OSCOR PC Interface Software

OPC-5000

OWNER'S GUIDE

Version 4.0

RESEARCH ELECTRONICS INTERNATIONAL LLC
10 March 2004

OPC Passwords

OSCOR Unit Serial Number	OPC Version 4.0 Password

OSCOR Kernel Version _____

OSCOR Program Key Version _____

OSCOR serial number and version Numbers may be obtained from OSCOR by pressing SHIFT, then press F1.

Keep a copy of this information in a safe place for future use.

This software is password protected for use only with those OSC-5000 units for which usage rights have been purchased.

OSCOR OMNI SPECTRAL CORRELATOR is a registered trademark of Research Electronics International.

Any product or brand names contained in this manual are used only for identification purposes and are trademarks or registered trademarks of their respective holders.

See our website at www.research-electronics.com**.**

Table Of Contents

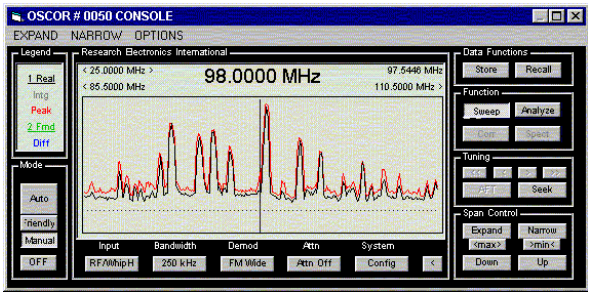
SECTION 1: INTRODUCTION

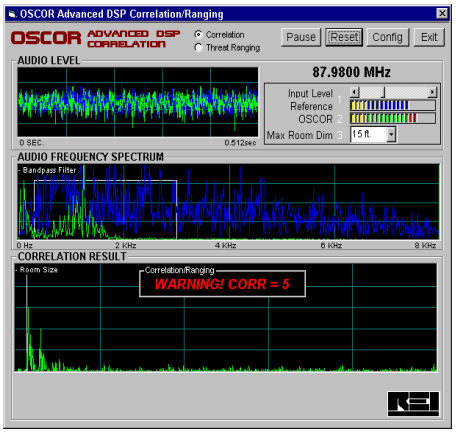
The OSCOR PC Interface software provides the opportunity for your computer to communicate directly with the OSCOR to store signal database information from the OSCOR in your PC for later retrieval and to upload a signal database that was previously created by an OSCOR. Using the PC as a permanent storage device for OSCOR information, records of previous sweeps from various locations can be created, manipulated, and compared. After an accurate signal database is established for a specific environment, it may be used as a reference database and will save significant time in performing future sweeps. Furthermore, the OPC software provides the ability to program the OSCOR and utilize the OSCOR in new methods above and beyond the original hardware design of the OSCOR.

This manual outlines the functions and capabilities of the OSCOR PC Interface software, explains how to install and use the software with the OSCOR, and helps you use your computer to make sweeps easier, faster, and more efficient. However, it is important to note that this manual assumes that the user has a working knowledge of using the OSCOR without the software.

Since Version 2.3 of the software, many new features have been added to the software. The newest features of the software are outlined below.

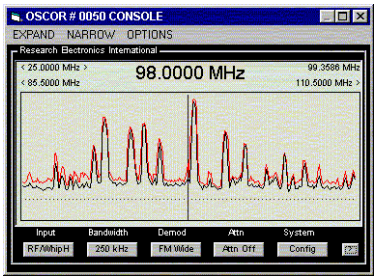
- Realtime RF Spectrum Display provides complete control of OSCOR from a PC computer.
- Comparison of Stored RF Spectrum with Realtime Spectrum provides rapid indication of a new threat signal.





- Advanced Correlation provides increased reliability for automatically identifying Eavesdropping devices. This new method utilizes white noise, CD audio, or ambient room noise for correlation. This new technology also uses the NGA-5000, which is a noise generation and audio amplifier that is required to perform the advanced audio correlation process.
- Provides the capability to locate an analog bugging device using white noise sound source.
- The ability to display multiple documents simultaneously. The database of a connected OSCOR will always be displayed. Additional file database documents can be opened.

- The ability to cut and paste between documents. Spans and signals can be copied from one document to another.
- The ability to edit or delete a selection of spans or signals in one operation.



- A better and more concise layout of the console, with the ability to trim the console to minimum essentials. This, in addition to saving screen space, allows the user to copy the console graphic (using Alt+Print Screen) into report documents.
- Easier selection of Inputs, Bandwidth, etc. using dropdown menus.
- More colors available for the console display.
- Addition of remote squelch control.
- More information is available from OSCOR including its clock time, installed options and startup preferences.
- There have been no changes to the Database Utilities portion of the OPC software. The most current version of the Database Utilities is version 3.0.

Because of these new features, the OSCOR must also have program key version 4.0.

SECTION 2: INSTALLATION AND CONNECTIONS

Installing your OPC is a simple, two-step process: installing the communications program and installing the Database Utilities software. Once the software is installed and direct communications have been established, the OSCOR and computer are programmed to retain all installation information to provide smooth operation for future use of the product.

Recommended PC System

Pentium II Processor or higher
Processor speed of at least 200 MHz
32 MB of RAM
Sound Card with stereo "line in" input for audio (required for DSP correlation)
Windows 98, 2000, or NT
At least 16 MB Hard Drive

Optional modem functions require simultaneous audio and data transmission. Most commercially available modems do not have this ability and will not interface properly with the OSCOR. REI has tested and stocks compatible SVD modems.

CAUTION: For best results, follow all installation instructions in the order that they are outlined in this manual.

Software Setup

The OPC-5000 version 4.0 software consists of two separate programs: the first program handles all of the communication between the OSCOR and a PC computer; the second program is a database utilities program that provides signal comparison and analysis and the generation of reports (and charts).

Therefore, the OPC-5000 setup consists of two setup procedures for the two separate programs, and each program must be independently installed. It is highly recommended that the same directory be chosen for the two installations.

To install both programs.

1. Run the file "Setup.exe" in the folder OPCComm of this disk.

2. Answer all installation questions, choosing the default or typical when available. Click IGNORE if Setup indicates a file not found or is in use.

3. Run the file "Setup.exe" in the folder OPCUtil of this disk.

4. Answer all installation questions, choosing the default or typical when available. Click IGNORE if Setup indicates a file not found or is in use.

Installation from Floppy disks

If the computer you are installing the OPC software on does not have a CDROM device, you may install the communications program from floppy disk by copying the necessary installation files to 3 1/2" floppy disks using a computer that has both a CDROM and Floppy drive. The required installation files are stored in folders called "DiskVer" in the OPCComm folder and the OPCUtil folder.

Note: The OPCComm installation requires 7 disks, and the OPCUtil requires 11 disks. Also, the OPCComm is broken into cab files and should be copied as shown below, but the OPCUtil files are stored in separate folders.

OPC Communications

Copy Setup.exe, Setup.lst and OPC5001.cab to a floppy disk labeled OPCComm #1.
Copy OPC5002.cab to a floppy disk labeled OPCComm #2.
Copy OPC5003.cab to a floppy disk labeled OPCComm #3.
…etc.

OPC Utilities

Copy the contents of Disk1 folder to the root folder of a floppy disk labeled OPCUtil #1.
Copy the contents of Disk2 folder to the root folder of a floppy disk labeled OPCUtil #2.
…etc.

For each installation, run the file "setup.exe" on floppy disk #1, and then follow instructions.

Office 2000 users:

If you have Office 2000 professional edition (includes Access 2000) on your machine, you may experience errors and need to run the Office 2000 patch on the CDROM. This patch is located in the OPCUtil directory in the folder called OPC2K. We apologize for this inconvenience; however, Access 2000 is not backwards compatible with previous versions of Access.

PC Direct Connection to the OSCOR

In order to establish communications between the PC and the OSCOR, a password, exclusive to your specific OSCOR, is required. This password is provided upon purchase of the OPC –5000 Software package. Licenses to use the software with additional OSCORs can be purchased from your dealer or REI. Please allow your dealer sufficient time to acquire the proper password(s) from REI.

Prior to communicating with the OSCOR, it is necessary to select an available communications port to establish proper communications. Generally, but not always, the external 9 pin communications port on either a laptop or desktop computer will be "COM1." Use the "OSCOR Communications Setup" dialog box, after starting the PC software, to select the appropriate COM port and communications speed. (See the following section for more information about communication speed.)

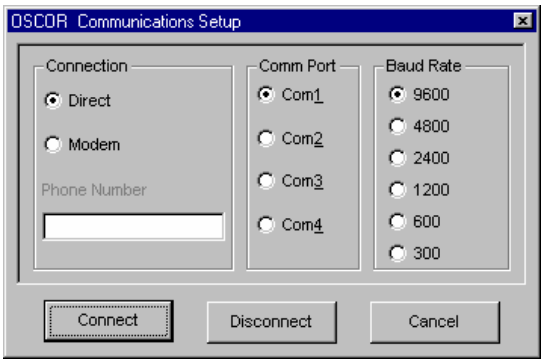
If the COM port is active, you only need to use the "OSCOR Communications Setup" dialog box to configure the computer communications port to establish proper direct communications with the OSCOR. You do not need to use Window's control panel to set the COM port's baud rate and other parameters. If the physical COM port connector is not active, a computer technician can set the BIOS and Windows configuration.

Proper connection to the OSCOR requires the Serial Communications cable provided with the OPC software. Normal serial communication cables do not provide the proper wiring to function with the OSCOR serial communication port. Each end of the cable is labeled for proper connection.

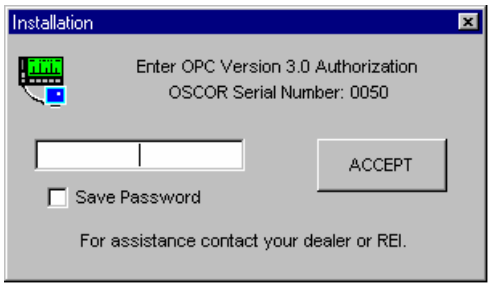
To establish proper communications:

1. *Connect the serial cable to the OSCOR Serial Communication port in the connector tray and the COM port you selected on your computer.*
2. *Start the OPC software (double click on the OPC program*  *icon , or use the Start Menu.)*
3. *Read the information on the "splash" window, then click or press any key to continue.*

4. *The first time the OPC software is started, it will present the Communications Setup dialog box. Select "Direct" and COM port. Always choose 9600 baud unless your particular situation requires otherwise. Once this is set, the OPC software will attempt to detect an OSCOR using the previous settings. You may return to this dialog box by clicking the Window menu item and selecting "Setup Communications".*

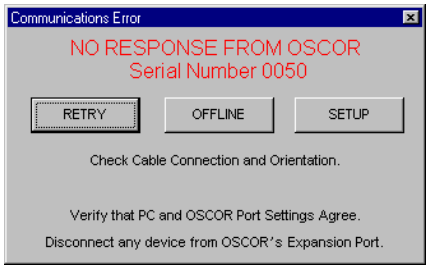


5. *When the OPC-5000 software detects a new OSCOR unit, it will present the installation dialog box. Enter the OPC license password for that OSCOR provided by REI. Note: Purchase of the OPC-5000 software constitutes license to use it with a single specific OSCOR. To use the software with multiple OSCORs, you will be required to purchase additional licenses one for each OSCOR.*



Note: If you do not have a password, you can still evaluate the software and perform some limited demonstrations. See the Section below describing the built-in demonstration capability.

Note: If communications have been interrupted for any reason, a warning screen will notify you. You can attempt to re-establish communications by clicking the "RETRY" button or by opening the setup dialog box.



If the computer and OSCOR will not communicate using the direct cable:

Check the version number of the OSCOR program key and OPC software. They should be of the same release. For OSCOR, press SHIFT + F1, check program version at the upper left. For OPC, click HELP, About OSCOR, and, if necessary, scroll down through the test box to view the OPC version. OSCOR program keys can be obtained through your dealer or direct from REI. Always use the latest software version. Do not reinstall older versions as this only complicates the problem.

Be sure to use the special OSCOR/OPC cable. A standard serial cable will not work. Be sure that the cable end labeled PC is connected to the computer and the end labeled OSCOR is connected to the serial communications port on OSCOR.

Unplug any device (i.e. OTL-5000 "clicker") from the expansion port connector on OSCOR.

On OSCOR, press "MENU" several times to display the "SYSTEM SET UP MENU". Press F4 "CONFIG CUSTOM". If the label above the F4 key does not show "9600,N81", press F4 until it does. (If "INSTALL", you will first need to enter the OPC password.) Go to the OSCOR Communications Setup dialog in the OPC communications program. Select "QUERY", "Direct", the comm port to be used and "9600" baud rate. Click "Connect". First time connection will require the entry of the OPC password found inside your OPC-5000 owner's guide.

If connection problems persist, slower baud rates can be tried. Some serial ports (especially laptops) may exhibit a weakness at the faster speed. Be sure to match the baud rate settings on both the OSCOR and PC. Generally, you will not have to modify any Windows system port settings.

Some "linking" programs that use the serial port for data transfers may not release the communications port for use by the OPC software. Consult the linking program's documentation.

The three most common causes for direct cable connection problems are:

1. Mismatched versions. Be sure the PC and OSCOR have the latest software versions.

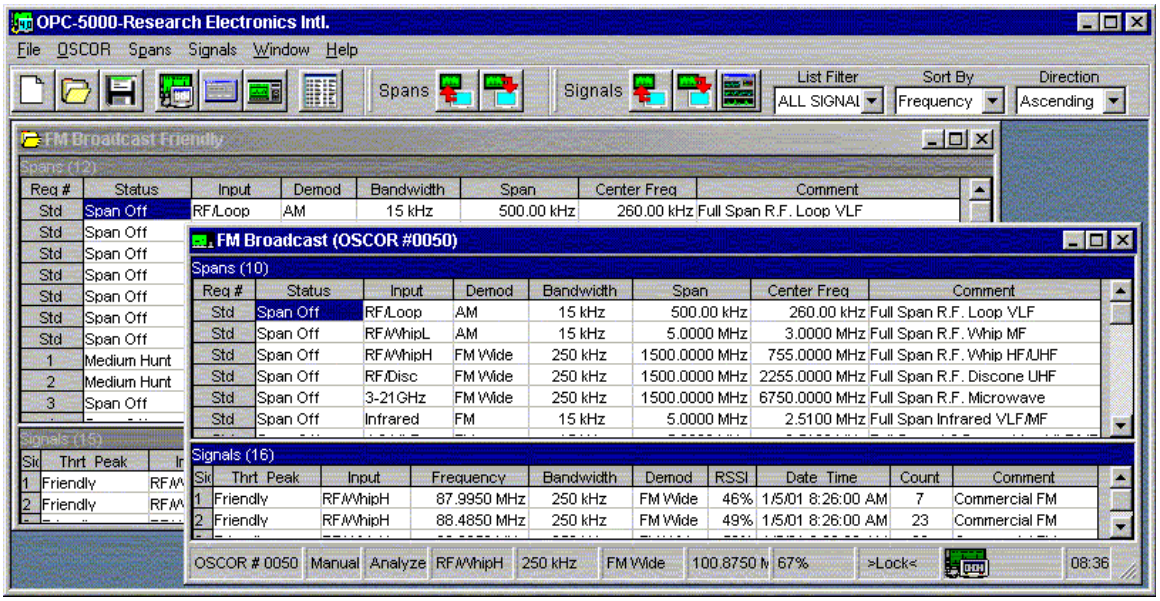
2. Incorrect cable connection. Be sure the REI supplied cable is properly oriented.

3. Mismatched baud rates. Use 9600 on the PC and OSCOR.

OPC Demonstration Mode

There is a special OSCOR operational mode that allows the software to communicate with the OSCOR without having the proper password. This mode exists only in the OSCOR unit itself and is accessed by pressing SHIFT key on the OSCOR and then the numbers 101. In this mode, all database signals will be erased from OSCOR memory, but the OPC software will have a communications capability with the OSCOR, but only for signals occurring in the US FM broadcast band. Also, in this mode, many of the normal OSCOR functions are non-operational. To return the OSCOR to a normal operational mode, it is necessary to cycle the OSCOR power off and back on.

SECTION 3: THE MAIN DOCUMENT WINDOW



The OPC software main window is the document window. It is always open, although it can be minimized. It has two basic parts: the menu/tool bar and document space. For your convenience, most commands are available in any of three methods: standard Windows dropdown menus, toolbars or right-click popup menus. This section will focus on the toolbar buttons, with notes where the menus differ.

The Main Toolbar

The first three buttons on the toolbar are database file controls. This section describes the basics of creating, opening, and saving OSCOR generated databases. All of the instructions in this section assume that communications have been established with the OSCOR. The main buttons described in this section are listed below:

A note about the OPC database: The OPC software generates Signal and Span databases that can be opened, edited, and modified using Microsoft Access. However, data that is stored in the Access database files is coded to minimize memory requirements and maximize communication speed with the OSCOR. Therefore, modifying the stored database information with Microsoft Access creates a risk of illegal values being uploaded to OSCOR and undesired results. OSCOR may have to be reset to recover.

Creating a New Database

To create a new empty database, click on the "New" icon on the toolbar or use the "New" command in the File menu. To set a connected OSCOR to this new database, right click anywhere on the grid and select "Set OSCOR to this database". Any span or signal data in OSCOR will be erased.

Opening an Existing Database

To open a database stored as a file, click on the "open" icon or use the "Open" command in the File menu. This database is available for viewing, editing or for upload to a connected OSCOR. To set a connected OSCOR to this file database, right click anywhere on the grid and select "Set OSCOR to this database". Any span or signal data in OSCOR will be erased and replaced with this file database. This is be used to upload a stored signal database to the OSCOR. For example, by storing a friendly signal database for a specified location, you can easily upload this friendly database to the OSCOR each time the sweep is performed and update the Friendly signal database as required. This process will eliminate the need to create a new "friendly" database before every sweep.

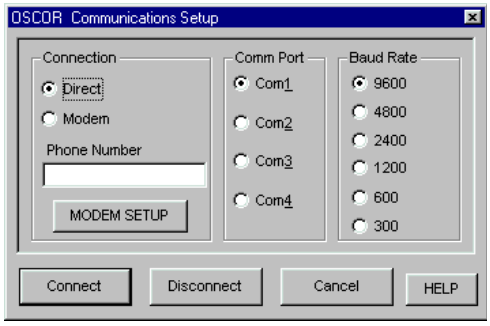
Saving a Database

Any time a database has been modified, an asterisk (*) appears in that document's title. To save the signal and span database information click on the "save" icon or use the "Save" command in the File menu. Use File "Save As" to change the name of the current database. Filenames should be very descriptive of the location and date of the sweep. The OSCOR Database Utilities uses the stored filename when referencing all reports. Also, when a database is uploaded to the OSCOR, the filename is used for the OSCOR Job Name so that all OSCOR prints contain the same referenced name. Because the OSCOR uses the filename as the Job Name, the filename should be limited to 31 characters.

The second group of three buttons open separate control and configuration windows. Nearly all of the features of OPC-5000 and real-time control of OSCOR can be accessed through one of these three buttons.

Accessing the Communications Setup Menu

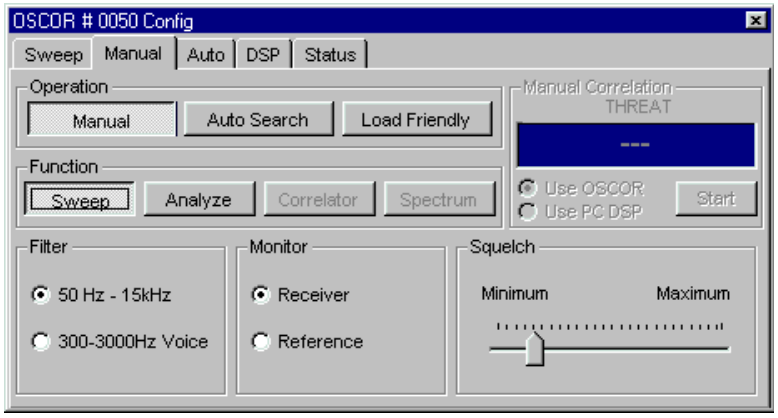
As previously described, if there are any problems communicating with the OSCOR, you can adjust the communication parameters using the Setup communications Menu. After direct connection has been established, the modem can also be setup through this dialog window. Click disconnect to close a connection to OSCOR.



OPC Configuration Screens

This button opens the configuration window. The series of tabs on this dialog box allows configuration of a variety of parameters related to the connected OSCOR. The current state of OSCOR determines which tabs are visible. For example the

"Sweep" tab shown below will change to "Analyze" if the OSCOR is placed in the sweep mode. Individual configuration tabs are discussed in later sections as they apply to the current function.



To access the power of the OPC software, explore the different tabs to be familiar with the various OPC configuration settings. Some functions are common on several tabs when they apply to different modes of operation.

The Console display

This button opens the console window. This is a real-time display of the OSCOR console. It is fully discussed in a later section.

The single button in the third group controls the display of the database document.

The Document display

The last button toggles the style of the database view. When needed, the span list can be displayed, otherwise it can be hidden to allow more screen space for the signal list. This function, like most others, is also available from the menu or by right clicking on the grid.

The Span List Toolbar

When the span list is displayed on the database documents, the Span toolbar will also be displayed. Although OSCOR and its associated document will usually stay synchronized, these two buttons allow manual updating. "Uploading" refers to transferring information from the computer to the OSCOR, and "Downloading" refers to transferring information from the OSCOR to the computer. In other words, the terms Download/Upload are

always referenced to the OSCOR. These buttons are available only when proper communications with the OSCOR have been established.

Uploading Spans to OSCOR

Clicking the upload spans button will synchronize OSCOR's span list with its associated document list. A dialog box will indicate transfer progress.

Downloading Spans from OSCOR

Clicking the download spans button will update the OSCOR document span list with the spans stored in OSCOR. A dialog box will indicate transfer progress.

The Signal List Toolbar

The Signals toolbar allows control of the signal database list of the open database documents. Selections are remembered and restored each time the OPC-5000 is started. "Uploading" refers to transferring information from the computer to the OSCOR, and "Downloading" refers to transferring information from the OSCOR to the computer. In other words, the terms Download/Upload are always referenced to the OSCOR. These buttons are available only when proper communications with the OSCOR have been established.

Uploading Signals to OSCOR

Clicking the upload signals button will replace the current OSCOR database with the signals in the active document to OSCOR's signal database. The active document does not have to be the OSCOR document. A dialog box will indicate transfer progress.

> **WARNING:** Uploading signals will overwrite any signals that are currently in the OSCOR memory and completely replace the database memory. In order to prevent accidental data loss, all signals should first be downloaded to the PC and saved under an appropriate filename.

Downloading Signals from OSCOR

Clicking the download signals button will update the OSCOR document signal list with the signals stored in OSCOR. A dialog box will indicate transfer progress.

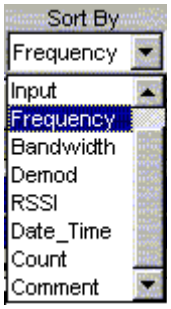
Start DSP Correlation on selected signal

Clicking the download signals button will update the OSCOR document signal list with the signals stored in OSCOR.

List Filter

Show only the signals that match the selected filter. A displayed signal list may be sorted or filtered using a variety of criteria using the pull-down list selections at the top of the signal list display. Select ALL SIGNALS to show the entire database. Selecting THREATS will only display those signals with a threat classification. When a list is filtered, all data is retained, but only the signals meeting the specified criteria are displayed.

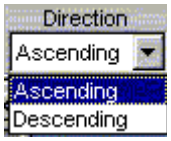
Sort Signals by column



For more efficient use of the signal list, it may be sorted by any column. This works in conjunction with the direction setting. For example, to see the most recently acquired signals at the top of the list, select Sort By Date_Time, and select Direction Descending. To sort by signals by the number of hits, select Count and the direction desired.

Note: Users familiar with earlier versions will notice that clicking on a column heading no longer sorts the list. Instead, the column is selected for editing features described later.

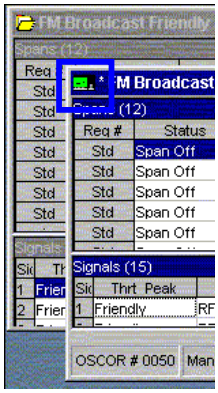
Sort Signals direction



This works with the Sort setting. Choose Ascending or Descending sorts.

OSCOR and File Documents

A new feature in OPC-5000 version 4.0 is the ability to open multiple documents at one time.



If a connection is made to an OSCOR, the OPC software will download the current OSCOR database and display a window with the current OSCOR database. This window is indicated by the OSCOR icon and the OSCOR unit number in the title bar of the window, and the OSCOR status bar at the bottom of the window. We call this the "OSCOR window".

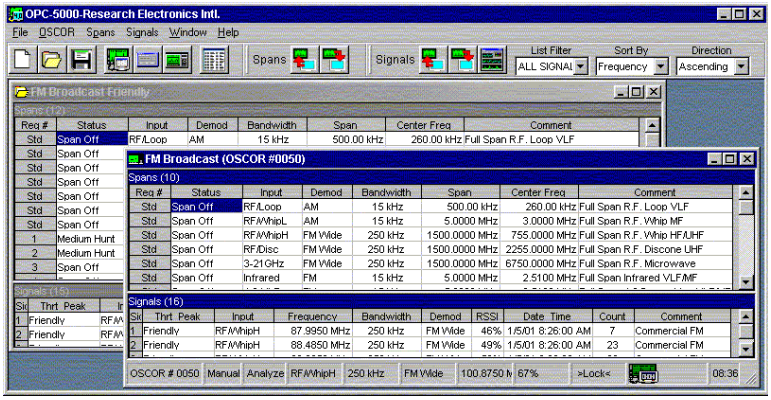
Stored databases can also be opened independently. These file documents display a folder on the title bar and have no status bar at the bottom. This is called a "file window".

If a file has been modified since it was opened or last save, an asterisk (*) appears in the title bar. The span list can be hidden as explained above.

OSCOR Status bar

The OSCOR status bar, like the configuration dialog, will change its appearance according to the current operating status of its associated OSCOR. Generally, the OSCOR serial number, operating mode, function and receiver data is displayed. The communications status panel indicates connection progress. The time panel displays the current time reported by the connected OSCOR. Click on the panel to display relevant control windows.

Using the Span database list



If the spans lists are not visible, click the Show/Hide Span list button.

Selecting the Frequency Span Display Format

The frequency span information can be displayed in either a Start Frequency/End Frequency format or a Span/Center Frequency format. To change the format, click the Span menu item, or right click on the Span grid, then select Frequency Format and select one of the two choices.

Editing a Span in the Database

When a span list is displayed, the following kinds of editing may be performed on it.

- Changing the auto mode scan depth
- Editing the span comment
- Deleting a span

New in version 4 is the ability to select one or more, or all of the spans and perform the same edit on all selected spans. Click the column header to select that column to edit all spans, or click within the desired column and drag to edit a range of spans.

To prepare OSCOR to run the automatic threat detection mode, it must know which spans and how “deep” to scan. (See the OSCOR manual.) To change the depth of auto mode scan, select the desired spans(s) by clicking in the status column in the row containing the span. Click and drag to select multiple signals. A pull-down arrow will appear with these choices:

- Span Off Auto Mode will ignore this Span.
- Fast Skim Auto Mode tests only the strongest signals.
- Medium Hunt Auto Mode test medium power signals.
- Deep Dig Auto Mode tests all detectable signals.
- % Squelch Auto Mode uses a fixed squelch level. To set the manual squelch level: 1. Viewing the span on the console 2. Set the squelch level

(Ctrl+Right click on console, or use the Manual tab of the Config dialog). 3. Select "% Squelch" to set.

All selected spans will be changed to the new Auto Mode depth. If the active document is an OSCOR document, the OSCOR database will be updated.

To edit a span comment, select the desired span comment(s). Edit the text in the box as desired and press enter. (The comment is not stored in the OSCOR itself. Comments are retained only in the PC stored database.)

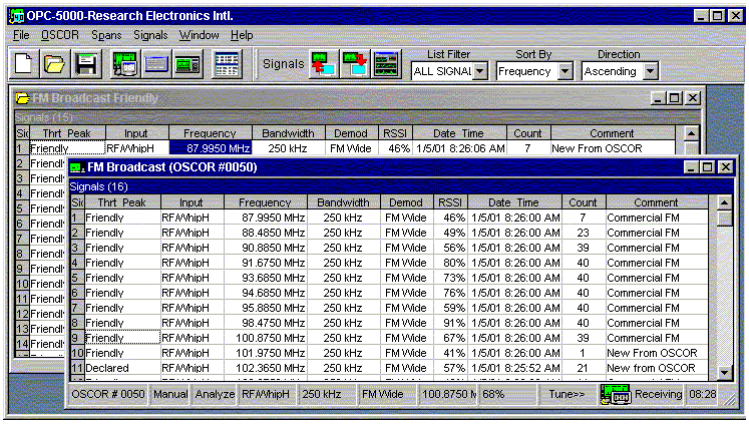
To delete one or more spans from the list, select the desired span(s). Click and drag to select multiple spans. Press the "Delete" button on the computer to delete the signal from the list. Or right click and select Cut selected Signals to remove them from this database, but have them available on the clipboard to be pasted into another document. The first 6 or 7 entries on the list, marked "Std", are standard full span sweeps and cannot be deleted. To remove any of these from the Auto Mode scan list, select "span Off" in the depth column.

To add a span to the list, use the Console to set the span parameters, then click Store on the console. Then edit the new span on the span list.

Copying a Span to another Database

Two or more databases can be combined using the new copy and paste feature. In the source database, select the spans you want to copy. Right click on the span grid and choose Select All Spans, or use any of the standard windows selection methods to select a range of spans. Right click and choose Cut or Copy Selected Span(s). Bring the destination document to the top and right click on the span list and choose Paste Selected Spans. If the destination document is an OSCOR document, the pasted spans will be also be added to the OSCOR database.

Using the Signal database list



To view the maximum number of signals, you may want to hide the span lists. Click the Show/Hide Span list button.

Editing a Signal in the Database

When a signal list is displayed, the following kinds of editing may be performed on it.

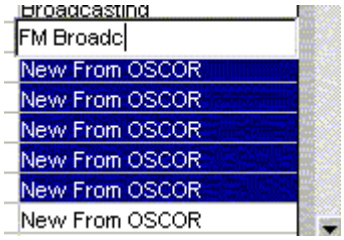
- Changing the threat level
- Editing the signal comment
- Deleting a signal

New in version 4 is the ability to select one or more, or all of the signals and perform the same edit on all selected signals. Click the column header to select that column to edit all signals, or click within the desired column and drag to edit a range of signals.

To change the threat level, select the desired signal(s) by clicking in the Threat column in the row containing the signal. Click and drag to select multiple signals. A pull-down arrow will appear with these choices: Friendly, No Corr and Declared.

- FRIENDLY – the signal has been determined to be friendly.
- NO CORR - the signal needs further correlation analysis.
- DECLARED – the signal has been determined to be a threat.

All signals selected will be changed to the new threat level. If the active document is an OSCOR document, the updates will be also be added to the OSCOR database.



To edit a signal comment, select the desired signal comment(s) and edit as desired. (The comment is not stored in the OSCOR itself. Comments are retained only in the PC stored database.) The database utilities included with the OPC software can automatically enter spectrum classification into the comment column of the signal database.

To delete a signal from the list select the desired signal(s). To minimize to risk of accidental deletion, the entire row must be selected by clicking in the far left “Sig. #” column. Click and drag to select multiple signals. Press the “Delete” button on the computer to delete the signal from the list. Right click and select Cut selected Signals to remove them from this database, but have them available on the clipboard to be pasted into another document.

Copying a Signal to another Database

Two or more databases can be combined using the new copy and paste feature. In the source database, select the signals you want to copy. Right click on the grid and choose Select All Signals, or use any of the standard windows selection methods to select a range of signals. Right click and choose Cut or Copy signals. Bring the destination document to the top and right click on the signal list and choose Paste Selected Signals. If the destination document is an OSCOR document, the pasted signals will be also be added to the OSCOR database.

Signal Analysis Under Computer Control

Whenever the Signal List is displayed and the OSCOR is connected to the computer, the OSCOR is automatically tuned to the first selected signal. Therefore, if you are listening to the audio of the OSCOR, you can select any signal and analyze it using the computer. This ability is particularly useful when communicating with the OSCOR via modem with SVD technology. You can analyze a signal from any database document. It does not have to be the OSCOR document. However, the status bar of the OSCOR document will indicate current receiver status.

To listen to the audio of a particular signal:

1. Select the desired signal in the list by clicking on the row of interest.
2. Adjust the volume of the OSCOR to listen to the selected signal.
3. If necessary, the signal bandwidth or demodulation can be adjusted from the console display, described in greater detail later in the manual. Using the OSCOR console screen, you can analyze a signal in the same manner as utilizing the OSCOR keypad directly.

You may store the signal with the newly specified parameters using the "Store" button on the OSCOR console display.

SECTION 4: THE OSCOR CONSOLE WINDOW

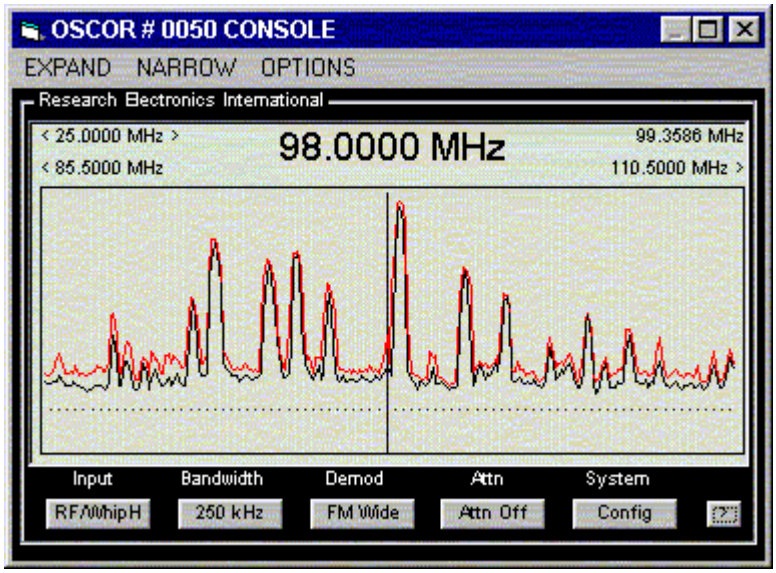
The OPC software provides a high degree of control over the OSCOR using the OSCOR console window. This screen will reflect the actual mode of the OSCOR as shown in the following example. The console layout and function is similar to the actual OSCOR console, varying only to take advantage of features available to the Windows interface. Detailed explanation of each button can be found in the OSCOR Owner's Guide.

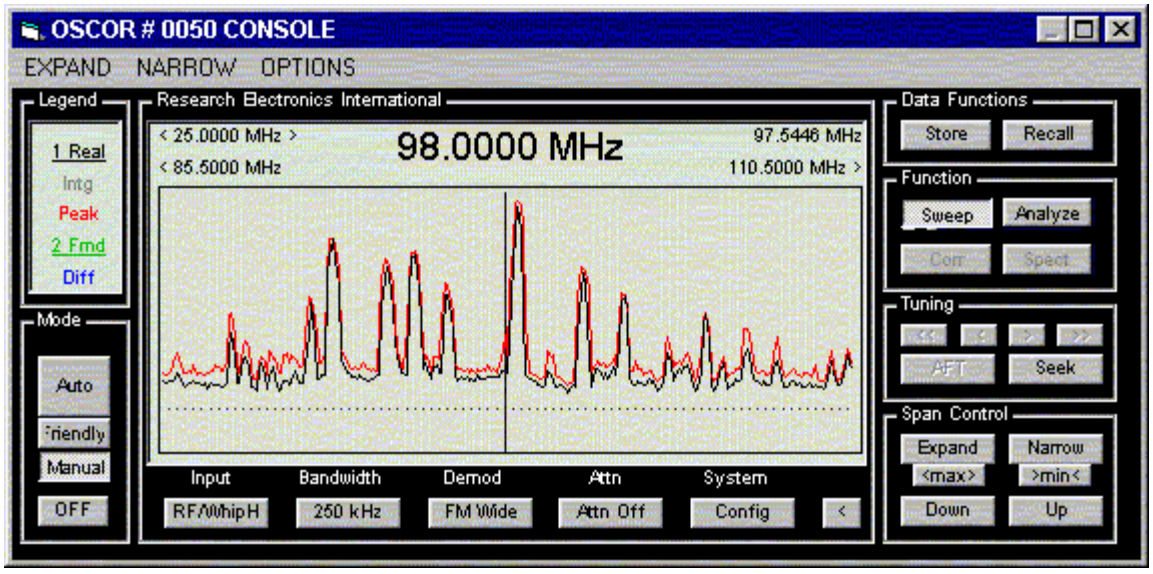
To open the real-time OSCOR console, click the Display OSCOR Console button on the toolbar, or from the menu, select Window, View OSCOR Console.

OPC Console Formats

Two fundamental formats are available, full and compact. Depending on your screen size and needs, this can be changed at any time. Each view is sizable and may be maximized. This feature is helpful in presentations.

The compact console eliminates screen clutter by showing only the graphics display and the primary function buttons. For report creation, this window is easily inserted into a document using the Alt+Print Screen copy feature, then pasting into the document. Expand the console by the options menu or the small arrow button at the lower right.





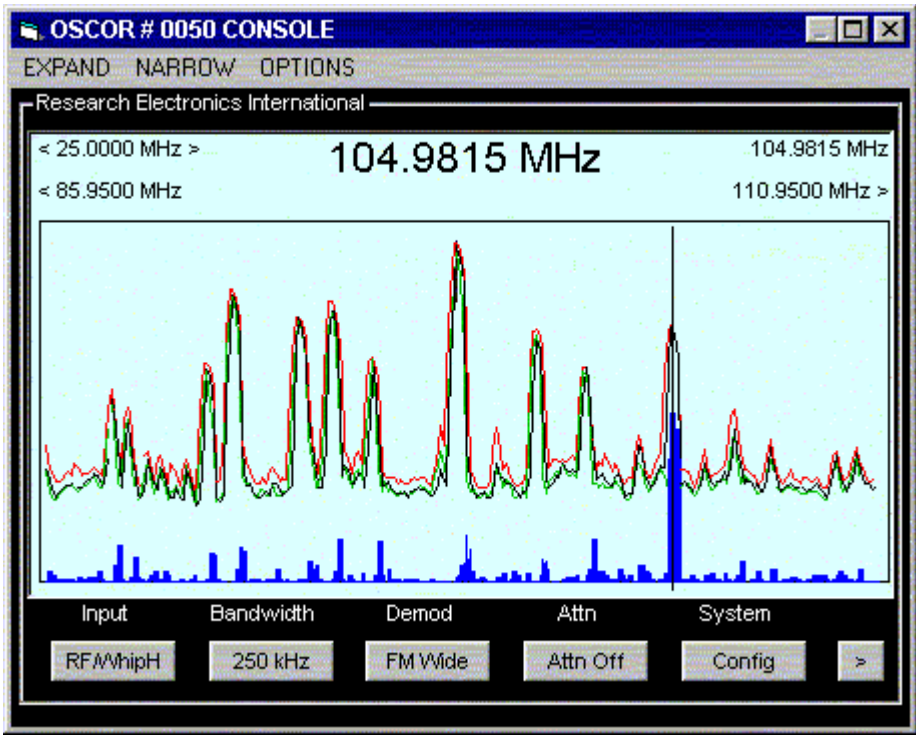
The full console displays all buttons, grouped according to function. Colors can be selected from the Sweep tab on the configuration dialog.

Console Real-time Group

The primary function of the console display is to provide virtually real-time emulation of the connected OSCOR's LCD display. Whether compact or full size format, both show the same information as presented on the actual OSCOR screen.. No matter where OSCOR must be physically located, this console allows convenient operation.

New in version 4, the four receiver function keys now have drop-down selections. You can now go directly to your desired choice without cycling through the entire list. As in OSCOR itself, only the "legal" choices are presented. For example, because SSB/CW demodulation is only valid with a 6 kHz bandwidth, it does not appear when any of the other bandwidths are active. The Config function key opens the configuration dialog.

The OPC interface enhances the OSCOR display with the addition of color. With color, more data can be displayed at one time. Instead of being limited to primary, "dot" and difference traces, OPC has the capability to display any or all of the various frequency spectrum sweep traces as shown in the example below.



In this example, the red trace is the stored peak spectrum.

The black spectrum represents the real-time frequency display.

The green indicates the stored friendly frequency spectrum.

The blue represents the difference between the real-time and Friendly spectrums. The integration trace is not visible. To quickly view or hide any trace, click its name in the legends frame on the full console format. (See Legend, below)

This example shows a new signal that has been brought into the environment at the frequency of 104.9MHz.

Spectrums available for display include the real-time trace, a trace integrated over time, a peak capture trace, captured friendly and a difference trace.

The real-time trace is the latest data obtained from OSCOR for the current sweep.

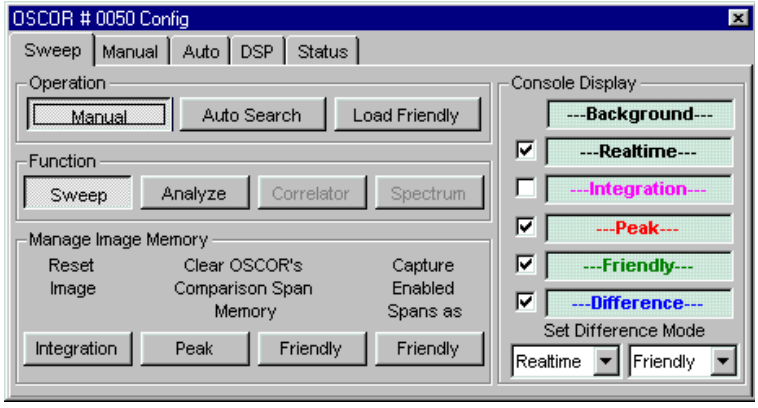
The Integration Spectrum provides a spectrum that is continuously integrated to minimize the visual effects of the rapidly changing frequency characteristics in the RF spectrum. This frequency display mode is particularly useful when looking for snuggle bugs because the modulated skirts of the spectrum that usually interfere with being able to see the snuggled bug are integrated and reduced so that the snuggled signals can be viewed easily. However, it is important to understand that this is highly dependent on the quality of the snuggled transmission.

The Peak Spectrum provides the ability to view the frequency spectrum in a peak display mode. The peak spectrum is continuously updated and stored in a buffer regardless of whether or not the Peak spectrum is displayed.

The Friendly Spectrum is captured as a Friendly sweep is performed.

Console Legend Group

When in the Sweep mode, click the trace name in the legend (full console) to the toggle the trace visibility. Right click the legend or click on the "Config" button to display the configuration dialog. The Sweep tab of the configuration dialog permits the setting of the spectrum display. You can set visibility also in the Console Display frame. Click the check box next to the trace. Click the trace name to set its color. Define custom colors for more variation.



Set the sources for the difference trace with the select boxes. The right hand selection (marked with "2" on the legend) will be subtracted from the left selection (marked with "1" on the legend). The Manage Memory buttons clear the current spectrums to provide a new reference point. The Capture Enable Spans as Friendly will use the sweep mode to load the Friendly spectrum memory. Note that no signals are stored using this method.

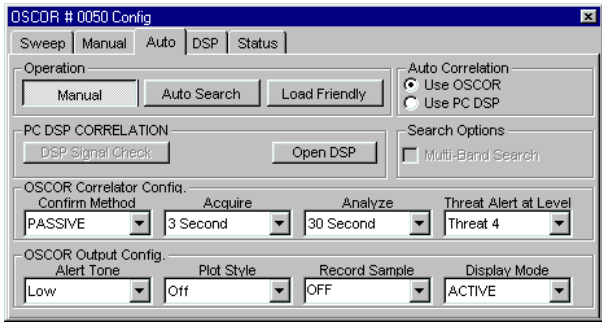
Console Mode Group

The mode group provides quick control of OSCOR's operating mode. The current mode is indicated by a "depressed" appearance. Select Auto, Friendly

or Manual control. The OFF button offers to disconnect and close the OPC program. You of course will be given the opportunity to save files or cancel.

Before clicking Auto or Friendly, be sure OSCOR is properly prepared using the following guide. See the OSCOR owner's guide for more information on Auto Mode configuration. Setting the Auto Mode from the PC is nearly identical with the exception of the advanced PC DSP correlation feature.

1. Select the desired Input Spans by editing the spans.
2. Be sure to delete irrelevant data or upload a friendly database.
3. To set the AutoMode options, open the configuration dialog and click the Auto tab. Select the desired options using the displayed pull-down menus. These options are identical to the Configure Auto Mode Output and Correlator Menus on the OSCOR. They are immediately set in OSCOR.



The OPC software includes a correlation process based on Digital Signal Processing of the audio received from the OSCOR. This DSP correlation method is discussed in greater detail in later sections, however, it is important to note that the you must select the desired correlation method (either the OSCOR correlator or the PC DSP correlator method) when running the OSCOR in the automatic mode from the OPC software.

To start the AutoMode process, click the Auto button on either the console or the OSCOR Config dialog.

To start the Load Friendly process, click the Friendly button on either the console or the OSCOR Config dialog.

To exit the AutoMode or Friendly and return to manual control, click the Manual button on either the console or the OSCOR Config dialog.

Console Data Functions Group

The current span (sweep mode) or the current signal (analyze, correlator or spectrum modes) can be stored to the OSCOR database.

To save a new span or signal that was set with the console, press Store.

The recall button brings the current span or signal list to the foreground.

Note: The OSCOR does not have the ability to store a signal having sub-carrier demodulation. The OSCOR can store the signal as FM demodulation, but not sub-carrier. Sub-carrier signals require an additional tuning frequency to be stored. The OPC software can tune and store a sub-carrier signal, but the signal will not be uploaded to the OSCOR.

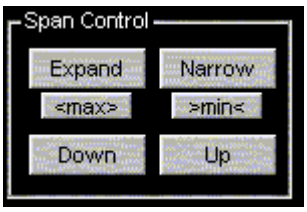
Console Function Group

The operating function can be selected with one of these four buttons. Select sweep, analyze, correlator or spectrum. Select the desired signal in the analyze mode before clicking Correlator or Spectrum.

Console Tuning Group

When in the signal analysis function, precision tuning of the signal can be accomplished with these buttons. High speed, single step and automatic fine tuning is available.

Console Span Control Group



In either the Sweep or Analyze function, these buttons emulate their counterparts on OSCOR.

Expand the spans width one step.

Narrow the frequency range one step.

<max> Set to the maximum range allowed for this input.

<min> Set to the minimum range allowed for this input. The resulting span width, however, will not be less than one column width of the original span. You may need to click <min> once, reset the cursor to the signal, and then click <min> again.

Down shifts the span down one window, as permitted.

Up shifts the span up one window, as permitted.

SECTION 5: Digital Signal Processing Correlation

The OPC Digital Signal Processing Correlation method provides an extremely reliable method of classifying analog signals as threat signals. However, this process is somewhat complicated, and it is highly recommended that this section be read carefully and completely before utilizing the DSP correlation process. Furthermore, this correlation method provides the ability to range and triangulate on the detected analog device.

- The DSP Correlation has very robust performance in different acoustic environments.
- White Noise can be used very effectively as a sound source to mask the activities of the TSCM team while providing a very effective method of correlation.
- The system is capable of correlating on normal ambient room noises such as air conditioner noise, or street noise coming in through the window.
- The ranging function can use a continuous white noise source to make ranging measurements rather than relying on an alerting timed audio response from an active speaker.

- Can optimize correlation performance of the system based on the type of audio used for correlation and the audio environment. Selecting the optimum band-pass filter for the current room audio easily provides this feature.

Connecting the OPC Cables for the DSP Correlation Method

This correlation method works by taking audio from the OSCOR receiver (via the "speaker out" jack in the connector tray) and correlating this audio with a reference sound source. The reference sound source is typically the NGA-5000. These two audio signals are brought into the computer using the left and right channels of the "line in" input of the sound card. All correlation is performed using Digital Signal Processing techniques built into the OPC software. The pictures below show all of the connections required for proper correlation.

WARNING: It is important to note that the "Line Out" plug should **not** be plugged into the computer unless the computer CD-ROM is being used as the reference audio source. If the "Line Out" jack is plugged in while using the white noise or microphone reference audio, the system can result in false correlation on all detected signals.

Configuring the Windows Sound Card Settings

To properly use the DSP correlation method, the sound card in the computer that is being used must be configured for proper operation. The DSP software uses the Line-In input on the sound card for acquiring the DSP data. Therefore, you can only use a sound card that has a stereo Line-In input. (Warning: Some computers have sound cards with a Mono Mic-In input that doubles as a Line-In Input. This will not work because it is not a stereo

input.) In most cases, the OPC software will attempt to perform this configuration automatically, however, since there are many types of sound cards, it may have to be done manually. As most people agree (other than of course Microsoft help technicians) "plug-and-play" is not guaranteed. The procedure is as follows:

To Configure the Windows sound card for DSP operation:

1. *Double Click on the Speaker Icon in the tool tray in the lower right hand corner of the screen to access the Sound card controls. (The controls may also be accessed using the Start button and the Accessories program group.)*
2. *Click on the Pull-down "Options" menu and select the "Properties" menu item.*
3. *In the Frame "Adjust Volume For", click on the Recording selection.*
4. *In the window titled "Show volume controls for", check the Line-In input.*
5. *Click OK to view the recording Volume controls.*
6. *Under the Volume Control for the Line-In input, check the box labeled "Select". This operation selects the Line-in for data acquisition. Also, the Line-In Volume control adjusts the amplification of the audio data coming into the sound card. This volume control is duplicated on the DSP main menu for convenience.*
7. *This window can now be closed. However, you may wish to keep this window open to adjust the Line-In volume control.*

Using the DSP Correlation Method with Different Audio Inputs

There are three different audio reference sources that can be used with the NGA-5000. These audio inputs include:

1. NGA generated white noise
2. Microphone to utilize the ambient room audio
3. Externally provided music or CD audio

The advantages of each of these methods are described below:

NGA generated white noise

The white noise audio in the NGA-5000 is designed specifically to provide a wide spectrum of white noise for correlation. Using white noise for correlation will provide the maximum reliability for correlation. Furthermore, using the NGA-5000 white noise is the preferred audio source to use for threat ranging.

Microphone to utilize the ambient room audio

The microphone should be used whenever it is necessary to monitor a meeting in progress. However, the correlation is very reliable, and in most cases, the correlation method is sensitive enough to correlate on very low level audio sounds such as air conditioner noise, outdoor noise (wind, airplanes, traffic, etc…), and normal office noises (typewriters, fax machines, elevator music, etc..) This method of reference audio is extremely covert, however, it may not be as reliable as the white noise source and it cannot be used for threat ranging and triangulation due to the range differences associated with many different environmental noises.

Externally provided music or CD audio

In this mode, a CD player or other sound source can be used to produce reference audio. The system is designed primarily for CD audio to be placed in the computer CD-ROM.

You should click on the speaker icon in the system tray (typically lower right hand part of screen next to the clock) to access the Windows speaker controls and Line Out controls to adjust the volume level. Also, you must insert the "Line Out" plug of the OPC cable directly into the Line Out jack on the computer. Also, insert the plug labeled "speaker" of the OPC cable into the "Line In" jack on the NGA-5000. In this manner, you can use the NGA-5000 as an excellent audio amplifier and speaker. This is especially useful since most laptop speaker systems do not provide a good audio source. In this mode the OPC cable mixes the left and right channels of the audio into a single channel to ensure that a single audio source is used as a reference.

Using the DSP Correlation Manually

The DSP correlator may be accessed manually for any desired signal of interest.

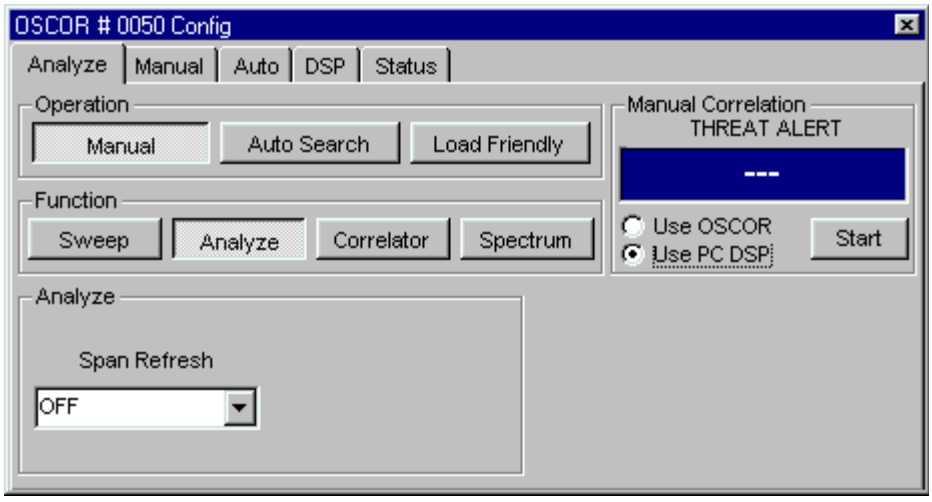
To access the DSP correlator manually using a stored signal:

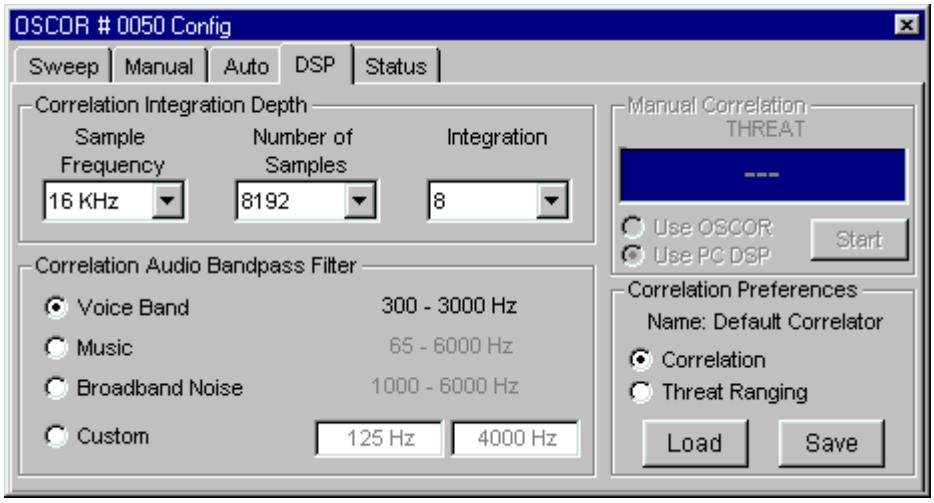
1. *Ensure that the audio cables are properly connected as described above.*
2. *Select the document containing the signal list.*
3. *Select the desired Signal from the list.*
4. *Click on the DSP Correlation button*  *to open the DSP correlation screen.*

This method of accessing the DSP correlation will open the DSP correlation for the selected signal in the list. When working with signals directly from the console, open the OSCOR Configuration dialog (click the Config button on either the console or main window.

1. *Select the "DSP Correlation Method for Correlation.*
2. *Click the "Start" Correlation button.*
3. *The DSP Correlation window will appear (see the next section of this manual).*

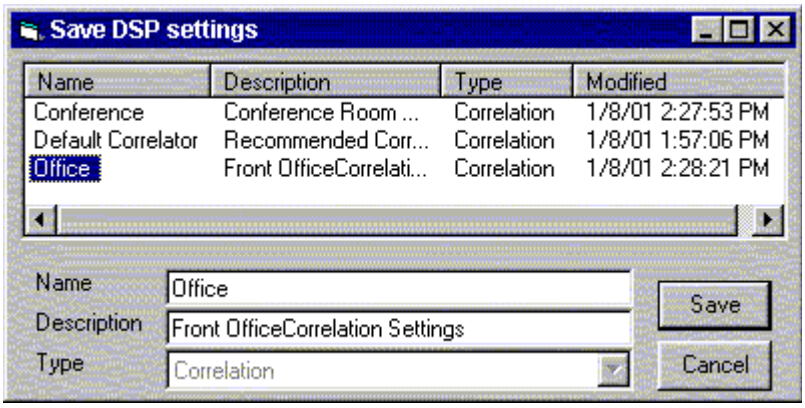
Configuring the DSP Correlation





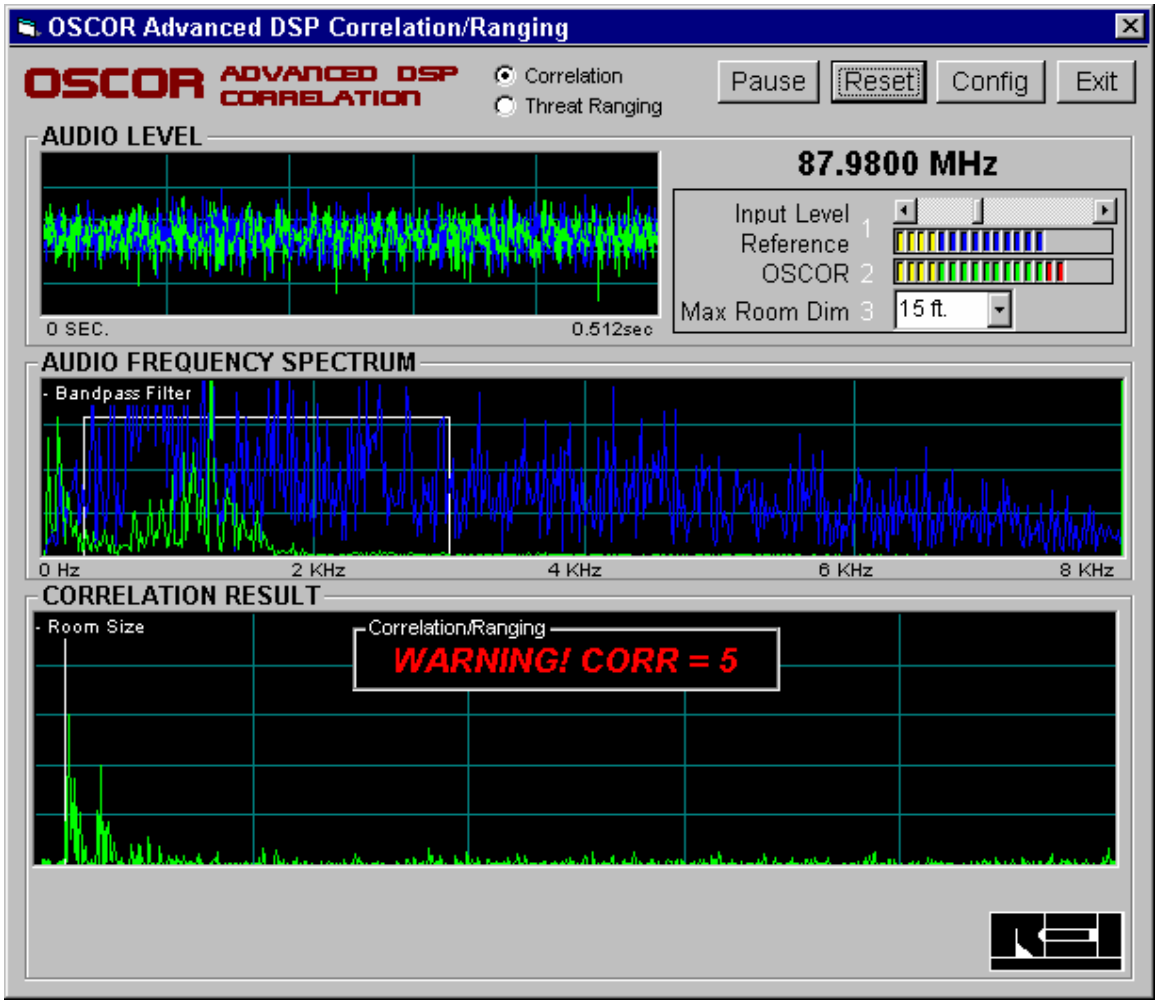
The DSP correlation system has its own configuration tab. While the default settings will provide good results in most cases, experienced users may want to optimize the DSP Correlation process. Using the features found on the DSP tab, it is possible to customize the sampling parameters of the audio, the band-pass filters used in the Correlation process, and the integration level of the correlation process. These parameters can provide some increased correlation by optimizing the correlation process for specific audio characteristics associated with some bugs. For example, if you know that a particular bug that you are using may only have audio frequency capability from 300Hz to 3KHz, then you can optimize the correlation process for this frequency range. Or, if you are using a specific tone for correlation, you can customize the band-pass filter for this tone frequency. These customized correlation parameters can be saved for future use. Furthermore, the correlation parameters for correlation and Threat ranging may be customized independently and stored for future use. Currently the software does not allow multiple correlation parameter profiles to be stored.

Once a customized DSP setup is complete, it may be saved to disk by clicking the save button and entering a unique name and description. Click Load to recall previously saved scenarios. Correlation and Threat Ranging are stored as separate entries.



Using DSP Correlation

The DSP Correlation screen has three main graphic screens. All of the data in these screens is dynamically scaled for ease of view. In the first two graphs, the blue represents the Reference audio signal while the green represents the OSCOR audio level.



1) Audio Level – This screen provides a graphic representation of the actually audio being sampled and correlated. The time at the lower right hand portion of this graph corresponds to the time window that is being sampled. This time window can be customized as described in the previous section.

2) Audio Frequency Spectrum – This graph represents the audio frequency spectrum of the sampled audio. This screen is updated with every window of sampled audio. The frequency range of this graph is also dependent on the sampling parameters. The white lines on this graph show the band-pass filter characteristics used in the correlation process.

3) Correlation Result – This graph represents the correlation result. There is not a known analog to the information of this graph since this technology is a new process developed by the engineers of REI. This correlation process compares the audio correlation between the two audio inputs at all possible range variations within the sampling window time. Therefore, you can compare this screen to a ranging screen

with the white line on this screen representing the maximum range dimension of the room. If strong correlation exists, there should be strong spikes in the graph around the maximum room dimension. It is possible for spikes to occur past the room dimension because of echoes within a room. Furthermore, it is also possible for strong spikes to occur at the far right of the screen. Spikes that occur at the far right hand side of the screen represent audio sounds that are originated in a closer proximity to the bugging device than the reference audio source. If there are spikes all over the screen, then the correlation is basically non-existent and the spikes are due simply to random noise correlation.

The correlation scale varies from "1" to "5" just like the OSCOR correlation scale. A "1" represents no correlation while "5" represents maximum correlation.

It is highly recommended to experiment with the DSP correlation process using test bugging devices and existing RF signals such as radio stations. This will greatly facilitate the understanding of capabilities and performance of this new correlation process.

Along with properly connecting the NGA cables and the accessing the DSP correlation screen, there are three main settings that must be adjusted to ensure proper correlation. These settings are numbered in white numerals on the DSP correlation screen.

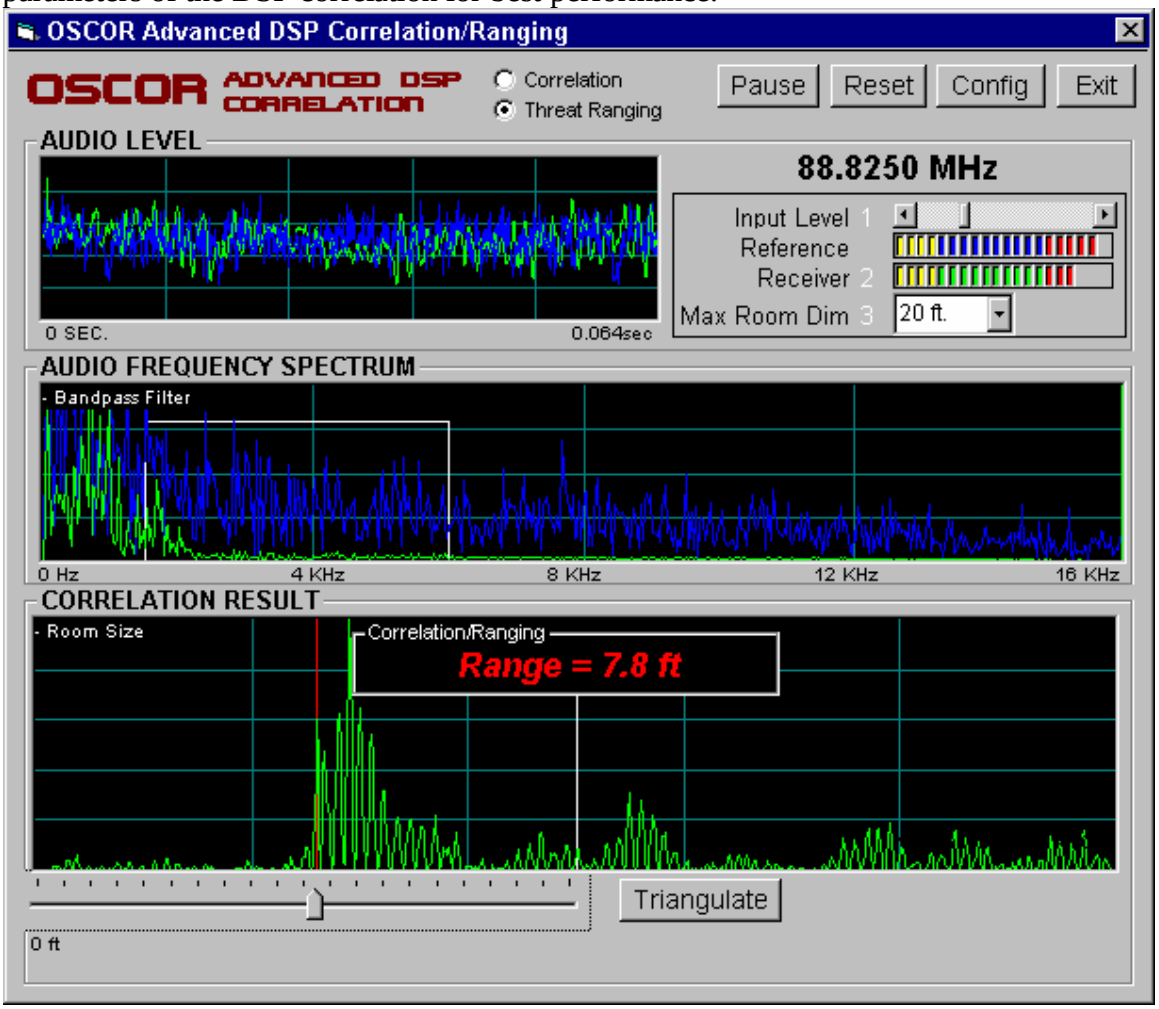
1) *Adjust the Input level so that the reference audio level is between the yellow and red levels of the bargraph. (The reference audio level is indicated by the blue color).*
2) *Adjust the OSCOR volume control to adjust the OSCOR OPC input level between the yellow and red levels of the bargraph. (The OSCOR input level is indicated by the green color).*
3) *Adjust the room size. This is a pull down menu. This dimension is a single number that should be approximately equal to the largest diagonal measurement of the room.*

Ranging and Triangulation Using the DSP Correlation

To enter the Threat ranging mode, select "Threat Ranging" at the top of the DSP correlation window. In this mode, the Correlation graph at the bottom of the window is changed to a ranging window. The white line down the center of the graph represents the maximum room dimension. For the ranging mode, the NGA-5000 should be used to generate a white noise sound source. The sliding bar at the bottom of the graph should be used to select the peak of the first major spike. If the sliding bar is near the peak, the software will automatically place a red line at the peak for the actual range measurement. All of the spikes in the graph after the first spike represent echoes in the room.

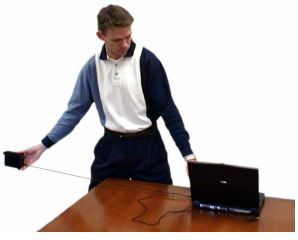
When performing ranging functions, it is important to ensure that physical objects are not directly blocking the sound path of the NGA. Furthermore, in a large room, it may be necessary to increase the volume of the NGA to cover the room, while in a small room it may be necessary to decrease the volume to prevent over modulation of the transmitting signal. Furthermore, higher frequency audio signals provide more accurate range resolution, but, some bugging devices do not provide good high frequency audio

performance. Therefore, it may be necessary to adjust the sampling and filtering parameters of the DSP correlation for best performance.

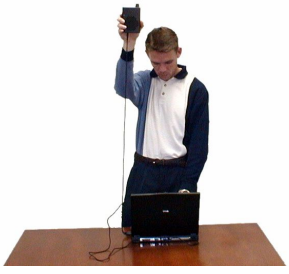


To use the triangulation system, click on the button labeled “Triangulation”. The three measurement labels will appear: “Left”, “Right” and “Center”. The figures below show the three measurement positions. The NGA should be fully extended so that the cable is relatively straight from the NGA to the “Line In” plug that is plugged into the sound card of the laptop computer. While holding the NGA in each of the three positions, adjust the sliding bar to accurately measure the proper range and click on the check box next to the respective measurement position to lock in each measurement. After each measurement is made, click on the Locate button to see the triangulation screen.

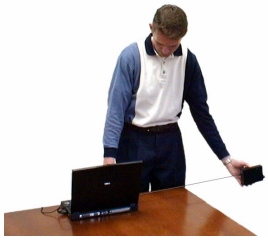
Right

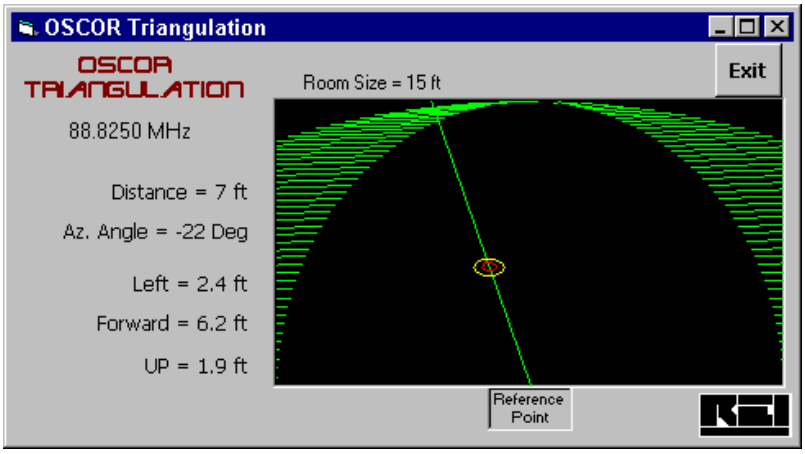


Center



Left





It is important to note that the reference point represents the location of the plastic bead on the NGA cable. The triangulation system only provides location information in front of the plane in which the three range measurements are made. For best performance, it is recommended that the system be moved to a corner and directed out into the room. Or, you may use the NGA and the OPC in the ranging mode to "sniff" the location of the bug. This can be done by utilizing the 3.5mm extension cable from the OSCOR and moving the NGA around the room environment until the range becomes very small. This will help to localize the location of the bug.

Using the DSP Correlation in the Automatic Mode

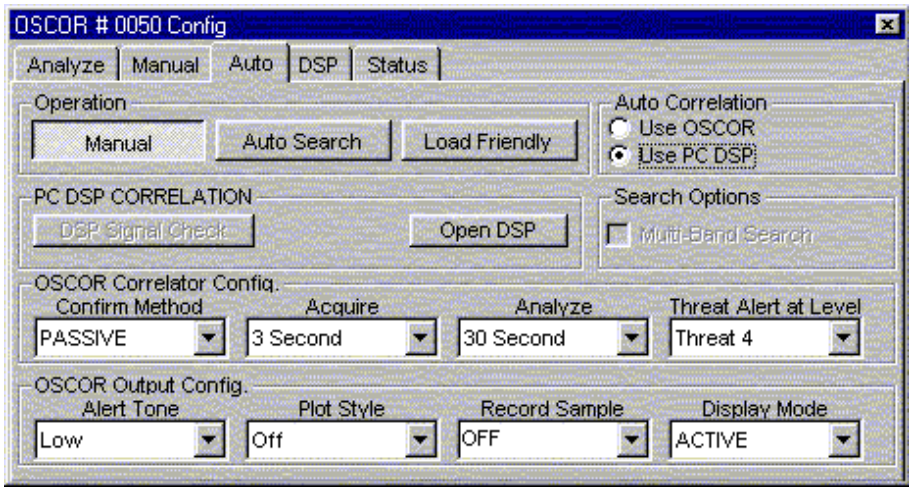
The DSP correlation can be used in the normal automatic mode in place of the OSCOR built-in correlator.

WARNING: It is important to first set-up the DSP correlation manually to ensure that the audio input levels are properly adjusted and the room size is correctly specified.

When using the PC DSP correlation method in the automatic mode, the OSCOR and OPC program will pause on each newly detected signal for correlation. After performing the DSP correlation process, the threat level will be stored in the OSCOR signal database as well as the OPC signal database and the system will then continue scanning for new signals.

To use the DSP correlation process in the automatic mode:

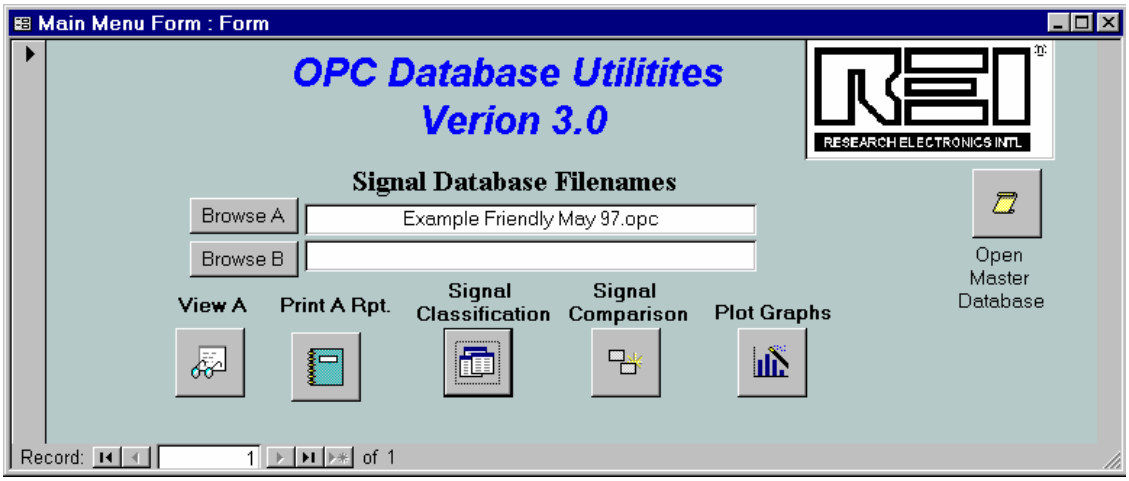
1) *Access the automatic mode setup window.* 
2) *Select the Auto tab. Click the Use PC DSP Auto Correlation button.*



3) Start the Automatic Mode from the OPC software using the "Auto Search" button.

SECTION 6: SIGNAL DATABASE UTILITIES

The OSCOR Database Utilities is a Microsoft Access database that has built-in menus and routines for viewing, printing, classifying, and comparing signal databases created using the OSCOR PC Interface software. You do not have to be connected to the OSCOR to use these utilities, but you must have saved the database information to the PC. It should also be pointed out that there have been no changes in the OPC Database Utilities from version 3.0 of the software.



When the Database Utilities is installed on your computer, a runtime version of Microsoft Access is automatically installed on your computer. This runtime version of Access provides all of the necessary functions to support the Database Utilities software. However, if you wish to customize the reports generated in the Database Utilities program, you must purchase Microsoft Office or Microsoft Access. Using your own installed version of Microsoft Access, you can use the provided database environment to create your own database analysis functions, if you are experienced in developing Microsoft Access Applications. However, you should keep a backup of your original Signal Database Utilities files. The button labeled “Open Master Database” gives you access to the design of the Utilities program.

The OPC Database Utilities provides the ability to do the following functions.

- View downloaded database information.
- Print detailed reports based on OSCOR signal database information.
- Generate color, custom frequency spectrum plots complete with signal classification information for professional reports.
- Apply FCC allocations to sweep lists.
- Compare two databases.

To run the Signals Database Utilities, select the “OPC Utilities from the Windows “Start” menu. (The OPC communications program does not have to be closed first.)

Note: The OPC Utilities uses the Signal Database filename for all reports.

The main purpose of the OPC utilities is to provide a variety of reporting options for a signal database. As such, it does not provide the means for permanently storing a generated report or graph, but reports or graphs can always be regenerated using the original data. Nonetheless, several customers have requested the ability to store a report or graph. While the software does not directly support this capability, here are a few ways to achieve this goal.

- Using the Alt-Print Screen, you can store graphic images of the computer screen to insert into reports. Simply press Alt-PrintScreen and then open a graphics program such as Microsoft Paint and paste the recorded Screen image.
- Using Adobe Distiller, you can print the reports to a PDF file that can be permanently stored for future comparison or printing. This is a very effective way to storing documents in a commonly used format.

Viewing Database Information

The information obtained with the OSCOR may be viewed, either one or two jobs at a time, using the Utilities software. In the main menu screen, which appears automatically when you enter the Utilities software, click on "Browse A" or "Browse B" and select the stored sweep by the job name. Click on the "View A" icon to display the information. It will be arranged in the same chart as when it was downloaded from the OSCOR, but the information cannot be edited in this software.

Classifying Signals

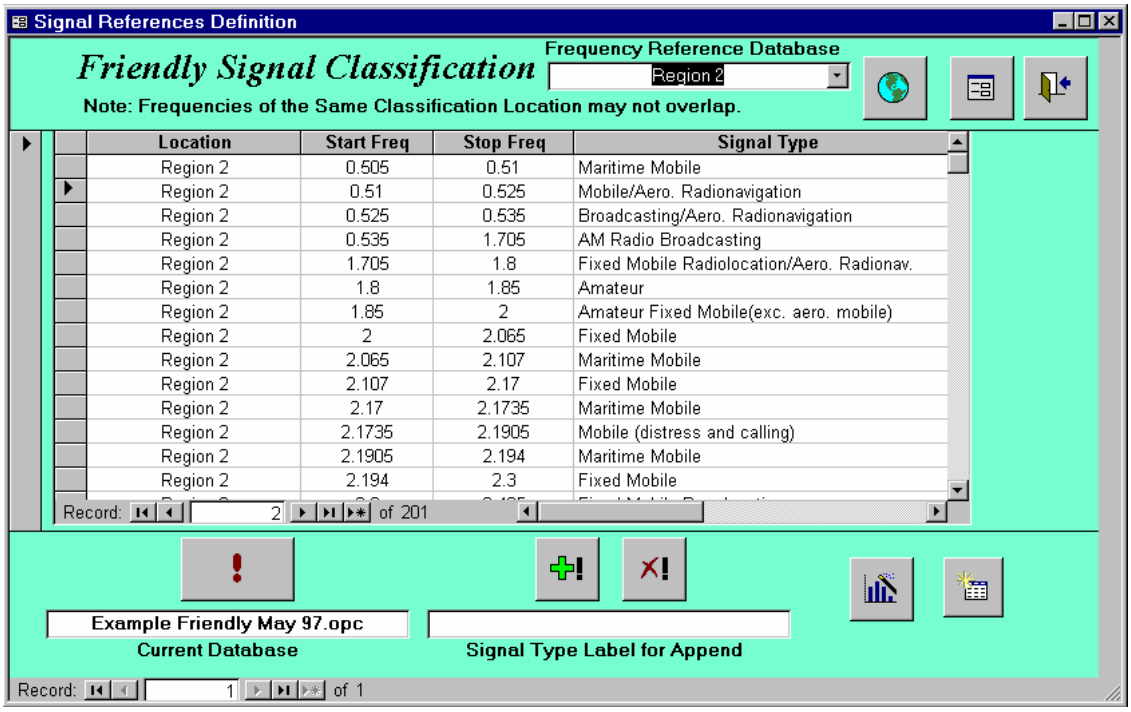
FCC Frequency Allocation Information

In every region of the world, all frequency ranges are designated for certain purposes. The distributions are available through the FCC, but are also available through the Utilities software. This program allows you to apply the appropriate information to signal lists of friendly signals.

For signals that have been classified as friendly signals, this menu provides the ability to apply the FCC frequency range label directly to all applicable signals. For signals that have been classified as anything other than friendly, the software does not apply the FCC frequency range label.

Note: Just because a signal is found in an inappropriate range, it is not necessarily a surveillance device. However, it should be studied more closely.

To access the FCC Frequency Allocation Information, click on the "Signal Classification" icon.



To determine which region you are in, click on the globe icon labeled "World Map." With this chart, you should be able to determine in which region you are located. (The United States is located in Region 2.)

To select a region for frequency data:

1. *Click on the arrow in the Frequency Reference Database window.*
2. *Select the appropriate region.*

The FCC Frequency Allocation Information will appear in the large display window.

To apply the displayed information to the selected signal list (displayed just below the Frequency Allocation Information), click on the "!" icon labeled "Apply."

Customized Reference Signal Information

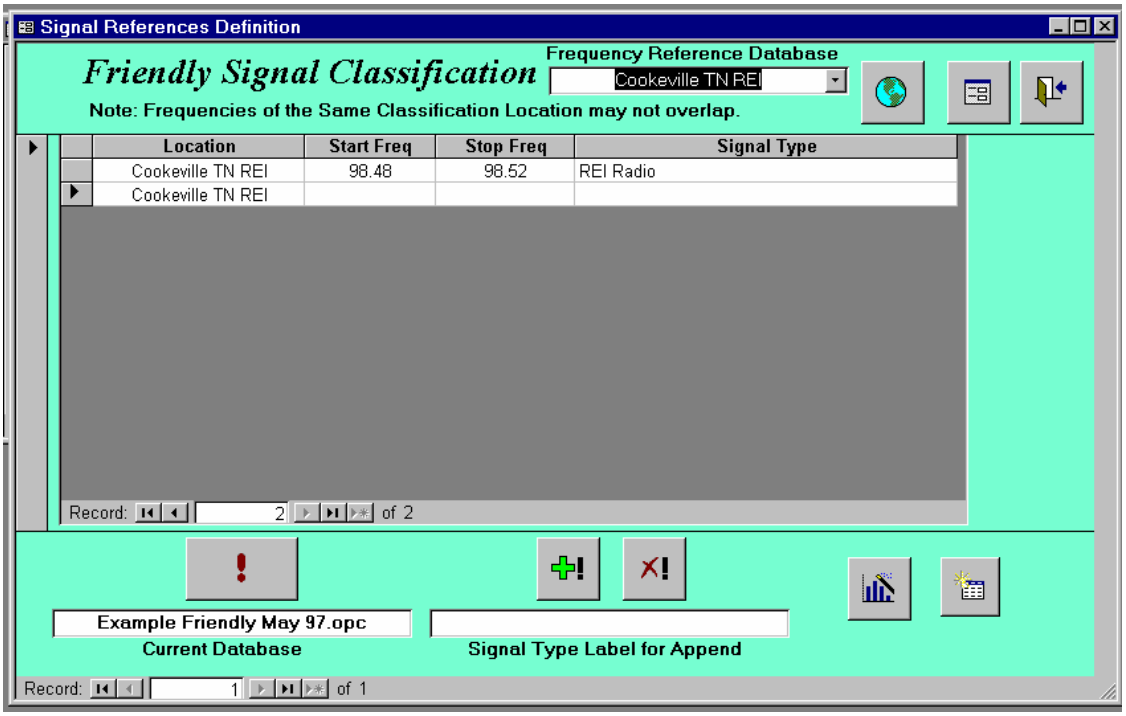
You can also create your own frequency information to apply to signal databases. In this way, you can label specific local signals (like television or radio stations), or you can label all the signals that are normal to your environment.

To label specific frequencies:

1. *Click the "Signal Classification" icon.*
2. *In the large display screen, under "Location," type in a specified location of the signals you are identifying (like the name of the town or an office location), and press "ENTER." This title will serve as the name of the information when you access it from the Frequency Reference Database pull down menu. (See the following figure.)*
3. *Type in the start frequency of the signal, and press "ENTER." (Choose a start frequency slightly lower than that of the signal to allow for deviation. For example,*

if the signal is a radio station at 99 MHz, then choose a start frequency near 98.8 MHz.)

4. *Type in the stop frequency of the signal, and press "ENTER." (Again, allow for some deviation, for the example radio station, you might choose 99.2 MHz as the stop frequency.)*
5. *Type in the name you wish to give the signal, and press "ENTER." (You might want to use the call letters or name of the station.)*
6. *After entering only one signal, click on the Frequency Reference Database menu to establish the new location as a pull down menu option.*
7. *Repeat steps 2-5 for all signals you wish to label.*
8. *When you have finished entering the information for the signals you wish to label, click the "!" icon to apply the information to the database displayed beneath the icon.*
9. *To view the altered information, return to the Main Menu Screen, and click on the "Print A Rpt" icon.*



To label a database with a reference database:

1. *In the Main Menu Screen, select the reference database in the "A" window.*
2. *Click the "Signal Classification" icon.*
3. *Click the "+!" icon to display the reference database information in the display window and add its job name to the scroll list under the Frequency Reference Database window.*
4. *Return to the Main Menu Screen, and select the database you wish to classify in the "A" window.*

5. *Return to the Signal Classification Screen. The reference information should still be displayed in the display window. If not, select the information by its job name under the Frequency Reference Database window.*
6. *Click the "!" icon to apply the information to the selected database. All signals that are in the selected database and the reference database will be labeled with the reference job name. New signals will not be labeled.*
7. *To view the altered database, return to the Main Menu Screen, and click on the "Print A Rpt" icon.*

From this menu, you may also click the "Return to Classification Defaults" icon to reset the original Frequency Database information to the defaults.

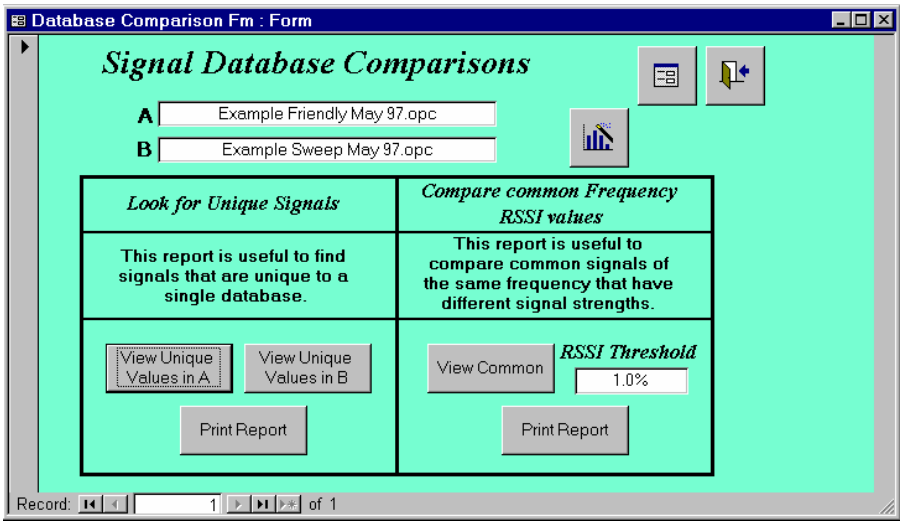
To delete a displayed frequency reference database, click the "**x!**" icon. The information will be removed from the display window and the database will be deleted.

Comparing Databases

One of the most useful features of the PC Interface Software is its ability to compare two signal lists and find information unique to one. For example, if you save the list of friendly signals as a reference job, you can compare it to a sweep list of an area and focus on the new information. You can also compare the strengths of signals over time.

To compare two jobs in order to find new signals:

1. *Select the two signal lists in the "Browse A" and "Browse B" windows.*
2. *Click on the "Signal Comparison" icon on the main menu screen.*
3. *Choose from the graphing options.*
   - *Unique signals in job A (if B is the reference list), or*
   - *Unique signals in job B (if A is the reference list)*



To print the list of unique signals, select "Print" under File on the main toolbar, or click the "Print" icon, or press "Control" and "p" at the same time.
To create graphs from the information, click the "Open Chart Menu" icon.

To compare the strength of signals of common signals between databases:

1. *Select the two databases to compare in the "A" and "B" windows of the main menu*
2. *Click the "Signal Comparison" icon.*
3. *In the RSSI Threshold window, type in the amount of change, by percentage, required to recognize the signal as changed.*
4. *Click the "View Common" icon.*
5. *All signals that vary by that percentage or more from one database to the other will be listed.*

Note: It is normal for many signals to vary in strength, especially with changes in the weather. However, a significant change is a sufficient reason to investigate further.

Printing Reports

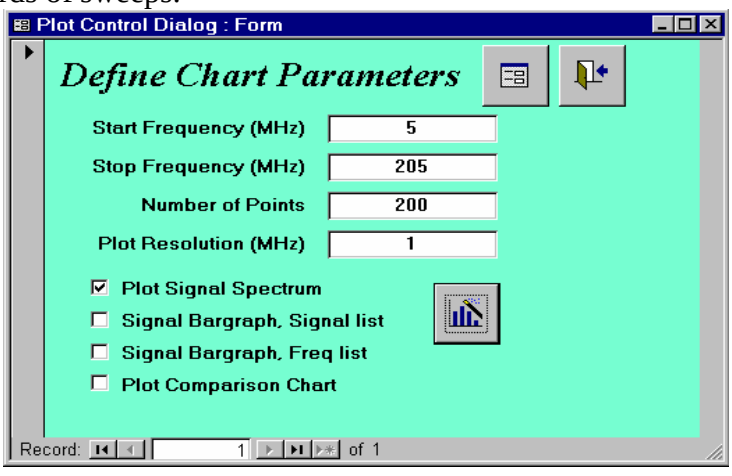
Detailed reports and graphs can be created with the OSCOR Utilities software and are useful for keeping records for later review and for keeping all information about a particular area organized.

To create a report of the selected sweep information, click on the "Print A Rpt" icon. This will assemble a report of the signal list that includes the day's date, the input that detected the signal, the frequency, bandwidth, demodulator, the signal history (the number of times the signal was detected), the time and date the signal was detected, and any additional comments made about the signal in the communications software.

To print, select "Print" under File on the main toolbar, or click on the "Print" icon on the toolbar to print. Pressing "Control" and "p" at the same time will also work.

Generating Plots and Graphs

The OSCOR PC Interface software can create four styles of graphs from the stored information. These can be used with the graphs from the previous section to create reports and records of sweeps.



To generate graphs:

1. *Select a sweep by its job name in the "Browse A" window on the Main Menu Screen. (If you want to compare two graphs, you should select the second sweep in the "Browse B" window.)*
2. *Select the "Plot Graphs" icon on the Main Menu Screen.*
3. *Choose the parameters of the graph.*
   - *Start frequency – Type in the minimum frequency to be displayed on the graph and press ENTER.*
   - *Stop Frequency – Type in the maximum frequency to be displayed on the graph and press ENTER.*
   - *Number of Points – Type in the number of plotted points you want to appear between the Start and Stop Frequencies and press ENTER.*
   - *Plot Resolution – This is calculated automatically when you enter the previous information.*
4. *Choose a plot style.*
   - *Plot Signal Spectrum – This graph shows the entire specified frequency range. Signals appear as spikes at the appropriate frequency.*
   - *Signal Bargraph, Signal List – This graph shows all the signals in the specified range and labels them by their type.*
   - *Signal Bargraph, Frequency List – This graph is similar to the Signal List Bargraph, but the signals are labeled with their frequencies.*
   - *Plot Comparison – This final graph compares the signals of two different jobs on one graph.*

   Note (for the Plot Comparison graph ONLY): If the plot resolution is low enough that two or more signals cannot be distinguished from each other, the multiple signals will appear as one in this graph. The strength assigned to this signal will equal their combined strengths. This ensures that a low plot resolution does not cause a new signal to be ignored.

5. *Click the "Build Graph" icon.*

To print the graphs, select "Print" under File on the main toolbar, or click on the "Print" icon on the toolbar, or press "Control" and "p" at the same time.

Future Updates

Research Electronics has been committed to continuous improvement in its software. The OPC software will continue to evolve in the future as new features are incorporated. REI provides updated versions of the utilities available through our Internet Webpage. Visit our Website, www.research-electronics.com to learn more about other products available from REI.

If you have questions, please contact REI or your dealer for assistance.