

Operating and Installation Manual

Barrett PRC-4090 Tactical HF SDR Transceiver



Model: PRC-4090 HF SDR Transceiver
4090-00-02/3.1

RF Exposure Warning

To ensure optimal transceiver performance and to avoid exposure to excessive electromagnetic fields, the antenna system must be installed according to the instructions provided.

High voltages exist on the antenna during transmission and tuning. Do not touch the antenna during these activities. RF burns may result.

Install the grounding system or counterpoise as directed to prevent RF burns from any metal part of the transceiver.

Safe working distance is based on continuous exposure to CW type transmissions for occupational exposure. Safe working distance can be reduced with normal voice communication.

Important Notes:

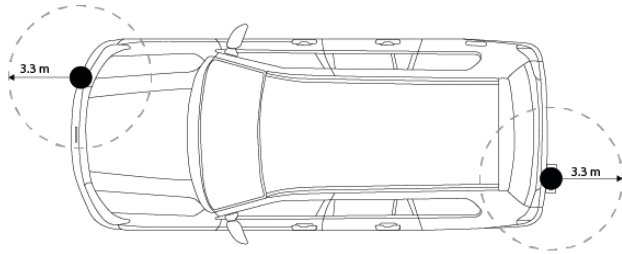
- When the PRC-4090 transceiver is used at a power level of 150 watts PEP and with a 13 dBi gain antenna, the antenna(s) used with this transceiver should be located at least 14.4 metres from the operator and should not be co-located or operating in conjunction with any other antenna or transmitter.
- When the PRC-4090 transceiver is used in a vehicular environment at a power level of 150 watts PEP with 1.5 dBi gain antenna, the antenna(s) used with this transceiver should be located at least 3.9 metres from the operator and should not be co-located or operating in conjunction with any other antenna or transmitter.
- Antenna types not included in the list below that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Typical antenna types and minimum separation distance:

Antenna type	Gain (dBi)	PEP (W)	Minimum safe separation distance (m)	Typical Environment
Automatic tuned and whip	0	150	3.3	Vehicle
Magnetic Loop	1.5	150	3.9	Vehicle
Multi-wire Broadband	5	150	5.8	Fixed
Log-Periodic	13	150	14.4	Fixed
Automatic tuned and Whip	0	100	2.7	Vehicle
Magnetic Loop	1.5	100	3.2	Vehicle
Multi-wire Broadband	5	100	4.7	Fixed
Log-periodic	13	100	11.8	Fixed
Automatic tuned and Whip	0	30	1.5	Manpack
Magnetic Loop	1.5	30	1.8	Vehicle
Multi-Wire Broadband	5	30	2.6	Fixed
Log-Period	13	30	6.5	Fixed

The above antennas are identified for reference only. It is important that the installer and operator maintain a minimum safe separation distance with the actual antenna used in the installation and to insure, in a vehicular environment, that the transmitter is only used when persons outside the vehicle are at least the recommended lateral distance away.

The image below shows an example of minimum recommended separation distance from antenna in a vehicular environment.



● 4049 Automatic Tuning Mobile HF Antenna

Note: References to Vehicular environments and minimum safe operating distances relate to persons outside the vehicle only and not to persons within the vehicle.

Contents

INTRODUCTION 1	1
Introduction	2
Important Disclosure.....	3
Terms & Abbreviations	4
The Barrett PRC-4090 HF Transceiver Overview.....	6
BASIC OPERATION 2	17
Starting the Transceiver	18
Keypad	18
Display	19
Swipe Menu	21
Status Info.....	23
Antenna Type	24
Selecting a Channel.....	25
Making a Voice Call.....	26
Making an Emergency Call	27
Receiving an Emergency Call	28
SELCALL 3	29
Overview	30
Important Selective Calling Information	31
Summary of Calling Systems	32
Setting up a Self ID	33
Setting up Contacts.....	34
Additional Contact Information	36
Making a Selcall	37

Beacon Call	38
Selcall.....	39
Telcall	41
Advanced Call History	43
Advanced Selcall Functions	47
Selcall Settings.....	47
Pagecall.....	48
GPS Request.....	49
GPS Position.....	51
Status Call.....	52
Secure Call	53
Hangup Call	55
Selcall Networks.....	56
BASIC SETTINGS 4	59
System Information.....	60
Head Device ID.....	60
Serial Number	60
Version Information	60
Transceiver Options.....	61
Configuration Pack Information	61
SDV/4026 Serial Number.....	61
General Settings.....	62
Audio Settings.....	63
Display Settings.....	64
PROGRAMMING 5	65
Channel Programming	66

Programming Channels Through the Handset	66
Free Scroll Rx/Tx.....	70
Programming Via USB	73
ADVANCED OPERATION 6	75
ARINC Call.....	76
Audio - Advanced.....	77
Rx Configuration	77
Tx Configuration	77
Audio Bandwidth.....	77
Line Audio.....	78
Line Follows Digital Voice.....	78
Line Out Level	78
Line In Level	78
Audio Record	78
Custom Filter Bandwidth	78
Collective Call.....	79
Digital Voice (Encoding)	80
Export	81
Frequency Hopping	82
Selecting the Hopping Band.....	82
Entering the Hopping PIN	82
Enabling and Disabling Hopping.....	82
GPS Push	83
GPS Push State.....	83
Privacy Key	83
Preamble Time	83
IO Settings	84

RS232 Connection.....	84
RS232 Network Encryption	84
RS232 Out (async. Indications).....	84
RS232 Baud Rate.....	85
External Alarm Type	85
Antenna Select Behavior	85
Antenna 1	85
Antenna 2	85
Modes	87
Mute	88
Network	90
Noise Reduction (NR)	93
RF Settings	94
Rx Preamp.....	94
Tx Over Beep.....	94
Tx Timeout.....	95
Noise Blanker	95
Tx Power Level	95
AGC Hang.....	95
Broadcast Filter	95
Scanning	96
Scan Settings	97
Secure Display Mode.....	100
Security Settings.....	101
Use OEM Selcall Privacy Key	102
OEM Selcall Privacy Key.....	102
Frequency Hop PIN.....	102
Frequency Hop Rate	102

OEM Secure Type	102
OEM Secure Key	102
Secure Digital Voice/Data Key	103
Digital Voice Baud Rate	103
Selcall Secure Call Hop Rate	103
Selcall Secure Call Code	103
SDV/4026 Programming Mode	103
Service Mode	103
Enable Power On PIN	104
Transceiver Lock	104
Over the Air Zeroise (OTAZ)	104
Zeroise	104
Remote Access Password	104
Stealth Mode	105
Theme Schedule	106
Tuning	107
Zeroise	108
INSTALLATION 7	109
Introduction	110
Installing a Secondary Control Handset	111
Manpack Installations	112
Control Handset Mounting	113
Battery Pack	115
Tactical Antenna Options	122
Tactical Broadband Dipole Antenna (2090-02-03)	127
Tactical Tuned Wire Dipole Antenna (2090-02-01)	130
Mobile Installations	133

PRC-4090 System Docking Station – Rear	134
Assembly.....	135
SDS Feet Configurations.....	136
Handset Docking Station Configurations	137
Complete Mobile Assembly.....	140
2019 Automatic Tuning Mobile HF Antenna	145
2018 Mobile Magnetic Loop Antenna.....	156
Base Station Installations	158
Assembly.....	159
Cooling Fan	161
Installing the Cooling Fan	161
Connection Diagram	162
Site Selection Recommendations	164
Antennas	166
912 Multi wire Broadband Dipoles.....	166
4017 Automatic Tuning Horizontal Dipole Antenna.....	168
4011 Automatic Antenna Tuner for Base Station Installations	171
Marine Installations.....	184
APPENDICES 8.....	189
Appendix 1 - Specifications	190
Appendix 2 - Connectors.....	194
Appendix 3 - Overview of HF Operation	212
Appendix 4 - BITE Test	216
Warranty Statement.....	219
Contact Details.....	220
Index	221

INTRODUCTION 1

This chapter contains the following sections:

- Introduction
- Terms and Abbreviations
- The Barrett PRC-4090 HF Transceiver Overview

Introduction

The Barrett PRC-4090 Tactical Transceiver is an SDR based HF SSB transceiver with a frequency range of 1.5 to 30 MHz in transmit and 250kHz -30MHz in receive. The Barrett PRC-4090 is designed using the latest technology enabling a physically small package with a full feature complement.

Designed to operate in the most arduous environments, as encountered in portable, off-road vehicles, vessels and aircraft environs, the Barrett PRC-4090 will provide many years of efficient and trouble free service.

The Barrett PRC-4090 supports features such as digital voice, data transmission and remote diagnostics as well as established features such as Selective Call (Selcall), direct dial telephone connection to base stations fitted with telephone interconnect systems (Telcall), GPS location, 2G and 3G ALE (Automatic Link Establishment) and frequency hopping. These features make the Barrett PRC-4090 HF Transceiver one of the most economical and versatile HF transceivers available today.

Up to 1000 channels are available to be field or workshop programmable. Auxiliary features such as Selcall, Telcall, scanning, mute status, alarm system etc. can be individually enabled or disabled for every channel as required to suit your operation.

The Barrett PRC-4090 Transceiver caters for increased use of HF data transmission for Internet email access and point-to-point data applications, by providing a comprehensive data modem interface port, high speed transmit-to-receive switching, a high stability frequency standard and an efficient cooling system option.

The Barrett PRC-4090 is operated by a smartphone-style touchscreen, full colour Control Handset. The handset integrates seamlessly into manpack, vehicle and base station installations when used with the cradle and cradle docking station. The streamlined design and unobtrusive size easily mounts to a vehicle dashboard or vessel helm.

The Barrett PRC-4090 Transceiver can be controlled from all major mobile and desktop platforms. Full remote control is available via the Barrett PRC-4090 Remote Control app, providing unprecedented access to all transceiver functionality across all major platforms.

Teamed with other matching Barrett products which include antennas, power supplies, vehicle tracking packages and HF modems, the Barrett PRC-4090 HF Transceiver becomes a powerful tool, providing solutions to many long distance communication requirements.

Important Disclosure

Please note that this manual describes all the features of the PRC-4090 HF SDR Transceiver and that some variants of the PRC-4090 may not have all the features installed.

Illustrations may show accessories, optional equipment or other features which are not part of the standard specification and are not available in individual countries.

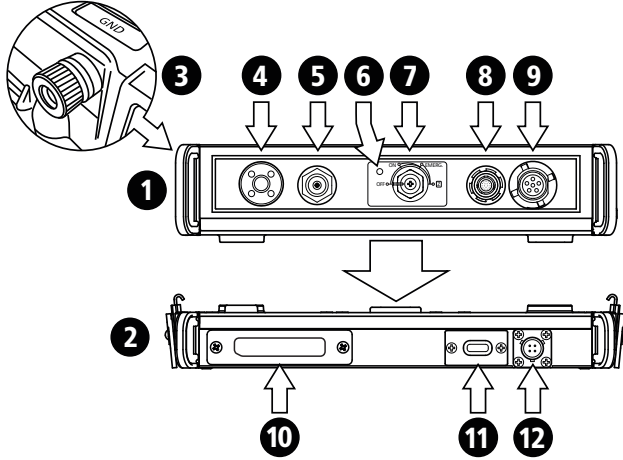
Terms & Abbreviations

Term / Abbreviation	Definition
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARINC	A set of standards as established by Aeronautical Radio, Incorporated (ARINC).
Call History	A list containing details of the last thirty calls received.
CCIR	One of many possible Selcall formats as defined by the Consultative Committee on International Radio (CCIR).
CF	Custom Filter selection
CW	Continuous Wave (used for Morse code)
dB	Decibels
dBm	Power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW).
DSP	Digital Signal Processing
ESU	Encryption Synchronisation Unit
FHSS	Frequency Hopping Spread Spectrum
GPS	Global Positioning System
HF	High Frequency
INT	International Selcall format
LCD	Liquid Crystal Display
LSB	Lower Sideband
LUF	Lowest Usable Frequency
MUF	Maximum Usable Frequency
OEM	Original Equipment Manufacturer, OEM Selcall Format
OTG	On-The-Go (USB)
PCB	Printed Circuit Board
PEP	Peak Envelope Power
PIN	Personal Identification Number
PRC	Portable Radio Communications
PSTN	Public Switched Telephone Network

Term / Abbreviation	Definition
PTT	Push to talk
Receive Only Channel	A channel that receives calls but does not transmit calls.
Revertive Tone / Signal	An acknowledgment signal automatically transmitted from a station receiving a Selcall.
RF	Radio Frequency
RFDS	Royal Flying Doctor Service
Scan Table	A list of channels used when scanning for incoming calls.
Selcall	Selective Calls
SCF	Suppressed Carrier Frequency
SDR	Software Defined Radio
SDS	System Docking Station
SSL	Signal Strength Level
Station ID	The ID of the station being called (the receiving station's Self ID).
Self ID	The programmed address identification number of a local station. (Used by other stations to call you.)
SMS	Short Message Service
SSB	Single Sideband (a transmission format)
Telcall	Telephone call using the Selective Call protocol.
USB	Upper Sideband
VSWR	Voltage Standing Wave Ratio

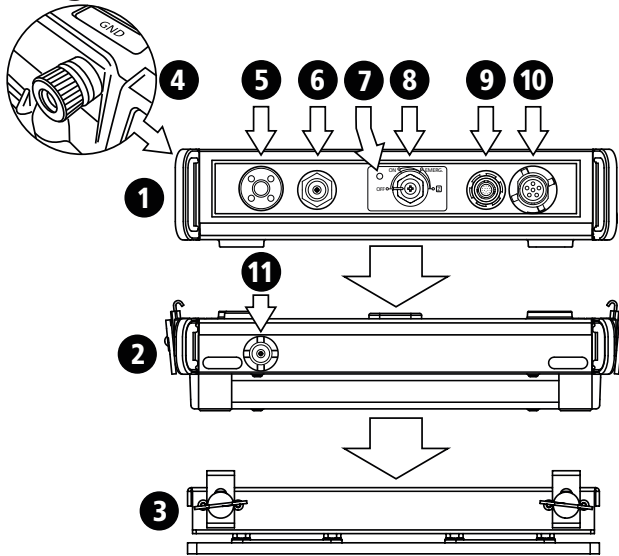
The Barrett PRC-4090 HF Transceiver Overview

Manpack Configuration



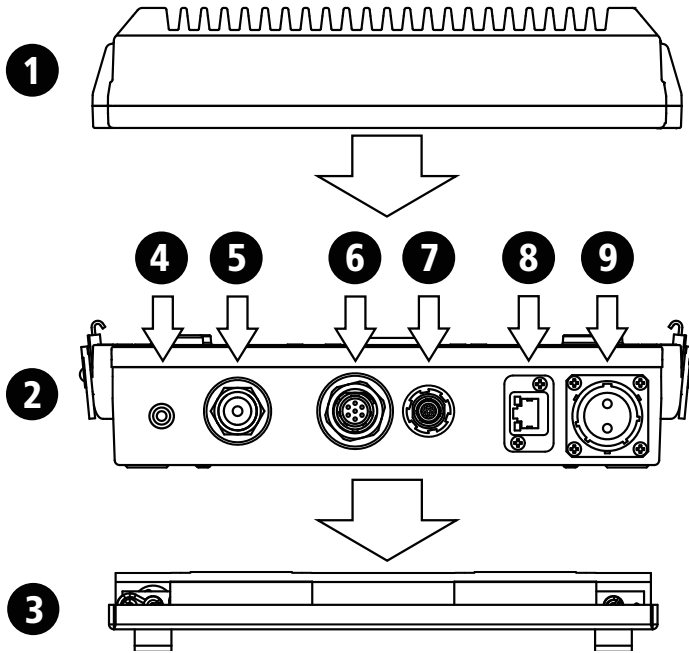
- 1 PRC-4090 HF SDR Transceiver (P/N 4090-00-01)
- 2 PRC-4090 16Ah battery pack (P/N 4090-03-05)
- 3 Earth stud
- 4 Whip antenna connection
- 5 50 Ohm antenna connection
- 6 LED status indicator
- 7 On/Off, Emergency and Zeroise switch
- 8 PRC-4090 Control Handset connector
- 9 H250 Handset connector
- 10 Battery isolator
- 11 Battery indicator
- 12 Battery charger connector

Mobile Configuration (front)



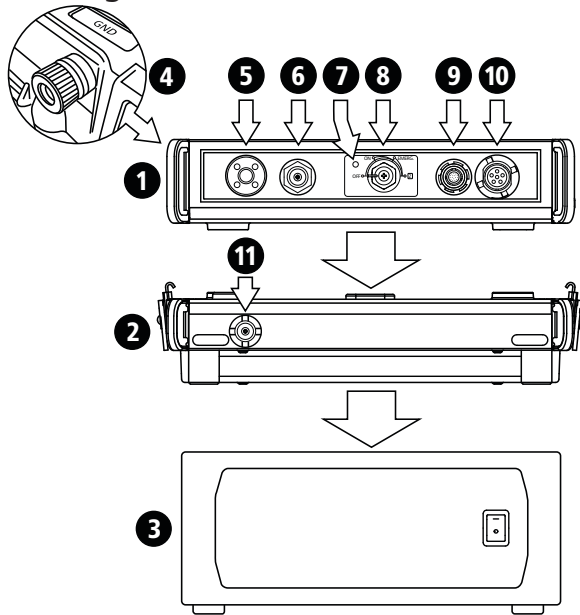
- ❶ PRC-4090 HF SDR Transceiver (P/N 4090-00-01)
- ❷ PRC-4090 System Docking Station (P/N 4090-05-00)
- ❸ PRC-4090 Anti-vibration plate (P/N4090-05-07)
- ❹ Earth stud
- ❺ Whip antenna connection
- ❻ 50 Ohm antenna connection
- ❼ LED status indicator
- ❽ On/Off, Emergency and Zeroise switch
- ❾ PRC-4090 Control Handset connector
- ❿ H250 Handset connector
- ⓫ RF Connector (from 50 Ohm output)

Mobile Configuration (rear)



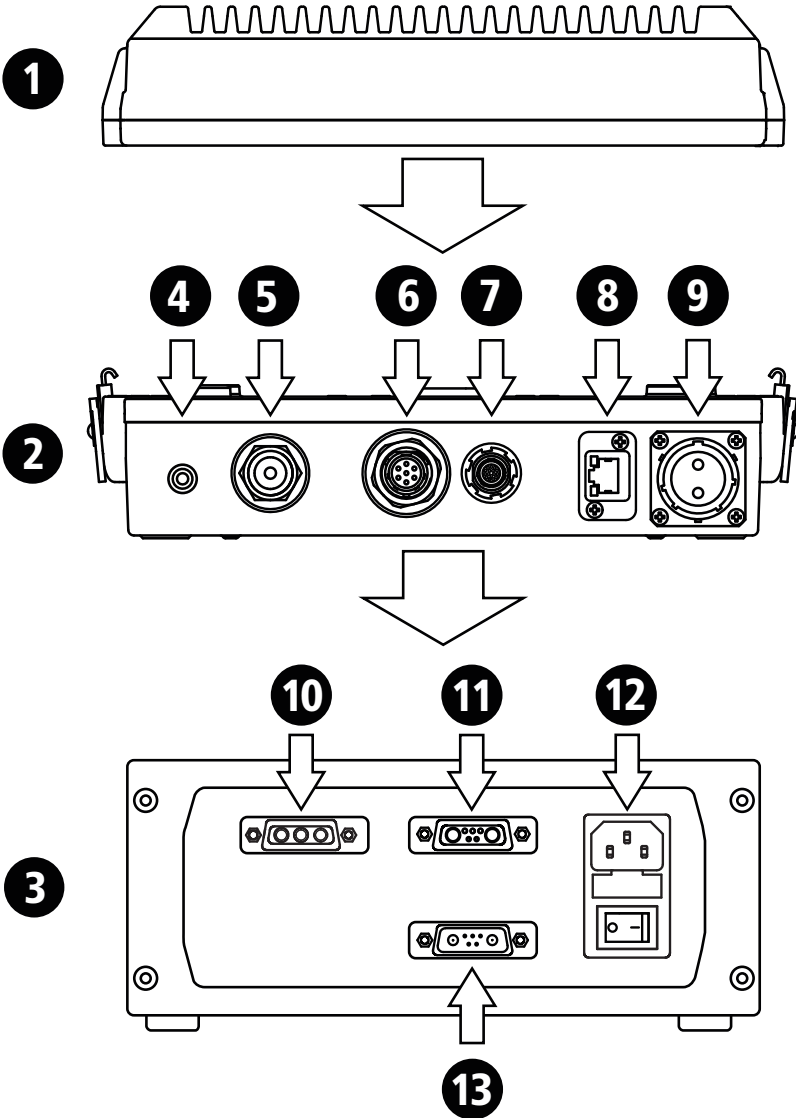
- ① PRC-4090 Transceiver (P/N 4090-00-01)
- ② PRC-4090 System Docking Station (P/N 4090-05-00)
- ③ PRC-4090 Anti-vibration plate (P/N 4090-05-07)
- ④ Ground
- ⑤ Coaxial connection (RF out)
- ⑥ ATU Connector
- ⑦ Aux. PRC-4090 Control Handset connector
- ⑧ Ethernet connection (RJ45)
- ⑨ DC in (+11 V to +28 V DC)

Base Station Configuration (front)



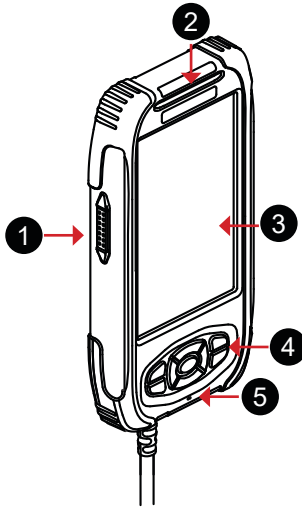
- ① PRC-4090 Transceiver (P/N 4090-00-01)
- ② PRC-4090 System Docking Station (P/N 4090-05-00)
- ③ PRC-4022 Power Supply (P/N 4090-06-01)
- ④ Earth stud
- ⑤ Whip antenna connection
- ⑥ 50 Ohm antenna connection
- ⑦ LED status indicator
- ⑧ On/Off, Emergency and Zeroise switch
- ⑨ PRC-4090 Control Handset connector
- ⑩ H250 Handset connector
- ⑪ RF Connector (from 50 Ohm output)

Base Station Configuration (rear)



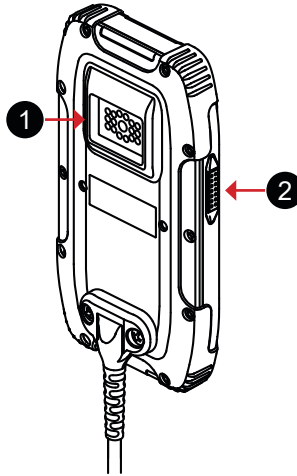
- 1 PRC-4090 Transceiver (P/N 4090-00-01)
- 2 PRC-4090 System Docking Station (P/N 4090-05-00)
- 3 PRC-4022 Power Supply (P/N 4090-06-01)
- 4 Ground
- 5 Coaxial connection (RF out)
- 6 ATU
- 7 Aux. PRC-4090 Control Handset connector
- 8 Ethernet connection
- 9 DC in (+11 V to +28 V DC)
- 10 DC out (24 V DC)
- 11 Auxiliary out (13.8 V DC)
- 12 AC in (100-240 V AC)
- 13 Battery backup (13.8 V DC)

Control Handset (Front)



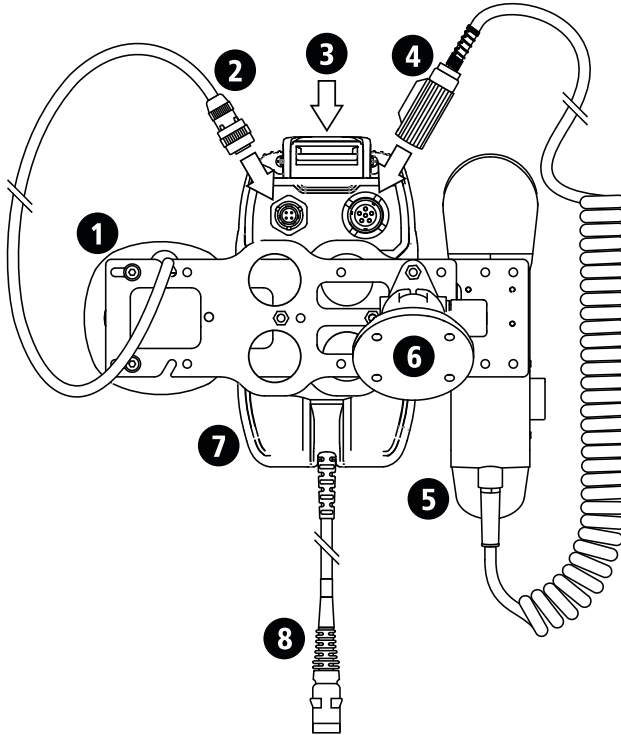
- 1 PTT button
- 2 Handset Speaker
- 3 LCD Display
- 4 Keypad
- 5 Microphone

Control Handset (Rear)



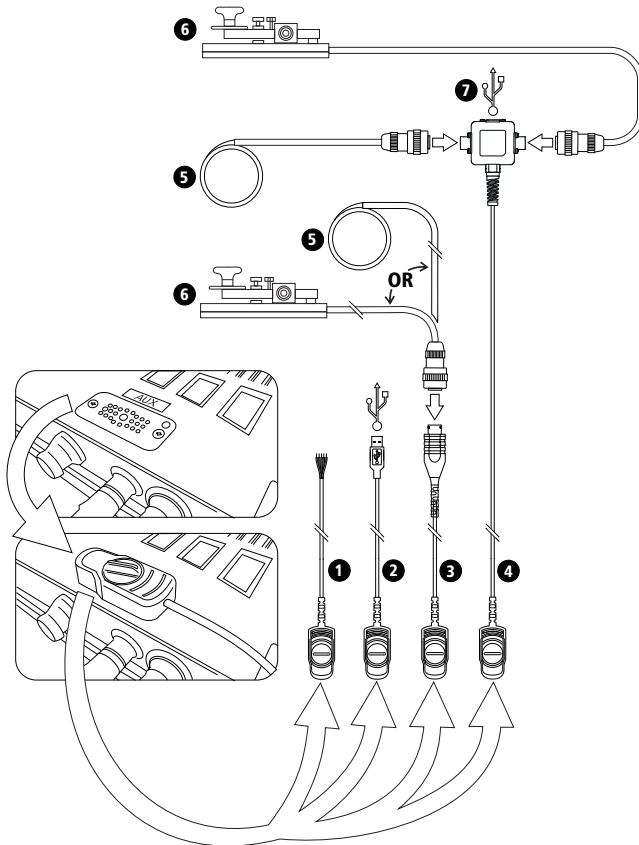
- 1 Hot-shoe connection to cradle and USB interface unit
- 2 PTT Button

Cradle and Handset Docking Station (rear)



- 1 External speaker (3W, 8 Ohm)
- 2 External Speaker connection
- 3 USB connection for WiFi adaptor or programming
- 4 H-250 handset connection
- 5 H-250 Handset
- 6 Control Handset Docking Station (P/N 4090-05-03)
- 7 Control Handset (P/N 4090-01-09)
- 8 Connection to PRC-4090 Transceiver

Auxiliary Cables



- 1 Hotshoe cable (unterminated) (P/N 4090-01-34)
- 2 Hotshoe adapter cable to USB male (P/N 4090-01-32)
- 3 Hotshoe adapter cable to GPS or CW key (P/N 4090-01-31)
- 4 3 port accessory hub (P/N 4090-01-39)
- 5 GPS adaptor (P/N 2090-01-24)
- 6 CW Key (P/N 2090-01-07)
- 7 USB connection

BASIC OPERATION 2

This chapter contains the following sections:

- Starting the Transceiver
- Display
- Antenna Type
- Channel Selection
- Receiving and Transmitting -Voice Call
- Making an Emergency Call

Starting the Transceiver

Ensure the transceiver is attached to a power source appropriate for your situation.

Turn the switch from the off position to the on position.

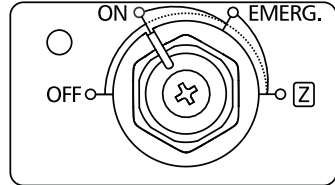
Reverse the procedure to power off.

LED status:

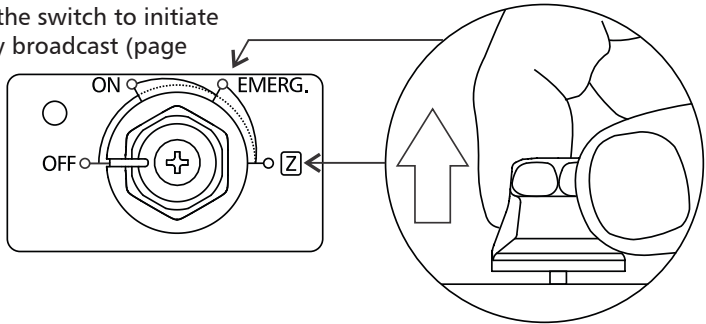
Power on: Constant green

Emergency call: Flashing green (rapid flashing green when transmitting)

Zeroize: Flashing red, then solid when complete



Lift and turn the switch to initiate an emergency broadcast (page 27) or to zeroize the transceiver (see page 108).



Keypad

There are seven keys on the keypad. Some keys have multiple functions assigned to them depending on when or how long the key is pressed.

Key	Function
	Channel Up / Scroll up
	Channel Down / Scroll down
	Scroll left and right
	Enter / Set a menu item











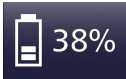
Key	Function
	Make a call
	Clear / Back one step
	Volume Up
	Volume Down

Display










1	Tune Status	10	Modulation Mode
2	Date and Time	11	Receive/transmit status
3	ALE Status	12	Receive Strength/Transmit Power Indicator
4	Digital Voice/Secure Digital Voice	13	Swipe Menu Access
5	Status Indicators (see page 20)	14	Channel Label
6	Operation icons (see page 20)	15	Channel Frequency
7	ALE (Channel) Status	16	Channel Number
8	Selcall Network	17	ALE 3G Sync status
9	Transmit Power		

Status Indicators

	Access Point		GPS
	WiFi Client		USB Storage
	Low Voltage		Missed Call
	Screen Lock		Ethernet
	Busy		Networked RS232
	Battery charge		

A number on the WiFi Client icon or the Networked RS232 icon indicates the number of connections currently made to that device.

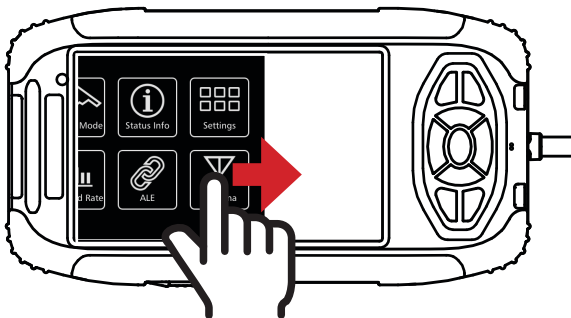
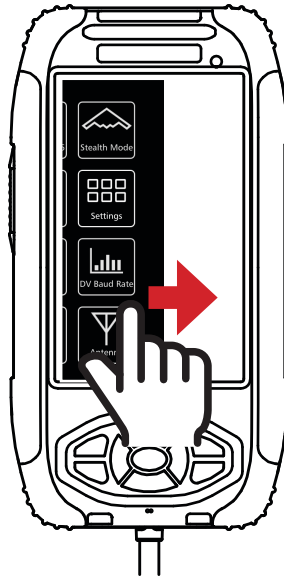
Operation Icons

	Toggles Digital Voice or Secure Digital Voice encoding on or off (if fitted).		Cycles through low, med, high or no noise reduction.
	Opens the channel select menu.		Toggles mute on/off. See page 88 for further mute details.
	Manually tunes the antenna.		Enables/disables scanning.
	Enables/disables Frequency Hopping (if fitted).		

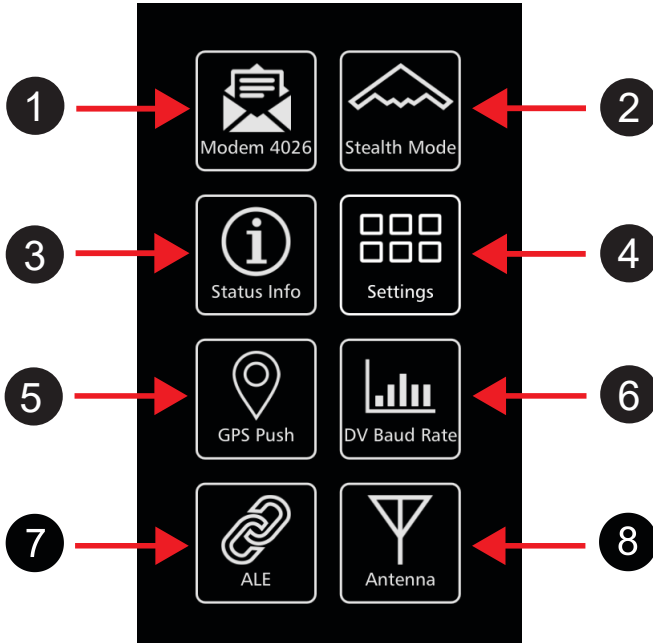
Swipe Menu

To access this menu, either swipe horizontally across the screen from the left edge to drag open the swipe menu or press and hold the right arrow key. The icons (other than Settings) appear green when enabled and white if disabled.

Accessing the Swipe Menu



Swipe Menu



- 1 Modem Select - Tap to enable internal modem for data use
- 2 Stealth Mode - When active, all lights and sounds are disabled
- 3 Status Information - Displays IDs and mechanical information
- 4 Settings Menu - Access to Settings menus
- 5 GPS Push (if fitted) or Display Settings
- 6 DV Baud Rate - Quick access to Digital Voice Baud Rate settings
- 7 ALE Menu - Quick access to ALE menu
- 8 Antenna Select - Quick access to antenna select menu

The items displayed in the Swipe menu are determined by the options installed in the transceiver. Each of the Modem, Stealth Mode and GPS Push icons will turn green when active.

Status Info

The Status Info menu displays important information about the transceiver and the network.

It can be accessed from the Swipe Menu.

It displays the following:

Power: Receive and transmit voltage use, transceiver internal temperature and current draw.

Battery: If in Manpack Configuration, this line will display the time until battery needs to be charged, or if charging, the time until battery is fully charged as well as the charging current.

GPS Position: The current GPS position of the transceiver (if acquired).

IP Address: The IP address of the transceiver (if connected to an IP network).

Selcall ID: The primary four and six digit selcall IDs of the transceiver.

ALE 2G Self ID: The Self ID of the transceiver in an ALE 2G network (optional)

ALE 3G Self ID: The Self ID of the transceiver in an ALE 3G network (optional)



Status Info ←

Power
Rx 15.9V , Tx 0.0V , 26°C , 0.4A

Battery
28h39m until empty

GPS Position
LAT: 32°06.035' S LONG: 115°48.665' E

IP Address

ALE 2G Self ID
alpha1

ALE 3G Self ID
PerthBas

When charging battery:

Battery
03h24m until charged 2.6A

When not charging battery:

Battery
28h39m until empty