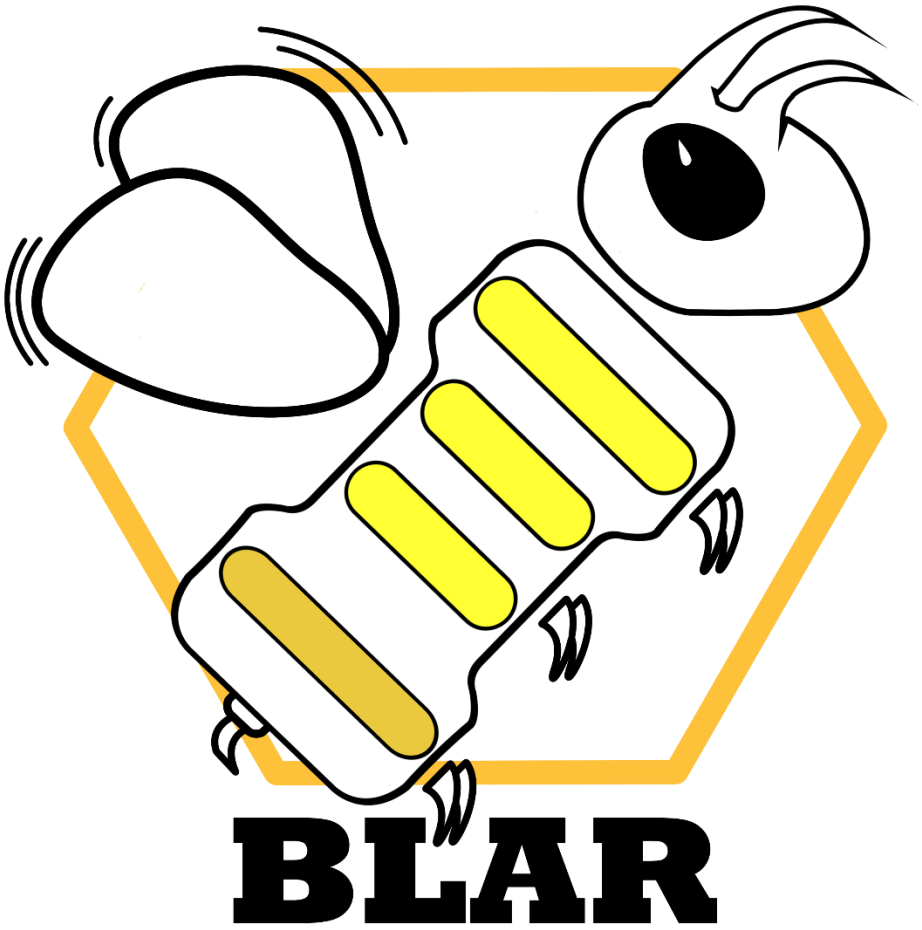
BLARphone Cave Radio Communication System: User Manual



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Chapter 1 – Introduction

The BLARphone is a system which provides through-rock communication for use by cave rescue teams. It allows communication between a cave and the surface as well as between two or more underground locations. A range of up to 500m can be achieved although this depends on various factors including the geology and spacing of the probes.

The BLARphone operates on the same principle as earlier rescue communication systems used in the UK, most notably the Molefone and Hayphone. Although operating using the same principle, a 30kHz carrier frequency is used, making them non compatible.

Manual contents

This BLARphone user manual forms part of the documentation set, together with the technical manual. This manual contains:

- A list of BLARphone parts
- How front panel controls operate
- How the LCD control operates
- How to use the BLARphone
- List of technical specifications

Chapter 2 – System components

A complete BLARphone system contains a number of parts which are identified in the following photographs. These parts make up the full BLARphone system to give its full functionality.

Transceiver System
This is where the bulk of the system is contained, including where the ground probes and microphone are connected, and where the speaker and LCD is situated.

Ground probe connectors
These leads connect from the transceiver box to the ground probes (either pegs or tape).

Ground probes
Ground probes (tent pegs) are driven into the ground and connected to the transceiver using the probe connectors. These function as the “antenna”, detailed in the technical manual.

Mallet
The mallet is used to drive the ground probes into the ground.

Microphone
This plugs into the transceiver and is used to transmit voice communication.

Charger
This connects to the transceiver box and charges the battery without removing the casing.

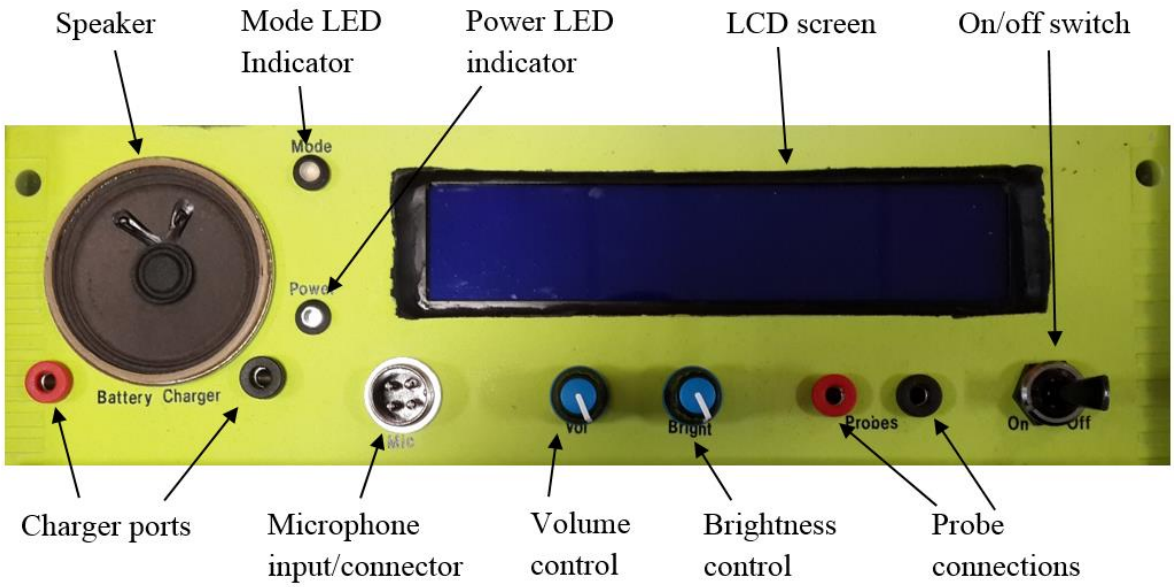
Carry pouch
This is velcroed to the inside of the peli case and used to store probes and probe connectors.

Peli case
The peli case is used to store all the components protecting them from water and drop damage

Keyboard
This connected to the transceiver box and used to control the system as well as enter characters.

Chapter 3 - Front Panel Controls, Connectors & Indicators

This chapter details the functions of the front panel, including LED indicators, and basic controls. Full LCD interface is addressed in the chapter 4 of this manual.



Speaker
When a voice transmission is received the speaker is used to vocalise transmission.

Mode LED inductors
These indicate what sate the system is currently in:
Red – Transmission
Green – Receiving
Blue – Beacon mode

Power LED indicator
This indicates when the system is powered; controlled by the on/off switch.

LCD screen
This displays received messages, sets the system in beacon mode and is used to display most functions of the BLARphone, discussed in chapter 4 of the manual.

On/off switch
Controls whether the BLARphone is on or off; this should be turned off to save power when not in use.

Charger ports
The charger described in chapter 2 of this manual is connected here, charging the battery without removing it from the casing.

Microphone input/connector
The microphone is connected where when in use. This should be disconnected when the BLARphone case is closed to prevent breakages.

Volume control
The volume of the speaker is controlled using this dial. This should be kept low, but at an audible volume to save battery.

Brightness control
This dial controls the brightness of the screen. Much like the volume control, this should be kept to a minimum brightness to conserve battery.

Probe Connections
These are the inputs for the banana plug side of the ground cable connectors. The cables are contacted into these holes to two separate ground probes, spaced far apart.

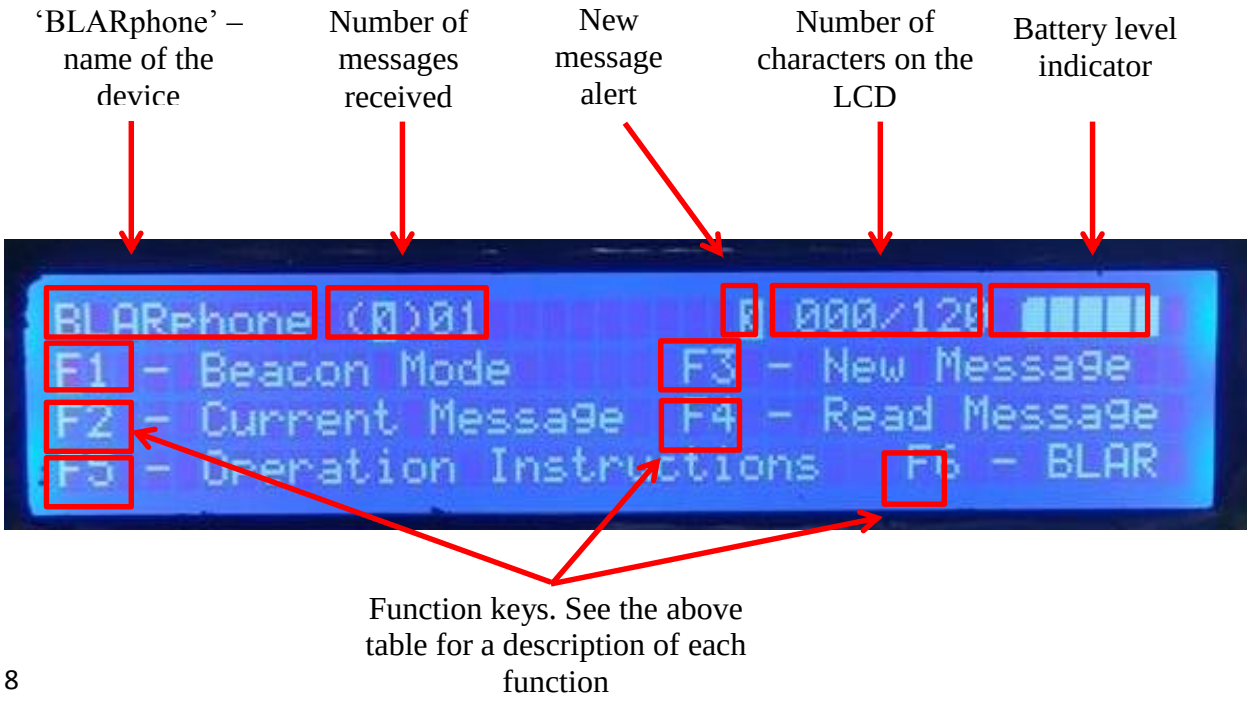
Chapter 4 – LCD Commands and Controls

The following chapter describes how to navigate the LCD commands. Though a description of each function key binding has been discussed in the technical document, the features concerning each function key will be highlighted in this manual. These descriptions refer how each function affects each aspect of the BLARphone, as well as how to navigate between each function. Also, as the top line purely displays system information rather than text or instructions, each element of these data will be explored.

As the keyboard has been discussed in the previous chapter, a brief overview of each key function can be seen below;

Function Key	Key Reference	Key Description
Left Control	CTRL	Navigates to menu screen
Caps Lock	CAPS	Toggles upper/lower case
Left Key Arrow	‘<’	Switches between messages or instructions
Right Key Arrow	‘>’	Switches between messages or instructions
F1	F1	Enables beacon mode
F2	F2	Continues message
F3	F3	Starts new message
F4	F4	Reads received message
F5	F5	Opens instruction list
F6	F6	Opens creator acronym
F12	F12	Debug – clears all messages from memory

As the LCD of each BLARphone contains many attributes, the function of each component will be described, before a summary of how to use each one will be given. Below is a photograph showing the BLARphone running the ‘options menu’ subroutine.



LCD navigation

Not all of the keys shown above appear on the LCD during operation, as some are required solely for navigation or for debugging purposes. So long as the user remembers these five key bindings that are not displayed, navigation of all BLARphone peripherals will be simple.

When the BLARphone is initially turned on, the LCD is in its default state – ready to receive data from the keyboard with the cursor at the start of the 2nd line. At this point, the user is free to write messages into the keyboard, and each character will appear on the LCD.

To navigate to the options menu from this state, the user must the 'CTRL' button, usually located in the bottom left hand corner of the keyboard. **NOTE** None of the special function keys will work if the BLARphone is not in the options menu. If the user wishes to select a different function based on their situation, they must first press the CTRL key to bring up the options menu. Then a selection can be made.

Once the CTRL key has been pressed, the screen is changed to display the options menu, as seen above. From this point, the user may select any function they wish. The details, as well as the destinations of each function can be seen below.

F1 – Beacon mode

When this function key is pressed, the screen clears, and displays the beacon mode message to show that the system has gone into beacon mode. During this time, the user may not enter text or commands into the system, as the BLARphone is effectively in a 'standby' mode, where a character is sent to another BLARphone in the vicinity, allowing them to acknowledge that a BLARphone user is in operation and in need of assistance. To exit this screen, the user must press the CTRL key, and thereby returns to the options screen.

F2 – Current message

When this function key is pressed, the LCD will revert back to the point before the user pressed the CTRL. Whatever the user had typed onto the LCD will be placed back onto the screen so that the user may continue the message. This feature will most likely be used if the user is typing a message, and receives an external message while they are typing their own message. If the user wishes to keep the data that was initially being typed, they may navigate through the options screen to read what has been sent, and then return to wherever they left off. Though the number of characters available per message is small, the user may still wish to retain the data, based upon the situation at hand.

F3 – New message

When this function key is pressed, the LCD will be cleared, and the user may enter a new message from scratch. This has the opposite effect of the 'F2' key, in that all memory of the current message is cleared when the key is pressed.

F4 – Read message

This function will typically be selected when a message is received by the BLARphone. When a new message is received, the total message count to increment by one, and the new message symbol appearing on the top line of the display. When the function key is pressed, the LCD is cleared and the latest message is shown. If there is more than one message in the BLARphone's internal memory, the messages can be switched between by pressing either the '<' or the '>' key.

F5 - Instructions

When this function key is pressed, the LCD is cleared, and the operational instructions are shown. As standard, there are a total of six instructions, detailing how to use the input and output ports of the BLARphone, as well as using the switches and dials. If there is more than one instruction set in the BLARphone's internal memory, the instructions can be switched between by pressing either the '<' or the '>' key.

F6 - BLAR

This function serves little purpose other than as a tribute to the creators of the BLARphone. When the function key is pressed, the acronym of 'BLAR' will appear with a dash next to each of the letters linking the letter to the name of the constituent letter.

F12 – Clear messages (DEBUG)

When this function key is pressed, all messages in the BLARphone's internal memory will be cleared, and the number counting the total number of message on the top line of the display will be reset to zero.

Chapter 5 – Setting up the BLARphone

As the battery, the keyboard, and the microphone are already connected to the correct position is the BLARphone, all that is required by the user is to connect the ground probe plugs into the ground probe sockets in the BLARphone, and to connect the actual ground probes to the tent pegs. These tent pegs should optimally be placed as far away as possible from each other to result in the best possible communications channel. For the case of the cave-side BLARphone however, the environment may be restricting in terms of space. In this case, the probes should just be placed as far away from each other possible. When connecting the plugs into the sockets of the BLARphone, it doesn't matter which one goes in which port.

NOTE ***Achieving a good ground connection is key to the efficient operation of the BLARphone***

Surface side

Drive each earth probe into the ground using a mallet, or a rock so that a good connection is made with the earth. A good connection can be easily judged by attempting to pull, or wiggle the probe after insertion. If the probe is tight in the ground and stable, a good connection has been made. As earth communications work better in more dense material, such as wet soil rather than dry soil, the user may consider watering the area in which the probes are placed, especially if communications between devices is poor.

Only two tent pegs are provided with each BLARphone, one for each probe, though more can be added if desired. The pegs used in the case of the BLARphone were steel tent pegs acquired from the camping shop 'Millets', though any kind of peg that conducts electricity will work equally as well. Once the probe is inserted, attach the crocodile clip to the peg so that a good connection is made between peg and clip.

Cave side

As the cave floor will no doubt be made of rock, and so impossible to drive a peg through, it is recommended that the tent pegs be placed on their sides on the ground, and then covered with wet mud. If there is absolutely no material of any kind to cover the pegs on the ground, it may be best to either stand on the peg, or to cover them in water, though this scenario is very unlikely. Attach the crocodile clips to the pegs, and the sockets to the BLARphone plugs as before.

Chapter 6 – Outline Technical Specification

ELECTRICAL SPECIFICATION

Frequency:	30 KHz
Modulation Method:	RDFT
Receiver Bandwidth:	1.6 KHz
Beacon Beep Frequency:	~ 196 Hz (Musical G)
Beacon Beep Period:	~ 1 second
Supply Voltage:	12 V
Maximum Current Consumption:	~ 500 mA

PHYSICAL SPECIFICATION

Dimensions of BLARphone:	L330 x W234 x D152
Mass:	~ 3 Kg

A full specification can be found in the BLARphone technical manual