Locust

manual version 1.9

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LOCUST DATA SHEET

Locust™ is a **handheld, wireless receiver designed specifically for sweeping and optimizing Local Area Networks. The instrument measures coverage of direct sequence CDMA networks which operate on the IEEE 802.11b standard allowing the user to measure and determine the AP (Access Point), PER (Packet Error Rate), and RSSI signal levels aiding in locating the hub and access points throughout a building. Locust detects and differentiates from narrow-band multipath interferences such as microwave ovens and frequency hopping systems and features a built-in display, keypad and removable battery pack for true portability.**

Locust's battery pack uses common AA battery cells found in any conveinence store. Ni-Cad, Alkalines, Ni-MH and Li-Ion cells may all be used. Locust does require 5 AA cells with at least 1500 mAh per cell. BVS supplies 2 battery packs complete with 10 Ni-MH battery cells to get users working right out of the box. Ni-MH cells are recommended for best performance from your Locust.

Locust also includes a simple 2.4 GHz threaded antenna that screws right into the top of the unit. Additional antennas may be ordered from BVS through BVS.

At the top of the Locust rests the GPS connector, antenna connector and upload port. The GPS antenna connector (left) is a small male connector. The antenna connector (center) is a 2.4 GHz SMA Female 50 ohm. The provided antenna easily screws and unscrews from this connector. Be sure to unscrew antennas when transporting the Locust. The upload port (right) is used as a one way communications port for uploading new firmware to the Locust. The port uses the provided cable which employs a standard RJ-11 phone jack on one end and DB-9 PC serial cable on the other end.

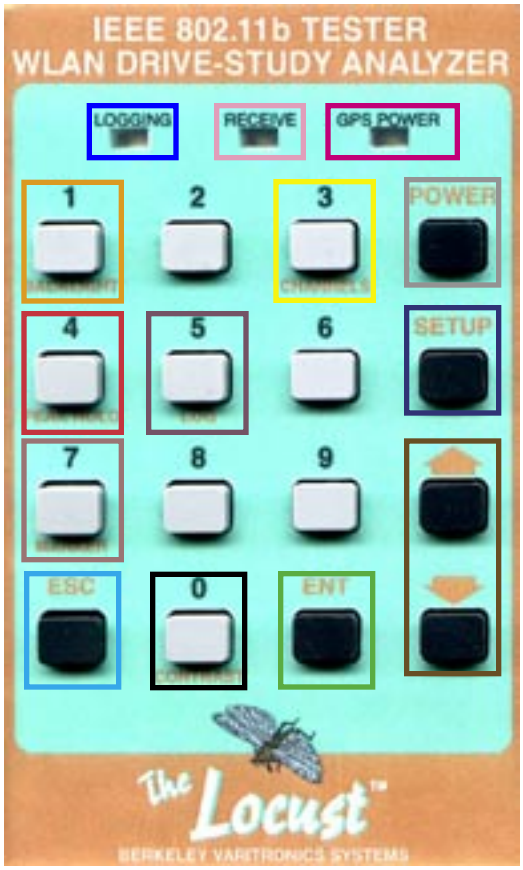
See UPDATING LOCUST FIRMWARE in this manual for firmware updating procedures.

LOCUST ACCESSORIES

Your **Locust** includes all basic operational accessories including the following: 2.4 GHz antenna, GPS antenna, 16MB compact flash card, compact flash card reader, 2 (Ni-MH) battery packs, AC/DC power cable, carrying case and upload cable. Insert depleted battery pack into charger and plug charger into AC outlet. See rear of charger for LED status indicator lights. Approximate charging time for included Ni-MH battery pack is just over one hour. Run time using these same batteries is just over two hours.

NOTE: The included charger may only be used to charge the included Ni-MH batteries or other AA Ni-MH batteries. <u>NOT</u> Ni-CAD batteries. Batteries are automatically conditioned in the charger before starting a rapid charge. The charge and runtime are balanced so that the charge is usually complete before the Locust displays low battery indication. This is an average estimate since the current consumed by Locust and runtime depend substantially on the mode of operation. Expect over 500 cycles from each Ni-MH pack.

LOCUST KEYPAD



Locust uses a raised plastic keypad as its only interface. Below are simple descriptions of the buttons and their features:

LOGGING - indicates if unit is logging to compact flash
RECEIVE - indicates if any signals are being received
GPS POWER - indicates internal GPS ON / OFF status
1 - toggles backlight ON & OFF
3 - displays the DSSS channel menu
POWER - toggles Locust ON & OFF
4 - toggles highest signal strength metering ON & OFF
5 - toggles data logging ON & OFF to compact flash
SETUP - enters the setup menu screen
7 - incrementally time stamps
ESC - exits current menu screen
0 - displays contrast screen
ENT - executes currently selected option
UP/DOWN ARROWS - scroll through selections

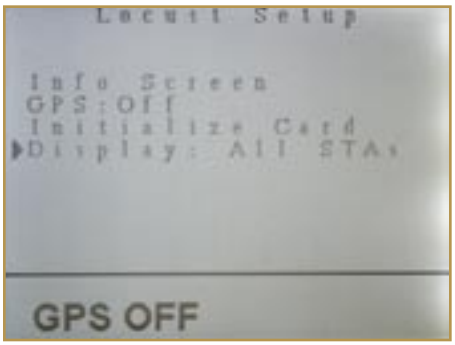
GETTING STARTED

Operation of the **Locust** is straightforward. Insert 5 fresh battery cells into removable pack. Close the bottom back up and power on the Locust by holding down the POWER button for about 2 seconds.

remove bottom cover & insert fresh batteries

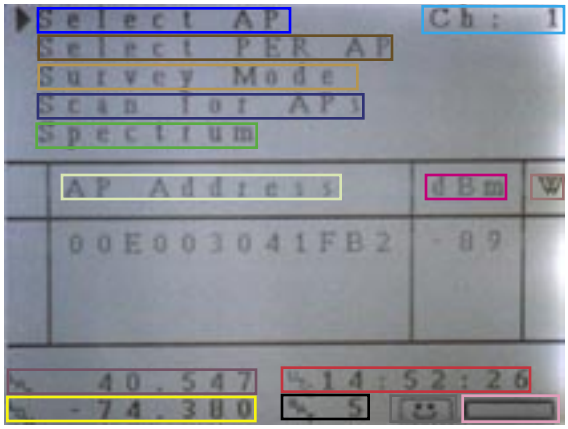
MAIN SCREEN

This is the main measurement screen used for monitoring and selecting STAs (STAtions) and APs (Access Points). A station may be any 802.11b signal detected such as a wireless LAN PCMCIA card in a laptop. The Locust includes all IEEE 802.11b signals and valid APs in the list of STAs but only valid APs in the AP scan list. The Locust defaults to an AP scan when it is powered up but the user may broaden the scanning by selecting the SETUP button and choosing Display All STAs in the SETUP menu immediately.



The main screen may be accessed anytime by pressign the ESC button. Multiple addresses may be listed and monitored simultaneously here. Use the UP/DOWN ARROW keys to toggle between all of these selections and ENT to choose one.

Select AP - toggles between listed APs below
Select PER APs - displays PER screen for selected AP
Survey Mode - scans all channels for authentic APs
Scan for APs - scans selected channel for authentic APs
Spectrum - enters spectrum analyzer mode
Channel - indicates current channel selection for measure



The AP address window at the bottom indicates all IEEE addresses indentified. The asterisk to the left indicates the address that is currently selected.

dBm - indicates the signal strength of the last packet measured.

W - indicates WEP (Wireless Equivalent Privacy). “P” indicates encryption is detected.

LAT - GPS Latitude coordinates
UTC - GPS time stamp
LON - GPS Longitude coordinates
SAT - number of satellites in view

Indicates compact flash has been formatted for Locust

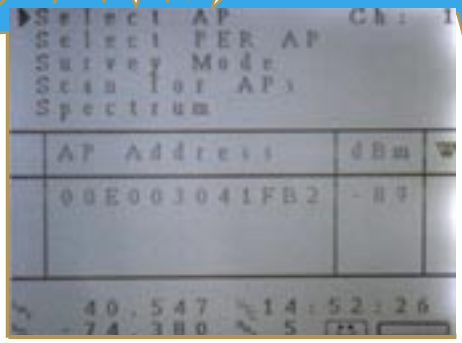
Indicates data storage remaining in compact flash card

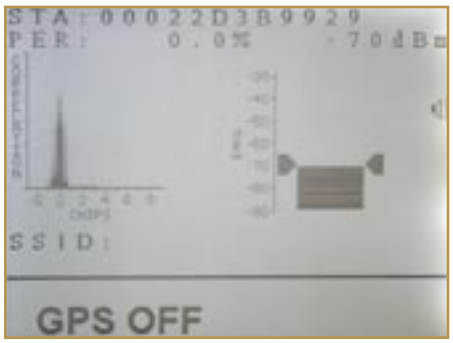
SELECT AP

This selection places a cursor at the bottom of the screen to the left of the AP addresses. By pushing ENT, the user selects (indicated by an asterisk) a specific AP address to monitor. Use Select AP and the UP / DOWN ARROW keys to toggle through all received addresses. In this screen, the user may access up to 16 unique, detected AP addresses by scrolling through the list and selecting one. Press the number 2 key at anytime in this screen to clear all APs.

Once an AP is selected, the screen provides various information and measurements including the AP MAC address, PER, RSSI, corrlelated signal strength or multipath, Peak RSSI, SSID or network identification and GPS data. Pressing the number 4 key at anytime will reset all the measurements of this screen. The following screen shows an STA measurement. Notice that the SSID is blank because this is not a valid AP.

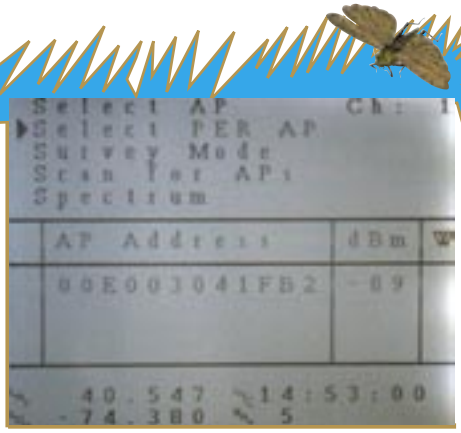
Pressing the number 8 key at anytime toggles the strength audio indicator ON or OFF. Notice the little speaker icon to the right side of the screen.

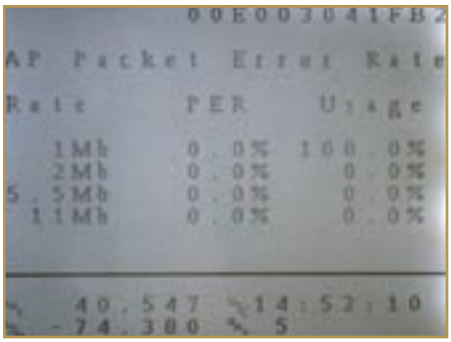




SELECT PER AP

This selection will display the Packet Error Rate screen for the currently selected AP. The Rate column to the left indicates the speed rate that is being used in Megabits per second. The PER is based on actual packets coming in at different data rates. PER indicates the Packet Error Rate using each of these speeds in the selected AP. Usage displays the respective percentage breakdowns between the 4 different transfer rates all in the selected AP. PER is calculated by the percentage of bad packets out of the packets coming in at that data rate.

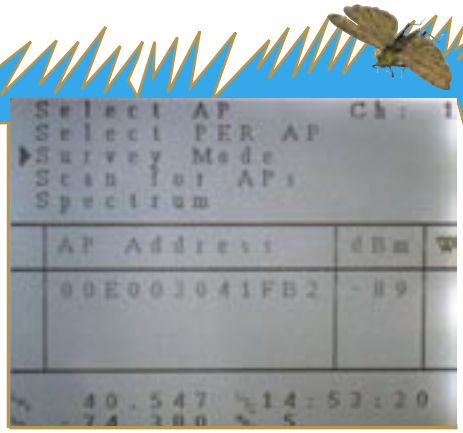


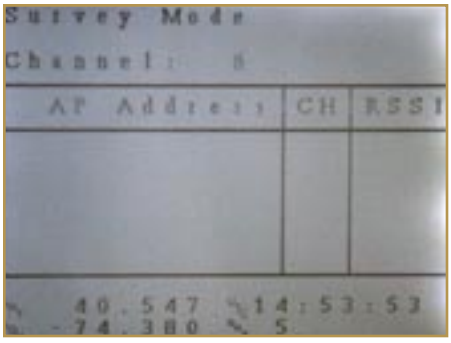


SURVEY MODE

This selection scans all 14 channels continuously searching for authentic APs. While in the Survey screen, the user may scroll through and access up to 64 different APs. Each channel is displayed as it is scanned (roughly one second per channel) and any valid APs, their channels and their RSSI is also listed.

Note that STAs cannot be received using Survey mode.

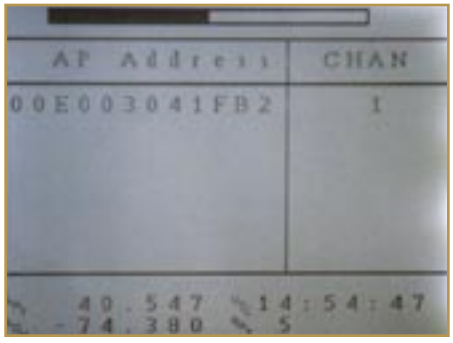




SCAN FOR APs

This selection scans all 14 channels once searching for authentic access points. Up to 8 APs are listed. Pressing ENT will scan again. Press ESC to exit to main screen.

Note that STAs cannot be received using Scan for APs mode.



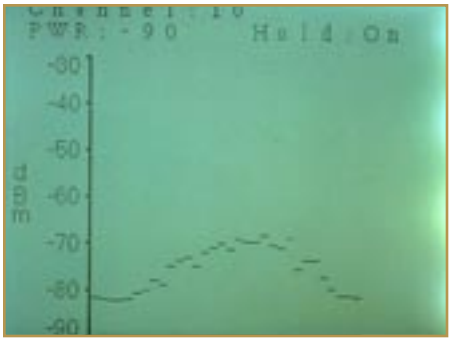
SPECTRUM SCREEN

Selecting this screen will instantly display all RSSI in a 22 MHz bandwidth that Locust continuously scans. Any peaks indicate a signals although it could represent some spurious noise so the user must check that their channel corresponds with an appropriate AP address. The peak power is indicated graphically and numerically on this screen as well as the channel being scanned. Here, the signal peak indicates a narrowband jammer source. Press ESC to exit this screen.

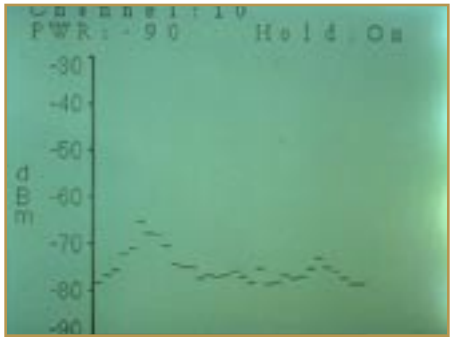
Narrowband Jammer

PEAK HOLD

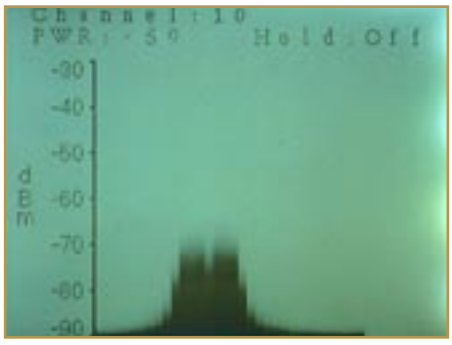
Use Peak Hold when looking for interference sources with low duty cycles. Push the 4 key on the keypad to turn ON the Peak Hold. Push the 4 key again to turn the Peak Hold back OFF. Remember the last signal displayed will reset when Peak Hold is toggled ON.



802.11 Access Point



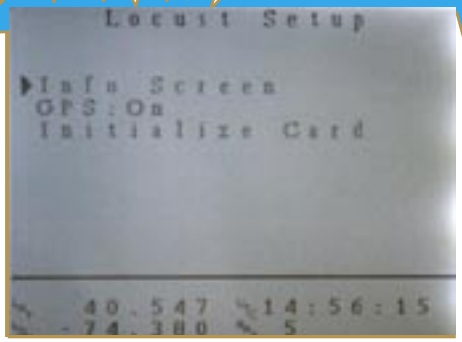
Microwave Oven



Wideband 5 MHz Jammer

LOCUST SETUP

Press this key at antime to access the Setup Menu. While in the this menu, use the UP/DOWN ARROW keys to choose a setu option. Press ENTER to select or ESC to return to previous menu screen.



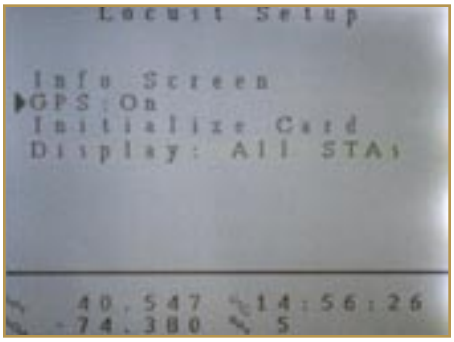
INFO SCREEN

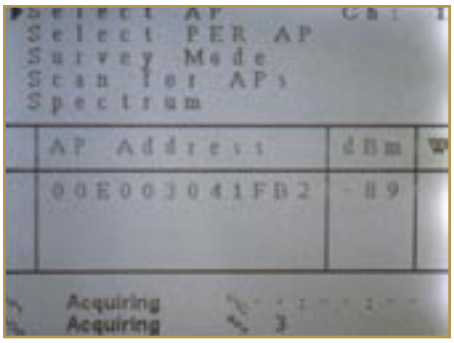
This informational screen provides information on your Locust unit such as firmware version, serial number and current GPS information.

GPS : ON

Press ENTER to toggle the internal GPS ON and OFF. The GPS POWER LED indicator above the keypad will light up indicating the internal GPS is operational. Be sure that the GPS antenna is connected to the Locust and not blocked from the satellites in the sky.

Allow a few minutes for the GPS antenna to acquire a few satellites and lock. Be sure to keep the GPS off if GPS data is not needed in WLAN studies as it will draw power and shorten the running time of your Locust.

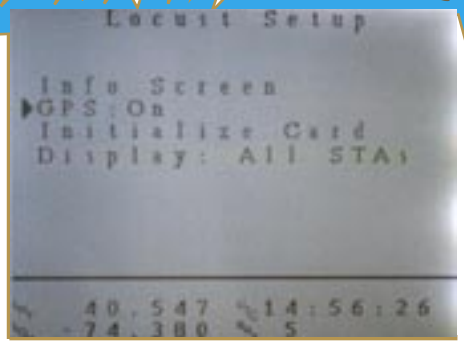




Still not locked…

INITIALIZE CARD

Press ENTER to begin initialization of the compact flash card. A warning screen will then appear asking the user to press ESC or ENTER. Upon selecting ENTER, and new message will appear moments later indicating that the compact flash card is now formatted for use in your Locust.



CONTRAST ADJUSTMENT

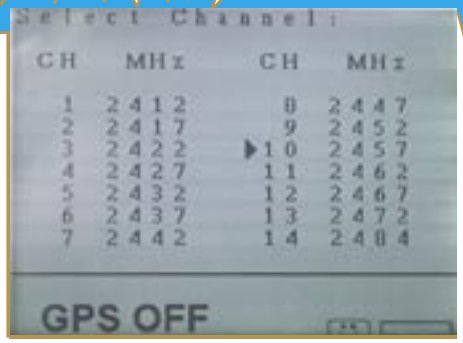
At anytime, press 0 on the key pad to access the Contrast Adjustment screen. Use the UP/DOWN ARROW keys to increase or decrease LCD contrast. When finished, press ESC to exit this screen.

BACKLIGHT ADJUSTMENT

At anytime, press 1 to toggle the backlght off and on. Remember that using the Locust without the backlight on will increase overall battery life.

CHANNEL SCREEN

At anytime, press 3 to open the channel screen indicating all available channels and their corresponding frequencies. Refer to channel chart towards the end of this manual. Use the UP/DOWN ARROW keys to toggle bewteen the desired channels and the press ENT to choose the channel. Press ESC to exit screen.



WEP ENCRYPTION DETECTION

A “P” next to its associated AP address and signal strength indicates that WEP (Wireless Equivalent Privacy) is enabled and deteced for that particular AP. An empty space indicates no WEP encryption.

UPDATING LOCUST FIRMWARE

1. Install the Locust loader program on a PC. Insert Disk 1 of the Locust loader and run Setup.exe. Install Shield will guide you through the installation. Please make note of the install directory. You will need this information later.

2. Connect the download cable to the Locust and to the PC. Turn the unit on and press the Setup key. This places the unit in the channel selection screen.

3. Run the Locust firmware loader installed in step 1. Select the Comm port that the Locust is connected to. Hit the browse button and select the file that is located in the installation directory for the Locust firmware loader. Press the load button and wait for the download to complete.

4. Turn the unit off. In order to reset the unit and run the new firmware, turn the unit off, remove the download cable and turn the unit back on.

The Locust firmware loader can be uninstalled from your computer at this point.

Networking Basics

Packets and traffic

Information travels across a network in chunks called "packets." Each packet has a header that tells where the packet is from and where it's going, similar to what you write on the envelope when you send a letter. The flow of all these packets on the network is called "traffic."

Hardware addresses

Your PC "listens" to all of the traffic on its local network and selects the packets that belong to it by checking for its hardware address in the packet header or MAC (Media Access Control). Every hardware product used for networking is required to have a unique hardware address permanently embedded in it.

IP addresses

Since the Internet is a network of networks (connecting millions of computers), hardware addresses alone are not enough to deliver information on the Internet. It would be impossible for your computer to find its packets in all the world's network traffic, and impossible for the Internet to move all traffic to every network, your PC also has an IP (Internet Protocol) address that defines exactly where and in what network it's located. IP addresses ensure that your local Ethernet network only
receives the traffic intended for it. Like the hierarchical system used to define zip codes, street names, and street numbers, IP addresses are created according to a set of rules, and their assignment is carefully administered.

Put another way, the hardware address is like your name; it uniquely and permanently identifies you. But it doesn't offer any clues about your location, so it's only helpful in a local setting. An IP address is like your street address, which contains the information that helps letters and packages find your house.

Rules for Sending Information (Protocols)

A protocol is a set of rules that define how communication takes place. For instance, a networking protocol may define how information is formatted and addressed, just as there's a standard way to address an envelope when you send a letter.

Networking Devices:

Bridges

A bridge joins two networks at the hardware level. This means that as far as other protocols are concerned, the two networks are the same.

Routers

A router connects two IP networks. In contrast to a bridge, which joins networks at the hardware level, a router directs network IP traffic based on information stored in its routing tables. A routing table matches IP addresses with hardware addresses. The router stamps each incoming IP packet with the hardware address that corresponds to that IP address. As a result, the packet can be picked up by the right computer on the hardware network.

DNS (Domain Name Server)

Networks (domains) on the Internet have names that correspond to their IP addresses. A Domain Name Server maintains a list of domain names and their corresponding addresses. This is why you can go to Berkeley's Web site by entering www.bvsystems.com, instead of the IP address.

Networking Terms:

TCP/IP (Transport Control Protocol/Internet Protocol)

TCP/IP is a collection of protocols that underlies almost every form of communication on the Internet.

DHCP (Dynamic Host Control Protocol)

DHCP is a method of automatically assigning IP addresses. Instead of assigning addresses to individual users, addresses are assigned by the DHCP server when clients need them. This means that instead of entering several fields of long addresses, users need only to select DHCP as their configuration method for IP networking.

PPP (Point-to-Point Protocol)

PPP is the most common protocol for providing IP services over a modem.

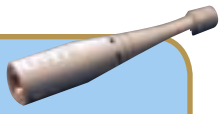
NAT (Network Address Translation)

NAT is used to share one IP address among several computers. A device set up as a NAT router uses a collection of "private" IP addresses (in the range 10.0.1.2 to 10.0.1.254 for example) to allow several computers to access the Internet using one "public" IP address. When a computer using a private IP address requests information from the Internet, the NAT router keeps a record of the computer making the request, and sends the information to the Internet using its own IP address. When the response comes back from the Internet, the NAT router forwards the packet to the appropriate computer.

Channel Number	Frequency GHz	North America	Europe	Spain	France	Japan MKK
1	2.412	X	X			
2	2.417	X	X			
3	2.422	X	X			
4	2.427	X	X			
5	2.432	X	X			
6	2.437	X	X			
7	2.442	X	X			
8	2.447	X	X			
9	2.452	X	X			
10	2.457	X	X	X	X	
11	2.462	X	X	X	X	
12	2.467		X		X	
13	2.472		X		X	
14	2.483					X

DSSS INTERNATIONAL CHANNEL CHART

Accessories for your Locust



2.4 GHz Antenna
SMA connector
P/N SMA-001
$ 25.00

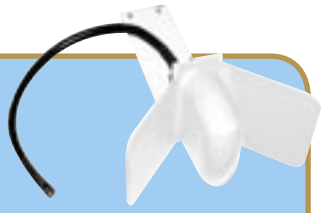
RS-232 Serial Cable
DB-9 Female to RJ-11
P/N 00002AB
$ 25.00

Rugged Carrying Case
ABS Plastic
P/N P-CASE
$ 100.00

GPS Antenna
GPS magmount active antenna with
SMC male connector
P/N GPS-SMC
$ 45.00

PCMCIA Card Reader
Type I, II & III
P/N ATA-000
$ 45.00

Ni-MH Battery Charger with switch-
ing transformer
P/N NIMH-000
$ 105.00



Direction Finding Antenna with
mounting bracket, cable &
type N SMA male
9 dBi gain
P/N DFA-000
$ 250.00

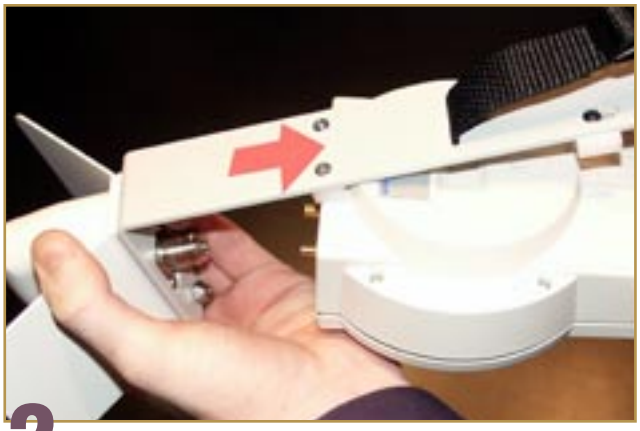
Ni-MH Battery Pack
5 AA 7.5 V
P/N NIMH-005
$ 45.00

Compact Flash Card
16 Megabytes
P/N 16MBATAF-C
$ 50.00

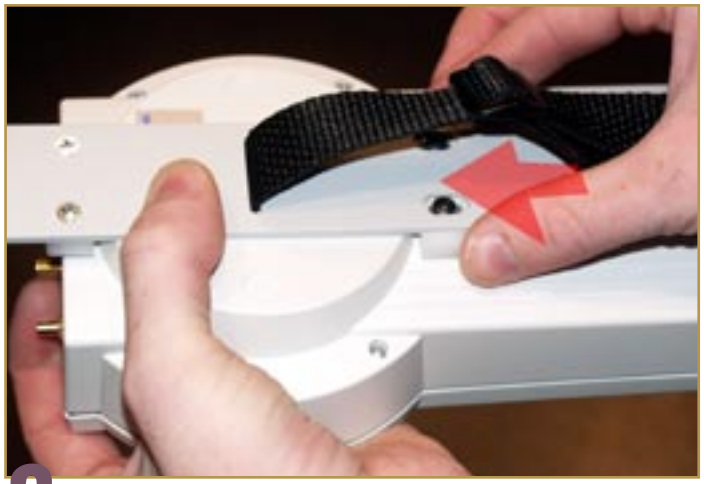
DC PowerCable Pack
Cigarette Lighter Adaptor
P/N 002NIMH
$ 50.00

Optional Direction Finding Antenna (DFA-000) Setup

1 Remove cap from SMA connector on DF antenna.



2 Hook antenna bracket into slit on top of unit.



3 Slide bracket plate into other slit.

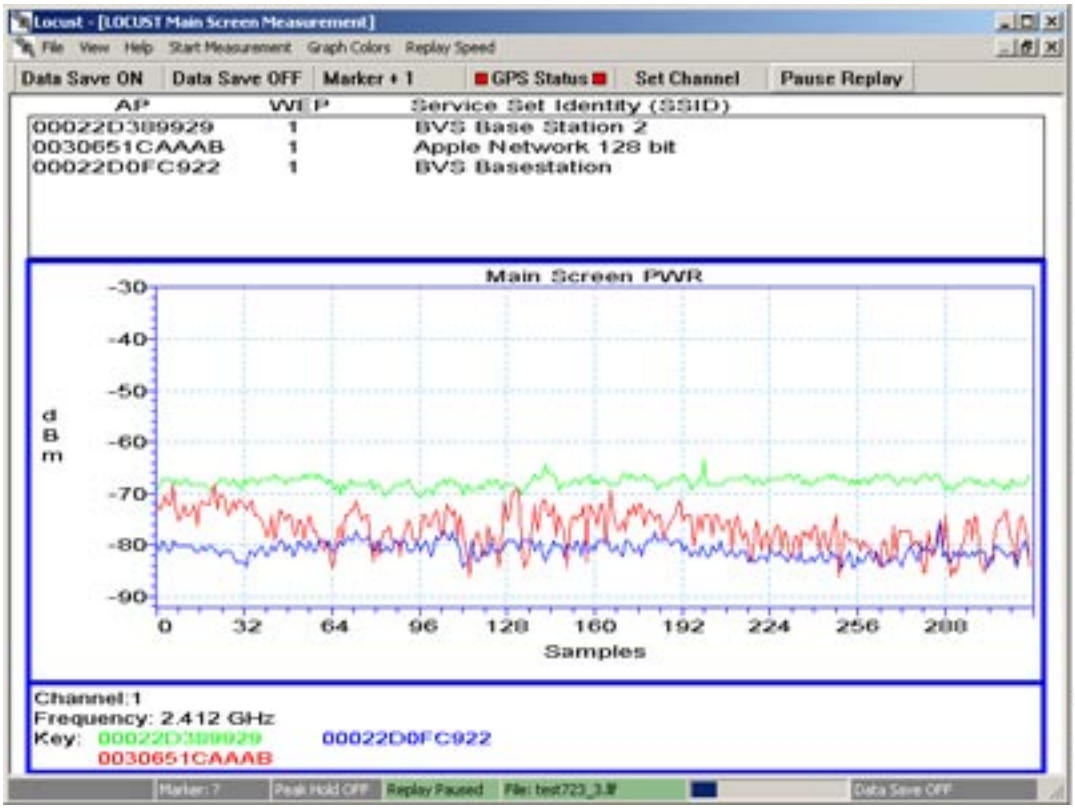
4 Tighten both screws on bracket.

5 Loop & screw in antenna cable to unit.

LOCUST SERIAL INTERFACE OVERVIEW

V2.0 Locust Data Logger requires the following:

Windows 98, Windows 2000 or Windows XP operating system
64 Meg (or more) RAM
Pentium II CPU
500 MHz or greater operating speed
100 MB (or more) free space on Hard Drive
At least 1 serial port for data logging (not required for replay)
Color Display 800 x 600 recommended
Optional PCMCIA card reader



Locust Main Screen

This example of the Locust Main Screen measurement displays data from a file being replayed. Note that the status bar Box 6 indicates the replay is about 1/5'th through. Box 4 indicates a disk file replay in progress that is paused. Box 5 shows the data file being replayed. The two green indicators in the GPS Status tool bar button show that the GPS receiver was not locked at this time in the replay data.

Main Screen Display:

The Locust main screen measurement is displayed by the PC in 3 sections:

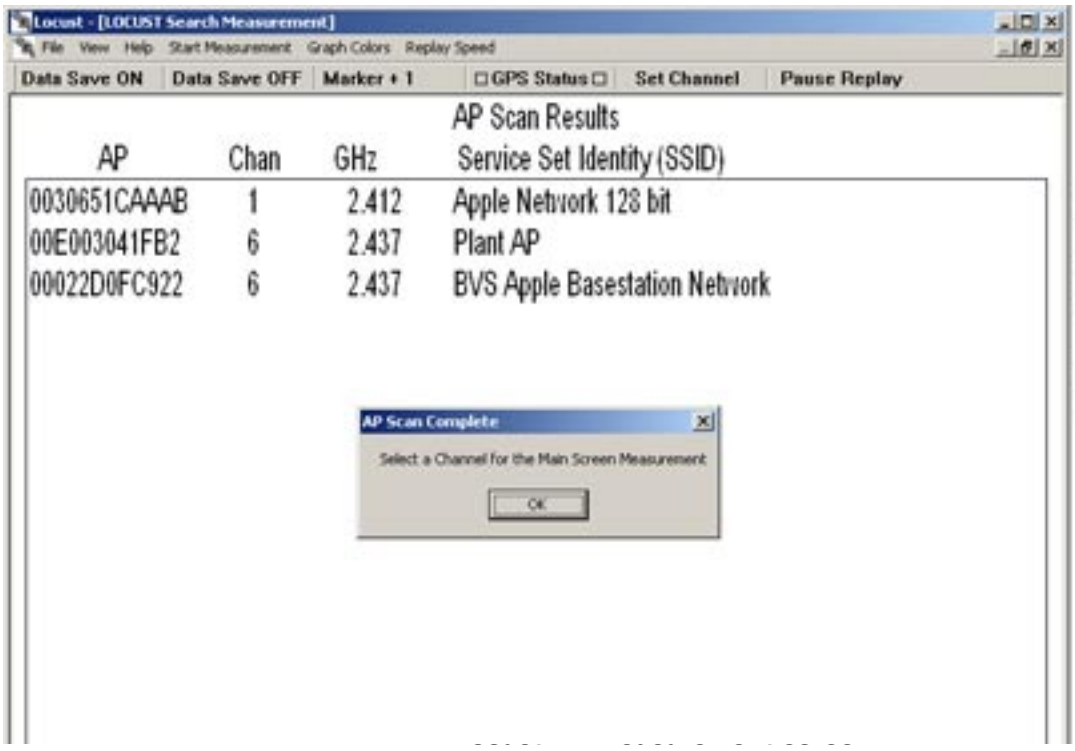
The Top section displays a list of up to 64 AP's encountered during the measurement. This section of the main screen is used to select an AP for the Multipath and PER measurements. To select an AP, move the mouse pointer on to the AP to measure and click the left mouse button. To use the AP selected in this manner, now click the main menu Start Measurement button and click the measurement to begin (Multipath

and PER require that an AP be selected).

The Middle section displays the dBm values of the first 8 AP's encountered. In this example, 3 AP's have been detected. The 8 AP's are colored as follows:

AP	Color
1	Green
2	Red
3	Blue
4	Cyan
5	Magenta
6	Yellow
7	Orange
8	Black

The Bottom section of the display indicates the channel and frequency the Locust is tuned to while decoding the displayed AP's. In addition, the AP address is displayed in the same color as its dbm graph in the middle section of the display.



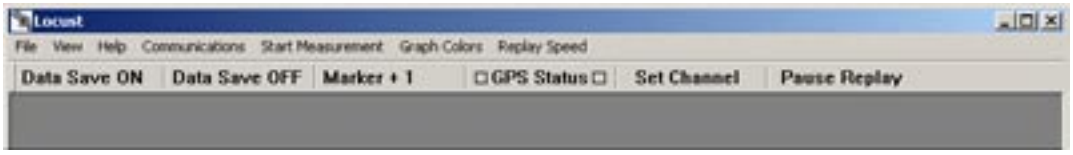
This is an example of the PC screen displayed by the Locust Scan for AP measurement. Use this measurement to find local active channels with AP's. The Locust scans once through all of the channels in order to find activity. When the Scan is complete, the Scan complete dialog is displayed. Click the dialog OK button. To go to the Main Screen measurement on a particular channel, double click the AP displayed for the channel required.

Up to 64 AP's can be captured by this screen When more than 16 AP's are detected, scroll bars are dis-

played to aide in viewing the additional AP's.

All screens including the main screen are sizeable by using the mouse and the lower right hand corner of the screen to size.

Menu and Tool Bar



Menu Selections:

File – use to select a replay data file or to cancel the current replay.

View – use to control if the tool bar is visible and to get the Unit Data from the Locust connected to the PC serial Port.

Help – use to display software revision or this help file.

Communications – select the PC serial port that is connected to the Locust.

Start Measurement – change the current Locust measurement.

Graph Colors – use to change the color being used for Locust measurements or the color of the grid. To turn off the grid, select White for the grid color

Replay Speed – use to select the speed at which the replay data is displayed.

Tool Bar Buttons:

Data Save ON – click to start saving Locust data to a disk file. A file select menu will prompt for a disk file to put data into. If an existing file is selected, the current data will be appended to the end of the file selected. The file extension 'llf' is used for Locust data files. This button is ignored if data save is already on or if a file is being replayed.

Data Save OFF – click this button to stop saving data to a disk file. Clicking this button has no effect if disk save is off or during replay.

Marker + 1 – click this button to increment the Locust marker. This button has no effect if the PC is not connected to a Locust or during file replay.

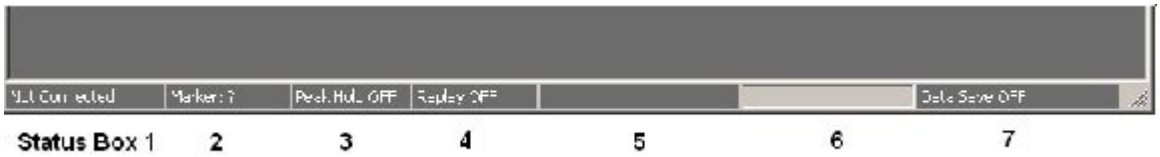
GPS Status –indicates GPS lock status via the two indicators to the right and left of the button's text. If green, the GPS is locked; if red, the GPS is not locked; if the color of the button, no GPS data is being received (GPS is off). These indicators operate in the same way during a file replay. Click this button to display the current GPS status in detail.

The GPS Status button indicates current GPS Status as follows:

Set Channel – click this button to change the Locust frequency. A dialog will be displayed with a radio button for each Locust frequency. Click the required frequency button and then OK. This button has no effect if the PC is not connected to a Locust or during file replay.

Pause Replay - click this button during a disk file replay to pause the PC display.

Bottom of Menu – The Status Bar



Box 1 – This box indicates which PC serial port is connected to the Locust. Note that during File Replay, this indicates "Not Connected". To resume serial connection after a replay, use the Menu "Communications" selection.

Box 2 – Indicates Current Locust Marker value

Box 3 – Indicates Peak Hold Status (On or Off)

Box 4 – Indicates Replay Status (Replaying, Replay Paused or Replay Off)

Box 5 – Shows the name of the disk file being replayed or having data saved to. Note that the file path is not displayed.

Box 6 – Indicates Replay Progress

Box 7 – Indicates Data Save Status and current data file size if save to file is On

PEAK HOLD ON and OFF

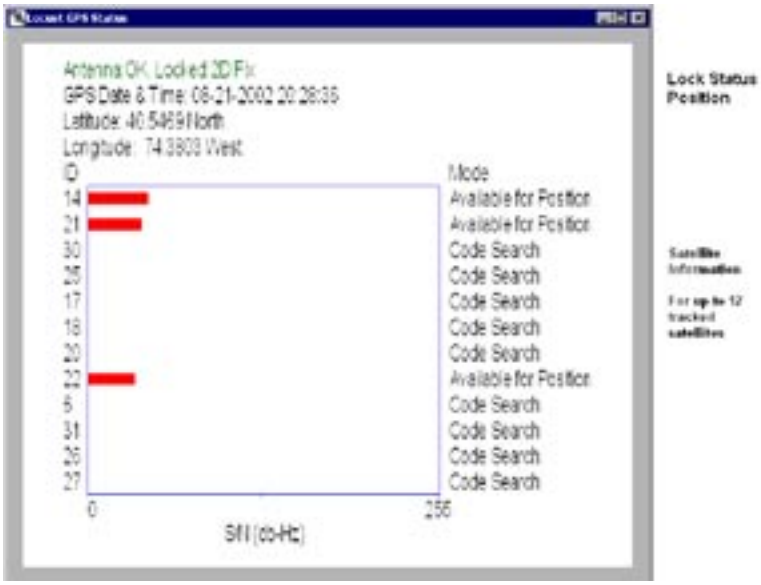
To turn on and off the peak hold feature, place the mouse pointer on the Locust measurement screen being displayed on the PC and double click the left mouse button. Peak hold status is indicated in Box 3 of the status bar. Spectrum and Multipath measurements support peak hold.

REPLAY PAUSE ON and OFF

To pause and resume the current replay, click the tool bar "Pause Replay" button.. Replay is resumed when the same button is clicked again.

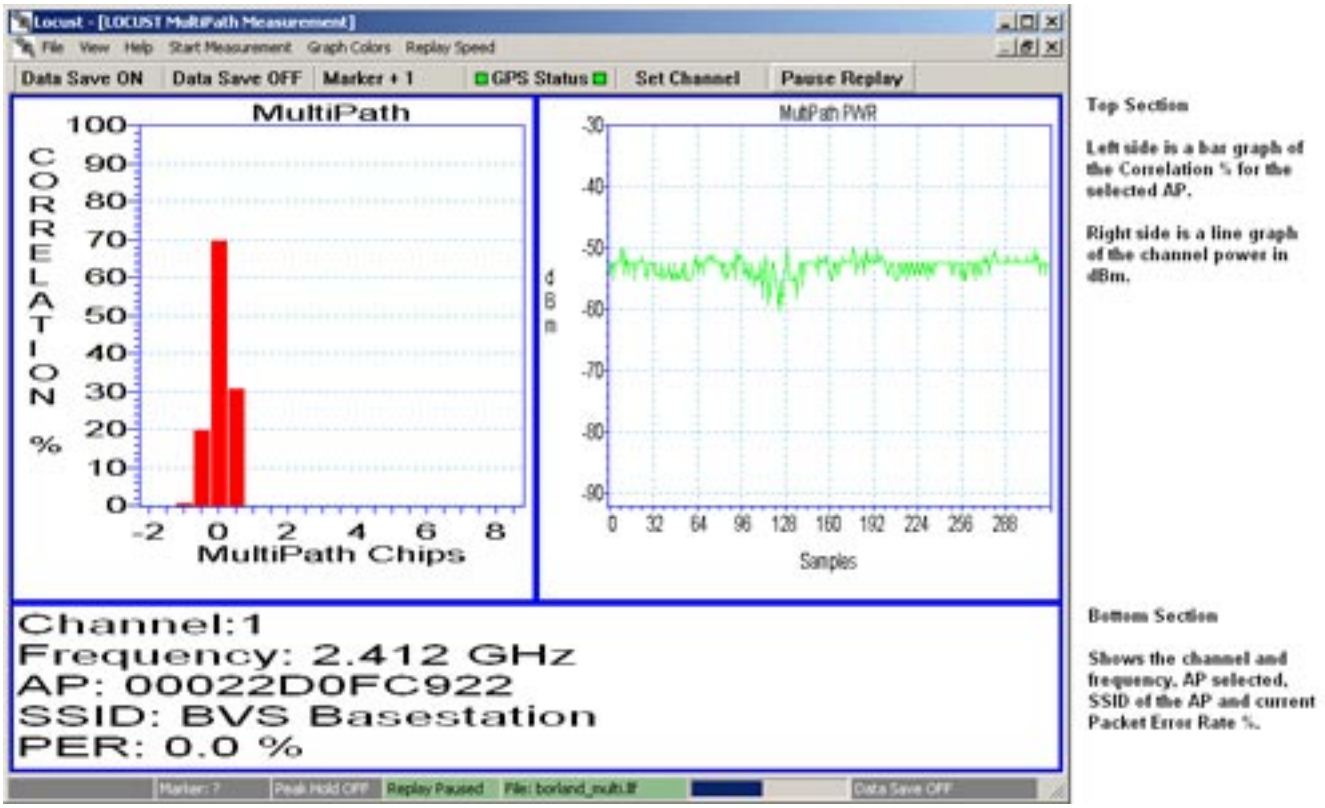
Replay status is displayed in Box 4 of the status bar.

GPS Detail Screen – displayed whenever the tool bar GPS Status button is clicked.



GPS Status Screen

This display is available during replay or while displaying real time data. It can be sized using the mouse and the lower right hand corner of the GPS display. The color of the top line of this display indicates GPS lock status. The same color is displayed by the indicators on the GPS Status tool bar button.



Locust MultiPath Screen Example

This is an example of the Locust Multipath Screen measurement. Note that the status bar Box 3 indicates

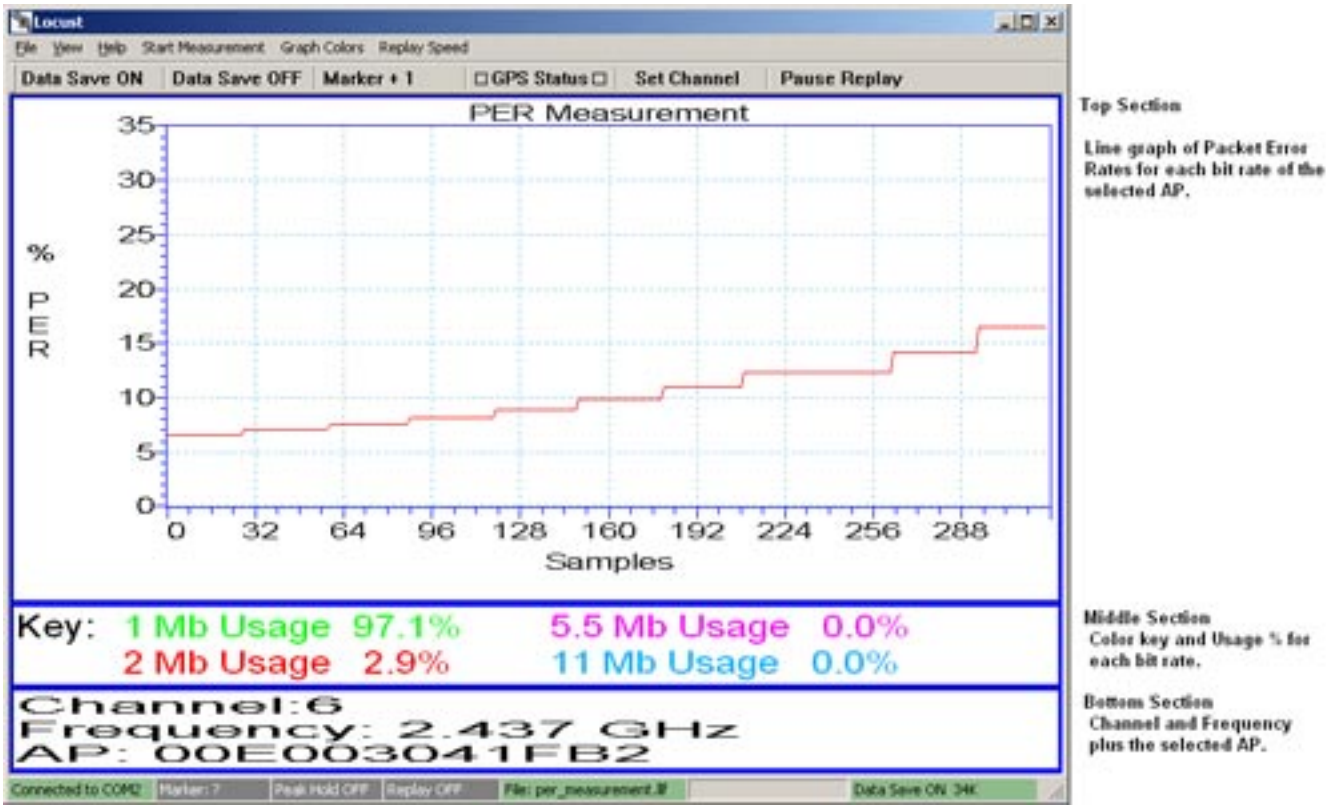
that the dBm peak hold is ON. The highest dBm reading encountered is indicated on the dBm graph by the word “Peak” with a line to the Y axis that shows the “Peak” dBm reading.

Multipath Screen Display:

The Locust Multipath screen measurement is displayed by the PC in 2 sections:

The Top Section displays a bar graph of the correlation percent of each chip. To the right of the bar graph is a line graph of the AP’s dBm value in real time. This graph has a peak hold feature that is controlled with the left mouse button. Turn this feature on and off by moving the mouse pointer over any section of this display and double click the left mouse button.

The bottom section of the display indicates Channel, Frequency, AP (in hex), SSID text and PER percent for the displayed AP.



Locust Packet Error Rate Screen Example

This is and example of the Locust Packet Error Rate Screen measurement as displayed by the PC.

Packet Error Rate Display:

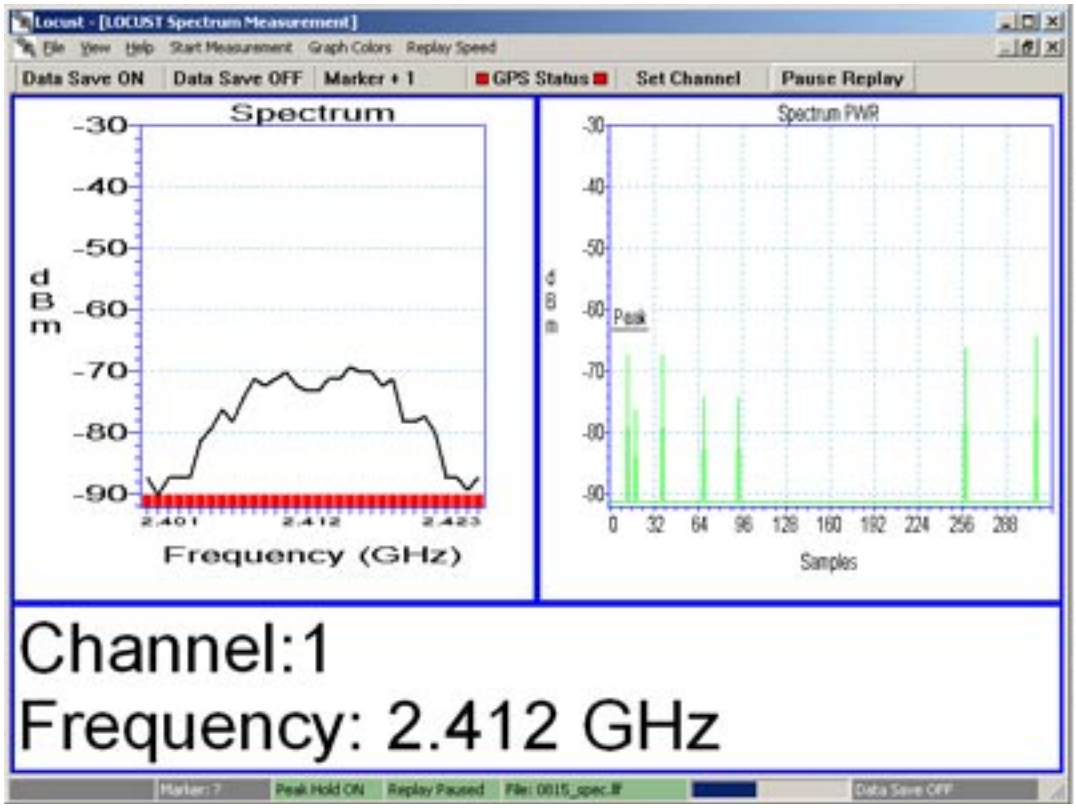
The Locust Packet Error Rate screen measurement is displayed by the PC in 3 sections:

The Top section is a real time line graph of the 4 possible data rate packet errors. The error rates are displayed on a common Y axis from 0 to 35 % error.

The Middle section displays the line graph color key and Usage % such that:

Bit Rate (Mb)	Line Color
1:	Green
2:	Red
5.5:	Magenta
11:	Cyan

The Bottom section of the display indicates the channel, frequency the Locust is tuned to and the AP being decoded (in hex).



Locust Spectrum Screen Example

This screen is an example of the Locust Spectrum Screen measurement that was captured using the Data File save and is now being replayed (note the progress bar in the status bar Box 1 and Box 4).

Spectrum Screen Display:

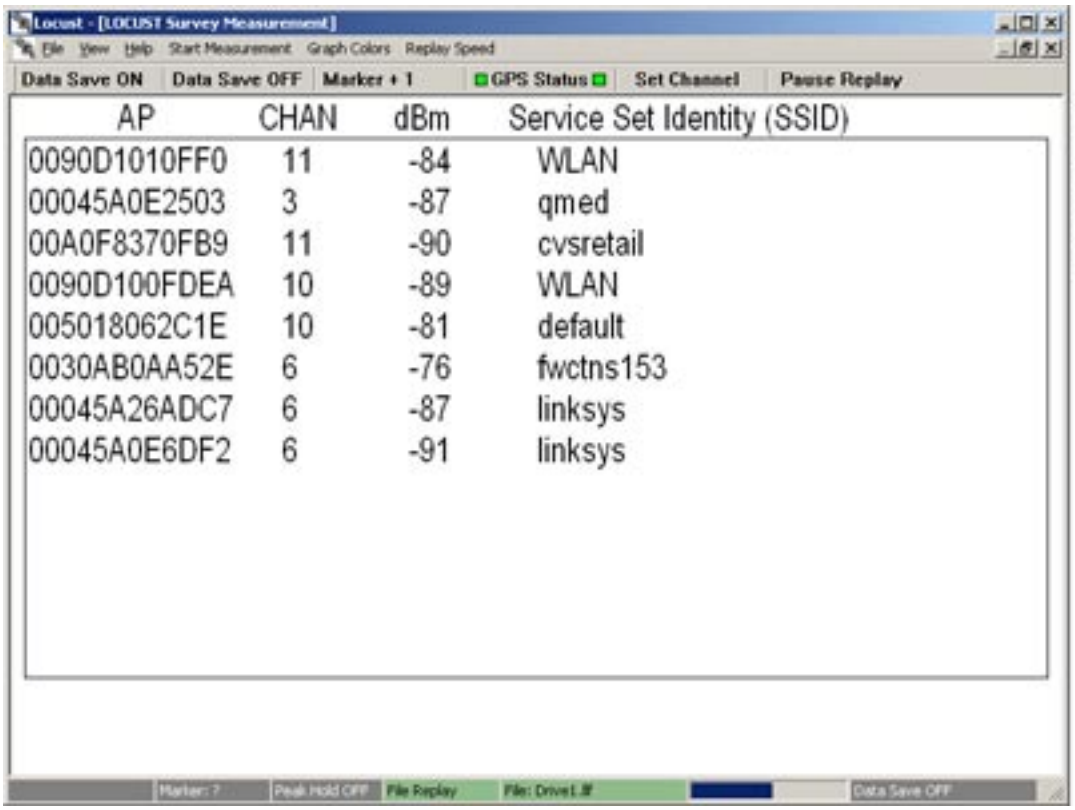
The Locust spectrum screen measurement is displayed in 2 sections on the PC screen:

The top section displays the spectrum as a bar graph with the frequency range displayed under the bar graph X axis. To the right of the bar graph is a line graph of the channel dBm in real time. Note that in this example the peak hold is on (as indicated by Box 3 of the status bar). The bar graph peak is displayed as a line over the bar's that is held at the highest dBm value encountered for that bar during the measurement. The dBm peak is indicated by the word "Peak" with a line under it. This line points to the Y axis value of the highest dBm value encountered during the measurement. As with the Multipath measurement, the peak hold feature is turned on and off by moving the mouse pointer over the measurement display and double clicking the left mouse button.

The bottom section of the spectrum display indicates the channel # and center frequency that the Locust

is tuned to. Use the Tool Bar "Set Channel" button to change the spectrum measurement to a different channel. Note that the spectrum measurement always generates output since it is not decoding data. If the "Set Channel" button is used to change the channel in a measurement other than "Spectrum", data may stop coming from the Locust if the channel selected is inactive.

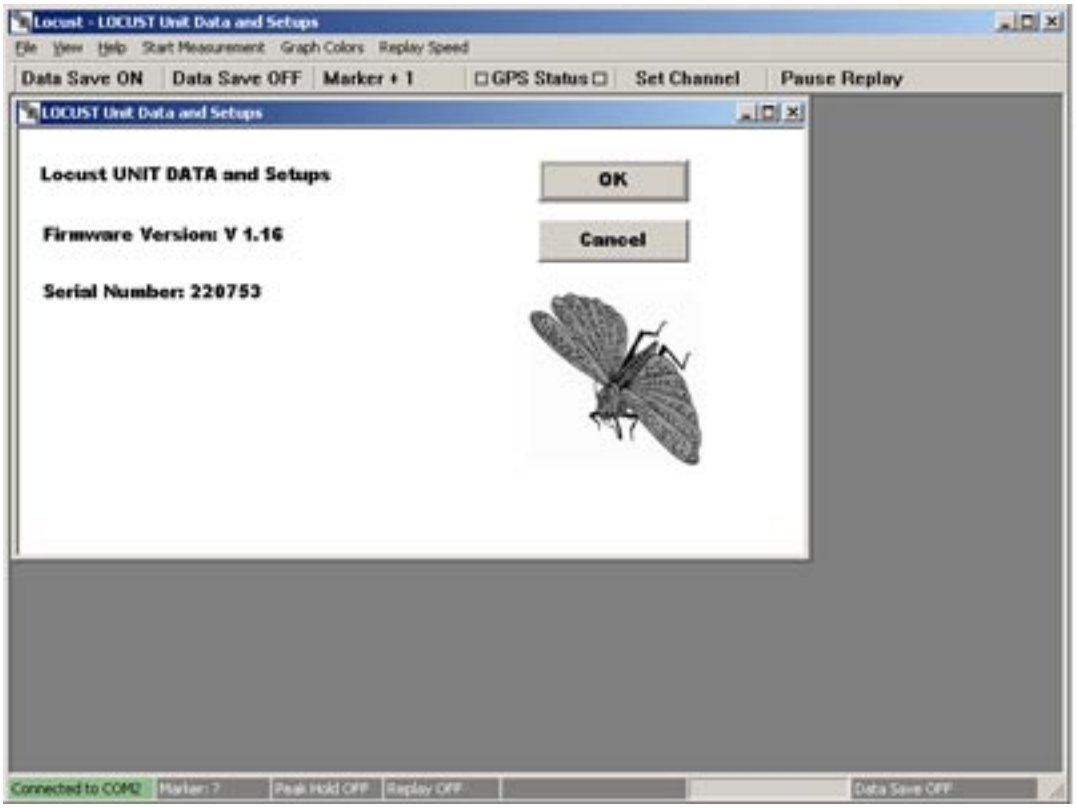
Also note that only Spectrum and Multipath measurements support the peak hold feature.



Locust Survey Mode Measurement.

This is an example of the PC screen displayed during the Locust "Survey Mode" measurement. In this measurement, the Locust continually changes channels and tests for activity, similar to the AP Search measurement. In this measurement, however, unlike the AP Search measurement, the Locust continues to sequence through the channels until stopped. All AP's encountered and their channel are displayed on the PC screen.

Up to 128 AP's can be captured by this screen When more than 16 AP's are detected, scroll bars are displayed to aide in viewing the additional AP's.



Locust Unit Data Screen

This is an example of the screen displayed by the PC when the Menu View Unit Data button is clicked. The PC must be connected to a Locust for this button to function. The data displayed is also saved into a data file if the Data Save is on when the tool bar button is clicked. This data must be available to the PC when using Dolphin.

V2.0 Locust PC Software Dolphin Support

Dolphin software requires that the Locust serial number be recorded before it will operate. Use the following steps to ensure that the Dolphin software has the Locust serial number.

1 Run the supplied copy of BVS Dolphin before starting Locust v2.0.

2 Start Locust v2.0

3 If connected to the Locust via PC serial port, get the Locust Setups by clicking the "Setups" tool bar button. If using Dolphin later with replay, make sure that the tool bar "Setups" button is clicked just after turning on the data file save so that the Locust serial number is recorded in the data save file.

4 Make sure the Locust GPS is turned on.

Measurements supported by Locust for Dolphin:

Locust V2.0 averages dBm data during Main, Spectrum, Multipath and Survey measurements. Each time a GPS position is received by the software, the current average and gps position are passed to Dolphin. At the same time, the average is reset in anticipation of the next gps reading. GPS data comes out of the Locust once per second.

BVS CHAMELEON DATA CONVERSION UTILTTY

Introduction

The Chameleon application software is the universal data conversion and filtering tool for BVS Receivers.

The Chameleon was designed to greatly simplify the transfer of receiver data to many popular post-processing applications such as MapInfo and MS Excel.

The following sections of this document outline the various features of the Chameleon WLAN software.

Installation

Installation of Chameleon is straightforward. Use the enclosed CD and follow the instructions.

Starting the Application

Start Chameleon by clicking on the icon created by the installation utility. The main screen will show up. All steps for the conversion of data are taken from this screen.

Chameleon WLAN Main Screen

Input File

The first step is the choosing of files for input and output. Choose the data file that is to be converted. The Chameleon will automatically determine which product created the file. Chameleon will display the product on the top of the screen. Then choose the name of the file to store the conversion results. By default, the filename for input will be chosen with a ".out" extension.

Output Format

By selecting the appropriate post-processing application, the correct fields will be selected and placed in the field selection screen in the appropriate order. The user may also choose “none”. Whether or not the field titles are in the output can be selected.

Also, the delimiting character of the fields in the output file is chosen in this section.

Output Field Selection

This section enables the selection of those fields that are to be placed in the output file. The individual fields for the data types will appear in the far right box when the data type is selected in the “selected” box.

Conversion

The final step in the step-by-step process is the “conversion” section. Press the CONVERT button. The progress bar will be updated as the file is being processed. The speed of conversion will vary based on the size of the data file.

Ni-MH Battery Q&A:

Question: Why does my Ni-MH battery pack only last for a few minutes after charging?

Answer: The Grasshopper™, Locust™, Yellow Jacket™ and Yellow Jacket Plus (fomally called Scorpion), Beetle™, Cricket™, and Cicada W-LAN receivers use 4 or 5 Ni-MH long-lasting "AA Cells".
1. Ni-MH batteries do not charge to full capacity the first time they are charged.
2. Ni-MH batteries do not charge to full capacity the first time they are charged after a long period of inactivity. or after a long period of non-use.

Cause: When charging Ni-MH batteries for the first time after long-term storage, deactivation of reactants may lead to increased battery voltage and decreased capacity, (which causes premature termination of charging). Because batteries are chemical products involving internal chemical reactions, performance deteriorates with prolonged storage. This is normal in Ni-MH batteries.

Resolution: Ni-MH batteries may not charge to full capacity the first time they are charged, or after a long period of inactivity.
The first-time charge of the Ni-MH Rechargeable Battery Pack should take approximately 2 hours. If the Receiver Dock light turns green, indicating a full charge, in less than 2 hours, repeat the charge cycle as follows:

First-time Charge:
1. To begin charging, place the instrument on the Charge Dock. Refer to your instrument's User Guide for details.
2. When the charge light turns green, remove the W-LAN Receiver from the dock and place back on the dock after several seconds.
3. Repeat steps 1 and 2 three or four times or until the combined charge time is 2 hours.
Subsequent charges of the W-LAN Ni-MH Battery Pack will not require multiple charging cycles unless left uncharged for a long period of time (greater than 2 months).

Glossary of Acronyms

AC	Alternating Current
A/D	Analog to Digital converter
AGC	Automatic Gain Control
AP	Access Point
Applet	a small Application
BER	Bit Error Rate
BPSK	Binary Phase Shift Keying
BSS	Basic Service Set
BW	Band Width
CDMA	Code Division Multiple Access (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
DSSS	Direct Sequence Spread Spectrum
ESS	Extended Service Set
FIR	Finite Impulse Response
GHz	GigaHertz
IF	Intermediate Frequency
I and Q	In phase and Quadrature
IBBS	Independent Basic Service Set
kHz	kiloHertz
LCD	Liquid Crystal Display
LO	Local Oscillator
MAC	Medium Access Control
Mbits	Megabits
MHz	MegaHertz
NIC	Network Interface Card
OFDM	Orthogonal Frequency Domain Multiplexing (802.11a)
PC	Personal Computer
PCS	Personal Communications Service (1.8 to 2.1 GHz frequency band)
PER	Packet Error Rate
PN	Pseudo Noise
QPSK	Quaternary Phase Shift Keying, 4-level PSK
RF	Radio Frequency
RSSI	Receiver Signal Strength Indicator
SSID	Service Set IDentification
UCT	Universal Coordinated Time
VAC	Volts Alternating Current
VGA	Video graphic
WEP	Wired Equivalent Protocol
WLAN	Wireless Local Area Network

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.)

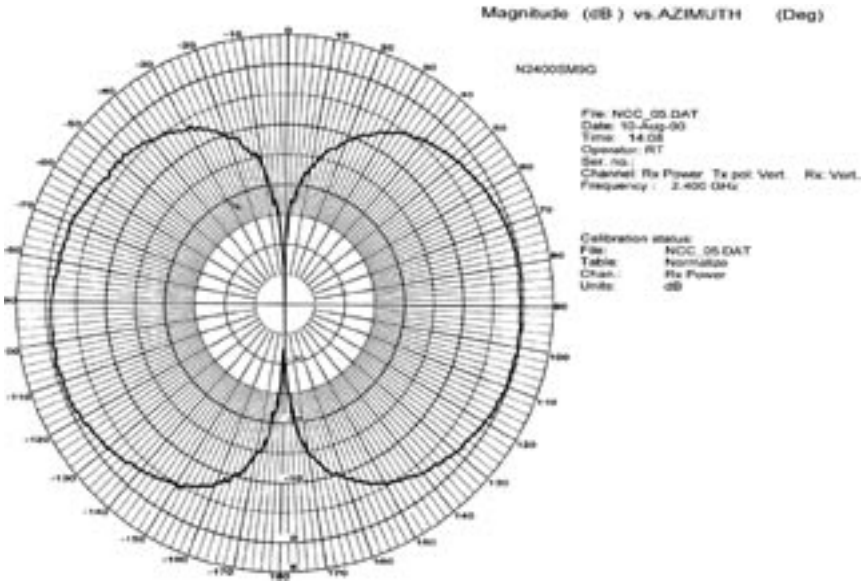
8. When inserting batteries into this product, the proper polarity or direction must be observed. Reverse insertion of batteries can cause charging, and that may result in leakage or explosion. (Applies to product employing more than one separately replaceable primary battery.)

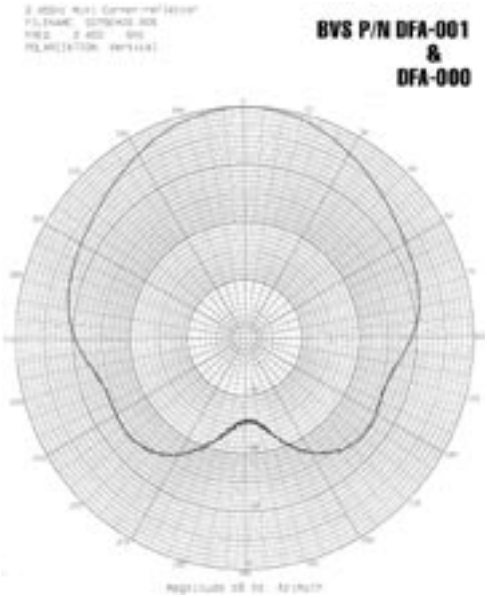
9. Remove the batteries from this product if the product will not be used for a long period of time (several months or more) since during this time the battery could leak in the product.

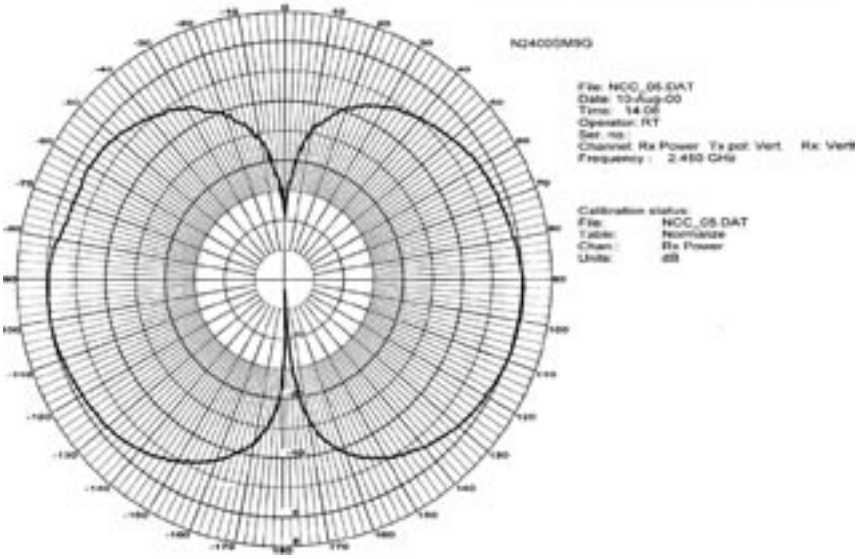
10. Discard "dead" batteries as soon as possible since "dead" batteries are more likely to leak in a product.

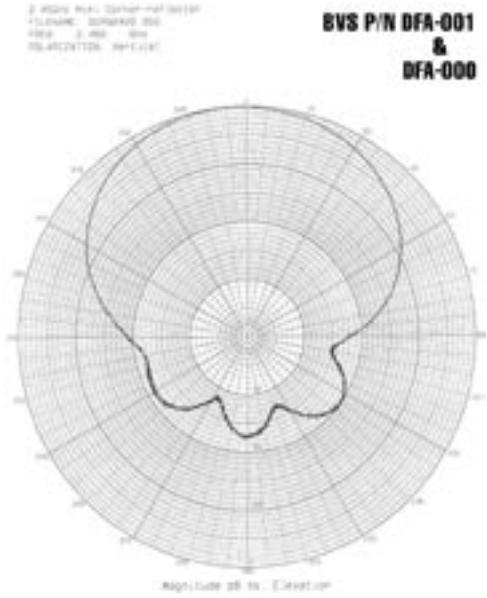
11. Do not store this product, or the batteries provided with or identified for use with this product, in high-temperature areas. Batteries that are stored in a freezer or refrigerator for the purpose of extending shelf life should be protected from condensation during storage and defrosting. Batteries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

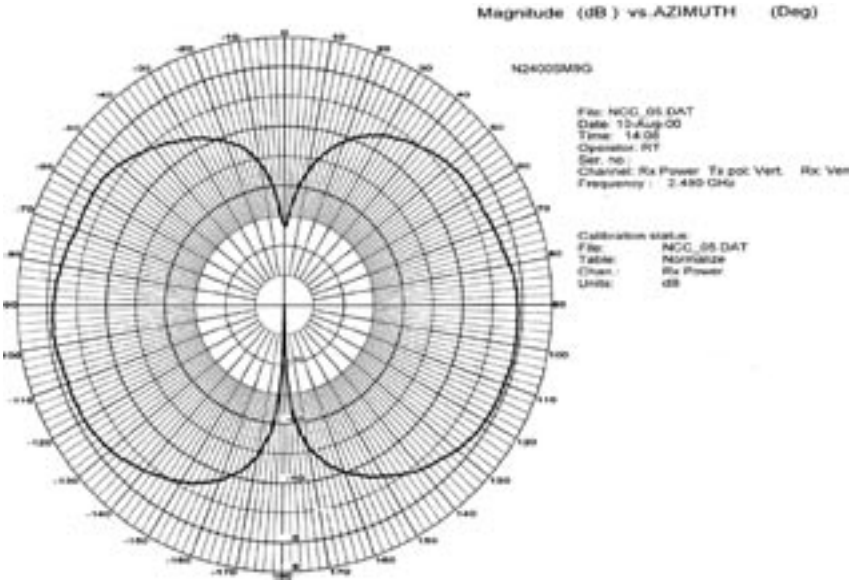
Below are Radiation Patterns for the included N2400SMA1G Antenna (left) and BVS' optional DF corner reflector (right). The Antenna Under Test was measured against a 1/2 Wave Dipole, therefore; The Gain is measured in dBd (0 dBd = 2.14 dBi).







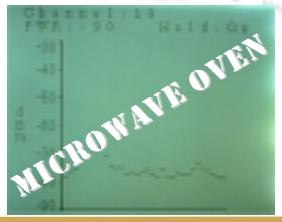




Locust™ 802.11b 2.4 GHz TESTER

WLAN DRIVE-STUDY ANALYZER

Locust™ is a wireless receiver designed specifically for sweeping and optimizing 2.4 GHz Local Area Networks. The instrument measures coverage of direct sequence CDMA networks which operate on the ***IEEE 802.11b*** standard allowing the user to determine the AP (Access Point), PER (Packet Error Rate), and RSSI signal levels aiding in locating the hub and access points of neighboring WLANs. ***Locust***™ provides measurements in realtime and also logs data for further post processing analysis. Users may detect and differentiate from narrowband multipath interferences using a drive-test vehicle, GPS antenna and a laptop PC.



FEATURES:

- Measure 2.4 GHz coverage for direct sequence (DSSS) wireless networks (IF wideband 22 MHz) within the **IEEE 802.11b** standard
- Internal 12-channel, 12 satellite GPS for support of most popular mapping/post processing applications
- Measures Packet Error Rate
- Measures and displays channel for multipath
- Measures and displays RF power: narrow band received signal strength (RSSI), total channel power
- Removable ATA Flash card (16 MB compact) stores collected data for post processing
- Removable battery pack (5 AA Ni-MH cells), also can be powered from 12VDC car cigarette lighter
- Built-in numeric keypad, backlit display with simple menu interface

The Locust is just one of many exceptional design solutions from Berkeley Varitronics. Call us today for more information:
(732) 548-3737 / Fax: (732) 548-3404
Internet: www.bvsystems.com
E-mail: info@bvsystems.com

wireless products
BERKELEY VARITRONICS SYSTEMS

Locust™

802.11b 2.4 GHz TESTER

WLAN DRIVE-STUDY ANALYZER

BANDS SUPPORTED	ISM: 2.400-2.495 GHz
RF SENSITIVITY (Wide Band)	-20 to -90 dBm
RSSI MEASUREMENT (Narrow Band)	-30 to -90 dBm @ 687.5 kHz resolution bandwidth
TUNING INCREMENTS	Tunes 11 USA channels & 3 international channels

PACKET PREAMBLE DEMODULATOR and ANALYZER:
Multipath Measurement and Graphical Display

CORRELATED POWER MEASUREMENTS:	**RATIO**
Correlated Power (dBm)	-30 dBm : -100 dBm
Correlated Power to Total Power Ec/Io (dB)	0 dB : -10 dB
Total Channel Power Measurement	-20 dBm : -90 dBm

GENERAL SPECIFICATIONS

IF Bandwidth:	Wideband 22 MHz
Stability:	± 2.5 PPM Temp range 32° to 120 F°
Antenna:	SMA Female 50 ohm
Controls:	16 button keypad
Warm Up Time:	< 3 minutes
Power:	Internal battery pack (5 AA Ni-MH batteries) or 12VDC from car adaptor
Weight:	3 lbs.
Dimensions:	2" H x 4" W x 9" L (water resistant, high impact ABS plastic case)
Internal GPS (included)	Motorola 12-channel differential capable receiver

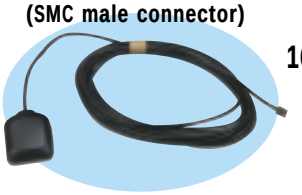
Locust includes all of the following accessories:

Locust includes a straight 3dBi 2.4 GHz antenna (SMA Female 50 ohm), GPS magmount antenna, two removable battery packs (5 AA Ni-MH cells and 12V car power adaptor) charger, RS-232 cable all in a rugged carrying case.

carrying case

ATA compact flash reader

GPS active antenna
(SMC male connector)



16 MB compact flash

battery pack, charger & car cigarette power adaptor

Excel 97

MapInfo

Locust Data Logger™ output data supports customizable outputs as well as Microsoft Excel® spreadsheets, MapInfo® post processing applications for Windows 98®.

Berkeley Varitronics Systems, Liberty Corporate Park, 255 Liberty Street, Metuchen, NJ 08840
Phone 732-548-3737 • Fax 732-548-3404 • www.bvsystems.com • E-mail: info@bvsystems.com