Back to
Main Page

T6TR 50 Watt VHF Multimode Transceiver

This documentation is applicable to transceivers at Mod strike 7

Select Topic

Specification

Operation

Installation

Maintenance

Approvals and
Standards

Back to Transceiver
Main Page

Approvals and Standards T6TR VHF 50 Watt Transceivers

Approvals:

The equipment is designed to meet the essential requirements of Directives 1999/5/EC, 89/336EEC 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.

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.

Back to Transceiver
Main Page

Specification

This document provides specifications applicable to the
T6TR VHF Multimode Transceiver.

General Specification

The general specification applies to a transceiver irrespective of the selected operating mode. Separate listings are given for AM modes, Mode 2 and Mode 3.

Frequency Range

The T6TR VHF Multimode Transceiver is available in two variants as listed below:

- The B6550/NB/50 that operates within the frequency band 118 to 136.975 MHz.
- The B65500/WB/50 that operates within the frequency band 112 to 155.975 MHz.

Frequency Selectable Band Edges

Four selectable frequency band edges are available on each model: BE1, BE2, BE3 and BE4. Frequencies can only be selected that lie between BE1 and BE2 inclusive or between BE3 and BE4 inclusive. The band edge frequencies can only be set in 25 kHz increments. BE1 and BE3 both default to the lowest selectable frequency for the model and BE2 and BE4 both default to the highest selectable frequency for the model.

Frequency Accuracy

Better than 1ppm.

Reference Frequency Adjustment

Provision is made on the front panel to allow the 20.95 MHz reference oscillator frequency to be adjusted. An output is provided suitable for driving an external frequency counter.

Adjustment allows the frequency to be set to within 0.15 ppm.

Frequency Change Time

Less than 250 ms from receipt of a remote frequency change command message.

Number of Channels

The transceiver has a multi-channel capability. 100 channels can be stored and recalled.

Modulation Modes

AM-Voice (standard).

AM-MSK (optional).

Mode 2 (optional).

Mode 3 (optional).

Power Requirements

The transceiver 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 transceiver 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 240 Vac ±10%. The power consumption figures are given in Table 1.
dc input supply	The transceiver operates from a dc input supply between 21.6 and 32 V (measured at the radio's input). The supply current figures are given in Table 1.

Table 1 Power Consumption

Transmitting or Receiving	Requirement	Normal Operation	
		ac	dc
Transmitting	Typical	300 VA	8.5 A
	Maximum	500 VA	12 A
Receiving	Typical	70 VA	1.2 A

Dimensions and Weight

The dimensions and weight of the transceiver are:

Width	483 mm (19 inches).
Height	88.9 mm (3.5 inches). The height occupies 2U of equipment cabinet space.
Depth	430 mm (16.9 inches) measured from front panel to rear panel.
Depth	450 mm (17.8 inches) measured from front panel to rear of fan.
Weight	13.5 kg (29.76 pounds).

Environmental

Temperature range	The transceiver operates to specification across the temperature range of -20 to +55°C. The transceiver can be stored at temperatures ranging from -30 to +70°C without causing any damage.
Humidity	The transceiver operates to specification at a relative humidity between 5% and 90% non-condensing.
Altitude	The radios operate to specification up to 15,000 feet. Additionally the equipment is capable of storage at altitudes up to 50,000 feet without damage.
Shock and vibration	The radios comply with shock and vibration protection MIL-STD-810E, method 516.4, procedure VI - Bench Handling. In all cases, no fixed parts become loose. No movable part or permanently set adjustment shifts its setting or position.

Ventilation	The transceivers are cooled by an integral fan, 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 transceivers also include an additional temperature controlled fan contained in the power supply.
Warm up time	All variants are fully operational to specification within 20 seconds after switch on.

AM Modes

Introduction

The transceiver can operate in AM-Voice mode and AM-MSK mode. The following specifications apply to both modes unless stated otherwise.

Transceiver Tx RF Characteristics

RF Power Output

The RF carrier output power is adjustable in 1 W steps from 5 W to 50 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	Loop error can reduce power progressively by up to ±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 VSWRs 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 transceiver is de-keyed and automatically re-keyed at 70°C.

Duty Cycle

100% continuous operation.

Channel Spacing

AM-Voice	The transceivers are capable of both 25 kHz channel spacing and 8.33 kHz channel spacing.
AM-MSK	25 kHz only.

Offset Carrier

AM-Voice	The T6TR is capable of offsetting the carrier frequency to provide 2, 3 and 4 carrier offset.
AM-MSK	Not available

Harmonic Outputs

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.

Spurious Outputs

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

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

Transceiver Rx RF Characteristics

Sensitivity

118 to 136.975 MHz	12 dB SINAD for -107 dBm 30% modulated.
112 to 117.975 MHz and 137 to 155.975 MHz	12 dB SINAD for -105 dBm 30% modulated

Notes ...

(1) All references to SINAD in this document include ITU-T recommendation P.53 weighting.

(2) When operating the transceiver in combined T/R antenna configuration, the sensitivity figures are degraded by 1 dB.

Channel spacing

AM-Voice mode	25 kHz, or 8.33 kHz.
AM-MSK mode	25 kHz.

IF selectivity

For 25 kHz channel spacing	At ±11 kHz from the centre frequency, the signal is attenuated by less than 6 dB. At ±25 kHz from the centre frequency, the signal is attenuated by more than 80 dB.
For 8.33 kHz channel spacing	At ±3.5 kHz from the centre frequency, the signal is attenuated by less than 6 dB. At ±8.33 kHz from the centre frequency, the signal is attenuated by more than 70 dB (60 dB using the ETSI test method). At ±25 kHz from the centre frequency, the signal is attenuated by more than 80 dB.

Unwanted Signal Suppression

Intermod signal suppression	The intermodulation signal suppression is 80 dB or greater (reference 12 dB SINAD) for two unwanted signals spaced 100 kHz (unmodulated) and 200 kHz (30% modulation) from the channel frequency.
Blocking ratio	95 dB or greater (reference 12 dB SINAD and degraded by 6 dB) in the presence of an unmodulated unwanted signal spaced at 200 kHz from the channel frequency. 105 dB or greater (reference 12 dB SINAD and degraded by 6 dB) in the presence of an unmodulated unwanted signal spaced at 3 MHz from the channel frequency.

Cross-modulation rejection	95 dB or greater (reference 30 dB SINAD and degraded by 10 dB) in the presence of a 30% modulated unwanted signal spaced at 200 kHz from the channel frequency. 105 dB or greater (reference 30 dB SINAD and degraded by 10 dB) in the presence of a 30% modulated unwanted signal spaced at 3 MHz.
Spurious signal suppression	90 dB, or greater (reference 12 dB SINAD) for a 30% modulated unwanted signal spaced by more than two channels from the tune frequency up to 1 GHz, 80 dB or greater for frequencies up to 2 GHz and 70 dB or greater for frequencies above 2 GHz..
Interfering signals	At least 6 dB SINAD is achieved for a wanted -87 dBm signal modulated with a 1 kHz tone 30% in the presence of two -5 dBm interfering signals, both FM modulated, one with a 19 kHz tone 7.5 kHz deviation at 107.9 MHz and varied by ±4 kHz the other with a 19.1 kHz tone 7.5 kHz deviation with its frequency chosen such that one of the 3rd order products is located on the chosen receive frequency.

Antenna radiation

Radiation at the antenna socket is less than -81 dBm, typically less than -100 dBm, within the frequency range 9 kHz to 4 GHz.

Maximum RF Input

The transceiver can withstand an RF input of +36 dBm for 20 seconds, and a continuous +27 dBM input, without causing damage.

Transceiver Tx Modulation Characteristics

The transceiver Tx modulation characteristics are as follows:

Mode

AM-Voice mode	The AM-Voice mode uses Double Side Band (DSB) Amplitude Modulation (AM) full carrier, emission designator 6K80A3EJN for 25 kHz channels and 5K00A3EJN for 8.33 kHz channels.
AM-MSK	The AM MSK mode uses Double Side Band (DSB) Amplitude Modulation (AM) full carrier, emission designator 13K0A2DJN.

Modulation Depth

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

Hum and Noise

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	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	The variation in frequency response with reference to a 1k Hz 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	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

For a test signal of 1 kHz set at 80% modulation depth applied to the line input of the transceiver, 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	VOGAD permanently 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 permanently disabled.

Differential group delay

AM-MSK only	There is a 60 µs of differential group delay for signals in the range 1200 to 2400 Hz.

Transceiver Rx Modulation Characteristics

The transceiver Rx modulation characteristics are as follows:

Mode

AM-Voice mode	The AM-Voice mode uses Double Side Band (DSB) Amplitude Modulation (AM) full carrier, emission designator 6K80A3EJN for 25 kHz channels and 5K00A3EJN for 8.33 kHz channels.
AM-MSK	The AM-MSK mode uses Double Side Band (DSB) Amplitude Modulation (AM) full carrier, emission designator 13K0A2DJN.

Frequency response

25 kHz channel spacing	The variation in frequency response with reference to a 1 kHz signal, is within +1 dB and -2 dB across the frequency range 300 to 3400 Hz. The response is less than -20 dB for frequencies at or below 100 Hz, and less than -30 dB at 4 kHz and above.
8.33 kHz channel spacing	The variation in frequency response with reference to a 1 kHz signal, is within +1 dB and -2 dB across the frequency range 350 to 2500 Hz. The response is less than -10 dB for frequencies at or below 100 Hz, and less than -30 dB at 4 kHz and above.

Distortion

25 kHz channel spacing	For RF input signals between -53 dBm and +10 dBm, the total harmonic distortion is less than 5% within the frequency range 300 Hz to 3.4 kHz when the modulation depth is between 30 and 90%.
8.33 kHz channel spacing	For RF input signals between -53 dBm and +10 dBm, the total harmonic distortion is less than 5% within the frequency range 350 Hz to 2.5 kHz when the modulation depth is between 30 and 90%.

Wanted Signal Dynamic Range (RF AGC)

For a 90% modulated on-channel signal, a change in signal level from -107 dBm to +10 dBm results in less than a 3 dB change in audio output. On-channel signals modulated at 90% up to a level of +17 dBm achieve at least 10 dB SINAD.

Audio AGC

AM-Voice Mode	The audio AGC compresses a 30% to 90% variation in input modulation depth to an audio output power change of 1 dB or less. The audio output level is maintained at the equivalent of 90% modulation. Audio AGC can be disabled.
AM-MSK Mode	The audio AGC is permanently disabled.

Squelch

The transceiver has a noise compensated carrier operated squelch with an adjustment range of -114 to -60 dBm, and providing greater than 60 dB of quieting. Note that when the RF pre-attenuator is switched in, the adjustment levels are increased by 6 dB.

The squelch has a noise compensation disable facility to provide carrier only operation.

Transceiver Tx Control

Transceiver Tx control characteristics are as follows:

Audio Inputs

AM-MSK	AM-MSK data is connected to the transceiver via an external modem connected to the line inputs.

AM-Voice	Voice can be connected to the transceiver 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 can be disabled.

Tranceiver Rx Control

AM-Voice Audio Outputs

The transceiver's outputs are the remote audio line output, the headset output and the loudspeaker. Line level output is adjustable between -30 and +10 dBm.

AM-MSK Output

AM-MSK data is connected to an external modem through the remote audio line output.

Back to Transceiver Main Page

Mode 2

Introduction

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

Transceiver Tx RF Characteristics

RF Power Rise Time

The transceiver 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.

Transceiver Tx Modulation Characteristics

Mode

Mode 2 uses Carrier Sense Multiple Access (CSMA) differentially encoded 8-phase shift keying (D8PSK), using a raised cosine filter with α =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 (±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 10Hz. After this, the phase acceleration is less than 500 Hz/s.

Back to Transceiver Main Page

Transceiver Rx RF Characteristics

Sensitivity

The transceiver has a sensitivity better than -102dBm for $1x10^{-3}$ Bit Error Rate (BER) with Reed Solomon Decoding off.

Channel Spacing

Mode 2 channel spacing is 25 kHz.

IF Selectivity

At ±11 kHz from the centre frequency, the signal is attenuated by less than 6 dB.

At ±25 kHz from the centre frequency the signal is rejected by more than 80 dB.

Unwanted Signal Suppression

With the required signal at -92 dBm, a BER of better than $1x10^{-3}$ with Reed Solomon Decoding switched off is achieved under the following conditions:

- An interfering signal at -32 dBm on an adjacent channel
- One or more out-of-band interfering signals having a total level of -33 dBm
- One or more VHF FM broadcast signals having a total level of -5 dBm
- Co-channel rejection better than 20 dB.

Synchronisation

For received signals greater than -103 dBm, the probability of synchronisation is greater than 0.999. The probability of false synchronisation is $3x10^{-3}$

Transceiver Rx 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.

Wanted Signal Dynamic Range (RF AGC)

A BER better than $1x10^{-3}$ with Reed Solomon Decoding off is achieved for received signals of -102 dBm to +10 dBm.

Frequency Offsets

The transceiver operates with frequency offsets up to 826 Hz.

Mode 3

Introduction

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

Transceiver Tx RF Characteristics

RF Power Rise Time

The transceiver 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.

Transceiver Tx Modulation Characteristics

Mode

Mode 3 uses Time Division Multiple Access (TDMA) differentially encoded 8-phase shift keying (D8PSK), using a raised cosine filter with α=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 (±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 10Hz. After this, the phase acceleration is less than 500 Hz/s.

Transceiver Rx RF Characteristics

Sensitivity

The transceiver has a sensitivity better than -102dBm for $1x10^{-3}$ Bit Error Rate (BER) with Reed Solomon Decoding off.

In order to improve co-location performance where maximum sensitivity cannot be realized due to large unwanted signals, the transceiver's sensitivity can be reduced by 6 dB. This is achieved by switching on the 6 dB RF pre-attenuator from the front panel menu system.

Channel Spacing

Mode 3 channel spacing is 25 kHz.

IF Selectivity

At ±11 kHz from the centre frequency, the signal is attenuated by less than 6 dB.

At ±25 kHz from the centre frequency the signal is rejected by more than 80 dB.

Unwanted Signal Suppression

With the required signal at -92 dBm, a BER of better than $1x10^{-3}$ with Reed Solomon Decoding switched off is achieved under the following conditions:

- An interfering signal at -32 dBm on an adjacent channel
- One or more out-of-band interfering signals having a total level of -33 dBm
- One or more VHF FM broadcast signals having a total level of -5 dBm
- Co-channel rejection better than 20 dB.

Synchronisation

For received signals greater than -103 dBm, the probability of synchronisation is greater than 0.999. The probability of false synchronisation is $3x10^{-3}$.

Transceiver Rx 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.

Wanted Signal Dynamic Range (RF AGC)

A BER better than $1x10^{-3}$ with Reed Solomon decoding off is achieved for received signals of -102 dBm to +10 dBm. The AGC attack time is less than 0.5 ms and the decay time is less than 1 ms for a 40 dB step input.

Frequency Offsets

The transceiver operates with frequency offsets up to 826 Hz.

Back to Transceiver
Main Page

Operation

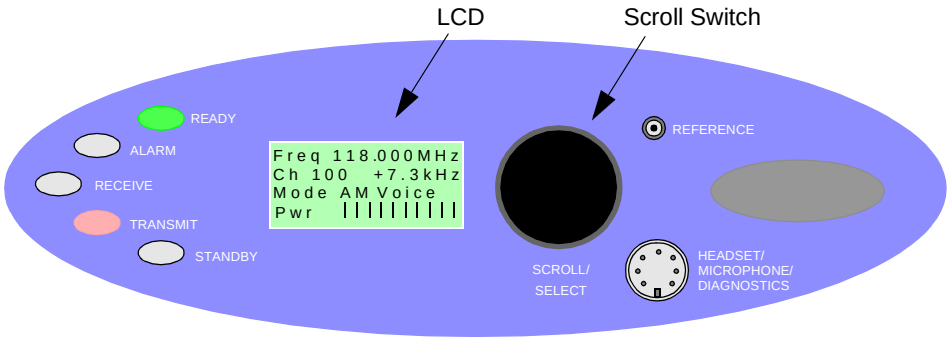
This document describes the controls, indicators, setting up and operating instructions applicable to the T6TR VHF Multimode Transceiver.

Controls and Indicators

This part details the purpose of all controls and indicators of the T6TR transceivers.

Front Panel

The front panel's controls, indicators and connectors are shown below and detailed in the following paragraphs.



Scroll/Select Switch and LCD

The Scroll/Select switch is used in conjunction with the LCD to select most of the transceiver's operational settings. Use of the switch and LCD is fully detailed in the section of this user guide applicable to the particular operating mode. 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 below shows the transceiver operating on 118.000 MHz; the frequency has been preset as channel 100 and offset at +7.3 kHz.

Transmit Indicator

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

Receive Indicator

An amber indicator that lights when a signal is received that is above the squelch threshold. Additionally, this indicator is lit when the transceiver's squelch facility is switched off (squelch defeated). This indicator also lights when the transceiver is keyed.

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 transceiver remains operational. A BIT 'alert' is indicated if:

- If the transceiver RF output power has reduced from its setting by more than 1 dB but not more than 3 dB
- If 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 transceiver cannot be used.

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

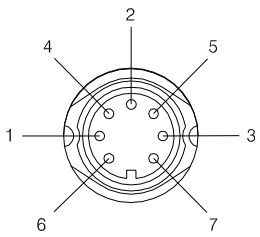
Standby Indicator
A red indicator that lights when the transceiver is in standby mode. When in standby mode, most of the radio's circuits are inactive, the front panel LCD is blanked, and the transceiver cannot be keyed.

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 15.

Reference Connector
An SMB jack socket that allows a frequency counter to monitor the transceiver'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.

Headset/Microphone/Diagnostics Connector
A dual purpose connector that allows either a headset/microphone, or a PC, to be connected to the transceiver. 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 transceiver 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 T6TR maintenance section. The PC connections at the transceiver are shown in Table 2 on page 4.



Viewed from front

Table 1 Headset/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/headset drive	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 Headset/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.
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's power switch is a 2-way rocker switch used to select between power on, and standby.

WARNING  **Dangerous Voltages**

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

 = On

 = Standby

Setting Up and Operation

Introduction

Setting up the transceiver involves selecting various parameters using the Virtual Front Panel (VFP), through a Multi-Access Remote Control (MARC) system, from a T6 controller, or from the transceiver's front panel. The transceiver can be configured for remote or local use.

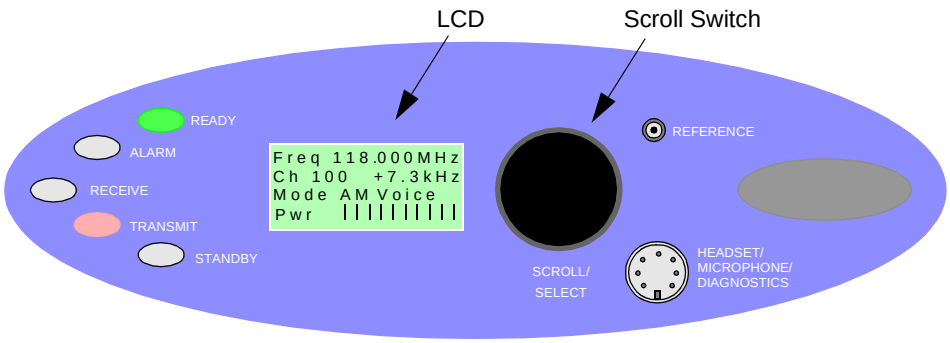
Table 11 on page 35 details the functions and parameters that can be set from all these sources.

The rest of this document details how to configure the transceiver from the front panel, and how to operate the radio in local mode.

Selecting most of the transceiver's operational settings is carried out using the front panel Scroll/Select switch and the LCD (see the illustration below). No attempt to set up the transceiver should be made until the transceiver has been installed as per the installation procedures given in the Installation section.

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 transceiver is keyed. If the transceiver 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.

Back to Transceiver Main Page

Screen Protocol

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

Main Screen During normal transceiver operation, the Main screen, an example of which is shown below, is displayed.

```
Freq      118.000MHz
Ch100          +7.3kHz
Mode      AM   Voice
Vol       IIIIIIIIII
```

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 transceiver 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.

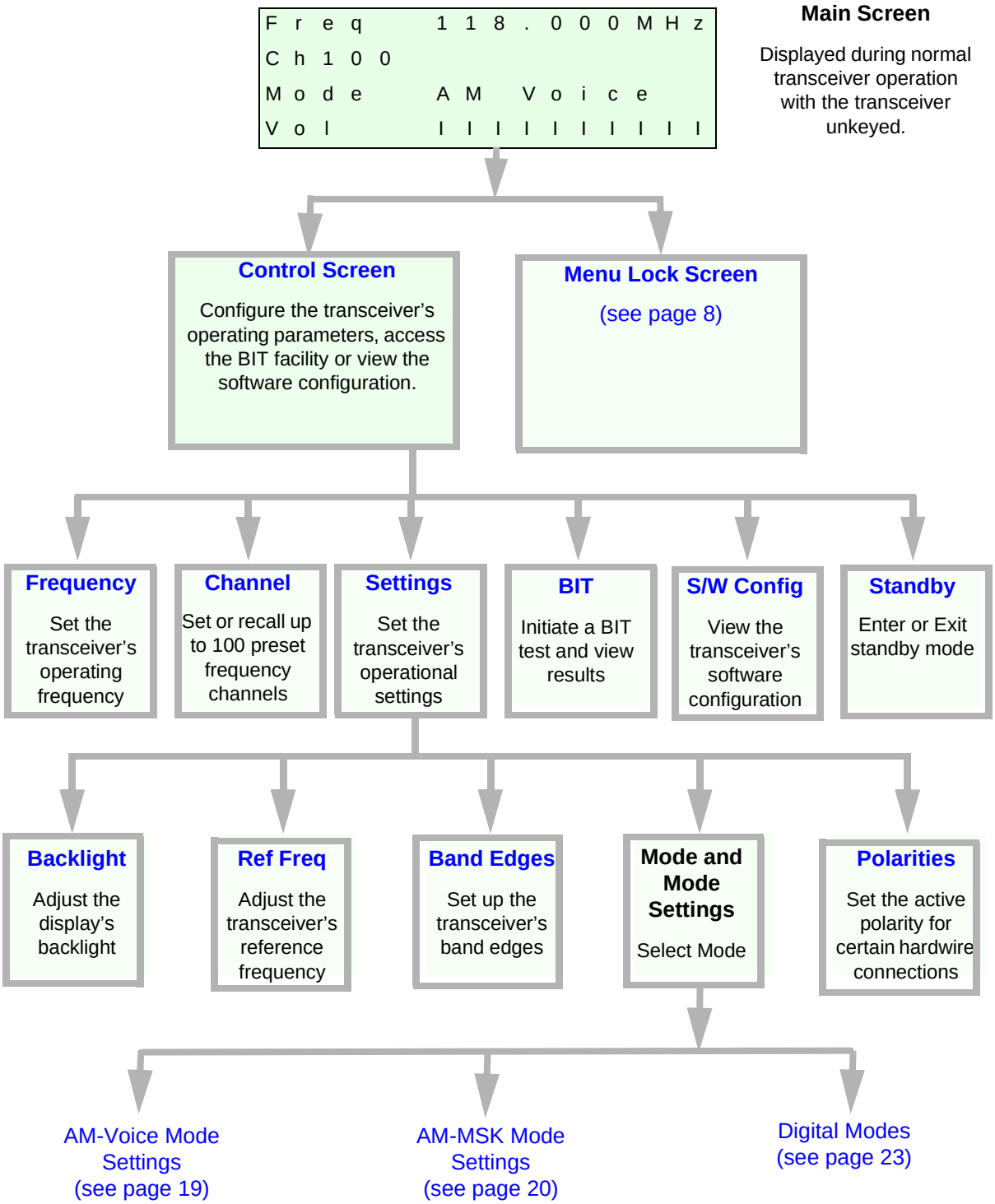
Back When Back is selected, you are returned to the previous menu.

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.

Back to Transceiver Main Page

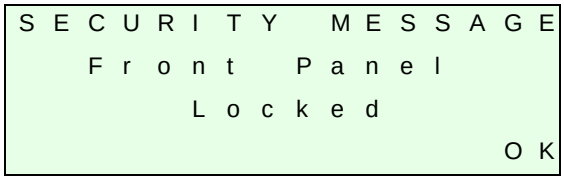


Menu System

Menu Lock Screen

A security facility available only from the VFP allows the transceiver's 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.



To exit the system lock screen:

- Select OK, then press the switch. You are returned to the Main screen.

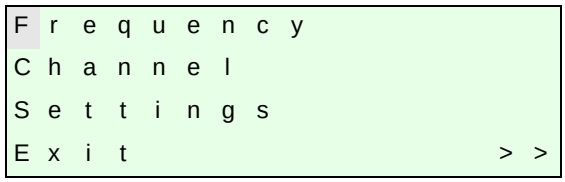
  or,

- Wait for the 30 second time-out to expire. You are returned to the Main screen.

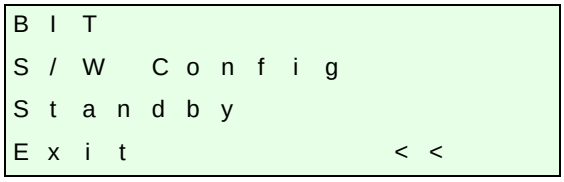
Control Screen

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

Change the transceiver’s operating frequency.
Store or recall preset channel frequencies.
Select operating mode and mode settings.



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



Notes for Setting Up the Transceiver

The following notes should be read before setting up the transceiver. 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 transceiver and 8.33 kHz channel spacing is selected, 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 transceiver'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 Transceiver'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

Input Line Level Settings

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 transceiver 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 pre-set 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

Output Line Level Setting

The output 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 transceiver using a signal generator with sine wave modulation, the line output level will be 10 dB above the line level setting.

Table 5 shows the relationship between line level, output levels with average speech and sine wave (assuming that the audio AGC is set to on, and the modulation depth is between 30% and 100%).

Table 5 Relationship between Line Level, Output Levels with Average Speech and Sine Wave

Line Level Setting (Front Panel Setting) (dBm)	Output Level with Average Speech (dBm)	Output Level with Sine Wave (dBm)
+10	+10	+20
+5	+5	+15
0	0	+10
-5	-5	+5
-10	-10	0
-15	-15	-5
-20	-20	-10
-25	-25	-15
-30	-30	-20

Back to Transceiver Main Page

Changing the Transceiver's Operating Frequency

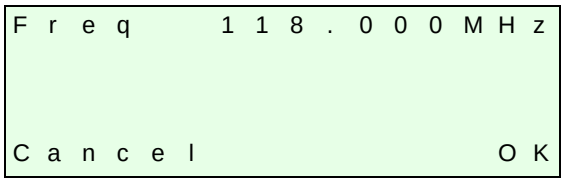
The transceiver's frequency can be changed in two ways: either from the frequency screen, or by recalling a preset channel. This procedure details using the Frequency screen.

(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.



To Store and Recall Frequency Channels

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

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.

To recall a Stored Frequency Channel

(1) From the Control screen, select Channel to display the Channel screen.

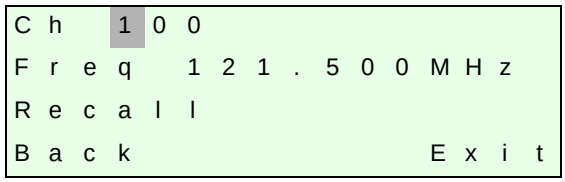
(2) To make the transceiver operate on any preset channel frequency, highlight Channel and press the switch. Turn the switch until the required channel number/frequency is displayed, then press the switch.

(3) Turn the switch to highlight Recall, then press the switch. Exit the screen. The transceiver now operates on the recalled channel frequency.

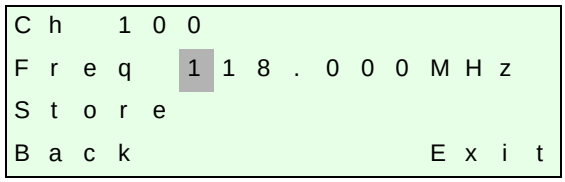
Notes:

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

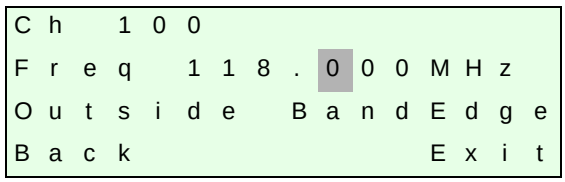
If a frequency not valid for the mode of operation is entered, a message (see Channel Screen - Example 4) is displayed.



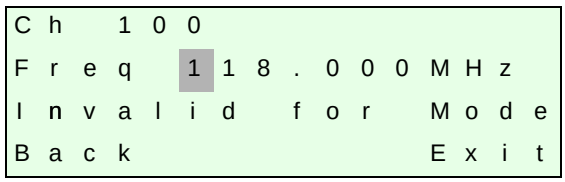
Channel Screen - Example 1



Channel Screen - Example 2



Channel Screen - Example 3



Channel Screen - Example 4

To Initiate a BIT Test

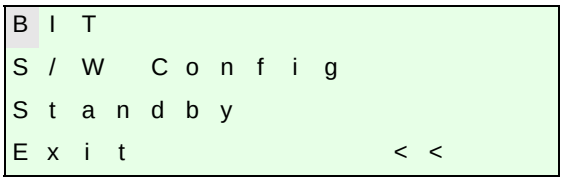
Use the following procedure to initiate an interruptive BIT test from the transceiver's front panel. A BIT test cannot be initiated while the transceiver is keyed. After a BIT test has been run, the BIT screen is displayed (see AM-Voice and AM-MSK BIT Screen on page 28). An interruptive BIT test cannot be initiated in Mode 2 or Mode 3.

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

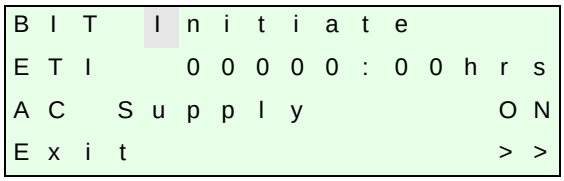
If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transceiver's antenna connector.

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 transceiver must not be keyed during the test.

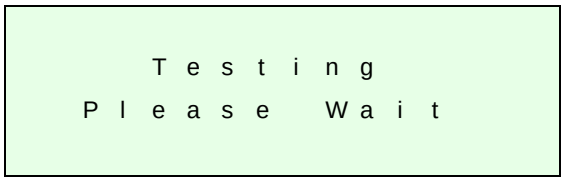
(1) From the Main screen, press the switch to display the Control screen. Turn the switch until BIT is highlighted. Press the switch.



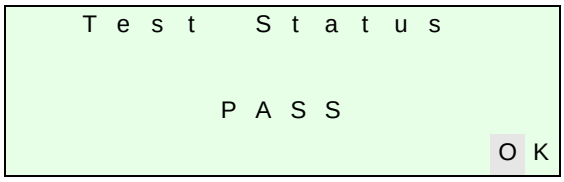
(2) Ensure the BIT menu is displayed. Turn the switch until BIT Initiate is highlighted. Press the switch.



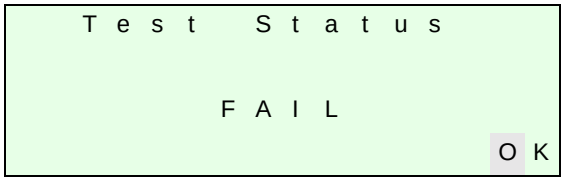
(3) During the test, which takes approximately two seconds, the Testing screen is displayed.



(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 transceiver parameters for failure.

Standby Mode

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

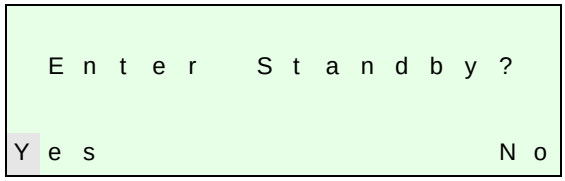
When the transceiver is in Standby mode, the red front panel Standby indicator is lit.

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.

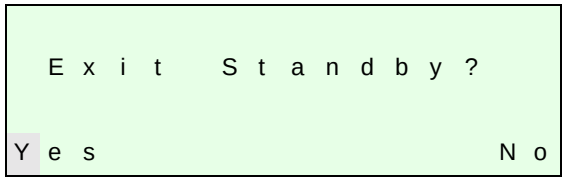


To Exit Standby Mode

(1) Press the Switch.

(2) Select Yes.

(3) Check that the Main screen is displayed and that the front panel Standby indicator is unlit.



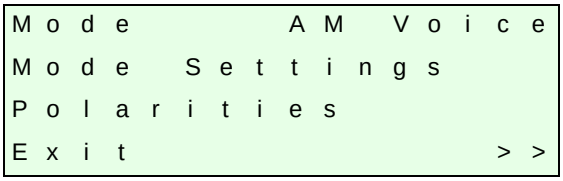
Settings

Operational settings for the T6TR VHF transceiver 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.

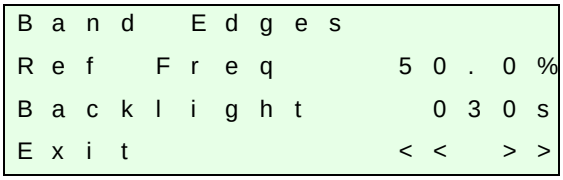
Note that the mode selection, reference frequency and backlight are set from this screen. When mode settings, polarities and band edges are selected the user is taken to other screens.



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

Select to take you to the mode specific Settings menu.

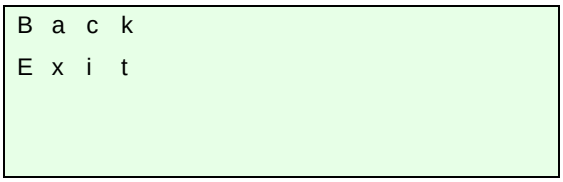
Select to take you to the Polarities menu.



Set the transceiver's frequency band edges.

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

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



Notes:

1. Setting the transceiver's reference frequency is a maintenance operation. The current value should not be reset unless the correct test equipment is connected. See the Maintenance section.
2. The LCD's 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 6 on page 17. Click on any required parameter by page number for further references.

Table 6 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 15
Exit standby mode	All	Yes or No	-	page 15
Set mode of operation	All	AM-voice, AM-MSK, Mode 2 or Mode 3	AM-voice	page 16
Set polarities	AM-Voice AM-MSK	STD or INV	STD	page 24
Band edges	All AM modes only	NB model 118.000 to 136.975 MHz or WB model 112.000 to 155.975 MHz	NB model 118.000 and 136.975 MHz WB model 112.000 and 155.975 MHz	page 33
LCD backlight	All	15 to 120 s, On or Off	30 s	page 16
RF Power	All	5 to 50 W	50 W	page 19
Audio line in level	AM-Voice AM-MSK	-30 to +10 dBm	-13 dBm	page 19 and page 21
Audio line out level	AM-Voice AM-MSK	-30 to +10 dBm	-13 dBm	page 19 and page 21
Inhibit	AM-Voice AM-MSK	On or Off	Off	page 19 and page 21
PTT (key)	AM-Voice AM-MSK	On (key), Off (de-key)	Off	page 19 and page 21
Tx time out	AM-Voice AM-MSK	2 to 510 s or Off	180 s	page 19 and page 21
Modulation depth	AM-Voice AM-MSK	5 to 95%	85%	page 19 and page 21
Mute	AM-Voice	On or Off	On	page 19
VOGAD	AM-Voice	On or Off	On	page 19
Antenna C/O delay	AM-Voice AM-MSK	On or Off	On Off	page 19 page 21
Offset	AM-Voice	0, ±2.5, ±5, ±7.3, or ±7.5 kHz	0 (No offset)	page 19
Squelch	AM-Voice AM-MSK	-114 to -60 dBm in 1 dB steps. With the RF pre-attenuator selected, the range is -108 to -54 dBm	-107 dBm	page 19 and page 21
RF Pre-attenuation	AM-Voice AM-MSK	On or Off	Off	page 19 and page 21
Squelch Defeat	AM-Voice AM-MSK	On or Off	Off	page 19 and page 21
Squelch noise compensation	AM-Voice AM-MSK	On or Off	On	page 19 and page 21
Squelch carrier override	AM-Voice AM-MSK	On or Off	Off	page 19 and page 21

Table 6 Operational Settings from the Front Panel (Continued)

Parameter	Mode	Adjustment Range	Factory Default Setting	Further Reference
Audio AGC	AM-Voice	On or Off	On	page 19
Loudspeaker	AM-Voice	On or Off	On	page 19
Step	AM-Voice	8.33, 25 kHz or both	25 kHz	page 20
Mic	AM-Voice	Active or Passive	Passive	page 20
Key priority	AM-Voice AM-MSK	Local-Remote or Remote-Local	Local-Remote	page 20 and page 21
Local PTT	AM-Voice AM-MSK	Enabled or Disabled	Enabled	page 20 and page 21
Remote PTT	AM-Voice AM-MSK	Enabled or Disabled	Enabled	page 20 and page 21
Remote phantom PTT	AM-Voice AM-MSK	Enabled or Disabled	Enabled	page 20 and page 21
Self receive	AM-Voice	On or Off	Off	page 20

AM-Voice Settings Procedure

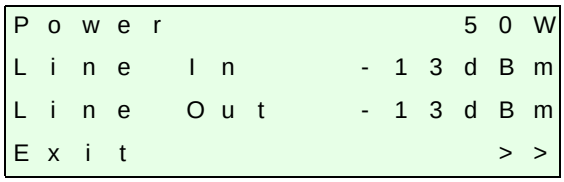
During this procedure, the following parameters, applicable to AM-Voice operation, can be set:

- RF power output
- Audio Line input level
- Audio Line output 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
- Squelch (See “Squelch Setting Options” on page 22.)
- RF pre-attenuation (on or off)
- Squelch defeat (on or off)
- Squelch noise compensation (on or off)
- Squelch carrier override (on or off)
- Audio AGC (on or off)
- Loudspeaker (on or off)
- Step (25 kHz or 8.33 kHz)
- Mic (Passive or Active)
- Key priority (local or remote)
- Enable or disable local PTT
- Enable or disable remote PTT
- Enable or disable remote phantom PTT
- Self receive

AM-Voice Mode Settings Screen

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

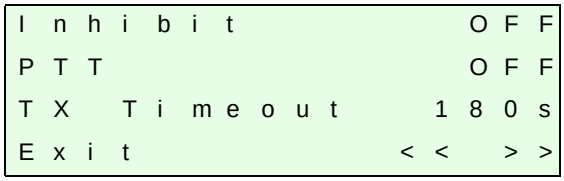
Adjustments



RF power between 5 W to 50 W.

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

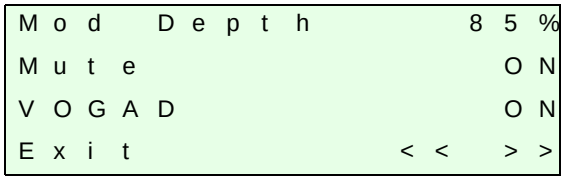
Audio line out level between -30 to +10 dBm.



On or Off.

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

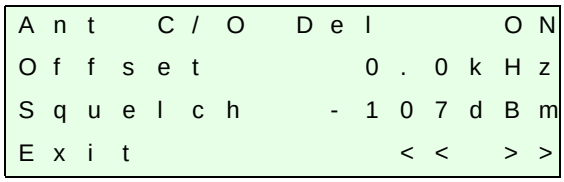
2 to 510 s.



5 to 95%.

On or Off.

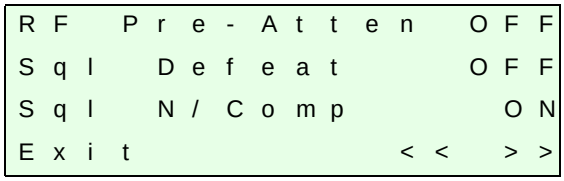
On or Off.



On or Off.

0, ±2.5, ±5, ±7.3, ±7.5 kHz.

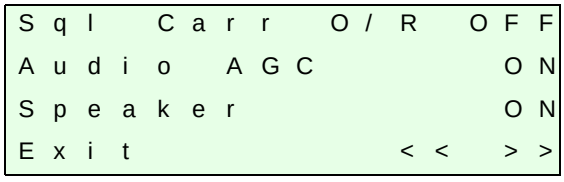
-114 to -60 dBm in 1 dB steps. With the RF pre-attenuator selected, the range is -108 to -54 dBm.



On or Off.

On or Off.

On or Off.

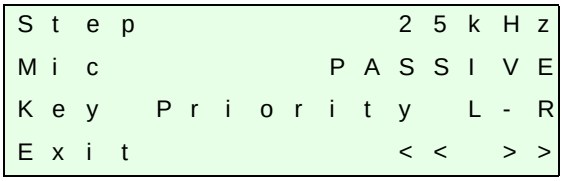


On or Off.

On or Off.

On or Off.

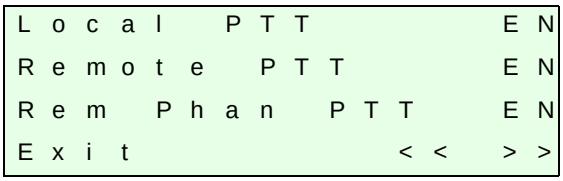
Adjustments



25 kHz, 8.33 kHz or both.

Active or Passive.

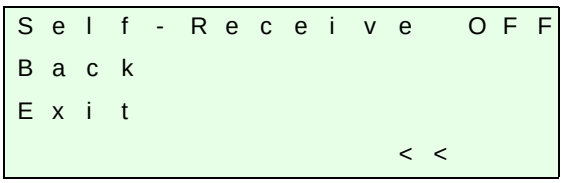
Local-remote or Remote-local.



Enabled or Disabled.

Enabled or Disabled.

Enabled or Disabled.



On or Off.

AM-MSK Mode Settings Procedure

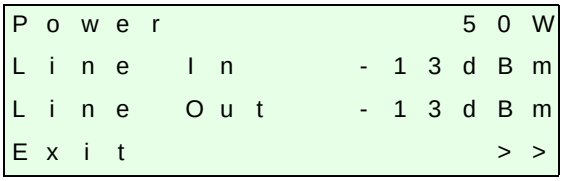
During this procedure, the following parameters, applicable to AM-MSK operation, can be set:

- RF Power output
- Audio Line input level
- Audio Line output level
- Inhibit
- PTT on (key) or off (de-key)
- Transmitter time out
- Modulation depth
- Antenna c/o delay (on or off)
- Squelch (See “Squelch Setting Options” on page 22.)
- RF pre-attenuation
- Squelch defeat
- Squelch noise compensation
- Squelch carrier override
- 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-Voice mode setting screen is a accessed from the Settings screen. Use the Scroll/Select switch to select the parameter, then enter the required setting(s).

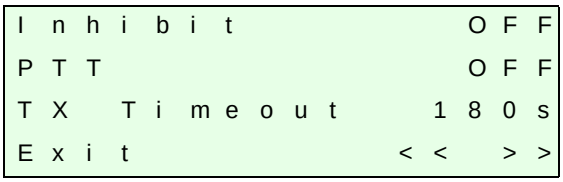
Adjustments



RF power between 5 W to 50 W.

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

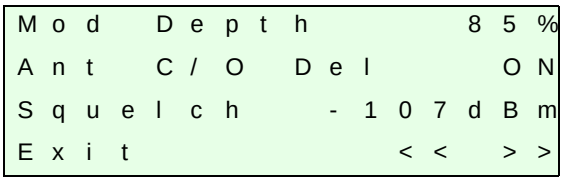
Audio line in level between -30 to +10 dBm.



On or Off.

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

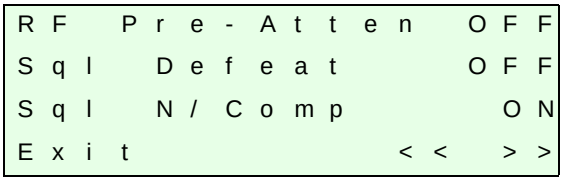
2 to 510 s.



5 to 95%.

On or Off.

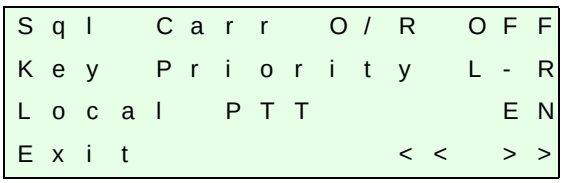
-114 to -60 dBm in 1 dB steps. With the RF pre-attenuator selected, the range is -108 to -54 dBm.



Off or On.

Off or On.

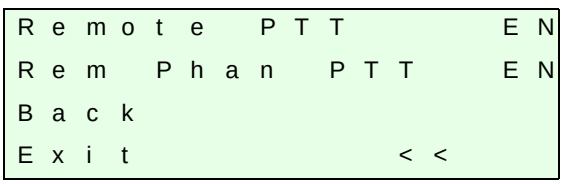
Off or On.



Off or On.

Local-remote or Remote-local.

Enabled or Disabled.



Enabled or Disabled.

Enabled or Disabled.

Squelch Setting Options

The transceiver's squelch facility is configured from the AM-Voice, or AM-MSK Settings screen. The following fields are applicable to squelch operation.

Sql Defeat. The squelch defeat facility can be set to on or off.

- When set to on, the squelch facility does not operate.
- When set to off the transceiver's squelch facilities are available.

Squelch. The squelch field sets the threshold; the default setting is -107 dBm.

- During periods of no reception, or when signals weaker than the threshold are received, the transceiver is muted.
- When signals stronger than the squelch threshold are received, the squelch circuits are defeated and reception is heard in the normal way.

Sql N/Comp. This field allows noise compensated squelch to be selected on or off. When this facility is on, the squelch circuits mute all signals weaker than the threshold, and also mute signals stronger than the threshold that are excessively noisy.

Sql Carr O/R. The carrier override squelch facility is used in conjunction with the noise compensated squelch facility. If too many noisy signals are being lost due to noise compensation, carrier override can be switched on to reduce the squelch threshold by 10 dB. The default threshold of -107 dBm effectively becomes -97 dBm with carrier override switched on. All signals stronger than -97 dBm, irrespective of the noise level, are then heard in the normal way.

Table 7 Squelch Facility Settings

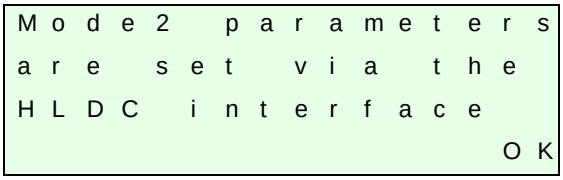
Required Squelch Operation	Squelch Defeat Setting	Squelch Setting	Sql N/Comp Setting	Sql Carr O/R Setting
No squelch	On	Any	Off	Off
Squelch (without noise compensation)	Off	Required threshold	Off	Off
Noise compensated squelch	Off	Required threshold	On	Off
Noise compensated squelch with carrier override squelch	Off	Required threshold	On	On

Using the RF Pre-Attenuator

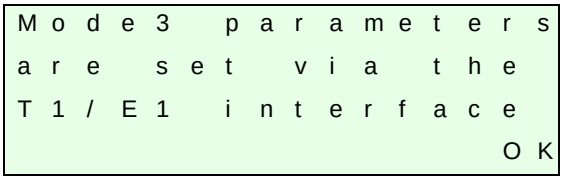
Selecting the RF pre-attenuator to On provides a 6 dB reduced sensitivity feature to improve co-location performance where maximum sensitivity cannot be realised due to large unwanted signals

Back to Transceiver
Main Page

Mode 2 Settings Screen
This is an advisory screen. Pressing OK returns the user to the Main screen.



Mode3 Settings Screen
This is an advisory screen. Pressing OK returns the user to the Main screen.

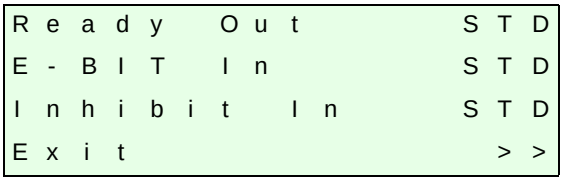


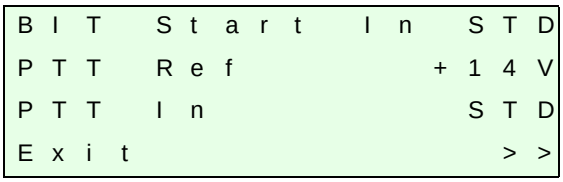
Polarities Screens AM-Voice and AM-MSK

A number of remote indication and control signals can be hard-wire connected to the transceiver. The following paragraphs detail the signals applicable to each operational mode of the transceiver.

The Polarities screen is accessed from the Settings screen.

AM-Voice and AM-MSK Polarity Settings

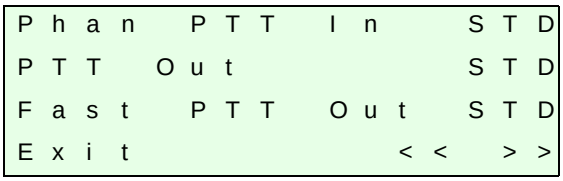


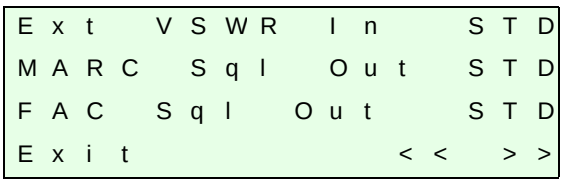


Each of thirteen polarity settings applicable to AM-Voice and AM-MSK can be set to the default STD (standard) setting or INV (inverted).

The signal connections are shown in Table 8 on page 25 along with the conditions when STD or INV is selected.

The settings for the PTT Reference voltage are also shown in Table 8 on page 25.





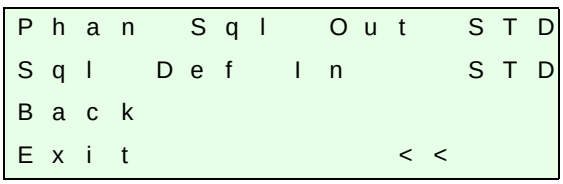


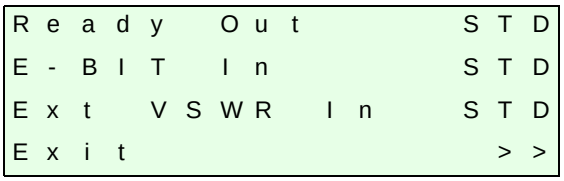
Table 8 AM-Voice and AM-MSK Polarity Settings

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 receiver operation.	TTL input. 5 V inhibits receiver 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 Audio, pin 8	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	MARC Audio, pin 4	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.
Fast PTT Output (antenna changeover)	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.
External VSWR Input	Facilities, pin 4	TTL input. 0 V active.	TTL input. 5 V active.
MARC squelch out	MARC, pin 4 MARC audio, pin 6	Normally open relay contact that closes to give a 0 V output when the squelch circuits are defeated (aircraft calling).	Normally closed (0 V output) relay contact that opens when the squelch circuits are defeated (aircraft calling).

Table 8 AM-Voice and AM-MSK Polarity Settings

Signal	Connector	Polarity set to STD	Polarity set to INV
FAC squelch out	Facilities, pin 5	Normally open relay contact that closes when the squelch circuits are defeated (aircraft calling). The relay contact can be configured to switch any potential between -60 V and + 60 Vdc.	Normally closed relay contact that opens when the squelch circuits are defeated (aircraft calling). The relay contact can be configured to switch any potential between -60 V and + 60 Vdc.
Phantom squelch out	MARC, pin 2 MARC audio, pin 1	Phantom Squelch. Normally open relay contact that closes to connect a 0 V phantom potential to the audio lines when the squelch circuits are defeated (aircraft calling).	Phantom Squelch. Normally closed relay contact connecting a 0 V potential to the audio lines that opens when the squelch circuits are defeated (aircraft calling).
Squelch defeat in	Facilities pin 7	TTL input. 0 V switches off the squelch circuits.	TTL input. 5 V switches off the squelch circuits.
PTT Ref .	-	PTT Ref can be set to +14 V, 0 V or -14 V. PTT state is: **+14 V Ref.** key ≤+4 V ≥+24 V unkey +13 to +15 V **0 V Ref.** key ≤-10 V ≥+10 V unkey -1 V to +1 V **-14 V Ref.** key ≤-24 V ≥-4 V unkey -13 to -15 V Maximum input level ±60 V with respect to reference. Input will draw no more than 6 mA, and requires at least 1 mA to operate.	PTT Ref can be set to +14 V, 0 V or -14 V. PTT state is: **+14 V Ref.** unkey ≤+4 V ≥+24 V key +13 to +15 V **0 V Ref.** unkey ≤-10 V ≥+10 V key -1 V to +1 V **-14 V Ref.** unkey ≤-24 V ≥-4 V key -13 to -15 V Maximum input level ±60 V with respect to reference. Input will draw no more than 6 mA, and requires at least 1 mA to operate.

Mode 2 and Mode 3 Polarity Settings



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 shown in Table 9 along with the conditions when STD or INV is selected.

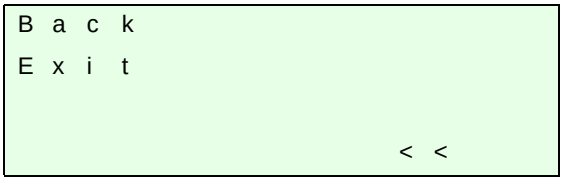
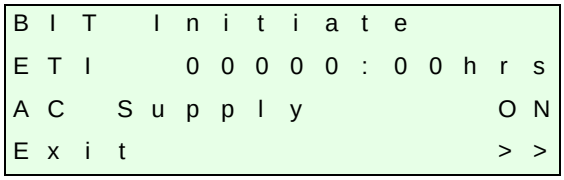


Table 9 Mode 2 and Mode 3 Polarity Settings

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

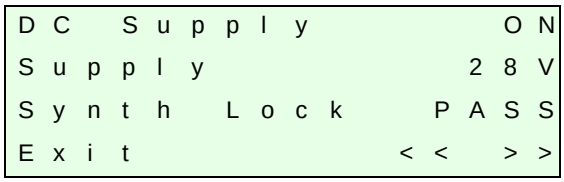
The AM-Voice and AM-MSK BIT screen is a accessed from the Control screen. Further information on the BIT screen can be found in the Maintenance section.



Select to initiate BIT test.

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

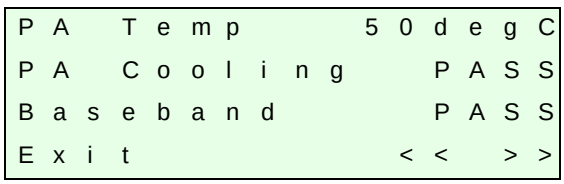
Shows state of ac supply (On or Off).



Shows state of dc supply (On or Off).

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

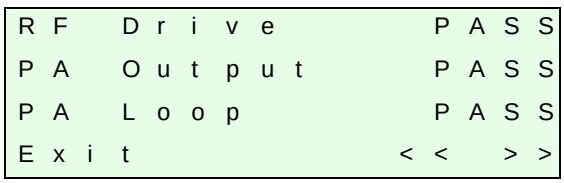
Pass or Fail (Out-of-Lock).



PA temperature (range -20°C to +150°C).

Pass or Fail.

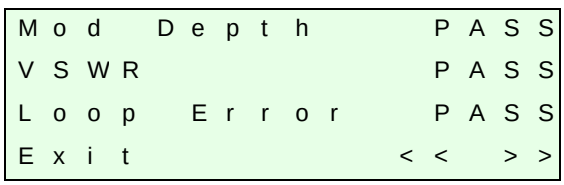
Pass, Fail or Not Connected.



Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

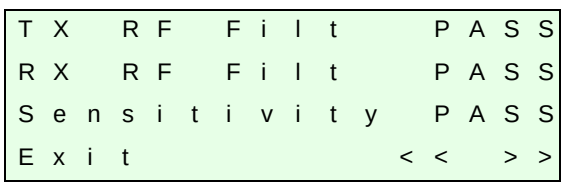
Pass, Fail or Not Tested.



Pass, Fail or Not Tested.

Pass or Fail.

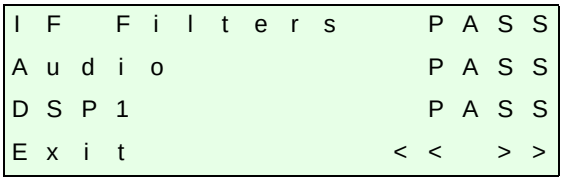
Pass or Fail.



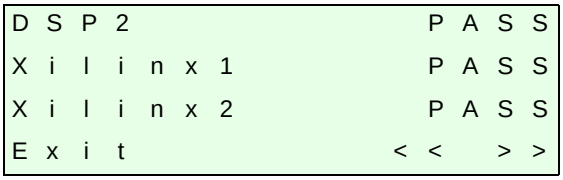
Pass, Fail or Not Tested.

Pass, Fail or Not Tested.

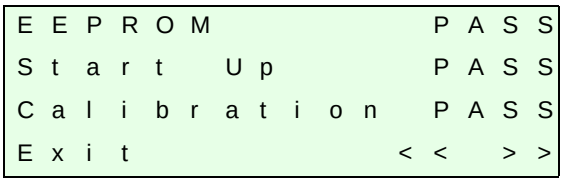
Pass, Fail or Not Tested.



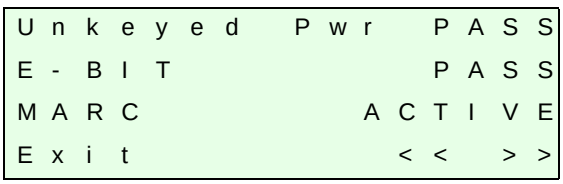
Pass, Fail or Not Tested.
Pass, Fail or Not Tested.
Pass or Fail.



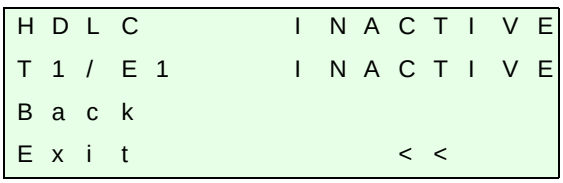
Pass or Fail.
Pass or Fail.
Pass or Fail.



Pass or Fail.
Pass or Fail.
Pass or Fail.



Pass or Fail.
Pass or Fail.
Active or Inactive.

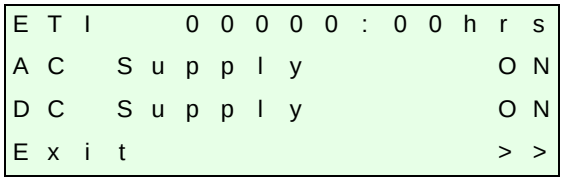


Active or Inactive.
Active or Inactive.

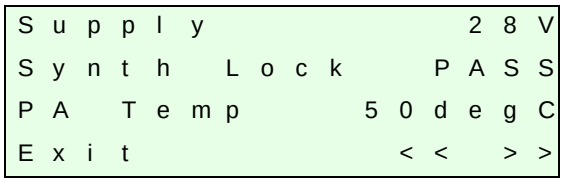
Back to Transceiver Main Page

Mode 2 and Mode 3 BIT Screen

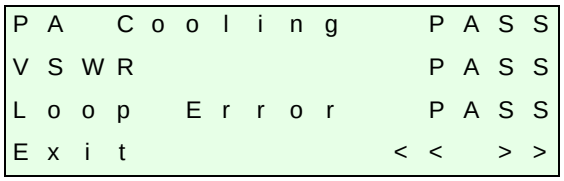
The Mode 2 and Mode 3 BIT screen is accessed from the Control screen.



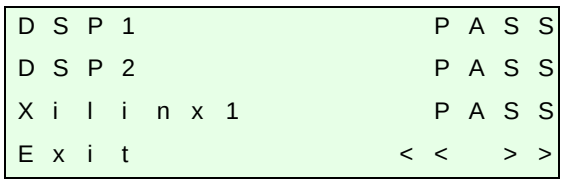
Shows elapsed time 0:00 to 99999:59 (Hrs:Min).
Shows state of ac supply (On or Off).
On or Off.



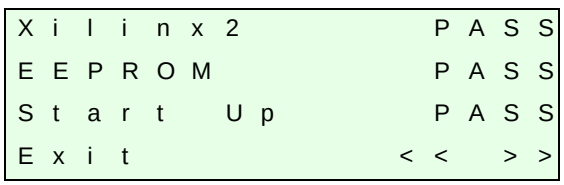
Shows value of dc supply.
Pass or Fail.
Indicates the PA temperature.



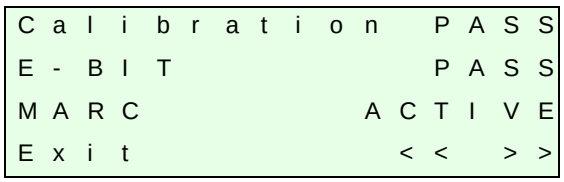
Pass or Fail.
Pass, Fail or Not Tested.
Pass or Fail.



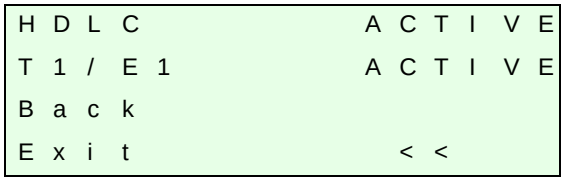
Pass or Fail.
Pass or Fail.
Pass or Fail.



Pass or Fail.
Pass or Fail.
Pass or Fail.



Pass or Fail.
Pass or Fail.
Active or Inactive.



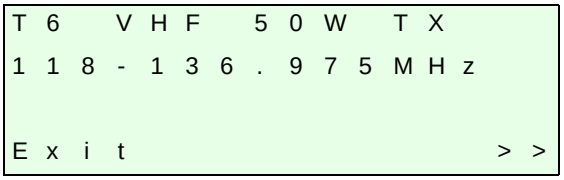
Active or Inactive.

Active or Inactive.

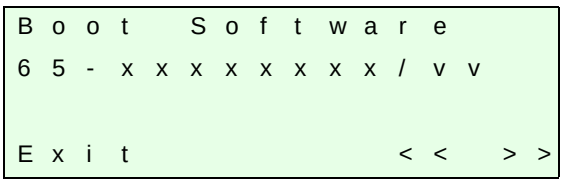
Active or Inactive.

Software Configuration Screens

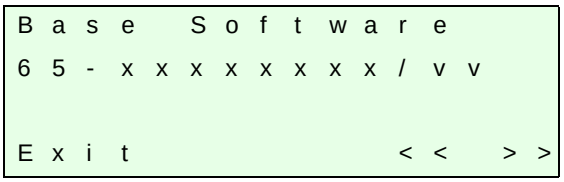
Software configuration screens are as follows:



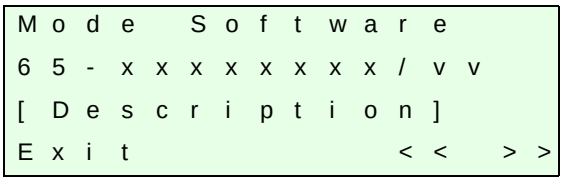
Second line variation for WB radios reads 112-155.975 MHz.



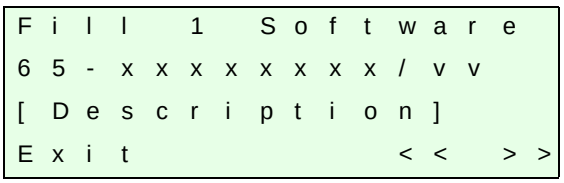
65-xxxxxxxx represents the software part number and /v v represents its version.



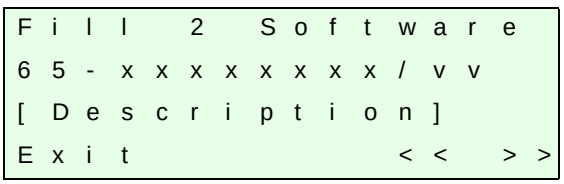
65-xxxxxxxx represents the software part number and /v v represents its version.



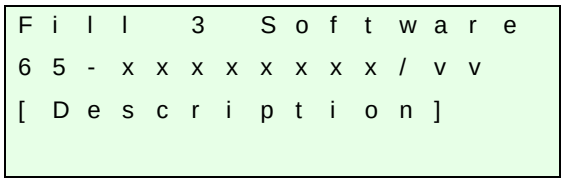
Current mode running. 65-xxxxxxxx represents the software part number and /v v represents its version.



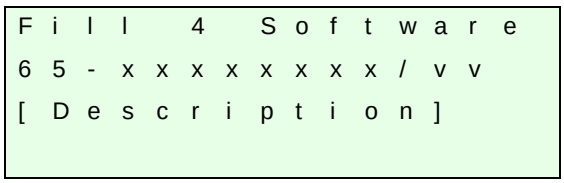
65-xxxxxxxx represents the software part number and /v v represents its version.



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



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

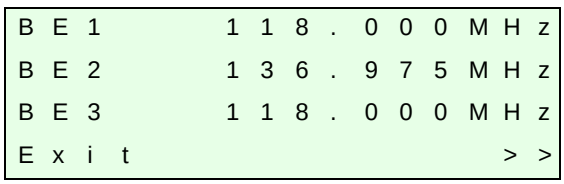


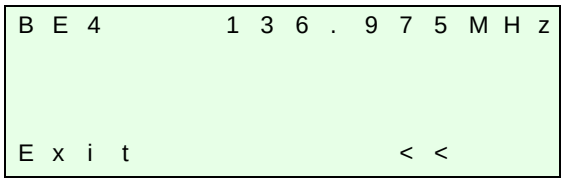
65-xxxxxxxx represents the software part number and /v v represents its version.

Band Edges

The frequency range of the transceiver is 118 to 136.975 MHz for the B6550/NB version, or 112 to 155.975 MHz for the B6550/WB version.

If required, reception can be limited to either one or two smaller parts of the frequency band by setting the band edges BE1 to BE4. Reception is possible between BE1 and BE2 frequencies, and frequencies between BE3 and BE4.





The Band Edge screen is accessed from the Control screen.

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

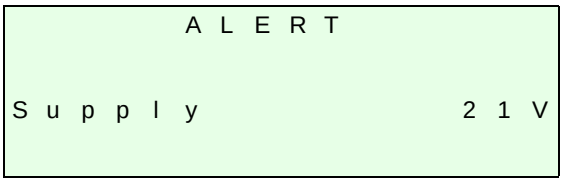
If the transceiver is required to operate over the full range, the band edge parameters must be set to the lowest and highest values in the range (see Table 10).

Table 10 Band Edge Values

	BE1	BE2	BE3	BE4
B6550/NB set so that the full frequency range can be received.	118.000	136.975	118.000	136.975
B6550/WB set so that the full frequency range can be received.	112.000	155.975	112.000	155.975
Example: Transceiver set to transmit and receive only those frequencies in the range 120 to 130 MHz.	120.000	130.000	120.000	130.000
Example: Transceiver set to transmit and receive only those frequencies in the ranges 120 to 125 MHz and 130 to 135 MHz.	120.000	125.000	130.000	135.000

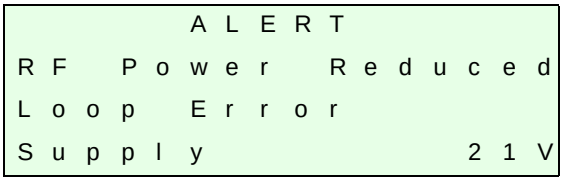
BIT Status Warning Screens

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.



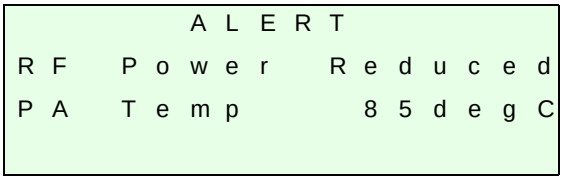
Alarm indicator flashing

No RF power reduction.



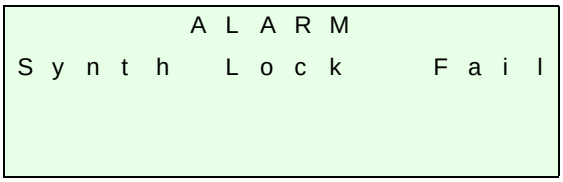
Alarm indicator flashing

RF power reduced between 1 and 3 dB.



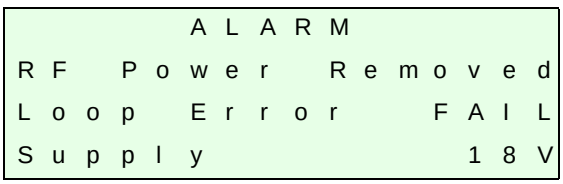
Alarm indicator flashing

RF power reduced between 1 and 3 dB.



Alarm indicator on

Synth Lock failure (showing a single cause of alarm).



Alarm indicator on

RF power shut down (showing multiple causes of alarm).

Table 11 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	✔	✔	✔	✔	✗	✗	**-**
SETTINGS							
Set modulation mode	✔	✔	✔	✔	✔	✔	**AM-Voice**
Radio Settings (AM Modes):							
Set RF output power	✔	✔	✔	✔	✔	✔	**50 W**
Set audio input line level	✔	✔	✔	✗	✔	✗	**-13 dBm**
Set audio output line level	✔	✔	✔	✗	✔	✗	**-13 dBm**
Set inhibit on or off	✔	✔	✔	✗	✗	✗	**Off**
PTT test facility on (key) off (de-key)	✔	✔	**View only**	✗	✔	✗	**Off**
Set Tx time out	✔	✔	✔	✗	✔	✗	**180 s**
Set modulation depth	✔	✔	✔	✔	✔	✗	**85%**
Set mute on or off (AM-Voice only)	✔	✔	✔	✗	✗	✗	**On**
Set VOGAD on or off (AM-Voice only)	✔	✔	✔	✗	✗	✗	**On**
Set antenna C/O delay on or off	✔	✔	✔	✗	✗	✗	**AM-Voice - On** **AM-MSK - Off**
Set frequency offset (AM-Voice only)	✔	✔	✔	✗	✗	✗	**0 (No offset)**
Squelch Level	✔	✔	✔	✔	✗	✗	**-107 dBm**
RF pre-attenuator On or Off	✔	✔	✔	✗	✗	✗	**Off**

Continued >>

Table 11 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Set squelch defeat on or off	✔	✔	✔	✔	✗	✗	**Off**
Set squelch noise compensation on or off	✔	✔	✔	✗	✗	✗	**On**
Set squelch carrier override on or off	✔	✔	✔	✗	✗	✗	**Off**
Audio AGC on or off	✔	✔	✔	✗	✗	✗	**On**
Loudspeaker on or off	✔	✔	**View state**	✗	✗	✗	**On**
Set frequency step size (AM-Voice only)	✔	✔	✗	✗	✗	✗	**25 kHz**
Set microphone type (active or passive) (AM-Voice only)	✔	✔	✗	✗	✗	✗	**Passive**
Set keying priority (local or remote)	✔	✔	✗	✗	✗	✗	**Local-Remote**
Enable or disable local PTT	✔	✔	✗	✗	✗	✗	**Enabled**
Enable or disable remote PTT	✔	✔	✗	✗	✗	✗	**Enabled**
Enable or disable remote phantom PTT	✔	✔	✗	✗	✗	✗	**Enabled**
Self Receive (transmit audio on line output)	✔	✔	✗	✗	✗	✗	**Off**
Radio Settings (Digital Modes):							
MAC TM1 (inter access delay)	✗	✔	✗	✗	✗	✔	**2.5 ms**
MAC TM2 (channel busy)	✗	✔	✗	✗	✗	✔	**60 s**
MAC p (persistance)	✗	✔	✗	✗	✗	✔	**13/256**
MAC M1 (maximum number of access attempts)	✗	✔	✗	✗	✗	✔	**135**

Continued >>

Table 11 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Scramble vector	✗	✔	✗	✗	✗	✔	**4D4B 19787**
Tx enable	✗	✔	✗	✗	✗	✔	**On**
Polarities:							
Ready out	✔	✔	**View state**	✗	✗	✗	**STD**
Set PTT input polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD**
Set phantom PTT input polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD**
Set PTT reference voltage (AM modes only)	✔	✔	**View state**	✗	✗	✗	**+14 V**
Set PTT output polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD**
Set fast PTT antenna changeover output polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD**
Set external VSWR input polarity (All modes)	✔	✔	**View state**	✗	✗	✗	**STD**
Set Inhibit input polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD**
BIT interruptive test input polarity (AM modes only)	✔	✔	**View state**	✗	✗	✗	**STD (active low)**
E-bit input polarity (All modes)	✔	✔	**View state**	✗	✗	✗	**STD (active low)**
Squelch output polarity at the MARC connector	✔	✔	✗	✗	✗	✗	**STD (n/o)**

Continued >>

Table 11 Functions and Parameters (Continued)

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
Squelch output polarity at the Facilities connector	✔	✔	✗	✗	✗	✗	**STD (n/o)**
Phantom squelch output polarity	✔	✔	✗	✗	✗	✗	**STD (n/o)**
Squelch defeat input polarity	✔	✔	✗	✗	✗	✗	**STD**
Band Edges:							
Set band edges	✔	✔	✗	✗	✗	✗	**118.000 & 136.975 MHz or 112.000 & 155.975 MHz**
Reference Frequency:							
Adjust transceiver's reference frequency	✔	✔	✗	✗	✗	✗	**-**
LCD Backlight:							
Adjust LCD backlight	✔	✔	✗	✗	✗	✗	**30 s**
BIT:							
Initiate BIT interruptive test	✔	✔	✔	✔	✗	✗	**-**
Standby:							
Enter and exit standby facility	✔	✔	✔	✔	✗	✗	**Not in Standby**
Software Configuration:							
View the transceiver's sofeware configuration	✔	✔	✗	✗	✔	✔	**-**
LOCK FACILITIES:							
Front panel lock	✗	✔	✗	✗	✗	✗	**Off**
MARC lock	✗	✔	✗	✗	✗	✗	**Off**
T1/E1 lock	✗	✔	✗	✗	✗	✗	**Off**
HDLC lock	✗	✔	✗	✗	✗	✗	**Off**

Back to Transceiver
Main Page

Installation Procedures

This document gives the installation procedures applicable to the

T6TR VHF Multimode Transceiver.

WARNING  **Dangerous Voltages**

The instructions given in this section involve connecting dangerous voltages to the transceiver. The instructions detailed in this document must be carried out only by suitably qualified personnel.

WARNING  **Antenna Radiation**

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

WARNING  **ESSDs**

The T6TR transceiver'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 in this document describe how to install a T6TR transceiver. The procedures necessary during installation are listed in Table 1 and it is recommended that they be completed in the order shown.

Table 1 Installation Procedures

Procedure		Reference
1	Perform an initial inspection of the transceiver.	see page 4
2	Antenna configuration (if required).	see page 4
3	Fit the transceiver into an equipment cabinet.	see page 6
4	Connect the remote facilities (as required).	see page 7
5	Fit the correct ac input fuse.	see page 22
6	Connect the chassis stud to the cabinet or system earth.	see page 22
7	Connect the ac supply (if required).	see page 22
8	Connect the dc supply (if required).	see page 23

Fuses and Connectors

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

Component	Type	Park Air Part Number
Fuses:		
AC input fuse, F2, for 110/120 V input AC input fuse, F2, for 220/230 V input	T4A, 125V, UL T4A, 250V, IEC	29C11120102S 29E01120108S
DC input fuse	15A size 0	29-01350201
Connectors:		
AC supply connector	IEC	20-02030102
DC supply connector	XLR3 socket	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	BNC to SMB 2 metre long lead	17K11000004
Microphone/Diagnostics connector	7-pin DIN plug to 9-way D-type, radio to PC interconnection lead	17E12600001

Initial Inspection of the Transceiver

On receipt of the transceiver from Park Air, remove all transit packaging and check that there is no transit damage. If damage is evident, contact Park Air immediately and retain the original transit packaging.

The following items are included with the transceiver:

- Item 1. One copy of the T6 VHF Radios User Guide CD (part number 31-36T62VCD)
- Item 2. Packing box.

Antenna Configuration

The transceiver can be operated using a single antenna, or separate transmit and receive antennas (see Fig 4 to Fig 9). For single antenna operation, the antenna's feeder cable is connected to the rear panel TX/RX antenna connector. For separate antenna operation, the transmit feeder cable is connected to the TX/RX antenna connector and the receive feeder cable is connected to the RX antenna connector.

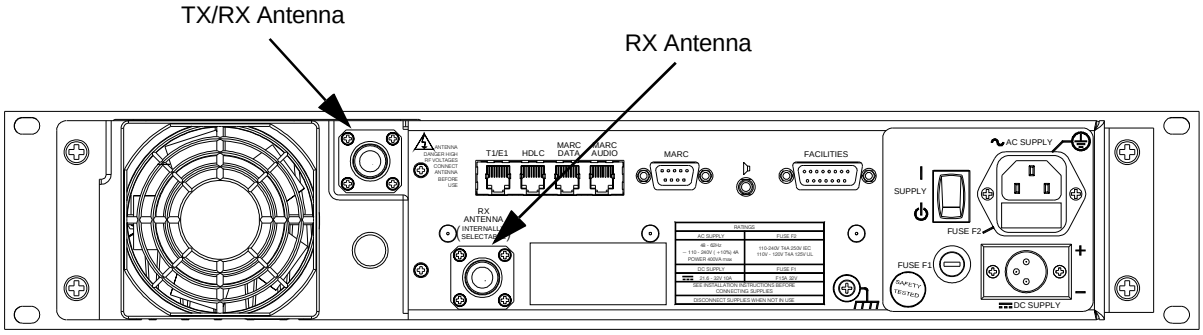


Fig 1 Antennas

Internal RF cables must be correctly positioned to suit the required configuration. This is normally carried out at Park Air prior to shipment. Should the configuration be required to change on installation, perform the procedure detailed below. Note that if this procedure is used at any other time take note of the warning preceding the instructions.

Back to Transceiver Main Page

Changing the Antenna Configuration (if required)

WARNING **Dangerous Voltages**

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

Proceed as follows:

(1) Remove the 15 captive screws securing the bottom cover to the mainframe.

(2) With the cover removed locate the PA Control/Rx RF module.

(3) Locate CN7 and CN12 on the PA Control/Rx RF module (see Fig 2).

(4) For single antenna configuration, connect the Rx antenna RF cable to CN12 (Park). Connect the adjacent RF cable from the PA module to CN7.

(5) For dual antenna configuration, connect the Rx antenna RF cable to CN7. Connect the adjacent RF cable from the PA module to CN12 (Park).

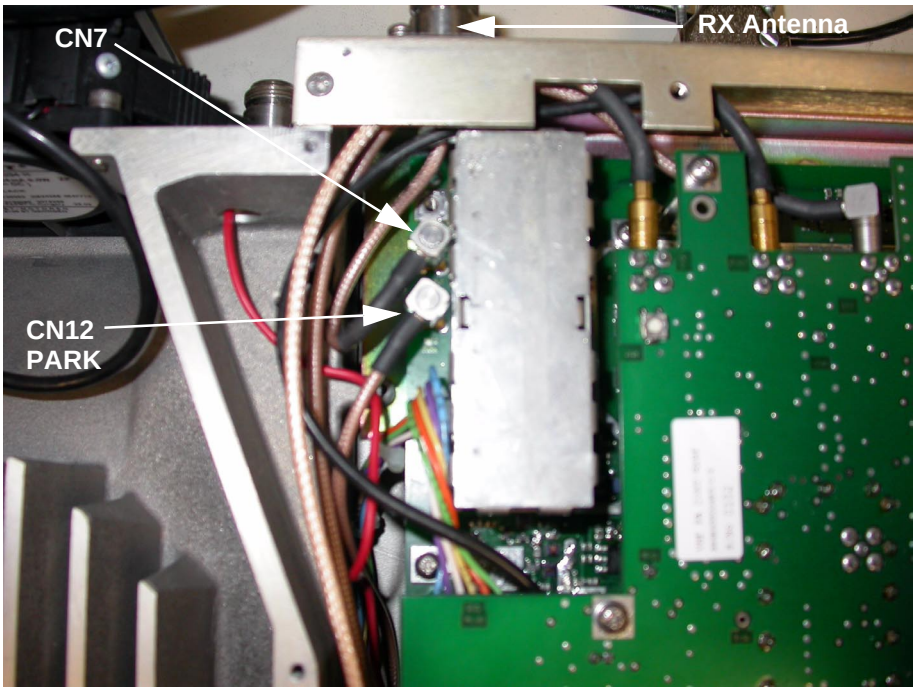


Fig 2 Antenna Configuration

(6) When configured, replace the transceiver's bottom cover using the 15 captive screws.

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 transceiver must not be supported by the front panel; doing so can cause damage.

The transceiver can be installed on telescopic slides, or on fixed runners, within a standard 483 mm (19 inch) equipment rack. M4 tapped holes, each 10 mm deep (see Fig 3) 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 rack, the transceiver's front panel must be secured to the cabinet's chassis using four M6 x 16 mm screws and plastic washers.

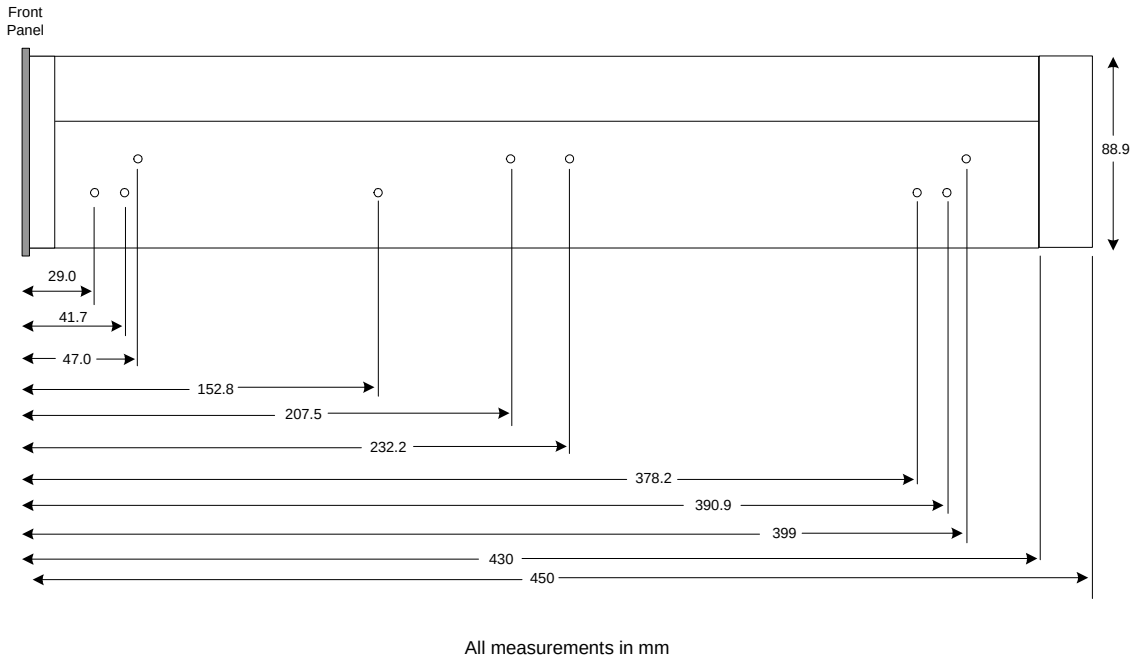


Fig 3 Slide Fittings

Connecting the Remote Equipment

Connection of external equipment depends on the configuration required. These configurations are as follows:

- T6TR transceiver configured for local operation
- T6TR transceiver configured for remote operation
- T6TR transceiver configured for use with MARC
- T6TR Mode 2 configuration
- T6TR Mode 3 configuration.

Fig 4 to Fig 9 illustrate the various configurations.

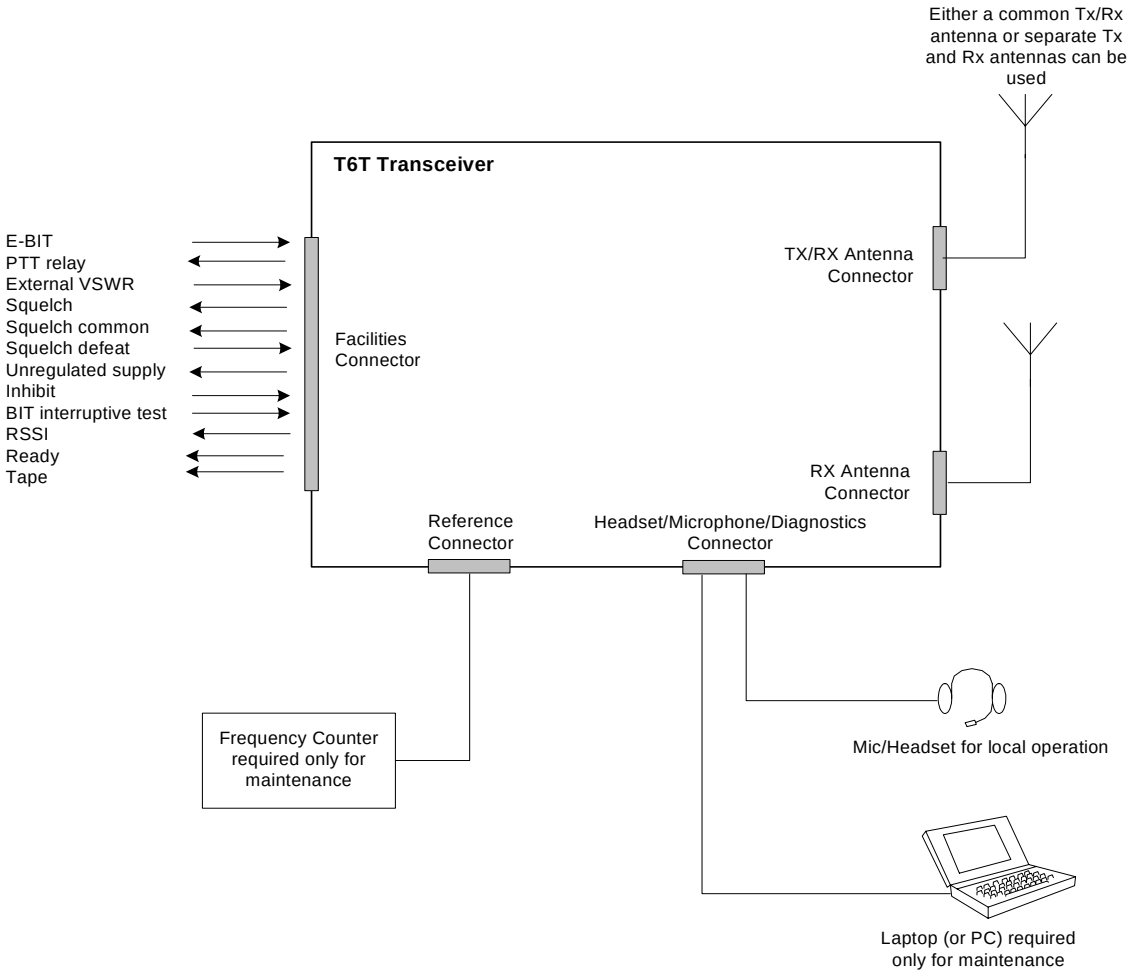


Fig 4 Transceiver Configured for Local Operation

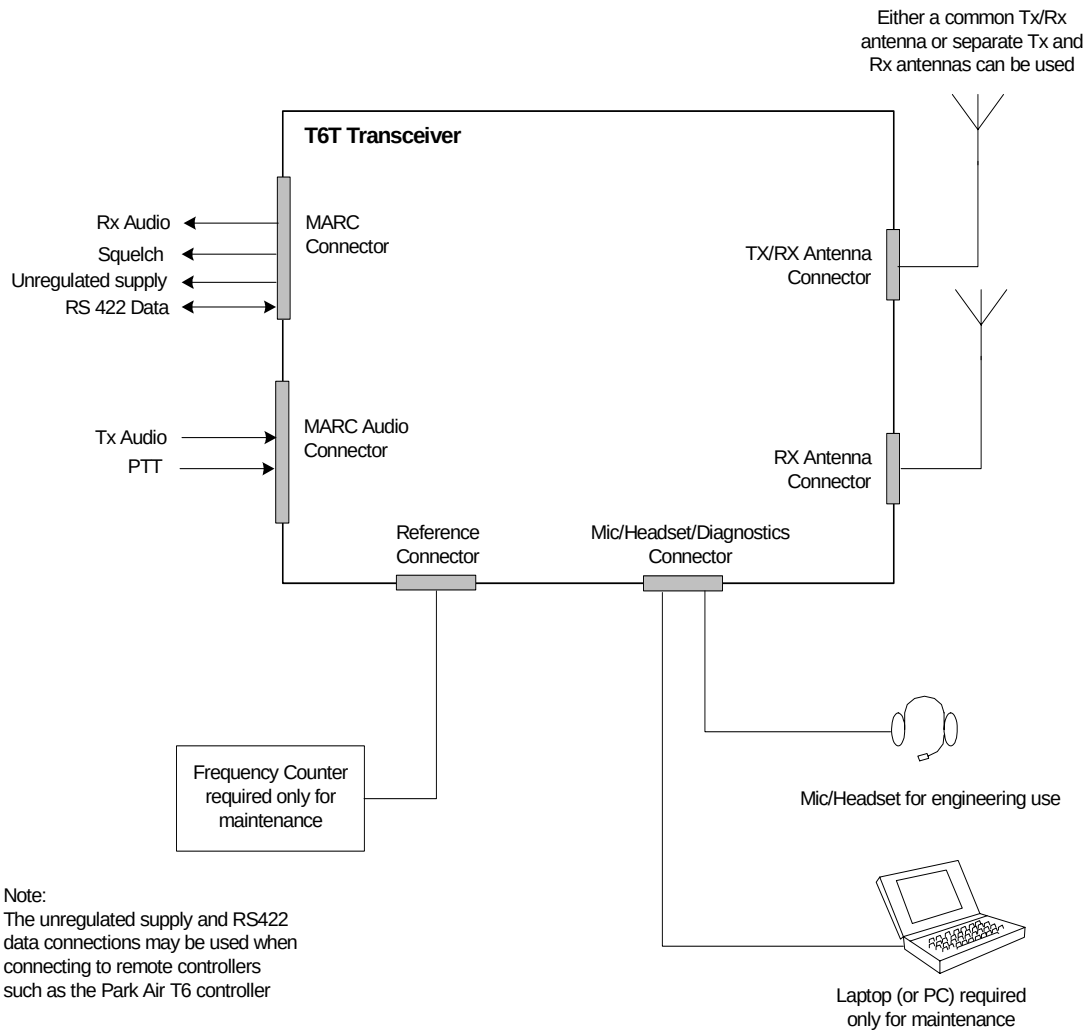


Fig 5 T6TR Transceiver Configured for Remote Operation

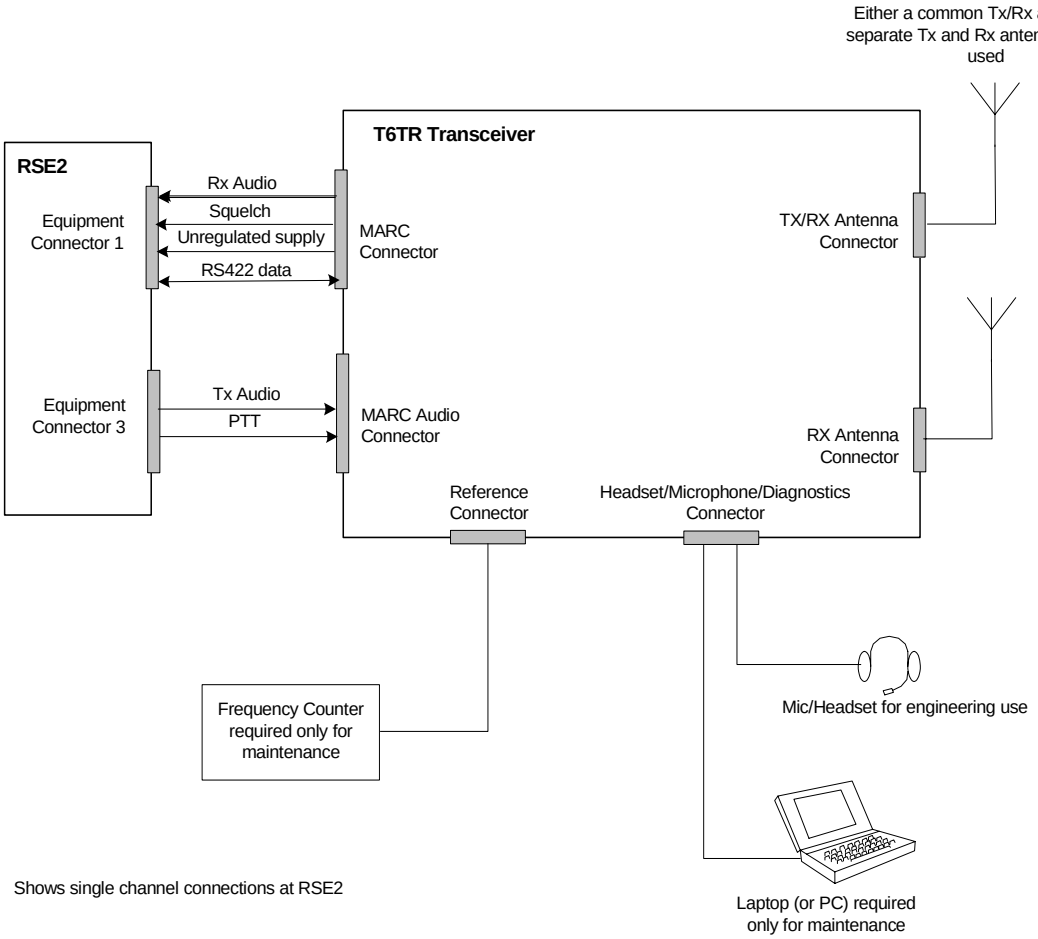


Fig 6 T6TR Transceiver Configured for use with MARC

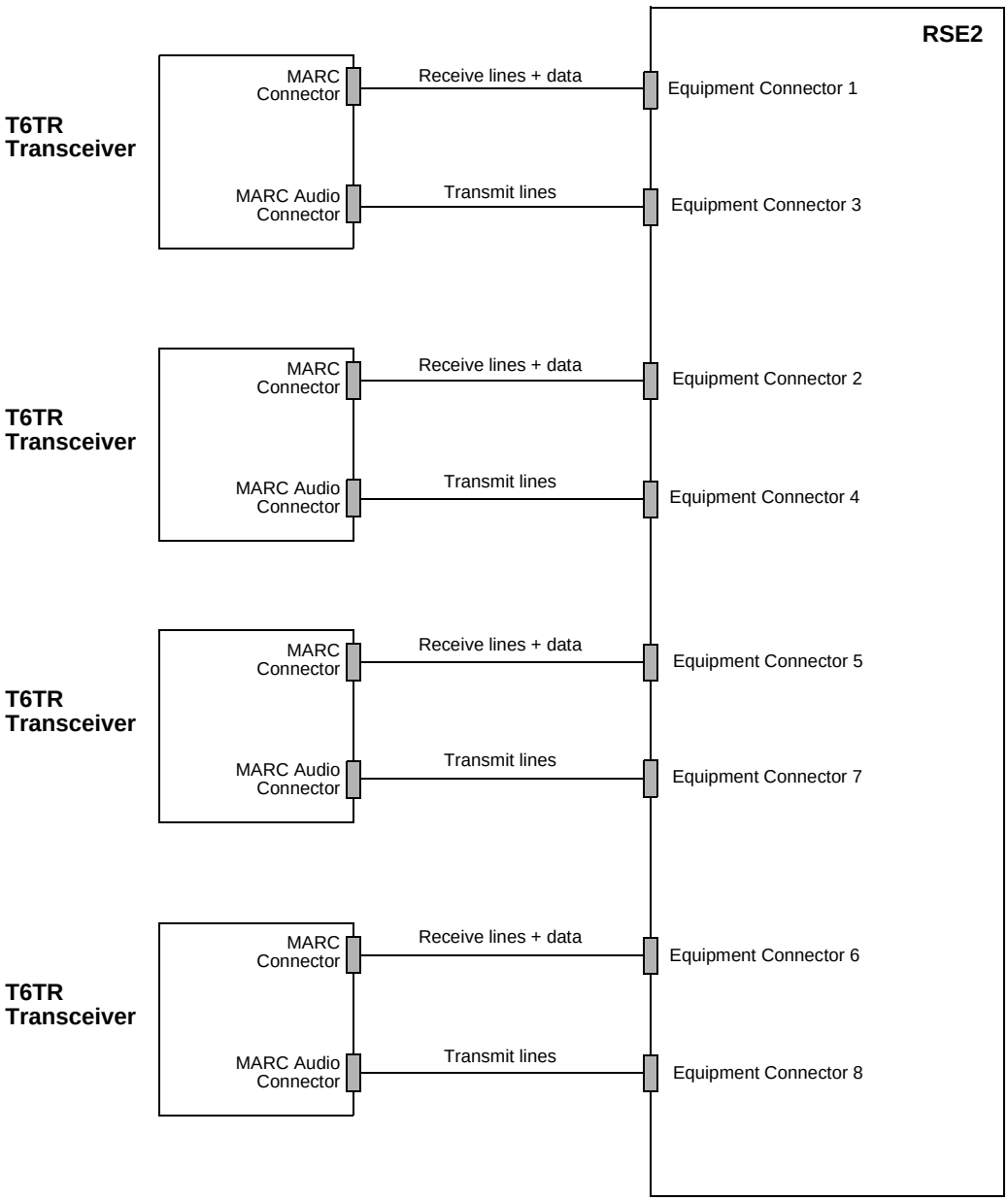


Fig 7 Transceiver to MARC RSE2 Connections

Fig 7 shows the connection convention when connecting transceivers to a single RSE2. Table 2 and Table 3 detail the pin to pin connections.

Back to Transceiver Main Page

Table 2 Transceiver to RSE2 Equipment Connector 1, 2, 5 or 6

Transceiver MARC 9-Way D-type Connector Pin Number	Signal at Transceiver		Signal at RSE2	RSE2 Equipment Connector Pin Number
1	Ground		Ground	1
2	Audio line out (+)		Audio line L1	2
3	Audio line out (-)		Audio line L2	3
4	Squelch indication		Mute indication	4
5	Unregulated supply output		Unregulated supply input	5
6	Data in (+)		Data out (+)	6
7	Data in (-)		Data out (-)	7
8	Data out (+)		Data in (+)	8
9	Data out (-)		Data in (-)	9

Table 3 Transceiver to RSE2 Equipment Connector 3, 4, 7 or 8

Transceiver MARC RJ48 Audio Connector Pin Number	Signal at Transceiver		Signal at RSE2	RSE2 Equipment Connector Pin Number
7	Ground		Ground	1
4	Audio line in (+)		Audio line L1	2
5	Audio line in (-)		Audio line L2	3
8	PTT		PTT	4

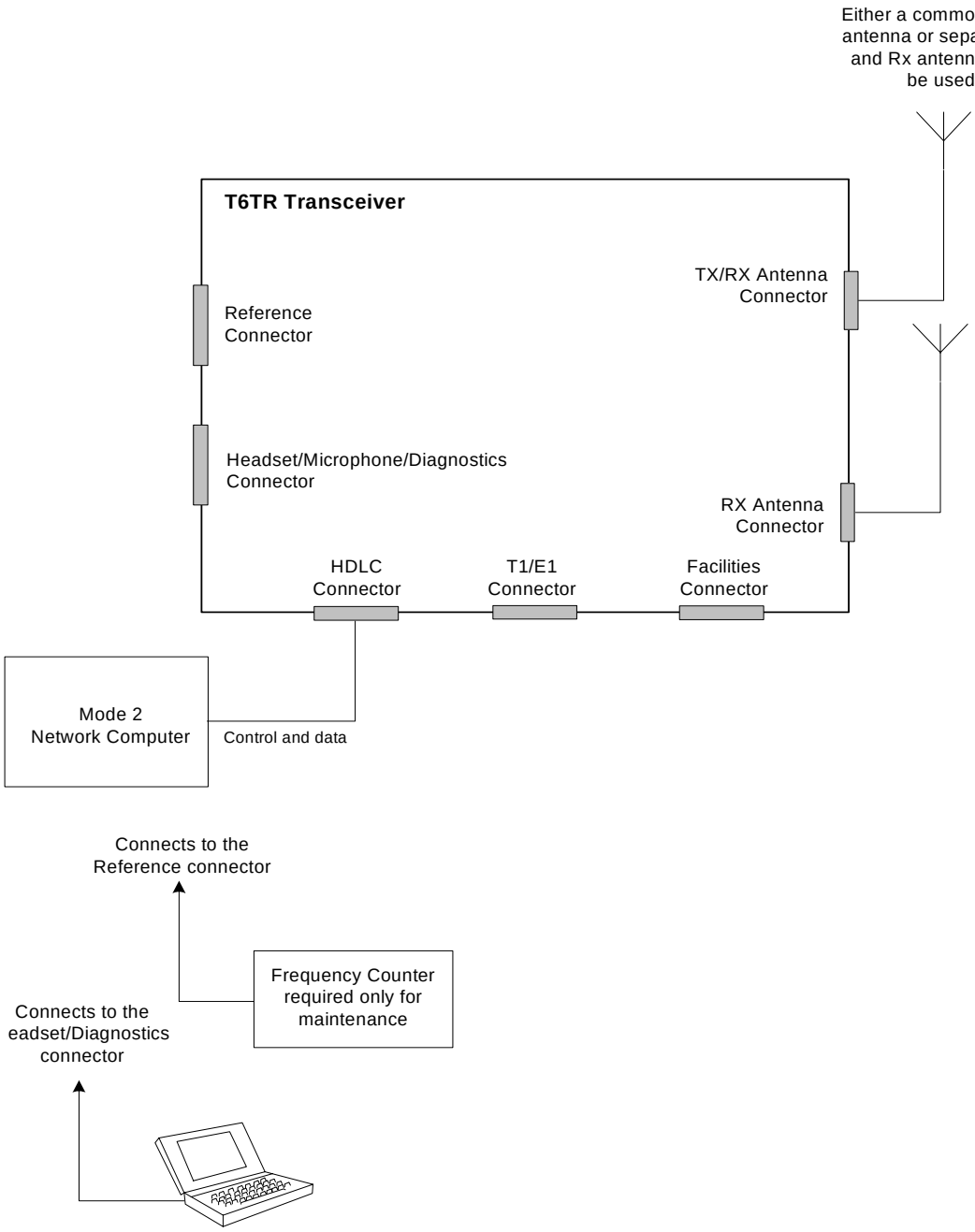


Fig 8 T6TR Mode 2 Configuration

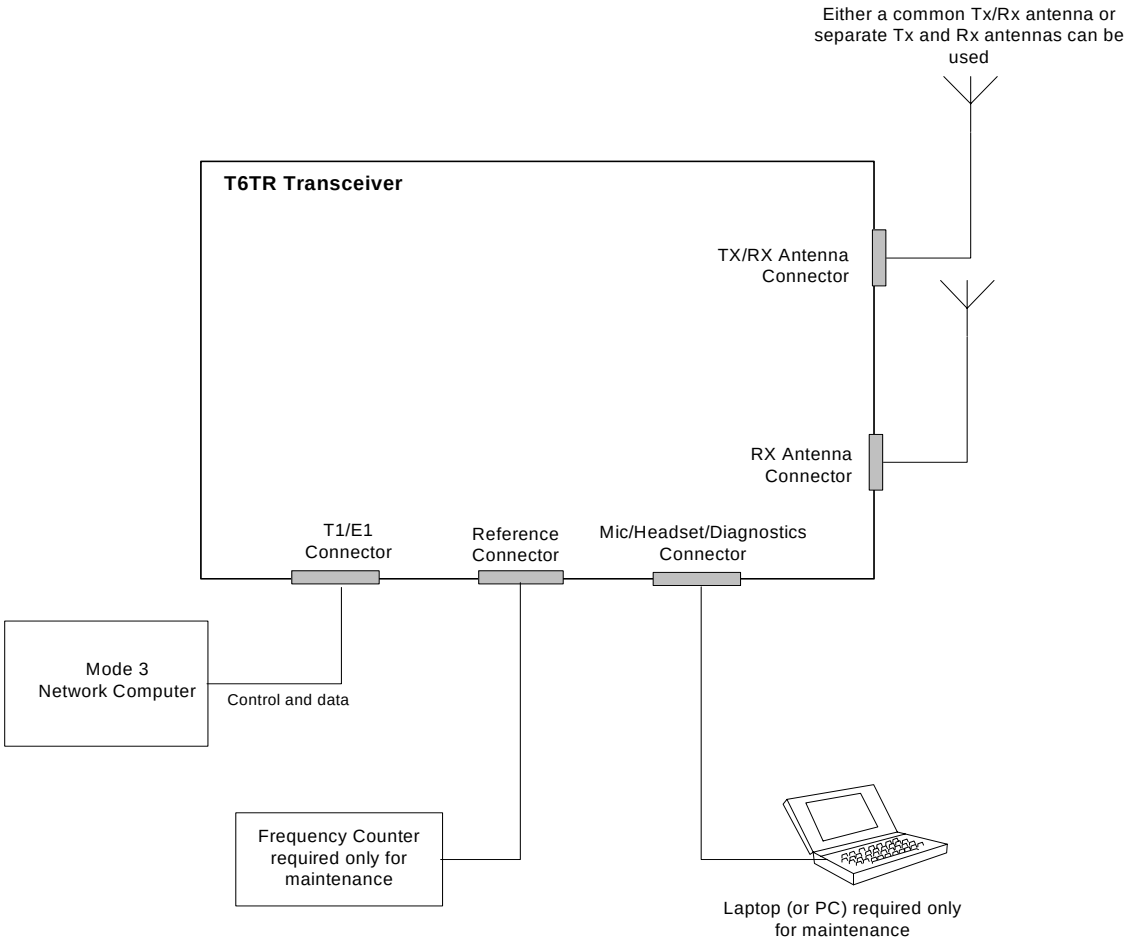


Fig 9 T6TR Mode 3 Configuration

Connectors

Front and rear panel connector pin-outs are detailed in Table 4 to Table 11. The Reference connector is described in text.

Front Panel Connectors

The front panel has two connectors; Headset/Microphone/Diagnostics connector and Reference connector. These are illustrated in Fig 10.

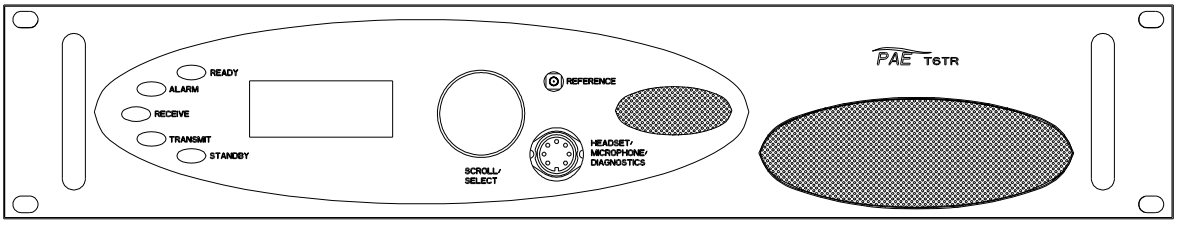


Fig 10 Front Panel

Headset/Microphone/Diagnostics Connector

The Headset/Microphone/Diagnostic connector is shown in Table 4. This connector is a self-locking 7-way DIN socket used for connecting a microphone, microphone/headset or computer.

Table 4 Headset/Microphone/Diagnostics Connector

Pin Number	Signal	Characteristic
1	Microphone ground	0 V
2	Transmit data (output)	RS232. 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
3	Microphone PTT (input)	0 V to PTT.
4	Receive data (input)	RS232. 115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
5	Sidetone/headset drive (output)	The level is adjustable between 0 and 3 V peak-to-peak by using the volume control.
6	Microphone input (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
7	Ground	0 V

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 11. These connectors are:

- Antenna
- RX Antenna
- MARC
- MARC Audio
- MARC Data
- T1/E1
- HLDC
- External Speaker
- Facilities
- ac Supply
- dc Supply

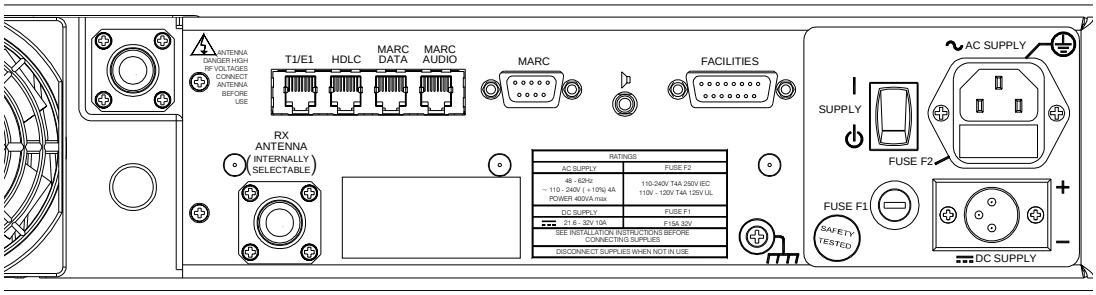
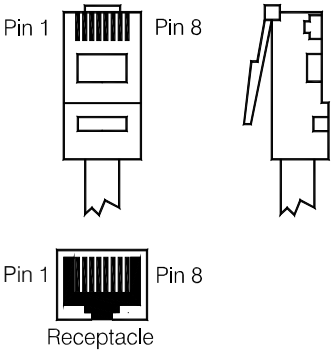


Fig 11 Rear Panel (Connectors)

The MARC Audio, MARC Data, T1/E1 and HLDC connectors are all RJ48 types. Fig 12 illustrates an RJ48 plug used with these connectors.



RJ48 Plug

Numbering is shown as looking from the top of the connector.

[The top is being viewed when the lever is on the bottom.]

Fig 12 RJ48 Modular Plug

Antenna Connectors
The antenna connectors are N-type sockets suitable for connecting 50 ohm antennas.

MARC Connector
The MARC connector is a 9-way D-type socket used for connecting to a MARC system via an RSE2. The connector pin-out is detailed in Table 5.

Table 5 MARC Connector

Pin Number	Signal	Characteristic
1	Ground	0 V
2	Audio line out (+)	Balanced 600 ohm, -20 to +20 dBm. Phantom squelch (see Fig 14) - solid-state relay, +60 to -60 V ac or dc, 100 mA max, configurable n/o or n/c.
3	Audio line out (-)	Pair to pin 2.
4	Squelch (output)	Solid state relay, +60 to -60 V, ac or dc, 100 mA max, configurable n/o or n/c.
5	Unregulated supply (output)	This output is between 21.6 and 32 Vdc (nominally 24 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 and MARC Audio connectors are the limits when testing the transceiver with sine wave modulation; the line level will be 10 dB above the line level setting. See the information supplied under the heading ‘Line Level Settings’ in the Operation section.

MARC Audio Connector

The MARC Audio connector is an 8-way RJ48 socket. The connector pin-out is detailed in Table 6.

Table 6 MARC Audio Connector

Pin Number	Signal	Characteristic
1 2	Audio line out (-) Audio line out (+)	Balanced 600 ohm -20 and +20 dBm. Phantom squelch (see Fig 14) - solid-state relay, +60 to -60 V, ac or dc, 100 mA max, configurable n/o or n/c.
3	Fast antenna changeover/PTT	Open collector NPN transistor grounding output, 200 mA max, configurable n/o or n/c.
4 5	Audio line in (+) Audio line in (-)	Balanced 600 ohm input, -20 to +20 dBm. Phantom PTT (see Fig 13) - 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. Configurable active high or low. Common reference to all inputs programmable to +14, 0 or -14 V (±1 V).
6	Squelch (output)	Solid state relay, +60 to -60 V, ac or dc, 100 mA max, configurable n/o or n/c.
7	Ground	0 V.
8	PTT (input)	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. Configurable active high or low. Common reference to all inputs programmable to +14, 0 or -14 V (±1 V).

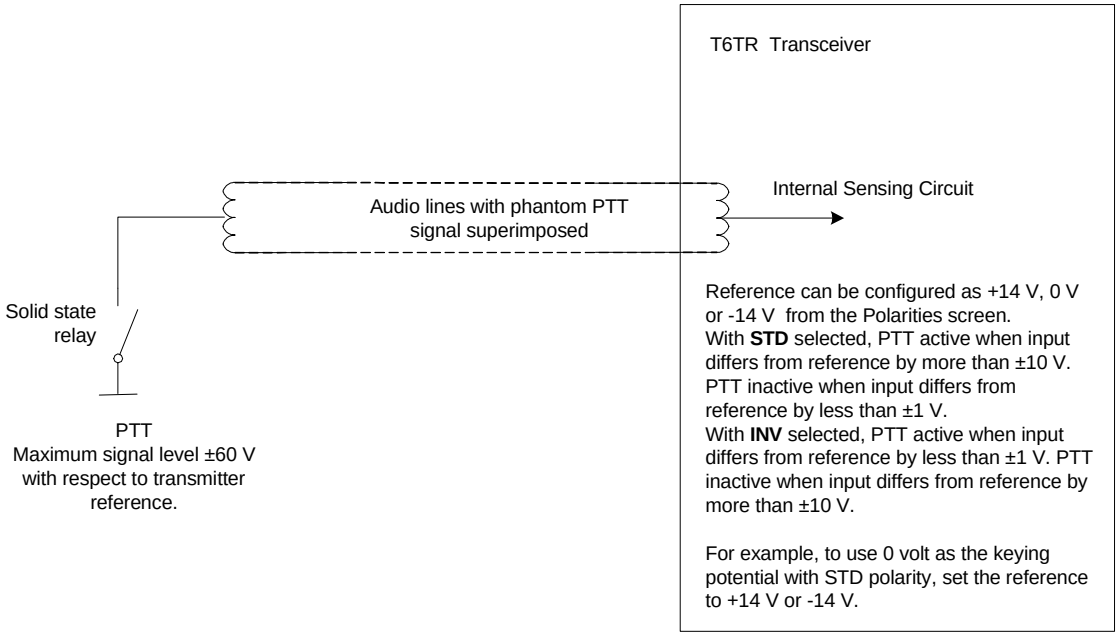


Fig 13 Example Phantom PTT Keying Diagram

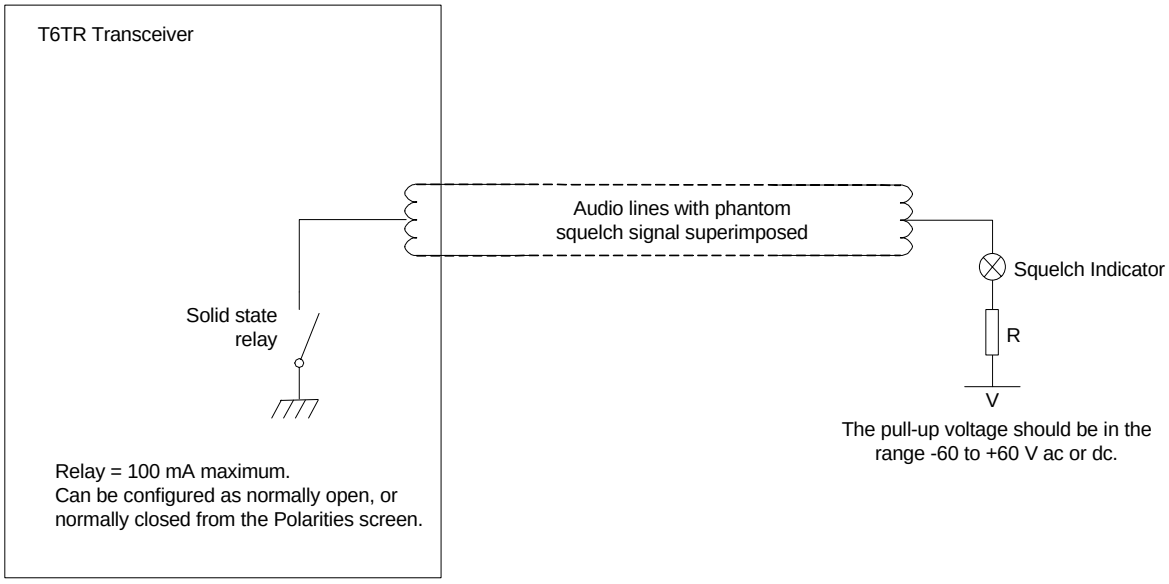


Fig 14 Example Phantom Squelch Indication Diagram

MARC Data Connector

The MARC Data connector is an 8-way RJ48 socket. The connector pin-out is detailed in Table 7.

Table 7 MARC RJ48 Data Connector

Pin Number	Signal	Characteristic
1 2	Data in - Data in +	RS422 differential asynchronous data, 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
3	Not connected	-
4 5	Data out + Data out -	RS422 differential asynchronous data, 9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking.
6	Remote Supply ON/OFF (input)	0 V to switch off. Note: Rear panel switch must be in ON position for this function to operate.
7	Ground	0 V.
8	Unregulated supply (output)	This output is between 21.6 and 32 Vdc (nominally 24 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. The connector pin-out is detailed in Table 8.

Table 8 T1/E1 Connector

Pin	Signal	Characteristic
1	RRing (input)	T1 - Balanced 100 ohm (±10%), 1.544 Mbits per second (±50 ppm), AMI/B8ZS Coding. E1 - Balanced 120 ohm (±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 (input)	
3	Not connected	-
4	TRing (output}	T1 - Balanced 100 ohm (±10%), 1.544 Mbits per second (±50 ppm), AMI/B8ZS Coding. E1 - Balanced 120 ohm (±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 (output)	
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.

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)	RS422 differential synchronous data, 128 kbytes per second ±50 ppm.
7	Ground	0 V.
8	Unregulated Supply (output)	21.6 to 32 V, fused at 500 mA.

External Speaker

The External Speaker connector is a 3.5 mm stereo jack used for connecting to an external speaker to provide sidetone on the transceiver. 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

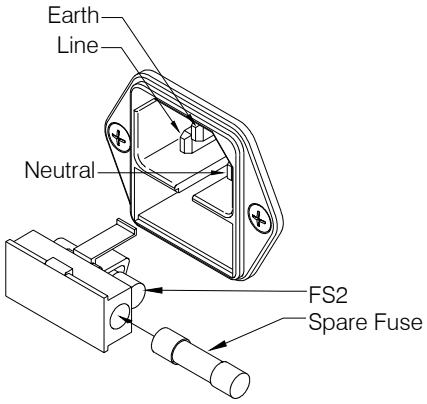
The Facilities connector is a 15-way D-type filtered socket used for connecting to associated parts of a system. The connector pin-out is detailed in Table 11.

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 transceiver's front panel Alarm indicator flashes and an E-BIT message is displayed on the LCD. 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)	TTL input with 4.7 kohm pull-up to 5 V. Configurable active high or low.
5	Squelch (output)	Solid state relay linked to pin 6. +60 to -60 V ac or dc, 100 mA max, configurable n/o or n/c.
6	Squelch common (output)	Solid state relay linked to pin 5.
7	Squelch defeat (input)	TTL with 4.7 kohm pull-up to 5 V. Configurable active high or low.
8	Ground	0 V.
9	Unregulated supply (output)	21.6 to 32 V, fused at 500 mA.
10	Inhibit (Input)	TTL with 4.7 kohm pull-up to 5 V. Configurable active high or low.
11	BIT Interruptive test (input)	TTL with 4.7 kohm pull-up to 5 V. Configurable active high or low. Must be asserted for >300 ms.
12	RSSI (output)	0 to 10 V.
13	Ready (output)	Open collector NPN transistor grounding output, 200 mA max, configurable n/o or n/c.
14	Tape (output)	0 dBm fixed output into 600 ohm for 90% modulation depth.
15	Reserved (output)	Open collector NPN transistor grounding output, 200 mA max, configurable n/o or n/c.

Fitting the Correct AC Input Fuse

The mains input fuse F2 is an integral part of the rear panel ac connector (see Fig 11). The fuse type must be correct for the local mains supply. Check the fuse fitted conforms to that detailed in Fig 15.



For a mains input in the range 110 to 120 Vac, fuse F2 should be rated T4A, 125V, UL.

For a mains input in the range 110 to 240 Vac, fuse F2 should be rated T4A, 250V, IEC.

Fig 15 ac Input Fuse

Chassis Stud Connection

WARNING **Chassis Earth**

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

In order not to compromise the transceiver's Electromagnetic Compatibility (EMC) the chassis stud, marked ⏚ and fitted to the rear panel (see Fig 11) must be connected to the equipment rack (if a rack 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 mm^2. 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.

AC Supply Connection

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 transceiver'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.

An ac input connector (see Fig 11 and Fig 15) is fitted to the equipment's rear panel. The cable used to connect between the equipment and the user's 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 mm^2 per core. Park Air recommends the use of polyvinyl chloride (PVC) insulated cable. The cable must be fitted with the IEC approved equipment connector (Park Air part number 20-02030102) supplied with the transceiver, 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 T6TR transceiver is a Class 1 equipment. The ac supply cable 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.

DC Supply Connection

The transceiver 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.

A dc input supply connector (see Fig 11) is fitted to the equipment's rear panel. The recommended minimum rating of the dc supply cable is: 2-core having a cross-sectional area of 1.5 mm^2 per core. The supply cable should be fitted with an XLR3 connector (Park Air part number 20-01030106).

Back to Transceiver Main Page

Switching On

WARNING  **Dangerous Voltages**

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

When installation is complete, the transceiver 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 transceiver's circuitry but does not remove power from the radio.

 = On  = Standby

Under normal circumstances this screen is displayed when the radio is switched on.

```
T6  Digital  Radio
(c)2003 Park Air
Initialising...
................
```

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

Note ...

All radios have a standby function to extend power supply life when the radios are not required to be operational. With the standby function enabled the transceiver is unable to transmit or receive and the display is blank. Remote control serial ports and the front panel control knob remain active to allow normal operation to be restored.

Back to Transceiver
Main Page

End of Document

Back to Transceiver
Main Page

Back to Transceiver
Main Page

Maintenance

This document gives the maintenance procedures applicable to the

T6TR VHF Multimode Transceiver.

General Information

This section provides the maintenance personnel with sufficient information to maintain and repair the T6TR VHF transceiver. The standard maintenance policy regards the transceiver as a Line Replacement Unit (LRU) which should be changed for a serviceable unit should a failure occur. Note that modules may be changed on the advice of Park Air Customer Support (see following contact details).

Email address: Support@uk.parkairsystems.com.

Telephone during normal hours: From UK 01778 381557 or from outside UK 44 1778 381557.

Telephone out of normal hours: From UK 07733 124457 or from outside UK 44 7733 124457.

Caution ...

When replacing a Processor module ensure the correct module is fitted.

- **For radios at Mod Strike Level 5 the Processor Module part number is 68-60000671/F (board issue 5).**
- **For radios at Mod Strike Level 7 the Processor Module part number is 68-60000671/H (board issue 7).**
- **Note that Mod strike 6 was a special to type modification.**

The following provides information that enables the user to:

- Conduct scheduled maintenance tasks including checking/setting the reference frequency oscillator to compensate for long term ageing effects
- Identify any tools or test equipment required to maintain the transceiver
- Use the built-in test facilities to check transceiver functionality
- Remove a transceiver from service to dismantle and replace a faulty module, and where applicable, realign the module
- Install the Virtual Front Panel (VFP) software into a PC
- Use the VFP to:
  - Download all radio settings to a file that can be stored/printed for reference
  - Change radio settings
  - Copy settings from one radio to another
  - Check a radio after repair and return it to service.

Refer to the Installation and Operating sections, available from the Main page of this document, for complete installation and setting up procedures.

Included on the CD-ROM delivered with the radio is the VFP software. The software enables the original settings to be re-loaded and alignment to be made if the transceiver's Processor, PA Control and PA modules are ever replaced. The VFP software can be run from this document by clicking on ‘Back to Transceiver Main Page’ (at top right of page) and from there, clicking on ‘Back to Main Page’ (at top right of page). When the Main page is displayed select ‘Run the VFP Software’.

Note ...

A hard copy of the User Documentation is available. Contact Park Air for details.

Transceiver Variants

Two variants of the T6TR VHF transceiver are available:

- B6550/NB/50. This transceiver frequency operating range is 118.000 to 136.975 MHz. Power output adjustable from 5 to 50 Watts. Frequency stability compliant with ICAO requirements for 2, 3 and 4-offset carrier applications
- B6550/WB/50. This transceiver frequency operating range is 112.000 to 155.975 MHz. Power output adjustable from 5 to 50 Watts. Frequency stability compliant with ICAO requirements for 2, 3 and 4-offset carrier applications.

Operating Frequency

The transceiver's operating frequency can be changed by the user through the front panel, through the VFP, through a T6 controller or through an associated MARC system (or compatible control data system). Details of how to change the operating frequency from the front panel and VFP are contained in this document. Details of how to change the frequency from MARC or a T6 controller can be found in the MARC and T6 Controller User Guides respectively.

Input Supplies

The transceiver can be operated from standard ac input supplies, or from a low voltage dc supply. Both ac and dc input supplies can be connected to the equipment. When both ac and dc supplies are connected, operation from the ac supply takes priority; automatic change-over to the dc supply will occur if the ac supply fails. On restoration of the ac supply, the equipment reverts to ac operation.

Built-in Test (BIT) Indications

The transceiver continuously self monitors key internal parameters without affecting normal operation. If a BIT alarm is detected, the front panel Alarm indicator lights, the Ready indicator becomes unlit, and the transceiver becomes inoperable. Additionally, a BIT alert, as opposed to a BIT alarm may be indicated.

A BIT alert is shown by the front panel Alarm indicator flashing; the Ready indicator remains lit and the transceiver remains operational, but at reduced power. Conditions that cause a BIT alert are:

- RF output has reduced from its setting by more than 3 dB
- Supply volts has fallen below a pre-defined level.

In AM-voice and AM-MSK modes only, and in addition to continuous monitoring, an interruptive BIT test can be initiated locally at the front panel or remotely. When initiated, test signals are injected that key the transceiver allowing parameters to be monitored in their active state.

The results of continuous monitoring, and of interruptive testing, are available at the front panel LCD and, if connected, the VFP PC. When the transceiver is used with a MARC system (or other compatible data and control system) the results are also sent, in the form of a data message, to the monitoring facility.

Configurations

The connectors used to configure the transceiver depend on the required operating mode. The purpose of each connector is detailed in the following text. Configuration details can be found in the Installation section of this document.

Antenna Connector	Used in all operating modes to connect the 50 ohm antenna feeder cable.
Headset/Microphone/Diagnostics	This is a dual purpose connector. A microphone/headset Connector(complete with integral PTT switch) can be connected to enable local AM-voice operation. Alternatively, a PC can be connected to allow use of the VFP. The VFP can be used to set the transceiver's operational settings, or to download new software.
Reference Connector	Used in all operating modes to check and reset the transceiver's reference frequency.
Facilities Connector	Used primarily to connect remote signals when using AM-voice mode and the transceiver does not form part of a MARC system. Some auxiliary signals available at this connector, for example the 24 volt (nominal) unregulated output supply, can be utilized irrespective of the operating mode.
MARC Port	The MARC port is used to connect received audio, squelch indication and data to a MARC system via an RSE2.
MARC Audio	The MARC Audio port is used for connecting transmit audio and PTT to a MARC system via an RSE2.
MARC Data	The MARC Data port is used for connecting data to a MARC system.
T1/E1	The T1/E1 port is an 8-way RJ48 socket used for connecting a Mode 3 network computer.
HLDC	The HLDC port is an 8-way RJ48 socket used for connecting a Mode 2 network computer.

Maintenance Procedures

WARNING  **Dangerous Voltages**

The instructions given in this section involve connecting dangerous voltages to the transceiver. The instructions detailed in this document must be carried out only by suitably qualified personnel.

When an ac supply is connected, lethal voltages are present within the transceiver. 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 off position, lethal voltages are still present in the transceiver's internal power supply circuitry. To ensure safe working, the ac and dc input supplies must be disconnected from the transceiver.

WARNING  **Antenna Radiation**

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

Caution  **ESSDs**

The T6TR transceiver's 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**

(1) 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 transceiver's Electromagnetic Compatibility (EMC) and breach European Commission regulations.

(2) When screws are inserted into the transceiver 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 module.

Introduction

This part of the Maintenance section covers maintenance tasks that include schedule maintenance, dismantling and assembly instructions and fault finding. Due to the complexity of most modules the recommended policy is repair by replacement of the radio. However module replacement information is supplied in the event that Park Air Customer Support advises this may be done.

A faulty module may be traced by aid of the front panel LCD and Scroll/Select control; VFP or MARC.

Note ...

Access to a PC is essential when fitting spares.

During all maintenance tasks the warnings and cautions given in this section should strictly be adhered to.

For maintenance purposes and loading new software, a Virtual Front Panel (VFP) is used. The VFP is a standard PC loaded with a bespoke software package for carrying out these tasks. Separate VFP operational instructions are included in Part 3 of this section of the document.

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 Toolkit (including a 1.5 mm Allen key) ❑ 6BA 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)

Scheduled Maintenance

Park Air recommends that this is carried out at twelve-monthly intervals. Schedule maintenance comprises:

(1) Ensuring the equipment is clean (see page 7).

(2) Ensuring that the external connectors are securely fitted to the transceiver (see page 7).

(3) Checking and resetting (if required) the transceiver's frequency standard (see page 7).

(4) Performing a BIT interruptive test (see page 7).

(5) Performing an ac and dc change-over check (see page 9).

Schedule Maintenance Procedure

The procedure, detailed in the following paragraphs, should be followed when carrying out schedule maintenance.

Cleaning the Equipment

Remove all dust and dirt from the equipment's exterior using the cleaning cloths and camel hair brush. Clean the front panel indicators and LCD face.

Security of External Connections

Check all external connections are secure and free from damage.

Setting the Transceiver's Internal Reference Frequency

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

(1) Refer to AM-Voice Mode Settings Screen in the Operation section of this document and set the offset to 0 kHz.

(2) Select Exit and return to the Main screen.

(3) Connect a high impedance frequency counter to the front panel Reference connector.

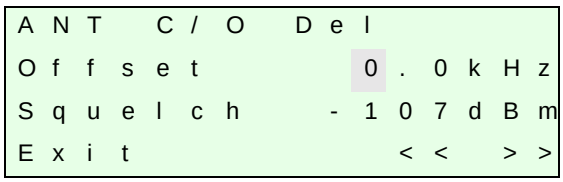
(4) From the Main screen, press the switch to display the Control screen. Turn the switch until Settings is highlighted. Press the switch.

(5) Ensure the Settings screen is displayed. Turn the switch until Ref Freq is highlighted, then press the switch.

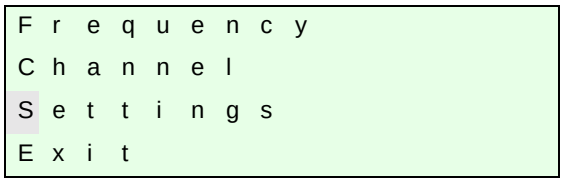
(6) With Ref Freq selected turn the switch clockwise or anti-clockwise until the frequency counter reads 20.950000 MHz ±10 Hz, then press the switch.

(7) Turn the switch clockwise until Exit is highlighted, then press the switch. You are returned to the Main screen.

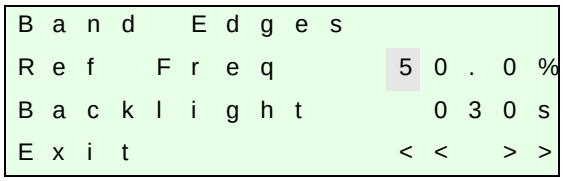
AM-Voice Mode Settings Screen



Control Screen



Settings Screen



(8) Disconnect the frequency counter.

(9) Refer to AM-Voice Mode Settings Screen in the Operation section of this document and set to the required offset.

To Initiate a BIT Test

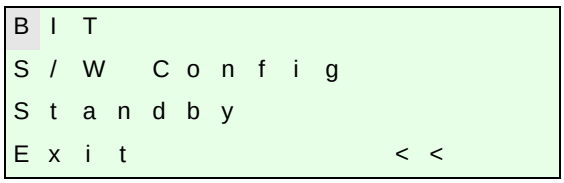
Use the following procedure to initiate an interruptive BIT test from the transceiver's front panel. A BIT test cannot be initiated while the transceiver is keyed. An interruptive BIT test cannot be initiated in Mode 2 or Mode 3.

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

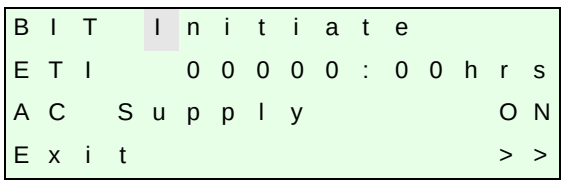
If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transceiver's Antenna (not Rx Antenna) connector.

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 transceiver must not be keyed during the test.

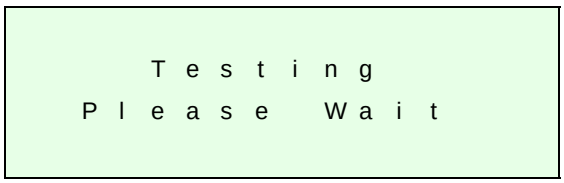
(1) From the Main screen, press the switch to display the Control screen. Turn the switch until BIT is highlighted. Press the switch.



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

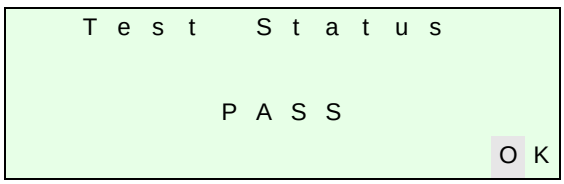


(3) During the test, which takes approximately two seconds, the Testing screen is displayed.



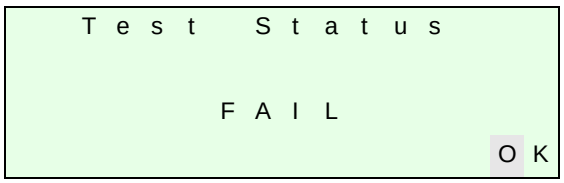
On completion, and if the interruptive test was initiated from the front panel, one of the following screens will be shown.

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



.

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



AC and DC Change-over Check

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

(1) Confirm that both ac and dc supplies are connected to the transceiver. 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 transceiver is operational.

(3) Switch off the ac supply from its source.

(4) Check that the transceiver 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.

Dismantling and Assembly Instructions

Introduction

This topic provides the user with detailed instructions on the removal and replacement of modules and assemblies. Access to a PC loaded with VFP software, and a radio to PC serial interconnection lead, Park Air part number 17E12600001 is essential when carrying out these instructions.

The transceiver's modules and assemblies are accessed by removing the top and bottom covers. The top cover is secured by 18 countersunk screws and the bottom cover by 15 countersunk screws. To remove a module from the transceiver, follow the instructions detailed in the following paragraphs (see Fig 3 for module locations when covers are removed).

Cautions ...

(1) When removing or refitting modules, observe antistatic handling precautions.

(2) Do not change any potentiometer (or link) settings unless detailed in these instructions. Potentiometers have been set using specialist equipment.

(3) The transceiver uses the following Molex KK connectors:

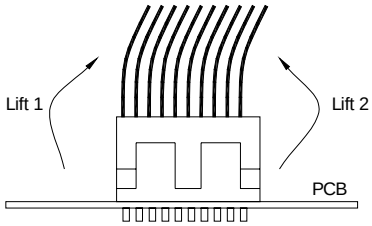
CN2 on the PA Control/Rx RF module

CN7 and CN6 on the PSU Regulator module

CN3 on the Front Panel PCB.

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.



Top Cover

To remove the top cover, locate and unscrew the 18 countersunk screws securing the top cover to the mainframe. Access can then be gained to the following modules:

- Processor module
- PSU Regulation module
- Power Supply (requires both top and bottom covers to be removed)
- Front Panel assembly (requires both top and bottom covers to be removed).

WARNING **Dangerous Voltages**

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

Removing and Refitting the Processor Module

The Processor module is located as shown in Fig 3. A module removal diagram is shown in Fig 4.

Removal

Before attempting to remove the Processor module, and if possible, save the equipment settings. To achieve this 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 transceiver is isolated from the ac and dc input supplies. Then proceed as follows:

(1) Remove the transceiver's top cover as described on page 10 (take heed of the warning).

(2) Locate the Processor module and disconnect the following connectors:

- CN1 50-way connector (50-way ribbon cable from PA Control/Rx RF module)
- CN3 14-way connector (14-way ribbon cable from PSU Regulator module)
- CN4 34-way connector (34-way ribbon cable from Front Panel module)
- CN2 SMB connector (to PA Control/Rx RF module).

(3) Gain access to the rear of the transceiver. Using a 6BA nut spinner tool, remove the four screwloc 8 mm-4-40 UNC screws that secure the Processor module interface connectors CN5 and CN6 to the rear panel.

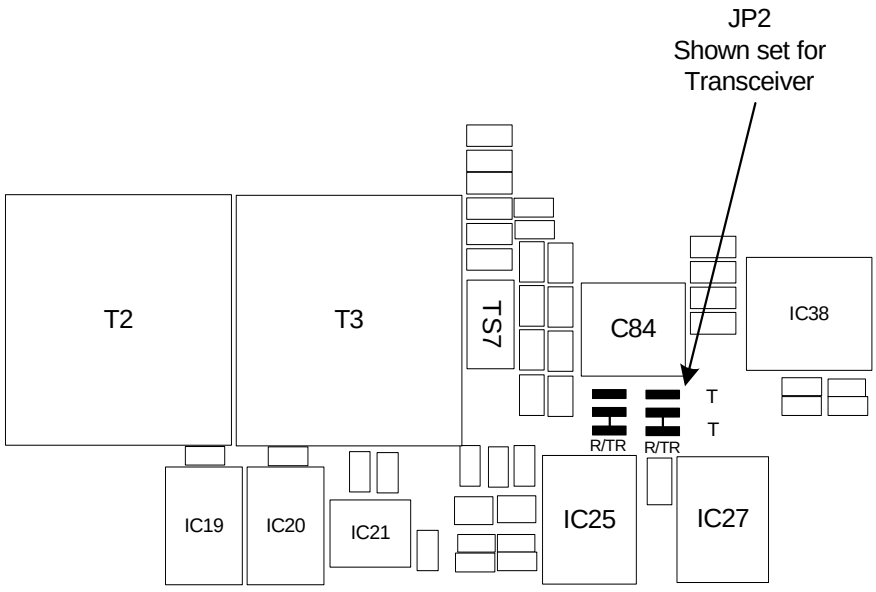
(4) Remove the 11 (Mod Strike 5 modules), 7 (Mod Strike 6 and 7 modules) M3 x 8 mm screws that secure the module to the transceiver's mainframe.

(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 'R/TR' for transceiver (see diagram on this page).



(1) Ensure the module's 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.

(2) Fit the 11 (Mod Strike 5 modules), 7 (Mod Strike 6 and 7 modules) M3 x 8 mm screws that secure the module to the transceiver's mainframe, but leave them loose.

(3) Using a nut spinner tool, tighten the four screwloc 8 mm-4-40 UNC screws and wavy washers that secure the connectors; then tighten the 11 (Mod Strike 5 modules), 7 (Mod Strike 6 and 7 modules) M3 x 8 mm screws that secure the module to the receiver's mainframe.

(4) Refit the following connectors to the module:

- CN1 50-way connector (50-way ribbon cable from PA Control/Rx RF module)
- CN3 14-way connector (14-way ribbon cable from PSU Regulator module)
- CN4 34-way connector (34-way ribbon cable from Front Panel module).

(5) Re-establish the ac and/or dc supplies (take heed of the warning on page 10).

(6) Switch power on at the radio using the rear mounted Power switch.

(7) Ensure the front panel Ready indicator is lit and the Alarm Indicator is unlit.

(8) 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.

(9) If saved during the removal procedure, download the radio settings from file using the VFP (see VFP information starting on page 21). 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.

(10) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure To Calibrate the Transceiver on page 26.

(11) Carry out a BIT interruptive test as detailed in the procedure To Initiate a BIT Test on page 7.

(12) Remove the VFP PC to radio interconnection lead and switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies.

(13) Refit the transceiver's top cover (take note of repairs caution (1) on page 5 before carrying out this task). The transceiver can now be returned to service.

Removing and Refitting the PSU Regulator Module

The PSU Regulator module is located as shown in Fig 3. A module removal diagram is shown in Fig 5.

Removal

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

(1) Remove the transceiver's top cover as described on page 10 (take heed of the warning).

(2) Locate the PSU Regulator module and remove the three M3 x 8 mm captive washer screws that secure the module to the transceiver's 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/Rx RF module)
- CN6 6-way connector (2-way loom to power supply). Note caution (3) on page 10
- CN4 14-way connector (14-way ribbon cable to Processor module)
- CN3 3-way connector (3-wire loom to PA module)
- CN7 3-way connector (3-wire loom to rear panel On/Off switch). Note caution (3) on page 10
- CN2 2-way connector (2-wire loom from dc input connector on rear panel)
- CN1 4-way connector (4-wire cable from power supply)
- CN9 2-way connector (2-wire cable ac input to power supply)
- CN8 3-way connector (2-wire loom to rear panel ac input connector plus chassis connection).

(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:

- CN8 3-way connector (2-wire loom to rear panel ac input connector plus chassis connection)
- CN9 2-way connector (2-wire cable ac input to power supply)
- CN1 4-way connector (4-wire cable from power supply)
- CN2 2-way connector (2-wire loom from dc input connector on rear panel)
- CN7 3-way connector (3-wire loom to rear panel On/Off switch)
- CN3 3-way connector (3-wire loom to PA module)
- CN4 14-way connector (14-way ribbon cable to Processor module)
- CN6 6-way connector (2-way loom to power supply)
- CN5 10-way connector (10-way ribbon cable to PA Control/Rx RF module).

(2) Locate the module in position. Ensure no wires are trapped by the module.

(3) Secure the module to the transceiver's mainframe using the three M3 x 8 mm captive washer screws removed during the removal procedure.

(4) Re-establish the ac and/or dc supplies (take heed of the warning on page 10).

(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 7.

(8) Switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies.

(9) Refit the transceiver's top cover (take note of repairs caution (1) on page 5 before carrying out this task). The transceiver can now be returned to service.

Bottom Cover

To remove the bottom cover, locate and unscrew the 15 captive screws securing the bottom cover to the mainframe. Access can then be gained to the following modules:

- PA Control/Rx RF module
- Power supply (requires top and bottom covers to be removed)
- PA module (requires top cover and bottom covers to be removed)
- Front Panel assembly (requires top cover and bottom covers to be removed).

WARNING  **Dangerous Voltages**

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

Removing and Refitting the PA Control/Rx RF Module

The PA Control/Rx RF module is located as shown in Fig 3. A module removal diagram is shown in Fig 6.

Removal

Before attempting to remove the PA Control/Rx RF module, ensure that the transceiver is isolated from the ac and dc input supplies.

Then proceed as follows:

(1) Remove the transceiver's bottom cover as described above (take heed of the warning).

(2) Locate the module and disconnect the following connectors (before removing CN7 and CN12, note the antenna configuration):

- CN1 50-way connector (50-way ribbon cable from Processor module)
- CN6 10-way connector (10-way ribbon cable from PSU Regulator module)
- CN5 SMB connector (reference frequency)
- CN3 SMB connector (RF drive)
- CN4 SMB connector (forward power sense)
- CN2 6-way connector (to PA module). Note caution (3) on page 10)
- CN8 SMB connector (to Processor Module)
- CN7 SMB connector from the Rx antenna connection or CN13 on the PA module (see antenna configuration on page 16)
- CN12 SMB connector (connects to CN13 on the PA module) or Rx antenna connection (see configuration on page 16).

(3) Remove the seven M3 x 8 mm captive washer screws that secure the module to the transceiver's mainframe.

(4) Remove the module from the chassis.

Refitting

To refit the PA Control/Rx RF module, proceed as follows:

(1) Place the module in position. Ensure no wires are trapped by the module.

(2) Fit the seven M3 x 8 captive washer screws that secure the module to the transceiver's mainframe.

(3) Refit the following connectors to the module:

- CN7 SMB connector to the Rx antenna connection or to the connector from CN13 on the PA module (see antenna configuration on page 16)
- CN12 SMB connector to the CN13 on the PA module or Rx antenna connection (see configuration on page 16)
- CN8 SMB connector (to Processor Module)
- CN2 6-way connector (to PA module)
- CN4 SMB connector (forward power sense)
- CN3 SMB connector (RF drive)
- CN5 SMB connector (reference frequency)
- CN6 10-way connector (10-way ribbon cable from PSU Regulator module)
- CN1 50-way connector (50-way ribbon cable from Processor module).

(4) Re-establish the ac and/or dc supplies (take heed of the warning on page 14).

(5) Switch power on at the radio using the rear mounted Power switch.

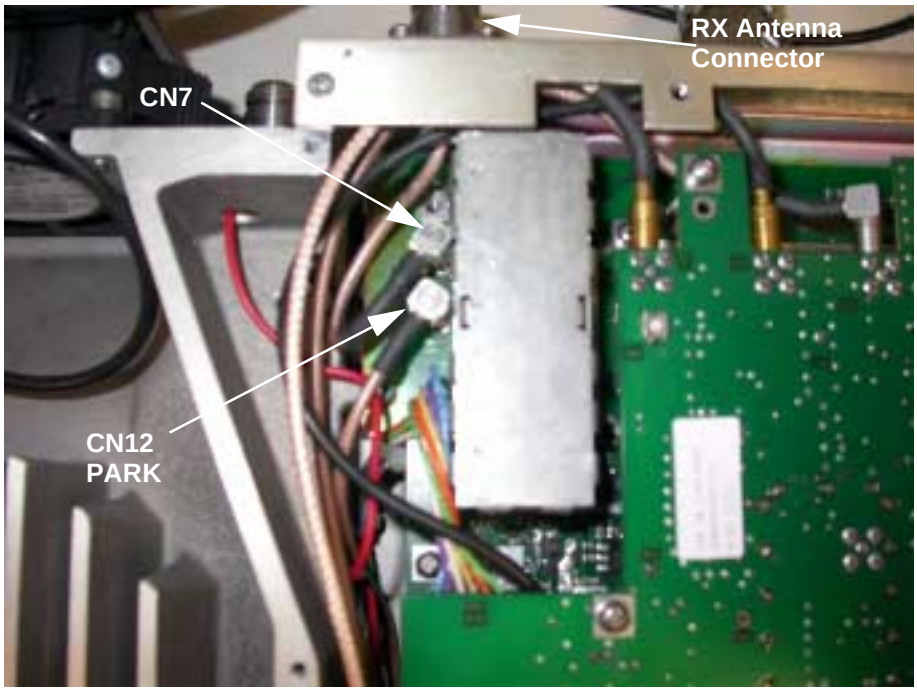
(6) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.

(7) Carry out the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure To Calibrate the Transceiver on page 26

(8) Carry out a BIT interruptive test as detailed in the procedure To Initiate a BIT Test on page 7.

(9) Remove the VFP PC to radio interconnection lead and switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies.

(10) Refit the transceiver's bottom cover. The transceiver can now be returned to service.



Antenna Configuration	Connector CN12 PARK	Connector CN7
Single	Rx antenna	CN13 (from PA Module)
Dual	CN13 (from PA Module)	Rx antenna

Antenna Configuration

Removing and Refitting the Power Supply

The Power Supply is located as shown in Fig 3. A module removal diagram is shown in Fig 7.

Removal

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

(1) Remove the transceiver's top and bottom covers as described on page 10 and page 14 (take heed of the warnings on those pages).

(2) Support the radio on its side.

(3) Locate the power supply. From the bottom half of the unit remove the four No. 6 x 32 UNC countersunk screws that secure the power supply to the transceiver's mainframe. During this operation support the power supply from the top half of the unit.

(4) Withdraw the 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 connector CN4 (power supply to the power regulator).

(6) Disconnect the dc wires from the eight connector terminal block.

(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 the power supply from the transceiver.

Refitting

(1) With the transceiver on its side hold the 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 2 and terminal 3 and black to terminal 6 and terminal 7.

(4) Connect connector 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 the four countersunk screws.

(6) Re-establish the ac and/or dc dc supplies (take heed of the warnings on page 10 and page 14).

(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 7.

(10) Switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies.

(11) Refit the transceiver's top and bottom covers (take note of Repairs caution (1) on page 5 before carrying out this task). The transceiver can now be returned to service.

Removing and Refitting the PA Module

The PA module is located as shown in Fig 3. A module removal diagram is shown in Fig 8.

Removal

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

(1) Remove the transceiver's top and bottom covers as described on page 10 and page 14 (take heed of the warnings on those pages).

(2) Remove CN3 from the PSU Regulator module.

(3) With the transceiver upside-down disconnect CN2 from the PA Control/Rx RF module.

(4) Disconnect the SMB connectors CN8 and CN10. Note that CN10 is located within the heatsink fins and should be disconnected using long nosed pliers. Do not attempt to remove the connector by pulling on the cable.

(5) Remove the black equipment handle from the PA side of the radio by unscrewing and removing the two M5 x 16 mm panhead screws that secures it to the transceiver.

(6) Remove the six M3 x 8 mm countersunk screws and two M3 x 8 mm captive screws that secure the PA from the bottom and top of the mainframe as shown in Fig 8. Ensure the PA module is well supported during this operation.

(7) Withdraw the PA module from the mainframe taking care not to snag the wiring looms.

Refitting

Note ...

Take note of Repairs caution (2) on page 5 before fitting the PA module.

To refit the PA module, proceed as follows:

(1) Place the module in position and butt it up to the mainframe. Ensure no wires are trapped by the module.

(2) Fit the six M3 x 8 countersunk screws and two M3 x 8 mm captive screws that secure the module to the transceiver's mainframe.

(3) Fit the black equipment handle to the PA side of the radio using the two M5 x 16 mm panhead screws.

(4) Connect the SMB connectors CN8 and CN10. Note that CN10 is located within the heatsink fins and should be connected using long nosed pliers if unable to use fingers in the enclosed space.

(5) With the transceiver upside-down connect CN2 to the PA Control/Rx RF module.

(6) Fit CN3 to the PSU Regulator module.

(7) Re-establish the ac and/or dc supplies (take heed of the warnings on page 10 and page 14).

(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 the Calibrate routine using the Virtual Front Panel (VFP), as detailed in the procedure To Calibrate the Transceiver on page 26.

(11) Carry out a BIT interruptive test as detailed in the procedure 'To Initiate a BIT Test on page 7'.

(12) Remove the VFP PC to radio interconnection lead and switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies.

(13) Refit the transceiver's top and bottom covers (take note of Repairs caution (1) on page 5 before carrying out this task). The transceiver 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 3. An assembly and PCB removal diagram is shown in Fig 9.

Removal

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

(1) Remove the transceiver's top and bottom covers as described on page 10 and page 14 (take heed of the warnings on those pages).

(2) Disconnect CN4 at the Processor module. Carefully pull the cable through the aperture in the mainframe to free it.

(3) Disconnect SMB connector CN5 at the PA Control/RxRF module.

(4) Remove the four M3 x 8 mm countersunk screws from the bottom and top of the mainframe box section (see Fig 9, Diagram A).

(5) Remove the two black equipment handles by unscrewing and removing the four M5 x 16 mm panhead screws that secure them to the transceiver. The front panel can now be moved forward and away from the mainframe.

(6) At the front panel, 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.

(7) Disconnect the speaker connector from the Front Panel PCB.

(8) Remove the Front Panel PCB from the Front Panel assembly by removing the six M3 x 6 mm panhead screws and wavy washers (see Fig 9 Diagram B).

Refitting

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

(1) Place the PCB in position at the Front Panel assembly. Ensure the spindle of the control knob and Heaset/Microphone/Diagnostics connector are correctly located.

(2) Secure the PCB to the Front Panel assembly using the six M3 x 6 mm panhead screws and wavy washers (see Fig 9, Diagram B).

(3) Connect the speaker connector to the Front Panel PCB.

(4) 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.

(5) Secure the Front Panel assembly to the top and bottom of the mainframe box section using the four M3 x 8 mm countersunk screws. Fit the two black equipment handles using the four M5 x 16 mm panhead screws (see Fig 9, Diagram A).

(6) Route the ribbon cable to the Processor module connector CN4 and connect it.

(7) Route the SMB connector to CN5 on the PA Control/RxRF module and connect it.

(8) Re-establish the ac and/or dc supplies (take heed of the warnings on page 10 and page 14).

(9) Switch power on at the radio using the rear mounted Power switch.

(10) Ensure the front panel Ready indicator is lit and the Alarm indicator is unlit.

(11) Carry out a BIT interruptive test as detailed in the procedure To Initiate a BIT Test on page 7.

(12) Switch power off at the transceiver using the rear mounted Power switch. Isolate the transceiver from the ac and/or dc supplies

(13) Refit the transceiver's top and bottom covers (take note of repairs caution (1) on page 5 before carrying out this task). The transceiver can now be returned to service.

Removing and Refitting the Cooling Fan

The cooling fan is at the rear of the PA module as shown in Fig 3. An assembly and removal diagram is shown in Fig 10.

Removal

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

(1) Disconnect the two-pin connector.

(2) Remove fan's finger guard.

(3) Using an Allen key, inserted through the holes in the fan exposed with the finger guard 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 the cooling fan, proceed as follows:

(1) Locate the fan in position and using a suitable Allen key inserted through the holes for the fan's finger guard, secure using the four M4 x 12 mm caphead Allen screws.

(2) Secure the finger guard to the fan.

(3) Connect the 2-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.

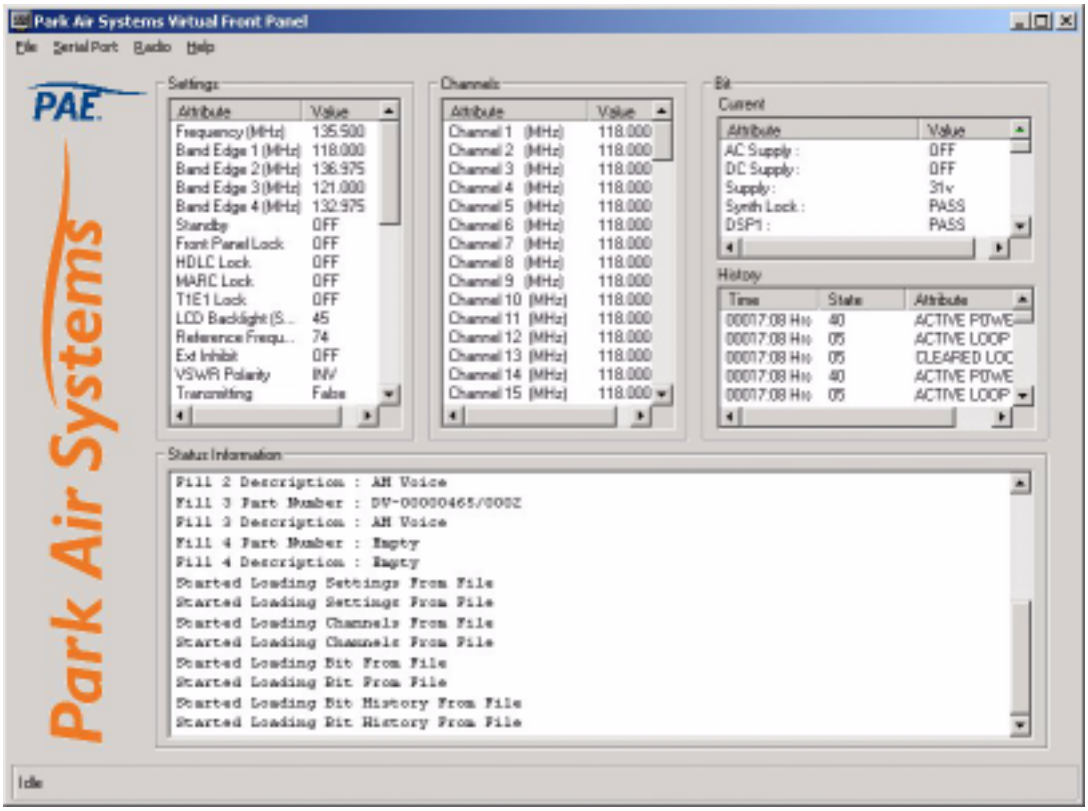
(7) Carry out a BIT interruptive test as detailed in the procedure 'To Initiate a BIT Test on page 7'.

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 transceiver from the front panel; these are:

- A profile of the transceiver's operation settings and channel information can be created, stored on disk, and then recalled to download into other transceivers.
- A print out of the transceiver's profile can be made from the VFP.
- Front Panel Lock is available only when using the VFP. As part of the transceiver's Settings (see typical screen display shown below) 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 transceiver 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.



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.

(2) Using the mouse, right click on the file S0473VXX.EXE 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 transceiver's 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's front panel controls as detailed on page 7.

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.

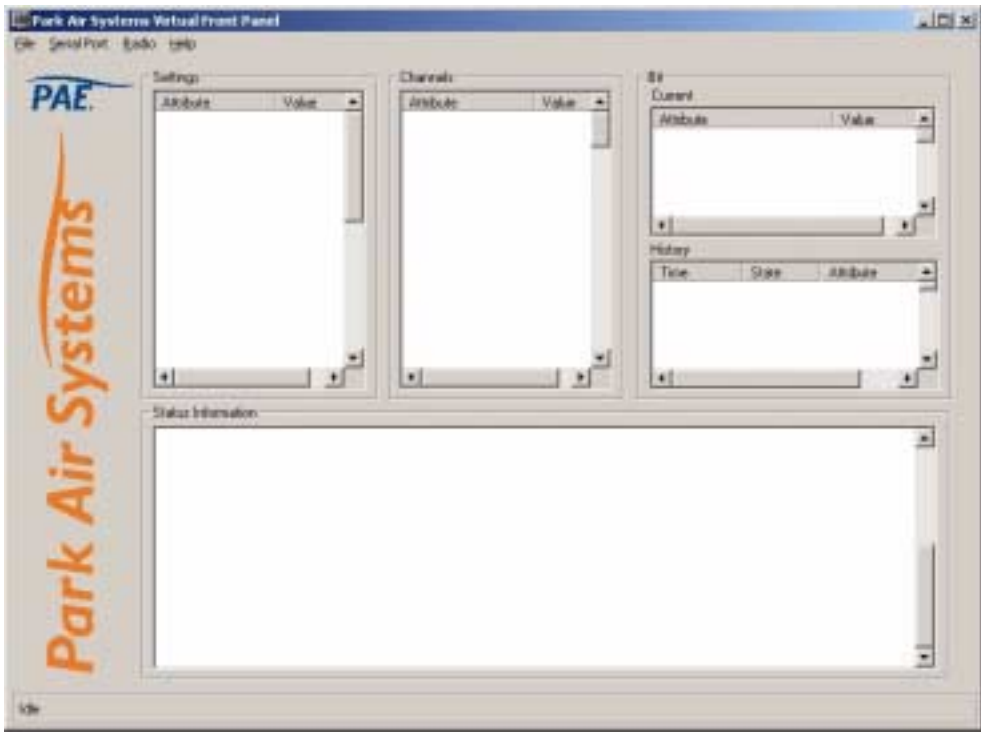
BIT Window
Two lists of information are presented. The current BIT status and the BIT history. The BIT history shows the last 100 entries.

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 Transceiver'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 Headset/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 (as shown below) is displayed.



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 transceiver 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 transceiver'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 transceiver 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 Headset/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 Transceiver

(1) Connect a dummy load via a power meter to the transceiver's Tx/Rx Antenna connector.

(2) Remove the transceiver's bottom cover.

(3) Using a VFP to PC interconnection lead, Park Air part number 17E12600001, connect the radio's front panel Headset/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.

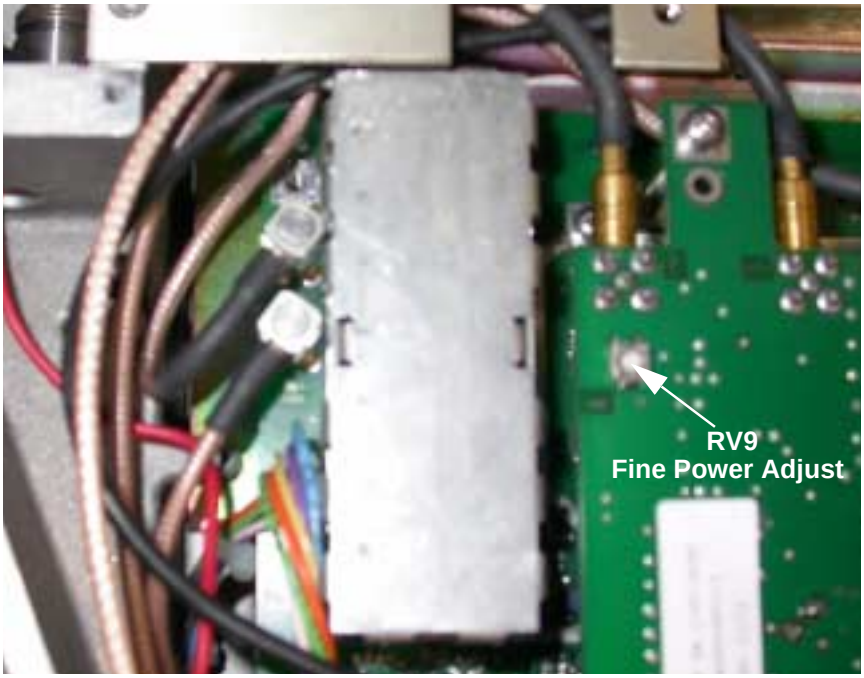
(9) When the PA Control/PA loop has been calibrated the Progress screen disappears and the VFP screen re-appears showing a calibration complete message in the Status Information window.

(10) Gain access to the PA Control/Rx RF module and identify RV9 (this control is on the solder side of the outer PCB adjacent to the label - see next page). From the transceiver's front panel AM-Voice or AM-MSK Settings screen, select PTT On.

(11) From the Settings pane of the VFP screen, note the RF power setting. Adjust RV9 until the power meter reads this value.

(12) From the transceiver's 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.

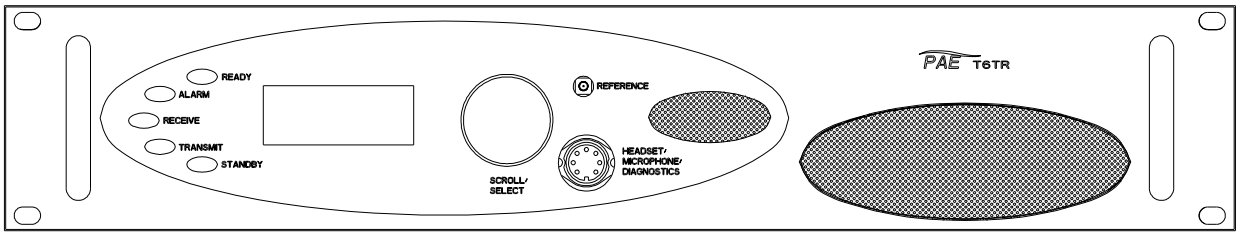
(13) When there is no further requirement for using the VFP, exit the VFP software and disconnect the radio from the PC.



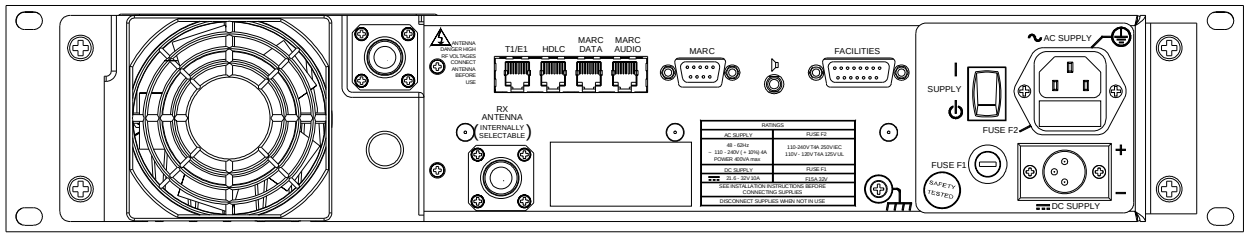
Location of RV9

Figs 1 to 10 follow

Back to Transceiver
Main Page



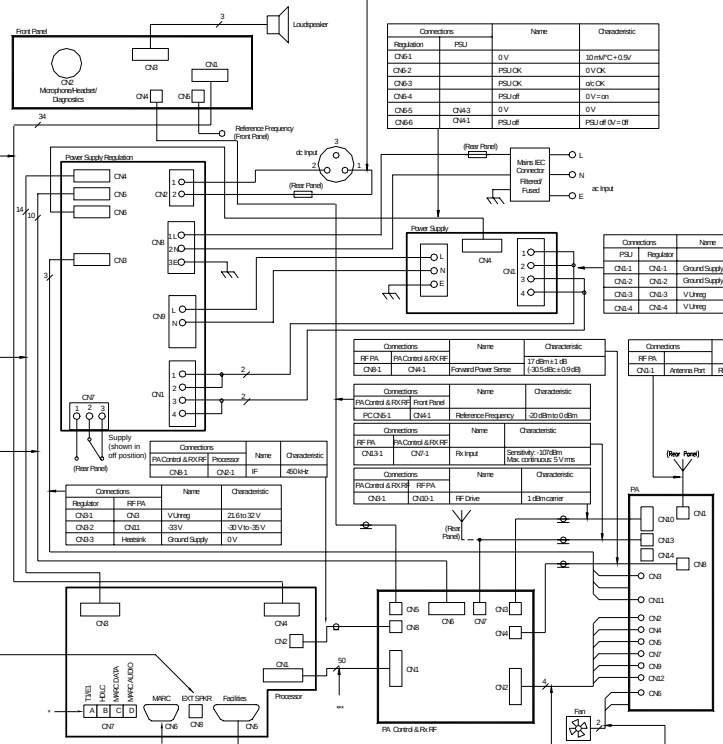
Front View



Rear View

Fig 1 T6TR Front and Rear Panels

Back to Transceiver Main Page



Connections		Name	Characteristic
Processor	Front Panel		
CN4-1	CN1-1	LED Alarm	Open collector (5mA)
CN4-2	CN1-2	LED Ready	Open collector (5mA)
CN4-3	CN1-3	LED Standby	Open collector (5mA)
CN4-4	CN1-4	LED Tx (LED Rx)	Open collector (5mA)
CN4-5	CN1-5	LCD RS	TTL
CN4-6	CN1-6	LCD R/W	TTL
CN4-7	CN1-7	LCD Enable	TTL
CN4-8	CN1-8	Data 0	TTL
CN4-9	CN1-9	Data 1	TTL
CN4-10	CN1-10	Data 2	TTL
CN4-11	CN1-11	Data 3	TTL
CN4-12	CN1-12	Data 4	TTL
CN4-13	CN1-13	Data 5	TTL
CN4-14	CN1-14	Data 6	TTL
CN4-15	CN1-15	Data 7	TTL
CN4-16	CN1-16	LCD Backlight	Open collector (200mA)
CN4-17	CN1-17	Transmit Data	RS232
CN4-18	CN1-18	+5 V Supply	+5 V
CN4-19	CN1-19	Receive Data	RS232
CN4-20	CN1-20	-5 V Supply	-5 V
CN4-21	CN1-21	Ground	0 V
CN4-22	CN1-22	+15 V Supply	+15 V
CN4-23	CN1-23	Ground	0 V
CN4-24	CN1-24	LED RX	Open collector (5mA)
CN4-25	CN1-25	Turn +	5 V pull-up
CN4-26	CN1-26	Turn -	5 V pull-up
CN4-27	CN1-27	Push	5 V pull-up
CN4-28	CN1-28	Mic PTT	0 V=PTT,5 V pull-up=PTT
CN4-29	CN1-29	Ground	0 V
CN4-30	CN1-30	Sidetone (Headset Drive)	3 Vac pk-pk
CN4-31	CN1-31	Loudspeaker Amp Drive	2V pp maximum
CN4-32	CN1-32	Ground	0V
CN4-33	CN1-33	Mic Input	1.6V p-p maximum
CN4-34	CN1-34	Ground	0V

Connections		Name	Characteristic
Front Panel	Microphone/ Diagnostics		
CN2-1	1	Ground - Microphone	0 V
CN2-2	2	Transmit Data	RS232
CN2-3	3	MIC PTT	0 V = PTT, 5 V pull-up = not PTT
CN2-4	4	Receive Data	RS232
CN2-5	5	Sidetone (Headset Drive)	3 Vac pk-pk, 200R
CN2-6	6	Microphone Input	6dB input impedance, 5mV sensitivity
CN2-7	7	Ground	0 V

** Connections		Name	Characteristic
Processor	MARC Port		
CN5-1	1	Ground	0 V
CN5-2	2	Line+	+20 dBm to -20 dBm 600R
CN5-3	3	Line-	+20 dBm to -20 dBm 600R
CN5-4	4	PTT (Mute)	0 V or +10 V to +50 V or -10 V to 50 V at 5mA
CN5-5	5	Unregulated Supply	Fused 500mA, 21.6 to 32 V
CN5-6	6	Data RX B - Data In +	RS422
CN5-7	7	Data RX A - Data In -	RS422
CN5-8	8	Data TX B - Data Out +	RS422
CN5-9	9	Data TX A - Data Out -	RS422

Connections		Name	Characteristic
Front Panel			
CN3-1	Loudspeaker	Loudspeaker output	2V p-p maximum
CN3-2	Loudspeaker	Ground	0 V
CN3-3		n/c	n/c

Connections		Name	Characteristic
DC Input	Regulation		
Input-1	CN2-2	dc Input	Fused 21.6 to 32 V
Input-2	CN2-1	Ground Supply	0 V
Input-3		n/c	n/c

Connections		Name	Characteristic
Regulation	PSU		
CN6-1		0 V	10 mV/°C + 0.5V
CN6-2		PSU OK	0 V OK
CN6-3		PSU OK	o/c OK
CN6-4		PSU off	0 V = on
CN6-5	CN4-3	0 V	0 V
CN6-6	CN4-1	PSU off	PSU off 0V = Off

Connections		Name	Characteristic
Regulation	Processor		
CN4-1	CN3-1	+15 V Supply	+15 V
CN4-2	CN3-2	+15 V Supply	+15 V
CN4-3	CN3-3	+5 V Supply	+5 V
CN4-4	CN3-4	+5 V Supply	+5 V
CN4-5	CN3-5	Ground	0V
CN4-6	CN3-6	Ground	0V
CN4-7	CN3-7	-15 V Supply	-15 V
CN4-8	CN3-8	-15 V Supply	-15 V
CN4-9	CN3-9	ac Detect	> 20 mA into 250R
CN4-10	CN3-10	dc Detect	Open collector
CN4-11	CN3-11	V Unreg	21.6 to 32 V
CN4-12	CN3-12	V Unreg	21.6 to 32 V
CN4-13	CN3-13	Remote on/off	0V = on, open collector = off
CN4-14	CN3-14	n/c	n/c

Connections		Name	Characteristic
Regulation	PA Control & RX RF		
CN5-1	CN6-1	+15 V Supply	+15 V
CN5-2	CN6-2	+15 V Supply	+15 V
CN5-3	CN6-3	+5 V Supply	+5 V
CN5-4	CN6-4	+5 V Supply	+5 V
CN5-5	CN6-5	Ground	0V
CN5-6	CN6-6	Ground	0V
CN5-7	CN6-7	-15 V Supply	-15 V
CN5-8	CN6-8	-15 V Supply	-15 V
CN5-9	CN6-9	ac Detect	n/c
CN5-10	CN6-10	dc Detect	n/c

Connections		Name	Characteristic
Regulator	RF PA		
CN3-1	CN3	V Unreg	21.6 to 32 V
CN3-2	CN11	-33 V	-30 V to -35 V
CN3-3	Heatsink	Ground Supply	0 V

Connections		Name	Characteristic
PA Control & RX RF	Processor		
CN6-1	CN2-1	IF	450 kHz

Connections		Name	Characteristic
RF PA	PA Control & RX RF		
CN8-1	CN4-1	Forward Power Sense	17 dBm ± 1 dB (-30.5 dBc ± 0.5 dB)

Connections		Name	Characteristic
PA Control & RX RF	Front Panel		
PCCN5-1	CN4-1	Reference Frequency	-20 dBm to 0 dBm

Connections		Name	Characteristic
RF PA	PA Control & RX RF		
CN3-1	CN7-1	Rx Input	Sensitivity: -107dBm Max. continuous: 5 V rms

Connections		Name	Characteristic
PA Control & RX RF	RF PA		
CN3-1	CN10-1	RF Drive	1 dBm carrier

Connections		Name	Characteristic
RF PA			
CN5-1	Antenna Port	RF Output/Input	5 to 50 W / 107dBm sensitivity

Connections		Name	Characteristic
PSU	Regulator		
CN5-1	CN1-1	Ground Supply	0 V
CN5-2	CN1-2	Ground Supply	0 V
CN5-3	CN1-3	V Unreg	29 V
CN5-4	CN1-4	V Unreg	29 V

Connections		Name	Characteristic
Processor	External Speaker		
CN8 Tip	1	External Speaker Drive	3 Vac pk-pk max
CN8 Ring	2	External Speaker Drive	3 Vac pk-pk max
CN8 Sleeve	3	Ground	0 V

Connections		Name	Characteristic
Processor	Facilities		
CN5-1	1	Ground	0 V
CN5-2	2	E Bit	
CN5-3	3	PTT	
CN5-4	4	External VSWR	TTL pull-up active low
CN5-5	5	Antenna Change Over (Squelch)	Open collector, 0 V = Tx
CN5-6	6	Antenna Change Over (Squelch)	Open collector, 0 V = Tx
CN5-7	7	Squelch Defeat	TTL pull-up active low
CN5-8	8	Ground	0 V

Connections		Name	Characteristic
Processor	Facilities		
CN5-9	9	Unregulated Supply	Fused 300mA 21.6 to 32 V
CN5-10	10	Inhibit	TTL pull-up active low
CN5-11	11	BIT Interruptive Test	TTL pull-up active low
CN5-12	12	RSSI	Potential range 0 V to 10 V
CN5-13	13	Ready Output	Open collector, 0 V = Ready
CN5-14	14	Tape Output	-10 dBm 100R
CN5-15	15	Reserved	n/c

Connections		Name	Characteristic
PA Control & RX RF	RF PA		
CN2-1	CN4	PA Temperature	10 mV/°C + 0.5V
CN2-2	CN2	Drive Detect	0.5 V for +10 dBm
CN2-3	CN7	PA Bias Enable	TTL - High for bias on
CN2-4	CN5	Fan Enable	TTL - High for fan on
CN2-5	CN9	Reflected Power	50 W = -3.95 V
CN2-6	CN12	PA Current Detect	0.1V per Amp

Connections		Name	Characteristic
RF PA			
CN6	Fan	Fan Control	24 V
PA Heatsink	Fan	Ground	0V

CN7A		
Pin Number	Name	Characteristic
1	RRING	ANSI T1.403-1995 (T1), ITU-T. G.703 (E1)
2	RTIP	
3	n/c	
4	TRING	ANSI T1.403-1995 (T1), ITU-T. G.703 (E1)
5	TTIP	
6	n/c	
7	n/c	
8	n/c	

CN7C		
Pin Number	Name	Characteristic
1	Ground	0V
2	Data Rx B (Data In +)	RS 422
3	Data Rx A (Data In -)	RS-422
4	Data Tx B (Data Out +)	RS-422
5	Data Tx A (Data Out -)	RS-422
6	n/c	
7	n/c	
8	Unregulated Supply	21.6V to 32V

CN7B		
Pin Number	Name	Characteristic
1	Ground	0V
2	HDLC Rx B	RS-422
3	HDLC Rx A	RS-422
4	HDLC Tx B	RS-422
5	HDLC Tx A	RS-422
6	HDLC CL B	RS-422
7	HDLC CL A	RS-422
8	Unregulated Supply	21.6V to 32V

CN7D		
Pin Number	Name	Characteristic
1	Ground	0 V
2	Line In/Out +	+10 dBm in to 600W
3	Line In/Out -	+10 dBm in to 600W
4	PTT Input	0 V or +10 V to +50 V or -10 V to 50 V at 5mA
5	Line In +	+20 dBm to -20 dBm 600R
6	Line In -	+20 dBm to -20 dBm 600R
7	Antenna Change Over/PTT/ Fast ATR Output (T6T)	PNP open collector grounding transistor
8	Squelch Output (T6TR)	Solid-state relay grounding output

*** Connections		Name	Characteristic
Processor	PA Control & RX RF		
CN3-1	CN3-1	Ground	0 V
CN3-2	CN3-2	IF AGC	0 to 2.5 V
CN3-3	CN3-3	Ground	0 V
CN3-4	CN3-4	RF AGC	0 to 2.5 V
CN3-5	CN3-5	Ground	0 V
CN3-6	CN3-6	I	0 to 2.5 V
CN3-7	CN3-7	Ground	0 V
CN3-8	CN3-8	BIT I Monitor	±2.5 V
CN3-9	CN3-9	Ground	0 V
CN3-10	CN3-10	BIT Q Monitor	±2.5 V
CN3-11	CN3-11	Ground	0 V
CN3-12	CN3-12	Q	0 to 2.5 V
CN3-13	CN3-13	Ground	0 V
CN3-14	CN3-14	Frequency Trim	0 to 4 V / 0 to 6V
CN3-15	CN3-15	Tx/Rx Detect	TTL
CN3-16	CN3-16	Power Down	TTL pull up active low
CN3-17	CN3-17	Ground	0 V
CN3-18	CN3-18	Filter 0	TTL
CN3-19	CN3-19	Filter 1	TTL
CN3-20	CN3-20	Filter 2	TTL
CN3-21	CN3-21	Filter 3	TTL
CN3-22	CN3-22	Filter 4	TTL
CN3-23	CN3-23	Ground	0 V
CN3-24	CN3-24	Synth Load	TTL
CN3-25	CN3-25	Data	TTL
CN3-26	CN3-26	Clock	TTL
CN3-27	CN3-27	Phase Load	TTL
CN3-28	CN3-28	Reserved	TTL
CN3-29	CN3-29	Tx Key	TTL
CN3-30	CN3-30	Auto Level Control	0 to 5 V (5 V 3dB back off)
CN3-31	CN3-31	PA Temperature	10 mV / °C
CN3-32	CN3-32	Reflected Power	0 to 2.5 V
CN3-33	CN3-33	PAC Temperature	10 mV / °C
CN3-34	CN3-34	External VSWR	TTL
CN3-35	CN3-35	Narrow/Wide	TTL
CN3-36	CN3-36	BIT Control 0	TTL
CN3-37	CN3-37	BIT Control 1	TTL
CN3-38	CN3-38	BIT Open Loop	TTL
CN3-39	CN3-39	BIT Synth Lock	TTL
CN3-40	CN3-40	BIT Loop Correct	TTL
CN3-41	CN3-41	BIT VSWR OK	TTL
CN3-42	CN3-42	RF PA Bias Disable	TTL
CN3-43	CN3-43	Fan Enable	TTL - High fan on
CN3-44	CN3-44	OXCO Fitted	TTL - Low OCXO fitted
CN3-45	CN3-45	Reserved	TTL
CN3-46	CN3-46	Step Size	TTL
CN3-47	CN3-47	TR Detect	TTL
CN3-48	CN3-48	VIU Detect	TTL
CN3-49	CN3-49	BIT Control 2	TTL
CN3-50	CN3-50	BIT Control 3	TTL

Fig 2 Wiring and Interconnection Diagram

Back to Transceiver Main Page

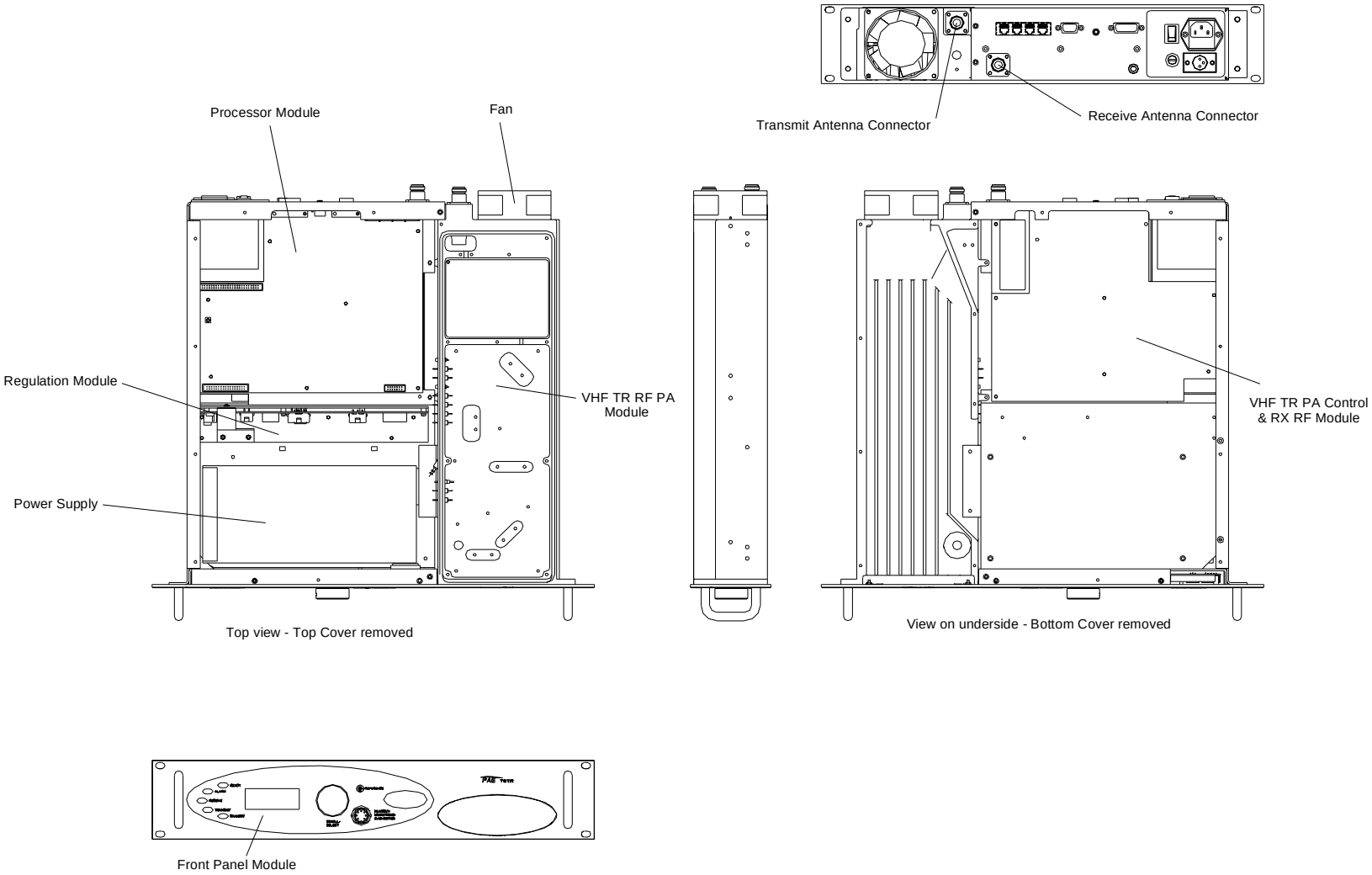


Fig 3 Module Location Diagram

Back to Transceiver
Main Page

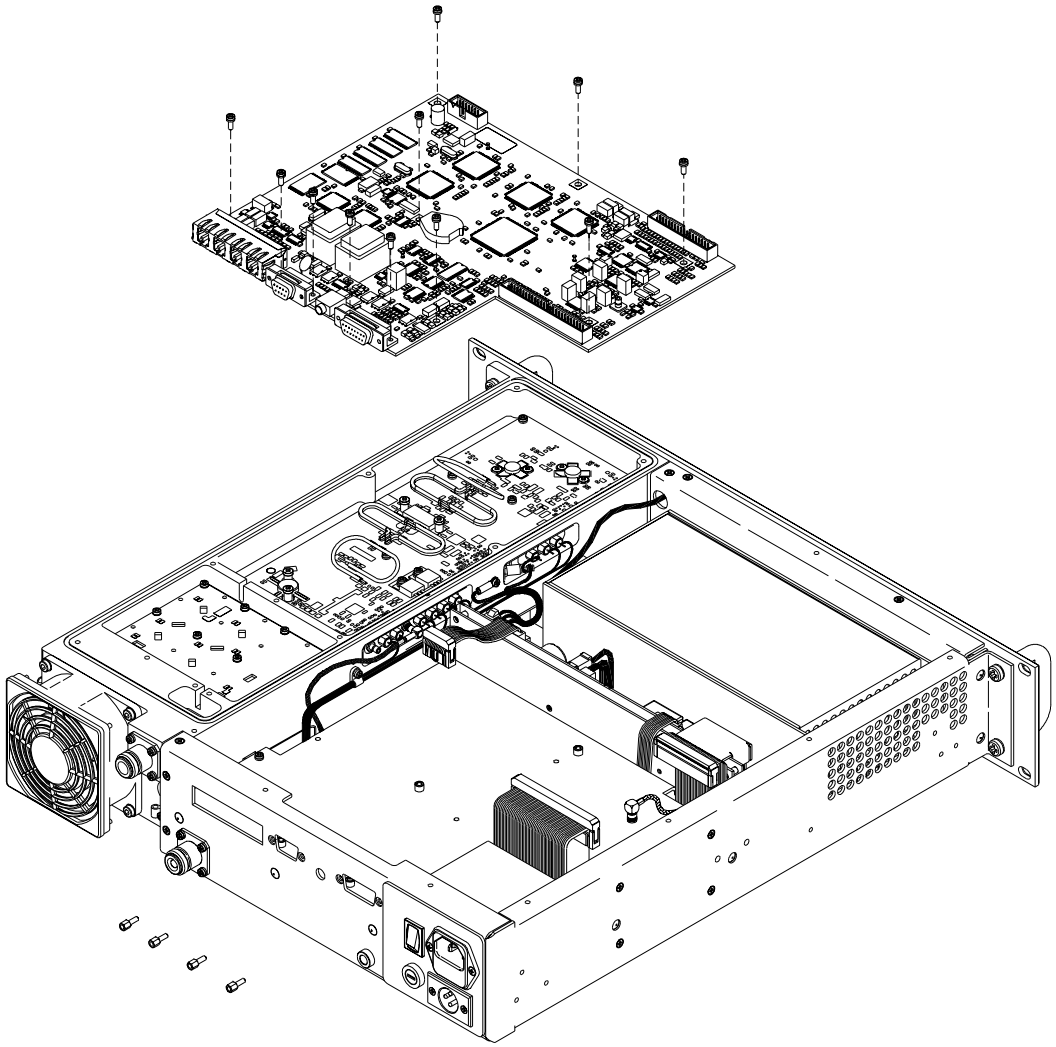


Fig 4 Processor Module - Removal and Refitting Detail

Back to Transceiver
Main Page

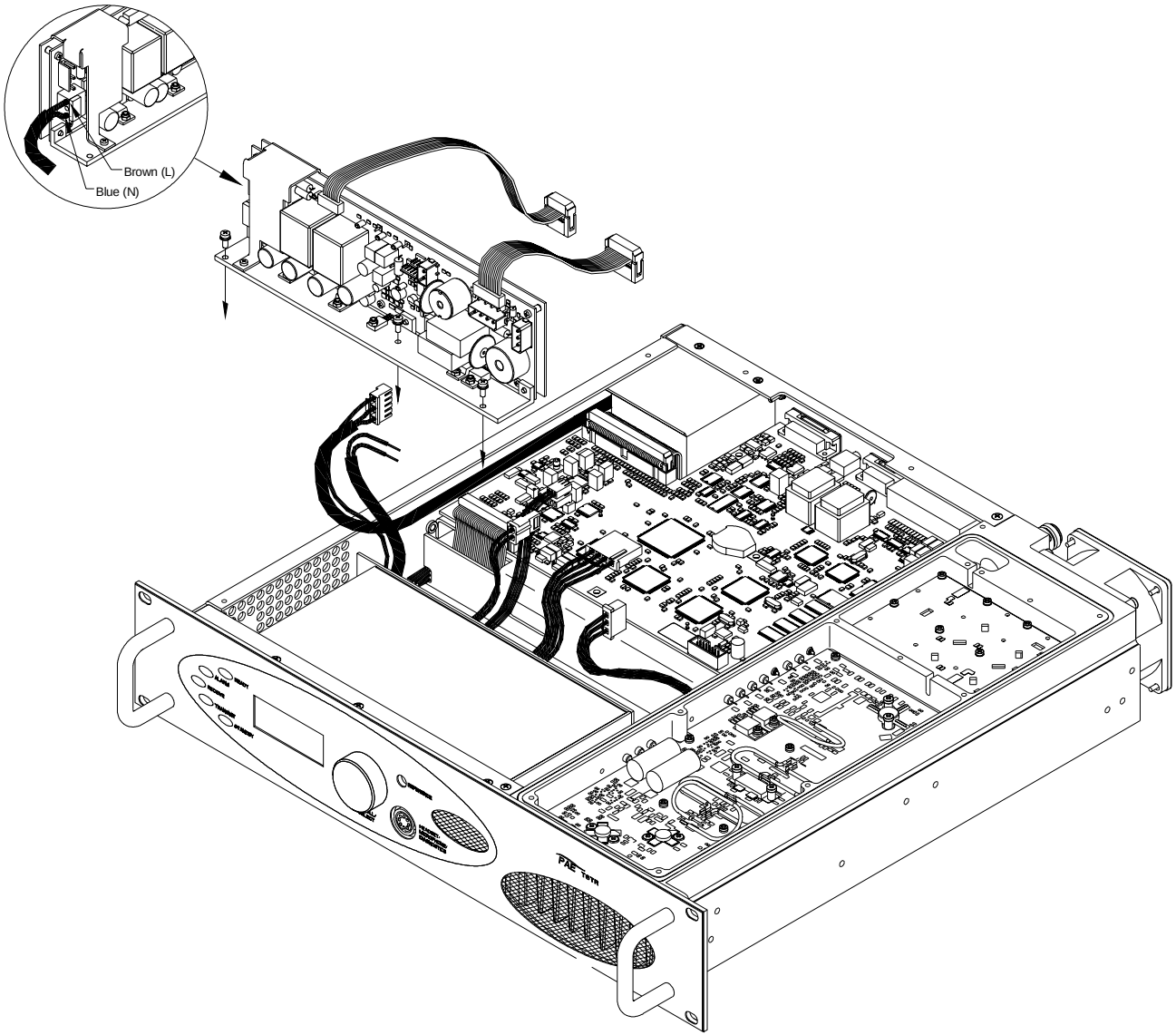


Fig 5 PSU Regulator Module - Removal and Refitting Detail

Back to Transceiver
Main Page

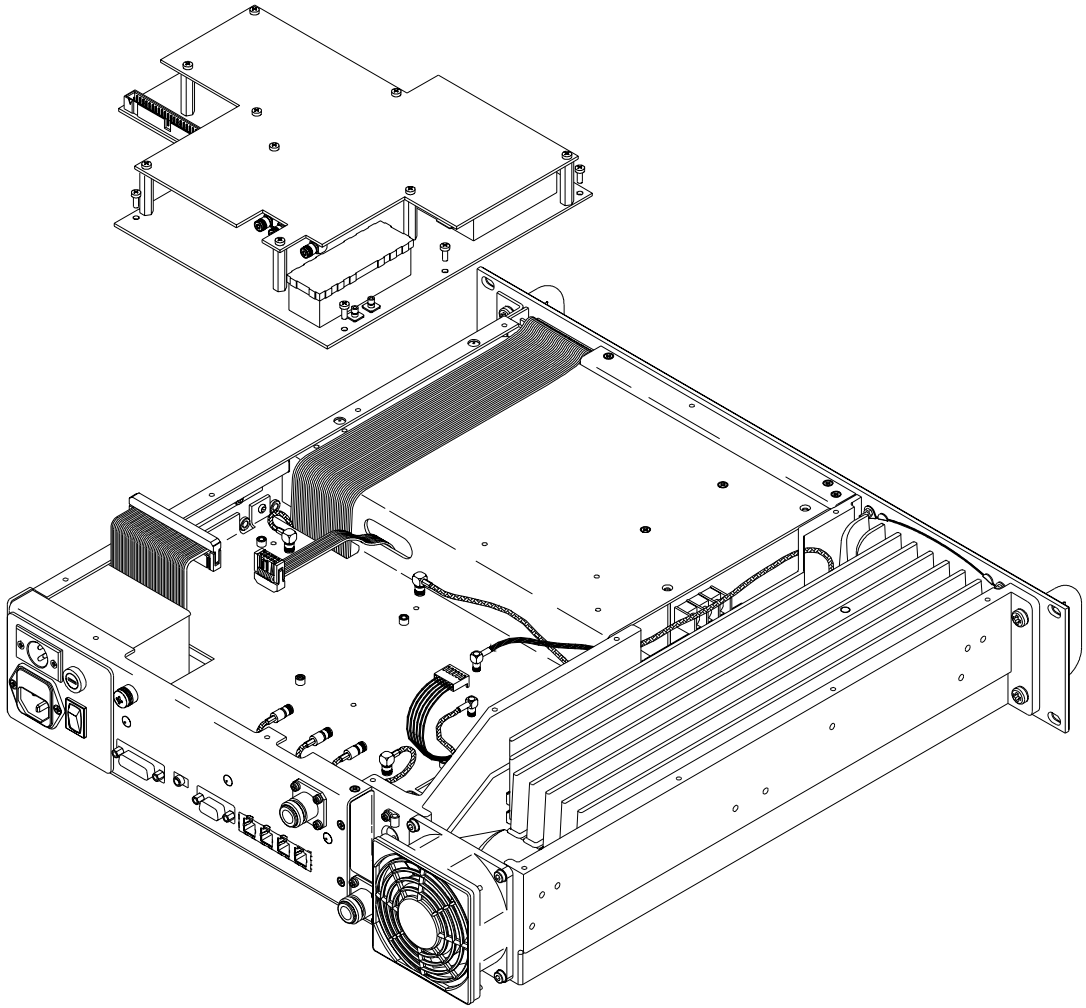


Fig 6 PA Control/Rx RF Module - Removal and Refitting Detail

Back to Transceiver
Main Page

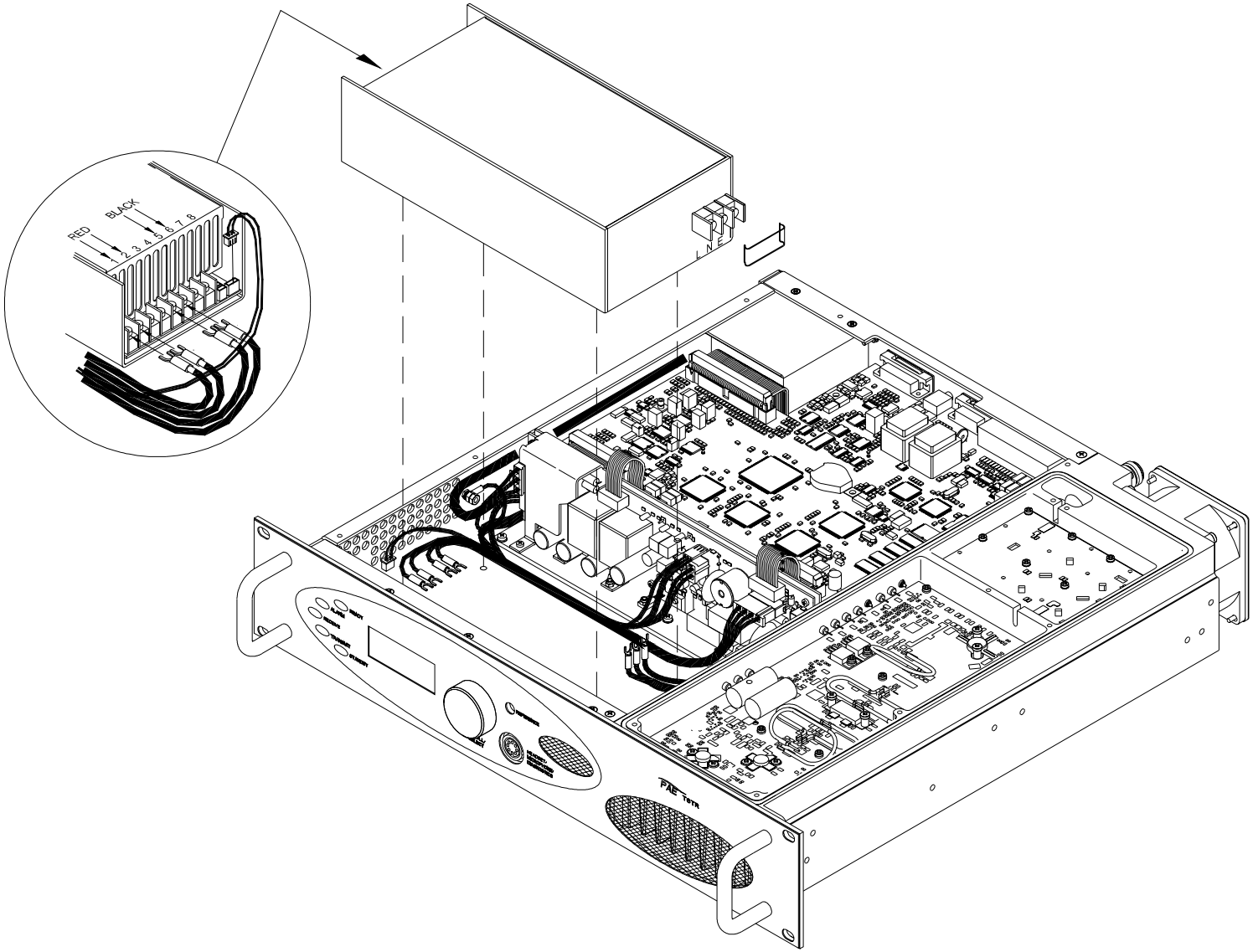


Fig 7 Power Supply - Removal and Refitting Detail

Back to Transceiver
Main Page

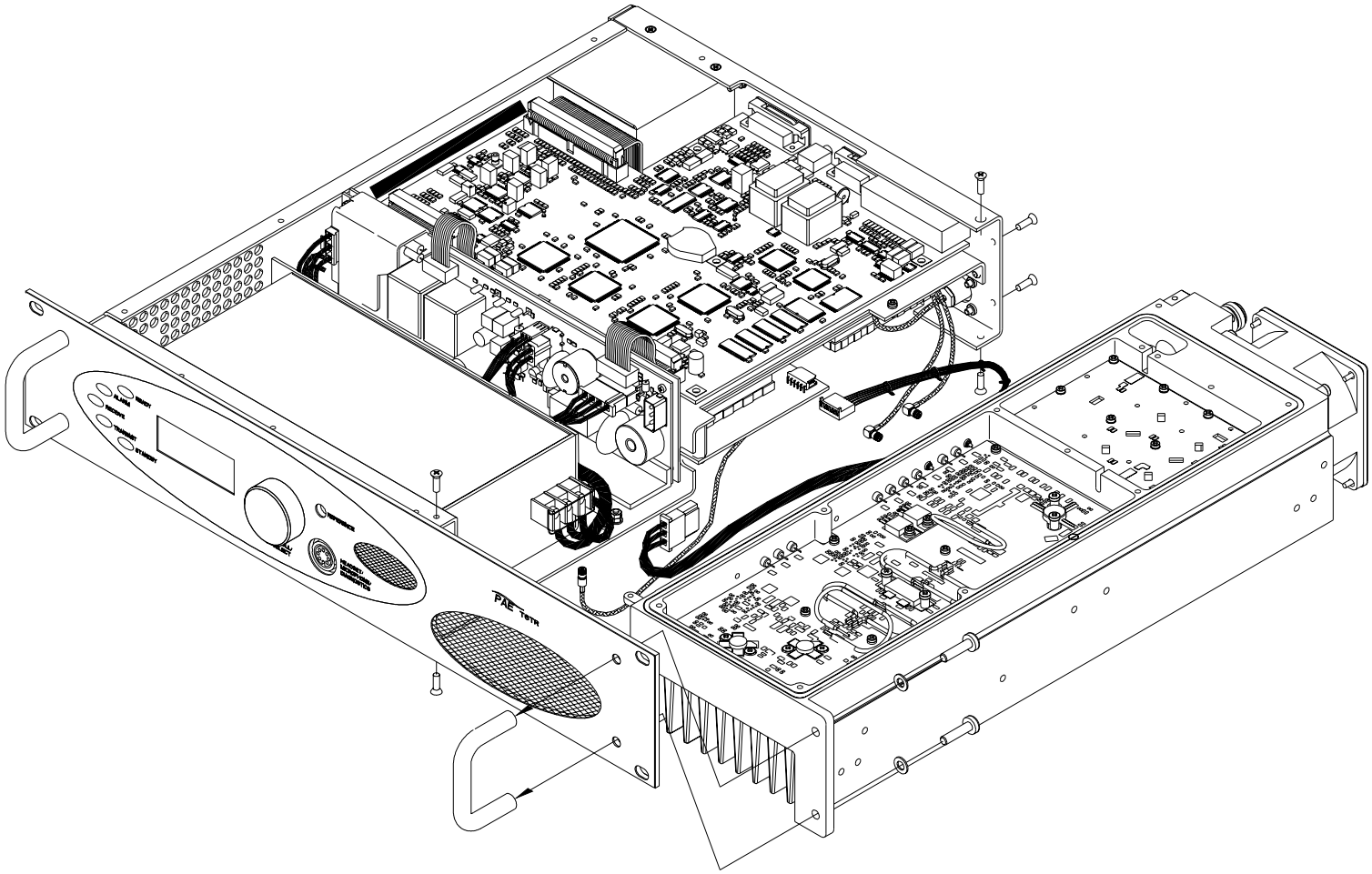


Fig 8 PA Module - Removal and Refitting Detail

Back to Transceiver
Main Page

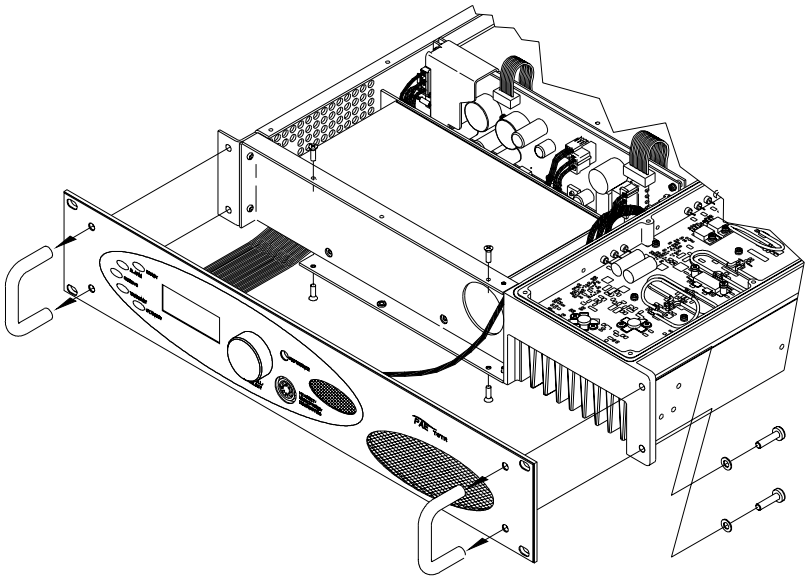


Diagram A

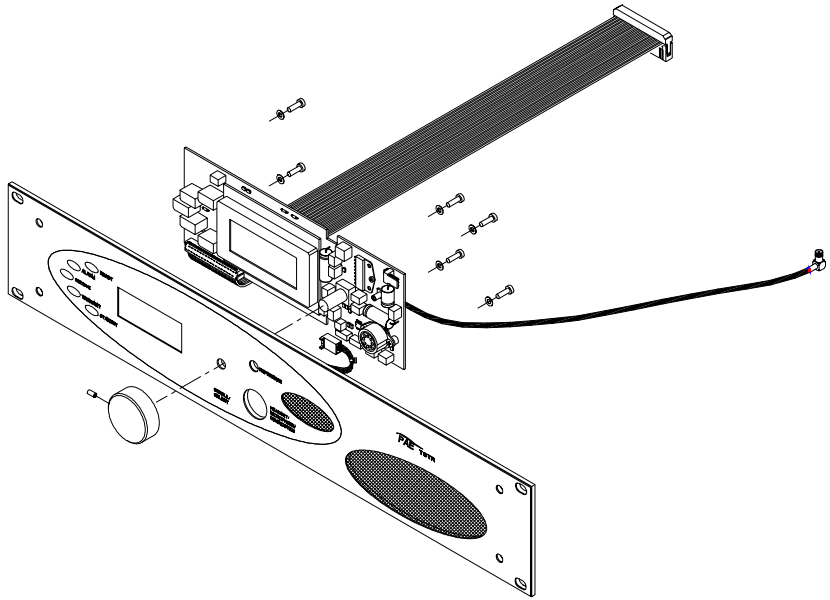


Diagram B

Fig 9 Front Panel Assembly PCB - Removal and Refitting Detail

Back to Transceiver
Main Page

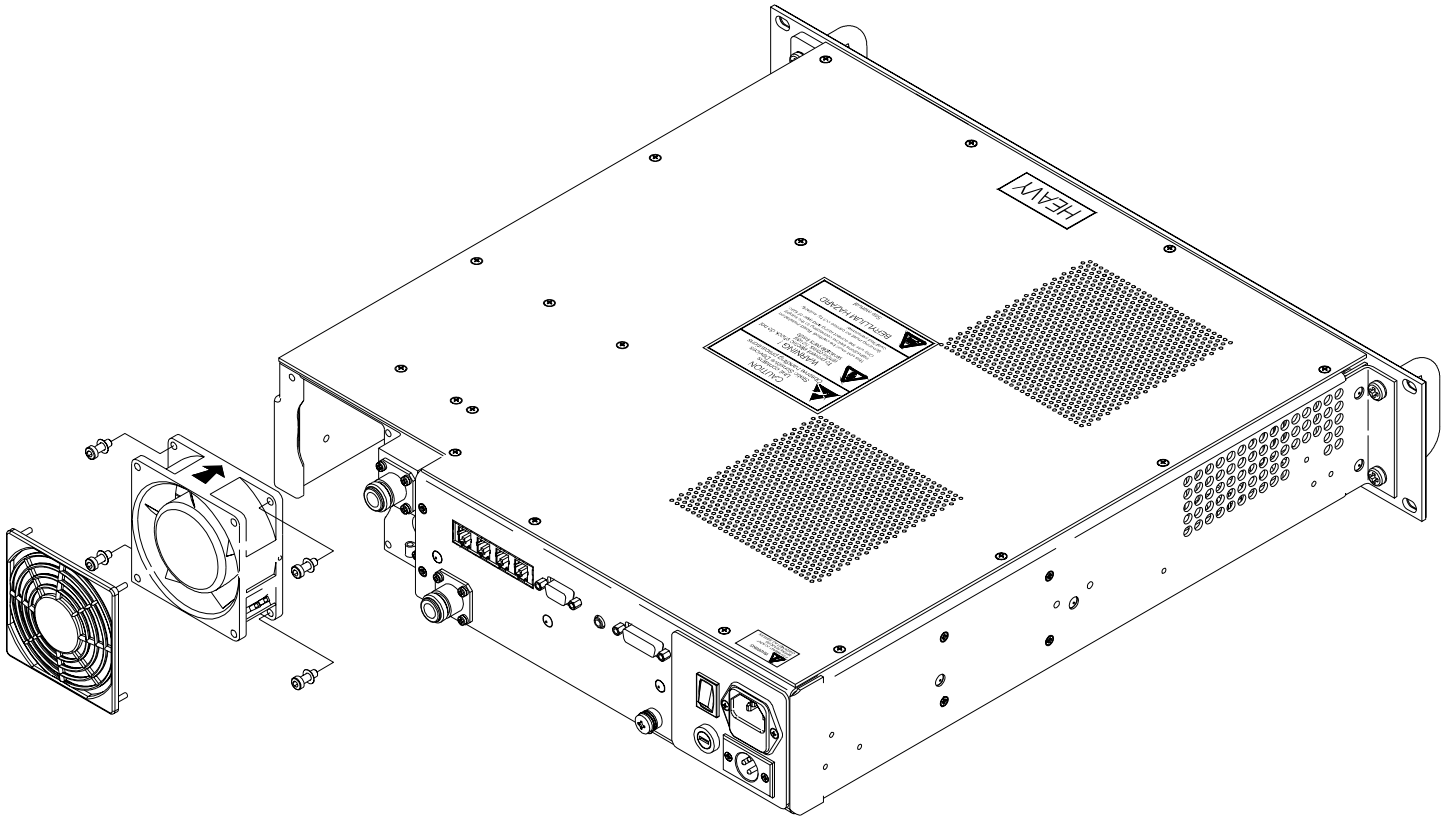


Fig 10 Cooling Fan - Removal and Refitting Detail