**Operation Overview**

The BA/RCV(418,900)-USB is a wireless receiver designed to listen to all BAPI wireless transmitters and send the ASCII data payload via USB port to a customer provided computer or BAS system. The receiver comes in 2 standard configurations to receive transmitters at 418MHz or repeated signals at 900MHz.

The unit BA/RCV418-USB is powered over the USB port and the BA/RCV900-USB is powered by a separate plug-in power supply. Both have 79” extension cables to a dipole antenna. The ASCII data can be directly interpreted by any BAS control computer as documented below. BAPI can provide our Wireless Monitoring System (BA/WMS) to interpret the serial data for easier interface from our Structured Query Language (SQL) data base.

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>BA/RCV418</th>
<th>BA/RCV900</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage:</strong></td>
<td>RCV418: 5V from computer USB cable</td>
<td>RCV900: 6-24VDC ±0.3V</td>
</tr>
<tr>
<td></td>
<td>(Opt. plug-in power supply available)</td>
<td></td>
</tr>
<tr>
<td><strong>Power:</strong></td>
<td>70mA</td>
<td></td>
</tr>
<tr>
<td><strong>Wiring:</strong></td>
<td>1 - USB type B female jack</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 - 2 meter USB cable, type B to type A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 - Female power jack</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 - Antenna</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 pin terminal, not used</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(only on RCV418 model)</td>
<td></td>
</tr>
<tr>
<td><strong>Power Supply:</strong></td>
<td>RCV418: Optional (order separately, BA/PXFR-12V)</td>
<td>RCV900: Transformer (included)</td>
</tr>
<tr>
<td><strong>Indication:</strong></td>
<td>Red Power LED, blinks during reception</td>
<td></td>
</tr>
<tr>
<td><strong>Antenna:</strong></td>
<td>RCV418: 6.5” Dipole w/79” cable (Hard wired)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCV900: 3.78” Dipole w/79” cable (MMCX screw connector)</td>
<td></td>
</tr>
<tr>
<td><strong>Receiver Sensitivity:</strong></td>
<td>RCV418: 418MHz @ -112db</td>
<td>RCV900: 900MHz@ -110db</td>
</tr>
<tr>
<td><strong>Typical Reception:</strong></td>
<td>RCV418: 100ft, Line of sight</td>
<td>RCV900: 1000ft, Line of sight</td>
</tr>
<tr>
<td><strong>Communication:</strong></td>
<td>USB Serial</td>
<td></td>
</tr>
<tr>
<td><strong>Payload:</strong></td>
<td>ASCII command/response</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient:</strong></td>
<td>Temperature 32 to 158°F (0 to 70°C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humidity: 10% to 90%RH, Non-condensing</td>
<td></td>
</tr>
<tr>
<td><strong>Material:</strong></td>
<td>ABS Plastic</td>
<td></td>
</tr>
<tr>
<td><strong>Plastic Rating:</strong></td>
<td>RCV418: UL94V-5A</td>
<td>RCV900: Not Rated</td>
</tr>
<tr>
<td><strong>Agency:</strong></td>
<td>Part 15 of the FCC rules</td>
<td></td>
</tr>
<tr>
<td><strong>Mounting:</strong></td>
<td>Desk or shelf mounted</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions:</strong></td>
<td>RCV418: Oval - 4”W x 3”L x 1.38”H (101.6 x 75.2 x 35mm)</td>
<td>RCV900: Box - 2.6”W x 4.26”L x 1.22”H (66 x 108 x 28.4mm)</td>
</tr>
<tr>
<td><strong>Software:</strong></td>
<td>Drivers: USB communication driver software</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discovery: Made to find wireless receiver IP address</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BA/WMS-101: Basic wireless monitoring system</td>
<td></td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.

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Wireless Receiver W/ USB Output
BA/RCVxxx-USB
Installation and Operating Instructions

Wiring & Termination

BA/RCV418-USB Connections:
Wiring the BA/RCV418-USB consists of plugging in cable connectors in the step sequence below.
(See Figure 6 below)

Follow the steps in order below: (The computer should be “on”)

Step 1 The antenna wire is attached and comes out the rounded back of the receiver. Mount as high as practical.
Step 2 Load BAPI software CD so USB drivers can be loaded
   2a Place the BAPI software CD disc into your disc drive. The disc will start to load automatically and display on the BAPI software screen.
   2b At the bottom of the BAPI software menu click on “Exit”. Leave the disc in the CD drive.
Step 3 Power up the USB receiver by following 3a or 3b below. Follow 3a if a separate power supply is purchased, or go to 3b if power is from the USB cable.
   3a If a plug in power supply is used, plug in the round power plug into the receiver face plate called “6-24VDC” and the plug the power supply into a 120VAC receptacle. (A UPS power source would be ideal). Purchase the power supply separately from BAPI as the BA/PXFR-12V. (Go to step 4 below)
   3b Plug in the provided USB cable to the face of the receiver and plug the other end into an open jack of the computer. Power is provided over the USB connection. If the USB port on the computer cannot provide the power for the receiver then a separately purchased plug in the power supply may also be used as described in 3a above (Go to step 4b below).
Step 4 Computer communication connections. (USB Direct to computer)
   4a Plug in the provided USB cable into the face of the receiver and plug the other end into an open jack of the computer. (This may have been done in step 3a above. If not plug it in now)
   4b Your computer should detect the new hardware and will display a screen called “Found New Hardware Wizard”.
   4c Follow the directions of the Wizard to find the “USB Driver” files on the BAPI Software CD disc.
   4d Complete the Wizard installation.
   4e The BAPI USB communication drivers should now be loaded.

Note: If there is a transmitter in the area, the computer should now be receiving wireless signals and outputting data from the USB connection in ASCII format.

Step 5 No connections should be made to the green “RS485” terminals, as they are not used. They should be left disconnected.

Fig. 6: BA/RCV418-USB Cabling and Layout

Specifications subject to change without notice.
BA/RCV900-USB Connections:
Wiring the BA/RCV900-USB consists of plugging in cable connectors in the step sequence below. (See Figure 7 below)
Follow the steps in order below: (The computer should be “on”)

Step 1
Action
The antenna wire is screwed into the rear and should be mount as high as practical.

Step 2
Power is from the provided plug in the power supply. Plug in the round power plug into the receiver face plate called “6-24VDC” and plug the power supply into a 120VAC receptacle. (A UPS power source would be ideal)

Step 3
Load BAPI software CD so USB drivers can be loaded
3a Place the BAPI software CD disc into your disc drive. The disc will start to load automatically and display on the BAPI software screen.
3b At the bottom of the BAPI software menu click on “Exit”. Leave the disc in the CD drive.

Step 4
Computer communication connections. (USB Direct to computer)
4a Plug in the provided USB cable into the face of the receiver and plug the other end into an open jack of the computer.
4b Your computer should detect the new hardware and will display a screen called “Found New Hardware Wizard”.
4c Follow the directions of the Wizard to find the “USB Driver” files on the BAPI Software CD disc.
4d Complete the Wizard installation.
4e The BAPI USB communication drivers should now be loaded.

Note: If there is a transmitter in the area, the computer should now be receiving wireless signals and outputting data from the USB connection in ASCII format.

Computer Set-up

Computer Serial Port Settings: (For the USB Receiver)
These parameters are normally set by your computer automatically as the devices are accessed. However, if your serial device does not work properly you may need to set them manually by following the steps below in the Microsoft operating system “Device Manager”.

Note: The serial receiver must be connected to properly perform the steps below.

Step Description
Step 1 Click on the Microsoft “Control Panel” from the “start” button in the lower left of the desk top.
Step 2 Click on “Administrative Tools” or “Performance and Maintenance” then “Administrative tools” (The Microsoft screen view dictates the buttons presented in step 2)
Step 3 Click on “Computer Management”
Step 4 Click on “Device Manager”
Step 5 Look for the “Ports (COM & LPT)” directory and click on the + sign to display all the ports used.
Step 6 Click on the Port your receiver is using. (This is usually “USB Serial Port COMx” for the USB receiver)
Step 7 Right click to open a selection of commands and then left click to select “Properties”.
Step 8 A window will appear with a number of setup properties along the top. Click on “Port Settings”
Step 9 Fill in each field with the following settings from the pull down menu’s.

Bits Per Second (BAUD): 19200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None
Step 10 Click on “OK” (You are done)
Operational Test

Opening up your computer HyperTerminal program is the quickest way to see if the receiver is getting data and sending it to your computer.

Reception Verification Test Steps:

Step 1  First the receiver and computer must be turned on.
Step 2  A transmitter must be powered and within range.
        (If the receiver is 900MHz than a repeater must also be powered and within range)
Step 3  Start HyperTerminal in your computer. (See Ins-Ops 24801 if directions are needed.)
        (This document is available from the BAPI website or from the main BAPI Software disc screen.)
4.    Enter the pertinent data in the following menu’s
        4a Select any “Name” and then “OK” (Any name will do)
        4b Connect using: Pull down menu to select the COM port the USB receiver is using. Then “OK”.
            Example: COMx, x = to the number the USB port is on.
        4c Fill in each field with the following settings from the pull down menu’s.
            Bits Per Second (BAUD): 19200
            Data Bits: 8
            Parity: None
            Stop Bits: 1
            Flow Control: None
        4e Click “Apply” then “OK” and you should be receiving wireless data packets on the HyperTerminal window screen indicating good reception and a good receiver.

Note: Only one program can look at the COM port at the same time. Other programs such as the Wireless Receiver System must be turned off for HyperTerminal to receive data on the same COM port.

General Verification Information: You may also use the Wireless Receiver Software to verify the receivers operation. See Ins-Ops 24861 Wireless Receiver System Software for installation details (Software included).

Special Multi-Receiver System Applications

In some systems multiple receivers may be employed. Please be aware of the following limitations or caution notes.

1 Each receiver will require a unique COM Port address.
2 If the contractor writes his own monitoring software and there are multiple receivers, be aware that there is a very good possibility that duplicate wireless receptions with the same duplicate data could be introduced into the system from separate receivers.
3 If BAPI BA/WRS-101 Data Base Software is employed to monitor the receivers there must be separate software packages running in individual computers.
4 BAPI BA/WRS-101 Data Base Software is not designed to monitor multiple receivers.
5 The BAPI BA/WRS-101 Data Base Software is a stand-alone package and cannot be combined with other BAPI Data Base packages.
6 The BAPI BA/WRS-101 Data Base Software can only monitor one wireless receiver. Multiple receiver monitoring is not possible from one software package.
7 Multiple BAPI BA/WRS-101 Data Base Software packages will be required to monitor multiple receivers but must be loaded into separate computers.
8 Design Rules of Thumb using BAPI Software.
    A Only use one wireless receiver per computer.
        (Only 1- BA/RCVxxx-ENET or BA/RCVxxx-USB or BA/RCVxxx-RS232 per computer)
        (Custom customer software may relieve this limitation.)
    B Only load and use one set of BAPI software packages in a single computer.
        (1 set- BA/WRS-101, BA/FPS-101 BA/WMS-101)
Wireless Receiver W/ USB Output
BA/RCVxxx-USB

Installation and Operating Instructions

Diagnostics

The lamps on the receiver have specific meanings.

Red LED
  Steady on signifies power is applied.
  Steady with an intermittent blink signifies when each RF reception is made.

Dual Green LED’s
  Blinking signifies an active USB connection.

Possible Problems

No Red LED
  Check your power connections including breakers

No Green LED
  Check the plug in transformer and receiver power plug

No reception (Red LED not blinking)
  Check antenna placement. (not inside or behind a metal enclosure or wall)
  For a 900MHz receiver check if the repeater is installed and powered.
  Check to see if any sensors are transmitting (Internal LED blinks)
  Move transmitters/repeaters into range (shorten the distance)

Application Protocol

Below are the general descriptions of the BAPI payload and data packets as they come out of BAPI wireless receiver using the USB port communication. The serial data uses standard ASCII Hex protocol for easy independent program interface. The in depth data packet descriptions can be found on the BAPI web site in the wireless section under BAPI Wireless Data Packet Specification.

Data packet Format:

The data packet is 29 characters in length and in ASCII Hex.

IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>

Abbreviations and Definitions:

Payload: All information transmitted in the wireless RF signal
Data Packet: The data portion of the information in the wireless payload.
Enumerator: The number in the data packet telling the interpreting program how to interpret this data packet for range and engineering units.

ID= Device ID: This identifies the type of device transmitting in the data packet
SS= Serial Number: This is the serial number transmitted in the data packet.
nn= Enumerator 2: This ID’s the engineering units and range of data field 2.
ee= Enumerator 1: This ID’s the engineering units and range of data field 1.
aa= Data field 2: This is the 1st transmitted data value in the payload.
AA= Data field 1: This is the 2nd transmitted data value in the payload.
CC= CRC Error check: Communication error check
KK= 256 sum of data: Communication checksum of the binary data.
<CR> Carriage Return End of DATP packet.

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