Park Air Systems

T6T 300 Watt VHF Transmitter

User Documentation

Errata

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www.parkairsystems.com

Approvals and Standards

Interoperability of the European Air Traffic Management Network
Park Air Systems declares that the T6T 300 watt VHF transmitter conforms to the essential requirements set out in Regulation (EC) No 552/2004 on the interoperability of the European Air Traffic Management network.

EC Declaration of Conformity
The declaration of conformity is shown on the next page.

Health & Safety, EN 60950, CAN/CSA-C22.2 No. 60950, UL 60950.
Radio IC RSS141, FCC part 15 and 87.

Telecom CS-03.

This Class B digital apparatus complies with Canadian ICES-003

FCC Statement:

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and the receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the supplier or an experienced radio/TV technician for help.

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

Operation at greater than 200W is subject to FAA approval

Park Air Systems

CE 0336 !

Declaration of Conformity

We, the undersigned,

Company	*Park Air Systems Limited*
Address, City	*Northfields, Market Deeping, Peterborough PE6 8UE*
Country	*England*
Phone number	*+44 1778 345434*
Fax number	*+44 1778 342877*

certify and declare under our sole responsibility that the following equipment:

Product description / Intended use	Ground to air communications in the VHF aeronautical band
EU / EFTA member states intended for use	All countries
Member states with restrictive use	*None*
Manufacturer	*Park Air Systems Limited*
Brand	PAE
Type	T6T HS 300 , T6T HS 200

are tested to and conform with the essential requirements for protection of health and the safety of the user and any other person and Electromagnetic Compatibility, as included in following standards:

Standard	Issue date
EN60950-1:2002	*2002*
EN60215	*1989*
EN301 489-1, EN301 489-22	*06/2005, 11/2003*

and is tested to and conforms with the essential radio test suites so that it effectively uses the frequency spectrum allocated to terrestrial/space radio communication and orbital resources so to as to avoid harmful interference, as included in following standards:

Standard	Issue date
EN 300 676	*V1.3.1 03/2003*

and therefore complies with the essential requirements and provisions of the **Directive 1999/5/EC** of the European Parliament and of the council of March 9, 1999 on Radio equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity and with the provisions of Appendix IV (Conformity Assessment procedure referred to in article 10).

The following Notified Body has been consulted in the Conformity Assessment procedure:

Notified Body number	Name and address
0336	TNO Certification B.V., PO Box 15, 9822 ZG Niekerk, The Netherlands

The technical documentation as required by the Conformity Assessment procedure is kept at the following address:

Company	*Park Air Systems Limited*
Address, City	*Northfields, Market Deeping, Peterborough PE6 8UE*
Country	*England*
Phone number	*+44 1778 345434*
Fax number	*+44 1778 342877*

CE

TCF/TF reference nr.	*TCF-124-008*
Drawn up in	*Northfields, Market Deeping, Peterborough PE6 8UE*
Date	*10 October 2005*
	A Horsfield
Name and position	*A. Horsfield consultant Engineer*

Health and Safety

T6T 300 Watt VHF Transmitter

The T6T 300 watt VHF transmitter operates from a low voltage dc input supply, or a standard mains ac input supply. When using a mains supply, dangerous voltages are present on the rear panel ac connector and within the equipment. For this reason, only suitably qualified personnel should install and maintain the equipment.

WARNING  **Antenna Radiation**

In use, an antenna is connected to the transmitter. During installation, consideration must be given regarding the resultant field strength in areas accessible to personnel. The formula to determine the field strength is given in the Installation topic.

WARNING  **Beryllium Hazard**

The output transistors used in the power amplifier (PA) of this transmitter contain the toxic material beryllium. Beryllium oxide dust is toxic if inhaled.

Although no procedures in this documentation instruct component removal, users should be aware that there could be a hazard if a PA's output transistors become physically damaged.

WARNING  **Lifting the Transmitter**

The transmitter weighs approximately 79 kg. When lifting a transmitter, especially when fitting into an equipment cabinet, a minimum of two people should be used. Failure to do so can result in personal injury.

Disposal

This product is covered by the European Directive 2002/96/EC.

It must not be disposed of in domestic waste.

Disposal should be made using designated collection facilities appointed by the government or the local authorities in your area.

Warnings and Cautions

The following warnings and cautions are used in Park Air documentation.

Warnings

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

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

Cautions

A caution is used to indicate possible danger to the equipment. Throughout Park Air user documentation, cautions are indicated by the following symbols:

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

Customer Support

Contacting Park Air

Customer support is available using email, telephone or fax. If you require help in configuring, installing or maintaining equipment supplied by Park Air, use any of the contact methods listed below.

Email

Address: support@uk.parkairsystems.com

Telephone

During normal UK office hours: +44 1778 381557

Outside normal UK office hours: +44 7733 124457

Fax

Fax number: +44 1778 381556

Mail

Address: Customer Services Department
Park Air Systems
Northfields
Market Deeping
Peterborough PE6 8UE
England

Web Site

Web address: www.parkairsystems.com

Fault Reporting

To ensure that Park Air continues to offer the highest level of after sales service, it is necessary to gather as much information as possible about equipment faults. If any equipment supplied by Park Air becomes unserviceable, please complete a copy of the fault report shown on the next page, and return it to the Customer Services department at Park Air.

Fault Report

Customer: . . . . . .

Address: . . . . . .

. . . . . .

. . . . . .

Telephone: . . . . . .

Email: . . . . . .

Fax: . . . . . .

Equipment Details

Park Air works order number . . . . . .

Equipment model . . . . . .

Equipment serial number . . . . . .

Service Details

Commissioning date. . . . . .

Failure/repair date . . . . . .

Software version (if known) . . . . . .

Supply voltage . . . . . .

Equipment environment: Office area / dedicated equipment room / heated / air-conditioned (delete as applicable)

Fault Detail

Symptoms of fault: . . . . . .

. . . . . .

. . . . . .

. . . . . .

Results of any tests: . . . . . .

. . . . . .

Any repairs carried out: . . . . . .

. . . . . .

Comments/action requested: . . . . . .

. . . . . .

Park Air Systems

Abbreviations

The following list gives the standard abbreviations used in Park Air user documentation.

A	ampere
ac	alternating current
AGC	automatic gain control
AM	amplitude modulation
ATC	air traffic control
BER	bit error rate
BIT	built-in test
C	celsius
CAS	channel associated signalling
CCE	control centre equipment
CD	compact disk
CSMA	carrier sense multiple access
dB	decibel
dBm	decibels relative to 1 mW
dc	direct current
DSB	double sideband
D8PSK	differentially encoded 8-phase shift keying
E1-RIC	E1-radio interconnect
E-BIT	external bit signal
EMF	electromagnetic force
ESD	electrostatic sensitive device
ETSI	European Telecommunications Standards Institute
Fig	figure
FM	frequency modulation
g	gramme
HPA	high power amplifier
Hz	hertz
ICAO	international civil aviation organization
IF	intermediate frequency
kbits/s	kilobits per second
kg	kilogramme
kHz	kilohertz
LCD	liquid crystal display
LED	light emitting diode
LRU	line replaceable unit
m	metre
mA	milliamp
MARC	multi-access remote control
Mbits/s	megabits per second
MHz	megahertz
mm	millimetre
ms	millisecond
MSK	minimum shift keying
mV	millivolt
mW	milliwatt
PA	power amplifier
PC	personal computer
PCB	printed circuit board
PCU	protocol conversion unit
pk-pk	peak-to-peak
ppm	parts per million
PSU	power supply unit
PTT	press to transmit
PVC	polyvinyl chloride
RCMS	remote control and monitoring system
RF	radio frequency
RSE2	remote site equipment
RSSI	radio signal strength indication
SINAD	signal plus noise plus distortion to noise plus distortion ratio
S+N/N	signal plus noise to noise ratio
TDMA	time division multiple access
TS	time slot
UHF	ultra high frequency
µW	microwatt
V	volt
VA	volt-ampere

VCCS	voice control and communication switch
VFP	virtual front panel
VHF	very high frequency
VOGAD	voice-operated gain adjusting device
W	watt

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Overview

Purpose

The T6T 300 watt VHF transmitter is intended for use in fixed ground environments such as airports and en-route centres. The transmitter operates in voice and ICAO defined data modes at frequencies between 118 and 136.975 MHz. Dependent on the software loaded into the radio, the following operating modes can be selected:

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

The transmitter, see Fig 1 and Fig 2, consists of a drive assembly, three 100 watt amplifiers and a combiner. The transmitter is configured as shown in Fig 3. Should any one of the amplifiers fail, the transmitter continues to operate at reduced (200 watt) power.

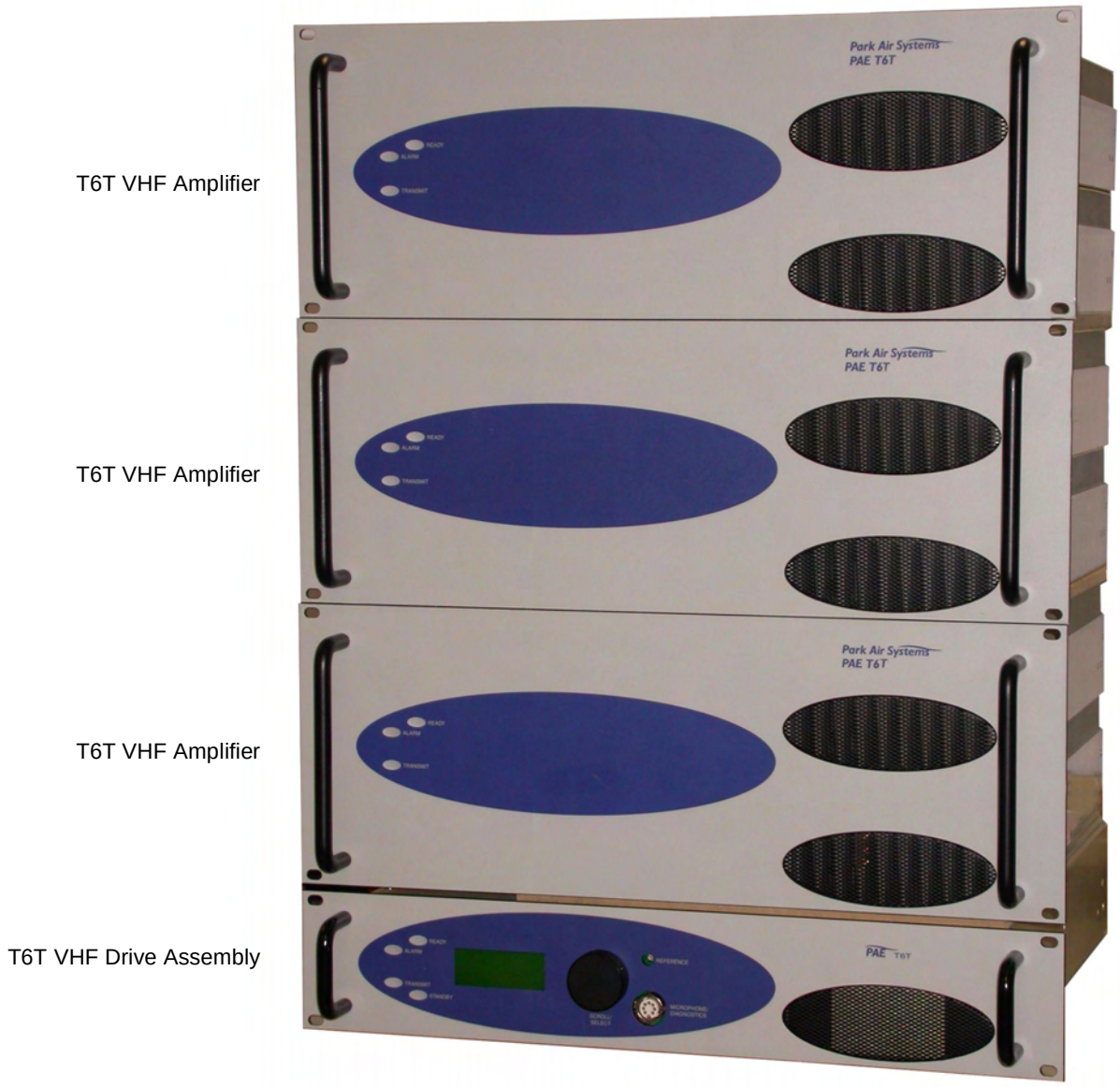


Fig 1 T6T 300 Watt VHF Transmitter

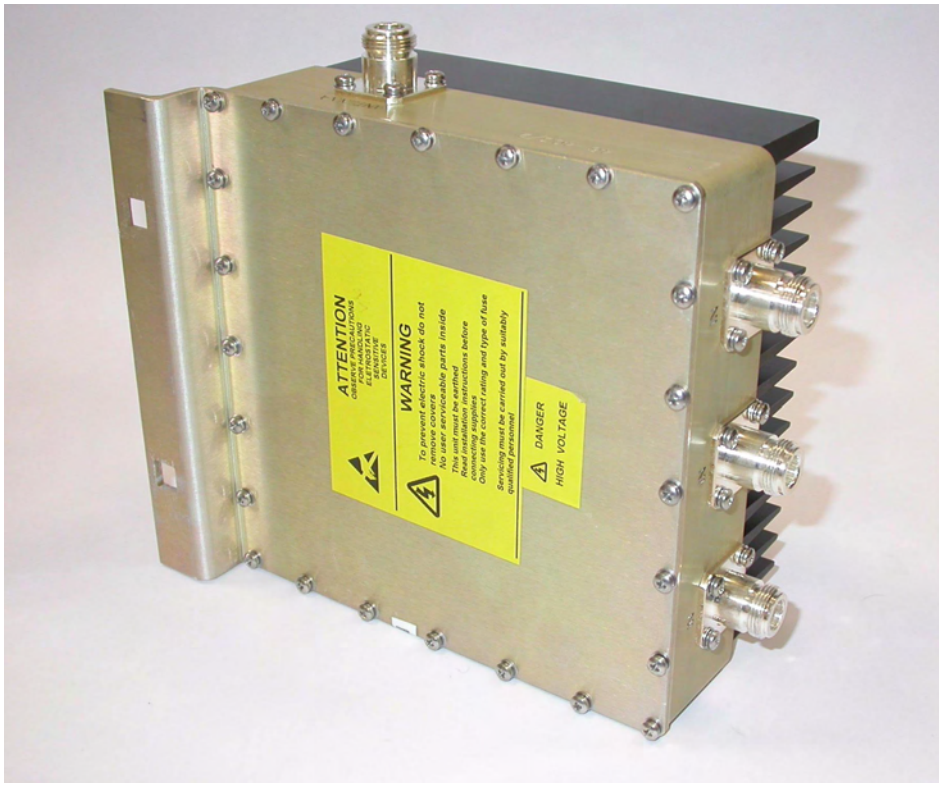


Fig 2 T6T VHF Combiner

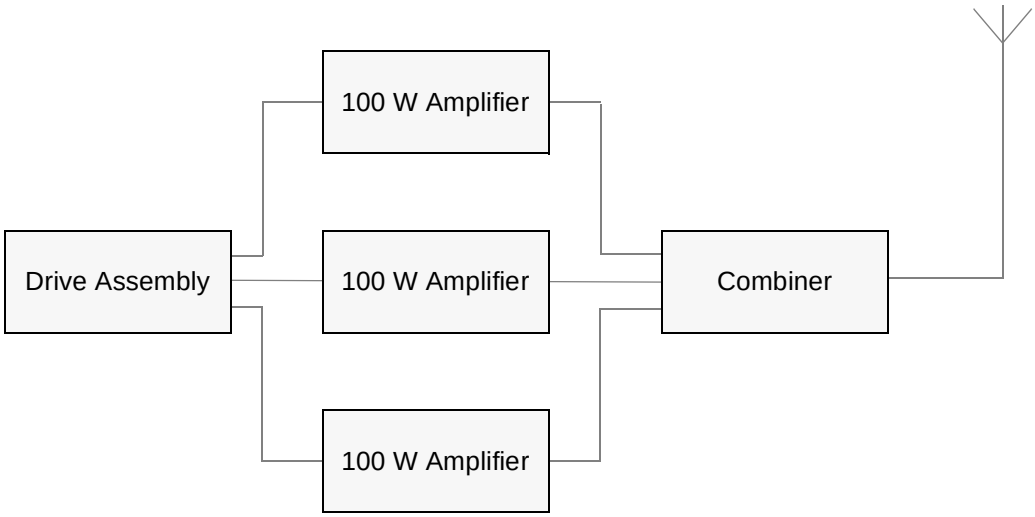


Fig 3 300 Watt Transmitter Arrangement

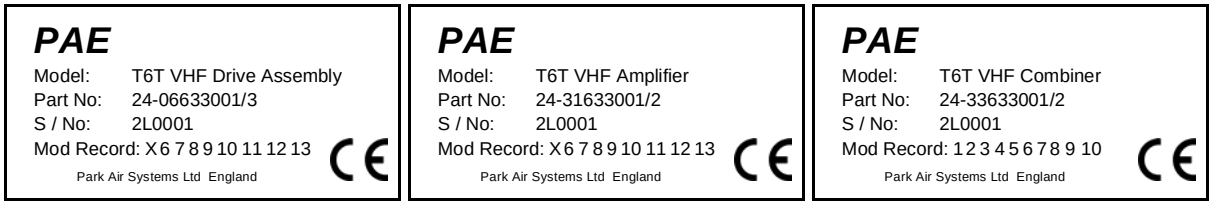
Models and Part Numbers

Table 1 identifies a T6T 300 watt VHF transmitter.

Fig 4 shows the identification labels attached to each component. Each label identifies the model, part number, serial number and modification level.

Table 1 Model Identification

Description	Part Number	Frequency Range	Channel Spacing (AM-Voice)	Special Applications
T6T 300 watt standard frequency coverage, high stability, VHF transmitter	B63300HS	118 to 136.975 MHz	25 kHz or 8.33 kHz	Supports 5-offset carrier operation



Drive Assembly Identification Label | Amplifier Identification Label | Combiner Identification Label

Fig 4 Identification Label Examples

Mechanical Installation

The transmitter, as shown in Fig 1, fits into an industrial standard 19 inch (483 mm) equipment cabinet and occupies, in total, 14U of cabinet space. Additionally, the combiner must be mounted at the back of the equipment cabinet directly behind the amplifiers' cooling fans. A bracket provided (shown fitted in Fig 2) is used to mount the combiner on a cabinet upright.

Operating Parameters

The transmitter's operating parameters are set using the drive assembly's multi-purpose Scroll/Select switch, or remotely from suitable control equipment. Additionally, the Park Air Virtual Front Panel (VFP) software can be used to set up the transmitter.

Frequency Selection

The transmitter is a single frequency synthesised radio that can operate with 25 kHz and 8.33 kHz channel spacing. The radio recognizes frequencies entered in ICAO format and automatically adjusts to the correct channel spacing. For multichannel operation up to 100 preset frequency channels can be stored in the radio for immediate recall; any combination of 8.33 kHz and 25 kHz channel spacing can be stored. Valid operating frequencies can be selected from the radio's front panel or a compatible remote control equipment.

Virtual Front Panel

The VFP software supplied on CD with the radio is compatible with any PC or laptop running Windows 2000™ or Windows XP™. The VFP allows changes to a radio's settings and channel information, it displays the current BIT state, displays BIT history, allows security locks to be set, and provides maintenance facilities. A typical VFP presentation is shown in Fig 5. Using the VFP has several advantages over setting a radio from the front panel; these are:

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

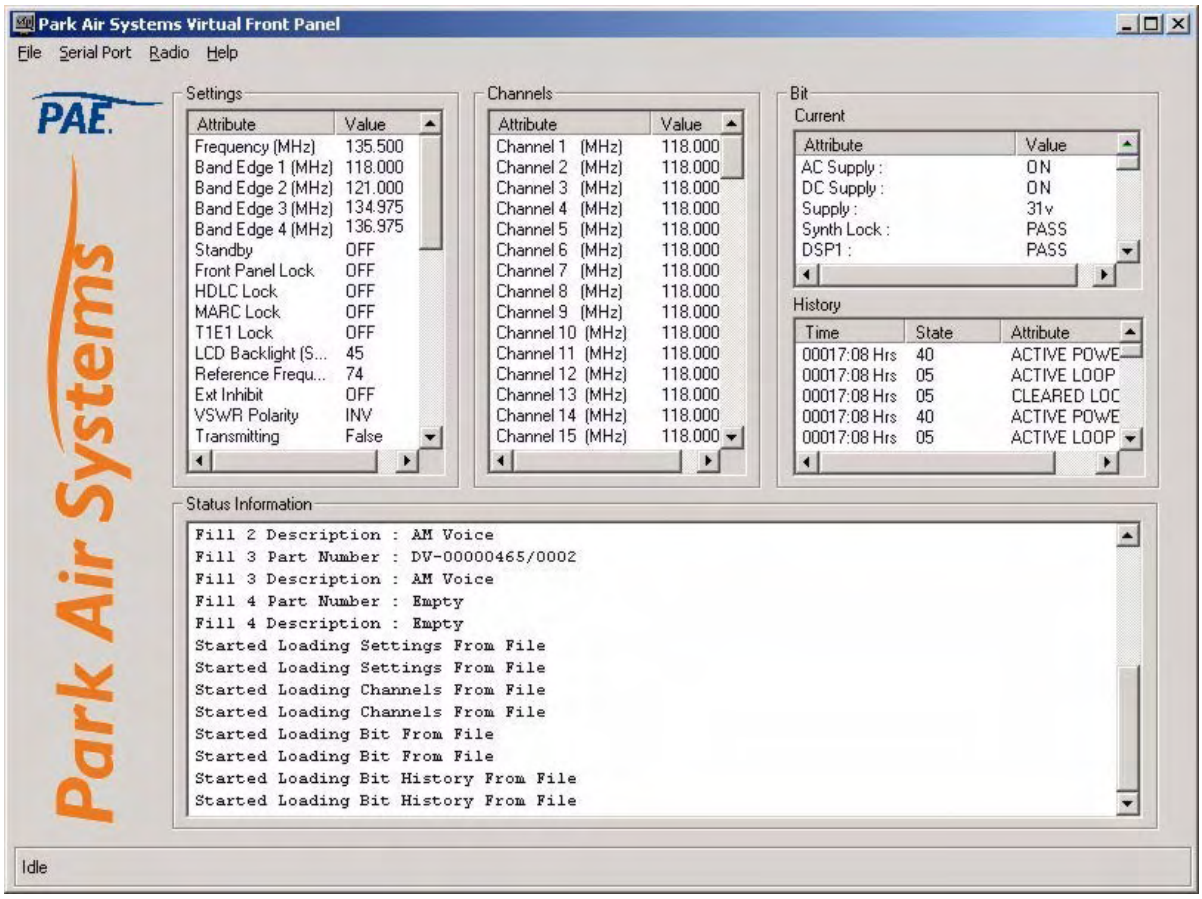


Fig 5 Typical VFP Presentation

Intentionally Blank

Specification

General Specification

The general specification applies to the transmitter irrespective of the selected operating mode.

Variants

Only one variant of the T6T 300 watt transmitter is available as detailed in Table 2.

Table 2 300 Watt T6T Transmitter

Description	Part Number	Frequency Range	Special Applications
300 watt, standard frequency coverage, high stability, VHF transmitter	B63300HS	118 to 136.975 MHz	Supports 5-offset carrier operation

Number of Channels

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

Frequency Accuracy

The frequency accuracy is better than 0.3 ppm.

Power Requirements

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

ac input supply — The transmitter operates from a 48 to 62 Hz single-phase ac supply and automatically adjusts to operate from any supply voltage ranging from 110 Vac to 230 Vac ±10%. The power consumption figures are given in Table 3.

dc input supply — The transmitter operates from a dc input supply between 21.6 and 32 V (measured at the radio's input). Current loading is given in Table 3.

Table 3 Power Consumption

Requirement	Normal Operation	
	ac	dc
Maximum	3000 VA	75 A
Typical	2100 VA	60 A
Not Transmitting	350 VA	3.5 A

Dimensions and Weight

The transmitter consists of one drive assembly, three amplifiers and a combiner.

Transmitter

The dimensions and weights quoted below are for a complete transmitter (that is a drive assembly plus three amplifiers):

Width	483 mm (19 inches).
Height	622.3 mm (24.5 inches). The height occupies 14U of equipment cabinet space.
Depth	430 mm (16.9 inches) measured from front panel to rear panel. 465 mm (18.3 inches) measured from front panel to rear RF connectors.
Weight	79 kg (174 pounds).

Combiner

The dimensions of the combiner, including connectors, are:

Width	205 mm (8 inches).
Height	180 mm (7 inches).
Depth	85 mm (3.4 inches).
Weight	1 kg (2.2 pounds).

Environmental

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

AM Modes

The transmitter can operate in AM-Voice mode (standard) and AM-MSK mode (optional). The following specifications apply to both modes unless stated otherwise. ETSI test methods specified in EN 300 676 are used where applicable.

Transmitter RF Characteristics

Output Impedance
50 ohm via an N-type connector.

RF Power Output
The RF carrier output power is adjustable in 6 W steps from 30 W to 300 W. As an option, the maximum selectable power can be limited. Output power is automatically controlled under the following conditions:

Frequency range	Variations in power remain within -0.5 to +1 dB over the operational frequency range.
Low supply voltage	Variations in power remain within ±1 dB for supply voltages between 27 Vdc and 32 Vdc. For voltages less than 27 Vdc the power progressively reduces by up to 3 dB. When the minimum dc voltage level is reached, the transmitter dekeys.
High VSWR	Loop error can reduce power progressively by up to 3 dB. Variations in power remain within ±1 dB into a VSWR of up to 2.5:1. At a VSWR greater than this the output power may be reduced by 10 dB ±1 dB.
High RF PA temperature	If the RF PA temperature sensor exceeds 80°C the output power is reduced by 3 dB ±1 dB. If the RF PA temperature sensor exceeds 90°C the transmitter is de-keyed and automatically re-keyed at 70°C.
Amplifier failure	If one of the three amplifiers fails, the transmitter continues to operate at 66% of the original set power.
Rise time	The power rise time from a keying contact to 90% of full power is less than 50 ms.

Duty Cycle

Both modes	100% continuous operation.

Channel Spacing

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

Offset Carrier

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

Harmonic Outputs
All harmonic outputs are less than -80 dBc.

Spurious Outputs

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

Intermodulation

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

Transmitter Modulation Characteristics

Mode

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

Modulation Depth

Both modes	The transmitter modulation can be set to a maximum of 95%.

Hum and Noise

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

Frequency Response

25 kHz channel spacing	AM-Voice and AM-MSK: The variation in frequency response with reference to a 1 kHz signal is within +0.5 dB and -1.5 dB across the frequency range 300 to 3400 Hz. The response is also less than -20 dB at 100 Hz and below, and less than -30 dB at 4 kHz and above.
8.33 kHz channel spacing	AM-Voice only: The variation in frequency response with reference to a 1 kHz signal is within +0.5 dB and -1.5 dB across the frequency range 350 Hz to 2500 Hz. The response is also less than -10 dB at 100 Hz and below, and less than -30 dB at 3200 Hz and above.

Distortion

25 kHz channel spacing	The total harmonic distortion is less than 5% due to signals with a modulation depth of 90%, within the frequency range 300 Hz to 3400 Hz.
8.33 kHz channel spacing	AM-Voice only: The total harmonic distortion is less than 5% due to signals with a modulation depth of 90%, within the frequency range 350 Hz to 2500 Hz. Under extreme conditions, when the loop error protection circuit is active, the distortion is maintained at less than 10%.

Residual FM

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

VOGAD

AM-Voice mode	The VOGAD has an operational range of 30 dB with the threshold level set at 10 dB below the average speech line level setting. Within the VOGAD range the modulation depth remains at the set level ±10%. It has an attack time of less than 20 ms and a decay time of greater than 2 seconds, both measured with a 10 dB step to 15 dB into VOGAD.
AM-MSK mode	The VOGAD is disabled.

Mute

AM-Voice mode	The mute level is set at 15 dB below the average speech line level setting. The mute can be disabled.
AM-MSK mode	The mute is disabled.

Differential Group Delay

AM-MSK mode	There is less than 60 µs differential group delay for signals in the range 1200 to 2400 Hz.

Transmitter Control

Audio Inputs

Audio can be connected to the transmitter via the front panel microphone connector or via the 600 ohm balanced line inputs. Line level setting from -30 to +10 dBm.

PTT Time Out

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

Mode 2

Mode 2 parameters are identical to AM-Voice mode with the following exceptions.

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

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

Channel Spacing
25 kHz channel spacing only.

Transmitter Modulation Characteristics

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

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

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

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

Transmitter Control
All control information and data for transmission is transferred via the HDLC connector. Control information to an associated receiver is passed via the T1/E1 connector. Data from the receiver is also passed back via the T1/E1 connector and then transferred to the Mode 2 computer via the HDLC connector. This is illustrated in the Installation topic of this CD.

Time Out
The transmitter automatically dekeys if a transmission exceeds 10 seconds. No fault is flagged and the transmitter keys again for the next transmission.

Mode 3

Mode 3 parameters are identical to AM-Voice mode with the following exceptions.

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

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

Channel Spacing
25 kHz channel spacing only.

Transmitter Modulation Characteristics

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

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

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

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

Transmitter Control
All control information and data for transmission is transferred via the T1/E1 connector. This is illustrated in the Installation topic of this CD.

Operation

Overview

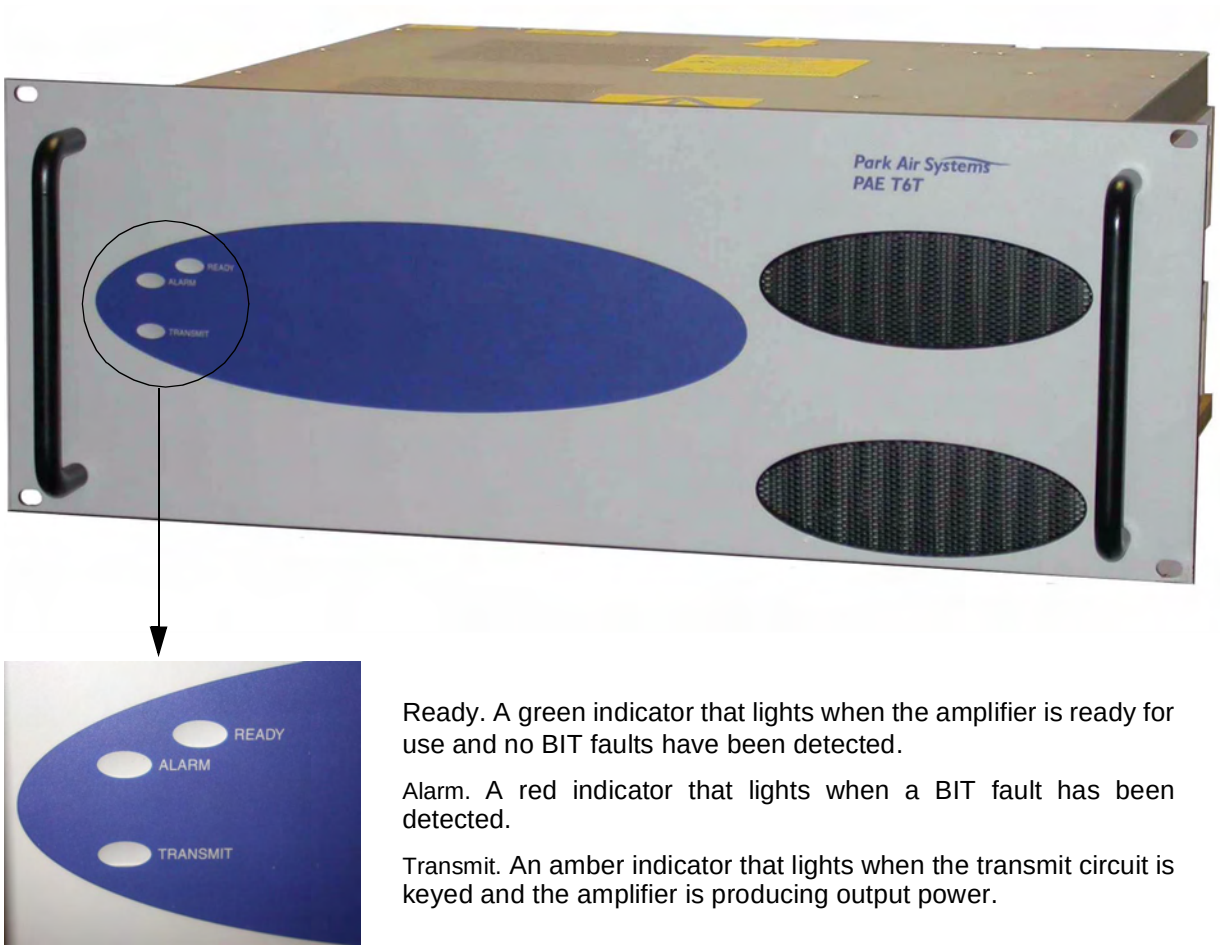
This topic describes the transmitter's controls and indicators and details how to adjust the operational settings.

The transmitter comprises a drive assembly, three amplifiers and a combiner. All operational settings are made at the drive assembly's front panel.

T6T VHF Amplifier

There are no operating controls fitted to the amplifier. All operational settings are made at the drive assembly.

The amplifier has three front panel indicators as detailed in Fig 6 and a rear panel Supply switch. Should an amplifier fail, shown by the Alarm indicator being lit, the transmitter continues to operate at reduced power (200 watts).



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

Alarm. A red indicator that lights when a BIT fault has been detected.

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

Fig 6 T6T VHF Amplifier Front Panel Indicators

Rear Panel Supply Switch

The rear panel Supply switch (Fig 7) is a 2-way rocker switch used to select between power on, and standby.

WARNING **Dangerous Voltage**

When the Supply switch is set to the Standby position, dangerous voltage is still present in the internal power supply circuitry. To ensure safe working, the amplifier must be isolated from the ac and dc input supplies.

| = On | = Standby

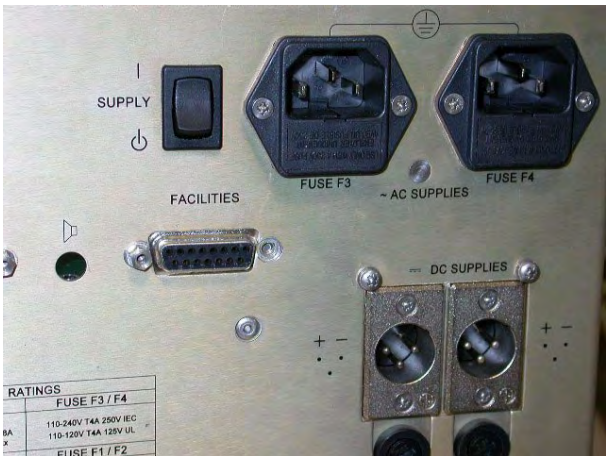


Fig 7 Rear Panel Supply Switch

Drive Assembly

The transmitter's operational settings are made from the drive assembly's front panel (Fig 8). The following pages describe the controls and detail how to set up the transmitter to suit the operational requirement.

No attempt to set up the transmitter must be made until all procedures detailed in the Installation topic have been completed.

Fig 8 T6T Drive Assembly

Front Panel Controls and Indicators

The drive assembly front panel controls and indicators are shown in Fig 9.

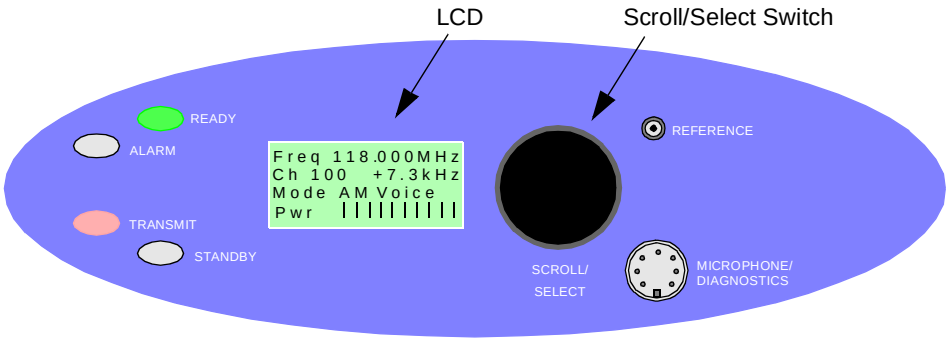


Fig 9 Front Panel Controls and Indicators

Scroll/Select Switch and LCD

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

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

Ready Indicator

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

Transmit Indicator

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

Alarm Indicator

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

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

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

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

Standby Indicator

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

Standby mode is selected and deselected using the front panel Scroll/Select switch and LCD, by initiating an instruction through a MARC system, through a T6 controller or through the VFP. For details of front panel selection and deselection see page 46.

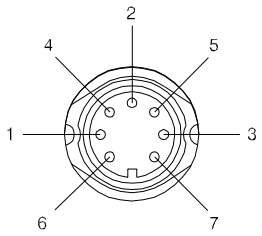
Reference Connector

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

Microphone/Diagnostics Connector

A dual purpose connector that allows either a microphone, or a PC, to be connected to the transmitter. The connector is a 7-pin self-locking DIN socket; the pin-out is shown in Table 4.

A microphone is fitted to this connector to enable the transmitter to be operated in AM local mode. The connections are detailed in Table 4. A PC can also be connected to allow the VFP to be displayed. Using the VFP is detailed in the Maintenance topic. The PC connections at the transmitter are shown in Table 5.



Viewed from front

Table 4 Microphone/Diagnostics Connector - Audio Connections

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

Table 5 Microphone/Diagnostics Connector - PC Connections

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

Rear Panel Supply Switch

The rear panel Supply switch (Fig 10) is a 2-way rocker switch used to select between power on, and standby.

WARNING **Dangerous Voltage**

When the Supply switch is set to the Standby position, dangerous voltage is still present in the internal power supply circuitry. To ensure safe working, the drive assembly must be isolated from the ac and dc input supplies.

| = On | = Standby |

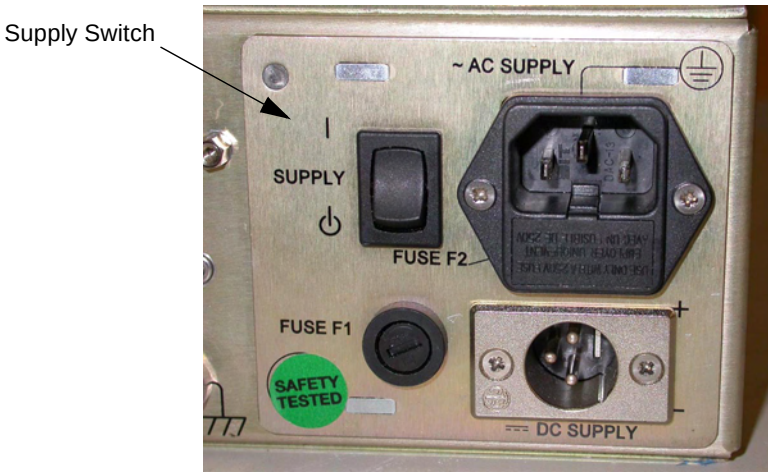


Fig 10 Drive Assembly Supply Switch

Setting Up and Operation

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

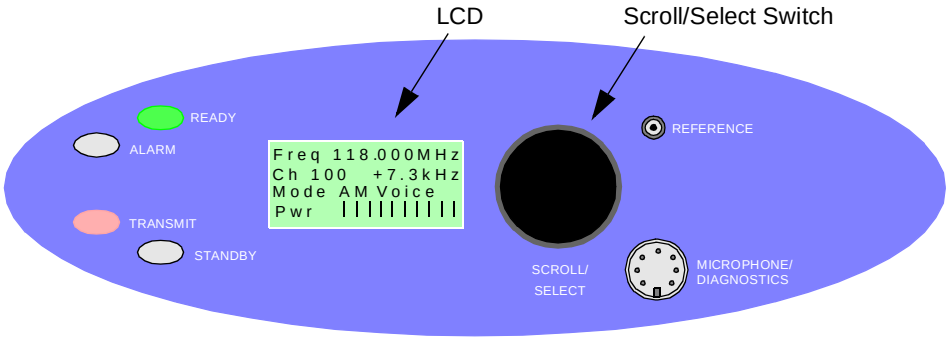
Operating parameters can also be set using the Virtual Front Panel (VFP), through a Multi-Access Remote Control (MARC) system, or from an associated T6 controller. VFP operation is described on this CD under Maintenance; MARC and T6 controller functionality is described in separate documentation.

Table 12 on page 63 details the functions and parameters that can be set from all sources.

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

Normal Operation

During normal operation, the LCD displays the Main screen. This screen shows the operating frequency, the channel number (if the channel store facility is used), the offset carrier (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.



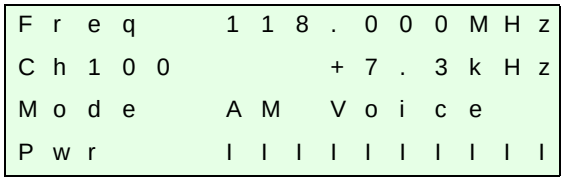
Using the Scroll/Select Switch

The Scroll/Select switch (referred to throughout this topic as the 'Switch') is used to leave the Main screen and display the Control screen (see page 40). Further use of the Switch displays various selection menus and allows the required parameters to be set. The switch has three actions: it can be turned clockwise, anti-clockwise, or momentarily pushed in.

Screen Protocol

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

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



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

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

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

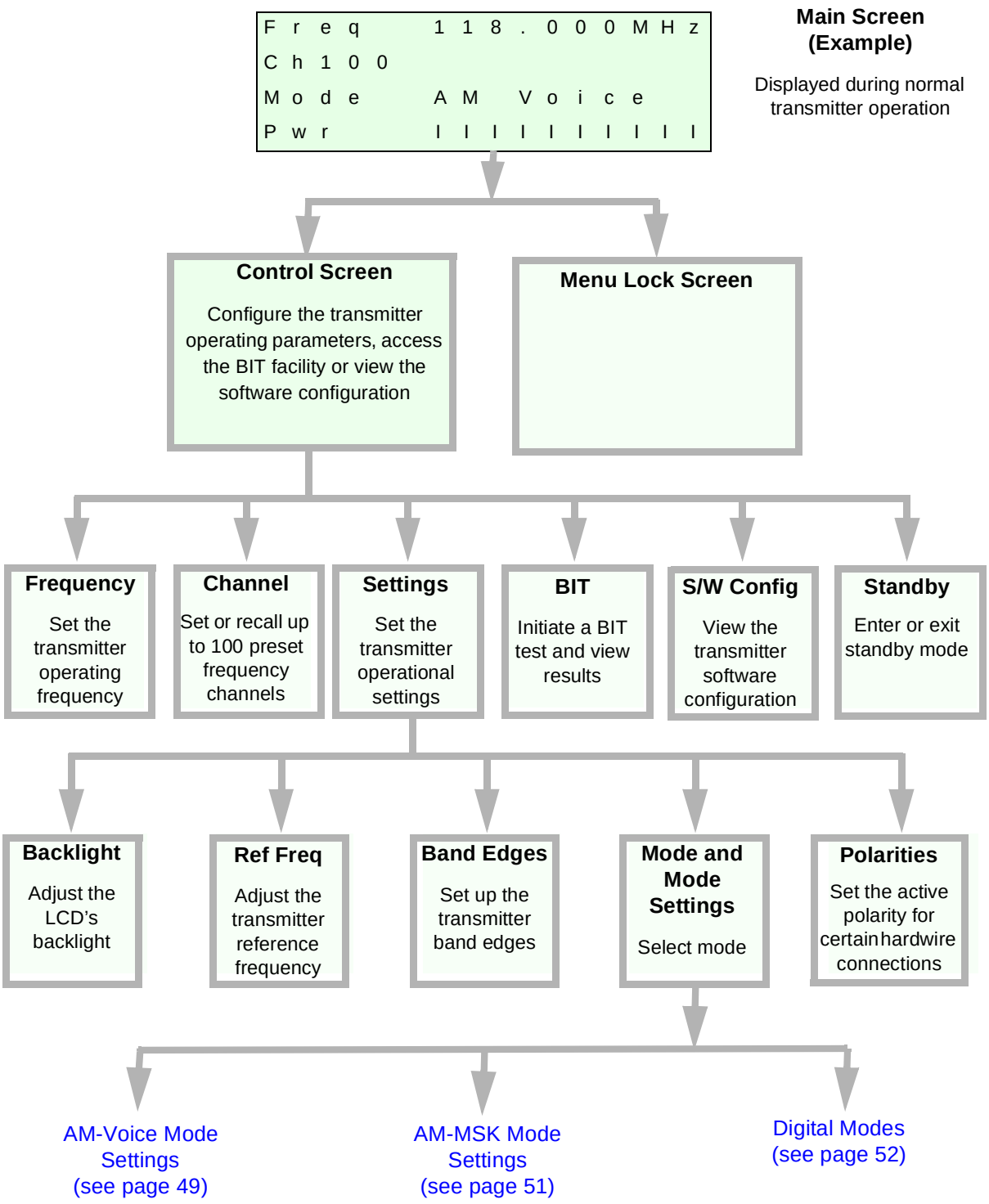
<< Indicates more fields are available other than those currently displayed. To access those fields, turn the switch anti-clockwise through the first displayed field.

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

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

Menu System

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

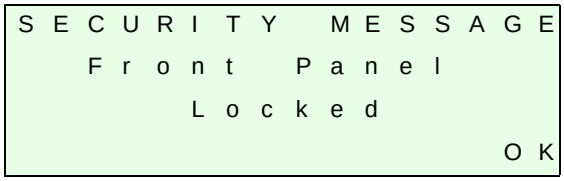

Freq 118.000MHz
Ch100
Mode AM Voice
Pwr IIIIIIIIII
Main Screen (Example)
Displayed during normal transmitter operation
Control Screen
Configure the transmitter operating parameters, access the BIT facility or view the software configuration
Menu Lock Screen
Frequency
Set the transmitter operating frequency
Channel
Set or recall up to 100 preset frequency channels
Settings
Set the transmitter operational settings
BIT
Initiate a BIT test and view results
S/W Config
View the transmitter software configuration
Standby
Enter or exit standby mode
Backlight
Adjust the LCD's backlight
Ref Freq
Adjust the transmitter reference frequency
Band Edges
Set up the transmitter band edges
Mode and Mode Settings
Select mode
Polarities
Set the active polarity for certain hardwire connections
AM-Voice Mode Settings (see page 49)
AM-MSK Mode Settings (see page 51)
Digital Modes (see page 52)

Menu System

Menu Lock Screen

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

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



To exit the system lock screen:

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

  or,

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

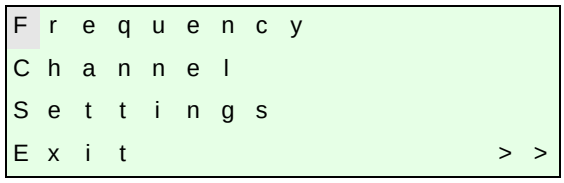
Control Screen

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

Change the transmitter operating frequency.

Store or recall preset channel frequencies.

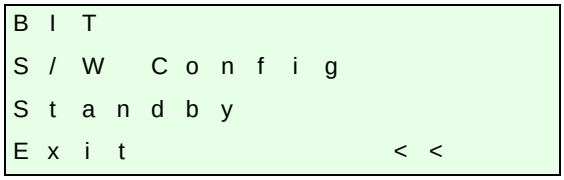
Select operating mode and mode settings.



Initiate a BIT test and view results.

View software configuration.

Enter or exit standby mode.



Notes for Setting Up the Transmitter

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

Front Panel Display for 25 kHz and 8.33 kHz Channel Spacing

When setting the operating frequency of the transmitter and 8.33 kHz channel spacing is required, the displayed frequency differs from the actual channel frequency. Table 6 shows the pattern used for 25 kHz and 8.33 kHz spaced channel frequencies from 118.000 MHz to 118.141 MHz. The pattern is the same for any frequency within the transmitter's frequency range. The display conforms to ICAO convention for 8.33 kHz operation.

Table 6 25 kHz and 8.33 kHz Channel Spacing Displays

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

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

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

Table 7 shows the relationship between the input line level, VOGAD threshold and mute threshold.

Table 7 Relationship Between Line Level, VOGAD Threshold and Mute Threshold

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

Offset Carrier Operation
This transmitter can be set to operate using a 2, 3, 4 or 5-offset carrier system as follows:

- With 2-offset carrier working, the carriers are spaced at ±5 kHz
- With 3-offset carrier working, the carriers are spaced at zero and ±7.3 kHz
- With 4-offset carrier working, the carriers are spaced at ±2.5 kHz and ±7.5 kHz
- With 5-offset carrier working, the carriers are spaced at zero, ±4 kHz and ±8 kHz. [5-offset carrier is available only on HS transmitter variants.]

If using a 2, 3 or 4-offset carrier system, the appropriate offset is selected from the AM-Voice mode settings screen. After selection, no further action is required.

If using a 5-offset carrier system, the appropriate offset (-4 kHz, +4 kHz, -8 kHz or +8 kHz) is selected from the AM-Voice mode settings screen. After selection, the procedure titled ‘Setting a 5-Offset Carrier Frequency’ must be completed; this procedure is found in the Maintenance topic.

Changing the Transmitter's Operating Frequency

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

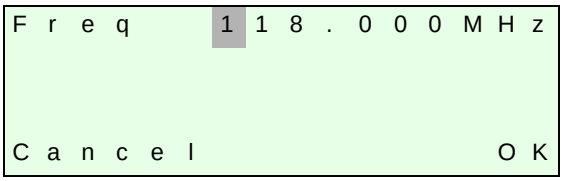
(1) From the Control screen, select frequency to display the Frequency screen.

(2) Turn the switch to highlight the digit to be changed, then press the switch.

(3) Turn the switch until the required digit is shown, then press the switch.

(4) Repeat until the required frequency is shown, then highlight OK and press the switch.

(5) Only frequencies that fall between the band edge settings (see page 61) can be selected.



To Store and Recall Frequency Channels

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

To Store a Channel Frequency:

(1) From the Control screen, select Channel to display the Channel screen. Highlight Channel, press the switch and then turn it until the required channel number is displayed; press the switch.

(2) Highlight the MHz frequency value (see Example 2) press the switch and then turn it until the required MHz value is shown. Press the switch.

(3) Highlight the kHz frequency value (see Example 3), press the switch and then turn it until the required kHz value is shown. Press the switch.

(4) Highlight Store and press the switch. The new frequency is now stored in the selected channel number.

To Recall a Stored Frequency Channel:

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

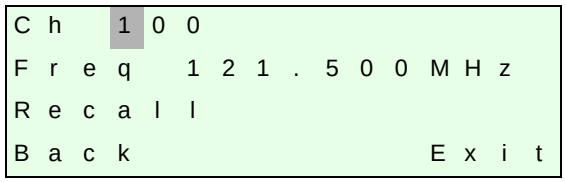
(2) To make the transmitter operate on any preset channel frequency, highlight Channel and press the switch. Turn the switch until the required channel number/frequency is displayed, then press the switch.

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

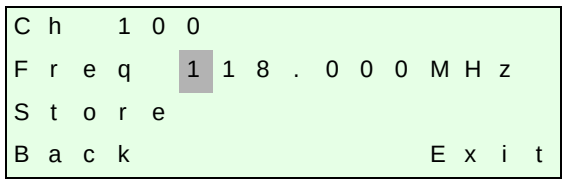
Notes:

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

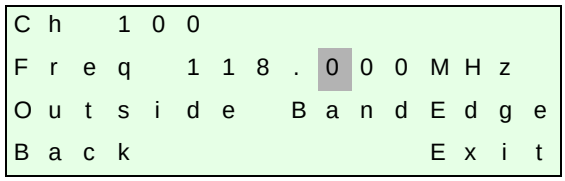
If a frequency not valid for the mode of operation is entered, a message (see Example 4) is displayed.



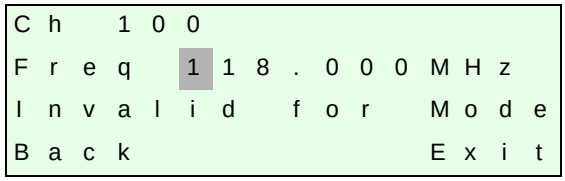
Channel Screen - Example 1



Channel Screen - Example 2



Channel Screen - Example 3



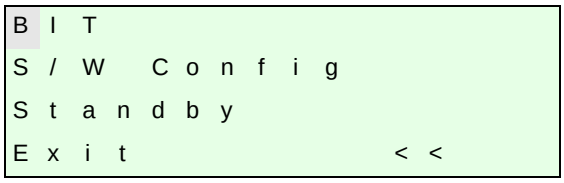
Channel Screen - Example 4

To Initiate a BIT Test

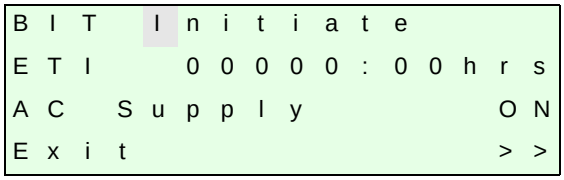
Use the following procedure to initiate an interruptive BIT test from the drive assembly front panel. A BIT test cannot be initiated while the transmitter is keyed. After a BIT test has been run, the BIT screen is displayed (see AM-Voice and AM-MSK BIT Screen on page 57). An interruptive BIT test cannot be initiated in Mode 2 or Mode 3.

> During an interruptive BIT test, the transmitter radiates modulated carrier waves at the set power. Users should therefore obtain the necessary authority before initiating a test.
>
> If the test is to be carried out with the antenna disconnected, ensure a load is fitted to the transmitter's antenna connector.
>
> In order to test the line input stages, an internally generated 1 kHz tone is injected into the line input circuit. Any other audio present on the line input will cause the test to be inaccurate. Therefore the transmitter MUST NOT be keyed during the test.

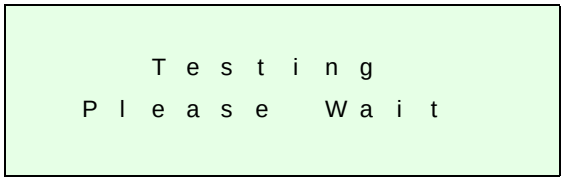
(1) From the Main screen, press the switch to display the Control screen. Turn the switch until BIT is highlighted. Press the switch.



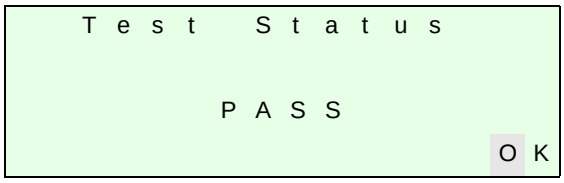
(2) Ensure the BIT menu is displayed. Turn the switch until BIT Initiate is highlighted. Press the switch.

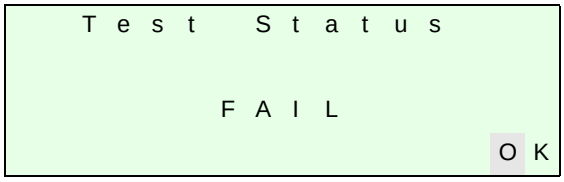


(3) During the test, which takes approximately two seconds, the Testing screen is displayed.



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





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

Standby Mode

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

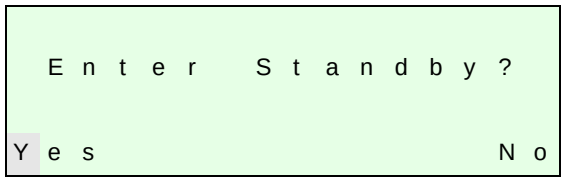
When the transmitter is in Standby mode, the red front panel Standby indicator is lit.

To Enter Standby Mode

(1) From the Control screen select Standby.

(2) At the Standby screen, select Yes.

(3) Check that the LCD blanks and the front panel Standby indicator is lit.

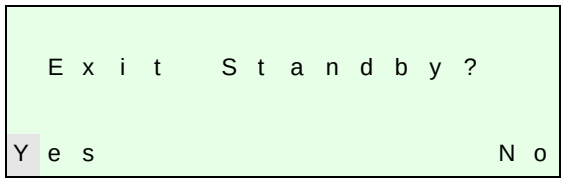


To Exit Standby Mode

(1) Press the Switch.

(2) Select Yes.

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



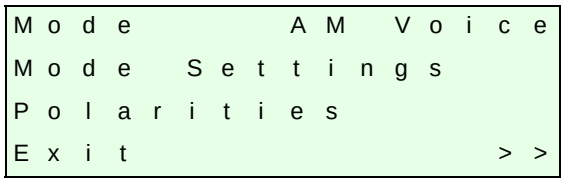
Settings

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

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

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

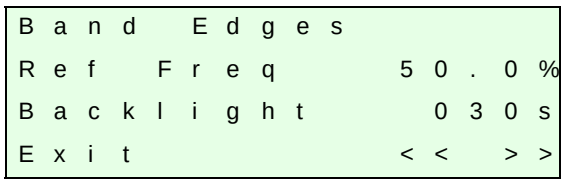
Note that the mode selection, reference frequency and backlight are set from this screen. When mode settings, polarities and band edges are selected the user is taken to other screens.



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

Select for the mode specific Settings menu.

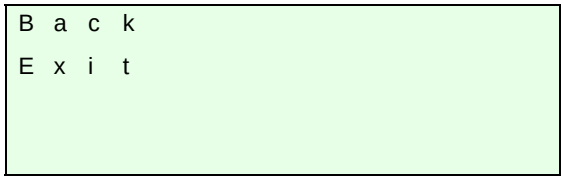
Select for the Polarities menu.



Select for band edge settings screen.

Align the transmitter reference frequency (Note 1).

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



Notes:

(1) Setting the transmitter reference frequency is a maintenance operation. The current value should not be reset unless the correct test equipment is connected. See the Maintenance topic.

(2) The LCD backlight can be set for permanently on, off, or timed to stay on for a period between 15 and 120 seconds.

General and mode specific settings, showing default values, are referenced in Table 8 on the following page. Click on any required parameter by page number for further references.

Table 8 Operational Settings from the Front Panel

Parameter	Mode	Adjustment Range	Factory Default Setting	Further Reference
Menu lock screen	All	Locked or unlocked	Unlocked	page 40
Enter standby mode	All	Yes or No	-	page 46
Exit standby mode	All	Yes or No	-	page 46
Set mode of operation	All	AM-Voice, AM-MSK, Mode 2 or Mode 3	AM-Voice	page 47
Set polarities	AM-Voice, AM-MSK	STD or INV	STD	page 53
Band edges	All	118.000 to 136.975 MHz	118.000 and 136.975 MHz	page 61
LCD backlight	All	15 to 120 s, On or Off	30 s	page 47
RF power	All	30 to 300 W (6 W steps)	300 W	page 49 and page 51
Audio line in level	AM-Voice, AM-MSK	-30 to +10 dBm	-13 dBm	page 49 and page 51
Inhibit	AM-Voice, AM-MSK	On or Off	Off	page 49 and page 51
PTT (key)	AM-Voice, AM-MSK	On (key) or Off (de-key)	Off	page 49 and page 51
Tx time out	AM-Voice, AM-MSK	2 to 510 s or Off	180 s	page 49 and page 51
Modulation depth	AM-Voice, AM-MSK	5 to 95%	85%	page 49 and page 51
Mute	AM-Voice	On or Off	On	page 49
VOGAD	AM-Voice	On or Off	On	page 49
Antenna C/O delay	AM-Voice AM-MSK	On or Off On or Off	On Off	page 49 page 51
Offset	AM-Voice	0, ±2.5, ±4, ±5, ±7.3, ±7.5 or ±8 kHz	0 (No offset)	page 50
Step	AM-Voice	8.33 kHz, 25 kHz or both	25 kHz	page 50
Mic	AM-Voice	Active or Passive	Passive	page 50
Key priority	AM-Voice, AM-MSK	Local-Remote or Remote-Local	Local-Remote	page 50 and page 51
Local PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 50 and page 51
Remote PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 50 and page 51
Remote phantom PTT	AM-Voice, AM-MSK	Enabled or Disabled	Enabled	page 50 and page 51

AM-Voice Settings Procedure

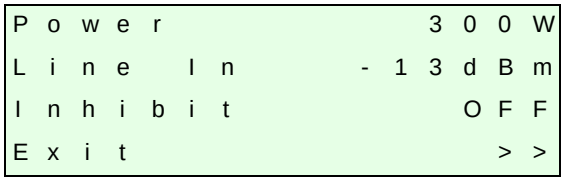
During this procedure, the following parameters, applicable to AM-Voice operation, can be set:

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

AM-Voice Mode Settings Screen

The AM-Voice mode setting screen is accessed from the Settings screen. Use the Scroll/Select switch to select the parameter, then enter the required setting(s). Notes regarding optimum line levels are given on page 42.

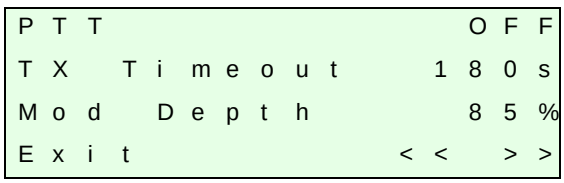
Adjustments



RF power between 30 W and 300 W.

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

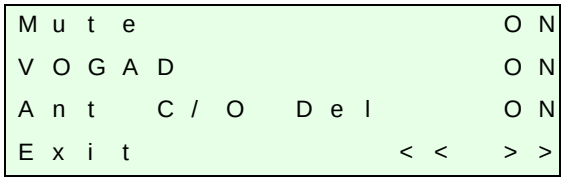
On or Off.



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

2 to 510 s or Off.

5 to 95%.

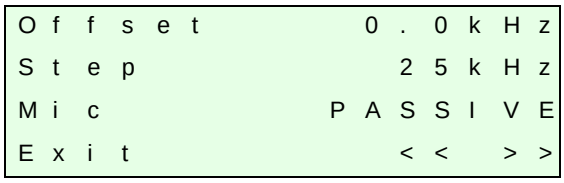


On or Off.

On or Off.

On or Off.

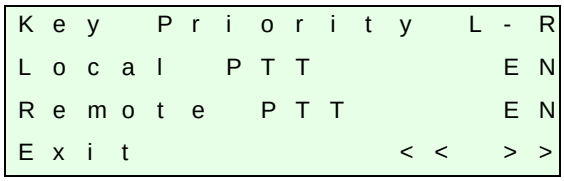
Adjustments



See Offset Carrier Operation on page 42.

25 kHz, 8.33 kHz or both.

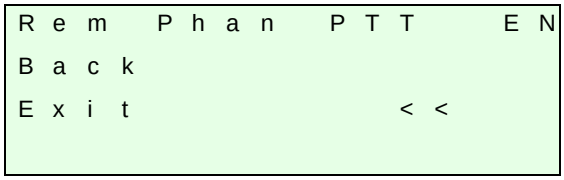
Active or Passive.



Local-remote or Remote-local.

Enabled or Disabled.

Enabled or Disabled.



Enabled or Disabled.

Return to Settings screen.

AM-MSK Mode Settings Procedure

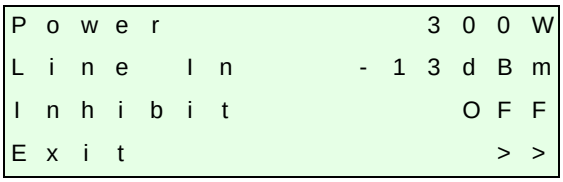
During this procedure, the following parameters, applicable to AM-MSK operation, can be set:

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

AM-MSK Mode Settings Screen

The AM-MSK mode setting screen is accessed from the Settings screen. Use the Scroll/Select switch to select the parameter, then enter the required setting(s). Notes regarding optimum line levels are given on page 42.

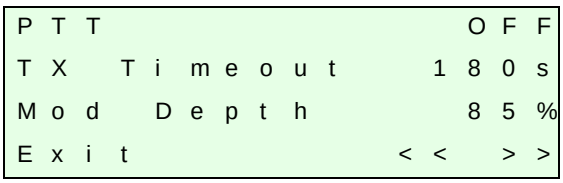
Adjustments



RF power between 30 W and 300 W.

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

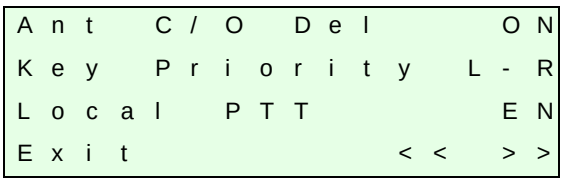
On or Off.



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

2 to 510 s or Off.

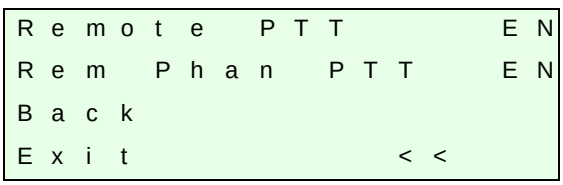
5 to 95%.



On or Off.

Local-remote or Remote-local.

Enabled or Disabled.



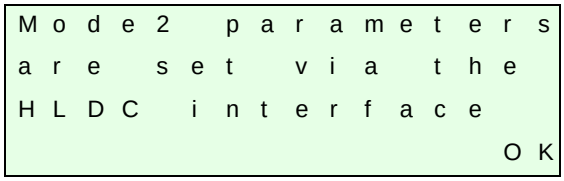
Enabled or Disabled.

Enabled or Disabled.

Return to Settings screen.

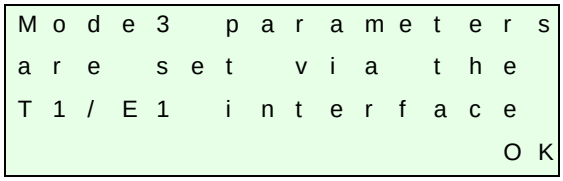
Mode 2 Settings Screen

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



Mode 3 Settings Screen

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



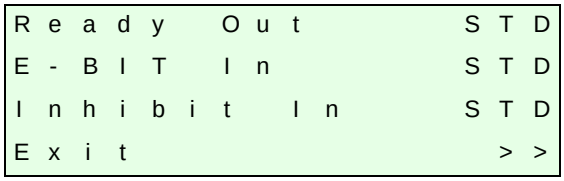
Polarities Screen AM-Voice and AM-MSK

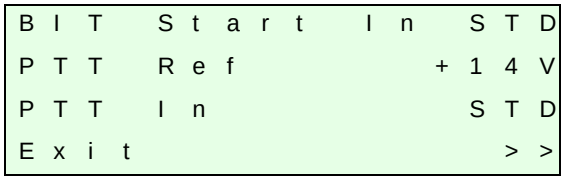
A number of remote indication and control signals can be hardwire connected to the transmitter. These signals, which can have their polarities set to standard (STD) or inverted (INV), are listed in Table 9.

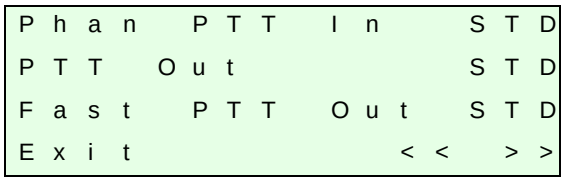
The Polarities screen is accessed from the Settings screen.

AM-Voice and AM-MSK Polarity Settings

Each of ten polarity settings applicable to AM-Voice and AM-MSK can be set to the default STD (standard) or INV (inverted) setting. The signal connections are shown in Table 9 along with the conditions when STD or INV is selected. The settings for the PTT Reference voltage are also given.







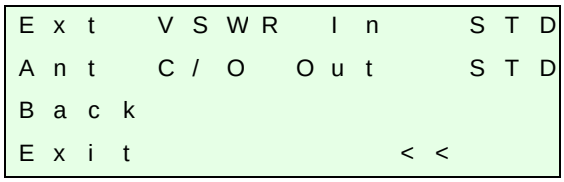


Table 9 AM-Voice and AM-MSK Polarity Settings

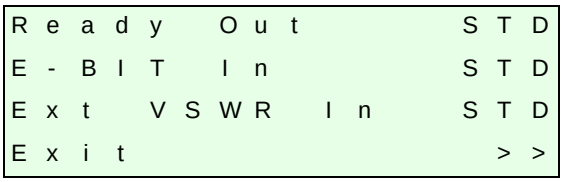
Signal	Connector	Polarity set to STD	Polarity set to INV
Ready Out	Facilities, pin 13	An open collector grounded output when the radio is ready to transmit and no BIT faults are detected.	An open collector high impedance output when the radio is ready to transmit and no BIT faults are detected.
E-BIT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

Continued ...

Table 9 AM-Voice and AM-MSK Polarity Settings (Continued)

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

Mode 2 and Mode 3 Polarity Settings



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

The signal connections are detailed in Table 10 along with the conditions when STD or INV is selected.

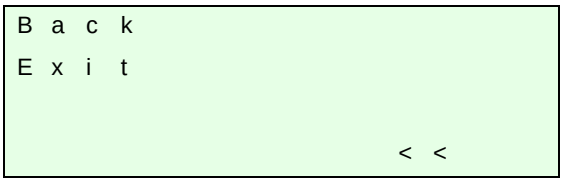
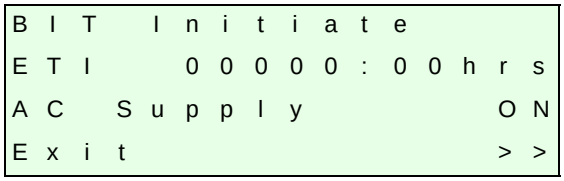


Table 10 Mode 2 and Mode 3 Polarity Settings

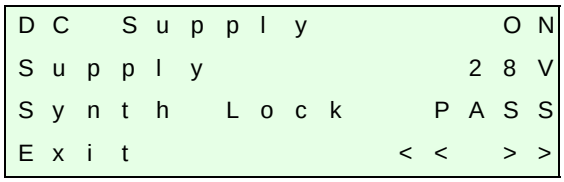
Signal	Connector	Polarity set to STD	Polarity set to INV
Ready Out	Facilities, pin 13	An open collector grounded output when the radio is ready to transmit and no BIT faults are detected.	An open collector high impedance output when the radio is ready to transmit and no BIT faults are detected.
E-BIT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

AM-Voice and AM-MSK BIT Screen

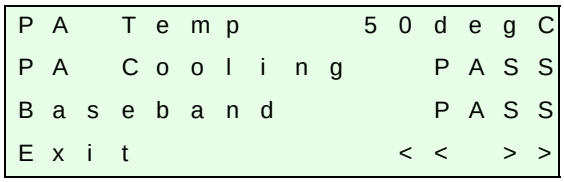
The AM-Voice and AM-MSK BIT screen is accessed from the Control screen.



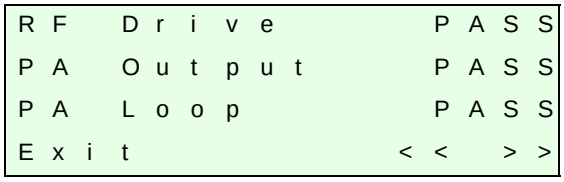
Select to initiate BIT test.
Shows elapsed time 0:00 to 99999:59 (Hrs:Min).
Shows state of ac supply (On or Off).



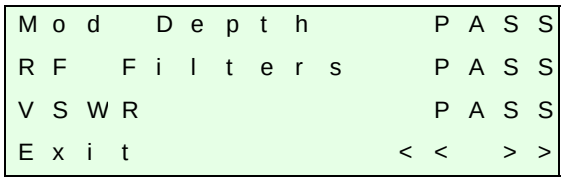
Shows state of dc supply (On or Off).
dc supply 0 to 40 V, <21.6 V Alert, <19 V Alarm.
Pass or Fail (Out-of-Lock).



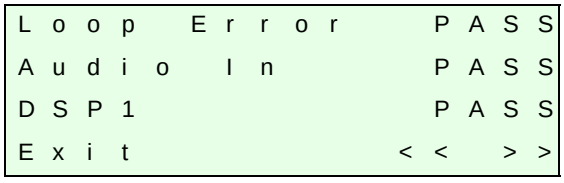
PA temperature -20°C to +150°C.
Pass or Fail.
Pass, Fail or Not Tested.



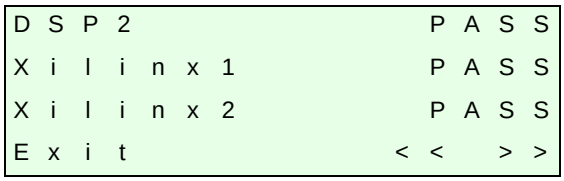
Pass, Fail or Not Tested.
Pass, Fail or Not Tested.
Pass, Fail or Not Tested.



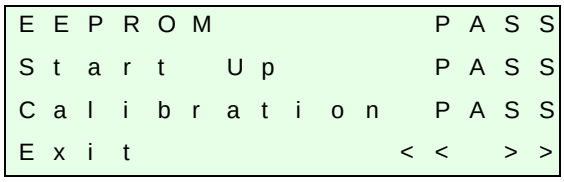
Pass, Fail or Not Tested.
Pass, Fail or Not Tested.
Pass, Fail or Not Tested.



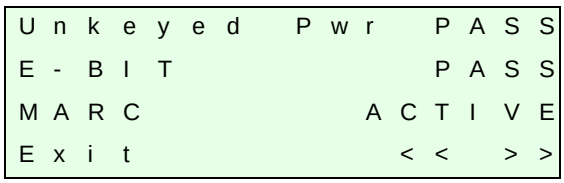
Pass or Fail.
Pass, Fail or Not Tested.
Pass or Fail.



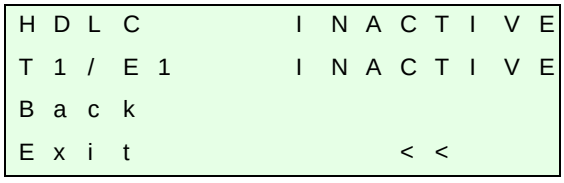
Pass or Fail.
Pass or Fail.
Pass or Fail.



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



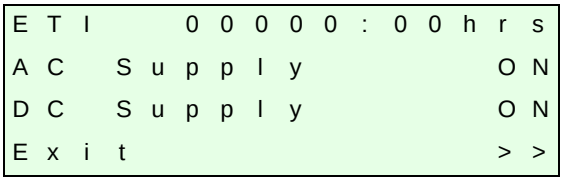
Pass or Fail.
Pass or Fail.
Active or Inactive.



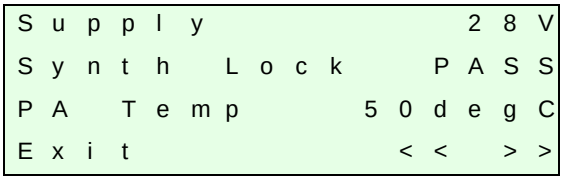
Active or Inactive.
Active or Inactive.

Mode 2 and Mode 3 BIT Screen

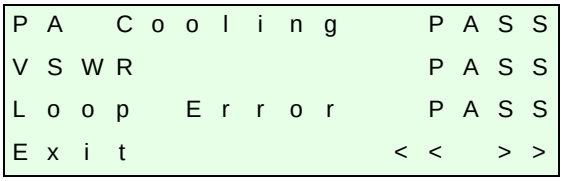
The Mode 2 and Mode 3 BIT screen is accessed from the Control screen.



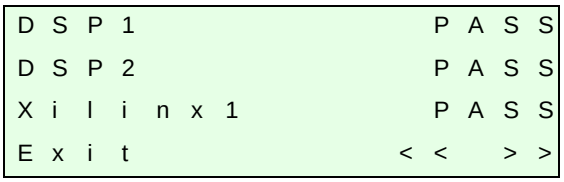
Shows elapsed time 0:00 to 99999:59 (Hrs:Min).
Shows state of ac supply (On or Off).
Shows state of dc supply (On or Off).



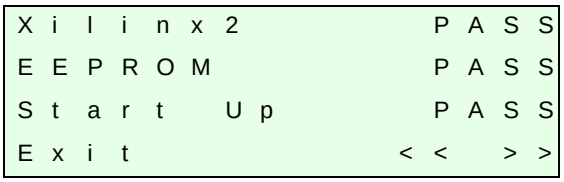
Shows value of dc supply.
Synth lock (Pass or Fail).
Indicates the PA temperature.



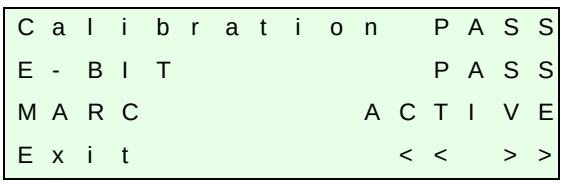
Pass or Fail.
Pass, Fail or Not Tested.
Pass or Fail.



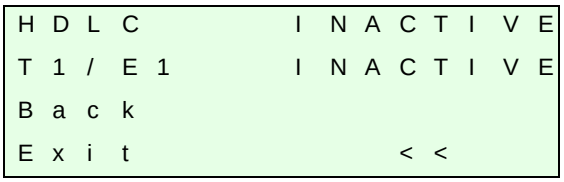
Pass or Fail.
Pass or Fail.
Pass or Fail.



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



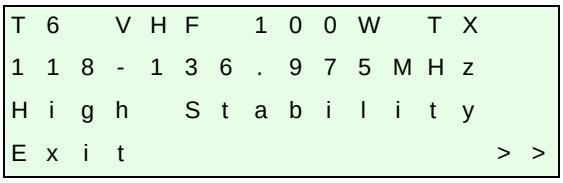
Pass or Fail.
Pass or Fail.
Active or Inactive.



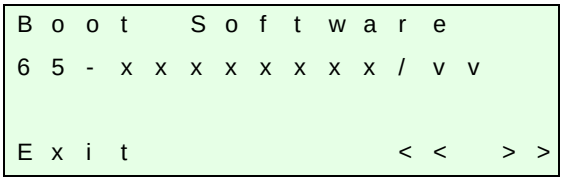
Active or Inactive.
Active or Inactive.

Software Configuration Screens

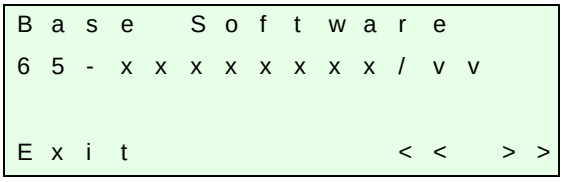
Software configuration screens are as follows:



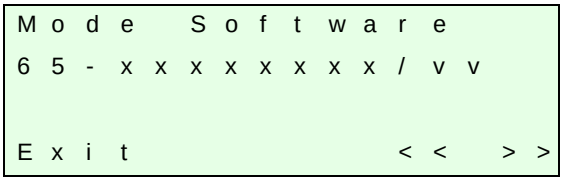
The first screen defines the radio.



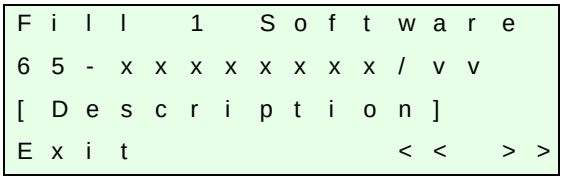
65-xxxxxxxx represents the software part number and /v v represents its version.



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



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

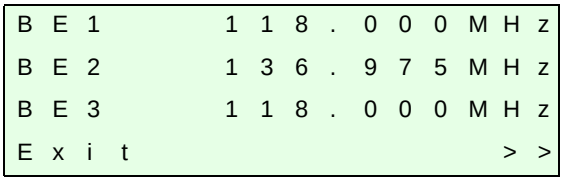


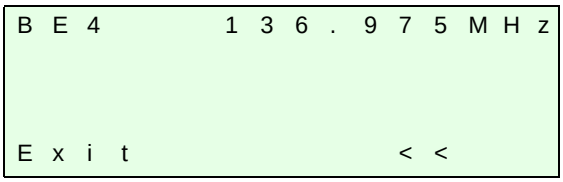
65-xxxxxxxx represents the software part number and /v v represents its version.

The transmitter has four software fills. Fills 2, 3 and 4 screens are the same format as this example shown for Fill 1.

Band Edges

The frequency range of the T6T 300 watt transmitter is 118 to 136.975 MHz. If required, transmission can be limited to either one or two smaller parts of the frequency band by setting the band edges, BE1 to BE4. Transmission is possible between BE1 and BE2 frequencies, and between BE3 and BE4 frequencies.





The Band Edge screen is accessed from the Control screen.

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

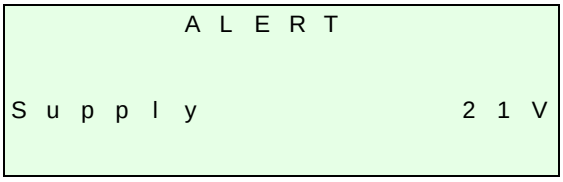
If the transmitter is required to operate over the full range, the band edge parameters must be set to the lowest and highest values in the range (see Table 11).

Table 11 Band Edge Settings

	BE1	BE2	BE3	BE4
B63300HS set so that the full frequency range can be transmitted.	118.000	136.975	118.000	136.975
Example: Transmitter set to transmit only those frequencies in the range 120 to 130 MHz.	120.000	130.000	120.000	130.000
Example: Transmitter set to transmit only those frequencies in the ranges 120 to 125 MHz and 130 to 135 MHz.	120.000	125.000	130.000	135.000

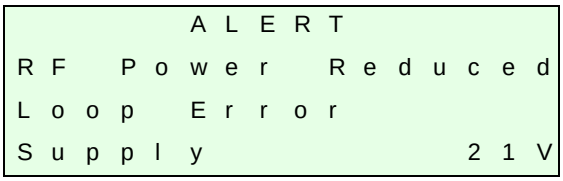
BIT Status Warning Screens

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



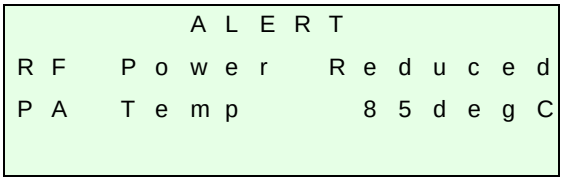
Alert:

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



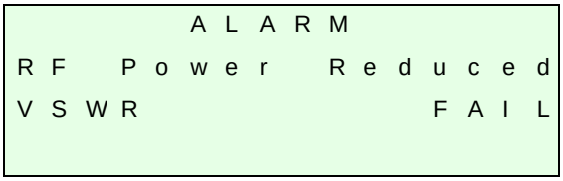
Alert:

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



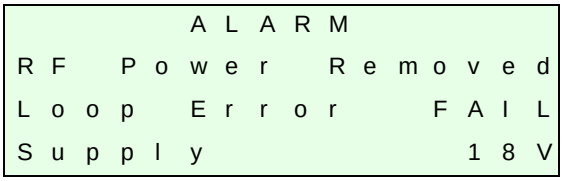
Alert:

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



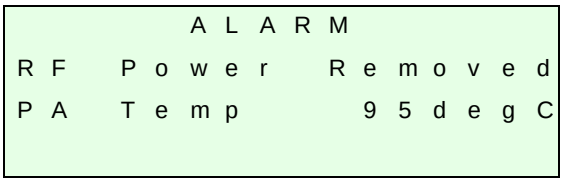
Alarm:

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



Alarm:

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



Alarm:

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

Table 12 Functions and Parameters

Function	Front Panel	VFP	MARC	T6 Controller	T1/E1	HDLC	Default Setting
FREQUENCY							
Change frequency	✔	✔	✔	✔	✔	✔	**118.000 MHz**
FREQUENCY CHANNELS							
Store/Recall preset frequency channels	✔	✔	✔	✔	✗	✗	**-**
SETTINGS							
Set modulation mode	✔	✔	✔	✔	✔	✔	**AM-Voice**
Radio Settings (AM Modes)							
Set RF output power	✔	✔	✔	✔	✔	✔	**300 W**
Set audio input line level	✔	✔	✔	✗	✔	✗	**-13 dBm**
Set inhibit on or off	✔	✔	✔	✗	✗	✗	**Off**
PTT test facility on (key), off (de-key)	✔	✔	**View state**	✗	✔	✗	**Off**
Set Tx time out	✔	✔	✔	✗	✔	✗	**180 s**
Set modulation depth	✔	✔	✔	✔	✔	✗	**85%**
Set mute on or off (AM-Voice only)	✔	✔	✔	✗	✗	✗	**On**
Set VOGAD on or off (AM-Voice only)	✔	✔	✔	✗	✗	✗	**On**
Set antenna C/O delay on or off	✔	✔	✔	✗	✗	✗	**AM-Voice - On** **AM-MSK - Off**
Set frequency offset (AM-Voice only)	✔	✔	✔	✗	✗	✗	**0 (No offset)**
Set frequency step size (AM-Voice only)	✔	✔	✗	✗	✗	✗	**25 kHz**

Continued ...

Table 12 Functions and Parameters (Continued)

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

Continued ...

Table 12 Functions and Parameters (Continued)

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

Continued ...

Table 12 Functions and Parameters (Continued)

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

Installation

Warnings and Cautions

WARNING  **Dangerous Voltage**

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

WARNING  **Dangerous Voltage**

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

WARNING  **Antenna Radiation**

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

The RF field strength from the antenna can be predicted from the equation $S=1.4PG/4\pi R^2$

[Where S = power density; P = power input to antenna; G = antenna gain; R = distance to centre of radiation and 1.4 = multiplication factor for average power based on a modulation index of 90%.]

Based on this formula for a 300 watt transmitter and using a 0 dBi antenna, the predicted safe distance from the centre of radiation would be approximately 1.8 m for a field strength of 10 W/m^2 (1 mW/cm^2).

This meets the requirements of Health Canada Safety Code 6 for RF and microwave exposed workers. For persons not classed as RF and microwave workers and including the general public the limit is 2 W/m^2 (0.2 mW/cm^2) which increases the minimum safe distance to 4.1 m.

Further information on calculating the field strengths and power levels can be found in Health Canada Safety Code 6 'Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range 3 kHz to 300 GHz', and also in FCC document OET Bulletin 65.

Caution  **ESDs**

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

Caution  **Unauthorized Modifications**

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

Introduction

The procedures necessary to install a transmitter are listed in Table 13. Installation is in two parts: Steps 1 to 9 in Table 13 must be completed irrespective of how the transmitter is to be configured; step 10 provides a selection of different configurations.

.

Table 13 Installation Procedures

Step	Procedure	Reference
1	Read and understand the warnings and cautions given on page 68.	
2	Perform an initial inspection of the transmitter and fit the correct ac input fuse.	page 71
3	Fit the drive assembly and amplifiers into an equipment cabinet.	page 72
4	Connect the amplifiers to the drive assembly.	page 73
5	Fitting and connecting the combiner.	page 74
6	Connect the antenna.	page 75
7	Connect the chassis stud to the cabinet or system earth.	page 77
8	Connect the dc input supply (if required).	page 77
9	Connect the ac input supply (if required).	page 78
10	Configuring the transmitter for operational use.	page 79

Fuses and Connectors

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

Table 14 Fuses and Connectors

Component	Type	Park Air Part Number
Fuses:		
AC input fuses, F3 and F4 for 110-240 V input AC input fuse, F2 for 110-240 V input	T6.3AH, 250V T3.15AH, 250V	29L01170108S 29C01100102S
DC input fuses, F1 (drive assembly), F1 and F2 (amplifier)	15A size 0	29-01350201
Connectors:		
AC supply connectors	IEC	20-02030102
DC supply connectors	XLR 3-pin	20-01030106
Antenna connector	N-type plug	19-01030301
MARC connector	9-way D-type plug	Plug: 20-01090100 Cover: 20-09090101
MARC audio	RJ48 plug	20K01080100
MARC data	RJ48 plug	20K01080100
Facilities connector	15-way D-type plug	Plug: 20-01150100 Cover: 20-09150101
HDLC connector	RJ48 plug	20K01080100
T1/E1 connector	RJ48 plug	20K01080100
Reference connector	SMB connector	19C01050300
Microphone/Diagnostics connector	7-pin DIN plug	20-01070101

Installing the Transmitter

Initial Inspection of the Transmitter

The transmitter comprises:

- One T6T VHF drive assembly
- Three T6T VHF amplifiers
- One T6T VHF combiner
- One phasing harness.

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

Fitting the Correct ac Input Fuses

The mains input fuses are an integral part of the rear panel ac connectors. The fuse type must be correct for the local mains supply as detailed in Fig 11.

- The drive assembly has one fuse, F2
- Each amplifier has two fuses, F3 and F4.

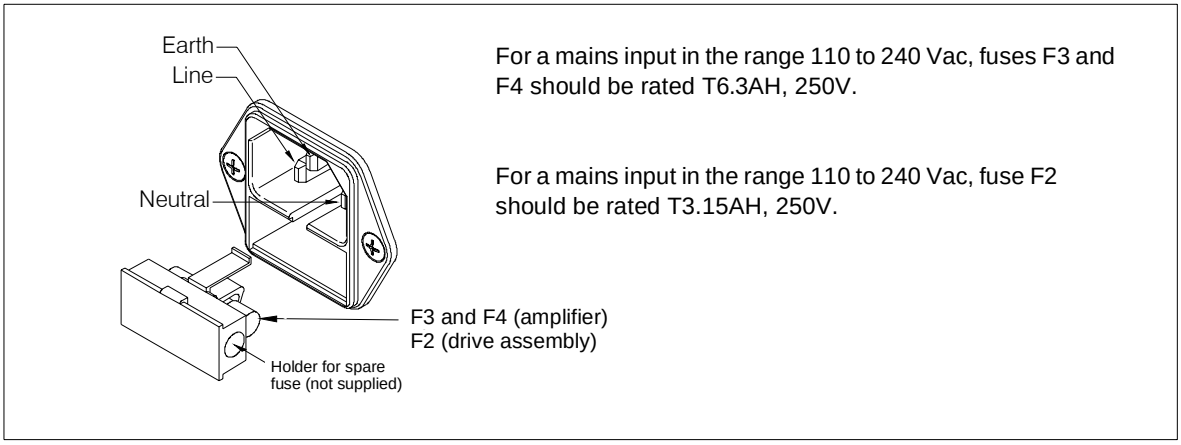


Fig 11 ac Input Fuses

Fitting the Drive Assembly and Amplifiers into an Equipment Cabinet

Caution **Mechanical Support**

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

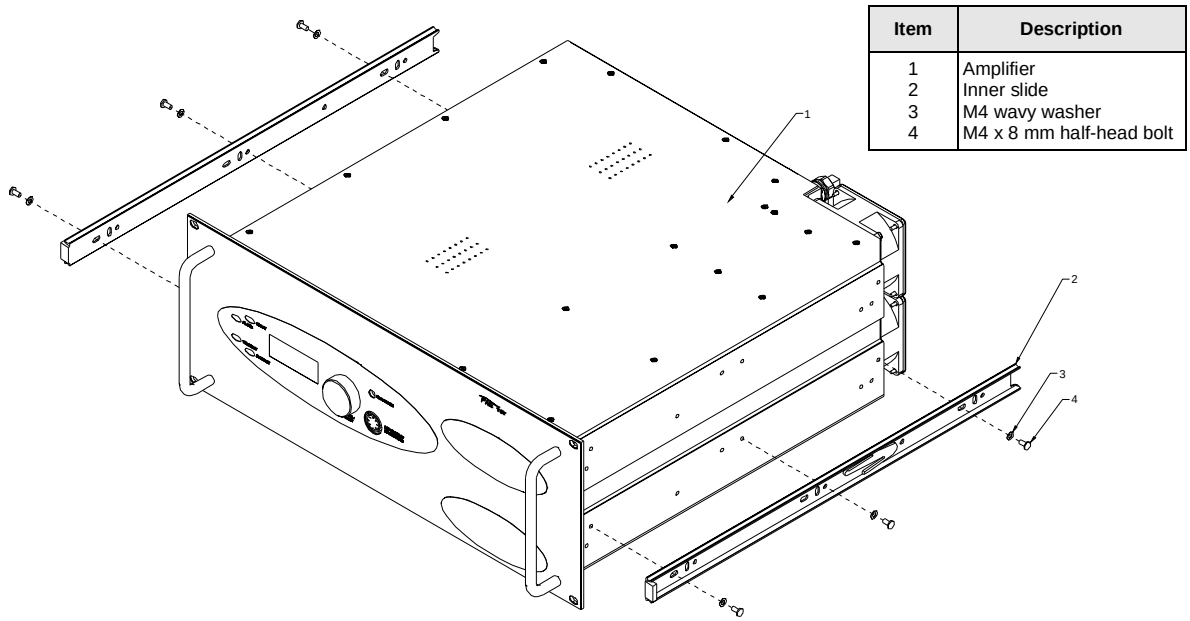
The drive assembly and the three associated amplifiers, which occupy 14 U of cabinet space, should be installed in an equipment cabinet in the order shown here.

The amplifiers are identical and are designated by the numbers 1, 2 and 3 for connection purposes only.

Amplifier 1 (4 U)
Amplifier 2 (4 U)
Amplifier 3 (4 U)
Drive Assembly (2 U)

The drive assembly and amplifiers can be installed on telescopic slides, or on fixed runners, within a standard 483 mm (19 inch) equipment cabinet. M4 tapped holes, each 10 mm deep (see Fig 12) are provided on each side of the equipment to accept the slides. Details of suitable telescopic slides and fixed runners are available from Park Air. Slide fittings (in this case for an amplifier) are shown in Fig 12.

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



Item	Description
1	Amplifier
2	Inner slide
3	M4 wavy washer
4	M4 x 8 mm half-head bolt

Fig 12 Slide Fittings

Connecting the Amplifiers to the Drive Assembly

Having fitted the drive assembly and amplifiers into a cabinet, the units must be interconnected, as shown in Fig 17, using the supplied phasing harness, part number 17L13000006. The connections that must be made are listed in Table 15. Fig 13 shows the amplifier rear panel connectors CN5 and CN8. Fig 14 shows the drive assembly rear panel and Amplifier Out connectors.

Table 15 Amplifier/Drive Assembly Interconnections

Drive Assembly	Amplifier 1	Amplifier 2	Amplifier 3
CN1 CN4	CN8 CN5		
CN2 CN5		CN8 CN5	
CN3 CN6			CN8 CN5

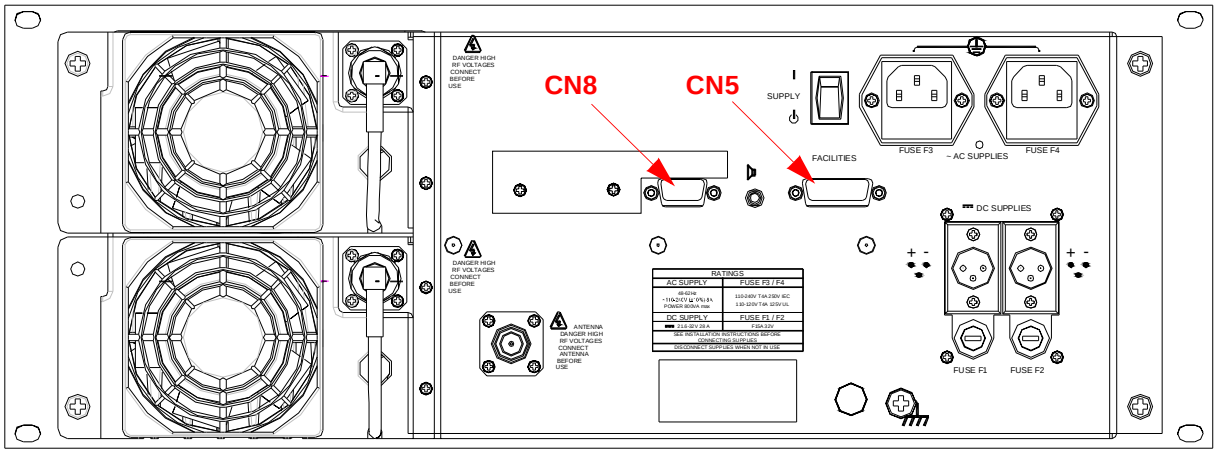


Fig 13 100 Watt Amplifier Rear Panel Showing CN5 and CN8

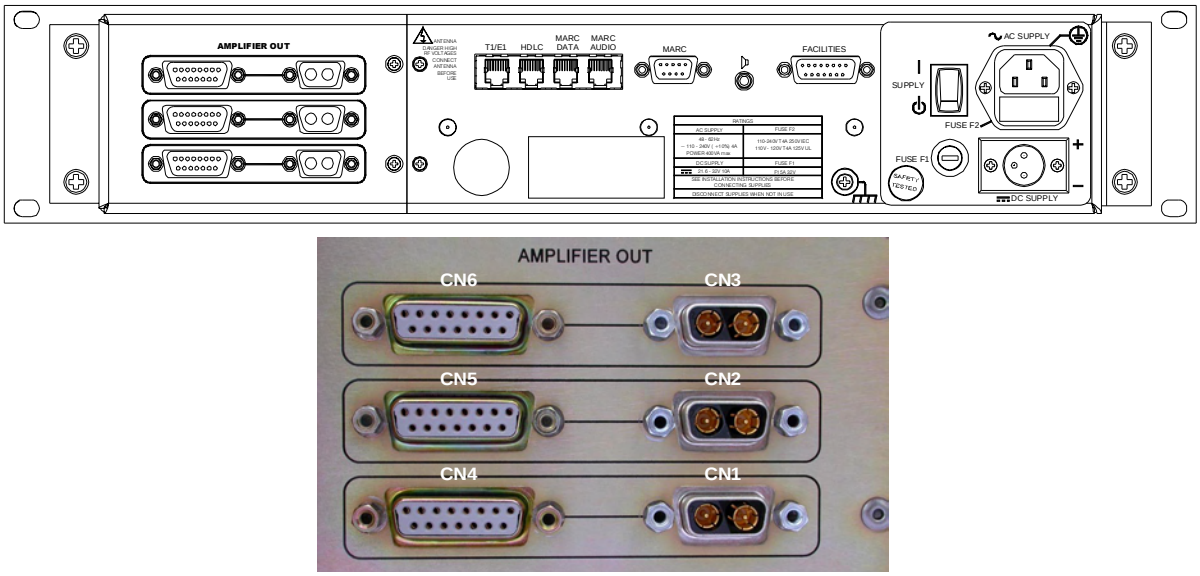


Fig 14 Drive Assembly Rear Panel Showing Amplifier Out Connectors

Fitting and Connecting the Combiner

Fitting

The combiner, shown in Fig 15, should be mounted at the back of the cabinet directly behind the amplifiers' fans and with the heatsink pointing into the cabinet. Cabinet mounting holes are provided in the combiner's bracket to allow fixing to a cabinet upright. Fig 16 shows a plan view of the mounting arrangement.

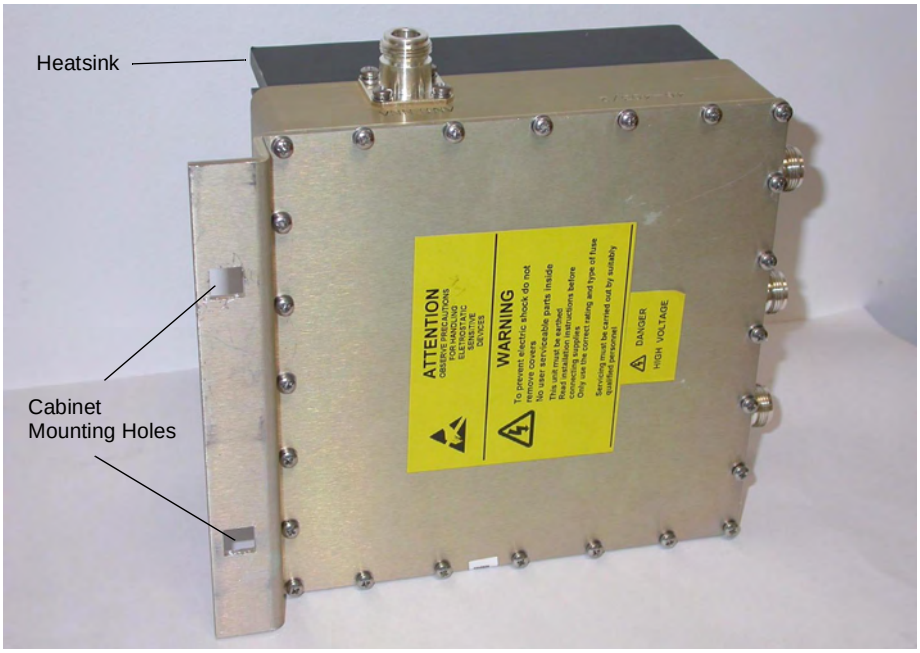


Fig 15 Combiner

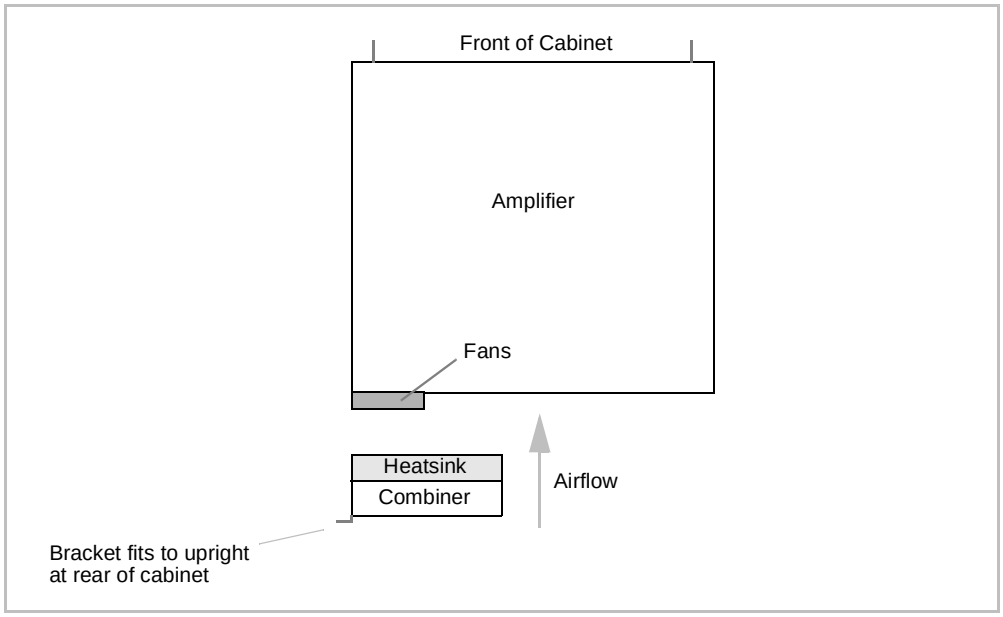


Fig 16 Combiner Mounting Arrangement Plan View

Connecting

A coaxial cable connects each amplifier to the combiner's three inputs (marked IN) as shown in Fig 17. These cables are part of the phasing harness, part number 17L13000006.

Caution  **Critical Length Cables**

The cables used to connect from the amplifiers to the combiner are critical length. Use only the cables supplied by Park Air.

Connecting the Antenna

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

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.

The RF field strength from the antenna can be predicted from the equation $S=1.4PG/4\pi R^2$

[Where S = power density; P = power input to antenna; G = antenna gain; R = distance to centre of radiation and 1.4 = multiplication factor for average power based on a modulation index of 90%.]

Based on this formula for a 300 watt transmitter and using a 0 dBi antenna, the predicted safe distance from the centre of radiation would be approximately 1.8 m for a field strength of 10 W/m^2 (1 mW/cm^2).

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Further information on calculating the field strengths and power levels can be found in Health Canada Safety Code 6 'Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range 3 kHz to 300 GHz', and also in FCC document OET Bulletin 65.

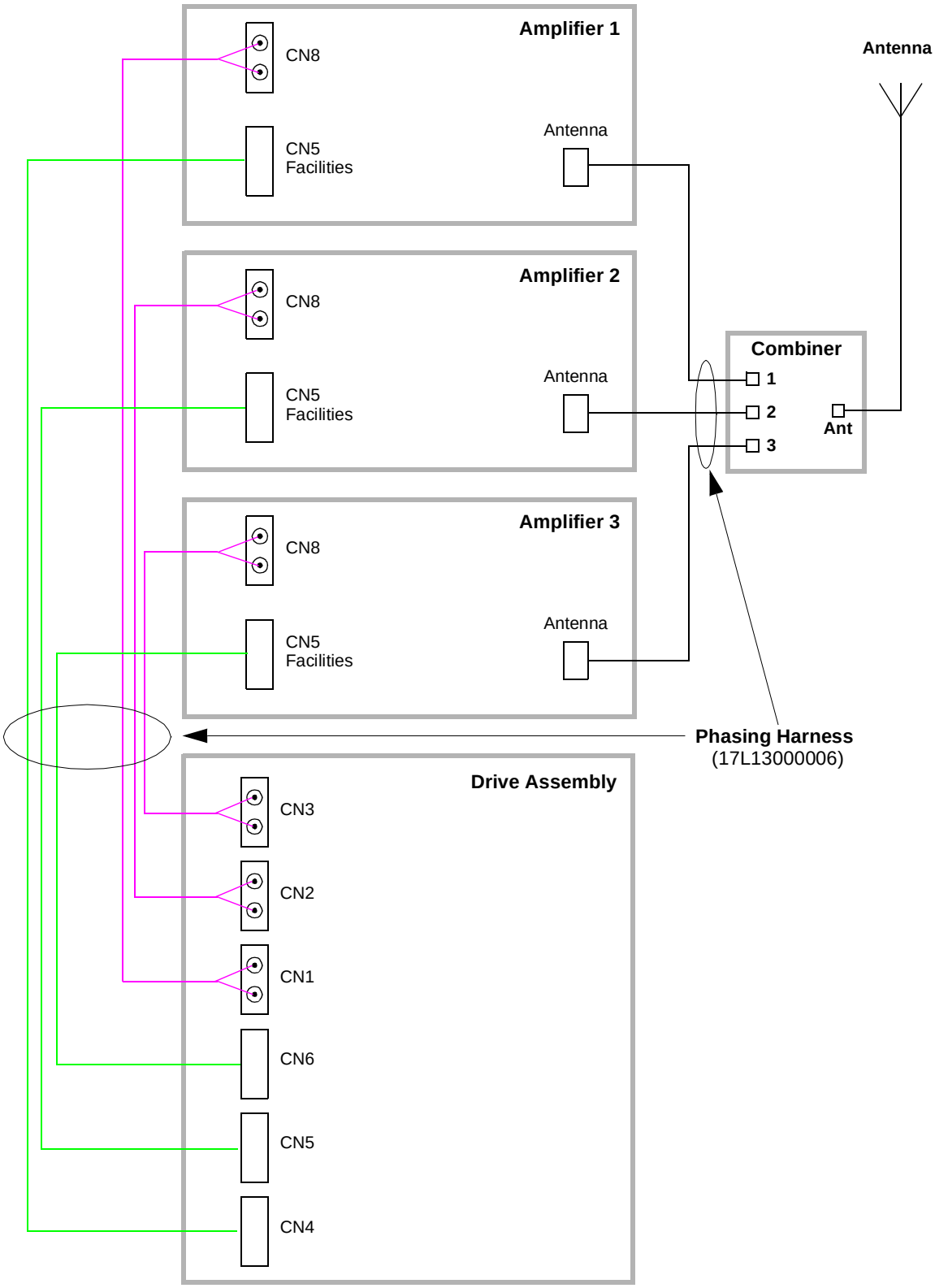

Fig 17 300 Watt Transmitter Interconnections

Connecting the Chassis Stud

WARNING **Chassis Earth**

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

In order not to compromise the transmitter's Electromagnetic Compatibility (EMC) the chassis stud, marked ⏚ and fitted to the rear panel must be connected to the equipment cabinet (if a cabinet is being used) or to the user's system earth point. The connection should be made using a single tri-rated, green-and-yellow cable having a cross-sectional area of 2.5 mm^2. The cable should have CSA and UL1015 approval, and be connected to the chassis stud through an M6 eyelet (for example, Park Air part number 20-08010103).

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

Connecting the DC Input Supply

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

Two dc input supply connectors (see Fig 18) are used on each amplifier and one on the drive assembly. The recommended minimum rating of the dc supply cables is: 2-core having a cross-sectional area of 1.5 mm^2 per core. The supply cables should be fitted with XLR 3-pin connectors (Park Air part number 20-01030106).

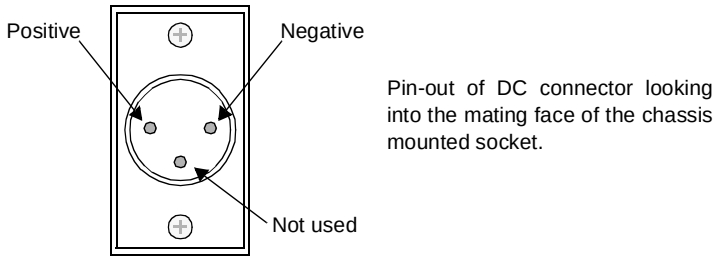

Fig 18 DC Connectors

Connecting the AC Input Supply

WARNING **Dangerous Voltage**

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

WARNING **Earth Connection**

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

Two ac input connectors are fitted to each amplifier rear panel, and one to the drive unit rear panel. The cables used to connect between the equipment and the ac power source should be 3-core (to IEC 227) rated 250 Vac at 8 amps, and have a minimum cross-sectional area of 1.0 mm^2 per core. Park Air recommends the use of polyvinyl chloride (PVC) insulated cable. The cable must be fitted with the IEC approved equipment connector 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 300 W transmitter is a Class 1 equipment. The ac supply cables should have a green-and-yellow protective earthing conductor electrically connected to the protective earthing terminal of the equipment connector and the mains plug. Park Air recommends the ac supply cable is colour coded in accordance with the electrical appliance (colour code) regulations for the UK. That is:

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