

T6T Transmitter User Guide

Issue 1



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Northfields
Market Deeping
Peterborough
England PE6 8UE
Telephone: From UK, 01778 345434
From outside UK, 44 1778 345434
Fax: From UK, 01778 342877
From outside UK, 44 1778 342877

Handbook Amendment Record

Amendments to this handbook, originated by Park Air Electronics, are listed in the following table.

Amendment Number	Date	Brief Details	PAE Change Note Number

Equipment Modification Record

Modifications to the T6T transmitter are detailed in the following table.
The equipment's modification label shows modifications embodied in the equipment.

Modification Number	Date	Brief Details	PAE Change Note Number

List of Abbreviations

The following abbreviations are used in this user guide:

A	amp
AM	amplitude modulation
BIT	built-in test
dB	decibel
DSP	digital signal processing
ETI	elapsed time indicator
ICAO	international civil aviation organisation
kg	kilogram
kHz	kilo Hertz
LCD	liquid crystal display
mA	milliamp
MARC	multi-access remote control system
MHz	mega Hertz
mm	millimetre
ppm	parts per million
PSK	phase shift keying
rms	root mean square
RSSI	receiver signal strength indication
V	volt
VFP	virtual front panel
VHF	very high frequency

T6T Transmitter User Guide

Section 1

General Information

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This chapter provides an introduction to the T6T transmitter, briefly describes the features, and shows how the radio is configured for operational use.

INTRODUCTION TO THE T6T TRANSMITTER

Park Air Electronics (PAE) T6T is a VHF multi-mode air-traffic control transmitter compatible with analogue (AM) and digital (D8PSK) modulation modes. Current models are supplied programmed for AM voice operation in the frequency range 118 to 136.975 MHz using 25 kHz or 8.33 kHz channel spacing. Future software upgrades will allow D8PSK operation.

The transmitter produces a 50 watt carrier output that can be reduced, in 1 watt steps, to 5 watts. The output power, and the majority of operational settings, can be selected at the front panel, using the virtual front panel (VFP) or through a compatible control and data system such as the PAE multi-access remote control (MARC) system.

A multi-channel feature allows up to 100 frequency channels to be stored and recalled by channel number.

The transmitter is designed to be fitted in an industrial 19 inch (483 mm) equipment rack. Operation is from either a standard ac mains supply, or from a low voltage dc supply. When both input supplies are connected, the dc supply acts as a back-up if the mains supply fails.

Comprehensive continuous and interruptive Built-In Tests (BIT) provide confidence of the transmitter's serviceability.

T6T HANDBOOKS

This user guide describes the T6T transmitter and gives complete installation and setting up procedures. The user guide is split into sections as follows:

- Section 1.** Section 1 (this section) provides general information that is common to all operating modes.
- Section 2.** Section 2 provides information that is specific to operating the T6T transmitter in AM-voice mode.
- Section 3.** Section 3 onwards will, when available, describe the digital operating modes.

A maintenance kit (PAE part number 70-6350MKIT) is also available. A maintenance handbook, included in the kit, contains fault finding guides to module level and details VFP operation. The VFP can be used for setting up, maintenance purposes, and for loading new software.

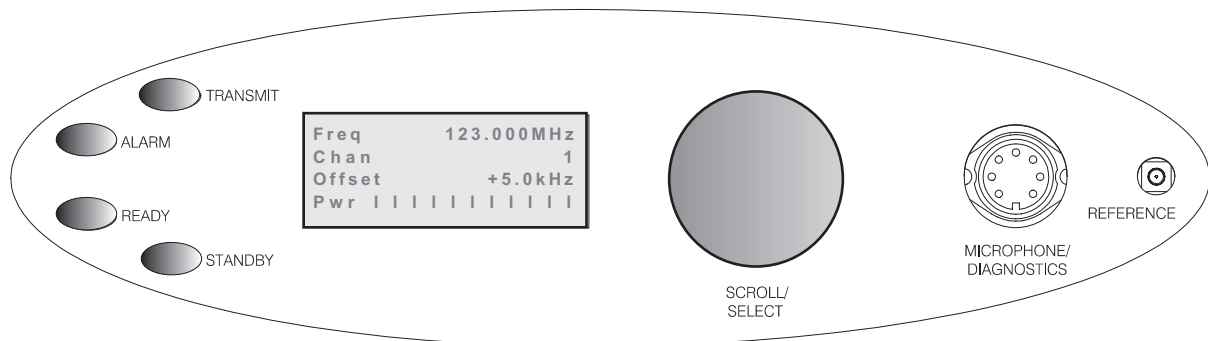
T6T transmitter maintenance should not be attempted without reference to the maintenance handbook

The maintenance kit includes a CD-ROM containing the VFP software and a lead for connecting the radio to a Personal Computer (PC). The CD-ROM also contains the software as loaded into the T6T at the time of sale. This enables the original software to be re-loaded if the transmitter's Digital Signal Processing (DSP) module is ever replaced.

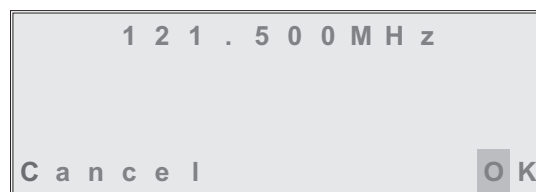
Both the user guide and maintenance handbook are available on CD ROM. Contact PAE for details.

OPERATIONAL SETTINGS

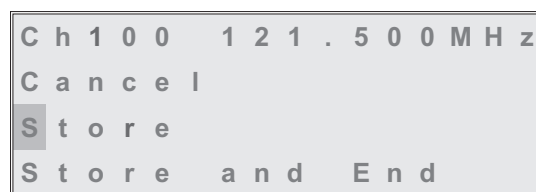
Operational settings for the T6T transmitter are configured at the front panel, through the VFP, or through an associated MARC system (or compatible control and data system). At the transmitter, operational settings are selected and displayed using the front panel Scroll/Select switch and the LCD.



The settings are selected through a series of menus. Full details are given in the section of this user guide applicable to the operating mode. Two example selection menus, Set Frequency menu and Channel Storage menu, are shown below.



Example Set Frequency Menu



Example Channel Storage Menu

During normal transmitter operation, the Main screen, shown below, is displayed. The screen shows the operating frequency, the channel number (if the channel store facility is used), the carrier offset (if used in AM-voice mode), and displays a graphical representation of instantaneous peak power.



Example Main Screen

Virtual Front Panel

As an alternative to setting up the transmitter from the front panel, the T6T's virtual front panel (VFP) software can be used. To use the VFP, an IBM™ compatible PC must be connected to the transmitter (see Fig. 1-1). Using the VFP offers several advantages over setting up from a transmitter's front panel. These are:

- When set up using the VFP, a profile of the transmitter's operational settings can be created. The profile can then be used to automatically set up other radios within a system, or to reset a radio should its DSP module ever be replaced.
- When using the VFP, the transmitter's front panel can be locked. This means that a transmitter's settings cannot inadvertently be changed by tampering with the front panel controls.
- A print-out of a transmitter's profile (all the operational settings) can be made from the VFP.

Instructions on VFP usage is outside the scope of this user guide. Reference, therefore, should be made to the T6T maintenance handbook that is supplied with a CD-ROM containing the VFP software.

BUILT-IN TESTS

The transmitter continuously self monitors key internal parameters without affecting normal operation. If a BIT fault is detected, the front panel Alarm indicator lights, the Ready indicator becomes unlit, and the transmitter becomes inoperable.

Additionally, a BIT warning, as opposed to a BIT fault may be indicated. A BIT warning is shown by the front panel Alarm indicator flashing; the Ready indicator remains lit and the transmitter remains operational, but at reduced power.

Apart from 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 transmitter 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. When the transmitter 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. A full description of the BIT facilities is given in the section applicable to the required operating mode. The following two illustrations show example front panel BIT displays.

R F	D r i v e	P A S S
F w d	P o w e r	2 5 W
R f l	P o w e r	2 W
		< < > >

V S W R	P A S S	
P A	T e m p	8 0 ° C
S y n t h	L o c k	P a s s
		< < > >

TRANSMITTER VARIANTS

Two variants of the T6T transmitter are available:

- B6350. This model operates in all modes except in AM-voice when using a 5-carrier offset. The frequency stability of this model is 1 ppm.
- B6350OPT1. This model operates in all modes including AM-voice when using a 5-carrier offset. The frequency stability of this model is 0.25 ppm.

CONFIGURING THE T6T TRANSMITTER

Fig. 1-1 shows the signal connectors fitted to the transmitter's front and rear panels. The connectors used to configure the transmitter depend on the required operating mode. The purpose of each connector is briefly described in the following paragraphs and fully detailed in chapter 3 starting on page 11.

<u>Antenna Connector</u>	Used in all operating modes to connect the 50 ohm antenna feeder cable.
<u>Microphone/Diagnostics Connector</u>	<p>This is a dual purpose connector. A microphone/headset (complete with integral PTT switch) can be connected to enable local AM-voice operation.</p> <p>Alternatively, a PC can be connected to allow use of the VFP. The VFP can be used to set the transmitter's operational settings, or to download new software.</p>
<u>Reference Connector</u>	Used in all operating modes to check and reset the transmitter's reference frequency.
<u>Facilities Connector</u>	<p>Used primarily to connect remote signals when using AM-voice mode when the transmitter does not form part of a MARC system.</p> <p>Some auxiliary signals available at this connector, for example the 24 volt (nominal) unregulated output supply, can be utilized irrespective of the operating mode.</p>
<u>MARC Port</u>	The MARC port is used to connect remote signals when the transmitter forms part of a MARC system, or other compatible control and data system.
<u>Computer Port</u>	The computer port is used in digital communication modes to connect the transmitter to a control computer.

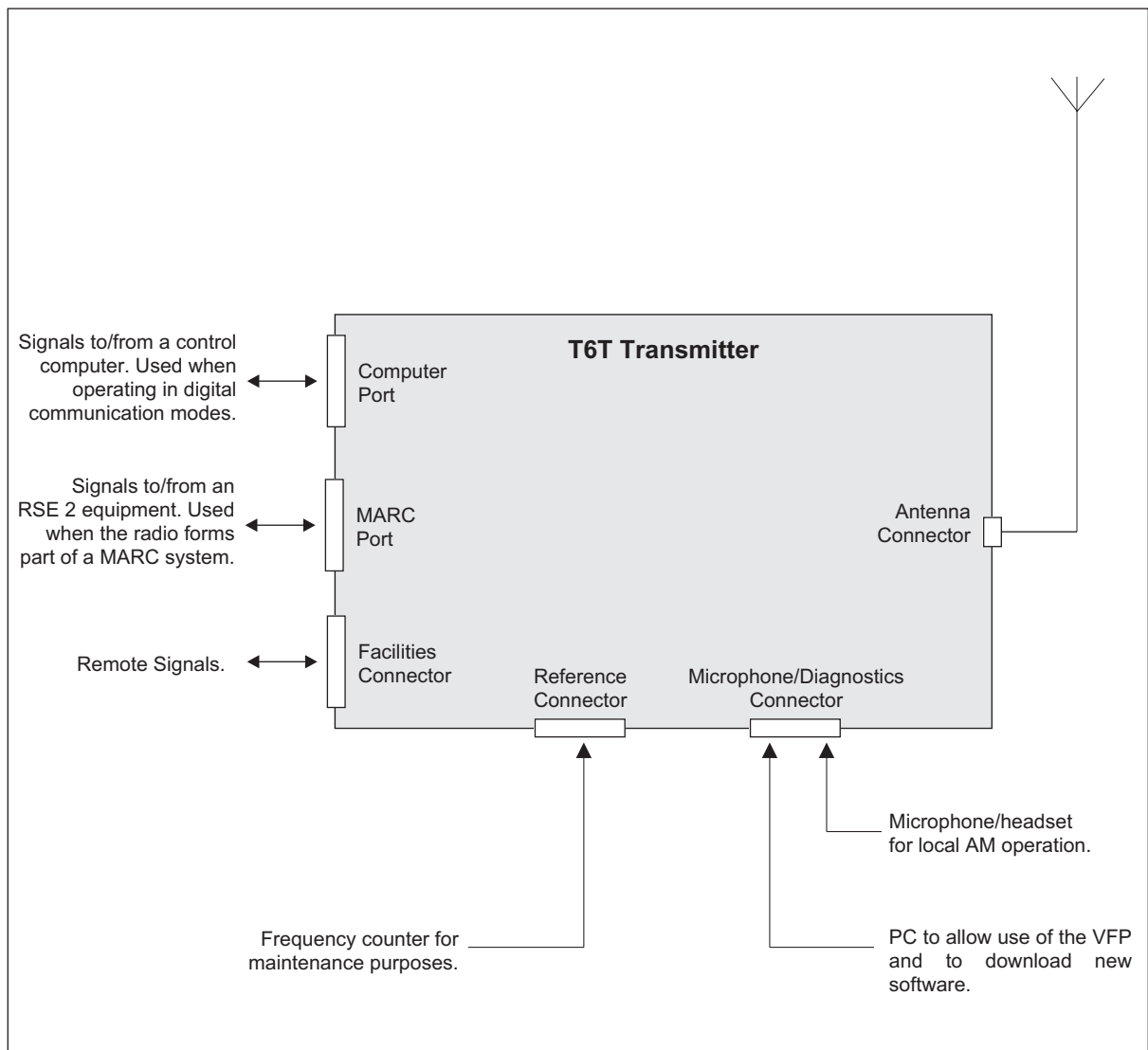


Fig. 1-1. T6T Transmitter Configuration

Intentionally Blank

This chapter contains the T6T transmitter's specification that is common to all operating modes. Specifications relevant to specific operating modes are contained in the section applicable to the required operating mode.

DIMENSIONS AND WEIGHT

The dimensions and weight of the T6T transmitter are:

Width	483 mm (19 inches).
Height	88.9 mm (3.5 inches). The height occupies 2U of equipment cabinet space.
Depth (front panel to rear panel)	430 mm (16.9 inches).
Depth (front panel to rear of fan)	450 mm (17.7 inches).
Weight	15.6 kg (34.4 pounds)

RF CHARACTERISTICS

Frequency range	118 to 136.975 MHz.
Output carrier power	The output power is adjustable between 5 and 50 watts.
Number of channels	The transmitter has a multi-channel capability. 100 channels can be stored and recalled.
Frequency accuracy	Better than 1 ppm for transmitter B6350. Better than 0.25 ppm for transmitter B6350OPT1.
Protection	Excessive VSWR. The transmitter will transmit at full power into a VSWR of up to 2.5 :1. At a higher VSWR the output power will be reduced by 10 dB \pm 1 dB, if necessary, in order to protect the transmitter. Provision is made via the facilities port to allow an external VSWR signal to be monitored. This is required when isolators are employed which shield the transmitter from a VSWR fault at the antenna. PA Overheating. If the RF PA temperature exceeds 80° C, the output power is reduced by 6 dB \pm 1 dB and a BIT warning indicated. If the RF PA temperature exceeds 90° C the transmitter de-keys and a BIT alarm is indicated.

Control Loop Error. If the cartesian control loop goes out of limits, for example, due to low supply volts, the output power gradually reduces by up to 3 dB until the loop regains stability. If this fails to stabilise the loop the transmitter de-keys and a BIT alarm is indicated.

Harmonic outputs

Harmonic outputs are below -36 dBm.

ENVIRONMENTAL

Temperature range

The transmitter operates to specification at temperatures between -20 and +55°C and at a relative humidity between 5% and 90% (non-condensing).

Duty cycle

100%.

Warm up time

The transmitter is fully operational 5 seconds after switch on.

Storage

The transmitter can be stored at temperatures between -30 and +70°C without causing damage.

Cooling

The transmitter has an integral cooling fan.

POWER REQUIREMENTS

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

ac input supply

The transmitter operates from a 48 to 62 Hz single-phase ac supply.

The input voltage, measured at the equipment, can be 110/120/220/230/240 V ac ($\pm 10\%$). The correct ac input tap must be selected to suit the input voltage. Additionally, the correct ac input fuse F2 must be fitted. See installation detail on page 23.

ac power consumption

Typically 330 VA. 500 VA maximum.

dc input supply

Between 21.6 and 32 V. Full output power capability is maintained with a dc input between 24 and 32 V. From 24 down to 21.6 V the output power gradually decreases.

dc supply current

15 amp (maximum) with a 28 volt dc input supply.

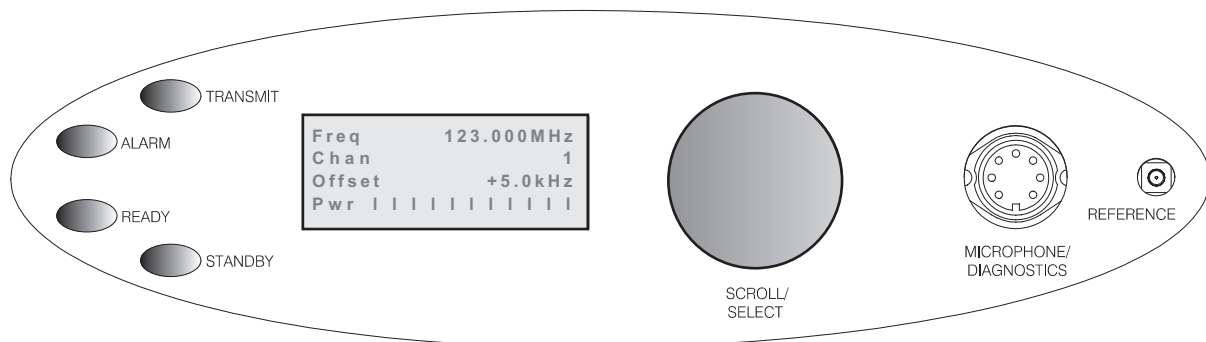
Chapter 3.

Controls, Indicators, and Connectors

This chapter details the purpose of all controls, indicators, and connectors fitted to the transmitter's front and rear panels.

FRONT PANEL

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



Transmit Indicator

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

Alarm Indicator

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

If a warning is detected, the Alarm indicator flashes, the Ready indicator remains lit, and the transmitter remains operational. A BIT warning is indicated if:

- a high PA temperature is sensed
- a high VSWR is sensed.

If a fault is detected, the Alarm indicator lights and the Ready indicator becomes unlit; the transmitter cannot be used.

Ready Indicator

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

Standby Indicator

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

Standby mode is selected and deselected using the front panel Scroll/Select switch and LCD, by initiating an instruction through a MARC system, or through the VFP. Details of front panel selection and deselection are given in the section of this user guide applicable to the particular operating mode.

Reference Connector

An SMB jack socket that allows a high impedance frequency counter to monitor the transmitter's reference frequency. This connector is used only for maintenance purposes. The instructions for checking and adjusting the reference frequency are given in the T6T maintenance handbook.

Microphone/Diagnostics Connector

A dual purpose connector that allows either a dynamic microphone (and headset if sidetone is required) or a PC to be connected to the transmitter. The connector is a 7-pin self locking DIN socket.

A microphone/headset with integral PTT switch can be fitted to this connector to enable the transmitter to be operated in local mode. The connections are detailed in table 1-1. A PC can also be connected to allow the VFP to be displayed. Using the VFP is detailed in the T6T maintenance handbook. The connections at the transmitter are shown in table 1-2.

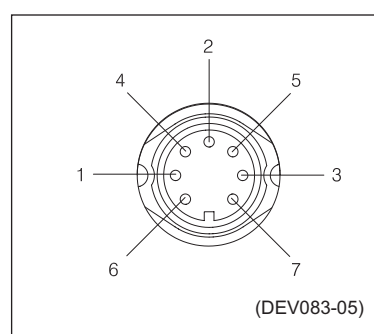


Fig. 1-2.
Microphone/Diagnostics
Connector Pin-Out

Table 1-1. Microphone/Headset Connections

Headset/Diagnostics Connector Pin Number	Signal	Notes
1	Microphone ground	0 volt.
3	Microphone PTT	0 volt = PTT. 5 V pull-up = not PTT.
5	Sidetone to headset	200 ohm output impedance. Maximum = 3 volt peak-to-peak.
6	Microphone input	6.8 kohm, 5 mV sensitivity.

Table 1-2. Diagnostics PC Connections

Headset/Diagnostics Connector Pin Number	Signal	Notes
2	Transmit data	RS232
4	Receive data	RS232
7	Ground	0 volt

Scroll/Select Switch and LCD

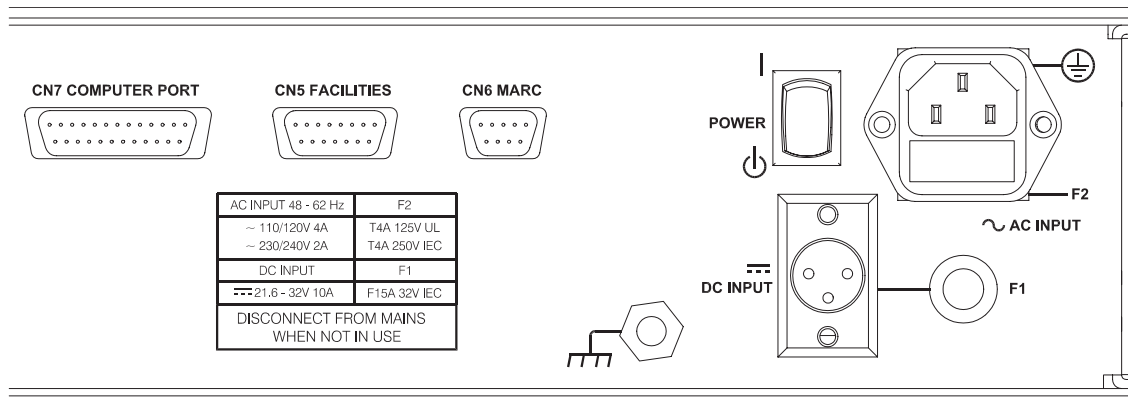
The Scroll/Select switch is used in conjunction with the LCD to select most of the transmitter's operational settings. Use of the switch and LCD is fully detailed in the section of this user guide applicable to the particular operating mode. During normal operation, the LCD shows the operating frequency, 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 transmitter operating on 123.000 MHz; the frequency has been preset as channel 8; and no offset is used.



REAR PANEL

The rear panel's controls, indicators, and connectors are shown in Fig. 1-3 and described in the following paragraphs.



(DEV083-02)

Fig. 1-3. Rear Panel

Power Switch

A 2-way rocker switch used to switch on, and switch off, power to the transmitter's circuitry.

I = On  = Off

WARNING!

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

AC Input Connector

A 3-pole IEC chassis plug for connecting the ac input supply. The plug has an integral 20 mm fuse (F2) that protects the Line (L) input circuit. The fuse is rated at 4 amps. Detailed instructions regarding fuse types, and connecting the ac supply are given in the installation chapter on page 26.

Caution!

Before connecting an ac input supply to the transmitter, the ac input taps must be set to suit the local mains supply (see page 22).

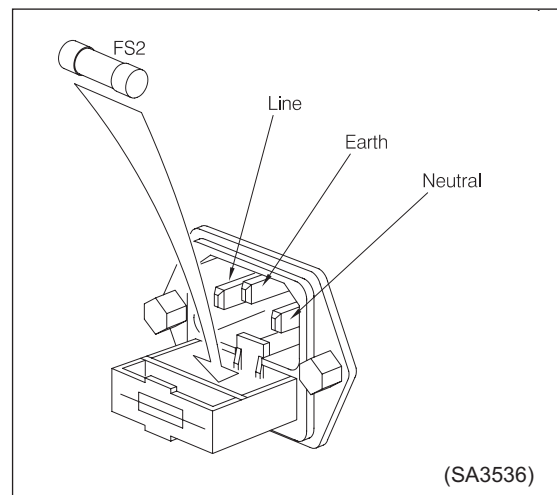


Fig. 1-4. AC Mains Connector

DC Input Connector

A 3-pole chassis plug for connecting the dc input supply. Detailed instructions for connecting the dc supply are given in the installation chapter of this handbook on page 27.

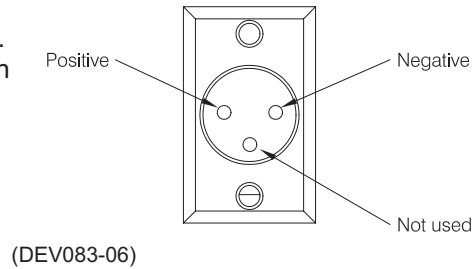


Fig. 1-5. DC Connector

Fuse F1

Fuse F1 protects the dc input positive supply circuit. It is a Size 0 fuse rated at 15 amps. The PAE part number of the fuse is: 29-01350201.

Chassis Stud Connection

The chassis stud is used to provide a common earth point between the transmitter and the associated equipment rack, or the transmitter and the user's system earth. **The stud must not be used as a safety earth.** Connection details are given on page 26.

Facilities Connector CN5

A 15-way D-type socket used primarily to connect remote signals when the transmitter operates in AM mode and does not form part of a MARC (or similar) system. The pin-out of this connector is given in table 1-3 on page 17.

Apart from allowing connection of remote signals, this connector makes some auxiliary signals available to the user. For example, a 24 volt (nominal) unregulated output supply. The auxiliary signals can be employed by the user as and when required irrespective of the operating mode.

Facilities connector CN5 as seen when looking at the rear panel. Connections should be made using a 15-way D-type plug PAE part number: 20-01150100 (plug), and 20-09150101 (cover). These are supplied with the transmitter as item 3 (see page 22).

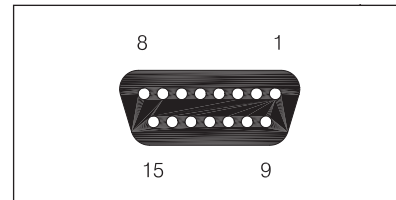


Fig. 1-6. Facilities Connector CN5 Pin-Out

MARC Port CN6

A 9-way D-type socket used to connect remote signals to a MARC system or other compatible control and data system. The pin-out of this connector is given in table 1-4 on page 18.

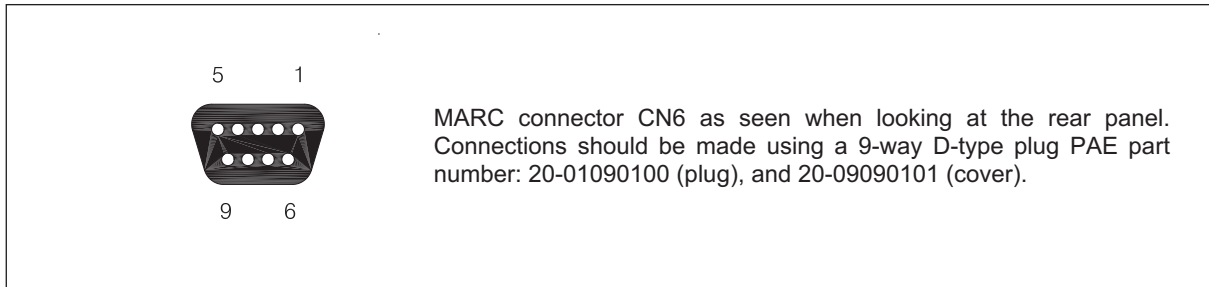


Fig. 1-7 MARC Port CN6 Pin-Out

Computer Port CN7

A 25-way D-type socket used to connect the transmitter to a control computer when the transmitter is operated in digital communication modes. The pin-out of this connector is given in table 1-5 on page 19.

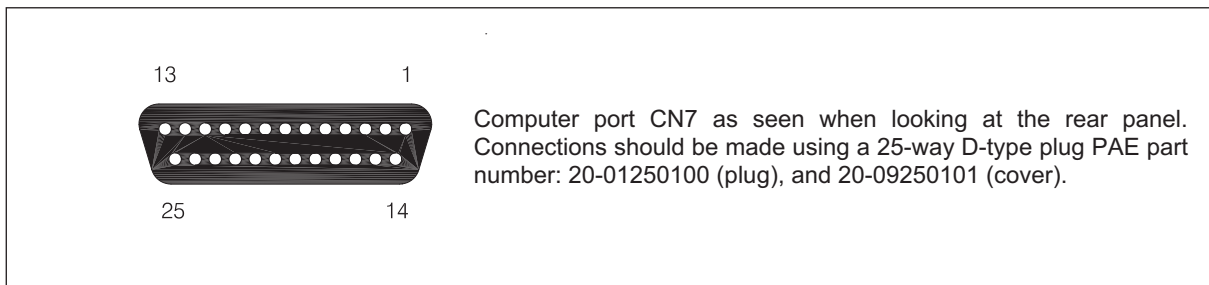


Fig. 1-8 Computer Port CN7 Pin-Out

Antenna Connector

An N-type 50 ohm coaxial socket used to connect the antenna's feeder cable.

Table 1-3. Facilities Connector CN5 Pin-Out

Pin Number	Signal Name	Description
1	Ground	0 volt.
2	Line In (+)	Pins 2 and 3 present a 600 ohm balanced audio input to the transmitter for use in AM modes. The input level is adjustable between -40 dBm and 0 dBm. Phantom keying can be superimposed on the audio lines. See 'Selecting the Applicable Keying Method' in section 2 on page 10.
3	Line In (-)	
4	External VSWR	An input signal to the transmitter to indicate a VSWR fault in the antenna circuit. When this signal is active, the transmitter's output power is reduced by 10 dB and a VSWR warning is indicated. This is a TTL input pulled-up to 5 V; the active signal is 0 volt.
5	Antenna Change-Over	An output signal that can be used to control an antenna change-over relay when the transmitter is used in conjunction with a T6R receiver. Antenna change-over is a grounding output; the active (transmitter keyed) polarity is always the same as the PTT output signal on pin 6. Maximum current sink is 100 mA.
6	PTT Output	This output, when active, indicates the transmitter is keyed. It is a grounding output. The active polarity is set from the front panel. Maximum current sink is 100 mA.
7	Remote PTT	An input signal used to key the transmitter. The active signal can be 0 volt, or a dc level between +10 and +50 volt, or a dc level between -10 and -50 volt. Internal jumpers JP8 and JP9 must be correctly set to suit the required keying potential (see 'Remote Keying Configurations' in section 2 on page 11). The active polarity is set from the front panel.
8	Ground	0 volt.
9	Unregulated Supply	A dc output supply between 21.6 and 32 volt. The supply is fused at 500 mA.
10	Tx Inhibit	This input signal, when active, prevents the radio from being keyed. This is a TTL input pulled-up to 5 V; the active polarity is set from the front panel.
11	BIT Interruptive Test	An input signal that initiates a BIT interruptive test. This is a TTL input pulled-up to 5 V. The active polarity of this signal is set from the front panel. The input signal must be active for a minimum of 300 ms; the signal cannot then be activated again for at least 3 seconds.
12	Not Used	Pin 12 is internally connected. Do not make any connections to this pin.
13	Ready Output	This output is active when the radio is ready to transmit and no faults have been detected by the BIT circuitry. It is an open collector output. The active polarity is set from the front panel.
14	Tape Output	An audio output for connection to a recording system. The output is nominally -10 dBm into 100 ohm.
15	Not Used	-

Table 1-4. MARC Connector CN6 Pin-Out

Pin Number	Signal Name	Description
1	Ground	0 volt.
2	Line In (+)	Pins 2 and 3 present a 600 ohm balanced audio input to the transmitter for use in AM modes. The input level is adjustable between -40 dBm and 0 dBm. Phantom keying can be superimposed on the audio lines. See 'Selecting the Applicable Keying Method' in section 2 on page 10.
3	Line In (-)	
4	PTT	An input signal used to key the transmitter. The active signal can be 0 volt, or a dc level between +10 and +50 volt, or a dc level between -10 and -50 volt. Internal jumpers JP8 and JP9 must be correctly set to suit the required keying potential (see 'Remote Keying Configurations' in section 2 on page 11). The active polarity is set from the front panel.
5	Unregulated Supply	A dc output supply between 21.6 and 32 volt. The supply, which is fused at 500 mA, is used as the power source for the MARC RSE 2 equipment.
6	Data In (+)	RS422 data line.
7	Data In (-)	RS422 data line.
8	Data Out (+)	RS422 data line.
9	Data Out (-)	RS422 data line.

Table 1-5. Computer Port CN7 Pin-Out

CN7 Pin Number	Signal Name	Level	Input or Output
1	Ground	0 volt	-
2	Serial 0 TXA	RS422	Output
3	Serial 0 TXB	RS422	Output
4	Serial 0 RXA	RS422	Input
5	Serial 0 RXB	RS422	Input
6	Serial 0 CLA	RS422	Output
7	Serial 0 CLB	RS422	Output
8	Serial 1 TXA	RS422	Output
9	Serial 1 TXB	RS422	Output
10	Serial 1 RXA	RS422	Input
11	Serial 1 RXB	RS422	Input
12	Serial 1 CLA	RS422	Output
13	Serial 1 CLB	RS422	Output
14	Input A	RS 232	Input
15	Input B	RS232	Input
16	Input C	RS232	Input
17	Input D	RS232	Input
18	Output A	RS232	Output
19	Output B	RS232	Output
20	Output C	RS232	Output
21	Output D	RS232	Output
22	Ground	0 volt	-
23	Not used	-	-
24	Not used	-	-
25	Not used	-	-

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This chapter details the installation procedures for a T6T transmitter that are necessary irrespective of which operating mode is to be used.

WARNING. LETHAL VOLTAGES!

The instructions given in this chapter involve connecting lethal voltages to the transmitter. The instructions detailed in this chapter must be carried out only by suitably qualified personnel.

WARNING. ANTENNA RADIATION!

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

WARNING. BERYLLIUM/BERYLLIA!

The equipment covered by this handbook contains components containing the highly toxic material Beryllium and/or its oxide Beryllia. These materials are particularly hazardous if:

1. Beryllium materials are absorbed into body tissues through the skin, mouth, or wound.
2. The dust created by breakage of Beryllia is inhaled.
3. Toxic fumes are inhaled from Beryllia/Beryllium involved in a fire.

The components containing Beryllia/Beryllium are: TR5, TR6 and TR9 in the PA module.

WARNING. UNAUTHORIZED MODIFICATIONS!

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

CAUTION. ESSDs!

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

INTRODUCTION

The procedures in this chapter describe how to install a T6T transmitter. The procedures necessary during installation are listed in table 1-5 and should be completed in the order shown.

Table 1-5 Installation Procedures

Procedure		Reference
1	Perform an initial inspection of the transmitter.	Page 22
2	Fit the correct ac input fuse.	Page 22
3	Select the correct ac input tap.	Page 23
4	Selecting the keying method (AM-voice only)	Page 24
5	Fit the transmitter into an equipment rack.	Page 25
6	Connecting remote facilities	Page 25
7	Connect the chassis stud to the rack or system earth.	Page 26
8	Connect the ac input supply (if applicable).	Page 26
9	Connect the dc input supply (if applicable).	Page 27
10	Connect an antenna.	Page 27

INITIAL INSPECTION OF THE TRANSMITTER

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

The following items should be included with the transmitter:

- Item 1. One copy of the T6T User Guide (this handbook).
- Item 2. An unterminated IEC mains connector.
- Item 3. An unterminated 15-way D-type plug (for use with the rear panel Facilities connector CN5).

FITTING THE CORRECT AC INPUT FUSE

The mains input fuse F2 is an integral part of the rear panel ac connector (the connector and fuse are shown in Fig. 1-4 on page 14). The fuse type must be correct for the local mains supply. Check the fuse fitted conforms to that detailed in Table 1-6.

Table 1-6 Input AC Fuse Rating

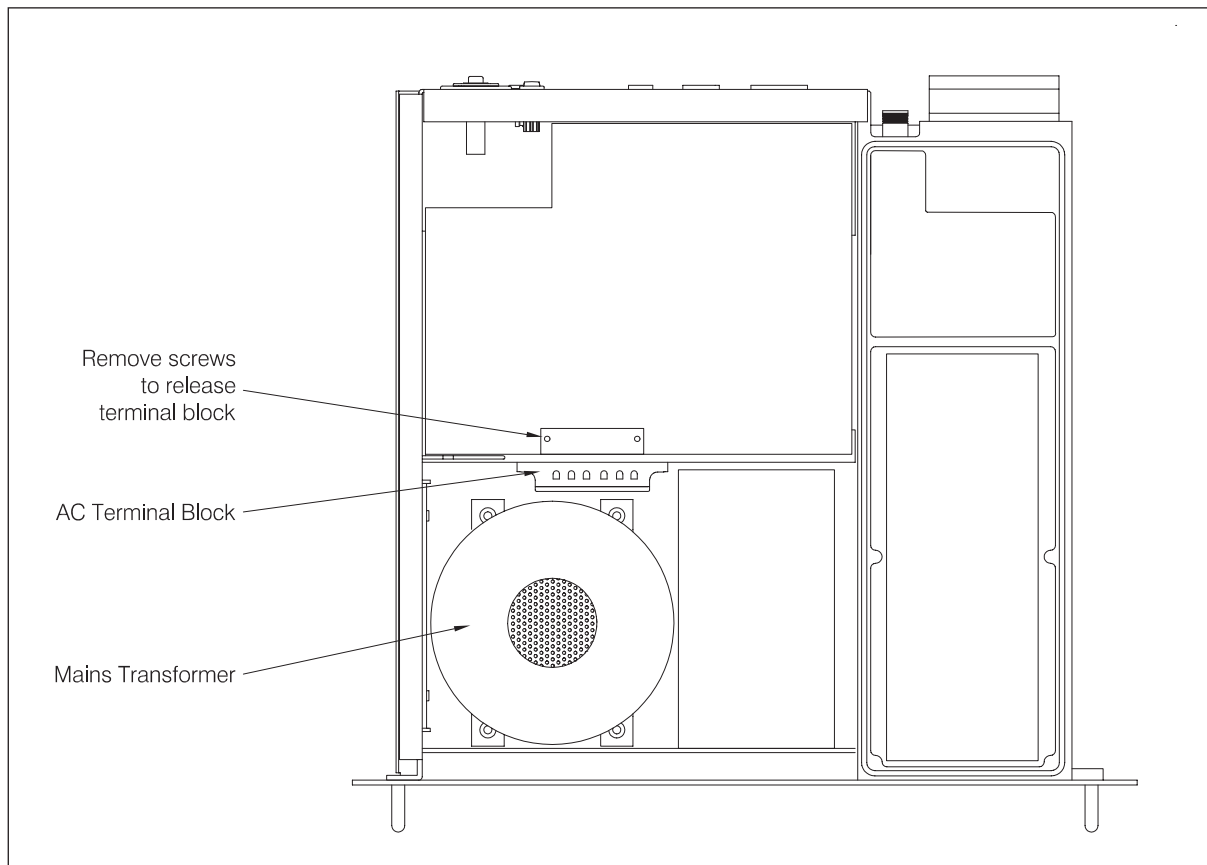
Mains Input Supply	Fuse	PAE Part Number
110/120 V	T4A 125 V UL	29C11120102S
220/230/240 V	T4A 250 V IEC 127 HBC	29E01120108S

SELECTING THE CORRECT AC INPUT TAP

Factory default setting. The transmitter is set for a 230 V ac input unless specified otherwise at the time of ordering.

The correct tap on the input ac transformer must be selected to suit the local mains supply. The taps are selected by configuring connections on the AC Terminal Block. To set the correct tap:

- a. Release the M3 captive screws that secure the transmitter's top cover. Remove the cover. Refer to Fig. 1-9 and identify the AC Terminal Block. Refer to Fig. 1-10 and identify the configuration that is required for the local ac mains supply.
- b. Remove the two screws that secure the terminal block bracket as shown in Fig. 1-9.
- c. Connect the ac wires (brown = Line, and blue = Neutral) to the correct terminals. Connect link(s) as shown in Fig. 1-10.
- d. If the transmitter is to be operated in AM-voice mode, go to the next procedure. If operating in other modes, refit the top cover.



DEV083-08

Fig. 1-9. Location of Input Tap Terminal Block

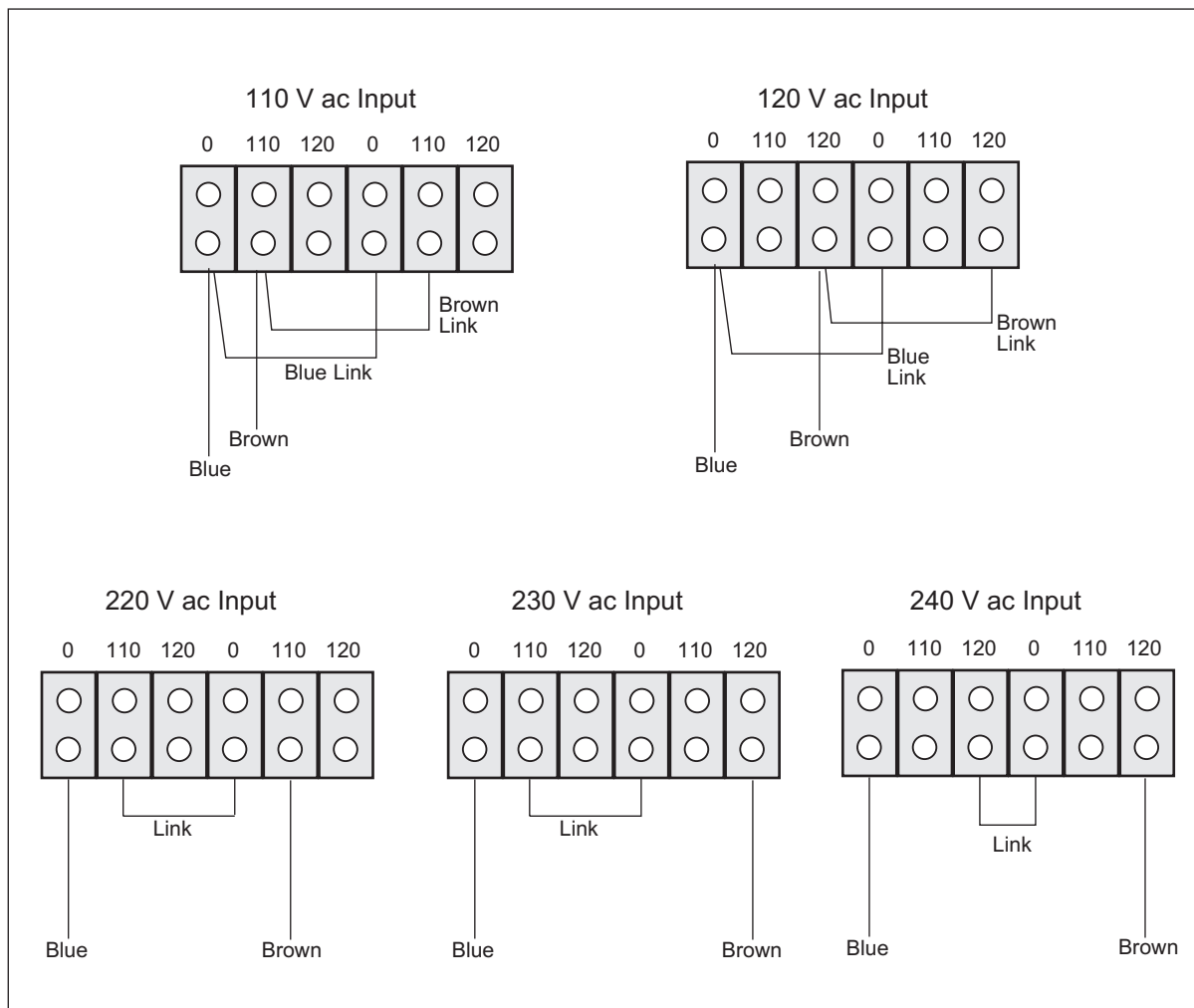


Fig. 10. Input Tap Selection

SELECTING THE KEYING METHOD

This procedure is applicable only to AM-voice mode.

A number of different 'remote' or 'phantom' keying configurations are possible with the T6T transmitter. Internal jumpers must be correctly set to suit the required configuration. To do this, refer to section 2, chapter 3, of this user guide and follow the procedure 'Selecting the Applicable Keying Method'.

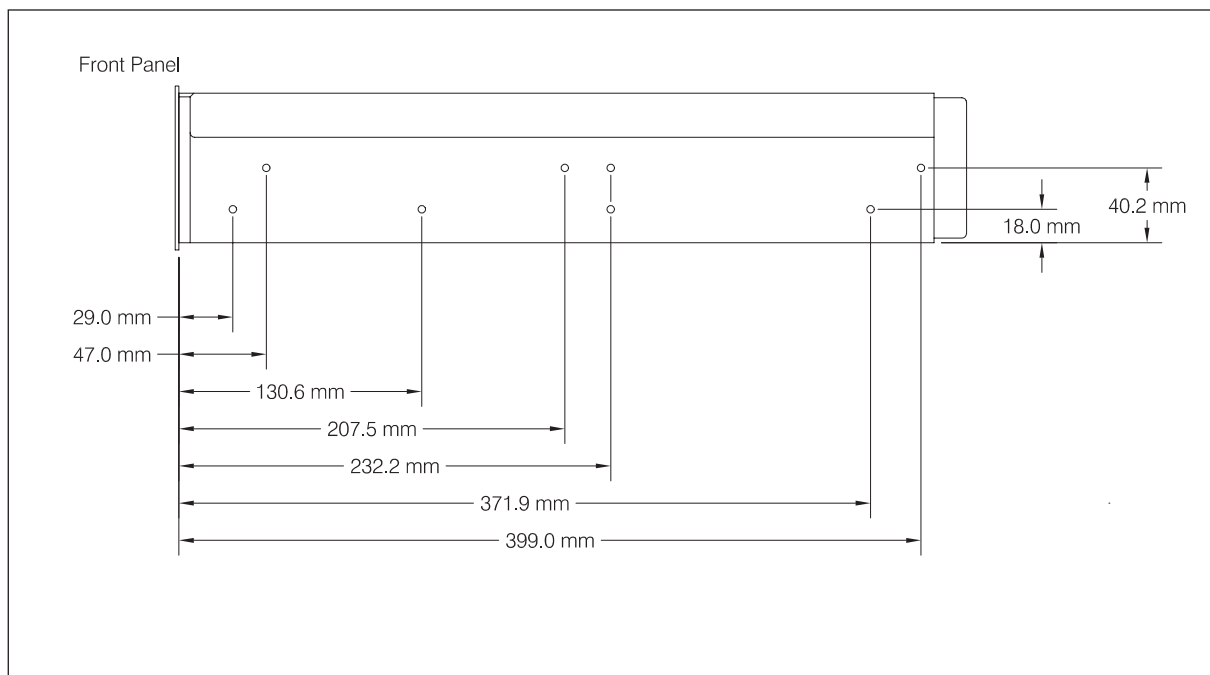
FITTING A RADIO INTO AN EQUIPMENT RACK

CAUTION!

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

The transmitter can be installed on telescopic slides, or on fixed runners, within a standard 483 mm (19 inch) equipment rack. M4 tapped holes, each 10 mm deep (see Fig. 1-11) are provided on each side of the equipment to accept the slides. Details of suitable telescopic slides and fixed runners are available from PAE.

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



(DEV083-09)

Fig. 1-11. Telescopic Slide Fixing Points

CONNECTING REMOTE FACILITIES

Remote facilities connections depend on the transmitter's operating mode. To determine the required remote connections, refer to chapter 3 of the section applicable to the operating mode.

CHASSIS STUD CONNECTION

WARNING. CHASSIS EARTH!

A chassis stud is fitted to the transmitter's rear panel. This stud is used to connect the equipment to the equipment 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 transmitter's Electromagnetic Compatibility (EMC) the chassis stud, marked $\overline{\text{TT}}$ and fitted to the rear panel (see Fig. 1-3 on page 14) 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 mm². The cable should have CSA and UL1015 approval, and be connected to the chassis stud through an M6 eyelet (for example, PAE 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. LETHAL VOLTAGES!

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

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. 1-4 on page 14) 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 V ac at 8 amps, and have a minimum cross-sectional area of 1.0 mm² per core. PAE recommends the use of polyvinyl chloride (PVC) insulated cable. The cable must be fitted with the IEC approved equipment connector (PAE part number 20-02030102) supplied with the transmitter, and conform to the following specification:

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

The T6T transmitter 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. PAE recommends the ac supply cable is colour coded in accordance with the electrical appliance (colour code) regulations for the UK. That is:

- The core that is 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 \perp or coloured green-and-yellow.
- The core that is coloured blue must be connected to the terminal that is marked with the letter N or coloured black.
- The core that is coloured brown must be connected to the terminal that is marked with the letter L or coloured red.

DC SUPPLY CONNECTION

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

A dc input supply connector (see Fig. 1-5 on page 15) 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 mm² per core. The supply cable should be fitted with an XLR3 connector (PAE part number 20-01030106).

CONNECTING AN ANTENNA

The antenna feeder cable connects to the transmitter's rear panel N-type antenna connector (see Fig. 1-3 on page 14).

SWITCHING ON

When installation is complete, the transmitter should be switched on at the rear panel Power switch (see page 14).

T6T Transmitter User Guide

Section 2

AM-Voice Mode

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This chapter provides an introduction to using the T6T transmitter in AM-voice mode.

INTRODUCTION TO AM-VOICE MODE

In AM-voice mode, the T6T transmitter operates in the frequency range 118 to 136.975 MHz using 25 kHz or 8.33 kHz channel spacing. The transmitter produces a 50 watt carrier output that can be reduced, in 1 watt steps, to 5 watts. The output power, and the majority of operational settings, can be selected at the front panel or through a compatible control and data system such as the PAE Multi-Access Remote Control (MARC) system.

A multi-channel feature allows up to 100 frequency channels to be stored and recalled by channel number. In AM voice mode, and when 25 kHz channel spacing is used, the transmitter can operate with a 2, 3, 4, or 5 carrier-offset frequency in accordance with ICAO Annex 10.

CARRIER OFFSET OPERATION

In AM voice mode the transmitter can offset the carrier frequency to provide 2, 3, 4, or 5-carrier offset to meet the requirements of ICAO Annex 10. Offsets are selected using the front panel Scroll/Select control and the LCD display. The offsets are:

- 2-carrier offset: carriers are spaced at ± 5 kHz.
- 3-carrier offset: carriers are spaced at zero, and ± 7.3 kHz.
- 4-carrier offset: carriers are spaced at ± 2.5 kHz and ± 7.5 kHz
- 5-carrier offset: carriers are spaced at zero, ± 4 kHz and ± 8 kHz

Note ...

For 5-carrier offset operation, transmitter variant B6350OPT1 must be used.

OPERATIONAL SETTINGS

Operational settings for the T6T transmitter are configured at the front panel, through the VFP, or through an associated MARC system (or compatible control and data system). At the transmitter, operational settings are selected and displayed using the front panel Scroll/Select switch and the LCD. The settings that can be selected are:

- Operating frequency
- Selecting the channel spacing
- Setting the line level
- Standby mode to on or off
- Setting the MARC baud rate
- Setting the PTT output signal polarity
- Setting the BIT initiate signal polarity
- Setting the antenna change-over signal polarity
- Setting the PTT timeout
- Mute enable or disable
- Adjusting the sidetone volume
- Selecting a carrier offset
- Channel allocation and recall
- Setting the output power
- Setting inhibit to on or off
- Setting the PTT input signal polarity
- Setting the inhibit input signal polarity
- Setting the Ready output signal polarity
- PTT test facility
- Setting the modulation depth
- Vogad enable or disable
- Setting the LCD backlight

BASIC CONFIGURATION

Fig. 2-1 shows the basic T6T transmitter connections for AM voice operation. If the transmitter is part of a MARC system, or other compatible control and data system, refer to 'Configuration for Operation with MARC' on page 6.

Local Operation

In its simplest configuration, the transmitter can be operated in Local mode. This involves plugging a microphone with integral PTT switch into the front panel Microphone/Diagnostics connector. The transmitter is then operated from the front panel.

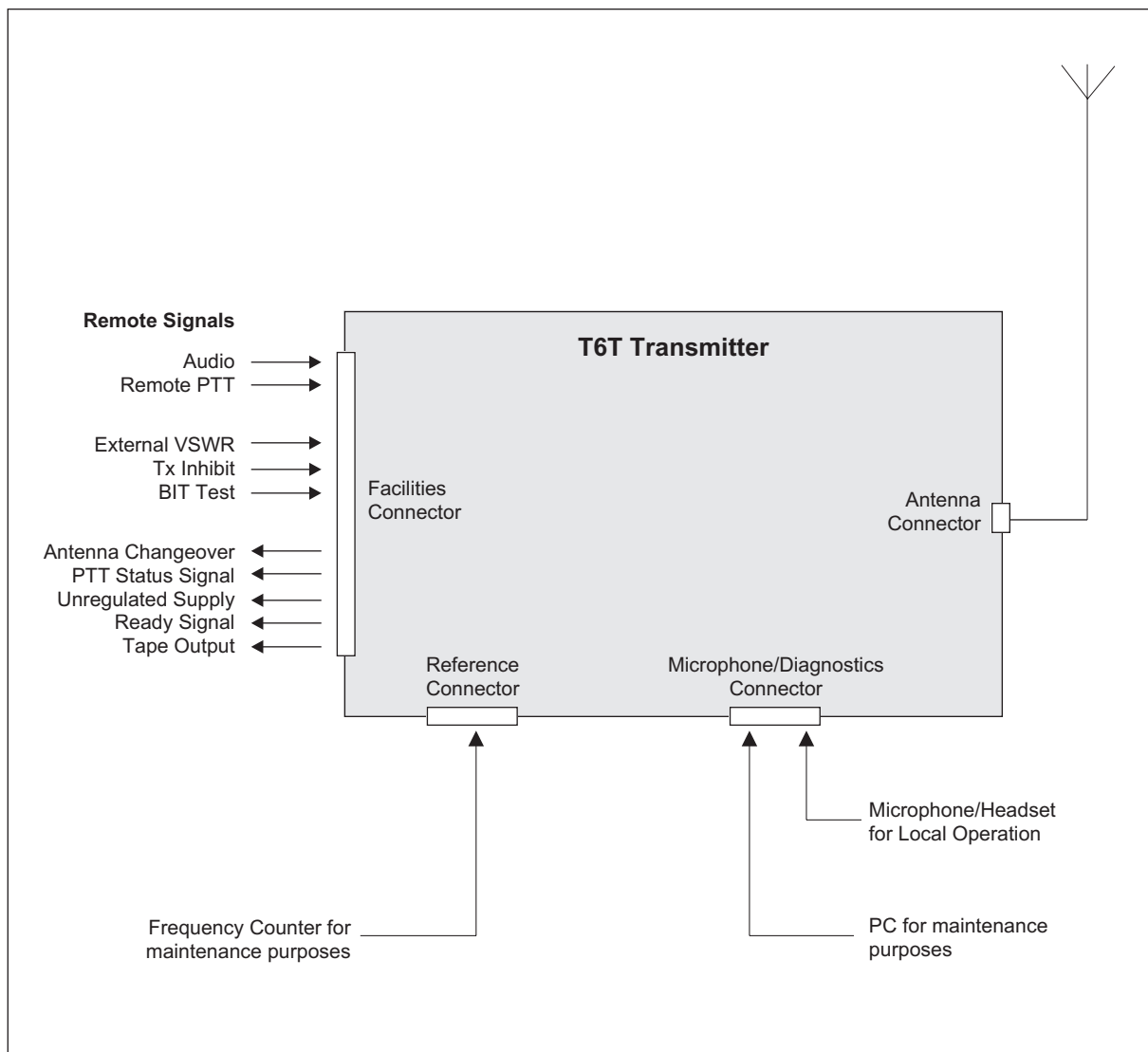


Fig. 2-1. T6T Transmitter - Basic Configuration

Remote Operation

For remote operation signals are connected from the control equipment, through a suitable communication link, to the transmitter's rear panel Facilities connector. Essential connections are an audio input and a keying input. For the keying input, the Remote PTT connection can be used, or phantom keying can be superimposed on the audio lines (see 'Selecting the Applicable Keying Method' in chapter 3). Other remote signals can be connected to suit the particular application. The remote signals are fully described in section 1 on page 17.

In the basic configuration, the rear panel MARC and Computer Port connectors are not used. The front panel Reference connector is used to check the transmitter's internal reference frequency during scheduled maintenance. The front panel Microphone/Diagnostics connector has two purposes: a microphone/headset is connected for local operation, or, a PC is connected for maintenance purposes.

Maintenance using a PC connected to the Headset/Diagnostics connector is outside the scope of this user guide. Full information is contained in the T6T maintenance handbook.

CONFIGURATION FOR OPERATION WITH MARC

When the T6T transmitter is used with a MARC system or other compatible control and data system, the remote signals are connected through the rear panel MARC connector (see Fig. 2-2). In this configuration, the rear panel Facilities and Computer Port connectors are not used unless some auxiliary signals available at the Facilities connector are required.

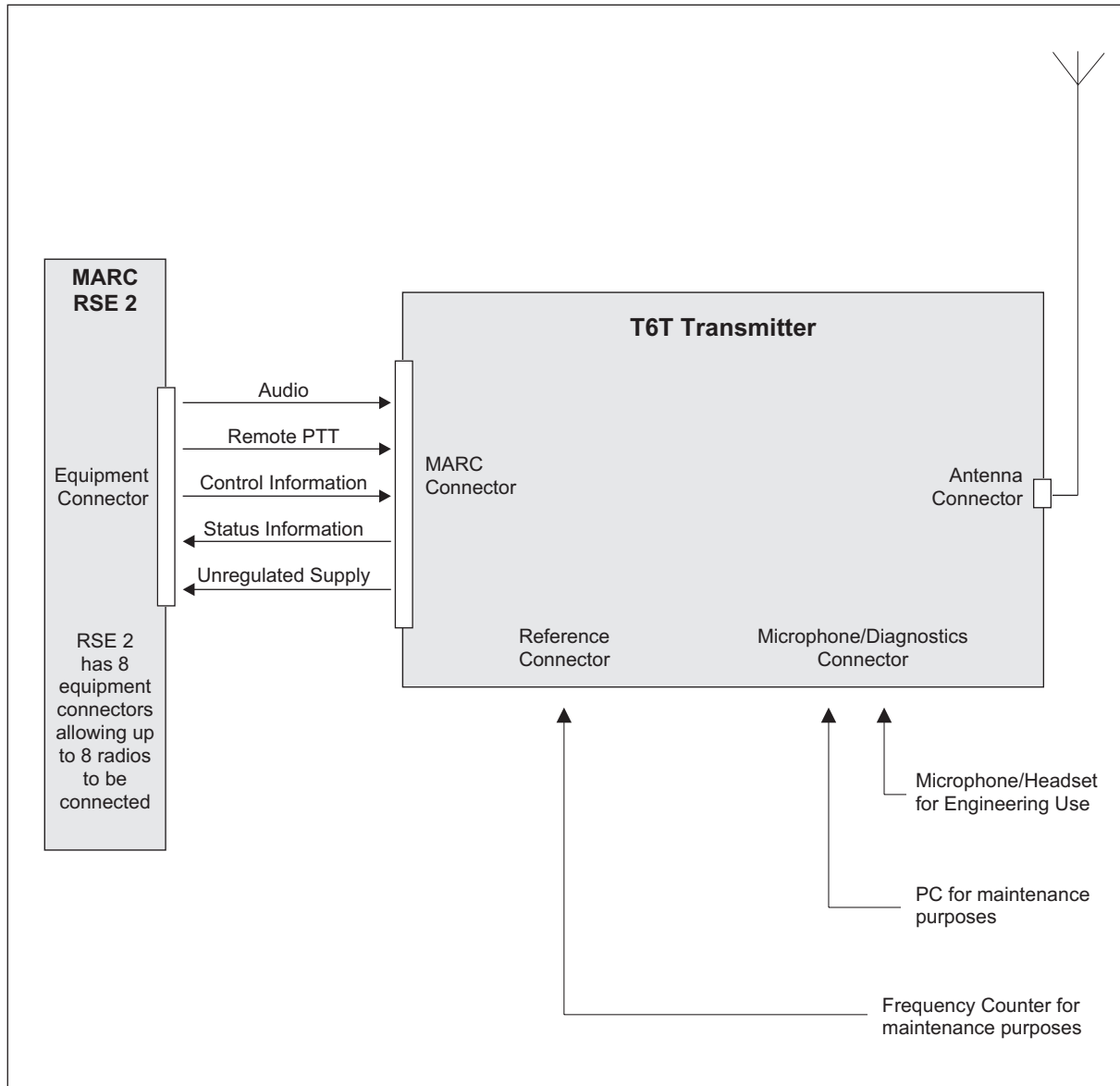


Fig. 2-2. T6T Transmitter - Configuration for Use with MARC

This chapter gives the transmitter's specification applicable to AM-voice operation.

RF CHARACTERISTICS

Channel spacing	25 kHz, or 8.33 kHz across the frequency band 118 to 136.975 MHz.
Spurious outputs	Spurious outputs are below -46 dBm. Spurious outputs are measured greater than 500 kHz from the carrier frequency and with a modulation index below $m = 0.9$.
Transmitter rise time	90% of full power is reached within 20 ms of keying the transmitter.
Transmitter decay time	The output power decays by at least 20 dB 5 ms after the keying potential is removed.

MODULATION CHARACTERISTICS

Modulation depth	Adjustable up to 100%.
Hum and noise	Greater than 45 dB below the signal level. Measured within a 15 kHz bandwidth with the carrier modulated by a 1 kHz signal and at a modulation depth of 90%.
Frequency response	<p>With 25 kHz channel spacing the variation in frequency response, with reference to a 1 kHz signal, is within +1 dB and -3 dB across the frequency range 300 Hz to 3.4 kHz. The response is better than -20 dB at 100 Hz, and less than -30 dB at 5 kHz.</p> <p>With 8.33 kHz channel spacing the variation in frequency response, with reference to a 1 kHz signal, is within +2 dB and -4 dB across the frequency range 350 Hz to 2.5 kHz. Frequencies above 3.2 kHz are attenuated by at least 25 dB.</p>
Distortion	With a 90% modulation depth, distortion is less than 5% at frequencies between 300 Hz and 3.4 kHz.
Residual FM	With a 1 kHz signal set at 80% modulation applied to the transmitter's audio input, the unwanted frequency modulation is less than 500 Hz.
VOGAD	<p>The VOGAD has an operational range of 30 dB with the threshold set relative to the line level setting. Within the VOGAD range, the modulation depth is maintained within 10% of the set level.</p> <p>VOGAD has an attack time between 20 and 50 ms measured with a 10 dB step to 15 dB into VOGAD, and a decay time greater than 2 seconds.</p>

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This chapter details the installation procedures that are applicable only to AM-voice operation.

WARNING. LETHAL VOLTAGES!

The instructions given in this chapter involve connecting lethal voltages to the transmitter. The instructions detailed in this chapter must be carried out only by suitably qualified personnel.

WARNING. ANTENNA RADIATION!

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

WARNING. BERYLLIUM/BERYLLIA!

The equipment covered by this handbook contains components containing the highly toxic material Beryllium and/or its oxide Beryllia. These materials are particularly hazardous if:

1. Beryllium materials are absorbed into body tissues through the skin, mouth, or wound.
2. The dust created by breakage of Beryllia is inhaled.
3. Toxic fumes are inhaled from Beryllia/Beryllium involved in a fire.

The components containing Beryllia/Beryllium are: TR5, TR6 and TR9 in the PA module.

WARNING. UNAUTHORIZED MODIFICATIONS!

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

CAUTION. ESSDs!

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

INTRODUCTION

The procedures in this chapter that allow a T6T transmitter to be installed for AM-voice operation are:

- Selecting the applicable keying method
- Connecting remote facilities.

SELECTING THE APPLICABLE KEYING METHOD

Factory default setting. The transmitter is set for remote 0 volt keying unless specified otherwise at the time of ordering.

The transmitter can be remotely keyed through the Facilities connector CN5 using either the Remote PTT input, or by using Phantom Keying on the audio lines. The chosen method, and the required keying potential is selected by the position of two jumpers (JP8 and JP9) fitted on the transmitter's DSP module.

To access the jumpers, remove the M3 captive screws that secure the transmitter's top cover (if not already removed). Remove the cover and identify the links by referring to Fig. 2-3. Set the links to the required positions as detailed under the next two headings: "Remote Keying" and "Phantom Keying". When the jumpers have been configured, refit the transmitter's top cover.

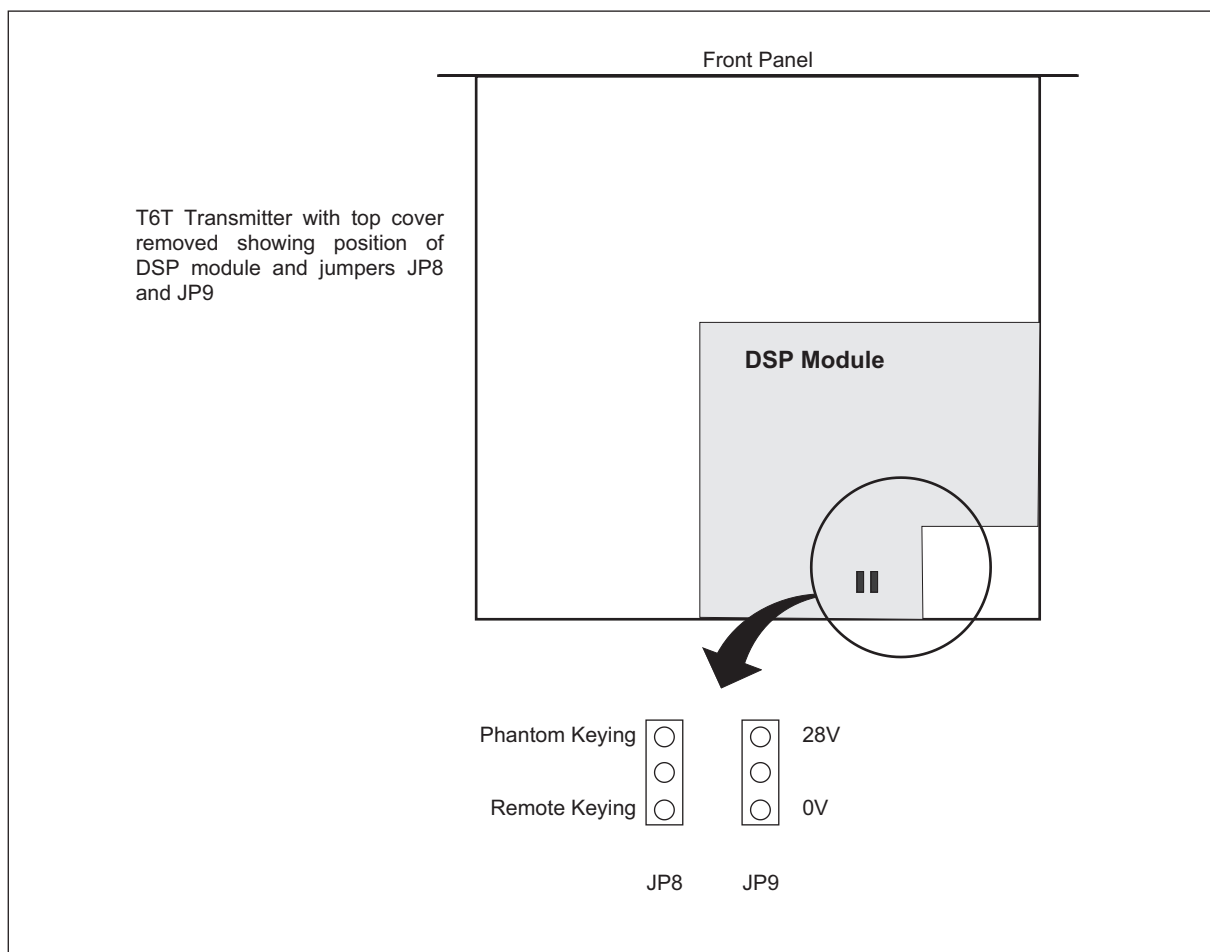
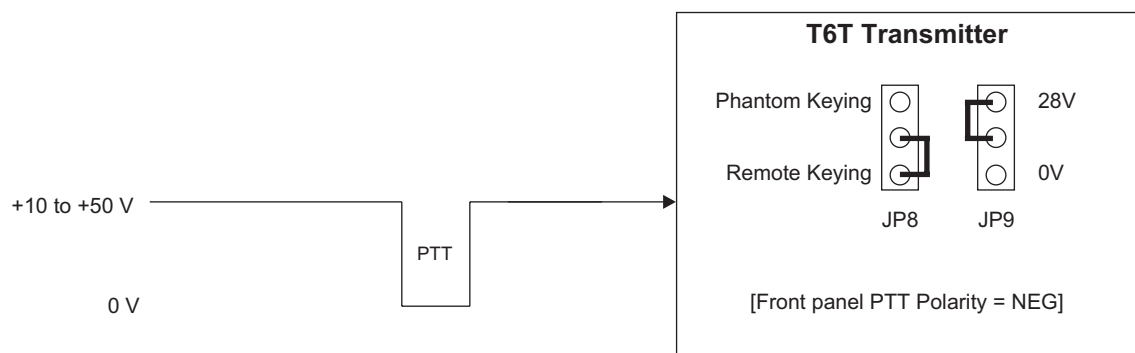
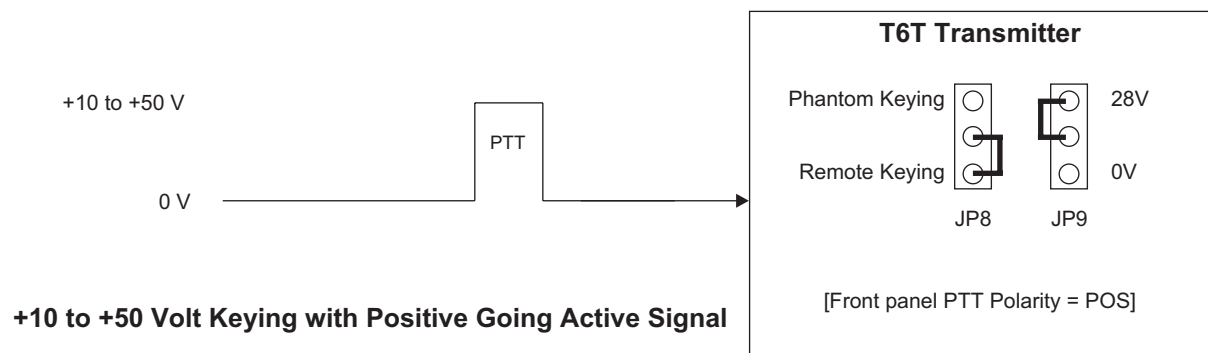
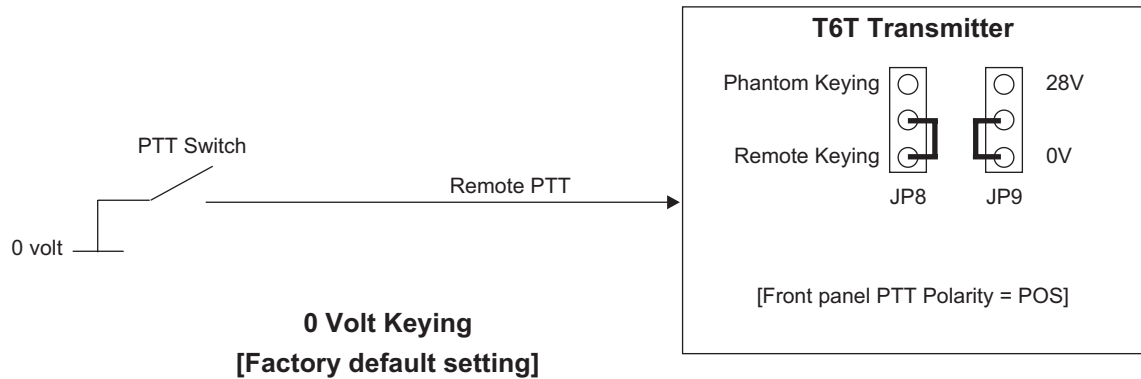


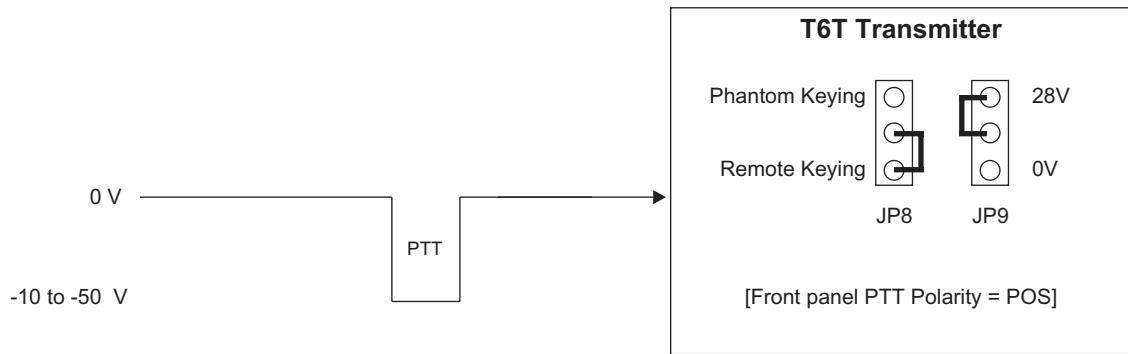
Fig. 2-3 Location of Jumpers JP8 and JP9

REMOTE KEYING CONFIGURATIONS

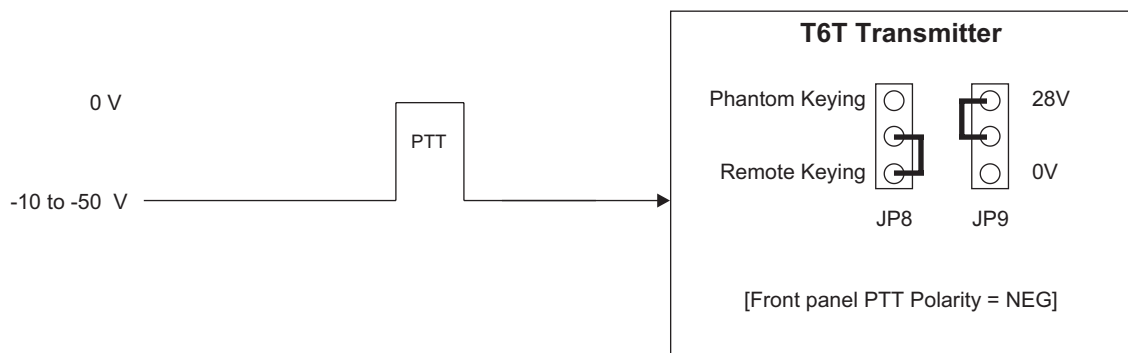
During installation jumpers JP8 and JP9 must be set to suit the remote keying potential. The keying potentials are 0 volt, a dc voltage between +10 and +50 V, or a dc voltage between -10 and -50 V.

The following illustrations show the PTT signal, the settings of jumpers JP8 and JP9, and the 'PTT in polarity' that must be set at the front panel when completing the 'Operational Settings' procedures.





-10 to -50 Volt Keying with Negative Going Active Signal



-10 to -50 Volt Keying with Positive Going Active Signal

PHANTOM KEYING CONFIGURATIONS

Phantom keying can be used with the transmitter. This involves superimposing a dc potential on the audio lines at the control equipment. The potential can be 0 volt, or between 10 and 50 volts as shown in the illustrations on the opposite page.

To use phantom keying, the PTT switch at the control equipment must connect to a centre-tap on the 600 ohm audio transformer. The keying potential is connected to the centre-tap.

At the transmitter, jumpers JP8 and JP9, fitted to the DSP module, must be correctly set for phantom keying.

Note that the audio lines in the illustrations connect to the transmitter's Facilities connector CN5. If phantom keying is required when using a MARC, or compatible control and data system, the lines connect to the MARC connector CN6 pins 2 and 3.

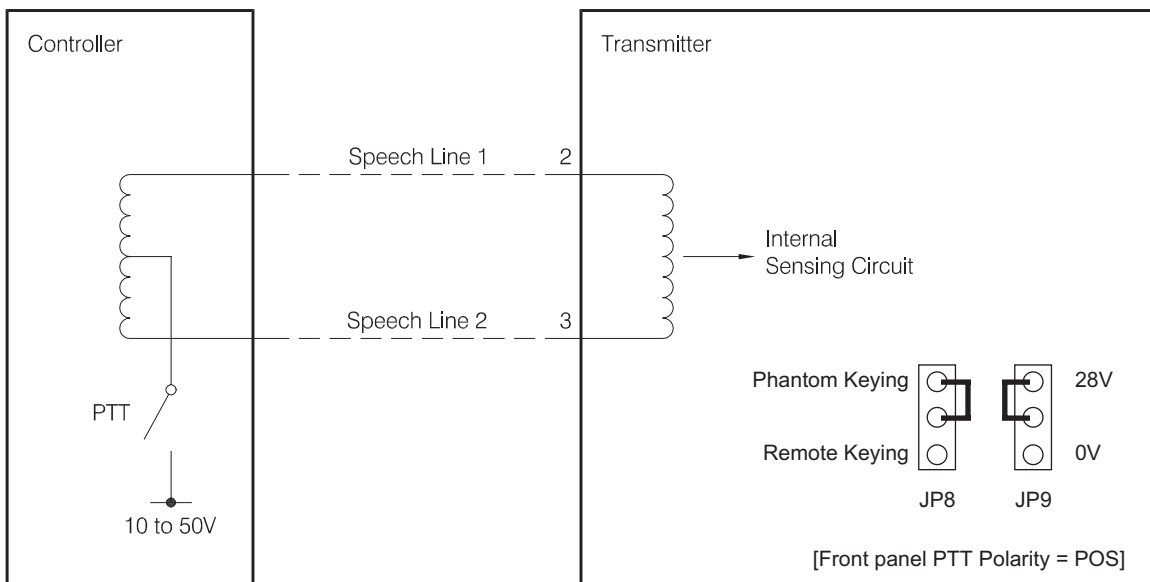
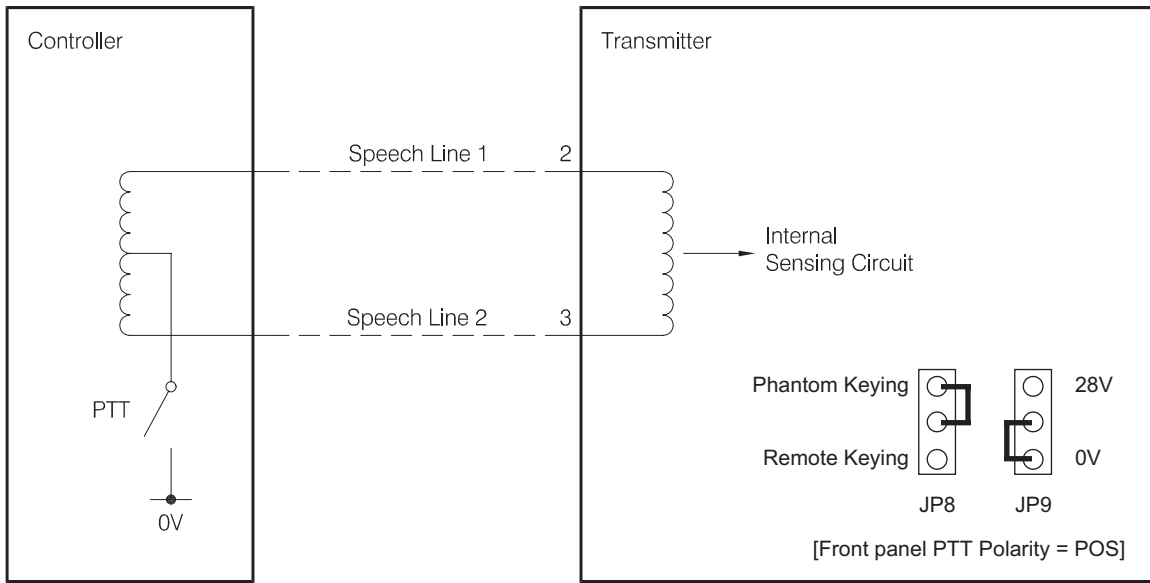


Fig. 2-4. Phantom Keying Arrangements

CONNECTING THE REMOTE FACILITIES

If the transmitter is being used in the 'Basic Configuration' (see Fig. 2-1 on page 5) remote signals are terminated on the rear panel Facilities connector CN5. For configurations where the T6T transmitter is being used with a MARC system, or other compatible data and control system, this procedure should be ignored; instead, refer to 'Connecting to MARC Equipment'.

The remote facilities available at CN5 are listed in section 1 on page 17. Essential connections, unless the transmitter is being used only in local mode, are the audio input (pins 2 and 3) and a keying input. The keying input can be the Remote PTT connection on pin 7, or Phantom Keying can be used on the audio lines. The chosen method must correspond to the settings of internal jumpers JP8 and JP9 (see page 10).

Make any other connections to CN5 as required.

When making connections to the Facilities connector CN5, and in order not to compromise the transmitter's Electromagnetic Compatibility (EMC) users must:

- Use a D-type connector that has a screened cover
- Use screened multi-way cable, with the cable's screen connected to the Facilities connector's shell or body.

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

CONNECTING TO MARC EQUIPMENT

If the transmitter is being used with a MARC system, or compatible control and data system, remote connections are made through the rear panel MARC connector CN6.

The pin-out of CN6 is shown in section 1 on page 18. If connecting to a MARC RSE 2 equipment, the connections between CN6 and one of RSE 2's Equipment Connectors is pin-to-pin as shown in table 2-1.

When making connections to the Facilities connector CN6, and in order not to compromise the transmitter's Electromagnetic Compatibility (EMC) users must:

- Use a D-type connector that has a screened cover
- Use screened multi-way cable, with the cable's screen connected to the Facilities connector's shell or body.

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

Table 2-1 MARC Connector CN6 to RSE 2 Equipment Connector

T6T Transmitter			RSE 2 Equipment Connector	
Pin Number	Signal Name		Pin Number	Signal Name
1	Ground		1	0 Volt
2	Line In (+)		2	Audio Line L1
3	Line In (-)		3	Audio Line L2
4	PTT		4	PTT
5	Unregulated Supply		5	Unregulated Supply Input
6	Data In (+)		6	Data Out (+)
7	Data In (-)		7	Data Out (-)
8	Data Out (+)		8	Data In (+)
9	Data Out (-)		9	Data In (-)

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Chapter 4.

AM-Voice Operational Settings

This chapter details how the T6T transmitter is set up for AM voice operation from the front panel. It also details how to set the transmitter in and out of standby mode.

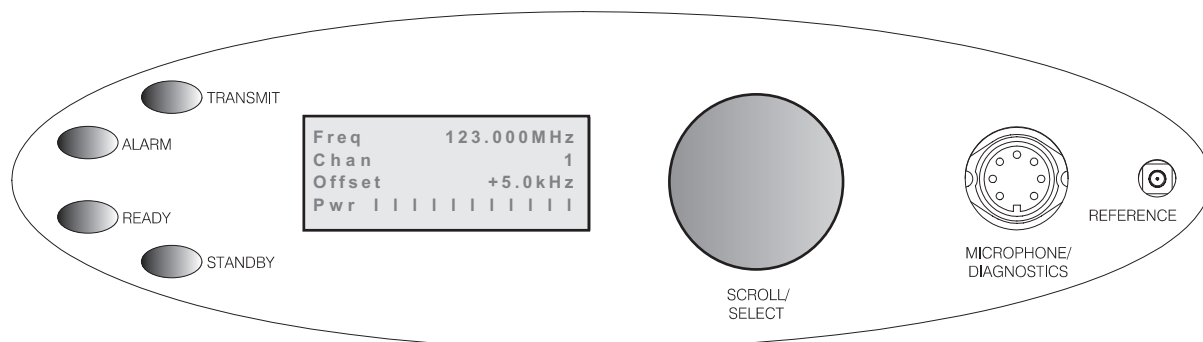
The transmitter can also be set up through a MARC system, or by using the VFP. Both of these methods are outside the scope of this handbook; users should refer to the MARC User Guide and the T6T Maintenance Handbook.

INTRODUCTION

Selecting most of the transmitter's operational settings is carried out using the front panel Scroll/Select switch and the LCD (see the illustration below). Table 2-2 on page 19 shows a list of the operational settings. No attempt to set up the transmitter should be made until the transmitter has been installed as per the Installation Procedures given in section 1 of this user guide.

Normal Operation

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



Using the Scroll/Select Switch

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

SCREEN PROTOCOL

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

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

```
F r e q      1 2 3 . 0 0 0 M H z
C h a n                      1
O f f s e t      + 5 . 0 k H z
P w r  | | | | | | | | | | | |
```

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

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

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

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

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

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

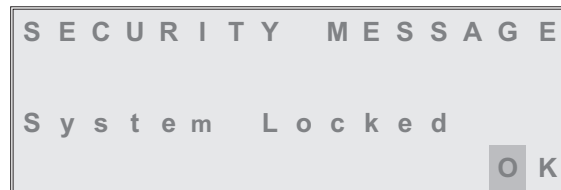
Table 2-2 Operational Settings

Parameter	Adjustment Range	Factory Default Setting	Further Reference
Menu Lock screen	Locked or Unlocked	Unlocked	Page 20
To enter Standby mode	On or Off	Off	Page 23
To exit Standby mode	-	-	Page 24
Set mode of operation	AM voice	AM-voice	Part of AM Voice Settings Procedure starting on page 25.
PTT test facility	On or Off	Off	
PTT timeout	2 s to 510 s, or off	180 s	
Modulation depth	0 to 100%	85%	
Tx mute	On or off	On	
Vogad	On or Off	On	
Carrier offset	0, ± 2.5 , ± 4 , ± 5 , ± 7.3 , ± 7.5 , or ± 8 kHz	0 (no offset)	
Adjust sidetone volume	0 to 100%	30%	
Front panel frequency step size	8.33, 25 kHz, or both	25 kHz	
LCD backlight timeout	15 s to 120 s, Off, or On	30 s	
PTT inhibit	On or Off	Off	
Line input level	-40 dBm to 0 dBm	-13 dBm	
Output power	5 watt to 50 watt	50 W	
MARC port baud rate	300 to 9600 baud	9600	
PTT input signal polarity	Positive or negative	Pos	
PTT output signal polarity	Positive or negative	Pos	
Inhibit input signal polarity	Positive or negative	Pos	
BIT initiate input signal polarity	Positive or negative	Pos	
Ready output signal polarity	Positive or negative	Pos	
Operating frequency	118 to 136.975 MHz	118.000 MHz	Page 34
Store frequency channels	1 to 100	118.000 MHz	Page 35
Recall frequency channels	1 to 100	-	Page 36
Initiate a BIT test	-	-	Page 37
View BIT pages and advise screen	-	-	Page 38
Elapsed time indication	-	-	Page 39
Display internal reference frequency screen	-	-	Page 40
Software versions	-	-	Page 41

MENU LOCK SCREEN

A security facility available only from the VFP allows the transmitter'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:

- Turn the switch to highlight OK, then press the switch. You are returned to the main screen.

or,

- Wait for the 30 second timeout to expire. You are returned to the main screen.

NOTES FOR SETTING UP THE TRANSMITTER

The following notes should be read before setting up the transmitter. They advise on the special frequency display when using 8.33 kHz channel spacing, and give guidance on the optimum line level setting.

Front Panel Display for 25 kHz and 8.33 kHz Channel Spacing

When setting the operating frequency of the transmitter and 8.33 kHz channel spacing is selected, the displayed frequency differs from the actual channel frequency. Table 2-3 shows the pattern used for 25 kHz and 8.33 kHz spaced channel frequencies from 118.000 MHz to 118.1916 MHz. The pattern is the same for any frequency within the transmitter's frequency range. The display conforms to ICAO convention for 8.33 kHz operation.

Table 2-3 25 kHz and 8.33 kHz Channel Spacing Displays

Actual Frequency (to 4 decimal places)	Channel Spacing	Displayed Frequency at Transmitter's Front Panel
118.0000 MHz	25 kHz	118.000 MHz
118.0000 MHz	8.33 kHz	118.005 MHz
118.0083 MHz	8.33 kHz	118.010 MHz
118.0166 MHz	8.33 kHz	118.015 MHz
118.0250 MHz	25 kHz	118.025 MHz
118.0250 MHz	8.33 kHz	118.030 MHz
118.0333 MHz	8.33 kHz	118.035 MHz
118.0416 MHz	8.33 kHz	118.040 MHz
118.0500 MHz	25 kHz	118.050 MHz
118.0500 MHz	8.33 kHz	118.055 MHz
118.0583 MHz	8.33 kHz	118.060 MHz
118.0666 MHz	8.33 kHz	118.065 MHz
118.0750 MHz	25 kHz	118.075 MHz
118.0750 MHz	8.33 kHz	118.080 MHz
118.0833 MHz	8.33 kHz	118.085 MHz
118.0916 MHz	8.33 kHz	118.090 MHz
118.1000 MHz	25 kHz	118.100 MHz
118.1000 MHz	8.33 kHz	118.105 MHz
118.1083 MHz	8.33 kHz	118.110 MHz
118.1166 MHz	8.33 kHz	118.115 MHz
118.1250 MHz	25 kHz	118.125 MHz
118.1250 MHz	8.33 kHz	118.130 MHz
118.1333 MHz	8.33 kHz	118.135 MHz
118.1416 MHz	8.33 kHz	118.140 MHz
118.1500 MHz	25 kHz	118.150 MHz
118.1500 MHz	8.33 kHz	118.155 MHz
118.1583 MHz	8.33 kHz	118.160 MHz
118.1666 MHz	8.33 kHz	118.165 MHz
118.1750 MHz	25 kHz	118.175 MHz
118.1750 MHz	8.33 kHz	118.180 MHz
118.1833 MHz	8.33 kHz	118.185 MHz
118.1916 MHz	8.33 kHz	118.190 MHz

Line Level

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

When testing the transmitter using a sine wave, the line input level should be set to 10 dB above the line level setting.

The VOGAD and mute thresholds are preset at 10 dB and 15 dB respectively below the line level setting.

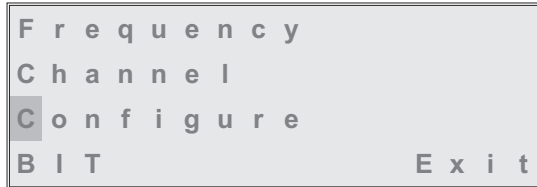
Table 2-4 Relationship between Line Level, Vogad, and Mute Threshold

Line Level Setting (dBm)	Average Speech Level (dBm)	Sine Wave Level (dBm)	Vogad Threshold	Mute Threshold
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
-35	-35	-25	-45	-50
-40	-40	-30	-50	-55

TO ENTER STANDBY MODE

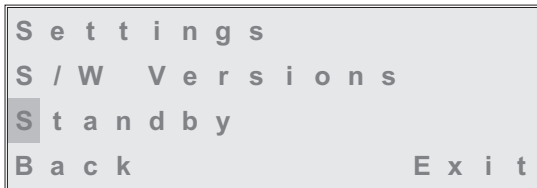
Standby mode is a power saving feature that can be used for non-operational transmitters. When in standby mode, most of the transmitter's circuits are inactive, the LCD is blanked, and the transmitter cannot be keyed. To put the transmitter into standby mode, use the following procedure.

1. From the Main screen, press the switch to display the Options menu. Ensure that Configure is highlighted. Press the switch.



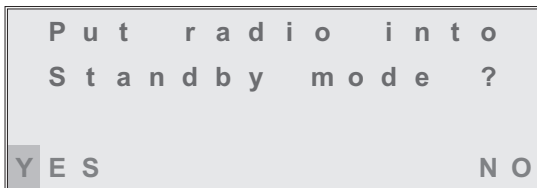
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T E x i t

2. Ensure the Configure menu is displayed. Turn the switch until Standby is highlighted, then press the switch.



S e t t i n g s
S / W V e r s i o n s
S t a n d b y
B a c k E x i t

3. Check that the Standby menu is displayed. Turn the switch until Yes is highlighted, then press the switch. [To abandon this procedure, select No instead of Yes and then press the switch.]



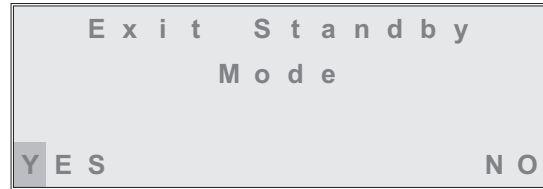
P u t r a d i o i n t o
S t a n d b y m o d e ?
Y E S N O

4. Check that the LCD blanks, and the front panel STANDBY indicator lights.
5. The transmitter is now in standby mode. To exit standby, see the next procedure.

TO EXIT STANDBY MODE

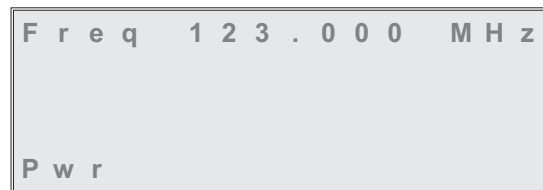
Standby mode is indicated by the front panel STANDBY indicator being lit and the LCD being blanked. To exit this mode, use the following procedure.

1. Press the switch and check that the Exit menu is displayed.



2. Turn the switch until YES is highlighted, then press the switch. [To abandon this procedure, select No instead of Yes and then press the switch.]

3. Check that the transmitter's Main screen is displayed and that the front panel STANDBY indicator is unlit.



4. The transmitter is now ready for normal use.

AM VOICE SETTINGS PROCEDURE

During this procedure, the following parameters, applicable to AM voice operation, will be set:

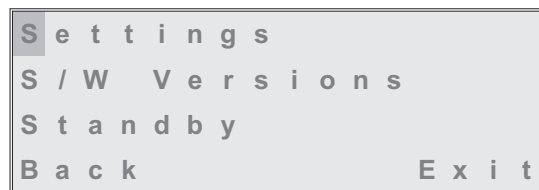
- Mode of operation
- PTT test facility
- PTT timeout
- Modulation depth
- Mute enable or disable
- Vogad enable or disable
- Selecting a carrier offset
- Adjusting the sidetone volume
- Selecting the channel spacing.

- From the Main screen, press the switch to display the Options menu. Turn the switch until Configure is highlighted. Press the switch.



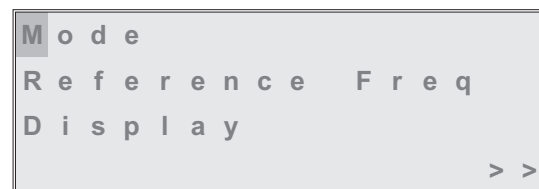
Options Menu

- Ensure the Configure menu is displayed. Turn the switch until Settings is highlighted, then press the switch.



Configure Menu

- Check that the Function menu is displayed. Ensure Mode is highlighted. Press the switch.

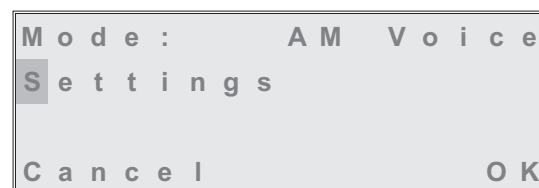


Function Menu

- Setting the Mode of Operation.**

Check that AM Voice is displayed. If any other mode is displayed, press the switch until AM Voice is shown.

Turn the switch clockwise until Settings is highlighted. Then press the switch to display the mode specific Settings menu.



5. **Setting the PTT Test Facility.**

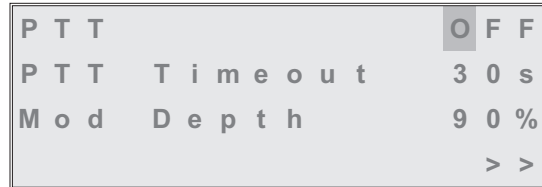
[Factory default setting: Off]

The PTT test facility can be set to Off or On.

When Off is selected, the transmitter is keyed only when the PTT signal is active.

When On is selected, the transmitter keys, and remains keyed until the display times out.

To set the PTT facility, ensure PTT is highlighted. Press the switch to toggle between Off and On. When the required setting is displayed, turn the switch clockwise to highlight PTT Timeout.



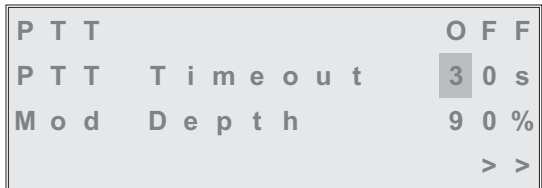
Mode Specific Settings Menu

6. **Setting the PTT Timeout.**

[Factory default setting: 180 s]

The PTT timeout can be set to a value between 2 and 510 seconds (in two second steps), or it can be set to Off. This setting affects the transmitter when keyed by a front panel microphone, or through the remote lines.

To set the timeout ensure that PTT Timeout is highlighted and press the switch. Turn the switch clockwise to increment the time in seconds, or anti-clockwise to decrement the time in seconds. Note that the fully anti-clockwise position switches the PTT timeout to Off. When the required time, or Off, is displayed press the switch. Turn the switch clockwise to highlight Mod Depth.

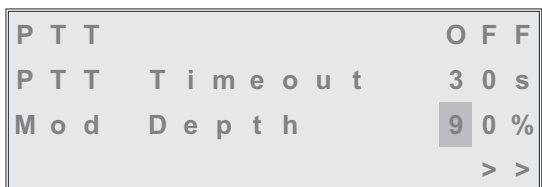


7. **Setting the Modulation Depth.**

[Factory default setting: 85%]

The transmitter's modulation depth can be set between 0 and 100% in increments of 1%.

To set the required value, ensure that Mod Depth is highlighted and press the switch. Turn the switch clockwise or anti-clockwise to increment or decrement the value. When the required value is displayed, press the switch. Turn the switch clockwise until the next screen is displayed and Mute is highlighted.

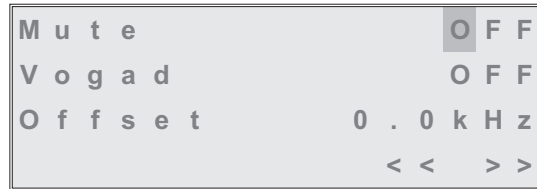


8. **Setting Mute On or Off.**

[Factory default setting: On]

The transmitter's mute facility can be enabled or disabled.

To enable or disable the mute, ensure that Mute Disable is highlighted. Press the switch to toggle between On and Off. On = Mute Disabled; Off = Mute enabled. When the required setting is highlighted, turn the switch clockwise to highlight Vogad.

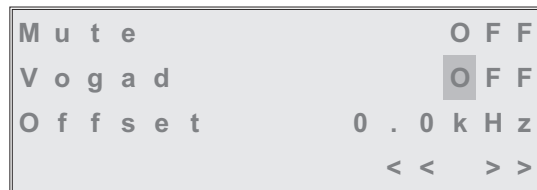


9. **Switching Vogad On or Off.**

[Factory default setting: On]

The transmitter's Vogad facility can be set to On or Off.

To enable or disable the Vogad, ensure that Vogad is highlighted. Press the switch to toggle between On and Off. When the required setting is highlighted, turn the switch clockwise to highlight Offset.



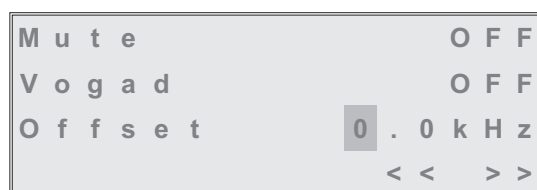
10. **Setting the Carrier Offset.**

[Factory default setting: 0]

A carrier offset can be used with the transmitter. The available offsets are ± 2.5 kHz, ± 4.0 kHz, ± 5 kHz, ± 7.3 kHz, ± 7.5 kHz, and ± 8 kHz.

Note that transmitter type B6350OPT1 must be used if selecting an 8 kHz carrier offset, and a separate setting up procedure must be completed. This procedure, which involves the use of external test equipment, is detailed in the T6T transmitter maintenance handbook.

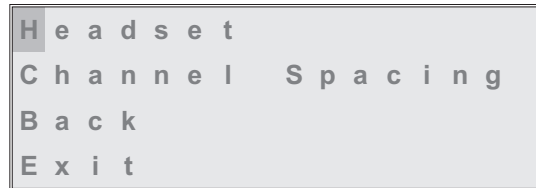
To select the required offset (0.0 kHz must be selected if no offset is used) ensure that Offset is highlighted and press the switch. Turn the switch to display the required value, then press the switch. Turn the switch clockwise, through >> to highlight Headset.



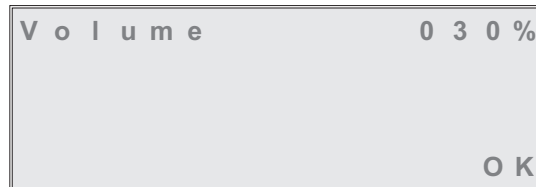
11. Adjusting the Sidetone Volume.

[Factory default setting: 30%]

The transmitter's sidetone volume through the headset is adjusted from this screen. To do this, ensure Headset is highlighted and press the switch.



Check that the Volume setting is highlighted. Turn the switch clockwise to increase volume, or anti-clockwise to decrease volume. The volume increments or decrements in 5% steps. When the required setting is displayed, press the switch. Highlight OK, and press the switch to return to the mode specific settings menu.



Turn the switch clockwise, through >> to highlight Channel Spacing.

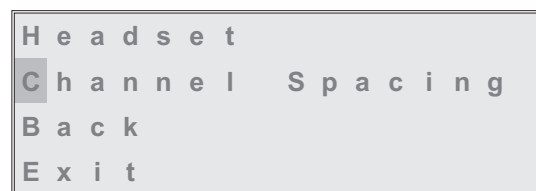
12. Setting the Front Panel Frequency Step Size.

[Factory default setting: 25 kHz]

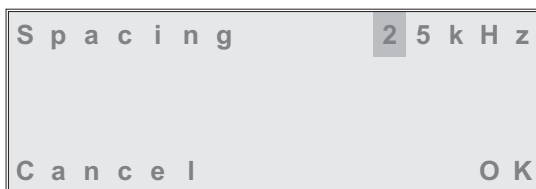
The transmitter's channel spacing can be 25 kHz, or 8.33 kHz. The radio automatically sets the correct channel spacing for the frequency that is entered at the front panel. This setting, which is only for the user's convenience, alters front panel frequency step size.

- If all channels to be selected or stored are 25 kHz spaced channels, then 25 should be selected.
- If all channels to be selected or stored are 8.33 kHz spaced channels, then 8.3 should be selected.
- If a mixture of the two are required, both 25 and 8.3 should be selected.

To select the required spacing, ensure that Channel Spacing is highlighted and press the switch.



Check that the Channel Spacing menu is displayed and that Spacing is highlighted.



Press the switch to change between 25 kHz, 8.3 kHz, and both. When the required value is displayed, turn the switch to highlight OK, then press the switch again. You will be returned to the Mode Specific Settings menu.

13. To exit the AM Voice Settings Procedure, turn the switch to highlight OK, then press the switch. You are returned to the Main screen. When this procedure is complete, go to the General Transmitter Settings procedure starting on the next page.

GENERAL TRANSMITTER SETTINGS

During this procedure the following parameters are set:

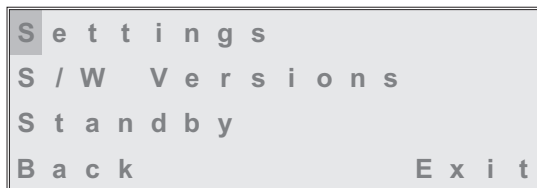
- Setting the LCD backlight
- Setting the input line level
- Setting the MARC baud rate
- Setting the PTT output signal polarity
- Setting the BIT initiate signal polarity
- Setting the antenna change-over signal polarity
- Setting inhibit to on or off
- Setting the output power
- Setting the PTT input signal polarity
- Setting the inhibit input signal polarity
- Setting the Ready output signal polarity

1. From the Main screen, press the switch to display the Options menu. Turn the switch until Configure is highlighted. Press the switch.



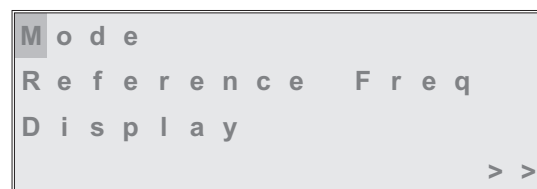
Options Menu

2. Ensure the Configure menu is displayed. Turn the switch until Settings is highlighted, then press the switch to display the Function menu.



Configure Menu

3. Ensure the Function menu is displayed. Turn the switch until Display is highlighted.

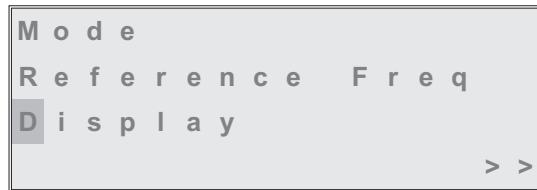


Function Menu

4. Setting the LCD Backlight.

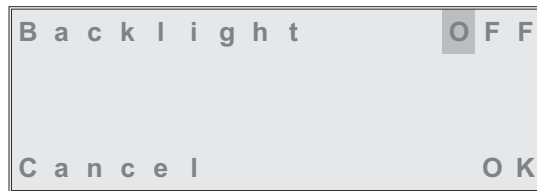
[Factory default setting: 30 s]

The LCD's backlight can be set to off, permanently on, or timed to stay on for a period between 15 and 120 seconds (adjustable in 15 second steps) after the Scroll/Select switch was last operated.



Check that the Function menu is displayed and ensure Display is highlighted. Press the switch.

Ensure the Backlight menu is displayed and the Backlight setting is highlighted. Rotation of the switch displays the full range of settings. When the required setting is highlighted, press the switch. Turn the switch until OK is highlighted, then press the switch. You are returned to the Function menu.



5. Setting Inhibit.

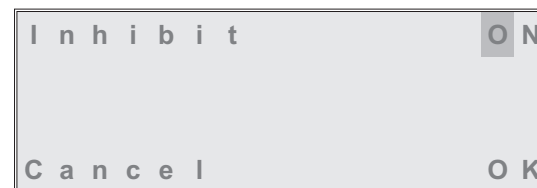
[Factory default setting: Off]

Inhibit can be set to either On or Off. When set to on, the transmitter cannot be keyed; when set to off the transmitter operates normally. Note that a separate Inhibit function is available on the Facilities connector CN5 (see pin-out in section 1 on page 17).

From the Function menu, turn the switch clockwise until Inhibit is highlighted, then press the switch.



Check that the Inhibit menu is displayed and Inhibit is highlighted. Pressing the switch toggles between On and Off. When the correct setting is displayed turn the switch clockwise to highlight OK, then press the switch. You are returned to the Function menu.



6. Setting the Line Level.

[Factory default setting: -13 dBm]

The audio line level can be set to any value between -40 dBm and 0 dBm. Some notes regarding the optimum line level are given on page 22.

From the Function menu, turn the switch clockwise until Line Level is highlighted, then press the switch.



Check that the Line Level menu is displayed and that Line Lvl is highlighted, then press the switch.



Turn the switch clockwise or anti-clockwise to increase or decrease the value. When the required value is displayed, press the switch. Turn the switch to highlight OK and then press the switch. You are returned to the Function menu.

7. Setting the Output Power.

[Factory default setting: 50 W]

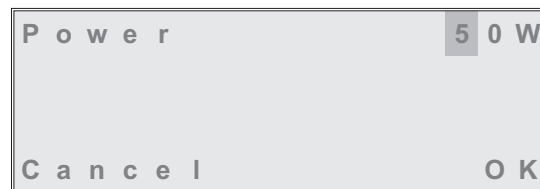
The transmitter's output power can be set to any value between 5 watts and 50 watts (in one watt steps).

From the Function menu, turn the switch clockwise until Power is highlighted, then press the switch.



Ensure that the Power menu is displayed and that Power is highlighted.

Press the switch. Turn the switch clockwise to increase the power, or anti-clockwise to decrease the power. When the required value is displayed, press the switch. Turn the switch clockwise until OK is highlighted, then press the switch. You are returned to the Function menu.

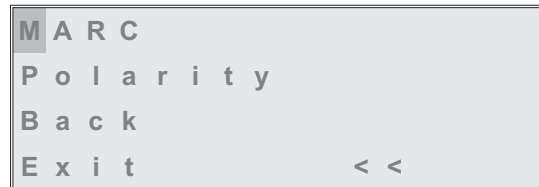


8. Setting the MARC Baud Rate.

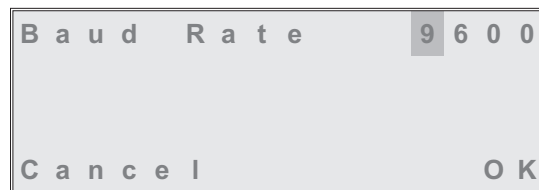
[Factory default setting: 9600]

The baud rate must be set when the T6T transmitter is connected to a MARC system (or other compatible data and control system). The rate can be set to 300, 600, 1200, 2400, 4800, or 9600 baud. The standard setting for MARC systems is 9600 baud.

From the Function menu, turn the switch clockwise until MARC is highlighted, then press the switch.



Ensure that the MARC menu is displayed and that the Baud Rate is highlighted. Press the switch.

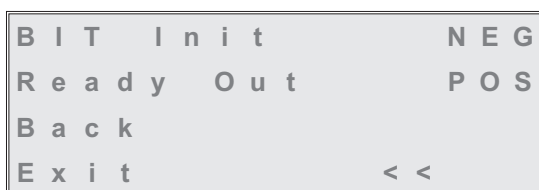
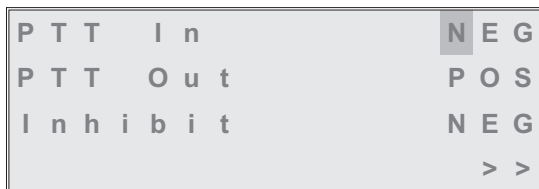


Turn the switch until the required value is displayed, then press the switch. Turn the switch clockwise until OK is highlighted, then press the switch. You are returned to the Function menu.

9. Polarity Settings.

The polarity of the following input and output and output signals is set using the Polarity menu:

- PTT input signal
- PTT output signal
- Inhibit input signal
- BIT initiate input signal
- Ready output signal.



In addition to the signals listed, the polarity of the Antenna Change-Over signal is determined from this menu. It is always the same polarity as the PTT output signal.

Polarity Menu

To establish the required polarity for the PTT input signal, refer to the illustrations starting on page 11 under the heading 'Remote Keying Configurations'. Note that internal links must also be correctly configured to obtain the required input PTT configuration.

To establish the required polarity for the other input and output signals, refer to table 2-5.

To set the required polarity, turn the switch to highlight the required parameter, then press the switch to toggle between NEG and POS.

Table 2-5 Signal Polarities

Signal	Description	State when Polarity is set to NEG	State when Polarity is set to POS
PTT output	This output, when active, indicates the transmitter is keyed. It is a grounding output.	Output is a high impedance when the transmitter is keyed, and 0 volt when not keyed.	Output is 0 volt when the transmitter is keyed, and a high impedance when not keyed.
Transmitter inhibit	This input signal, when active, prevents the radio from being keyed. This is a TTL input pulled-up to 5 V.	A 5 volt input inhibits the transmitter.	A 0 volt input inhibits the transmitter.
BIT initiate	An input signal that initiates a BIT interruptive test. This is a TTL input pulled-up to 5 V. The input signal must be active for a minimum of 300 ms; the signal cannot then be activated again for at least 3 seconds.	A 5 volt input initiates a BIT test.	A 0 volt input initiates a BIT test.
Ready output	This output is active when the radio is ready to transmit and no faults have been detected by the BIT circuitry. It is an open collector output.	Output is a high impedance when the transmitter is 'ready', and 0 volt when not 'ready'.	Output is 0 volt when the transmitter is 'ready', and a high impedance when not 'ready'.
Antenna change-over	An output signal that can be used to control an antenna change-over relay when the transmitter is used in conjunction with a T6R receiver. Antenna change-over is a grounding output. This signal cannot be independently set. It is always the same polarity as the PTT output signal.		

- To exit the General Transmitter Settings Procedure, turn the switch to highlight Exit, then press the switch. You are returned to the Main screen. When this procedure is complete, go to Setting the Operating procedure starting on the next page.

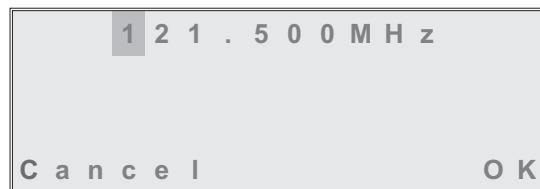
SETTING THE OPERATING FREQUENCY

To set the transmitter's operating frequency, use the following procedure. If a frequency is to be stored as one of the 100 available preset channels, ignore this procedure and go to 'Allocating Channel Numbers to Specified Frequencies' on page 35. Before setting the operating frequency, the required channel spacing should be set (see page 28).

1. From the Main screen, press the switch to display the Options menu. Ensure that Frequency is highlighted. Press the switch.



2. Ensure the Set Frequency menu is displayed and that the MHz digits are highlighted. Press the switch.



3. Turn the switch clockwise to increase frequency, or anti-clockwise to decrease frequency. The MHz value increments/decrements in 1 MHz steps. Stop when the required value is shown. Press the switch.
4. Turn the switch clockwise to highlight the kHz digits and press the switch. Turn the switch clockwise to increase frequency, or anti-clockwise to decrease frequency (note that continuous scrolling of the kHz value will increment or decrement the MHz value). Stop when the required value is shown. Press the switch. Note that if 25 kHz channel spacing is selected, the kHz value increments/decrements in 25 kHz steps; if 8.33 kHz channel spacing is selected, the kHz value increments/decrements in the pattern detailed in 'table 2-3, Front Panel Display for 25 kHz and 8.33 kHz Channel Spacings' on page 21. If both is selected, the display shows the 25 kHz and 8.33 kHz channels.
5. Turn the switch clockwise until either Cancel or OK is highlighted. Then press the switch. If cancel is selected, the new frequency entered in this procedure is ignored. If OK is selected, the transmitter operates on the new frequency.

ALLOCATING CHANNEL NUMBERS TO SPECIFIED FREQUENCIES

Up to 100 frequency channels can be stored in the transmitter. Use the following procedure to allocate frequency channels.

The process of allocating frequency channels can be simplified by using the VFP. The VFP software is contained in the T6T transmitter's maintenance kit.

1. From the Main screen, press the switch to display the Options menu. Turn the switch until Channel is highlighted. Press the switch.

```
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T                               E x i t
```

2. Ensure the Channel menu is displayed. Turn the switch until Set is highlighted. Press the switch.

```
C h 0 0 7   1 2 3 . 4 5 0 M H z
R e c a l l
S e t
B a c k
```

3. Ensure the Channel screen is displayed and turn the switch until the channel number is highlighted. Press the switch, then turn the switch until the required channel number is displayed. When it is, press the switch.

```
C h 0 0 1   1 1 9 . 1 0 0 M H z
R e c a l l
S t o r e
S t o r e   a n d   E n d
```

4. Turn the switch to highlight the MHz value, then press the switch. Turn the switch until the required value is displayed, then press the switch. Repeat for the kHz value.

5. When the correct frequency for the displayed channel number is displayed, turn the switch until Store is highlighted, then press the switch.

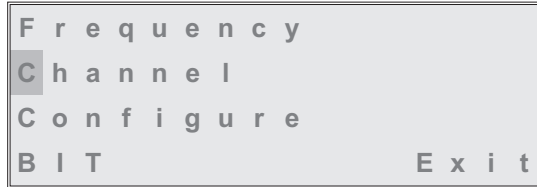
```
C h 0 0 1   1 1 9 . 1 0 0 M H z
R e c a l l
S t o r e
S t o r e   a n d   E n d
```

6. Repeat steps 3 to 5 for all frequency channels that are to be stored. When the required number of frequency channels have been stored, highlight Store and End and press the switch. You will be returned to the Main screen.

TO RECALL CHANNEL FREQUENCIES

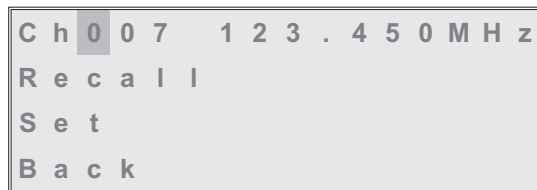
Frequency channels that have been stored in the transmitter can be recalled by channel number as follows.

1. From the Main screen, press the switch to display the Options menu. Turn the switch until Channel is highlighted. Press the switch.



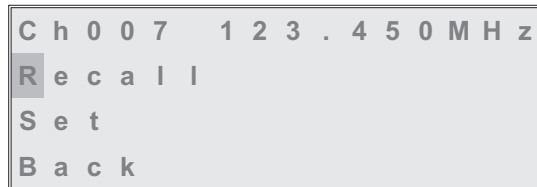
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T E x i t

2. Ensure the Channel menu is displayed. Turn the switch until the channel number is highlighted. Press the switch. Turn the switch until the required channel number is displayed. Then press the switch.



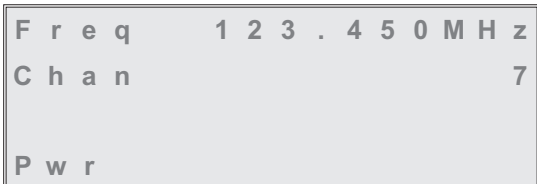
C h 0 0 7 1 2 3 . 4 5 0 M H z
R e c a l l
S e t
B a c k

3. Turn the switch until Recall is highlighted, then press the switch.



C h 0 0 7 1 2 3 . 4 5 0 M H z
R e c a l l
S e t
B a c k

4. The Main screen will then be displayed showing the transmitter's selected channel number and corresponding operating frequency.



F r e q 1 2 3 . 4 5 0 M H z
C h a n 7
P w r

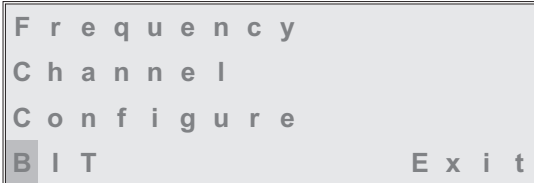
TO INITIATE AN INTERRUPTIVE BIT TEST

Use the following procedure to initiate an interruptive BIT test from the transmitter's front panel. A BIT test cannot be initiated while the transmitter is keyed.

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

Users should ensure a load is connected to the transmitter's antenna connector, and note that the BIT circuits apply a signal to the audio input lines during a test.

1. From the Main screen, press the switch to display the Options menu. Turn the switch until BIT is highlighted. Press the switch.



F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T E x i t

2. Ensure the BIT menu is displayed. Turn the switch until BIT Initiate is highlighted, then press the switch.



B I T I n i t i a t e
B I T V i e w
B a c k E x i t

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



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

4. When the test has finished, check that the transmitter's front panel Alarm indicator is not lit. After a BIT test, BIT screens are automatically displayed. The screens are shown on the next page.

TO VIEW BIT PAGES AND ADVISE SCREEN

Use the following procedure to view the BIT page displays. Note that after a BIT interruptive test, the BIT screens are automatically displayed.

1. From the Main screen, press the switch to display the Options menu. Turn the switch until BIT is highlighted. Press the switch.

```

F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T                               E x i t
    
```

2. Ensure the BIT menu is displayed. Turn the switch until BIT View is highlighted, then press the switch.

```

B I T   I n i t i a t e
B I T   V i e w
B a c k                               E x i t
    
```

3. A series of pages is shown displaying certain transmitter parameters. Some examples are shown here.

A full list of BIT screens along with appropriate explanations is given in the T6T transmitter maintenance handbook.

```

A C   S u p p l y           O N
D C   S u p p l y           O F F
S u p p l y                 3 1 V
                               > >
    
```

Example BIT Screen

```

S y n t h   L o c k       P A S S
P A   T e m p             3 0 °
P A   T e m p             P A S S
                               < <   > >
    
```

Example BIT Screen

4. Note that the last BIT screen allows Advise to be highlighted and selected by pressing the switch. If any BIT faults have been detected, the advise screen recommends the remedial action, in order of priority, to be taken.

```

A d v i s e
B a c k
                               < <
    
```

Last BIT Screen

Further detail regarding the Advise screen is given in the T6T transmitter maintenance handbook.

```

P l e a s e   C h e c k
1 : A n t e n n a
2 : P A   C t r l .
    
```

Example Remedial Advise Screen

ELAPSED TIME INDICATOR

An elapsed time indicator (ETI) shows the number of hours the transmitter has been powered up since manufacture. To view the ETI:

1. From the Main screen, press the switch to display the Options menu. Turn the switch until BIT is highlighted. Press the switch.

```
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T                               E x i t
```

2. ETI can be seen measured in hours and minutes.

```
B I T   I n i t i a t e
B I T   V i e w
E T I   0 0 1 2 3 : 5 9
B a c k                               E x i t
```

DISPLAYING THE TRANSMITTER'S INTERNAL REFERENCE FREQUENCY SCREEN

Caution!

This procedure is included only for informational purposes. The reference frequency setting must not be altered unless following the procedure given in the T6T maintenance handbook. External test equipment is required to set this parameter.

Failure to comply with this caution may render the transmitter inoperable.

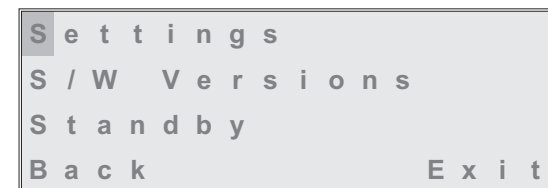
To display the transmitter's internal reference frequency screen, use the following procedure.

1. From the Main screen, press the switch to display the Options menu. Turn the switch until Configure is highlighted. Press the switch.



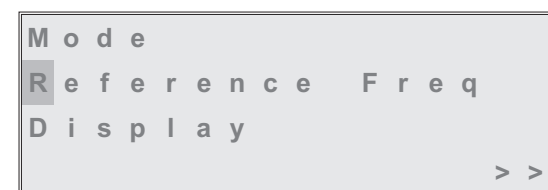
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T E x i t

2. Ensure the Configure menu is displayed. Turn the switch until Settings is highlighted, then press the switch.



S e t t i n g s
S / W V e r s i o n s
S t a n d b y
B a c k E x i t

3. Check that the Function menu is displayed and turn the switch until Reference Freq is highlighted. Press the switch.



M o d e
R e f e r e n c e F r e q
D i s p l a y > >

4. Ensure the Reference menu is displayed.
5. To exit the screen, wait for 30 seconds when the display automatically reverts to the Main screen, or select Cancel.



R e f F r e q 5 0 . 0 %
C a n c e l O K

SOFTWARE VERSIONS SCREEN

The software versions screen allows the user to view the version of various software modules installed in the transmitter. To view the software versions, use the following procedure.

1. From the Main screen, press the switch to display the Options menu. Ensure that Configure is highlighted. Press the switch.

```
F r e q u e n c y
C h a n n e l
C o n f i g u r e
B I T                               E x i t
```

Options Menu

2. Ensure the Configure menu is displayed. Turn the switch until S/W Versions is highlighted, then press the switch.

```
S e t t i n g s
S / W   V e r s i o n s
S t a n d b y
B a c k                               E x i t
```

Configure Menu

3. Check the Software Versions screen is displayed. Select Boot, Flash, or Fills and press the switch to display the installed version. The example shows the Boot software.

```
B o o t
F l a s h
F i l l s
B a c k                               E x i t
```

Software Versions Screen

4. Select OK, then press the switch to return to the Software Versions screen. View the other software modules as required.

```
B o o t   V e r s i o n
S 0 2 7 1 V 0 0 0 1

O K
```

Boot Version Screen