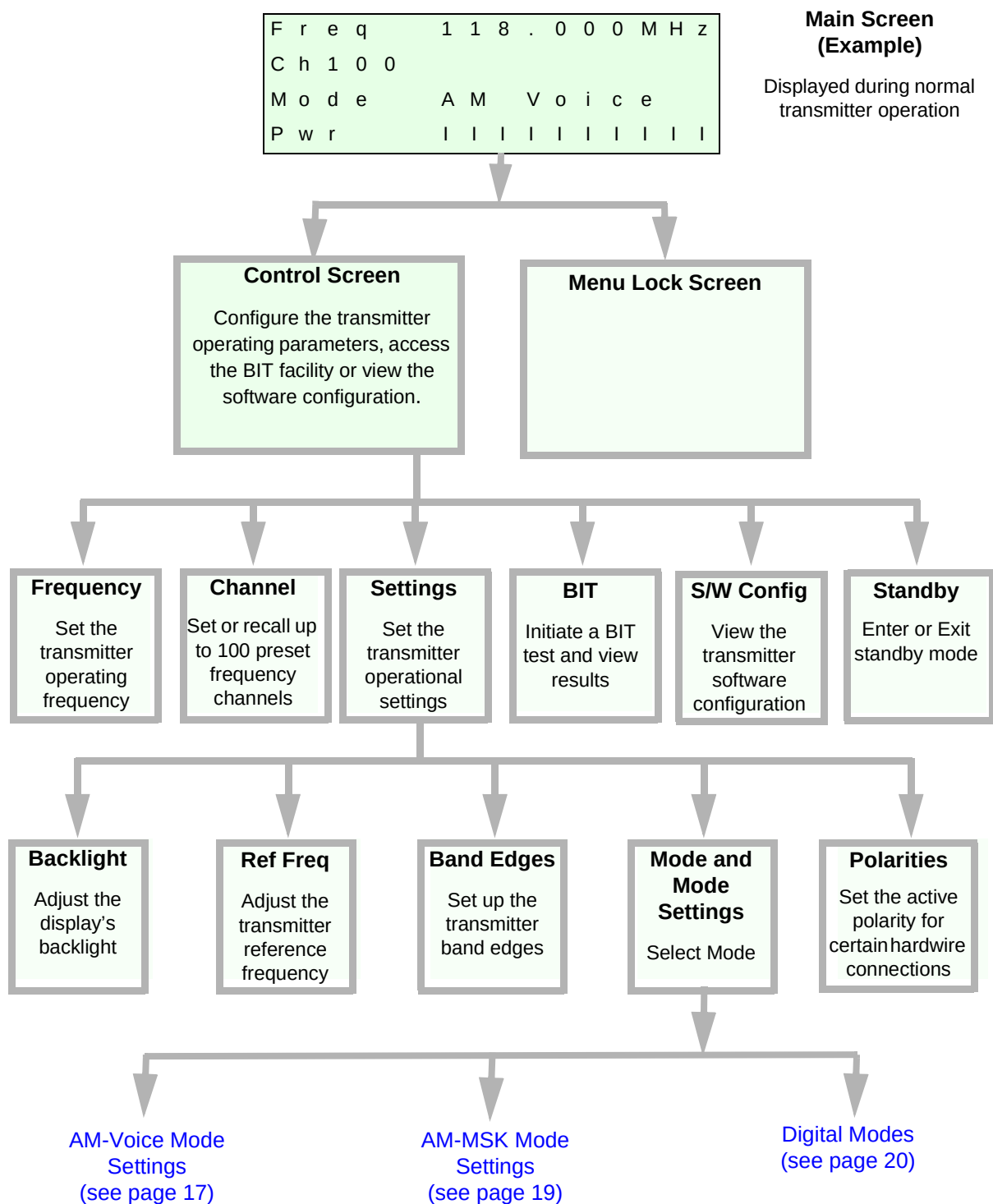
<< Indicates more fields are available other than those currently displayed. To access those fields, turn the switch anti-clockwise through the first displayed field.

Back When Back is selected, you are returned to the previous menu.

Exit When Exit is selected, you are returned to the Main screen.

Menu System

The front panel control of the radio is implemented through a hierarchical menu system as shown on the following page.



Menu System



Menu Lock Screen

A security facility available only from the VFP allows the transmitter front panel to be 'locked'. When this facility is active, no operational settings can be made from the front panel until an 'unlock' command is sent from the VFP.

The following screen is displayed when 'lock' is active, and the front panel switch is pressed.

```

S E C U R I T Y   M E S S A G E
  F r o n t   P a n e l
    L o c k e d
                                O K
  
```

To exit the system lock screen:

- ❑ Select OK, then press the switch. You are returned to the Main screen.
or,
- ❑ Wait for the 30 second time out to expire. You are returned to the Main screen.

Control Screen

The Control screen is entered from the Main screen by pressing the switch. The following screen is displayed:

Change the transmitter operating frequency.
Store or recall preset channel frequencies.
Select operating mode and mode settings.

```

F r e q u e n c y
C h a n n e l
S e t t i n g s
E x i t                                > >
  
```

Initiate a BIT test and view results.
View software configuration.
Enter or exit standby mode.

```

B I T
S / W   C o n f i g
S t a n d b y
E x i t                                < <
  
```



Notes for Setting Up the Transmitter

The following notes should be read before setting up the transmitter. They advise on the special frequency display when using 8.33 kHz channel spacing, and give guidance on the optimum line level settings. Note that for operation in the United States of America, this equipment is certified only for operation using 25 kHz channel spacing.

Front Panel Display for 25 kHz and 8.33 kHz Channel Spacing

When setting the operating frequency of the transmitter and 8.33 kHz channel spacing is required, the displayed frequency differs from the actual channel frequency. Table 3 shows the pattern used for 25 kHz and 8.33 kHz spaced channel frequencies from 118.000 MHz to 118.141 MHz. The pattern is the same for any frequency within the transmitter's frequency range. The display conforms to ICAO convention for 8.33 kHz operation.

Table 3 25 kHz and 8.33 kHz Channel Spacing Displays

Actual Frequency (to 4 decimal places)	Channel Spacing	Displayed Frequency at Transmitter's Front Panel
118.0000 MHz	25 kHz	118.000 MHz
118.0000 MHz	8.33 kHz	118.005 MHz
118.0083 MHz	8.33 kHz	118.010 MHz
118.0166 MHz	8.33 kHz	118.015 MHz
118.0250 MHz	25 kHz	118.025 MHz
118.0250 MHz	8.33 kHz	118.030 MHz
118.0333 MHz	8.33 kHz	118.035 MHz
118.0416 MHz	8.33 kHz	118.040 MHz
118.0500 MHz	25 kHz	118.050 MHz
118.0500 MHz	8.33 kHz	118.055 MHz
118.0583 MHz	8.33 kHz	118.060 MHz
118.0666 MHz	8.33 kHz	118.065 MHz
118.0750 MHz	25 kHz	118.075 MHz
118.0750 MHz	8.33 kHz	118.080 MHz
118.0833 MHz	8.33 kHz	118.085 MHz
118.0916 MHz	8.33 kHz	118.090 MHz
118.1000 MHz	25 kHz	118.100 MHz
118.1000 MHz	8.33 kHz	118.105 MHz
118.1083 MHz	8.33 kHz	118.110 MHz
118.1166 MHz	8.33 kHz	118.115 MHz
118.1250 MHz	25 kHz	118.125 MHz
118.1250 MHz	8.33 kHz	118.130 MHz
118.1333 MHz	8.33 kHz	118.135 MHz
118.1416 MHz	8.33 kHz	118.140 MHz

Line Level Setting

The input line level setting displayed on the front panel is equivalent to the average speech level with a peak-to-average ratio of 13 dB. This corresponds to the level specified for the lines.

When testing the transmitter using a sine wave, the line input level should be set to 10 dB above the line level setting. The VOGAD and mute thresholds are preset at 10 dB and 15 dB respectively below the line level setting.

Table 4 shows the relationship between the input line level, VOGAD threshold and mute threshold.

Table 4 Relationship Between Line Level, VOGAD Threshold and Mute Threshold

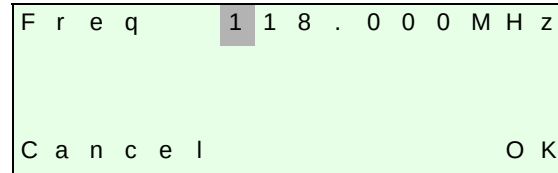
Line Level Setting (dBm)	Average Speech Level (dBm)	Sine Wave Level (dBm)	VOGAD Threshold (dBm)	Mute Threshold (dBm)
+10	+10	+20	0	-5
+5	+5	+15	-5	-10
0	0	+10	-10	-15
-5	-5	+5	-15	-20
-10	-10	0	-20	-25
-15	-15	-5	-25	-30
-20	-20	-10	-30	-35
-25	-25	-15	-35	-40
-30	-30	-20	-40	-45



Changing the Transmitter Operating Frequency

The transmitter frequency can be changed in two ways: either from the frequency screen, or by recalling a preset channel. This procedure details the use of the Frequency screen.

- (1) From the Control screen, select frequency to display the Frequency screen.
- (2) Turn the switch to highlight the digit to be changed, then press the switch.
- (3) Turn the switch until the required digit is shown, then press the switch.
- (4) Repeat until the required frequency is shown, then highlight OK and press the switch.
- (5) Only frequencies that fall between the band edge settings can be selected.



To Store and Recall Frequency Channels

Up to 100 frequency channels can be stored in the transmitter.

To store a Channel Frequency:

- (1) From the Control screen, select Channel to display the Channel screen. Highlight Channel, press the switch and then turn it until the required channel number is displayed; press the switch.
- (2) Highlight the MHz frequency value (see Example 2) press the switch and then turn it until the required MHz value is shown. Press the switch.
- (3) Highlight the kHz frequency value (see Example 3), press the switch and then turn it until the required kHz value is shown. Press the switch.
- (4) Highlight Store and press the switch. The new frequency is now stored in the selected channel number.

C h	1	0	0
F r e q	1	2	1 . 5 0 0 M H z
R e c a l l			
B a c k			E x i t

Channel Screen - Example 1

C h	1	0	0
F r e q	1	1	8 . 0 0 0 M H z
S t o r e			
B a c k			E x i t

Channel Screen - Example 2

C h	1	0	0
F r e q	1	1	8 . 0 0 0 M H z
O u t s i d e B a n d E d g e			
B a c k			E x i t

Channel Screen - Example 3

C h	1	0	0
F r e q	1	1	8 . 0 0 0 M H z
I n v a l i d f o r M o d e			
B a c k			E x i t

Channel Screen - Example 4

To recall a Stored Frequency Channel:

- (1) From the Control screen, select Channel to display the Channel screen.
- (2) To make the transmitter operate on any preset channel frequency, highlight Channel and press the switch. Turn the switch until the required channel number/frequency is displayed, then press the switch.
- (3) Turn the switch to highlight Recall, then press the switch. Exit the screen. The transmitter now operates on the recalled channel frequency.

Notes:

If a frequency outside the band edge limits is entered, a message (see Channel Screen - Example 3) is displayed.

If a frequency not valid for the mode of operation is entered, a message (see Channel Screen - Example 4) is displayed.

To Initiate a BIT Test

Use the following procedure to initiate an interruptive BIT test from the transmitter front panel. A BIT test cannot be initiated while the transmitter is keyed. After a BIT test has been run, the BIT screen is displayed (see [AM-Voice and AM-MSK BIT Screen on page 25](#)). An interruptive BIT test cannot be initiated in Mode 2 or Mode 3.

During an interruptive BIT test, the transmitter radiates modulated carrier waves at the set power. Users should therefore obtain the necessary authority before initiating a test.

If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transmitter's antenna connector.

In order to test the line input stages, an internally generated 1 kHz tone is injected into the line input circuit. Any other audio present on the line input will cause the test to be inaccurate. Therefore the transmitter must not be keyed during the test.

- (1) From the Main screen, press the switch to display the Control screen. Turn the switch until BIT is highlighted. Press the switch.

```

B I T
S / W   C o n f i g
S t a n d b y
E x i t                               < <

```

- (2) Ensure the BIT menu is displayed. Turn the switch until BIT Initiate is highlighted. Press the switch.

```

B I T   I n i t i a t e
E T I       0 0 0 0 0 : 0 0 h r s
A C   S u p p l y           O N
E x i t                               > >

```

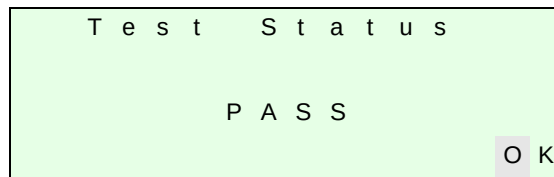
- (3) During the test, which takes approximately two seconds, the Testing screen is displayed.

```

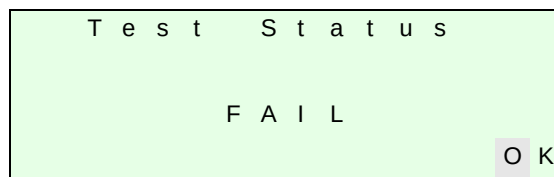
      T e s t i n g
P l e a s e   W a i t

```

- (4) On completion, and if the interruptive test was initiated from the front panel, one of the following screens will be shown.



- (5) Selecting OK takes the user back to the BIT screen.



- (6) Selecting OK takes the user back to the BIT screen. The user can then scroll through the screen to check out transmitter parameters for failure.

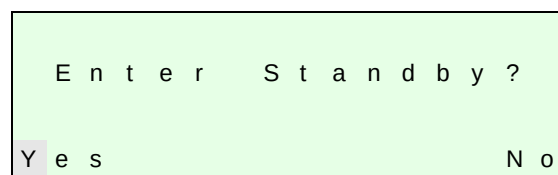
Standby Mode

Standby mode is a power saving feature that can be used for non-operational transmitters. When in standby mode, most of the transmitter's circuits are inactive, the LCD is blanked, and the transmitter cannot be keyed. To put the transmitter into standby mode, use the following procedure.

When the transmitter is in Standby mode, the red front panel Standby indicator is lit.

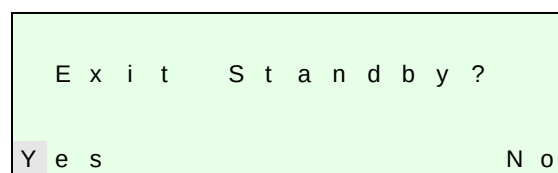
To Enter Standby Mode

- (1) From the Control screen select Standby.
- (2) At the Standby screen, select Yes.
- (3) Check that the display blanks and the front panel Standby indicator is lit.



To Exit Standby Mode

- (1) Press the Switch.
- (2) Select Yes.
- (3) Check that the Main screen is displayed and that the front panel Standby indicator is unlit.



Settings

Operational settings for the T6T 100 W VHF transmitter are configured at the front panel, through the VFP, and through an associated MARC system (or compatible control system). Some settings can also be made remotely via a T6 controller. The Settings screen is entered from the Control screen.

The settings that can be selected at the front panel Settings screen are:

- ❑ Mode - either AM-Voice, AM-MSK, Mode 2 or Mode 3
- ❑ Mode settings - allows the selected mode parameters to be set
- ❑ Polarities
- ❑ Band edges
- ❑ Backlight
- ❑ Reference frequency.

Note that the mode selection, reference frequency and backlight are set from this screen. When mode settings, polarities and band edges are selected the user is taken to other screens.

M o d e	A M V o i c e
M o d e S e t t i n g s	
P o l a r i t i e s	
E x i t	> >

Select between AM-Voice, AM-MSK, Mode 2 or Mode 3.

Select to take you to the mode specific Settings menu.

Select to take you to the Polarities menu.

B a n d E d g e s	
R e f F r e q	5 0 . 0 %
B a c k l i g h t	0 3 0 s
E x i t	< < > >

Set the transmitter's frequency band edges.

Align the transmitter's reference frequency (Note 1).

Adjust the LCD's backlight time out (Note 2).

B a c k	
E x i t	

Notes:

- Setting the transmitter reference frequency is a maintenance operation. The current value should not be reset unless the correct test equipment is connected. See the Maintenance section.
- The LCD backlight can be set for permanently on, off, or timed to stay on for a period between 15 and 120 seconds.

General and mode specific settings, showing default values, are referenced in [Table 5](#) on the following page. Click on any required parameter by page number for further references.

Table 5 Operational Settings from the Front Panel

Parameter	Mode	Adjustment Range	Factory Default Setting	Further Reference
Menu lock screen	All	Locked or unlocked	Unlocked	page 8
Enter standby mode	All	Yes or No	-	page 14
Exit standby mode	All	Yes or No	-	page 14
Set mode of operation	All	AM-Voice, AM-MSK, Mode 2 or Mode 3	AM-Voice	page 15
Set polarities	AM-Voice, AM-MSK	STD or INV	STD	page 21
Band edges	All	118.000 to 136.975 MHz	118.000 and 136.975 MHz	page 29
LCD backlight	All	15 to 120 s, On or Off	30 s	page 15
RF power	All	10 to 100 W	100 W	page 17
Audio line in level	AM-Voice, AM-MSK	-30 to +10 dBm	-13 dBm	page 17 and page 19
Inhibit	AM-Voice, AM-MSK	On or Off	Off	page 17 and page 19
PTT (key)	AM-Voice, AM-MSK	On (key), Off (de-key)	Off	page 17 and page 19
Tx time out	AM-Voice, AM-MSK	2 to 510 s or Off	180 s	page 17 and page 19
Modulation depth	AM-Voice, AM-MSK	5 to 95%	85%	page 17 and page 19
Mute	AM-Voice	On or Off	On	page 17
VOGAD	AM-Voice	On or Off	On	page 17
Antenna C/O delay	AM-Voice AM-MSK	On or Off	On Off	page 17 page 19
Offset	AM-Voice	0, ± 2.5 , ± 4 , ± 5 , ± 7.3 , ± 7.5 , ± 8 kHz	0 (No offset)	page 18
Step	AM-Voice	8.33 kHz, 25 kHz or both	25 kHz	page 18
Mic	AM-Voice	Active or Passive	Passive	page 18
Key priority	AM-Voice, AM-MSK	Local-Remote or Remote-Local	Local-Remote	page 18 and page 19
Local PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 18 and page 19
Remote PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 18 and page 19
Remote phantom PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 18 and page 19



AM-Voice Settings Procedure

During this procedure, the following parameters, applicable to AM-Voice operation, can be set:

- ❑ RF power output
- ❑ Audio line input level
- ❑ Inhibit
- ❑ PTT on (key) or off (de-key)
- ❑ Transmitter time out
- ❑ Modulation depth
- ❑ Mute (on or off)
- ❑ VOGAD (on or off)
- ❑ Antenna c/o delay (on or off)
- ❑ Offset
- ❑ Step
- ❑ Mic
- ❑ Key priority (local or remote)
- ❑ Enable or disable local PTT
- ❑ Enable or disable remote PTT
- ❑ Enable or disable remote phantom PTT.

AM-Voice Mode Settings Screen

The AM-Voice mode setting screen is accessed from the Settings screen. Use the Scroll/Select switch to select the parameter, then enter the required setting(s).

Adjustments

P o w e r	1 0 0 W
L i n e I n	- 1 3 d B m
I n h i b i t	O F F
E x i t	> >

RF power between 10 W to 100 W.

Audio line in level between -30 to +10 dBm.

On or Off.

P T T	O F F
T X T i m e o u t	1 8 0 s
M o d D e p t h	8 5 %
E x i t	< < > >

On (key), Off (de-key).

2 to 510 s.

5 to 95%.

M u t e	O N
V O G A D	O N
A n t C / O D e l	O N
E x i t	< < > >

On or Off.

On or Off.

On or Off.

Adjustments

O f f s e t	0 . 0 k H z
S t e p	2 5 k H z
M i c	P A S S I V E
E x i t	< < > >

0, ±2.5, ±4, ±5, ±7.3, ±7.5, ±8 kHz.

25 kHz, 8.33 kHz or both.

Active or Passive.

K e y P r i o r i t y L - R	
L o c a l P T T	E N
R e m o t e P T T	E N
E x i t	< < > >

Local-remote or Remote-local.

Enabled or Disabled.

Enabled or Disabled.

R e m P h a n P T T	E N
B a c k	
E x i t	< <

Enabled or Disabled.

Return to Settings screen.



AM-MSK Mode Settings Procedure

During this procedure, the following parameters, applicable to AM-MSK operation, can be set:

- ❑ RF power output
- ❑ Audio line input level
- ❑ Inhibit
- ❑ PTT on (key) or off (de-key)
- ❑ Transmitter time out
- ❑ Modulation depth
- ❑ Antenna c/o delay (on or off)
- ❑ Key priority (local or remote)
- ❑ Enable or disable local PTT
- ❑ Enable or disable remote PTT
- ❑ Enable or disable remote phantom PTT.

AM-MSK Mode Settings Screens

The AM-MSK mode setting screen is accessed from the Settings screen. Use the Scroll/Select switch to select the parameter, then enter the required setting(s).

Adjustments

P o w e r	1 0 0 W
L i n e l n	- 1 3 d B m
I n h i b i t	O F F
E x i t	> >

RF power between 10 W to 100 W.

Audio line in level between -30 to +10 dBm.

On or Off.

P T T	O F F
T X T i m e o u t	1 8 0 s
M o d D e p t h	8 5 %
E x i t	< < > >

On (key), Off (de-key).

2 to 510 s.

5 to 95%.

A n t C / O D e l	O N
K e y P r i o r i t y	L - R
L o c a l P T T	E N
E x i t	< < > >

On or Off.

Local-remote or Remote-local.

Enabled or Disabled.

R e m o t e P T T	E N
R e m P h a n P T T	E N
B a c k	
E x i t	< <

Enabled or Disabled.

Enabled or Disabled.



Mode 2 Settings Screen

This is an advisory screen. Pressing OK returns the user to the Main screen.

```
M o d e 2   p a r a m e t e r s
a r e   s e t   v i a   t h e
H L D C   i n t e r f a c e
O K
```

Mode 3 Settings Screen

This is an advisory screen. Pressing OK returns the user to the Main screen.

```
M o d e 3   p a r a m e t e r s
a r e   s e t   v i a   t h e
T 1 / E 1   i n t e r f a c e
O K
```

Polarities Screens AM-Voice and AM-MSK

A number of remote indication and control signals can be hardwire connected to the transmitter. These signals include a transmitter ready indication, a PTT control signal, a phantom PTT control signal, a PTT out indication, a transmitter inhibit control signal, an E-BIT input, a BIT test initiation control signal, an external VSWR fault indication and antenna C/O. The following paragraphs detail the signals applicable to the operational mode of the transmitter.

The Polarities screen is accessed from the Settings screen.

AM-Voice and AM-MSK Polarity Settings

Each of ten polarity settings applicable to AM-Voice and AM-MSK can be set to the default STD (standard) setting or INV (inverted).

The signal connections are shown in [Table 6](#) along with the conditions when STD or INV is selected.

The settings for the PTT Reference voltage are also shown in [Table 6](#).

R e a d y	O u t	S T D
E - B I T	I n	S T D
I n h i b i t	I n	S T D
E x i t		> >

B I T	S t a r t	I n	S T D
P T T	R e f		+ 1 4 V
P T T	I n		S T D
E x i t			> >

P h a n	P T T	I n	S T D
P T T	O u t		S T D
F a s t	P T T	O u t	S T D
E x i t			< < > >

E x t	V S W R	I n	S T D
A n t	C / O	O u t	S T D
B a c k			
E x i t			< <



Table 6 AM-Voice and AM-MSK Polarity Settings

Signal	Connector	Polarity set to STD	Polarity set to INV
Ready Out	Facilities, pin 13	An open collector grounded output when the radio is ready to transmit and no BIT faults are detected.	An open collector high impedance output when the radio is ready to transmit and no BIT faults are detected.
E-BIT In	Facilities, pin 2	TTL input. 0 V indicates an external fault.	TTL input. 5 V indicates an external fault.
Inhibit In	Facilities, pin 10	TTL input. 0 V inhibits transmitter operation.	TTL input. 5 V inhibits transmitter operation.
BIT Start In	Facilities, pin 11	TTL input. 0 V initiates an interruptive BIT test.	TTL input. 5 V initiates an interruptive BIT test.
PTT In	MARC, pin 4 MARC Audio, pin 6	Active when input differs from reference by more than 10 V. Inactive when input differs from reference by less than 1 V. Maximum input level ± 60 V with respect to reference. Input will draw no more than 6 mA, requires at least 1 mA to operate.	Active when input differs from reference by less than 1 V. Inactive when input differs from reference by more than 10 V. Maximum input level ± 60 V with respect to reference. Input will draw no more than 6 mA, requires at least 1 mA to operate.
Phantom PTT In (Phan PTT In)	MARC or MARC Audio, pin 2	Active when input differs from reference by more than 10 V. Inactive when input differs from reference by less than 1 V. Maximum input level ± 60 V with respect to reference. Input will draw no more than 6 mA, requires at least 1 mA to operate.	Active when input differs from reference by less than 1 V. Inactive when input differs from reference by more than 10 V. Maximum input level ± 60 V with respect to reference. Input will draw no more than 6 mA, requires at least 1 mA to operate.
PTT Out	Facilities, pin 3	Grounding solid state relay. +60 to -60 V, ac or dc, 100 mA max, n/o. Activated 20 ms (± 1 ms) before the start of the power ramp up to allow for the antenna relay to pull-in time.	Grounding solid state relay. +60 to -60 V, ac or dc, 100 mA max, n/c. Activated 20 ms (± 1 ms) before the start of the power ramp up to allow for the antenna relay to pull-in time
External VSWR Input (Ext VSWR In)	Facilities, pin 4	TTL input. 0 V active.	TTL input. 5 V active.
Antenna Changeover (Ant c/o out)	Facilities, pin 5 (Common pin 6)	Solid state relay. +60 to -60V, ac or dc, 100 mA max, n/o. Activated 35 ms (± 1 ms) before the start of the power ramp up to allow for the antenna relay pull-in time.	Solid state relay. +60 to -60V, ac or dc, 100 mA max, n/c. Activated 35 ms (± 1 ms) before the start of the power ramp up to allow for the antenna relay pull-in time.
Continued >>			



Table 6 AM-Voice and AM-MSK Polarity Settings (Continued)

Signal	Connector	Polarity set to STD	Polarity set to INV
Fast PTT Output (antenna change-over)	MARC Audio, pin 3	Open collector NPN transistor grounding output, 200 mA max, n/o.	Open collector NPN transistor grounding output, 200 mA max, n/c.
PTT Ref	-	PTT Ref can be set to +14 V, 0 V or -14 V. PTT. Maximum input level ± 60 V with respect to PTT reference. Input will draw no more than 6 mA, and requires at least 1 mA to operate. When the input PTT signal and the PTT reference differ by more than 10 V the radio keys. When the input PTT signal and the PTT reference are within 1 V, the radio dekeys. Other conditions are indeterminable.	PTT Ref can be set to +14 V, 0 V or -14 V. PTT. Maximum input level ± 60 V with respect to PTT reference. Input will draw no more than 6 mA, and requires at least 1 mA to operate. When the input PTT signal and the PTT reference differ by more than 10 V the radio dekeys. When the input PTT signal and the PTT reference are within 1 V, the radio keys. Other conditions are indeterminable.

Mode 2 and Mode 3 Polarity Settings

R e a d y O u t	S T D
E - B I T I n	S T D
E x t V S W R I n	S T D
E x i t	> >

Each of the three polarity settings applicable to Mode 2 and Mode 3 can be set to the default STD (standard) setting or INV (inverted).

The signal connections are detailed in [Table 7](#) along with the conditions when STD or INV is selected.

B a c k
E x i t
< <

Table 7 Mode 2 and Mode 3 Polarity Settings

Signal	Connector	Polarity set to STD	Polarity set to INV
Ready Out	Facilities, pin 13	An open collector grounded output when the radio is ready to transmit and no BIT faults are detected.	An open collector high impedance output when the radio is ready to transmit and no BIT faults are detected.
E-BIT In	Facilities, pin 2	TTL input. 0 V indicates an external fault.	TTL input. 5 V indicates an external fault.
External VSWR Input	Facilities, pin 4	TTL input. 0 V active.	TTL input. 5 V active.

AM-Voice and AM-MSK BIT Screen

The AM-Voice and AM-MSK BIT screen is accessed from the Control screen.

```

B I T   I n i t i a t e
E T I       0 0 0 0 0 : 0 0 h r s
A C   S u p p l y           O N
E x i t                               > >

```

Select to initiate BIT test.

Shows elapsed time 0:00 to 99999:59 (Hrs:Min).

Shows state of ac supply (On or Off).

```

D C   S u p p l y           O N
S u p p l y           2 8 V
S y n t h   L o c k       P A S S
E x i t                               < < > >

```

Shows state of dc supply (On or Off).

dc supply 0 to 40 V, <21.6 V Alert, <19 V Alarm.

Pass or Fail (Out-of-Lock).

```

P A   T e m p       5 0 d e g C
P A   C o o l i n g       P A S S
B a s e b a n d         P A S S
E x i t                               < < > >

```

PA temperature -20°C to +150°C.

Pass or Fail.

Pass, Fail or Not Tested.

```

R F   D r i v e       P A S S
P A   O u t p u t       P A S S
P A   L o o p         P A S S
E x i t                               < < > >

```

Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

```

M o d   D e p t h       P A S S
R F   F i l t e r s     P A S S
V S W R           P A S S
E x i t                               < < > >

```

Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

```

L o o p   E r r o r     P A S S
A u d i o   I n         P A S S
D S P 1           P A S S
E x i t                               < < > >

```

Pass or Fail.

Pass, Fail or Not Tested.

Pass or Fail.



D S P 2	P A S S	Pass or Fail.
X i l i n x 1	P A S S	Pass or Fail.
X i l i n x 2	P A S S	Pass or Fail.
E x i t	< < > >	

E E P R O M	P A S S	Pass or Fail.
S t a r t U p	P A S S	Pass or Fail.
C a l i b r a t i o n	P A S S	Pass or Fail.
E x i t	< < > >	

U n k e y e d P w r	P A S S	Pass or Fail.
E - B I T	P A S S	Pass or Fail.
M A R C	A C T I V E	Active or Inactive.
E x i t	< < > >	

H D L C	I N A C T I V E	Active or Inactive.
T 1 / E 1	I N A C T I V E	Active or Inactive.
B a c k		
E x i t	< <	

Mode 2 and Mode 3 BIT Screen

The Mode 2 and Mode 3 BIT screen is accessed from the Control screen.

```

E T I      0 0 0 0 0 : 0 0 h r s
A C   S u p p l y      O N
D C   S u p p l y      O N
E x i t      > >

```

Shows elapsed time 0:00 to 99999:59 (Hrs:Min).

Shows state of ac supply (On or Off).

Shows state of dc supply (On or Off).

```

S u p p l y      2 8 V
S y n t h   L o c k      P A S S
P A   T e m p      5 0 d e g C
E x i t      < < > >

```

Shows value of dc supply.

Synth lock (Pass or Fail).

Indicates the PA temperature.

```

P A   C o o l i n g      P A S S
V S W R      P A S S
L o o p   E r r o r      P A S S
E x i t      < < > >

```

Pass or Fail.

Pass, Fail or Not Tested.

Pass or Fail.

```

D S P 1      P A S S
D S P 2      P A S S
X i l i n x 1      P A S S
E x i t      < < > >

```

Pass or Fail.

Pass or Fail.

Pass or Fail.

```

X i l i n x 2      P A S S
E E P R O M      P A S S
S t a r t   U p      P A S S
E x i t      < < > >

```

Pass or Fail.

Pass or Fail.

Pass or Fail.

```

C a l i b r a t i o n      P A S S
E - B I T      P A S S
M A R C      A C T I V E
E x i t      < < > >

```

Pass or Fail.

Pass or Fail.

Active or Inactive.

```

H D L C      I N A C T I V E
T 1 / E 1      I N A C T I V E
B a c k
E x i t      < <

```

Active or Inactive.

Active or Inactive.

Software Configuration Screens

Software configuration screens are as follows:

```
T 6   V H F   1 0 0 W   T X
1 1 8 - 1 3 6 . 9 7 5 M H z
H i g h   S t a b i l i t y
E x i t                               > >
```

The first screen defines the radio.

```
B o o t   S o f t w a r e
6 5 - x x x x x x x x / v v

E x i t                               < <   > >
```

65-xxxxxxx represents the software part number and /v v represents its version.

```
B a s e   S o f t w a r e
6 5 - x x x x x x x x / v v

E x i t                               < <   > >
```

65-xxxxxxx represents the software part number and /v v represents its version.

```
M o d e   S o f t w a r e
6 5 - x x x x x x x x / v v

E x i t                               < <   > >
```

Current mode running. 65-xxxxxxx represents the software part number and /v v represents its version.

```
F i l l   1   S o f t w a r e
6 5 - x x x x x x x x / v v
[ D e s c r i p t i o n ]
E x i t                               < <   > >
```

65-xxxxxxx represents the software part number and /v v represents its version.

```
F i l l   2   S o f t w a r e
6 5 - x x x x x x x x / v v
[ D e s c r i p t i o n ]
E x i t                               < <   > >
```

65-xxxxxxx represents the software part number and /v v represents its version.



```
F i l l   3   S o f t w a r e
6 5 - x x x x x x x x / v v
[ D e s c r i p t i o n ]
```

65-xxxxxxx represents the software part number
and /v v represents its version.

```
F i l l   4   S o f t w a r e
6 5 - x x x x x x x x / v v
[ D e s c r i p t i o n ]
```

65-xxxxxxx represents the software part number
and /v v represents its version.

Band Edges

The frequency range of the T6 100 W transmitter is 118 to 136.975 MHz. If required, transmission can be limited to either one or two smaller parts of the frequency band by setting the band edges, BE1 to BE4. Transmission is possible between BE1 and BE2 frequencies, and between BE3 and BE4 frequencies.

B E 1	1 1 8 . 0 0 0 M H z
B E 2	1 3 6 . 9 7 5 M H z
B E 3	1 1 8 . 0 0 0 M H z
E x i t	> >

B E 4	1 3 6 . 9 7 5 M H z
E x i t	< <

The Band Edge screen is accessed from the Control screen.

Band edge frequencies can be set only in increments of 25 kHz.

If the transmitter is required to operate over the full range, the band edge parameters must be set to the lowest and highest values in the range (see [Table 8](#)).

Table 8 Band Edge Settings

	BE1	BE2	BE3	BE4
B63100HS/NB set so that the full frequency range can be transmitted.	118.000	136.975	118.000	136.975
<i>Example:</i> Transmitter set to transmit only those frequencies in the range 120 to 130 MHz.	120.000	130.000	120.000	130.000
<i>Example:</i> Transmitter set to transmit only those frequencies in the ranges 120 to 125 MHz and 130 to 135 MHz.	120.000	125.000	130.000	135.000

BIT Status Warning Screens

The following shows some example BIT screens. These screens alternate with the Main screen when an alert or alarm condition is present. Only the parameters causing the alert or alarm are displayed, and if both an alert and alarm condition exists simultaneously only the alarm information is displayed. If multiple parameters are signalling an alert or alarm condition, multiple screens are used to display the status alternating with the Main screen.

A L E R T		
S u p p l y		2 1 V

Alert:

There is no RF power reduction. The Alarm indicator is flashing.

A L E R T		
R F P o w e r R e d u c e d		
L o o p E r r o r		
S u p p l y		2 1 V

Alert:

The RF output power is reduced between 1 and 3 dB. The Alarm indicator is flashing.

A L E R T		
R F P o w e r R e d u c e d		
P A T e m p		8 5 d e g C

Alert:

The RF output power is reduced between 1 and 3 dB. The Alarm indicator flashing

A L A R M		
R F P o w e r R e d u c e d		
V S W R		F A I L

Alarm:

The RF output power reduced by more than 3 dB. The Alarm indicator is lit.

A L A R M		
R F P o w e r R e m o v e d		
L o o p E r r o r		F A I L
S u p p l y		1 8 V

Alarm:

The RF output power is shut down. The Alarm indicator is lit.

A L A R M		
R F P o w e r R e m o v e d		
P A T e m p		9 5 d e g C

Alarm:

The RF output power is shut down. The Alarm indicator is lit.

Table 9 Functions and Parameters

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
FREQUENCY							
Change frequency	✓	✓	✓	✓	✓	✓	118.000 MHz
FREQUENCY CHANNELS							
Store/Recall preset frequency channels	✓	✓	✓	✓	X	X	-
SETTINGS							
Set modulation mode	✓	✓	✓	✓	✓	✓	AM-Voice
Radio Settings (AM Modes)							
Set RF output power	✓	✓	✓	✓	✓	✓	100 W
Set audio input line level	✓	✓	✓	X	✓	X	-13 dBm
Set inhibit on or off	✓	✓	✓	X	X	X	Off
PTT test facility on (key), off (de-key)	✓	✓	View state	X	✓	X	Off
Set Tx time out	✓	✓	✓	X	✓	X	180 s
Set modulation depth	✓	✓	✓	✓	✓	X	85%
Set mute on or off (AM-Voice only)	✓	✓	✓	X	X	X	On
Set VOGAD on or off (AM-Voice only)	✓	✓	✓	X	X	X	On
Set antenna C/O delay on or off	✓	✓	✓	X	X	X	AM-Voice - On AM-MSK - Off
Set frequency offset (AM-Voice only)	✓	✓	✓	X	X	X	0 (No offset)
Set frequency step size (AM-Voice only)	✓	✓	X	X	X	X	25 kHz
							Continued >>

Table 9 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Set microphone type (active or passive) (AM-Voice only)	✓	✓	X	X	X	X	Passive
Set keying priority (local or remote)	✓	✓	X	X	X	X	Local-Remote
Enable or disable local PTT	✓	✓	X	X	X	X	Enabled
Enable or disable remote PTT	✓	✓	X	X	X	X	Enabled
Enable or disable remote phantom PTT	✓	✓	X	X	X	X	Enabled
Radio Settings (Digital Modes)							
MAC TM1 (inter access delay)	X	✓	X	X	X	✓	2.5 ms
MAC TM2 (channel busy)	X	✓	X	X	X	✓	60 s
MAC p (persistence)	X	✓	X	X	X	✓	13/256
MAC M1 (maximum number of access attempts)	X	✓	X	X	X	✓	135
Scramble vector	X	✓	X	X	X	✓	4D4B 19787
Tx enable	X	✓	X	X	X	✓	On
Polarities							
Ready out	✓	✓	View state	X	X	X	STD
Set PTT input polarity (AM modes only)	✓	✓	View state	X	X	X	STD
Set phantom PTT input polarity (AM modes only)	✓	✓	View state	X	X	X	STD
Continued >>							

Table 9 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Set PTT reference voltage (AM modes only)	✓	✓	View state	X	X	X	+14 V
Set PTT output polarity (AM modes only)	✓	✓	View state	X	X	X	STD
Set fast PTT antenna change-over output polarity (AM modes only)	✓	✓	View state	X	X	X	STD
Set antenna change-over output polarity (AM modes only)	✓	✓	View state	X	X	X	STD
Set external VSWR input polarity (All modes)	✓	✓	View state	X	X	X	STD
Set inhibit input polarity (AM modes only)	✓	✓	View state	X	X	X	STD
BIT interruptive test input polarity (AM modes only)	✓	✓	View state	X	X	X	STD (active low)
E-bit input polarity (All modes)	✓	✓	View state	X	X	X	STD (active low)
Band Edges							
Set band edges	✓	✓	X	X	X	X	118.000 and 136.975 MHz
Reference Frequency							
Adjust transmitter's reference frequency	✓	✓	X	X	X	X	-
LCD Backlight							
Adjust LCD backlight	✓	✓	X	X	X	X	30 s
							Continued >>
BIT							

Table 9 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Initiate BIT interruptive test	✓	✓	✓	✓	✗	✗	-
STANDBY							
Enter and exit standby facility	✓	✓	✓	✓	✗	✗	Not in Standby
SOFTWARE CONFIGURATION							
View the transmitter's software configuration	✓	✓	✗	✗	✓	✓	-
LOCK FACILITIES							
Front panel lock	✗	✓	✗	✗	✗	✗	Off
MARC lock	✗	✓	✗	✗	✗	✗	Off
T1/E1 lock	✗	✓	✗	✗	✗	✗	Off
HDLC lock	✗	✓	✗	✗	✗	✗	Off



Intentionally Blank



Installation

This topic gives the information required to install a T6T VHF 100 W Multimode Transmitter.



Warnings and Cautions

WARNING



Dangerous Voltages

The instructions given in this topic involve connecting dangerous voltages to the transmitter and should be carried out only by suitably qualified personnel.

WARNING



Dangerous Voltages

The equipment is permanently connected to the mains supply when the mains connector is attached. Switching the rear panel Power switch to off does not isolate all internal circuits from the mains supply. For this reason, a mains isolating switch should be fitted close to, and easily accessible from, the transmitter's position. The isolation switch should isolate both live and neutral supplies, be clearly labelled, and adequately rated to protect the equipment.

WARNING



Antenna Radiation

The antenna used with the transmitter must be installed such that the resultant radiated field strength is below 10 W/m² in areas normally accessible to personnel.

Caution



ESSDs

The T6T transmitter's circuitry contains Electrostatic Sensitive Devices (ESSDs). Personnel must be aware of the precautions necessary to prevent damage to such devices. During installation all precautions necessary to prevent ESSD damage must be taken.

Caution



Unauthorized Modifications

Changes or modifications made to this equipment that are not expressly approved by Park Air, or parties authorized by Park Air, could void the user's authority to operate the equipment.



Introduction

The procedures necessary to install a transmitter are listed in [Table 1](#).

Table 1 Installation Procedures

Procedure		Reference
1	Read and understand the warnings and cautions given on page 2 .	
2	Perform an initial inspection of the transmitter and fit the correct ac input fuse.	page 9
3	Fit the transmitter into an equipment cabinet.	page 9
4	Make external signal connections. See Fig 1 to Fig 5 to determine which external connections are required for the particular configuration.	page 10
5	Connect the chassis stud to the cabinet or system earth.	page 22
6	Connect the antenna.	page 22
7	Connect the dc input supply (if required).	page 22
8	Connect the ac input supply (if required).	page 23

Fuses and Connectors

The following list details the radio's supply fuses and connectors. Some of the connectors (depending on your particular configuration) are required during installation.

Table 2 Fuses and Connectors

Component	Type	Park Air Part Number
Fuses:		
AC input fuses, F3, F4 for 110/120 V input	T4A, 125V, UL	29C11120102S
AC input fuses, F3, F4 for 220/230 V input	T4A, 250V, IEC	29E01120108S
DC input fuses, F1, F2	15A size 0	29-01350201
Connectors:		
AC supply connectors	IEC	20-02030102
DC supply connectors	XLR 3-pin	20-01030106
Antenna connector	N-type plug	19-01030301
MARC connector	9-way D-type plug	Plug: 20-01090100 Cover: 20-09090101
MARC audio	RJ48 plug	20K01080100
MARC data	RJ48 plug	20K01080100
Facilities connector	15-way D-type plug	Plug: 20-01150100 Cover: 20-09150101
HDLC connector	RJ48 plug	20K01080100
T1/E1 connector	RJ48 plug	20K01080100
Reference connector	SMB connector	19C01050300
Microphone/Diagnostics connector	7-pin DIN plug	20-01070101



Configuration

Connection of external equipment depends on the configuration required. Possible configurations are:

- ❑ T6T transmitter configured for local operation (see Fig 1).
- ❑ T6T transmitter configured for remote operation (see Fig 2).
- ❑ T6T transmitter configured for use with MARC (see Fig 3).
- ❑ T6T Mode 2 configuration (see Fig 4).
- ❑ T6T Mode 3 configuration. (see Fig 5).

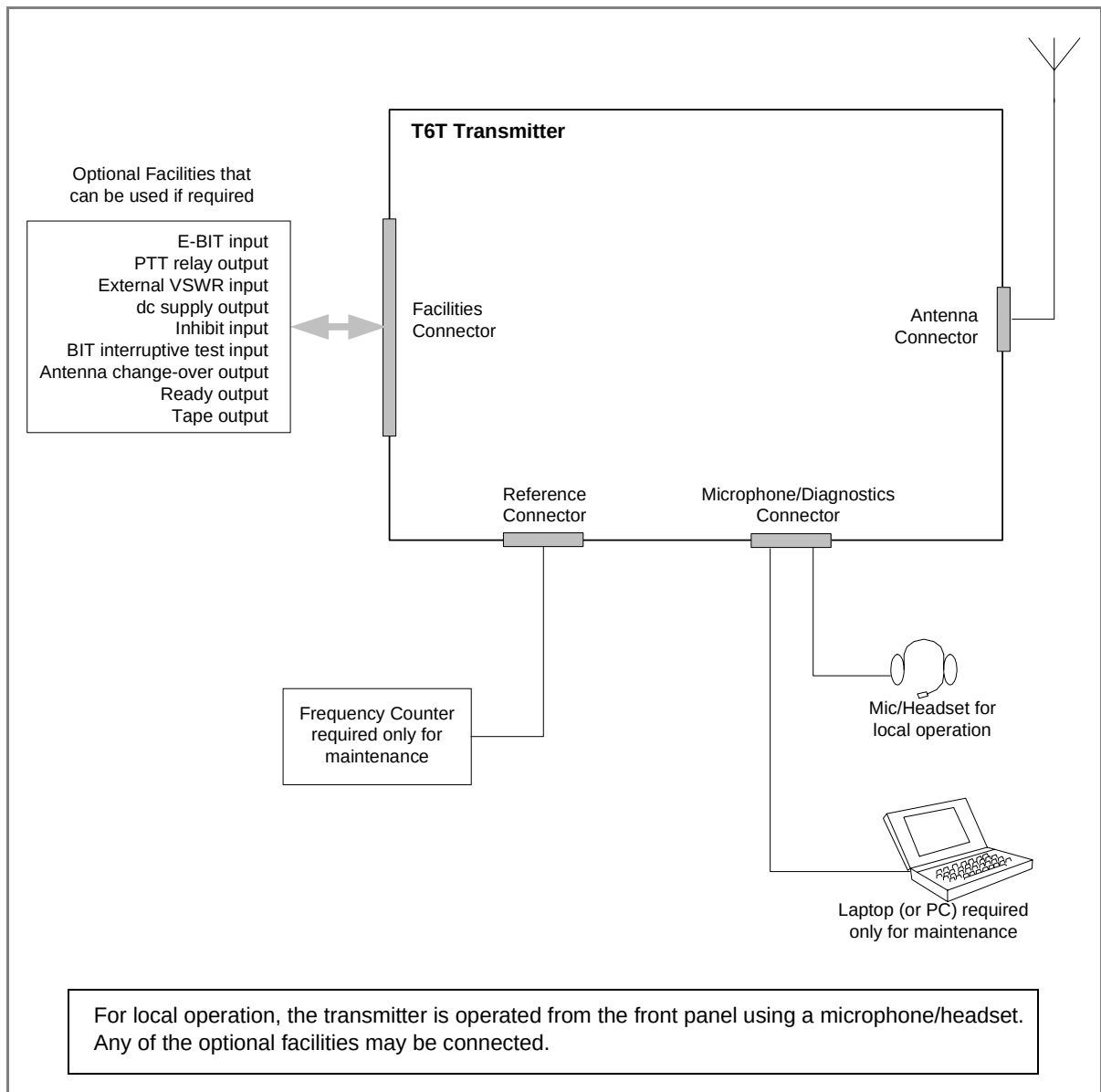


Fig 1 T6T Transmitter Configured for Local Operation

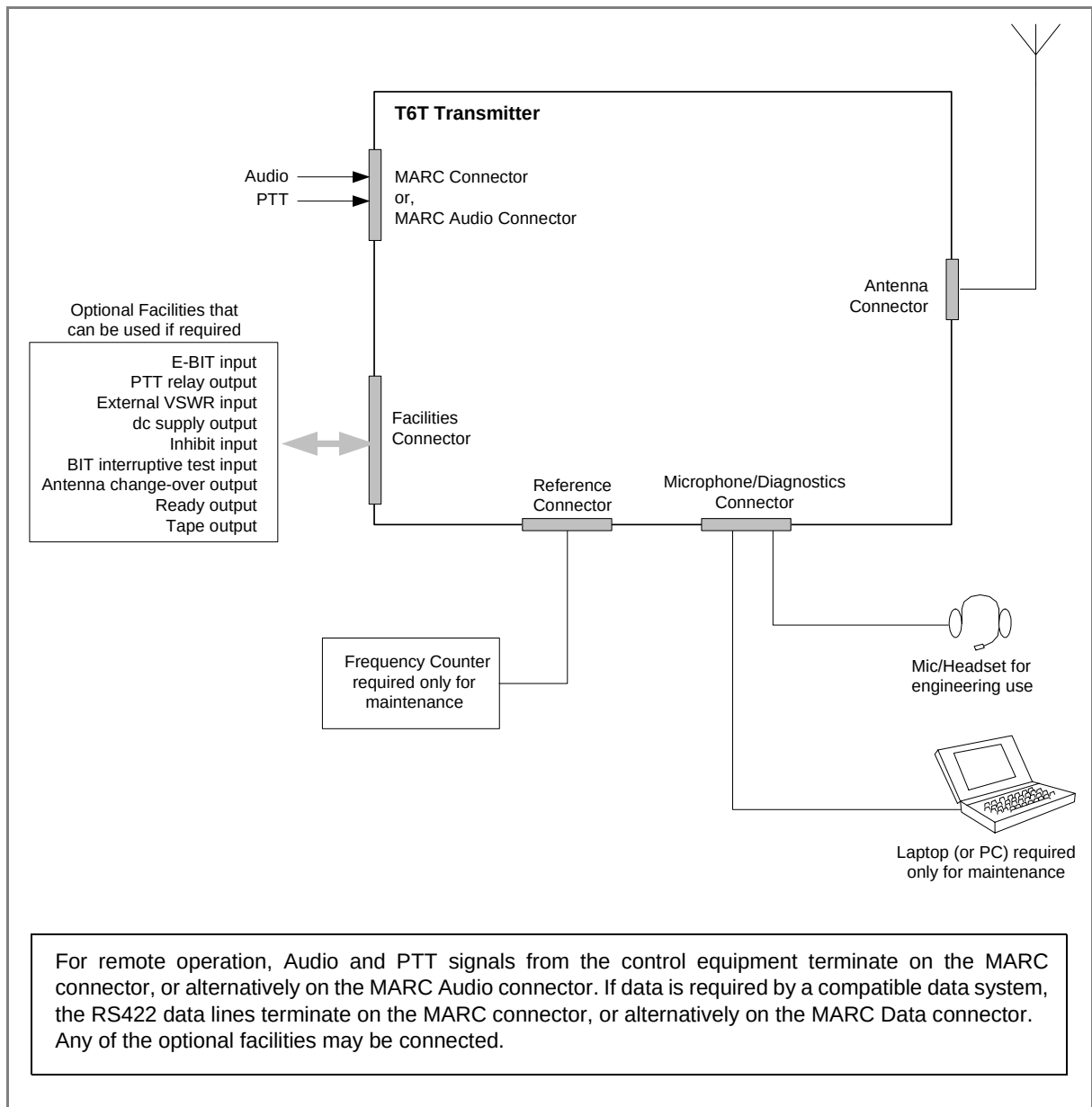


Fig 2 T6T Transmitter Configured for Remote Operation

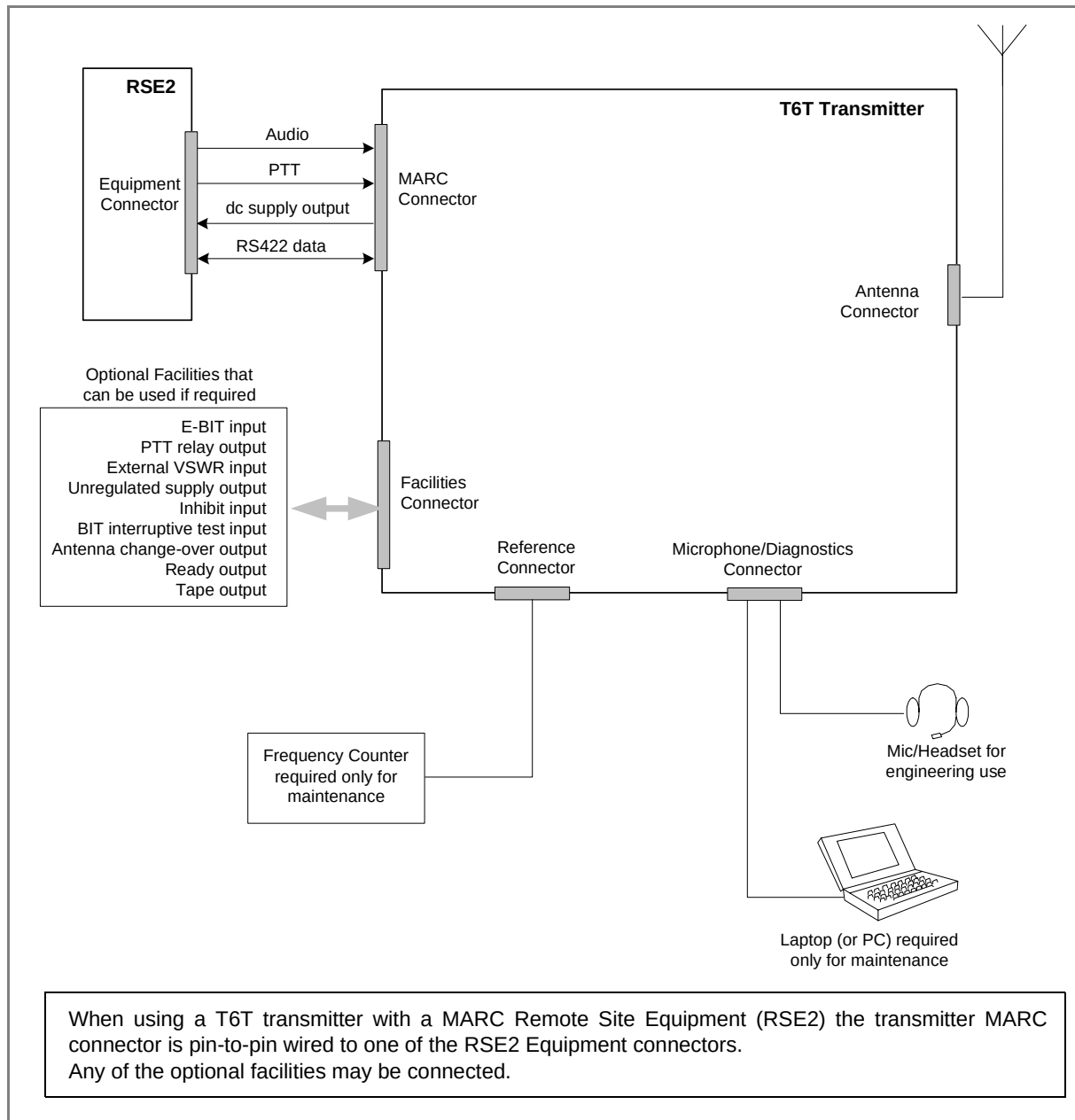


Fig 3 T6T Transmitter Configured for use with MARC

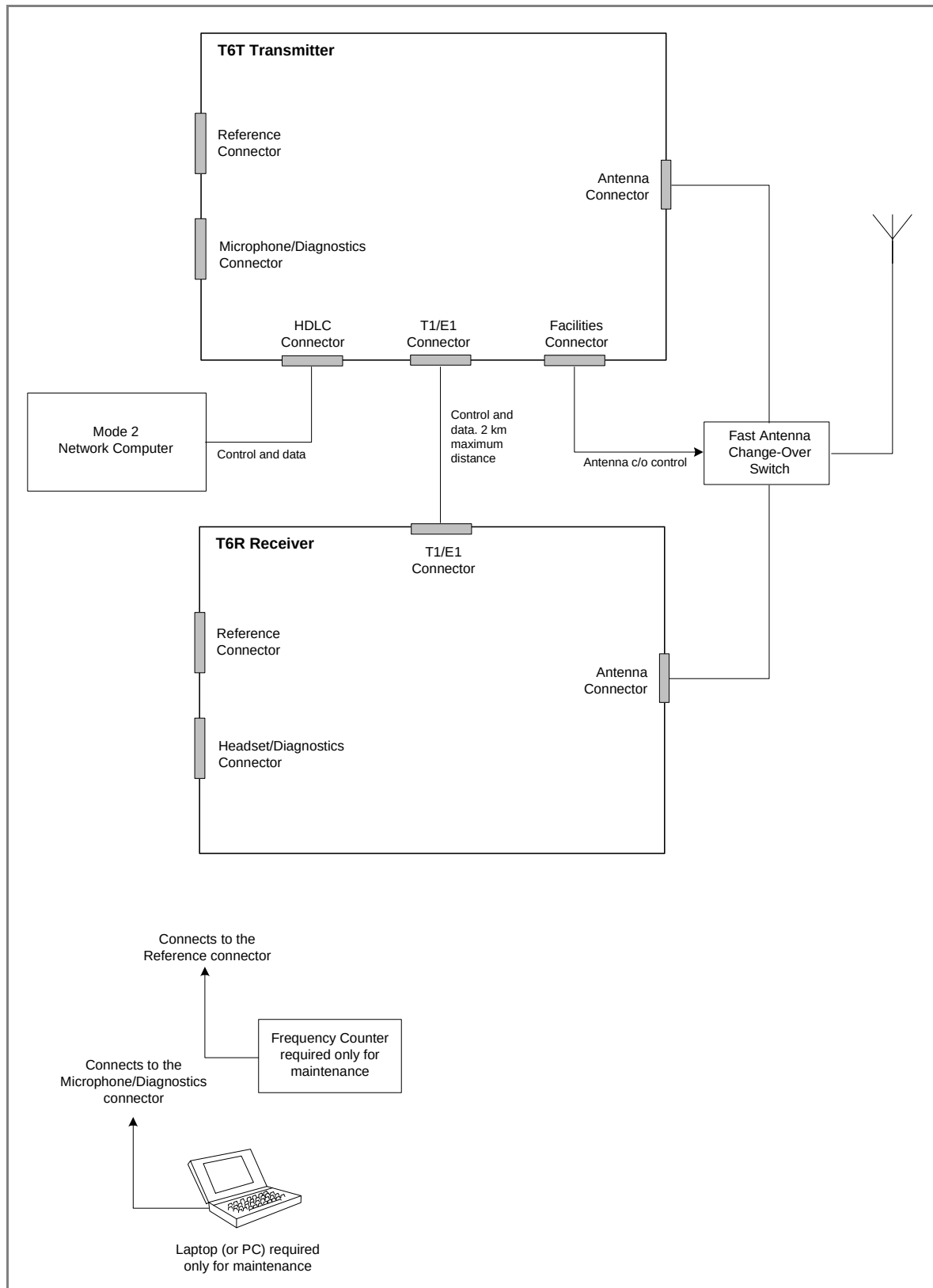


Fig 4 T6T Transmitter Mode 2 Configuration

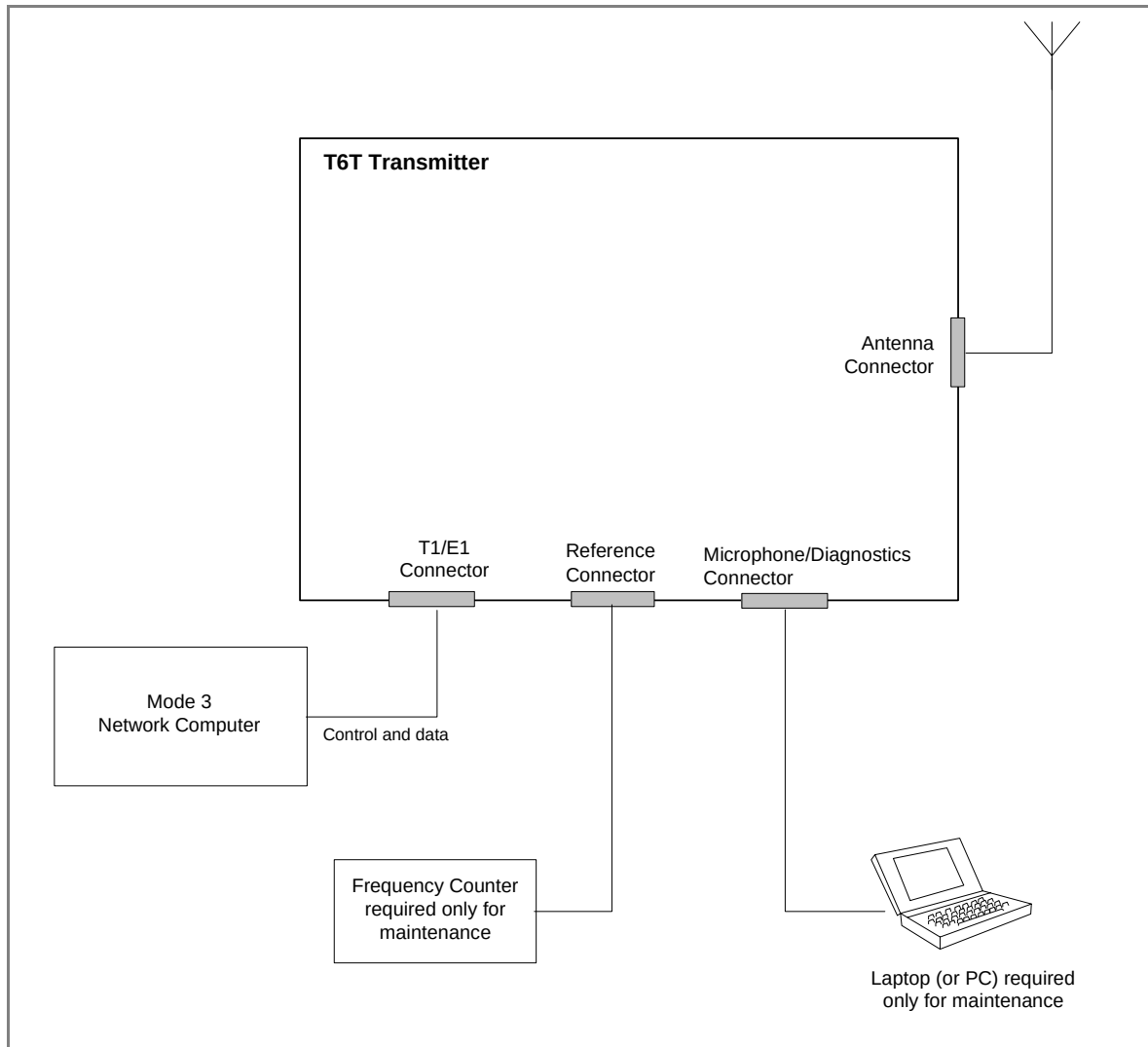


Fig 5 T6T Transmitter Mode 3 Configuration



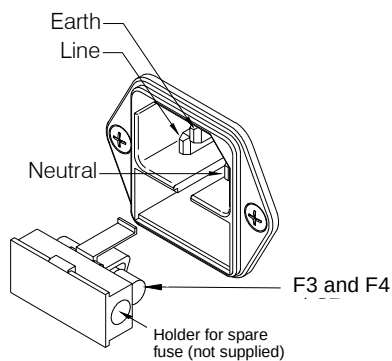
Installation Procedures

Initial Inspection of the Transmitter

On receipt of the transmitter, remove all transit packaging and check that there is no damage. If damage is evident, contact Park Air immediately and retain the original transit packaging. One copy of the T6 User Documentation CD (part number 31-36T62VCD) is normally supplied with the transmitter. This CD includes the VFP software.

Fitting the Correct AC Input Fuses

The mains input fuses, F3 and F4, are an integral part of the rear panel ac connectors. The fuse type must be correct for the local mains supply as detailed below.



For a mains input in the range 110 to 120 Vac, fuses F3 and F4 should be rated T4A, 125V, UL.

For a mains input in the range 220 to 230 Vac, fuses F3 and F4 should be rated T4A, 250V, IEC.

Fitting a Radio into an Equipment Cabinet

Caution



Mechanical Support

It is essential that the chosen mechanical installation provides adequate support along the depth (front to rear) of the unit. The transmitter must not be supported by the front panel; doing so can cause damage.

The transmitter can be installed on telescopic slides, or on fixed runners, within a standard 483 mm (19 inch) equipment cabinet. M4 tapped holes, each 10 mm deep (see [Fig 6](#)) are provided on each side of the equipment to accept the slides. Details of suitable telescopic slides and fixed runners are available from Park Air.

When fitted in the cabinet, the transmitter's front panel must be secured to the cabinet's chassis using four M6 x 16 mm screws and plastic washers.

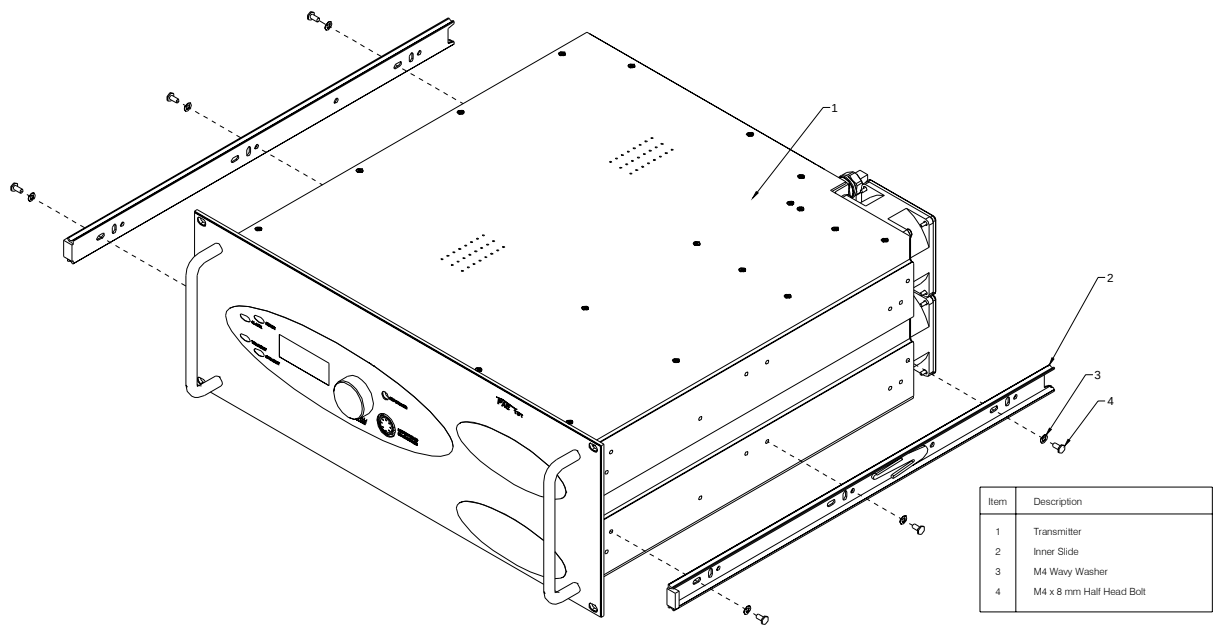


Fig 6 Slide Fittings

Make External Signal Connections

Making the external signal connections involves configuring the transmitter to suit its operational mode. Illustrations showing various configurations are shown in Fig 1 to Fig 5; these figures should be used only as a guide.

Front Panel Connectors

The front panel has two connectors; Microphone/Diagnostics and Reference connectors. These are illustrated in Fig 7.

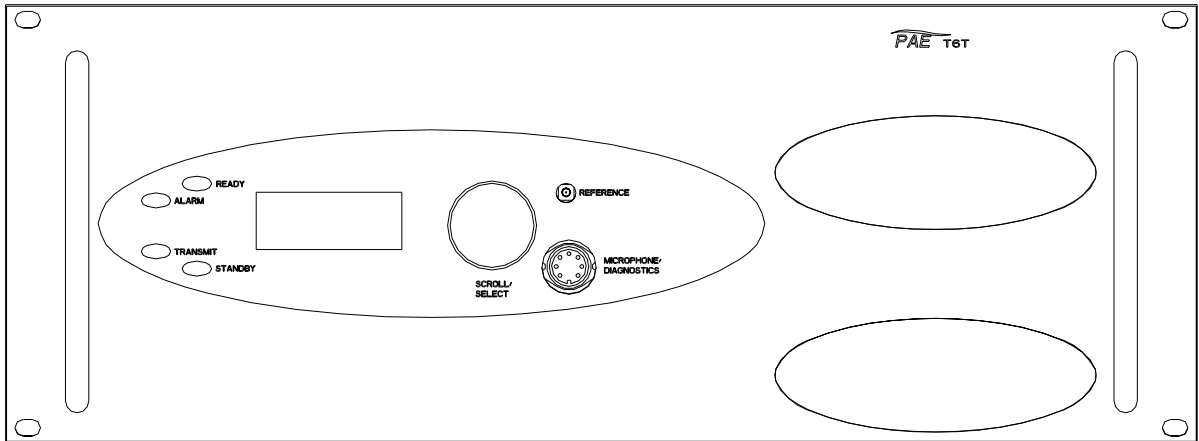
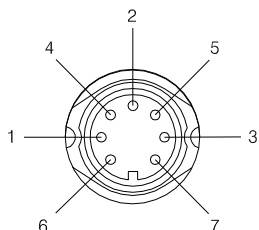


Fig 7 Front Panel



Microphone/Diagnostics Connector

The Microphone/Diagnostics connector is a self-locking 7-way DIN socket used for connecting a microphone, microphone/headset or PC. The connector pin-out is detailed in Table 3.



Pin-out of the Microphone/Diagnostics connector looking into the mating face of the chassis mounted socket.

A suitable free socket is detailed in [Table 2 on page 3](#).

Table 3 Microphone/Diagnostics Connector

Pin Number	Signal	Characteristic	Usage
1	Microphone ground	0 V.	Microphone/Headset
2	Transmit data	RS232. 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.	PC
3	Microphone PTT	0 V to PTT.	Microphone/Headset
4	Receive data	RS232. 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.	PC
5	Sidetone	–	Microphone/Headset
6	Microphone input	To ensure correct VOGAD operation, the following microphone input levels are required: Passive setting: between 2 and 35 mV Active setting: between 8 and 140 mV.	Microphone/Headset
7	Ground	0 V.	PC

Reference Connector

The Reference connector is an SMB plug used to monitor the radio's reference frequency. It monitors the frequency at a level of 100 mV (± 50 mV) with less than -10 dBc harmonics.

Rear Panel Connectors

The rear panel connectors are shown in Fig 8 and listed in Table 4. Select which connectors are going to be used and then make connections as required.

Table 4 Rear Panel Connector Usage

Connector	Type	Usage
AC supply	2 x IEC	Terminating the ac input supply.
DC supply	2 x XLR 3-pin	Terminating the dc input supply.
Antenna	N-type	Terminating the antenna feeder coaxial cable.
External speaker	3.5 mm stereo jack	Connects an external loudspeaker for monitoring sidetone.
MARC	9-way D-type	Used to connect to a MARC remote site equipment. Used to connect a T6 controller or hub. Used to terminate remote audio and PTT signals when a remote site equipment or T6 controller is not used.
MARC audio	RJ48	Used as an alternative to the MARC connector for terminating remote audio and PTT signals.
MARC data	RJ48	Used as an alternative to the MARC connector for terminating data signals to and from a compatible data system.
Facilities	15-way D-type	Provides a number of optional facilities that can be used as required.
T1/E1	RJ48	Used for connecting the radio to a Mode 3 network computer, connecting a transmitter and receiver together as a Mode 2 base station, or for connecting to a digital voice and data network.
HLDC	RJ48	Used to connect to a Mode 2 network computer.

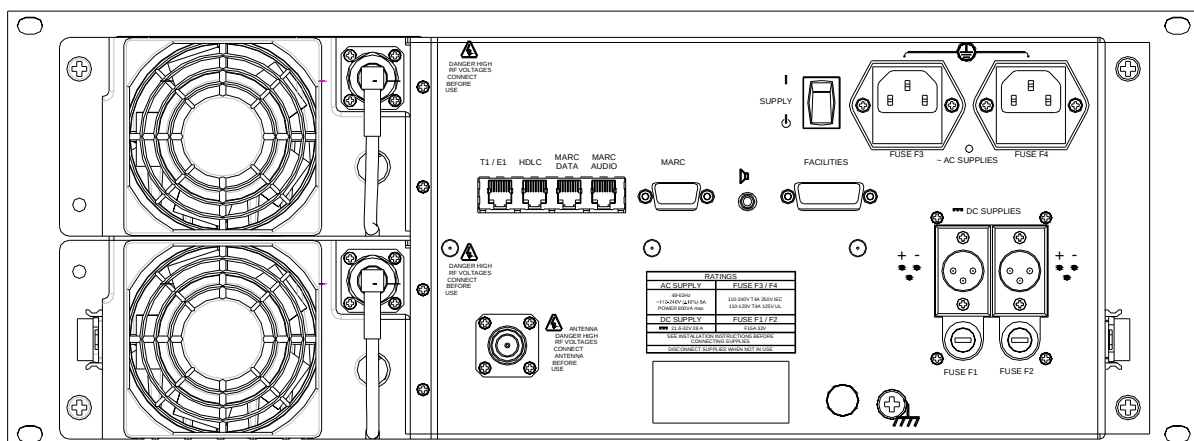


Fig 8 Rear Panel (Connectors)

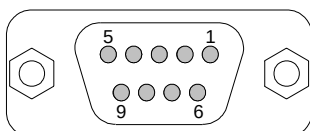


MARC Connector

The MARC connector is a 9-way D-type socket used to connect the transmitter to a MARC remote site equipment, or it can also be used for normal remote operation.

As an alternative to using this connector, the RJ48 style MARC Audio and MARC Data connectors can be used to provide the same functions.

The MARC connector pin-out is shown below and detailed in Table 5.



Pin-out of MARC connector looking into the mating face of the chassis mounted socket.

A suitable free socket is detailed in [Table 2 on page 3](#).

Table 5 MARC Connector

Pin Number	Signal	Characteristic
1	Ground	0 V.
2 3	Audio line in (+) Audio line in (-)	Balanced 600 ohm, -20 to +20 dBm. Phantom keying can be superimposed on the audio lines. See Fig 10 .
4	PTT input	Remote PTT signal input. See Fig 9 .
5	Output supply	This output is between 21.6 and 32 Vdc (nominally 28 V) fused at 500 mA.
6 7	Data in (+) Data in (-)	RS422 differential asynchronous data at 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
8 9	Data out (+) Data out (-)	RS422 differential asynchronous data at 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.

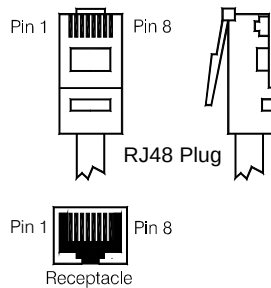
Note ...

The line level figures shown for the MARC connector are the limits when testing the transmitter using a sine wave; the line level will be 10 dB above the line level setting. See the information supplied under the heading 'Line Level Setting' in Operation.



MARC Audio Connector

The MARC Audio connector is an 8-way RJ48 socket. It can be used as an alternative to the MARC connector for audio and PTT connections. The connector pin-out is shown below and detailed in Table 6.



Numbering is shown looking from the top of the connector.
The top is being viewed when the lever is on the bottom.

Table 6 MARC Audio Connector

Pin Number	Signal	Characteristic
1	Audio line in (-)	Balanced 600 ohm, -20 to +20 dBm.
2	Audio line in (+)	Phantom keying can be superimposed on the audio lines. See Fig 10 .
3	Fast antenna change-over/PTT (output)	Open collector NPN transistor grounding output, 200 mA max, configurable n/o or n/c.
4	Not used	-
5	Not used	-
6	PTT (input)	Remote PTT signal input. See Fig 9 .
7	Ground	0 V.
8	Not used	-

Note ...

The line level figures shown for the MARC Audio connector are the limits when testing the transmitter using a sine wave; the line level will be 10 dB above the line level setting. See the information supplied under the heading 'Line Level Setting' in Operation.

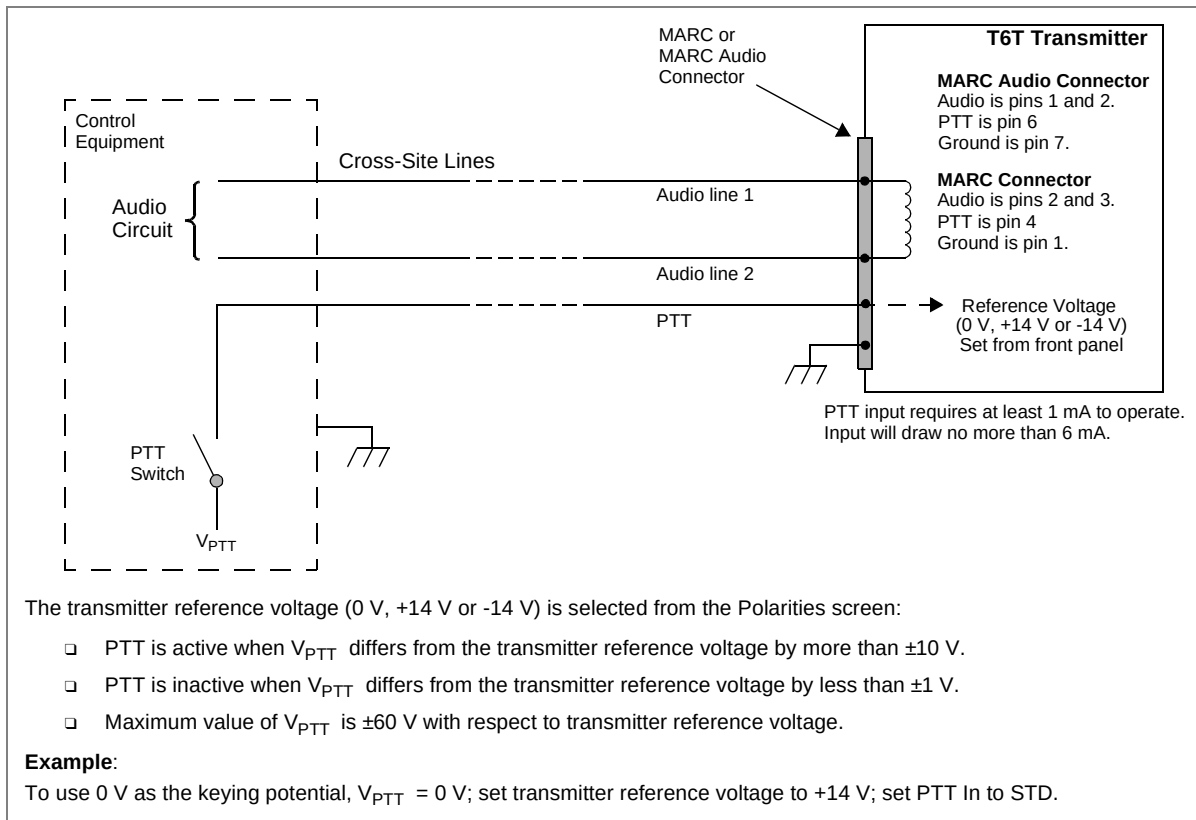


Fig 9 Remote Keying

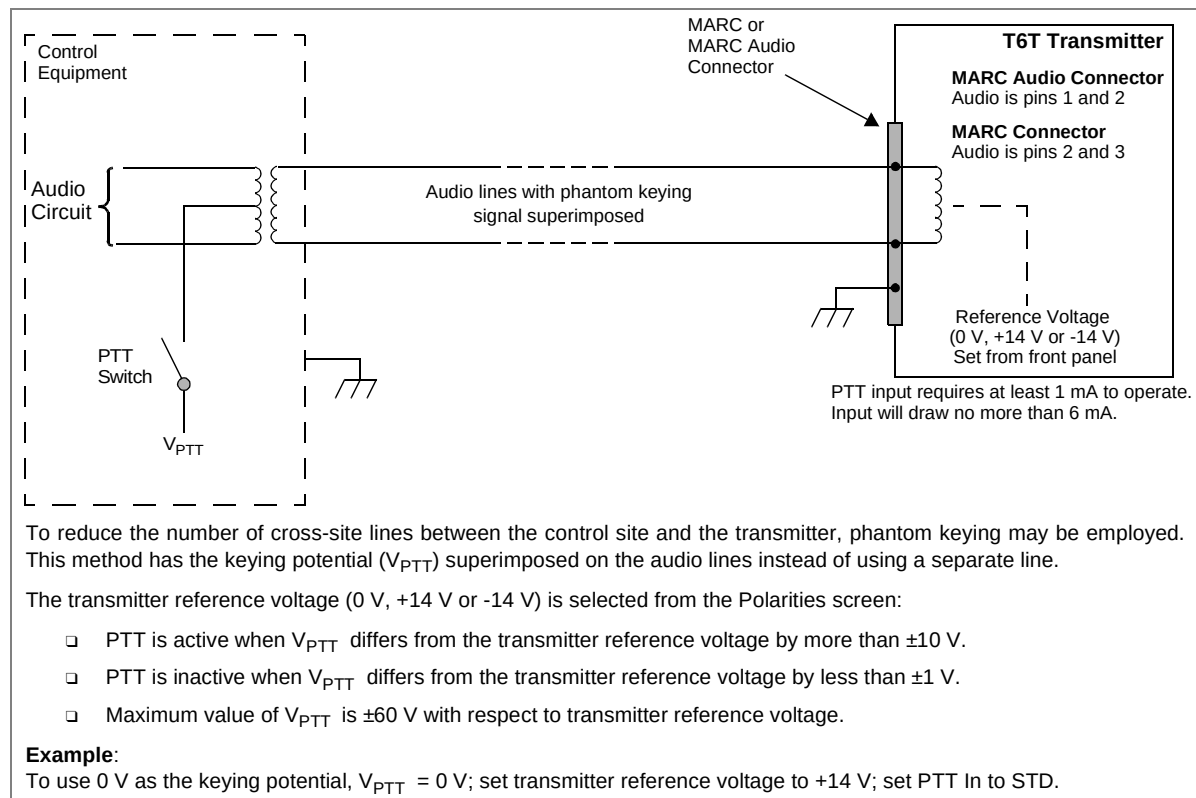
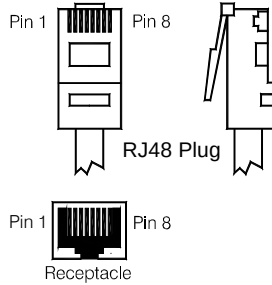


Fig 10 Phantom Keying



MARC Data Connector

The MARC Data connector is an 8-way RJ48 socket. It can be used as an alternative to the MARC connector for data connections. The connector pin-out is shown below and detailed in Table 7.



Numbering is shown looking from the top of the connector. The top is being viewed when the lever is on the bottom.

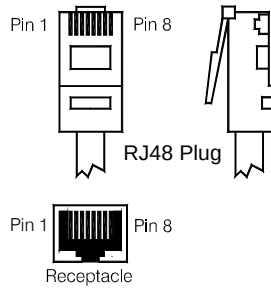
Table 7 MARC RJ48 Data Connector

Pin Number	Signal	Characteristic
1	Data in (-)	RS422 differential asynchronous data, 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
2	Data in (+)	
3	Not connected	-
4	Data out (+)	RS422 differential asynchronous data, 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
5	Data out (-)	
6	Remote supply ON/OFF	0 V to switch off. Note: Rear panel switch must be in the ON position for this function to operate.
7	Ground	0 V.
8	Output supply	This output is between 21.6 and 32 Vdc (nominally 28 V) fused at 500 mA.



T1/E1 Connector

The T1/E1 connector is an 8-way RJ48 socket used for connecting to a Mode 3 network computer or connecting a transmitter and receiver together when operating as a Mode 2 base station. The connector pin-out is detailed in Table 8.



Numbering is shown looking from the top of the connector.
The top is being viewed when the lever is on the bottom.

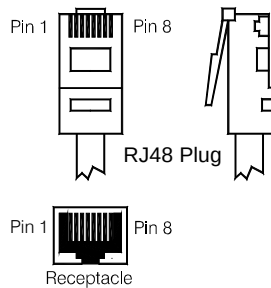
Table 8 T1/E1 Connector

Pin	Signal	Characteristic
1	RRing	T1 - Balanced 100 ohm ($\pm 10\%$), 1.544 Mbits per second (± 50 ppm), AMI/B8ZS Coding. E1 - Balanced 120 ohm ($\pm 10\%$), 2.048 Mbits per second (± 50 ppm), AMI/HDB3 Coding. Protected with 28 V differential and common mode clamp and 1.25 A fuse in each line.
2	RTip	
3	Not connected	-
4	TRing	T1 - Balanced 100 ohm ($\pm 10\%$), 1.544 Mbits per second (± 50 ppm), AMI/B8ZS Coding. E1 - Balanced 120 ohm ($\pm 10\%$), 2.048 Mbits per second (± 50 ppm), AMI/HDB3 Coding. Protected with 28 V differential and common mode clamp and 1.25 A fuse in each line.
5	TTip	
6	Not connected	-
7	Not connected	-
8	Not connected	-



HDLC Connector

The HDLC connector is an 8-way RJ48 socket used for connecting to a Mode 2 network computer. The connector pin-out is detailed in Table 9.



Numbering is shown looking from the top of the connector.
The top is being viewed when the lever is on the bottom.

Table 9 HDLC Connector

Pin	Signal	Characteristic
1	HDLC RX A (input)	RS422 differential synchronous data, 128 kbytes per second (± 50 ppm).
2	HDLC RX B (input)	
3	HDLC CL A (output)	RS422 differential synchronous data, 128 kbytes per second (± 50 ppm).
4	HDLC TX B (output)	RS422 differential synchronous data, 128 kbytes per second (± 50 ppm).
5	HDLC TX A (output)	
6	HDLC CL B (output)	Pair to pin 3.
7	Ground	0 V.
8	Output supply	This output is between 21.6 and 32 Vdc (nominally 28 V) fused at 500 mA.



External Speaker

The External Speaker connector is a 3.5 mm stereo jack used for connecting an external speaker to the transmitter to provide sidetone. This speaker should be a high impedance active type.

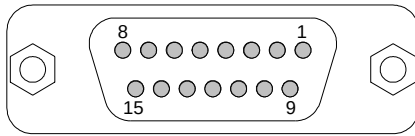
Table 10 External Speaker

Pin	Signal	Characteristic
Tip	Speaker drive (output)	0 to 3 V pk-pk. Connected directly to Ring.
Ring	Speaker drive (output)	0 to 3 V pk-pk. Connected directly to Tip.
Sleeve	Ground	0 V.



Facilities Connector

The Facilities connector is a 15-way D-type filtered socket used for connecting to associated parts of a system. The connector pin-out is detailed in Table 11.



Pin-out of Facilities connector looking into the mating face of the chassis mounted socket.

A suitable free socket is detailed in [Table 2 on page 3](#).

Table 11 Facilities Connector

Pin Number	Signal	Characteristic
1	Ground	0 V.
2	E-BIT (input)	An external BIT input that connects from any ancillary equipment having a compatible BIT alarm output. When this input is active, the transmitter's front panel Alarm indicator flashes and an E-BIT message is displayed on the display. The input is TTL having a 4.7 kohm pull-up resistor to 5 V. The input is configurable from the front panel to be active high or low.
3	PTT output	Grounding solid state relay. +60 to -60 V, ac or dc, 100 mA max, configurable n/o or n/c. Activated 35 ms (± 1 ms) before the start of the power ramp up to allow for the antenna relay pull-in time.
4	External VSWR input	Used to indicate an external VSWR fault. TTL input with 4.7 kohm pull-up to 5 V. Configurable active high or low.
5	Antenna change-over (output)	Solid state relay linked to pin 6. See Fig 11 for further detail.
6	Antenna change-over common (output)	Solid state relay linked to pin 5.
7	Not used	-
8	Ground	0 V.
9	Output supply	This output is between 21.6 and 32 Vdc (nominally 28 V) fused at 500 mA.
10	Inhibit (input)	Active signal prevents the transmitter keying. TTL with 4.7 kohm pull-up to 5 V. Configurable active high or low.
11	BIT interruptive test (input)	Active signal initiates a BIT test. TTL with 4.7 kohm pull-up to 5 V. Configurable active high or low. Must be asserted for >300 ms.
12	Not used	-
13	Ready (output)	An output that is active when the radio is ready to transmit and no faults are detected. Open collector NPN transistor grounding output, 200 mA max, configurable n/o or n/c.
14	Tape (output)	An audio output for connection to a recording system. 0 dBm fixed output into 600 ohm for 90% modulation depth.
15	Reserved (output)	Do not connect to pin 15 unless advised to do so by Park Air.

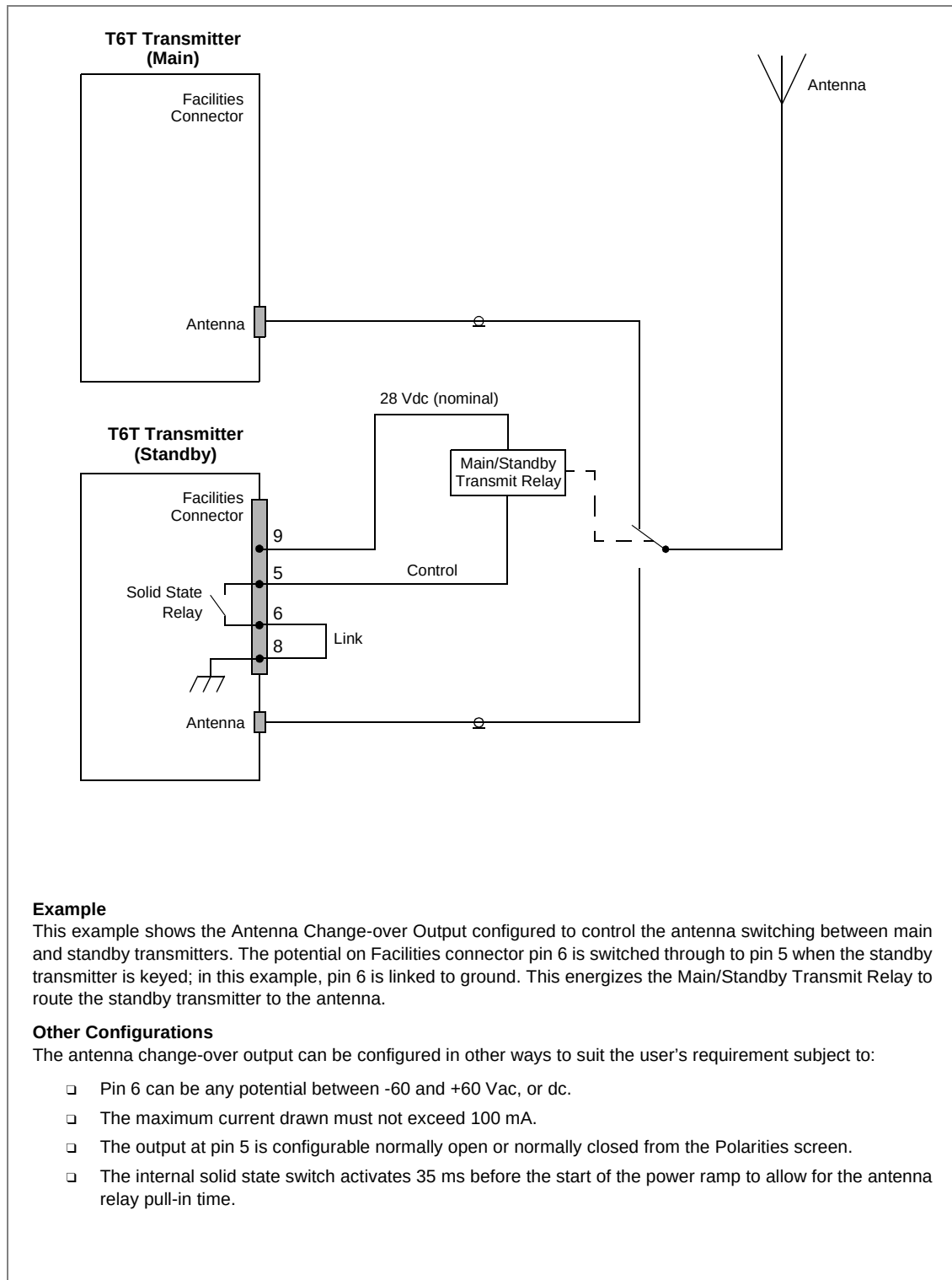


Fig 11 Example: Using the Antenna Change-over Output



Chassis Stud Connection

WARNING



Chassis Earth

A chassis stud is fitted to the transmitter's rear panel. This stud is used to connect the equipment to the equipment cabinet, or to the user's system earth point. The stud must not be used as the safety earth.

In order not to compromise the transmitter's Electromagnetic Compatibility (EMC) the chassis stud, marked  and fitted to the rear panel must be connected to the equipment cabinet (if a cabinet is being used) or to the user's system earth point. The connection should be made using a single tri-rated, green-and-yellow cable having a cross-sectional area of 2.5 mm². The cable should have CSA and UL1015 approval, and be connected to the chassis stud through an M6 eyelet (for example, Park Air part number 20-08010103).

Failure to comply with this instruction could result in non-compliance with the European Commission EMC Directive 89/336/EEC.

Connect the Antenna

The antenna connector is an N-type socket suitable for connecting a 50 ohm antenna.

Connect the DC Input Supply

The transmitter operates from either an ac, or a dc input supply. When both ac and dc are connected, operation from the ac supply takes priority; automatic change-over to the dc supply occurs if the ac supply fails. On restoration of the ac supply, the equipment reverts to ac operation.

The dc input supply connectors (see Fig 12) are fitted to the transmitter rear panel. The recommended minimum rating of the dc supply cables is: 2-core having a cross-sectional area of 1.5 mm² per core. The supply cables should be fitted with XLR 3-pin connectors (Park Air part number 20-01030106).

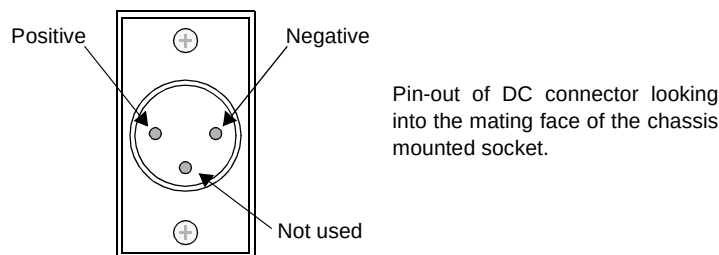


Fig 12 DC Connectors



Connect the AC Input Supply

WARNING



Dangerous Voltages

The equipment is permanently connected to the mains supply when the mains connector is attached. Switching the rear panel Power switch to off does not isolate all internal circuits from the mains supply. For this reason, a mains isolating switch should be fitted close to, and easily accessible from, the transmitter's position. The isolation switch should isolate both live and neutral supplies, be clearly labelled, and adequately rated to protect the equipment.

WARNING



Earth Connection

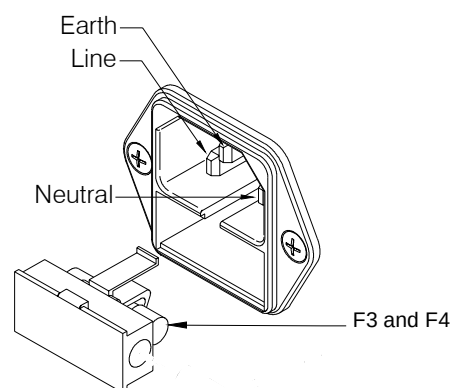
This equipment must be earthed. The earth terminal of the ac connector should be used as the safety earth.

Two ac input connectors are fitted to the transmitter rear panel. The cables used to connect between the equipment and the ac power source should be 3-core (to IEC 227) rated 250 Vac at 8 amps, and have a minimum cross-sectional area of 1.0 mm² per core. Park Air recommends the use of polyvinyl chloride (PVC) insulated cable. The cable must be fitted with the IEC approved equipment connector and conform to the following specification:

- ❑ If PVC insulated, be not lighter than ordinary polyvinyl chloride sheathed flexible cord according to IEC publication 227 (designation H05 VV-F, or H05 VVH2-F).
- ❑ If rubber insulated, be of synthetic rubber and not lighter than ordinary tough rubber-sheathed flexible cord according to IEC publication 245 titled 'Rubber Insulated Cables of Rated Voltages up to and Including 450/750 V (designation H05 RR-F)'.

The T6T 100 W transmitter is a Class 1 equipment. The ac supply cables should have a green-and-yellow protective earthing conductor electrically connected to the protective earthing terminal of the equipment connector and the mains plug. Park Air recommends the ac supply cable is colour coded in accordance with the electrical appliance (colour code) regulations for the UK. That is:

- ❑ The core coloured green-and-yellow must be connected to the terminal in the plug that is marked with the letter E or by the earth symbol or coloured green-and-yellow.
- ❑ The core coloured blue must be connected to the terminal that is marked with the letter N or coloured black.
- ❑ The core coloured brown must be connected to the terminal that is marked with the letter L or coloured red.





Switching On



Dangerous Voltages

When the Power switch is set to the Standby position, dangerous voltages are still present in the transmitter's internal power supply circuitry. To ensure safe working, the transmitter must be isolated from the ac and dc input supplies.

When installation is complete, the transmitter should be switched on at the rear panel 2-way rocker Power switch. The Power switch is used to switch on, and switch off, power to the transmitter's circuitry but does not remove power from the radio.

 = On

 = Standby

Under normal circumstances this screen is displayed for a few seconds when the radio is switched on.

```
T 6   D i g i t a l   R a d i o
( c ) 2 0 0 3   P a r k   A i r
I n i t i a l i s i n g . . . .
. . . . .
```

The bottom row begins empty and dots are added as the initialisation progresses. When the initialisation is complete the Main Screen is displayed.

Setting Up

When installation has been successfully completed the transmitter must be set up using the front panel controls or the VFP.

Setting up is detailed in the Operation section of this documentation.



When setting up the transmitter, pay particular attention to the Polarities of any functions that have been hardwired during installation. For example, the polarity of the PTT input and the polarity and configuration of the Antenna Change-over output. Failure to select the correct settings will result in incorrect operation.



Maintenance

This topic gives scheduled maintenance procedures, details module replacement, and describes how to use the Virtual Front Panel (VFP).



Introduction

This section gives the scheduled and unscheduled maintenance procedures for the T6T 100 W transmitter and shows how to use the Virtual Front Panel (VFP).

Scheduled Maintenance	A scheduled maintenance procedure is given on page 3. Park Air recommends that this task be completed every twelve months.
Unscheduled Maintenance	Normally, the T6 transmitter is considered a Line Replaceable Unit (LRU) and should be replaced with a serviceable spare if a fault occurs. The faulty transmitter should then be returned to Park Air for repair. In certain circumstances, Park Air Customer Support may suggest that the user change one of the transmitter modules. Dismantling and assembly instructions are therefore given under the heading Unscheduled Maintenance starting on page 7.
Using the VFP	Operating parameters can be set from the transmitter front panel, or by using the VFP. Some additional functions are available from the VFP. See page 22 .

Configuration

T6 radios are configured in respect of hardware and software.

Hardware Configuration

The radio's hardware configuration is identified by the modification level. A modification label is fitted to the radio's rear panel showing the model of radio, the radio's part number and the radio's serial number.

The modification (Mod) record shows the configuration status. In the example shown, the radio is at Mod strike 8.



Modification Label

Software Configuration

A white label fitted to the top cover lists the radio's software configuration.

In this example there are three fills: AM-Voice, Mode 2 and Mode 3.

Software Configuration			2K1234
Part Order No.	B63100HS/NB		
Software	Mode	Part No.	
Fill 1	AM_VOICE	65-00000465	
Fill 2	2	65-00000466	
Fill 3	3	65-00000467	
Fill 4			

Software Configuration Label

Replacement Modules

To ensure compatibility when replacing a radio or a module, the configuration should be the same (see the previous headings: Hardware and Software Configuration).

Spare modules received from Park Air are supplied with a Spares Instruction that details the configuration of the module and any special instructions. If in any doubt regarding the suitability of spare modules contact [Park Air Customer Support](#).



Scheduled Maintenance

Park Air recommends that scheduled maintenance is carried out at twelve-monthly intervals. Scheduled maintenance comprises the following checks:

Number	Check	Tools/Test Equipment Required
1	Ensure the equipment is clean and that external connectors are securely fitted.	Camel hair brush/clean lint-free cloths
2	Check and reset (if required) the transmitter's internal frequency reference.	VHF frequency counter
3	Perform a BIT interruptive test.	
4	Perform an ac and dc change-over check (if both supplies are connected).	

Cleaning and Checking Security of Connectors

Remove all dust and dirt from the equipment exterior using a lint-free cloth and camel hair brush. Check all external connections are secure and free from damage.

Setting the Transmitter Internal Reference Frequency

To set the transmitter internal reference frequency, use the following procedure. Note that references to the switch in the procedure mean the Scroll/Select switch.

- (1) Ensure the transmitter does not have an offset.
- (2) Connect a frequency counter to the front panel Reference connector.
- (3) From the Main screen, press the switch to display the Control screen. Turn the switch until Settings is highlighted. Press the switch.
- (4) Ensure the Settings screen is displayed. Turn the switch until Ref Freq is highlighted, then press the switch.
- (5) With Ref Freq selected turn the switch clockwise or anti-clockwise until the frequency counter reads 20.950000 MHz $\pm$ 10 Hz, then press the switch.
- (6) Turn the switch clockwise until Exit is highlighted, then press the switch. You are returned to the Main screen.
- (7) Disconnect the frequency counter.

F r e q u e n c y
C h a n n e l
S e t t i n g s
E x i t

Control Screen

B a n d	E d g e s	
R e f	F r e q	5 0 . 0 %
B a c k	l i g h t	0 3 0 s
E x i t		< < > >

Settings Screen



- (8) If not using 5-carrier offset, refer to AM-Voice Mode Settings Screen in the Operation section of this document and set to the required offset.
- (9) If 5-carrier offset is required, restore the carrier offset using the following routine:
 - ❑ Connect a 50 ohm frequency counter, through a 60 dB attenuator, to the transmitter rear panel Antenna connector (see [Fig 5](#) for location of the Antenna connector)
 - ❑ Refer to AM-Voice Mode Settings Screen in the Operation section of this document and set the desired 5-carrier offset
 - ❑ Refer to Changing the Transmitter Operating Frequency in the Operation section and set the transmitter to the nearest 25 kHz channel frequency. For example, if the required frequency is 124.504 (+4 kHz offset), set the transmitter to 124.500 MHz
 - ❑ Key the transmitter and adjust the reference frequency, using the front panel Scroll/Select switch, until the frequency counter displays the required operating frequency. For example 124.504 MHz
 - ❑ When the frequency counter displays the exact operating frequency, press the Scroll/Select switch and stop keying the transmitter
 - ❑ Disconnect the test equipment and reconnect the antenna.



To Initiate a BIT Test

An interruptive BIT test cannot be initiated in Mode 2 or Mode 3.

During an interruptive BIT test, the transmitter radiates modulated carrier waves at the set power. Users should therefore obtain the necessary authority before initiating a test.

If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transmitter's Antenna connector.

In order to test the line input stages, an internally generated 1 kHz tone is injected into the line input circuit. Any other audio present on the line input will cause the test to be inaccurate. Therefore the transmitter MUST NOT be keyed during the test.

- (1) From the Main screen, press the switch to display the Control screen. Turn the switch until BIT is highlighted. Press the switch.

```

B I T
S / W   C o n f i g
S t a n d b y
E x i t                               < <
  
```

- (2) Ensure the BIT menu is displayed. Turn the switch until BIT Initiate is highlighted. Press the switch.

```

B I T   I n i t i a t e
E T I       0 0 0 0 0 : 0 0 h r s
A C   S u p p l y           O N
E x i t                               > >
  
```

- (3) During the test, which takes approximately two seconds, the Testing screen is displayed.

```

           T e s t i n g
        P l e a s e   W a i t
  
```

- (4) After the test, either a Pass or Fail screen is displayed. Selecting OK takes the user back to the BIT screen.

```

           T e s t   S t a t u s

           P A S S

                                   O K
  
```

- (5) If fail is displayed, scroll through the screen to check the cause of the failure.

```

           T e s t   S t a t u s

           F A I L

                                   O K
  
```



AC and DC Change-over Check

If both ac and dc input supplies are connected to the transmitter, carry out the following check:

- (1) Confirm that both ac and dc supplies are connected to the transmitter. Ensure that the rear panel Power switch is set to the I (on) position.
- (2) Confirm that the front panel Ready indicator is lit, the LCD is illuminated, and the transmitter is operational.
- (3) Switch off the ac supply from its source.
- (4) Check that the transmitter continues to operate correctly from the dc supply. If accessed, the front panel BIT screen will show AC Supply as off, and DC Supply as on. The value of the dc supply is also shown.



Unscheduled Maintenance

WARNING



Dangerous Voltages

The instructions given in this section involve connecting dangerous voltages to the transmitter. Maintenance should be carried out only by suitably qualified personnel.

When an ac supply is connected, dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry during maintenance or alignment procedures.

When the Power switch is set to the Standby position, dangerous voltages are still present in the transmitter's internal power supply circuitry. To ensure safe working, the ac and dc input supplies must be disconnected from the transmitter.

WARNING



Antenna Radiation

The antenna used with the transmitter must be installed such that the resultant radiated field strength is below 10 W/m² in areas normally accessible to personnel.

Caution



ESSDs

The T6 transmitter circuitry contains Electrostatic Sensitive Devices (ESSDs). Personnel must be aware of the precautions necessary to prevent damage to such devices.

Caution



Unauthorized Modifications

Changes or modifications made to this equipment that are not expressly approved by Park Air, or parties authorized by Park Air, could void the user's authority to operate the equipment.

Caution



Repairs

When carrying out repairs to the PA module, care must be taken not to damage the gasket. If the strips become damaged, they must be replaced. Failure to comply with this instruction may compromise the transmitter Electromagnetic Compatibility (EMC) and breach European Commission regulations.

When screws are inserted into the transmitter PA casting care must be taken not to exceed a torque of 6 lbs/inch when tightening. This applies when replacing the top and bottom covers and during the refitting of the PA modules.



Introduction

This document provides the user with detailed instructions on the removal and replacement of modules and assemblies. When removing or refitting modules, observe antistatic handling precautions. Do not change any potentiometer (or link) settings unless detailed in these instructions. Potentiometers have been set using specialist equipment.

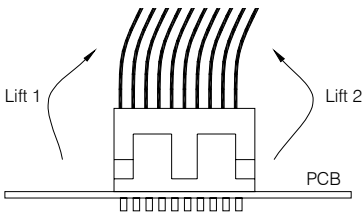
Molex KK Connectors

The transmitter uses the following Molex KK connectors:

- ❑ CN2 on the PA Control module
- ❑ CN7 and CN6 on the PSU Regulator module.

To remove KK type connectors:

- ❑ Free the locking mechanism on the connector by moving one side of the connector up, then move the other side up (see the following diagram). The upward motion should only be as far as needed to free the locking mechanism
- ❑ DO NOT pull the cable to free the connector
- ❑ Note that KK type connectors are designed to be removed in this manner to free the locking mechanism. Do not use this procedure with non-KK type connectors as damage to the connector may occur.



Tools, Materials and Test Equipment Required

The following tools, materials and test equipment should be made available to complete the maintenance tasks described in this section.

❑ Personal Computer (PC) ❑ General Purpose Tool Kit (including a 1.5 mm Allen key) ❑ 5 mm Nut Spinner ❑ Camel Hair Brush ❑ Clean Lint-free Cloths	❑ Frequency Counter ❑ Power Meter ❑ Dummy Load ❑ PC to Radio Interconnection Lead (Park Air part number 17E12600001) ❑ SMB to BNC Lead for Reference Frequency (Park Air part number 17K11000004)
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Top and Bottom Covers

One of the top cover screws is covered with a warranty label that should not be tampered with unless Park Air Customer Support has advised otherwise. When authorisation has been made the following procedures should be followed.

To remove the top cover, locate and unscrew the 19 countersunk screws securing the top cover to the mainframe. Access can then be gained to the Processor module and PSU Regulation module.

To remove the bottom cover, locate and unscrew the 15 countersunk screws securing the bottom cover to the mainframe. Access can then be gained to the PA Control module.

The following modules require both top and bottom covers to be removed:

- ❑ Power Supply modules
- ❑ Combiner BIT module
- ❑ PA modules
- ❑ Front Panel assembly PCB.

Removing and Refitting the Processor Module

The Processor module is located as shown in [Fig 5](#). A module removal diagram is shown in [Fig 8](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the Processor module, and if possible, save the radio settings. Connect a PC with the VFP software loaded to the radio using the PC to Radio Interconnection Lead (Park Air part number 17E12600001). With the VFP software active, upload the radio settings to a specified file.

Ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Unscrew the 19 countersunk screws and remove the transmitter top cover.
- (2) Locate the Processor module and disconnect the following connectors ([Fig 8](#)):
 - ❑ CN1 50-way connector (50-way ribbon cable from PA Control module CN1)
 - ❑ CN3 14-way connector (14-way ribbon cable from PSU Regulator module CN4)
 - ❑ CN4 34-way connector (34-way ribbon cable from Front Panel module CN1).
- (3) Gain access to the rear of the transmitter. Using a 5 mm nut spinner tool, remove the four screwloc 8 mm-4-40 UNC stud spacers that secure the Processor module interface connectors CN5 and CN6 to the rear panel.
- (4) Remove the seven M3 x 8 mm screws that secure the module to the transmitter mainframe.
- (5) Remove the module from the chassis.



Refitting

To refit the Processor module, proceed as follows:

- (1) Place the module in position. Ensure no wires are trapped by the module. Ensure jumper J2 on the module is set to 'T' for transmitter (see Fig 1).

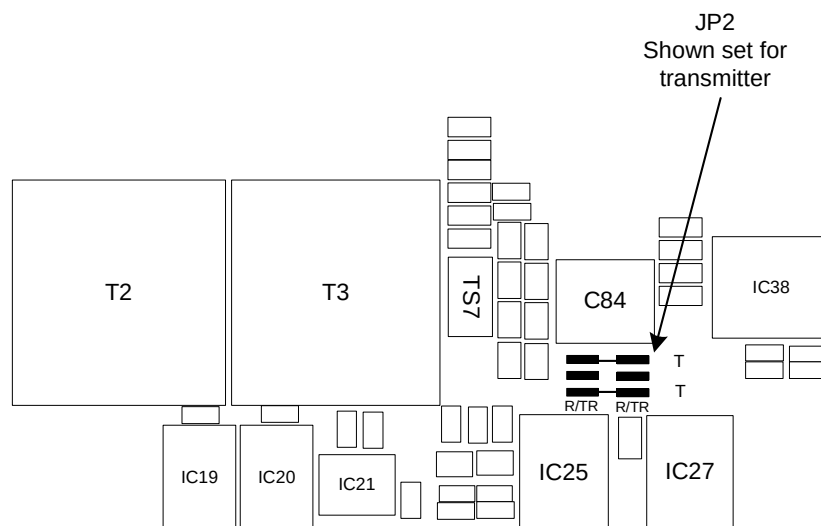


Fig 1 Processor Module JP2 Location

- (2) Ensure the module interface connectors CN5 and CN6 are located correctly and are aligned with the screw holes in the rear panel. Fit the four screwloc 8 mm-4-40 UNC screws and wavy washers but leave them loose.
- (3) Fit the seven M3 x 8 mm screws that secure the module to the transmitter mainframe, but leave them loose.
- (4) Using a 5 mm nut spinner tool, tighten the four screwloc 8 mm-4-40 UNC screws and wavy washers that secure the connectors; then tighten the seven M3 x 8 mm screws that secure the module to the transmitter mainframe.
- (5) Refit the following connectors to the module:
 - ❑ CN1 50-way connector (50-way ribbon cable from PA Control module CN1)
 - ❑ CN3 14-way connector (14-way ribbon cable from PSU Regulator module CN4)
 - ❑ CN4 34-way connector (34-way ribbon cable from Front Panel module CN1).
- (6) Re-establish the ac and/or dc supplies.
- (7) Switch power on at the radio using the rear mounted Power switch.
- (8) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (9) If a new module has been fitted, connect the VFP PC to the radio using the PC to Radio Interconnection Lead, Park Air part number 17E12600001 (if not already connected). Note that any module sent from Park Air as a spare for a particular radio will be programmed with compatible operating and Fill software. Park Air keeps records of module software in all radios supplied. Care must be taken when using a module removed from another radio as this module may not have compatible software.
- (10) Download the saved radio settings from file using the VFP. Alternatively the settings can be edited by hand as described in the Operation section of this document. Once entered, ensure the required settings appear in the VFP screen.



- (11) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure [To Calibrate the Transmitter on page 26](#).
- (12) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (13) Set the transmitter internal reference frequency by carrying out the procedure detailed on [page 3](#).
- (14) Set the rear panel Power switch to Standby and remove the VFP connector. Isolate the transmitter from the ac and/or dc supplies.
- (15) Refit the transmitter top cover. The transmitter can now be returned to service.

Removing and Refitting the PSU Regulator Module

The PSU Regulation module is located as shown in [Fig 5](#). A module removal diagram is shown in [Fig 9](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the PSU Regulation module, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Unscrew the 19 countersunk screws and remove the transmitter top cover.
- (2) Locate the PSU Regulation module and remove the three M3 x 8 mm captive washer screws that secure the module to the transmitter mainframe.
- (3) Carefully raise the module to gain access to the module connectors.
- (4) Disconnect the following connectors:
 - ❑ CN5 10-way connector (10-way ribbon cable to PA Control module CN6)
 - ❑ CN6 6-way connector (6-way loom to Combiner BIT module CN12)
 - ❑ CN4 14-way connector (14-way ribbon cable to Processor module CN3)
 - ❑ CN3 3-way connector (part of loom to Combiner BIT module CN7)
 - ❑ CN7 3-way connector (3-wire loom to rear panel On/Off switch)
 - ❑ CN2 2-way connector (part of loom to Combiner BIT module CN7)
 - ❑ CN1 4-way connector (part of loom to Combiner BIT module CN7)
- (5) Remove the module from the chassis.



Refitting

To refit the PSU Regulator module, proceed as follows:

- (1) While holding the module in position, connect the following connectors:
 - ❑ CN1 4-way connector (part of loom to Combiner BIT module CN7)
 - ❑ CN2 2-way connector (part of loom to Combiner BIT module CN7)
 - ❑ CN7 3-way connector (3-wire loom to rear panel On/Off switch)
 - ❑ CN3 3-way connector (part of loom to Combiner BIT module CN7)
 - ❑ CN4 14-way connector (14-way ribbon cable to Processor module CN3)
 - ❑ CN6 6-way connector (6-way loom to Combiner BIT module CN12)
 - ❑ CN5 10-way connector (10-way ribbon cable to PA Control module CN6).
- (2) Locate the module in position. Ensure no wires are trapped by the module.
- (3) Secure the module to the transmitter mainframe using the three M3 x 8 mm captive washer screws removed during disassembly.
- (4) Re-establish the ac and/or dc supplies.
- (5) Switch power on at the radio using the rear mounted Power switch.
- (6) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (7) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (8) Set the rear panel Power switch to Standby. Isolate the transmitter from the ac and/or dc supplies.
- (9) Refit the transmitter top cover. The transmitter can now be returned to service.



Removing and Refitting the PA Control Module

The PA Control module is located as shown in [Fig 5](#). A module removal diagram is shown in [Fig 10](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the PA Control module, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Unscrew the 15 countersunk screws and remove the transmitter bottom cover.
- (2) Locate the PA Control module and disconnect the following connectors:
 - ❑ CN1 50-way connector (50-way ribbon cable from Processor module CN1)
 - ❑ CN6 10-way connector (10-way ribbon cable from PSU Regulator module CN5)
 - ❑ CN5 SMB connector (reference frequency from front panel)
 - ❑ CN3 SMB connector (RF drive to Combiner BIT module CN16)
 - ❑ CN4 SMB connector (forward power sense from Combiner BIT module CN27)
 - ❑ CN2 6-way connector (6-wire loom to Combiner BIT module CN15).
- (3) Remove the eight M3 x 8 mm captive washer screws that secure the module to the mainframe.
- (4) Remove the module from the chassis.

Refitting

To refit the PA Control module, proceed as follows:

- (1) Place the module in position. Ensure no wires are trapped by the module.
- (2) Fit the eight M3 x 8 mm captive washer screws, previously removed, that secure the module to the mainframe.
- (3) Refit the following connectors to the module:
 - ❑ CN2 6-way connector (6-wire loom to Combiner BIT module CN15)
 - ❑ CN4 SMB connector (forward power sense from Combiner BIT module CN27)
 - ❑ CN3 SMB connector (RF drive to Combiner BIT module CN16)
 - ❑ CN5 SMB connector (reference frequency from front panel)
 - ❑ CN6 10-way connector (10-way ribbon cable from PSU Regulator module CN5)
 - ❑ CN1 50-way connector (50-way ribbon cable from Processor module CN1).
- (4) Re-establish the ac and/or dc supplies.
- (5) Switch power on at the radio using the rear mounted Power switch.
- (6) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (7) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure [To Calibrate the Transmitter on page 26](#).



- (8) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (9) Set the transmitter internal reference frequency by carrying out the procedure detailed on [page 3](#).
- (10) Set the rear panel Power switch to Standby and remove the VFP connector. Isolate the transmitter from the ac and/or dc supplies.
- (11) Refit the transmitter bottom cover. The transmitter can now be returned to service.

Removing and Refitting the Power Supply Modules

The Power Supply modules are located as shown in [Fig 5](#). The removal diagram is shown in [Fig 11](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the Power Supply modules, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Remove the transmitter top and bottom covers as described previously.
- (2) Support the radio on its side.
- (3) Locate the power supplies. From the bottom half of the unit remove the two No. 6 x 32 UNC countersunk screws that secure each power supply to the transmitter mainframe. These screws are accessed through clearance holes in the Combiner BIT module. During this operation support the power supply from the top half of the unit.
- (4) Withdraw each power supply from the chassis sufficient to allow access to the power terminal blocks taking care not to damage the ac terminal plastic supply guard.
- (5) Remove the CN4 connectors (PSU-1 and PSU-2 to the Combiner BIT module, CN10 and CN11 respectively).
- (6) Disconnect the dc wires from the power supply terminal block (PSU-1 and PSU-2 to the Combiner BIT module, CN1 and CN3 respectively).
- (7) Slide back the terminal block cover and disconnect the ac wires from the three connector terminal block (marked L N E).
- (8) Carefully remove each power supply from the transmitter.



Refitting

To refit the power supply modules:

- (1) With the transmitter on its side hold each power supply near to its securing position in the top half of the radio.
- (2) Slide back the terminal block cover and connect the ac wires to the three connector terminal block (marked L N E); brown to terminal L, blue to terminal N and yellow/green to terminal E.
- (3) Connect the dc wires to the eight connector terminal block, red to terminal 1 and terminal 2 and black to terminal 5 and terminal 6.
- (4) Connect CN4.
- (5) Taking care not to damage the plastic supply guard, lower the power supply into position and secure from the bottom half of the unit using two countersunk screws, previously removed, for each power supply.
- (6) Re-establish the ac and/or dc supplies.
- (7) Switch power on at the radio using the rear mounted Power switch.
- (8) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (9) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (10) Set the rear panel Power switch to Standby. Isolate the transmitter from the ac and/or dc supplies.
- (11) Refit the transmitter top and bottom covers. The transmitter can now be returned to service.



Removing and Refitting the Combiner BIT Module

The Combiner BIT module is located as shown in [Fig 5](#). The removal diagram is shown in [Fig 12](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the Combiner BIT module, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Remove the transmitter top and bottom covers.
- (2) Locate the Combiner BIT module and disconnect the following connectors:
 - ❑ CN1 4-way connector
 - ❑ CN2 3-way connector
 - ❑ CN3 4-way connector
 - ❑ CN4 3-way connector
 - ❑ CN5 3-way connector
 - ❑ CN6 3-way connector
 - ❑ CN7 8-way connector
 - ❑ CN10 3-way connector
 - ❑ CN11 3-way connector
 - ❑ CN12 6-way connector
 - ❑ CN13 6-way connector
 - ❑ CN14 6-way connector
 - ❑ CN15 10-way connector
 - ❑ CN16 SMB connector
 - ❑ CN17 SMB connector
 - ❑ CN18 SMB connector
 - ❑ CN22 QMA connector
 - ❑ CN23 QMA connector
 - ❑ CN24 QMA connector
 - ❑ CN25 SMB connector
 - ❑ CN26 SMB connector
 - ❑ CN27 SMB connector
- (3) The Combiner BIT module is secured from both sides of the chassis thus requiring removal of the Power Supply modules. Refer to [page 14](#) and remove both Power Supply modules.
- (4) Removal of the Power Supply modules will expose the six M3 x 6 mm countersunk screws that secure the Combiner BIT module heatsink to the chassis. Remove these six screws.



- (5) Remove the six M3 nuts that secure the Combiner BIT module PCB to the stud spacers. Also remove the two M3 x 8 mm panhead screws that secure the Combiner BIT module heatsink to the lower PA heatsink. The Combiner BIT module can now be removed.

Refitting

- (1) Place the Combiner BIT module in place on the stud spacers and replace the six washers and nuts but do not tighten. Take care that cables are dressed properly and that none are trapped. Replace the two screws that secure the Combiner BIT module to the PA heatsink, but do not tighten.
- (2) Turn the unit over and replace the six countersunk M3 x 6 mm screws. Tighten these and return to the other side to tighten the six nuts and two screws.
- (3) All 22 connectors removed earlier can now be reconnected. Refer to [Fig 6](#) and [Fig 7](#), if necessary.
- (4) Re-establish the ac and/or dc supplies.
- (5) Switch power on at the radio using the rear mounted Power switch.
- (6) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (7) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure [To Calibrate the Transmitter on page 26](#).
- (8) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (9) Set the rear panel Power switch to Standby and remove the VFP connector. Isolate the transmitter from the ac and/or dc supplies.
- (10) Refit the transmitter top and bottom covers. The transmitter can now be returned to service.



Removing and Refitting the PA Modules

Caution



Repairs

When carrying out repairs to the PA module, care must be taken not to damage the gasket. If the strips become damaged, they must be replaced. Failure to comply with this instruction may compromise the transmitter Electromagnetic Compatibility (EMC) and breach European Commission regulations.

When screws are inserted into the transmitter PA casting care must be taken not to exceed a torque of 6 lbs/inch when tightening. This applies when replacing the top and bottom covers and during the refitting of the PA modules.

The PA modules are located one above the other on the right side of the transmitter as shown in [Fig 5](#). The module removal diagram is shown in [Fig 13](#). At the transmitter rear panel, each PA module is fastened to the chassis with two M3 x 8 mm panhead screws. At the front, the modules are fastened with one countersunk screw each, one at the top (PA-1) and one at the bottom (PA-2). They are also secured to the front panel with two M5 x 20 mm panhead screws that also fix the right-hand equipment handle.

WARNING



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove one or both PA modules, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Remove the transmitter top and bottom covers.
- (2) Disconnect CN3, a flying 3-way connector from the Combiner BIT module, CN5 (PA-1) and/or CN6 (PA-2).
- (3) At the Combiner BIT module disconnect the 6-way CN13 (PA-1) and/or CN14 (PA-2). Also remove the two M3 x 8 mm panhead screws that secure the Combiner BIT module heatsink to the lower PA module heatsink.
- (4) Disconnect the SMB connectors CN8 from PA-1 (upper) and PA-2 (lower). Disconnect SMB connector CN10 from the lower PA using long nosed pliers; do not pull on the cable. On the lower PA remove the screw securing the p-clip that holds the coaxial cable coming from the type-N connector at the rear.
- (5) Disconnect the type-N connectors at the rear of the PA modules.
- (6) Remove the four countersunk M3 x 6 mm screws that hold the front panel to the chassis.
- (7) Remove the equipment handle from the right-hand side of the transmitter by unscrewing and removing the two M5 x 20 mm panhead screws that secure it. Loosen (but do not remove) the two screws securing the left-hand equipment handle so that the front panel can be pulled slightly away from the PA heatsinks.



- (8) Remove the two screws holding the upper heatsink to the rear panel and the countersunk screw securing it to the front of the chassis. Slowly withdraw the upper PA module from the mainframe taking care not to snag the wiring looms. Note that SMB connector CN10 is located within the bottom of the heatsink fins and should be disconnected using long nosed pliers. Do not attempt to remove the connector by pulling on the cable.
- (9) Remove the two screws holding the lower heatsink to the rear panel and the countersunk screw securing it to the bottom of the chassis in front. Slowly withdraw the lower PA module from the mainframe taking care not to snag the wiring looms.

Refitting

To refit the PA modules, proceed as follows:

- (1) Place the lower PA module in position and secure it in place with the single countersunk screw at the front and the two panhead screws at the rear. Replace the two screws that secure the Combiner BIT module to the PA heatsink. Connect the SMB connector CN10.
- (2) Route the coaxial cable with the type-N connector out the rear of the module and connect to CN1. Replace the p-clip that was removed earlier. Ensure no wires are trapped by the module.
- (3) Next, while placing the upper PA module in position, first connect SMB connector CN10 before replacing the two rear screws and the front countersunk screw. Route the coaxial cable from Combiner BIT module out between the PAs via the heatsink groove. Connect the type-N to CN1.
- (4) Fit the four countersunk screws, previously removed, that secure the front panel to the chassis, two at the top and two at the bottom. Replace the right-hand handle and tighten the screws securing the left-hand handle.
- (5) Connect the SMB connectors CN8 on both modules and CN13 (PA-1) and CN14 (PA-2) at the Combiner BIT module.
- (6) Connect the two flying 3-way connectors CN3 that come from CN5 (PA-1) and CN6 (PA-2) on the Combiner BIT module.
- (7) Re-establish the ac and/or dc supplies and switch power on at the radio using the rear mounted Power switch.
- (8) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (9) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure [To Calibrate the Transmitter on page 26](#).
- (10) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (11) Set the rear panel Power switch to Standby and remove the VFP connector. Isolate the transmitter from the ac and/or dc supplies.
- (12) Refit the transmitter top and bottom covers. The transmitter can now be returned to service.



Removing and Refitting the Front Panel Assembly PCB

The Front Panel assembly PCB is located as shown in [Fig 14](#). Removing this assembly necessitates the removal of both Power Supply modules and partial removal of the Combiner BIT module.



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the Front Panel assembly PCB, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Remove the transmitter top and bottom covers.
- (2) Disconnect CN4 (34-way ribbon cable) at the Processor module. Carefully push the cable through the aperture to the other side of the chassis.
- (3) Refer to the instructions for removal of the Combiner BIT module, but **do not** remove any connectors. The Power Supply modules must be removed and the Combiner BIT module's securing screws must be removed so that it can be lifted slightly away from the chassis. This permits the ribbon cable to pass under the Combiner BIT module.
- (4) Disconnect SMB connector CN5 at the PA Control module (note how the cable is routed to the front panel).
- (5) Remove the two handles from the front panel by removing the four M5 x 20 mm panhead screws.
- (6) Remove the four countersunk M3 x 6 mm screws that hold the front panel to the chassis. The front panel can now be moved away from the mainframe while guiding the ribbon and coaxial cables from within.
- (7) With the front panel free from the mainframe, release the control knob by unscrewing the Allen head grub screw using a 1.5 mm Allen key. Withdraw the control knob from the spindle.
- (8) Remove the Front Panel PCB from the Front Panel assembly by removing the six M3 x 6 mm panhead screws and wavy washers.

Refitting

To refit the Front Panel assembly PCB, proceed as follows:

- (1) Place the PCB in position on the front panel. Ensure the spindle of the control knob and microphone/diagnostics connector are correctly located. Secure the PCB to the Front Panel assembly using the six M3 x 6 mm panhead screws and wavy washers previously removed.
- (2) At the front panel, place the control knob onto the spindle and using a 1.5 mm Allen key, secure the Allen head grub screw.
- (3) Feed the ribbon and coaxial cables through their respective holes at the front of the chassis
- (4) Secure the Front Panel assembly to the top and bottom of the chassis using the four M3 x 6 mm countersunk screws. Fit the two equipment handles using the four M5 x 20 mm panhead screws previously removed.
- (5) Route the ribbon cable under the Combiner BIT module, through the aperture to the Processor module and connect it to CN4.



- (6) Route the coaxial cable SMB connector to CN5 on the PA Control module and connect it.
- (7) Re-establish the ac and/or dc supplies.
- (8) Switch power on at the radio using the rear mounted Power switch.
- (9) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.
- (10) Carry out a BIT interruptive test as detailed in the procedure [To Initiate a BIT Test on page 5](#).
- (11) Set the rear panel Power switch to Standby. Isolate the transmitter from the ac and/or dc supplies.
- (12) Refit the transmitter top and bottom covers. The transmitter can now be returned to service.

Removing and Refitting the Cooling Fans

The cooling fans are mounted at the rear of the PA modules as shown in [Fig 5](#). The removal diagram is shown in [Fig 15](#).



Dangerous Voltages

Dangerous voltages are present within the transmitter. Care must be taken by personnel to avoid accidental contact with exposed circuitry when the covers are removed and power is applied to the radio.

Removal

Before attempting to remove the fan, ensure that the transmitter is isolated from the ac and dc input supplies. Then proceed as follows:

- (1) Disconnect the two-pin connector.
- (2) Remove the fan finger guard.
- (3) Using an Allen key inserted through the holes exposed when the finger guard is removed, remove the three M4 x 12 mm caphead Allen screws that secure the fan to the PA module heatsink.
- (4) Remove the fan from the PA module.

Refitting

To refit a cooling fan, proceed as follows:

- (1) Locate the fan in position and using a suitable Allen key inserted through the holes for the fan finger guard, secure using the three M4 x 12 mm caphead Allen screws previously removed.
- (2) Secure the finger guard to the fan.
- (3) Connect the two-pin fan connector to the fan. Ensure the + marked socket mates with the + marked plug on the fan.
- (4) Re-establish the ac and/or dc supplies.
- (5) Switch power on at the radio using the rear mounted Power switch.
- (6) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit. The transmitter can now be returned to service.

Virtual Front Panel (VFP)

Virtual Front Panel (VFP) software is supplied on CD-ROM and is compatible with any PC or laptop running Windows 2000™ or Windows XP™. The VFP allows changes to a radio's settings and channel information, it displays the current BIT state, displays BIT history, allows security locks to be set, and provides maintenance facilities.

A radio can be set up using the front panel Scroll/Select switch and LCD, or by using the VFP. Using the VFP has several advantages over setting the transmitter from the front panel; these are:

- ❑ A profile of the transmitter's operation settings and channel information can be created, stored on disk, and then recalled to download into other transmitters
- ❑ A print out of the transmitter's profile can be made from the VFP
- ❑ Front Panel Lock is available only when using the VFP. As part of the transmitter's Settings (see Fig 2), Front Panel Lock can be set to ON. When selected to on, no settings or frequency information can be changed from the front panel
- ❑ If the transmitter is part of a MARC system or operates in a digital mode, a MARC Lock, HDLC Lock and T1E1 Lock are available when using the VFP. When selected to on, no settings or frequency information can be changed from the MARC equipment screen, or the digital control equipment.

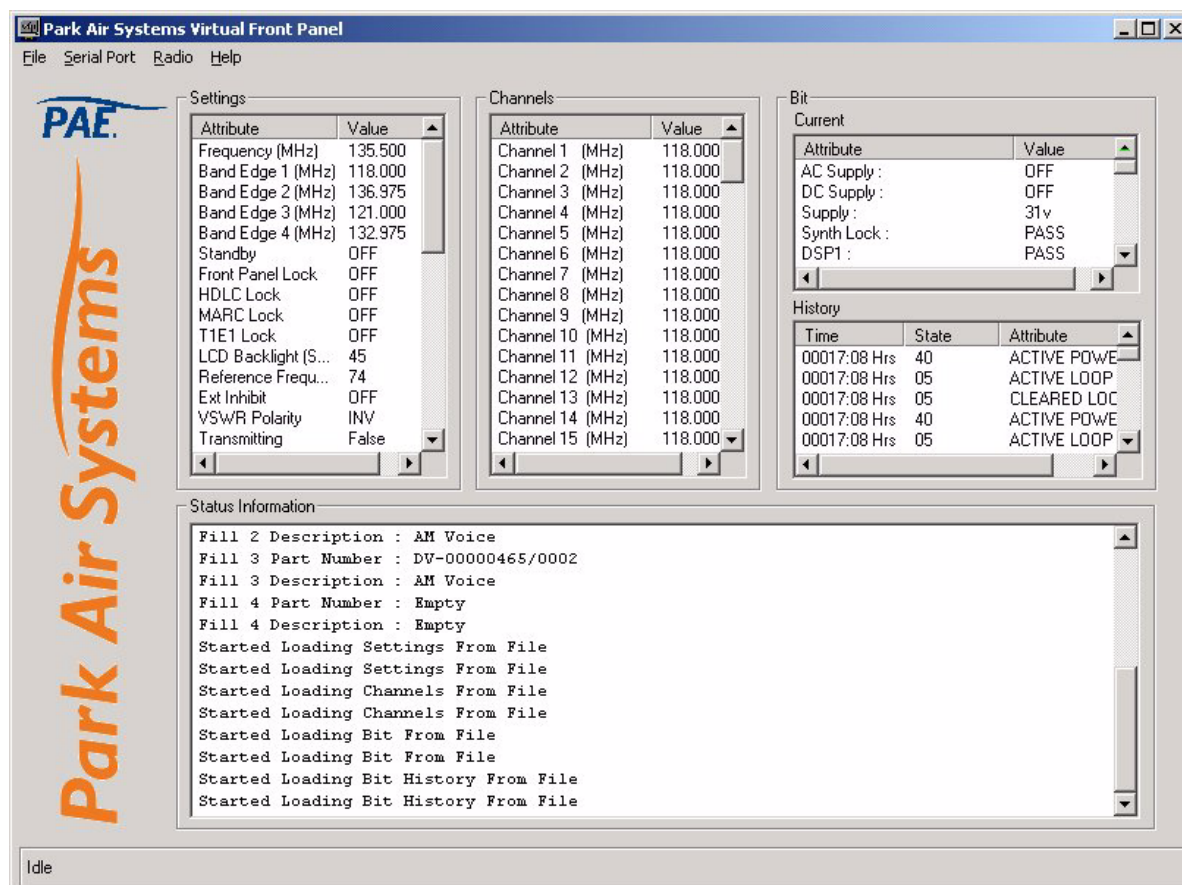


Fig 2 Typical VFP Screen - AM-Voice Profile Shown



Installing the VFP Software

The VFP software is supplied by Park Air on CD-ROM. The software can be run from the Main page or installed on your PC via Explorer.

To install the software onto your PC:

- (1) Using explorer, display the contents of the CD-ROM supplied by Park Air. Identify the file named S0473Vxx.EXE (where xx is the version number).
- (2) Using the mouse, right click on the file and then select *Copy*.
- (3) Display the Windows desktop. Right click anywhere on the desktop and select *Paste*.
- (4) Check that the VFP icon is shown on the desktop. Reposition the icon as required. The VFP application is now installed on the PC's desktop.



VFP Icon

VFP Features

The VFP screen is divided into four main windows: Settings, Channels, BIT and Status Information. Four colours are used to display text. The colours have the following meanings:

- ❑ Black indicates a valid parameter that has been accepted by the radio.
- ❑ Red indicates an invalid parameter that has been rejected by the radio, or a BIT failure.
- ❑ Green indicates text that has not yet been downloaded to the radio. Text loaded into the VFP from a previously stored file, or any text that is manually amended is green until it is downloaded into the radio; after being downloaded into the radio the text changes to black, or if it is invalid, to red.
- ❑ Blue indicates Help text and is shown in the Status Information window.

The Menu Bar

The menu bar has four categories: File, Serial Port, Radio and Help.

File	Has the sub-categories: Open, Save and Print. These sub-categories allow the user to open previously saved profiles, save a new profile, or print a profile. A special sub-category: File > Save > Diagnostics should only be used when advised by Park Air.
Serial Port	Has the sub-categories: Com 1 and Com 2. Before the VFP can be used, the appropriate Com 1 or Com 2 must be selected to correspond with the PC's Com Port used for the radio connection.
Radio	Has the sub-categories: Retrieve, Send, Calibrate and Test. This category allows a radio's profile to be loaded into the VFP, allows a profile to be downloaded from the VFP to a radio, calibrates a radio and initiates a BIT test.
Help	Provides detail about the VFP software.



Settings Window

This window lists all attributes that can be adjusted by the user. If any individual attribute is clicked on using the mouse, help information is displayed in the Status Information window showing the range of adjustment for that attribute. Click on the value and use the keyboard to amend it; press Enter to confirm the new value noting that the amended text is green until it is downloaded into the radio.

Any invalid parameters are not indicated until the Settings are downloaded to the radio. It is the radio that rejects invalid parameters, not the VFP.

The transmitter reference frequency setting is displayed in the window. Adjusting the reference frequency is a maintenance operation that requires external test equipment to be connected. The value shown in the Settings window should not be changed; instead, adjustment of the reference frequency should be performed using the radio front panel controls as detailed on [page 3](#).

Channels Window

Up to 100 preset channels can be stored in the radio. These are listed in the Channels window. Any channel frequency can be amended by clicking on the value to amend it and pressing Enter to confirm the new value. Note that the amended channel is green until it is downloaded into the radio.

Any invalid frequencies are not indicated until the Channels are downloaded to the radio. It is the radio that rejects invalid frequencies, not the VFP.

BIT Window

Two lists of information are presented. The current BIT status and the BIT history. The BIT history shows the last 100 entries.

Status Information Window

The Status Information window gives information regarding the type of radio, the software fills, recent VFP actions and Help information.

To Change the Transmitter's Profile or Save a Profile

- (1) Using a radio to PC Serial Interconnection Lead, Park Air part number 17E12600001, connect the radio's front panel Microphone/Diagnostics connector to the PC's Com Port 1 or Com Port 2 (note which Com Port is used).
- (2) Run up the VFP software and check that a blank VFP screen (see Fig 3) is displayed.

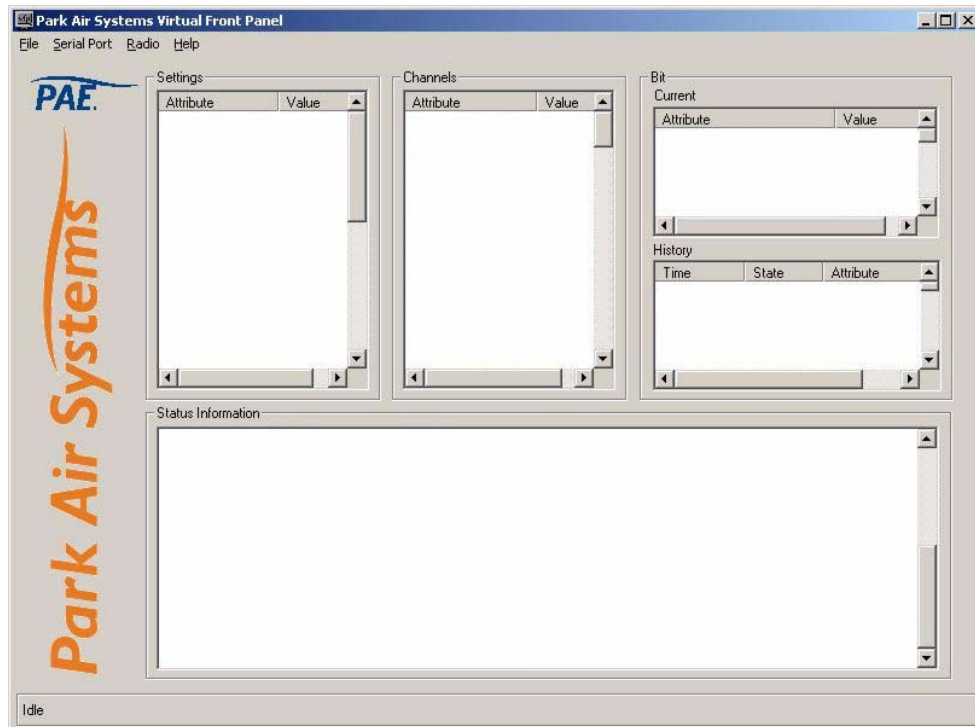


Fig 3 Blank VFP Screen

- (3) At the Menu Bar, click on *Serial Port* and select either *Com 1* or *Com 2*. The selection must correspond to the port used to connect to the radio.
- (4) Load the required information from the radio, or from a stored file. The required information can be radio settings, frequency channels, BIT information, or all of these.

To load a previously stored file, select *File > Open > All*

or, *File > Open > Settings*

or, *File > Open > Channel*

or, *File > Open > BIT*

To load information from the radio, select *Radio > Retrieve > All*

or, *Radio > Retrieve > Settings*

or, *Radio > Retrieve > Channel*

or, *Radio > Retrieve > BIT*

- (5) If required, amend any radio Settings or Channel information.
- (6) Download the radio's profile as shown on the VFP screen to either the radio, or to a file.

To download into the radio, select *Radio > Send > All*

or, *Radio > Send > Settings*

or, *Radio > Send > Channel*

To download to a file, select *File > Send > All*

or, *File > Send > Settings*

or, *File > Send > Channel*

or, *File > Send > BIT*



- (7) Check that after downloading to a radio, no invalid parameters are returned (such parameters are displayed as red text). If there are invalid parameters, amend them and then repeat the download.
- (8) When there is no further requirement for using the VFP, exit the VFP software and disconnect the radio from the PC.

To Initiate a BIT Test

During an interruptive BIT test, the transmitter radiates modulated carrier waves at the set power. Users should therefore obtain the necessary authority before initiating a test.

If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transmitter's Antenna connector.

In order to test the line input stages, an internally generated 1 kHz tone is injected into the line input circuit. Any other audio present on the line input will cause the test to be inaccurate. Therefore the transmitter **MUST NOT** be keyed during the test.

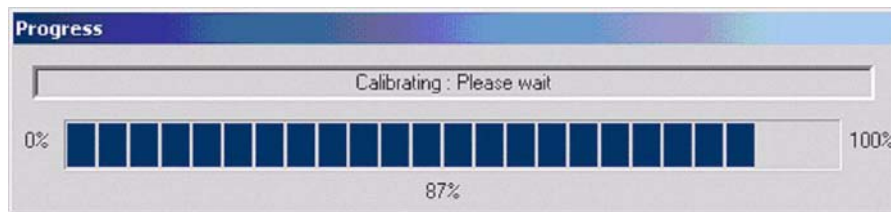
- (1) Using a radio to PC Serial Interconnection Lead, Park Air part number 17E12600001, connect the radio's front panel Microphone/Diagnostics connector to the PC's Com Port 1 or Com Port 2 (note which Com Port is used).
- (2) Run up the VFP software and check that a blank VFP screen is displayed.
- (3) At the Menu Bar, click on *Serial Port* and select either *Com 1* or *Com 2*. The selection must correspond to the port used to connect to the radio.
- (4) At the Menu Bar select *Radio > Test*.
- (5) An interruptive BIT test now takes place. The results are displayed in the BIT window.
- (6) If there is no further requirement for using the VFP, exit the VFP software and disconnect the radio from the PC.

To Calibrate the Transmitter

- (1) Connect a dummy load via a power meter to the transmitter Antenna connector.
- (2) Remove the transmitter's bottom cover.
- (3) Using a radio to PC Serial Interconnection Lead, Park Air part number 17E12600001, connect the radio's front panel Microphone/Diagnostics connector to the PC's Com Port 1 or Com Port 2 (note which Com Port is used).
- (4) Run up the VFP software and check that a blank VFP screen is displayed.
- (5) At the Menu Bar, click on *Serial Port* and select either *Com 1* or *Com 2*. The selection must correspond to the port used to connect to the radio.
- (6) At the Menu Bar select *Radio > Retrieve > All*.
- (7) At the Menu Bar select *Radio > Calibrate*. The Confirm screen will then be displayed to remind you that a dummy load must be connected before proceeding.



- (8) With the Confirm screen displayed and dummy load connected, select Yes to continue with the calibrate routine. The Progress screen will then be displayed.



- (9) When the PA Control/PA loop has been calibrated the Progress screen disappears and the VFP screen reappears showing a calibration complete message in the Status Information window.
- (10) Gain access to the PA Control module and identify RV8 (see [Fig 4](#)). From the transmitter front panel AM-Voice or AM-MSK Settings screen, select PTT On.
- (11) From the Settings window of the VFP screen, note the RF power setting. Adjust RV8 until the power meter reads this value.
- (12) From the transmitter front panel AM-Voice or AM-MSK Settings screen select PTT Off, then remove the power meter and dummy load. This completes the calibration routine.
- (13) When there is no further requirement for using the VFP, exit the VFP software and disconnect the radio from the PC.

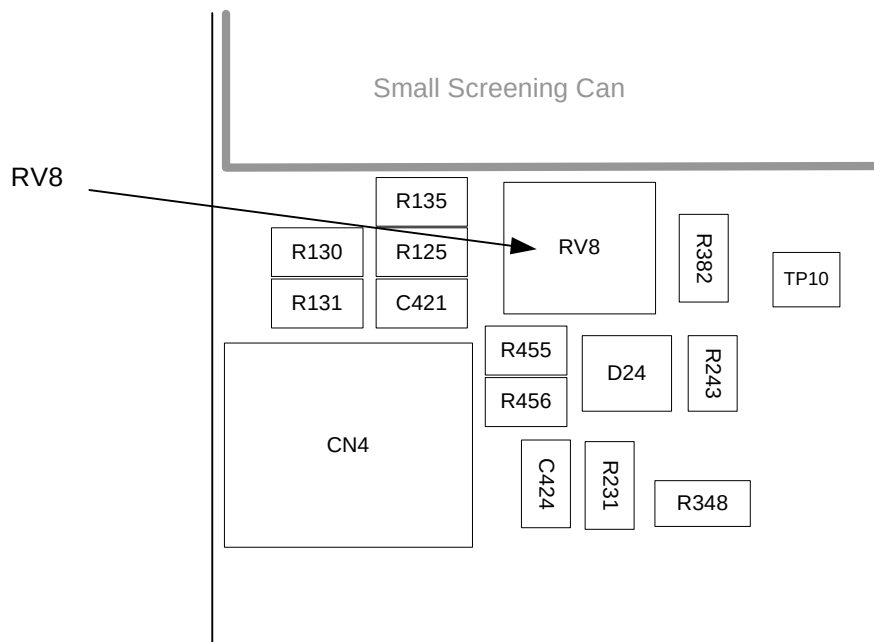


Fig 4 Location of PA Control Module RV8

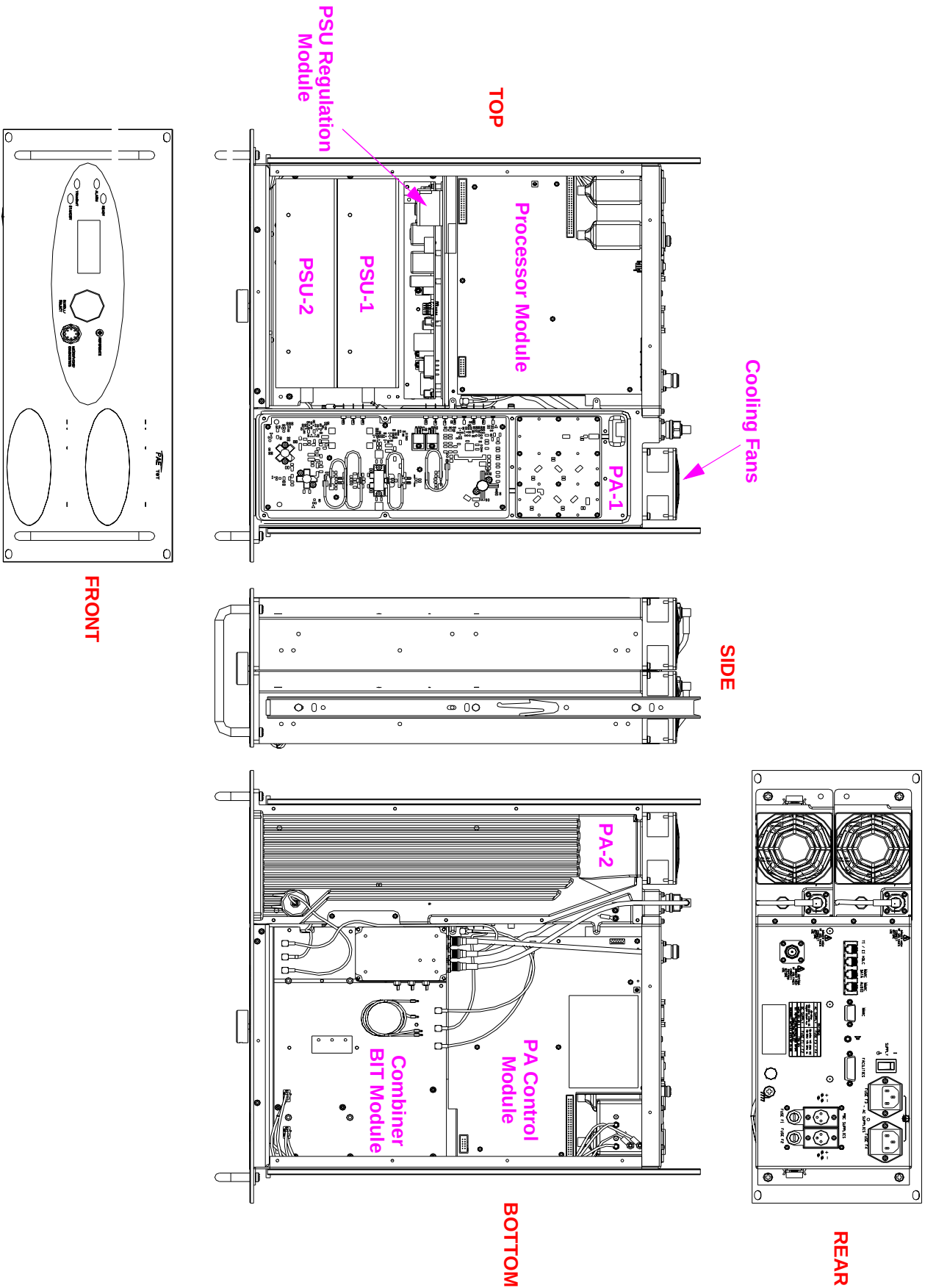


Fig 5 T6T 100 W Module Location Diagram

Fig 6 Wiring and Interconnection Diagram



Connections		1	Name	Characteristic
Pre-amplifier	1	LM85Pact		
	CHM-1	Ground	0V	
	CHM-2	2	+2000 to 2000n 600V	
	CHM-3	3	LM85 to +	+2000 to 2000n 600V
	CHM-4	4	LM85 to +	+2000 to 2000n 600V
CHM-5	5	PTT Input	PTT Input	PTT Input
	CHM-6	6	UHF Input	UHF Input
	CHM-7	7	UHF Input	UHF Input
	CHM-8	8	UHF Input	UHF Input
	CHM-9	9	UHF Input	UHF Input

Connections		2	Name	Characteristic
Pre-amplifier	1	External Speaker		
	CHM-10	External Speaker	300 ohm 100W	
	CHM-11	External Speaker	300 ohm 100W	
CHM-12	12	Ground	0V	
	CHM-13	Ground	0V	
	CHM-14	Ground	0V	

Connections		3	Name	Characteristic
Pre-amplifier	1	External Speaker		
	CHM-15	External Speaker	300 ohm 100W	
	CHM-16	External Speaker	300 ohm 100W	
CHM-17	17	Ground	0V	
	CHM-18	Ground	0V	
	CHM-19	Ground	0V	
CHM-20	20	Ground	0V	
	CHM-21	Ground	0V	
	CHM-22	Ground	0V	
CHM-23	23	Ground	0V	
	CHM-24	Ground	0V	
	CHM-25	Ground	0V	
CHM-26	26	Ground	0V	
	CHM-27	Ground	0V	
	CHM-28	Ground	0V	
CHM-29	29	Ground	0V	
	CHM-30	Ground	0V	
	CHM-31	Ground	0V	
CHM-32	32	Ground	0V	
	CHM-33	Ground	0V	
	CHM-34	Ground	0V	
CHM-35	35	Ground	0V	
	CHM-36	Ground	0V	
	CHM-37	Ground	0V	
CHM-38	38	Ground	0V	
	CHM-39	Ground	0V	
	CHM-40	Ground	0V	
CHM-41	41	Ground	0V	
	CHM-42	Ground	0V	
	CHM-43	Ground	0V	
CHM-44	44	Ground	0V	
	CHM-45	Ground	0V	
	CHM-46	Ground	0V	
CHM-47	47	Ground	0V	
	CHM-48	Ground	0V	
	CHM-49	Ground	0V	
CHM-50	50	Ground	0V	
	CHM-51	Ground	0V	
	CHM-52	Ground	0V	
CHM-53	53	Ground	0V	
	CHM-54	Ground	0V	
	CHM-55	Ground	0V	
CHM-56	56	Ground	0V	
	CHM-57	Ground	0V	
	CHM-58	Ground	0V	
CHM-59	59	Ground	0V	
	CHM-60	Ground	0V	
	CHM-61	Ground	0V	
CHM-62	62	Ground	0V	
	CHM-63	Ground	0V	
	CHM-64	Ground	0V	
CHM-65	65	Ground	0V	
	CHM-66	Ground	0V	
	CHM-67	Ground	0V	
CHM-68	68	Ground	0V	
	CHM-69	Ground	0V	
	CHM-70	Ground	0V	
CHM-71	71	Ground	0V	
	CHM-72	Ground	0V	
	CHM-73	Ground	0V	
CHM-74	74	Ground	0V	
	CHM-75	Ground	0V	
	CHM-76	Ground	0V	
CHM-77	77	Ground	0V	
	CHM-78	Ground	0V	
	CHM-79	Ground	0V	
CHM-80	80	Ground	0V	
	CHM-81	Ground	0V	
	CHM-82	Ground	0V	
CHM-83	83	Ground	0V	
	CHM-84	Ground	0V	
	CHM-85	Ground	0V	
CHM-86	86	Ground	0V	
	CHM-87	Ground	0V	
	CHM-88	Ground	0V	
CHM-89	89	Ground	0V	
	CHM-90	Ground	0V	
	CHM-91	Ground	0V	
CHM-92	92	Ground	0V	
	CHM-93	Ground	0V	
	CHM-94	Ground	0V	
CHM-95	95	Ground	0V	
	CHM-96	Ground	0V	
	CHM-97	Ground	0V	
CHM-98	98	Ground	0V	
	CHM-99	Ground	0V	
	CHM-100	Ground	0V	
CHM-101	101	Ground	0V	
	CHM-102	Ground	0V	
	CHM-103	Ground	0V	
CHM-104	104	Ground	0V	
	CHM-105	Ground	0V	
	CHM-106	Ground	0V	
CHM-107	107	Ground	0V	
	CHM-108	Ground	0V	
	CHM-109	Ground	0V	
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	CHM-111	Ground	0V	
	CHM-112	Ground	0V	
CHM-113	113	Ground	0V	
	CHM-114	Ground	0V	
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CHM-116	116	Ground	0V	
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	CHM-118	Ground	0V	
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CHM-131	131	Ground	0V	
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	CHM-135	Ground	0V	
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	CHM-138	Ground	0V	
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	CHM-142	Ground	0V	
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	CHM-145	Ground	0V	
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	CHM-148	Ground	0V	
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	CHM-151	Ground	0V	
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	CHM-211	Ground	0V	
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CHM-215	215	Ground	0V	
	CHM-216	Ground	0V	
	CHM-217	Ground	0V	
CHM-218	218	Ground	0V	
	CHM-219	Ground	0V	
	CHM-220	Ground	0V	
CHM-221	221	Ground	0V	
	CHM-222	Ground	0V	
	CHM-223	Ground	0V	
CHM-224	224	Ground	0V	
	CHM-225	Ground	0V	
	CHM-226	Ground	0V	
CHM-227	227	Ground	0V	
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CHM-245	245	Ground	0V	
	CHM-246	Ground	0V	
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	CHM-250	Ground	0V	
CHM-251	251	Ground	0V	
	CHM-252	Ground	0V	
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	CHM-256	Ground	0V	
CHM-257	257	Ground	0V	
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	CHM-259	Ground	0V	
CHM-260	260	Ground	0V	
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	CHM-262	Ground	0V	
CHM-263	263	Ground	0V	
	CHM-264	Ground	0V	
	CHM-265	Ground	0V	
CHM-266	266	Ground	0V	
	CHM-267	Ground	0V	
	CHM-268	Ground	0V	
CHM-269	269	Ground	0V	
	CHM-270	Ground	0V	
	CHM-271	Ground	0V	
CHM-272	272	Ground	0V	
	CHM-273	Ground	0V	
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	CHM-276	Ground	0V	
	CHM-277	Ground	0V	

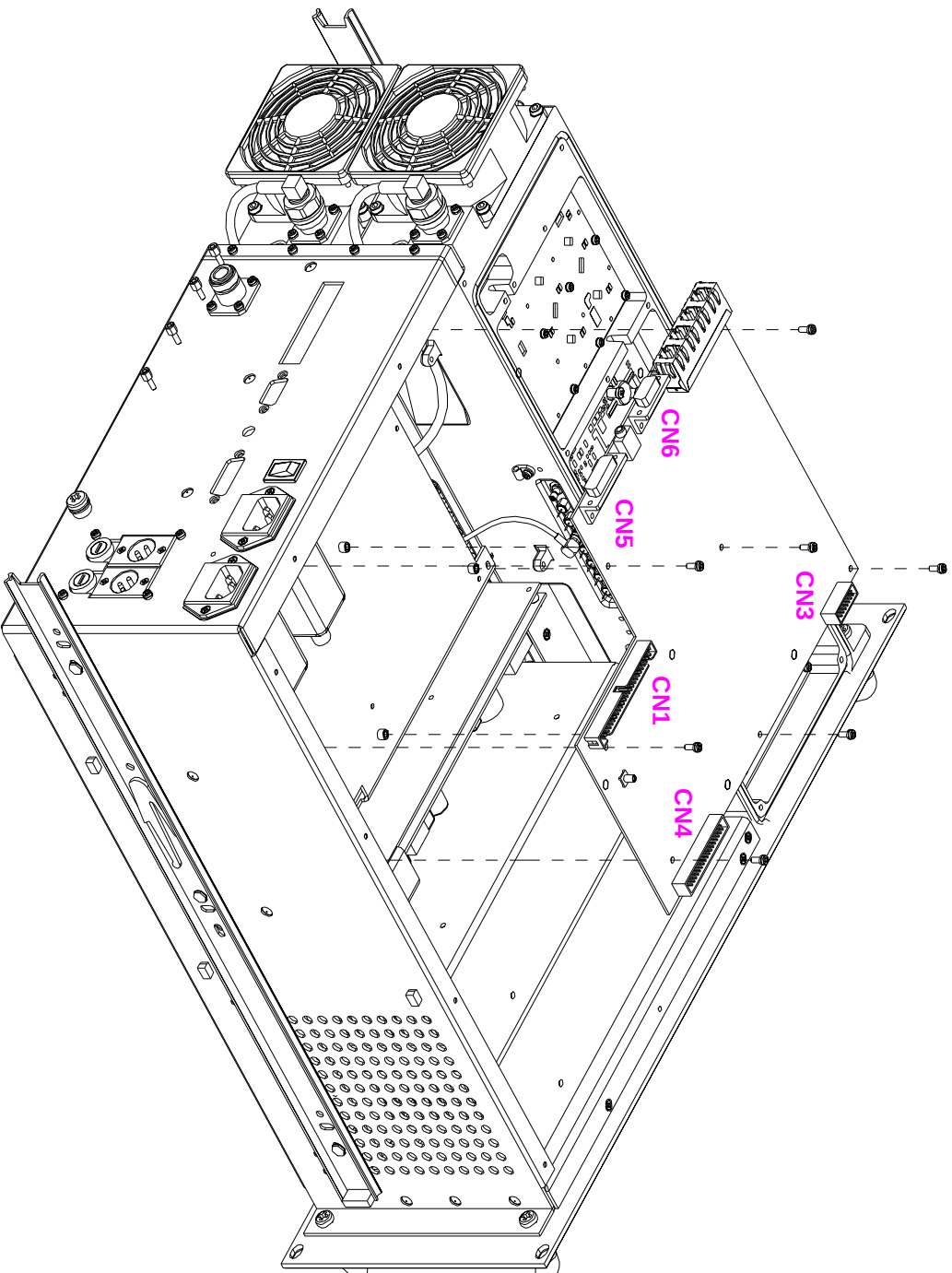


Fig 8 Processor Module - Removal and Refitting Detail

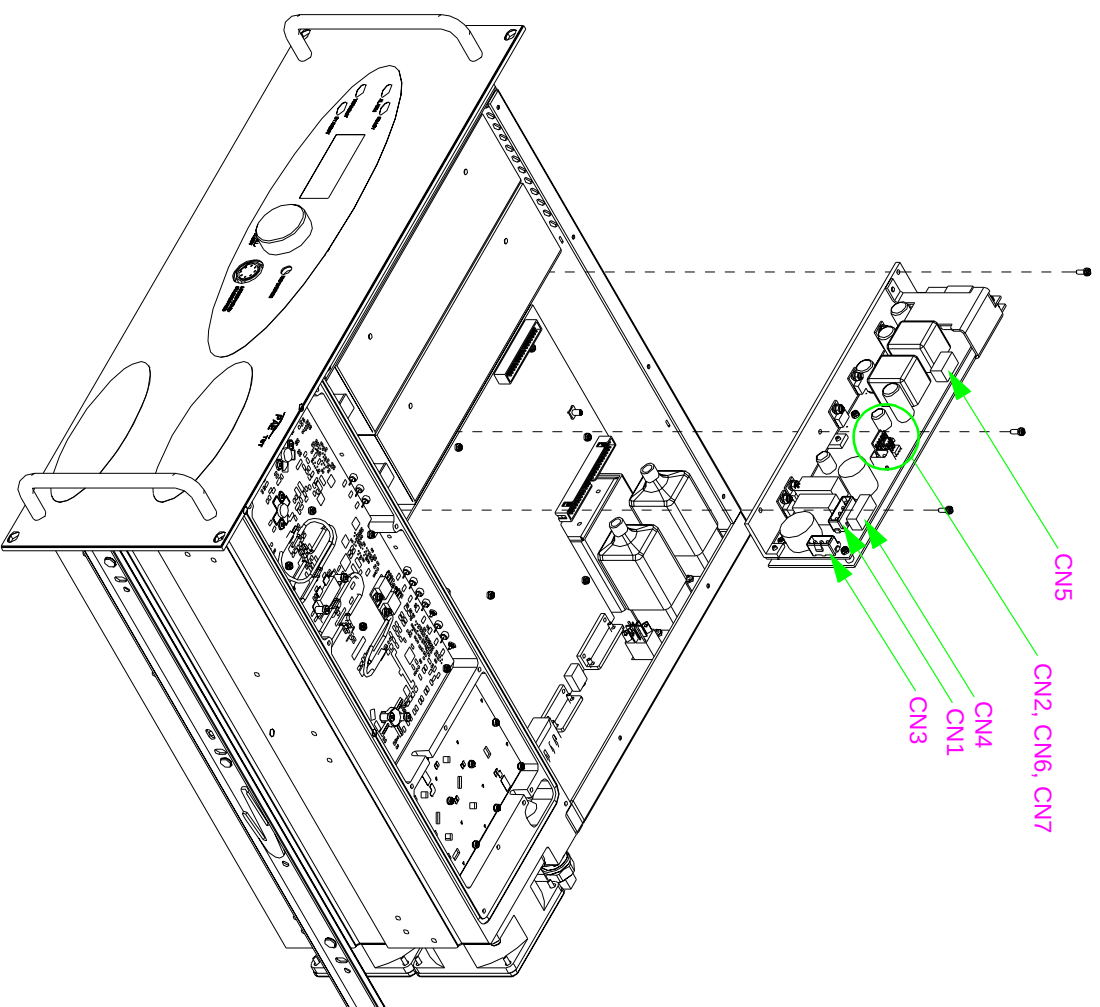


Fig 9 PSU Regulation Module - Removal and Refitting Detail

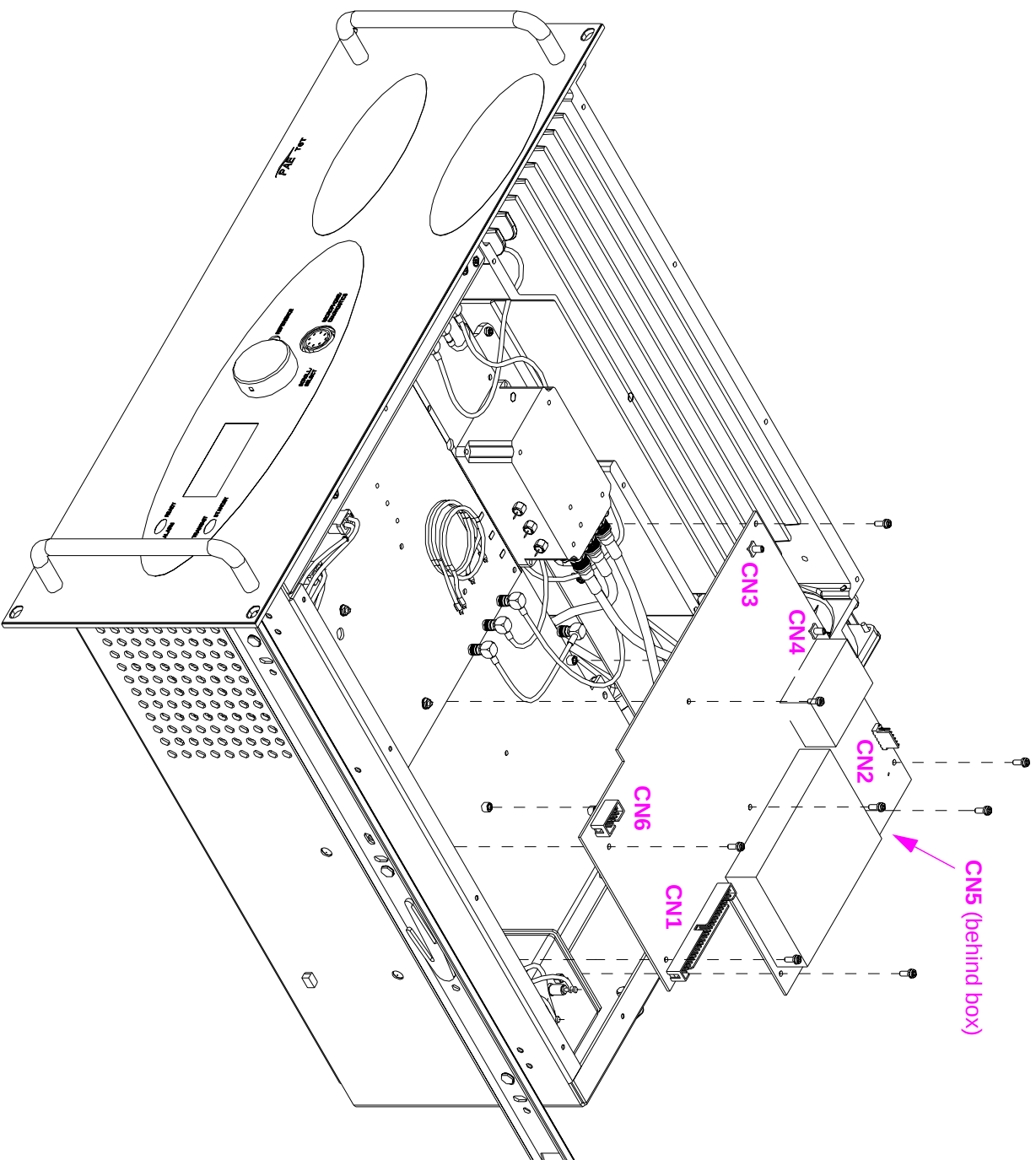


Fig 10 PA Control Module - Removal and Refitting Detail

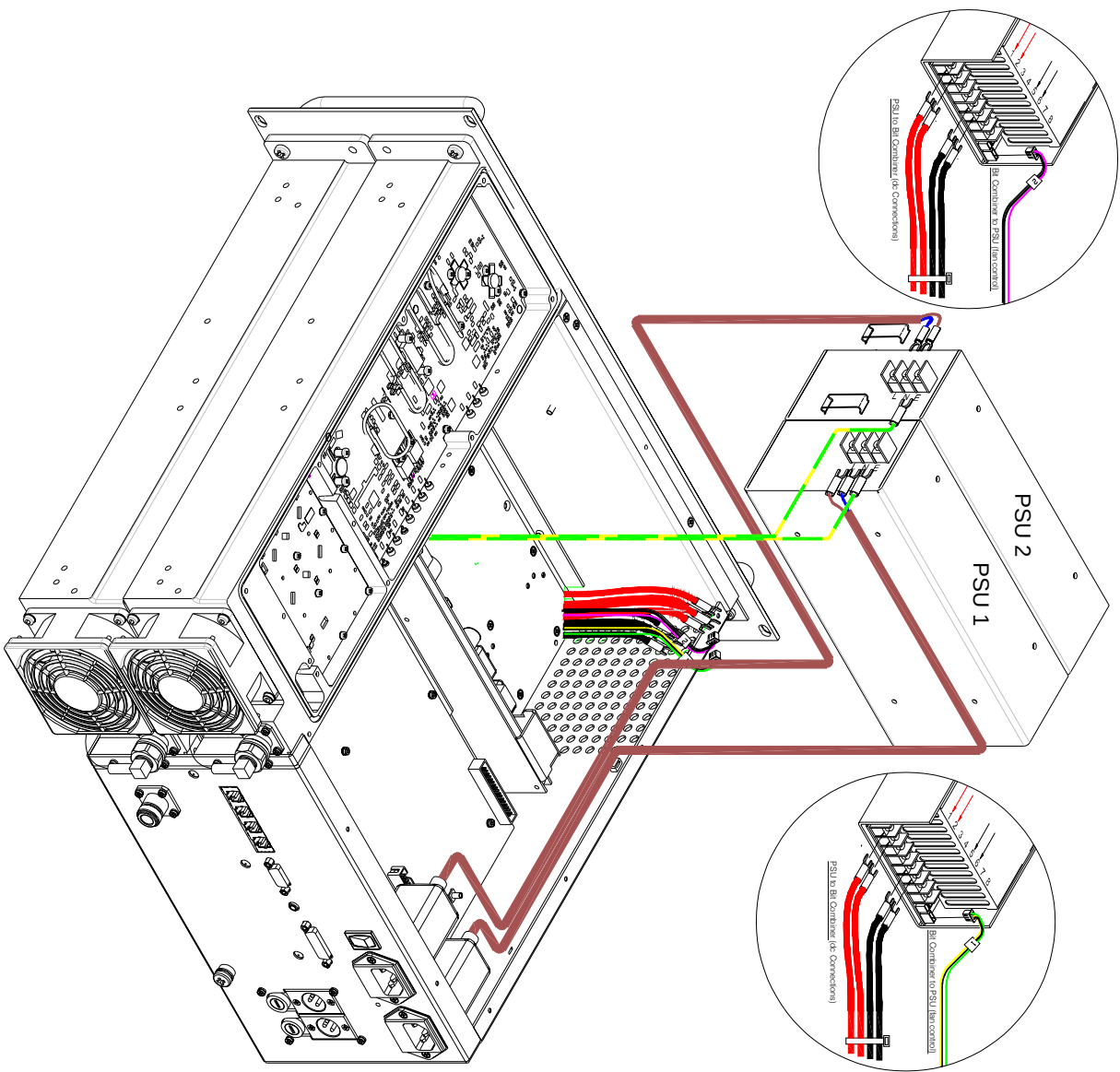


Fig 11 Power Supply - Removal and Refitting Detail

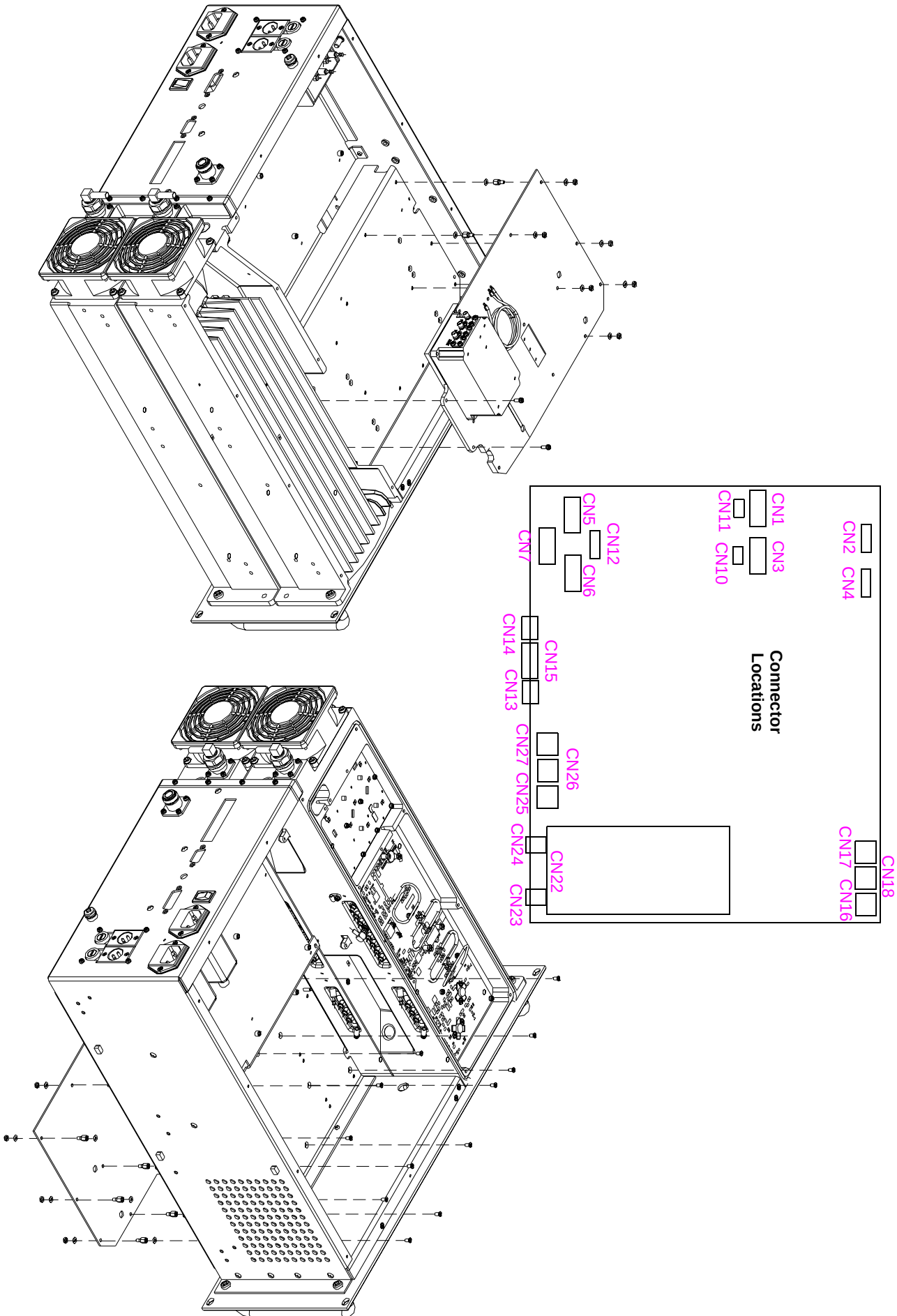


Fig 12 Combiner BIT Module - Removal and Refitting Detail

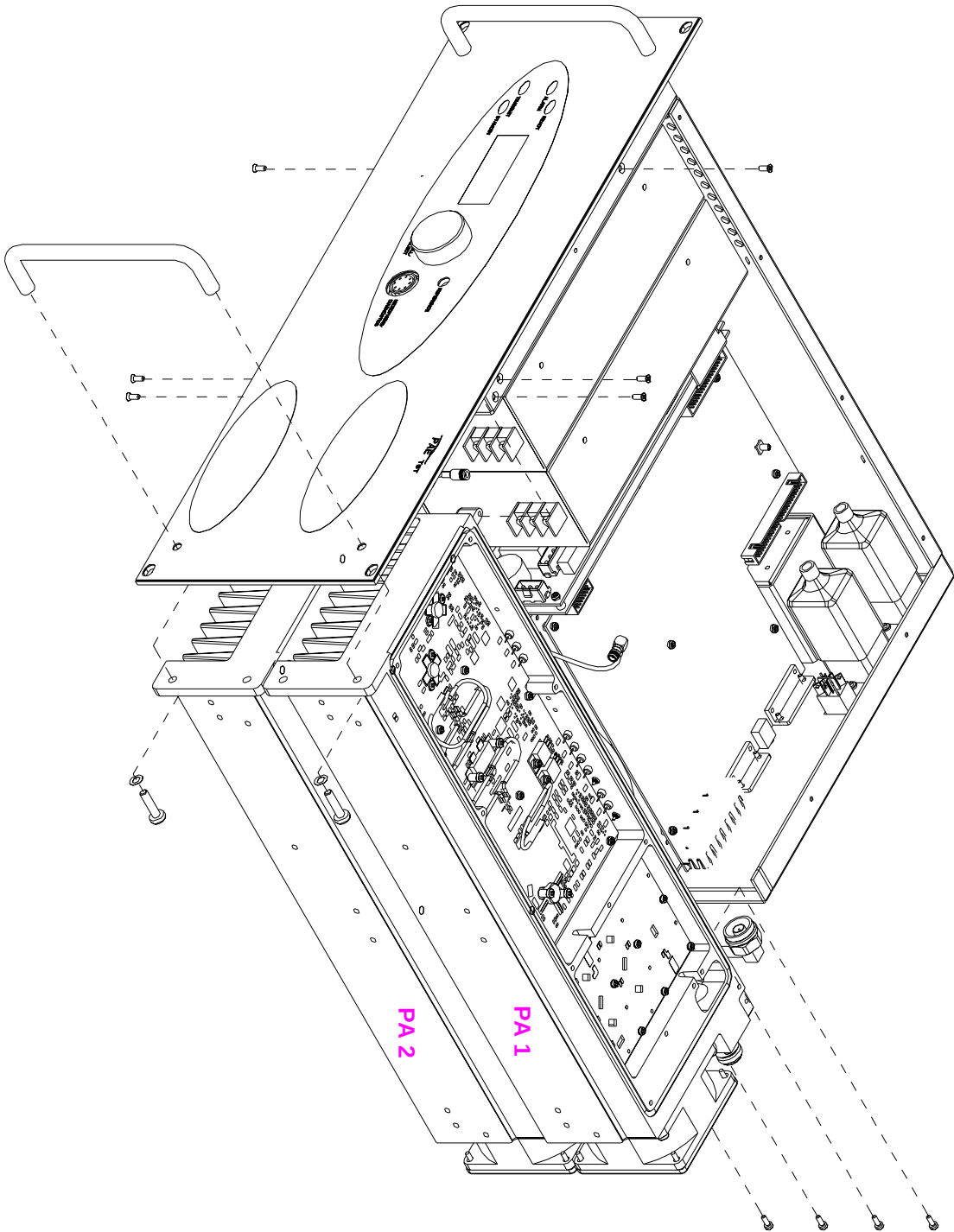


Fig 13 PA Modules - Removal and Refitting Detail

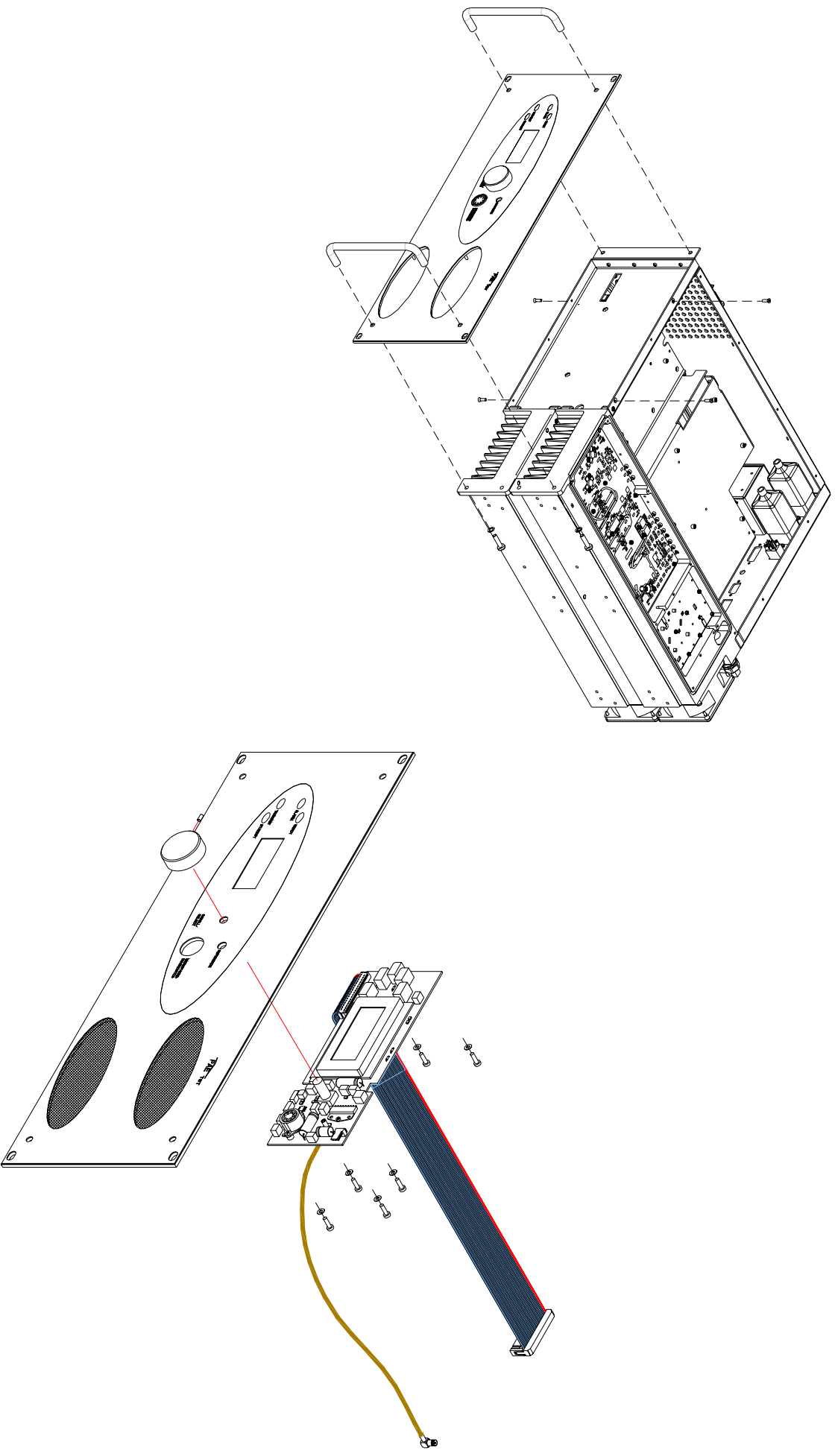


Fig 14 Front Panel and Front Panel Assembly PCB Removal and Refitting Detail

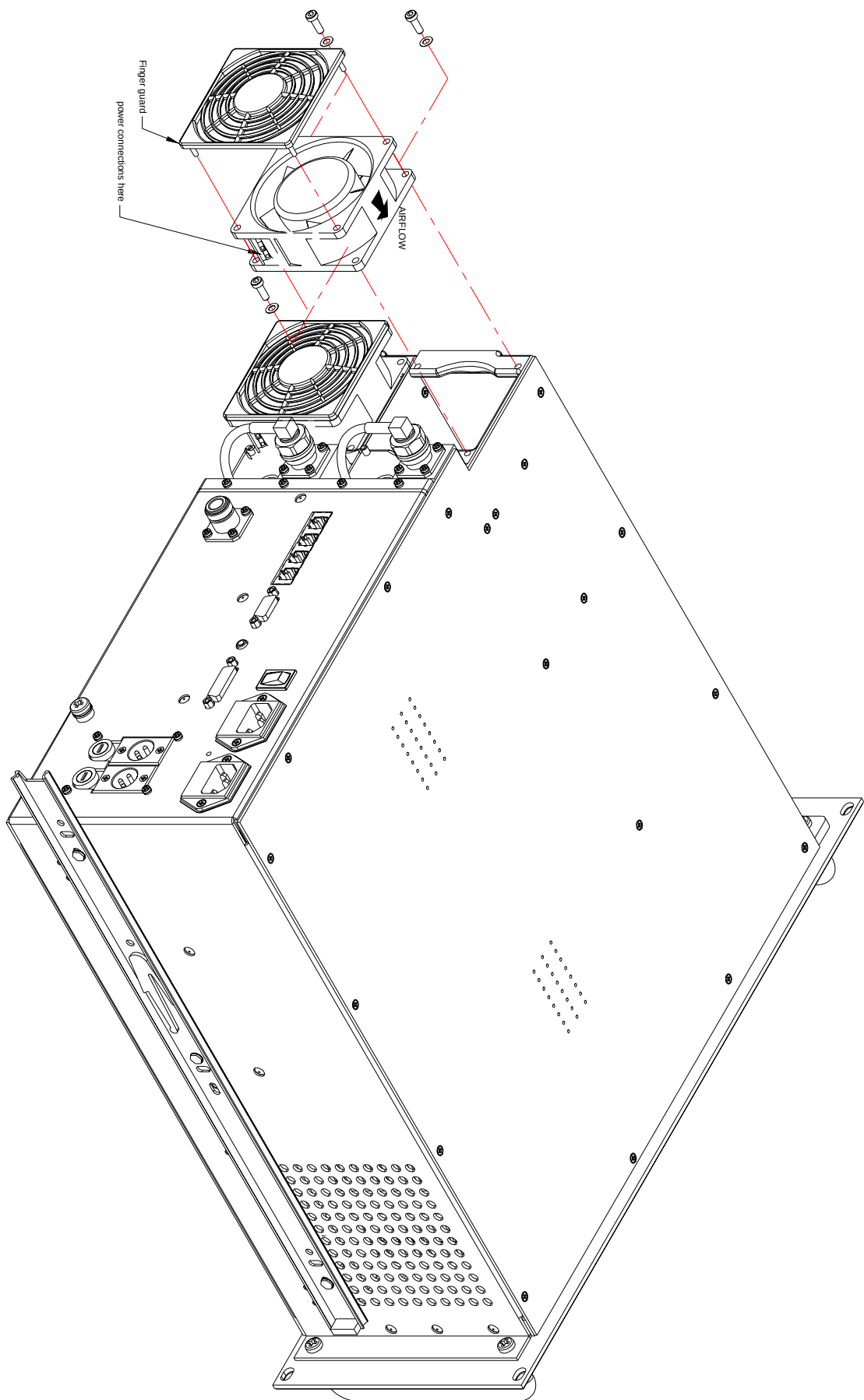


Fig 15 Cooling Fans - Removal and Refitting Detail

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