The Lizard

manual version 1.6 (EAMPS)

BVS LIZARD Transmitter Manual (version 1.6)

CONTENTS

Overview

The Lizard is a portable, battery-powered 1 watt CW (Continuous Wave) or modulated (available on certain models) stimulus transmitter used for indoor coverage testing. The Lizard is ideal for WLAN set-up and evaluating network performance. In a typical application, one or more Lizards are placed throughout an area of interest and set on different channels; while measuring and recording field strength using one of BVS's portable signal strength meters such as Champ, Fox, Mongoose or Ultra-Lite.The Lizard is a portable, battery-powered 1 watt CW (Continuous Wave) or modulated (available on certain models) stimulus transmitter used for indoor coverage testing. The Lizard is ideal for WLAN set-up and evaluating network performance. In a typical application, one or more Lizards are placed throughout an area of interest and set on different channels; while measuring and recording field strength using one of BVS's portable signal strength meters such as Champ, Fox, Mongoose or Ultra-Lite.The LIZARD has the following features:

•Backlit 128x128 pixel LCD display that exhibits current, frequency, power level and status.

•14-button keypad used to enter frequency, power level and setup options.

•Knob used to adjust frequency or power level.

•Infra-red remote control of knob and keypad functions.

•Power output adjustable from 0 to 30 dBm in 0.5 db steps.

•Bright panel mounted LED that indicates transmitt status (lit when ON).

•RS-232 serial port for computer control of the transmitter.

1 128 x 128 LCD display

2 Infrared remote receiver window

3 Rotary optical encoder

4 Power switch

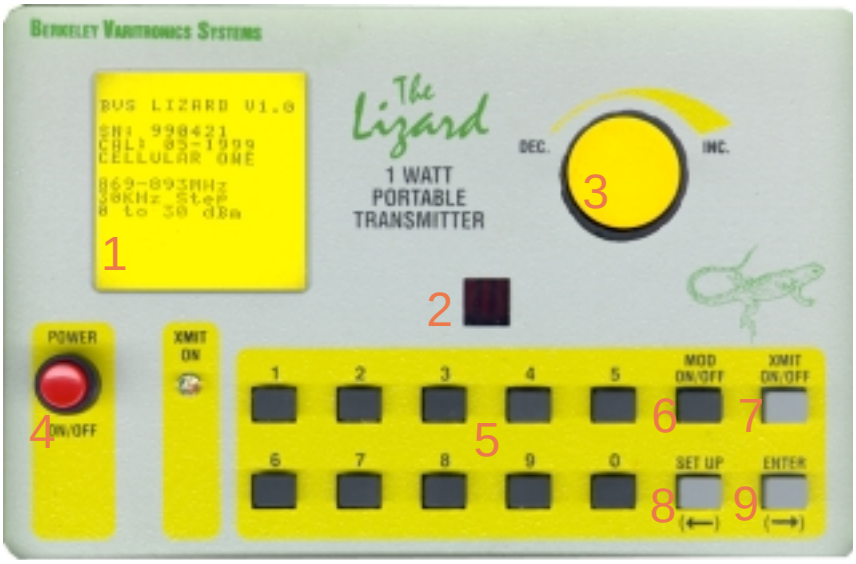
5 Numeric keypad

6 Modulation On/Off button

7 Transmit power On/Off button

8 Setup menu/Left arrow button

9 Enter/Right arrow button



Getting Started

Use the SETUP key to select modulation, entry of channel number or frequency and to select the function of the knob. See sections on USING THE KEYPAD and SETUP MENU for further information. Connect the transmitter TNC output connector to an antenna or other 50 ohm load. When connecting to a spectrum analyzer, be sure there is a suffient pad to protect the analyzer input.Turn on the LIZARD and press the ENTER key to set the frequency and power output. Turn the output on by pressing the XMIT key (when the LIZARD is transmitting, the front panel XMIT LED will be on and status will indicate TX ON). You can turn the backlight on by pressing the MOD ON/OFF button on the keypad or remote for viewing the backlight will go out after 15 seconds. If unit is transmitting, it will not shut transmitter off. The output of the transmitter is monitored. It will automatically adjust (if need be) every 15 seconds. If transmitting at one power level and changing to another level or frequency you should transmit, then wait 15 seconds before measurements are taken.

LCD Display

The LIZARD LCD displays the current transmitter status using large characters that are easily visible from a distance. In addition, the display is used for entry of frequency, power and setups. The first line of the display indicates the transmitt frequency in MHz. The second line is the output power in dBm. Below the output power is the status of the transmitter (on or off) and the modulation status (on or off). If the channel number display option is selected in setup, the first line would display the channel number (the EAMPS channel number would be 0334). Whenever a key is pressed, the knob moved or the remote control used, the LCD backlight is turned on for one minute. This is the normal running display when the LIZARD is either transmitting or idle. In the event of an RF problem or battery low condition,an error screen will be displayed and the device is prevented from transmitting.

When the transmitter is on, the LIZARD backlight can be turned on for 15 seconds by pressing the MOD key on the top panel keypad or the IR remote. Pressing ENT, SETUP or turning the knob with PWR or FREQ selected will turn off the transmitter and allow changes to be made. All other keys or turning the knob with the knob selected off have no effect on either the backlight or the operation of the unit (the transmitter stays on).

Using the Keypad

The digit keys are used for entering frequency, output power and setup parameters. Pressing the MOD ON/OFF key toggles modulation on and off. Modulation is selected using the SETUP MENU. Pressing the XMIT ON/OFF key toggles the power output on and off. Whenpower output is on, the LCD display indicates TX ON , frequency or channel number, output power in dBm and the front panel XMIT ON led is lit.

To change frequency and power output, press the ENTER key . The LCD wil display the frequency edit screen...

line 1-indicates the edit menu the user is in
line 2-indicates the entry limits in MHz
line 3-indicates minimum frequency increment (step).
line 4-indicates current frequnecy setting

The rightmost digit of the current frequency is highlighted. To change the highlighted digit, press a digit key, use the remote up-down arrow keys or use the knob. To use the highlighted digit, press the ENTER key to move right one digit. Note that there is no need to enter a decimal point, when moving the highlight, the decimal point is skipped.If an error is made during entry, use the SETUP key to move the highlight left to correct a digit. When the rightmost digit is highlighted and the ENTER key is pressed, the frequency is taken and the output power edit sceen is displayed. If channel number entry and display has been selected, channel number would be displayed instead of frequency. Changing digits and moving the highlight is the same.

line 1-indicates the edit menu the user is in
line 2-indicates the range of valid power settings
line 3-indicates current power setting

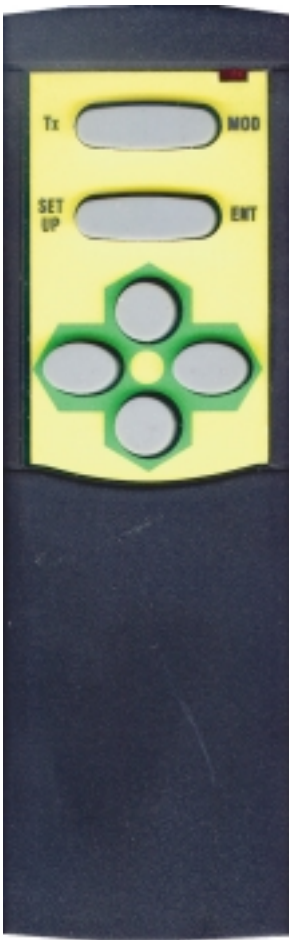
On entry, the leftmost digit is highlighted. Entry of digits is the same as in the frequency edit screen.When the rightmost digit is highlighted and the ENTER key is pressed, the entered output power is taken and the display returns to normal.

Using the Knob

The front panel INC/DEC knob can be set to increase or decrease frequency or outputpower. When set for frequency, each turn adjusts the frequency by 1 channel step.

The stepis displayed in the frequency edit screen. When the knob is selected for output power, each turn of the knob adjusts the output power by .5 dDm. In situations where the power and frequency must remain fixed, the knob can be set to off so that turning it has no effect on eitherpower or frequency. In addition, the knob can be used in the frequency and output power edit screens to increase or decrease the highlighted digit. When in the setup screen, the knob can beused to select setup options.

Using the Remote Control



The infra-red remote is used to control the transmitter in situations where it has been installed in an inconvenient location (such as on top of an eight foot step ladder). Every functionavailable on the front panel (using the keypad or knob) can be controlled using the remote. To use the remote control, aim it at the front panel of the LIZARD and press the TX key to toggle the transmitter output on and off (the same aspressing the front panel keypad XMIT ON/OFF key). Press the MOD key to turn modulation on and off (the same as pressing the front panel MOD ON/OFF key). Press the ENT key to change the frequency and output power. The LCD will enter the frequency edit screen. Use the remoteENT and SETUP keys to move the highlight. Use the UP and DOWN arrow keys to change thecurently highlighted digit. To enter the setup screen, press the remote SETUP key. Use the UP and DOWN arrow keys to change the setup selection. When the required setup option is displayed, press the remote ENT key to select the option.

When the LIZARD is in its normal screen the remote UP and DOWN arrow keyshave the same function as the front panel knob. If the knob is selected to control output power, pressing the remote UP asn DOWN arrow keys has the same effect as turing the front panel knob. The same is true if the knob is selected to control frequency. If the knob is selected OFF, pressing the remote UP or DOWN key has no effect.

Setup Menu Screen

The setup menu screen is entered if the LCD is in the normal running screen and the front panel or remote SETUP key is pressed. The setup menu is used to select the operation mode of the knob (power, frequency or off), the entry and display of frequency (either as frequency or channel number), and to select modulation options.

line 1-indicates that SETUP screen is active
line 2-indicates the current setup selection
line 3-indicates current power setting

Below the current selection are brief instructions for using the setup screen. To change the selection on line 2, press the SETUP key on the front panel keypad, turn the front panel knob, or use the remote UP and DOWN keys. When the required selection is displayed on line 2, press the ENTER key on the fron panel key-pad or the remote's ENT key.

Setup Options

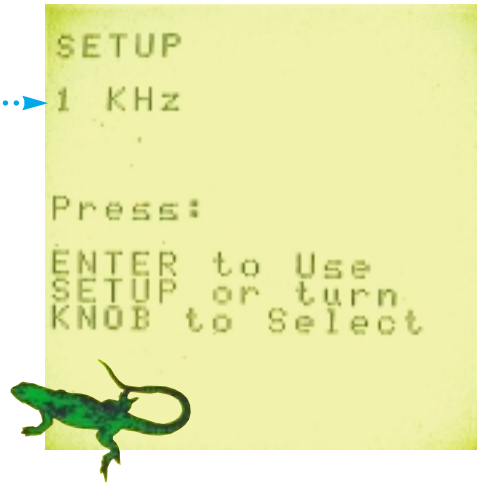
The following setup selections are available on all LIZARD transmitters:

CW

When CW is selected, no modulation is applied to the transmitter (continuous wave) when the output is turned on (the MOD ON/OFF key will turn backlight on for 15 seconds.)

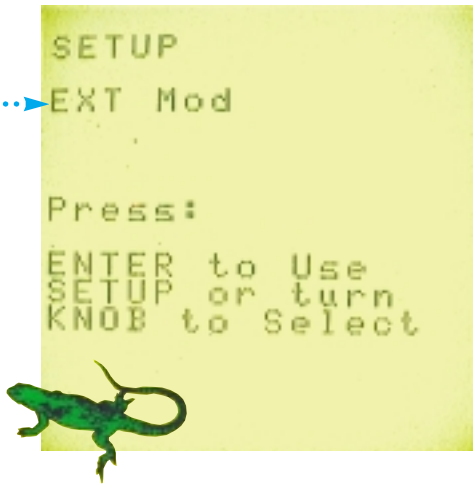
1KHz

When 1KHz is selected, a 1KHz tone is applied to the transmitter when the output isturned on and the modulation is turned on.



EXT Mod

When EXT MOD is selected, the voltage from the AUDIO MOD. jack is applied to thetransmitter when the output is ON and modulation is ON.



Display Freq

When this option is selected, entry and display of frequency is in MHz.

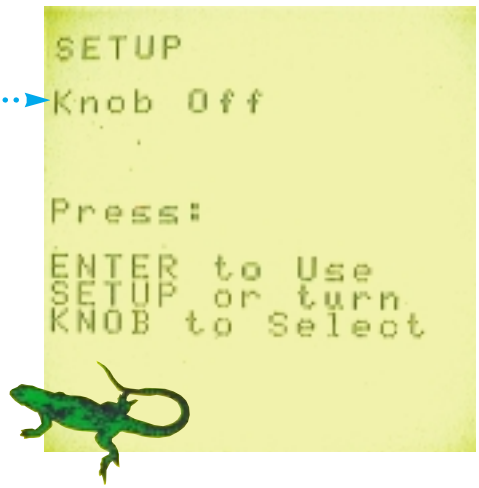
Display Chan #

When this option is selected, entry and display of frequency is in channel number. For non-EAMPS units, the relation between frequency and channel number is:

*Frequency = ((Channel # - 1) * frequency step) + base frequency.*

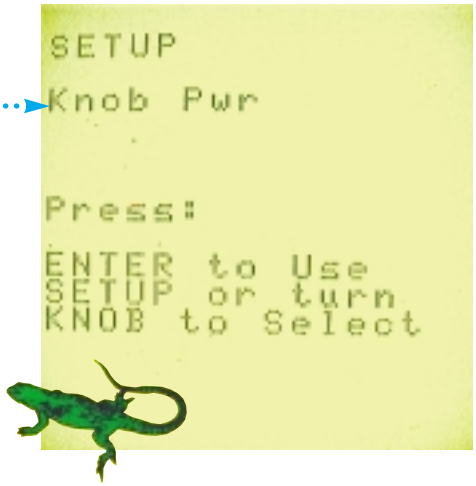
Knob Off

When this option is selected, the front panel knob does not effect either frequency, output power and does not turn backlight on. MOD ON/OFF will turn backlight on. The knob can still be used to change digits in the frequency/power edit screens and to change the selection in the setup screen.



Knob Pwr

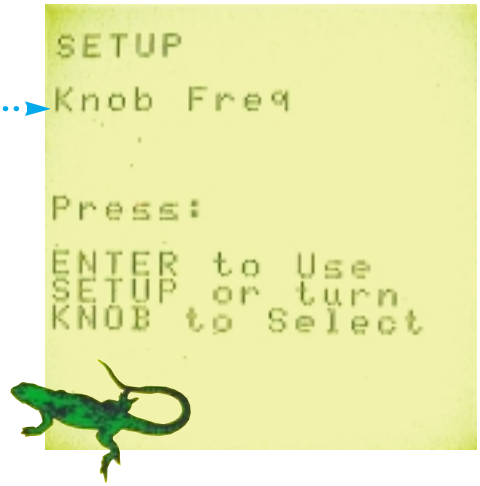
When this option is selected, the front panel knob changes output power and turns backlight ON.



Knob Freq

When this option is selected, the front panel knob changes frequency and turns backlight ON.

Note that the function of the remote UP/DOWN arrow keys follows the setting of the knob.



BVS Lizard Controller (v1.00) Application Software Introduction

The Lizard Controller application software is the Windows 95/98 interface that enables a user of the Lizard Transmitter to control the unit for desired performance.

Certain operations such as modification of frequency and transmit power can be accomplished from a remote location by using the Lizard Controller software. The following sections outline the operation of the Lizard Controller in greater detail.

Application Overview

The Lizard Controller application mimics the display panel for the Lizard. The status is reported once a second from the Lizard and updated on the PC display. Different commands can be sent to the Lizard from the software to control certain parameters of the transmitter.

The main menu contains three different submenus. The first submenu is FILE. The user may exit the application from this submenu.

The second submenu is COMMUNICATION. In this submenu, the user can select the port to which the Lizard is connected. This is the same screen that comes up upon launching the Lizard Controller application.

The final submenu is HELP. In this submenu, this user manual can be brought up. The About box, which displays version information, is also available.

The main screen of the Lizard Controller can be seen in Figure 1. In addition to the status being updated in the display, the Xmit simulated LED will light up during a transmit condition.

The status bar of the Lizard Controller displays unit information such as the calibration date, the serial number, the owner, and the frequency range. The PC system clock is also displayed.

The individual features of the application software are discussed in the following sections.

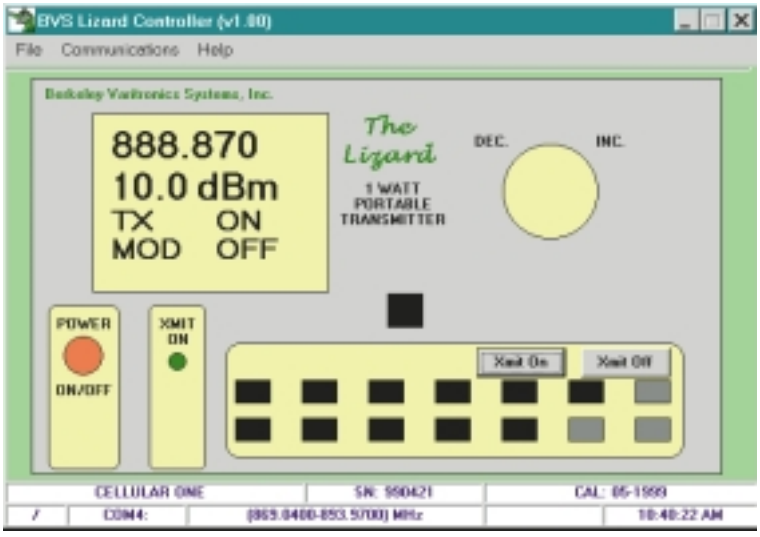


Figure 1 – BVS Lizard Controller

Installing the Application

The application is installed by placing the diskette provided into a 3.5" drive. Run the SETUP.EXE application and InstallShield will prompt for further installation questions. After the installation is completed, an icon will be created in the folder specified during the installation process.

Starting the Application

Make sure that the Lizard is running and connected to a serial port on a PC using the cable packed with the unit. The Lizard Controller application is started by clicking on the Lizard Controller icon. When the PORT screen appears, choose the port to which the Lizard is connected. Leaving the choice as AUTOMATIC will put the Lizard Controller into search mode, and it will poll COM1 thru COM4 in an attempt to find an operating Lizard.

When the main screen appears, check the status bar for verification that the connection was made to the Lizard. The status bar should report unit information and the communications window should read the com port to which the application is connected to the Lizard. You are now ready to control the Lizard.

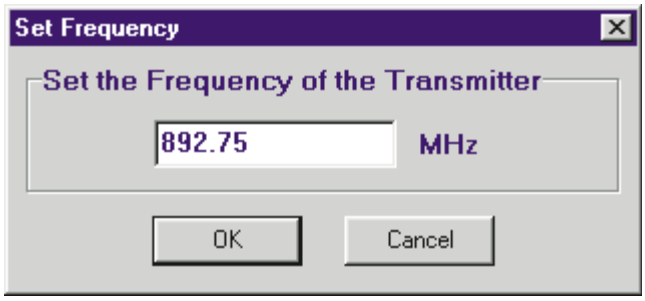


Figure 2 – Update Frequency Dialog

Setting the Frequency

The frequency of the Lizard may be set by clicking once on the frequency in the display box. The dialog box shown in Figure 2 then appears. Enter a frequency in the range of the Lizard and click OK. Within a couple of seconds the status will reflect the new frequency. If the frequency selected is between channels, the Lizard will correct to the nearest channel. NOTE: If the Lizard is transmitting, transmission will cease when a request to change this parameter is received. This is normal and intended to prevent accidental interference with other licensed users.

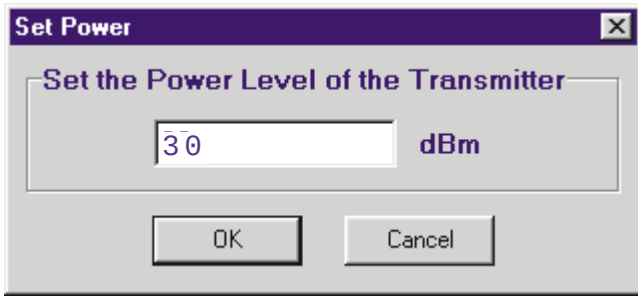


Figure 3 – Update Power Dialog

Setting the Power

The power of the Lizard may be set by clicking once on the power in the display box. The dialog box shown in Figure 3 appears. Enter in a power in the range of the Lizard and click on OK. Within a couple of seconds the status will reflect the new power output setting. If the power selected is out of range, the Lizard will correct to the nearest valid power value.

NOTE: If the Lizard is transmitting, transmission will cease when a request to change this parameter is received. Transmission may be started or stopped by using the two buttons provided on the application main screen.

Setup Options – EAMPS Modulations

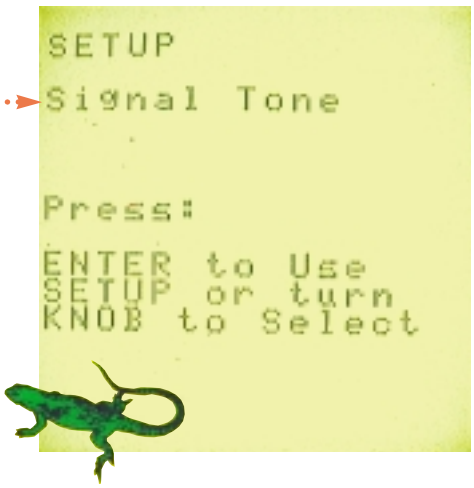
For EAMPS units, standard EAMPS channel numbering is used:

Channel	Frequency
991	869.04
1023	870.00
1	870.03
799	893.97

The following setup selections are available in LIZARD transmitters equipped with EAMPS option:

Dotting

A 5KHz tone is applied to the transmitter when the transmitter is ON and modulation is ON.



Signal Tone

A 10KHz tone is applied to the transmitter when the transmitter is ON and modulation is on.

The following selections can be used in conjunction with a BVS FOX with EAMPS optionto measure EAMPS parameters. The LIZARD in these modes simulates an EAMPS base station. Using the PAGE mode, both the FOX and an EAMPS phone can be made to operate as if controled by a base station. Once a call is established, the LIZARD can be used to cause the phone (and FOX) to “hand-off” to other frequencies. In addition , the phone's power level can be changed (VMAC). Note that when using these modes, the LIZARD keypad, knob and remote may not be as responsive as normal.

1 KHz + SAT

The current SAT tone and a 1KHz tone are applied to the transmitter when the transmitter is ON and MODULATION is ON. The SAT can be measured using a FOX.

FCC

Forward Control Channel data is applied the transmitter when the transmitter is ON and MODULATION is ON. This measurement can be used with the FOX to make BER measurements. In addition, when applied to an EAMPS phone, this modulation will causethe phone's NO SVC indicator to go out (as long as the LIZARD is set to an EAMPS control channel frequency).

Page Phone

This selection is used to cause an EAMPS phone to ring and to cause a FOX to move from the BER to the FOLLOW measurement. The LIZARD must be set to transmitt on an EAMPS control channel (313-354) and the MIN of the phone must have been previouslyentered. When this selection is made, the LIZARD will act as a base station and order thephone to ring at the control channel frequency, SAT 0 and VMAC 0. Once the phone rings and the send button on the phone is pressed (call established), the phone can be made to change frequency, power level or to terminate the call.

Hand Off

This selection is used to cause an EAMPS phone to change to a new frequency “hand-off”. When this selection is made, the new frequency (or channel number) will be requested. When entered, the LIZARD will order the phone to the new frequency.

Change Power

This selection is used to cause as EAMPS phone to change its transmitt power level. When this selection is made, a power code (VMAC) will be requested. When entered, the LIZARD will order the phone to the new power level. To use the previous two selections, the phone must be in the "conversation" mode, as established by the Page Phone selection.

Release

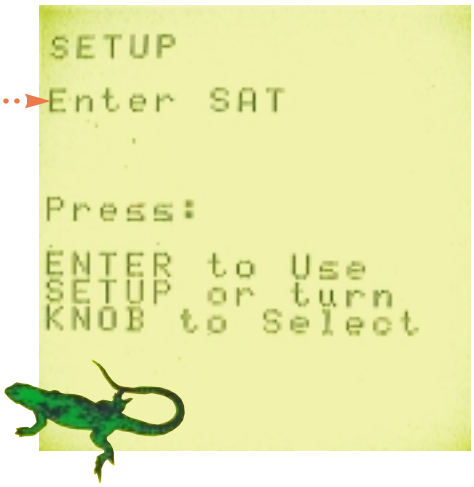
Use this option to terminate a call established using the Page Phone selection.

Enter Min

Use this selection to enter the 10 digit MIN of the phone to be paged with the Page Phone selection. Enter the 3-digit area code followed by the 7-digit phone number.Entry of both these parameters is similar to entering frequencies and power levels. The ENT and SETUP key are used to move the highlight. Use the digit keys or the knob to change the highlighted digit.

Enter SAT

Use this selection to enter the Signal Audio Tone (SAT) that is transmitted using the 1KHz + SAT modulation selection.

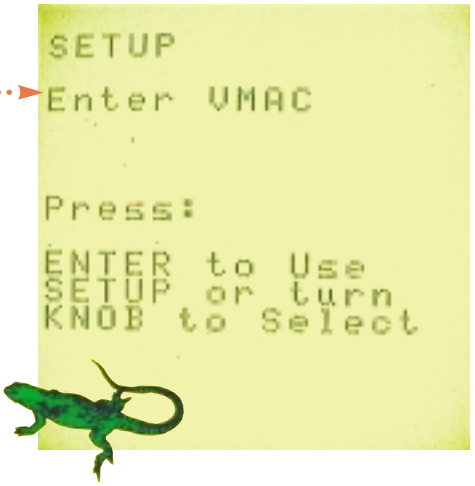


Entries of 0-3 are valid as follows:

ENTRY	SAT FREQUENCY
0	5970 Hz
1	6000 Hz
2	6030 Hz
3	NO SAT

Enter VMAC

Use this selection to set the Voice Mobile Attenuation Code (VMAC) that the phone will be set to when using the Hand Off selection. This screen is also used to enter the VMAC for the Change Power selection. Values of from 0 (max power) to 7 (min power) are accepted.



7.2V battery (Makita) run times

Power Output	runtime	mA.dc	amp-hours
+10 dBm/10 mW	5:30	266	1.463
+20 dBm/100 mW	4:10	332	1.383
+27 dBm/500 mW	3:15	458	1.480
+30 dBm/1 W	2:22	590	1.395

Glossary of Acronyms

AC	Alternating Current
A/D or ADC	Analog to Digital Converter
AGC	Automatic Gain Control
BER	Bit Error Rate
BPSK	Binary Phase Shift Keying
BW	Band Width
CDMA	Code Division Multiple Access - a spread spectrum modulation
DC	Direct Current
D/A	Digital to Analog
dB	deciBel
dBm	deciBels referenced to 1 milliwatt
DOS	Digital Operating System
DSP	Digital Signal Processing
FIR	Finite Impulse Response
GHZ	GigaHertz
GPS	Global Positioning System (satellite based)
GPS diff.	GPS error correction signal which enhances GPS accuracy
IF	Intermediate Frequency
I and Q	In phase and Quadrature
kHz	kiloHertz
LCD	Liquid Crystal Display
LO	Local Oscillator
Mbits	Megabits
MHz	MegaHertz
modem	acronym for modulator/demodulator
PCMCIA	Personal Computer Memory Card International Association
PC	Personal Computer
PCS	Personal Communications Service (1.8 to 2.1 GHz)
PN	Pseudo Noise
QPSK	Quaternary Phase Shift Keying, 4-level PSK
RF	Radio Frequency
RSSI	Receiver Signal Strength Indicator
UTC	Universal Time Code
VAC	Volts Alternating Current
VGA	Video Graphics Array
VSWR	Voltage Standing Wave Ratio
X	horizontal axis
Y	vertical axis

If you require technical assistance, or service to your LIZARD, please contact:

LIZARD Technical Support

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E-mail: info@bvsystems.com

Telephone: 1(732)548-3737

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8:00 a.m. - 6:00 p.m. Eastern Time

The Lizard

1 WATT PORTABLE TRANSMITTER

The Lizard is a portable, battery-powered 1 watt CW (Continuous Wave) or modulated (available on certain models) stimulus transmitter used for indoor coverage testing. The Lizard is ideal for WLAN set-up and evaluating network performance. In a typical application, one or more Lizards are placed throughout an area of interest and set on different channels; while measuring and recording field strength using one of BVS's portable signal strength meters such as Champ, Fox, Mongoose or Ultra-Lite.

FEATURES:

- Completely self-contained module design
- Dynamically adjustable power control from 1 milliwatt to 1 watt output
- Infrared Remote control adjusts power output, frequency and on-off >25 feet
- Super bright 128 x 128 graphic LCD with backlight for viewing in all light conditions
- Removable rechargeable 7.2 volt battery (Makita Ni-Cad available at Home Depot)
- Light-weight design is ideal for "stick-up" applications
- Includes rudimentary modulation (on certain models)
- Precision output held to within ±0.5 dB

13 STANDARD FREQUENCIES IMMEDIATELY AVAILABLE:

- LMR . . . . . 450-470 MHZ
- SMR . . . . . 850-870 MHz
- Cellular EAMPs reverse . . . 824-848 MHz
- Cellular EAMPs forward . . . 868-894 MHz (optional modulation available)
- Cellular ETACs forward . . . . 915-947 MHz (optional modulation available)
- Cellular ETACs reverse . . . . 872-905 MHz
- Cellular GSM forward . . . . . 935-960 MHz
- ISM . . . . . 900-928 MHz
- Paging . . . . . 928-941 MHz (optional POCSAG modulation)
- PCS reverse . . . . . 1850-1910 MHz
- PCS forward . . . . . 1930-1990 MHz
- PCS Korean . . . . . 1805-1865 MHz
- ISM . . . . . 2400-2485 MHz

The Lizard is just one of many exceptional design solutions from Berkeley Varitronics. Call us today for more information:

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Internet: www.bvsystems.com
Email: info@bvsystems.com

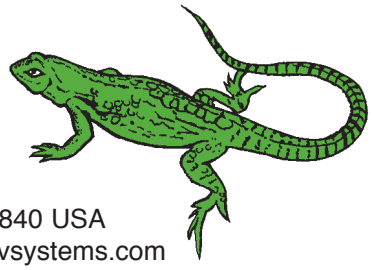
BERKELEY VARITRONICS SYSTEMS

The Lizard

1 WATT PORTABLE TRANSMITTER

SPECIFICATIONS

FREQUENCY RANGE	13 models covering all popular telecom bands
FREQUENCY STEP SIZE	12.5, 25, 30, 50 kHz or 1.25 MHz
FREQUENCY STABILITY	±2.0 ppm (short term) 30° to125° F
FREQUENCY STABILITY	±0.5 ppm (aging maximum for 1 year)
MODULATION (optional)	FSK Manchester modulation or A1 (CW)
MODULATION MODES	Holding tone 1004 Hz SAT tones 5970, 6000, 6030 Hz End tone 10 kHz
OUTPUT POWER	0.0 dBm to 30.0 dBm ±0.5 dB
PASSBAND FLATNESS	±0.5 dB maximum
POWER STEPS	±0.5 dB
OUTPUT	50Ω with TNC Female
OUTPUT VSWR	<2:1
OUTPUT LOAD VSWR	>100:1
DISPLAY	128 x 128 Graphic STN LCD
BACKLIGHT	LED
CONTROLS	Direct enter via 14 button keypad Rotary optical encoder (push to choose) Infrared remote keypad (25' operational range)
DC POWER	Internal (removable) Ni-Cad rechargeable cells External DC power supply via 2.5mm slip jack
CHARGER	2 hour external recharge time. 110 VAC
WEIGHT	5 pounds with battery
SIZE	6-1/2" wide x 8-1/2" long x 3-1/4" deep
ENVIRONMENTAL	Wet suit recommended



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