The Gecko

manual version 1.1

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Overview

The Gecko™ is a portable, battery-powered 1/2 watt CDMA modulated transmitter used for indoor coverage testing. The Gecko is ideal for CDMA microcell set-up and evaluating network performance. In a typical application, one or more Geckos are placed throughout an area of interest and set to different base station PN offsets; while measuring and recording Ec/Io measurements using one of BVS's portable CDMA signal strength meters such as Hummingbird™ and Raven™.

- Completely self-contained module design
- Dynamically adjustable power control from 1 milliwatt to 500 milliwatt output
- Infrared remote control adjusts power output, frequency and ON / OFF all at a distance of 25 feet
- Super bright 128 x 128 graphic LCD with backlight for viewing in all light conditions
- Removable rechargeable 9 volt battery (Makita Ni-Cad available at Home Depot)
- Lightweight design is ideal for "stick-up" applications
- Precision output held within ±1.0 dB
- Optional connection to Rhino rubidium frequency source for precise base station PN offsets [0-511]

1 128 x 128 LCD display

2 Infrared remote receiver window

3 Rotary optical encoder

4 Power switch

5 Numeric keypad

6 ESC

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 Internal or External, 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 GECKO and press the ENTER key to set the frequency and power output. Turn the output on by pressing the XMIT key (when the GECKO 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 ESC ON/OFF button on the keypad or remote for viewing the backlight will go out after 5 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 5 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. Be sure to charge battery fully using only the included 9.6 volt Ni-Cad battery and charger.

LCD Display

The GECKO 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). If the channel number display option is selected in setup, the first line would display the channel number. 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 GECKO is either transmitting or idle. In the event of an RF, I&Q, Clock, PPS problem or battery low condition, an error screen will be displayed and the device is prevented from transmitting.

line 1-indicates transmitting frequency (or channel)
line 2-indicates power level in dBm
line 3-indicates current transmit status (ON or OFF)
line 4-indicates timing source as external for precise frequency

When the transmitter is on, the GECKO backlight can be turned on for 5 seconds by pressing the ESC 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 will turn backlight on

but will not affect 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 ESC key turns the backlight on and exits out of 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 right-most digit of the current frequency is highlighted. To change the highlighted digit, press a digit key, use the remote up-down arrow keysor 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 step is displayed in the frequency edit screen. When the knob is selected for output

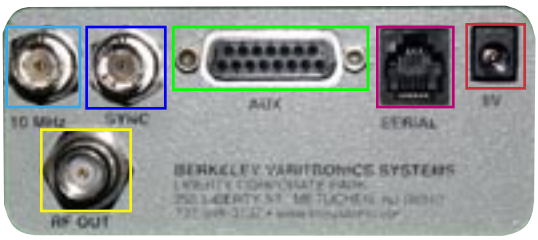
power, each turn of the knob adjusts the output power in1.0 dBm increments. In situations where the power and frequency must remain fixed, the knob can be set to off so that turning it has no effect on eitherpower or frequency. In addition, the knob can be used in the frequency and output power edit screens to increase or decrease the highlighted digit. When in the setup screen, the knob can be used to select setup options.

Rear Panel

optional ports

SYNC - 1/2 PPS input for precise base station offsets (0-511 selectable)
10 MHz - external Rhino sync input at 10 MHz
AUX - advanced Rhino sync control features

SERIAL - RJ-11 serial port control from PC software
9V - 9 volt 2.5mm external DC input
RF OUT - TNC female RF output



Using the Remote Control

The infrared 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 function available 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 GECKO and press the TX key to toggle the transmitter output on and off (the same as pressing the front panel keypad XMIT ON/OFF key). Press the MOD / ESC key to turn backlight on for 5 seconds for viewing the screen. 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 GECKO is in its normal screen the remote UP and DOWN arrow keys have 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. (Internal or External)

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

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 keypad or the remote's ENT key.

Setup Options

The following setup selections are available on all standard model GECKO transmitters:

External Clock

When External Clock is selected, GECKO may be connected to an external rubidium frequency source for precise base station PN offsets [0-511] such as Berkeley's Rhino™ or Rhino II™. Both the 10 MHz and SYNC (1/2 PPS) inputs must be connected. The main screen will indicate an external timing source with an EXT at the bottom and base station. (example 072)

Display Freq

When this option is selected, entry and display of frequency is in MHz. GECKO is available in either PCS or Cellular frequencies.

Display Chan

When this option is selected, entry and display of frequency is by channel number in either PCS or Cellular frequency depending upon the model. 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 but does 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 the backlight ON.

Knob Freq

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

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

Enter Base Station

When this option is selected, the user may select any of the 512 (from 0 to 511) basestation PN offsets to transmit from. When selecting this option you must select external clock first, then select desired base station number. Use the keypad to enter the desired number and press ENTER when finished. This feature may only be used when GECKO External Clock is set to EXT and a 10 MHz clock and a 1/2 pulse per second is applied to the rear panel.

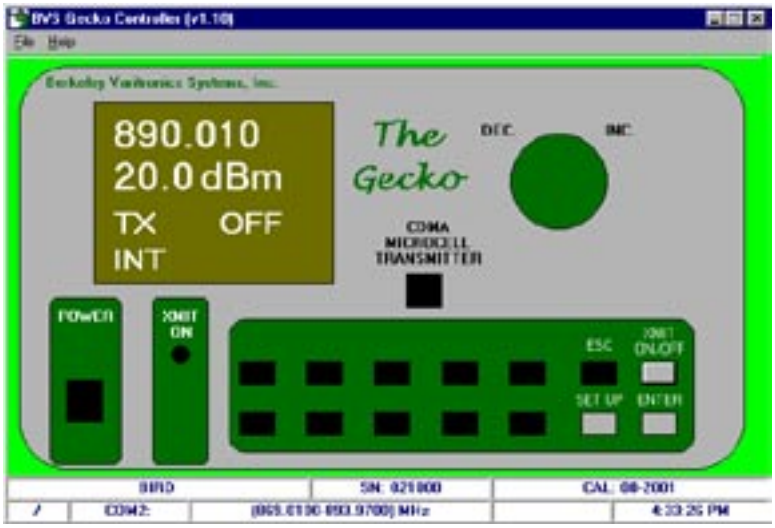
Note: If either of these options are not connected, the Tx will not transmit and an error message will appear:

Introduction

The Gecko Controller application software is the Windows 95/98 interface that enables a user of the Gecko 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 Gecko Controller software.

The following sections outline the operation of the Gecko Controller in greater detail.



Gecko Main Screen

Application Overview

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

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

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.

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 Gecko 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.

Installing the Application

The application can be installed from the application CD provided. The PC must be running Win 95/98/Me.Choose Gecko as the product and click on the Gecko C button. 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 Gecko is running and connected to a serial port on a PC using the cable packed with the unit. The Gecko Controller application is started by clicking on the Gecko Controller icon. When the PORT screen appears, choose the port to which the Gecko is connected. Leaving the choice as AUTOMATIC will put the Gecko Controller into search mode, and it will poll COM1 thru COM4 in an attempt to find an operating Gecko.

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

Setting the Frequency

The frequency of the Gecko may be set by clicking once on the frequency in the display box. Enter a frequency in the range of the Gecko and click OK. Within a couple of seconds the status will reflect the new frequency. If the frequency selected is between channels, the Gecko will correct to the nearest channel.

NOTE: If the Gecko 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. This is normal and intended to prevent accidental interference with other licensed users.

Frequency Screen

Setting the Power

The power of the Gecko may be set by clicking once on the power in the display box. Enter in a power in the range of the Gecko 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 Gecko will correct to the nearest valid power value. NOTE: If the Gecko is transmitting, transmission will cease when a request to change this parameter is received.

Power Screen

Transmission

Transmission may be started or stopped by using the button provided on the application main screen.

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

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1)Read and understand all instructions.

2)Follow all warnings and instructions marked on the product.

3)Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

4)Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.

5)Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.

6)Slots and openings in the cabinet and the back or bottom are provided for ventilation, to protect it from overheating these openings must not be blocked or covered The openings should never be blocked by placing the product on the bed, sofa, rug or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7) This product should be operated only from the type of power source indicated on the appliance. If you are not sure of the type of power supply to your home, consult your dealer or local power company.

8)Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.

9)Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.

10)Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

11) To reduce the risk of electric shock, do not disassemble this product, but take it to a qualified service facil4 when some service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the appliance is subsequently used.

12)Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

A) When the power supply cord or plug is damaged or frayed. B) If liquid has been spilled into the product.

C)If the product has been exposed to rain or water.

D) If the product does not operate normally by following the operating instructions. Adjust only those controls, that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

E) If the product has been dropped or the cabinet has been damaged. F) If the product exhibits a distinct change in performance.

13)Avoid using the product during an electrical storm. There may be a remote risk of electric shock from lightning.

14)Do not use the telephone to report a gas leak in the vicinity of the leak.

INSTALLATION INSTRUCTIONS

1. Never install telephone wiring during a lightning storm.

2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

4. Use caution when installing or modifying telephone lines.

INSTRUCTION FOR BATTERIES

CAUTION: To Reduce the Risk of Fire or Injury to Persons, Read and Follow these Instructions:

1. Use only the type and size of batteries mentioned in owner's manual.

2. Do not dispose of the batteries in a fire. The cells may explode. Check with local codes for possible special disposal instructions.

3. Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.

4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.

5. Do not attempt to recharge the batteries provided with or identified for use with this product. The batteries may leak corrosive electrolyte or explode.

6. Do not attempt to rejuvenate the batteries provided with or identified for use with this product by heating them. Sudden release of the battery electrolyte may occur causing burns or irritation to eyes or skin.

7. When replacing batteries, all batteries should be replaced at the same time. Mixing fresh and discharged batteries could increase internal cell pressure and rupture the discharged batteries. (Applies to products employing more than one separately replaceable primary battery.)

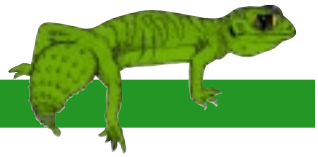
8. When inserting batteries into this product, the proper polarity or direction must be observed. Reverse insertion of batteries can cause charging, and that may result in leakage or explosion. (Applies to product employing more than one separately replaceable primary battery.)

9. Remove the batteries from this product if the product will not be used for a long period of time (several months or more) since during this time the battery could leak in the product.

10. Discard "dead" batteries as soon as possible since "dead" batteries are more likely to leak in a product.

11. Do not store this product, or the batteries provided with or identified for use with this product, in high-temperature areas. Batteries that are stored in a freezer or refrigerator for the purpose of extending shelf life should be protected from condensation during storage and defrosting. Batteries should be stabilized at room temperature prior to use after cold storage.

Gecko™



CDMA MICROCELL TRANSMITTER

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- Precision output held within ±0.5 dB
- Optional connection to Rhino rubidium frequency source for precise base station PN offsets [0-511]

CONNECT TO A RHINO FOR PRECISE BASESTATION PN:

1. Acquire GPS lock with Rhino

2. Connect Gecko to the Rhino

3. Transmit any PN offset from anywhere that GPS may not be available

The Gecko is just one of many exceptional design solutions from Berkeley Varitronics Systems. Call us today for more information:
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Internet: www.bvsystems.com
Email: info@bvsystems.com

wireless products
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Gecko™

1/2 WATT PORTABLE CDMA TRANSMITTER

SPECIFICATIONS

FREQUENCY RANGE	PCS and Cellular frequencies
FREQUENCY STEP SIZE	30, 50 kHz or 1.25 MHz
FREQUENCY STABILITY	±2.0 ppm (short term) 30° to 125° F
FREQUENCY STABILITY	±0.5 ppm (aging maximum for 1 year)
MODULATION	I and Q pilot codes (IS-95)
OUTPUT FILTERING	Digital FIR
OUTPUT POWER	0.0 dBm to 27.0 dBm ±1.0 dB
PASSBAND FLATNESS	±0.5 dB maximum
POWER STEPS	1.0 dB
OUTPUT	50 Ω with TNC Female
OUTPUT VSWR	<2:1
OUTPUT LOAD VSWR	>100:1
DISPLAY	128 x 128 Graphic STN LCD
BACKLIGHT	LCD
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 with110 VAC
WEIGHT	5 pounds with battery
SIZE	6-1/2” wide x 8-1/2” long x 3-1/4” deep
OPTIONS	Connection to Rhino rubidium frequency source providing precise base station PN offsets [0-511]

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