



YELLOWJACKET™-A

manual version 1.1



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INTRODUCTION

The Yellowjacket™ is an 802.11a Analysis System. It consists of an HP iPAQ PocketPC® coupled with custom hardware and software by BVS. This system contains a variety of features to analyze 802.11a networks including spectrum analysis over all 8 channels (5 GHz), a list of AP's and/or stations over all 8 channels and packet-error rate information for each individual MAC address. The Yellowjacket also contains a "Geiger-counter" feature to locate a single AP/ STATION via audio/visual aids and a security feature to warn the user of possible unauthorized AP/ STATIONS in the area based on a list of authorized MAC addresses. The data from a Yellowjacket may be logged into resident memory for transfer to a desktop PC at a later time and then be converted from binary to ASCII using "Chameleon WLAN".

Yellowjacket receiver (top view) has an **SMA male connector** for the supplied antenna. This manual contains operational procedures to get the user up-and-going right out of the box. For any details regarding the iPAQ, users should read all materials from Compaq/HP and contact them.

STARTING UP YELLOWJACKET

Power up your Yellowjacket by pushing **power button** in upper right corner of unit. This power will automatically power up the Yellowjacket receiver also. When you power down the iPAQ, (push the power button on the upper right quickly-holding this button will also toggle the backlight on and off) your Yellowjacket receiver will also shut down. Connect the included antenna to the SMA connector and remove the stylus by pushing down on it. Use your stylus to tap onto the **Windows® icon** in the upper left corner. Choose **Yellowjacket** in the pulldown menu. Data may be transferred to a PC via the IrDA window or USB or serial connection. Install Yellowjacket software by connecting your iPAQ to your PC and inserting included BVS software CD-ROM into PC to begin installation. You may also use the provided Compact Flash Installer card. Be sure to turn off any internal WLAN or Bluetooth in your iPAQ before using your Yellowjacket.

YELLOWJACKET ACCESSORIES

Your Yellowjacket includes the following accessories: antenna, 2 sets of AA (Ni-MH) removable batteries (8 total), Simply insert depleted batteries into charger and plug charger into AC outlet. See top of charger for LED status indicator lights (see



Your iPAQ can be reset using 2 different methods. If Yellowjacket software loses communications with Yellowjacket hardware, perform a **soft reset** with your stylus by pressing the reset button on the back left corner just below the battery door. Perform a **hard reset** by holding in the **two outer buttons** for at least 10 seconds while performing a soft reset. **Warning!** Hard reset erases all RAM data from iPAQ so be sure to backup all data and re-install your Yellowjacket application software after a hard reset.

WARNING FOR USERS WITH BUILT-IN WIRELESS **(you must disable your iPAQ's Bluetooth and WLAN)**

1. Press the START button on the upper left hand side of the touch screen.
2. Click on the "iPAQ Wireless" folder.
3. Click on the "Wireless Control" program.
4. Click on "All wireless features OFF". The icons for Bluetooth and WLAN will have red backgrounds when disabled.

end of manual for charger specs). Approximate charging time for 4 Ni-MH batteries is just over one hour. Run time is just over two hours. Yellowjacket uses common AA battery cells found in any convenience store. Ni-Cad, Alkalines, Ni-MH and Li-Ion cells may all be used. Yellowjacket does require 4 AA cells with at least 1500 mAh per cell. BVS supplies 2 battery sets (8 Ni-MH battery cells total) to get users working right out of the box. Ni-MH cells are recommended for best performance from your Yellowjacket. Batteries that are warm or hot to the touch (from constant usage or warm ambient temperatures) will take longer to charge than batteries of a normal temperature. Contact BVS for new Ni-MH battery packs. Expect over 500 cycles from each Ni-MH battery or battery pack.



YELLOWJACKET SD Card Installer

Insert SD card into the SD slot on the top of iPAQ.
Tap on the "Start" icon on top left of screen
Tap on "Programs" in menu
Tap on the "File Explorer" folder
Choose "My Device"
Tap on "SD Card" or "Storage Card"
Choose Yellowjacket receiver and iPAQ model for
installation and tap on "install"

DATE: _____

The Yellowjacket CF or SD Backup Installer card has been included as a courtesy. The card may be used to log data files onto. It can also be used on iPAQs that have never been initially set up at the BVS factory, have had files erased or damaged in the ROM or after a hard reset has been performed on an iPAQ. Yellowjacket software that has been erased/lost from RAM may be restored at anytime by accessing the "install" file from the SD Card or Storage Card directory. Always make sure batteries are fully charged when doing any software installs. Yellowjacket software that has been erased from RAM may be restored at anytime by accessing the "reinstyj" file from the \iPAQ File Store\My Device directory.



Recommended iPAQ 4700/4705 model shown with Yellowjacket receiver



Starting Up Your Yellowjacket

Unpack and assemble your Yellowjacket unit as shown. Slide the iPAQ case onto the Yellowjacket and slide your iPAQ computer into the iPAQ case. Remove the Compact Flash cover and install the Compact Flash serial cable. The Compact Flash serial cable is the communication link between the Yellowjacket receiver and the iPAQ. Connect both the Yellowjacket and iPAQ to external power as shown with the "Y" power cable.

Power up the iPAQ by pushing the **power button** in the upper right corner of the iPAQ. Connect the appropriate frequency antenna to the SMA male antenna input. iPAQs shipped by BVS are optimized for the Yellowjacket. If you are using your own iPAQ, see the optimization section to set up your iPAQ.

iPAQs supplied by BVS have the Yellowjacket software pre-installed. If you need to install the Yellowjacket software, see the software installation/re-installation section.

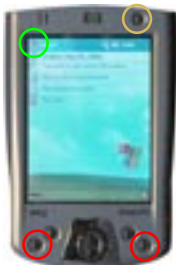
Tap the **windows Start icon** in the upper left corner and then choose Yellowjacket in the pulldown menu. If the Yellowjacket does not appear in the pulldown menu, tap on the "Programs" folder. Tap on the Yellowjacket icon.

Running the Yellowjacket software will power the Yellowjacket receiver.

If the Yellowjacket software loses communication with the Yellowjacket, perform a soft reset by pressing the iPAQ's reset button. If communications problems persist, perform a hard reset by holding down the **two outer buttons** on the front of the iPAQ while holding in the soft reset button. Remember, hard resets erase all data collected and software installed so backup all data and see software installation for details.

Optional iPAQ 2210/2215 model shown

Reset button located on back just below battery



Optional iPAQ 2415/2410 model shown



Yellowjacket Startup Screen



Getting Started

The YellowJacket 802.11a software can be started by:

1. Pressing the Start button on the Ipaq.
2. Pressing the “Yellow Jacket A” program option from the main drop-down list.
3. Tapping anywhere on the screen when the splash screen appears as shown below.



Yellowjacket Main Screen



The main menu of the YellowJacket software contains option buttons in the main viewing area and a series of toolbar options. The main viewing area is shown below. There are three choices in the main viewing area. You may choose spectrum analysis, which enters a **spectrum analyzer-type screen** which will show all RF being received within the range of the receiver. This mode also allows for zooming in to a particular channel.

The next option is the **access point screen**. This will allow the user to view individual access points being seen by the receiver and then to proceed to Geiger mode for locating the particular access point.

The final option is the **security screen**. This screen allows the entry and maintenance of authorized and unauthorized access point lists. This screen is useful in determining if there are any rogue access points in the area that can be potentially invasive to an existing network.

The **GPS Data screen** is only available on YellowjacketPLUS.

The **toolbar** gives the user more options on every screen. The first icon (from left to right) has five interconnected colored circles. Using this option will always return the user to the main menu.

The second and third icons are arrows pointing upward and downward. These options have different uses depending on the currently active screen. For instance, on the access point



Note: Users should normally see genuine firmware and serial numbers on this screen when Yellowjacket is functioning properly. If your firmware and serial number appear as 0.00 and XXXXXX, then the iPAQ software is not communicating properly with the Yellowjacket receiver. Try troubleshooting procedures found in this user's manual.

screen, the arrows are used to flip the current page of access points.

The fourth icon represents a camera. This option takes snapshots of the current screen for later viewing.

The “record” button is for logging a data file. The “stop” button is for terminating the logging of data. The “play” button will be implemented in a later version of the software.

The icon with the letters “ABCD” enters the system options screen. The question mark icon reveals the application about box.

Spectrum Analysis

The spectrum analysis feature of the YellowJacket allows a user to view any RF signals that is received by the receiver. It uses frequency for the X-axis and RSSI (received signal strength indicator) in dBm on the Y-axis.

Both the full spectrum and the single channel screens have the same options for the most part. There are three available traces. The red, blue, and yellow traces. Only one trace can be active at any one time.

Each of the three traces can be made visible by pressing their respective “visible” buttons. The active trace can be peak held by pressing it’s “hold trace” button.

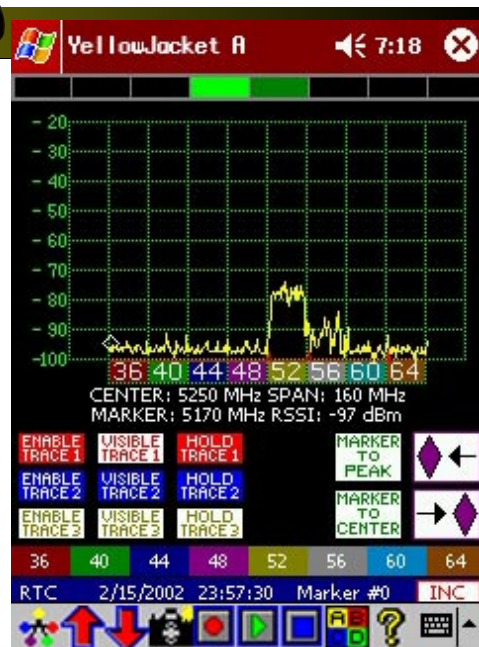
Use the “marker to peak” button to move the diamond marker to the current highest dBm valued point. Use the “marker to center” button to move the diamond marker to the center of the currently displayed section.

There are also buttons for moving the diamond peak mark to the left or right in the currently displayed screen.

Each spectrum screen displays information regarding the center frequency of the screen as well as the span in MHz. The current marker position and value is also displayed.

The full spectrum screen is the first one entered when going into the spectrum analysis option. This screen shows RF energy in dBm over all 8 channels seen by the receiver. Each vertical section represents a single channel. Simply look at the channel number at the bottom of the vertical section to reference the data to the channel.

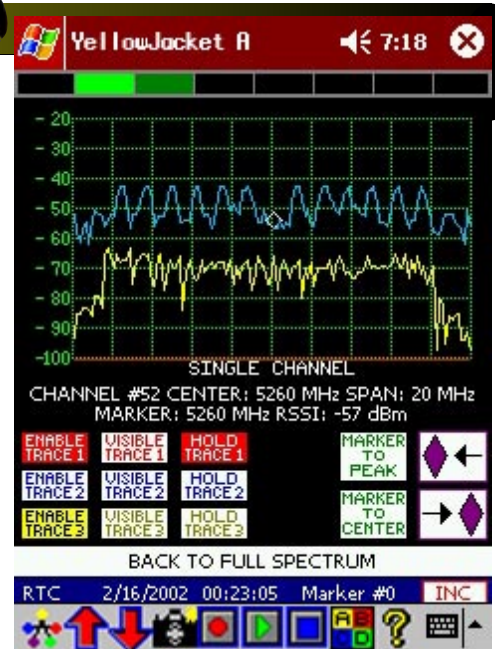
To “zoom in” on a single channel, simply tap one of the col-



ored boxes located just above the RTC bar. For example, clicking on the green channel 40 box will zoom in to channel 40.

Single Channel Spectrum

The single channel screen displays RSSI valued data within the channel specified (a 20 MHz span). To return to the full spectrum mode, press the “BACK TO FULL SPECTRUM” button.



Access Point List

The access point list screen provides the user with a list of access points that are seen by the receiver. The user can then “zoom in” on a particular access point for further analysis as well as for pinpointing the AP’s location.

MAC List

The MAC list is shown on the main access point list screen. This list shows each of the access points seen and other information on each of the access points. This information includes such fields as the channel number associated with each access point, the MAC address and SSID of the access point, as well as the RSSI value in dBm of the access points.

The color of the information text for each access point will change as the RSSI value increases and decreases. The scale of colors are shown on the top of the list. White is the strongest value while red is the weakest. It is loosely based on the colors of stars, white being the hottest and red being the coolest.

Also, there are two pages of the access point list. To flip between these two pages, use the up and down arrows provided on the bottom of the screen in the toolbar.



System Information

On the bottom of the access point list is a line of data that represents statistics relating to the overall frame error rate.

This line shows the number of good frames, the number of bad frames, and the number of aborted frames. The frame error rate is calculated and displayed as well.

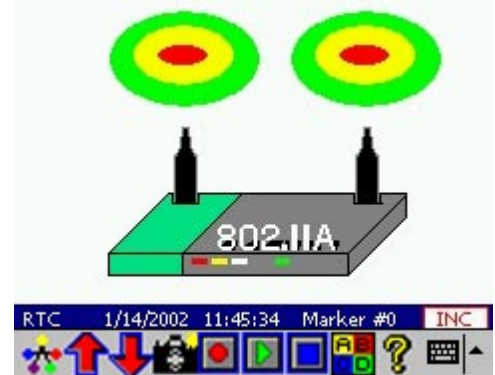
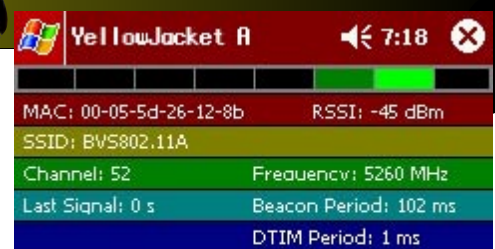
MAC Locator (Geiger Mode)

When a single MAC address is selected, the 'Geiger screen' appears. This screen has individual MAC address information as well as a visual and audio representation of proximity to the access point.

As the signal from the access point becomes stronger, the audio effect of a submarine ping becomes more frequent. The visual effect of colored circles above each of the twin antennas becomes larger as the signal increases. This mode is even more useful when coupled with a directional antenna that would allow the user to "home" in on the transmitted signal more efficiently.

The information provided on the Geiger screen includes the MAC address and the SSID, as well as the channel on which the access point is transmitting. It also shows when the last packet was received. The frequency in MHz is shown, the beacon interval period is shown, and the DTIM period.

Finally, the RSSI level is also displayed as a numeric value in dBm.



Real-Time Clock and Markers

It is noted that the blue bar on the AP list screen and other screens shows the lpaq date and time as provided by the operating system. This date and time is used for marking logged records with a reference point in time.

There is also a marker number. When the INC button is pressed on this bar, the marker number will increment. This is also used in log files for a reference point to interesting data collection anomalies.



RTC 1/14/2002 11:45:34 Marker #0 INC



The security screen allows for entering and maintaining of authorized and unauthorized access point lists. This is a feature that is used for determining if there are rogue/hostile access points within striking distance of the network.

The “security feature” is enabled by checking the “check for unauthorized AP’s” found on the screen.

Authorized List

The “authorized lists” is a list that contains the MAC addresses of access points that are authorized to broadcast in the area to be concerned. This list can be created one of three ways. The first way is by entering MAC addresses in the topmost edit field on the security screen. Then the “ADD” button is pressed to add the address to the list. The next method is to retrieve a previously saved list or a list that has been created on a PC or laptop.

The final method is by pressing the “GENERATE AUTHORIZED LIST” button. This may be pressed after leaving the YellowJacket in the access point screen for a period where all access points have been seen. All of these MAC addresses will be moved into the authorized list.

This list can be saved to RAM by pressing the “SAVE” button. This Authorized listing may be cleared by pressing the “CLR” icon on the iPaq. This is found next to the list box.

Unauthorized List

The unauthorized list is populated when the security feature is turned on via the option screen. Any MAC addresses seen and demodulated by the receiver that are not in the current authorized list will be flagged and inserted into the unauthorized MAC address list.

Items in this list can be saved or retrieved to/from RAM by pressing the “SAVE” or “RETRIEVE” buttons.

If the MAC addresses found in the unauthorized list is to be authorized, simply select the entry in the list box and press the “AUTH” button.

This list may be cleared by pressing the “CLR” button found next to the list box.



Unauthorized Warning

When Yellowjacket detects any AP that is not included in the Authorized list, an **ALERT!** screen will appear and audible warning beep will be heard. Press OK to close the **ALERT!** screen. Remember that Yellowjacket will continue to sound off the alarm each time any unauthorized AP is detected until it is placed in the Authorized list by the user. Check your Options Screen to turn this security alert ON or OFF.

Data Recording

When the “record” button icon is pressed from the toolbar at the bottom of the screen, the user will be prompted for a filename. This filename will be used to store collected data for later conversion by Chameleon WLAN.

The data is stored in a compact proprietary binary format. The YellowJacket will store data as it received from the hardware, depending on the currently active screen. If the spectrum screen is currently active, spectrum data will be stored. If the access point screen is currently active, access point information will be stored.

To save the collected data, press the “stop” button icon. To view the size of the log file while still logging, simply return to the main menu screen.

WARNING! : Make sure that the “stop” button is pressed to avoid the loss of data saved.

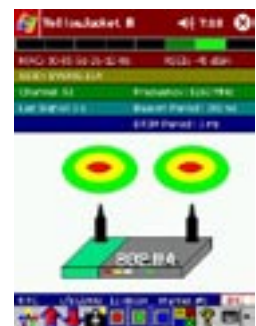
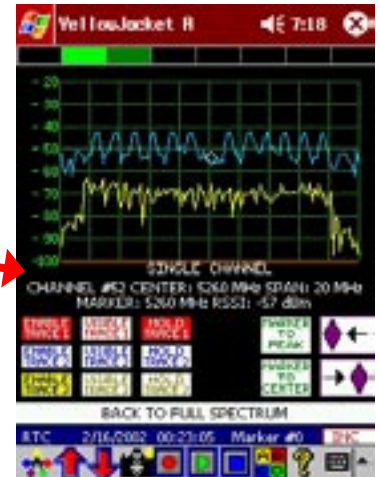
Snapshots

When the camera icon is pressed from the toolbar at the bottom of the screen, a snapshot of the currently viewable display is taken. The snapshot can be saved as a JPEG format picture (just like a digital camera) for viewing at a later time or for importing into documents and reports. As an example, the images of the YellowJacket screens shown in this section of the manual were saved using this option.

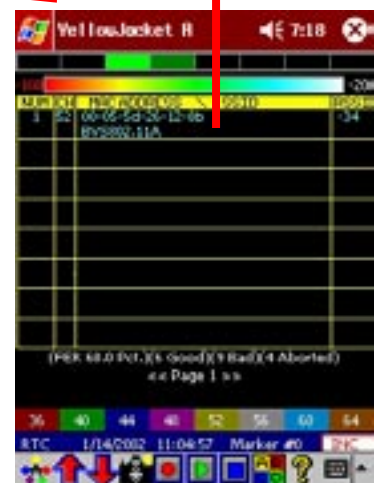
Data Conversion (using Chameleon WLAN)

Data that has been logged by the YellowJacket is stored in a proprietary binary format. It can be transferred to a PC or laptop. Once on the PC or laptop, the Chameleon WLAN utility application can be used to convert the binary data into an ASCII-readable format that can be imported into spreadsheet applications such as MS Excel or other applications that accept ASCII-delimited data.

START HERE



This selection requires GPS available only on Yellowjacket PLUS models.



Yellowjacket Troubleshooting Setup Steps

STEP 1

When you start the software and tap past the startup screen, what do you see for the firmware and serial number?

XXXXXX and 0.00 Proceed to **STEP 2**

Valid SN and FW Proceed to **STEP 10**

STEP 2

Do you have the AC adapter Y cable attached to the iPAQ and YJ base unit?

YES Proceed to **STEP 4**

NO Proceed to **STEP 3**

STEP 3

Plug in the Y power adapter to the iPAQ and base unit and power from an AC source. Does the software see a firmware number and serial number now?

YES The batteries on the iPAQ or base unit are not fully charged.

NO Proceed to **STEP 4**

STEP 4

Reset iPAQ by pushing the button on the bottom of iPAQ using stylus. Run the YJ software again. Does the unit respond with a valid serial number and firmware version?

NO Proceed to **STEP 5**

STEP 5

How does the flash card serial cable attach to the base unit?

RJ-11 connector Call BVS at 732-548-3737 for a cable upgrade

Grommet (fixed) Proceed to **STEP 6**

STEP 6

Re-seat the flash card and reset the iPAQ again. Does the unit respond with a valid serial number and firmware version when running the software again?

NO Proceed to **STEP 7**

STEP 7

Verify that the AC Y cable is firmly attached to the base unit. You should hear a click while feeling a little resistance. Was the cable firmly attached?

YES Proceed to **STEP 8**

NO Proceed to **STEP 3**

STEP 8

Verify that the iPAQ is firmly seated in its expansion pack through the large connector at the bottom of the iPAQ. When you remove the iPAQ and then re-seat it, do you hear and see a confirmation (on the iPAQ screen) that the expansion pack was recognized?

YES Proceed to **STEP 9**

NO Connection is not made with expansion pack. Reset iPAQ and proceed to **STEP 9** when a connection is made. If no connection is ever made, proceed to **STEP 10**.

STEP 9

Reset iPAQ and try the software again. Do you see a valid serial number and firmware version?

NO Proceed to **STEP 10**

STEP 10

Call BVS at 732-548-3737 for further technical support and/or an RMA.

Charging System

The Yellowjacket has 2 different battery sources that need charging power. There is an internal battery for the Pocket PC and removable batteries for the receiver module. The 4 AA Ni-MH receiver batteries may only be charged using the supplied fast charger or another comparable Ni-MH charger. The Compaq iPAQ internal battery may be charged by either plugging in the supplied power transformer or by inserting the iPAQ PDA into the supplied charging / data transfer cradle. The BVS supplied charger will **power the Yellowjacket receiver AND power and charge the iPAQ PDA**. Batteries for the Yellowjacket receiver (4 AA cells) must be charged in the provided charger. See Compaq's documentation for complete charging instructions.

Troubleshooting

Replacing Batteries

If your Yellowjacket or Hive has difficulty connecting or collecting data and you have verified the iPAQ is fully charged, then you may need to change your AA Ni-MH batteries out for fresh ones. To access batteries under iPAQ:

1. Slide iPAQ back and away from antenna end of receiver. Be sure not to pull too hard on the cable in any way. NEVER remove the Compact Flash connector from the iPAQ sled unless troubleshooting for connectivity issues.

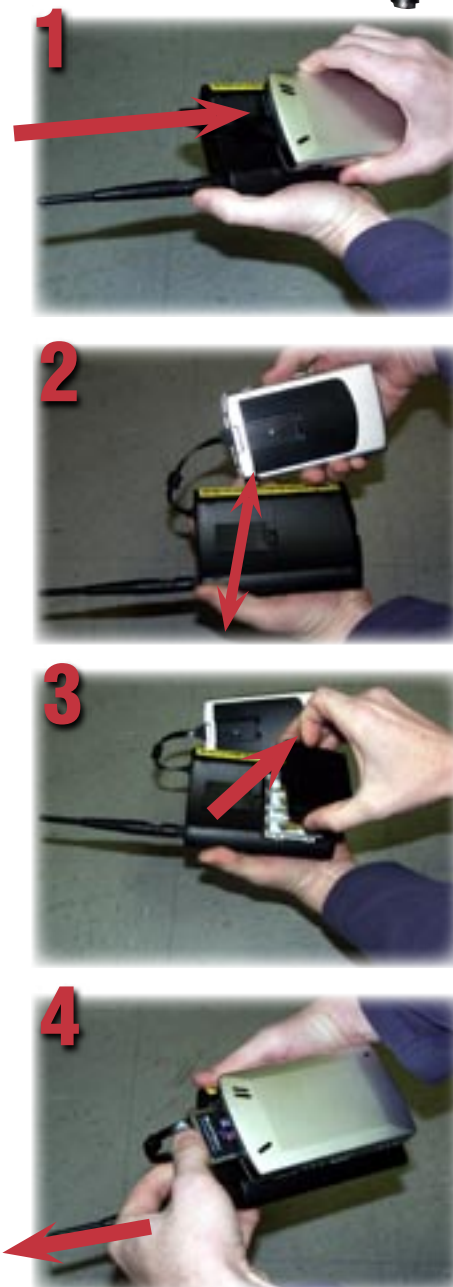
2. Flip over iPAQ exposing the battery compartment on the top of the BumbleBee receiver.

3. Change 4 Ni-MH AA batteries for fresh Ni-MH batteries and repeat steps above in reverse order.

4. When troubleshooting connectivity issues, be sure to GENTLY remove the Compact Flash serial adapter card from the iPAQ. Slowly slide the card out holding it by the very top of the card and NOT the cable. Be sure it is seated properly and slowly slide it back into the iPAQ's CF housing.

- Cannot Open Com Port or System Not Responding – Try restarting the application. If the system locks up completely, **press the small reset button** located at the back of your iPAQ. See HP's usage instructions for more info on performing a hard reset.

- Yellowjacket software is missing or corrupted - Re-install your Yellowjacket software.



TIPS

BATTERY LIFE

Yellow Jacket™ and Yellow Jacket Plus (formerly called Scorpion), 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 charger indicates a full charge, in less than 2 hours, repeat the charge cycle as follows:

First-time Charge:

1. To begin charging, provide power to charger and insert NI-MH batteries.
2. When the charge is complete, remove the batteries from charger and place back in after several seconds.
3. Repeat steps 1 and 2 three or four times or until the combined charge time is 2 hours.

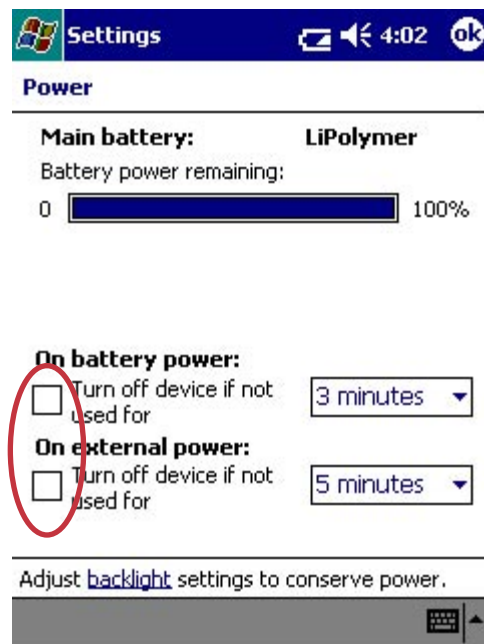
Subsequent charges of the W-LAN Ni-MH Battery Pack will not require multiple charging cycles unless left uncharged for a long period of time (greater than 2 months).

NOTE: In order to prevent the Ipaq from freezing when running YellowJacket software (therefore rendering the power button useless), make sure to:

1. ALWAYS leave the checkboxes in the **SETTINGS/SYSTEM/POWER** screen unchecked. Power-save mode will lock up the application due to the fact that the application is stopped while communicating with the hardware..
2. Make sure that the battery level on the Ipaq remains above 40%. The serial card interface may cease to operate when the battery level is under 40%.

To resolve the freeze, simply press the soft reset button on the bottom of the Ipaq with the stylus.

NEVER LEAVE THE IPAQ ON FOR EXTENDED TIMES (10 HOURS OR GREATER) WITHOUT EXTERNAL POWER. ALWAYS SAVE ANY DATA AND THEN TURN OFF IPAQ (TOP RIGHT POWER BUTTON) WHEN NOT IN USE. NOT DOING SO WILL RESULT IN DAMAGE TO THE IPAQ'S INTERNAL BATTERY.



In the PocketPC's OS, choose Settings and then choose System settings at the bottom. Select the battery icon for Power Settings to access this screen. These power settings come unchecked from the BVS factory to ensure Yellowjacket software runs optimally. **Power must remain on during logging or else data might be corrupted.**

SOFTWARE INSTALLATION

YELLOWJACKET SOFTWARE INSTALLATION FROM A SECURE DIGITAL (SD) CARD

Yellowjacket software comes pre-installed on your iPAQ, but as a courtesy, BVS includes an SD card containing a Yellowjacket software installer should you provide your own iPAQ or lose the factory installed files. This SD card may be used to store Yellowjacket data or other data.

Remember you must switch “lock” tab on side of SD card to “unlock” before storing or erasing any data.

To install the YellowJacket application from the SD card provided in the YellowJacket package, complete the following steps:

1. Insert SD card into the SD slot on the top of the iPAQ.
2. Using the stylus, tap on the “Start” button on the top of the screen.
3. Tap on “Programs” near the bottom of the menu.
4. Tap on the “File Explorer” folder.
5. Make sure that the shaded area on the top of the File Explorer says “My Device”. If not, use the upside-down triangle next to the text to choose “My Device”.
6. Tap on “SD Card”.
7. Make sure that the shaded area on the top of the File Explorer says “SD Card”. If not, use the upside-down triangle next to the text to choose “SD Card”.
8. Choose your Yellowjacket receiver and iPAQ model for installation and tap on “install”.
9. When the message “Installation is Complete” appears, you have successfully installed the application.

The YellowJacket application will be accessible by tapping on “Start” and then “Programs”. Scroll down to the bottom and the YellowJacket application icon will appear.

DRIVER INSTALLATION

The 24xx model iPAQ needs an updated driver for the Quatech serial card which interfaces to your BVS product. The driver installation program can be found in the “driver” directory of your product CD. Run this executable from your PC while the iPAQ is connected via ActiveSync. After installation, soft boot the iPAQ. Your product should be ready to go. Symptoms of an iPAQ needing this driver include loss of communication in a high-speed data transfer mode (such as spectrum on YellowJackets and Bumble Bee).

SURVEYING

While surveying, Yellowjacket achieves the most accuracy when the supplied omni-directional antenna is at a vertical 90 degree angle and completely perpendicular to the ground or floor as shown.



BVS CHAMELEON DATA CONVERSION UTILITY

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.

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.

Accessories for your **YELLOWJACKET™**




5 GHz Antenna
adjustable angle
SMA connector
P/N YJ-5GHz
\$ 25.00




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



Hive Indoor Mapping Software
P/N 0075-BEA
\$ Call for Pricing



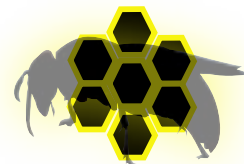
**5GHz Direction Finding
Antenna with mounting bracket,
cable & type N SMA male**
9 dBi gain
P/N 5NE
\$ 250.00



Ni-MH Fast-Charger
4 AA 6 V
P/N NIMH-001
\$ 55.00



IrDA USB Interface
wireless data transfer Adaptor
P/N IRDA-000
\$ 125.00



Yellowjacket Indoor 802.11 Wi-Fi Mapping Software

1 Create your floorplan: **Site Initiator**

Create floorplan layouts using bitmaps on any PC

Add rooms, floors, walls, and other clutter

Import existing floorplans for modification and surveys

Survey floorplans on a PocketPC. Create and organize survey maps on a PC.



Hive™ is powerful mapping software that works with Berkeley's Yellowjacket 802.11 (B, A or B/G) Wi-Fi receiver system. *Hive™* runs on iPAQ® Pocket PC® allowing site surveys to be performed completely **INDOORS** and outdoors using real-time mapping coverage technology. No GPS reception needed. Simply walk through an office space, warehouse or multi-floor building - any interior space that needs to be surveyed - and take Access Point measurements. Next, place those measurements on top of any structural floorplan to get a comprehensive, bird's eye view of any WLAN based upon MAC addresses, RSSI, SSID and more. Export AutoCAD files into *Hive™* powerful floorplan Site Initiator and scale your rooms and walls for measurement overlays. All measurements can be transferred, stored, displayed and printed using any PC running Windows 98, 2000, ME or XP OS.

3 Organize and plot your coverage: **Site Investigator:**

Plot coverage by AP or AP groups

Save and print color plots of survey layout and collected data

Propagation data can be studied after or during any 802.11 survey



2 Take your AP measurements: **Site Supervisor**

Touch-screen measurement points using PocketPC®

Customizable surveys based on MAC, RSSI, SSID

Export floorplans from AutoCAD® or any bitmap

Call us today for more information on Hive software:
(732) 548-3737 / Fax: (732) 548-3404
Internet: www.bvsystems.com
E-mail: info@bvsystems.com

Windows CE, PocketPC and HP iPAQ are registered ® trademarks of the Microsoft Corporation and Hewlett Packard Corporation respectively.



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
FHSS	Frequency-Hopping Spread Spectrum
FIR	Finite Impulse Response
GHz	GigaHertz
IF	Intermediate Frequency
I and Q	In phase and Quadrature
IBBS	Independent Basic Service Set
IrDA	Infrared Data Association
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
STA	STAtion (generally a laptop WLAN card)
UCT	Universal Coordinated Time
VAC	Volts Alternating Current
VGA	Video graphic
WEP	Wired Equivalent Protocol
WLAN	Wireless Local Area Network

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 facility 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.

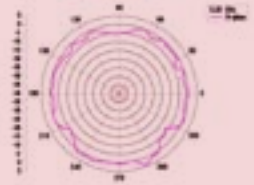
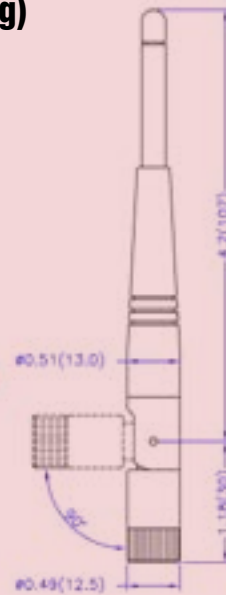
5 GHz Omni-Directional (5.5" long)

Electrical Properties:

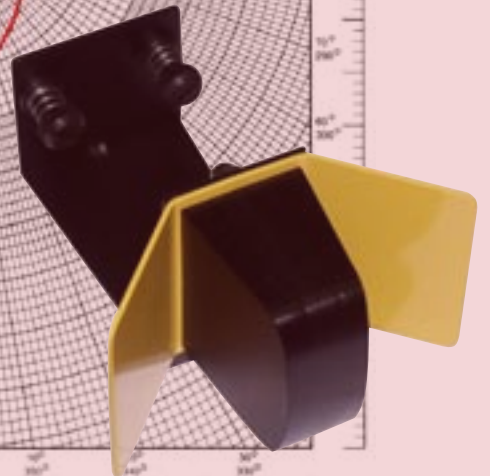
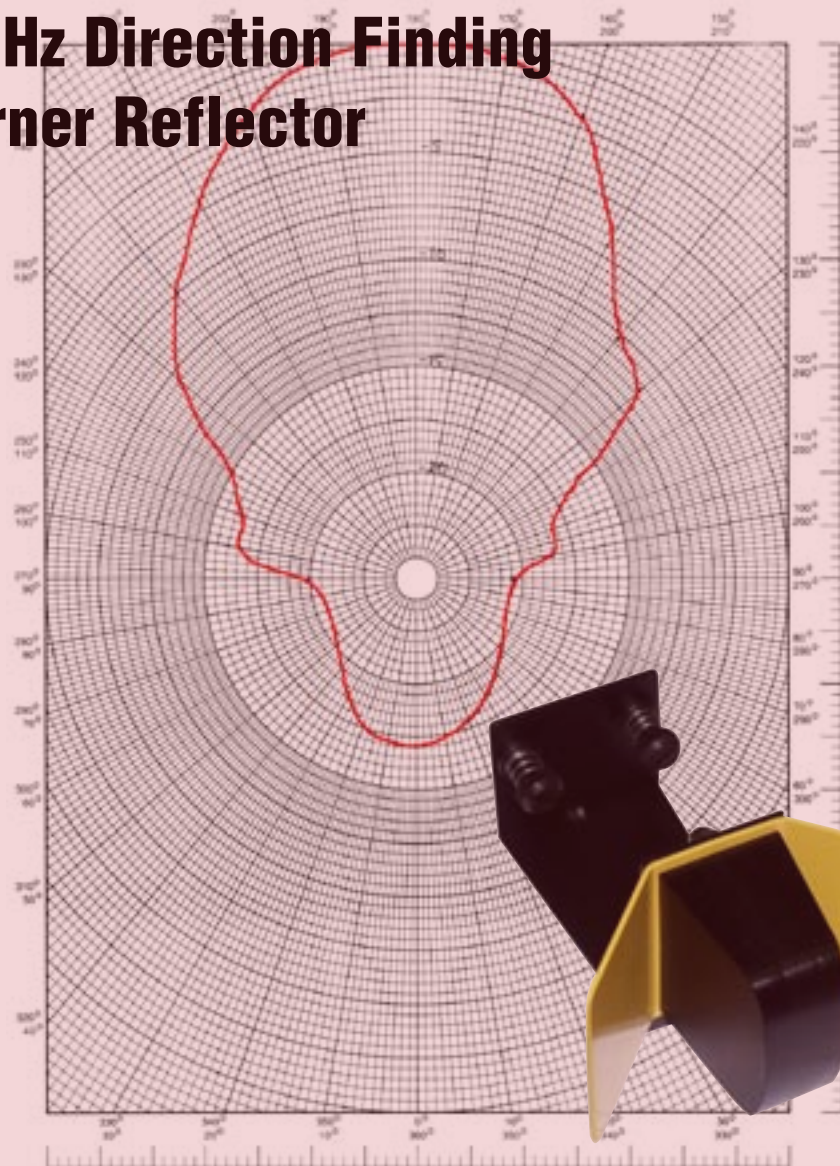
Frequency Range: 5.15~5.35 GHz
 Impedance: 50Ω nominal
 VSWR: <2.0:1
 Gain: 5 dBi
 Radiation: Omni
 Polarization: Vertical

Mechanical Properties:

Connector: SMA Plug(male)
 Material: Whip: Polyurethane(Black)
 Swivel Mechanism: Polycarbonate(Black)
 Connector: Brass with black chrome plating
 Operation Temp.: -20°C to +65°C
 Storage Temp.: -30°C to +75°C



5 GHz Direction Finding Corner Reflector



YELLOWJACKET™-A

802.11a Wi-Fi Analysis System



Yellowjacket™ is a wireless receiver module designed to work with Compaq's iPAQ® PDA in sweeping, analyzing and optimizing 5 GHz Wireless Local Area Networks. The receiver measures 8 OFDM network channels which operate on the **IEEE 802.11a** standard allowing the user to determine the AP's MAC address, SSID and RSSI signal levels for locating and optimizing access points of neighboring WLANs. **Yellowjacket™** 802.11a system uses a custom receiver, custom software and interfaces with an iPAQ giving **Yellowjacket™** the distinction of being the only true RF spectrum analysis and direction finding tool accurate to within 1 dB. Berkeley's calibrated receiver sweeps and measures all RF energy in the 5 GHz range as well as each of the 8 OFDM channels for detailed network inspection of any nearby 802.11a AP. **Yellowjacket's** ability to see the "whole picture" makes it ideal for measuring and pinpointing wireless interference and hackers that plague so many 802.11a WISPs and Hotspots.



802.11a

FEATURES:

- Measure 5 GHz coverage for (OFDM) WLANs via custom, calibrated receiver all within the **IEEE 802.11a** standard
- Receive, filter and process OFDM studies all in PocketPC®
- 64K color backlit display for real-time color-coded signal analysis
- Touch screen, Windows® PDA-like interface using a stylus pen
- Removable HP iPAQ® PocketPC®
- Measures RSSI (narrow band & total channel power)
- Complex Access Point Analysis including RSSI, Absolute Channel, Survey Sweep and SSID
- FER (system-wide)
- JPEG snapshot any screen instantly for later analysis
- Connection (Hot Sync) to a PC via IRDA or USB
- Removable battery power (4 AA Ni-MH cells)

Yellowjacket Measurements:

- ✓ MAC
- ✓ SSID
- ✓ Total Channel Power
- ✓ Narrowband RSSI
- ✓ Survey Sweep
- ✓ AP Manufacturer's ID



Yellowjacket 802.11a scans and displays all APs listing them by channel, MAC, SSID and RSSI.

Berkeley Varitronics Systems
255 Liberty Street, Metuchen, NJ 08840
(732) 548-3737 / Fax: (732) 548-3404
www.bvsystems.com

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YELLOWJACKET™-A



802.11a W-LAN Analysis System

BANDS SUPPORTED

U-NII lower band (5.180 - 5.240 GHz) (channel numbers 36,40,44,48)

RF SENSITIVITY (Wide Band)

U-NII lower band (5.260 - 5.320 GHz) (channel numbers 52,56,60,64)

RSSI MEASUREMENT (Narrow Band)

-20 to -90 dBm

TUNING INCREMENTS

-30 to -90 dBm @ 156 kHz resolution bandwidth

Tunes 8 channels (36,40,44,48,52,56,60,64)

RECEIVER GENERAL SPECIFICATIONS

IF Bandwidth:

Wideband 20 MHz

Stability:

± 2.5 PPM Temp range 32 to 120 degrees

Antenna:

SMA Female 50 ohm

Power:

Internal battery power (4 AA rechargeable Ni-MH batteries in receiver)

Weight:

3 lbs.

Dimensions:

2"H x 4"W x 6"L (water resistant, high impact ABS plastic case)

Runtime:

> 3 hours

Recharge Time:

< 1 hour

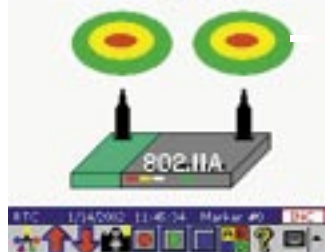


Hive™

Yellowjacket™ output data supports Microsoft Excel spreadsheets as well as Berkeley's own Hive™ Real-time Indoor/Outdoor Mapping solution on iPAQ PocketPC®. No GPS required.



Yellowjacket's optional Direction Finding Antenna pinpoints WLAN hackers and specific sources of interference.



YELLOWJACKET FEATURES:

SPECTRUM MODE:

- Full spectrum (8 channel) sweep
- Single channel zoom
- Peak Search and Hold
- 3 distinct waveform signal traces

AP ANALYSIS:

- Survey sweep of channels for all APs
- Individual channel analysis of APs or STAs
- Absolute channel
- SSID
- AP manufacturer's ID
- RSSI for each AP in true dBm
- "Geiger Mode" for direction finding individual AP/STA



NETWORK SECURITY:

- Authorize or Unauthorize up to 1000 MAC addresses
- Generate valid AP list automatically
- Upload AP list from PC
- Flag invalid APs as "suspect"