

Operating and Installation Manual

Barrett 4050 HF SDR Transceiver



Model: 4050ip/4050se

BCM40500/14.2

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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 and bystander exposure.

When the 4050 transceiver is used at a power level of 150 watts PEP and a 13 dBi gain antenna, the antenna(s) used with this Transceiver should be located at least 13.6 metres from the operator and should not be co-located or operating in conjunction with any other antenna or transmitter.

When the 4050 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 3.6 metres from the operator and should not be co-located or operating in conjunction with any other antenna or transmitter.

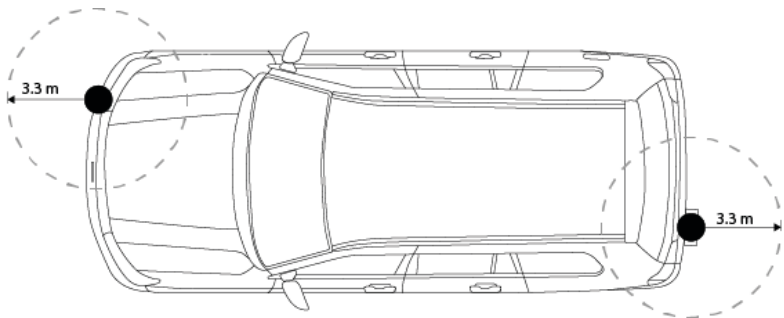
Approved antenna types and minimum separation distance:

Antenna type	Gain (dBi)	PEP (W)	Minimum separation distance (m)	Typical Environment
Automatic tuned and whip	0	150	3.1	Vehicle
Magnetic Loop	1.5	150	3.6	Vehicle
Multi-wire Broadband	5	150	5.4	Fixed
Log-Periodic	13	150	13.6	Fixed
Automatic tuned and Whip	0	125	2.8	Vehicle
Magnetic Loop	1.5	125	3.3	Vehicle
Multi-wire Broadband	5	125	5.0	Fixed
Log-periodic	13	125	12.4	Fixed
Automatic tuned and Whip	0	30	1.5	Vehicle

Antenna type	Gain (dBi)	PEP (W)	Minimum separation distance (m)	Typical Environment
Magnetic Loop	1.5	30	1.7	Vehicle
Multi-Wire Broadband	5	30	2.5	Fixed
Log-Period	13	30	6.1	Fixed
Automatic tuned and whip	0	10	0.8	Vehicle
Magnetic Loop	1.5	10	1.0	Vehicle
Multi-wire Broadband	5	10	1.4	Fixed
Log-Periodic	13	10	3.5	Fixed

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.

FCC RF Exposure Compliance Statement

The Barrett 4050 transceivers have been evaluated and comply with the Federal Communications Commission (FCC) RF exposure limits for the General Population/Uncontrolled exposure environment.

In addition, the transceivers have been designed to comply with:

- US Federal Communications Commission Office of Engineering & Technology. Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields OET Bulletin 65, Edition 97-01, August 1997

Supplier's Declaration of Conformity

Per FCC CFR 47 Part 2 Section 2.1007(a)



4050ip and 4050se models

FCC ID: OW4-4050IP

Responsible Party

Name: Barrett Communications

Address: 47 Discovery Dr, Bibra Lake, Western Australia, 6163

Phone Number: +618 9434 1700

Hereby declares that the product:

Model Name: 4050ip and 4050se

conforms to the following regulations:

FCC part 15, subpart B, section 15.107(a), 15.107(d), and section 15.109(a)

Class A Digital Device

As a personal computer peripheral, this device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Notice:

This equipment has been tested and found to comply within the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are

designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Important Safety Information

RF Energy Exposure and product Safety Guide for Mobile Two-Way Radios



CAUTION:

This radio is restricted to Occupational use only.

Notice to Users (FCC and Industry Canada)

This device complies with Part 15 of the FCC rules and Industry Canada's RSS's per the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- Changes or modifications made to this device, not expressly approved by Barrett Communications, could void the authority of the user to operate this equipment.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, this antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

The operation of your Barrett Communications radio is subject to the Radio-communications Act and must comply with rules and regulations of the Federal Government's department of Industry Canada. Industry Canada requires that all operators using Private Land Mobile Frequencies obtain a radio license before operating their equipment.

Cet appareil est conforme à la partie 15 des règles de la FCC et aux flux RSS d'Industrie Canada selon les conditions suivantes :

-
- Cet appareil ne doit pas provoquer d'interférences nuisibles.
 - Cet appareil doit accepter toute interférence reçue, y compris les interférences susceptibles de provoquer un fonctionnement indésirable.
 - Les changements ou modifications apportés à cet appareil, non expressément approuvés par Barrett Communications, pourraient annuler le droit de l'utilisateur à utiliser cet équipement.

Conformément aux réglementations d'Industrie Canada, cet émetteur radio ne peut fonctionner qu'en utilisant une antenne d'un type et d'un gain maximum (ou inférieur) approuvés pour l'émetteur par Industrie Canada. Pour réduire les interférences radio potentielles avec d'autres utilisateurs, ce type d'antenne et son gain doivent être choisis de telle sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne soit pas supérieure à celle nécessaire pour une communication réussie.

Le fonctionnement de votre radio Barrett Communications est soumis à la Loi sur les radiocommunications et doit être conforme aux règles et réglementations du ministère fédéral d'Industrie Canada. Industrie Canada exige que tous les opérateurs utilisant des fréquences mobiles terrestres privées obtiennent une licence radio avant d'utiliser leur équipement.

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INTRODUCTION 1

This chapter contains the following sections:

- Introduction
- The Barrett 4050 HF Transceiver
- Starting the Transceiver
- Display

Introduction

The Barrett 4050 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 4050 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 off-road vehicles, vessels and aircraft, the Barrett 4050 will provide many years of efficient and trouble free service.

The Barrett 4050 supports 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), frequency hopping, digital voice, data transmission and remote diagnostics. These features make the Barrett 4050 HF Transceiver one of the most economical and versatile HF transceivers available today.

The Barrett 4050 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 4050 Transceiver can be operated in either a local (desktop) configuration for base station applications or, with the addition of an inexpensive mobile pack, in a remote control (trunk mount) configuration for mobile applications.

The Barrett 4050 Transceiver can be controlled from all major mobile and desktop platforms. Full remote control is available via the Barrett 4050 Remote Control app, providing unprecedented access to all transceiver functionality across all major platforms.

Operated from 12 V DC to 24 V DC power supplies, the transmitter is rated at 125-150 watt PEP in voice mode and is protected from over-voltage or reverse-voltage application.

Up to 1000 channels (depending on the 4050 variant) are available. 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.

Teamed with other complementary Barrett products which include antennas, power supplies, vehicle tracking packages and HF modems, the Barrett 4050 HF Transceiver becomes a powerful tool, providing solutions to many long distance communication requirements.

Please refer to the 4000 Series IP Connectivity/Networking Guide (P/N BCM40507) for information regarding IP connectivity and networking of the 4050 Transceiver.

Important Disclosure

Please note that this manual describes all the features of the 4050 HF SDR Transceiver and that some variants of the 4050 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 some countries.

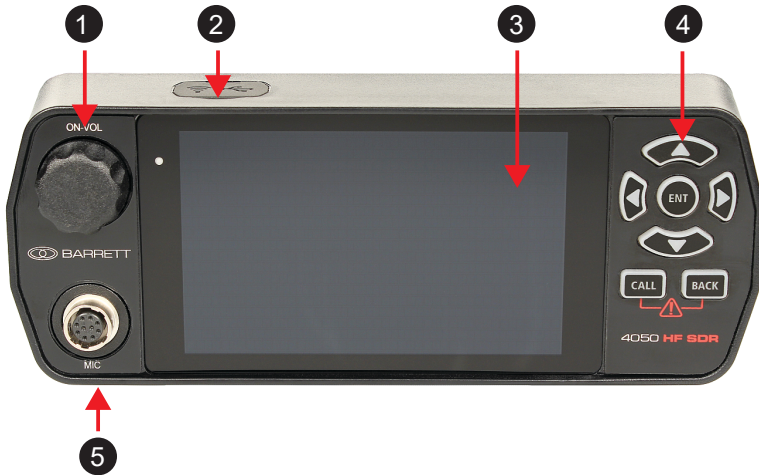
Terms & Abbreviations

Term / Abbreviation	Definition
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARINC	A set of standards as established by Aeronautical Radio, Incorporated (ARINC).
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
IP	Internet Protocol
ISB	Independant Sideband
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
PSTN	Public Switched Telephone Network
PTT	Push to talk

Term / Abbreviation	Definition
Receive Only Channel	A channel that receives only and cannot be transmitted on.
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
SSL	Signal Strength Level
Station ID	The ID of the station being called (the receiving station's Self ID).
SE	Standard Edition
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 4050 HF Transceiver

Transceiver Front



1

Power button which combines switching the transceiver on and off with adjusting the volume.

This will be represented as  throughout the manual

2

USB / WiFi Socket

3

Touchscreen

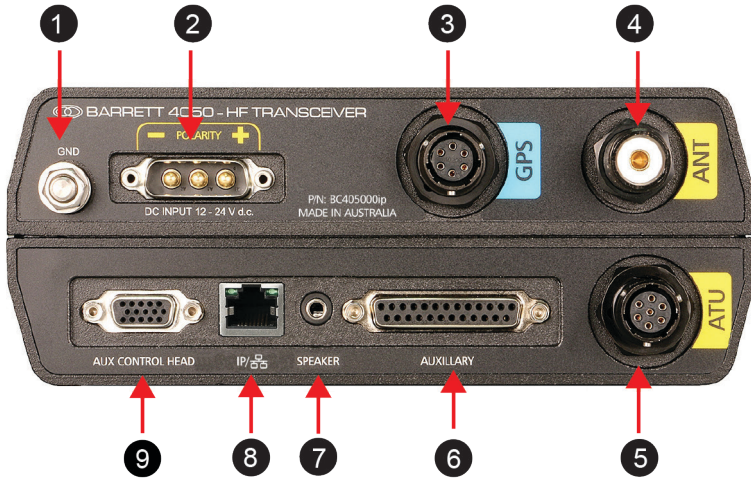
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Keypad

5

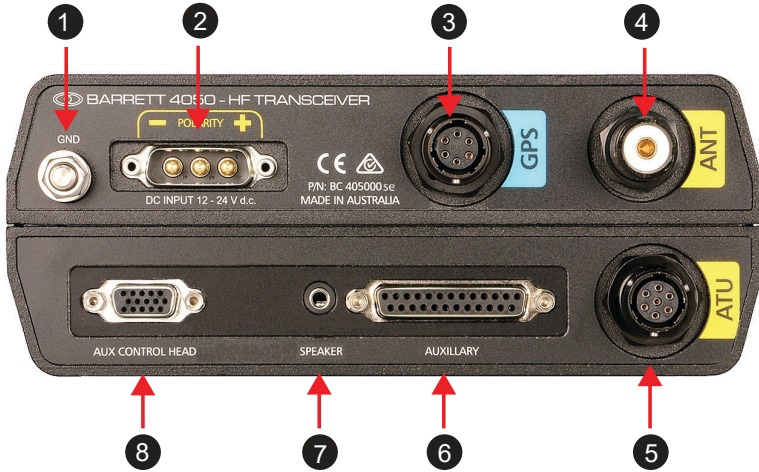
Microphone socket

Transceiver Rear - 4050ip



- | | | |
|----------|--------------------------|---|
| 1 | GND | Use this stud to attach to a ground (earth) connection. For example, a vehicle chassis |
| 2 | DC INPUT
12 - 24 V DC | Power input for use with the 4022 power supply |
| 3 | GPS | Input for GPS receiver (P/N BCA40009) for vehicle tracking / location applications |
| 4 | ANT | Antenna socket |
| 5 | ATU | Interface for Barrett automatic tuning antennas and 4075 Linear Amplifier system |
| 6 | AUXILIARY | 25-way auxiliary interface |
| 7 | SPEAKER | Output for loudspeaker (P/N BCA40015) |
| 8 | IP | RJ45 Ethernet port for IP connection. |
| 9 | AUX CONTROL
HEAD | This can be used to attach a secondary control head (via a six metre cable) in addition to the front panel. |

Transceiver Rear - 4050se



- 1** GND Use this stud to attach to a ground (earth) connection. For example, a vehicle chassis
- 2** DC INPUT 12 - 24 V DC Power input for use with the 4022 power supply
- 3** GPS Input for GPS receiver (P/N BCA40009) for vehicle tracking / location applications
- 4** ANT Antenna socket
- 5** ATU Interface for Barrett automatic tuning antennas and 4075 Linear Amplifier system
- 6** AUXILIARY 25-way auxiliary interface
- 7** SPEAKER Output for loudspeaker (P/N BCA40015)
- 8** IP/AUX CONTROL HEAD This can be used to attach a secondary control head (via a six metre cable) in addition to the front panel. This can also be used to attach a linear system or connect to an IP network.

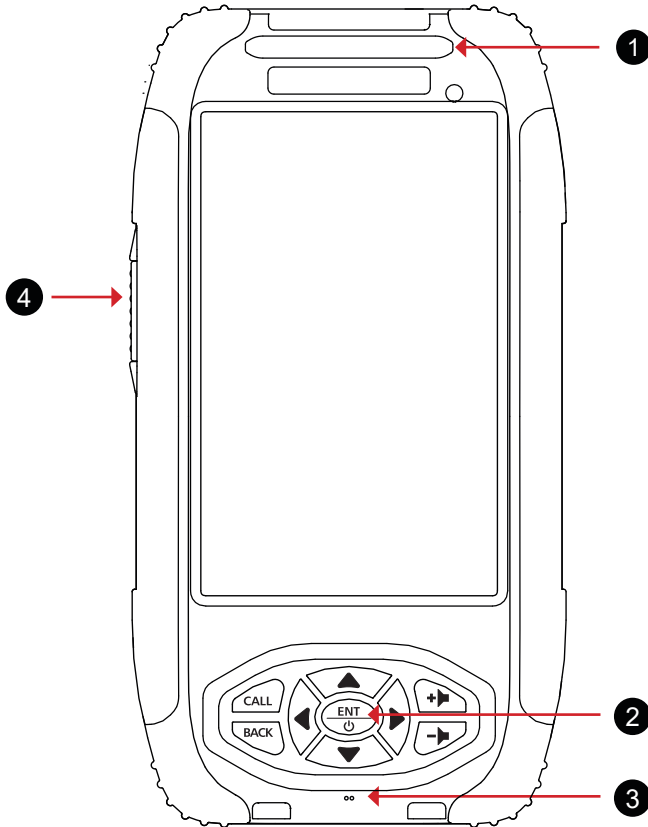
The 4050 Control Handset

The 4050 can support an optional 4050 Control Handset (P/N BCA40500) through the AUX Control head port on the rear of the 4050. This Control Handset can be purchased from Barrett Communications (P/N BCA40500) and controls the radio in the same manner as the original but in a modern cellular-type format.

IMPORTANT NOTES:


DO NOT USE THE CONTROL HANDSET IN CONJUNCTION WITH THE ORIGINAL CONTROL HEAD.

ONLY CONNECT THE CONTROL HANDSET WHEN THE TRANSCEIVER IS POWERED OFF. NOT DOING SO MAY DAMAGE THE TRANSCEIVER.




Number	Description
1	Speaker
2	On/Off/Enter key
3	Microphone
4	PTT


Powering on

Press  to power on the transceiver.

Press and hold to bring up the Shutdown/reboot screen.


Volume Control

 To increase the audio volume

 To decrease the audio volume

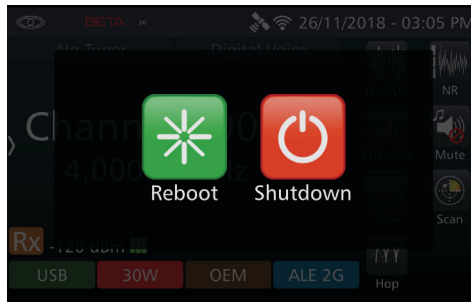
Starting the Transceiver

Ensure the transceiver is attached to a power source appropriate for your situation. Please refer to the Basic Operation section on page 15.

To turn the transceiver on, momentarily press the on button: .




Pressing the same button will:




- Press for three seconds powers down the transceiver.
- Holding down for 10 seconds at any time will perform a hard shut down of the transceiver.
- Pressing briefly brings up the Power Button Menu allowing the transceiver to be rebooted or shut down.





Keypad

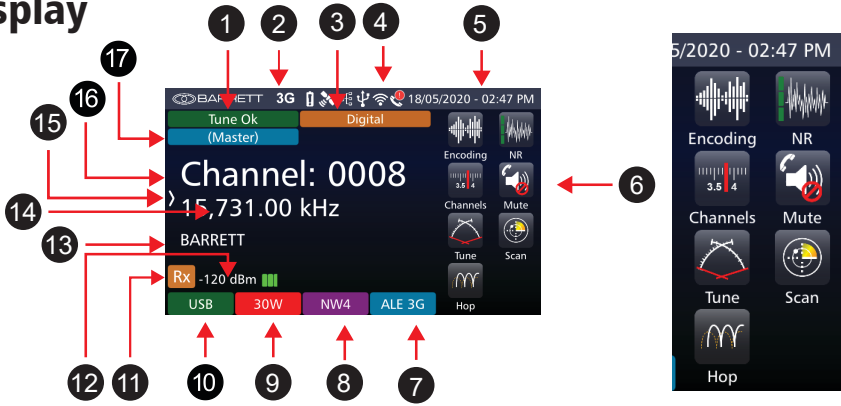
There are seven keys on the keypad. Some keys have multiple functions assigned to them depending on when or how long the key is pressed.

Key	Function
	Channel Up / Scroll up
	Channel Down / Scroll down
	Scroll left and right

Key	Function
	Enter / Set a menu item
	Make a call
	Clear / Back one step

Press the  and  buttons together to initiate an emergency call. See page 20 for further information.

Display



1	Tune Status	5	Date and Time
2	ALE Status (2G/3G)	6	Operation Icons
3	Encoding Status	7	ALE (Channel) Status
4	Status Indicators	8	Selcall Network
	Access Point	9	Transmit Power
	WiFi Client	10	Modulation Mode
	Low Voltage	11	Receive/transmit status
	Screen Lock	12	Receive Strength/Transmit Power Indicator
	Busy	13	Channel Label
	GPS	14	Channel Frequency
	USB Storage	15	Swipe Menu Access
	Missed Call	16	Channel Number
	BoB Active	17	ALE 3G Sync status
	Ethernet		
	Networked RS232		

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

Operation Icons



Allows selection of voice encoding type and toggles voice encoding on or off.



Cycles through low, med, high or no noise reduction.



Opens the channel select menu.



Toggles mute on/off. See page 83 for further mute details.



Manually tunes the antenna.



Enables/disables scanning.



Enables/disables Frequency Hopping (see page 76).

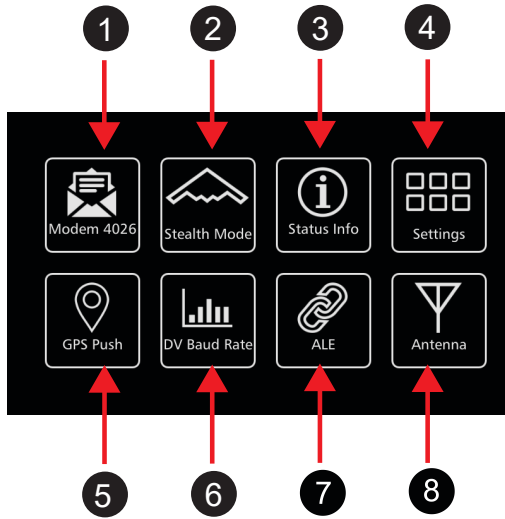
Swipe Menu

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.

Accessing the Swipe Menu



Swipe Menu



- 1 Modem Select - Tap to toggle through available internal modem options for data use.
- 2 Stealth Mode - When active, all lights and sounds are disabled.
- 3 Status Information - Displays IDs and other information.
- 4 Settings Menu - Access to Settings menus.
- 5 Enable/Disable 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.