YELLOWJACKET-B/G

manual version 1.6 for Yellowjacket & YJPLUS models

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INTRODUCTION

The **Yellowjacket™** is an 802.11b/g analysis system consisting of an HP iPAQ PocketPC® coupled with custom hardware and software designed and manufactured by BVS. This system contains a variety of features to analyze 802.11b and 802.11g networks including spectrum analysis over all 14 channels (2.4 GHz), a list of AP's and/or stations over all 14 channels and packet-error rate information for each individual MAC address. The Yellowjacket also contains 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, CF or SD storage card for transfer to a desktop PC at a later time and then be converted from binary to ASCII using BVS Chameleon™ software. YellowjacketPLUS is identical to standard Yellowjacket in every way accept for the addition of GPS receiver hardware and PocketPC software screens. Except for the GPS antenna jack on the receiver, all Yellowjacket 802.11b/g models look identical.

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 pulling it up. 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.

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.

YELLOWJACKET ACCESSORIES

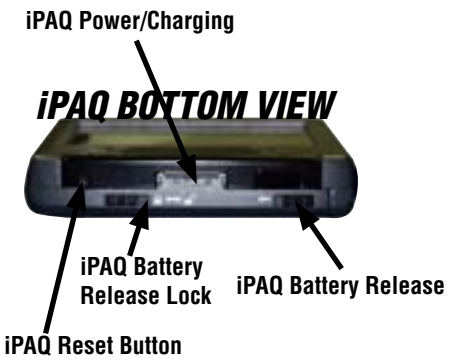
Your Yellowjacket includes the following accessories: antenna, 2 sets of AA (Ni-MH) removable batteries (8 total), Simply insert depleted batteries into charger and plug charger into AC outlet. See top of charger for LED status indicator lights (see end of manual for charger specs). Approximate charging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

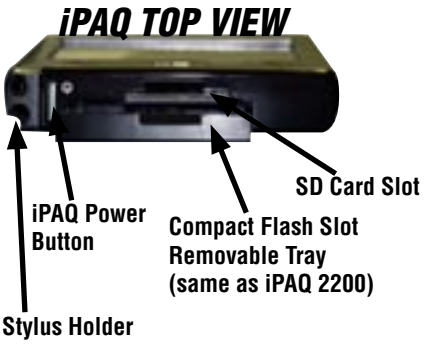
Insert SD card into the SD slot on the top of iPAQ
Tap on the "Start" icon on top left of screen
Tap on "Programs" in menu
Tap on the "File Explorer" folder
Choose "My Device"
Tap on "SD Card" or "Storage Card"
Tap on "install" executable
Choose Yellowjacket receiver and iPAQ model for installation and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

Tap on Windows Media Viewer icon to play either of the 2 Yellowjacket demos included on this SD card

DATE:_____

If the Yellowjacket CF or SD Backup Installer card has been included, it 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

Optional iPAQ 2400/2700 model shown

Reset button located on bottom of iPAQ

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.

Getting Started

To start the YellowJacket 802.11b/g software:

1. Press the Start button on the iPAQ.
2. Press the PROGRAMS option.
3. Press the "Yellow Jacket BG" icon (usually at the bottom of the alphabetized list).
4. Tap anywhere on the screen when the splash screen appears as shown below.

Note: This splash screen may vary slightly depending upon the Yellowjacket model.

Main Menu

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 five choices in the main viewing area. You may choose spectrum analysis, which enters a spectrum analyzer-type screen that 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 (and stations) being seen by the receiver and then to proceed to an individual MAC address screen for closer examination.

The third option is the "WISP Antenna Alignment" screen. This screen allows the user to select an access point to focus on for antenna alignment.

The fourth 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.

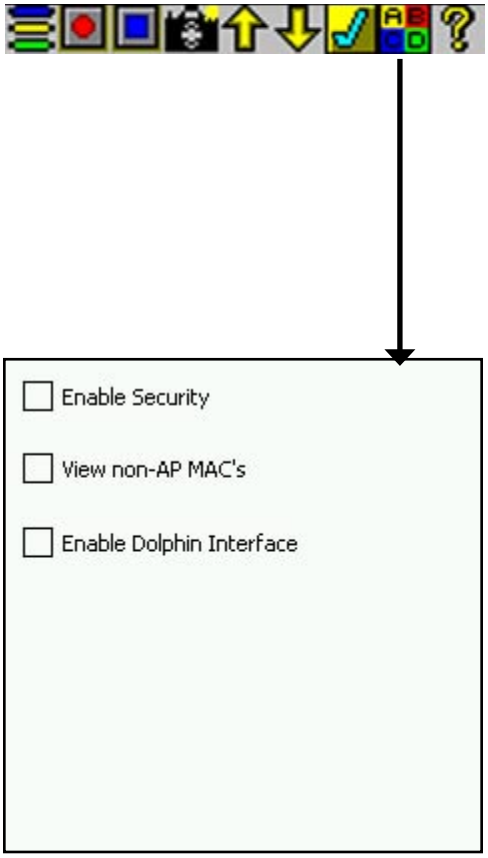
The fifth option is the network utilization screen. This screen shows the system utilization for each channel.

The sixth button shown takes the user to the GPS receiver screen displaying LAT,LON,ALT and satellite information. This

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.

button will only appear on YellowjacketPLUS models.

The toolbar gives the user more options on every screen. The first icon has three colored circles. Using this option will always return the user to the main menu.



The "record" button is for logging a data file. The "stop" button is for terminating the logging of data.

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

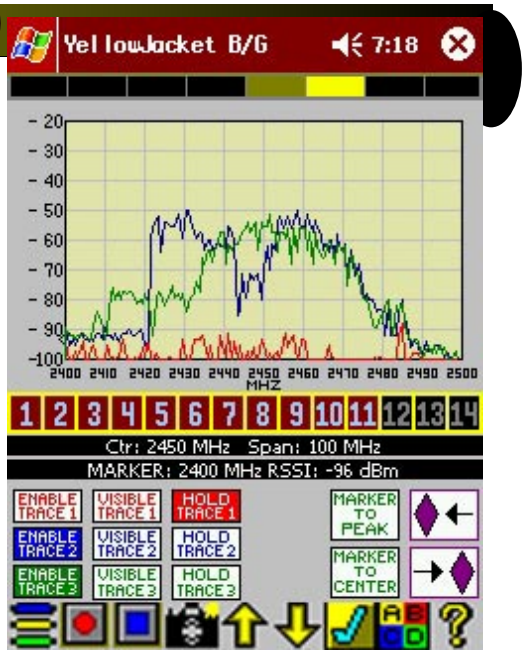
The fifth and sixth icons are arrows pointing upward and downward. These options have different uses depending on the currently active screen. For instance, on the access point screen, the arrows are used to flip the current page of access points.

The "checkmark" icon is used to increment the current marker number. This starts at 1 when the software is started. It will increment by 1 on every touch. This is of use when a file is being logged. Any change in value will be recorded in the log file.

The icon with the letters "ABCD" enters the system options screen. There is an option to report any unauthorized MAC addresses. This is discussed further in the "SECURITY" section later in this manual. The "Enable Dolphin port" option only applies to YellowjacketPLUS receivers with the internal GPS receiver installed at the BVS factory.

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, red, blue, and green 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.

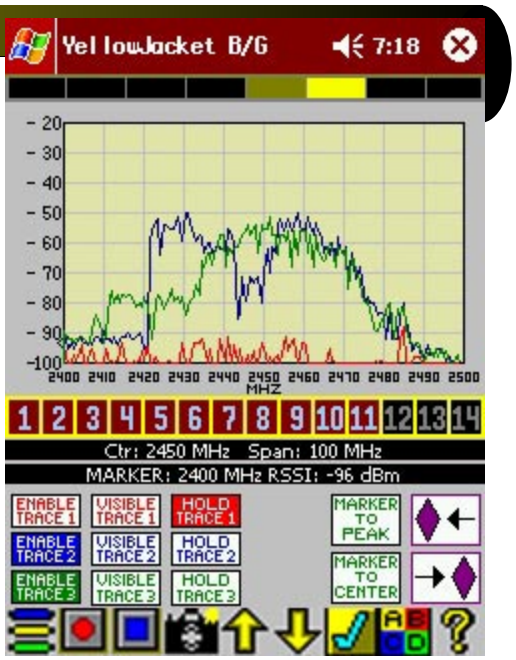
There are also buttons for moving the diamond peak mark to the left or right in the currently displayed screen.

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.

Full Spectrum

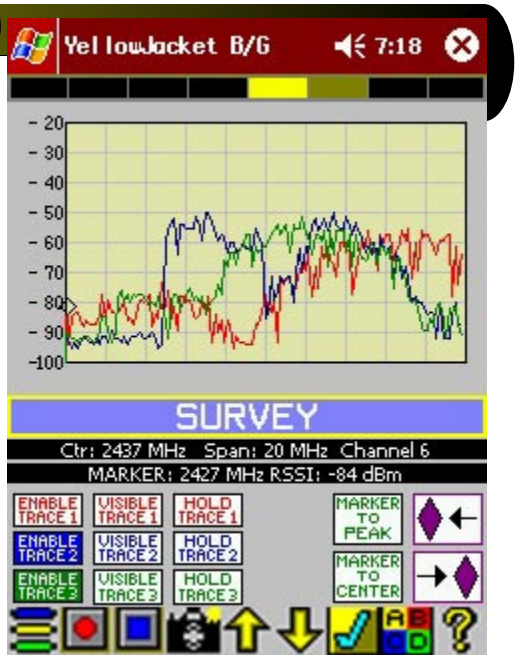
The full spectrum screen is the first one entered when going into the spectrum analysis option. This screen shows RF energy in dBm over all 14 channels seen by the receiver. Each vertical section represents 10 MHz.

To “zoom in” on a single channel, simply tap one of the numbered boxes. For example, clicking on the channel 4 box will zoom in to channel 4.

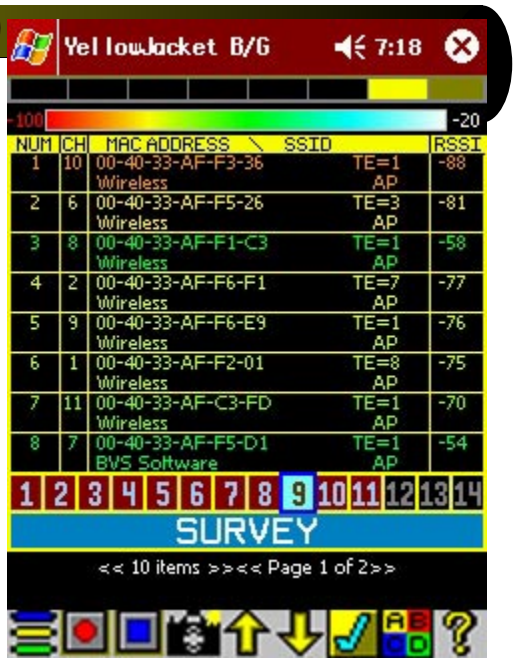


Single Channel Spectrum

The single channel screen displays RSSI valued data within the channel specified. To return to the full spectrum mode, press the “SURVEY” 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 MAC's seen and other information on each of them. 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.

A note on the channel number. If the particular MAC address is a client, the channel number will be what the receiver is set to at the time. If the receiver sees the access point to which the client is talking, the channel will be readjusted to the proper transmitting channel. A gray background box signifies that the channel number is that which was observed. The lack of the gray background denotes that it is the actual channel that the client is on.

The RSSI value may appear as a couple of dashes (--) if:

1. The MAC address is an access point.
2. The channel that the access point is truly on has not been reached in the survey yet.

The YellowJacket will only report RSSI values from access points when it is from the actual channel from which the AP's are transmitting.

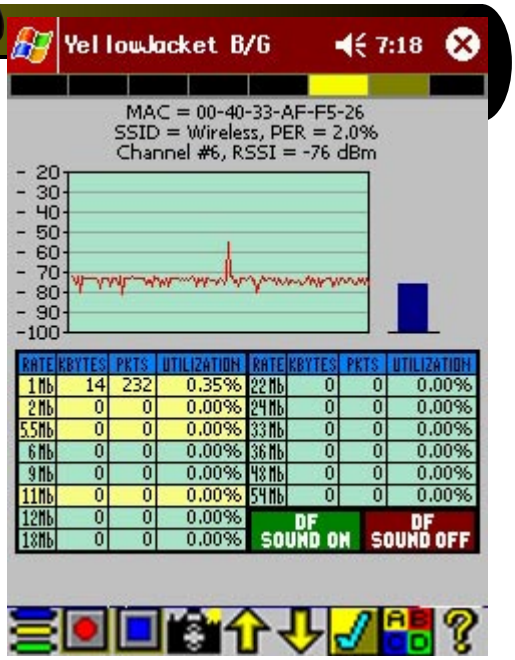
Also shown is the time elapsed since the last packet received by each MAC. This is signified by the "TE=#" next to the MAC address. Below this is an indicator signifying whether or not this particular MAC address is related to an access point. If "WEP" appears next to this, WEP encryption is detected.

The color of the information text for each access point will change as the RSSI value increases and decreases. The scale of the colors is 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 may be multiple pages of the MAC list. To flip between pages, use the up and down arrows provided on the bottom of the screen in the toolbar.

To look at one particular MAC address, simply tap on the box containing the MAC address of interest.

Single MAC Address Mode (Locator Mode)



When a single MAC address is selected, the locator mode 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 higher in pitch. Selecting the "DF Sound Off" button on the screen will mute this audible sound. 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.

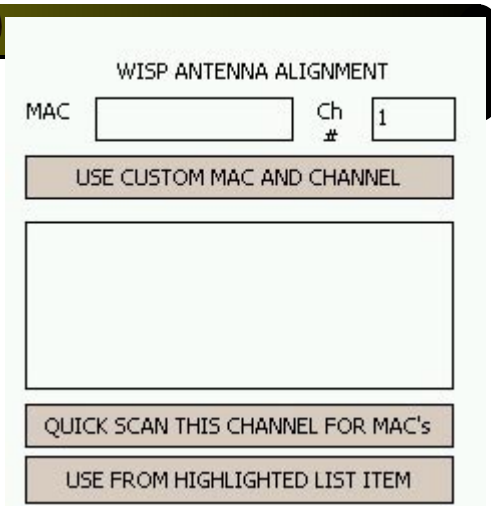
The information provided on the locator screen includes the MAC address and the SSID, as well as the channel on which the access point is transmitting.

The packet error rate (PER) is displayed next to the SSID. This is the overall PER for the last 200 packets received.

The RSSI level is displayed as a numeric value in dBm, as well as a in a bar graph format and a temporal display.

Below the RSSI readings is a table relating packets received to their data rates. Information such as kilobytes received, packets received, and utilization percentage are displayed.

WISP Antenna Alignment

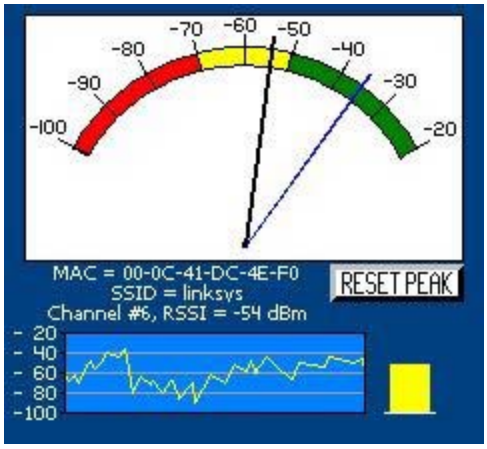


The WISP Antenna alignment screen allows the user to select a MAC address from a list or enter one manually for setting up an antenna. If the MAC List screen has been entered recently, the list box will have a number of MAC addresses to choose. Also, a MAC may be entered separately in the edit box.

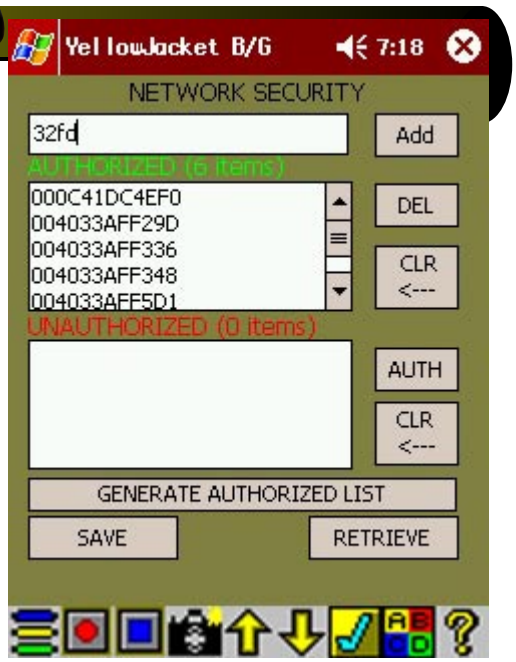
After choosing the MAC, the user will then see a screen with a gauge that shows current signal strength and allows for a peak hold. This peak hold can be reset at any time using the "RESET PEAK" button.

Also, the temporal and bar RSSI displays are on the bottom of the screen. Using a direction-finding antenna with this screen is a fast way of locating the direction of the required signal

from the MAC in question.



Security



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.

Checking the "check for unauthorized AP's" option in the option screen enables the security feature.

Authorized List

The authorized list 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 list can be cleared by pressing the "CLR" button next to the list box.

The input file format for the authorized MAC list is as follows:

It is an ASCII file separated by CR/LF's. The first line is the number of addresses in the list. Then each MAC is on a sepa-

Unauthorized Warning

When Yellowjacket detects any AP that is not included in the Authorized list, an audible warning beep will be heard. 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.

rate line.

N
MAC#1
MAC#2
.
.
.
MAC#N

After creating this file, it may be imported into the Yellowjacket software by using the 'Retrieve' option.

Unauthorized List

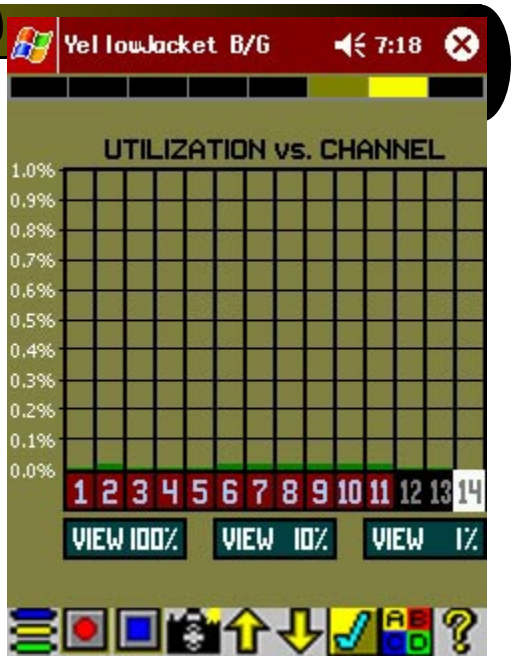
The unauthorized list is populated when the security feature is turned on via the option screen. Any MAC addresses seen and demodulated by the receiver which are not in the current authorized list will be flagged and inserted into the unauthorized MAC address list.

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

If the MAC addresses in the unauthorized list are wished to be authorized, simply select the entry in the list box and press the "AUTH" button.

This list can be cleared by pressing the "CLR" button next to the list box.

Network Utilization



The Network Utilization screen shows the utilization seen by the YellowJacket for each of the 14 channels. The view can be switched from 0-100% to 0-10% to 0-1%.

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.

Markers

There is a marker number associated with logged data records. When the checkmark button is pressed on the toolbar, this marker number is incremented. This can be useful when needing to mark a specific point in time for later post-processing.

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 (YellowJacket Edition)

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 (YellowJacket Edition) 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.

YellowjacketPLUS GPS Status

The GPS screen of the Yellowjacket Plus provides position and timing information from the Global Positioning System of satellites. The Motorola GPS receiver provides accurate information after synchronizing with at least 3 of the 24 satellites.

The Yellowjacket Plus must have a clear view of a good portion of the sky in order to communicate with the GPS satellites. The GPS receiver should lock within a few minutes. The only exception is when the unit is turned on in a new area. If the receiver was last turned on in California and now in New Jersey, the GPS receiver could take up to an hour to lock.

The status bar at the bottom of the Yellowjacket Plus screen shows the current date and time (Greenwich Mean) as well as

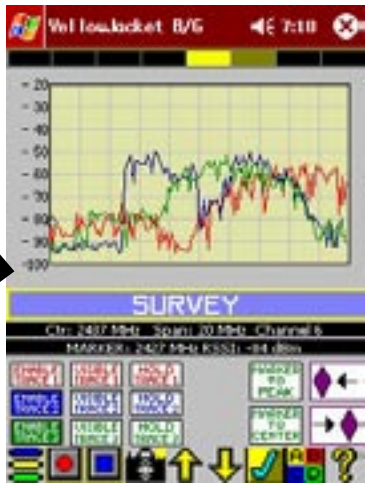
the current latitude and longitude in decimal degrees. There is also a separate GPS screen which shows satellite information.

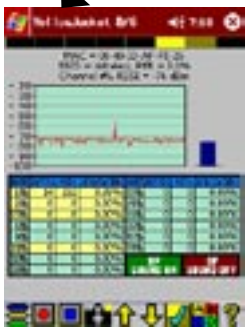
The GPS information is stored in the log file when enabled for later conversion by Chameleon. Each record will be tagged with GPS information if so desired.

If you require GPS time-stamping with your 802.11b/g measurements and your Yellowjacket does not display the GPS screen or the main menu screen does not show a bottom GPS data line similar to this:

Ask about our internal GPS option to upgrade your Yellowjacket.

START HERE





This GPS screen is only available on the PLUS verison with the internal GPS receiver installed

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.

Use this included power adapter for iPAQs with no separate power input.

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 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).

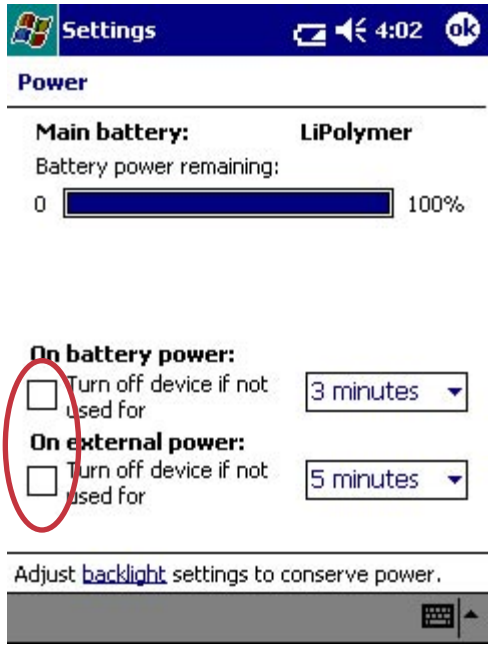
NOTE: In order to prevent the Ipaq from freezing when running YellowJacket software (therefore rendering the power button useless), make sure to:

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 a 128MB 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).

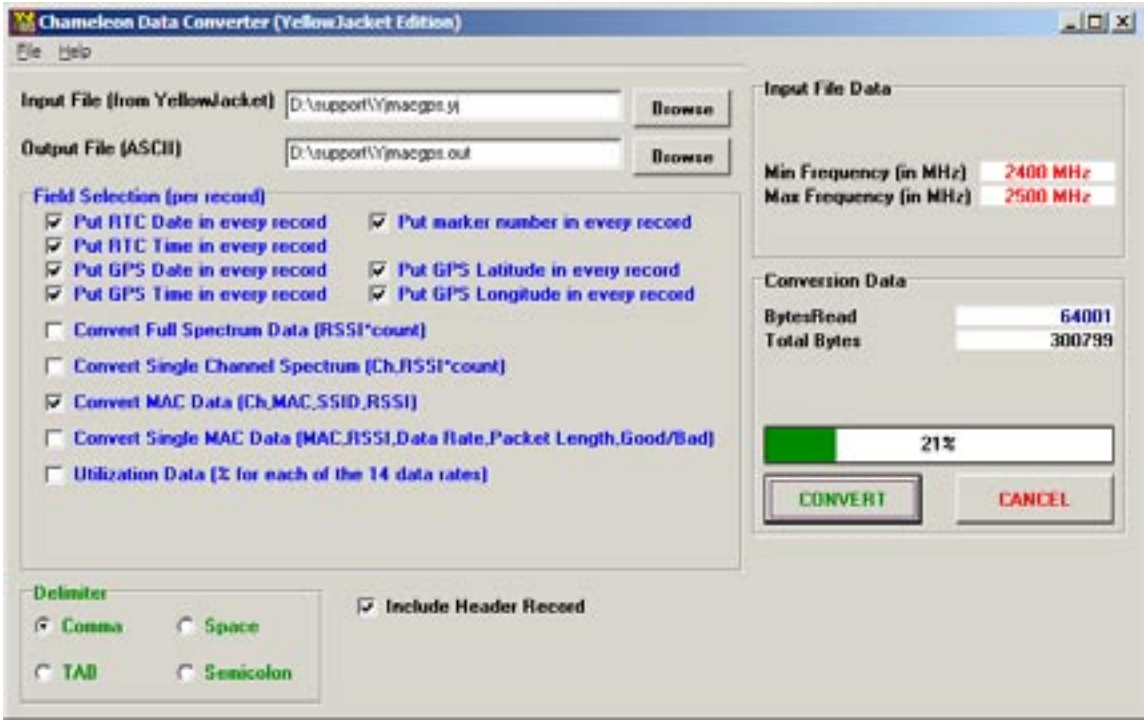
SURVEYING

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

Chameleon (YellowJacket Edition)

PC Application

The Chameleon application converts data logged by the YellowJacket into an ASCII delimited file for use in post-processing. The data converted is based on correlation records collected in the measurement mode of the iPAQ YellowJacket Receiver Interface.



To convert a file, use the following steps:

1. **Copy the log file off of the iPAQ and onto your desktop or laptop.**
2. **Run the Chameleon application.**
3. **Click BROWSE on the Input File line to choose a file to convert.**
4. **A default output filename will be created. Change if needed.**
5. **Choose which fields you wish to have in the output file.**
6. **Choose the delimiter to place between fields.**
7. **Choose whether or not you would like a header record with titles for each column.**
8. **Press the CONVERT button.**

The progress bar will monitor the progress of the conversion.

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.

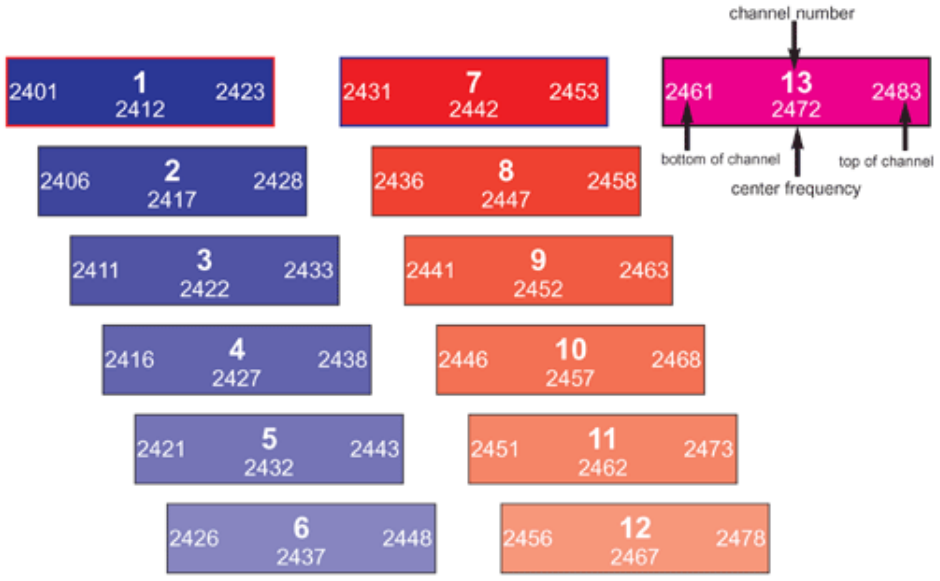
PPP (Point-to-Point Protocol)

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



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

Accessories for your YELLOWJACKET™

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

2.4 GHz Antenna
adjustable angle
SMA connector
$ 25.00

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

Drone™ GPS-Based Wi-Fi Site Survey Software
$ Call for Pricing

2.4 GHz Direction Finding Antenna with mounting bracket, cable & type N SMA male
9 dBi gain
P/N DFA-001
$ 250.00

Dolphin GPS Mapping Software
P/N 0038-DOLP
$ Call for Pricing

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

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

Internal GPS Receiver Upgrade
12-channel receiver
check with BVS sales for pricing and details.

IMPORTANT SAFETY INSTRUCTIONS

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

1)Read and understand all instructions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

INSTALLATION INSTRUCTIONS

1. Never install telephone wiring during a lightning storm.

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

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

4. Use caution when installing or modifying telephone lines.

INSTRUCTION FOR BATTERIES

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

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

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

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

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

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

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

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

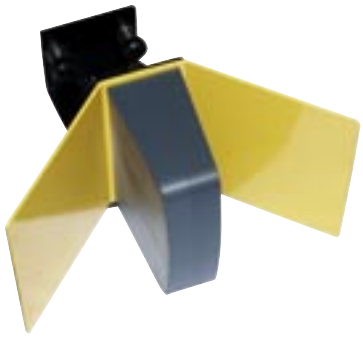
8. When inserting batteries into this product, the proper polarity or direction must be observed. Reverse insertion of batteries can cause charging, and that may result in leakage or explosion. (Applies to product employing more than one separately replaceable primary battery.)

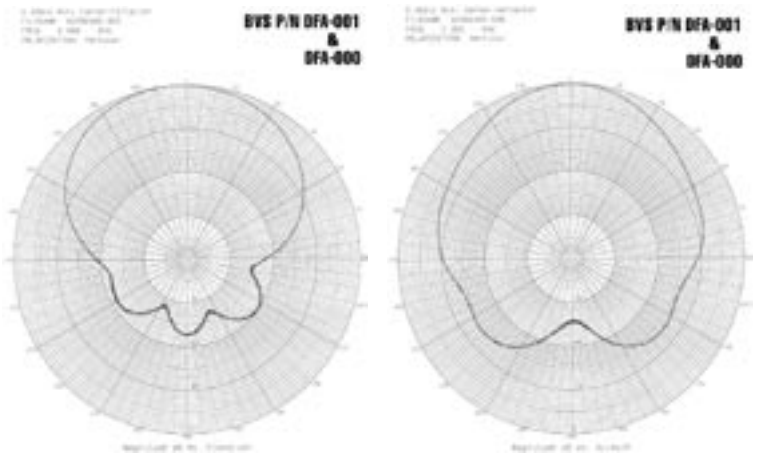
9. Remove the batteries from this product if the product will not be used for a long period of time (several months or more) since during this time the battery could leak in the product.

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

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

2.4 GHz Direction Finding Corner Reflector





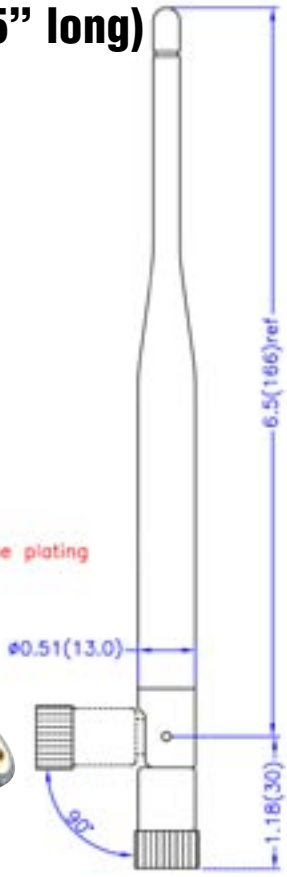
2.4 GHz Omni-Directional (7.5” long)

Electrical Properties:

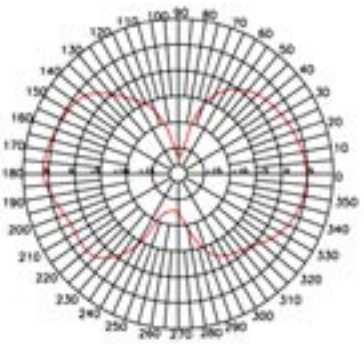
Frequency Range:	2.4~2.5 GHz
Impedance:	50Ω nominal
VSWR:	<2.0:1
Gain:	5 dBi
Radiation:	Omni
Polarization:	Vertical

Mechanical Properties:

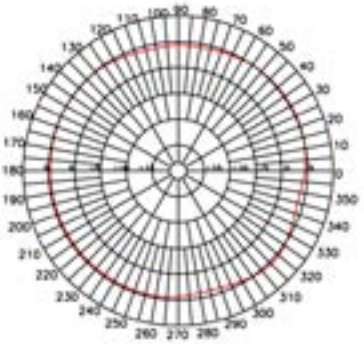
Connector:	SMA Plug(male)
Material:	
Whip:	Polyurethene(Black)
Swivel Mechanism:	Polyurethene(Black)
Connector:	Brass with black chrome plating
Operation Temp.:	-20°C to +65°C
Storage Temp.:	-30°C to +75°C



E-Plane Pattern @ 2.45GHz



H-Plane Pattern @ 2.45GHz



Hive™

Yellowjacket® Indoor 802.11 Wi-Fi Mapping Software

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 an iPAQ® Pocket PC® allowing site surveys to be handheld and performed completely **INDOORS** or outdoors using real-time mapping coverage technology. No GPS reception needed. First, import bitmap files into ***Hive™*** Site Initiator and scale your rooms and walls for measurement overlays. Walk through an office space, warehouse or multi-floor building - any interior space that needs to be surveyed - and take Access Point measurements with Site Supervisor. Then place those measurements on top of any structural floor-plan to get a comprehensive, bird's eye view of any WLAN based upon MAC addresses, RSSI, SSID and more. Finally, view your Wi-Fi coverage results in table and graphical views using Site Investigator running under Windows 2000 and XP.

1 Create your floorplan: Site Initiator

Create floorplans from scratch or from any BMP, GIF, JPEG, TIF

User defined objects for placement onto floorplan

Import existing floorplans for modification and surveys

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

2 Take your AP measurements: Site Supervisor

Touch-screen measurement points using PocketPC®

Customizable surveys based on MAC, RSSI, SSID

Take floorplan survey snapshots anytime

Visible survey path throughout floorplan

3 Organize and plot your coverage: Site Investigator:

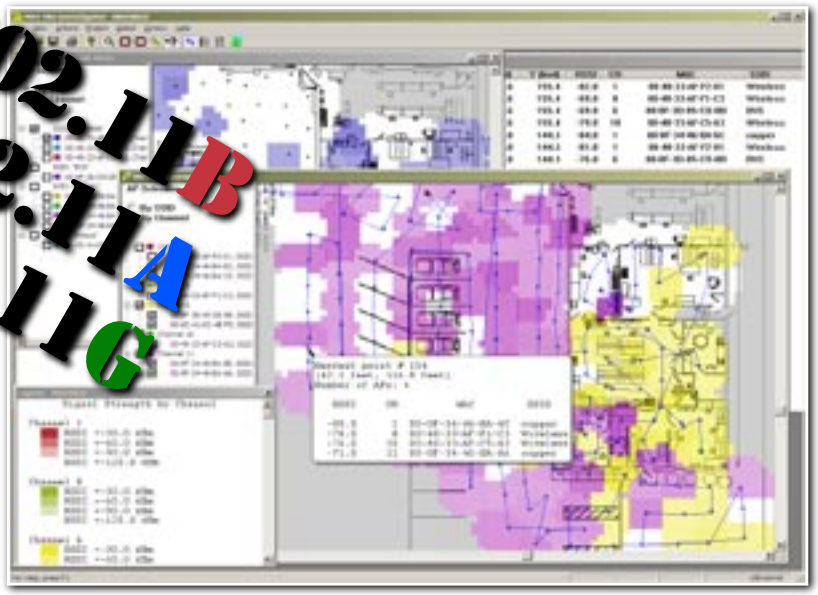
Plot and view surveys in multiple data table or graphical windows

Plot coverage by AP or AP groups

Print and export plots or table data into ASCII format for spreadsheets

Create RTF files that import into MS Word & most popular word processors

802.11B
802.11A
802.11G



OPTIONAL SOFTWARE AVAILABLE FOR YOUR YELLOWJACKET

BEEKEEPER™

802.11b Wi-Fi Analysis PC Software

BeeKeeper™ is a Windows® XP software application that graphically & textually scans, monitors and [illegible] 2.4 GHz 802.11b Wi-Fi networks. ***BeeKeeper***™ utilizes the ***BeeKeeper***™ ***Receiver Module*** monitoring all 14 DSSS network channels as well as MAC, SSID, AP manufacturer, SNR, data rate and RSSI signal levels of any access point or NIC. **Yellowjacket®** users may use their 802.11b receivers with the **Pollenator**™ PC interface with ***BeeKeeper***™ software. User selectable scanning and log settings ensure that ***BeeKeeper***™ will identify any unauthorized MAC and notifies the user instantly with audible and email alerts and time-stamped log file onto any desktop or laptop PC. Vital RF data is captured, logged (24/7) and may be used to identify neighboring 2.4 GHz interference, WLAN interference and even nearby client cards trying to wirelessly "hack" into the network. In addition, APs can be traced from local NICs in ad-hoc mode they are connected to allowing users to view the network transparently. Unlike NIC based analyzers, ***BeeKeeper***™ is a passive, network independent hardware & software package with the ability to see the "whole picture" wirelessly without being seen or detected by anyone on or off the network. ***BeeKeeper***™ software is controllable via any PC's serial or ethernet port allowing RF surveys to be performed all from your desk.

BeeKeeper™ monitors and logs continuously on any Windows® PC for both realtime and time-stamped RSSI analysis.

receive 802.11b via PC

BeeKeeper™ ***receiver module***

or

Pollenator™ ***receiver interface***

BeeKeeper™ utilizes an 802.11b calibrated receiver for dBm accurate analysis. Yellowjacket® users may use their receivers with Pollenator™ to interface with ***BeeKeeper***™.

SECURITY

- Detection of ad-hoc mode for non-APs
- Detects WEP encryption & client ad-hoc mode
- Useful for SOX/DoD/GLBA/HIPAA compliance monitoring
- Detects Access Points & Network Interface Cards
- Classification of 802.11B and 802.11BG devices
- Protocol Analysis & Packet Classification for any device
- Flag unauthorized devices based on Access Control List
- Audible & e-mail alerts for unauthorized devices

SURVEYS

- Scan & Display Devices on ALL channels
- Display Capacity of 300 Devices
- Full 2.4 GHz 802.11b Spectrum Waveform
- MAC address, SSID, Vendor, Signal Strength, Channel & SNR
- Single Channel Spectrum Waveform
- Passive Surveys with Calibrated Receiver
- Channel-Wise Signal-to-Noise Display
- Network Bandwidth Utilization for 802.11b data rates

OPTIONAL SOFTWARE AVAILABLE FOR YOUR YELLOWJACKET

DRONE™

GPS-Based Wi-Fi Site Survey Software

1 Create Survey Maps: Drone Projector (iPAQ)

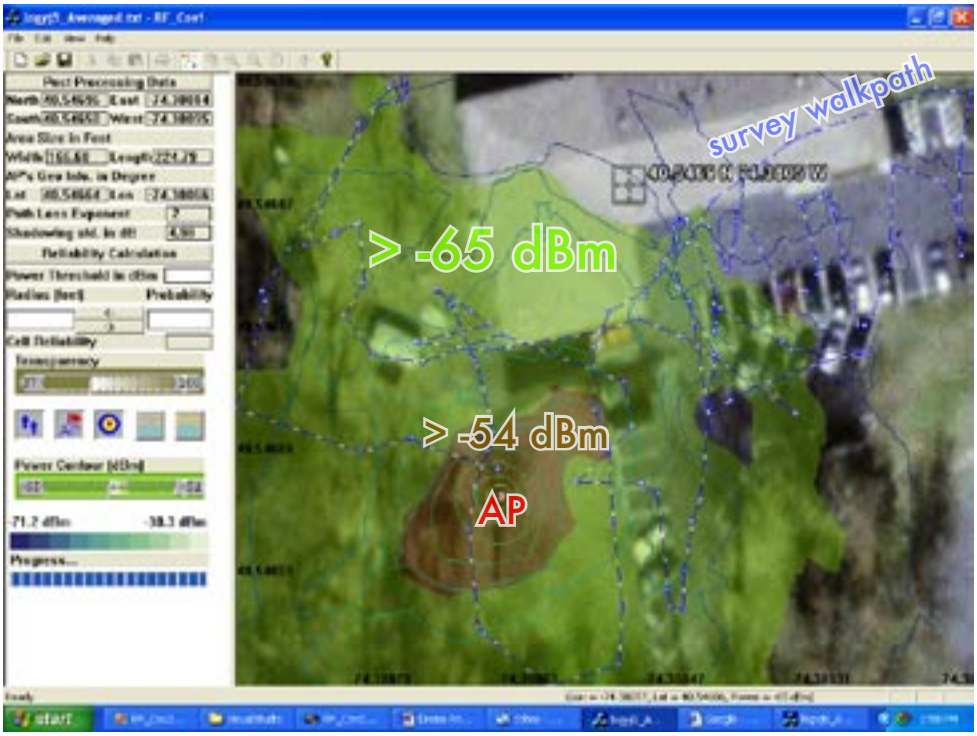
Import any bitmap for surveys

Create geo-coded site files for analysis

Tap on 802.11b/g site points

Use Yellowjacket 802.11b/g PLUS receiver hardware for handheld surveys anywhere in the world.

Drone™ combines the power of realtime Yellowjacket® Wi-Fi measurements with GPS geo-coding accuracy. Create your survey bitmap with **PROJECTOR**. Next, simply walk or drive to any spot with GPS reception while ***Drone™*** **COLLECTOR** automatically scans all 802.11b/g channels and correlates them to your exact location in realtime. ***Drone™*** only needs a few reference points to fill in the locations for the rest making it effective for quick outdoor studies. GPS measurements provide both LAT and LON as well as time stamping for a complete Wi-Fi survey path anywhere in the world. ***Drone™*** allows JPEG screen snapshots to be taken at particular points of interest throughout the survey. Survey data such as RSSI, MAC and SSID may be exported into ***Drone's*** **ANALYZER** for further mapping coverage studies in multiple graphical and tabular layouts. Surveys may be exported further into KML files for plotting in applications such as Google Earth™.



2 Constant Realtime Wi-Fi Surveys: Drone Collector (iPAQ)

Scan all 14 channels at periodic intervals

Place data points on LAT and LON

JPEG snapshots of any survey screen

Handheld Windows Mobile® 5.0 environment

3 Coverage Reliability Analysis: Drone Analyzer (PC)

Plot surveys in graphical or tabular views

Plot coverage by SSID, MAC, RSSI, AP or AP groups

Locate unknown APs' positions

Print and export plots into bmp files for spreadsheets

Create KML file for plotting coverage over Google Earth™

OPTIONAL SOFTWARE AVAILABLE FOR YOUR YELLOWJACKET