Introducing the KE7ATE PCR-1000 Signal Capture and Analysis Software

Breathe new life into a classic black box receiver.

One of the most desirable things about the PCR-1000 receiver compared to more recently released versions of this receiver is its inexpensive aftermarket price. The PCR-1000 has excellent signal to noise ratio, making it a very desirable computer controlled receiver. While many of these receivers are still in use, software to control the IC-PCR1000 is generally dedicated only to controlling it and tends to lack some of the more useful features such as a spectrum display, time domain signal display and station logging. I have found much of the available software is cumbersome or inconvenient to use, including the supplied manufacturer software. Want more?

Choose between two types of s-meters, enter frequencies on the fly in the frequency display and graphically see your volume, squelch, BFO and IF Shift settings

Full featured controls to set the audio, squelch, BFO and IF Shift features of the IC-PCR1000

Unique Frequency and Step controls

Additional up and down 1 MHz and 1 kHz frequency shifting controls

Standard control of the AGC, Noise Blanker, VSC and Attenuation settings

Enter frequencies on the fly using the direct entry keypad

Adjust your filter settings according to the type of signal you are monitoring

Standard control of receiving mode

Turn the Interface on or off, set your startup configuration or get some help with the controls

Switch the main display between spectrum, signal or frequency scan displays and open the logging window to capture the frequency, mode, signal strength.

Select between three type of spectrum displays - Line (as shown), Dot or Bar

A variety of scanning controls are displayed depending upon if you are in signal or frequency scan modes

Expands the interface to include some powerful spectrum capture, signal mapping and antenna control options (optional hardware required)

Introducing… the Explorer Tools

View real-time, record and view saved waterfall spectrum displays of received signals. Five different color schemes to choose from.

Expand your antenna connector using optional hardware and these easy to use antenna controls

View peak frequencies in the spectrum display

Map an existing RF Source such as a transmitter site using GPS and this powerful signal plotting software

View real-time audio using the oscilloscope display and record real-time audio using the included audio recorder or take the breaks out of two-way comms using the signal threshold audio recorder

Diversify your IC-PCR1000 and you diversify your world of listening.
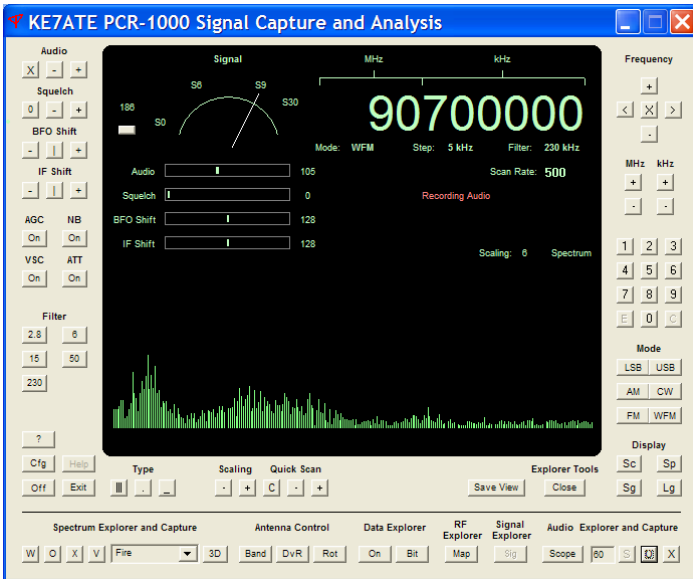
Not only having a pleasant and simple interface, the KE7ATE PCR-1000 Signal Capture and Analysis Software can enhance the IC-PCR1000 receiver in ways only new black box receivers have just now began to address, such as Antenna Phase Diversity Reception and automatically selecting a specific antenna for a specific range of frequencies. With a little bit of extra hardware and a spare serial port, you can have features only more expensive receivers provide. It includes features that are designed to enhance the already impressive IC-PCR1000. This is the software that should have been included with your IC-PCR1000.
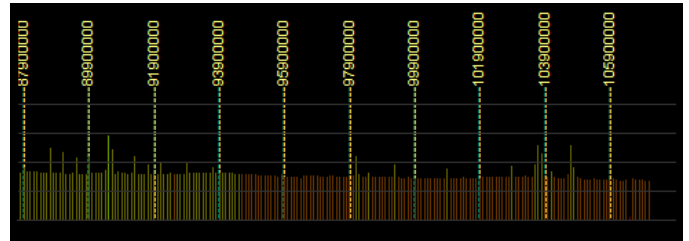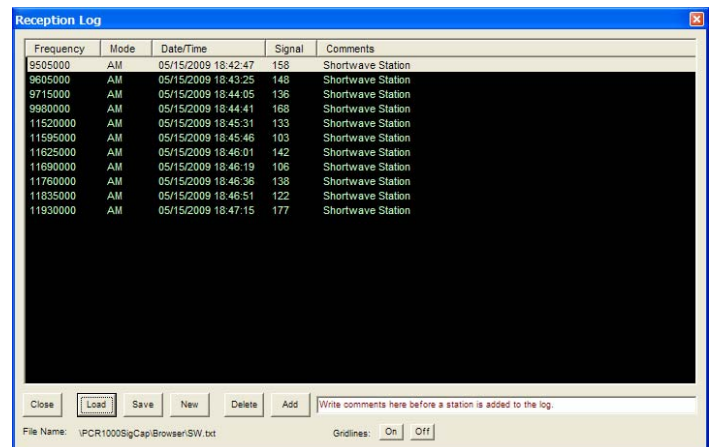

Easy logging of received signals lets you focus on what you enjoy the most…Listening

Built on ideas developed in my VR-5000 software, the KE7ATE PCR-1000 Signal Capture and Analysis Software takes another step towards providing a more powerful listening and monitoring radio interface. Simplifying the tools you need as a listener, improves your monitoring activities, and lets you focus on more interesting aspects of the information you are receiving. The KE7ATE PCR-1000 Signal Capture and Analysis Software includes improved logging features, while simplifying the logging activity, letting the computer do some of the work filling in the blanks.

Add a station with the click of the mouse and the point and click interface makes the recall of saved stations and logs easy and convenient. Logs may saved and organized to your own listening needs.
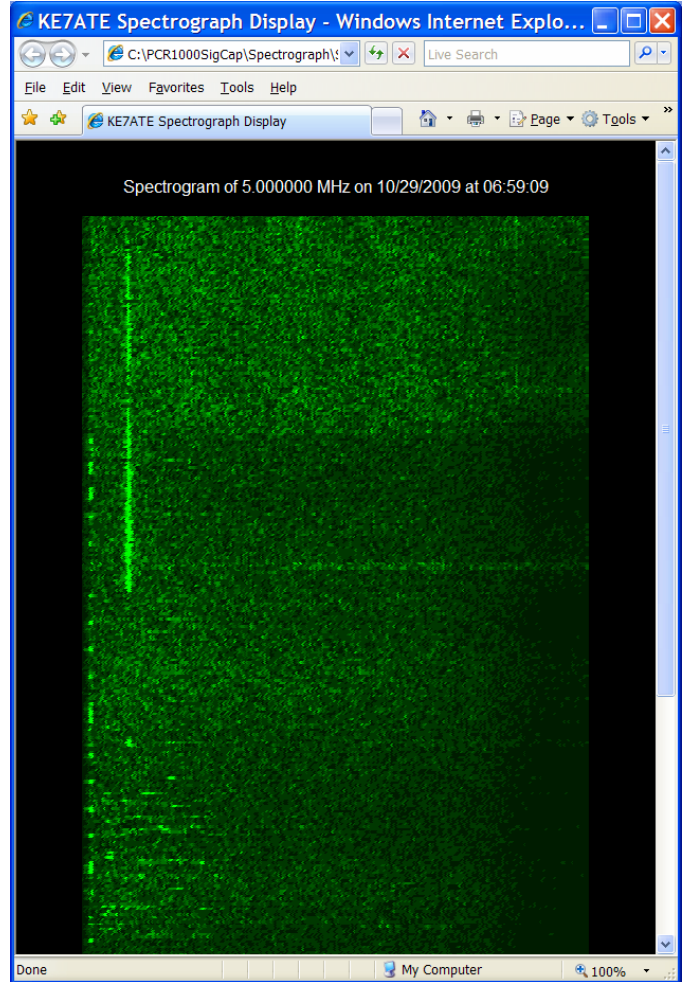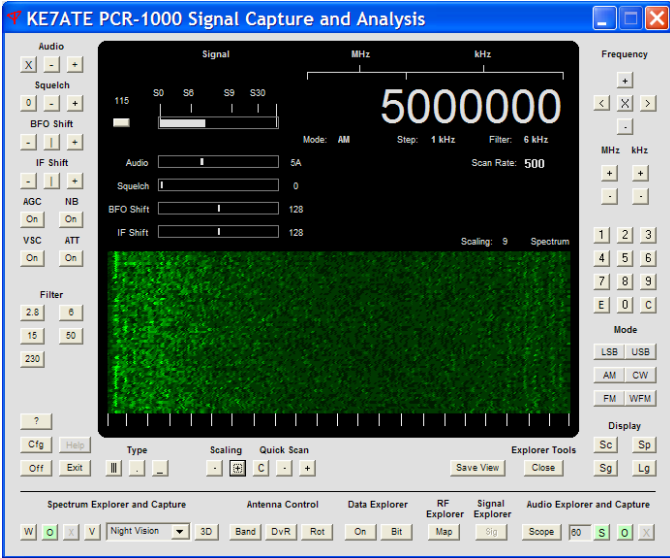

Expand your IC-PCR1000 and make those other black box receivers' jealous or maybe just a little green with envy…
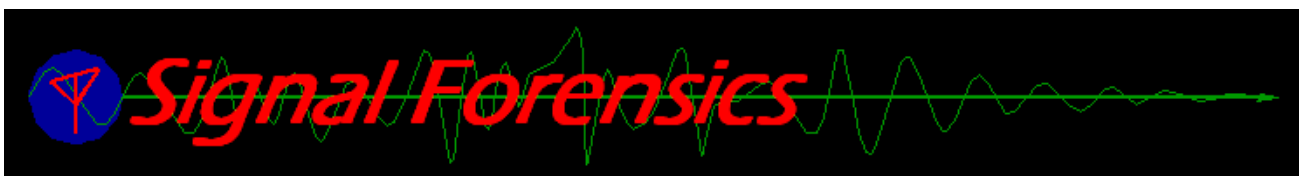
A Waterfall Spectrograph with Recording Capability

Record the waterfall display and view it using your system's default web browser. This unique feature is terrific for storing spectrographic information about a signal and may be date/time stamped as needed. The length of recording is only limited to the free space you have on your hard drive.

Five color schemes to choose from:
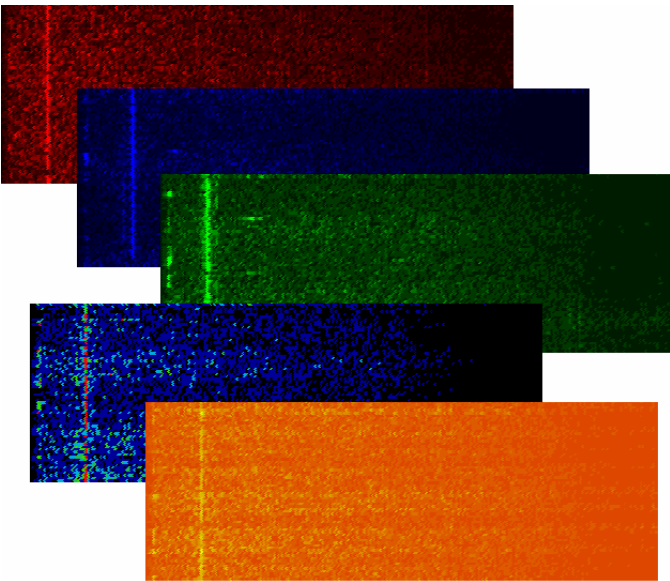
Color schemes are selectable in real-time, even while you are recording the audio spectrum. The recording uses the default system browser to directly view the recorded spectrum, reducing any memory overhead normally found in this type of recording software. This is a feature you don't even find in many specialized spectrograph programs. Each time you record a new spectrograph, the previous files are overwritten with the new data.

Copying the recorded files to another folder will allow you to save the files for future review and analysis. The screenshot shown above shows an example of capturing the sub-audible time code of WWV. The waterfall display is calibrated with a tick mark every 250 Hz allowing quick estimation of peak frequency. You can also use the Data Explorer feature to show the approximate peak frequency in the spectrum display.

The simplified controls make using the waterfall spectrograph display effortless and remarkably intuitive.
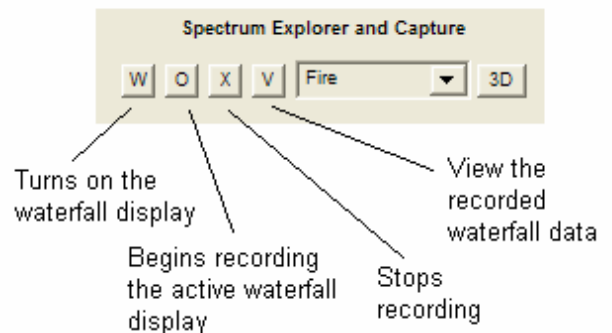
Antenna Add-ons to Improve your Reception and your Listening Needs...

Antenna Band Switch

Antenna Band Switch Control

Ant 1	Ant 2	Ant 3	Ant 4
10000	30000001	50000001	420000001
30000000	50000000	420000000	1300000000
1	2	3	4

Incoming Signal
140

Close — Ant Off — Auto
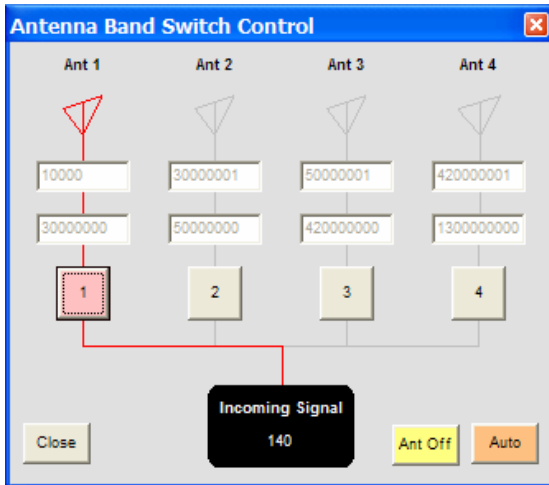
Antenna Band Switch. Frequency ranges may be set according to your antenna receive ranges.

Antenna
Band
Switch

To Secondary
Serial Port

IC-PCR1000

Expand your antenna input to automatically select an antenna suited to your received frequency range. Connect up to four antennas of your choosing via the antenna connectors on the

Antenna Phase Diversity Reception
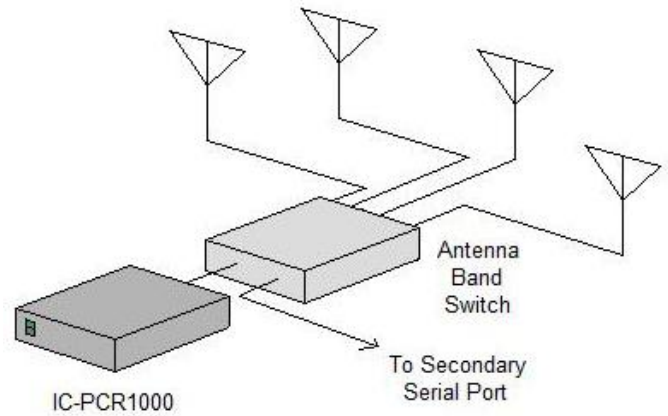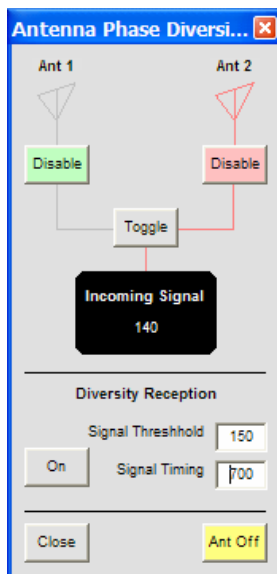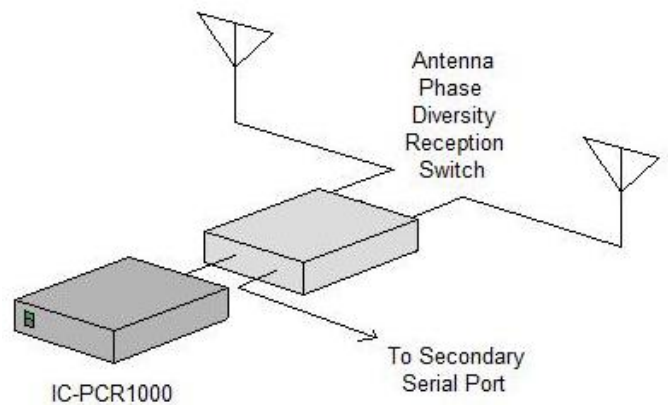
Antenna Phase Diversi...

Ant 1	Ant 2
Disable	Disable

Toggle

Incoming Signal
140

Diversity Reception

Signal Threshhold 150
On   Signal Timing 700

Close   Ant Off

There are several forms of diversity reception that has been developed over the last sixty years. This system uses a single receiver, with two antennas 90 degrees out of phase with each other. Fading occurs when a signal returns to earth on different paths and arrives at the antenna at different times. Antenna phase diversity reception tests the signal for the best signal strength and uses the strongest signal to feed into the receiver input. This reduces fading and improves your capability to maintain uninterrupted listening during long path reception.

Antenna
Phase
Diversity
Reception
Switch

To Secondary
Serial Port

IC-PCR1000

Antenna phase diversity reception has been employed in many high end receivers since the Second World War and can help reduce fading in the shortwave bands.

All antenna options require a secondary serial port installed on your computer and the appropriate antennas to utilize the optional hardware. The Antenna Band Switch, Antenna Phase Diversity Reception Switch and Antenna Rotator are available pre-assembled and pre-tested. Contact me for pricing and information if you are interested in expanding the antenna connector on your IC-PCR1000 communications receiver.

A New Kind of Antenna Rotator

Based on new a hardware design and control software, this beta version can rotate a one meter square PVC cross with a magnetic loop, which are highly directional and useful in achieving low noise reception in the reception of shortwave signals. Magnetic loops have a much narrower bandwidth than traditional loop antennas making an antenna rotator and this type of antenna a good combination towards improving signal reception.

Larger versions are possible with a variety computer and manual control hardware, making for a variety of custom arrangements for various specialized applications or receiving purposes.
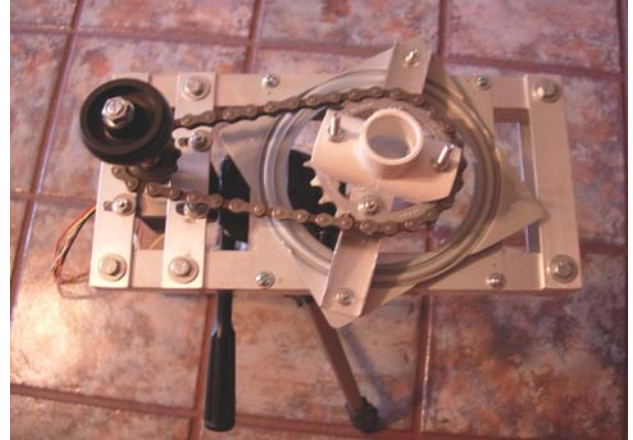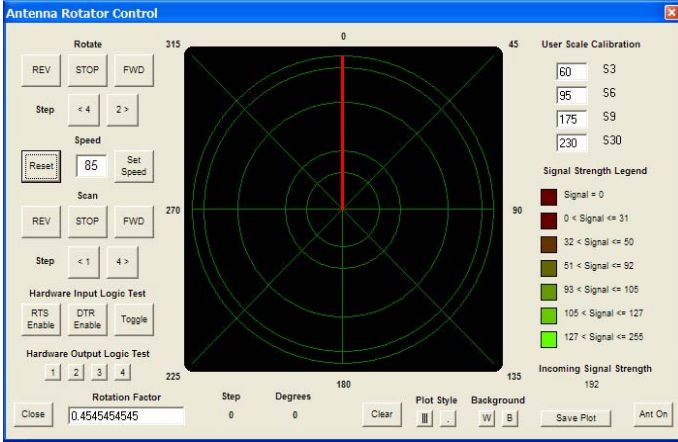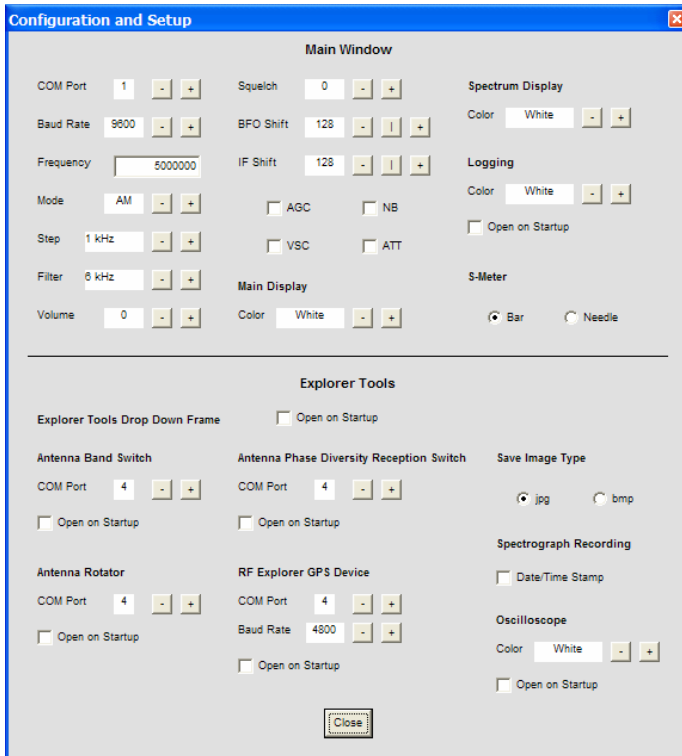

Antenna and associated antenna parts are not included, but are available upon request.

Configuration and Setup controls to set the features you want when you connect to the IC-PCR1000 communications receiver.

Configure your software to startup with a preferred frequency, mode, step, or filter setting. Adjust the startup volume, squelch, IF and BFO Shift controls to whatever startup setting you need when you turn on the IC-PCR1000 communications receiver.   The COM port setting may be set to the serial port your receiver is connected and the baud rate is set to whatever baud rate the receiver has been set to use.
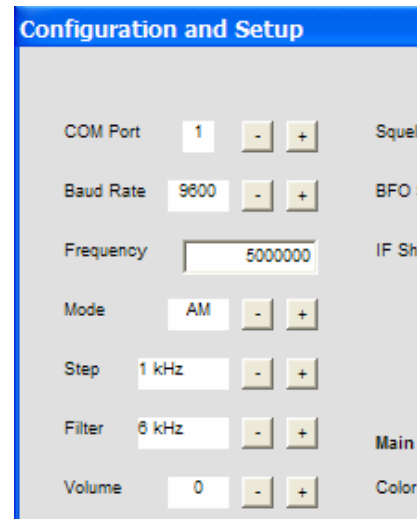
Also, you may set display colors and have specific windows open when the receiver is turned on, you may even have the Explorer tools open. Other settings include options to set the optional hardware to connect to specific COM ports as needed. You may even select the type of s-meter you want to use on startup.

Take your Signal Analysis on the Road with the RF Explorer

RF Explorer

GPS Device

On   Off

UTC Time   02:15:46

Latitude   32.200499

Longitude   106.463161

Elevation   1217.1 meters

Incoming Signal Strength

187

Signal Strength Legend

Signal = 0
0 < Signal <= 31
32 < Signal <= 50
51 < Signal <= 92
93 < Signal <= 105
105 < Signal <= 127
127 < Signal <= 255

Mapping   Logging

G   C   O   !

Line Scale

-    +   5

CLEAR   Save View

Raw NMEA Data

```
$GPRMC,021546,A,3220.0499,N,10646.3161,W,0.0,133.1,061109,9.9,E,A*05
$GPRMB,A,,,,,,,,,,,,A,A*0B
$GPGGA,021546,3220.0499,N,10646.3161,W,1,05,3.1,1217.1,M,-25.0,M,,*4A
$GPGSA,A,3,,06,,,15,,18,21,22,,,,4.1,3.1,1.0*3C
$GPGSV,3,1,12,03,08,320,00,06,18,317,32,09,11,122,00,14,09,200,00*7F
$GPGSV,3,2,12,15,36,051,42,16,12,272,00,18,67,303,43,21,68,005,50*79
$GPGSV,3,3,12,22,37,262,42,26,28,191,31,27,14,106,00,29,38,169,00*72
$GPGLL,3220.0499,N,10646.3161,W,021546,A,A*56
$GPBOD,,T,,M,,*47
$GPRME,13.6,M,8.2,M,16.5,M*22
$GPRMZ,3993,f,3*2B
$GPRTE,1,1,c,*37
```
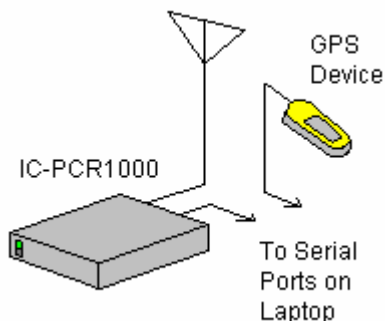
RF Source

Latitude:
32200513

Longitude:
106463130

upperY
32210916

leftX
106493321

Select Map

rightX
106433543

lowerY
32174707

Map File Name:

lc1.JPG

Unload Map

Plot File Name

gpsandsignalaquire.txt

Plot Track   Plot Graph

Window

Not On Top   Close

Map an RF Source such as a transmitter site and collect signal data in relation to incoming GPS data.

IC-PCR1000
GPS Device
To Serial Ports on Laptop

Map an RF source emission pattern simply by driving around it using the RF Explorer software, your receiver and a GPS device, such as an eTrex GPS receiver (uses NMEA 0183 sentences) connected to a secondary serial port on your laptop computer. Use your own maps and aerial photos from any Internet source, prepared to the window size. Record the data into a file for future analysis or plotting to the display. This is terrific software for analyzing your club repeater or other communications system. This software allows the user to map a single RF source in relation to your driving location. Two mapping modes are available, graphing and tracking modes (graphing mode is shown). Plotting stored data allows you to plot in either mode. All you need to know is the bounding coordinates (Latitudes and Longitudes) of your aerial photo or map and the RF source coordinates (Latitude and Longitude) and you can start mapping the emission pattern right away. Knowing how a signal behaves in relation to terrain, buildings and other obstacles can help find the weakest link in troubled communication systems or poor repeater coverage. This is a powerful tool that RF Engineers and communication experts may find helpful in optimizing or troubleshooting an existing communications system.

Specifications and Features

Version 1.10a

System Requirements

ICOM IC-PCR1000 Communications Receiver
Microsoft Windows XP Home or Windows XP Professional
Sound Blaster or Compatible sound card
800 x 600 screen resolution (minimum)
1024 x 1280 required for RF Explorer
128 Megabytes of RAM
9-Pin Serial Port
9-Pin Serial Port Cable

Features - Version 1.10a

Control of all standard features on the PCR-1000 communications receiver with additional features provided by this software, which include:

Standard Controls

Keypad entry of any allowable frequencies
1 MHz and 1 kHz up/down frequency increment
Graphical display of Volume, IF Shift, BFO and Squelch settings
Volume Muting
Squelch Zeroing
IF control centering
BFO control centering
Selectable Signal Meters (Bar/Needle)
Audio Spectrum displays (Bar/Dot/Line)
7 different main display colors
Customize your start up settings with the Configuration and Setup Window

Frequency Scanning

Frequency calibrated
Quick Scan - Scan the band ahead to search for busy channels/frequencies
Custom Scan - Tailor your scanning rate at the speed you want and start/stop as needed.
Point and Click frequency selection of band scan display (Available only on some step settings).

Signal Strength display

Time calibrated
Line display
Dot display
Start/Stop as needed

Station Logging

Automatically add basic information about the received signal with the click of a button
Add custom comments
Save and load listening logs
7 different display colors

Line/Dot/Bar Spectrum Display

Single Line display
Dot display
Bar display
7 different display Colors
Frequency Calibrated every 250Hz

Explorer Tools

Audio Recording

Signal threshold audio capture for intermittent recording
Continuous audio capture

Audio Oscilloscope

Line display selection
Dot display selection
16-step zoom control
7 different display Colors

3D Spectrograph Display (Beta)

Shows current frequency, mode, date and time
Save image capability

Waterfall Spectrographic Display

Capability to capture and display audio spectrum waterfall displays (Saving them requires the user to copy 'not moving' the files to another folder)
5 Selectable color palettes
Date/Time stamp saved spectrograph as it is received.
Display requires a default system browser such as Microsoft Internet Explorer or Mozilla's Fire Fox to display saved waterfall images.

Antenna Options:

These options utilizes separate antenna hardware, which may be purchased as kits or pre-built (if your not handy with the soldering iron).

Also, requires an additional serial port, which may be added using a USB serial Bridge cable or adapter cable.
These are custom designs that expand on one of the most important part of your radio reception system, your antenna.

Antenna Phase Diversity Reception - Ability to optimize signal fading. Utilize antennas 90 degrees out of phase and increase your opportunity to improve on your signal reception. Requires special hardware of my own design. Also, requires an additional serial port, which may be added using a USB serial Bridge cable or adapter cable.

Antenna Band Switch - Automatically switch to separate antennas, depending upon which frequency range you are using. Handy if you have diverse listening needs. Requires special hardware of my own design. Also, requires an additional serial port, which may be added using a USB serial Bridge cable or adapter cable.

Antenna Rotator (Beta) - This is a simple but effective rotator system making a stepper motor rotator accessible through the software. Requires simple but special hardware of my own design (will not work with commercial rotators). I have found a cost effective method of controlling large stepper motors and producing enough torque to rotate large antennas. Also, requires an additional serial port, which may be added using a USB serial Bridge cable or adapter cable. Two types of manual controls and large motors are supported.

RF Explorer (Beta)

This is a feature only found in some very expensive commercial software.
Requires a GPS device capable of sending NMEA sentences to serial port. A special cable may be required depending upon your specific GPS device.
Requires an additional serial port for the GPS receiver, which may be added using a USB serial Bridge cable or adapter cable.
Map a known RF Source, such as a transmitter site using GPS
Gives you the radiation pattern using a preset color scale and custom maps or aerial photograph, which you can screen capture from most online map sites of mapping software.
Gives the user a selection between two mapping modes - graphical and tracking

Save mapping data to a file in real time for future analysis. Plot previous collected data to the map view as a graph or a track.

Data Explorer

Ability to examine the frequency of an audible tone or multiple audio tones in a received signal.
Accurate within approximately 1% of the actual received tone frequency. Also, one can observe the FFT 'N' value that is being processed in my software. This is a feature that will be expanded upon in future versions of this software.

Future versions will include:

Ability to customize colors of the Waterfall display and scan displays

Signal Explorer (Beta) - Signal Logging, Band Activity Scope, Signal to Data Processing (This is very cool)

Expand the point and click selection in the scanned frequency display to other step settings

DSP controls for the ICOM UT-106 option

CTCSS and DTMF controls

And much more…

Note: The purchase price includes a single license of my software. ALL cables, hardware options, including GPS devices and specific antenna options are not included in the purchase price of this software and must be purchased as optional add-ons to the KE7ATE PCR-1000 Signal Capture and Analysis Software. Pre-assembled and pre-tested hardware for my antenna options are available for purchase and are designed to work only with my software, but other devices and cables are 'off the shelf' items and may be purchased from other vendors as required (such as an appropriate GPS receiver or associated cables).