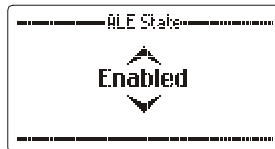



ALE Configuration Menus**ALE State**

This feature enables or disables the ALE system

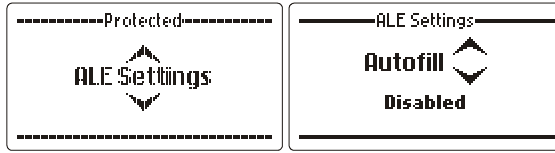
Use the **Scroll keys** to select the setting required (example "ALE Enabled"):-



When the setting required is selected press the  key

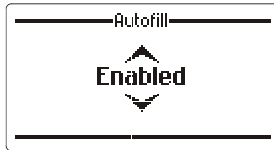


ALE Autofill



This feature enables or disables the ALE Autofill option. The Autofill option allows the 2050 transceiver to automatically add unknown stations to the ALE network. This means that whenever a new station is added to the network the network administrator does not have to individually re-configure each station in the network with the new stations ID. The Autofill queue is a first in first out queue where up to eleven new stations can be added, after this the next received unknown station will overwrite the first ID in the Autofill queue. To avoid this happening the operator must reassign the Autofill station ID alias.

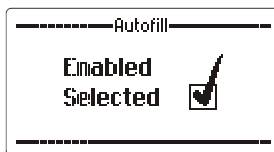
Use the **Scroll keys** to select the setting required (example "Autofill Enabled"):-



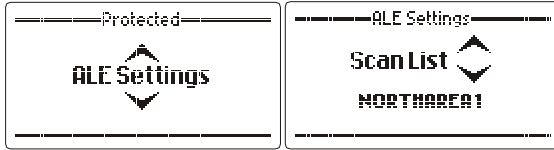
When the setting required is selected press the




key



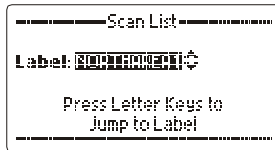
ALE Scan List



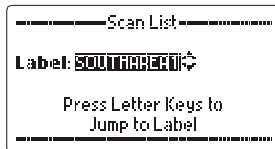
Note:- you can also enter this scan list select section by holding down the  key for more than two seconds


To select the ALE scan list required

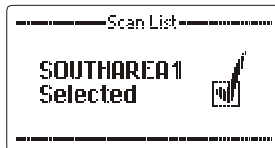
press the  key



Use the **Scroll keys** or press the first letter of the scan list you want to use (example shown – “s”) to select the scan table required:-



then press the  key

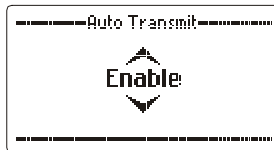



Auto Transmit

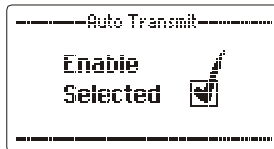


When Auto Transmit is set to "Disable" the ALE system will not respond to any calls made to this station.

Use the **Scroll keys** to select the setting required (example "Enable"):-



When the setting required is selected press the  key

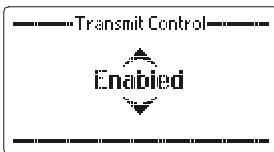



Transmit Control

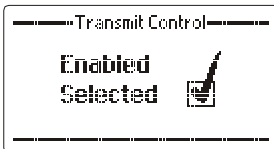


When Transmit Control is set to “Disabled” the ALE system will not be able to transmit any ALE calls, including automatic soundings and responses to incoming ALE calls.

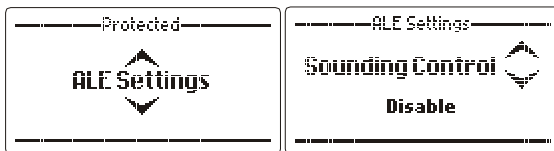
Use the **Scroll keys** to select the setting required (example “Enabled”):-



When the setting required is selected press the  key



Sounding Control



ALE operates normally both transmitting and receiving sounds when Sounding Control is set to "Enable". In some circumstances however it is desirable not to transmit soundings under any circumstances, in this case Sounding Control is set to "Disable". Sounding is limited to certain channels (pre-programmed by the ALE fill program). The ALE system will however, continue to make and respond to calls (depending on the Response Control settings).

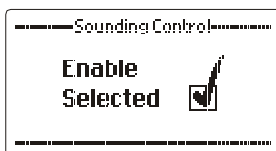
Use the **Scroll keys** to select the setting required (example "Enable"):-



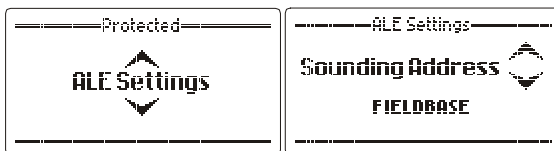
When the setting required is selected press the



key



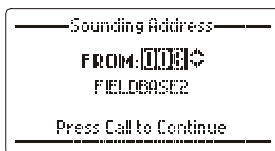
Sounding Address



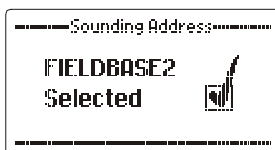
Configures the self address used during an automatic sounding (Sounding Control must be set to Global On). If sounding control = individual preset basis, the address used is dependant on the active channel.



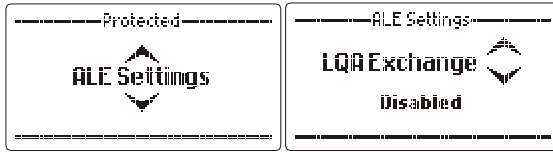
Use the **Scroll keys** to select the setting required (example "FIELDBASE2"):-



When the setting required is selected press the **ENTER** key




Link Quality Analysis (LQA) Exchange

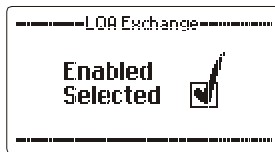


This option enables or disables the exchange of LQA information with other stations

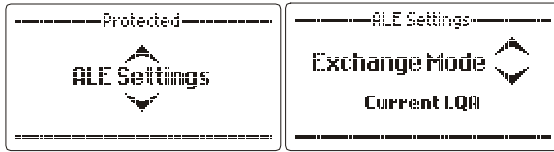
Use the **Scroll keys** to select the setting required (example "Enabled"):-



When the setting required is selected press the  key

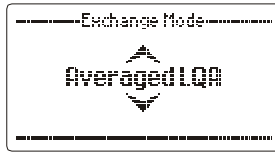


Link Quality Analysis (LQA) Exchange Mode

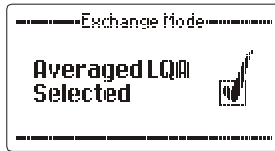


This option sets the source of the LQA reading sent to the other station, it can be set to "Current LQA" which is a reading taken during the ALE burst just received or it can be set to "Averaged LQA" which uses the long term averaged value taken from memory.

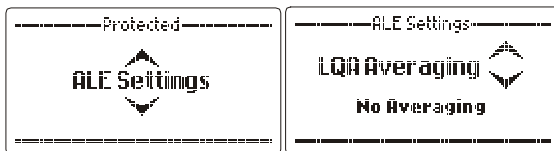
Use the **Scroll keys** to select the decay time or disable (example "Averaged LQA"):-



When the setting required is selected press the **ENTER** key



Link Quality Analysis (LQA) Averaging



This option sets the method used to update an existing link quality value stored in ALE processor memory when the new link quality value is worse than the stored value.

The option can be set to either replace the old values with the new values or replace the old values with different weighted averages of the old values and new readings.

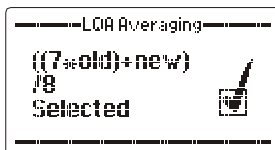
Averaging reduces the effect that one bad reading might otherwise have on a perfect channel. If a new reading is better than an old value, the old value is replaced by the reading. There are 4 different averaging formulas available:-

- No averaging, replace the old values with new values
- $(old+new)/2$
- $((3*old)+new)/4$
- $((7*old)+new)/8$

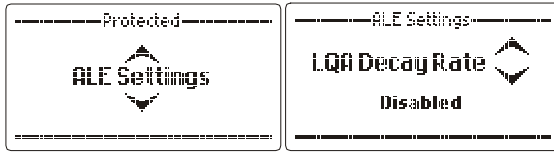
Use the **Scroll keys** to select the LQA averaging value required (example " $((7*old)+new)/8$ "):-



When the setting required is selected press the **ENTER** key



Link Quality Analysis (LQA) Decay Rate



This option sets the artificial decay rate for the link quality information that is stored in the link quality table within the ALE processor.

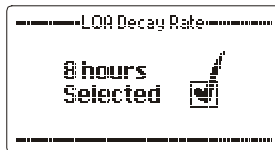
Switching the sounding off and setting a decay rate of two hours would result in the recording of a perfect channel (100% channel quality) decaying to an unusable channel (0% channel quality) over a period of two hours.

The decay rate can be disabled, set to 1,2,4,8,24 and 48 hours.

Use the **Scroll keys** to select the decay time or disable (example "8 hours"):-



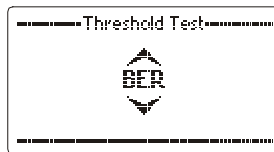
When the setting required is selected press the **ENTER** key



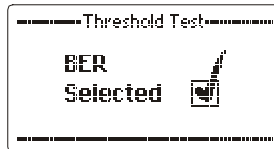
Threshold Test

Used to select which type of threshold test is used to determine what quality ALE channel is acceptable for communication. Either "Sinad", "BER", "Both" or "None" can be selected.

Use the **Scroll keys** to select the test required (example "BER"):-



press the  key



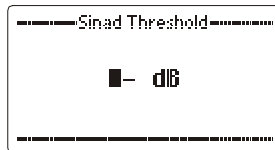
SINAD Threshold



This option sets the SINAD threshold at which an ALE channel is considered usable.


This can be set to between 0 and 30dB.

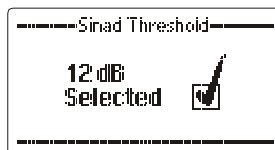
press the  key



using the numeric keys enter the SINAD threshold required (example "12dB"):-



then press the  key



BER Threshold



This option selects the BER threshold at which an ALE channel is considered usable. If the required BER is not reached in the reply from the remote station the link establishment process is rejected. Depending on the retry setting the link establishment would continue on another link.


It can be set between 0-30, selecting 30 effectively means that all links are allowed

press the  key



using the numeric keys enter the BER threshold required (example "7"):-



then press the  key



ALE Fill Mode

The ALE is configured with its entire network data using the Barrett PC based ALE fill program. Refer to the Barrett 2050 PC based programming software that contains the ALE fill program for details.

Programming Functions

The Barrett PRC-2090 transceiver can be programmed in three ways:-

Using the software supplied with the programming kit (P/N 2090-01-30), loaded on a PC, and transferring information to the PRC-2090 by RS-232 through the auxiliary connector.

By direct key entry through the front panel

Note:- This facility may not be available if the network administrator has barred the function during programming using a PC.

By cloning information from another transceiver, through the auxiliary connector using a cloning cable Barrett P/N BCA204020.

Programming Using the Programming Software

The programming software should be loaded onto PC using the instructions supplied with the package.


Transceiver configuration packs are uploaded and downloaded to the PRC-2090 transceiver via the auxiliary socket on the PRC-2090 transceiver.

Programming Using the Supplied Barrett Cable

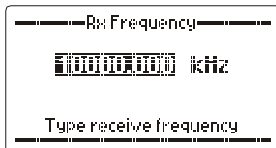
To program the transceiver using the RS-232 port of your PC or Laptop plug one end of the programming cable supplied into the PC or laptops serial port. The other end should be plugged into the auxiliary socket. The PC or laptop should have the Barrett 2000 series programming software running and the PRC-2090 should be switched on. Programming functions can now commence.

Programming a Channel from the Front Panel

Note:- To program a channel from the front panel it is necessary to have this function enabled.

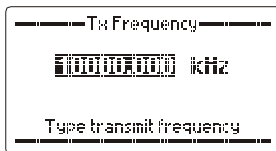
To enter the programming mode first select the channel you want to program then press the  key:-

Transmit and Receive Frequencies



Use the numeric keypad to enter the receive frequency

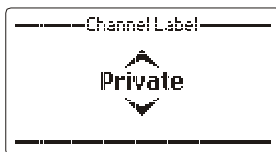
then press the  or  key



Use the numeric keypad to enter the transmit frequency

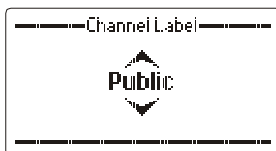
then press the  or  key

Channel Use Labels



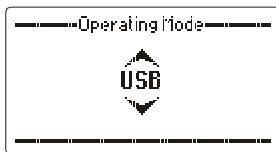
Use the Scroll keys to select the required channel label

Note:- channel labels can be entered in the “General” section of the protected menu.



then press the  or  key

Operating Mode

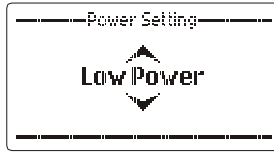


Use the Scroll keys to select the required operating mode, USB, LSB, AM, CW or AFSK

then press the  or  key

Note:- If the 500 Hz or narrow filter hardware option is enabled this filter is automatically selected in CW mode and AFSK mode

Transmitter Power Setting

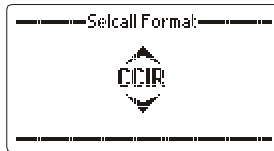


Use the Scroll keys to select the required output power – high, medium or low power.

then press the  or  key

Selcall Format

Each channel can be programmed for one Selcall format, for a description of the formats available, refer to the beginning of this manual.




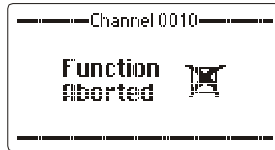
Use the Scroll keys to select the required Selcall format

then press the  or  key

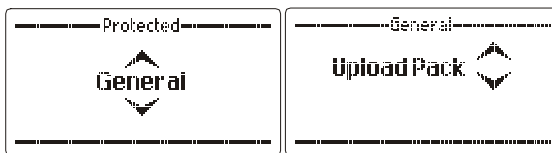
This last key press displays the following screen indicating the channel programming is complete:-



The channel program sequence can be aborted at any stage in the programming sequence by pressing the  key after which the following is displayed:-



Cloning (Programming) from Another Transceiver

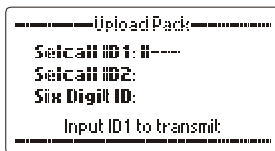



Note:- Use the transceiver you want to **send the configuration from** for the following steps

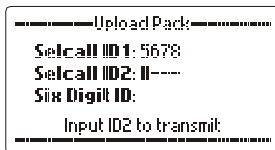
This feature is used to send a copy of the configuration of one PRC-2090 transceiver or PRC-2090 transceiver fitted in the manpack adaptor to another using a cable (BCA204020) connecting both transceivers together via their auxiliary connectors using the RS-232 connection.


Before uploading commences it is necessary to enter the Selcall IDs of the transceiver that will be loaded.

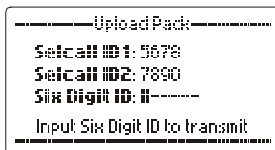
press the  key



Using the numeric keypad enter Self ID 1 and press the  key



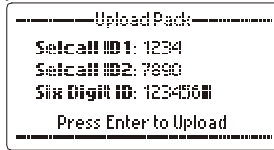
Using the numeric keypad enter Self ID 2 and press the  key



Using the numeric keypad enter Six digit ID and press the



key



then press the



key to proceed with cloning.

Manpack Operation

Power Systems

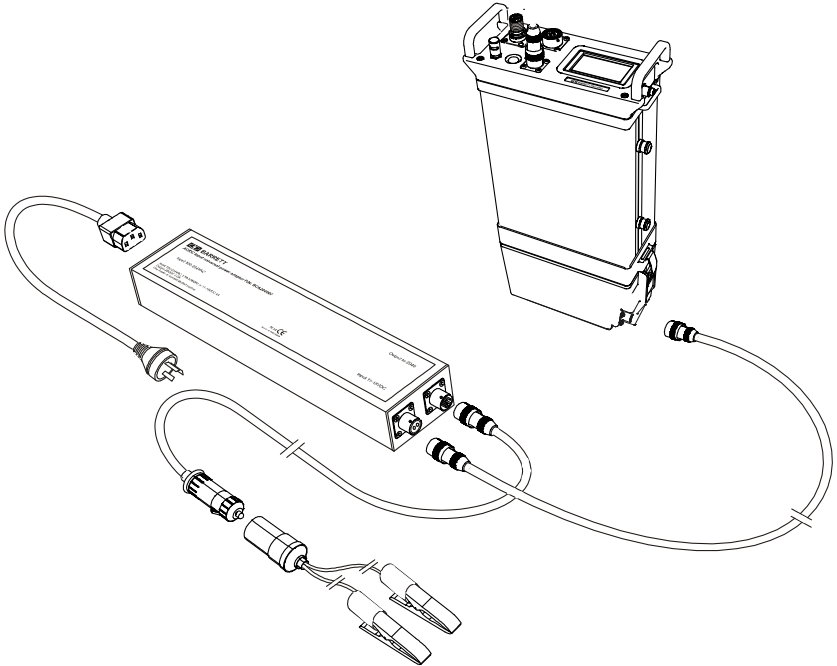
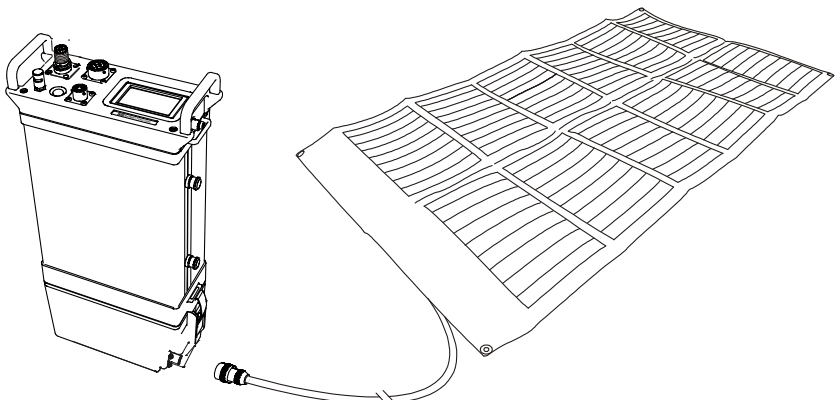
The Barrett PRC-2090 transceiver uses a removable 10Ah Lithium Ion battery cartridge. This cartridge contains the battery and the battery management system. It has a connector that is used for charging and operating the PRC-2090 when connected to the PRC-2090 or charging the battery when not connected to the PRC-2090.

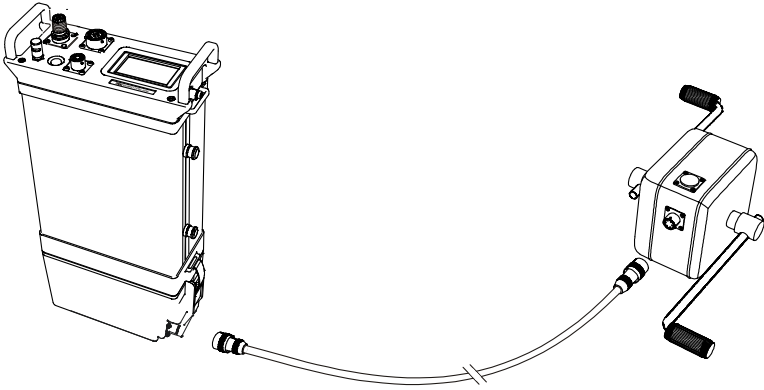
A DC input between 20VDC and 30VDC is required, allowing operation and charging from 24V vehicle sources, 24V solar panels and 24V hand crank generators. A separate Universal AC/DC input power adaptor is available to charge and operate the manpack when mains voltages are available between 100-254 VAC or DC voltage between 11-18VDC are available from sources such as 12V vehicles sources.

With the battery cartridge fitted the transceiver can be operated and the battery cartridge charged when a DC input of between 20 VDC and 30 VDC is supplied to the unit.

AC/DC input Universal Power Adaptor Unit P/N 2090-03-01

For operation from a mains voltage between 100-254VAC or from 12VDC sources such as available in a vehicle:-

**Tactical solar panel P/N 2090-03-02 or 03****Hand Crank Generator P/N 2090-03-04**

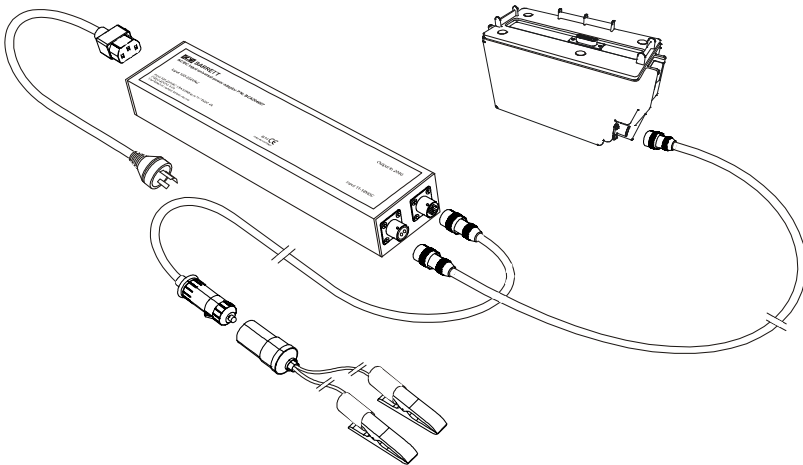
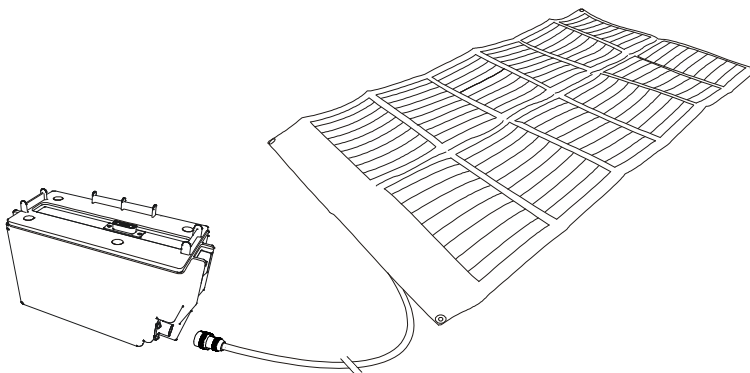


Charging a 10Ah Lithium Ion Battery Cartridge Outside the Manpack

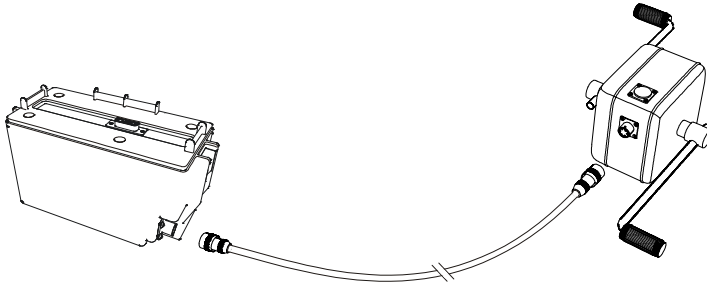
The PRC-2090 battery cartridge can be charged outside the manpack using the AC/DC input universal power adaptor unit or directly from a 24V tactical solar panel or a 24V hand crank generator configured as shown in the following diagrams:-

AC/DC input universal power adaptor unit P/N 2090-03-01

For operation from a mains voltage between 100-254VAC or from 12VDC sources such as available in a vehicle:-

**Tactical Solar Panel P/N 2090-03-02 or 03**

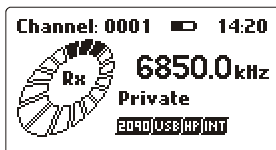
Hand Crank Generator P/N 2090-03-04



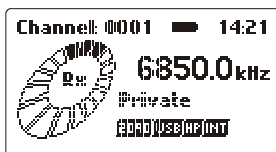
Battery Charge Indicator when Charging the 2090

When the charging source is connected to the 2090 and the transceiver is switched on, the battery icon between the channel number and the time shows the progress of the charge process:-

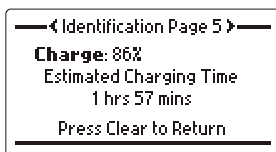
The battery icon with a moving line running from left to right indicates that the battery is charging, once the charger is removed the battery icon represents battery capacity available:-



The battery icon stationary and filled "black" indicates that the battery is charged and the charger is now trickle charging:-



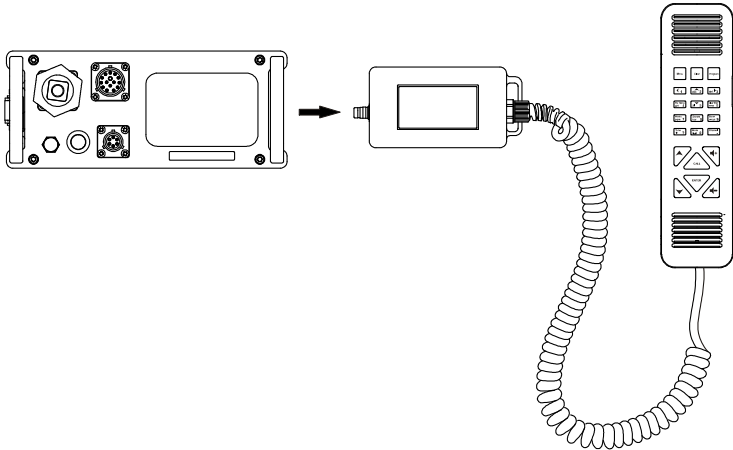
When the PRC-2090 is in charge mode the estimated charge time left is displayed in the Identification menu.



Operation in the Manpack Configuration

Using the LCD Unit Extension Kit (P/N 2090-01-11)

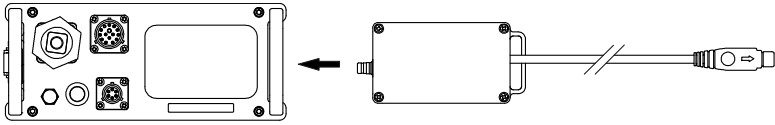
The PRC-2090 manpack LCD unit can be removed from the manpack itself and placed into the LCD unit pouch located on the manpack bag using the extension kit supplied. Please see below on how to use the extension kit.



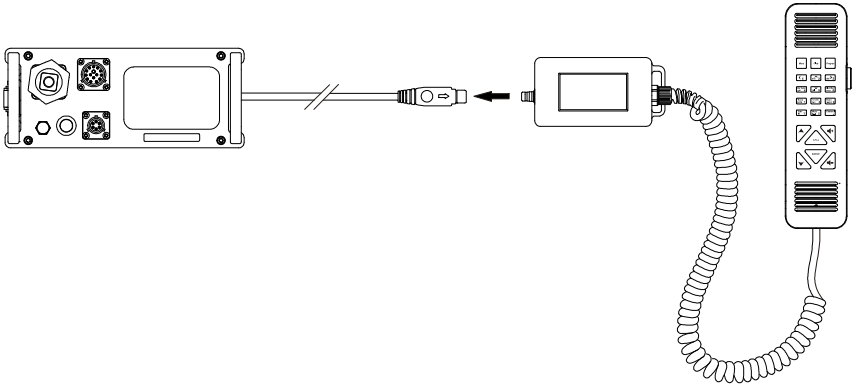
Step 1: Pull out the LCD unit from the manpack.



Step 2: Get extender cable and plug one end into LCD blanking unit.



Step 3: Push LCD blanking (metal face side up) unit into the manpack.



Step 4: Connect LCD unit to the unconnected end of the extender cable.

Manpack Operation Using the Automatic Antenna Tuner

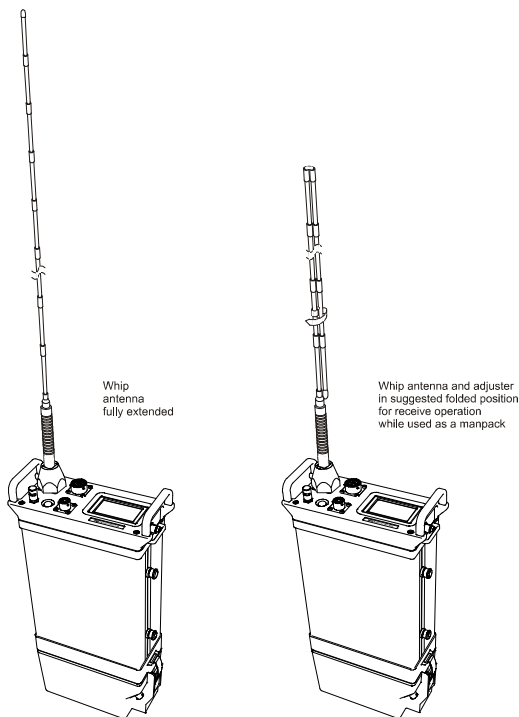
The PRC-2090 manpack can be used with the 10 metre throw over long-wire provided or the optional 3 metre collapsible whip.

Note:- Either the whip or the long-wire can be used but not both together.

Using the Whip (P/N 2090-02-07)

The gooseneck should be fitted to the whip antenna stud and the whip unfolded to its maximum height. If using the Barrett manpack while walking in the backpack configuration it is suggested that while in receive standby mode the collapsible antenna be only extended to half height and secured using the Velcro tab. **When a call is received extend the antenna to full height before transmission.**

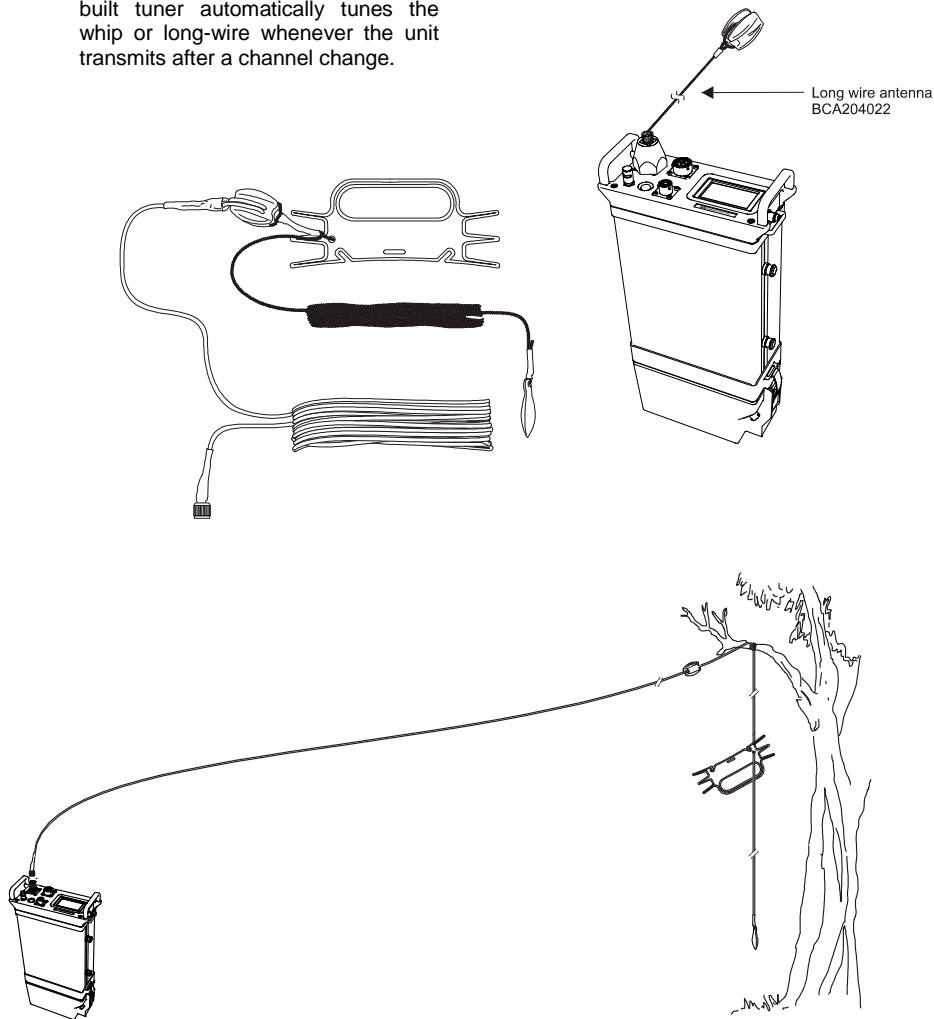
Note:- When using an un-tuned antenna such as the whip or the long-wire the section “**Antenna Select**” in the standard menu should be used to enable the automatic tuner i.e. select “Whip/Long-wire” operation. When this is selected the in-built tuner automatically tunes the whip or long-wire whenever the unit transmits after a channel change.



Using the Throw Over Long-wire Antenna (P/N 2090-02-06)

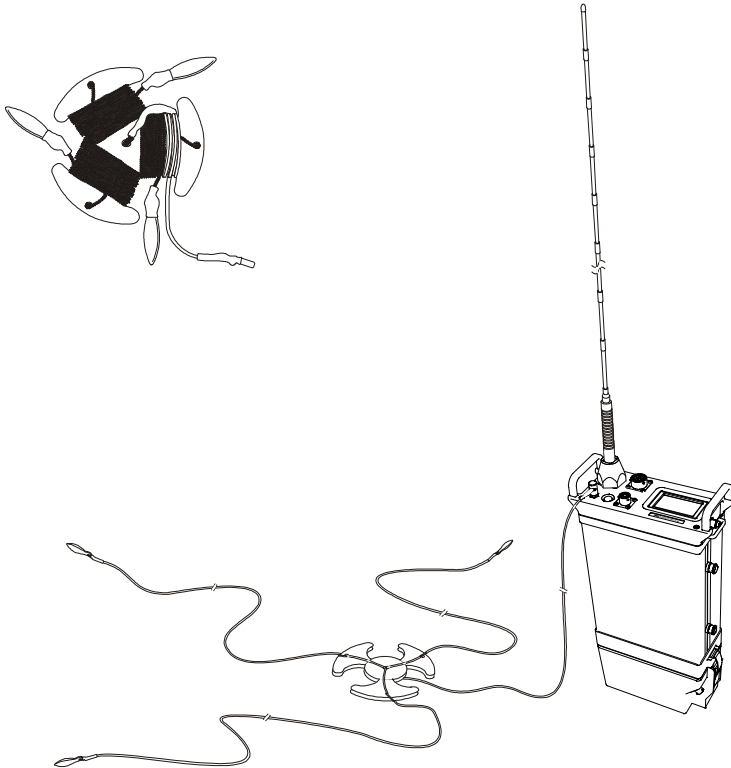
The long-wire antenna should be unfurled and the end away from the manpack transceiver should be attached to any structure available and as high as possible.

Note:- When using an un-tuned antenna such as the whip or the long-wire the section **“Antenna Select”** in the standard menu should be used to enable the automatic tuner i.e. select **“Whip/Long-wire”** operation. When this is selected the in-built tuner automatically tunes the whip or long-wire whenever the unit transmits after a channel change.



Using the Multi-wire Counterpoise (P/N 2090-02-08)

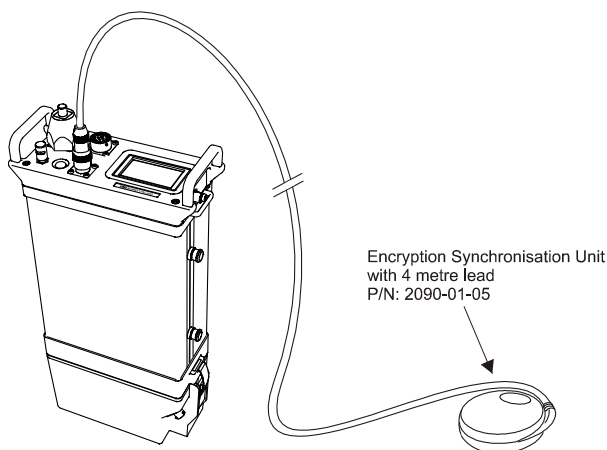
When using either a whip or the long-wire antenna efficiency can be increased by the use of the counterpoise supplied. This is connected to the 2090 via the BNC connector connected to the counterpoise. The three radials should be spread out on the ground as indicated in the diagram below:-



Operation of the Manpack in Frequency Hopping Mode

To operate in frequency hopping mode one of the of ESU (Encryption Synchronisation Units) supplied with the frequency hopping option must be plugged into the ESU socket on the top of the 2090 manpack adaptor. The ESU acquires satellite timing information so must be in view of the sky i.e. cannot be operated inside buildings. To help with this an optional ESU extender cable is available (P/N 2090-01-09) to enable the ESU to be positioned outside if operating within a building.

To operate the manpack in frequency hopping mode refer to the Section "Frequency hopping" in this manual.

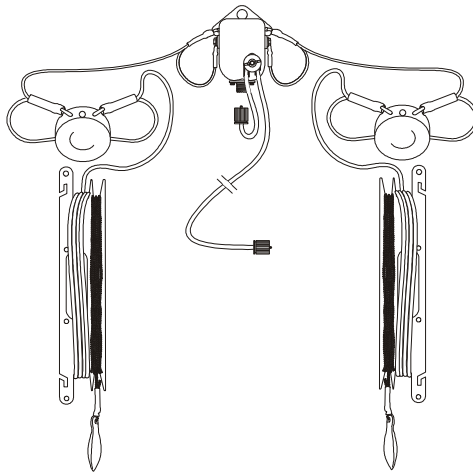


Operation of the PRC-2090 Tactical Manpack in Temporary Base Stations

For temporary base station operation, the Barrett PRC-2090 can be operated using either a tactical broadband antenna **Barrett P/N 2090-02-03** or a tactical tunable wire dipole, **Barrett P/N 2090-02-01**.

Tactical Broadband Dipole Antenna (2090-02-03)

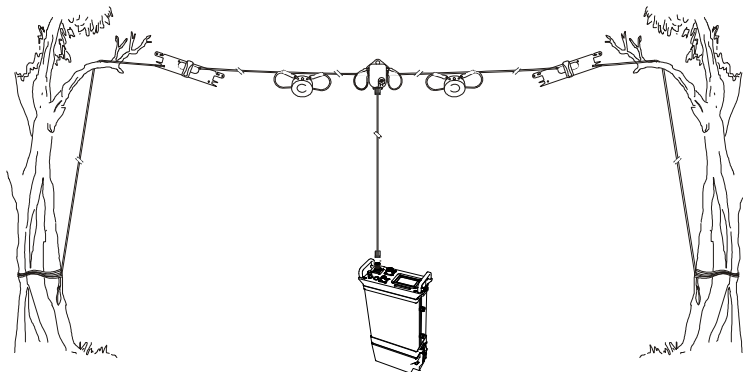
The Tactical Broadband Dipole Antenna is a dipole antenna with loading to allow broadband operation. For operation, each side of the antenna is unwound to its full length. Throwing cords are provided that can be used to elevate the antenna or tie it to ground for an inverted V configuration. The antenna will handle continuous data and CW transmission with a Barrett 30w manpack radio. Only low duty cycle voice operation is supported for operation with 100w transmitters. The antenna can be used in a number of configurations, depending on structures available for elevation.



Tactical Broadband Dipole Antenna Configurations

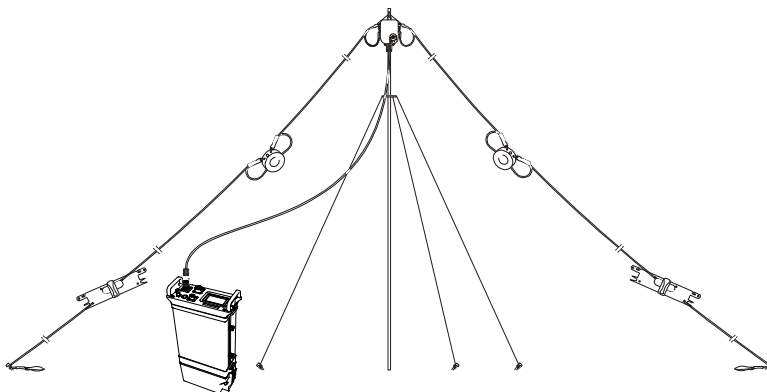
Horizontal Dipole

The horizontal dipole has maximum gain on the broadsides of the antenna and reduced gain along the axis. Height above ground affects radiation angle. Lower heights give higher angle radiation, better for NVIS (short distance). Higher heights give lower radiation angle, better for long distance communication.



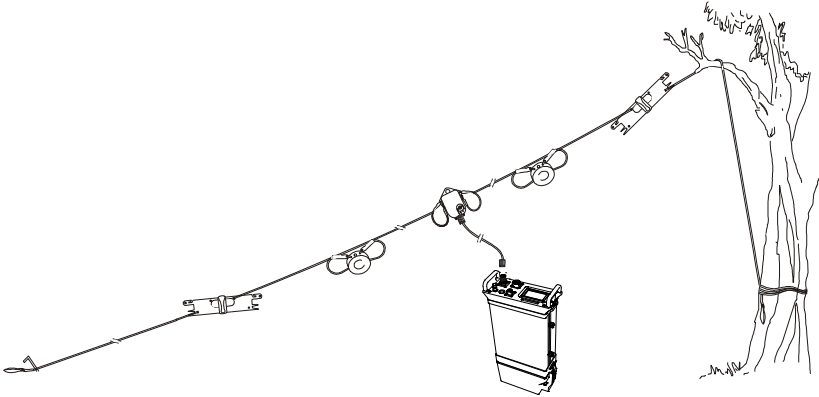
Inverted V

The inverted-V has a more omni-directional pattern than the Horizontal Dipole, with lower maximum gain. The ends of the antenna should be at least 0.5m above ground. Suitable mainly for NVIS and medium distance.

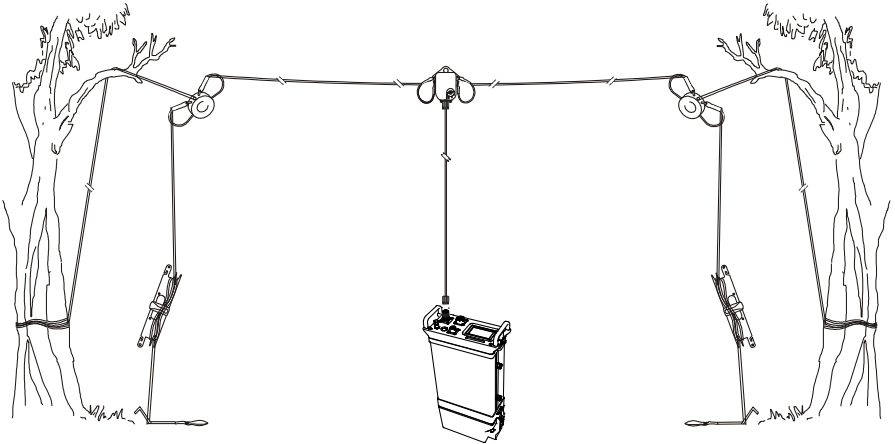


Sloping Dipole

Radiation with the Sloping Dipole becomes more directional, with increased gain in the direction of the lower end of the antenna, and reduced gain towards the higher end.

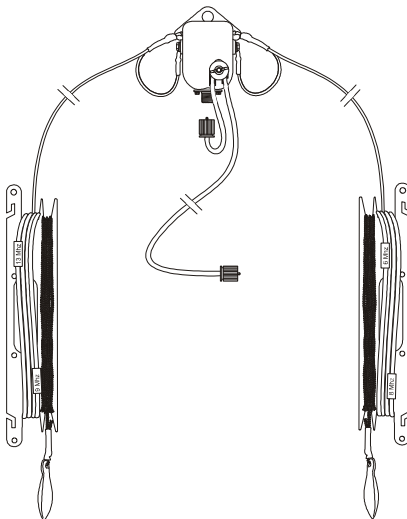
**Inverted U**

The inverted U has a radiation pattern between that of horizontal dipole and inverted V. For optimum performance, the radiating elements should be fully unwound, and should not touch the ground. Suitable for NVIS to medium distance. Longer distance performance will be enhanced by erecting the antenna at a height of 10m or more.



Tactical Tunable Wire Dipole Antenna (2090-02-01)

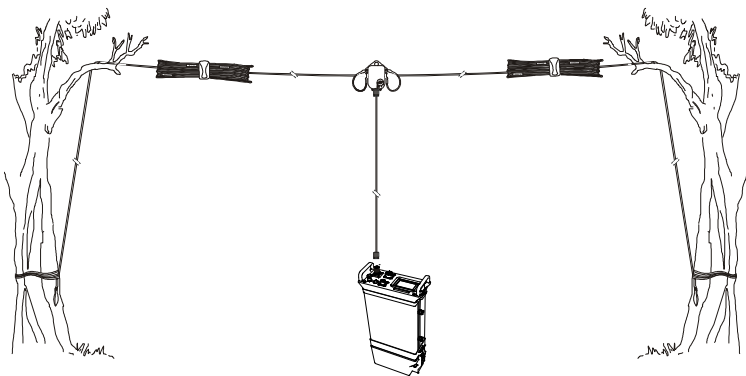
The Tactical Tuned Dipole Antenna is a tuned antenna with frequency labels to indicate tuned lengths. For operation, each side of the antenna is unwound to the tuned length for the frequency required. For operation at a labelled frequency, the label should be level with the end of the winder as shown in the picture below. Lengths for intermediate frequencies should be estimated and tied off appropriately. The remaining wire remains on the winder. The throwing cord can then be used to elevate the antenna. The antenna will handle 100W continuous data and CW transmission. The antenna can be used in a number of configurations, depending on structures available for elevation.



Tactical Tunable Wire Dipole Antenna Configurations

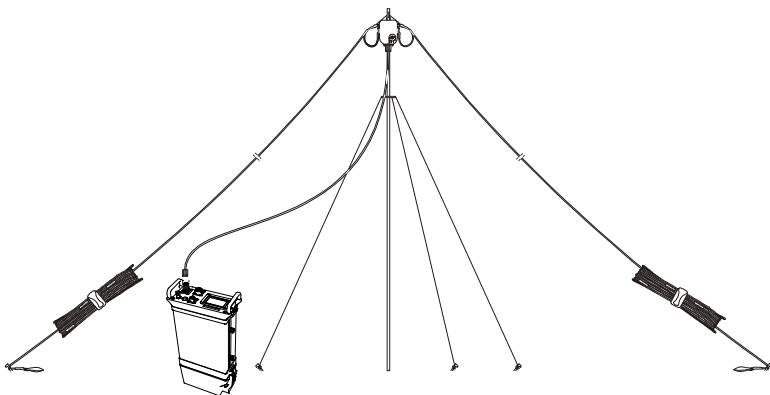
Horizontal Dipole

The horizontal dipole has maximum gain on the broadsides of the antenna, and reduced gain along the axis. Height above ground affects radiation angle. Lower heights give higher angle radiation, better for NVIS (short distance). Higher heights give lower radiation angle, better for long distance communication.



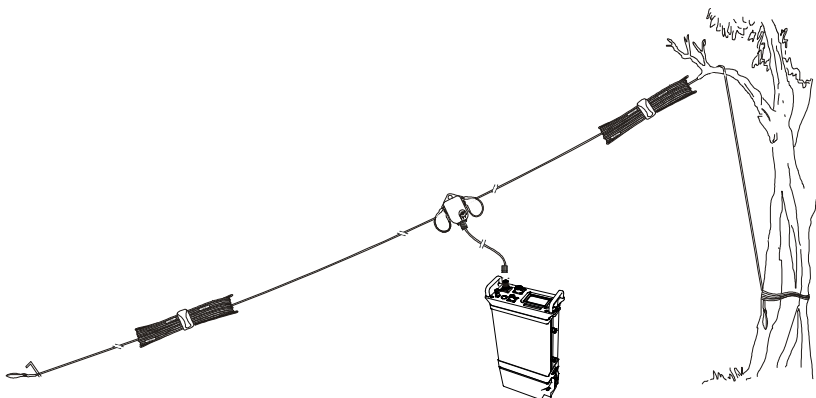
Inverted V

The inverted-V has a more omni-directional pattern than the Horizontal Dipole, with lower maximum gain. The ends of the antenna should be at least 1m above ground. Suitable mainly for NVIS and medium distance.

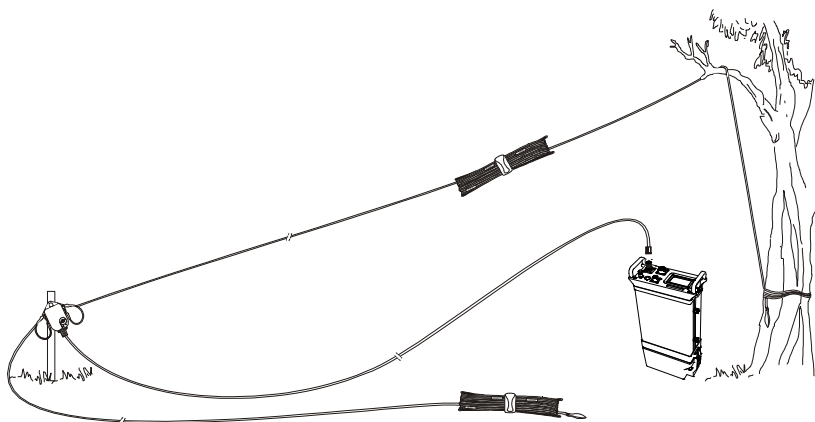


Sloping Dipole

Radiation with the Sloping Dipole becomes somewhat asymmetrical, with increased gain in the direction of the lower end of the antenna, and reduced gain towards the higher end.

**Single Ended**

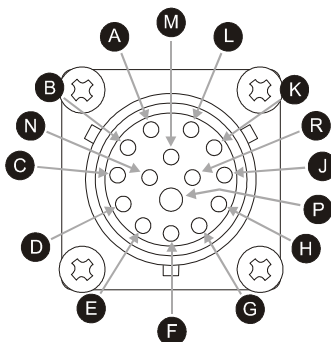
For rapid deployment, with reduced but still acceptable efficiency, the antenna can be operated single ended. In this configuration, one side of the antenna (labelled "antenna") is unwound to the desired frequency and tied to an elevated structure. The central balun should be located close to the ground, and the remaining side of the antenna ("earth") partly unwound (5 to 10m) and stretched out on the ground below the radiating element.



Connectors

Auxiliary Socket

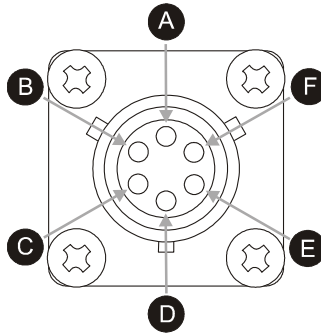
15 pin waterproof panel mounted socket



Pin	Name	Description of function	Level
A	+13V8 Fused	Fused 13.8VDC output	+13.8VDC
B	Bal Audio Out 1	Balanced audio out 1	600 Ω -6dBm to +9dBm
C	Bal Audio Out 2	Balanced audio out 2	600 Ω -6dBm to +9dBm
D	Bal Audio Out 1	Balanced audio in 1	600 Ω -24dBm to 0dBm
E	Bal Audio Out 2	Balanced audio in 2	600 Ω -24dBm to 0dBm
F	Aux PTT	PTT in	Active low 0V
G	RS-232 Tx	RS-232 Tx data	True RS-232 levels
H	RS-232 Rx	RS-232 Rx data	True RS-232 levels
J	Scan Stop	Scan stop input	Active low 0V
K	PTT Out	PTT output to external equipment	Active low 0V
L	Aux Dig Out 2	Auxiliary digital output (future use)	Active low 0V
M	External MICH	Balanced Microphone input high	
N	Speaker	Loudspeaker output	0-10V
P	Gnd	Ground	Ground 0V
R	External MICL	Balanced Microphone input low	

ESU/CW Socket

6 pin waterproof panel mounted socket



Pin	Name	Description of function	Level
A	1PPS	1 PPS from External Synchronisation Unit (ESU)	TTL
B	NMEA +	NMEA data input	+5VDC
C	+5	+5V for ESU power	+5VDC
D	CW key	CW key input	Active low 0V
E	Gnd	Ground	Ground 0V
F	N/C	Not connected	

Handset Socket

6 pin waterproof panel mounted socket

Pin	Name	Description of function	Level
A	MICL	Balanced Microphone input low	
B	MICH	Balanced Microphone input high	
C	PTT	PTT input	Active low 0V
D	Speaker	Loudspeaker output	0-10V
E	Aud UnBal	Unbalanced audio in	
F	Gnd	Ground	Ground 0V

Power Socket (on Battery Pack)**4 pin waterproof panel mounted socket**

Pin	Name	Description of function	Level
A	+VIn	External supply input – positive	+22 to 28 VDC
B	+VIn	External supply input – positive	+22 to 28 VDC
C	Gnd	External supply input – negative	-22 to 28 VDC
D	Gnd	External supply input – negative	-22 to 28 VDC

Barrett PRC-2090 Vehicle and Base Docking Stations

Vehicle Docking Station

Introduction

The Barrett PRC-2090 vehicle docking station turns the PRC-2090 tactical transceiver into a 100W PEP capable transceiver. With this configuration the transceiver can also interface to the full range of Barrett peripherals including the 2019 Automatic Tuning Mobile HF Antenna and Barrett Linear Amplifiers.

Vehicle Docking Station position

The following points must be considered when mounting the 2090 vehicle docking station.

Safety

It is essential that the transceiver be mounted in a place where it cannot cause injury to the occupants of the vehicle in the event of a motor vehicle accident.

For this reason overhead mounting is not generally recommended and "under dash" mounting must take into account the possibility of injuring the legs of front seat occupants.

Convenience

The chosen position for the transceiver or control head, (if a remote controlled model is used) should be one which allows convenient operation.

Positions which are often used are:

- on the transmission hump
- in place of the glove box
- behind the seat
- under the dash board (if safe)

Where a remote controlled transceiver is used, only the control head need be mounted convenient to the operator. The transceiver may be mounted under a seat, in the luggage compartment or any other out of the way place within the vehicle (which allows for sufficient cooling).

All equipment should be positioned in such a way that convenient access for maintenance is provided.

Strength

It must be assumed that the vehicle will be used on rough roads and in many cases off road. Hence mounting of equipment must take into account the severe vibration and shock that can be expected.

Transceivers may only be mounted to structural components of the vehicle body and not on dress panels or plastic interior panels. In some cases, the area around the transceiver mounting may need reinforcement.

Precautions should be taken to ensure fixing screws etc. cannot vibrate loose.

Air circulation

Most transceivers rely on air flow around cooling fins to dissipate heat generated by the transmitter. The mounting position must allow free airflow around these fins.

Obstruction

The installation of a transceiver into a vehicle should not inhibit the normal use of the vehicle. Before finally selecting equipment positions, check that normal operation of steering, foot pedals, gear change, hand brake etc. are not impeded, and that heater or air-conditioning outlets, glove box and doors are not obstructed. Always check that the drilling of mounting screw holes will not damage electrical wiring, heater hoses or hydraulic lines.

Power Wiring

Connect the red positive and black negative wires from the transceiver power cable to the positive and negative terminal of the battery. Do not connect to the ignition switch or internal fuse panels as vehicle wiring to these points is of insufficient current capacity, causing voltage drop and possible noise interference.

- fit a suitable 25A ATC fuse and holder (Barrett P/N BCA20021), as near as practicable to the battery connection in the positive (red) wire.
- route the power cable away from high tension ignition wiring.
- secure the power cable, either to other wiring or the vehicle body, with suitable cable ties.
- where wiring passes through bulkheads, provide appropriate protection to prevent insulation being damaged.

Antenna

In any radio system an effective antenna installation is essential. Because of the need to reduce the size of HF antennas so that they can be fitted to a vehicle, mobile antenna bandwidth becomes quite narrow and hence tuning is critical. In most cases the only tuning adjustment that can be effected is adjustment to position. Particular attention must be given to the antenna position if satisfactory performance is to be obtained. Refer to the instructions supplied with the antenna you have selected.

Antenna Mounting

The antenna mounting must provide a strong secure anchorage for the base of the antenna. To obtain maximum radiation, the antenna base **must** be well bonded electrically to the vehicle chassis. Paint, dirt, rust, etc. should be removed from the respective fixing points. The mounting point must provide a low resistance electrical path to the main vehicle metallic structure.

Antenna Feed Cables

Antenna feed cables should be run (as far as possible) away from other vehicle wiring and especially away from ignition high tension wiring. Where passing through body panels or internal bulkheads, grommets must be used to protect the cables. Water-proof connectors must be used when they are outside the vehicle.

Voltage Standing Wave Ratio (VSWR)

After installation it is recommended that the VSWR of the antenna should be measured for each channel. The instructions supplied with the antenna selected will detail this operation.

Noise Suppression

Noise generated by motor or electrical accessories on the vehicle may cause objectionable interference to the received signal. This noise enters the receiver either by means of the battery leads or the antenna system. Providing that the recommendations concerning battery wiring given earlier in this book are followed, noise injected via the battery lead is unlikely to be significant. Most noise problems result from pick-up by the antenna. Practical cures involve either preventing the noise from being generated or minimising it from being radiated by the wiring connected to the noise source.

Interference Suppression Kit (Barrett P/N BCA90017) is available to assist in noise suppression and contains filters, suppressing capacitors, earth straps and fitting instructions.

The techniques involved in noise suppression include re-routing of wiring, screening and the use of filters. It is also necessary to maintain all electrical equipment in good working order as worn brushes, loose connections and the like, will increase the amount of noise generated.

Before attempting to cure a noise problem, the source (or sources) of noise must be identified. Ideally, there should be no difference between background noise in the receiver with motor and accessories on and that with motor and accessories off.

If a detectable difference does exist, turn off all accessories one by one until a change in noise results. Continue, noting each contributing unit until there is no detectable difference from the "all off" noise level. (For accessories such as alternator, motors, instruments etc. a wire or drive belt may have to be temporarily removed for this assessment). After identifying each noise source, they can be worked on one at a time until an acceptable level of suppression is achieved.

Another approach to this problem is to remove or disconnect all possible sources of noise then replace and suppress them in turn.

Some suggestions for suppressing particular noise sources follow:-

Ignition Systems

All high tension wiring from the ignition coil through to the spark plugs should be kept as short as practicable, clean, and as close to the engine block as possible. The cable should be an impregnated neoprene resistive type and the coil must be either mounted on, or immediately adjacent to, the engine block. The low tension wire from the coil to the distributor contact breaker points must be as short as possible, and not included with other wires in a harness or loom. This wire must be shielded if more than 300mm long. Twin flex or 'figure eight' cable provides a suitable shield when connected in lieu of the original wire. This method is useful for shielding other wires suspected of radiating noise. Do not ignore the wire to an electric tachometer if one is fitted.

Coil to Battery Wiring

A low pass filter such as that supplied in the interference suppression kit or similar should be fitted at the coil end of this wire. The earth connection of the filter should be short and well-bonded to the coil body.

Battery Charging System

The charging system circuit, consisting of either generator or alternator and a regulator may also be split into three parts:-

Alternator / Generator to Battery Wiring

A low pass filter such as that supplied in the interference suppression kit or similar should be fitted to the main battery lead at the alternator. The filter must be rated for the maximum current available from the charging system. The earth lug of the filter should be attached to the alternator body or the engine block.

Alternator to Regulator Control Wire

This wire carries switching pulses that often contribute noise to the receiver. Suppression using capacitors or filters must not be attempted since damage to the regulator may result. Separate the wire from all other wiring, keep it as short as possible and, if longer than about 300mm it should be shielded as described above.

Other Regulator Wires

These are normally adequately suppressed using good low-inductance bypass capacitors. To be effective, these capacitors must connect to the wires to be suppressed and to chassis with very short leads. For this reason, the 'pigtail' style of suppressor capacitor often used with MF broadcast receivers is generally ineffective at HF.

Other Noise Sources

Electric Motors (Windscreen Wipers, Fans Etc.)

Small electric motors can usually be suppressed with good low inductance bypass capacitors.

Engine Instrumentation

Certain types of oil-pressure sensors and voltage regulators used in instrument systems contain a vibrating or thermal cycling contact. These devices can only be suppressed by isolating and screening or wiring in the same way as described for the alternator to regulator control wire. Disc ceramic capacitors with short leads (protected with insulating sleeving) are frequently useful but to prevent damage to instrument contacts, where the use of bypass capacitors is attempted, values larger than 1nF should not be used.

General Noise Suppression Tips

When searching for sources of noise, some of their characteristics can be helpful in identification:-

Petrol engine ignition noise and contact breaker noise is a sharp staccato 'plop' varying with engine speed. It is only with this class of noise that the impulse noise limiter incorporated within some transceivers is effective

Noise from other sources generally has a more 'mushy' sound. That from the alternator/generator may only be troublesome over a limited range of engine speed and can also be influenced by the state of charge of the battery.

The noise from instrument regulators may depend on the battery voltage, the reading of the instrument and the length of time the system has been switched on. For this reason, the search for noise sources must be done thoroughly to prevent noise from apparently reappearing after the installation has been completed.

Electric motors generate a 'whining' sound. Do not forget to check windscreen wipers, electric fuel pumps, heater and air conditioning fans and other motors which operate only on an intermittent basis.