

**Park Air**  
**T6-TRV VHF Transceiver**  
**User Documentation**

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## Foreword

This user documentation gives the necessary information for a user to install and understand the operation of the radio supplied by Northrop Grumman.

## Copyright and trademarks

This documentation could contain information provided by other equipment manufacturers. It is acknowledged that the copyright of any third party information is retained by the respective holder. Similarly, any trademarks and protected names or symbols contained in this documentation, or associated documentation, belong to their respective holder.

## Amendments and modifications

Amendments to this documentation are listed below.

Amendment number	Incorporated by	Date	Brief details

Modifications are listed below.

Modification state	Embodied by	Date	Brief details

**Note:**

This documentation contains sections of text and text in tables that are 'greyed out' [REDACTED]. These reflect radio functionality and documentation that are under revision.

## Health and safety

### Disposal



This equipment is covered by the European Directive 2012/19/EU.

Items must not be disposed of in domestic waste.

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

RoHS Directive 2011/65/EU compliant.

### Warnings

A warning is used to show possible danger to personnel. In this documentation, warnings are shown by the following symbols:



**Shows electrical danger to personnel**



**Shows a specified danger to personnel**



**Shows a non-ionizing radiation hazard**

### Cautions

A caution is used to show possible danger to the equipment. In this documentation, cautions are shown by the following symbols:



**Shows the presence of electrostatic sensitive devices (ESDs)**



**Shows a specified danger to the equipment**

**Dangerous voltage**

You must be suitably qualified to terminate a mains supply to the equipment.

**Antenna radiation**

The transmit antenna must be installed such that the resultant radiated field strength is below national limits, see "Annex" for limits and examples. The safe distance must be calculated for each installation.

**No user serviceable parts inside the radio**

There are no user serviceable parts inside the radio. Access to the fan is from the rear of the radio.

**Double pole/neutral fusing**

The radio uses a power supply which has both live *and* neutral fuses.

**AC socket-outlet**

The AC socket-outlet must be installed near the radio and must have easy access.

**Earth connection**

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

**AC and/or DC supply**

The power cord/s is/are the radio's disconnect supply device/s.

**AC supply fuse rating**

The radio AC supply must have a 5 Amp time-delay fuse fitted.

**Unauthorized modifications**

Changes or modifications made to equipment without the approval of Northrop Grumman, or parties authorized by Northrop Grumman, could invalidate the user's authority to operate the equipment.

**ESDs**

Modern electronic equipment contains Electrostatic Sensitive Devices (ESDs). Use necessary precautions to prevent damage to such devices.

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## Park Air Services

Use email, telephone or fax to contact Park Air Services. For help with configuration, installation or maintenance of equipment, use any of the contact methods listed below.

**Email:** [support@parkairsystems.com](mailto:support@parkairsystems.com)

**Telephone (24 hours):** Within the UK, 01778 381557  
International, +44 1778 381557

**Mail:** Customer Services Department  
Northrop Grumman  
Park Air Systems Ltd  
Northfields  
Market Deeping  
Peterborough PE6 8UE  
UK

**Web Site:** [www.northropgrummaninternational.com/capabilities/aviation-customer-support](http://www.northropgrummaninternational.com/capabilities/aviation-customer-support)

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## Approvals and standards

### Approvals

CE R&TTE Directive 1999/5/EC/RED 2014/53/EU

### Standards

EMC EMC EN 301 489-22 v1.3.1 2003-11

Safety BS EN 60950-1:2010

AM Voice EN 300 676-1 v1.5.2 2011-03

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CE type approval**Declaration of conformity**

<b>Company information</b>	Park Air Systems Limited (a wholly owned subsidiary of Northrop Grumman Corporation)  Northfields, Market Deeping, Peterborough, PE6 8UE  +44 1778 345 434
<b>Product, model and description</b>	PARK AIR T6  T6 -TRV  Ground to air transceiver for use in the VHF aeronautical band using 25/8.33kHz channel spacing
<b>Standards</b>	EN60950-1 (2006+A1:2010, incorporating amendment A11:2009)  EN301 489-22 (V1.3.1 2003-11)  EN62311 (2008)  EN300 676-1 (V1.5.2 2011-03) / EN300 676-2 (V1.5.1 2011-09)
<b>Mark and notified body</b>	<b>CE0168</b> ①  TÜV SÜD Product Service  Octagon House, Concorde Way, Segensworth North, Fareham, Hampshire, PO15 5RL

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The product has been tested to the listed standards and is confirmed as being in compliance with the essential requirements and provisions of Directive 1999/5/EC.

The conformity assessment procedure referred to in Article 10 and detailed in Annex IV of the Directive 1999/5/EC has been followed with the involvement of the notified body.

The technical documentation relevant to the product will be held at Park Air Systems Limited for not less than ten years after the last product has been manufactured.



**Neil Upton**  
Technical Director, Park Air Systems Limited

## About this user documentation

This user documentation has eight sections:

- Section 1. [Overview](#)
- Section 2. [Description](#) - the human machine interface and detailed connectivity
- Section 3. [Installation](#) - standalone, the Park Air C4 cabinet and legacy T6 cabinet
- Section 4. [Operation](#) - how to use the Park Air T6-TRV
- Section 5. [Maintenance](#) - periodic tasks and part replacement
- Section 6. [Connector information](#) - interface types and levels
- Section 7. [Specification](#)
- Section 8. [Associated equipment](#)
- Quick Start - a copy of the Quick Start guide supplied with the radio
- [Index](#) - to help the reader find keywords and topics.

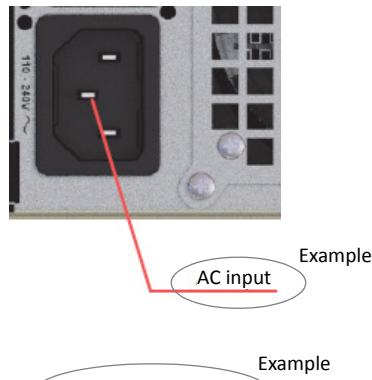
A cross-reference to a section is shown as the section or sub-section number and the title. An example is, [4.3.2 How to set a radio configuration](#).

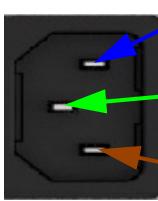
A cross-reference to a page is shown as the page number. An example is, [page 4-3](#).

A glossary of terms can be found in [Glossary of abbreviations, acronyms and technical terms on page x](#). To help the reader, the first time a term is used in the book, it is italicized and emboldened. An example is, [\*main/standby\*](#).

A table of associated equipment from the Park Air Sapphire range can be found in [Associated equipment](#). To help the reader, the first time a product is mentioned in the book, it is italicized. An example is [\*Park Air C4 cabinet\*](#).

The electronic (PDF) version of this documentation has text-links to help the reader navigate topics as shown in the examples:



Connector	Connection	Characteristics
AC input IEC-C14 chassis plug	 <div style="border: 1px solid blue; padding: 2px;">Neutral</div> <div style="border: 1px solid green; padding: 2px;">Earth</div> <div style="border: 1px solid brown; padding: 2px;">Live</div>	<p>Input supply: 99 to 264 V AC. Frequency: 47 to 63 Hz.</p> <p>No more than 400 VA while the radio transmits under any condition.</p> <p><b>Note:</b> The connections are shown as viewed on the rear panel of the radio.</p>

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## Glossary of abbreviations, acronyms and technical terms

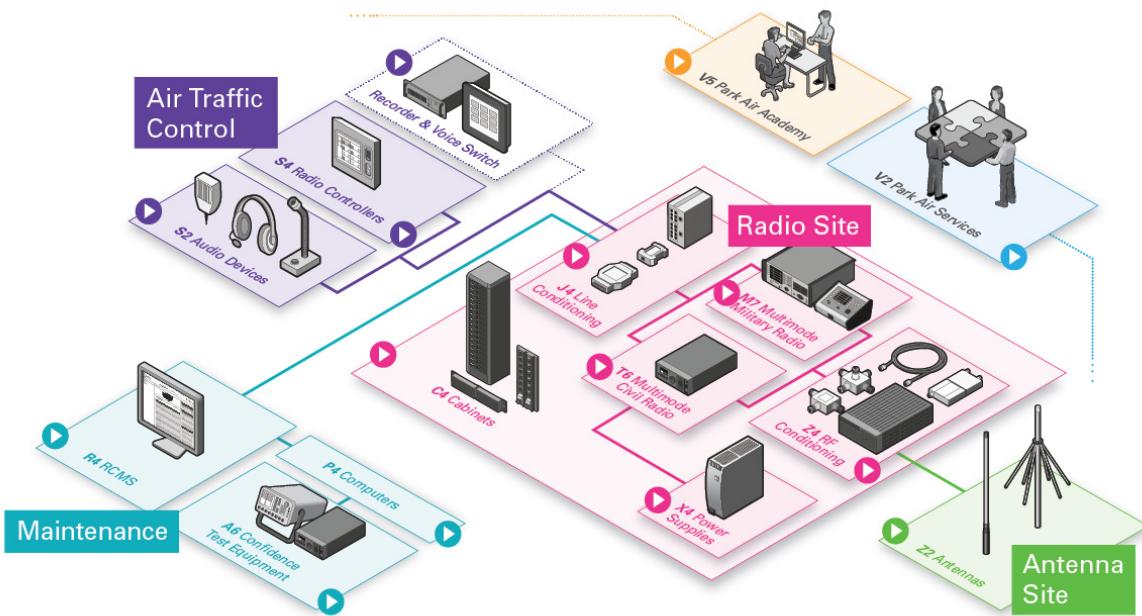
A	Ampere
AC	alternating current
ACARS	aircraft communications addressing and reporting system
Active	The radio is operationally active (IP RRC terminology)
AGC	automatic gain control
ALC	automatic level control
AM	amplitude modulation
ATC	air traffic control
ATM	air traffic management
baud	symbol rate or modulation rate in symbols per second or pulses per second
BIT	built-in-test
co-location	A location with multiple radio channels and/or users
CPLD	complex programmable logic device
dB	decibel
dBm	dB relative to 1 mW
dB <sub>r</sub>	dB relative to a specified level
DC	direct current
E1	E-carrier system frame structure (ITU-T adopted)
ESD	electrostatic sensitive device
ED-137	Interoperability standards for VoIP ATM components
Ethernet	Computer network technologies
E-BIT	external bit signal
GPS	Global Positioning System
HDB3 coding	High density bipolar of order 3 used in European E-carrier system
HTTPS	Hypertext transfer protocol within a connection encrypted by transport layer security (TLS)
Hz	Hertz
IEC	International Electrotechnical Commission
Inactive	The radio is operationally inactive (IP RRC terminology)
Inhibit(ed)	A function in the radio is stopped
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
kg	kilogram
LAN	local area network
LED	light emitting diode
m	metre
MAC	media access control
Main/standby	The radio is operationally main or standby (analogue radio control terminology)
MARC	multi access remote control
Mbits	megabits
Mute	Transmit audio/audio level is prevented
Network Jitter	Variation in packet transit delay

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**Glossary of abbreviations, acronyms and technical terms (continued)**

Off-air standard	An extremely high stability RF frequency source, for example GPS
OLED	organic light emitting diode
Ohm	unit of resistance
Phantom PTT	DC control voltage applied to transmit audio input lines
Phantom Squelch	DC control voltage applied to receive audio output lines
pk-pk	peak to peak
ppm	parts per million
PTT	press-to-transmit or push-to-talk
RF	radio frequency
RJ45	8 position 8 contact (8P8C) connector
RCMS	remote control and monitoring system
rms	root mean square
RRC	radio remote control
RSSI	received signal strength indication
RS422	Differential signalling standard
RS485	Differential signalling standard for networks
Rx or RX	receiver
SCT	simultaneous call transmission
SDR	software defined radio
Self-receiving	The radio receives the radio's transmission
SNMP	Single Network Management Protocol
subnet mask	bit mask or dot-decimal notation
squelch	receive audio/audio level is stopped
TTL	transistor-transistor logic
TR	transceiver
Tx or TX	transmitter
UHF	ultra high frequency
USB	universal serial bus
V	Volt
VA	Volt-Ampere
VCCS	voice communications control system
VDL Mode 2	VHF air-ground Digital Link, data transmission Mode 2
VHF	very high frequency
VoIP	Voice over Internet Protocol
VSWR	voltage standing wave ratio
W	Watt
4-wire E & M	Analogue transmit and receive audio with squelch and PTT signalling

## Park Air Sapphire



The Sapphire concept builds on almost 50 years of Park Air innovation, delivering a truly integrated approach to providing ground-to-air solutions.

The aim of Sapphire is to optimise the customer's experience. The result is a coherent and unified collection of system components, backed up by a tailored suite of support services.

From radios, controllers and filters to headsets and antennas, the Sapphire portfolio includes everything required for ATC communication systems. Just as importantly, the Sapphire components are designed to integrate perfectly for stress-free implementation and operation.

The name Park Air has been synonymous with ATC communications since 1966 and has always been a name you can trust. Now Sapphire represents the pinnacle of Park Air expertise, innovation and industry knowledge.

At the heart of Sapphire is the latest evolution of the world's leading ground-to-air radio platform, the Park Air T6. Packed with the latest technology, the T6 Radios offer outstanding performance for VHF and UHF coverage.

## 1 Overview

### 1.1 Introduction

The Park Air T6-TRV VHF transceiver is a class-leading analogue and **IP**, **ACARS**, voice and data radio, with the flexibility for any **ATC** scenario, integrated into a small light package.



The Park Air T6-TRV options:

- There are four frequency range options that extend from 112 to 155.975 MHz
- There are four maximum transmit power output options from 10 to 50 watts
- Software defined analogue and digital waveform options
- Park Air **SCT** - Simultaneous Call Transmission detection.

The options are shown in [1.2.2 Park Air T6-TRV options](#).

The Park Air T6-TRV features:

- Class-leading **RF co-location** performance
- Less power consumption
- Extended service interval and service lifetime
- 2U height and half-width (compared to 19-inch standard fitting)
- Tool-free installation into the **Park Air C4 cabinet**
- No materials specified in the Restriction of Hazardous Substances (RoHS 2)
- Backwards compatibility with the legacy T6 range for example, the Park Air E1-RIC.

The radio's IP connectivity provides:

- **VoIP** operation in accordance with **ED-137**
- Monitoring and control in accordance with ED-137
- Comprehensive monitoring and control of radio features through **SNMP**
- **HTTPS** web server interface.

The Park Air T6-TRV accessories:

- Connector kit
- Mounting adaptor for legacy cabinets.

The accessories are shown in [1.2.3 Park Air T6-TRV accessories](#).

### 1.1.1 Standalone operation

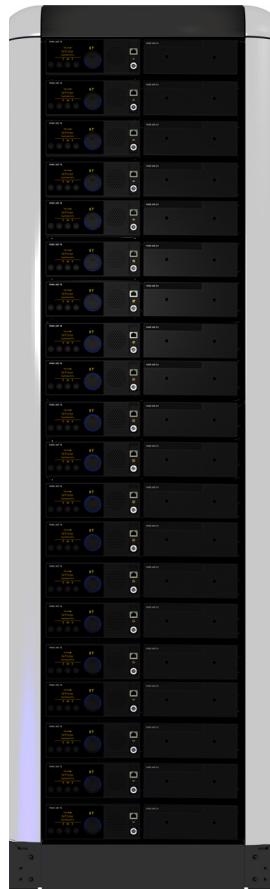
The Park Air T6-TRV can be used as a standalone desktop radio with the addition of a suitable AC and/or DC supply, a VHF antenna or antennas and a microphone or headset. Park Air Sapphire products are:

- Park Air T6-A-CK Connector Kit
- Park Air S2 microphone*
- Park Air S2 headset.*

Installation details are shown in [3.1 Park Air T6 standalone installation](#).

### 1.1.2 Park Air C4 cabinet installation

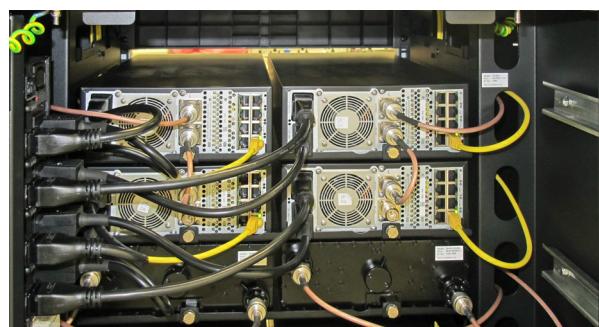
The Park Air T6 radios and *Park Air Z4 filters* are specifically designed to fit the Park Air C4 cabinet. The C4 cabinet (40U) can accommodate up to 40 T6 radios or Z4 filters.



The Park Air C4 options:

- 40U or 30U capacity.

Typical T6 radio and Z4 filter installation:



Installation details are shown in [3.2 Park Air C4 cabinet installation](#).

## 1.2 Park Air T6-TRV

The product codes and product names of the radio, options, accessories and documentation for the T6-TRV radio.

### 1.2.1 Park Air T6-TRV product code

Product code	Product name	Notes
T6-TRV	VHF transceiver	

### 1.2.2 Park Air T6-TRV options

Product code	Product name	Notes
T6-O-112-137	112 MHz to 137 MHz frequency range for T6 radios	
T6-O-112-156	112 MHz to 156 MHz frequency range for T6 radios	
T6-O-118-137	118 MHz to 137 MHz frequency range for T6 radios	
T6-O-118-156	118 MHz to 156 MHz frequency range for T6 radios	
T6-O-10W	10 W maximum power output for T6 radios	
T6-O-25W	25 W maximum power output for T6 radios	
T6-O-30W	30 W maximum power output for T6 radios	
T6-O-50W	50 W maximum power output for T6 radios	
T6-O-AMA	ACARS waveform for T6 radios	
T6-O-AMV	AM-voice waveform for T6 radios	Includes VoIP in accordance with all editions of ED-137
T6-O-AMW	AM-wideband waveform for T6 radios	
T6-O-SCT	Simultaneous Call Transmission Detection algorithm for T6 radios	
T6-O-VDLM2	VDL-Mode 2 waveform for T6 radios	

### 1.2.3 Park Air T6-TRV accessories

Product code	Product name	Notes
T6-A-CK	Connector kit for T6 radios	Includes AC mains power lead, DC power connector, N-type connector and <b>RJ45</b> to RJ45 patch cable
T6-A-CMA1	Cooper B-Line cabinet mounting adaptor for one or two T6 radios	

### 1.2.4 Park Air T6-TRV documentation

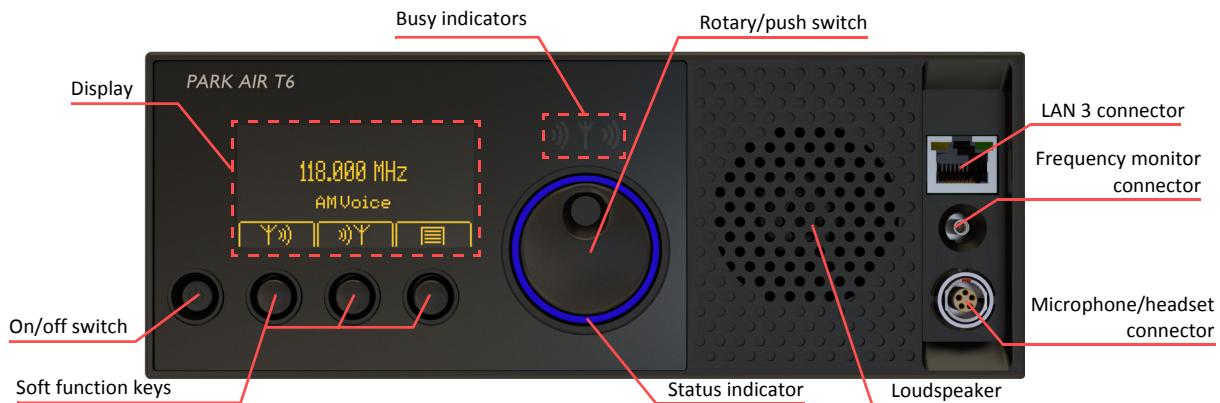
Product code	Product name	Notes
T6-D-USER-TRV-EN	User documentation for T6-TRV in English	

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## 2 Description

The T6-TRV interfaces are shown in this section.

### 2.1 Front panel interfaces



Control		Notes
On/off switch	Front panel on/off of the radio	See <a href="#">2.1.1 On/off switch</a>
Display	Parameter fields and soft function icons	See <a href="#">2.1.2 Display</a>
Soft function keys		See <a href="#">2.1.3 Soft function keys on page 2-2</a>
Busy indicators		See <a href="#">2.1.4 Busy indicators on page 2-3</a>
Rotary/push switch	Volume control, display control and selection	See <a href="#">2.1.5 Rotary/push switch on page 2-3</a>
Status indicator	<b>BIT</b> and radio <b>inhibit</b> status	See <a href="#">2.1.6 Status indicator on page 2-3</a>

Connector		Connectivity
LAN 3	10/100 Mbps, RJ45	 <p>See <a href="#">LAN 3 connector on page 6-1</a></p>
Reference frequency monitor	20 MHz high impedance output, SMB	 <p>See <a href="#">Reference frequency monitor connector on page 6-1</a></p>
Microphone/headset	Microphone, <b>PTT</b> and receive audio, LEMO™	 <p>See <a href="#">Microphone/headset connector on page 6-1</a></p>

### 2.1.1 On/off switch

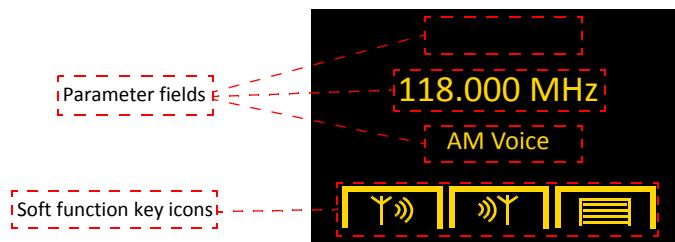
Control	Notes
	On/off switch The power cord is the power disconnect device.

**Note:**

This action symbol is used in the document.

### 2.1.2 Display

This is a high resolution **OLED** display.



**Notes:**

In the example, two parameter fields are shown and one is blank. Up to three parameter fields can be shown or blank.

The display brightness decreases after 24 hours

### 2.1.3 Soft function keys

There are three soft function keys below the display. Soft function icons are displayed above the keys and shown in 2.1.3.1 Soft function icons.

#### 2.1.3.1 Soft function icons

Soft function icon	Function	Notes
	Home	
	Menu	
	Squelch defeat	The busy indicator illuminates 
	Receive inhibited	The soft function key is disabled
	Press to transmit (PTT)	The busy indicator illuminates  or  if <i>self-receiving</i>
	Transmit inhibited	The soft function key is disabled
	Back	Previous menu
	Left or right	Moves the cursor
	Enter	Same as when the rotary/push switch is pushed
	Save	

#### 2.1.4 Busy indicators

Busy indicator	Function	Notes
	The radio receives	The busy indicator illuminates amber
	The radio transmits	The busy indicator illuminates amber
	The radio transmits and self-receives	The busy indicator illuminates amber

#### 2.1.5 Rotary/push switch

Action	Notes
	Adjust the rotary/push switch Changes selected volume setting. Changes the display menu
	Push the rotary/push switch Selects. Saves settings

**Note:**

These action symbols are used in the document.

#### 2.1.6 Status indicator

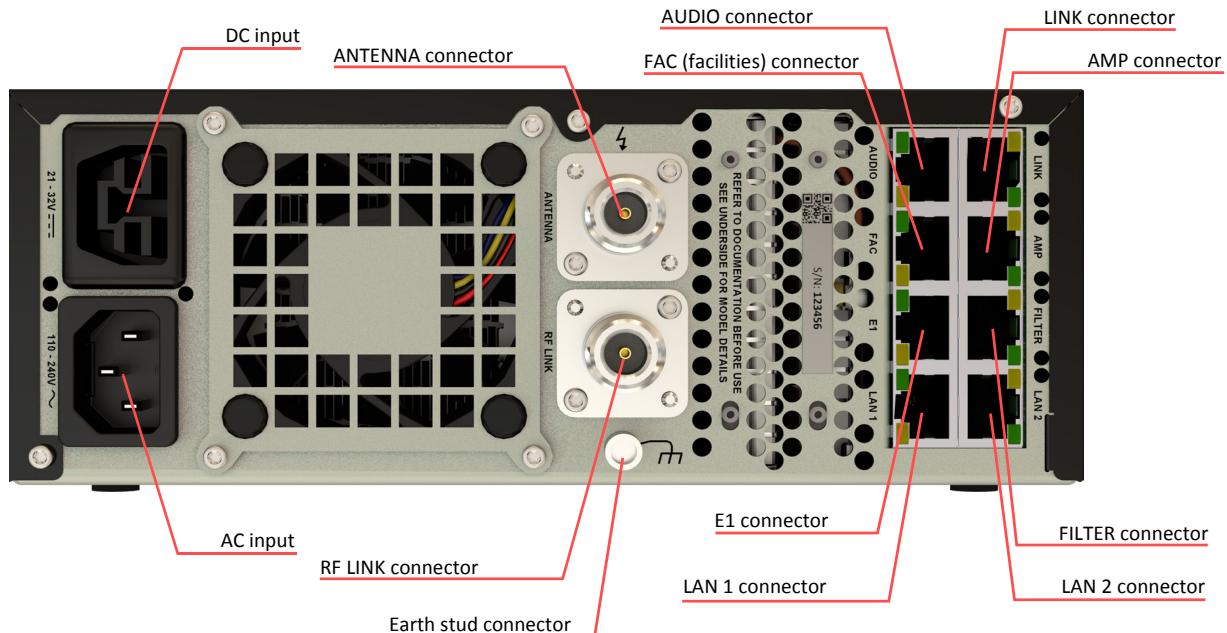
The Status indicator is around the rotary/push switch.

Status indicator	Action	Notes
	Illuminates blue	BIT status is Full Service. Radio is not inhibited
	Illuminates amber	BIT status is Reduced Service
	Illuminates red	BIT status is No Service or Reduced Service is made No Service by the user

**Note:**

These action symbols are used in the document.

## 2.2 Rear panel connectors

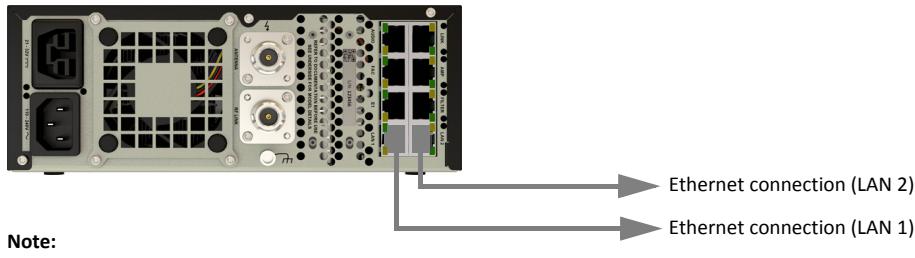


Each connector type is shown in the table below and associated connection cable colour codes.

Connector	Connector type	Cable	Notes
DC input	Saf-D-Grid chassis plug		<a href="#">See DC input connector on page 6-6</a>
AC input	IEC-C14 chassis plug		<a href="#">See AC input connector on page 6-6</a>
Antenna	N-type socket		<a href="#">See ANTENNA connector on page 6-7</a>
RF LINK	N-type socket		<a href="#">See RF LINK connector on page 6-7</a>
Earth stud connector	M5 thread		<a href="#">See Earth stud connector on page 6-6</a>
AUDIO	RJ45 socket	 Red	<a href="#">See AUDIO connector on page 6-2</a>
LINK	RJ45 socket	 Orange	<a href="#">See LINK connector on page 6-2</a>
FAC	RJ45 socket	 Yellow	<a href="#">See FAC (facilities) connector on page 6-3</a>
AMP	RJ45 socket	 Green	<a href="#">See AMP (amplifier) connector on page 6-3</a>
E1	RJ45 socket	 Blue	<a href="#">See E1 connector on page 6-4</a>
FILTER	RJ45 socket	 Purple	<a href="#">See FILTER connector on page 6-4</a>
LAN 1	RJ45 socket	 Grey	<a href="#">See LAN 1 connector on page 6-5</a>
LAN 2	RJ45 socket	 Grey	<a href="#">See LAN 2 connector on page 6-5</a>

### 2.2.1 VoIP connectivity

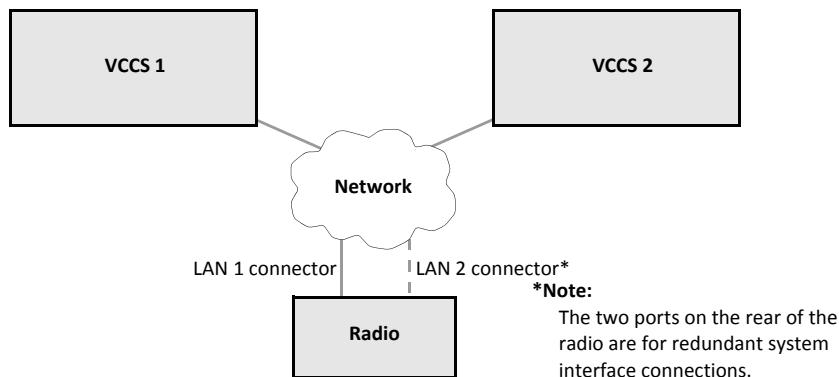
There are two ED-137 Ethernet connection options LAN 1 and LAN 2, on the rear of the radio:



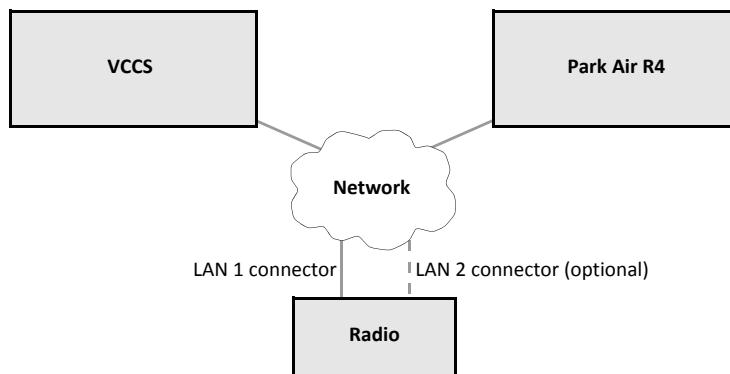
**Note:**

Each LAN connector has a unique **MAC** address.

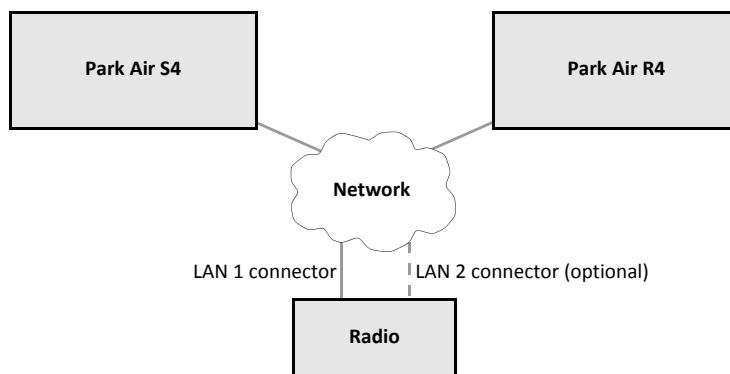
The radio connected to two digital voice communication and control systems (**VCCS**):



The radio connected to a VCCS and a *Park Air R4 module for MARC server* for **RCMS** operation:

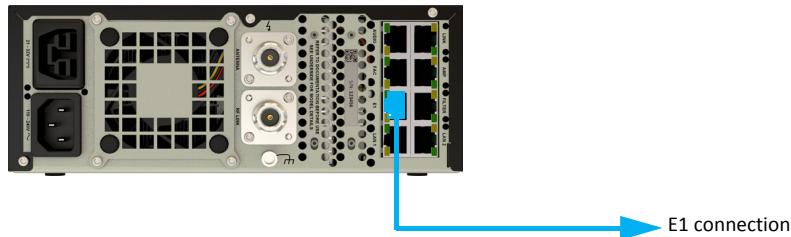


The radio connected to a *Park Air S4 IP controller* and a Park Air R4 module:



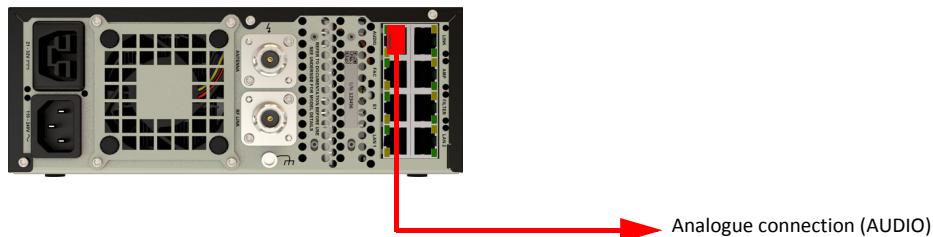
## 2.2.2 E1 connectivity

There is an **E1** connection for digital radio systems, digitalised voice communication systems (VCCS) and RCMS:

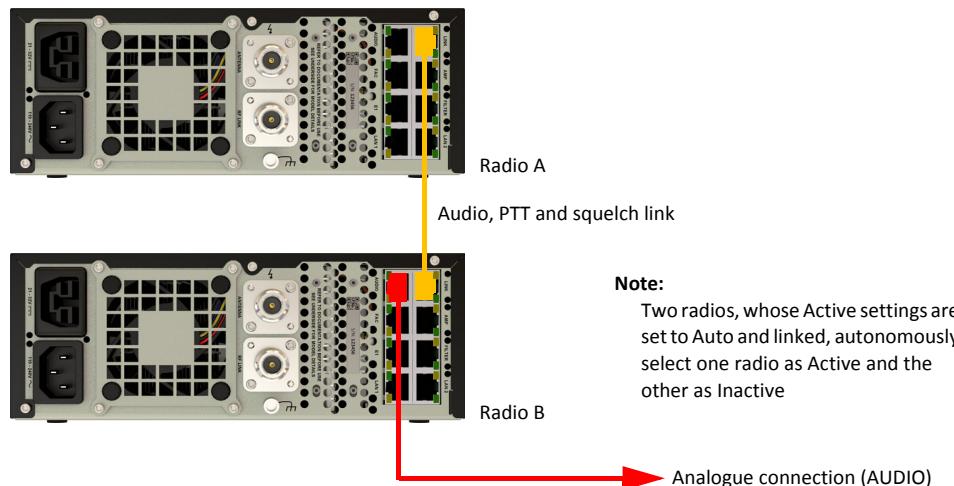


## 2.2.3 Analogue connectivity

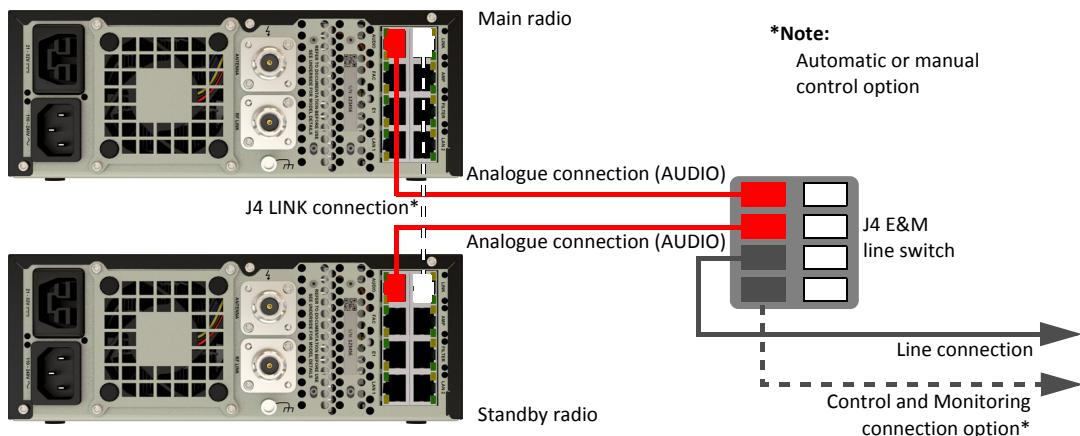
There is an **AUDIO** connection for analogue (**4-wire E & M**) radio systems:



When two radios are paired, the analogue connection can be linked:

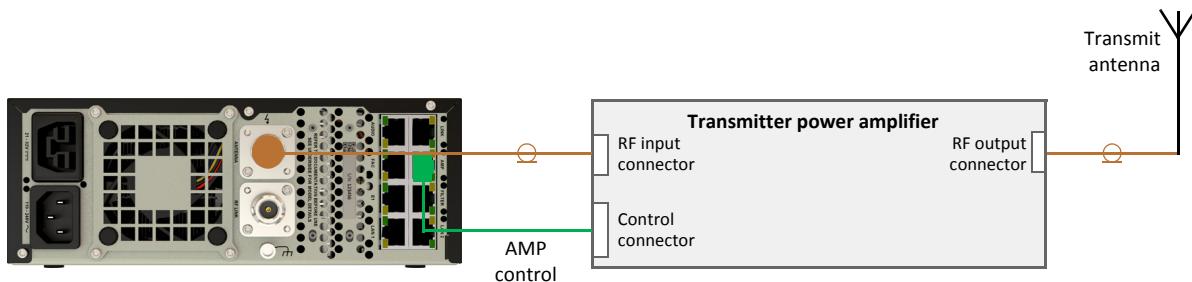


As an alternative, the **Park Air J4 2 way audio 4 wire E&M line switch** can be used to control main/standby audio operation:



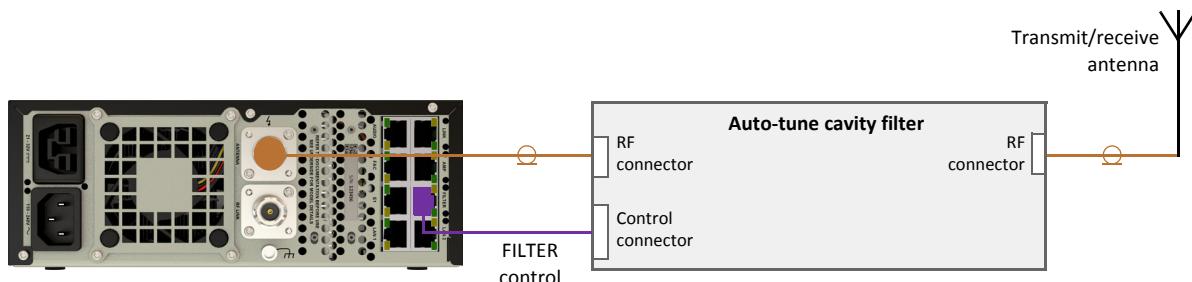
#### 2.2.4 Transmitter power amplifier connectivity

There is an AMP (amplifier) connection on the rear of the radio, for use with the *Park Air T6-AV power amplifier* range:

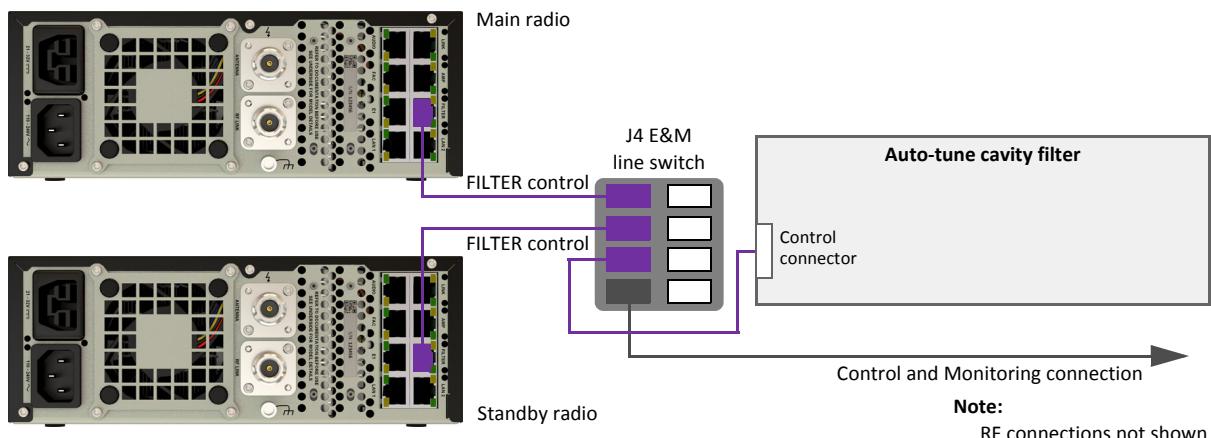


#### 2.2.5 Auto-tune cavity filter connectivity

There is a FILTER connection on the rear of the radio:

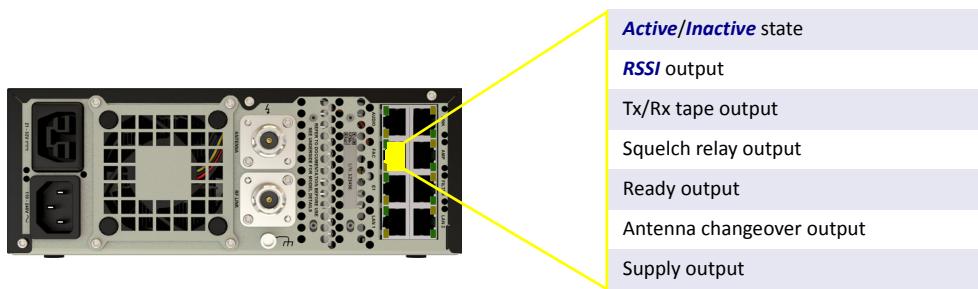


When two radios are paired a J4 Line Switch is used:



## 2.2.6 Facilities connectivity

There are general purpose outputs on the FAC (facilities) connector:



More information on all the connectors is shown in [2.2 Rear panel connectors](#).

## 2.2.7 AC and DC connectivity

There are both AC and DC inputs.



## 2.2.8 Antenna connectivity

There are a number of standalone and **main/standby** antenna configurations. More information on antenna configurations can be found in [2.3 Antenna configurations](#).

		Standalone operation options		Main/standby operation options	
		Transmit/receive	Transmit	Transmit/receive	Transmit
		Not used	Receive	Standby trans- mit/receive RF link*	Receive

\*Uses the T6-TRV internal solid-state RF change-over.

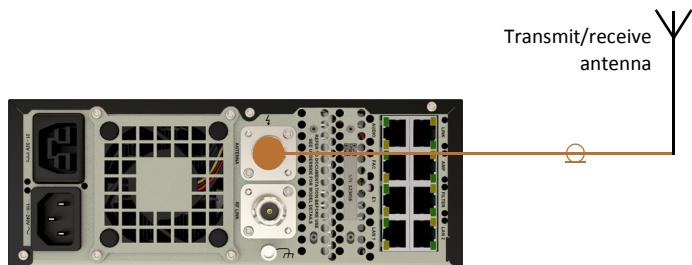
**Note:**

External Park Air antenna change-over relays and/or splitter to be used for some antenna configurations.

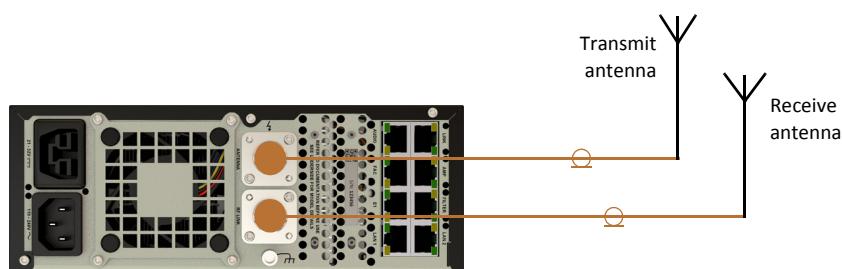
## 2.3 Antenna configurations

### 2.3.1 Standalone configurations

Single transmit/receive antenna:

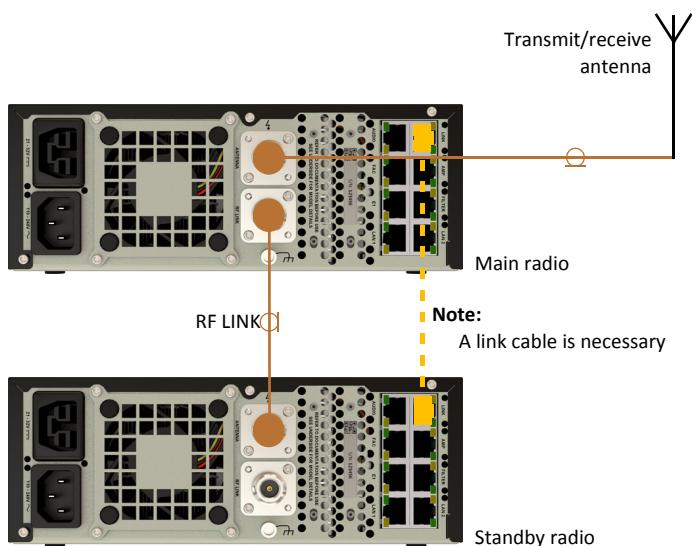


Transmit and receive antennas:

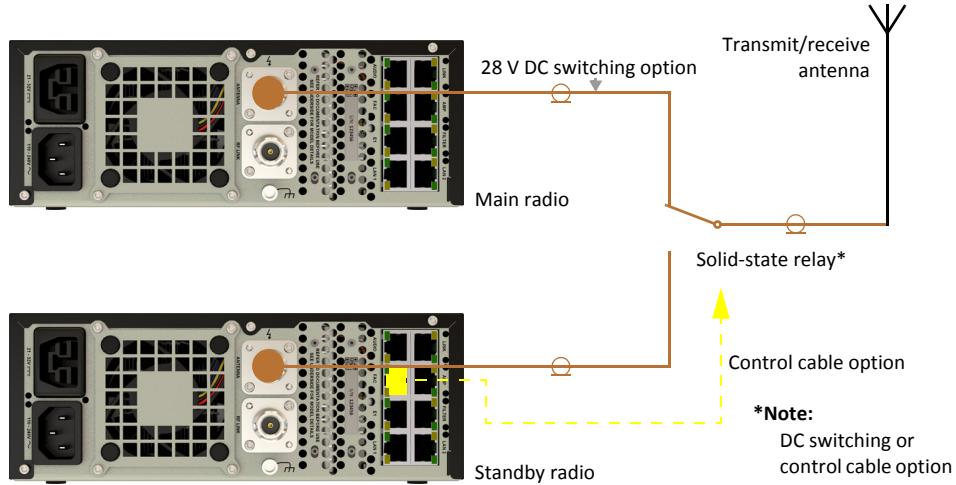


### 2.3.2 Main/standby configurations

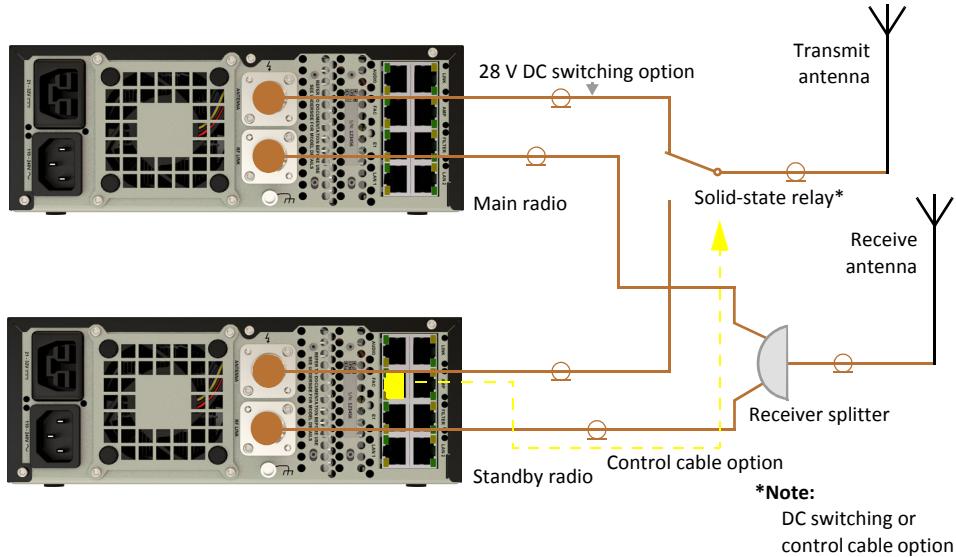
Single transmit/receive antenna with RF link:



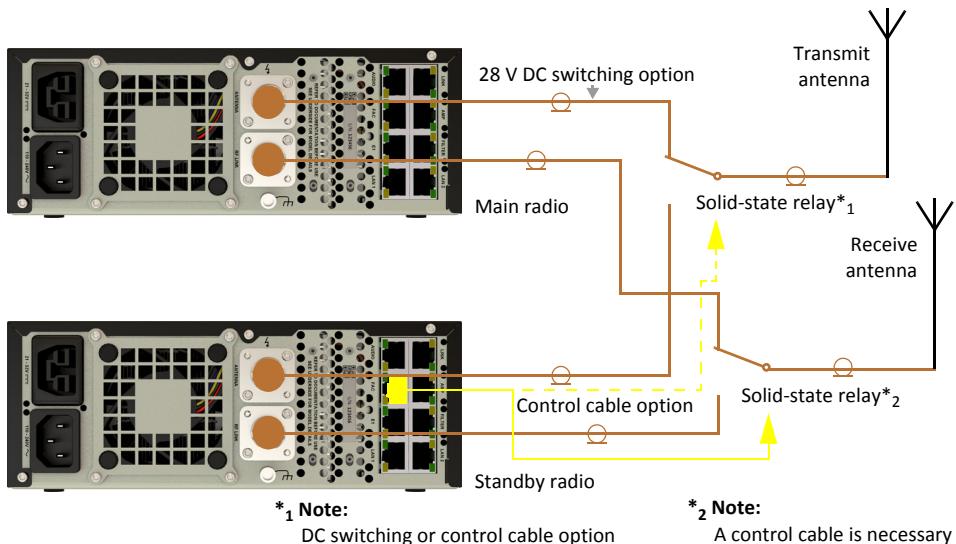
Single transmit/receive antenna with a *Park Air Z4 solid-state changeover relay* (which is referred to in this section as a solid-state relay):



Transmit and receive antennas with a solid-state relay and a *Park Air Z4 3dB receiver splitter* (which will be referred to in this section as a receiver splitter):



Transmit and receive antennas with solid-state relays:



## 2.4 Radio label

The radio label is on the bottom of the radio.



### 2.4.1 Serial number label

A serial number label is on the rear of the radio.



### 2.4.2 QR code

The QR code includes the serial number.

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### 3 Installation



#### Dangerous voltage

You must be suitably qualified to terminate a mains supply to the equipment.



#### Antenna radiation

The transmit antenna must be installed such that the resultant radiated field strength is below national limits, see "[Annex](#)" for limits and examples. The safe distance must be calculated for each installation.



#### Earth connection

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



#### AC and/or DC supply

The power cord/s is/are the radio's disconnect supply device/s.



#### AC supply fuse rating

The radio AC supply must have a 5 Amp time-delay fuse fitted.

### 3.1 Park Air T6 standalone installation



#### AC socket-outlet

The AC socket-outlet must be installed near the radio and have easy access.

You must have a suitable AC and/or DC supply and a suitable antenna or antennas. An accessory Park Air S2 microphone or headset is required for a functional test of the installation.

The AC supply cable specification is shown with "[AC input connector](#)" on [page 6-6](#) and the DC supply cable specification is shown with "[DC input connector](#)" also on [page 6-6](#).

#### 3.1.1 Connect the cables

- (1) Make sure the antenna cable/s is/are correctly connected.
- (2) Make sure the AC and/or DC supply cable/s is/are correctly connected.

#### 3.1.2 Switch on the radio

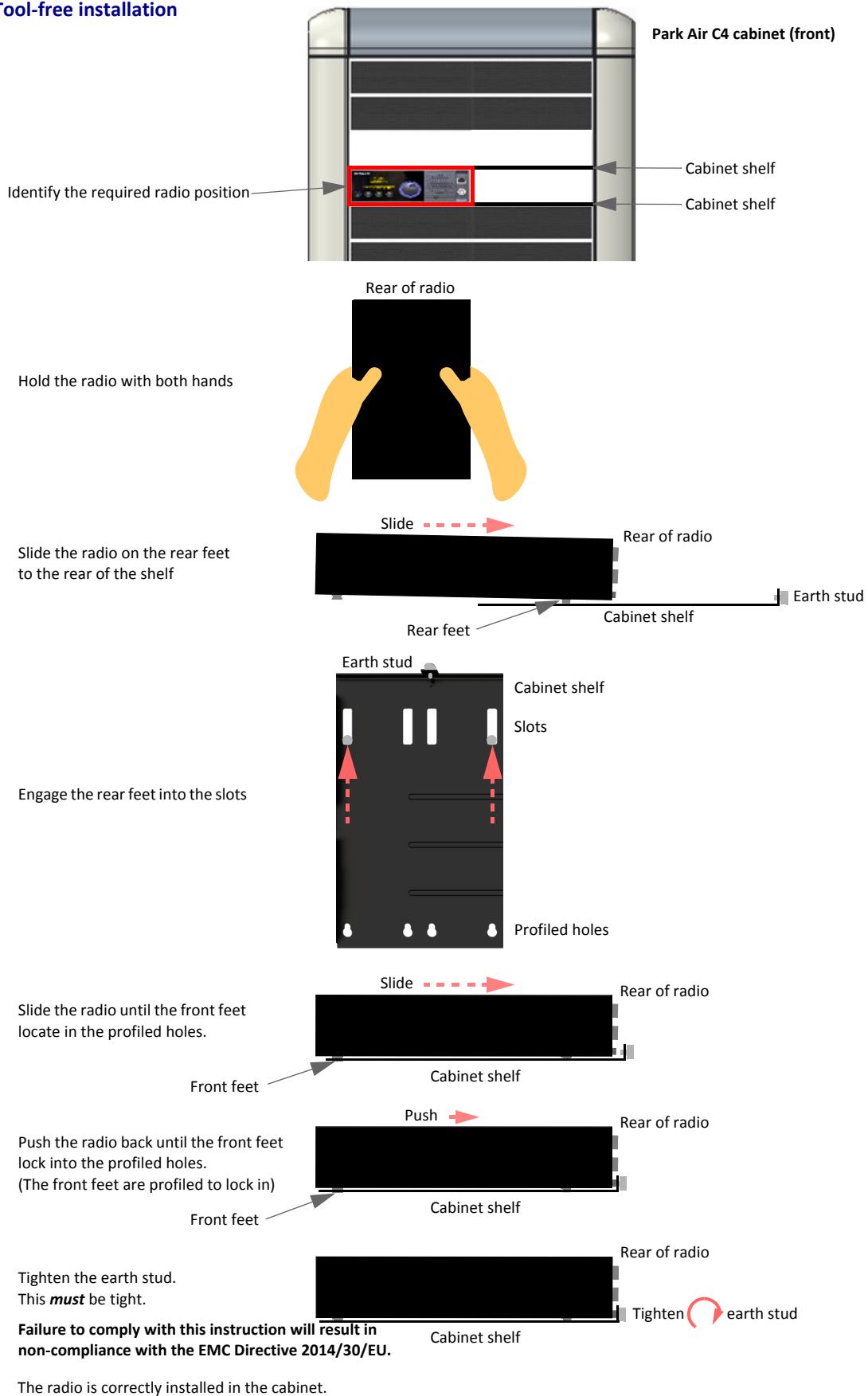
Refer to [4 Operation](#) for further details.

To make sure the radio is operational:

- (1) Make sure the Status Indicator is blue
- (2) An operational test is in accordance with local regulations or by the decision of the user.

## 3.2 Park Air C4 cabinet installation

### 3.2.1 Tool-free installation



### 3.2.2 Connect the cables

If the radio is fitted to a wired position in the cabinet, the radio control cables are wrapped together.

- (1) Connect the RJ45 cables **as applicable**. The cables are colour-coded.

RJ45 cable colour	Radio RJ45 connection	
	Red	AUDIO
	Orange	LINK
	Yellow	FAC
	Green	AMP
	Blue	E1
	Purple	FILTER
	Grey	LAN 1
	Grey	LAN 2

- (2) Connect the antenna cable/s.
- (3) Connect the AC and /or DC supply cables.

The radio is fully connected.

The radio can be powered when the cabinet installation is complete or when decided by a suitably qualified person.

### 3.2.3 Radio removal

To remove a radio from a Park Air C4 cabinet:

- (1) Remove the cables in the opposite order to 3.2.2 Connect the cables.
- (2) Remove the radio from the cabinet in the opposite order to 3.2.1 Tool-free installation.

### 3.3 Legacy Park Air T6 cabinet installation

To fit a Park Air T6 radio to a Cooper B-Line cabinet, a mounting adaptor is to be used.

#### 3.3.1 Legacy Park Air T6 cabinet accessories

Product code	Product name
T6-A-CMA1	Cooper B-Line cabinet mounting adaptor for 1 or 2 T6 radios

#### 3.3.2 Mounting adaptor installation

To fit the mounting adaptor to a Cooper B-Line cabinet:

- (1) Identify the cabinet position where the radio is to be fitted.
- (2) Use the four (4) cabinet fixing bolts provided to fit the mounting adaptor.

To fit a T6 radio to the mounting adaptor, see [Tool-free installation on page 3-2](#).



## 4 Operation

The easy-to-use menu-driven T6 radio has a clear, easy-to-read screen and icons. To help the user, the switch and soft key icons detailed in [2 Description](#) are shown in the instruction steps.

### 4.1 Turn the radio on

- Make sure the radio is connected to an AC and/or DC supply
- Push 

The radio then initialises.

(1) The icons illuminate 

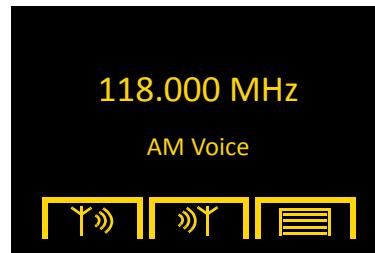
(2) The display shows:



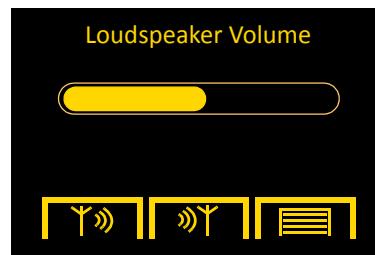
The radio then shows the home screen.

#### 4.1.1 Home screen

An example of the Home screen:



While the home screen is shown,  will adjust the loudspeaker or headset volume.

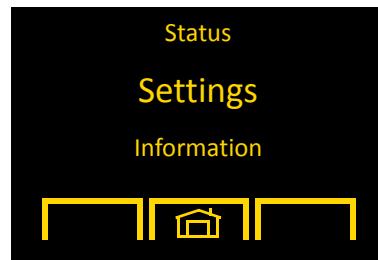


## 4.2 The screen menus

### 4.2.1 Settings

These are the radio settings. To look in Settings:

- Select 
- Scroll  so that Settings is shown:



To enter the settings list:

- Push 

The settings list screen is shown.



(To view a different setting, scroll  through the settings list.)

To change a setting, the Frequency setting is shown as an example:

- Select  or push 
- Adjust 

If a cursor is displayed:



- Use  to move cursor

To save the new setting:

- Select  or push 

All of the radio settings are shown, in order, on [page 4-3](#).

To go back to the menu screen:

- Select 

To go back to the home screen:

- Select 

Settings	Description	Notes	Default
Loudspeaker Volume	Loudspeaker/Headset volume	Selection of loudspeaker (shown) or headset volume. Adjust the volume setting with the rotary/push switch	Loudspeaker
Freq 118.000 MHz	Carrier frequency	Example of carrier frequency	Option minimum
Freq Preset 1	Frequency Preset	1 to 100	
Step 25 kHz	Front panel frequency step size	Selection of 8.3 kHz or 25 kHz steps.	25 kHz
Reference 50.0 %	Reference frequency	0 to 100%	50%
Offset 0 kHz	Carrier offset	0 kHz, ±2.5 kHz, ±4 kHz, ±5 kHz, ±7.3 kHz, ±7.5 kHz and ±8 kHz	0 kHz
RF Power 50 W	Transmit output power	AM Voice: 5 to 50 W in 1 W steps	Option maximum
Mod Depth 95 %	Modulation depth	5 to 95%	85%
ALC ON	Transmit automatic level control	On/off. Line only	On
Mute ON	Transmit <b>mute</b>	On/off. Line only	On
Mic PASSIVE	Microphone type	Passive or Active	Passive
Sidetone LOW	Transmit sidetone	Low or high	Low
Inhibit OFF	Radio inhibit	On/off	Off
Audio AGC ON	Receive audio <b>AGC</b>	On/off	On
Squelch -102 dBm	Receive <b>squelch</b> level	-114 to -60 dBm	-107 dBm
Squelch Carrier	Squelch option	CARRIER / S/N / OVERRIDE	S/N
IP1 192.168.1.100	IP address (LAN 1)	Example of IP address (LAN 1)	
NM1 255.255.255.0	Subnet mask (LAN 1)	Example of <b>subnet mask</b> (LAN 1)	
IP2 192.168.1.100	IP address (LAN 2)	Example of IP address LAN 2 (standby port)	
NM2 255.255.0.0	Subnet mask (LAN 2)	Example of subnet mask (LAN 2)	
IP3 192.168.1.100	IP address (LAN 3)	Example of IP address LAN 3 (front panel port)	
NM3 255.255.0.0	Subnet mask (LAN 3)	Example of subnet mask (LAN 3)	

Settings are changed to suit system engineering and/or user requirements.

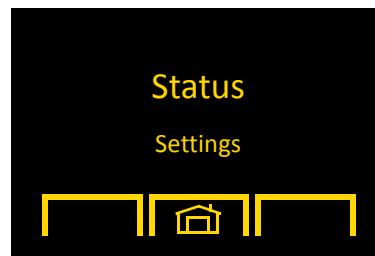
**Note:**

A website is hosted in the radio. To set a radio configuration, see [4.3.2 How to set a radio configuration](#).

#### 4.2.2 Status

This is the operational status of the radio. To look in Status:

- Select 
- Scroll  so that Status is shown.



To enter the status list:

- Push 

The status list screen is shown:



To view more status information/analogue measurements:

- Scroll 

To select a Status Message, Monitoring or Status Reset:

- Push 
- Scroll  as necessary.

To go back to the menu screen:

- Select 

To go back to the home screen:

- Select 

The status list is shown on [page 4-5](#).

Status	Description	Notes
Test	Built-in test (BIT)	See <a href="#">4.3.1 How to do a BIT test from the front panel</a>
<b>FULL SERVICE</b>	BIT system service level	See <a href="#">4.2.3 BIT system service level</a>
<b>No Messages</b>	Reduced and No Service status message/s: AC Supply DC Supply <b>VSWR</b> Ambient Temp System Amplifier <b>E-BIT</b> Fan Radio Health	 Only necessary messages (faults) are shown, see <a href="#">5.2 Status message procedure</a>
<b>Monitoring</b>	ETI *****h:**m AC Connected DC Not Connected DC Supply __V Ambient Temp *°C Forward Pwr *W Reflected Pwr *W VSWR *:*	 Only relevant measurements are shown
<b>Status Reset</b>	CONFIRM RESET	

**Note:**

No Messages is displayed with a FULL SERVICE radio. A status message or status messages are displayed with a REDUCED SERVICE or NO SERVICE radio.

**4.2.3 BIT system service level**

Status	Description	Procedure
<b>FULL SERVICE</b>	The radio is operational to specification	
<b>REDUCED SERVICE</b>	The radio is not fully operational and possibly does not meet specification.	 Find the status message/s displayed, see <a href="#">5.2 Status message procedure</a>
<b>NO SERVICE</b>	The radio is not operational	

The radio service level is adjustable by the user as necessary. For example, the ambient temperature status message is set to display REDUCED SERVICE. The user may select to display NO SERVICE.

#### 4.2.4 Information

This is the information about the radio. To enter Information:

□ Select 

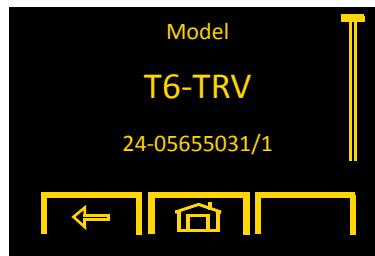
□ Scroll  so that Information is shown:



To enter the Information list:

□ Push 

The Information list screen is shown.



To view more information:

□ Scroll 

To go back to the menu screen:

□ Select 

To go back to the home screen:

□ Select 

The information list is shown on [page 4-7](#).

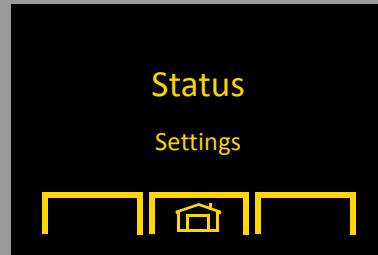
Screen	Information	Description	Notes
Model	T6-TRV 24-05655031/1	Radio model number Product code identification number	Example of product code identification number
Serial No.	12345678	Serial number	Example of serial number
Option Installed	T6-O-112-156	T6 option - frequency range	Examples of options fitted to the radio
	T6-O-AMV	T6 option - AM Voice	
	T6-O-50W	T6 option - transmit power output	
Firmware Installed	65-00000841/1	Fill firmware and version	/1 is an example of version
	65-00000811/1	Rx <b>CPLD</b> firmware and version	/1 is an example of version
	65-00000812/1	Tx CPLD firmware and version	/1 is an example of version
LAN 1 MAC	00:15:1B:12:34:56	MAC address - LAN 1	Example of MAC address
LAN 2 MAC	00:15:1B:12:34:57	MAC address - LAN 2	Example of MAC address
LAN 3 MAC	00:15:1B:12:34:58	MAC address - LAN 3	Example of MAC address

## 4.3 How to guides

### 4.3.1 How to do a BIT test from the front panel

Test is shown in the status list:

- Select 
- Scroll  so that Status is shown.



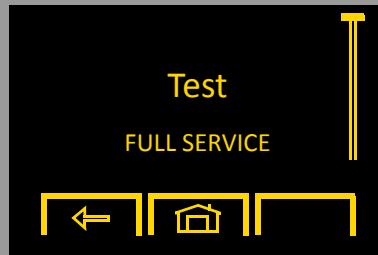
To enter the status list:

- Push 

The status list screen is shown:



- Scroll  so that Test is shown:

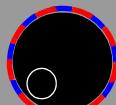


- Push  to start the BIT test

The screen shows:

Initiating BIT

The Status indicator illuminates:



When the test is complete, the service level is shown:

Status	Description
FULL SERVICE	The radio is operational to specification
REDUCED SERVICE	The radio is not fully operational and possibly does not meet specification
NO SERVICE	The radio is not operational

**Note:**

The user can change a Reduced Service BIT monitored parameter to show NO SERVICE.

See [4.3.2 How to set a radio configuration](#).

#### 4.3.2 How to set a radio configuration

A web server is hosted in the radio. To change a radio configuration:

- (1) Make sure you have a suitable laptop or desktop to access the radio.

Access to the radio can be via an Ethernet connection to the front panel RJ45 LAN 3 connector (or rear panel) or via an Ethernet connection through the user's network to the radio.

- (2) Open the browser software on the device.

The Park Air T6 radio supports a number of web browsers:

- Google Chrome™
- Apple Safari™
- Mozilla Firefox™
- Microsoft Internet Explorer 9™ onwards.

Northrop Grumman recommends the use of Google Chrome.

- (3) Enter the IP address of the radio in the browser address bar.

The web server is shown:

Under revision

- (4) Browse the web server to find the radio configuration to be changed.

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## 5 Maintenance



### No user serviceable parts inside the radio

There are no user serviceable parts inside the radio.



### Double pole/neutral fusing

The radio uses a power supply which has both live *and* neutral fuses.

#### 5.1 Reference frequency adjustment

In stable environmental conditions, adjustments are recommended (subject to local regulations) as follows:

- For 5-carrier offset operation - every 12 months
- For 2-carrier offset operation with 8.33 kHz channel spacing - every 3 years
- All other conditions - every 10 years.



### Frequency counter accuracy

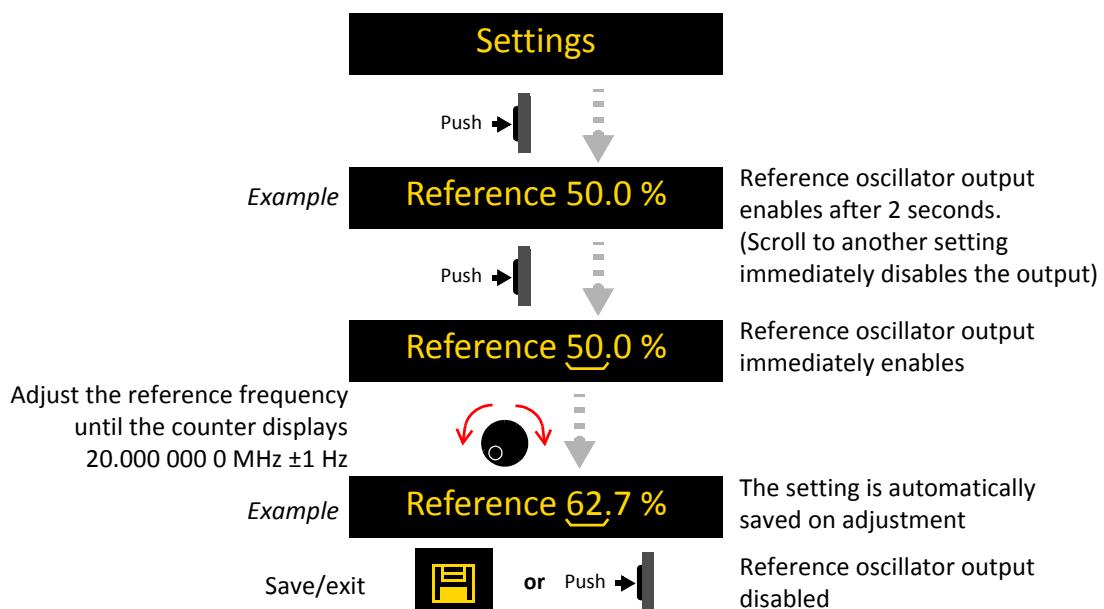
Make sure the stability, accuracy and resolution specifications of the frequency counter used exceed that of the reference oscillator. Wherever possible, use an external frequency standard, for example, GPS or an *off-air standard*.

To set the radio's internal reference frequency:

- (1) Connect a sufficiently accurate frequency counter to the Reference frequency monitor connector on the front panel of the radio with the correct test cable.

Northrop Grumman recommends the *Park Air A6-ATE6000 confidence test equipment*.

- (2) Scroll so that Settings is shown on the display.



**Note:**

The radio display time-out is 5 minutes.

## 5.2 Status message procedure

The table shows Status messages, message descriptions and necessary actions.

Status messages	Description	Action
AC Supply	AC supply failed/disconnected	Measure the AC supply Do a continuity test of the AC fuse
DC Supply	DC supply less than minimum DC voltage level	Measure the DC supply
	DC supply failed/disconnected	Measure the DC supply Do a continuity test of the DC fuse
VSWR	VSWR too high	Make sure the antenna circuit connections are correctly connected Do a VSWR test of the antenna circuit
Ambient Temp	Ambient temperature too high	Measure the local environment temperature Make sure the cabinet cooling operates Is the Fan status message shown?
	Active communication is lost	Make sure that other system equipment is correctly connected
Amplifier	External amplifier fault	Is the Error status shown on the external amplifier? Make sure the RF and control connections to the external amplifier are correctly connected
	External equipment failure	Make sure the antenna circuit connections are correctly connected Is the Auto-tune filter defective?
Fan	Internal fan failure	Replace the internal fan, see <a href="#">5.3 Fan replacement</a>
Radio Health	Integral radio failure	See <a href="#">5.2.1 Radio Health</a>

### 5.2.1 Radio Health

An internal radio failure is displayed on a suitable laptop (or desktop) and/or the RCMS, Park Air R4 MARC Server.

With access to the radio's web server, the following Radio Health messages may be displayed:

Radio Health message	Description
Degraded performance	An internal control system parameter may not be to specification
Power removed	Transmit power has been automatically reduced to zero due to one or more internal or external conditions
Not on frequency	An internal fault prevents the radio locking to the selected frequency
Not calibrated	Valid calibration data is not detected
Internal fault	Detection of an internal fault

If an internal radio failure clears, the radio health message clears.

On R4 MARC Server, Radio Health messages will be displayed in the BIT Status pane:

# Under revision

Make sure that radio failure is not due to an external failure, for example, antenna circuit VSWR.

If the internal fault condition is still displayed, return the radio to Northrop Grumman, see [Park Air Services](#).

## Notes:

A radio whose Service Status changes to No Service, automatically becomes Inactive. The faulty radio drops its SIP session in accordance with ED-137.

Transmit and receive operation is inhibited when the radio is Inactive.

## 5.3 Fan replacement

To replace the fan:

- (1) Switch off the radio.
- (2) Disconnect **all** cables from the radio.

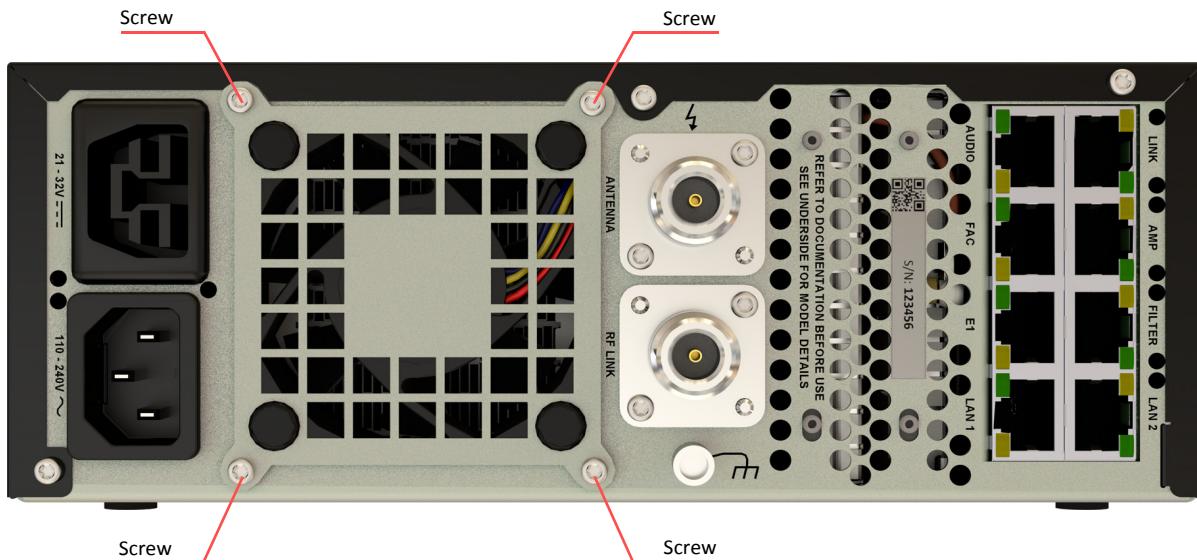


### AC and/or DC supply

The power cord/s is/are the radio's disconnect supply device/s.

- (3) Remove from the equipment cabinet (if applicable).

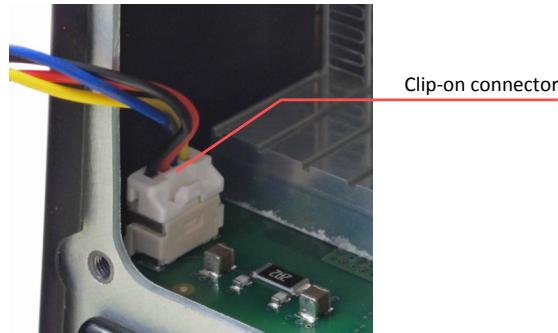
On the rear of the radio:



- (4) Remove the four (4) fixing screws with a T10 TORX screwdriver.

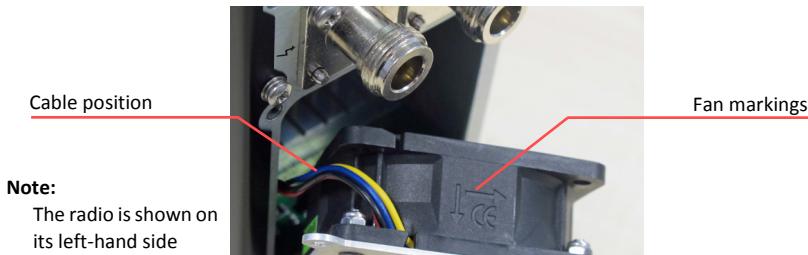
---

- (5) Move the fan away from the rear panel.
- (6) Disconnect the fan connector.



- (7) Check the heatsink cooling fins for blockages.
- (8) Connect the new fan.

Note the cable and fan position:



- (9) Place the fan in position on the rear panel.
- (10) Attach the fan with the four (4) fixing screws.
- (11) Install the radio to the cabinet (if applicable).
- (12) Connect all the cables.
- (13) Switch on the radio.
- (14) The radio continually checks the correct function of the fan.

## 6 Connector information

### 6.1 Front panel connectors

The front panel connector pin-outs:

*LAN 3 connector*

Connector	Pin	Signal	Characteristics
 <b>LAN 3 connector</b> <b>RJ45</b>	1	TD+ output	Balanced 100 ohm output, 10/100 Mbits per second.
	2	TD- output	
	3	RD+ input	Balanced 100 ohm input, 10/100 Mbits per second.
	4	Not used	
	5	Not used	
	6	RD- input	Balanced 100 ohm input, 10/100 Mbits per second.
	7	Not used	
	8	Not used	
	A valid link illuminates amber LED  and flashing amber LED indicates activity. 100 Mbits illuminates green LED  , 10 Mbits off.		

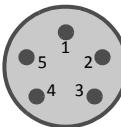
*Reference frequency monitor connector*

Connector	Signal	Characteristics
 <b>Reference frequency monitor</b> <b>SMB</b>	20 MHz high impedance	100 mV $\pm$ 50 mV pk-pk (high impedance measurement).

**Note:**

With Reference displayed, the oscillator output enables after 2 seconds. (Scroll to another setting immediately disables the output). Select Reference, the oscillator output immediately enables.

*Microphone/headset connector*

Connector	Pin	Signal	Characteristics
 <b>Microphone/</b> <b>headset</b> <b>LEMO 5-way</b> <b>self-locking</b>	1	Microphone input	PASSIVE (non-powered): 2 to 20 mV rms (default). ACTIVE (powered): 25 to 250 mV rms.
	2	Microphone ground	
	3	Headset/sidetone output	0 to 3 V pk-pk receive audio. Default headset volume setting is 30%. Sidetone volume is relative to the headset volume setting. It can be set HIGH or LOW. Default setting is LOW.
	4	Microphone PTT	0 V PTT.
	5	Ground (0 V)	

## 6.2 Rear panel connectors

The rear panel connector pin-outs:

### AUDIO connector

Connector	Pin	Signal	Configuration	Characteristics
AUDIO RJ45	1	Audio Line Out -	<b>Phantom squelch</b> (if Enabled): STANDARD - normally open, closed on squelch lift (default). INVERTED - normally closed, open on squelch lift. The default for Phantom squelch is Disabled.	600 ohm balanced, transformer coupled. Adjustable from -30 dBm to +10 dBm ( $\pm 2$ dB) in 1 dB steps, with the default setting -13 dBm.
	2	Audio Line Out +		If Self Receive is on, self-received transmit audio is output on Audio Line Out.
	3	Main/Standby Output		5 V output when the radio is selected as Active.
	4	Audio Line In +	<b>Phantom PTT</b> (if Enabled): STANDARD - normally open, closed on PTT (default). INVERTED - normally closed, open on PTT. The default for Phantom PTT is Disabled.	600 ohm balanced, transformer coupled. Adjustable from -30 dBm to +10 dBm ( $\pm 2$ dB) in 1 dB steps, with the default setting -13 dBm.
	5	Audio Line In -		
	6	Audio Squelch Output	STANDARD - normally open, closed on squelch lift (default). INVERTED - normally closed, open on squelch lift.	Grounding solid-state relay. Maximum ratings: ±60 V AC or DC, 100 mA.
	7	Ground (0 V)		
Red cable	8	Audio PTT Input	STANDARD - Active when the difference between input and reference is $>\pm 10$ V. Inactive when the difference between input and reference is $<\pm 1$ V (default). INVERTED - Active when the difference between input and reference is $<\pm 1$ V. Inactive when the difference between input and reference is $>\pm 10$ V.	PTT input illuminates amber LED  .

### LINK connector

Connector	Pin	Signal	Characteristics
LINK RJ45	1	Link Line Out -	Connected to pin 1 of the Audio connector.
	2	Link Line Out +	Connected to pin 2 of the Audio connector.
	3	Link Status input/output	Voltage level is 0 V to +5 V.
	4	Link Line In -	Connected to pin 4 of the Audio connector.
	5	Link Line In +	Connected to pin 5 of the Audio connector.
	6	Link Squelch output	Connected to pin 6 of the Audio connector.
	7	Ground (0 V)	Connected to pin 7 of the Audio connector.
	8	Link PTT input	Connected to pin 8 of the Audio connector.
The amber LED is illuminated  when the radio is selected as the active radio.			
<b>Note:</b> When two radios are connected via their Link connectors, audio and signalling are routed between them.			

**FAC (facilities) connector**

Connector	Pin	Signal	Configuration	Characteristics
FAC RJ45  Yellow cable	1	Active/Inactive	STANDARD - normally open, closed when active (default). INVERTED - normally closed, open when active.	Grounding output, 200 mA maximum.
	2	RSSI output		Analogue voltage, from 1 V at -110 dBm RF input, increasing linearly by 0.075 V/dB, to 10 V at +10 dBm RF input. Accuracy of $\pm 5$ dB.
	3	TX/RX tape		Fixed 0 dBm $\pm 2$ dB for 90% modulation, 600 ohm output.
	4	Squelch relay	STANDARD - normally open, closed on squelch lift (default). INVERTED - normally closed, open on squelch lift.	Grounding solid-state relay. Maximum ratings: $\pm 60$ V AC or DC, 100 mA.
	5	Ready output	STANDARD - normally open, closed when BIT status not Full Service or when radio is inhibited (default). INVERTED - normally closed, open when BIT status not Full Service or when radio is inhibited	Grounding output, 200 mA maximum. Active Ready output illuminates green LED  .
	6	Antenna changeover output	STANDARD - normally open, closed on PPT (default). INVERTED - normally closed, open on PTT.	Grounding solid-state relay. Maximum ratings: $\pm 60$ V AC or DC, 100 mA.
	7	Ground (0 V)		
	8	Supply output		28 V $\pm 1$ V. A total of <250 mA can be drawn from all Supply output pins.

**AMP (amplifier) connector**

Connector	Pin	Signal	Characteristics
AMP RJ45  Green cable	1	Amplifier PTT output	Grounding output, 200 mA maximum. Follows the keying input regardless of the radio inhibit state.
	2	Amplifier Present input	TTL levels. Amplifier Present illuminates amber LED  .
	3	Amplifier Ready input	TTL levels. Amplifier Ready illuminates green LED  .
	4	Amplifier 100 W/ 250 W input	TTL levels. 250 W low, 100 W high
	5	Reset Bypass output	
	6	Inhibit input	TTL levels.
	7	Ground (0 V)	
	8	Supply output	28 V $\pm 1$ V. A total of <250 mA can be drawn from all Supply output pins.

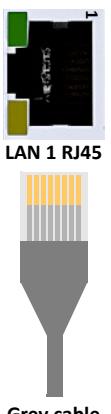
*E1 connector*

Connector	Pin	Signal	Configuration	Characteristics
 <b>E1</b> <b>RJ45</b>	1	RRing input		Balanced 120 ohm, 2.048 Mbits per second ( $\pm 50$ ppm), <b>HDB3 Coding</b> .
	2	RTip input		Protected with 28 V differential and common mode clamp and 1.25 A fuse in each line.
	3	Not connected		
	4	TRing output	The highest squelch Channel Associated Signalling (CAS) code, SQP3 is configurable in the range -80 dBm to +10 dBm. Default value is -80 dBm.	Balanced 120 ohm, 2.048 Mbits per second ( $\pm 50$ ppm), HDB3 Coding.
	5	TTIP output	A PTT Confirm CAS pattern can be enabled/disabled. Default is enabled.	Protected with 28 V differential and common mode clamp and 1.25 A fuse in each line.
	6	Remote on/off input		0 V = off, 5 V = on. This is equivalent to using the front panel on/off button.
	7	Ground (0 V)		
	8	Supply output		28 V $\pm 1$ V. A total of <250 mA can be drawn from all Supply output pins.

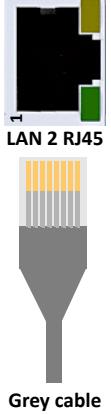
*FILTER connector*

Connector	Pin	Signal	Configuration	Characteristics
 <b>FILTER</b> <b>RJ45</b>	1	Data RX A (-) input		<b>RS422/485</b> differential asynchronous data, 9600 <b>baud</b> , 8 data bits, 1 stop bit, no parity, no handshake.
	2	Data RX B (+) input		
	3	EBIT/VSWR input	STANDARD - active low (default). INVERTED - active high. Default is EBIT	<b>TTL</b> levels.
	4	Data TX B (+) output		<b>RS422/485</b> differential asynchronous data, 9600 baud, 8 data bits, 1 stop bit, no parity, no handshake.
	5	Data TX A (-) output		
	6	Inhibit input	STANDARD - active low (default). INVERTED - active high.	TTL levels.
	7	Ground (0 V)		
	8	Supply output		28 V $\pm 1$ V. A total of <250 mA can be drawn from all Supply output pins.

*LAN 1 connector*

Connector	Pin	Signal	Characteristics
 LAN 1 RJ45	1	TD+ output	Balanced 100 ohm output, 10/100 Mbits per second.
	2	TD- output	
	3	RD+ input	Balanced 100 ohm input, 10/100 Mbits per second.
	4	Not connected	
	5	Not connected	
	6	RD- input	Balanced 100 ohm input, 10/100 Mbits per second.
	7	Not connected	
	8	Not connected	
A valid link illuminates amber LED  and flashing amber LED indicates activity. 100 Mbits illuminates green LED  , 10 Mbits off.			

*LAN 2 connector*

Connector	Pin	Signal	Characteristics
 LAN 2 RJ45	1	TD+ output	Balanced 100 ohm output, 10/100 Mbits per second.
	2	TD- output	
	3	RD+ input	Balanced 100 ohm input, 10/100 Mbits per second.
	4	Not connected	
	5	Not connected	
	6	RD- input	Balanced 100 ohm input, 10/100 Mbits per second.
	7	Not connected	
	8	Not connected	
A valid link illuminates amber LED  and flashing amber LED indicates activity. 100 Mbits illuminates green LED  , 10 Mbits off.			

**AC input connector**

Connector	Connection	Characteristics			
 AC input IEC-C14 chassis plug	<table border="1"> <tr> <td>Neutral</td> </tr> <tr> <td>Earth</td> </tr> <tr> <td>Live</td> </tr> </table>	Neutral	Earth	Live	<p>Input supply: 99 to 264 V AC. Frequency: 47 to 63 Hz. No more than 400 VA while the radio transmits under any condition.</p> <p><b>Notes:</b> The connections are shown as viewed on the rear panel of the radio. The protective earthing connector (earth) must be connected.</p>
Neutral					
Earth					
Live					
<p>The cable used to connect between the equipment and the user's AC power source must be 3-core (to IEC 227) rated 250 VAC at 8 amps, and have a minimum cross-sectional area of 1.0 mm<sup>2</sup> per core. Northrop Grumman recommends the use of polyvinyl chloride (PVC) insulated cable. The cable must be fitted with the IEC approved equipment connector and conform to this specification:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> If PVC insulated, be not lighter than ordinary polyvinyl chloride sheathed flexible cord according to IEC publication 227 (designation H05 VV-F, H05 VVH2-F). For North America the cable must be UL listed/CSA recognised.</li> <li><input type="checkbox"/> 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 Voltage up to and including 450/750 V (designation H05 RR-F).</li> </ul>					

**DC input connector**

Connector	Connection	Characteristics			
 DC input Saf-D-Grid chassis plug	<table border="1"> <tr> <td>Positive +ve</td> </tr> <tr> <td>Not connected</td> </tr> <tr> <td>Negative -ve</td> </tr> </table>	Positive +ve	Not connected	Negative -ve	<p>Input supply: 21 to 32 V DC. No more than 400 W while the radio transmits under any condition.</p> <p><b>Notes:</b> The connections are shown as viewed on the rear panel of the radio. The DC supply input protects against reverse polarity connection.</p>
Positive +ve					
Not connected					
Negative -ve					
<p>The DC supply cable must have a minimum cross-sectional area of 1.5 mm<sup>2</sup> or 14 AWG per core. If PVC insulated, be not lighter than ordinary polyvinyl chloride sheathed flexible cord according to IEC publication 227 (designation H05 VV-F, H05 VVH2-F). For North America the cable must be UL listed/CSA recognised.</p>					

**Earth stud connector**

Connector	Connection
 Earth stud M5 thread	<p><b>Note:</b> The radio is attached by the earth connection to the fixing-lug in the Park Air C4 cabinet. This <b>must</b> be attached.</p> <p><b>Failure to comply with this instruction will result in non-compliance with the EMC Directive 2014/30/EU.</b></p>

**ANTENNA connector**

Connector	Connection
 <b>ANTENNA</b> <b>N-type socket</b>	<p>The Antenna connector can be configured for:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Transmit/receive</li> <li><input type="checkbox"/> Transmit only.</li> </ul> <p><b>Note:</b></p> <p>Automatic power reduction in the presence of high VSWR can decrease the RF power to 5 W.</p>

**RF LINK connector**

Connector	Connection
 <b>RF LINK</b> <b>N-type socket</b>	<p>The RF Link connector can be configured for:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Transmit/receive RF link</li> <li><input type="checkbox"/> Transmit RF link</li> <li><input type="checkbox"/> Receive.</li> </ul>

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## 7 Specification

### 7.1 T6-TRV specifications

Parameter	Value
<b>Operating frequencies</b>	118 MHz to 137 MHz Extendable to between 112 MHz and 156 MHz
<b>Output Power</b>	50 W maximum
<b>Dimensions</b>	79 mm (2U) high 210 mm (half-rack) wide 420 mm deep
<b>Weight</b>	5 kg
<b>Waveforms</b>	AM Voice with 25 kHz and 8.33 kHz channel spacings AM Wideband ACARS VDL-M2
<b>Interfaces</b>	Self-locking LEMO connection for microphone/headset 4-W E&M for voice and data 3 individually addressable Ethernet ports for VoIP and RCMS E1 for voice and RCMS 2 N-Type coaxial antenna connectors
<b>Radio Pair Operation</b>	Autonomous selection of main/standby or transmit/receive radio with internal audio and RF switching
<b>Operating Temperature Range</b>	-20 to +55°C
<b>Standards</b>	ICAO Annex 10 EN 300 676 EN 302 617 ED-137 EN 301 489

## 7.2 T6-TRV features and benefits

Feature	Benefit
<b>Environmental Impact and Efficiency</b>	<p>Reduced whole life costs</p> <p>Efficiency increased and power consumption decreased</p> <p>Ten-year service interval and fifteen-year service lifetime</p> <p>Reduced initial and ongoing costs</p> <p>Reduced environmental impact</p> <p>No RoHS 2 specified materials used</p> <p>Better environmental performance</p>
<b>Quality of Communications</b>	<p>Class-leading RF performance</p> <p>Better interface and co-site performance</p> <p>Reduced or no need for external filtering</p>
<b>Safety</b>	<p>Flexible main/standby features</p> <p>Integral RF/line changeover</p> <p>Software programmable interfaces for controlling external changeover units.</p> <p>Independent AC and DC power options</p> <p>Advanced temperature control</p> <p>Digital power management</p> <p>Computer controlled airflow</p> <p>Intelligent built-in-test</p> <p>Continually monitors own environment and performance</p> <p>Enters a 'reduced service' state when issues are detected</p> <p>Decreases power output</p> <p>Alerts operator with diagnostic information</p> <p>Automatic simultaneous call transmission detection</p> <p>Alerts operator to the possibility of call blocking or loss of vital communications</p>
<b>Security</b>	<p>Our most secure radio ever</p> <p>Front panel screen lock</p> <p>Interface port locks</p> <p>SNMP v3</p> <p>Web server interface using HTTPS</p> <p>IPv6/IPv4 compliance</p>
<b>Connectivity and expansion</b>	<p>Designed for future networks and systems</p> <p>Two rear IP ports for autonomous network connectivity</p> <p>One front IP port for browser access to the built-in maintenance web server</p> <p>Significant reserves of computer power for future upgrades</p> <p>Software defined waveforms</p> <p>AM-Voice</p> <p>AM Wideband</p> <p>ACARS</p> <p>VDL-M2</p> <p>Remote firmware upgrade</p> <p>Upgrade from remote site</p> <p>Reduced site visits</p> <p>IPv6 core capability</p> <p>VoIP audio and 'monitor and control' data based on IPv6</p> <p>Ensures compatibility with latest-generation networks and systems</p>

Feature	Benefit
<b>Simplified installation, set-up and usability</b>	Half the size and weight of previous models Intuitive user interface
	More channels in available cabinet space No tools required for cabinet installation High resolution OLED graphical display Main rotary input control Context-specific soft buttons Indicator icons Visual indications of radio activity
Loudspeaker to monitor voice transmissions	Loudspeaker provided to monitor voice transmissions locally

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## 8 Associated equipment

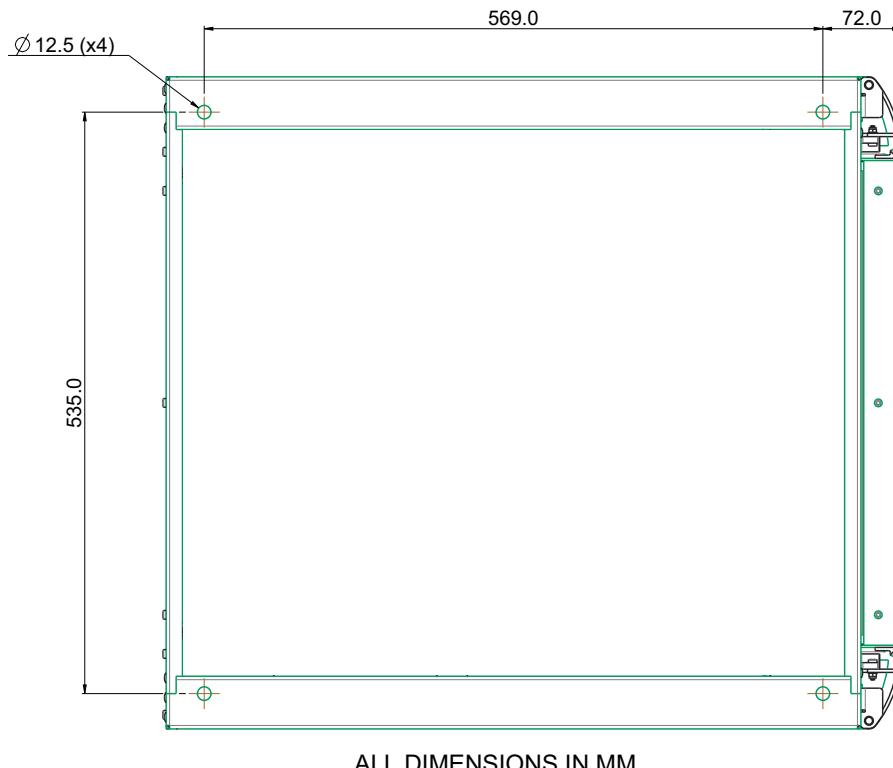
### 8.1 Table of associated equipment

Product code	Product name	Notes
A6-ATE6000	Confidence test equipment	A portable automated RF communications test system used to provide confidence that Park Air radios and systems are functioning correctly.
A6-O-T6S3RAD	Radio test suite for use with T6 radios	For use with A6-ATE6000 to allow confidence testing of T6 Radios. Includes radio test script and test interface adaptor including cables.
C4-30U	30U cabinet	For integration of Park Air T6 Radios, Z4 Filters and their accessories. Compatible with standard 19 inch rack-mount equipment. Includes cable management system and DIN-rails for rear-mounted components.
C4-40U	40U cabinet	
J4-4WEMSWITCH	2 way audio 4 wire E&M line switch	Switches a single audio 4 Wire E&M line two ways under radio control for interfacing to main/standby T6 Radio pairs. DIN-rail mounted.
R4-O-MST6S3	Park Air T6 radios module for MARC server	Allows monitoring and control of Park Air T6 radios from MARC Server.
S2-HST6	Headset for use with T6 radios	Robust dual earpiece lightweight headset with PTT switch and noise cancelling flexible boom microphone. Includes integral coiled cable of length 3m (when fully extended) terminated in self-locking plug.
S2-MICT6	Hand microphone for use with T6 radios	For Microphone/headset and general purpose use. Includes integral PTT switch and coiled cable of length 2m (when fully extended) terminated in self-locking plug.
S4-IP	IP controller	Remote Control Unit (RCU) hardware with colour LCD touch screen. Operates from ac supply or 12V nominal dc supply. Supplied with universal ac adaptor and lead, dc supply connector and 2m CAT 5 cable.
T6-AV100	VHF 100 W power amplifier	For use with T6 Transmitters and Transceivers.
T6-AV250	VHF 250 W power amplifier	For use with T6 Transmitters and Transceivers.
Z4-FILTSV80	VHF 80 mm single fixed cavity filter	A compact filter. 50 Watts power handling.
Z4 -FILTDV80	VHF 80 mm dual fixed cavity filter	A compact filter pair that may be configured as two individual filters or in series for higher performance applications. 50 Watts power handling
Z4-FILTICV80	VHF 80 mm iris coupled fixed cavity filter	A compact high performance filter. 50 Watts power handling.
Z4-FILTVAUTO	VHF autotune cavity filter	
Z4-SPLIT3DB	3dB receiver splitter	Splits a single RF feed two ways for interfacing to main/standby radio pairs. DIN-rail mounted.
Z4-SSRELAY	Solid-state changeover relay	Switches a single RF feed two ways under radio control for interfacing to main/standby radio pairs. DIN-rail mounted.

## 8.2 C4 cabinet specifications

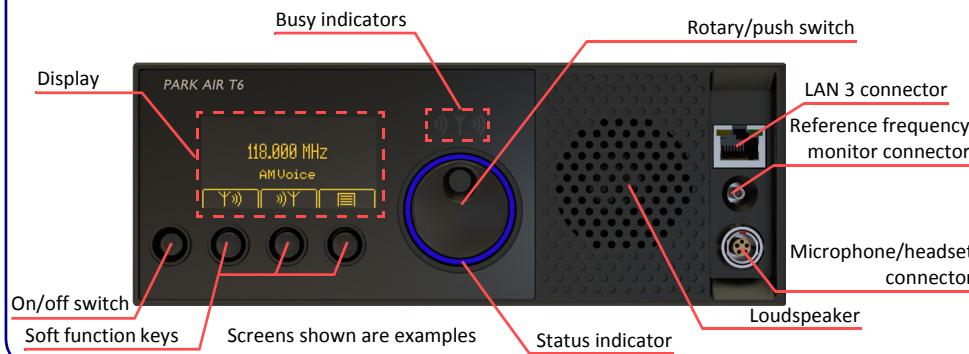
Capacity	Height	Width	Depth
40 U	1989 mm	600 mm	675 mm
30 U	1544 mm	600 mm	675 mm

### 8.2.1 C4 cabinet fixing holes

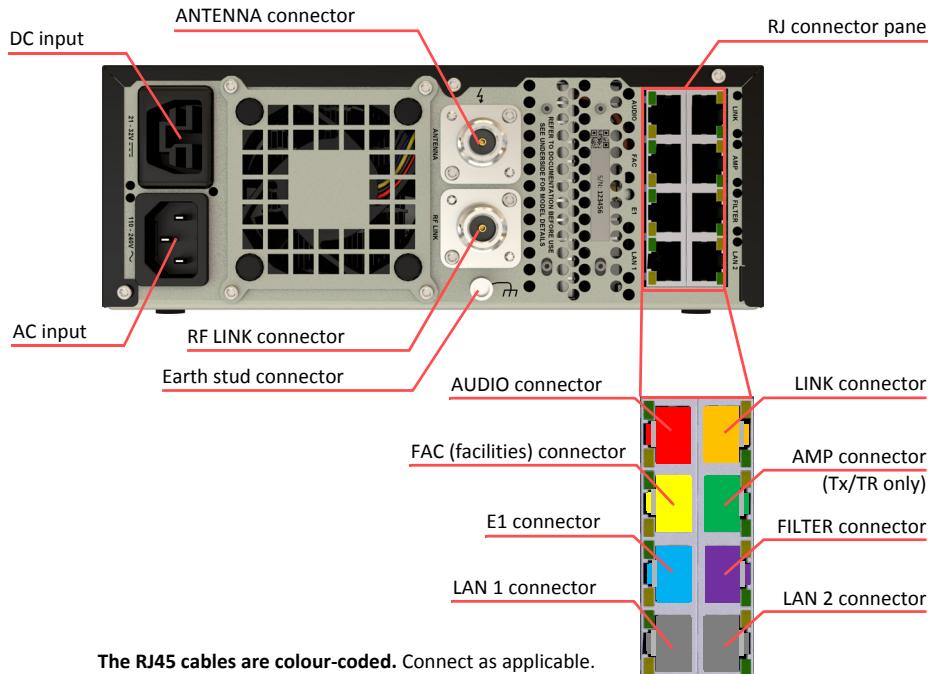


## Park Air T6 Quick Start Guide

## Front panel tour



## Rear panel tour



## Further information

To refer to Park Air T6 User Documentation (and system documentation if applicable) online use your Northrop Grumman supplied login to the Park Air Portal.

## Park Air T6 Quick Start Guide

## Warnings and cautions



## Radio label

The radio label is on the bottom of the radio



Refer to the radio label for the radio model

AC SUPPLY	DC SUPPLY
110-240V ~4A 47-63Hz	21-32V ==15A POWER 400VA max

Make sure the AC and/or DC supply is/are within range/s

## To install a Park Air T6 radio into a Park Air C4 cabinet

- 1) Slide the radio on the rear feet to the rear of the shelf in the cabinet.
- 2) Engage the rear feet into the slots.
- 3) Slide the radio until the front feet locate in the profiled holes.
- 4) Push the radio until the front feet lock into the profiled holes.
- 5) Tighten the earth stud - this **must** be tight.
- 6) Connect the cables as required.

## To use the radio

Turn the radio on with the on/off switch. The radio then initialises.

Use the soft function keys on the display and the rotary/push switch to navigate/select:

- Settings menu to change the settings
- Status menu to view status messages and BIT test the radio
- Information menu to view details about the radio.

## Park Air Services

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Email: sales@parkairsystems.com  
Web site: www.northropgrumman.com/ParkAir

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**Annex****Health and safety****Antenna radiation****Countries within the European Union**

The RF field strength limits according to EN 62311:2008 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz), are shown in the table below:

Frequency	Occupational level	General population level
100 - 400 MHz	10 W/m <sup>2</sup>	2 W/m <sup>2</sup>

*Example*

The safe distance from the antenna can be predicted using the equation:

$$R = \sqrt{\frac{1.45 PG}{4\pi S}}$$

where,

R = distance to centre of radiation in metres

1.45 = multiplication factor for average power based on a modulation index of 0.95

P = power input to antenna in Watts (example, 50 Watts)

G = antenna gain as a ratio (example, 2 dB =  $10^{2/10} = 1.585$ )

S = power density in W/m<sup>2</sup>.

Based on this formula and using a 2 dBi antenna,

For RF and microwave workers:

The predicted safe distance from the centre of the radiation would be approximately 0.96 metres for a field strength of 10 W/m<sup>2</sup> (1 mW/cm<sup>2</sup>).

For persons not classed as RF and microwave workers, and including the general public:

The minimum safe distance would be 2.14 metres for a field strength of 2 W/m<sup>2</sup> (0.2 mW/cm<sup>2</sup>).

*Correct at 13<sup>th</sup> May 2016.*

For Canada, please see overleaf.

**Canada**

The RF field strength limits according to Health Canada Safety Code 6, are shown in the table below:

Frequency MHz	Occupational level W/m <sup>2</sup>	General population level W/m <sup>2</sup>
112.000	6.83	1.29
118.000	7.01	1.29
127.500	7.28	1.29
136.975	7.55	1.29
155.975	8.06	1.29
225.000	9.68	1.29
300.000	11.18	0.13
399.975	12.90	0.15

The general equation for Occupational level:

$$W/m^2 = 0.6455 f^{0.5}$$

where, f = frequency in MHz.

The general equations for General Population level:

$$\text{For 100 to 300 MHz} = 1.291 W/m^2 \text{ and,}$$

$$\text{for 300 to 400 MHz, } W/m^2 = 0.02619 f^{0.6834}$$

where, f = frequency in MHz.

*Example*

The safe distance from the antenna can be predicted using the equation:

$$R = \sqrt{\frac{1.45 PG}{4\pi S}}$$

where,

R = distance to centre of radiation in metres

1.45 = multiplication factor for average power based on a modulation index of 0.95

P = power input to antenna in Watts

G = antenna gain as a ratio (example, 2 dB =  $10^{2/10} = 1.585$ )

S = power density in W/m<sup>2</sup>.

Based on this formula and using a 2 dBi antenna, frequency of 118.000 MHz and a measured carrier power of 53.321 W, for RF and microwave workers:

The predicted safe distance from the centre of the radiation would be approximately 1.18 metres.

For persons not classed as RF and microwave workers, and including the general public:

The minimum safe distance would be 2.75 metres.

*Correct at 28th June 2016.*