

YELLOWJACKET

manual version 2.1

PLUS



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INTRODUCTION

YellowjacketPLUS™ is an 802.11b analysis system consisting of an HP iPAQ PocketPC® coupled with custom hardware and software by BVS. This system contains a variety of features to analyze 802.11b networks including spectrum analysis over all 14 channels (2.401 – 2.495 GHz), a list of AP's and/or stations over all 14 channels, multi-path and packet-error rate information for each individual MAC address. The YellowjacketPLUS 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 YellowjacketPLUS 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”.

The top angle shows the removable antenna connection, stylus, GPS antenna connection (optional), IrDA port and SD card slot. Always keep the IrDA port clean and clear of obstacles for data transmission.

STARTING UP YellowjacketPLUS

Power up your YellowjacketPLUS by pushing power button in upper right corner of unit. This power will automatically power up the YellowjacketPLUS 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 PLUS 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 YellowjacketPLUS in the pulldown menu. Data may be transferred to a PC via the IrDA window or USB or serial connection. Install Yellowjacketplus software by connecting your iPAQ to your PC and inserting included BVS software CD-ROM (red disc) into PC to begin installation.

YellowjacketPLUS ACCESSORIES

YellowjacketPLUS includes a 2.4 GHz antenna, 2 battery packs (10 Ni-MH cells), AC/DC charger & USB/IrDA communicator sled and carrying case.



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 behind the battery door at the bottom of the unit. 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.



The Yellowjacket 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.



Yellowjacket Main Screen

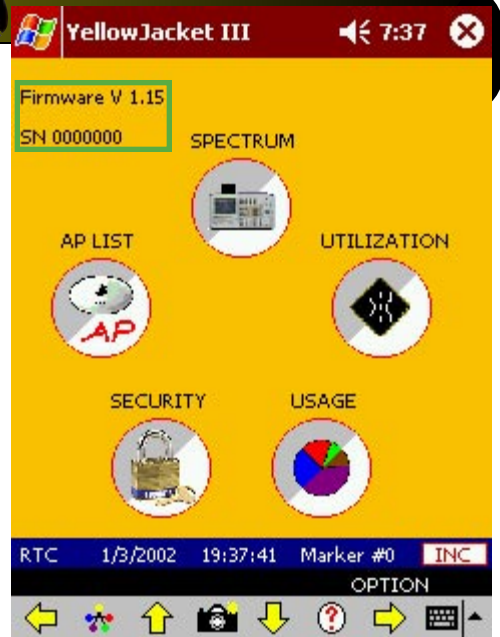
Yellowjacket PLUS main screen allows access to all software menus. Use the stylus or the joystick to make a selection. You can back up and access the main screen anytime by pressing the joystick UP, DOWN, LEFT or RIGHT (the direction is indicated at the bottom of the page).

Note that the firmware and serial number in the upper left corner appears indicating serial connection between the iPAQ and the Yellowjacket receiver.

RTC MARKER MODE

YellowjacketPLUS uses the internal real-time clock of the iPAQ for timing. In addition, there is a marker that starts at 0. By pressing the button to the right of the marker value, the marker increases by 1. These values are stored in any log files created for later conversion by Chameleon.

RTC 1/3/2002 19:37:41 Marker #0 INC



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.

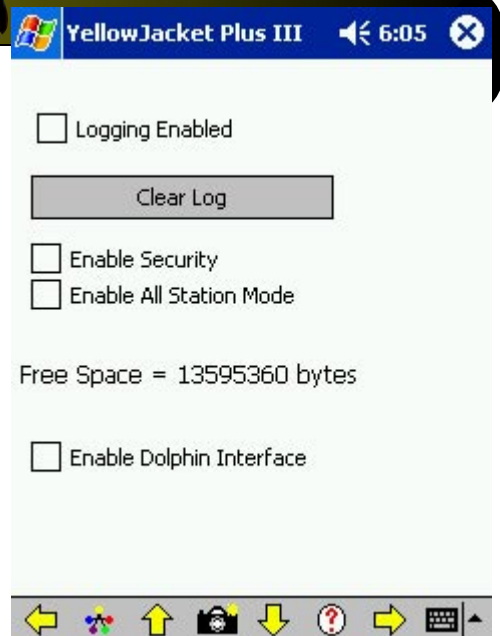
Yellowjacket Options Screen

Press the iPAQ's joystick to the right when in the Main Screen to access this options screen. Here, you may turn on logging and clear it from memory, enable security, enable all STATION mode and enable Dolphin™ Mapping Interface.

Note: Logging mode will only log data from the screen (multipath, spectrum, utilization, etc.) you are currently running. The data file containing all data collected when logging is turned ON is called LOG.YJ3.

Note: Security mode should only be enabled after the user has set the authorized MAC addresses in the security screen. Otherwise, all APs detected will be seen as 'unauthorized' and set off the security alarm until it is disabled.

Note: Dolphin Realtime Mapping software requires YellowjacketPLUS' internal GPS receiver option and a laptop with a USB connection. Do not enable this option unless you have the appropriate software, hardware and want to map your 802.11b study in real-time. set off the security alarm until it is disabled.





Full Spectrum Mode

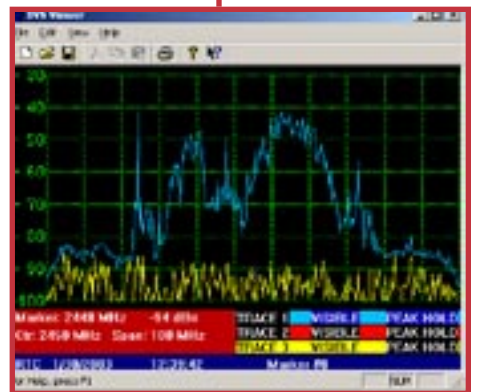
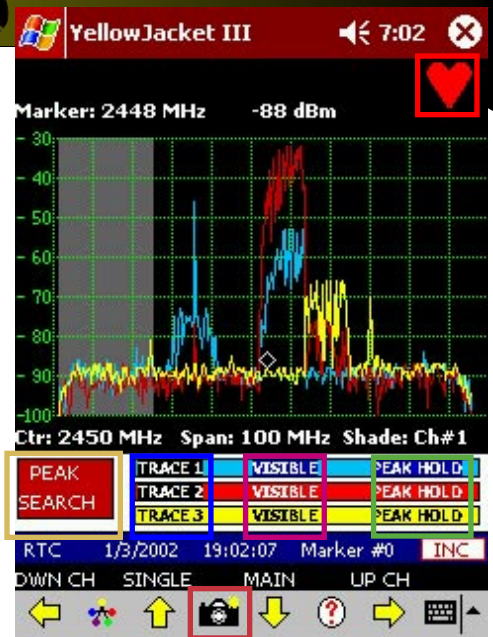
The full spectrum screen has **three available TRACES**. These traces can be **PEAK HOLD** and **VISIBLE/INVISIBLE**. Only one trace can be active at any time. The buttons on the screen below the graph change the settings on the spectrum screen.

There is also a **PEAK SEARCH** button that will put a diamond on the highest point in the spectrum at that time. RSSI and frequency information for that point will then be displayed on top of the graph.

The **BLINKING HEART** on the top right indicates an active 802.11b signal. This icon also applies to the other spectrum and multipath screens.

There is a highlight bar that allows the user to select a particular channel. This is navigated by use of the joystick and/or arrow buttons on the menu. After highlighting a particular channel, the user may enter into single channel spectrum mode by pressing the UP arrow on the joystick or the UP arrow on the menu bar.

You may take a snapshot of the full spectrum screen by pressing the **CAMERA BUTTON** on the menu bar. The data for the screen will then be stored along with RTC or GPS information. The PC Snapshot Viewer Utility will allow you to view these snapshots on the PC and then print them out on a printer.



Single Channel Spectrum

Single channel spectrum mode works exactly like the full spectrum mode with the exception that you are now zoomed in to a single 802.11b channel.

NOTE: 802.11b traffic will be seen in bursts on the spectrum screen. The energy will only rise as packets are transmitted. You will see a constant RSSI level in the AP screens because the RSSI measurement is synchronous with the reception of the packet. The spectrum screen is sweeping the frequency band because it is looking for **ALL** 2.4GHz energy, not just 802.11b packets. In this way, interferers will also appear. It sweeps as fast as it can, but if a packet is transmitted while the sweep is at another frequency, the energy will not be seen.





MAC AP/Station Survey Mode

Choose “AP List” mode from the main screen to get to the AP List screen. The first screen will “survey” all 14 channels for available AP’s. This screen will show AP’s ONLY. The single channel mode can show all stations.

The record number, absolute channel, whether or not it is authorized (if security is enabled), the MAC address, the SSID (for AP’s), the RSSI, and WEP (privacy enabled bit) are shown for each address.

Arrows will appear in the header if more than 5 AP’s are being detected. The user can then scroll up and down to view all of the AP/STA captured data. An address will be removed from the list if it hasn’t been detected the next time that channel is swept.

#	CH#	MAC TYP	AUT	SSID	RSSI WEP
1	6	AP		00E003041FB2 Plant_AP	-63
2	10	AP		004033AFF348 Wireless	-48
3	10	AP		004033AFF1C3 Wireless	-58
4	10	AP		004033AFF5D1 Wireless	-51
5	10	AP		004033AFF201 Wireless	-51



AP/Station Single Channel Mode

To see the AP’s/stations for a single channel, choose the channel by tapping the “SURVEY ALL CHANNELS” area above the AP list. This will switch the list to APs only from one channel.

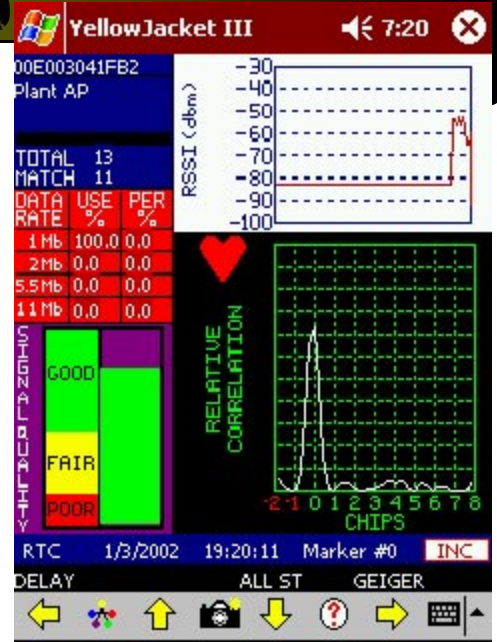
#	CH#	MAC TYP	AUT	SSID	RSSI WEP
1	6	AP		00E003041FB2 Plant_AP	-63
2	10	AP		004033AFF348 Wireless	-48
3	10	AP		004033AFF1C3 Wireless	-58
4	10	AP		004033AFF5D1 Wireless	-51
5	10	AP		004033AFF201 Wireless	-51



Multipath / Signal Quality Indicator ("Q" Factor)

The bar graph on the lower left hand side of the multipath and the delay spread screens is known as the 'Q' factor graph. This graph uses a formula to determine the quality of the direct path and reflections of the signal by determining the 'fatness' of the main peak compared to the height of the direct path component.

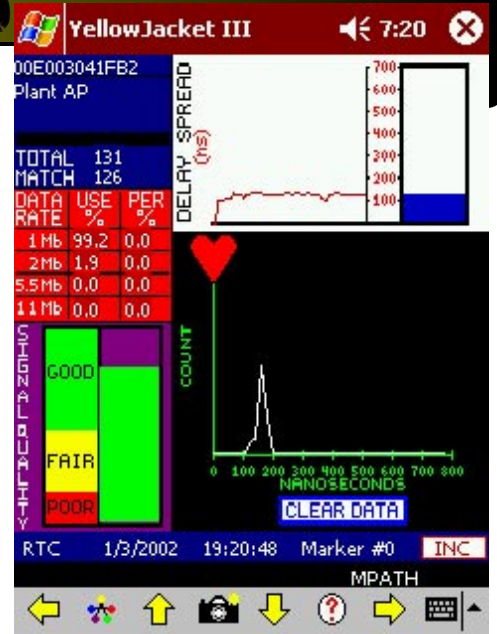
As the direct path gets stronger and sharper, the 'Q' factor goes up. As the path gets weaker and fatter, the 'Q' factor drops, signaling a possible multipath interference concern.



Delay Spread Screen

By moving left from the multipath screen using the joystick and/or menu arrow, the user enters the delay spread screen. The left of this screen shows the same information as the multipath screen. The upper right hand side of the delay spread screen shows a running total and current delay spread in nanoseconds.

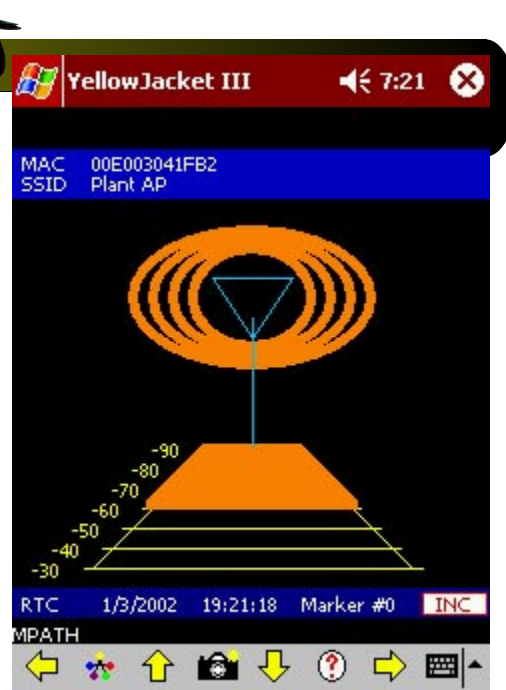
The next graph below the running total graph is the cumulative delay spread graph (count vs. spread). The X axis is also in nanoseconds. The spread is cumulative and can be reset using the provided button.





“Geiger-Counter” Mode

To find an AP/station using audible sounds as a guide, press up on the joystick to enter the “Geiger-counter” screen. The colors will approach white when nearing and/or pointing directly at an AP or station. The Geiger counter sound will also get stronger with more frequency.



Security Screen

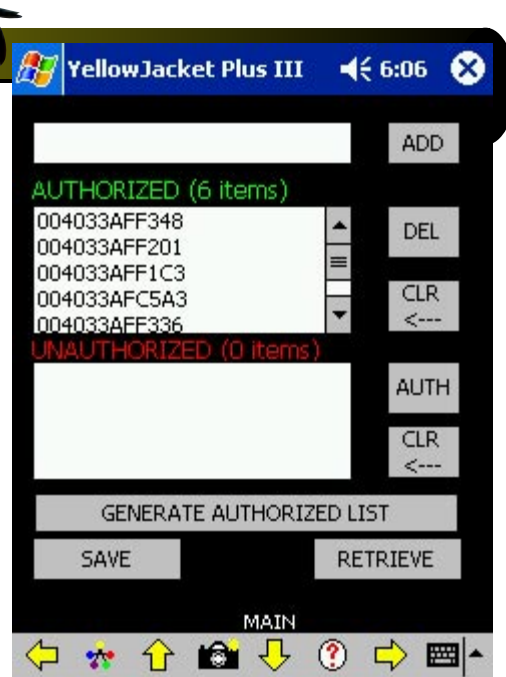
To go to the security screen, press the security icon from the main screen. The screen shown will appear. You may enter a list of AP's that are authorized (up to 1000) to be a part of the network by entering them in the top left edit field and then pressing the 'ADD' button. Press 'DEL' to delete an entry from the list after highlighting that entry. Press 'CLR<-->' to clear the authorized list.

An authorized list can be generated from the Yellowjacketplus by following these steps. First, go into survey mode or single channel mode in the AP List section. Then, once all of the AP's have been located, go back into the security screen. Press the 'GENERATE' button. All of the AP's(stations) will be transferred into the authorized list.

When the security mode is enabled from the menu bar in the AP/STA mode, APs and STATIONS which aren't in the authorized list will be put in the unauthorized list and a warning message will appear.

An AP/station can be moved over to the authorized list by pressing the 'ADD' button. To clear the unauthorized list, press the 'CLR-->' button.

A list of AP's can be saved and retrieved from/to the authorized (auth.lst) and unauthorized (unauth.lst) lists by choosing the save/retrieve options from the root directory of the Pocket PC.



Unauthorized Warning

When YellowjacketPLUS 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 YellowjacketPLUS 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 (press joystick right in Main Screen) to turn this security alert ON or OFF.



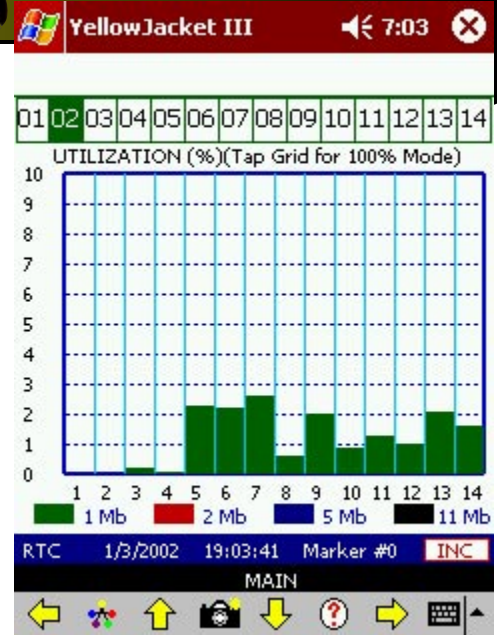
Utilization Screen

The utilization screen shows bandwidth utilization for every 802.11b channel. The top of the screen shows the current channel being scanned (highlighted). The chart below shows the utilization from 0 to 100% for channels 1 thru 14. It is color coded to show the percentages for each data rate, as keyed on the bottom of the screen.

The percentages add up the throughput of data at each data rate. For instance, if there were packets at 1Mb/s containing 500,000 bits, then the corresponding percentage at 1Mb/s would be 50%. This would be the same percentage for receiving 5.5 Mb/s on 11 Mb/s packets.

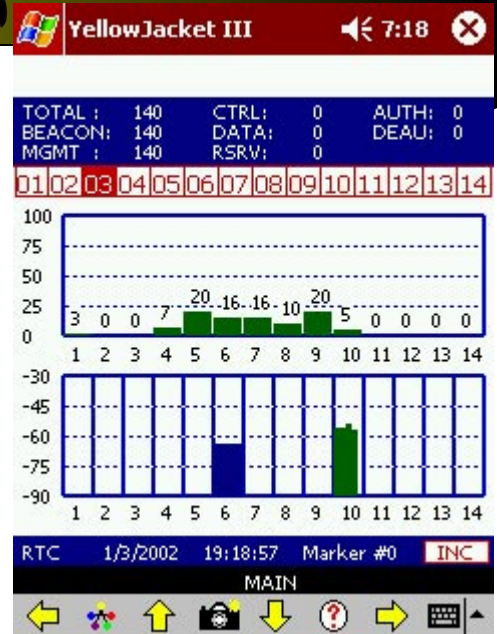
The bars stack on top of each other to reveal no more than 100%.

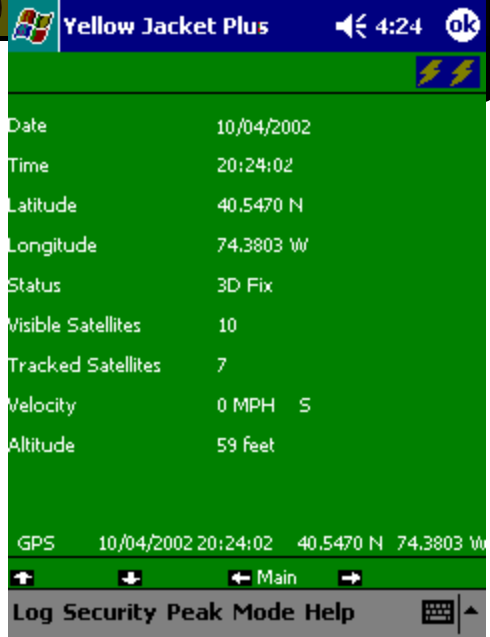
By tapping the grid, the display toggles between a range of 0-10% and 0-100%. This is for zooming in on low-utilization statistics.



Usage Screen

The usage screen displays the percentage of packets being seen by Yellowjacket PLUS in channels 1 through 14. The graph at the bottom shows RSSI bars for APs detected and is arranged by channel number. Note that the more APs that occupy each channel, the thinner the vertical RSSI bars will become (each bar represents a single AP). The PER/USAGE calculations are now based on a rolling average over the last number (1024) points.





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 measurements and Yellowjacket PLUS does not display the GPS screen or the main menu screen does not show a bottom GPS data line similar to this:

```
GPS 10/04/2002 20:24:02 40.5470 N 74.3803 W
```

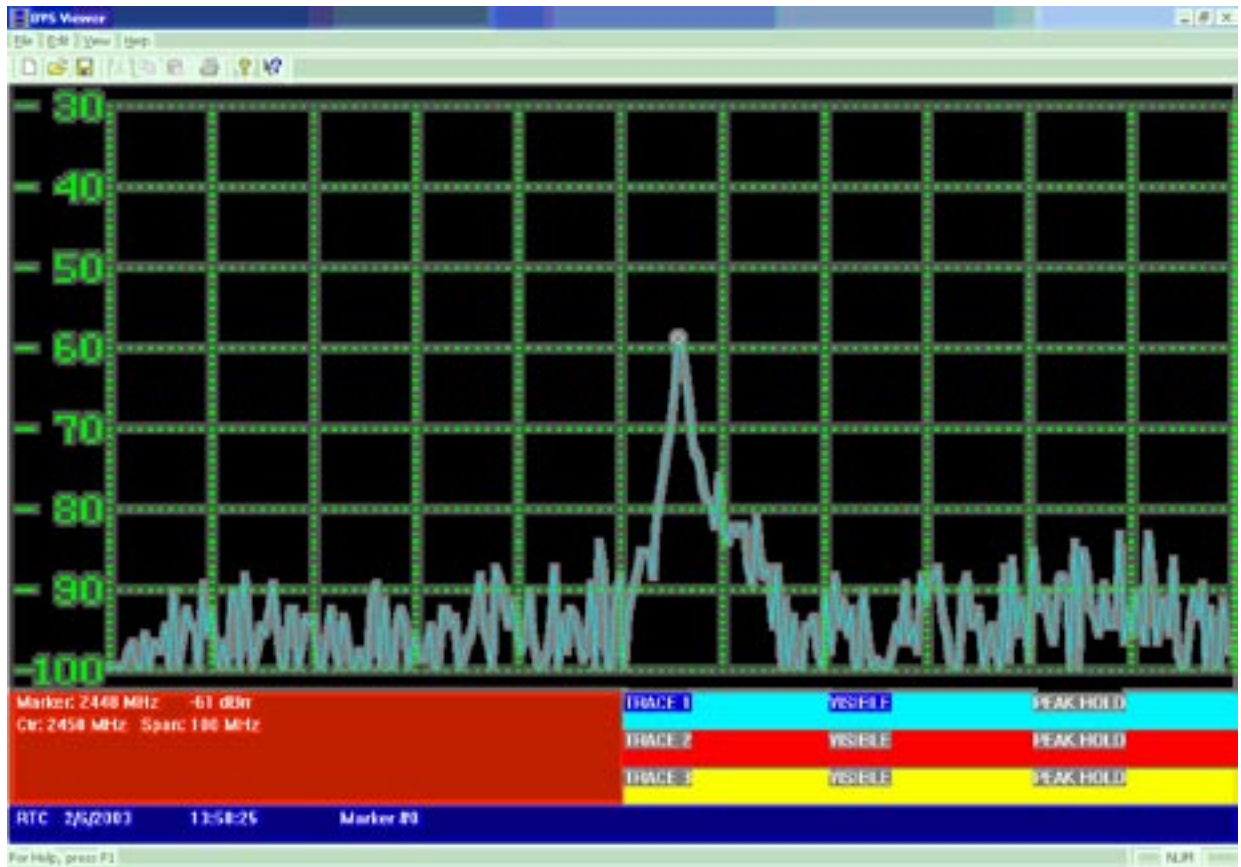
We recommend you send in your Yellowjacket PLUS to be upgraded with the internal GPS option. See accessories page in this manual or contact BVS for more information.

RTC MARKER MODE

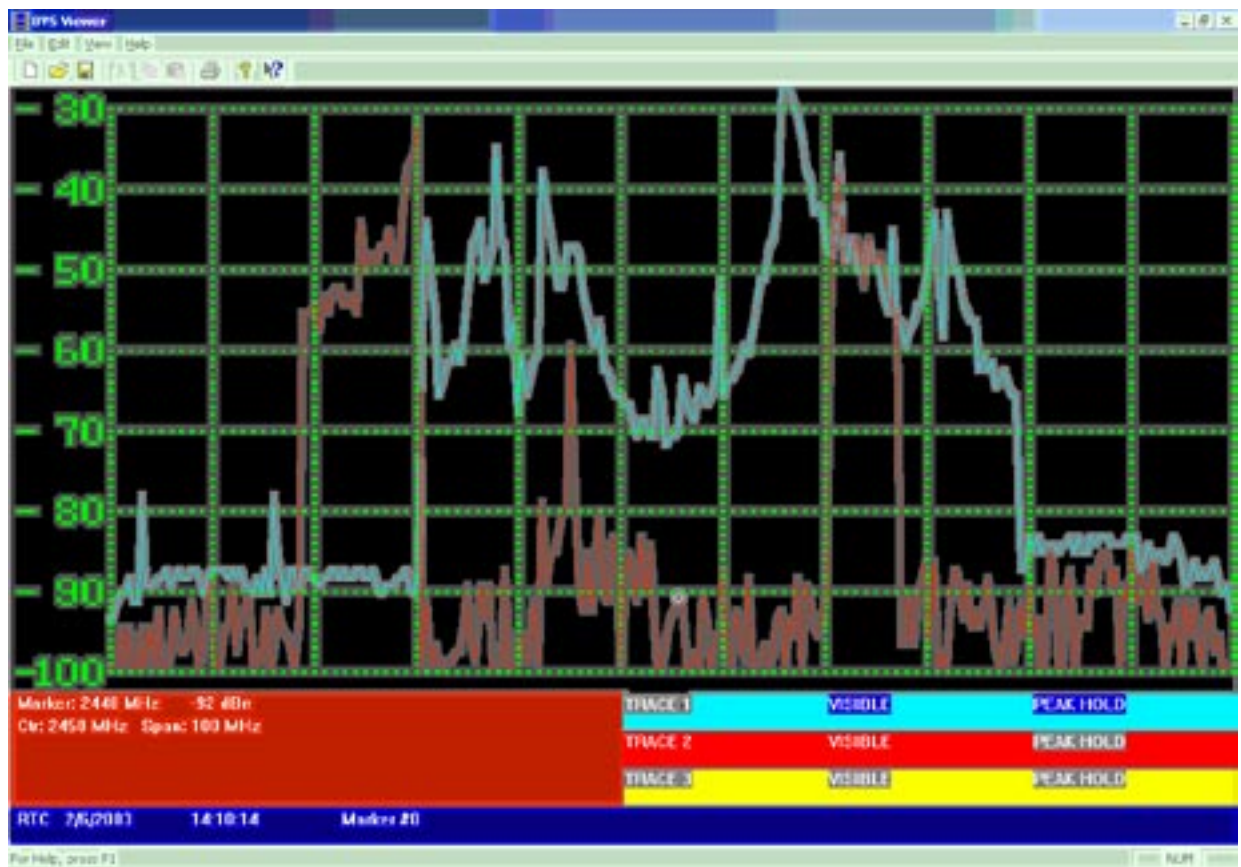
If there is no GPS module attached, the YellowJacket system uses the internal real-time clock of the iPAQ for timing. In addition, there is a marker that starts at 0. By pressing the button to the right of the marker value, the marker increases by 1. These values are stored in any log files created for later conversion by Chameleon. The screen above shows Yellowjacket with an internal GPS receiver detected. The screen below shows the RTC window when no GPS receiver is detected.

```
RTC 1/3/2002 19:37:41 Marker #0 INC
```

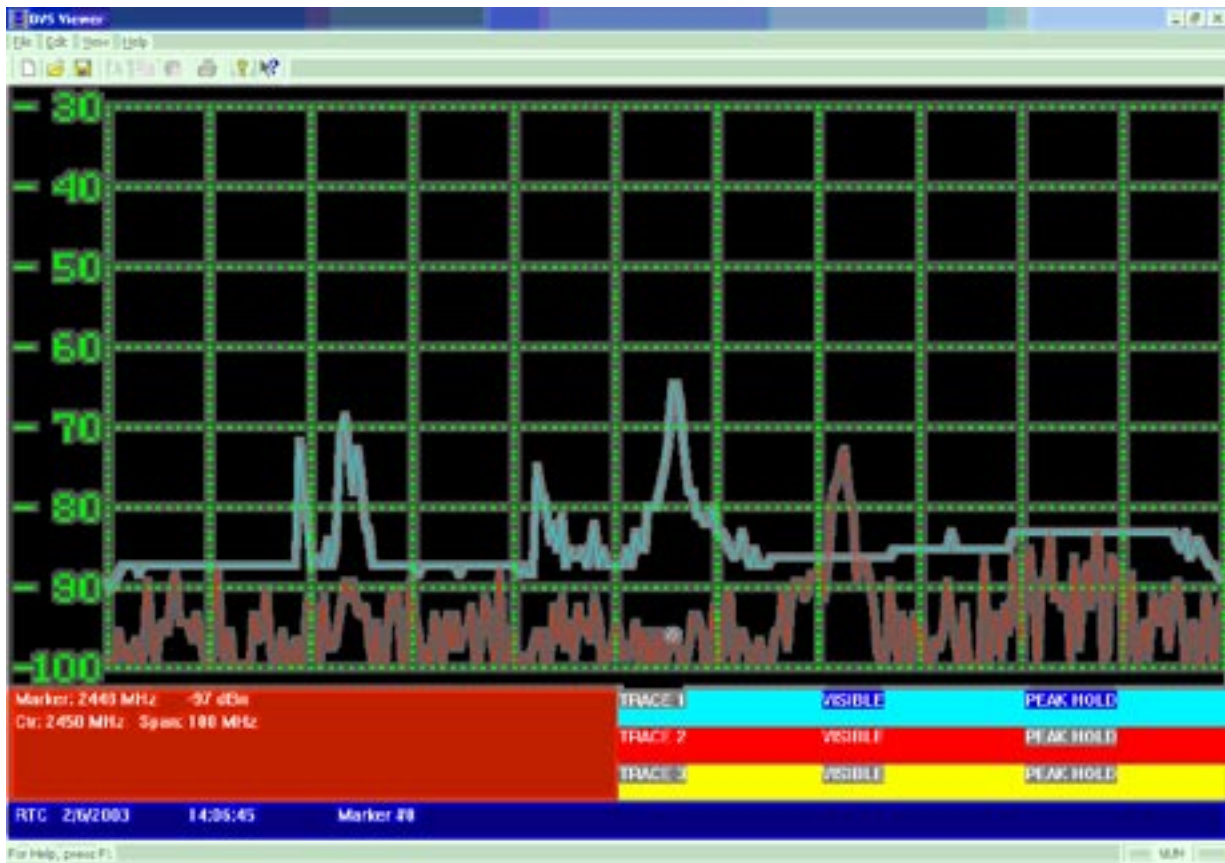
Yellowjacket Typical Spectrum Interference Examples



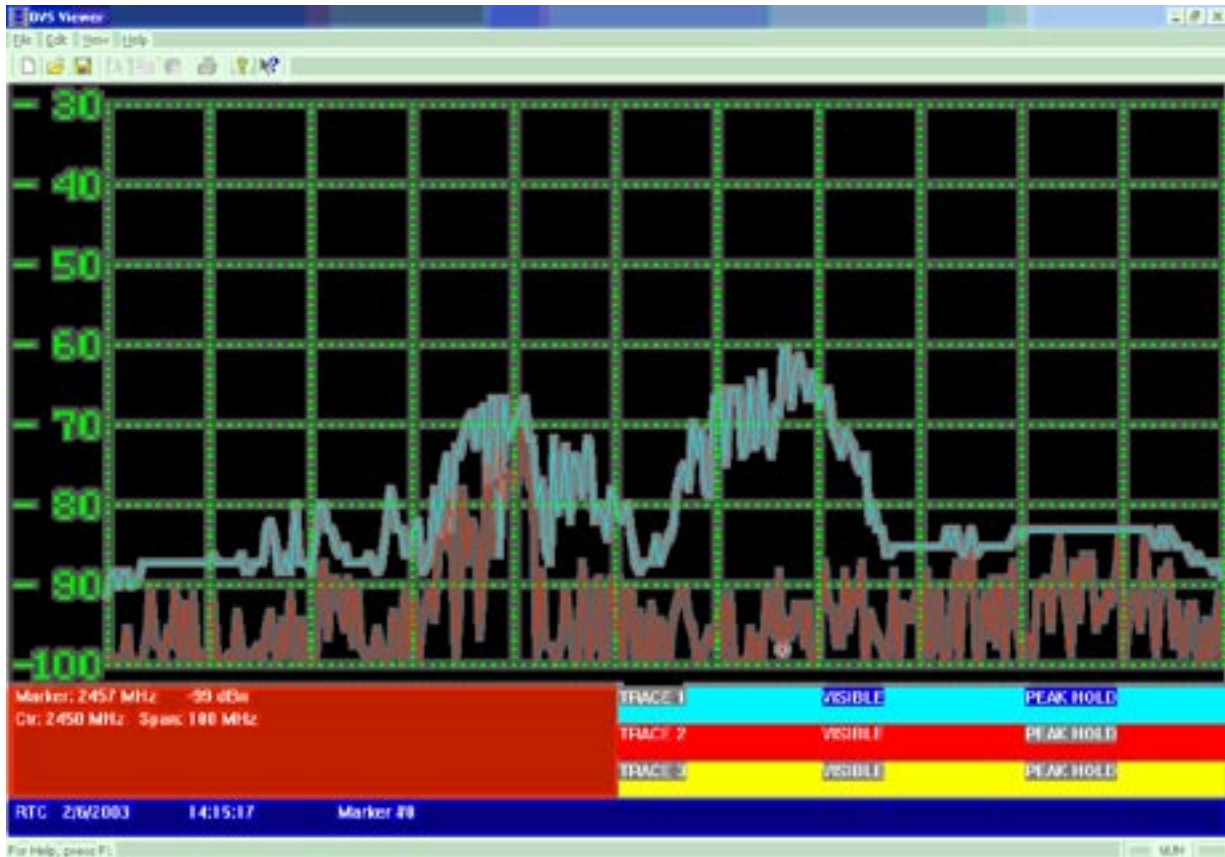
INTERFERENCE Narrow Band - Continuous Wave



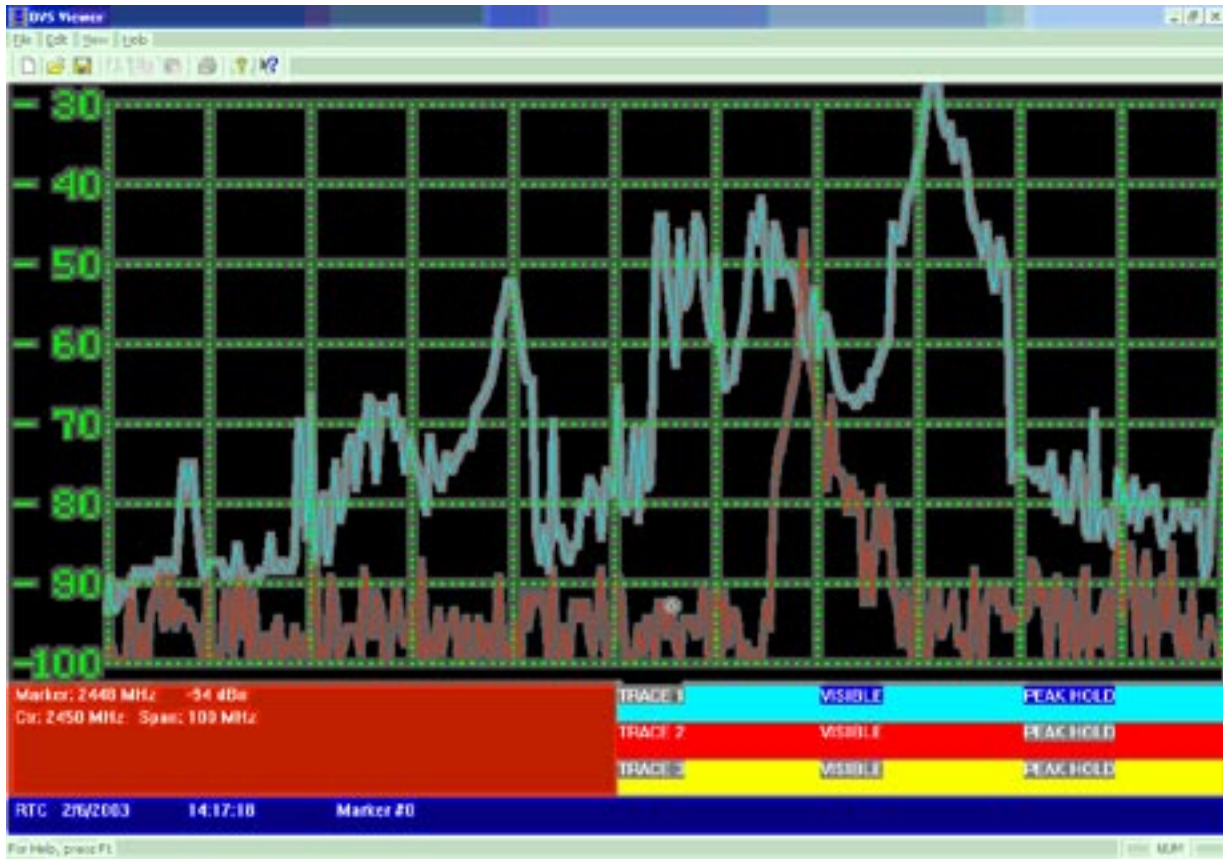
INTERFERENCE Microwave Oven - Blue Trace - Peak Hold Red Trace - Realtime



INTERFERENCE - Frequency Hopper (802.11) Blue Trace - Peak Hold Red Trace - Realtime



802.11b DSSS Signal - Blue Trace - Peak Hold Red Trace - Realtime



INTERFERENCE-Bluetooth frequency Hopper (strong signal strength) **Blue Trace - Peak Hold** **Red Trace - Realtime**

Yellowjacket PLUS Pocket PC Software Flow Chart



Troubleshooting

- **Active Sync not responding** - Be sure that all applicable drivers are loaded onto your PC. Drivers are included with your IrDA USB adapter on a CD-ROM as well as drivers for Windows 2000, 98, XP and Me in a folder on the red BVS software CD labeled "IR".

- **Cannot open Com port or System not responding** – If the Yellowjacket PLUS stops responding, try pressing OK and restarting the application. If the Yellowjacket is still not responding, **press the small reset button** located at the bottom of your iPAQ. Do not force this reset button hard. You will see instant results simply by pushing it gently once. See Compaq's usage instructions for more info on performing a hard reset.

- **Yellowjacket Application Software is missing or corrupted** - You can find the Yellowjacket application the BVS Software CD (red writing) included with your Yellowjacket. Re-install your Yellowjacket software.

Users may experience COM PORT communication problems when moving from Bird's Eye Site Surveyor to Yellowjacket Data Logger in Pocket PC 2002. This may be remedied by simply **pushing the reset switch** on the bottom of the iPAQ. See Bird's Eye manual for more details.

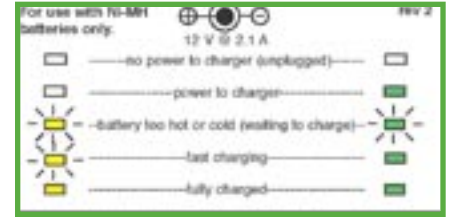
The Yellowjacket SD Backup Installer card has been included as a courtesy. The card may be used to log data files onto. It can also be used on iPAQs that have never been initially set up at the BVS factory, have had files erased or damaged in the ROM or after a hard reset has been performed on an iPAQ. 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.



YELLOWJACKET PLUS BATTERY CHARGING INSTRUCTIONS

Please observe the two different battery status lights. When the **amber status light** on the iPAQ blinks, it is being charged and when it is on solid, it is fully charged. When there is no status light on iPAQ, there is no charge current. The **charger status lights** (label on back of charging station) only indicate the status of the Ni-MH battery pack inserted into the charger itself. Batteries may be charged using the charger station but **NOT ALL AT THE SAME TIME**. Insert battery pack (pull tab up) into charger only when charging the battery pack itself. A battery pack must **NOT** be inserted into charger when trying to power or charge the iPAQ's internal battery or the YellowjacketPLUS' internal battery pack. The included charger may only be used to charge the included Ni-MH battery pack. **NOT** Ni-CAD batteries. 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. Only use Ni-MH batteries with 1600 mAH or more rating. Expect over 500 cycles from each Ni-MH pack. Below are some popular charging configurations.



Configuration 1 - charging YellowjacketPLUS removable battery pack and iPAQ internal battery

When the charger is plugged in and has power to it, this setup will power the Yellowjacket PLUS and simultaneously charge the iPAQ and internal battery pack (pack inside Yellowjacket PLUS unit).



Configuration 2 - charging removable battery pack inside charger

When the charger is plugged in and has power to it, this setup will only charge the battery pack inside the charger station. The Yellowjacket PLUS will operate in this configuration but will receive **NO** current for power or charging internal battery in iPAQ or internal battery pack (inside Yellowjacket PLUS).



Avoid this configuration as it will charge only one battery pack (pack inside charger) and nothing else.



TIPS

BATTERY LIFE

The Grasshopper™, Locust™, Yellow Jacket™ and Yellow Jacket Plus (formally called Scorpion), Beetle™, Cricket™, and Cicada W-LAN receivers use 4 or 5 Ni-MH long-lasting “AA Cells”.

1. Ni-MH batteries do not charge to full capacity the first time they are charged.
2. Ni-MH batteries do not charge to full capacity the first time they are charged after a long period of inactivity, or after a long period of non-use.

Cause:

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

Resolution:

Ni-MH batteries may not charge to full capacity the first time they are charged, or after a long period of inactivity.

The first-time charge of the Ni-MH Rechargeable Battery Pack should take approximately 2 hours. If the Receiver Dock light turns green, indicating a full charge, in less than 2 hours, repeat the charge cycle as follows:

First-time Charge:

1. To begin charging, place the instrument on the Charge Dock. Refer to your instrument’s User Guide for details.
2. When the charge light turns green, remove the W-LAN Receiver from the dock and place back on the dock after several seconds.
3. Repeat steps 1 and 2 three or four times or until the combined charge time is 2 hours.

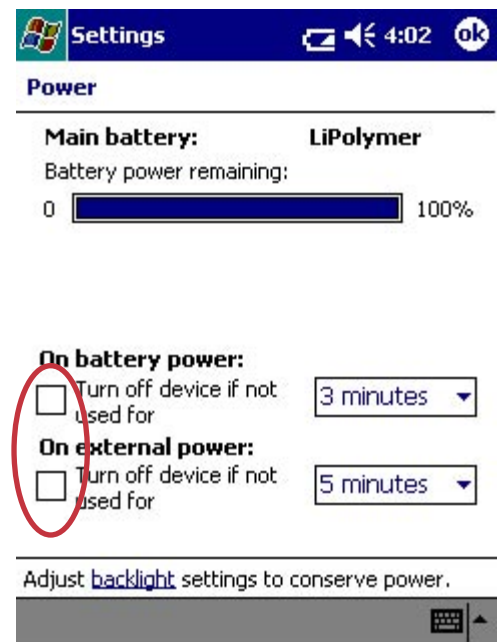
Subsequent charges of the W-LAN Ni-MH Battery Pack will not require multiple charging cycles unless left uncharged for a long period of time (greater than 2 months).

NOTE: In order to prevent the Ipaq from freezing when running YellowjacketPLUS 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 Yellowjacketplus 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.



BVS Viewer Utility

The BVS Viewer Utility allows users of the YellowJacket series of products to display and print snapshots of full spectrum outputs. The following steps are taken to display and print a snapshot.

STEP 1: PRODUCE A SNAPSHOT

While running the YellowJacket or YellowJacket Plus, enter into the fullband spectrum screen. This is the spectrum screen which sweeps the entire band of the receiver.

When the desired output is seen on the display, press the camera icon in the menu on the bottom of the screen. Note the filename of the snapshot that is saved. (For example, a message box would appear that would state that the file was saved as YJ#####.YJS.

This file contains data that will be used to recreate the screen in the Viewer.

STEP 2: COPY FILE TO HOST PC

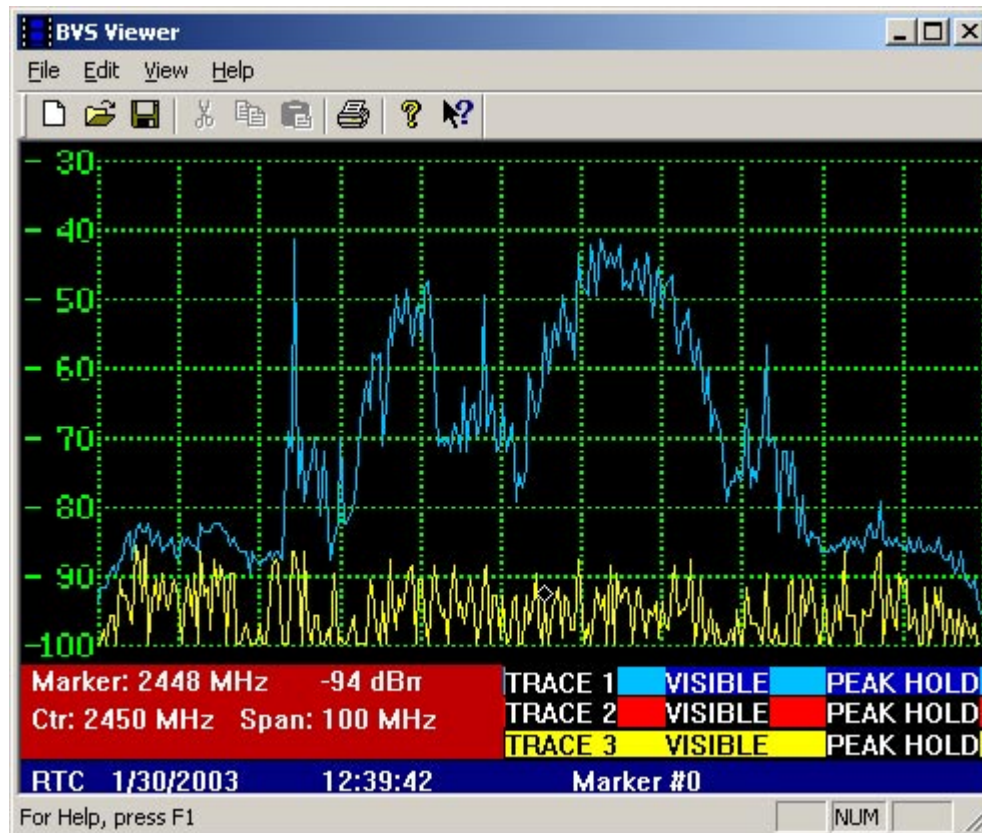
Using ActiveSync, copy the saved data file over to the PC. The file will be in the root directory of the Ipaq.

STEP 3: RUN VIEWER UTILITY

Run the BVS Viewer Utility on the PC. Open the file that was copied from the Ipaq by using FILE/OPEN. You will now view the recreated snapshot.

STEP 4: PRINT OUT THE PICTURE

Use FILE/PRINT to print out a black and white copy of the screenshot on your printer.



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.

YELLOW JACKET PLUS OPERATION WITH DOLPHIN™ SOFTWARE

In order to get your YellowJacket Plus to interface with Dolphin real-time software, you must perform the following steps in the correct order:

- 1. Start Dolphin software and create a geoset with your maps as outlined in the Dolphin manual. Enter the registration code for your hardware in the tools menu as outlined in the Dolphin registration letter in your package.**
- 2. Make sure your YellowJacket Plus is locked into the charging cradle, the infrared device is connected to the USB port, and that the system tray on the host PC shows another infrared device is present.**
- 3. Start your YellowJacket Portal software.**
- 4. Start the YellowJacket Plus software on the YellowJacket Plus Ipaq device.**
- 5. Go to the options menu in Yellowjacket and place a checkmark for 'Dolphin interface'.**
- 6. Go back to the main menu and then enter the AP List screen.**

You should now see GPS information on the YellowJacket Data Logger and on Dolphin.

BVS Dolphin Real-Time Mapping Tool User Manual

Minimum System Requirements

Pentium II

500 MHz

64MB RAM

100MB free on Hard Drive

Operating System: Windows 95, 98, ME, 2000

BVS GPS receiver interface: 1 free serial port:

INTRODUCTION

The Dolphin real-time mapping tool is used as a companion to a BVS Receiver with GPS. This tool is used to display scanned points on a map at the location(s) scanned. The tool receives data from a BVS data logger that communicates with the BVS receiver.

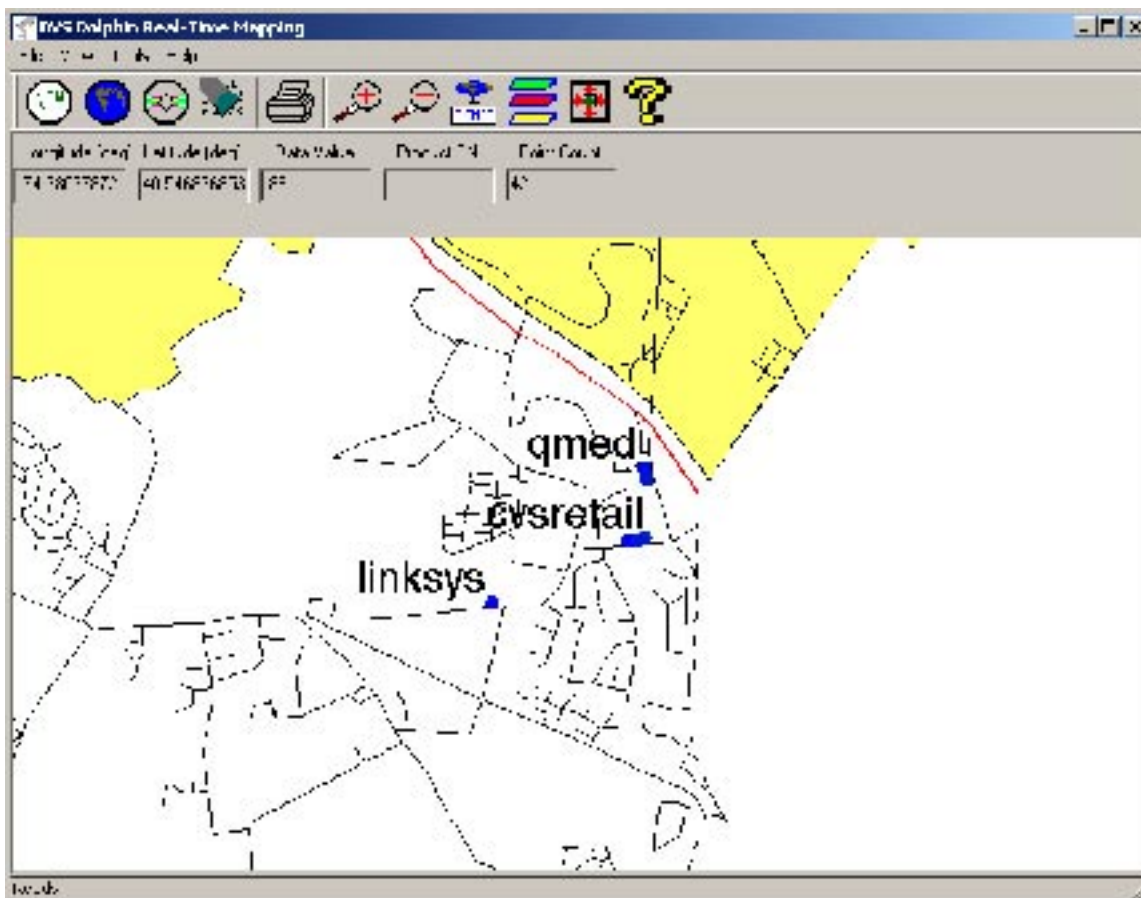


FIGURE 1 – BVS DOLPHIN

OVERVIEW

The Dolphin software receives data from the data logger for the individual product (see Figure 2). For example, if the Fox is the product, it would talk to the Fox Data Logger running on the PC. At the same time, the Dolphin software would also be running on the PC.

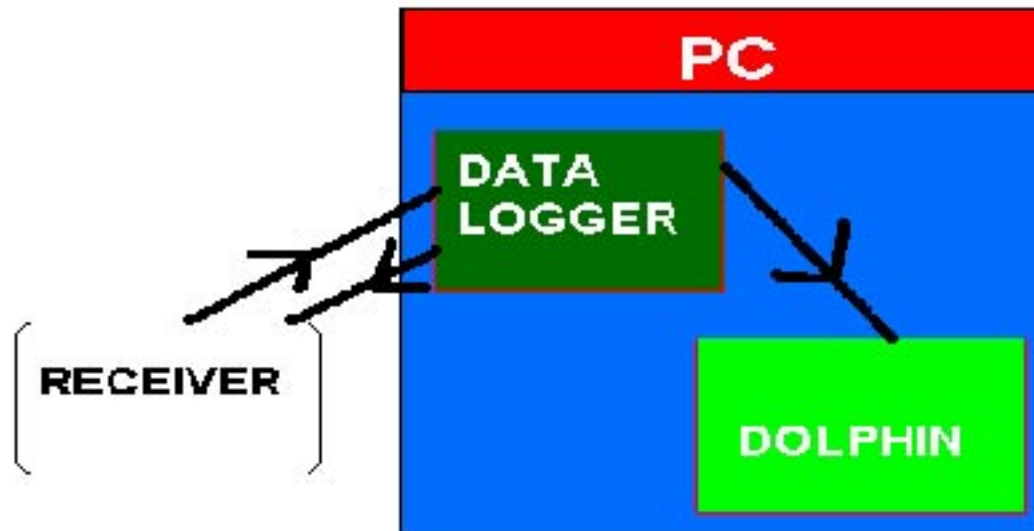


FIGURE 2 – DOLPHIN DATA FLOW

The Fox Data Logger would send data in a Windows message that includes information wished to be stored on the map as well as the GPS coordinates last stored by the data logger from the unit.

The information received would then be displayed on the Dolphin screen in the form of a colored circle. If text were also passed, it would be displayed next to the circle. The color of the circle represents the level of the data value (usually RSSI).

This process continues until the data logger or the receiver is terminated.

QUICK START

The following steps will guide you through setup and use of the Dolphin tool.

1. Make sure you have the product (e.g. Fox) connected to a serial port or USB port and turned on.
2. Make sure the GPS antenna is attached and GPS mode is enabled.
3. Start the Dolphin software. When using the Dolphin for the first time with this product, you must enter the registration code in order to receive data. See 'REGISTRATION' below.
4. Open an existing geoset or create a new geoset. See 'CREATING A GEOSET' or 'OPENING A GEOSET'.
5. Add layers to your geoset corresponding to the appropriate maps of the area that you are surveying.
6. Start the data logger for the product. Make sure any necessary steps to enable Dolphin connectivity from the data logger have been taken. Some products don't require any steps but others have an option to check for Dolphin connectivity.
7. You should now see data populating the maps. Some products output data at different rates. Some 802.11b products only produce data when a new AP is found.

REGISTRATION

When using Dolphin with a product for the first time, the product must be registered with Dolphin. There is a registration letter that ships with Dolphin that shows the registration code to use to work with the

product purchased. This code is matched against the serial number of the unit for verification. Use the **TOOLS/PRODUCT REGISTRATION** menu option to enter the correct code. This only needs to be done once and is stored in a file for recall on future uses.

DISPLAY FIELDS

Certain fields are displayed as data records come into the Dolphin system. These fields are (from left to right):

Longitude (in decimal degrees)

Latitude (in decimal degrees)

Data Value (usually RSSI in dBm)

Product Serial Number

Point Count (current count of points plotted on the map)

These always reflect the last data record to come into the Dolphin system.

CREATING/OPENING A GEOSSET

When starting up the Dolphin system, a Geoset must be open in order for the data points coming in to be properly attached to map layers. You can open an existing geoset or create a new geoset.

An existing geoset will have the map layers already set up. When creating a new geoset, the layer dialog will appear. Choose layers from the maps that were purchased for use with the Dolphin. There will already be a 'DOLPHIN' layer. **DO NOT REMOVE** this layer. This is needed to store the data points.

After choosing the map layers, the geoset is now ready to accept points.

NOTE: The maps may not be visible until the first data point comes in to center the coordinates.

SAVING A GEOSSET

Pressing the toolbar button that looks like a spinning CD allows you to save the geoset loaded. Save it to any filename for use in later Dolphin sessions.

NOTE: Data points will not be saved. Only the map layers.

CLEARING DATA POINTS

If you wish to clear the existing data from the geoset at any time, use the toolbar button that appears to be an eraser wiping off data. The next point taken in will be considered the first point again.

PRINTING A MAP

You may print out a copy of the map by pressing the printer icon on the toolbar.

ZOOM MODE

You may zoom in or out on the map by selecting the magnifying glass icon with a '+' sign for zooming in or a '-' sign for zooming out. This will turn the cursor into the appropriate magnifying glass. Simply click on the area to zoom in/out on and the map will adjust accordingly.

SAVE AS BITMAP

The map may be exported to a bitmap format by selecting the icon on the toolbar with a globe on the top and the word 'BITMAP' on the bottom.

LAYER DIALOG

The layer dialog is used to add or remove layers from the geoset. Layers can include landmarks, streets, water, etc. Choose the layers for the appropriate driving area from the maps that were purchased for use with the Dolphin.

RECENTERING FREQUENCY

The re-centering frequency icon looks like four arrows heading in from a square on the toolbar. This lets you choose how often you would like the map re-centered on the current point.

Depending on the rate of data coming into the Dolphin, the re-centering of the map may start to slow down the system and/or cause flicker. This option allows you to limit the number of times the screen is re-centered.

Dolphin / Yellowjacket PLUS Signal Strength Legend



Networking Basics

Packets and traffic

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

Hardware addresses

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

IP addresses

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

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

Rules for Sending Information (Protocols)

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

Networking Devices:

Bridges

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

Routers

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

DNS (Domain Name Server)

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

Networking Terms:

TCP/IP (Transport Control Protocol/Internet Protocol)

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

DHCP (Dynamic Host Control Protocol)

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

PPP (Point-to-Point Protocol)

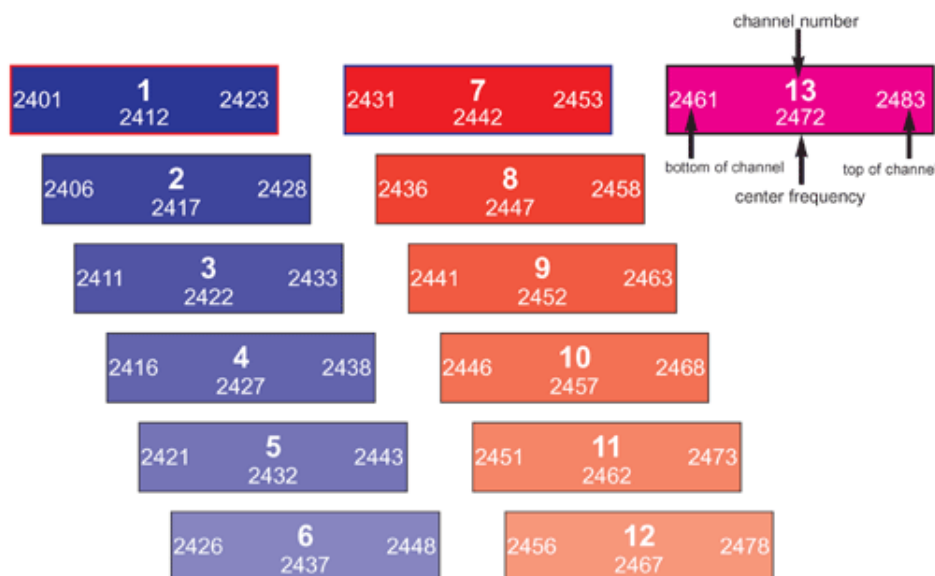
PPP is the most common protocol for providing IP services over a modem.

NAT (Network Address Translation)

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

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

DSSS INTERNATIONAL CHANNEL CHART




Accessories for your

YELLOWJACKET PLUS




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


GPS Receiver
Internal 12-channel
GPS receiver
(BVS factory installed)
P/N YJP-GPS
\$ 1000.00



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



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




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



Ni-MH Battery Charger with
switching transformer
P/N NIMH-000
\$ 105.00



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



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



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



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



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

Hive™



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

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wireless products **BERKELEY**
VARITRONICS
SYSTEMS

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 client 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.

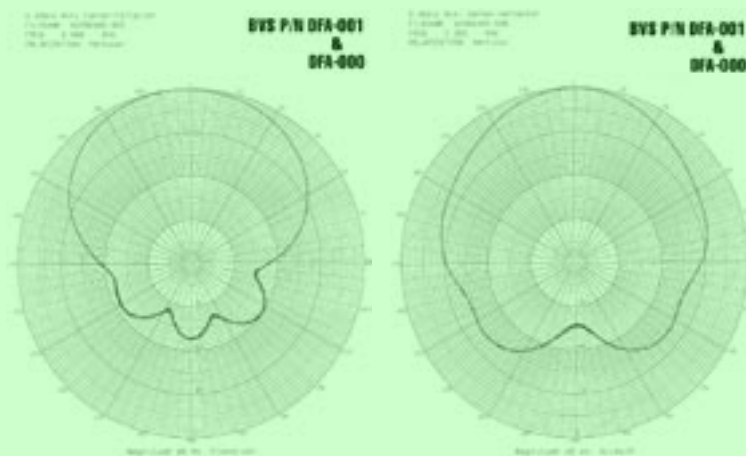
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines.

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.

2.4 GHz Direction Finding Corner Reflector



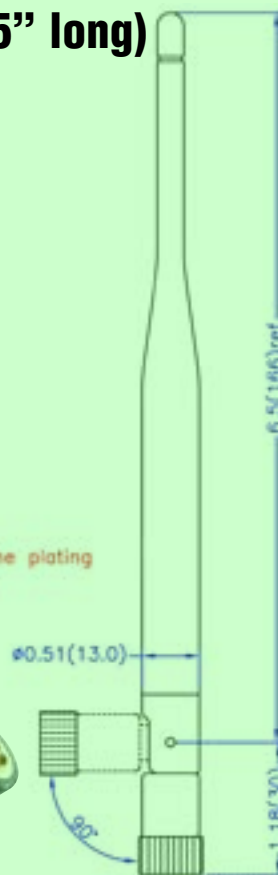
2.4 GHz Omni-Directional (7.5" long)

Electrical Properties:

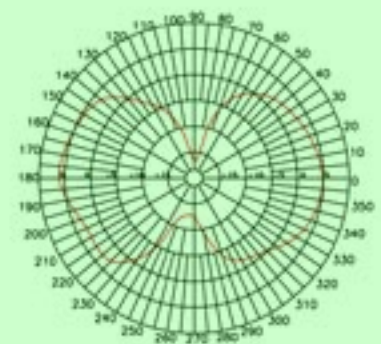
Frequency Range: 2.4~2.5 GHz
 Impedance: 50Ω nominal
 VSWR: <2.0:1
 Gain: 5 dBi
 Radiation: Omni
 Polarization: Vertical

Mechanical Properties:

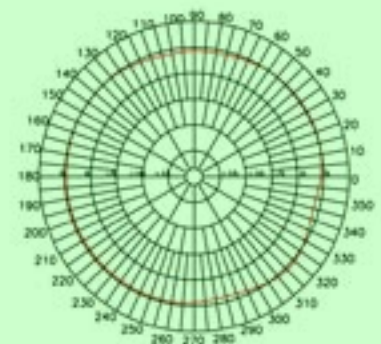
Connector: SMA Plug(male)
 Material:
 Whip: Polyurethane(Black)
 Swivel Mechanism: Polyurethane(Black)
 Connector: Brass with black chrome plating
 Operation Temp.: -20°C to +65°C
 Storage Temp.: -30°C to +75°C



E-Plane Pattern @ 2.45GHz



H-Plane Pattern @ 2.45GHz



YELLOWJACKET™ PLUS

802.11b Wi-Fi Analysis System



Yellowjacket™ PLUS is a wireless receiver system designed specifically for sweeping, analyzing and optimizing 2.4 GHz Wireless Local Area Networks. The instrument measures coverage of DSSS networks which operate on the **IEEE 802.11b** standard allowing the user to determine the AP (Access Point), PER (Packet Error Rate), Multipath (Ec/Io) and RSSI signal levels aiding in locating the hub and access points of neighboring WLANs. **Yellowjacket™ PLUS** functions as a complete WLAN analysis system housing both the PocketPC® Windows CE® environment along with Berkeley's precision receiver technology.

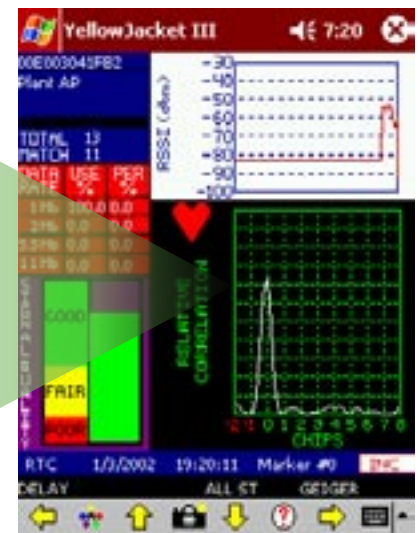
Optional Direction Finding Antenna allows YELLOWJACKET PLUS users to pinpoint any AP or Client Card.

FEATURES:

- Measure 2.4 GHz coverage for direct sequence (DSSS) WLANs (IF wideband 22 MHz) within the **IEEE 802.11b** standard
- Receive, filter and process DSSS studies all in Pocket PC®
- 64K color backlit display for real-time color-coded signal analysis
- Touch screen, Windows® PDA-like interface using a stylus pen
- Integrated HP IPAQ® PocketPC®
- Measures Packet Error Rate; data rate percentage breakdowns Multipath and RSSI; narrow band & total channel power
- Complex Access Point / Station list analysis including WEP, RSSI, Multipath, PER, Absolute Channel, Survey Sweep and SSID
- Optional internal 12-channel GPS receiver available
- Optional Dolphin™ Real-time GPS mapping software available
- Removable battery pack (5 AA Ni-MH cells) and also can be powered from 12VDC car cigarette lighter

Measurements:

- MAC
- SSID
- PER (1,2,5.5,11Mbit)
- Total Channel Power
- Narrowband RSSI
- Multipath in Chips
- Multipath in nsec.
- WEP
- Survey Sweep
- Absolute Channel
- LAT/LONG/ALT/UTC via GPS



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



YELLOWJACKET™

PLUS



802.11b Wi-Fi Analysis System

BANDS SUPPORTED	ISM: 2.400-2.495 GHz
RF SENSITIVITY (Wide Band)	-20 to -90 dBm
RSSI MEASUREMENT (Narrow Band)	-30 to -90 dBm @ 343.75 kHz resolution bandwidth
TUNING INCREMENTS	Tunes 11 USA channels & 3 international channels

PACKET PREAMBLE DEMODULATOR and ANALYZER:

Multipath Measurement and Graphical Display

CORRELATED POWER MEASUREMENTS:

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

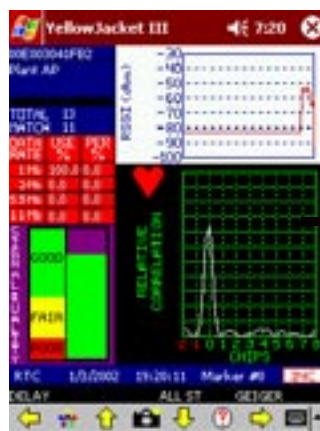
RATIO

GENERAL SPECIFICATIONS

IF Bandwidth:	Wideband 22 MHz
Stability:	± 2.5 PPM Temp range 32° to 120 F°
Antenna:	SMA Female 50 ohm
Controls:	touch-screen Windows CE® environment
Warm Up Time:	< 3 minutes
Power:	Internal battery pack (5 AA Ni-MH batteries)
Weight:	3 lbs.
Dimensions:	2" H x 4" W x 9" L (water resistant, high impact ABS plastic case)



When coupled with optional internal GPS receiver and Dolphin™ mapping software, Yellowjacket PLUS™ becomes a powerful, real-time 802.11 W-LAN mapping coverage tool for WISPs, Wardriving and Wi-Fi analysis. Perform drive-studies on campus, locate hackers and time stamp sources of interference all in REALTIME all in YellowjacketPLUS™.



YELLOWJACKET FEATURES:

SPECTRUM MODE:

- Full spectrum (14 channel) sweep
- Single channel zoom
- Peak Search and Hold
- 3 distinct waveform signal traces

AP ANALYSIS:

- Survey sweep of channels for all APs
- "Q" Factor signal strength quality meter
- Individual channel analysis of APs or STAs
- Absolute channel SSID
- AP manufacturer's ID
- WEP detection
- RSSI for each AP/STA in true dBm
- Multipath in chips and nanoseconds
- PER breakdown/usage for 1, 2, 5.5 and 11 Mbit/Sec.
- "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"



Yellowjacket PLUS™ includes a rugged travel case, 2.4 GHz antenna, two Ni-MH battery packs, charger base, IrDA USB communicator link and optional Direction Finding Antenna.