N6820ES Signal Surveyor 4D

Operator's Reference

Agilent Technologies

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Introduction

The N6820ES Signal Monitoring System is a high-speed signal monitoring system designed to find and collect information on wireless communications. It covers the spectrum from 100 kHz to 27.4 GHz (depending on the hardware configured) with sweep rates up to 4 GHz per second across multiple antennas, and controls as many as 100 handoff receivers.

The topics in this chapter are as follows:

Options

Hardware Options

The N6820ES works exclusively with the Agilent N6841A RF Sensor. It has a frequency range of 20 MHz to 6 GHz. An optional 3rd party Up/Down Converter is available to extend the frequency range down to 100 kHz and up to 27.4 GHz.

Refer to Agilent publication # 5990-3839EN, N6841A RF Sensor Technical Datasheet or http://www.agilent.com/find/N6841A for a complete description of the product and its specifications.

The N6820ES Signal Surveyor 4D software is available in a variety of configurations. A complete list of options and upgrades are available from your Agilent sales representative or at www.agilent.com/find/N6820ES

- **114: Signal Surveyor 4D** has all the basic capabilities including energy detection and alarm processing, user libraries to enhance signal characterization and identification. It includes a well-developed interface to PostgreSQL database and signal external triggering schemes and recording options. It can also be used as a development platform for creating new user-defined libraries.

- **ASD: User Programming** provides the ability to create new applications components, processes, and drivers as listed here:
  - receiver drivers
  - menus and panes
  - energy features and feature filters
  - wide band energy feature characterization and filtering
  - custom threshold definitions
  - alarm tasks

- **USD: Universal Signal Detection.** Create signal detection algorithms for signals of interest without the need to develop a customized program.

- **EDF: Enable direction finding applications provide the ability to use** Direction Finding (page 395) applications with the N6820ES software.

- **MR1: Basic Modulation recognition application.** In search mode can be used to perform modulation recognition on time snapshots between sweeps.

- **SSY: Sensor Sweep Synchronization.** This option supplies a client tool and GUI to facilitate synchronous sweeps of multiple instances of Signal Surveyor 4D and requires programming skill to implement. Consulting services are recommended.

What's New in E3.4?

Current version

- Please refer to the Version Differences guide, part number 35688-90106.

Document Organization

This document explains how to use the N6820ES Spectrum Monitoring and Interference Detection Software. We assume you are familiar with the basic operation of the host PC and operating system. If you are unfamiliar with such terms as *dialog box* or *double-clicking*, or basic file handling and printing procedures, please read the appropriate documentation supplied with your computer prior to continuing with this document.

The N6820ES Spectrum Monitoring and Interference Detection Software documentation is provided in book form and as online help, which is available by clicking **Help** in the menu bar and then clicking Index, or by clicking the Help button in any dialog box for information about the controls in use of that particular dialog box.

You can also press the F1 function key to get help for any menu that is pulled down or window element that is active (outlined) or press Shift-F1 to get contextual help. In the latter case, the mouse pointer changes to a question-mark pointer so that you can use it to click on the component for which you want help. For more information about using Help, see The Help Menu (page 505).

If you are reading this text online, some of the words are underlined. These are *hyperlinks*; and clicking them displays help on that topic. In the PDF version of the text, these words are displayed in a different color; and clicking on them displays the text on that topic. In the printed book, these topics are followed by a page number; and that page contains the referenced topic.

Document Conventions

This document uses several conventions you should be aware of:

`Computer Font` Words that appear `like this` are names of files, directories, or are lines in a file that you can expect to find exactly as they appear in the documentation.

Path: The **Path:** identifier is a description of how to find the feature being described. It usually starts with one of the entries in the main Menu Bar (page 49).

Option: The **Option:** identifier marks features that are options and may not be installed.

N6820ES Directory The application files are installed in the N6820ES home directory. The definition of this directory depends on the operating system in use.

The *suggested* home directory for **Windows** systems is `\E3238S`.

Documentation Terminology

Energy

Energy is either noise, a signal, or part of a signal. In general, *energy* or *energy peak* is used instead of *signal* until more information is collected in the signal development process. Energy feature types (sometimes called *externals*) include:

- Frequency
- Bandwidth (min, max, avg, current)
- Amplitude (min, max, avg, current)
- Duration (min, max, avg, current)
- Detections (number of)
- Intercepts (number of)
- Intercept time (first and last)
- Number of sweeps (since first intercept)
- Occupancy (%)
- User-defined (e.g., power)

Energy History

This is a history, somewhat like a database, of detected energy. This history contains all of the common energy feature parameters listed above as well as any user-defined features created with software option ASD feature libraries. See Energy History (page 37).

Features

Features are basic energy characteristics that are derived from the frequency-domain data stream (*signal externals*) provided by the N6820ES system hardware. The Energy History Database contains data collected for various energy features. Alarm criteria are based on feature values and determine when to launch a task.

Feature Extraction

Feature Extraction is part of option ASD (User Programming). This user-defined library addition to the N6820ES system allows you to derive new features that are tracked in Energy History and can be used as alarm criteria. See Feature Extraction (page 35).

Filter

Generally refers to methods that minimize the number of entries in the energy history. Pre-filters limit new entries that are made and post-filters remove existing entries in the energy history (e.g. inactive signals). See Energy Pre-filter (page 36).

Signal

Signal indicates that more information exists for an “energy peak.” A “signal” may be composed of one or more pieces of “energy”. Examples of information that contribute to identifying a signal’s type are:

- Modulation type
- Baud rate
- Peak spacing/offset

Signal Processing

Signal Processing refers to the narrow-band signal analysis (via DDC) used to identify, locate, demodulate or collect signals.

Spew/Subscribe

Spew is the process by which the N6820ES provides data or system information to other processes. These processes gain access to that data by **subscribing** to it. With option ASD, an external process or library program can subscribe to system information via a sockets (LAN) interface. The requested data is distributed to the connected system/process when the connection is first made and thereafter, whenever the information changes or new information is available. See Process Overview (page 33) and Socket Connections (page 490).

Polling

Polling is another way for a process to gain information from the N6820ES. The *Command Reference*[1] documents queries that return information about configuration and current operation values, like marker position (`traceA.markerValue?`). Data provided in this manner is supplied once, in response to the query.

[1] See the file \E3238s\manuals\command_ref.pdf.

Hardware Configuration

New systems are shipped from the factory configured correctly and ready to run. The installed hardware is defined in a configuration file. This file is, by default, `\E3238S\N684X_RF Sensor\e3238s.n6841.cfg`[1]. This file should be changed when the hardware is changed or when libraries are changed.

See the *Installation & Configuration Reference*[2] for information on installing hardware and editing configuration commands in the e3238s.n6841.cfg file.

The configuration file may be placed in another directory and given a different name by changing the `E3238s` resource file (see Application Resources (page 17)) as follows:

```
*hardwareConfiguration: /temp/hwConfig.cfg
```

It can also be specified in a command prompt or a desktop icon as follows:

```
C:\E3238s\bin\e3238s.exe -cfgFile "/temp/hwConfig.cfg"
```

When the program is running, you can determine which configuration file was used to start it by opening the Loaded Libraries (page 495) dialog box.

[1] An example file, named d.e3238s.n6841.cfg ("d" = default) is installed in the same directory. This file should be treated as a source file that you copy to another file and modify the copy; because it is replaced when the N6820ES application is updated. The file named e3238s.n6841.cfg may be replaced as part of a Sensor software or firmware update.

[2] This document is provided in printed form and as a PDF file. See the file \E3238s\manuals\install_ref.pdf.

Application Resources

N6820ES Resource File

The `E3238s` file is an X-Window application *resource* file[1]. Resources are application variables that the user can redefine by editing the application's resource file. Resources typically define fonts, colors, line thickness, window sizes, file lengths, path names, and many other things for each part of the `e3238s` program. Other application parameters defined in this file are:

- Hardware configuration file location (see Hardware Configuration (page 16))
- Function key definitions
- Accelerator key definitions (see Accelerator Keys (page 508))
- Memory usage parameters
- Capacity of the log views
- Initial size of the help windows
- Titles of trace panes and the handoff log pane

This allows you to change the application's appearance and functionality. For more information about application resources, see Volume Four of the X Window Series published by O'Reilly & Associates, Inc.

Multiple Configurations

To use a custom version of the resource file, copy the file `E3238s` (see footnote) to your profile directory, then modify it to suit your needs. The system searches until it finds the E3238s file, looking in the following paths:

1. `$USERPROFILE\E3238s`
2. `$HOMEDRIVE:\$HOMEPATH\E3238s`
3. `$E3238s\E3238s`
4. `C:\Exceed.nt\user\app-defaults\E3238s`

These paths are checked in the order given above. To determine the definition of the system variables (shown with the $ sign), open a command window and use the set command.

You can specify a resource when you start the program by using the `-xrm` option:

```
e3238s -xrm resourcestring
```

This option specifies a resource name and value to override any defaults. It is also very useful for setting resources that don't have explicit command line arguments.

If no resource file is found, the *fallback resources* are used. If you wish to modify these default settings, print the fallback resource to a file named `E3238s` and use it as a starting point. For a listing of the fallback resources, see Print To File (page 142), Fallback Resources. Also, see the discussion of application resources in the *Installation & Configuration Reference*.

[1] As shipped, there is no "E3238s" file. There is a file named d.E3238s ("d" = default) which should be treated as a source file (it is replaced when the software is reinstalled or updated). If you need to redefine application resources, copy the `d.E3238s` file to `E3238s` and edit the new file.

Note

In some cases, the Signal Surveyor 4D software is shipped from Agilent Technologies installed, configured, and ready to use. If you wish to reinstall the software, please refer to the *Installation & Configuration Reference*.

Starting the Program

Log in First, login at the workstation. To do this, you need to know your *username* and *password*.

- If your system was configured at the factory and this is the first time you have started the system, the *user name* is **Administrator** and the *password* is empty (press Enter). Factory-configured systems have been configured to have network settings provided by a DHCP server and the system name auto-generated.
- If your system was not configured at the factory but the system has previously been configured, contact your system administrator for the *username* and *password*. Substitute the correct entries when you are prompted on the display as follows:

  `user:` *username*
  `password:` *password*

Start the program

Select Start, All Programs, Agilent E3238S, "E3238S Signal Survey for N684X RF Sensor" Software. Or start the program using the command-line options.

```
Usage:
        e3238s [options]
     -audio  audio
        Specifies the name of the audio server to use.
     -cfg  resourcestring
        Specifies a configuration resource and value. See the file
        C:/E3238s/e3238s.n6841.cfg for available resources. If multiple
        resource/value pairs are required, separate them with a
        semi-colon.
     -cfgFile filename
        Specifies the hardware configuration file to use.
     -classic
        Causes the GUI to be displayed in the classic Motif mode.
     -display  display
        Specifies the name of the X server to use.
     -hideDisplay
        Causes the software to not display a X window.
     -remoteMode
        Causes the software to not display a X window and to not
        display any error or message dialog boxes. Any unwritten
        information at exit time will be deleted without warning.
     -geometry  geometry
        Specifies the initial size and location of the window.
     -macro filename
        Specifies a macro to run at start-up.
     -missionSetup  filename
        Specifies the mission setup to recall at power up.
     -noHardware
        Causes the software to run without the need of hardware.
     -openingScreen
        Causes the software to not display the opening screen.
     -recover
        Causes the software to try and run with the previous setup.
     -siteFile
        Specifies a site configuration file to use at startup.
     -surveyor
        Causes the software to run as a surveyor application.
     -systemBackground color
        Specifies the background color for the GUI when in Microsoft
        Windows mode.
     -systemName name
       Specifies the system name to show in the title bar of the GUI.
```

```
-usage
      Displays this message.
-windows
      Causes the GUI to be displayed as a Microsoft Windows mode.
-xrm  resourcestring
      Specifies a resource name and value to override any defaults.
      See the README file in the C:/E3238s directory for the
     description of the application specific resources.
```

Exporting Display and Audio

The N6820ES Signal Surveyor 4D Software can run as a remote XWindows application. The workstation running the program doesn't necessarily display the user interface or sound the audible signals. The window's display location can be defined with a command line option, as can other program features. Most X programs use the same names for common command line options and arguments.

Notes

- The host system to which the N6820ES will export its display must be configured to allow the connection. Use the `xhost` program to add or delete host names or user names to the list allowed to make connections to the X server.
- If the remote system is a Windows workstation, it must be running an XWindows server, such as Exceed.

To redirect the display and audio, use the following:

```
e3238s -display display_name -audio audio_name
```

Display Options

The `-display` option specifies the name of the X server to use. From the user's perspective, every X server has a *display_name* of the form:

```
hostname:displaynumber.screennumber
```

hostname Specifies the name of the host machine to which the display is physically connected. If the hostname is not given, the most efficient way of communicating to a server on the same machine is used.

displaynumber The term "display" is defined as a collection of monitors that share a common keyboard and pointer (mouse, tablet, etc.). Workstations usually have only one keyboard, and therefore, only one display. Larger, multi-user systems frequently have several displays so that more than one person can do graphics work at the same time. Each display on a machine is assigned a *displaynumber* (beginning at 0) when the X server for that display is started. The display number must always be included in a display name.

screennumber Some displays share a single keyboard and pointer among two or more monitors. Since each monitor has its own set of windows each screen is assigned a *screennumber* (beginning at 0) when the X server for that display is started. If the screen number is not given, screen 0 is used.

GUI Options

The N6820ES software runs, by default, as a Motif-based application with the look and feel of Windows applications. However, for users more familiar with Unix X Window applications, the N6820ES software can run in classic Motif mode.

The -classic option displays look and feel of the original X Window GUI.

The -windows option displays the look and feel similar to a Microsoft Windows application, with several small differences.

Basic Operation Concepts

To learn about the N6820ES Signal Intercept and Collection Software main window, see N6820ES Main Window (page 45).

To learn about signal detection, see Process Overview (page 33).

To learn how to handoff signals, see Handoff Source (page 77).

To learn how to use the mouse to do things faster, see Mouse Features (page 507).

Sweep Range vs. Trace Span

Sweep range generally refers to the start and stop frequencies that define the search receiver's frequency range. These settings are defined in the Search, Setup dialog box. See General Search Setup (page 290).

Trace span is the range of frequencies displayed in a trace pane, which may not be the same as the search receiver's sweep range. A Trace Pane (page 52) displays frequency information created by the search receiver, but a trace doesn't necessarily display *all* of the sweep. Trace start and stop frequencies may be set independent of the RF tuner sweep range - to any span, within or beyond the swept range of the search receiver. As many as four trace panes may be displayed, all of which could display the same span, possibly using different trace types as shown in the discussion on Trace Type (page 427); or each could be set to show part of the sweep span to expand the frequency axis.

You could set one trace's span to monitor the entire sweep and use one or more other traces to zoom in (show more detail) on spans of special interest. See Trace Scale (page 57).

Trace Handoff

A trace can be used to specify handoff settings (priority, detection, and duration) for signals within its span. Since these settings may be different for each trace, the traces can be used to assign different handoff settings for specific parts of the sweep.

See also, Alarms Setup (page 336).

Trace Settings

For a full discussion of trace features, see Trace Setup (page 424).

- The *spectrogram* trace type can be used to monitor signal activity over time.
- Each trace has a marker and delta-marker that can be used to read absolute or relative frequency and amplitude information from a trace.
- A trace marker can be linked to a handoff receiver such that the receiver automatically tunes to the marker frequency. See Handoff Receiver Link (page 434).
- Grids can be used to mark signals that have been handed off, signals that appear in the Energy History Pane (page 88), frequency lists that appear in the Frequency Lists Pane (page 118), or frequency and amplitude ranges covered by Alarms Setup (page 336). See Grid Type (page 429).

System Components

Antenna(s) The signal is captured by the receiving antenna. Switch modules may be used to connect to multiple antennas.

RF and IF switching may be used to implement special-purpose antennas and tuners to optimize performance (such as frequency response and directional sensitivity) or to use antennas at different locations. Custom configurations can be implemented to serve special needs. See Antenna Configuration (page 226) and Switch Configuration (page 228).

N6841A The N6841A RF Sensor is an integrated software defined wideband receiver that consists of the following elements:

- 2 x 1 solid state RF switch
- RF tuner covering the frequency range of 20MHz to 6 GHz
- 14-bit ADC (analog to digital converter) operating at 56 MSamples per second
- FIFO RF Memory with capacity to capture up to 4.8 seconds of IQ data at full sample rate
- FPGA processor where all fft's and averages are performed
- GPS receiver that sources precise time and location to the RF Sensor operations
- Single Board computer to facilitate command and control and data output

Controller The N6820ES application runs on the system Host PC. The data provided by the measurement hardware is passed by the network connection to the application and it performs the process described in Process Overview (page 33).

The controller uses storage media (such as internal or external disk drives) to store and retrieve information associated with the N6820ES and it can be connected to a network to provide communication with external processes.

With respect to other processes that interact with the N6820ES program, the controller is sometimes referred to as the application "Host."

Handoff Receivers The N6820ES can manage as many as 100 handoff receivers. These are self-contained radios that can be remotely controlled to tune to and demodulate signals of interest. The interface varies depending on the receiver used, but some examples are GP-IB, RS232, or LAN. The RF Sensor DDC can also be used as an internal audio Handoff Receiver.

See Handoff Manager under Process Overview (page 33).

Note External handoff receivers must each have their own independent antenna connection for proper operation.

[1] This document is provided in PDF format in \E3238s\manuals\install_ref.pdf.

Setting Sweep Measurement Parameters

This section discusses measurement parameters and how they influence system performance such as dynamic range and sweep rate. See also, System Block Diagram (page 23).

Shape Factor and RBW

Shape factor defines IF filter characteristics. It is the ratio of the filter's bandwidth at 60 dB to the bandwidth at 3 dB. The ratio is a measure of the filter's selectivity, where larger numbers are associated with increased selectivity.

Shape Factor	Passband Flatness	Sideband Level	FFT Window Equivalent
9.0:1	+0, -1.50 dB	-31 dBc	Hanning
4.0:1	+0, -0.68 dB	-125 dBc	Gausstop
2.6:1	+0, -0.01 dB	-95 dBc	Flattop

- **9.0:1** has the highest selectivity, the worst passband flatness (amplitude accuracy), and the worst sideband level performance. Use this setting when the signal density is high (signals are close together).
- **4.0:1** has the best sideband level performance, selectivity performance, and better amplitude accuracy than the 9.0:1 setting.
- **2.6:1** has the best amplitude accuracy, worst selectivity, and much better sideband level performance than the 9.0:1 setting.

Resolution bandwidth (RBW) has the biggest effect on the ability to distinguish signals. Pick a value just small enough to resolve the signal. Use larger RBW settings to improve sweep performance and optimize memory usage.

Shape factor and RBW can be changed automatically across the sweep when the Sweep Search Type (page 287) is *directed*. See Directed Search Setup (page 291).

Data Storage vs. RBW

High resolution (low bandwidth) settings require storing more data for a given sweep range. The following table shows some example number of spectral values and amount of memory required for a range of RBW values.

Span: 1 GHz Shape Factor: 9.0:1

RBW (Hz)	Data Storage	
	points (k)	MB
7.3	204,800	819.2
15	102,400	409.6
29	51,200	204.8
60	25,600	102.4
120	12,800	51.2
240	6,400	25.6
470	3,200	12.8
940	1,600	6.4
1,900	800	3.2
3,800	400	1.6
7,500	200	0.8
15,000	100	0.4
30,000	50	0.2
60,000	25	0.1
120,000	12.5	0.05

Data memory is allocated by the `dataBufferSize` resource, which is set to 8,000,000 words (32 MB) at the factory. For smaller RBW values and/or larger spans than this value supports, you may need to change the value. See the discussion in Application Resources (page 17).

Bin spacing is the frequency separation between spectral values (in Hz). Given the shape factor filter characteristic, this can be interpreted as a resolution bandwidth value.

In the N6820ES, shape factor and bin spacing determine the resolution bandwidth values. If you change the shape factor setting, the values in the RBW list change. What you *really* choose when you pick an RBW value, is bin spacing, given the current shape factor. Also, when you save a measurement state, bin spacing is what is saved in the state file, not RBW.

Averaging

After setting the RBW, set the averaging type and number of averages. Using averaging to lower the noise variance may reduce the sweep speed. However, since all averaging is done in the RF Sensor's FPGA, choosing the right number of averages can optimize your sweep speed when considering the capacity of the network connection to the sensor. Experimentation has shown that 32 averages is a good compromise between sweep speed and trace noise quality. If the user wishes to tune and listen to audio on a remote RF Sensor, a larger number of averages (greater than 256) may be required.

Peak displays the largest value in the specified number of averages. It is not, strictly speaking, *averaging* as it does not reduce the variance of the noise. Peak should be used for "transient" signals such as push-to-talk transmissions and signals using some modulation types. For example, when no averaging is used, a 4 Level FSK signal might appear as only one of the single tones but when peak averaging is used, samples from all the tones can be collected and the full modulation envelope observed.

RMS averaging reduces noise variance by calculating the square root of the sum of the squared values. It should be used to search for non-transient signals and for small signals in a noisy environment or near large signals.

$AVG_{rms} = \sqrt{\frac{1}{n}\sum_{i=1}^{n} X_i^2}$ where n is the number of samples to average together.

RMS averaging reduces noise floor variance but should only be used when the signal of interest is present for a significant amount of time (not transient). If the signal is not present for the time required to collect the number of signal samples specified, RMS averaging does not give accurate amplitude readings.

Note

When you specify a number of averages, that determines the number of data blocks taken at each step as the tuner works through the entire sweep. Each block of time-domain data is converted to frequency-domain data, then the specified averaging type is applied; either RMS or Peak. You do not wait n sweeps to collect n samples. See Averaging (page 301).

Average settings and values can be changed automatically across the sweep when the Sweep Search Type (page 287) is *directed*. See the discussion under Directed Search Setup (page 291).

Tuner Settings

Input selection. The N6841A RF Sensor has two RF inputs to accommodate two different antennas that cover the bands of interest. Antenna selection can be made manually or automatically (in directed search mode).

Tuner Attenuation

Tuner attenuation or gain is probably the only parameter you need to adjust regularly to compensate for changes in input level based on the RF environment and proximity to strong emitters.

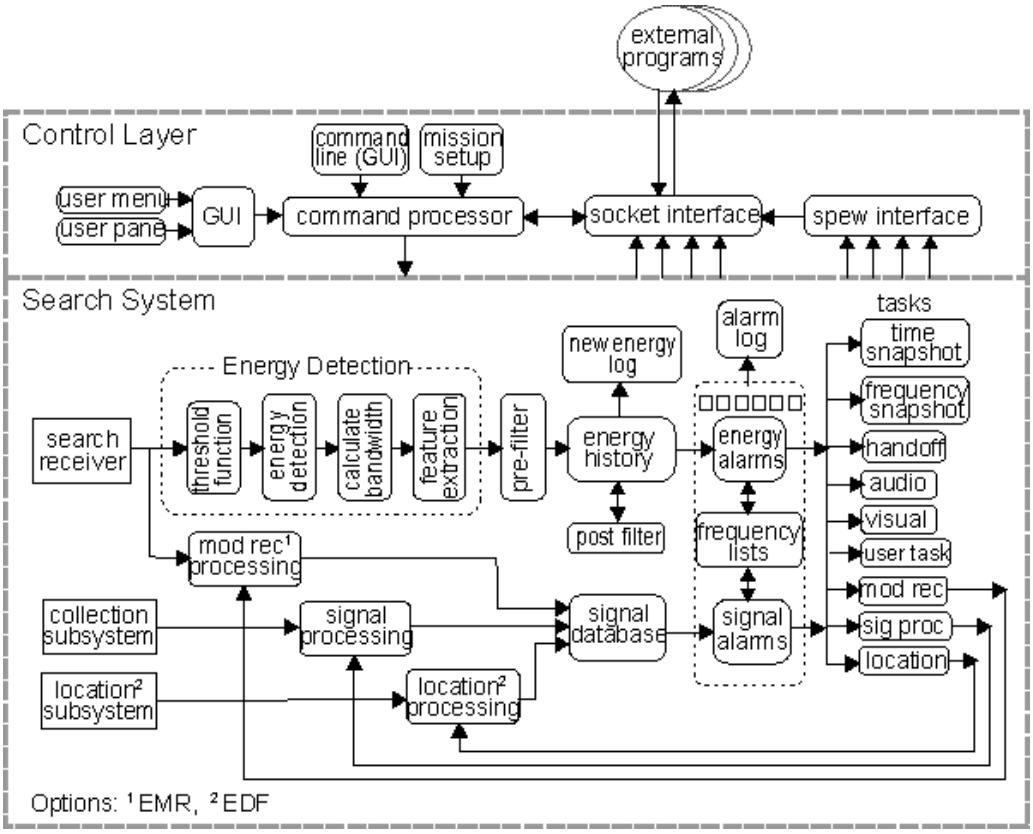
Attenuation values can be changed automatically across the sweep when the Sweep Search Type (page 287) is set to *directed*. See the discussion under Directed Search Setup (page 291).

Note

Tuner overloads are *not* detected by the N6820ES system.

ADC overloads *are* detected; they are indicated in the application window by changing the Trace Identifier (page 54) background color to red. Also, if the marker is on and its location is in a sweep segment with overloaded ADC data, "**OVLD**" appears in the Marker Readout (page 61).

Process Overview



Search System

Overview

The purpose of the search system is to discriminate signal energy from noise, isolate signals of interest (SOI) and perform one or more tasks such as tuning a handoff receiver, logging spectral data, or recording time series (IQ) snapshots. Classification and survey is accomplished by selective filtering using signal external and internal parameters. This is accomplished in two stages:

- Wide-band processing, described in Energy Detection Process (page 34)
- Narrowband processing using the RF Sensor's Digital Down Converter (DDC)

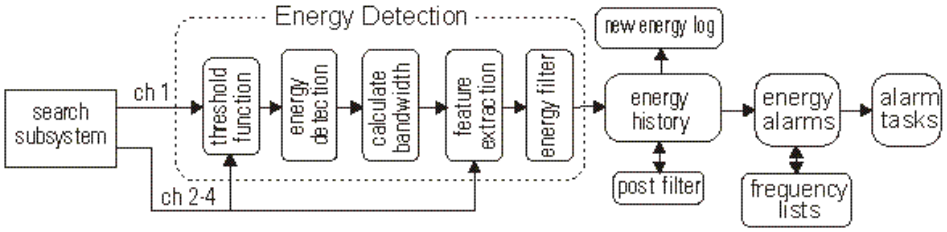
Search Receiver

This block consists of the measurement hardware settings. The N6841A RF Sensor hardware provides averaged spectral data (16k FFT) to the host PC to be processed. The hardware (antennas, tuner, and ADC) is configured with entries in The Configure Menu (page 225). Measurement concepts are discussed in Setting Sweep Measurement Parameters (page 27).

When one or more narrow-band signal processing libraries are loaded, the hardware configuration enables the DDC to collect times series data that is then sent to the Host PC for processing.

The search functions discussed in the following text are described in more detail under The Search Menu (page 285).

Energy Detection Process



Energy Detection evaluates wideband spectral data and isolates signal candidates from the noise. These candidates are classified based on signal externals and entered in the Energy History database where the information is continuously- updated.

The Energy Detection Process accomplishes this by applying a threshold, detecting peaks, calculating bandwidth, extracting features, and filtering out much of the environmental "noise."

Threshold The threshold is the first part of the energy detection process. A threshold is a set of amplitude values, like a signal trace, which can be used to signal candidates from a noisy spectral environment. See Threshold Setup (page 310). The threshold types are:

- **Level** is a single absolute power value (i.e. dBm), energy- independent threshold.
- **Auto** calculates a dynamic noise energy- dependent threshold.
- **Environment** captures the ambient spectral environment (high resolution max-hold). This can be saved as a file on the system disk, which can be loaded, manipulated and used at a later time or in a different location.
- **File** allows you to load a saved threshold.

Energy Detection This step uses the *Peak Criteria* parameter value to identify signals of interest. The energy's amplitude must be above the threshold by at least the peak criteria value (in dB). Also, to identify an "energy peak" among several large values close together, the peak criteria value is added to the amplitude of nearby nulls.

Note No energy is detected if "Energy Detection" is not selected. See the discussion under Energy Detection (page 309) for more information.

Calculate Bandwidth This part of the process calculates the bandwidth for the energy detected in the previous stage, given their frequency and amplitude and the value of the *Bandwidth Criteria*. This step measures the bandwidth of the energy peak.

See Bandwidth under Energy Detection (page 309) for information on calculating bandwidth or Bandwidth under Single-Alarm Setup (page 338) for information about taking action based on a measured bandwidth.

Feature Extraction

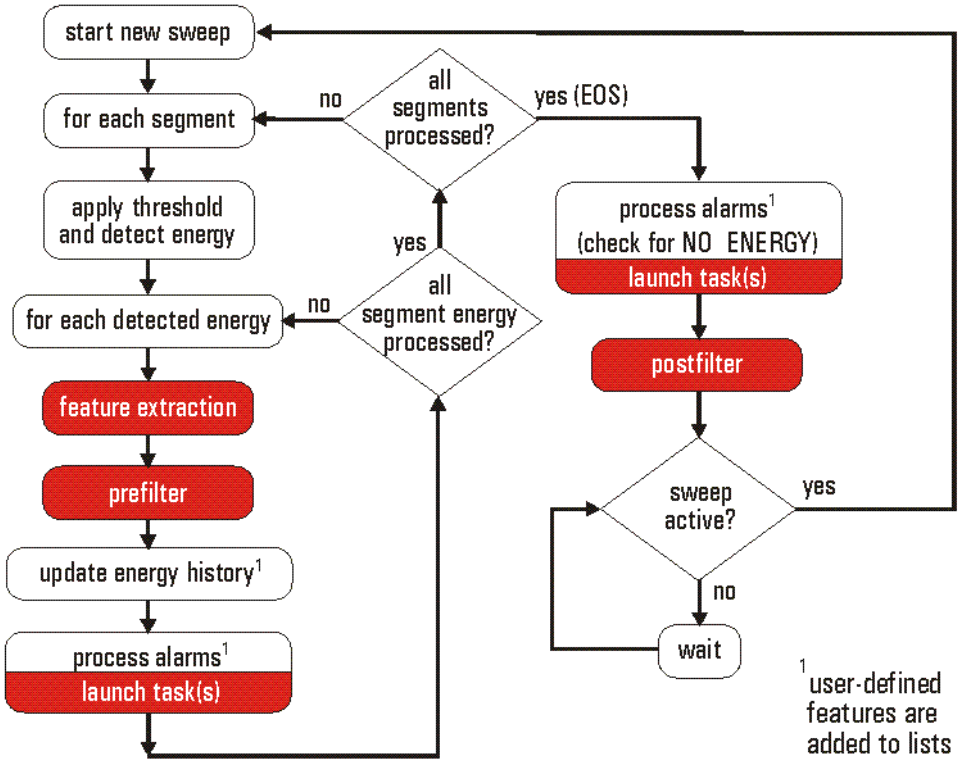
This block allows you to derive new energy characteristics or *features* such as power that can be tracked in the Energy History and used to define alarm conditions.

Features are added by writing a library program as described in the *N6820ES ASD Programming Guide*[1]. To include a new library program in the operation of the N6820ES software, add a line to the `e3238s.n6841.cfg` configuration file with the `featureExtraction:` command followed by the path and filename of the program. Library programs are loaded when the program starts.

Note

There is no user interface (e.g., dialog box) associated with feature extraction, but the feature names appear in the lists in Energy History. See View > Energy History > Edit > Format (Column Setup) (page 91), Energy History > View > Plot (page 95), and Alarms Definition (page 342).

The impact of ASD on the search processing loop is shown in red on the following flow chart.



ASD Impact on Search Processing Loop

Energy Pre-filter

This block allows you to control which features are placed in the Energy History. It is part of option ASD, User Programming. Commands used to configure its operation begin with `pre-filter`. Pre-filter and post-filter functions are defined and loaded with the `energyHistoryFilter:` command in the `e3238s.n6841.cfg` configuration file. See Hardware Configuration (page 16).

[1] See the \E3238s\manuals\program_guide.pdf file.

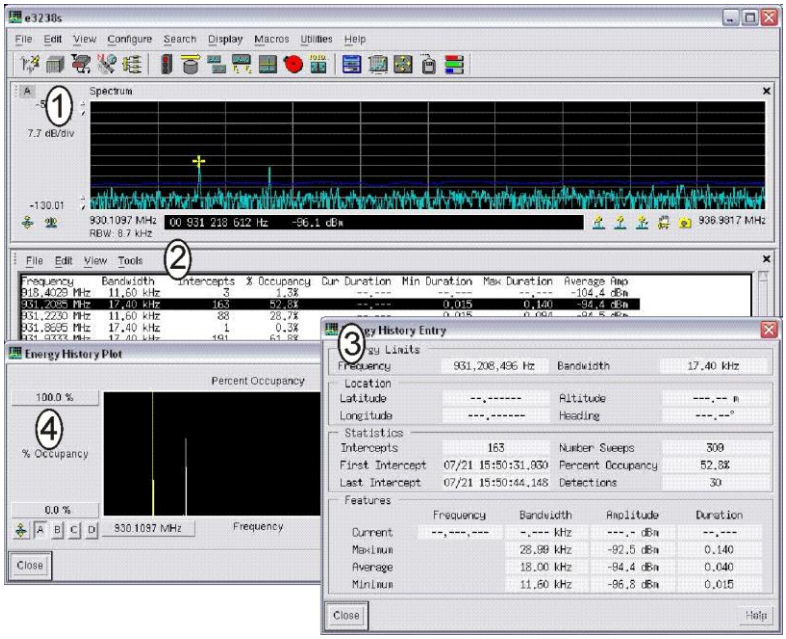
If no library exists, no pre-filter functions are defined, or the pre-filter functions are not enabled, all detected energy is entered in the Energy History.

The user interface for this block and the Post Filter block is discussed under Energy History Filter (page 332).

Energy History

The Energy History Block receives data from the Energy Detection Process. That data is displayed in the Energy History Pane (page 88).

The Energy History pane (#2) displays as many as 8 pieces of information (features) for each entry. You can display all features for any one entry (3) by clicking the Energy History Pane (page 88) and you can show a plot (4) of one feature data for the entire trace with the Energy History > View > Plot (page 95). Features may be linked to a particular trace marker (1), as shown in the following figure.



1. The energy history can be linked to a trace marker so that selecting an entry in the Energy History Pane (#2) moves the marker to the peak.
2. This is the Energy History Pane with an entry selected. Note that markers in the trace (#1) and Plot (#4) appear at the signal's frequency and that all the signal's statistics are displayed in the Entry table (#3).
3. The Energy History Entry table shows all the features of the entry selected in the Energy History Pane (#2).
4. The Energy History Plot shows feature statistics for the spectrum, with a marker at the frequency of the entry selected in the Energy History Pane (#2).

Energy Post-filter

This block is used to remove entries from the Energy History. It is part of option ASD, User Programming. An example of the usefulness of this feature is the `featureAGE` filter included with option ASD that removes entries that have had no activity (new data) for a given period of time.

Pre-filter and Post-filter functions are defined and loaded with the `energyHistoryFilter:` command in the `e3238s.n6841.cfg` configuration file. See Hardware Configuration (page 16).

If no library exists, no post-filter functions are defined, or the post-filter functions are not enabled, and no entries are removed from the Energy History.

The user interface for this block and the Post Filter block is discussed under Energy History Filter (page 332).

New Energy Log The New Energy Log Pane (page 86) displays a listing of energy that meets the criteria in the Energy Detection process. This log records the date and time of first intercept as well as the energy's measured frequency, bandwidth, and amplitude.

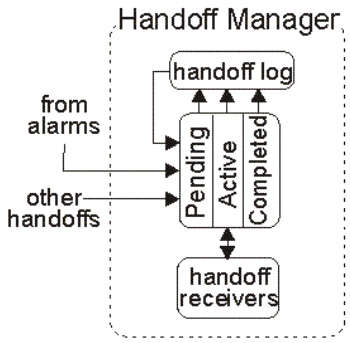
Energy Alarms The purpose of alarms is to launch a task when a defined pattern of energy or signal activity occurs. The Alarms Setup (page 336) dialog box is used to define the criteria and specify which task(s) to launch. Energy alarms are triggered by statistics in the Energy History block and signal alarms are triggered by information in the Signal Database block. As many as 100 alarms may be defined. When energy activity matches one of the alarm definitions, one or more alarm tasks may be launched. Each alarm is recorded in the Alarm Log Pane (page 87).

Frequency Lists Frequency lists allow you to limit alarm criteria to a specific set of frequency values. They may also be used as trace grids and by user-defined components such as feature extraction. The lists may be created with an ASCII editor and they may be viewed and edited in the Frequency Lists Pane (page 118).

Alarm Tasks Each alarm definition includes the task(s) to be launched when the alarm is triggered. These tasks are as follows:

- Capture a time snapshot file. See Time Snapshot Task (page 360).
- Capture a frequency snapshot file. See Frequency Snapshot Task (page 359).
- Sound an audible alarm. See Audio Task (page 358).
- Display an icon in the visual alarm pane. See Visual Task (page 357).
- Perform user-defined task. See Alarm Tasks in the *ASD Programming Guide*.
- Handoff the signal to the Handoff Manager. See Handoff Task (page 355).
- Modify a Frequency List. See Frequency Lists Pane (page 118).

Handoff Manager The handoff manager takes handoff requests from the alarm tasks, markers, trace panes, handoff log, and energy history pane and controls the handoff receivers such that the requests are properly serviced and makes entries in the Handoff Log to record the handoff activity. See the figure below.



To view handoff activity, see Handoff Log Pane (page 75).
To control/change handoff receiver settings, see Handoff Receiver Pane (page 70).

Handoff Receiver Drivers

Part of option ASD, User Programming, provides the ability to create custom handoff receiver drivers. These are created as library programs. See the *N6820ES Programming Guide* for more information.

Signal Database

This block is a **pane** in the N6820ES application window that displays the results of the signal processing in the same way that the Energy History pane displays the results of feature extraction. These results can be used to launch alarm tasks.

See Signal Database Pane (page 107).

Signal Alarms

This block corresponds to the Energy Alarms block. It tracks signal data in the signal database and may be used to launch any of the alarm tasks when the signal data satisfies the specified alarm definition.

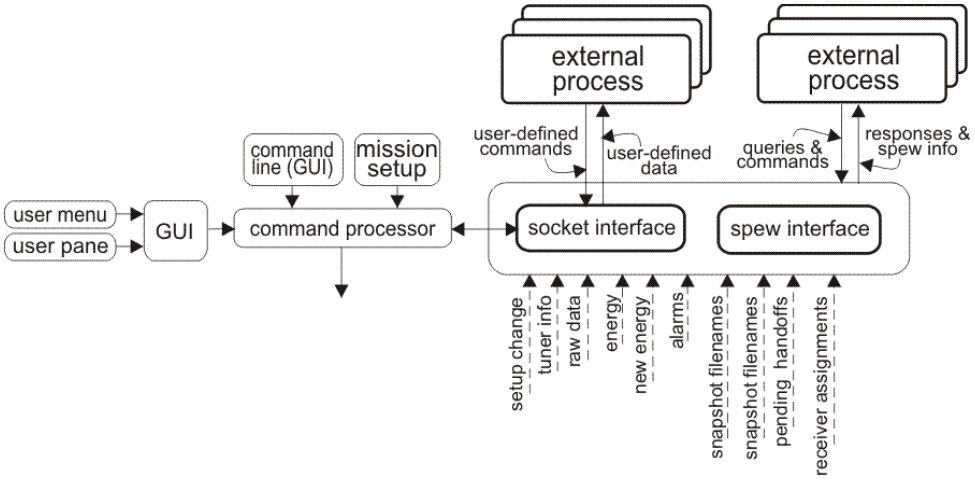
These blocks represent user-defined programs that may be executed when an alarm criteria are satisfied. Energy alarms may launch any of these tasks and signal alarms may also launch any of the energy alarm tasks described earlier. See Alarm Tasks Overview under Energy Detection Process (page 34).

Signal Processing is divided into three categories:

- Signal ID (Modulation format and/or symbol rate of signal)
- Location (e.g., link to the Agilent N6854A Geolocation Server Software)
- Collection (e.g., attributes of IQ or Frequency trace recording)

These may be implemented as library "programs" or alerts to other systems via the socket server. All information about a particular signal is stored in the Signal Database and may be viewed in the Signal Database Pane (page 107).

Control Layer



The following discussion applies, for the most part, to systems that have option ASD (User Programming) installed.

The N6820ES system is typically controlled via the windows graphic user interface (GUI) by the user/operator sitting at the system display. Option ASD allows system control from external processes or user-defined library additions. Also with option ASD, information generated by the search system can be passed to other processes via a socket server process.

Command Processor

The command processor collects the incoming commands and converts them into system control sequences. System commands are described in the *N6820ES Command Reference*[1].

Mission Setup The mission setup (system state) can be saved in a file and loaded again later to quickly configure the N6820ES to a previous state. All user settings are stored in the mission setup file including receiver settings, search setup (energy detection and alarm configuration) and display settings. The information is stored in ASCII format as commands that specify parameter settings. When a mission state file is loaded, these commands are processed in the same way as they are from the Command Line Pane (page 115).

Command Line

The command line interface is a pane within the graphic user interface; see Command Line Pane (page 115). This is a convenient way to experiment with the commands and see their effects. The command documentation is in the *N6820ES Command Reference*.

Libraries

Libraries are used to implement all of the user-defined features shown in the shaded blocks of the N6820ES process diagram as well as handoff receiver drivers. Functions in the libraries can pass commands directly to the command processor and receive responses to queries.

The libraries are loaded based on entries in the `e3238s.n6841.cfg` configuration files. To determine what libraries are loaded while the program is running, see Loaded Libraries (page 495).

[1] See the \E3238s\manuals\command_ref.pdf file.

Graphic User Interface (GUI)

Normal operation of the N6820ES Signal Intercept and Collection Software is done with the graphic user interface (GUI). The GUI appears in the application window described in N6820ES Main Window (page 45). The process diagram also shows two user-defined components attached to the GUI process, user menus and user pane.

User-defined Menus

With option ASD, User Programming, you can add as many as 4 menu groups to the main menu bar. Each menu group may have as many as 8 entries in the menu and each entry has a corresponding icon button in the tool bar. This is accomplished by writing a library program that is loaded at run time (when the N6820ES program starts). For information about writing this program, see the *N6820ES ASD Programming Guide*[1].

User-defined Pane

Option ASD, User Programming, allows you to create as many as 4 window panes, which may be displayed like any of the other panes (trace, log, energy history, etc.). A user-defined pane is created by writing a library program that is loaded at run time (when the N6820ES program starts). For information about writing this program, see the *N6820ES ASD Programming Guide*.

Socket Server

This process allows as many as 10 external processes to send commands, query, and subscribe to information from the N6820ES system via a sockets protocol. This feature is part of option ASD, User Programming.

Library Interface

This interface allows libraries to use the socket server to manage socket connections to other processes. See the *N6820ES Programming Guide*.

Spew Control

This process allows data from various parts of the N6820ES system to be sent to external processes via a sockets protocol. The data is sent whenever new data/settings occurs/changes (i.e., a subscription method). Command queries are also available. Command queries employ the polling method (the data is sent only when your process requests it). This feature is part of option ASD, User Programming.

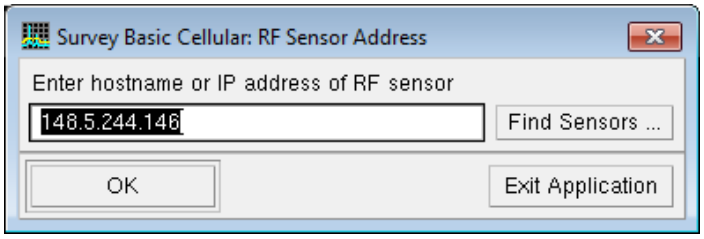
[1] See the \E3238s\manuals\program_guide.pdf file.

Opening Window

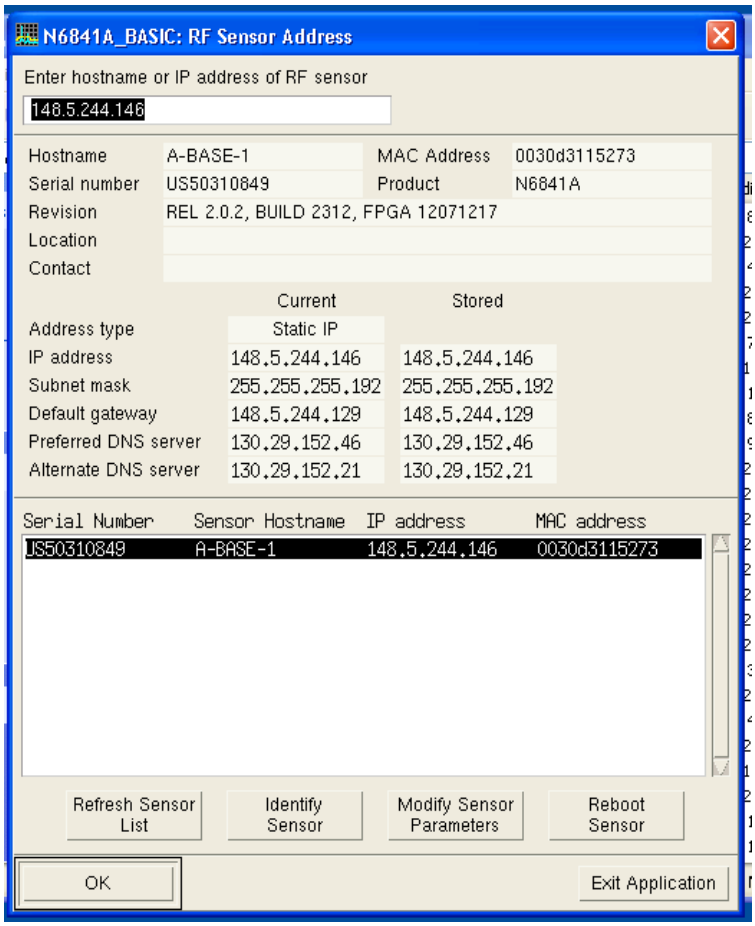
This window appears when the N6820ES program starts. Its startup characteristics are defined in the N6820ES resource file.

1. **Software Information** is the version of the program and operating system.
   - **Version** is the software version.
   - **Date Code** is the month/day/year that the executable was created.
2. **Initialization Status** is displayed as a scrolling list of status, error, and warning messages that appear as the program begins running.
3. **Close Window** Click this button the to close opening window. This does not affect the startup procedure, other than the window is not displayed. Otherwise, the window closes when the startup procedure finishes, just before the main window opens.
4. **Exit Application** When you click this button, the startup procedure is interrupted, program execution is stopped, and the program exits.

After the opening screen presents, another window will follow immediately prompting the user to select the RF Sensor to be used by Signal Surveyor 4D. The window is shown below.



By clicking on "Find Sensors", another screen presents that enables the user to identify any N6841A RF Sensors on the local subnet. If RF Sensors are present, they will populate the fields in this window, allowing the user to select one to operate with the N6820ES software.



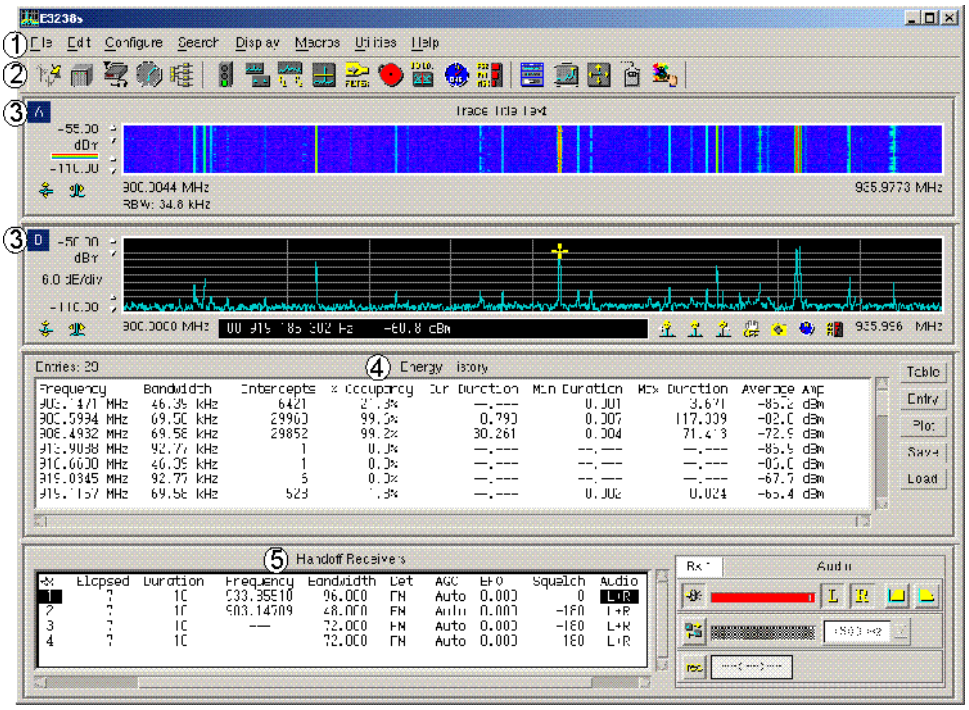
N6820ES Main Window

The N6820ES window is made up of a menu bar (2) and **panes** (3-5). Panes are added to or removed from the main window with the Display Layout (page 422) dialog box. The panes may be organized in many different ways.

The topics in this chapter are as follows:

Introduction to the N6820ES Graphic User Interface

The figure shown here is an example of the N6820ES application window.



1. The Menu Bar (page 49) contains the controls for the N6820ES program.
2. The Tool Bar (page 50) offers quick access to three of the menus.
3. A Trace Pane (page 52) displays sweep data as spectrum, spectrogram, or color spectrogram. There may be as many as four trace panes.
4. The Energy History Pane (page 88) displays information on detected energy.
5. The Handoff Receiver Pane (page 70) provides control and status of receivers.

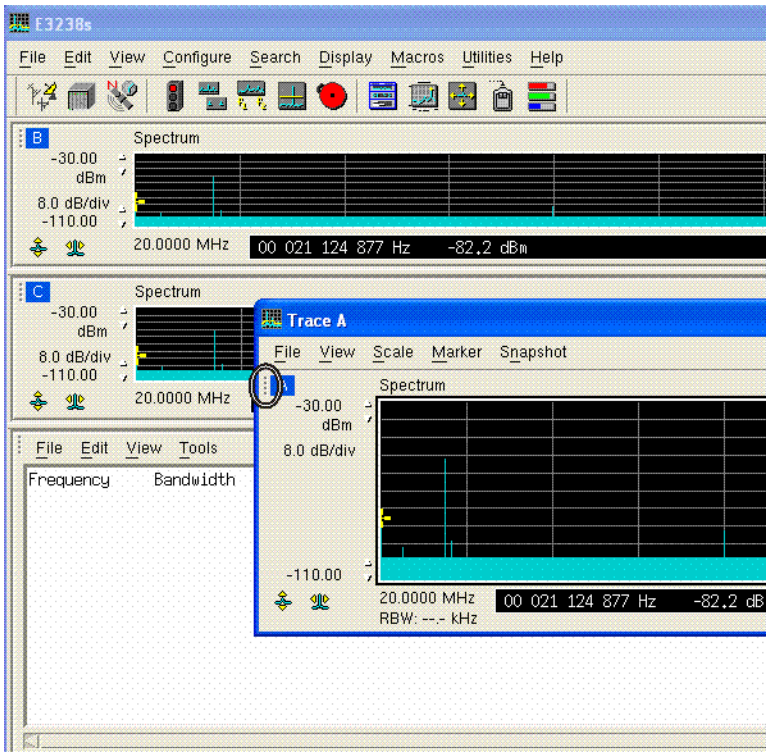
Panes can be resized by positioning the mouse arrow over the edge you wish to move and performing a click-and-drag action. Individual panes can be undocked from and then re-docked to the main application window.

Other panes that may be added to the main application window are:

- The Signal Database Pane (page 107) displays the results of signal processing.
- The Handoff Log Pane (page 75) displays the entries in the handoff log.
- The Text Editor Pane (page 113) allows you to create, edit, and print text files.
- The Command Line Pane (page 115) allows you to execute N6820ES commands.
- The New Energy Log Pane (page 86) lists peaks the first time they appear.
- The Alarm Log Pane (page 87) lists all the alarms that have occurred.
- The Visual Alarms Pane (page 112) displays images and instructions for alarms.
- The User-Defined pane is part of option ASD, User Programming. The contents of this pane can be defined by a user-written program. See the *N6820ES ASD Programming Guide*[1] for more information.
- The Frequency Lists Pane (page 118) is used to view, create, and modify lists of frequencies for trace grids and alarm criteria.

[1] See the \E3238s\manuals\program_guide.pdf file.

Undocking and Docking Panes



You can undock individual panes in the N6820ES application's main window and position them separately on the display. You can later re-dock the separated panes back into the main application window.

To undock a pane from the main application window, double click the vertical bar icon (⋮) located at the left of the pane's Trace Identifier (page 54). The application redisplays the pane as a separate window.

To re-dock a pane, double click the vertical bar icon at the far left of the pane's menu bar. The application replaces the pane in the application's main window.

To close a pane, click on the "X" close icon in the pane's top right-handed corner.

Menu Bar

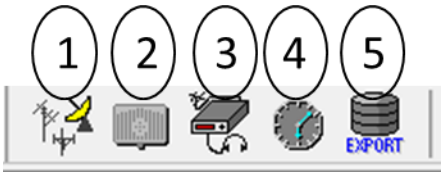
The menu bar contains pull-down menus that organize the N6820ES Signal Intercept and Collection Software features as follows:

- The File Menu (page 125) entries allow activities having to do with system files, including printing.
- The Edit Menu (page 145) entries allow you to clear the log views, log files, energy history, and audio alarm output.
- The View Menu (page 153) entries allow you to view additional panes.
- The Configure Menu (page 225) entries allow you to set the system hardware parameters that can be controlled by the program.
- The Search Menu (page 285) entries allow you to set up and execute search activities.
- The Display Menu (page 421) entries allow you to set up the display.
- The Macros Menu (page 477) allows you to create, edit, and list macro files associated with function keys or toolbar buttons.
- The Utilities Menu (page 485) entries allow you to control the N6820ES software's display and toolbars and to display library and licensing information
- The Help Menu (page 505) entries provide information on how the N6820ES Signal Intercept and Collection Software works and how to use it.

In addition to the menus shown above, users can create as many as 4 user-defined menus using option ASD, User Programming. Each menu group may have as many as 8 entries and each may have its own button in the Tool Bar (page 50).

Tool Bar

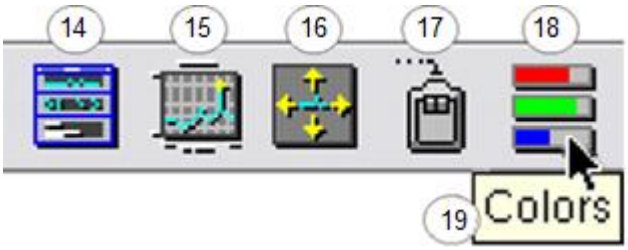
The tool bar offers quick access to the features found in the Configure, Search, and Display menus. Any item in the Configure, Search, and Display menus that is accessible (as defined in Menu/Toolbars (page 488)) has a button in the tool bar.



Note that some of these buttons do not appear in Signal Monitor (Option -113). See Software Options (page 10).

1. Antenna Configuration (page 226)
2. RF Sensor setup (page 227)
3. Handoff Receiver Configuration (page 271)
4. System Reference (page 274)
5. PostgreSQL Database Export (separate manual)

6. Search On/Off (page 286)
7. Search Type (page 287) (general or directed)
8. Search Setup (depending on Type)
   - General Search Setup (page 290)
   - Directed Search Setup (page 291)
9. Energy Detection (page 309)
10. Energy History Filter (page 332)
11. Alarms Setup (page 336)
12. Direction Finding (page 395)
13. Modulation Recognition (page 402)

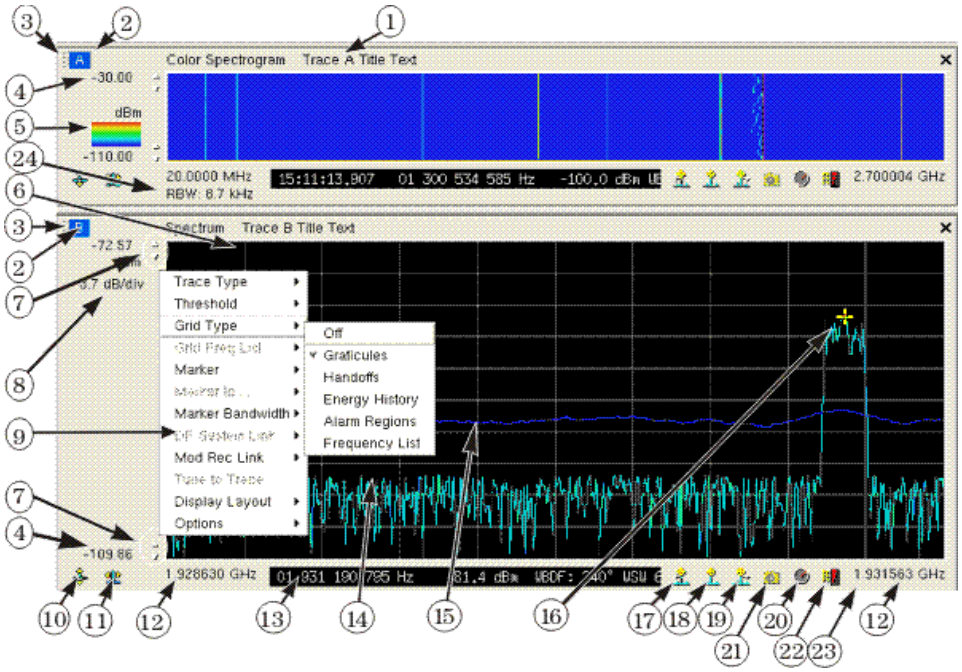


14. Display Layout (page 422)
15. Trace Setup (page 424)
16. Trace Scaling (page 458)
17. Mouse (page 466)
18. Colors (page 471)
19. Tool tips appear when the mouse cursor pauses over a button.

Toolbar Notes

- If the tool bar does not appear, you can activate it as you would any other window element, by putting it in a pane. Also, you can change the position of the tool bar (vertically) by taking it out of one pane and putting it in another. See Display Layout (page 422).
- You can remove buttons from the tool bar by changing their status under Menu/Toolbars (page 488).
- When custom menus are added, corresponding buttons are added to the toolbar. This makes the initial width of the application window wider. To allow the toolbar buttons to wrap, add *toolbarWrap:True to the E3238s resource file. See the Installation reference for details.

Trace Pane



The trace panes above are configured as follows:

- Trace Type: A = Color Spectrogram, B = Spectrum
- Grid Type: B = Graticules
- Marker: A = Off, B = On

Other trace components are as follows:

1. A Trace Title (page 53) (if defined)
2. A Trace Identifier (page 54)
3. Undocking Icon. See Undocking and Docking Panes (page 48)
4. Vertical scale labels. See Trace Scale (page 57)
5. Color bar (for color spectrogram). See Trace Type (page 427)
6. The grid lines. See Trace Setup (page 424)
7. Trace Amplitude Arrows (page 59)
8. dB/Div value.
9. The Trace Popup Menu (page 456)
10. The Amplitude Autoscale Button (page 59)
11. The Frequency Full Scale Button (page 60)
12. Horizontal scale labels. See Trace Scale (page 57)
13. The Marker Readout (page 61) (if the marker is on)
14. A trace line. See Trace Setup (page 424)
15. The Threshold line (if on). See Trace Setup (page 424)
16. The Marker (if on). See Trace Setup (page 424)

17. Marker Search, Next Peak Left (page 63) (if marker on).
18. Marker Search, Peak (page 63) (if marker on).
19. Marker Search, Next Peak Right (page 63) (if marker on).
20. Marker Snapshot (page 64)
21. Task Handoff Rx (page 63) (if option available).
22. Task DF (page 65) (if option available).
23. Task Mod Rec (page 66) (if option available).
24. Resolution Bandwidth. See Trace Scale (page 57)

Tips

- The N6820ES application window may contain as many as four trace panes.
- Panes are added or removed with the Display Layout (page 422) dialog box.

Trace Title

By default, traces do not have a title. A title can be assigned in the command line or by editing a (saved) mission state file and loading it.

To enter a title for trace A use the following command:

```
traceA.title: Trace title text
```

The trace title can be as long as 1023 characters. To get multiple lines, use \n to get a new line. The title can be aligned beginning, centered, or left by entering one of the following lines in the E3238s resource file:

```
*trace_pane.*.title.alignment:  XmALIGNMENT_BEGINNING
*trace_pane.*.title.alignment:  XmALIGNMENT_CENTER
*trace_pane.*.title.alignment:  XmALIGNMENT_END
```

If you want to assign different alignments to each trace, you can do so by specifying the trace as follows:

```
*trace_paneA.*.title.alignment:  XmALIGNMENT_BEGINNING
*trace_paneB.*.title.alignment:  XmALIGNMENT_CENTER
```

Tips

- To activate the command line, click on the Display Layout button. See Display Layout (page 422).
- To find the name and location of the mission state file, see Save Mission Setup (page 129).
- To edit a text file, see the Text Editor Pane (page 113).

Trace Identifier

Red indicates ADC overload .

There may be as many as four trace panes displayed in the window. They are identified by the letters A, B, C, and D located in the upper-left corner of the pane.

If your system has multi-channel option EMC installed, see Trace and Channel Indicators (page 521).

These identifiers are used to make changes to traces in the Trace Setup and Scaling dialog boxes. Refer to Trace Setup (page 424).

Note

Clicking the trace identifier displays the Trace Setup (page 424) dialog box with the particular trace activated.

The background of the trace ID square turns red when the system ADC receives an input signal large enough to cause an *overload*. See the discussion of ADC Input Range under Setting Sweep Measurement Parameters (page 27).

Trace Pane Menus

When trace pane is undocked and displayed as a separate window it displays a set of menus to control that individual trace pane. The menus are:

Trace File Menu

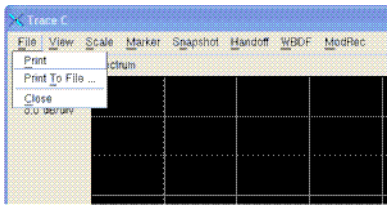
Trace View Menu

Trace Scale Menu

Trace Marker Menu

Trace Snapshot Menu

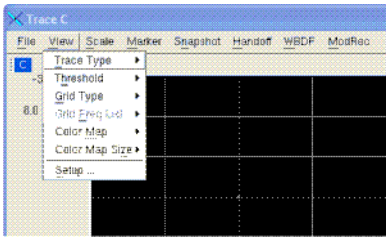
Trace File Menu



The Trace File Menu contains the following menu selections:

- Print allows you to print the current trace screen.
- Print to File allows you to save the current screen as a TIFF file in a selected directory.
- Close allows you to close the current Trace Window.

Trace View Menu



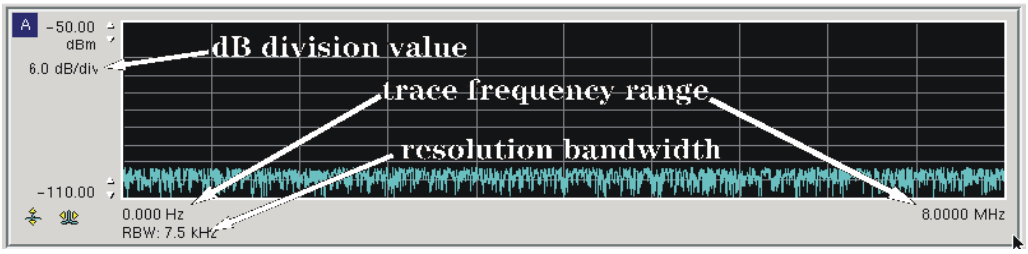
The Trace File Menu contains the following menu selections:

- Trace Type allows you to change the current trace window's display type. Clicking this menu entry displays the trace types available.
- Threshold allows you to save the current screen as a TIFF file in a selected directory.

- Grid Type allows you to close the current Trace Window.

Trace Scale

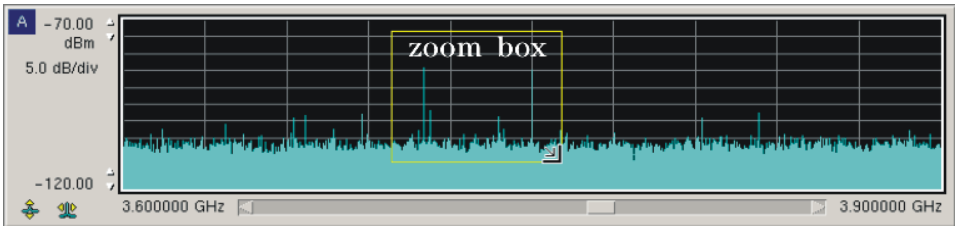
On the left-hand side of the trace screen several sets of numbers describe the amplitude range of the spectrum trace type. The top number displays the maximum Y-axis value of the screen, sometimes referred to as the *reference value*. The number directly beneath the maximum Y-axis value describes the trace screen's dB/division value. This value is shown only on the spectrum trace. For more information on trace scaling, see Trace Scaling (page 458).



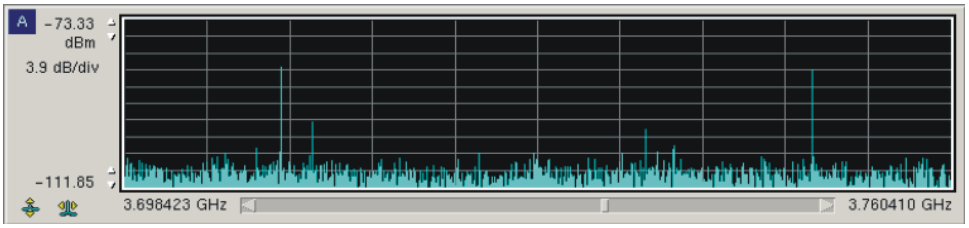
The numbers near the bottom of the trace screen describe the frequency range of the trace and the resolution bandwidth. The frequency range of the trace can be different from the search span. If it is less than the search span, the trace is said to be *zoomed*.

To zoom a trace scale with the right mouse button be sure the right mouse button is set to *Trace Scaling*. See Mouse (page 466). Then perform the following steps:

1. Place the mouse cursor at one corner of a box that defines the new scale settings.
2. Right-click and drag the cursor to the opposite corner of the box (see figure).
3. Release the mouse button.



Use the right mouse button to zoom.



After the zoom the scroll button is smaller.

You can zoom more than once. The scale values associated with each zoom selection are saved so that you can "un-zoom" back through the settings.

Trace Scale

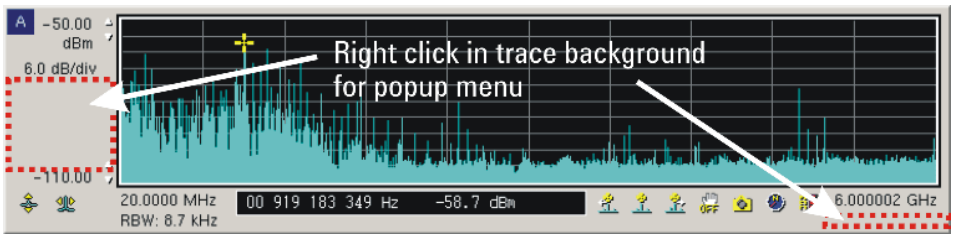
To return to the previous scale settings, double-click the right mouse button in the trace display. If the scale has been zoomed more than once, each double-click returns the scale to the previous scale setting in the order they were changed.

To quickly set the trace scale to match the hardware sweep range, click the Frequency Full Scale Button (page 60).

To change the sweep settings to match the zoomed trace frequencies, use Tune To Trace under Trace Popup Menu (page 456). This maximizes the revisit rate on a zoomed trace by changing the search sweep setup such that the start and stop frequencies match those of the trace's scale. When you do this the trace is no longer zoomed. To return the sweep to it's previous start and stop frequencies, see General Search Setup (page 290).

If the trace is zoomed, a scroll bar appears beneath the trace. This scroll bar does not appear if the marker is on. The scroll bar may be used to move the trace's frequency "view" within the search span.

If the trace's frequency range includes frequencies outside the search span, the trace line will not reach the end of the trace grid.



Trace frequency range is larger than sweep.

Note

When the trace scale is zoomed the trace displays only part of the sweep range being measured. Therefore, the trace display may seem to slow down and/or update sporadically.

To reset the frequency scale of a zoomed trace to match the search receiver's start and stop frequency, use the Frequency Full Scale Button (page 60).

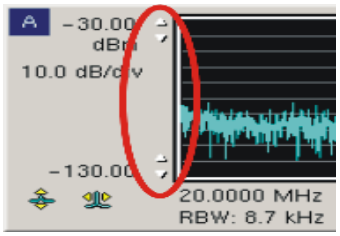
To increase the revisit rate for a trace, click the right mouse button anywhere on the trace background to display the Trace Popup Menu (page 456) and click Tune To Trace.

Tips

- To autoscale the amplitude, use the Amplitude Autoscale Button (page 59).
- To change scale, use the mouse or the trace manual scale menu. Clicking any of the 4 scale labels displays this dialog box.
- The Mouse (page 466) dialog box defines how the mouse buttons and wheel work.

Trace Amplitude Arrows

The arrows at the top and bottom left of the trace screen control the maximum and minimum signal amplitude displayed on the trace screen. When the display is in the Min/Max mode, clicking the arrows will affect either the minimum or maximum value. When the display is in the Ref/Div mode the arrows will modify the Reference Level. For more information on switching between the Min/Max and Ref/Div modes, see Trace Scaling (page 458).



The arrows on the left of the trace screen control the signal display as follows:

When the display is in the Min/Max mode, the arrows at the top left of the screen increase or decrease the maximum value that can be displayed; the arrows at the bottom left of the screen increase or decrease the minimum value that can be displayed. In this mode the relative size of the displayed signal changes with the changes to the screen.

When the display is in the Ref/Div mode, the arrows at both the top and bottom of the screen change the reference level up and down without changing the dB/div setting.

The trace amplitude can also be controlled by the mouse wheel. See Mouse (page 466).

Amplitude Autoscale Button

This button appears in the bottom-left corner of a trace pane. It sets the minimum and maximum amplitude values so that all of the trace is displayed.

Tips

- To set trace scales manually, see Trace Scaling (page 458).
- This button has no effect if the trace type is spectrogram.
- This button does *not* change the frequency span.

Frequency Full Scale Button

This button appears in the bottom-left corner of a trace pane. This button sets the trace's frequency scale to match that of the measurement hardware.

If the marker is off, a scroll bar appears beneath the trace when the trace's frequency scale is less than the whole sweep. (When the marker is on, the marker readout appears beneath the trace in either case.)

You can also revert to the previous scale (frequency and amplitude) by double-clicking the right mouse button in the trace display area.

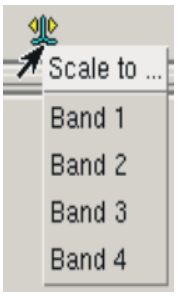
To set the trace's frequency scale to match one of the directed search band's range you can right-click this button. See the discussion below.

Tips

- To set trace scales manually, see Trace Scaling (page 458).
- To change frequency scale (zoom) with the mouse, see Mouse Features (page 507).
- This button does *not* change the amplitude scale. See Amplitude Autoscale Button (page 59).

Frequency Band Scale

This menu appears when you right-click the Frequency Full Scale Button when the Search Type (page 287) is set to *Directed*.



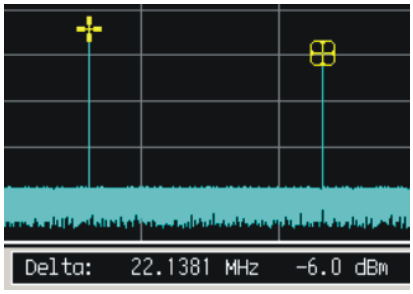
This is a list of the active bands defined in the Directed Search Setup (page 291) dialog box. The individual entry names are either the band's description (see Single-Band Search Setup (page 293)) or the band number if no description exists.

Marker Readout

When a marker is on, the Trace Marker Readout appears beneath the trace. This is frequency and amplitude information associated with current marker position.

Delta Marker

The trace marker can be used to measure the difference in frequency and amplitude between two points. This is called the *delta marker*.



To use the delta marker:

1. Position the regular marker at the reference point in the trace.
2. Press and hold the shift key.
3. Position the mouse cursor at/near the second point, then click and hold the left mouse button.
4. Read the delta values in the marker readout below the trace.

Notes

- The delta marker appears only while the mouse button is held down.
- This procedure assumes the mouse configuration is set to use the shift key for the delta marker. See Mouse (page 466).
- You can move the mouse while holding the shift key and left button to move the delta marker along the trace.
- To change the color of the markers, see Colors (page 471).

Delta Threshold Marker

The Delta Threshold Marker allows the user to display the threshold level and its delta from the actual spectrum in the marker readout area of the trace. This feature only works for the Spectrum display type and when a threshold is defined.

To use the delta marker:

1. Position the regular marker at some point in the trace.
2. Press and hold the Ctrl key.
3. Position the mouse cursor at/near the threshold line, then click and hold the left mouse button.
4. Read the delta values in the marker readout below the trace.

Notes

- The delta marker appears only while the mouse button is held down.
- This procedure assumes the mouse configuration is set to use the Alt key for the delta marker. See Mouse (page 466).
- You can move the mouse while holding the shift key and left button to move the delta marker along the trace.
- To change the color of the markers, see Colors (page 471).

Overload Indicators

If an ADC overload occurs during a sweep and the marker is located in the sweep *segment* in which the overload occurred, an indicator appears in the Marker Readout. Also, the trace identifier turns red to indicate an overload. See Trace Identifier (page 54).

ADC Underflow

If the ADC data is all zeros, an indicator appears in the Marker Readout.

Marker Function Buttons

The marker readout and function buttons appear in the trace pane only when its marker is on. See Trace Identifier (page 54) or Trace Setup (page 424).

Marker Search, Peak

When this button is clicked, the marker moves to the peak having the largest amplitude on the trace. “Peaks” are define in Example (page 323).

Marker Search, Next Peak Left

When this button is clicked, the marker moves to the next peak left of the current position. A “peak” is a local maxima more than approximately 6 dB above the computed noise floor of the display spectrum. Example (page 323)

Marker Search, Next Peak Right

When this button is clicked, the marker moves to the next peak right of the current position. A “peak” is a local maxima more than approximately 6 dB above the computed noise floor of the display spectrum. Example (page 323)

Task Handoff Rx

When this button is pressed, the N6820ES software hands off the signal defined by the frequency of the marker’s position. When a signal is handed off this way, the priority, detection, and duration values passed
to the handoff receiver are defined in the Trace Setup (page 424) dialog box. This allows you to use traces to specify varying handoff parameters (for example) by setting a trace to cover a range you want to have high priority and FM detection and setting the trace’s handoff parameters accordingly.

Marker Snapshot

When this button is pressed, it collects a data record and stores it on the system disk. The data may be either time domain or frequency (or both).

When the icon is ghosted (dull colored) it indicates that no snapshot is active for the trace. No snapshot data is collected until a snapshot setup is made active.

Cursor Shortcut To display Trace Snapshot Setup (page 438) dialog box, right-click the camera icon.

Notes

- The snapshot setup can be different for each trace such that no snapshot is active for one trace and one or both snapshot types are active for another.
- If you have more than one trace pane with the marker on (i.e., multiple snapshot buttons) be sure to click the snapshot button in the *correct* pane.
- Snapshot files may be loaded and analyzed with the `snapview` Snapshot Viewer program. See Snapshot Viewer (page 455).
- Snapshot files may be listened to using the Agilent N6829BS Snapshot Radio software (a separate product available from Agilent).

Task DF

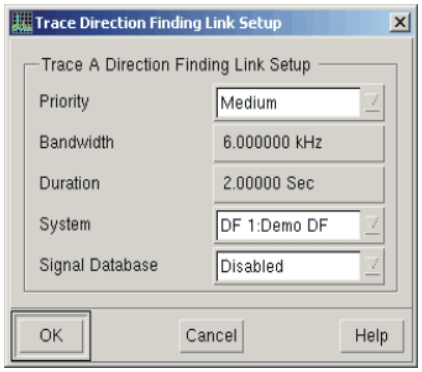
When this button is pressed, the marker's frequency is passed to an active direction finding process. See also, Direction Finding (page 395).

Note that this button appears only when the DF option is loaded and an appropriate DF system is integrated. See Software Options (page 10).

To specify the task settings, right-click this button to display the DF Trace Setup dialog box.

DF Trace Setup

When you right-click a trace's Task DF button, the following dialog box appears.



The Trace Direction Finding Link Setup dialog box allows you to enter or specify the following values:

Priority. This menu defines the channel's priority level within the channel list. Changing the priority is used to avoid having the channel assignment changed (bumped) by a signal with a higher priority.

Bandwidth. Clicking this box displays the Bandwidth Entry Dialog Box.

This dialog box allows you to specify the bandwidth of the signal sent to the DF process. The dialog box consists of a numeric value box and a set of radio buttons that allow you to specify Hz, kHz, MHz, and GHz.

Duration. Clicking this box displays a numeric entry dialog box. Entry allows you to specify the length of time after loss-of-signal that the channel should stay active. The dialog box consists of a numeric value box and a set of radio buttons that allow you to specify Sec, mSec, uSec, and nSec.

System. This menu allows you to specify the DF system to task.

Signal Database. "Enabled" causes the signal information to be saved in the Signal Database. "Disabled" causes the information to not be saved.

Task Mod Rec

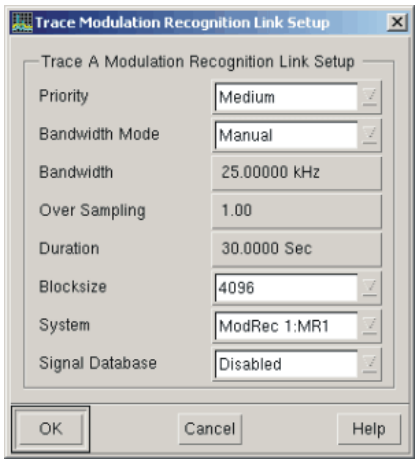
When this button is pressed, the marker's frequency is passed to the modulation recognition processing.

Note this button appears only when the Mod Rec option is loaded. See Software Options (page 10).

To specify the task settings, right-click this button to display the Mod Rec Link Setup dialog box.

Mod Rec Link Setup

Right-clicking the Modulation Recognition Marker Icon presents you with the Trace Modulation Recognition Link Setup dialog box.



See also, Modulation Recognition (page 402).

The Trace Modulation Recognition Link Setup dialog box allows you to enter or specify the following values:

Priority. This menu defines the channel's priority level within the channel list. Changing the priority is used to avoid having the channel assignment changed (bumped) by a signal with a higher priority.

Bandwidth Mode. This menu specifies the source of the signal bandwidth sent to the Mod Rec process. If you select Manual, you must enter a bandwidth value in the Bandwidth entry box below. If you select Energy History, the bandwidth is set to match that saved by the search process in the signal's energy history entry.

Bandwidth. Clicking this box displays the Bandwidth Entry Dialog Box. This value and the Oversampling value determine the sample rate.

This dialog box allows you to specify the bandwidth of the signal sent to the Modulation Recognition process. The dialog box consists of a numeric value box and a set of radio buttons that allow you to specify Hz, kHz, MHz, and GHz. Enter the numeric value you need, click on a radio button to pick a range, then click on the OK button.

Over Sampling. Clicking this box displays a numeric entry dialog box. You must enter values between 0.5 and 4.00. Entries less than or greater than these values are rounded to the nearest legal value. This value and the Bandwidth value determine the sample rate.

Duration. Clicking this box displays a numeric entry dialog box. The duration value limits the age of the request for modulation recognition and limits the time spent processing the modulation recognition task. It is similar to the Aging value in the Mod Rec Pending List (page 403), but also applies after a signal is assigned to a channel for processing.

This dialog box appears when you click a button to enter a duration value. To enter a value:

1. Enter the duration value in the text box.
2. Click one of the frequency units radio buttons or type s, m, u, or n to select Sec, mSec, uSec, or nSec, respectively. You can also enter floating-point numbers in the form 1.23e-4. Numeric values greater than 999999 are converted to scientific notation.
3. Click OK, or press the Enter/Return key.

Blocksize. This menu defines size of the data block passed to the modulation recognition task. The blocksizes range from 1024 complex pairs to 1,048,576 complex pairs in powers of two.

System. This menu allows you to specify the Modulation Recognition system to task. As of the E.01 release it has only one entry.

Signal Database. Choosing “Enabled” causes the signal information to be saved in the Signal Database. Choosing “Disabled” causes the information to not be saved.

Marker Popup Menu

This menu appears when you right-click any of the marker buttons in the lower right-hand corner of a trace display. See following figure. Note that these entries are available only when the Search Type (page 287) is General. They are unavailable when the search type is Directed.

To turn trace markers on, see Trace Identifier (page 54) or Trace Setup (page 424).

These menu entries are used to change the sweep's start and stop frequencies based on the position of the marker.

Ref Level sets the reference level of the trace display to the marker's level value (as shown in the Marker Readout (page 61)). This selection appears only when the trace scaling (set in the Trace Scaling (page 458) menu) is set to Ref/Div.

Center Freq uses the marker's frequency value to redefine the sweep's center frequency. This entry is active only when the Search Type (page 287) is *General*.

Start Freq uses the marker's frequency value to redefine the sweep's start frequency. This entry is active only when the Search Type (page 287) is *General*.

Stop Freq uses the marker's frequency value to redefine the sweep's stop frequency. This entry is active only when the Search Type (page 287) is *General*.

Scale Trace is a checkbox that controls whether the trace's X axis is automatically rescaled to fit the new sweep range. This is like automatically pressing the Frequency Full Scale Button (page 60) after each change.

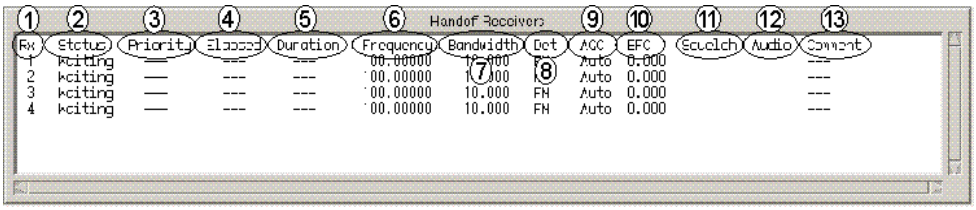
- Its default setting is *on*.
- When it is *off*, the trace doesn't necessarily display all the frequencies in the sweep range.

These parameters may also be changed using the General Search Setup (page 290) dialog box.

Note

Some entries in this menu are ghosted when the Search Type (page 287) is Directed. To use them the Search Type must be General.

Handoff Receiver Pane



This **pane** contains a listing of the installed handoff receivers. To add or delete panes from the N6820ES window, see Display Layout (page 422).

Note

The Handoff Receiver Pane is available only when one or more receivers are defined in the configuration file. See Hardware Configuration (page 16).

Handoff Queue: All handoff receiver assignments go through a queue. When there are more handoffs than installed receivers, the handoffs accumulate in the queue. They are assigned from the queue based on priority and order of handoff. This is tracked and indicated in the Handoff Log Pane (page 75).

If your system has option AU1 receivers installed see Audio Output (AU1) Controls (page 74).

1. **Rx** (receiver) is the receiver number as defined in the `e3238s.n6841.cfg` file.
   There may be as many as 100 handoff receivers installed. See Handoff Receiver Configuration (page 271) for information about the installed receivers.
2. **Status** indicates what activity the receiver is performing:
   - **Waiting** indicates that the receiver is available to service the next signal handed off (assuming its frequency is within the receiver's range).
   - **Active** indicates that the receiver is busy monitoring a signal. An active signal can be released by clicking the word *Active* with either the right or left mouse button. See Handoff Receiver Configuration (page 271).
   - **Manual** indicates that the receiver has been taken out of the receiver pool and is not available for signal assignment. See *Rx Pool* under Handoff Receiver Configuration (page 271).
   - **Offline** indicates that the receiver is present, but is unavailable for use. This usually indicates that, for Audio Output receiver (option AU1), the tuner is not locked. To lock the tuner select **Search - Type - Lock Tuner.**
3. **Priority** indicates a signal's importance relative to other signals. See Handoff Priority (page 79). This setting may be changed with the mouse buttons. See Changing Receiver Settings (page 72).
4. **Elapsed** indicates the time (in seconds) that this receiver has been monitoring this frequency. When the value reaches the value in the *Duration* column, the receiver is given another frequency assignment (if there is another one in the queue that it is capable of servicing) or changes status to *Waiting* (if not).

If a handoff with a higher priority enters the queue and bumps an assigned handoff from a receiver, that handoff's elapsed time will not reach the duration value.

5. **Duration** is the time (in seconds) that the signal was initially set to be monitored. This setting may be changed with the mouse buttons. See Changing Receiver Settings (page 72).
6. **Frequency** is the frequency to which the receiver is tuned. This may be changed with the left mouse button. See Changing Receiver Settings (page 72).
7. **Bandwidth** is the bandwidth setting for the receiver. This value may be changed with the mouse buttons. See Changing Receiver Settings (page 72).
8. **Det** indicates the detection type used by the handoff receiver. This value may be changed with the mouse. See Changing Receiver Settings (page 72).
9. **AGC** indicates the *automatic gain control* setting of the handoff receiver, if applicable. This value can be changed with the mouse buttons. See Changing Receiver Settings (page 72).
10. **BFO** indicates the *beat frequency oscillator* setting of the handoff receiver, if applicable. This value can be changed with the mouse buttons. See Changing Receiver Settings (page 72).
11. **Squelch** indicates the *squelch control* setting of the handoff receiver, if applicable. This value can be changed with the mouse buttons. See Changing Receiver Settings (page 72)
12. **Audio** is used when option AU1 receivers are used. See Audio Output (AU1) Controls (page 74)
13. **Comment** is a short (15-character) text field you can include to convey more information. This and other fields are recorded in the Handoff Log Pane (page 75). This information can be changed with the left mouse button. See Changing Receiver Settings (page 72).

Changing Receiver Settings

Initial Configuration

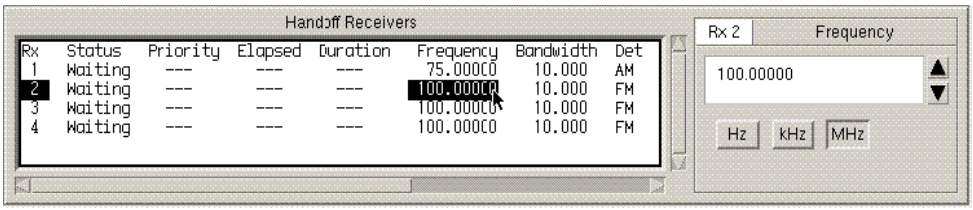
The settings in Handoff Receiver Configuration (page 271) determine whether an operator can release a handoff receiver or change any of the values. When the Releasable setting is "No," clicking an *Active* status does not call the *Release* feature. When the Interactive setting is "No," none of the other settings can be changed in the Handoff Receiver Pane.

Note

Changing the *Duration* or *Priority* values can have the same effect as trying to *Release* an active signal. If the handoff receiver is not configured to allow you to release a signal, try reducing either of these settings.

Left Mouse Button

When you click on a field in the Handoff Receiver Pane that can be modified, a dialog box appears at the right end of the pane as shown in the following figure:



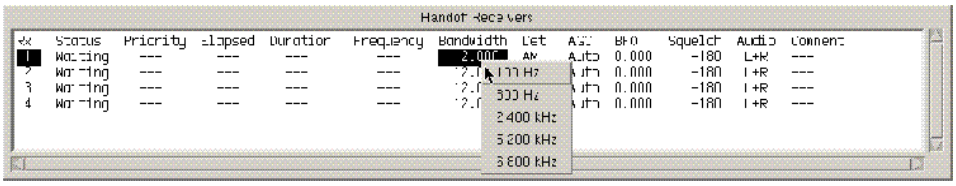
The dialog box varies depending on the field selected.

- **Status** (if Active) has the single button "Release Handoff."
- **Priority** is a list of the four priority values.
- **Elapsed** cannot be changed.
- **Duration** is a text entry line on which you can enter any value.
- **Frequency** (shown above) is a text line entry.
- **Bandwidth** is a selection from a list.
- **Det** is a selection from a list.
- **AGC** is an On/Off toggle where On indicates that the gain selection is automatic. If AGC is Off you set the gain with a slide control.
- **BFO** is a text line entry in which you can enter any value.
- **Squelch** indicates the *squelch control* setting of the handoff receiver, if applicable. This value can be changed with the mouse buttons.
- **Audio** see Audio Output (AU1) Controls (page 74).
- **Comment** is a text line in which you can enter or modify a comment up to 15 characters in length.

To turn off the dialog box at the right side of the pane, click the same field again or click a field that cannot be changed.

Right Mouse Button

When you click a field with the right mouse button, a popup menu appears that allows you to change the field setting as shown in the following figure:



The menu varies depending on the field selected. Note that “Frequency” must be changed with the left mouse button, since it is a text field.

Audio Output Controls

When a handoff receiver is configured, the following control is enabled.

1. **Mute** Clicking this button mutes the audio output and disables all other controls in this pane.

2. **Volume** Clicking and dragging the marker in this box raises or lowers the audio volume level. The solid bar indicates the current volume level.

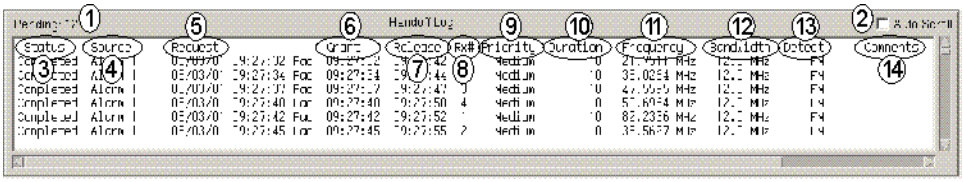
3. **Left/Right** These buttons control the audio output from the two available audio output channels. By default both audio channels are enabled. This control allows a user to listen to two channels at once. when two are installed.

4. **Low Pass/High Pass** Clicking the left box adds a high-pass filter to the audio output. The High Pass filter can be used to eliminate CTCSS tones. Clicking the right of these two boxes adds a low-pass filter to the audio output. The Low Pass filter can be used to reduce noise in the audio output.

5. **Record** Clicking this button directs the software to begin saving the audio signal in a file in the snapshot directory.

6. **Record Time** This readout displays the length of time that the current audio recording session has been running. Audio Output records up to 10 seconds of data that occurred before the “Record” button was clicked. This enables you to record the segment of the signal that caused you to record it.

Handoff Log Pane



This **pane** contains the log of handoff activity. To add it to the display, see the Display Layout (page 422) dialog box.

1. **Pending** shows the number of signals handed off but not yet assigned to a receiver. It is a count of the number of entries whose *status* is *pending*.
2. **Auto Scroll** keeps the latest log entries log visible by scrolling as new entries appear. You can scroll the list up and down with the Scroll Bars (page 133).
3. Handoff Status (page 76)
4. Handoff Source (page 77)
5. Request (page 78)
6. Grant (page 78)
7. Release (page 79)
8. Handoff Rx# (page 79)
9. Handoff Priority (page 79)
10. Handoff Duration (page 80)
11. Frequency (page 81)
12. Bandwidth (page 81)
13. Detect (page 81)
14. Comments (page 83)

Tips

- Handoff receivers must be described in the `e3238s.n6841.cfg` file and configured before they can be used. See Hardware Configuration (page 16).
- The definition of energy that is automatically detected and handed off are discussed in Energy Detection (page 309).
- Signals may also be handed off from a trace pane. See Trace Setup (page 424).
- To control handoff directly, see Handoff Receiver Configuration (page 271).
- The Handoff Log may be recorded as a file. See Log Files (page 139).
- To release pending signals, clear the log view entries with Clear Log (page 146) or mark the ones to release with the left mouse button and then click the right mouse button to get the Handoff Log Popup Menu (page 83).

Advanced Note

Each handoff log entry requires 160 bytes of memory. The number of entries in the handoff log view is limited as defined by the `handoffLogViewLength` resource variable in the `E3238s`. See also, Application Resources (page 17). When the number of log entries reaches the limit, new entries cause the oldest

completed entries to be discarded/lost from memory. Pending entries are not discarded. If the queue is full of pending entries, the new ones are discarded. The handoff log *file* is not affected by this limit.

Handoff Status

- **Pending**: A pending signal has been handed off (put in the handoff queue) but has not yet been assigned to a handoff receiver. You can change some settings of a Pending signal. To change an entry's priority, detection, or duration:

  a. Position the mouse cursor anywhere in the line of the entry you wish to change.

  b. Click the right mouse button. You can select multiple lines by holding the button down and dragging the cursor up or down. When you release the button a popup menu appears.

  c. Select the appropriate parameter.

  d. Select the new setting.

Note

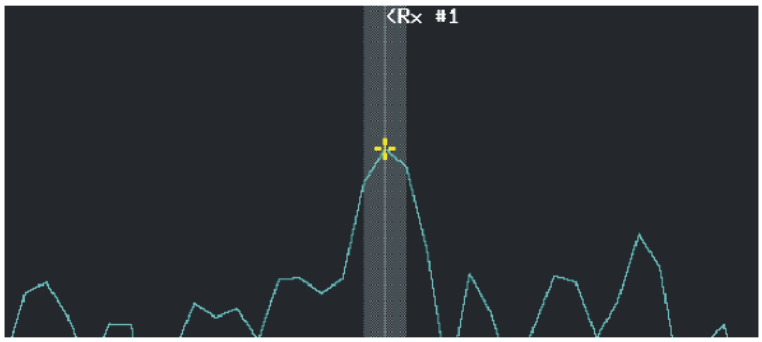
If the frequency or detection type of a signal are not supported by any *installed* handoff receivers, the status is changed to *Unable*.

If frequency or detection type limit the signal's handoff to a receiver that is installed but not available (e.g., it is Out of the receiver pool or assigned to a higher priority signal), the status will continue to be Pending until that receiver is available. See Rx Pool under Handoff Receiver Configuration (page 271).

- **Active**: An active signal is one that has been assigned and is being monitored by the handoff receiver identified in the Rx# column. The time that is was assigned is recorded in the Granted column. When the amount of time specified by *duration* has past, the status changes to *released*.

  You may change the frequency, priority, detection, or duration settings, add comments, or release the signal before the duration setting releases it automatically in the Handoff Receiver Pane (page 70).

  An *active* signal is flagged in a trace pane with text describing the handoff receiver monitoring it when the trace grid type is *Handoffs* and the Active signal frequency is within the span of the trace, as shown below. A trace's grid type is selected in Trace Setup (page 424).



- **Completed**: A completed signal was released at the time listed in the Released column. Completed signals may be handed off again; see Handoff Log Popup Menu (page 83).
- **Bumped**: A bumped signal was released before the *duration* time setting expired because another signal with a higher priority was handed off and all other handoff receivers were assigned to equal or higher-priority signals.
- **Released** means that the operator marked it and clicked the Release button while it was pending. If the number in the Rx column is 0, the signal was never assigned to a receiver.
- **Unable** means that either the frequency of the signal is outside the range of all installed handoff receivers or the detection type is not supported by any of the installed receivers.

  See note under Pending.

Tips

- To handoff a logged signal that was released, click it with the middle mouse button and drag it to the handoff receiver pane.
- To handoff more than one signal entry, select them by clicking them with the left mouse button. To select contiguous entries, click and drag or hold the Shift key when you click the entry at the end of the selection. To select individual entries, hold the Ctrl key when you click them.

Handoff Source

This field lists the feature that initiated the handoff.

- **Marker** means that the signal was handed off from a trace by moving the marker to it and then clicking the Task Handoff Rx (page 63). The procedure is described under Handoff a Signal (page 507).
- **Trace** means that the signal was handed off from the Trace Pane with the mouse. See Handoff a Signal (page 507).
- **Log** means that the signal was listed in the handoff log and its handoff log entry was selected with the mouse to tune a handoff receiver to it again. See Handoff Log Popup Menu (page 83).
- **Alarm 1**, Alarm 2, ... means that the signal was handed off as a task from the alarm (identified by number). See Handoff Task (page 355).
- **EnergyHist** means that the signal was handed off from the Energy History Pane (page 88).

- **Manual** means that the signal was handed off with the `manualHandoff` command either remotely (through a socket connection to an external process) or from the Command Line Pane (page 115).

Request

The date and time that the handoff request occurred. This time may not be the same as the Granted time, if more signals have been handed off than there are handoff receivers. It is also dependent on the priority differences of active handoffs and pending handoffs. The activity times in handoff log have a resolution of 1 second.

Grant

The time the handoff receiver accepted the signal and began monitoring. The activity times in handoff log have a resolution of 1 second.

Release

The time the handoff receiver quit monitoring the signal. The activity times in handoff log have a resolution of 1 second.

Handoff Rx#

The handoff receiver number used to monitor the signal as defined in the Handoff Receiver Configuration (page 271) dialog box.

Handoff Priority

This discussion applies to handoff setup parameters in the Energy History Pane (page 88) or Trace Setup (page 424) dialog box as well as column descriptions in the Handoff Log Pane (page 75) and Handoff Receiver Pane (page 70).

A handoff is given a *Priority* level when it is handed off. If more than one handoff is pending (waiting in the queue to be assigned to a handoff receiver), the handoff with the higher priority setting goes first. If the priority of two pending handoffs is the same, the handoff with the earlier request goes first. See Handoff Status (page 76) for descriptions of *pending* and *bumped*.

The priority levels are:

- **Critical** priority handoffs have the highest priority. When a Critical priority handoff is put in the handoff queue, it will *bump* any lower-priority handoff being monitored.
- **High** priority handoffs are superseded only by Critical priority handoffs. Critical priority handoffs can bump a High priority handoff. When a High priority handoff is put in the handoff queue, it will bump any Medium or Low priority handoff being monitored.
- **Medium** priority handoffs can bump Low priority handoffs, but any High and Critical priority handoffs will be handed off before a Medium priority handoff Handoffs with High and Critical priority will bump a Medium priority handoff being monitored.
- **Low** priority handoffs are handed off in the order they are put in the handoff queue when there are no pending handoffs with higher priority. If a handoff with higher priority is handed off while a low-priority handoff is being monitored, it is *bumped*; the handoff receiver tunes to the higher-priority handoff.

The initial priority value is defined by the Handoff Source (page 77) handoff settings. The priority can also be changed while the handoff is pending (e.g., increase priority to get it assigned to a receiver sooner by bumping an active handoff) or while it is active (e.g., increase priority to avoid its getting bumped by another handoff).

Tips

- After Priority, receiver assignment depends on the order in which the receivers are listed/installed. For example, when all active handoffs have the same priority and a handoff with a higher priority enters the queue, it bumps the handoff on the first receiver on the list. Receiver order is determined by entries in `e3238s.n6841.cfg`.

- The log's priority setting for a *pending* handoff is used to determine when it is assigned to a handoff receiver, given the priorities of all pending and active handoffs.
- The log's priority setting for an *active* handoff is used to determine whether other handoffs in the queue bump it before its *duration* expires.
- The log's priority setting for a *completed* handoff is the priority setting that was active when monitoring ended for that handoff.

To set the priority value before the handoff, see:

- Trace Setup (page 424) for assignments from the trace.
- Handoff Task (page 355) for assignments from the Process Overview (page 33).
- Energy History > Tools > Handoff Setup (page 102) for assignments from the Energy History Pane (page 88).

To change the priority of a pending entry in the handoff log, see Handoff Log Popup Menu (page 83).

To change the priority of an *active* handoff, see Handoff Receiver Pane (page 70).

Handoff Duration

This discussion applies to handoff setup parameters in the Energy History Pane (page 88) or Trace Setup (page 424) dialog box as well as column descriptions in the Handoff Log Pane (page 75).

Duration is the amount of time a frequency is to be monitored before it's status changes to *completed* and the handoff receiver takes another assignment from the queue. This value is assigned to a handoff when it is put in the handoff queue.

This value is listed in the Handoff Log Pane (page 75) as follows:

For a pending handoff, this is the amount of time the handoff receiver will stay tuned to the frequency if no handoffs with higher priority are put in the queue.

For a completed handoff, this is the amount of time the handoff receiver was tuned to the assigned frequency.

Minimum duration: 1 second
Maximum duration: 86400 seconds (24 hours)
Resolution: 1 second

Tips

- To set this value before the handoff, see:
  - Trace Setup (page 424) for trace handoffs.
  - Handoff Task (page 355) for alarm handoffs. See Process Overview (page 33).
  - Energy History > Tools > Handoff Setup (page 102) for handoffs from the Energy History Pane (page 88).
- To change this value for a pending entry in the handoff log, see Handoff Log Popup Menu (page 83).
- To change this value for an *active* handoff, see Handoff Receiver Pane (page 70).

Frequency

The frequency of the handoff assignment. This value may have been measured at the peak of detected energy, it may have been assigned as part of a Single-BW-Hint Setup (page 325) definition, or it may have been a user-defined value specified as part of an alarm task definition in the Handoff Task (page 355) dialog box.

Bandwidth

This is the bandwidth value associated with the handoff session.

- When the handoff status is *released*, *unable*, or *pending*, this value reflects the setup value for the source that requested it (e.g., trace handoff setup).
- When the handoff is granted (becomes active), the bandwidth value may be rounded up to the receiver's next largest acceptable setting.
- When the handoff status is *active*, the bandwidth value reflects the receiver's current setting (which may be changed by the operator).
- For a *bumped* or *completed* entry, the bandwidth value indicates the bandwidth value in use at the time of release.

Detect

This discussion applies to handoff setup parameters in the Energy History Pane (page 88) or Trace Setup (page 424) dialog box as well as column descriptions in the Handoff Log Pane (page 75).

Detection is the method used to demodulate the signal. The detection types available depends on the capabilities of the installed handoff receivers. The types displayed in the log and detection selection lists may include others. The list of standard types is:

- None
- AM: amplitude modulation
- FM: frequency modulation
- CW: continuous wave
- LSB: lower side band
- USB: upper side band
- Log: log modulation
- Pulse: pulse modulation

Tips

- To set this value before the handoff, see:
  - Trace Setup (page 424) for signals handed off from the trace.
  - Handoff Task (page 355) for signals handed off as part of the Process Overview (page 33).
  - Energy History > Tools > Handoff Setup (page 102) for signals handed off from the Energy History Pane (page 88).
- To change this value for a pending entry in the handoff log, see Handoff Log Popup Menu (page 83).
- To change this value for an *active* signal, see Handoff Receiver Pane (page 70).

Detect

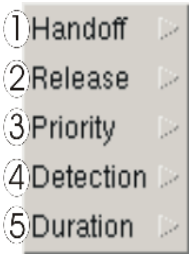
See the discussion under Handoff Receiver Configuration (page 271).

Comments

Comments may be added in the handoff receiver control box while the signal is being monitored (status=active). The maximum length of the comment is 15 characters.

Handoff Log Popup Menu

Path: In the Handoff Receiver pane, select one or more *pending* handoff log entries with the left mouse button, click the right mouse button.

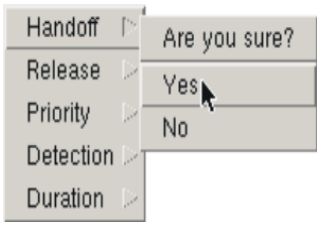


This allows you to assign a handoff receiver to the same settings that appear for an entry in the log or, for an *active* entry, release or change the priority, duration, or detection settings originally specified in the Trace Setup (page 424) or Handoff Task (page 355) dialog boxes.

1. Handoff Verification (page 83)
2. Release Verification (page 84)
3. Priority (page 84)
4. Detection (page 84)
5. Duration (page 84)

To add the Handoff Log Pane to the main window, see Display Layout (page 422).

Handoff Verification



Path: Perform following steps:

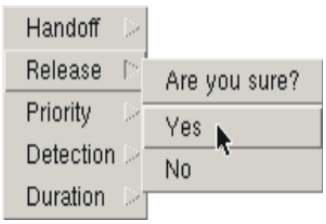
1. Select one or more entries with the left mouse button.
2. Click the right mouse button.
3. Click Handoff.

When you select Handoff, this menu confirms the request before it hands off the selected signals.

Yes confirms the handoff.

No cancels the handoff.

Release Verification



Path: Perform following steps:

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button.
3. Click Release.

When you select Release this menu confirms the release request before it releases signals that are pending in the handoff log.

Yes confirms the release and the status is changed to Released in the Handoff Log.

No cancels the release and the status is not changed.

Priority

This menu allows you to change the priority of a pending handoff log entry. To change the priority setting for one or more pending signals in the Handoff Log Pane (page 75):

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button anywhere inside the Handoff Log Pane; an option list appears containing time values.
3. Select a new priority value from the list by clicking it.

Detection

This menu allows you to change the detection type of a pending handoff log entry. To change the detection setting for one or more pending signals in the Handoff Log Pane (page 75):

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button anywhere inside the Handoff Log Pane; an option list appears containing time values.
3. Select a new detection value from the list by clicking it.

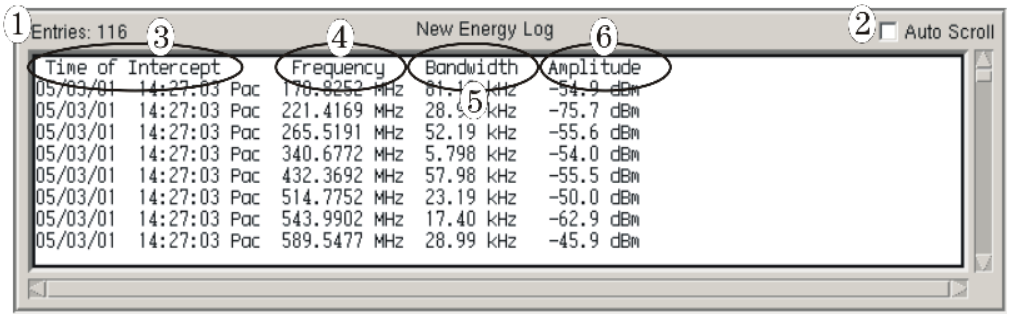
Duration

This menu allows you to change the duration of a pending handoff log entry. To change the duration setting for one or more pending signals in the Handoff Log Pane (page 75):

1. Select one or more pending handoff log entries with the left mouse button.

2. Click the right mouse button anywhere inside the Handoff Log Pane; an option list appears containing time values.
3. Select a new duration value from the list by clicking it.

New Energy Log Pane



This **pane** displays a log of new energy. For a general discussion of its place in the overall process, see Process Overview (page 33).

1. Number of entries in the log. "Full" means that it has reached capacity and some entries have been shifted out of the log. See the following note.
2. Auto Scroll keeps the latest entries visible by scrolling through the log. You can move the list up and down in the pane with the Scroll Bars (page 133).
3. This is the date and time of the first intercept (the first time the energy was detected. For information about the total number of intercepts and the time of the last intercept, see Energy History Pane (page 88).
4. The frequency of the energy the first time it was detected. This value may be at the peak of the detected energy, or it could be the center of a predefined band within which the energy was detected. See Process Overview (page 33) and Single-BW-Hint Setup (page 325) for more information.
5. The energy bandwidth on the first detection. This value may have been measured or copied from the Single-BW-Hint Setup (page 325) dialog box, if the frequency fell in an active hint. For information on the current, maximum, minimum, or average bandwidth values, see Energy History Pane (page 88).
6. The amplitude of the energy as measured when the intercept occurred. For information on the statistical values, see Energy History Pane (page 88).

Advanced Note

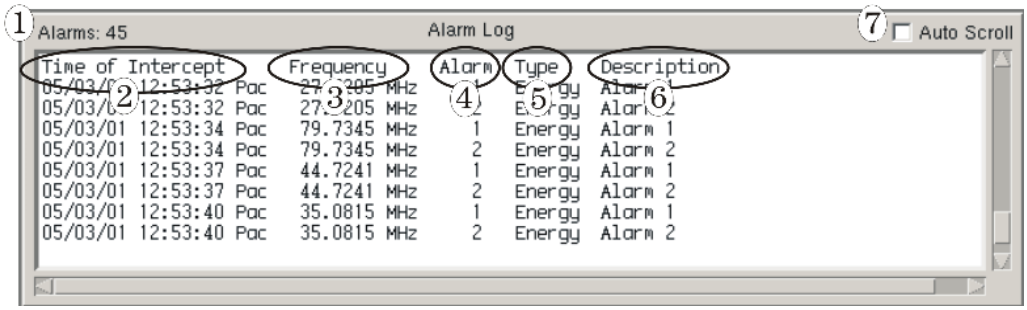
Each New Energy Log entry requires 60 bytes of memory. The number of entries in the log view is limited as defined by the `newEnergyLogViewLength` resource variable in the `E3238s`. See also, Application Resources (page 17).

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries will be written to a file on the hard disk. See Log Files (page 139).

Tips

- To add this pane to the main window, see Display Layout (page 422).
- To create a *file* containing this log, see Log Files (page 139).
- To clear the New Energy Log, see Clear Log (page 146).
- To receive help on this or any pane, click Help, On Window or press Shift+F1 to activate context-sensitive help and click in the pane.

Alarm Log Pane



This **pane** displays a log of triggered alarms. For a general discussion of its place in the overall process, see Process Overview (page 33).

1. The number of alarms in the log. "Full" means that it has reached capacity and some entries have been shifted out of the log. See the following note.
2. **Time of Intercept** This is the date and time of the intercept that caused the alarm.
3. **Frequency** The measured frequency of the detected energy peak. See Process Overview (page 33) for more information.
4. **Alarm** The alarm number. See Alarms Setup (page 336).
5. **Type** Either energy or signal alarm.
6. **Description** The description or name of the alarm as entered in the Single-Alarm Setup (page 338) dialog box.
7. Auto Scroll keeps the latest entries visible by scrolling the log as new additions appear. You can move the list up and down in the pane with the Scroll Bars (page 133) at the right.

Advanced Note

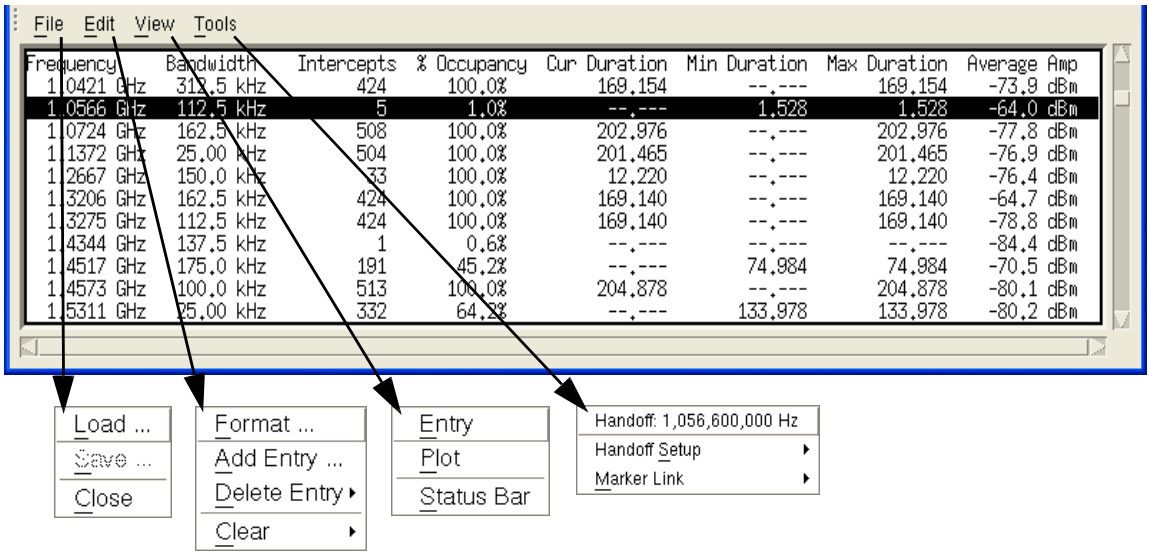
Each Alarm Log entry requires 90 bytes of memory. The number of entries in the log view is limited as defined by the `alarmLogViewLength` resource variable in the `E3238s`. See also, Application Resources (page 17).

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries will be written to a file on the system disk. See Log Files (page 139).

Tips

- To add this pane to the main window, see Display Layout (page 422).
- To create a *file* containing this log, see Log Files (page 139).
- To clear the Alarm Log, see Clear Log (page 146).
- To receive help on this or any pane, click Help, On Window or press Shift+F1 to activate context-sensitive help and click in the pane.

Energy History Pane



To use the pull-down menus of the Energy History Pane

- "Energy History > File Pull-Down Menu" on page 89
- "Energy History > Edit Pull-Down Menu" on page 90
- "View > Energy History > View Pull-Down Menu" on page 93
- "Energy History > Tools Pull-Down Menu" on page 101
- "Energy History > Right-Click Menu" on page 106

To print/save/clear/show Energy History entries

- Printing entries - See "File > Print".
- Saving entries - See "File > Print To File".
- Clearing entries - See "Edit > Clear Energy History".
- Showing entries in a trace - Set the grid type to New Energy.

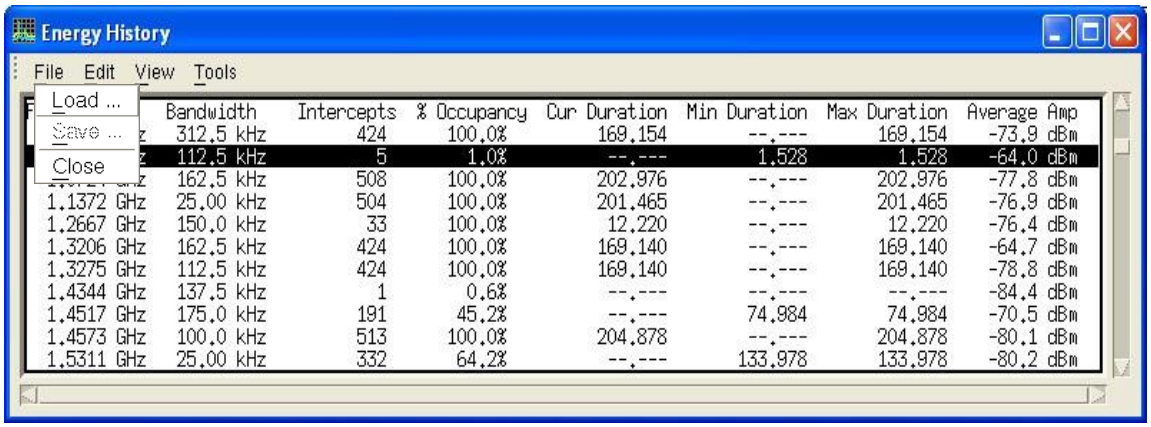
To change which feature/parameters are displayed

See "View > Energy History > Edit > Format (Column Setup)" on page 91. Up to eight feature/parameters can be displayed for each entry in the Energy History Pane.

To display all feature/parameters for a selected entry

See "Energy History > View > Entry" on page 94.

Energy History > File Pull-Down Menu



	Bandwidth	Intercepts	% Occupancy	Cur Duration	Min Duration	Max Duration	Average Amp
z	312.5 kHz	424	100.0%	169.154	--.---	169.154	-73.9 dBm
z	112.5 kHz	5	1.0%	--.---	1.528	1.528	-64.0 dBm
z	162.5 kHz	508	100.0%	202.976	--.---	202.976	-77.8 dBm
1.1372 GHz	25.00 kHz	504	100.0%	201.465	--.---	201.465	-76.9 dBm
1.2667 GHz	150.0 kHz	33	100.0%	12.220	--.---	12.220	-76.4 dBm
1.3206 GHz	162.5 kHz	424	100.0%	169.140	--.---	169.140	-64.7 dBm
1.3275 GHz	112.5 kHz	424	100.0%	169.140	--.---	169.140	-78.8 dBm
1.4344 GHz	137.5 kHz	1	0.6%	--.---	--.---	--.---	-84.4 dBm
1.4517 GHz	175.0 kHz	191	45.2%	--.---	74.984	74.984	-70.5 dBm
1.4573 GHz	100.0 kHz	513	100.0%	204.878	--.---	204.878	-80.1 dBm
1.5311 GHz	25.00 kHz	332	64.2%	--.---	133.978	133.978	-80.2 dBm

"View > Energy History > File > Load" on page 89

"View > Energy History > File > Save" on page 89

"View > Energy History > File > Close" on page 90

View > Energy History > File > Load

Load is used to read a file containing Energy History data from a file on the system disk. Loading an Energy History file removes the existing feature/parameter statistic data in the Energy History. You are prompted with a question to assure that this is your intention before the data is overwritten.

When you load an Energy History file that contains custom features, be sure that the same feature/parameter-defining library programs are loaded in the same order as were loaded when the file was created. The Agilent N6820ES Signal Detection and Monitoring Solutions tracks user-defined feature/parameters with an index/counter that is assigned based on the order that they are loaded; for example, the order they are listed in the *configuration file*.

View > Energy History > File > Save

Save writes the feature/parameter data in the Energy History to a file on the system disk. Saving Energy History data to a file creates an ASCII file containing all the feature/parameter statistics in scientific notation using a comma-separated-value format. To pull the data directly into Microsoft Excel, save the data as a .csv file. To do this, select All Files (*.*) as the Save as type: and <filename.csv> for the File name.

Note

Current, Minimum, and Maximum Amplitude data are saved as volts squared. Use the following formula to convert to dBM. *dBM=10*Log10(20*V2)*.

For Average Amplitude, use *dBM=10*Log10(20*V2/Intercepts)*

% Occupancy is not saved as part of the standard Energy History data. To calculate the % Occupancy, divide Intercepts by Number Sweeps.

Note

The First Intercept and Last Intercept saved values are saved as the number of seconds from the epochal date of January 1, 1970.

The following formula will convert a saved intercept value into a Greenwich Standard Time (Month/Day/Year Hour:Second) format. *GST time = (Saved Intercept Value/86400)+25569*.

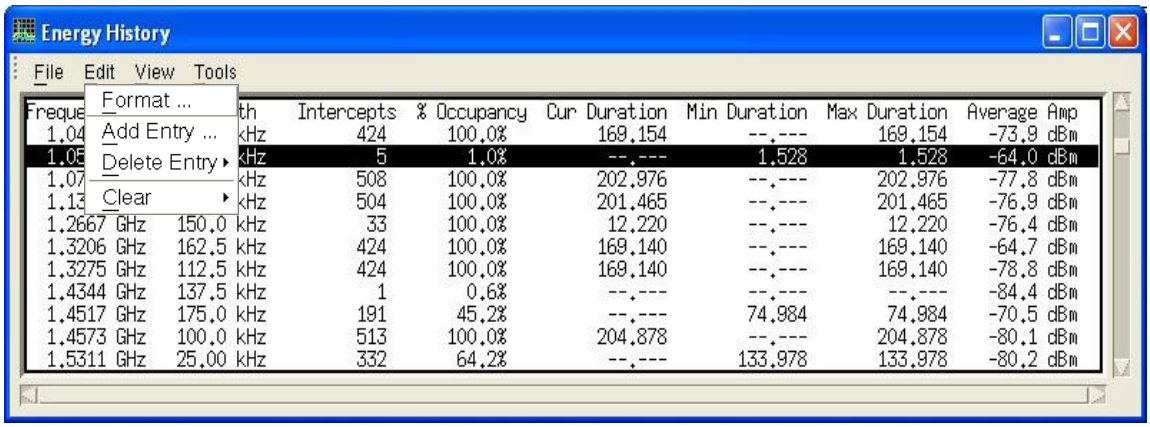
For example, to change GST to Pacific Standard Time you need to subtract 8 hours or 1/3 of a day.
PST time = (Saved Intercept Value/86400)+25569−0.33333

View > Energy History > File > Close

Closes the Energy History file.

Energy History > Edit Pull-Down Menu

View > Energy History > Edit Pull-Down Menu



"View > Energy History > Edit > Format (Column Setup)" on page 91

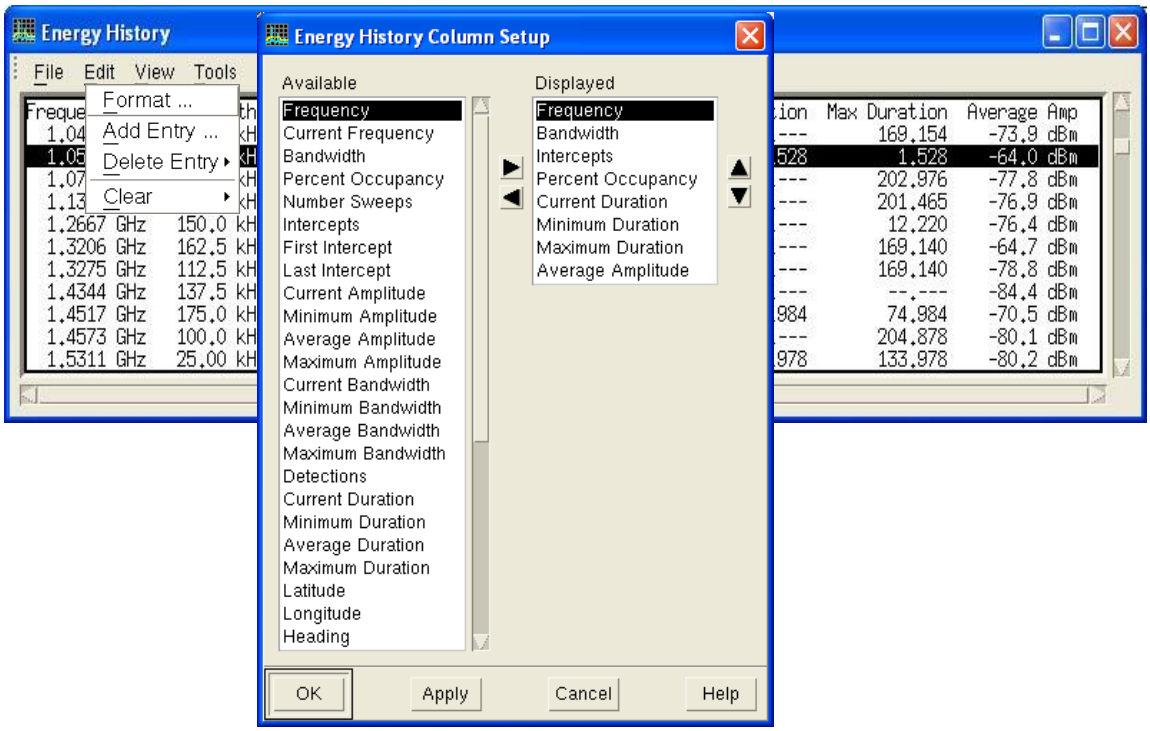
"Energy History > Edit > Add Entry" on page 92

"Energy History > Edit > Delete Entry" on page 92

"View > Energy History > Edit > Clear" on page 93

View > Energy History > Edit > Format (Column Setup)

View > Energy History > Edit > Format (Column Setup)



Energy History Column Setup dialog box is used to specify what feature/parameters appear in the columns of the Energy History Pane.

While there are many fields that can be displayed, only the first eight columns listed in the *Displayed* group appear in the Energy History Pane.

To add a column entry to the displayed energy history group

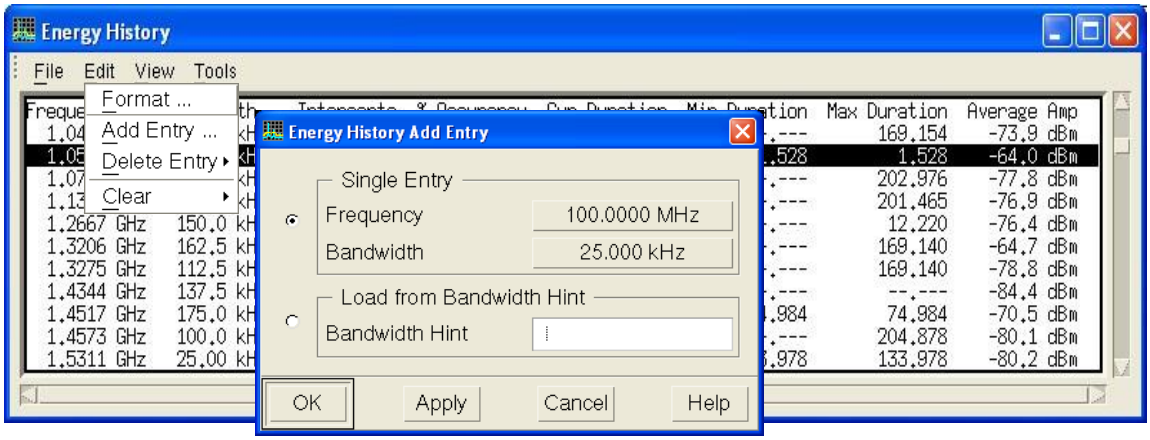
Select the name of a column from the *Available* group and click the horizontal arrow.

To remove a column entry from the displayed energy history group

- Select the name of a column from the *Displayed* group and click the horizontal arrow.
- **OK** implements the changes made and closes the dialog box.
- **Apply** implements any changes and leaves the dialog box open.
- **Cancel** closes the dialog box without making any changes.

Energy History > Edit > Add Entry

View > Energy History > Edit > Add Entry



Energy History Add Entry dialog box is used to add an entry to the Energy History Pane. This may be used to define alarm conditions that require energy history entries to monitor for No Signal conditions. See “Search > Alarms > Energy Definition".

- **Single Entry**

  To add one entry to the Energy History Pane, click the radio button associated with this selection, and enter values for the frequency and bandwidth with the buttons at the right.

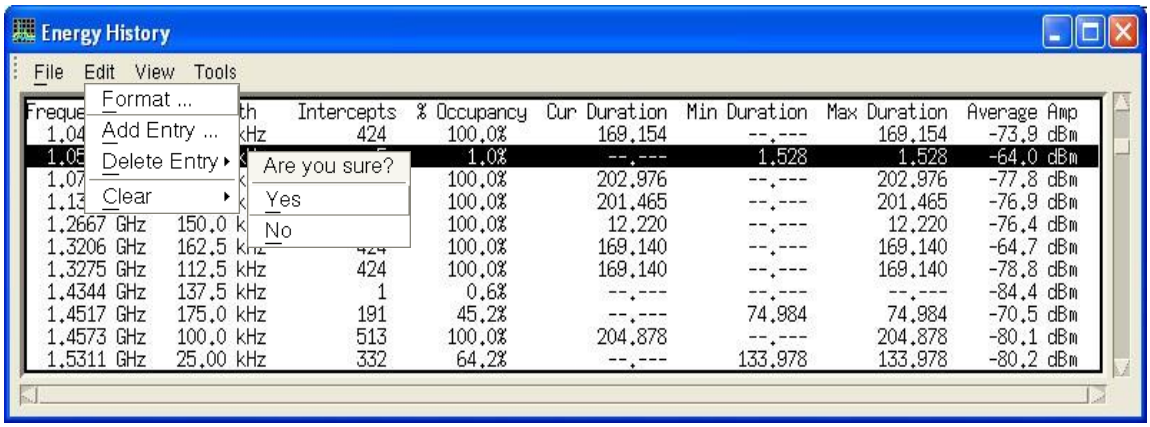
- **Load from Bandwidth Hint**

  To add all entries in a defined “Search > Detection Setup > Energy > Bandwidth Hints", click the radio button associated with this selection and enter the number associated with the Bandwidth Hint you want.

  The hint status must be active and channelize = Yes.

Energy History > Edit > Delete Entry

View > Energy History > Edit > Delete Entry

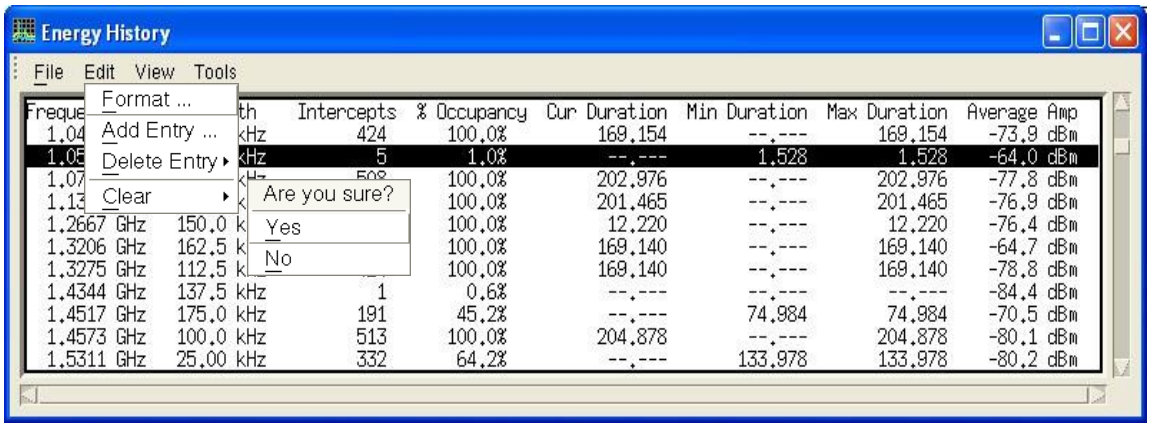


When **Delete Entry** is selected and before any data is cleared, a prompt is displayed acting as a two-step verification process which helps reduce the chances of making an error.

Yes allows the energy history entry deletion process to continue.
No cancels the energy history entry deletion process.

View > Energy History > Edit > Clear

View > Energy History > Edit > Clear

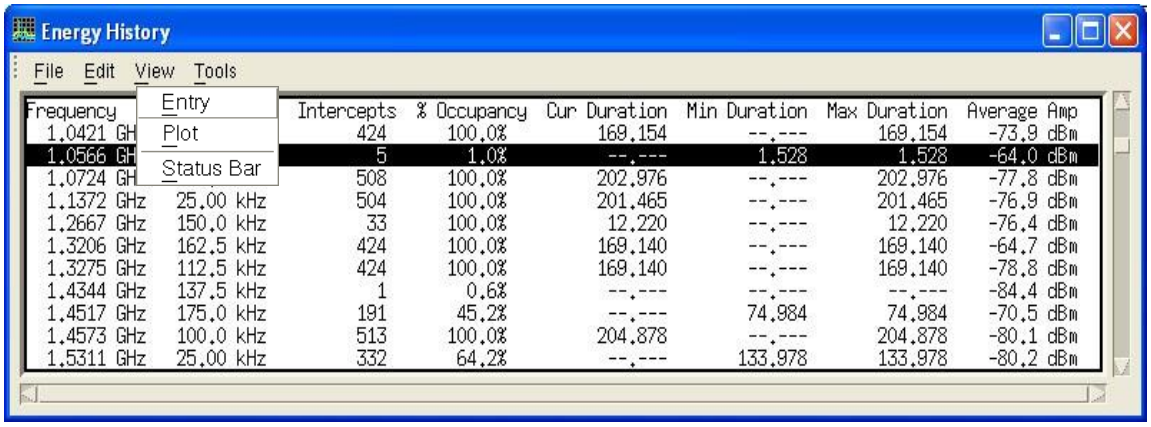


When **Clear** is selected and before any data is cleared, a prompt is displayed acting as a two-step verification process which helps reduce the chances of making an error.

Yes allows the energy history clearing process to continue.
No cancels the energy history clearing process.

View > Energy History > View Pull-Down Menu

View > Energy History > View Pull-Down Menu



"Energy History > View > Entry" on page 94

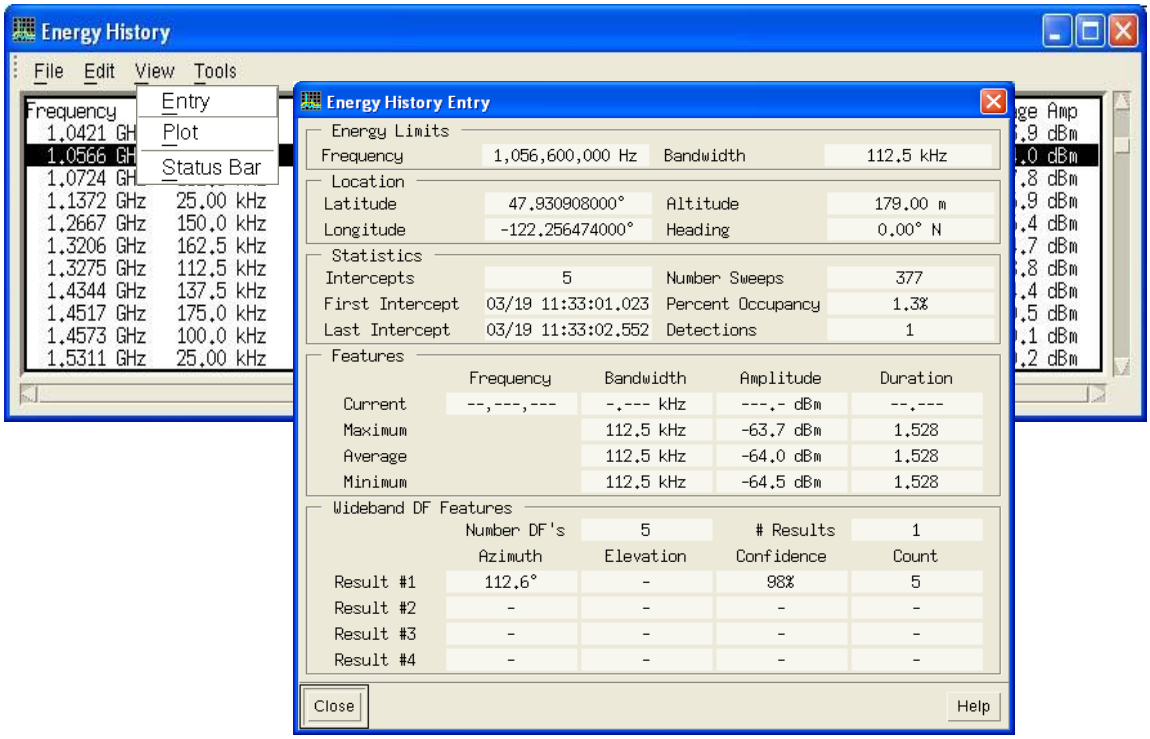
"Energy History > View > Plot" on page 95

"View > Energy History > View > Status Bar" on page 99

Energy History > View > Entry

This selection opens a dialog box that lists all the feature/parameter information for a single entry from Energy History.

View > Energy History > View > Entry



Any of the values displayed in this dialog box may be used to trigger an alarm. See “Search > Alarms > Single-Alarm Setup".

To select an entry, click on a row in the Energy History Pane.

Note

When an Energy History Entry is linked to a trace marker, the trace marker appears at the peak of the entry selected (for example, clicking a different entry moves the trace marker). Also, moving the marker to another peak causes the Energy History Entry information to track the selected entry if it falls within the span of an existing entry.
See “Energy History > Tools > Marker Link” on page 104.

Note

The amplitude, bandwidth, duration, and user-defined feature/parameters may be displayed as graphic profiles with the “Energy History > View > Plot” on page 95.

The detection counter is incremented when energy is detected on two consecutive sweeps; for example, not on first intercept. When the sweep is stopped or the sweep setup is changed, any pending detections are cleared.

The accuracy of the duration values depends on how frequently the energy’s frequency is swept. The calculation assumes the energy is present continuously between intercepts and stopped at the time of the last intercept

if energy is not detected on the current sweep.

The minimum and average duration values are updated only after a valid detection; the maximum duration is always updated.

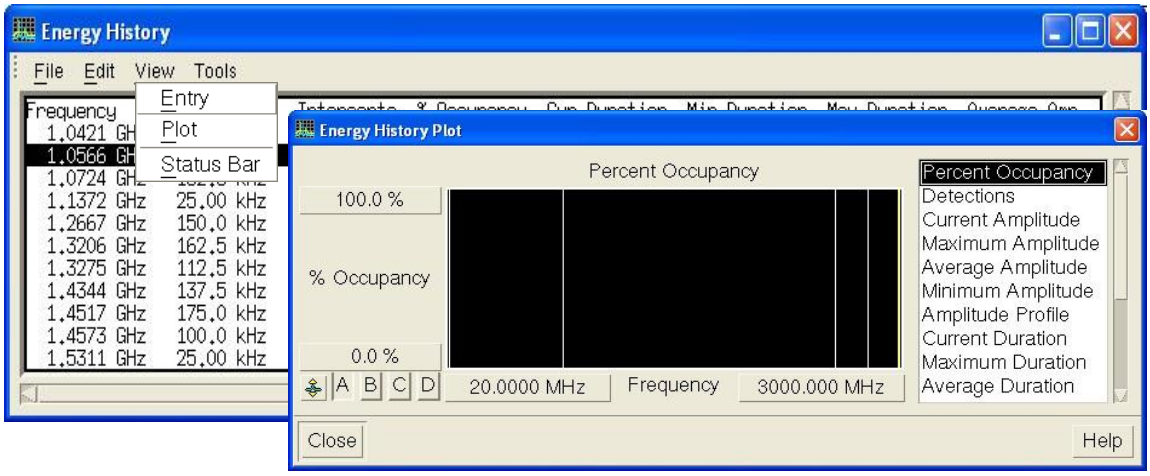
Energy History Entry

- Energy Limits of an Energy History Entry

- **Frequency** is the energy's center frequency, recorded at the first intercept. If this value falls into an active frequency range in "Search > Detection Setup > Energy > Bandwidth Hints" and *channelize* is active, the value recorded is the center of the band rather than the measured frequency of the peak.
- **Bandwidth** is the "current bandwidth" value of the "first intercept" event. The value is either the energy's measured bandwidth, given the bandwidth amplitude specified in "Search > Detection Setup > Energy > Energy Criteria" or a predetermined value from the "Search > Detection Setup > Energy > Bandwidth Hints", if the peak is in an active frequency range. This bandwidth value is used to determine if a peak belongs in this entry or is a new peak. The accuracy of the measured value depends on resolution (RBW).

Energy History > View > Plot

View > Energy History > View > Plot



Energy History Plot dialog box displays any single feature versus the frequency span of one of the traces or a span you define manually. Display this dialog box by clicking **Plot** on the "Energy History Pane" on page 88.

1. Feature data to be plotted.

   The feature data types are described in
   “Energy History > View > Entry” on page 94. Measured analog data types can be graphically combined into groups called profiles. These are:

   - Amplitude
   - Duration
   - Bandwidth

   A profile plot displays a vertical line for each entry.

   - The low end of the line is minimum value,
   - the highest end is the maximum value,
   - the green dot on the line is the average value, and
   - the white dot is the current amplitude.

2. “Energy History Plot Y-Axis Scaling” on page 96
3. “Energy History Plot X-Axis Scaling” on page 98
4. Amplitude auto-scale button.
5. These buttons synchronize the frequency scale with a trace.
6. This line indicates the trace’s marker position, if on, or the selected entry in the energy history.

o change the data to be plotted, select an entry from the scrolled list at the right.

To manually define the plot scale

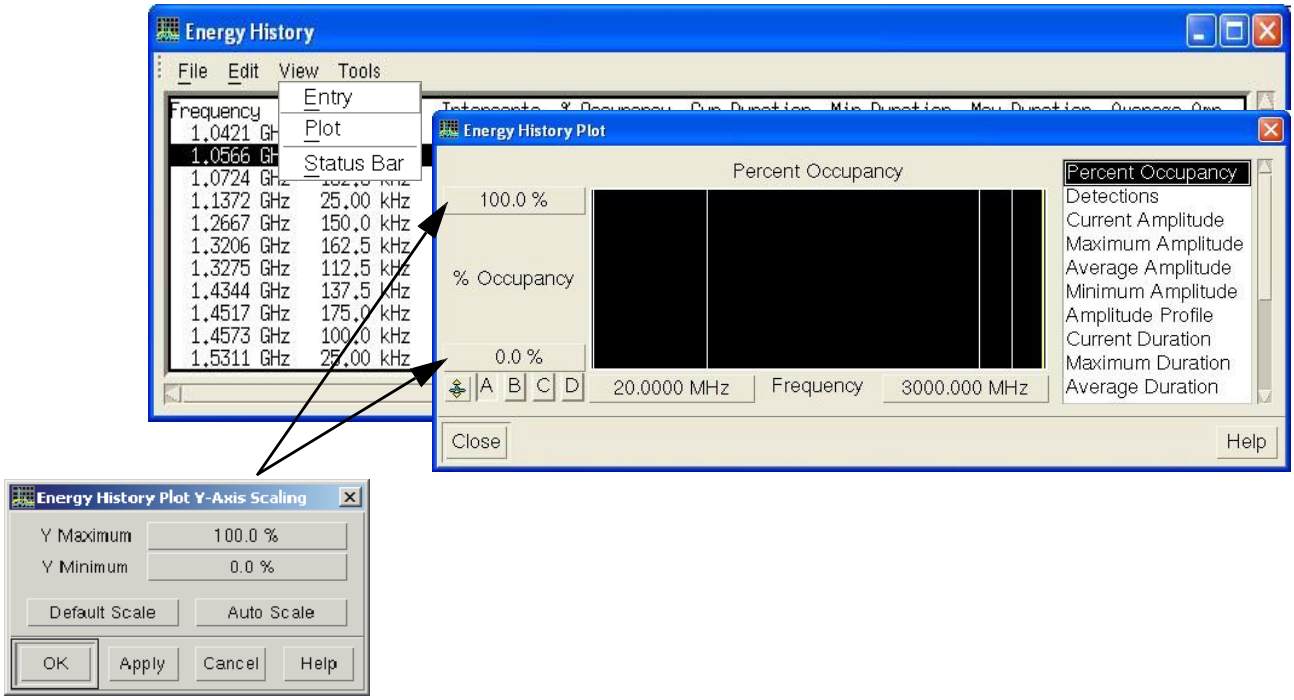
1. Click either a Y-axis button (item #2) or an X-axis button (item #3). A new dialog box appears.
2. Change the scale settings.
3. Click “OK” to apply the change and close the dialog box or click “Apply” to apply the change and leave the dialog box open.

Note

The plot colors can be modified in the `E3238s` resource file with `*plotColor` commands.
See “Application Resources” on page 17.

Energy History Plot Y-Axis Scaling

View > Energy History > View > Plot (Y-Axis Scaling)



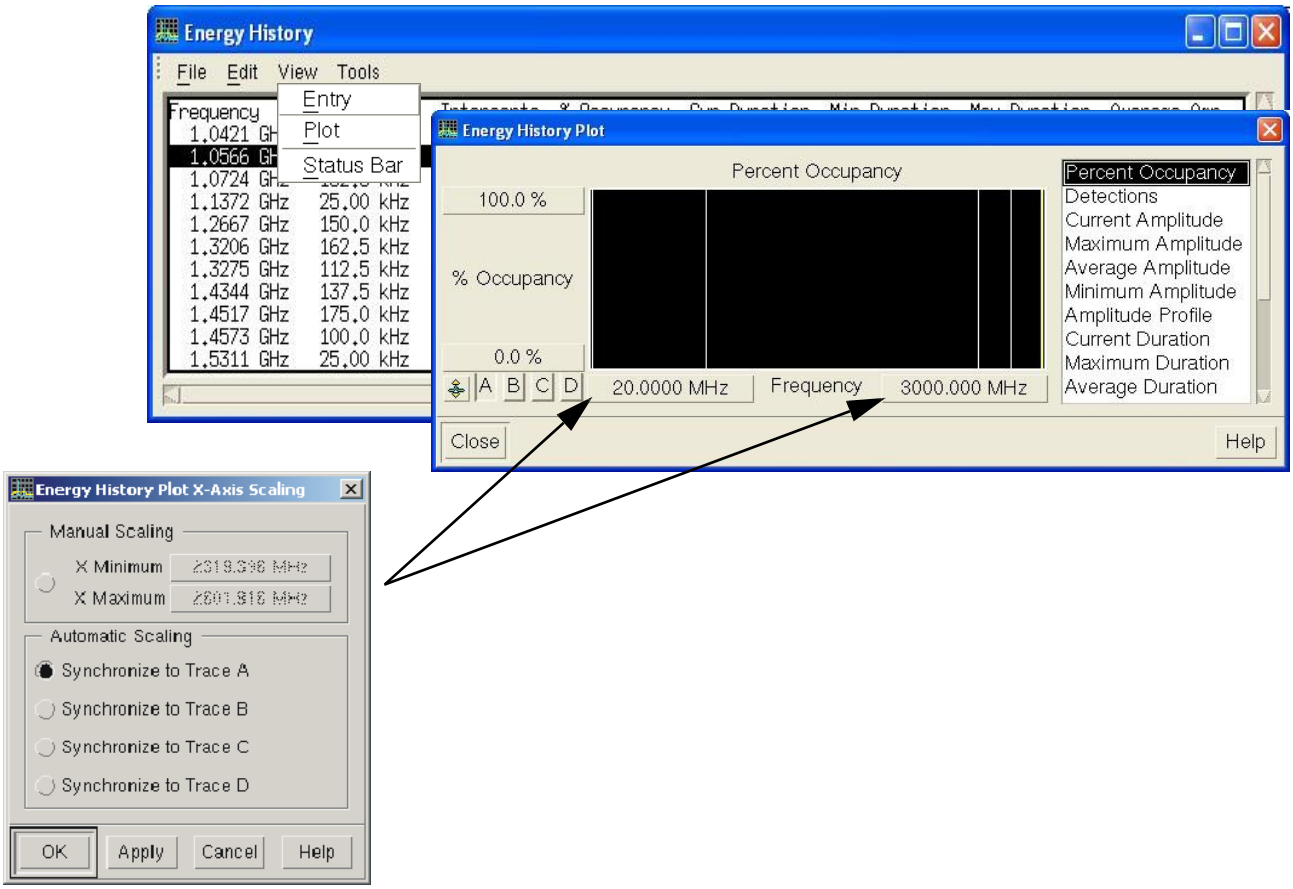
This dialog box is used to specify the Y-axis scale for the Energy History Plot. You can display this box by clicking in either of the Plot Y Scale buttons on the “Energy History > View > Plot” on page 95.

To specify the energy history scale with min/max values

1. Click the button corresponding to the parameter you wish to change. A new dialog box appears.
2. Make sure the mouse cursor is in the new dialog box.
3. Change the value using a numeric value only (don’t enter units).
4. Click **OK**.

Energy History Plot X-Axis Scaling

View > Energy History > View > Plot (X-Axis Scaling)



This dialog box is used to set the X-axis (frequency) scale of the energy history plot. You can display this box by clicking in either of the Plot X Scale buttons on the “Energy History > View > Plot” on page 95.

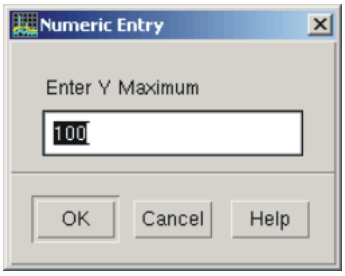
To select automatic frequency scaling, click the radio button of the trace whose frequency scale it should match.

To display data for frequency ranges that do not correspond to trace frequency spans, set the scale to start and stop frequencies entered manually:

1. Click the radio button in the Manual Scaling field. The numbers on the scale buttons become active.
2. Click the X Minimum (or Maximum) button. A new dialog box appears.
3. Enter the new value in the box. The cursor must be in the box while you type.
4. Click **OK**. The new value should appear on the button face.

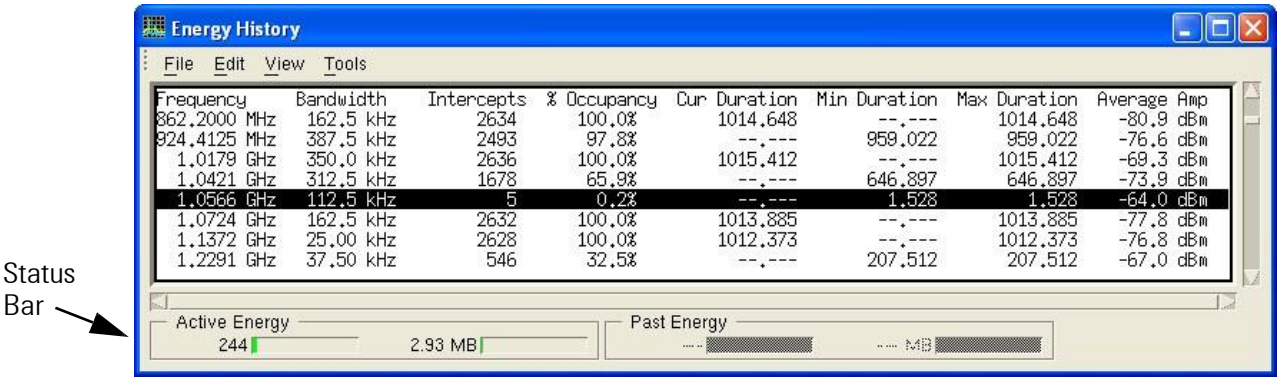
Energy History > View > Plot (Scale Value)

View > Energy History > View > Plot (Scale Value)



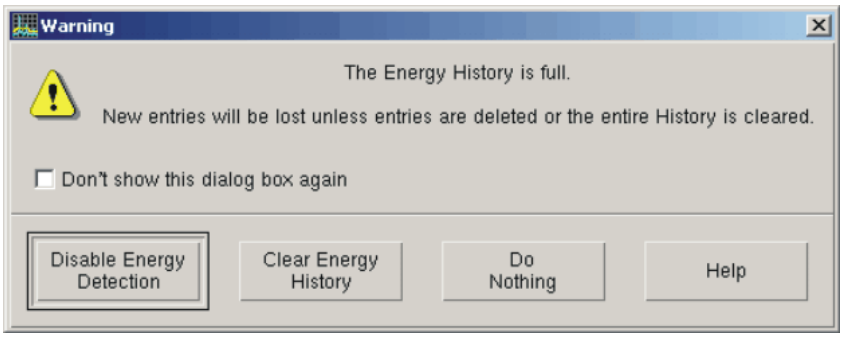
View > Energy History > View > Status Bar

View > Energy History > View > Status Bar



Status Bar adds an additional information to the bottom of the Energy History Pane that displays statistics related to Active Energy and Past Energy along with how much disk space the active and past energy are using.

Energy History Full



This dialog box appears when the number of entries in the Energy History exceeds the maximum allowed.

Note

Each Energy History entry requires approximately 128 bytes of memory. The number of entries in the pane is limited by the `maxEnergyHistorySize` resource variable in the *configuration file*. The default is 5000.

Another way to control the number of entries is to implement filters that limit new entries and/or delete existing entries.
See “Search > Energy History Filter (Option ASD)".

Don’t show this dialog box again

when the energy history gets full, new entries are lost/ignored and no warning is given. This resets when the application is restarted.

Disable Energy Detection

stops the creation of new entries. This may be reenabled in “Search > Detection Setup > Energy Tab".

Clear Energy History

deletes all of the entries in the database. This has the same effect as described in “Edit > Clear Energy History" and “View > Energy History > Edit > Clear” on page 93.

When the number of entries reaches the limit, new entries will not be added until some or all of the current entries are deleted: individual entries can be deleted with “Energy History > Edit > Delete Entry” on page 92.

Do Nothing

closes the warning dialog box. New entries will continue to be ignored.

Another method that can be used to minimize the total number of energy history entries is the use of the energy history filters.

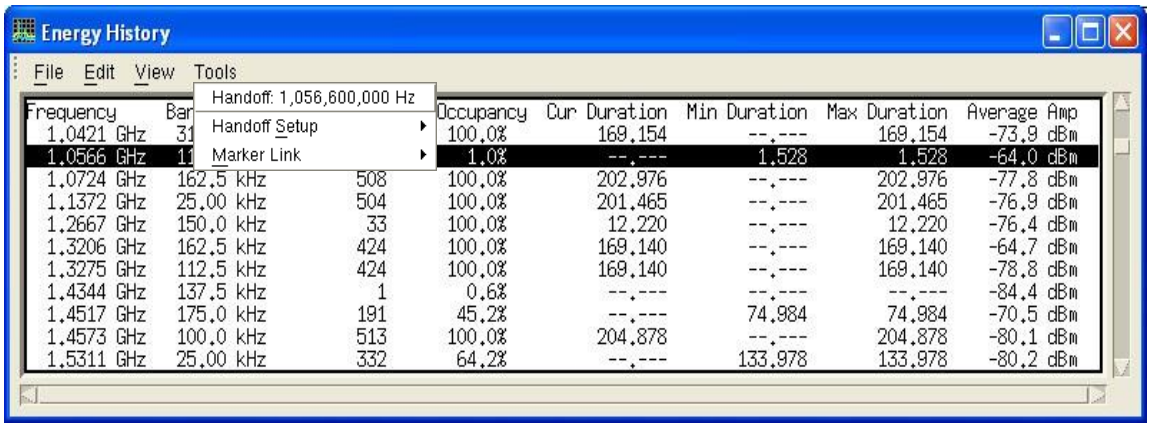
Verify Energy History Recall

This dialog box is displayed to point out that recalling an Energy History file clears the feature data currently in the Energy History.

To avoid losing this data click No, save the current Energy History in another file, and then load the desired Energy History file.

Energy History > Tools Pull-Down Menu

View > Energy History > Tools Pull-Down Menu



Handoff: displays the frequency of the entry that is to be handed off to a handoff receiver.

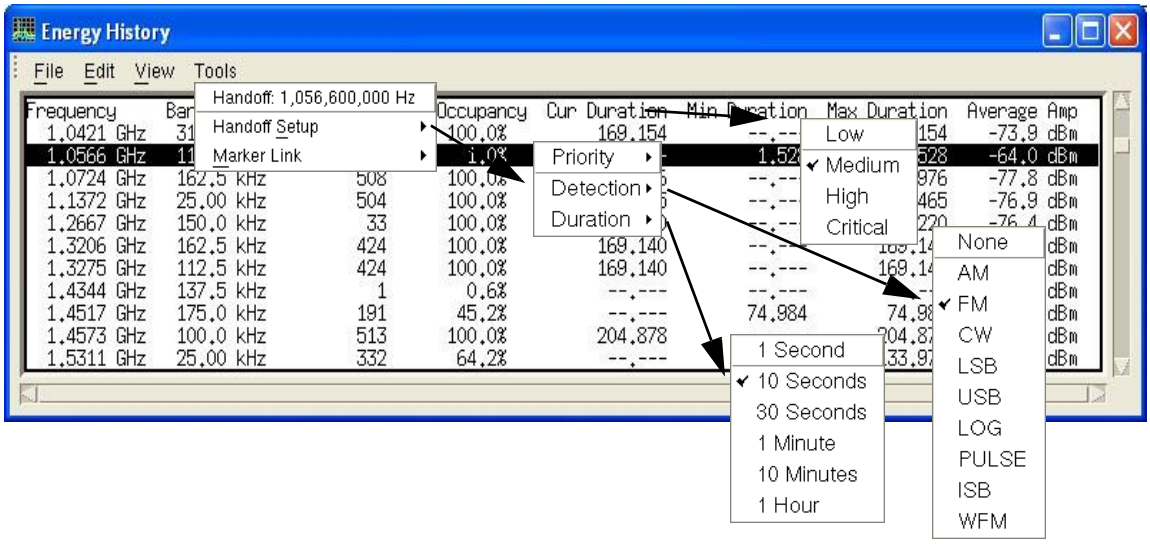
Handoff remains grayed out until an entry is selected from the Energy History Pane. Handoff Receivers must be designated in the *configuration file* before starting the Agilent N6820ES Signal Detection and Monitoring Solutions software.

“Energy History > Tools > Handoff Setup” on page 102

“Energy History > Tools > Marker Link” on page 104

Energy History > Tools > Handoff Setup

View > Energy History > Tools > Handoff Setup



When you click Handoff Setup, another menu appears that allows you to set the Priority, Detection, and Duration parameters for signals handed off from the Energy History Pane.

- <Hyperlink>“Handoff Log Priority
- “Handoff Log Detect” on page 103
- “Handoff Log Duration” on page 103

Handoff Log Priority

A handoff is given a Priority level when it is handed off. If more than one handoff is pending (waiting in the queue to be assigned to a handoff receiver), the handoff with the higher priority setting goes first. If the priority of two pending handoffs is the same, the handoff with the earlier request goes first.

The priority levels are:

- **Critical** priority handoffs have the highest priority. When a Critical priority handoff is put in the handoff queue, it will bump any lower-priority handoff being monitored.
- **High** priority handoffs are superseded only by Critical priority handoffs. Critical priority handoffs can bump a High priority handoff. When a High priority handoff is put in the handoff queue, it will bump any Medium or Low priority handoff being monitored.
- **Medium** priority handoffs can bump Low priority handoffs, but any High and Critical priority handoffs will be handed off before a Medium priority handoff. Handoffs with High and Critical priority will bump a Medium priority handoff being monitored.

- **Low** priority handoffs are handed off in the order they are put in the handoff queue when there are no pending handoffs with higher priority. If a handoff with higher priority is handed off while a low-priority handoff is being monitored, it is bumped; the handoff receiver tunes to the higher-priority handoff.
- The priority can also be changed while the handoff is pending (for example, increase priority to get it assigned to a receiver sooner by bumping an active handoff) or while it is active (for example, increase priority to avoid its getting bumped by another handoff).

Handoff Log Detect

is the method used to demodulate the signal. The detection types available depends on the capabilities of the installed handoff receivers. The types displayed in the log and detection selection lists may include others.

The list of standard types is:

- None
- AM: amplitude modulation
- FM: frequency modulation
- CW: continuous wave
- LSB: lower side band
- USB: upper side band
- Log: log modulation
- Pulse: pulse modulation

Handoff Log Duration

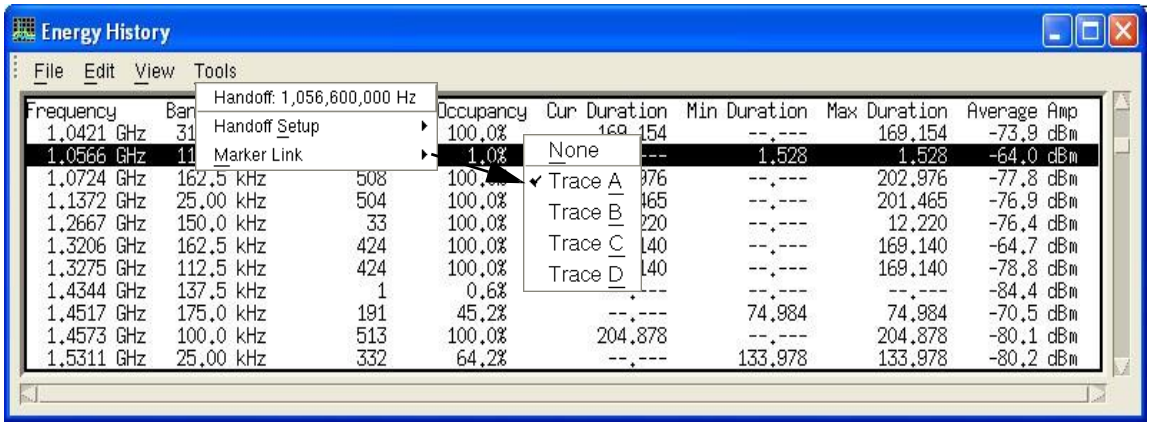
is the amount of time a frequency is to be monitored before its status changes to completed and the handoff receiver takes another assignment from the queue. This value is assigned to a handoff when it is put in the handoff queue.

This value is listed in “Energy History > Tools > Handoff Setup” on page 102 as follows:

- For a pending handoff, this is the amount of time the handoff receiver will stay tuned to the frequency if no handoffs with higher priority are put in the queue.
- For a completed handoff, this is the amount of time the handoff receiver was tuned to the assigned frequency.
  - Minimum duration: 1 second
  - Maximum duration: 86400 seconds (24 hours)
    - Resolution: 1 second

Energy History > Tools > Marker Link

View > Energy History > Tools > Marker Link



Marker Link allows one of the feature/parameters to be lined to a particular trace marker.

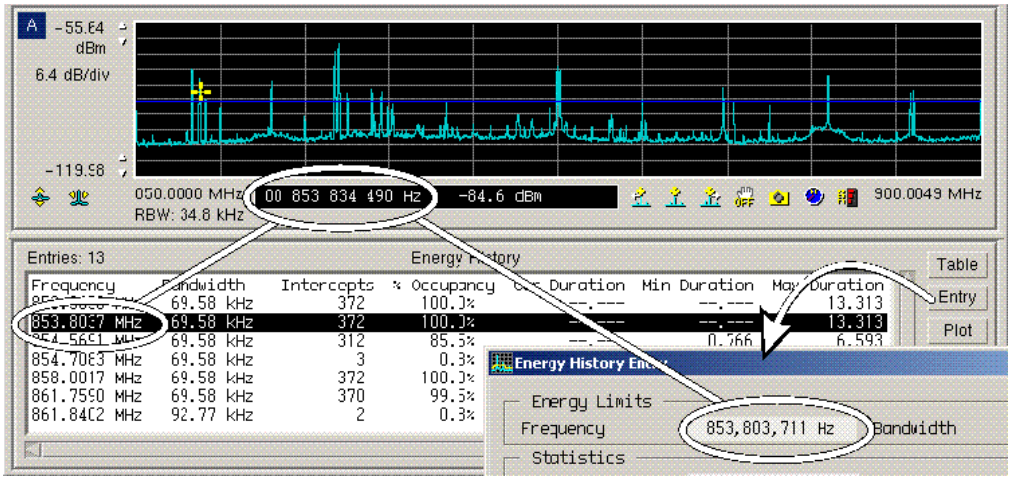
When the Energy History is linked to a trace marker, the marker appears at the peak of the entry selected in the Energy History Pane (for example, clicking a different entry moves the trace marker). Also, moving the trace marker to another peak causes the Energy History Entry information to track the selected entry if it falls within the span of an existing entry.

To link a trace marker to entry in the Energy History Pane

- Set up energy detection.
- Add the Energy History Pane to the main window.
- Click one of the entries (lines) in the Energy History Pane.
- Click the right-mouse button anywhere in the Energy History Pane's list area to display a popup menu.
- Continue to hold the mouse button down and move the cursor down to the Marker Link entry and release the button. The display should now appear as shown in <Hyperlink>Figure .
- Click the entry for the trace you wish to select.

When a trace is selected and its marker is on
(see "Trace Setup" on page 424), the marker moves to the frequency of the entry selected in the Energy History Pane

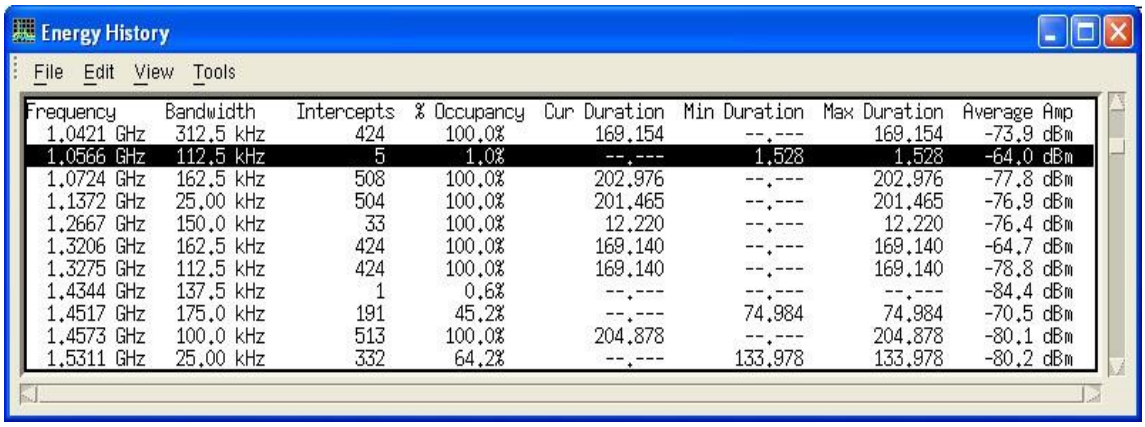
Linking a Trace Marker to the Energy History Pane



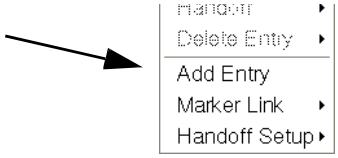
Also, when the marker is moved (in the trace) to a frequency value within the bandwidth of an entry in the Energy History Pane, that entry is selected (highlighted) in the pane.

Energy History > Right- Click Menu

View > Energy History > Right- Click Menu



Right-Click Menu appears when the right-mouse button



is clicked anywhere in the Energy History Pane.

The right-click menu appears when the right-mouse button is clicked anywhere in the Energy History Pane.

“Energy History > Edit > Delete Entry” on page 92

“Energy History > Edit > Add Entry” on page 92

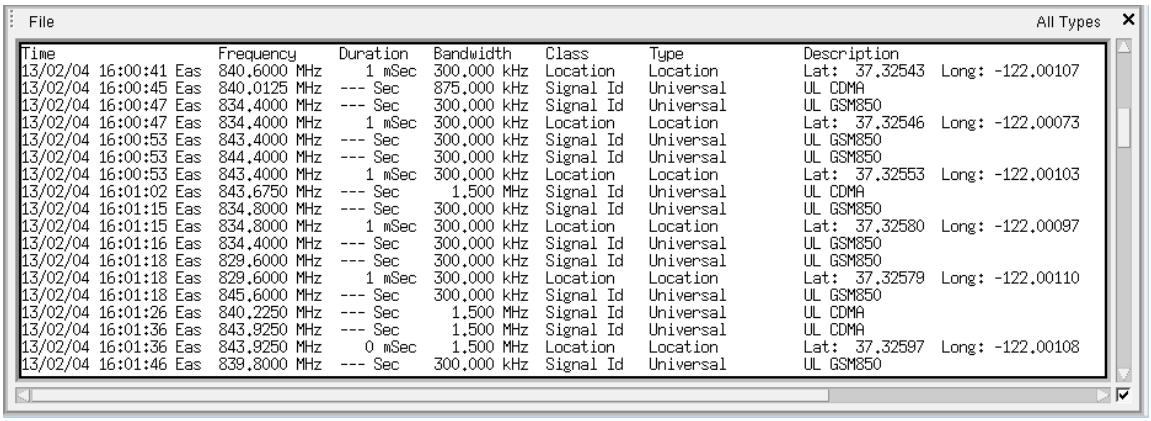
“Energy History > View > Entry” on page 94

“Energy History > Tools > Handoff Setup” on page 102

The right-click menu is used as a shortcut to:

1. Identify the selected entry’s frequency.
2. Add a signal to the handoff queue. Set the handoff’s priority, detection, and duration.
3. Delete an entry from the history listing.
4. Add an entry to the Energy History Pane. This may be useful for defining alarm conditions that require energy history entries to monitor for No Signal conditions.
   See “Energy History > View > Entry” on page 94.
5. Pick a trace whose marker is coupled to entry selection.
   See “Energy History > Tools > Marker Link” on page 104.
6. Specify handoff settings (priority, detection, and duration) for handoffs performed from this pane.

Signal Database Pane



Time	Frequency	Duration	Bandwidth	Class	Type	Description
13/02/04 16:00:41 Eas	840.6000 MHz	1 mSec	300.000 kHz	Location	Location	Lat: 37.32543 Long: -122.00107
13/02/04 16:00:45 Eas	840.0125 MHz	--- Sec	875.000 kHz	Signal Id	Universal	UL CDMA
13/02/04 16:00:47 Eas	834.4000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:00:47 Eas	834.4000 MHz	1 mSec	300.000 kHz	Location	Location	Lat: 37.32546 Long: -122.00073
13/02/04 16:00:53 Eas	843.4000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:00:53 Eas	844.4000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:00:53 Eas	843.4000 MHz	1 mSec	300.000 kHz	Location	Location	Lat: 37.32553 Long: -122.00103
13/02/04 16:01:02 Eas	843.6750 MHz	--- Sec	1.500 MHz	Signal Id	Universal	UL CDMA
13/02/04 16:01:15 Eas	834.8000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:01:15 Eas	834.8000 MHz	1 mSec	300.000 kHz	Location	Location	Lat: 37.32580 Long: -122.00097
13/02/04 16:01:16 Eas	834.4000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:01:18 Eas	829.6000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:01:18 Eas	829.6000 MHz	1 mSec	300.000 kHz	Location	Location	Lat: 37.32579 Long: -122.00110
13/02/04 16:01:18 Eas	845.6000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850
13/02/04 16:01:26 Eas	840.2250 MHz	--- Sec	1.500 MHz	Signal Id	Universal	UL CDMA
13/02/04 16:01:36 Eas	843.9250 MHz	--- Sec	1.500 MHz	Signal Id	Universal	UL CDMA
13/02/04 16:01:36 Eas	843.9250 MHz	0 mSec	1.500 MHz	Location	Location	Lat: 37.32597 Long: -122.00108
13/02/04 16:01:46 Eas	839.8000 MHz	--- Sec	300.000 kHz	Signal Id	Universal	UL GSM850

This **pane** displays the signal information collected by narrow-band signal processing assets.

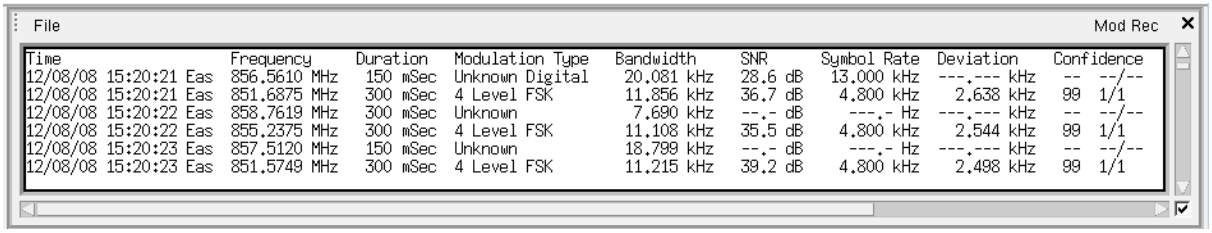
These assets are described in DSP Block Diagram (page 25). See also, the discussion of the processing diagram in Process Overview (page 33).

The maximum number of entries in the Signal Database is specified in the E3238s Resources file with the variable `signalDatabaseSize`. By default the maximum number is 500,000. When this limit is reached, no new signals are added to the database.

The signal processing activity and channel control appears in the Signal Processing (page 380) dialog box.

1. **File Menu** allows you to perform file manage operations such as load, save, merge, delete, and print. See Signal Database File Menu (page 109).
2. **Time** is the date and time that the signal was identified.
3. **Frequency** is the frequency associated with the signal. This can mean different things for different types of signals.
4. **Duration** is a value whose definition depends on the signal class and/or type as determined by the user-defined library. For typical signals it is the time the signal was “up”.
5. **Bandwidth** is the computed signal bandwidth.
6. **Class** is one of the three signal processing activities:
   - Signal Identification
   - Location (e.g., Geolocation)
   - Collection
7. **Type** is a designation given the signal by the library used to process this signal. It is used to sort signals in the database with the Type Menu.
8. **Description** This field is used to specify which user-defined signal data to display.

When the "All Types" selection is active, only the common characteristics are displayed in the listing. When a particular Class is selected for display (such as Mod Rec), its special characteristics are displayed as shown in the following figure.

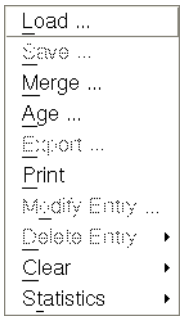


Time	Frequency	Duration	Modulation Type	Bandwidth	SNR	Symbol Rate	Deviation	Confidence
12/08/08 15:20:21 Eas	856.5610 MHz	150 mSec	Unknown Digital	20.081 kHz	28.6 dB	13.000 kHz	---.--- kHz	-- --/--
12/08/08 15:20:21 Eas	851.6875 MHz	300 mSec	4 Level FSK	11.856 kHz	36.7 dB	4.800 kHz	2.638 kHz	99 1/1
12/08/08 15:20:22 Eas	858.7619 MHz	300 mSec	Unknown	7.690 kHz	--.- dB	---.- Hz	---.--- kHz	-- --/--
12/08/08 15:20:22 Eas	855.2375 MHz	300 mSec	4 Level FSK	11.108 kHz	35.5 dB	4.800 kHz	2.544 kHz	99 1/1
12/08/08 15:20:23 Eas	857.5120 MHz	150 mSec	Unknown	18.799 kHz	--.- dB	---.- Hz	---.--- kHz	-- --/--
12/08/08 15:20:23 Eas	851.5749 MHz	300 mSec	4 Level FSK	11.215 kHz	39.2 dB	4.800 kHz	2.498 kHz	99 1/1

Tips

- To add this pane to the main window, see Display Layout (page 422).

Signal Database File Menu



This menu appears in the Signal Database Pane (page 107). It allows you to perform file management as follows:

- **Load** loads a previously-saved database file. This replaces the current contents of the database pane. See Save/Load/Merge/Export Signal Database (page 110).
- **Save** allows the current database to be written to a system file. See Save/Load/Merge/Export Signal Database (page 110).
- **Merge** allows you to load a previously-saved file, adding it to the current contents of the database.
- **Age** displays a dialog box that allows you to enable or disable the aging of Signal Database entries. If aging is enabled, entries older than a specified age are automatically removed from the database.
- **Print** appears in the menu if a printer is configured for the system (the file `print` exists in the `e3238s` directory) *and* the `*textPrintCommand` is given within it.
- **Modify Entry** exists only if it has been implemented in the user-defined library for a given signal type. The action it allows is defined by that code.
- **Delete Entry** is used to delete the selected entry.
- **Clear** is used to delete entries in the pane.
- **Statistics** displays the number of entries in the Signal Database.

Note

Caution - Database Loss

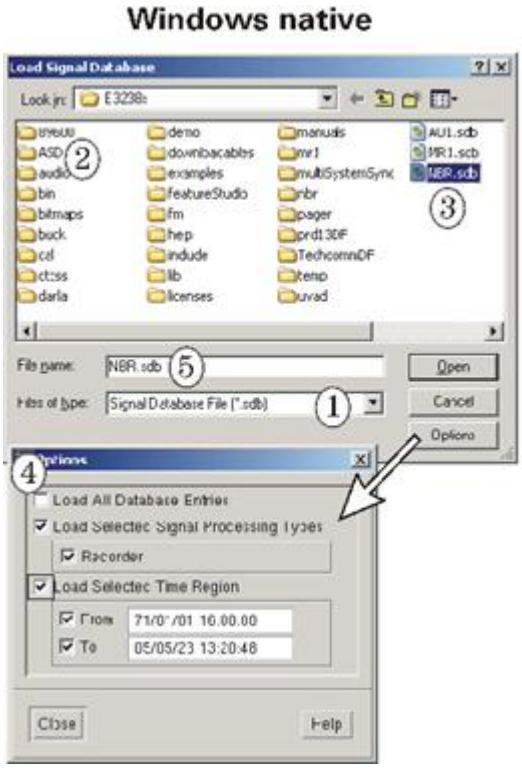
This message appears when information in the Signal Database Pane may be lost because the user selected to exit while unsaved database data exists.

Save allows you to save the information using the Save/Load/Merge/Export Signal Database commands.

Lose means to continue the exit process without saving the signal database information; the contents of the current database are lost.

Save/Load/Merge/Export Signal Database

Path: Signal Database Pane, File, Load



This dialog box is used to save, load, merge, or export a signal database file (.sdb).

Save means the information is stored on the system disk in a form that can be reloaded.

Loading a file replaces the current contents of the Signal Database Pane.

Merge causes the contents of the selected file to be combined with the current contents of the signal database.

Export causes the contents of the signal database to be saved to a file in comma-separated variable (csv) format. This supports use with a spreadsheet.

The Filename Dialog box shown above has the following components:

1. Filename Filter text line. Shows the current directory path and wildcard filter used to display the Files list (3). See also, Filter Text Box (page 130).
2. Directories list. Allows you to view directory names and define the path by selecting with the mouse. See also, Directories List (page 130).
3. Files list. Displays the files matching the wildcard pattern in the selected directory. To open one of the files, double-click it. See also, Files List (page 130).
4. Signal Type Database Selection. This section allows you to limit the database entries loaded from a selected file by signal type and/or time range.

5. Load Signal Database text line. Shows the current path and filename as selected in the Directories and Files lists (2 & 3). See also, Filename Text Box (page 132).

Note

Since signal types are defined and named by user-defined programs, the signal names that appear will vary.

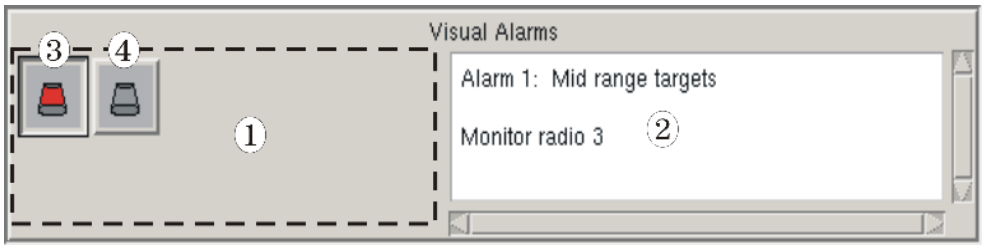
Caution - Database Loss

This message appears when information in the Signal Database Pane (page 107) may be lost because the user elected to exit while unsaved database data exists.

Save allows you to save the information via the Save/Load/Merge/Export Signal Database (page 110) dialog box.

Lose means to continue the exit process without saving the signal database information.

Visual Alarms Pane



This **pane** is used to display visual alarm indicators as well as text that could describe the situation and give instructions as defined in the Visual Task (page 357) dialog box.

Note

You must add the Visual Alarms pane to the N6820ES window via the Display Layout (page 422) dialog box to be able to see them.

1. This area (inside the dashed line) displays the alarm icons for the active alarms.
2. This area displays alarm information when a triggered alarm icon is clicked. The information is the alarm's number, its name/description, and instruction text, if any has been defined. See Visual Task (page 357). Each icon represents an alarm that has a visual "task" defined and selected in the Tasks section of the Single-Alarm Setup (page 338) dialog box.
3. This icon represents a triggered alarm. Clicking on this icon displays the alarm information in area #2. It may also be set to rearm the alarm's trigger. See Visual Task (page 357).
4. This icon represents an alarm that is not triggered.

Note

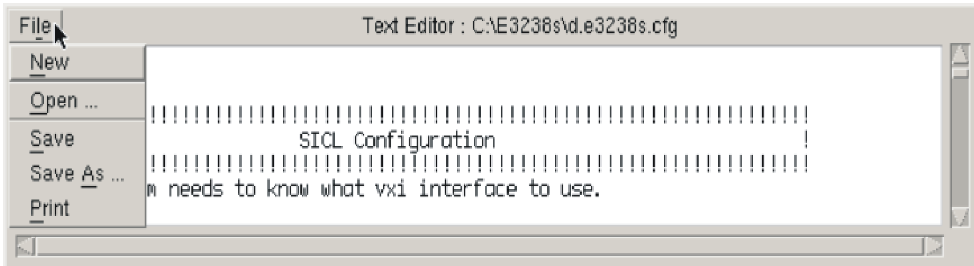
If an alarm's trigger type is "Once," and the Clear Alarm parameter is set, the trigger may be cleared (rearmed) by clicking the alarm's icon in this pane. See Alarm Control (page 340) and Alarm, Visual Task (page 357).

See also, Process Overview (page 33).

Tips

- Audio alarms may also be used to sound an alert when an alarm occurs. See Audio Task (page 358).
- To add this pane to the main window, see Display Layout (page 422).
- To change the size of a pane, see Undocking and Docking Panes (page 48).
- To receive help on this or any pane, click Help, On Window or press Shift+F1 to activate context-sensitive help and click in the pane.

Text Editor Pane



This **pane** contains a text editor. The editor can be used to view and modify ASCII text files such as saved state files, log files, or search band database files as well as create new files such as reports.

Its File Menu (page 114) button lets you open or save text files on the system hard disk.

When a file is open in the editor, its name appears after the words `Text Editor:` centered above the text area.

- To load an existing file, click Open and specify the directory and filename. See Filename Entry (page 140).
- To add text, place the cursor anywhere in the text editor window and click. Then type the new text. Line wraps occur only where there are end-of-line characters (when you press Enter).
- To select text:
  - Place the mouse cursor at one end of a segment of text, click and hold the left mouse button, move the cursor to the other end of the segment, and release the mouse button. This action is called *wiping* text.
  - Holding down the Shift key and clicking the left mouse button selects all text between its present position and its previous position.
  - To select a word, place the cursor anywhere on it and double-click.
  - To select a line, place the cursor anywhere on it and triple-click.
  - To select all text in the file, place the cursor anywhere in the text area and click rapidly, 4 times.
- To delete text:
  - Use the Backspace key to remove single characters on the *left* side of the cursor position.
  - Use the Delete key to remove single characters on the *right* side of the cursor position.
  - Select the text then press the Delete key.
- To toggle between insert and overwrite modes, press the Insert key.
- To move text, select it and drag it (click and hold the middle mouse button) to the destination, then release it.

- To copy text, select it and then press the Ctrl key and drag it (click and hold the middle mouse button) to the destination.
- To save the text you are working on, click File, Save.

  The first time you save a new file, you must specify a name.

  If you specify a filename that already exists, the file will be overwritten with the text file. A message appears before this happens to assure that it is what you want to do.
- To print the file, click File, Print.
- Panes are added to or removed from the main window in the Display Layout (page 422) dialog box.
- To change the size of a pane, see Undocking and Docking Panes (page 48).
- To receive help on this or any pane, click Help, On Window or press Shift+F1 to activate context-sensitive help and click in the pane.

File Menu

New clears a file from the text editor.

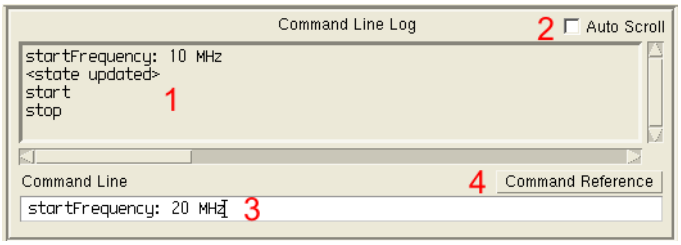
Open allows you to select a file to edit. See Filename Entry (page 140).

Save writes a copy of the file to the disk using the same file name you opened it with. Use *save* to update disk files that already have names. If it is a new file that has not yet been named, you are prompted for the path and name.

Save As writes a copy of the file to the disk, prompting you for a directory and filename. See Filename Entry (page 140).

Print causes the system line printer manager to print the text file. The system printer must be properly configured and specified in the `print` file. See the example file (`d.print`) for further explanation.

Command Line Pane



This **pane** allows you to control the N6820ES Signal Intercept and Collection Software with the commands typed in the Command Line text field.

1. *Command Line Log* is a record of commands that have been issued at the Command Line. This may also be saved as a file. See Log Files (page 139).
2. *Auto Scroll* is a button that scrolls the text in the command line log as necessary so that the latest commands issued appear in the log text area.
3. *Command Line* is the text line in which the command are typed. You can type them or select them from a list in the Command Syntax dialog box.
4. *Command Reference*. Click this button to display the Command Reference (page 116) dialog box.

Note

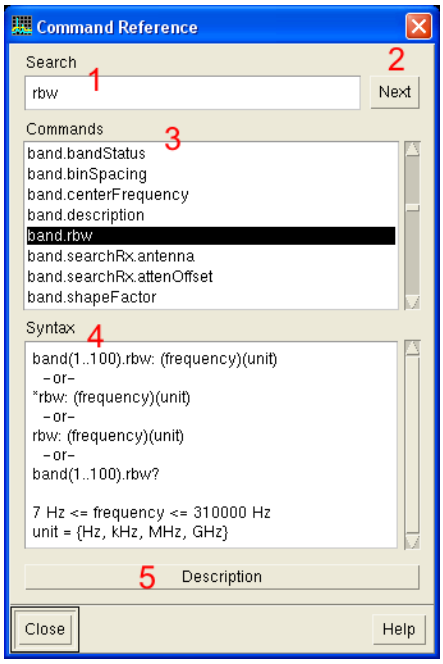
Each Command Log entry requires 80 bytes of memory. The number of entries in the log view is limited as defined by the `commandLineHistoryLength` resource variable in the `E3238s`. See also, Application Resources (page 17).

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries will be written to a file on the system disk. See Log Files (page 139).

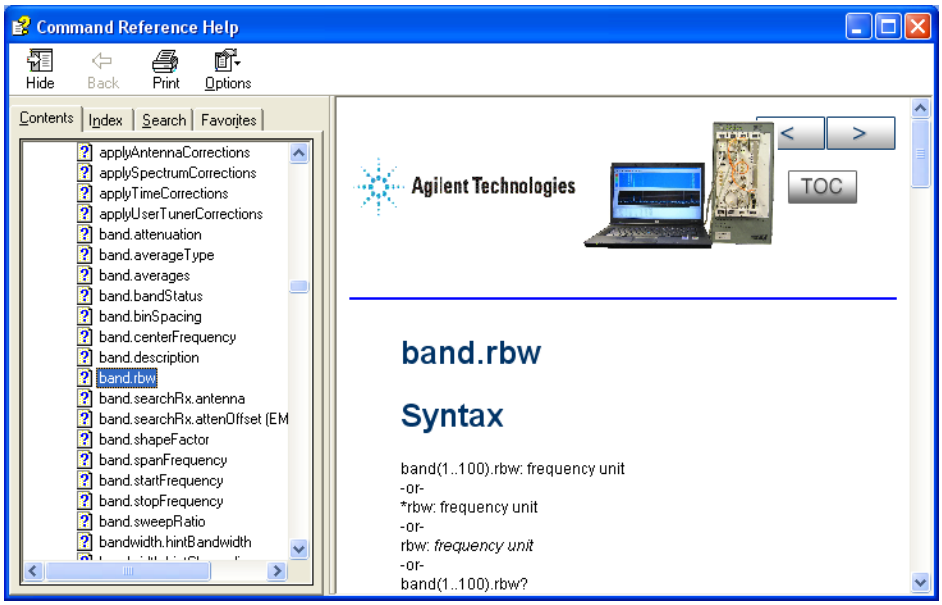
Tips

- To add this pane to the main window, see Display Layout (page 422).
- To create a *file* containing this log, see Log Files (page 139).
- To clear the Command Line Log, see Clear Log (page 146).
- To receive help on this or any pane, click Help, On Window or press Shift+F1 to activate context-sensitive help and click in the pane.

Command Reference



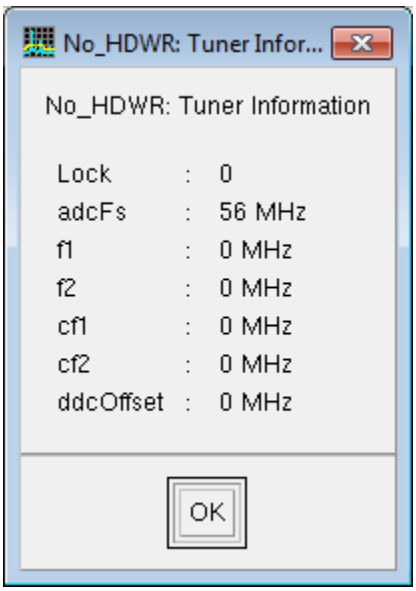
1. **Search** is a text line that allows you type in a string of characters and find the pattern in the command names. The list is searched from beginning to end and stops on the first match found. Every time a change is made to the pattern in the text line, the search is repeated. To search again for the same pattern, use the Next button.
2. **Next** is a button that lets you find other matching patterns in the command names if the last command name isn't the one you were looking for. You can click it multiple times to search through the list of commands.
3. **Commands** lists the commands that may be executed at the command line. Use the scroll bar to move up and down through the list or the Search/Next features above it.
   - When a command entry is selected, it's syntax appears in the lower pane.
   - Double-clicking a command brings up the detailed description window. This is the same as clicking the Description button at the bottom of the window.
   - You can drag the commands to the command line with the middle mouse button.
4. **Syntax** displays the syntax of the command selected in the Commands list. This gives the form(s) of the command and a description of acceptable parameters.
5. **Description** displays the Command Reference Help explanation of the command selected in the Commands list. A shortcut for bringing up the Command Reference Help for a particular command is to double-click the command in the Commands listing.



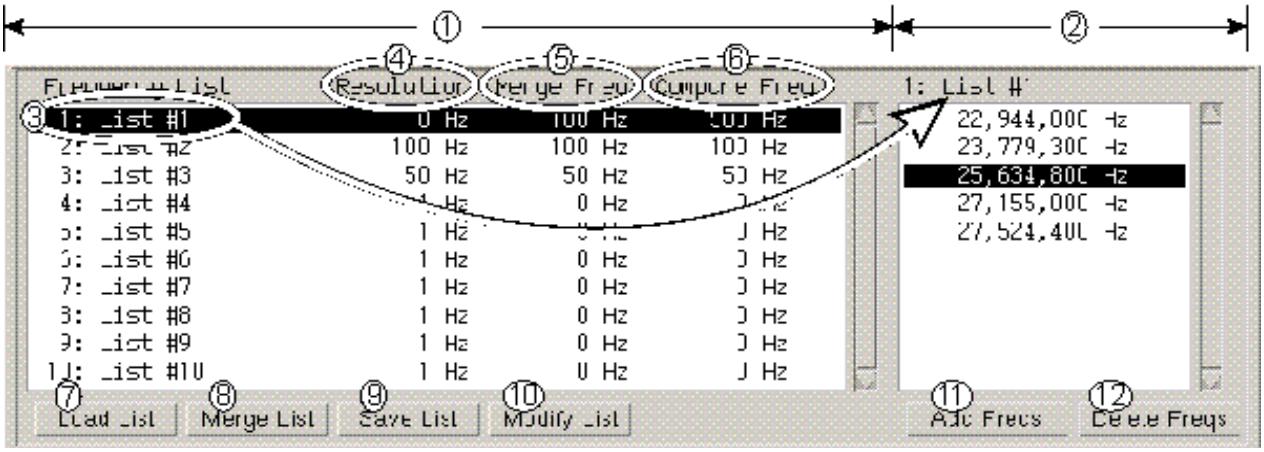
All of this information exists in the \E3238s\manuals\command_ref.pdf file.

Query Dialog Boxes

When the command is a query, the information requested is displayed in a popup dialog box as shown below for the `tunerInfo?` query.



Frequency Lists Pane



This **pane** is used to create, display, and modify *frequency lists*.

To add this pane to the application window, see Display Layout (page 422).

Using Frequency Lists

Frequency lists are used in a number of ways:

- as alarm criteria (i.e., in list #1, or not in list #1)
- as a trace grid (see Grid Type (page 429))

Lists can be changed by an alarm task (values added to or deleted from a list)

Lists also can be used in user-defined programs. So frequency list information could be employed as a source of information for an energy feature calculation or to specify energy filter activity.

The three parameters that affect how frequency entries are entered and used are:

- **Resolution** All entries are rounded to the nearest multiple of this value.
- **Merge Frequency** This provides another “resolution” parameter. The combination of the Resolution and Merge settings allows a strategy where one parameter (Resolution) can be used as a base which is never exceeded and the other (Merge) can be adjusted according to need.

  Frequency values may be manually added/deleted in the Frequency List Pane or as the result of an alarm task. Any new values are rounded by both Resolution and the Merge frequency settings before they are entered in a list.
- **Compare Frequency** A value used to evaluate alarm criteria. See (6).

The Frequency List pane has two scrolled text areas: the list table (1) and a list’s contents (2).

1. **List Table** The left text area is a table of frequency lists. As many as 10 lists may be defined; but the number of frequencies within a list is unlimited.
   - A list is identified by both a number and a *name* or label. See (3).

- The contents of a selected list appears in the text area on the right.
- A list may be defined by loading information from a file on the system disk. Use the Load List (7) button to replace the list contents or the Merge List (8) button to combine the contents of a file with the selected list.
- A list's name (3), Resolution (4), Merge Freq (5), and Compare Freq (6) settings are changed with the Modify list button (10).

2. **List Contents** This list area shows the entries of the selected list (highlighted) at the left. You may add or delete entries to this list with the buttons below it.

3. **Frequency List** This column identifies the frequency list by its number and "name." The name may be modified with the Modify List button. See Modify Frequency List (page 122). Since the list number is part of the identifier, the name need not be unique. These identifiers appear in the Single-Alarm Setup (page 338) dialog box (under Description, Feature, Frequency) and in the Trace Setup (page 424) dialog box.

4. **Resolution** is the spacing of the frequency values in the list. For example, given a resolution of 100 Hz, valid frequency values exist only every 100 Hz. When other values are added to the list, they are "rounded" up or down to a multiple of 100.

   The Resolution value may be changed by selecting a list entry and then clicking the Modify List button below it. See Modify Frequency List (page 122)).

5. **Merge Freq** is the frequency value used to sort new (added) entries into valid list values. This is typically equal to or greater than the Resolution value.

   The Merge Freq value may be changed by selecting a list entry and then clicking the Modify List button below it. See Modify Frequency List (page 122)).

6. **Compare Freq** is used to determine whether a frequency value exists in the list during the process of checking alarms. Consider this to be the "footprint" of the energy's frequency for the sake of determining whether the alarm value exists in the list. The comparison checks for existence of entries in the list $freq \pm compare\_freq/2$ where *freq* is the frequency of the energy that caused the alarm. The value of Compare Freq is typically equal to the Merge Freq or larger.

   The Compare Freq value may be changed by selecting a list entry and then clicking the Modify List button below it. See Modify Frequency List (page 122)).

7. **Load List** is used to load a file containing a frequency list. When you click this button the Filename Entry (page 140) dialog box is displayed.

   When a frequency list is loaded from a file, the list's Resolution, Merge, and Compare frequency settings are replaced by those in the file.

8. **Merge List** is used to load a frequency list file, adding its contents to those already in the selected list. Clicking this button displays the Merge Frequency List (page 121) dialog box.

   When the list is merged, the Resolution, Merge, and Compare frequency values in the file are ignored.

9. **Save List** allows you to save the selected list as a file. When you click this button, the Filename Entry (page 140) dialog box is displayed. You can also preserve the list information by saving the current state with Save Mission Setup (page 129). See the following note.
10. **Modify List** allows you to change the name and merge value of the selected frequency list. Clicking this button displays the Modify Frequency List (page 122) dialog box.
11. **Add Freqs** allows you to add frequency values to the selected list. When you click this button, the Add Frequencies to List (page 123) dialog box is displayed.
12. **Delete Freqs** deletes selected frequency value(s) from the list. To do this:
    a. Select a list in the left pane. Its entries appear in the right pane.
    b. Select one or more frequency value(s) that you wish to delete. You can use the Shift or Ctrl buttons with the mouse button to select multiple entries. Shift is used to select contiguous selection and Ctrl for non-contiguous selection.
    c. Click the Delete button.

Defining or Changing Frequency List Files

A *frequency list* can be stored on the system disk. These files have a .frq extension and are in ASCII format. Such a file can be created or modified with an editor like Notepad.

Each list the following attributes:

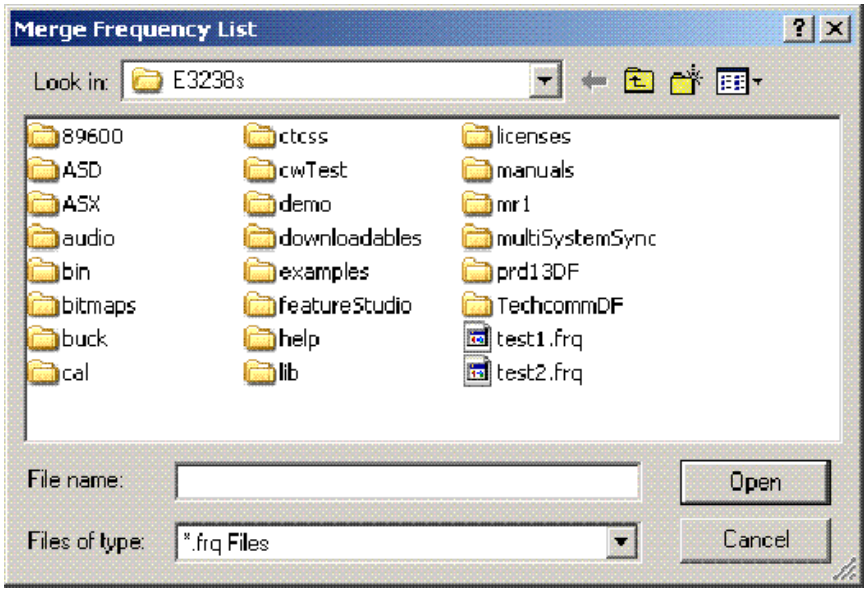
- a name (like “List #1”)
- a *resolution* value
- a *merge* value
- a *compare* value
- a list of frequency values (in Hz)

Note

Frequency lists are part of the mission state which may be saved and recalled from the File Menu (page 114). They may also be saved as individual files that can be recalled. If you create frequency lists in the pane and don’t save the mission state or save the work in files, the frequency list information is lost when the program stops running.

The information saved in the state file is the frequency information; *not* filenames containing the frequency lists.

Merge Frequency List



This dialog box is used to select a file containing a frequency list to merge with a previously selected frequency list. The process of selecting the file is the same as for any other Filename Entry (page 140) selection.

The file merging process is different from other load processes, however. When a frequency list file is merged with one of the 10 frequency lists in the Frequency Lists Pane (page 118), the name and parameter information in the file are ignored and the frequency values are added to the selected list according to the Resolution and Merge Frequency rounding values that are active for the selected list.

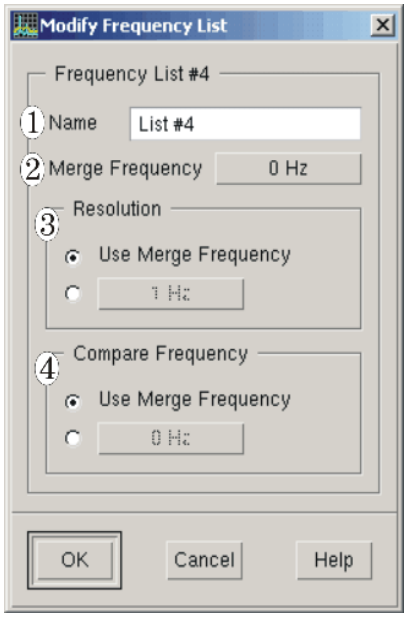
A frequency list file is an ASCII file containing:

- a name (like “List #1”)
- a *resolution* value
- a *merge* value
- a *compare* value
- a list of frequency values (in Hz)

```
name:Pagers
resolution:-1
merge:12500
compare:-1
929512500
929537500
929562500
929612500
929662500
929712500
929737500
929862500
929937500
930000000
931187500
931212500
```

The negative values for Resolution and Compare indicate that the Merge value is used for these settings.

Modify Frequency List



This dialog box is used to change the Name, Merge frequency, Resolution, or Compare Frequency values as defined in the Frequency Lists Pane (page 118).

1. **Name** is an identifier or short description. It appears with the list number wherever frequency lists are listed (alarm criteria and trace grid).
2. **Merge Frequency** is a rounding value used to place frequencies in a list.
3. **Resolution** is one of two rounding values used to place frequencies in a list.
4. **Compare Frequency** is used to compare values in the list to alarm criteria.

These parameters are explained under Frequency Lists Pane (page 118).

Changing Settings

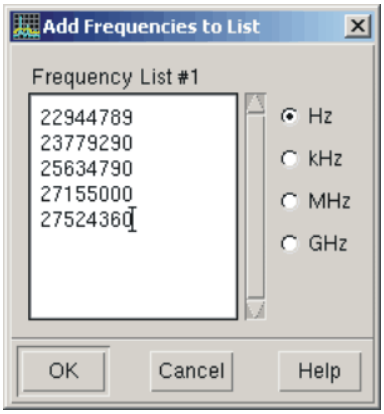
To display this dialog box, the Frequency Lists pane must be displayed in the application window. To add it to the window, see Display Layout (page 422).

1. In the Frequency Lists pane, select the frequency list entry you wish to modify (click on it and it becomes highlighted).
2. Click the Modify List button at the bottom of the pane. The dialog box shown above appears. This dialog box was designed to make it easy to use the merge frequency value for both the resolution and compare frequency settings.
3. Make the necessary changes. To use a value other than the Merge Frequency value for either Resolution or Compare Frequency, click the 1-of-N (radio) button beside the labeled button and enter the new value in the Frequency Entry (page 352) dialog box.
4. Click OK.

A resolution or merge value of 0 Hz allows any frequency to be entered.

When you change a list's merge value, existing entries in the list are *not* modified to fit the multiple pattern; only new entries are constrained.

Add Frequencies to List



This dialog box is used to add frequency values to a frequency list in the Frequency Lists Pane (page 118).

To add one or more frequency values to a list:

1. Select the frequency list entry you wish to modify from the Frequency Lists Pane (page 118) (click an entry and it becomes highlighted).
2. Click the Add button at the bottom of the pane (the dialog box shown above appears).
3. Click in the text area of the dialog box and enter the new values.
4. Click a button at the right side to select frequency units.
5. Click OK.

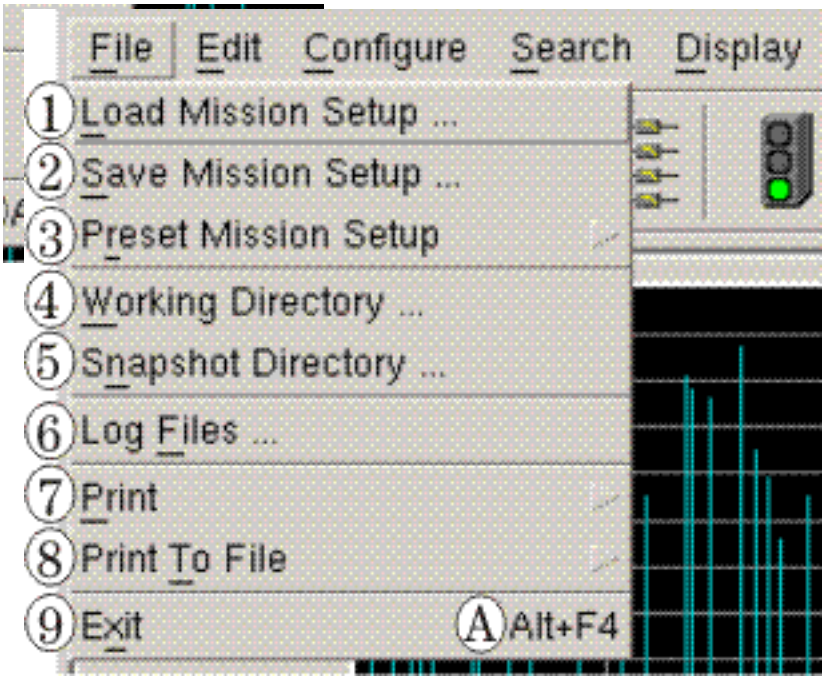
Note

The new values must be a multiple of the *merge* frequency. Values that are within 1/2 the merge range of an existing entry create no new entry. Values more than 1/2 the merge range above or below an existing entry are entered at the next multiple above or below the entry. New entries are added at the closest multiple of the Merge Freq.

These values aren't saved unless you save the state (see Save Mission Setup under The File Menu (page 125)) or save the individual list as a file.

The number of entries in a frequency list is unlimited.

The File Menu



The File Menu contains entries having to do with system file operations as well as the control used to stop the execution of the program.

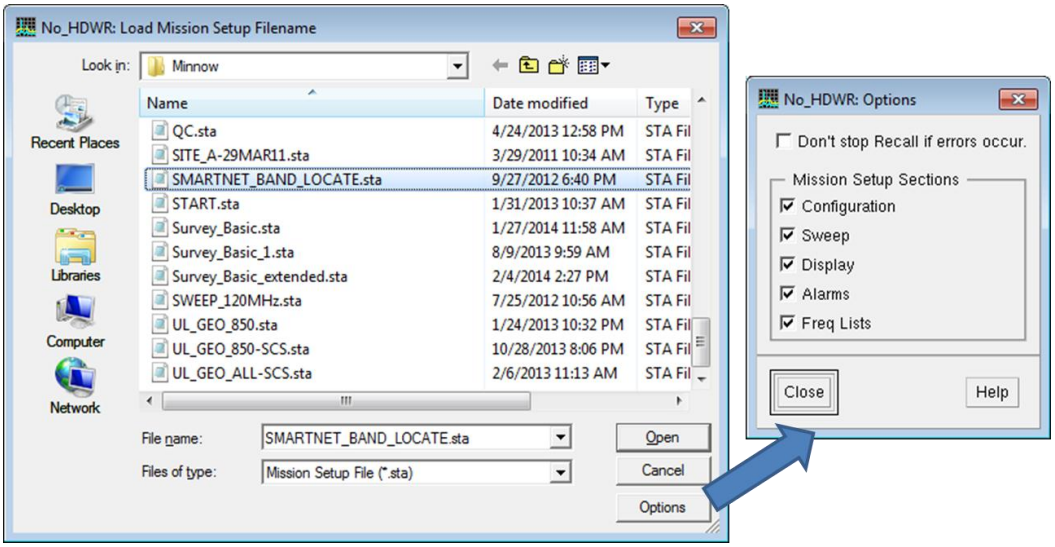
A. Several of the entries in the File Menu have text at the right side of the list. These are *accelerator* descriptions. They allow you to activate the feature very quickly, using the keyboard. You can define new ones and change existing accelerators as described under Accelerator Keys (page 508).

1. Load Mission Setup (page 127) is used to load mission states.
2. Save Mission Setup (page 129) is used to save the current settings (configuration, sweep parameters, and display).
3. Preset Mission Setup (page 134) sets the mission state to default settings.
4. Working Directory (page 135) defines the default working directory.
5. Snapshot Directory (page 136) defines where snapshot files are saved.
6. Log Files (page 139) controls use of log files and their names.
7. Print (page 141) is used to print system information.

8. Print To File (page 142) is used to “print” information to files on the system disk.
9. Exit (page 143) stops the search receiver program.

Load Mission Setup

Path: File, Load Mission Setup



This dialog box is used to recall a mission setup that was saved. The above illustration shows the dialog box. For detailed information, see the following references:

1. Directories List (page 130)
2. Don't stop Recall if errors occur (page 132)
3. Mission Setup Sections (page 132)
4. Filename Text Box (page 132)
5. Files List (page 130)
6. Scroll Bars (page 133)

Mission files are referred to as *state* files. To make them easy to filter and list by themselves, use filenames that end with `.sta`.

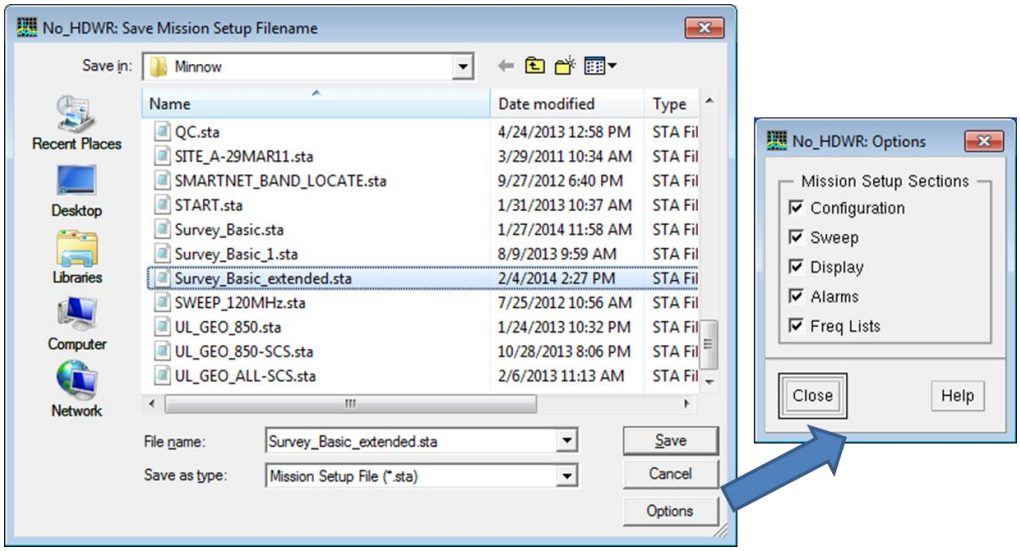
State files are ASCII text files that you can load in the text editor to view or modify. See the discussion on the Text Editor Pane (page 113).

Note

A mission file may be loaded when the program starts with the `-missionSetup` command option. See Usage under Starting the Program (page 19).

Save Mission Setup

Path: File, Save Mission Setup



This dialog box is used to save the mission setup state so that you can recall it. The above illustration shows both the remote (Motif) and the Windows native versions of the dialog box. For detailed information, see the following references:

1. Directories List (page 130)
2. Mission Setup Sections (page 132)
3. Filename Text Box (page 132)
4. Files List (page 130)
5. Scroll Bars (page 133)

Mission files are *state* files. To make them easy to filter and list by themselves, use filenames that end with `.sta`. State files are ASCII text files that you can load in the text editor to view or modify. See the discussion on the Text Editor Pane (page 113).

Note

To control file size, state files contain only pertinent state information. This can seem to cause ambiguities when recalling a state file into a second N6820ES system with a different configuration file, different options or user libraries loaded.

Don't stop Recall if errors occur

This button allows you to recall states saved with earlier versions of the program. These state files have valid information but may be missing parameters associated with the later revision.

Mission Setup Sections

These buttons select the parts of the mission setup to be saved or loaded. This allows you to do things like load a different display setup without changing the configuration or sweep parameters.

Configuration selects the hardware configuration. See the discussion for the Configure menu entries Antenna Configuration (page 226), Search Receivers (page 227), and Handoff Receiver Configuration (page 271).

Sweep Parameters selects the parameters that define the sweep configuration. See the discussions for Search Type (page 287), Energy Detection (page 309) (including threshold), Single-BW-Hint Setup (page 325), and Alarms Setup (page 336).

Display selects the parameter values that define the display configuration, the log filename definitions and view states, and the definition of the working directory. See the discussion for The Display Menu (page 421). Sash positions are *not* saved.

Alarms selects the settings that define the alarm states that are entered in Single-Alarm Setup (page 338).

Freq Lists selects the frequency list information used for trace grids and alarm criteria. These lists are displayed and edited in the Frequency Lists Pane (page 118).

Filename Text Box

The name of the file. If you click an entry in the Files List, the selected filename appears here. If you would rather type in the path name and filename, just click in this box and type it in. The name should follow the conventions of the operating system.

If no extension is appended to the end of the filename, one is automatically added as shown in the following table. If you want no extension added, end it with a period ".". This period will not be a part of the filename.

Filename Extensions

File Types	Directory	R/W[a]	Typical Extensions
Frequency Lists	Working	R/W	.frq
Audio Alarm Task	Working	R	.u, .al, .au, .wav, .snd, .l16, .l8, .lo8
Visual Alarm Task	Working	R	.pm, .bm
Directed Search Band database	Working	R/W	.csv
Test Editor	Working	R/W	.txt
Energy History	Working	R/W	.his
Hardcopy			
Screen Print	Working	W	.tif, .xwd
Feedback Form	Working	W	.txt
Fallback Resources	Working	W	.txt
Widget Hierarchy	Working	W	.txt
Energy History	Working	W	.txt
Log Files			
Handoff	Working	W	.hol
Command	Working	W	.sta
New Energy	Working	W	.nel
Alarm	Working	W	.all
Mission Setup	Working	R/W	.sta
User Color Map	Working	R/W	.ucm
Time Snapshot	Snapshot	W	.cap
Frequency Snapshot	Snapshot	W	.fss
Environment Threshold	Working	R/W	.thd
Signal Database	Working	R/W	.sdb
Feature Studio	Working	R/W	.fsp

[a] Indicates whether the application reads and/or writes the file type.

Scroll Bars

If the list is longer than can be displayed in this list area, the vertical scroll bar can be used to move up and down the list.

- To move down the list, click the down arrow at the right side of the list area.
- To move down as many lines as the list holds, click in the area between the down arrow and the scroll bar.
- You can also click the scroll bar, hold the mouse button down, and drag the scroll bar up or down.

The horizontal scroll bar can be used in the same manner to move right and left if an entry is too long to display all of it.

Preset Mission Setup

Path: File, Preset Mission Setup

This entry in the File menu sets the configuration, sweep setup, and display to the preset state.

Mission files are *state* files. To make them easy to filter and list by themselves, use filenames that end with `.sta`.

State files are ASCII text files that you can load in the text editor to view or modify. See the discussion on the Text Editor Pane (page 113).

To list the default settings:

1. Save the current state, if you want to return to it.
2. Preset the mission state
3. Save the mission state in a file
4. Load the mission state file in the text editor
5. Print it from the editor

Verify Preset

This menu appears when you select the Preset Mission Setup (page 134) entry in the File menu. This two-step verification process reduces the chance of making an error.

Yes allows the preset process to continue.

No cancels the preset process.

Working Directory

Path: File, Working Directory

This dialog box allows you to change the working directory. The mechanism is explained under Filename Entry (page 140).

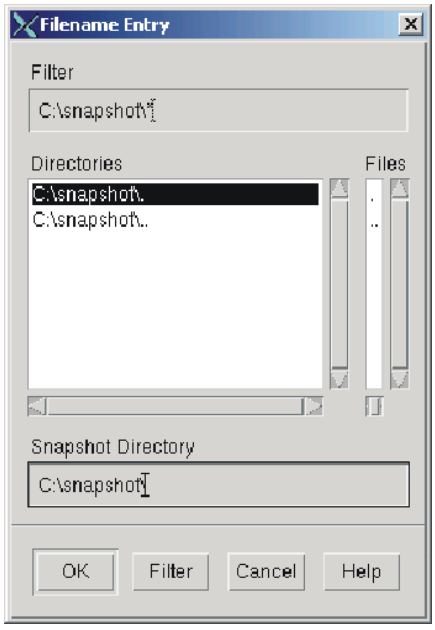
The working directory is the directory that you want to do most of your file work in. This applies to saving or loading mission setups and text files that are loaded and saved from the text editor. It is highly recommended to establish a working directory outside of the C:/E3238s directory. For example, create a folder C:/Working and copy the .cfg and .sta files from the C:/E3238s/N684x_RF_Sensor into the new folder. Next copy the Program shortcut into the Working folder. Modify the shortcut properties to start in the Working folder and alter the Target line to use the .cfg and ,sta files in that same folder. Modify the Shortcut name to personalize it. After completing this process, you should be able to launch the Surveyor 4D application from the Working directory. This is very useful for backing up your setups, program files and for moving the setup to another PC.

The definition of the working directory is saved as part of the mission setup. See Save Mission Setup (page 129).

If Working Directory is ghosted in the File menu, see Menu/Toolbars (page 488).

Snapshot Directory

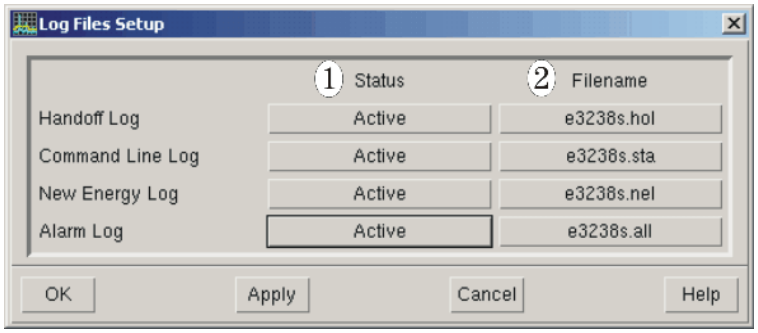
Path: File, Snapshot Directory



This dialog box allows you to specify the directory in which snapshot files are saved. By default this directory is `C:\snapshot`. See Filename Entry (page 140). At startup, the N6820ES working directory is set to the current working directory. The `snapshot` directory is used to store snapshot files.

Log Files

Path: File, Log Files



This dialog box is used to control whether log information is written to files on the system disk and, if so, specify their filenames.

If the Log Files entry in the File menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).

1. **Status**: These buttons are toggle buttons that change status when clicked.

   Active means that the log information is recorded in a file. The location and file name is defined with the Filename button.

   Inactive means that the log information is not recorded in a file.

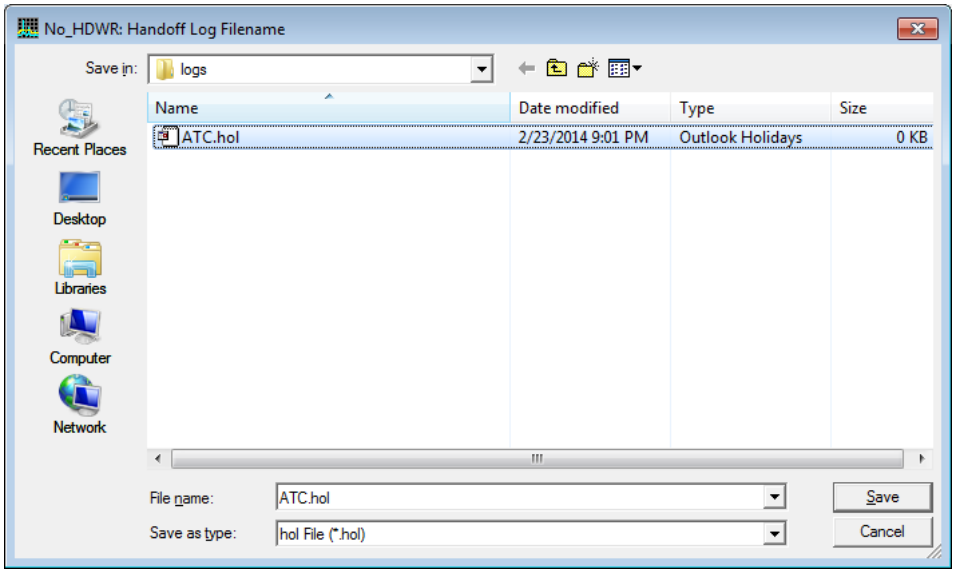
2. **Filename**: The buttons in this column display the current name of the associated log file. Clicking it displays the dialog box used to change the filename. To change the name of the log file, see Filename Entry (page 140).

   If the specified filename already exists, new entries are appended at the end of the file.

- **OK** makes the specified changes and closes the dialog box.
- **Apply** makes the specified changes and leaves the dialog box open.
- **Cancel** closes the dialog box; no changes are applied.

See Also To clear the log file, see Edit, Clear Log File (page 147).

Filename Entry



This dialog box appears whenever you need to specify the name of a file on the system disk. The example above shows the Handoff Log File version of this dialog box. Note that Windows © treats the *.hol extension as an Outlook file.

For detailed information, see the following:

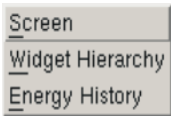
1. Directories List (page 130)
2. Filename Text Box (page 132)
3. Files List (page 130)
4. Scroll Bars (page 133)

Tips

- To limit the file names that appear in Files List (page 130), enter a wildcard pattern in the Filter Text Box (page 130) text line.
- To change directories, double-click an entry in the Directories List (page 130). The entry ending in /.. represents moving up one level in the directory hierarchy (toward the root directory).
- To select an existing file, double-click it from Files List (page 130).
- To specify a filename, type it in the Filename Text Box (page 132) text line.
- To abandon this process without making changes, click Cancel.

Print

Path: File, Print



This entry displays print options for application-related files.

Note

A system printer must be configured before using these entries. See the `d.print` file for more information.

Screen

Prints the contents of the screen to the system printer.

- To print the screen to a file, see Print To File (page 142).
- To set up a printer, see Hardware Configuration (page 16).

Widget Hierarchy

Creates the widget hierarchy information to support modifying the Motif resources defined in the `E3238s` file. See Application Resources (page 17).

Energy History

Prints the signal data currently in the Energy History Pane (page 88). If no signals have been detected, only the heading prints.

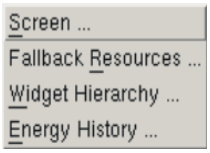
For an overview, see Process Overview (page 33).

Printing other things

- To print the handoff log or command line log, load the file into the Text Editor Pane (page 113) and print from there. These log files are created by changing their status to *active*. See File, Log Files (page 139).
- See Printing the Directed Search Band Table (page 308).
- To print help information, see The Help Menu (page 505).

Print To File

Path: File, Print to File



The entries in this menu allow you to print to a file.

Screen Prints the screen to a file in either TIFF or XWD graphic format. The graphic format selection is specified in the *d.print* file. See this file for more information.

To print a screen file in Windows, double click the file then print using the displayed graphics program.

Fallback Resources Fallback resources are the resources active when no resource file is present. The initial resource file should be created from these fallback resources so that the default behavior of other areas of the user interface are not lost. See Application Resources (page 17).

Widget Hierarchy Creates the widget hierarchy information to support modifying the Motif resources defined in the `E3238s` file. See Application Resources (page 17).

When this entry is selected from the menu, the Filename Entry (page 140) dialog box appears, which lets you specify the directory and filename for the print file.

Energy History Prints the signal data currently in the Energy History Pane (page 88). If no entries exist, only the heading is printed.

When this entry is selected from the menu, the Filename Entry (page 140) dialog box appears, which lets you specify the directory and filename for the print file.

To create a file more compatible with spreadsheet programs, use the Save button in the Energy History Pane (page 88).

For an overview of the detection/alarm system, see Process Overview (page 33).

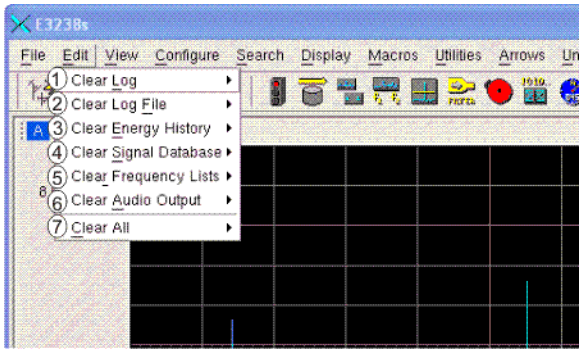
Exit

Path: File, Exit

Clicking this menu entry stops the program.

If there any open, unsaved files, you are prompted to save them before the program stop.

The Edit Menu

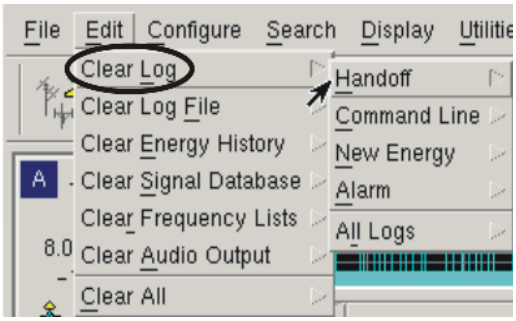


This menu contains entries used to clear various parts of the system, as described below.

1. **Clear Log** displays a menu listing of the logs. See Clear Log (page 146).
2. **Clear Log File** displays a menu listing of the log *files*. See Clear Log File (page 147).
3. **Clear Energy History** is used to clear the signal statistics displayed in the Energy History Pane (page 88). See Clear Energy History (page 148).
4. **Clear Signal Database** is used to clear the signal See Clear Signal Database Menu (page 149).
5. **Clear Frequency Lists** is used to clear the frequency values in all loaded frequency lists. See Clear Frequency Lists (page 150).
6. **Clear Audio Output** is used to clear (stop) the audible alarms. See Clear Audio Output (page 151).
7. **Clear All** clears everything listed in the Edit menu. See Clear All (page 152).

Tips Entries in this menu may appear ghosted (inactive). This occurs when it is locked out by the Menu/Toolbars (page 488) and when there is no log information to clear.

Clear Log



Clicking “Clear Log” in The Edit Menu (page 145) displays a menu of system logs plus an “All Logs” entry. Click the name of the log you wish to clear and then click “yes” to verify your selection. Before a log is cleared, the request is verified with Verify Clear Log. This two- step process reduces the chance of accidentally deleting data.

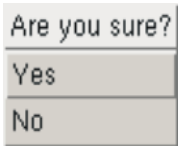
Log Descriptions

- Handoff Log Pane (page 75)
- Command Line Pane (page 115)
- New Energy Log Pane (page 86)
- Alarm Log Pane (page 87)

Tips

- If the Clear Log entry is ghosted (inactive), see Menu/Toolbars (page 488).
- The logs are displayed by adding their **pane** to the application window. To add a pane to the N6820ES Main Window (page 45), see Display Layout (page 422).

Verify Clear Log



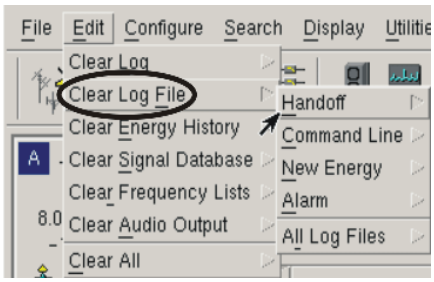
This message is displayed to verify that you intend to clear (delete) the selected log view. If you click “yes” the information in the log pane is cleared.

This has no effect on the file version of the log, if it is active.

Note

Clearing the handoff log aborts all *Pending* entries. See Handoff Log Pane (page 75).

Clear Log File



This entry in The Edit Menu (page 145) is used to clear one or all of the system log files. Before the file is cleared, the request is verified with the Clear Log File Verification (page 147). This two-step process reduces the chance of accidentally losing data.

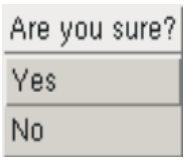
Log Descriptions

- Handoff Log Pane (page 75)
- Command Line Pane (page 115)
- New Energy Log Pane (page 86)
- Alarm Log Pane (page 87)

Tips

- If the Clear Log File entry in the Edit menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).
- To add a log pane to the display, see Display Layout (page 422).
- To create a log *file* or find the filename being used, see Log Files (page 139).

Clear Log File Verification



This message is displayed to verify that you intend to clear (delete) the log file. If you click the yes entry, the information in the file is cleared.

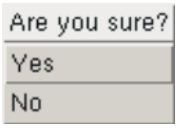
Clear Energy History

This entry in The Edit Menu (page 145) clears the signal data kept in the Energy History Pane (page 88). Before the data is cleared, the request is verified with Verify Clear Energy History. This two-step process reduces the chance of accidentally losing data.

Tips

- If the Clear Energy History entry in the Edit menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).
- To add the Energy History pane to the display, see Display Layout (page 422).

Verify Clear Energy History



This message is displayed to verify that you intend to clear (delete) the information in the Energy History pane. If you click “yes” the information in the pane is cleared.

Note

Clearing the Energy History may trigger new alarms. When an active alarm’s trigger type is “New Energy” and a detected signal meets all other alarm criteria, an alarm is launched if no entry exists in the Energy History for a signal at that frequency. See Signal Type in Definition (page 342).

Clearing the Energy History may affect active alarms whose definition depend history data. For an overview of the alarm process, see Process Overview (page 33).

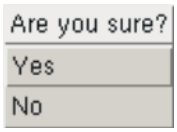
Clear Signal Database Menu

This entry in The Edit Menu (page 145) clears the entries in the Signal Database Pane (page 107). Before the data is cleared, the request is verified with the Verify Clear Signal Database (page 149). This two-step process reduces the chance of accidentally losing data.

Tips

- If the Clear Signal Database entry in the Edit menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).
- To add the Signal Database pane to the display, see Display Layout (page 422).

Verify Clear Signal Database



This message is displayed to verify that you intend to clear (delete) the information in the Signal Database pane. If you click “yes” the information in the pane is cleared.

Note

Clearing the Signal Database may affect active alarms whose definition depend on database information. For an overview of the alarm process, see Process Overview (page 33).

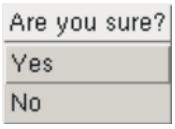
Clear Frequency Lists

This entry in The Edit Menu (page 145) clears the entries in the Frequency Lists Pane (page 118). Before the data is cleared, the request is verified with the Verify Clear All Frequency Lists (page 150). This two-step process reduces the chance of accidentally losing data.

Tips

- If the Clear Frequency Lists entry in the Edit menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).
- To add the Frequency Lists pane to the display, see Display Layout (page 422).

Verify Clear All Frequency Lists



This message is displayed to verify that you intend to clear (delete) the information in the frequency lists. If you click “yes” the information in the lists is cleared.

Note

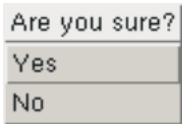
Clearing the Frequency Lists may affect active alarms whose definition depend on the frequency values. For an overview of the alarm process, see Process Overview (page 33).

Clear Audio Output

This entry in The Edit Menu (page 145) clears the queue of audible alarms as defined in the Single-Alarm Setup (page 338) dialog box. Before the data is cleared, the request is verified with the Verify Clear Audio Output (page 151). This two-step process reduces the chance of accidentally losing data.

Tips If the Clear Audio Output entry in the Edit menu is ghosted (inactive), see the discussion under Menu/Toolbars (page 488).

Verify Clear Audio Output

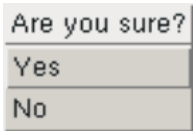


This message is displayed to verify that you intend to clear (delete) the queue of audible alarms. If you click “yes” the queue is cleared and no audible alarms currently waiting are sounded.

Clear All

This entry in The Edit Menu (page 145) clears *all* the items listed in the menu, including logs, log files, Energy History, Signal Database, Frequency Lists, and Audio Output (alarm sounds). Before the data is cleared, the request is verified with the Verify Clear All (page 152). This two-step process reduces the chance of accidentally losing data.

Verify Clear All



This message is displayed to verify that you intend to clear (delete) all logs, all log files, the Energy History data, and the audible alarm queue. If you click “yes” these are cleared.

Note

Clearing the handoff log aborts all *Pending* entries. See Handoff Log Pane (page 75).

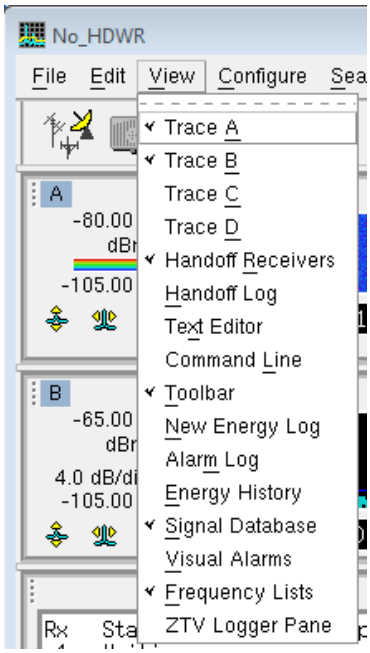
Clearing the Energy History may trigger new alarms. When an active alarm’s trigger type is “New Energy” and a detected signal meets all other alarm criteria, an alarm is launched if no entry exists in the Energy History for a signal at that frequency. See Signal Type in Definition (page 342).

Clearing the Energy History may also affect active energy alarms whose definition depend on history data. For an overview of the alarm process, see Process Overview (page 33).

Clearing the Signal Database may affect active alarms whose definition depend on database information. For an overview of the alarm process, see Process Overview (page 33).

Clearing the Frequency Lists may affect active signal alarms whose definition depend on the frequency values. For an overview of the alarm process, see Process Overview (page 33).

The View Menu



The View menu contains entries used to add or remove panes from the main application window's GUI. This is a **tear- off menu**. Clicking the top of the menu places the menu into its own window so that it does not disappear after a selection.

Access to any of the Panes can be enabled/disabled from the Utilities > Menu/Toolbars.

When enabled, Panes can be added to the main GUI when they are selected from the pull- down View menu. Panes are added to the bottom of the current GUI when they are selected. Panes that are active are marked in the menu by a check mark to the left of the menu entry.

All of the trace Panes and the Energy History pane can be undocked from the main GUI by selecting their docking icon located at the top- left corner of their individual trace pane.

The following panes may be added to or removed from the main GUI through the View pull-down menu:

- Trace Pane (page 52) **(A, B, C, D)** can be selected. Trace Panes display sweep data as spectrum, spectrogram, color spectrogram, color directogram, direction, color direction, DF specrogram (with option WDF), or polar.
- View > Handoff Receivers Pane (page 161) contains a listing which provides control and status of all installed handoff receivers.

- View > Handoff Log Pane (page 166) displays the log of handoff receiver activity.
- View > Text Editor Pane (page 175) opens a text editor that can be used to view and modify ASCII text files such as saved state files, log files, or search band database files as well as create new files such as reports. Its File Pull-Down Menu allows opening and saving text files on the system hard disk and printing to the system printer.
- View > Command Line Pane (page 177) on page 148 allows commands to be executed at the Command Line entry field and display a log of the commands that have been issued. This log of the commands may be saved as a file.
- View > Toolbar (page 180) consists of three groups of icons that enable quick access to the features found in the Configure, Search, and Display pull-down menus.
- View > New Energy Log Pane (page 182) lists peaks of new energy the first time that they appear and keeps a running count of the total number of entries in the log.
- View > Alarm Log Pane (page 183) on page 156 lists all the alarms that have occurred.
- View > Energy History Pane (page 184) displays as many as eight of the energy features that are tracked for each detected energy.
- View > Signal Database Pane (page 212) displays the results of signal processing.
- View > Visual Alarms Pane (page 216) displays images and instructions for alarms.
- View > Frequency Lists Pane (page 217) on page 196 is used to view, create, and modify lists of frequencies for trace grids and alarm criteria.
- The **User-Defined Pane** is part of the Agilent 35688E Option ASD, Host User Programming Libraries and Documentation. The contents of this pane can be defined by a user-written program. See *Agilent N6820ES Option ASD Programming Guide**.

Trace (A, B, C, and D)

Trace Panes display sweep data. They can display that data as spectrum, spectrogram, color spectrogram.

Each trace pane displayed on the main screen has an undocking icon in its upper left-hand corner, next to the trace identifier. Clicking this icon undocks the trace pane and displays it in a separate window. Clicking the icon on an undocked trace window closes that window and places the trace pane back into the N6820ES main window.

When a trace pane is displayed in a separate window, it has a menu bar added to the window. These trace pane menus provide the trace functions and operations that were available in the main window's menus and in the Trace Setup (page 424) dialog box.

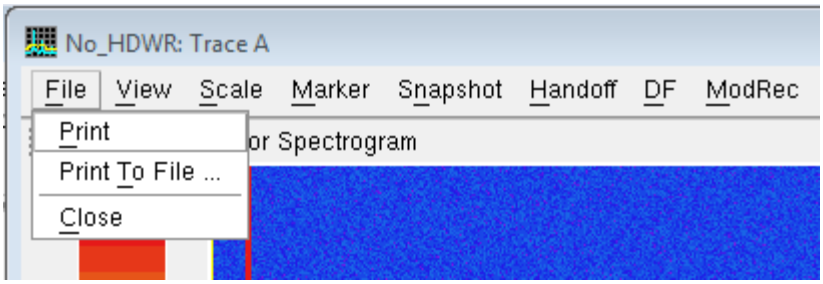
The Trace Pane menus are:

- Trace File Menu (page 156)
- Trace View Menu (page 156)
- Trace Scale Menu (page 157)
- Trace Marker Menu (page 158)
- Trace Snapshot menu (page 158)
- Trace Handoff Menu (page 159)

If the corresponding options are installed, the following menus are available from the trace screen:

- Trace ModRec Menu (page 160)

Trace File Menu



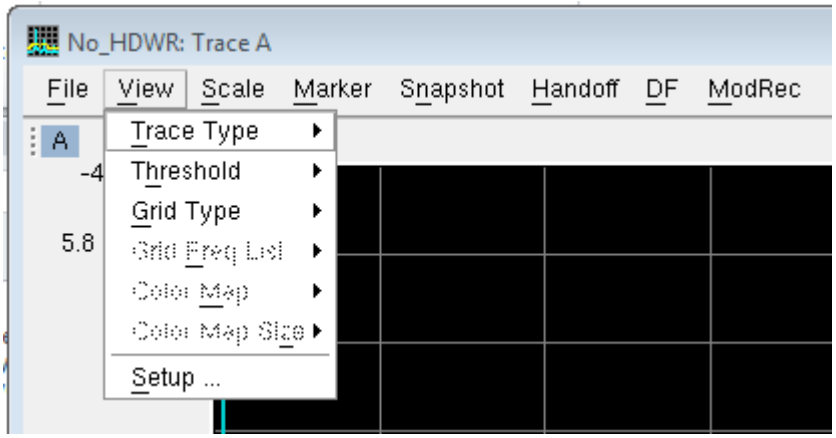
The Trace File menu has the following selections when the pane is undocked:

Print This selection prints the current trace window.

Print to File... This selection saves the current trace window to a TIFF graphics file with a format and a file extension of .tif.

Close This selection closes the current trace window.

Trace View Menu



The Trace View menu has the following selections:

Trace Type This selection controls how information is displayed. See Trace Type.

Threshold This selection controls how the energy threshold is presented. See Threshold Presentation.

Grid Type This selection the line pattern in the trace area background. See Grid Type.

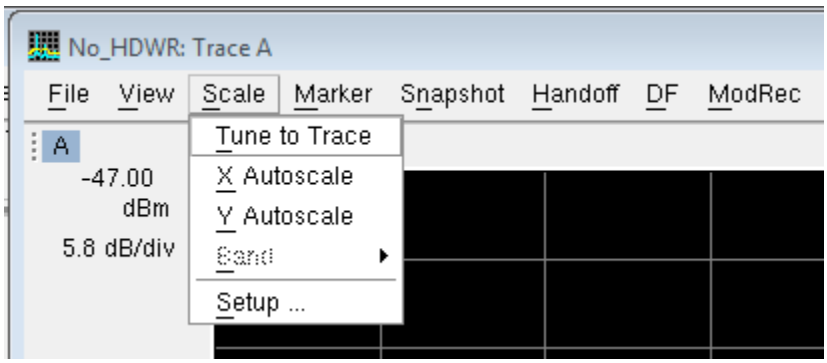
Grid Frequency List This selection allows you to select one of the defined frequency lists as a grid. SeeGrid Frequency List.

Color Map This selection allows you to choose from a selection of several color maps. Color maps can be edited using the Color Map Setup. See User Color Map Setup.

Color Map Size This selection allows you to choose the size of the color map used in the trace display. See User Color Map Setup.

Setup This selection displays the Trace Setup Dialog Box. See Trace Setup.

Trace Scale Menu



The Trace Scale menu has the following selections:

Tune to Trace This selection changes the start and stop frequency of the sweep. If the trace span is not the same as the span of the search receiver, as defined in the Search, Setup dialog box, Tune to Trace changes the start and stop frequencies in the sweep setup to match the start and stop frequencies of the trace. This gives you the highest update rate (shortest revisit time) very quickly.

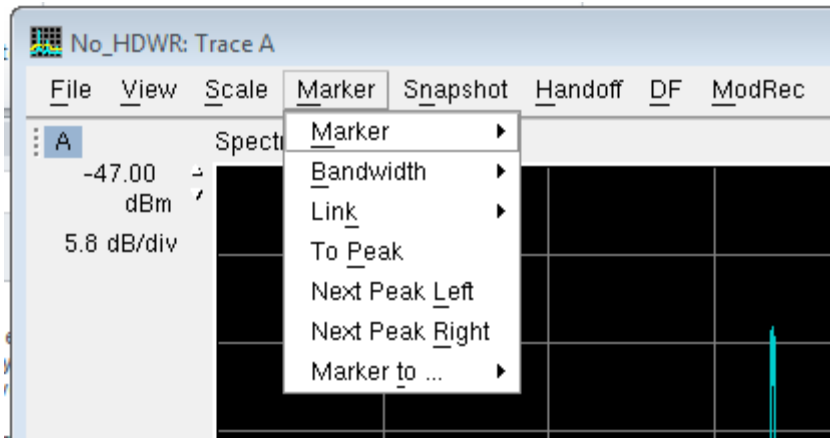
X Autoscale This selection sets the minimum and maximum amplitude values so that all of the trace is displayed.

Y Autoscale This selection sets the trace's frequency scale to match that of the measurement hardware.

Band This selection displays the Frequency Band Scale. This menu selection appears when the Search Type is set to Directed. See Frequency Band Scale.

Setup This selection displays the Trace Scaling dialog box.

Trace Marker Menu



The Trace Marker menu has the following selections:

Marker This selection allows you to turn the trace marker on and off. See Marker On/Off.

Bandwidth This selection allows you to specify bandwidth markers around the trace's marker.

Link The menu selection allows you to link the marker in this trace to markers in another trace.

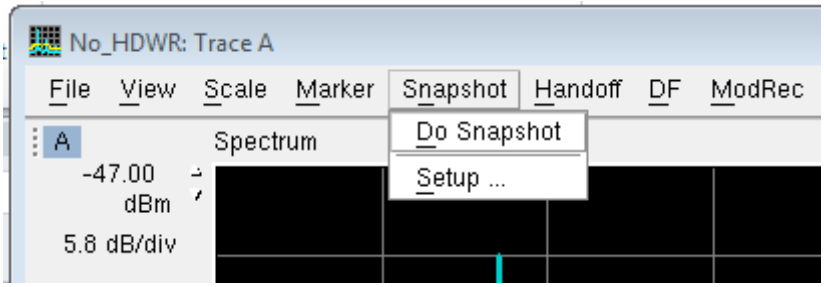
To Peak This selection moves the marker to the peak having the largest amplitude on the trace.

Next Peak Left This menu selection moves the marker to the next peak left of the current position. A "peak" is a local maxima more than approximately 6 dB above the computed noise floor of the display spectrum.

Next Peak Right This menu selection moves the marker to the next peak right of the current position. A "peak" is a local maxima more than approximately 6 dB above the computed noise floor of the display spectrum.

Marker To... This selection allows you to send the trace marker to specific locations. These locations include the sweep's center frequency, start frequency, stop frequency, and a reference level.

Trace Snapshot menu



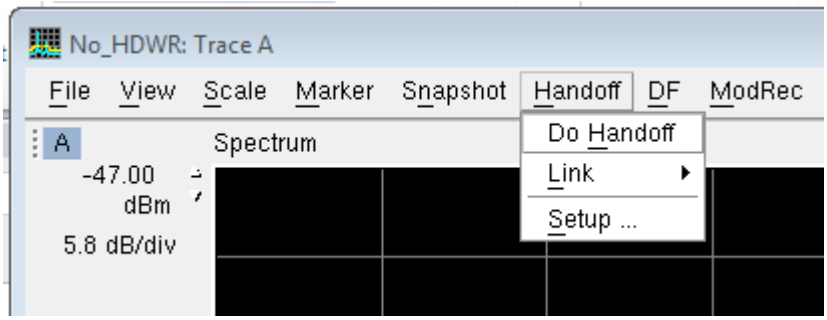
The Trace Snapshot menu has the following selections:

Do Snapshot This menu selection collects a data record and stores it on the system disk. The data may be either time domain or frequency (or both).

When this menu selection is unavailable it indicates that no snapshot is active for the trace. No snapshot data is collected until a snapshot setup is made active.

Setup... The menu selection displays the Trace Snapshot Setup dialog box.

Trace Handoff Menu



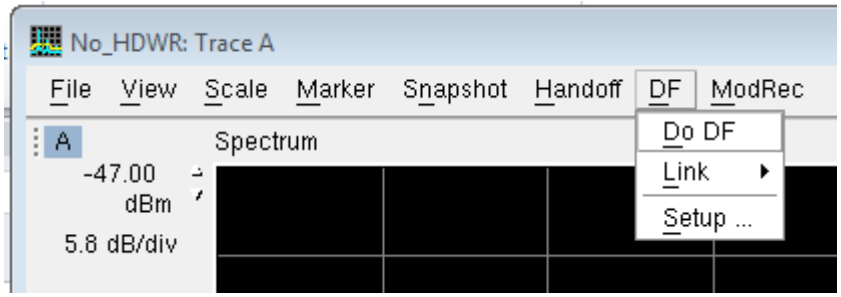
The Trace Handoff menu has the following selections:

Do Handoff This selection initiates a handoff of a current signal.

Link This selection lets you specify the receiver link for the handoff.

Setup... This selection displays the Trace Handoff Setup dialog Box

Trace DF Menu

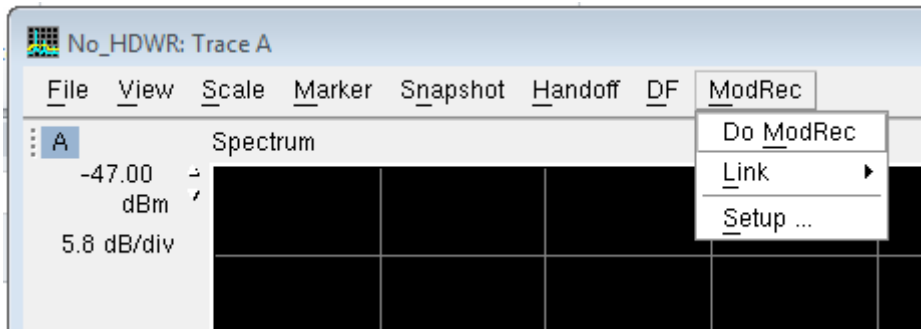


The DF menu has the following selections:

Do DF This selection initiates a DF measurement of a current signal.

Setup... This selection displays the Trace Direction Finding Link Setup dialog Box

Trace ModRec Menu



The Trace ModRec menu has the following selections:

Do ModRec This selection initiates a Modulation Recognition operation of the current signal.

Link This selection lets you specify the ModRec link for the handoff.

Setup... This selection displays the Trace Modulation Recognition Link Setup dialog Box

View > Handoff Receivers Pane

Path: View, Handoff Receivers

The handoff receivers pane provides control and status of all installed handoff receivers.

Note

The "View > Handoff Receivers Pane" on page 128 is available only when one or more handoff receivers are defined in the configuration file.

Handoff Receivers Queue

All handoff receiver assignments go through a queue. When there are more handoffs than installed receivers, the handoffs accumulate in the queue. They are assigned from the queue based on priority and order of handoff. This is tracked and indicated in the "View > Handoff Log Pane" on page 134.

If your system has the Agilent 35688E Option AU1, Audio Output - AM/FM Handoff Receiver Driver installed, see "Handoff Receivers Option AU1 Audio Output Controls" on page 132.

Handoff Receivers Pane Headings

To change the following settings available from the "View > Handoff Receivers Pane, see "Handoff Receivers Settings and Making Changes" on page 130 and "Configure > Handoff Receivers" on page 250.

Rx (receiver) is the receiver number as defined in the *configuration file*. There may be as many as 100 handoff receivers installed.

Status indicates what activity the receiver is performing:

- **Waiting** indicates that the receiver is available to service the next signal handed off (assuming its frequency is within the receiver's range).
- **Active** indicates that the receiver is busy monitoring a signal. An active signal can be released by clicking the word *Active* with the mouse.
- **Manual** indicates that the receiver has been taken out of the receiver pool and is not available for signal assignment.
- **Offline** indicates that the receiver is present, but is unavailable for use. This usually indicates that, for Audio Output Receiver (Option AU1), the tuner is not locked.

  To lock the tuner, select Search > Type > Lock Tuner (Tuner Sweep Control).

Priority indicates a signal's importance relative to other signals. See "Handoff Log Priority" on page 138.

Elapsed indicates the time (in seconds) that the receiver has been monitoring this frequency. When the value reaches the value in the *Duration* column, the receiver is given another frequency assignment (if there is another one in the queue that it is capable of servicing) or changes status to *Waiting*. If a handoff with a higher priority enters the queue and bumps an assigned handoff from a receiver, that handoff's elapsed time will not reach the duration value.

Duration is the time (in seconds) that the signal was initially set to be monitored.

Frequency is the frequency to which the receiver is tuned.

Bandwidth is the bandwidth setting for the receiver.

Det indicates the detection type used by the handoff receiver.

AGC indicates the automatic gain control setting of the handoff receiver, if applicable.

BFO indicates the beat frequency oscillator setting of the handoff receiver, if applicable.

Squelch indicates the squelch control setting of the handoff receiver, if applicable.

Audio is used when Option AU1 receivers are used. See "Handoff Receivers Option AU1 Audio Output Controls" on page 132.

Comment is a short (15-character) text field you can include to convey more information. This and other fields are recorded in the "View > Handoff Log Pane" on page 134.

Note Changing the *Duration* or *Priority* values can have the same effect as trying to *Release* an active signal. If the handoff receiver is not configured to allow you to release a signal, try reducing either of these settings.

Handoff Receivers Settings and Making Changes

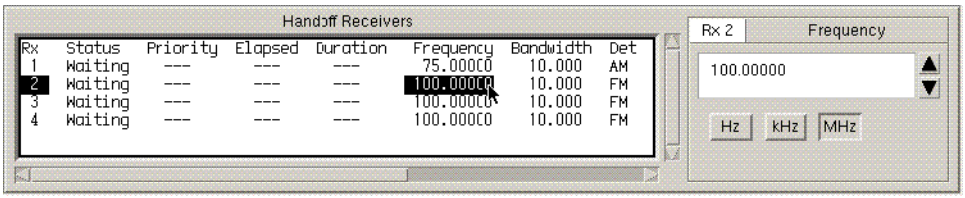
Initial Configuration

The settings in "Configure > Handoff Receivers" on page 250 determine whether an operator can release a handoff receiver or change any of the values. When the *Releasable* setting is "No," clicking an *Active* status does not call the *Release* feature. When the Interactive setting is "No," none of the other settings can be changed in the "View > Handoff Receivers Pane" on page 128.

Changing Handoff Receivers Settings with the Left Mouse Button

When you click on a field in the "View > Handoff Receivers Pane" on page 128 that can be modified, a control box appears at the right end of the pane as shown.

View > Handoff Receivers Pane (Changing with Left Button)



The controls vary depending on the field selected.

- **Status** (if Active) has the single button "Release Handoff."

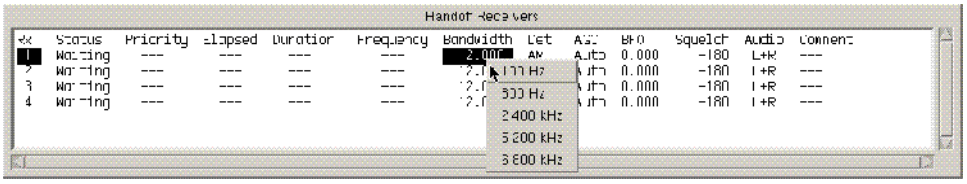
- **Priority** is a list of the four priority values.
- **Elapsed** cannot be changed.
- **Duration** is a text entry line on which you can enter any value.
- **Frequency** (shown above) is a text line entry.
- **Bandwidth** is a selection from a list.
- **Det** is a selection from a list.
- **AGC** is an On/Off toggle where On indicates that the gain selection is automatic. If AGC is Off, you set the gain with a slide control.
- **BFO** is a text line entry in which you can enter any value.
- **Squelch** indicates the squelch control setting of the handoff receiver, if applicable. This value can be changed with the mouse buttons.
- **Audio** See "Handoff Receivers Option AU1 Audio Output Controls" on page 132.
- **Comment** is a text line in which you can enter or modify a comment up to 15 characters in length.

To turn off the dialog box at the right side of the pane, click the same field again or click a field that cannot be changed.

Changing Handoff Receivers Settings with the Right Mouse Button

When you click on a field in the "View > Handoff Receivers Pane that can be modified, a drop-down list is displayed by the mouse pointer, as shown.

View > Handoff Receivers Pane (Changing with Right Button)



The menu varies depending on the field selected. Note that "Frequency" must be changed with the left mouse button, since it is a text field.

Handoff Receivers Pane Drop Site

This help information appears when the help key (F1) is pressed while using the mouse to drag a signal from a trace to a handoff receiver.

- To complete the handoff, release the mouse button in the control box of the handoff receiver that is to handle it.
- To abort the handoff, press the ESC key.
- To complete the current handoff, click OK.
- To cancel the current handoff, click Cancel.

Handoff Receiver Audio Output Controls

When an Agilent AM/FM Handoff Receiver Driver is installed, the handoff receivers have the following controls.

1. **Mute** Clicking this button mutes the audio output and disables all other controls in this pane.
2. **Volume** Clicking and dragging the marker in this box raises or lowers the audio volume level. The solid bar indicates the current volume level.
3. **Left/Right** These buttons control the audio output from the two available audio output channels. By default both audio channels are enabled. This control allows a user to listen to two channels at once. when two are installed.
4. **Low Pass/High Pass** Clicking the left box adds a high-pass filter to the audio output. The High Pass filter can be used to eliminate CTCSS tones. Clicking the right of these two boxes adds a low-pass filter to the audio output. The Low Pass filter can be used to reduce noise in the audio output.
5. **Record** Clicking this button directs the software to begin saving the audio signal in a file in the snapshot directory.
6. **Record Time** This readout displays the length of time that the current audio recording session has been running. Audio Output records up to 10 seconds of data that occurred before the “Record” button was clicked. This enables you to record the segment of the signal that caused you to record it.

Tip

If the frequency or detection type of a signal are not supported by any installed handoff receivers, the status is changed to “Handoff Log Status: Unable."

If frequency or detection type limit the signal’s handoff to a receiver that is installed, but not available (for example, it is out of the receiver pool or assigned to a higher priority signal), the status will continue to be “Handoff Log Status: Pending until that receiver is available. See Rx Pool under “Configure > Handoff Receivers" on page 250.

Handoff Log Status: Active An active signal is one that has been assigned and is being monitored by the handoff receiver identified in the Rx# column. The time that is was assigned is recorded in the *Granted* column. When the amount of time specified by duration has past, the status changes to “Handoff Log Status: Released.

You may change the frequency, priority, detection, or duration settings, add comments, or release the signal before the duration setting releases it automatically in the “View > Handoff Receivers Pane" on page 128.

An active signal is flagged in a trace pane with text describing the handoff receiver monitoring it when the trace grid type is Handoffs and the Active signal frequency is within the span of the trace, as shown below. A trace’s grid type is selected in “Display > Trace (Setup)" on page 515.

Handoff Log Status: Completed: A completed signal was released at the time listed in the Released column. Completed signals may be handed off again; see “Handoff Log Popup Menu" on page 143.

Handoff Log Status: Bumped: A bumped signal was released before the duration time setting expired because another signal with a higher priority was handed off and all other handoff receivers were assigned to equal or higher-priority signals.

Handoff Log Status: Released A released signal means that the operator marked it and clicked the Release button while it was pending. If the number in the Rx column is 0, the signal was never assigned to a receiver.

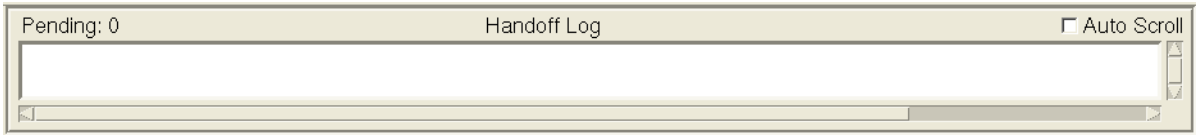
Handoff Log Status: Unable An unable signal means that either the frequency of the signal is outside the range of all installed handoff receivers or the detection type is not supported by any of the installed receivers.

Tip

To handoff a logged signal that was released, click it with the middle mouse button and drag it to the Handoff Receivers Pane.

To handoff more than one signal entry, select them by clicking them with the left mouse button. To select contiguous entries, click and drag or hold the Shift key when you click the entry at the end of the selection. To select individual entries, hold the Ctrl key when you click them.

View > Handoff Log Pane



Handoff Log displays the log of handoff receiver activity.

Handoff Log: Pending shows the number of signals handed off, but not yet assigned to a receiver. It is a count of the number of entries whose status is pending.

Handoff Log: Auto Scroll Checkbox keeps the latest log entries log visible by scrolling as new entries appear.

Handoff receivers must be described in the *configuration file* and configured before they can be used. See "Review Hardware Configuration" on page 17

The definition of energy that is automatically detected and handed off are discussed in "Search > Detection Setup (Threshold, Energy, Direction)" on page 333.

Signals may also be handed off from a trace pane. See "Display > Trace (Setup)" on page 515. To control handoff directly, see "Configure > Handoff Receivers" on page 250.

The Handoff Log may be recorded as a file. See "File > Log Files" on page 105.

To release pending signals, clear the log view entries with "Edit > Clear Log" on page 112 or mark the ones to release with the left mouse button and then click the right mouse button to get the "Handoff Log Popup Menu" on page 143.

Note

Each handoff log entry requires 160 bytes of memory. The number of entries in the handoff log view is limited as defined by the handoffLogViewLength resource variable in the E3238s. See "Application Resources" on page 19.

When the number of log entries reaches the limit, new entries cause the oldest completed entries to be discarded/lost from memory. Pending entries are not discarded. If the queue is full of pending entries, the new ones are discarded.

The handoff log file is not affected by this limit.

Handoff Log Status

Handoff Log Status can be one of the following:

- "Handoff Log Status: Pending" on page 135
- "Handoff Log Status: Active" on page 136
- "Handoff Log Status: Completed" on page 136
  - "Handoff Log Status: Bumped" on page 136
  - "Handoff Log Status: Released" on page 136
  - "Handoff Log Status: Unable" on page 136

Handoff Log Status: Pending

A pending signal has been handed off (put in the handoff queue), but has not yet been assigned to a handoff receiver. You can change some settings of a Pending signal.

To change an entry's priority, detection, or duration:

1. Position the mouse cursor anywhere in the line of the entry you wish to change.
2. Click the right mouse button.
3. Select multiple lines by holding the button down and dragging the cursor up or down. When the button is released, a popup menu appears.
4. Select the appropriate parameter.
5. Select the new setting.

Note

If the frequency or detection type of a signal are not supported by any installed handoff receivers, the status is changed to "Handoff Log Status: Unable.

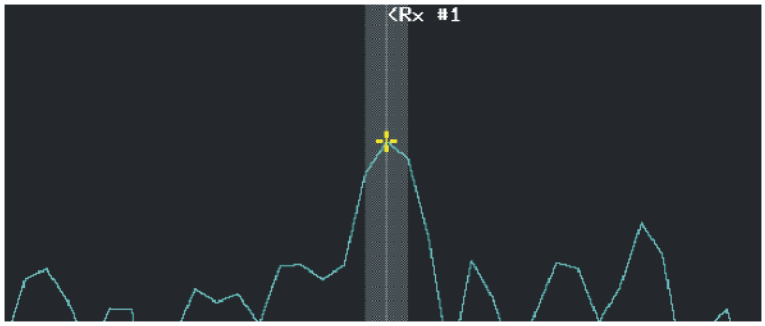
If frequency or detection type limit the signal's handoff to a receiver that is installed, but not available (for example, it is out of the receiver pool or assigned to a higher priority signal), the status will continue to be "Handoff Log Status: Pending until that receiver is available. See Rx Pool under "Configure > Handoff Receivers" on page 250.

Handoff Log Status: Active

An active signal is one that has been assigned and is being monitored by the handoff receiver identified in the Rx# column. The time that is was assigned is recorded in the Granted column. When the amount of time specified by duration has past, the status changes to "Handoff Log Status: Released.

You may change the frequency, priority, detection, or duration settings, add comments, or release the signal before the duration setting releases it automatically in the "View > Handoff Receivers Pane" on page 128.

An active signal is flagged in a trace pane with text describing the handoff receiver monitoring it when the trace grid type is Handoffs and the Active signal frequency is within the span of the trace, as shown below. A trace's grid type is selected in "Display > Trace (Setup)" on page 515.



Handoff Log Status: Completed A completed signal was released at the time listed in the Released column. Completed signals may be handed off again; see “Handoff Log Popup Menu" on page 143.

Handoff Log Status: Bumped A bumped signal was released before the duration time setting expired because another signal with a higher priority was handed off and all other handoff receivers were assigned to equal or higher-priority signals.

Handoff Log Status: Released A released signal means that the operator marked it and clicked the Release button while it was pending. If the number in the Rx column is 0, the signal was never assigned to a receiver.

Handoff Log Status: Unable An unable signal means that either the frequency of the signal is outside the range of all installed handoff receivers or the detection type is not supported by any of the installed receivers.

Tip

To handoff a logged signal that was released, click it with the middle mouse button and drag it to the Handoff Receivers Pane.

To handoff more than one signal entry, select them by clicking them with the left mouse button. To select contiguous entries, click and drag or hold the Shift key when you click the entry at the end of the selection. To select individual entries, hold the Ctrl key when you click them.

Handoff Log Source

This field lists the feature that initiated the handoff.

- Handoff Log Source can be one of the following:
- “Handoff Log Source: Marker
- “Handoff Log Source: Trace • “Handoff Log Source: Log
- “Handoff Log Source: Alarm 1, Alarm 2, ...
- “Handoff Log Source: EnergyHist
- “Handoff Log Source: Manual

Handoff Log Source: Marker means that the signal was handed off from a trace by moving the marker to it and then clicking the “Marker, Task Handoff Rx" on page 82. The procedure is described under “Mouse Features > Handoff a Signal from a Marker" on page 600.

Handoff Log Source: Trace means that the signal was handed off from the Trace Pane with the mouse. See “Mouse Features > Handoff a Signal from a Marker" on page 600.

Handoff Log Source: Log means that the signal was listed in the handoff log and its handoff log entry was selected with the mouse to tune a handoff receiver to it again. See “Handoff Log Popup Menu" on page 143.

Handoff Log Source: Alarm 1, Alarm 2, ... means that the signal was handed off as a task from the alarm (identified by number). “Search > Alarms Setup > Modify Single-Alarm" on page 363.

Handoff Log Source: EnergyHist means that the signal was handed off from the "View > Energy History Pane" on page 158. See also, "View > Energy History > Right-Click Menu" on page 188.

Handoff Log Source: Manual means that the signal was handed off with the manualHandoff command either remotely (through a socket connection to an external process) or from "View > Command Line Pane (Option ASD)" on page 148.

Handoff Log Request

The date and time that the handoff request occurred. This time may not be the same as the Granted time, if more signals have been handed off than there are handoff receivers. It is also dependent on the priority differences of active handoffs and pending handoffs. The activity times in handoff log have a resolution of 1 second.

Handoff Log Grant

The time the handoff receiver accepted the signal and began monitoring. The activity times in handoff log have a resolution of 1 second.

Handoff Log Release

The time the handoff receiver quit monitoring the signal. The activity times in handoff log have a resolution of 1 second.

Handoff Log Rx# The handoff receiver number used to monitor the signal as defined in "Configure > Handoff Receivers" on page 250.

Handoff Log Priority This applies to handoff setup parameters in the:

- "View > Energy History Pane" on page 158
- "Display > Trace (Setup)" on page 515

as well as column descriptions in the

- "View > Handoff Log Pane" on page 134 and "View > Handoff Receivers Pane" on page 128

A handoff is given a Priority level when it is handed off. If more than one handoff is pending (waiting in the queue to be assigned to a handoff receiver), the handoff with the higher priority setting goes first. If the priority of two pending handoffs is the same, the handoff with the earlier request goes first. See "Handoff Log Status" on page 135 for descriptions of pending and bumped.

The priority levels are:

- **Critical** priority handoffs have the highest priority. When a Critical priority handoff is put in the handoff queue, it will bump any lower-priority handoff being monitored.
- **High** priority handoffs are superseded only by Critical priority handoffs. Critical priority handoffs can bump a High priority handoff. When a High priority handoff is put in the handoff queue, it will bump any Medium or Low priority handoff being monitored.
- **Medium** priority handoffs can bump Low priority handoffs, but any High and Critical priority handoffs will be handed off before a Medium priority handoff Handoffs with High and Critical priority will bump a Medium priority handoff being monitored.

- **Low** priority handoffs are handed off in the order they are put in the handoff queue when there are no pending handoffs with higher priority. If a handoff with higher priority is handed off while a low-priority handoff is being monitored, it is bumped; the handoff receiver tunes to the higher-priority handoff.

The initial priority value is defined by the handoff settings in "Handoff Log Source" on page 137. The priority can also be changed while the handoff is pending (for example, increase priority to get it assigned to a receiver sooner by bumping an active handoff) or while it is active (for example, increase priority to avoid its getting bumped by another handoff).

Tip

After Priority, receiver assignment depends on the order in which the receivers are listed/installed. For example, when all active handoffs have the same priority and a handoff with a higher priority enters the queue, it bumps the handoff on the first receiver on the list. Receiver order is determined by entries in the *configuration_file*.

The log's priority setting for a pending handoff is used to determine when it is assigned to a handoff receiver, given the priorities of all pending and active handoffs.

The log's priority setting for an active handoff is used to determine whether other handoffs in the queue bump it before its duration expires.

The log's priority setting for a completed handoff is the priority setting that was active when monitoring ended for that handoff.

Handoff Log Duration

This applies to handoff setup parameters in the:

- "View > Energy History Pane" on page 158
- "Display > Trace (Setup)" on page 515

as well as column descriptions in the

- "View > Handoff Log Pane" on page 134 and "View > Handoff Receivers Pane" on page 128.

Duration is the amount of time a frequency is to be monitored before its status changes to completed and the handoff receiver takes another assignment from the queue. This value is assigned to a handoff when it is put in the handoff queue.

This value is listed in the "View > Handoff Log Pane" on page 134 as follows:

- For a pending handoff, this is the amount of time the handoff receiver will stay tuned to the frequency if no handoffs with higher priority are put in the queue.
- For a completed handoff, this is the amount of time the handoff receiver was tuned to the assigned frequency.
- Minimum duration: 1 second
- Maximum duration: 86400 seconds (24 hours) • Resolution: 1 second

To set this value before the handoff:

See "Display > Trace (Setup)" on page 515 for trace handoffs.

See "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Handoff Receiver Alarm Task" on page 419 and "Process Overview" on page 42.

See "View > Energy History > Right-Click Menu" on page 188 for handoffs from the "View > Energy History Pane" on page 158.

To change this value for a pending entry in the handoff log, see "Handoff Log Popup Menu" on page 143.

To change this value for an active handoff, see "View > Handoff Receivers Pane" on page 128.

Handoff Log Frequency

The frequency of the handoff assignment. This value may have been measured at the peak of detected energy, it may have been assigned as part of "Search > Detection Setup > Energy > Bandwidth Hints" on page 348, or it may have been a user-defined value specified as part of an alarm task definition in "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Handoff Receiver Alarm Task" on page 419.

Handoff Log Bandwidth

This is the bandwidth value associated with the handoff session.

- When the handoff status is released, unable, or pending, this value reflects the setup value for the source that requested it (for example, trace handoff setup).
- When the handoff is granted (becomes active), the bandwidth value may be rounded up to the receiver's next largest acceptable setting.
- When the handoff status is active, the bandwidth value reflects the receiver's current setting (which may be changed by the operator).
- For a bumped or completed entry, the bandwidth value indicates the bandwidth value in use at the time of release.

Handoff Log Detect

This applies to handoff setup parameters in the:

- "View > Energy History Pane" on page 158
- "Display > Trace (Setup)" on page 515

as well as column descriptions in the

- "View > Handoff Log Pane" on page 134

Detection is the method used to demodulate the signal. The detection types available depends on the capabilities of the installed handoff receivers. The types displayed in the log and detection selection lists may include others

The list of standard types is:

- None
- AM: amplitude modulation
- FM: frequency modulation
- CW: continuous wave

- LSB: lower side band
- USB: upper side band
- ISB: independent sideband (LSB and USB on left and right channels.)
- Log: log modulation
- Pulse: pulse modulation
- WFM wideband FM

To set this value before the handoff:

- See "Display > Trace (Setup)" on page 515 for trace handoffs.
- See "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Handoff Receiver Alarm Task" on page 419 and "Process Overview" on page 42.
- See "View > Energy History > Right-Click Menu" on page 188 for handoffs from the "View > Energy History Pane" on page 158.
- To change this value for a pending entry in the handoff log, see "Handoff Log Popup Menu" on page 143.
- To change this value for an active handoff, see "View > Handoff Receivers Pane" on page 128.

See "Configure > Handoff Receivers" on page 250.

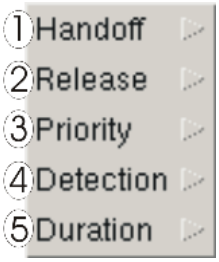
Comments

Comments may be added in the handoff receiver control box while the signal is being monitored (status=active). The maximum length of the comment is 15 characters. Comments can be entered only once and disappear when the duration expires.

Handoff Log Popup Menu

Path: In the "View > Handoff Receivers Pane" on page 128, select one or more pending handoff log entries with the left mouse button, click the right mouse button.

View > Handoff Receivers Pane (Right Mouse Button Menu)



This allows you to assign a handoff receiver to the same settings that appear for an entry in the log or, for an active entry, release or change the priority, duration, or detection settings originally specified in the dialog boxes for "Display > Trace (Setup)" on page 515 or "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Handoff Receiver Alarm Task" on page 419.

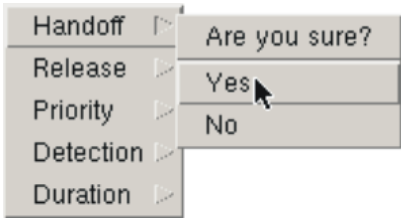
1. "Handoff Verification" on page 143
2. "Handoff Release Verification" on page 144

3. "Handoff Log: Priority" on page 145
4. "Handoff Log: Detection" on page 145
5. "Handoff Log: Duration" on page 145

To add the Handoff Log Pane to the main window, see "Display > Layout" on page 512

Handoff Verification

View > Handoff Receivers



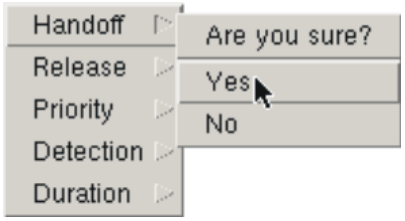
1. Select one or more entries with the left mouse button.
2. Click the right mouse button.
3. Click Handoff.

When you select Handoff, this menu confirms the request before it hands off the selected signals.

- Yes confirms the handoff.
- No cancels the handoff.

Handoff Release Verification

View > Handoff Receivers



To release a handoff receiver:

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button.
3. Click Release.

When you select Release this menu confirms the release request before it releases signals that are pending in the handoff log.

- Yes confirms the release and the status is changed to Released in the Handoff Log.
- No cancels the release and the status is not changed.

Handoff Log: Priority

This menu allows you to change the priority of a pending handoff log entry. To change the priority setting for one or more pending signals in the “View > Handoff Log Pane" on page 134.

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button anywhere inside the “View > Handoff Log Pane; an option list appears containing time values.
3. Select a new priority value from the list by clicking it.

Handoff Log: Detection

This menu allows you to change the detection type of a pending handoff log entry. To change the detection setting for one or more pending signals in the “View > Handoff Log Pane" on page 134.

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button anywhere inside the “View > Handoff Log Pane; an option list appears containing time values.
3. Select a new detection value from the list by clicking it.

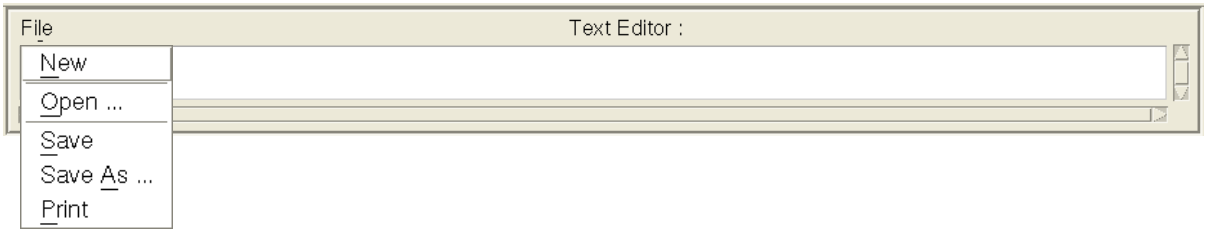
Handoff Log: Duration

This menu allows you to change the duration of a pending handoff log entry. To change the duration setting for one or more pending signals in the “View > Handoff Log Pane" on page 134.

1. Select one or more pending handoff log entries with the left mouse button.
2. Click the right mouse button anywhere inside the “View > Handoff Log Pane; an option list appears containing time values.
3. Select a new duration value from the list by clicking it.

View > Text Editor Pane

View > Text Editor Pane



The **Text Editor Pane** contains a text editor. The text editor can be used to view and modify ASCII text files such as saved state files, log files, or search band database files as well as create new files such as reports.

The Text Editor Pane File Pull-Down Menu allows opening and saving text files on the system hard disk and printing to the system printer. When a file is open in the editor, its name appears after the words Text Editor: centered above the text area.

- To load an existing file, select File > Open and specify the directory and filename.
- To add text, place the cursor anywhere in the text editor window and click. Type the new text. Line wraps occur only where there are end-of-line characters (when you press Enter).
- To select text, place the mouse cursor at one end of a segment of text, click and hold the left mouse button, move the cursor to the other end of the segment, and release the mouse button. This action is called wiping text.

  Holding down the Shift key and clicking the left mouse button selects all text between its present position and its previous position.
- To select a word, place the cursor anywhere on it and double-click.
- To select a line, place the cursor anywhere on it and triple-click.
- To select all text in the file, place the cursor anywhere in the text area and click rapidly, 4 times.
- To delete text, use the Backspace key to remove single characters on the left side of the cursor position.

  Use the Delete key to remove single characters on the right side of the cursor position.

  Select the text then press the Delete key.
- To toggle between insert and overwrite modes, press the Insert key.
- To move text, select it and drag it (click and hold the middle mouse button) to the destination, then release it.
- To copy text, select it and then press the Ctrl key and drag it (click and hold the middle mouse button) to the destination.

- To save the text you are working on, click File > Save.

  The first time you save a new file, you must specify a filename.

  If you specify a filename that already exists, the file will be overwritten with the text file. A message appears before this happens to assure that it is what you want to do.

- To print the file, select File > Print.

File Pull-Down Menu

New clears a file from the text editor.

Open opens a file for editing.

Save writes a copy of the file to the disk using the same file name that it was opened with. Use save to update disk files that already have names. If it is a new file that has not yet been named, a prompt is displayed that requires entry of the path and filename.

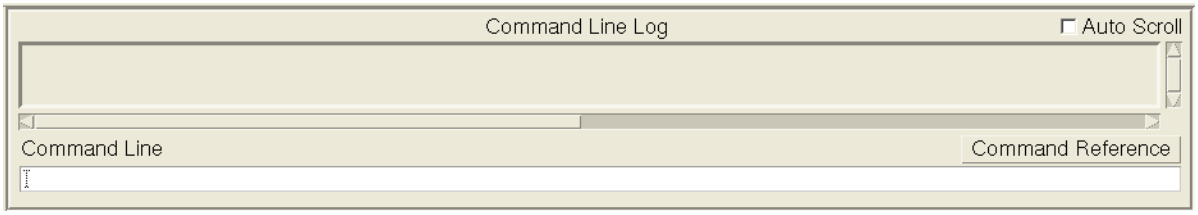
Save As writes a copy of the file to the disk, prompting for a directory and filename.
Print causes the system line printer manager to print the text file. The system printer must be properly configured and specified in the print file. See the example file (`C:\E3238s\d.print`) for further explanation.

Text Editor Warnings

- A warning appears when the editor contains a text file and changes have not been saved before clicking File > Open or File > New.
  - To save the file, click Cancel and then save the file.
  - To continue (and lose the text file changes), click OK.
- A warning appears when Agilent N6820ES Signal Detection and Monitoring Solutions is closed while there is a text file that has been changed and the changes have not been saved.
  - To save the file, click Save and specify a directory and filename.
  - To continue shutting down the program without saving the text file (and lose the text file changes), click Lose.

View > Command Line Pane

View > Command Line Pane



The **Command Line Pane** allows commands to be executed at the Command Line entry field and display a log of the commands that have been issued. This log of the commands may be saved as a file. See "File > Log Files" on page 105.

Auto Scroll is a check box that, when selected, scrolls the text in the command line log as necessary so that the latest commands issued appear in the log text area.

Command Line is the text line in which commands are entered. Commands can be typed or selected from a list in the Command Reference dialog box.

Command Reference is a button used to display the dialog box for the "View > Command Line > Command Reference" on page 149.

Note

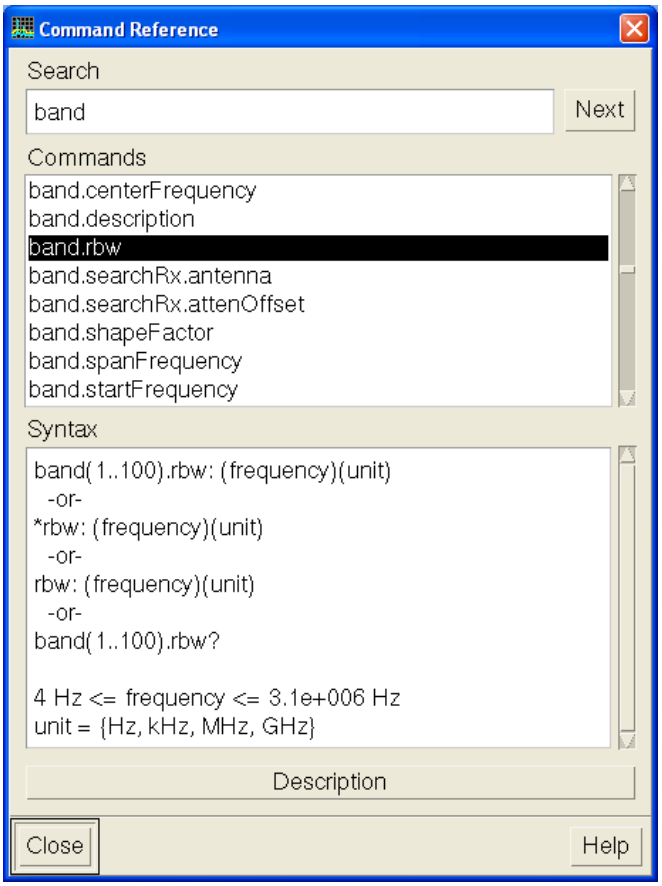
Each Command Line Log entry requires 80 bytes of memory. The number of entries in the log view is limited as defined by the `commandLineHistoryLength` resource variable in the E3238s. See also, "Application Resources" on page 19.

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries are then written to a file on the system disk. See "File > Log Files" on page 105.

- To add this pane to the main window, see "Display > Layout" on page 512 and "View > Command Line Pane (Option ASD)" on page 148.
- To create a file containing this log, see "File > Log Files" on page 105.
- To clear the Command Line Log, see "Edit > Clear Log" on page 112.
- To receive help on this or any pane, click Help or press Shift+F1 to activate context-sensitive help and click in the pane.

View > Command Line > Command Reference

View > Command Line > Command Reference



Search is a text line that allows you type in a string of characters and find the pattern in the command names. The list is searched from beginning to end and stops on the first match found. Every time a change is made to the pattern in the text line, the search is repeated. To search again for the same pattern, select **Next**.

Next is a button that lets you find other matching patterns in the command names if the last command name isn't the one you were looking for. You can click it multiple times to search through the list of commands.

Commands lists the commands that may be executed at the command line. Use the scroll bar to move up and down through the list or the Search/Next features above it.

When a command entry is selected, its syntax appears in the lower pane.

Double-clicking a command brings up the detailed description window. This is the same as clicking **Description** at the bottom of the window.

You can drag the commands to the command line with the middle mouse button.

Syntax displays the syntax of the command selected in the Commands list. This gives the forms of the command and a description of acceptable parameters.

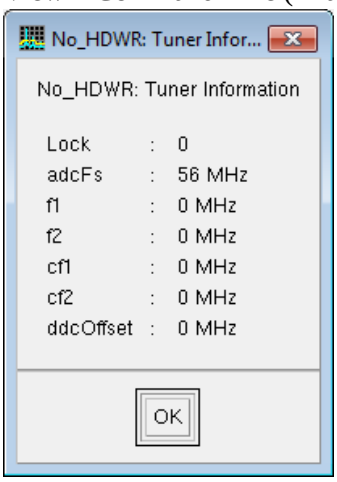
Description displays the Command Reference Help explanation of the command selected in the Commands list. A shortcut for bringing up the Command Reference Help for a particular command is to double-click the command in the Commands listing.

A detailed description of commands is contained file:
`\E3238s\manuals\command_ref.pdf`.

Query Dialog Boxes

When the command is a query, the information requested is displayed in a popup dialog box as shown below for the `tunerInfo?` query.

View > Command Line (Example of Query: `tunerInfo?`)



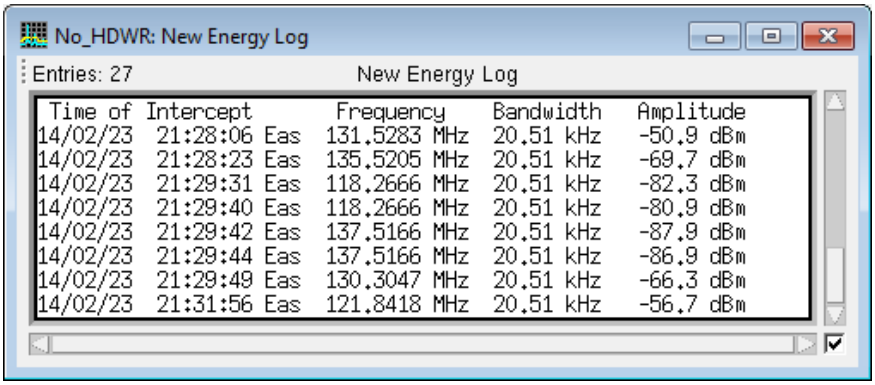
View > Toolbar

Toolbar Icons, N684x RF Sensor Platform

“Configure > Antennas" on page 207 Configure > RF Sensor (Search Receivers) “Configure > System Reference" on page 253

View > New Energy Log Pane

View > New Energy Log Pane



The **New Energy Log Pane** lists peaks of new energy the first time that they appear and keeps a running count of the total number of entries in the log.

Entries (Number of entries in the log.) "Full" means that it has reached capacity and some entries have been shifted out of the log.

Time of Intercept This is the date and time of the first intercept (the first time the energy was detected. For information about the total number of intercepts and the time of the last intercept, see "View > Energy History Pane" on page 158.

Frequency The frequency of the energy the first time it was detected. This value may be at the peak of the detected energy, or it could be the center of a predefined band within which the energy was detected. See "Process Overview" on page 42 and "Search > Detection Setup > Energy > Bandwidth Hints" on page 348.

Bandwidth The energy bandwidth on the first detection. This value may have been measured or copied from "Search > Detection Setup > Energy > Bandwidth Hints" on page 348, if the frequency fell in an active hint. For information on the current, maximum, minimum, or average bandwidth values, see "View > Energy History Pane" on page 158.

Amplitude The amplitude of the energy as measured when the intercept occurred. For information on the statistical values, see "View > Energy History Pane" on page 158.

Auto Scroll (in the lower right of the pane) keeps the latest entries visible by scrolling through the log.

Note

Each New Energy Log entry requires 60 bytes of memory. The number of entries in the log view is limited as defined by the `newEnergyLogViewLength` resource variable in the E3238s. See "Application Resources" on page 19.

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries will be written to a file on the hard disk. See "File > Log Files" on page 105.

Tip

To add this pane to the main window, see "Display > Layout" on page 512.

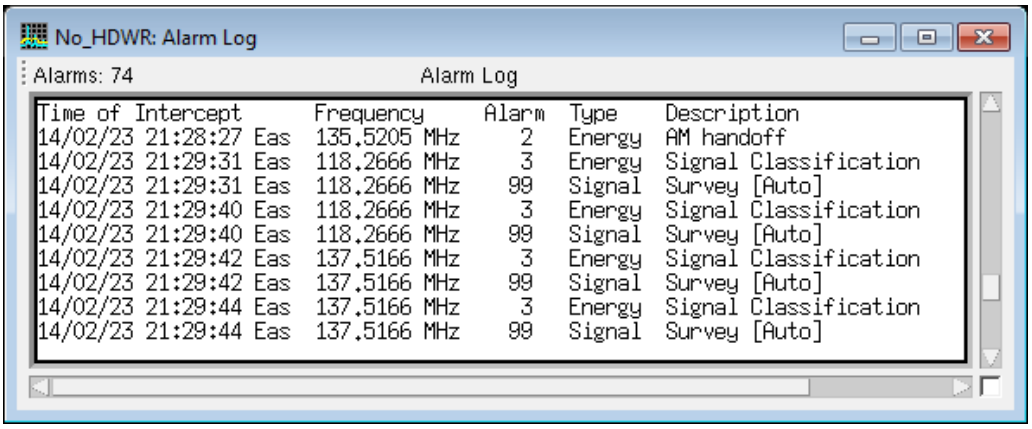
To create a file containing this log, see "File > Log Files" on page 105.

To clear the New Energy Log, see “Edit > Clear Log" on page 112.

To receive help on this or any pane, select “Help Pull-Down Menu" on page 597 or press Shift+F1 to activate context-sensitive help and click in the pane.

View > Alarm Log Pane

View > Alarm Log Pane



The **Alarm Log Pane** displays a log of triggered alarms.

Alarms The number of alarms in the log. “Full” means that it has reached capacity and some entries have been shifted out of the log.

Time of Intercept This is the date and time of the intercept that caused the alarm.

Frequency The measured frequency of the detected energy peak.

Alarm The alarm number. See “Search > Energy History Filter (Option ASD)" on page 355.

Type Either energy or signal alarm.

Description The description or name of the alarm as entered in the dialog box of “Search > Alarms Setup > Modify Single-Alarm" on page 363.

Auto Scroll (in the lower right of the pane) keeps the latest entries visible by scrolling the log as new additions appear.

Note

Each Alarm Log entry requires 90 bytes of memory. The number of entries in the log view is limited as defined by the `alarmLogViewLength` resource variable in the E3238s. See “Application Resources" on page 19.

When the number of log entries reaches the limit, new entries cause the oldest entries to be discarded/lost from memory. To avoid losing this information, turn on the log-to-file feature; all entries will be written to a file on the system disk. See “File > Log Files" on page 105.

Tip

To add this pane to the main window, see “Display > Layout" on page 512.

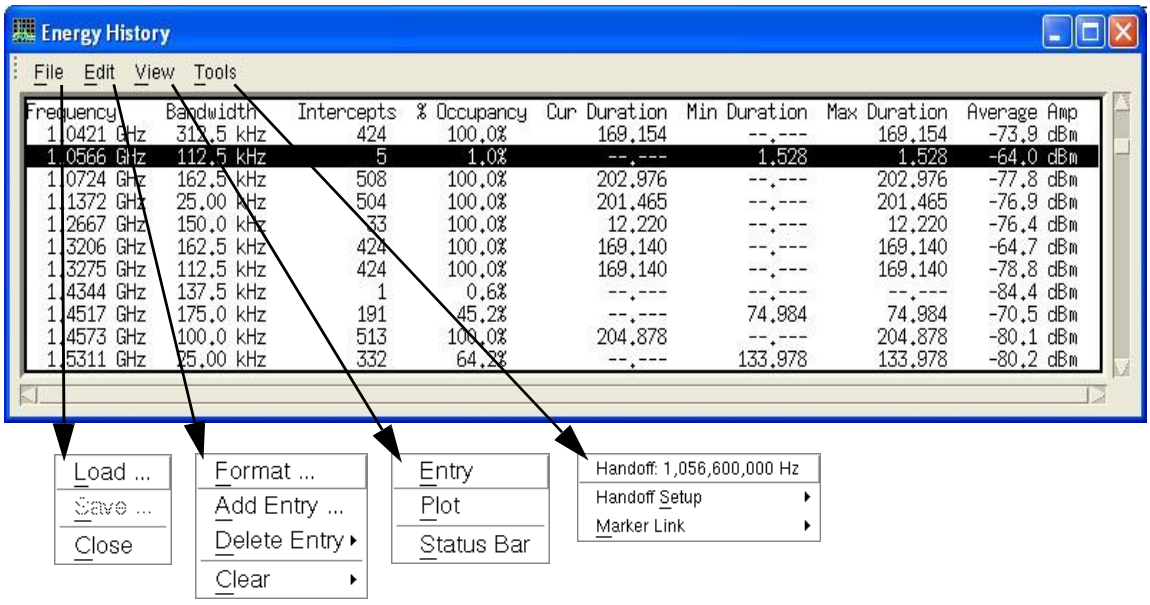
To create a file containing this log, see “File > Log Files" on page 105.

To clear the Alarm Log, see “Edit > Clear Log" on page 112.

To receive help on this or any pane, select “Help Pull-Down Menu" on page 597 or press Shift+F1 to activate context-sensitive help and click in the pane.

View > Energy History Pane

Figure 83 View > Energy History Pull-Down Menus



To use the pull-down menus of the Energy History Pane

- "View > Energy History > File Pull-Down Menu" on page 160
- View > Energy History > Edit Pull-Down Menu" on page 162
- "View > Energy History > View Pull-Down Menu" on page 166
- "View > Energy History > Tools Pull-Down Menu" on page 182
- View > Energy History > Right-Click Menu" on page 188

To print/save/clear/show Energy History entries

- Printing entries - See "File > Print".
- Saving entries - See "File > Print To File".
- Clearing entries - See "Edit > Clear Energy History".
- Showing entries in a trace - Set the grid type to New Energy.

To change which feature/parameters are displayed

See "View > Energy History > Edit > Format (Column Setup)" on page 163. Up to eight feature/parameters can be displayed for each entry in the Energy History Pane.

To display all feature/parameters for a selected entry

See "View > Energy History > View > Entry" on page 167.

To display an energy history plot of one of the feature/parameters

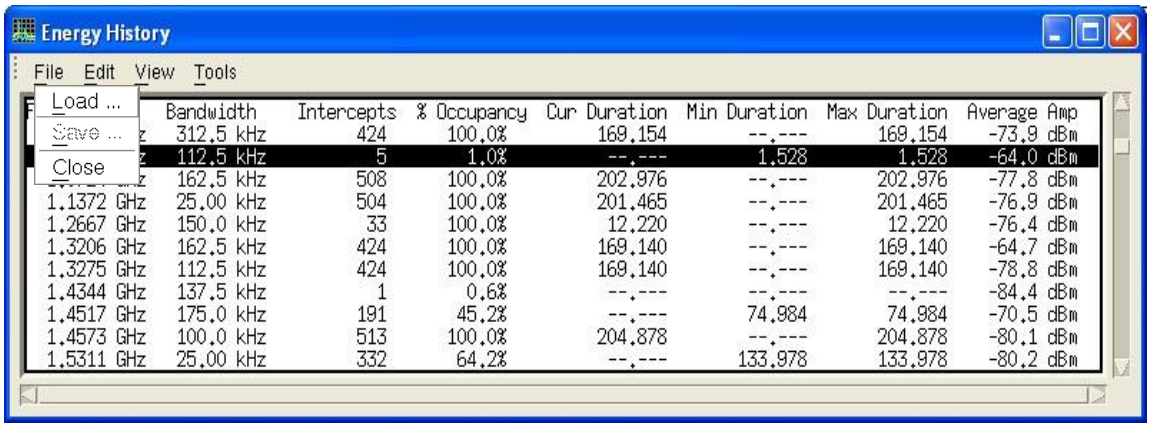
See "View > Energy History > View > Plot" on page 175.

To link one of the feature/parameters to a particular trace marker

See "View > Energy History > Tools > Marker Link" on page 186.

View > Energy History > File Pull-Down Menu

Figure 84 View > Energy History > File Pull-Down Menu



"View > Energy History > File > Load" on page 160
"View > Energy History > File > Save" on page 160
"View > Energy History > File > Close" on page 161

View > Energy History > File > Load

Load is used to read a file containing Energy History data from a file on the system disk. Loading an Energy History file removes the existing feature/parameter statistic data in the Energy History. You are prompted with a question to assure that this is your intention before the data is overwritten.

When you load an Energy History file that contains custom features, be sure that the same feature/parameter-defining library programs are loaded in the same order as were loaded when the file was created. The Agilent N6820ES Signal Detection and Monitoring Solutions tracks user-defined feature/parameters with an index/counter that is assigned based on the order that they are loaded; for example, the order they are listed in the *configuration file*.

View > Energy History > File > Save

Save writes the feature/parameter data in the Energy History to a file on the system disk. Saving Energy History data to a file creates an ASCII file containing all the feature/parameter statistics in scientific notation using a comma-separated-value format. To pull the data directly into Microsoft Excel, save the data as a .csv file. To do this, select All Files (*.*) as the Save as type: and <filename.csv> for the File name.

Current, Minimum, and Maximum Amplitude data are saved as volts squared. Use the following formula to convert to dBM. *dBM=10*Log10(20*V2)*.

For Average Amplitude, use *dBM=10*Log10(20*V2/Intercepts)*

% Occupancy is not saved as part of the standard Energy History data. To calculate the % Occupancy, divide Intercepts by Number Sweeps.

The First Intercept and Last Intercept saved values are saved as the number of seconds from the epochal date of January 1, 1970. The following formula will convert a saved intercept value into a Greenwich Standard Time (Month/Day/Year Hour:Second) format. *GST time = (Saved Intercept Value/86400)+25569*.

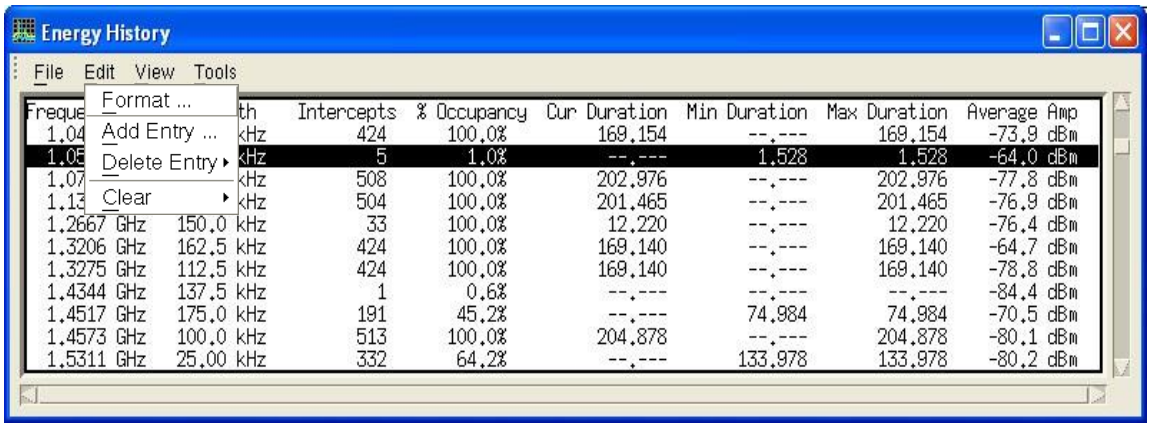
For example, to change GST to Pacific Standard Time you need to subtract 8 hours or 1/3 of a day. *PST time = (Saved Intercept Value/86400)+25569-0.33333*

View > Energy History > File > Close

Closes the Energy History file.

View > Energy History > Edit Pull-Down Menu

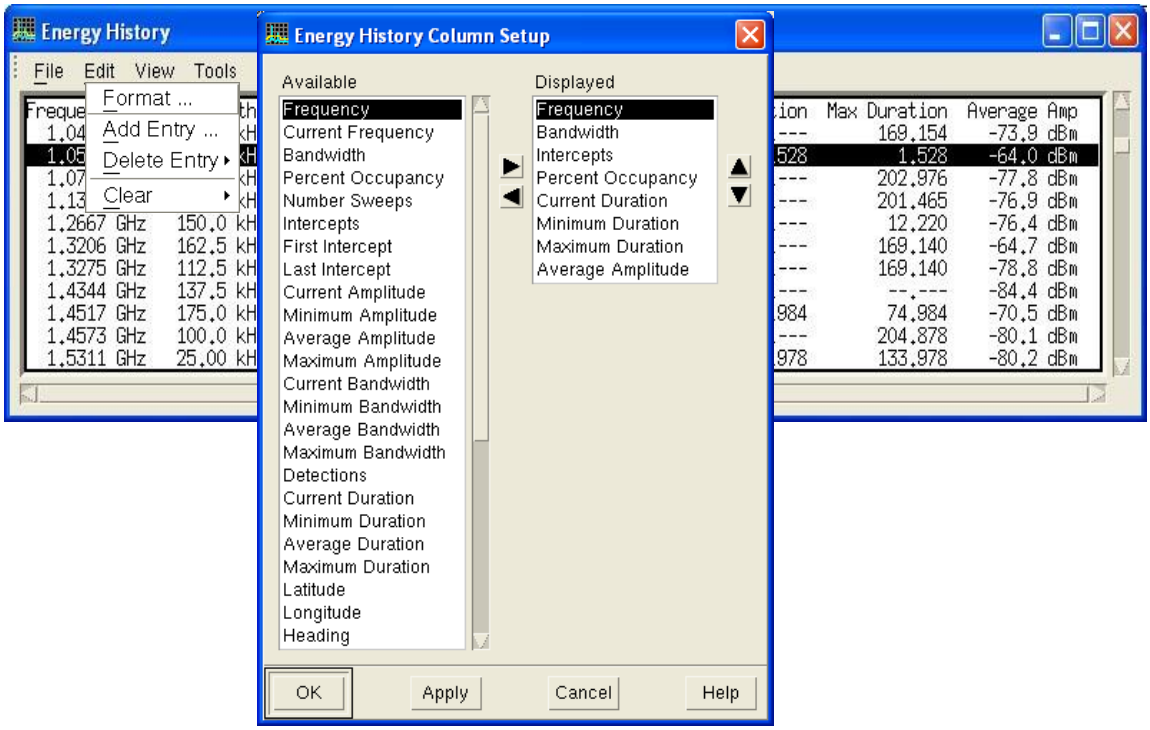
Figure 85 View > Energy History > Edit Pull-Down Menu



"View > Energy History > Edit > Format (Column Setup)" on page 163
"View > Energy History > Edit > Add Entry" on page 164
"View > Energy History > Edit > Delete Entry" on page 165
"View > Energy History > Edit > Clear" on page 165

View > Energy History > Edit > Format (Column Setup)

View > Energy History > Edit > Format (Column Setup)



The **Energy History Column Setup** dialog box is used to specify what feature/parameters appear in the columns of the Energy History Pane. While there are many fields that can be displayed, only the first eight columns listed in the *Displayed* group appear in the Energy History Pane.

To add a column entry to the displayed energy history group

Select the name of a column from the *Available* group and click the horizontal arrow.

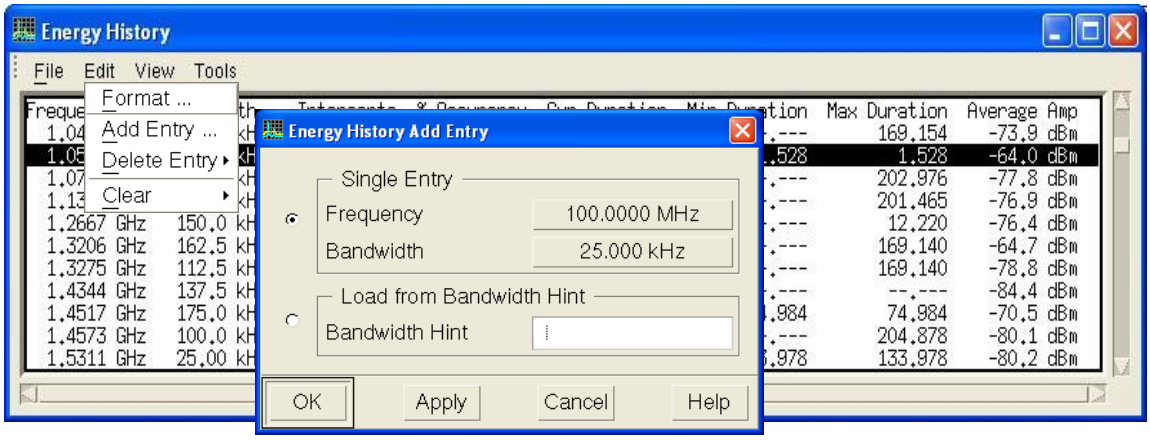
To remove a column entry from the displayed energy history group

Select the name of a column from the *Displayed* group and click the horizontal arrow.

- **OK** implements the changes made and closes the dialog box.
- **Apply** implements any changes and leaves the dialog box open.
- **Cancel** closes the dialog box without making any changes.

View > Energy History > Edit > Add Entry

View > Energy History > Edit > Add Entry



The **Energy History Add Entry** dialog box is used to add an entry to the Energy History Pane. This may be used to define alarm conditions that require energy history entries to monitor for No Signal conditions. See “Search > Alarms > Energy Definition".

Single Entry

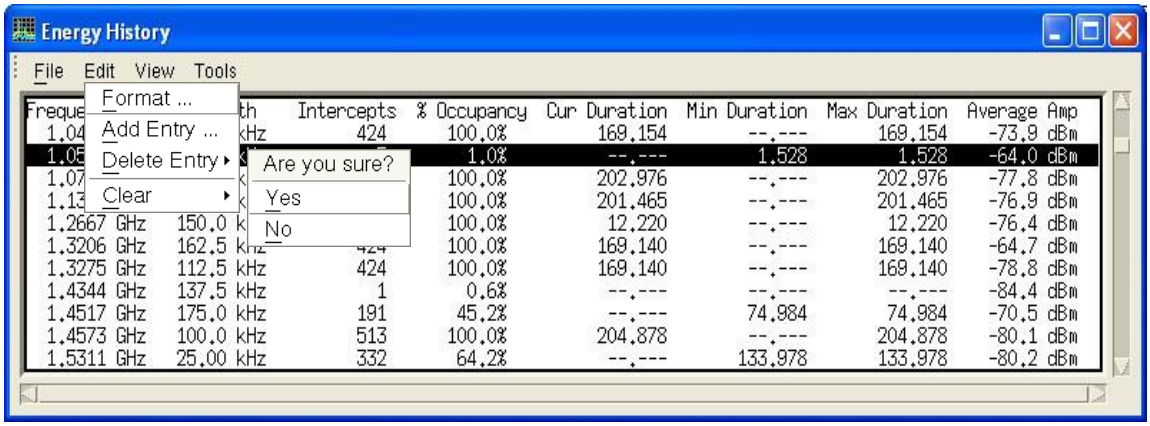
To add one entry to the Energy History Pane, click the radio button associated with this selection, and enter values for the frequency and bandwidth with the buttons at the right.

Load from Bandwidth Hint

To add all entries in a defined “Search > Detection Setup > Energy > Bandwidth Hints", click the radio button associated with this selection and enter the number associated with the Bandwidth Hint you want. The hint status must be active and channelize = Yes.

View > Energy History > Edit > Delete Entry

View > Energy History > Edit > Delete Entry

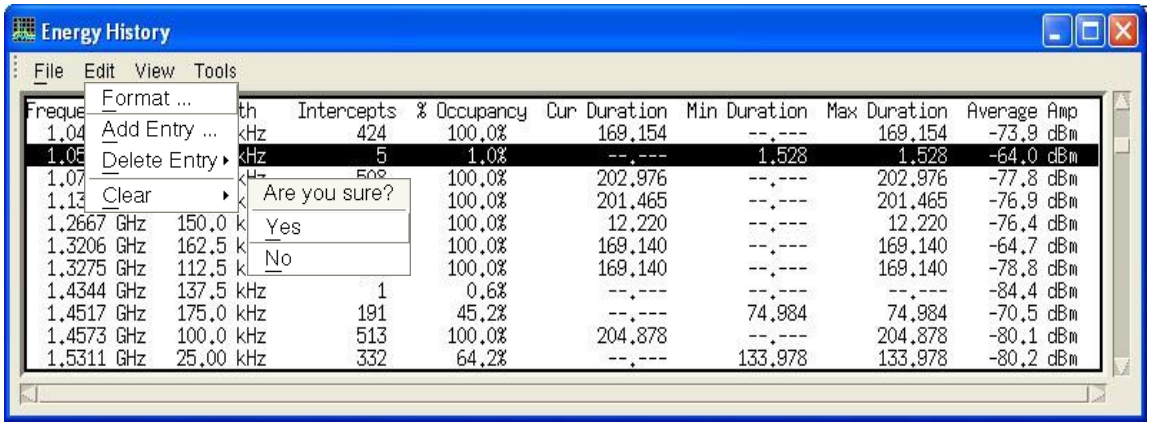


When **Delete Entry** is selected and before any data is cleared, a prompt is displayed acting as a two-step verification process which helps reduce the chances of making an error.

- **Yes** allows the energy history entry deletion process to continue.
- **No** cancels the energy history entry deletion process.

View > Energy History > Edit > Clear

Figure 89 View > Energy History > Edit > Clear

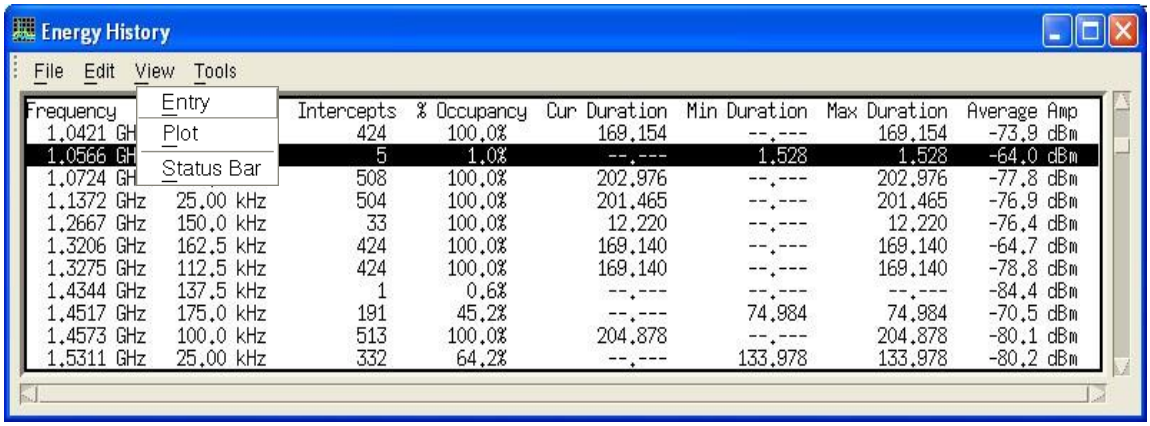


When **Clear** is selected and before any data is cleared, a prompt is displayed acting as a two-step verification process which helps reduce the chances of making an error.

- **Yes** allows the energy history clearing process to continue.
- **No** cancels the energy history clearing process.

View > Energy History > View Pull-Down Menu

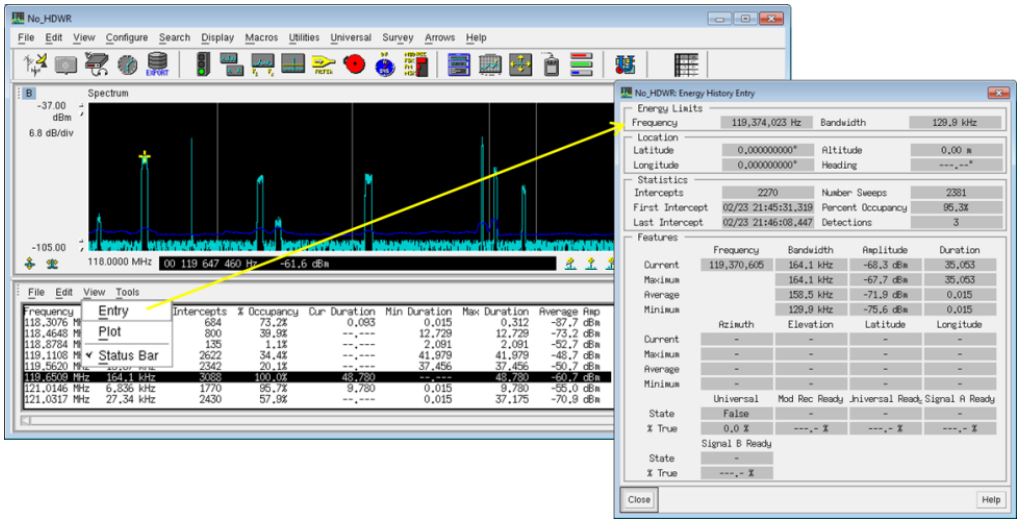
View > Energy History > View Pull-Down Menu



"View > Energy History > View > Entry" on page 167
"View > Energy History > View > Plot" on page 175
"View > Energy History > View > Status Bar" on page 179

View > Energy History > View > Entry

Figure 91 View > Energy History > View > Entry



This selection opens a dialog box that lists all the feature/parameter information for a single entry from Energy History. Any of the values displayed in this dialog box may be used to trigger an alarm. See “Search > Alarms > Single-Alarm Setup".

To select an entry, click on a row in the Energy History Pane.

Note

When an Energy History Entry is linked to a trace marker, the trace marker appears at the peak of the entry selected (for example, clicking a different entry moves the trace marker). Also, moving the marker to another peak causes the Energy History Entry information to track the selected entry if it falls within the span of an existing entry. See “View > Energy History > Tools > Marker Link" on page 186.

The amplitude, bandwidth, duration, and user-defined feature/parameters may be displayed as graphic profiles with the “View > Energy History > View > Plot" on page 175.

The detection counter is incremented when energy is detected on two consecutive sweeps; for example, not on first intercept. When the sweep is stopped or the sweep setup is changed, any pending detections are cleared.

The accuracy of the duration values depends on how frequently the energy’s frequency is swept. The calculation assumes the energy is present continuously between intercepts and stopped at the time of the last intercept if energy is not detected on the current sweep.

The minimum and average duration values are updated only after a valid detection; the maximum duration is always updated.

Energy History Entry

- Energy Limits of an Energy History Entry
  - **Frequency** is the energy's center frequency, recorded at the first intercept. If this value falls into an active frequency range in "Search > Detection Setup > Energy > Bandwidth Hints" and *channelize* is active, the value recorded is the center of the band rather than the measured frequency of the peak.
  - **Bandwidth** is the "current bandwidth" value of the "first intercept" event. The value is either the energy's measured bandwidth, given the bandwidth amplitude specified in "Search > Detection Setup > Energy > Energy Criteria" or a predetermined value from the "Search > Detection Setup > Energy > Bandwidth Hints", if the peak is in an active frequency range. This bandwidth value is used to determine if a peak belongs in this entry or is a new peak. The accuracy of the measured value depends on resolution (RBW).
- Location of an Energy History Entry

Any location on Earth can be described with latitude and longitude values. These two values can be used to specify a position on a map (also referred to as "coordinates" on a map).

Longitude and Latitude are two angles, measured in degrees, "minutes of arc" and "seconds of arc" and are denoted by the symbols (°, ', "). For example, 45° 40' 19" means an angle of 45 degrees, 40 minutes, and 19 seconds. A degree contains 60 minutes of arc and a minute contains 60 seconds of arc.

- **Altitude** - is the height of the antenna above sea level.
- **Longitude** - lines of longitude are lines of constant longitude ("meridians") that extend from the north pole to the south pole.
- **Latitude** - are parallel lines that encircle the earth perpendicular to the lines of longitude. The longest circle is along the equator (and has a latitude value of zero). While at the north pole and south pole, the lines of latitude, represented as circles, shrink to a point and have a latitude value of 90° at the north pole and -90° at the south pole. (See http://www-istp.gsfc.nasa.gov/stargaze/Slatlong.htm.)
- **Heading** - specifies the direction that the platform being used is pointing toward or facing relative to true north; the heading can be thought of as the "direction you are pointing or heading".
- **Elevation** - specifies the elevation that a signal of interest is emitting from.

Elevation is part of the direction result for an HF DF system (azimuth and elevation). Elevation is returned in meters and is only available on selected HF DF systems; it is not available on V/UHF DF systems.

Location of an Energy History Entry

Latitude		
	First Latitude	Specifies the latitude of the system the first time this energy was intercepted. Stored, but not displayed
	Last Latitude	Specifies the latitude of the system the last time this energy was intercepted.
Longitude		
	First Longitude	Specifies the longitude of the system the first time this energy was intercepted. Stored, but not displayed
	Last Longitude	Specifies the longitude of the system the last time this energy was intercepted.
Heading		
	First Heading	Specifies the heading of the system the first time this energy was intercepted. Stored, but not displayed
	Last Heading	Specifies the heading of the system the last time this energy was intercepted.
Altitude		
	First Altitude	Specifies the altitude of the system the first time this energy was intercepted. Stored, but not displayed
	Last Altitude	Specifies the altitude of the system the last time this energy was intercepted.

Statistics of an Energy History Entry

Statistics		
	Intercepts	Specifies the number of times the energy was intercepted. See “Search > Alarms > Alarm Criteria > Duration (Timing Diagram)”.
	First Intercept	Specifies the timestamp of the first time this energy was intercepted. It is relative to epoch time. (12:00 AM 1/1/1970)

	Last Intercept	Specifies the timestamp of the last time this energy was intercepted. It is relative to epoch time. (12:00 AM 1/1/1970)
	Number Sweeps	Specifies the number of times the system had a chance to intercept the signal.
	Percent Occupancy	Specifies the occupancy of the energy which is Intercepts divided by Number Sweeps. It is returned as a percent between 0 and 100.
	Detections	Specifies the number of times that the energy was transitioned from not being detected, to being detected, and then not being detected. See "Search > Alarms > Alarm Criteria > Duration (Timing Diagram)"

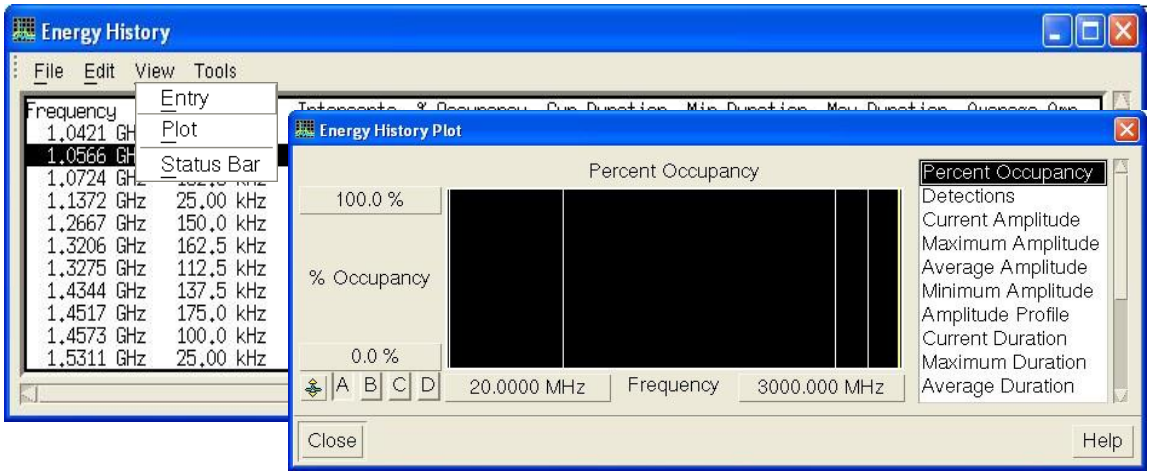
Features of an Energy History Entry

Frequency		
	Current	Specifies the center frequency of the energy. While the search is stopped, this field is blank.
	Maximum	Specifies the maximum frequency of the energy.
	Average	Specifies the average frequency of the energy.
	Minimum	Specifies the minimum frequency of the energy.

Bandwidth		
	Current	Specifies the bandwidth of the energy entry that was used during the energy detection process. It may be smaller than the average, maximum, or minimum bandwidth of the entry. While the search is stopped, this entry is blank.
	Maximum	Specifies the maximum bandwidth of the energy when it was intercepted. Returned in Hertz.
	Average	Specifies the average bandwidth of the energy when it was intercepted. Returned in Hertz.
	Minimum	Specifies the minimum bandwidth of the energy when it was intercepted. Returned in Hertz.

Amplitude		
	Current	Specifies the measured amplitude of the energy on the latest sweep. While the search is stopped, this entry is blank.
	Maximum	Specifies the maximum amplitude of the energy when it was intercepted. Returned in dBm.
	Average	Specifies the average amplitude of the energy when it was intercepted. Returned in dBm. To derive the energy's average amplitude value, divide this value by the number of intercepts for this signal.
	Minimum	Specifies the minimum amplitude of the energy when it was intercepted. Returned in dBm. The amplitude is measured only when an energy is detected, so this is the smallest amplitude recorded for an intercept of this energy.

Duration		
	Current	Specifies how long the energy has been present without interruption. Duration is calculated as the difference in time between the first intercept and the latest intercept during which time the energy was detected on every sweep. No duration value exists until there are two consecutive intercepts. While the search is stopped, this entry is blank.
	Maximum	Specifies the maximum duration of the energy. This is the duration that the energy was continually intercepted. Returned in seconds.
	Average	Specifies the average duration of the energy. This is the duration that the energy was continually intercepted. Returned in seconds.
	Minimum	Specifies the minimum duration of the energy. This is the duration that the energy was continually intercepted. Returned in seconds. As explained for "Current Duration," one intercept, with no intercept on the previous sweep or the next, has no duration value.



The **Energy History Plot** dialog box displays any single feature versus the frequency span of one of the traces or a span you define manually. Display this dialog box by clicking **Plot** on the "View > Energy History Pane" on page 158.

1. Feature data to be plotted.

The feature data types are described in "View > Energy History > View > Entry" on page 167. Measured analog data types can be graphically combined into groups called profiles. These are:

- Amplitude
- Duration
- Bandwidth

A profile plot displays a vertical line for each entry.

- The low end of the line is minimum value,
- the highest end is the maximum value,
- the green dot on the line is the average value, and
- the white dot is the current amplitude.

2. "Energy History Plot Y-Axis Scaling" on page 177
3. "Energy History Plot X-Axis Scaling" on page 178
4. Amplitude auto-scale button.
5. These buttons synchronize the frequency scale with a trace.
6. This line indicates the trace's marker position, if on, or the selected entry in the energy history.

To change the data to be plotted, select an entry from the scrolled list at the right.

To manually define the plot scale

1. Click either a Y-axis button (item #2) or an X-axis button (item #3). A new dialog box appears.
2. Change the scale settings.

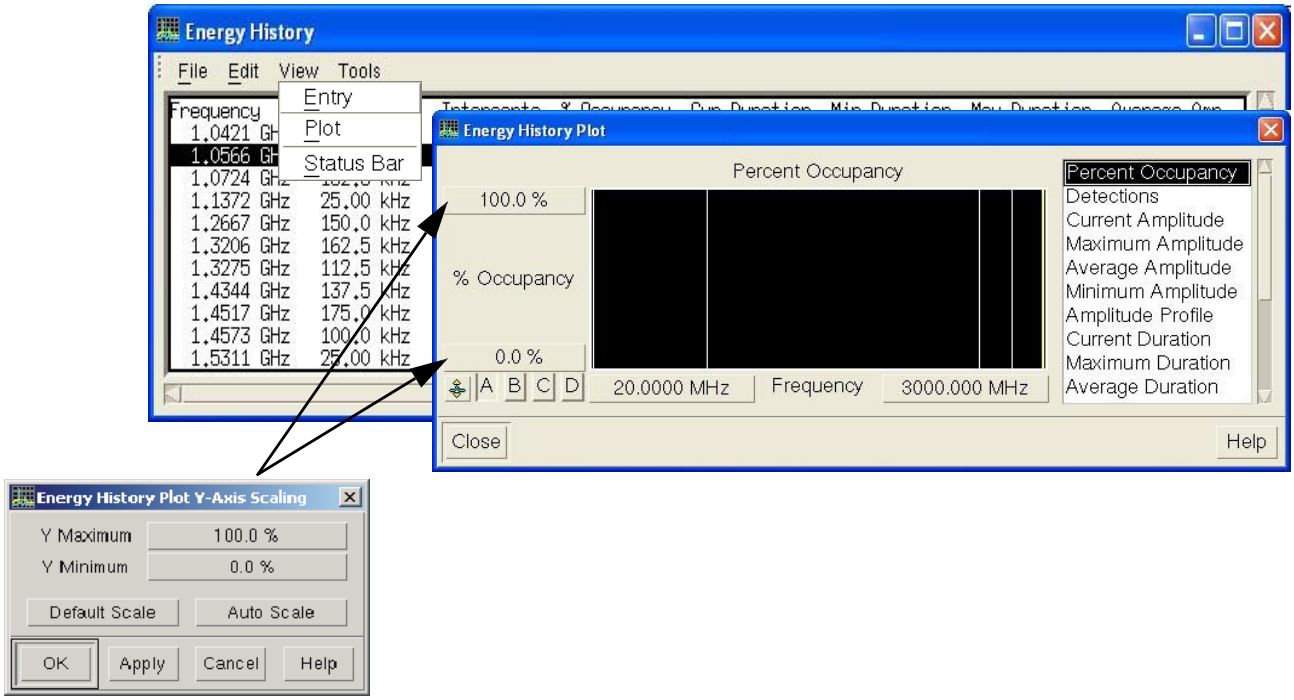
3. Click “OK” to apply the change and close the dialog box or click “Apply” to apply the change and leave the dialog box open.

Note

The plot colors can be modified in the `E3238s` resource file with `*plotColor` commands. See “Application Resources" on page 19.

Energy History Plot Y- Axis Scaling

View > Energy History > View > Plot (Y-Axis Scaling)



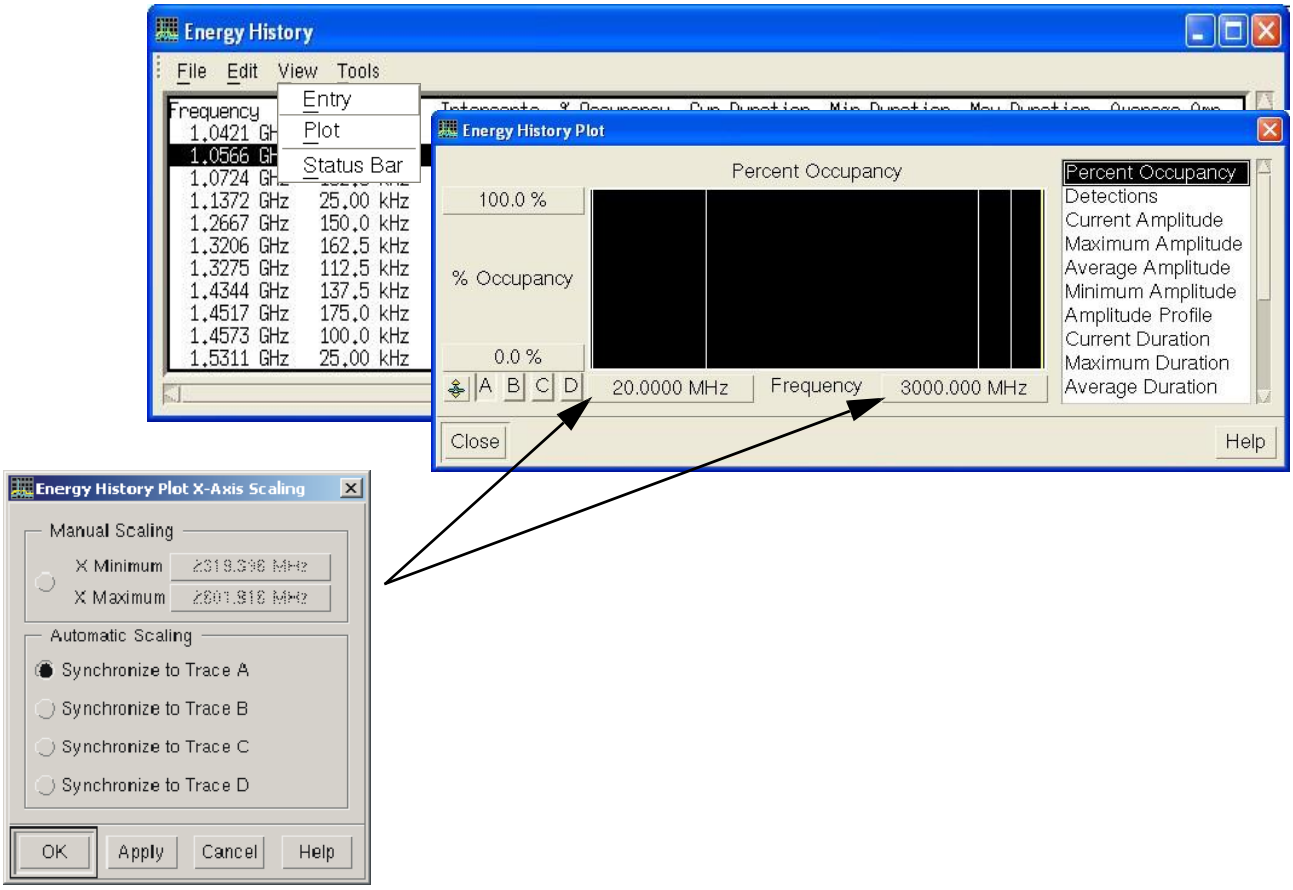
This dialog box is used to specify the Y-axis scale for the Energy History Plot. You can display this box by clicking in either of the Plot Y Scale buttons on the "View > Energy History > View > Plot" on page 175.

To specify the energy history scale with min/max values

1. Click the button corresponding to the parameter you wish to change. A new dialog box appears.
2. Make sure the mouse cursor is in the new dialog box.
3. Change the value using a numeric value only (don't enter units).
4. Click **OK**.

Energy History Plot X- Axis Scaling

Figure 94 View > Energy History > View > Plot (X-Axis Scaling)



This dialog box is used to set the X-axis (frequency) scale of the energy history plot. You can display this box by clicking in either of the Plot X Scale buttons on the "View > Energy History > View > Plot" on page 175.

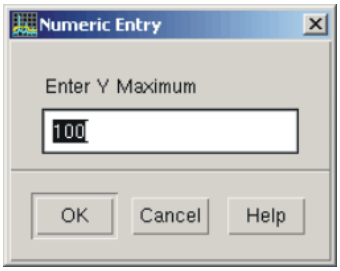
To select automatic frequency scaling, click the radio button of the trace whose frequency scale it should match.

To display data for frequency ranges that do not correspond to trace frequency spans, set the scale to start and stop frequencies entered manually:

1. Click the radio button in the Manual Scaling field. The numbers on the scale buttons become active.
2. Click the X Minimum (or Maximum) button. A new dialog box appears.
3. Enter the new value in the box. The cursor must be in the box while you type.
4. Click **OK**. The new value should appear on the button face.

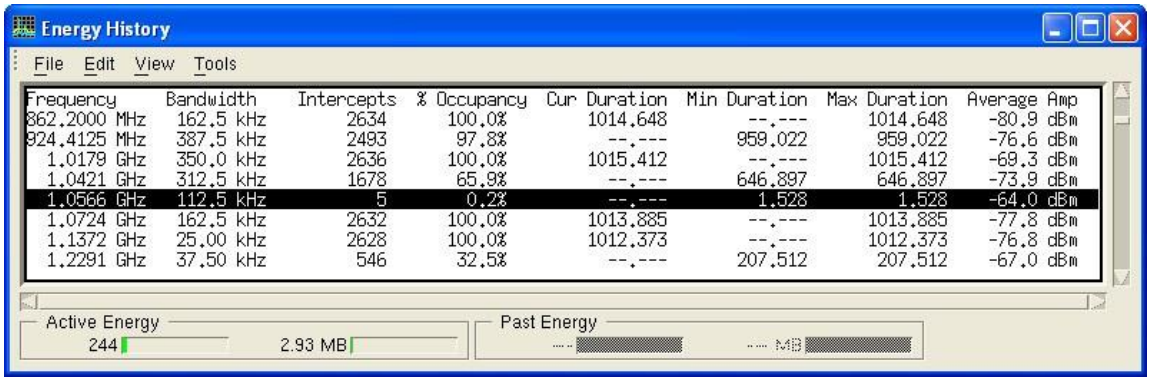
View > Energy History > View > Plot (Scale Value)

View > Energy History > View > Plot (Scale Value)



View > Energy History > View > Status Bar

View > Energy History > View > Status Bar

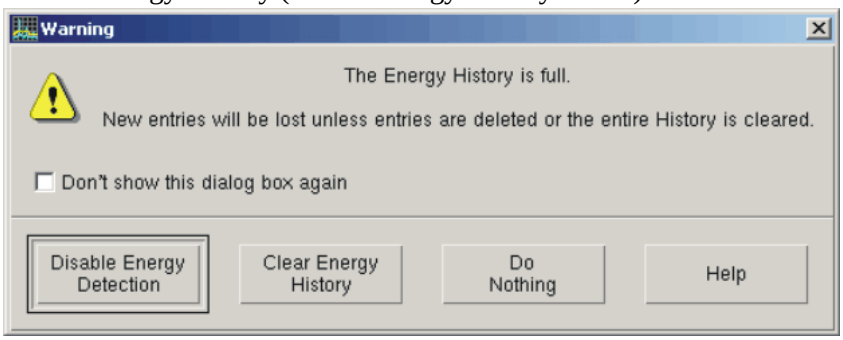


Status Bar

The Status Bar adds an additional information to the bottom of the Energy History Pane that displays statistics related to Active Energy and Past Energy along with how much disk space the active and past energy are using.

Energy History Full

View > Energy History (Notice Energy History is Full)



This dialog box appears when the number of entries in the Energy History exceeds the maximum allowed.

Note

Each Energy History entry requires approximately 128 bytes of memory. The number of entries in the pane is limited by the `maxEnergyHistorySize` resource variable in the *configuration file*. The default is 5000.

Another way to control the number of entries is to implement filters that limit new entries and/or delete existing entries. See “Search > Energy History Filter (Option ASD)".

Don’t show this dialog box again when the energy history gets full, new entries are lost/ignored and no warning is given.

This resets when the application is restarted.

Disable Energy Detection stops the creation of new entries. This may be re-enabled in “Search > Detection Setup > Energy Tab".

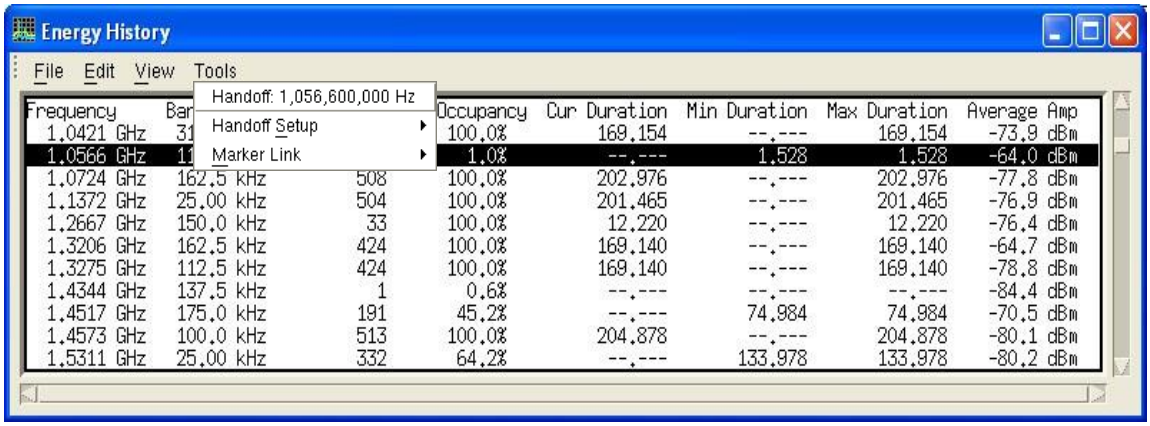
Clear Energy History deletes all of the entries in the database. This has the same effect as described in “Edit > Clear Energy History" and “View > Energy History > Edit > Clear" on page 165. When the number of entries reaches the limit, new entries will not be added until some or all of the current entries are deleted: individual entries can be deleted with “View > Energy History > Edit > Delete Entry" on page 165.

Do Nothing closes the warning dialog box. New entries will continue to be ignored. Another method that can be used to minimize the total number of energy history entries is the use of the energy history filters.

Verify Energy History Recall This dialog box is displayed to point out that recalling an Energy History file clears the feature data currently in the Energy History. To avoid losing this data click No, save the current Energy History in another file, and then load the desired Energy History file.

View > Energy History > Tools Pull-Down Menu

View > Energy History > Tools Pull-Down Menu



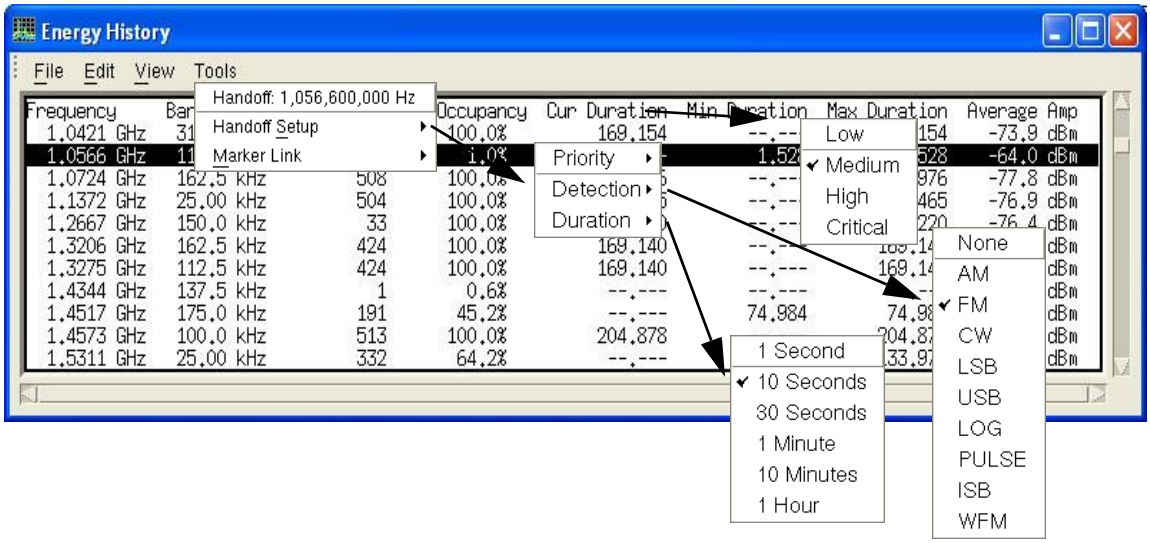
Handoff: displays the frequency of the entry that is to be handed off to a handoff receiver. Handoff remains grayed out until an entry is selected from the Energy History Pane. Handoff Receivers must be designated in the *configuration file* before starting the Agilent N6820ES Signal Detection and Monitoring Solutions software.

"View > Energy History > Tools > Handoff Setup" on page 183

"View > Energy History > Tools > Marker Link" on page 186

View > Energy History > Tools > Handoff Setup

View > Energy History > Tools > Handoff Setup



When you click Handoff Setup, another menu appears that allows you to set the Priority, Detection, and Duration parameters for signals handed off from the Energy History Pane.

- “Handoff Log Priority
- “Handoff Log Detect" on page 184
- “Handoff Log Duration" on page 184

Handoff Log Priority

A handoff is given a Priority level when it is handed off. If more than one handoff is pending (waiting in the queue to be assigned to a handoff receiver), the handoff with the higher priority setting goes first. If the priority of two pending handoffs is the same, the handoff with the earlier request goes first.

The priority levels are:

- **Critical** priority handoffs have the highest priority. When a Critical priority handoff is put in the handoff queue, it will bump any lower-priority handoff being monitored.
- **High** priority handoffs are superseded only by Critical priority handoffs. Critical priority handoffs can bump a High priority handoff. When a High priority handoff is put in the handoff queue, it will bump any Medium or Low priority handoff being monitored.
- **Medium** priority handoffs can bump Low priority handoffs, but any High and Critical priority handoffs will be handed off before a Medium priority handoff. Handoffs with High and Critical priority will bump a Medium priority handoff being monitored.
- **Low** priority handoffs are handed off in the order they are put in the handoff queue when there are no pending handoffs with higher priority. If a handoff with higher priority is handed off while a low-priority handoff is being monitored, it is bumped; the handoff receiver tunes to the higher-priority handoff.

The priority can also be changed while the handoff is pending (for example, increase priority to get it assigned to a receiver sooner by bumping an active handoff) or while it is active (for example, increase priority to avoid its getting bumped by another handoff).

Handoff Log Detect

Handoff Log Detect is the method used to demodulate the signal. The detection types available depends on the capabilities of the installed handoff receivers. The types displayed in the log and detection selection lists may include others.

The list of standard types is:

- None
- AM: amplitude modulation
- FM: frequency modulation
- CW: continuous wave
- LSB: lower side band
- USB: upper side band
- ISB: independent sideband
- Log: log modulation
- Pulse: pulse modulation
- WFM wideband FM

Handoff Log Duration

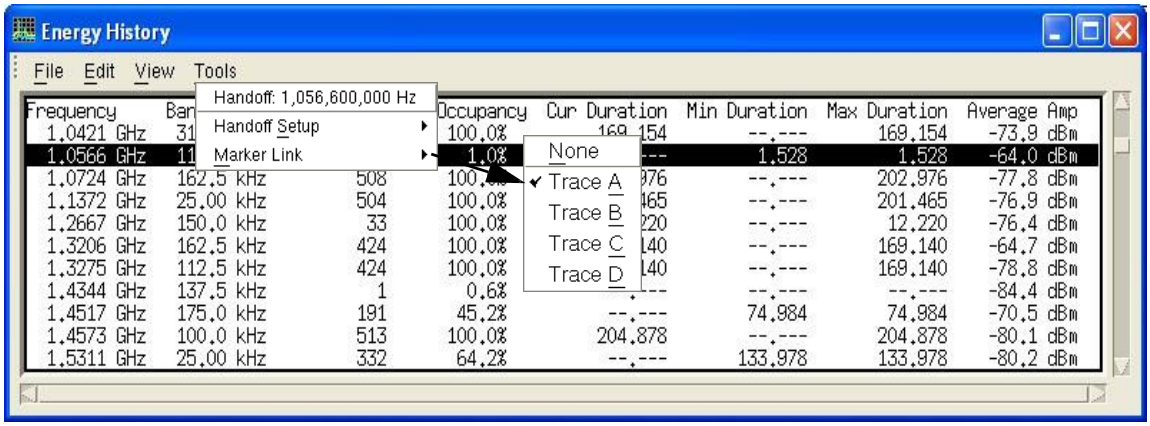
Handoff Log Duration is the amount of time a frequency is to be monitored before its status changes to completed and the handoff receiver takes another assignment from the queue. This value is assigned to a handoff when it is put in the handoff queue.

This value is listed in "View > Energy History > Tools > Handoff Setup" on page 183 as follows:

- For a pending handoff, this is the amount of time the handoff receiver will stay tuned to the frequency if no handoffs with higher priority are put in the queue.
- For a completed handoff, this is the amount of time the handoff receiver was tuned to the assigned frequency.
  - Minimum duration: 1 second
  - Maximum duration: 86400 seconds (24 hours)
    - Resolution: 1 second

View > Energy History > Tools > Marker Link

View > Energy History > Tools > Marker Link



The Marker Link allows one of the feature/parameters to be lined to a particular trace marker.

When the Energy History is linked to a trace marker, the marker appears at the peak of the entry selected in the Energy History Pane (for example, clicking a different entry moves the trace marker). Also, moving the trace marker to another peak causes the Energy History Entry information to track the selected entry if it falls within the span of an existing entry.

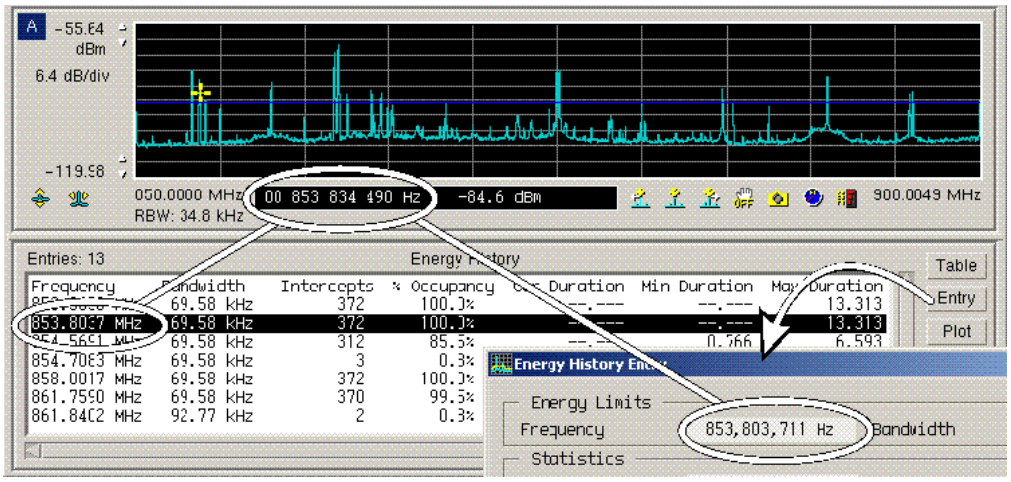
To link a trace marker to entry in the Energy History Pane

1. Set up energy detection.
2. Add the Energy History Pane to the main window.
3. Click one of the entries (lines) in the Energy History Pane.
4. Click the right-mouse button anywhere in the Energy History Pane's list area to display a popup menu.
5. Continue to hold the mouse button down and move the cursor down to the Marker Link entry and release the button. The display should now appear as shown in Figure 101.
6. Click the entry for the trace you wish to select.

When a trace is selected and its marker is on (see "Display > Trace (Setup)" on page 515), the marker moves to the frequency of the entry selected in the Energy History Pane

To link a trace marker to entry in the Energy History Pane

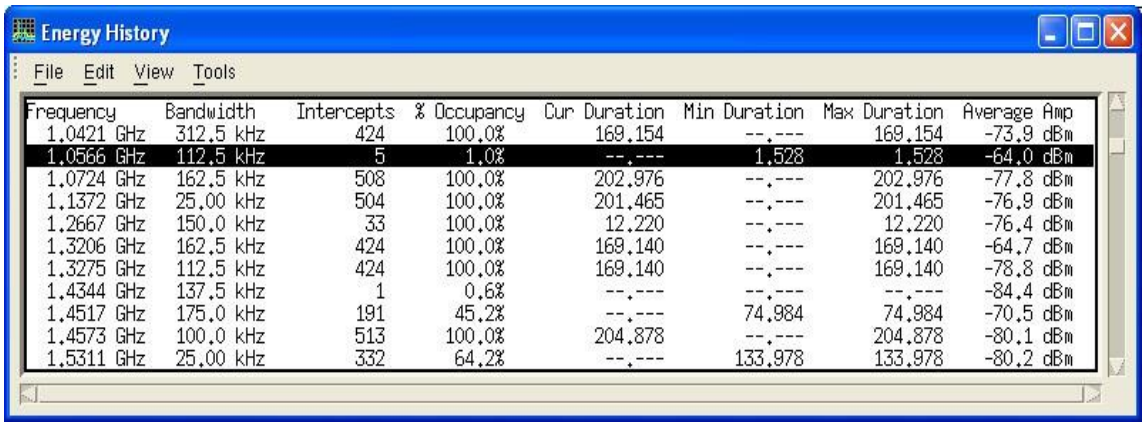
Linking a Trace Marker to the Energy History Pane



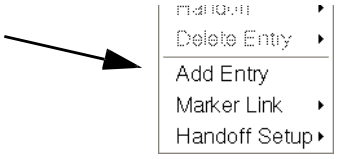
Also, when the marker is moved (in the trace) to a frequency value within the bandwidth of an entry in the Energy History Pane, that entry is selected (highlighted) in the pane.

View > Energy History > Right- Click Menu

View > Energy History > Right-Click Menu



Right-Click Menu appears when the right-mouse button



is clicked anywhere in the Energy History Pane.

The right-click menu appears when the right-mouse button is clicked anywhere in the Energy History Pane.

"View > Energy History > Edit > Delete Entry" on page 165

"View > Energy History > Edit > Add Entry" on page 164

"View > Energy History > Tools > Marker Link" on page 186

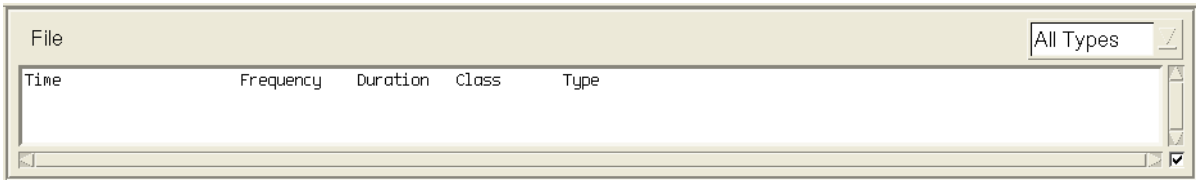
"View > Energy History > Tools > Handoff Setup" on page 183

The right-click menu is used as a shortcut to:

1. Identify the selected entry's frequency.
2. Add a signal to the handoff queue. Set the handoff's priority, detection, and duration.
3. Delete an entry from the history listing.
4. Add an entry to the Energy History Pane. This may be useful for defining alarm conditions that require energy history entries to monitor for No Signal conditions.
   See "View > Energy History > View > Entry" on page 167.
5. Pick a trace whose marker is coupled to entry selection. See "View > Energy History > Tools > Marker Link" on page 186.
6. Specify handoff settings (priority, detection, and duration) for handoffs performed from this pane.

View > Signal Database Pane

Figure 103View > Signal Database Pane



The **Signal Database Pane** displays the signal information collected by narrow-band signal processing assets. These assets are described in "Understanding the DSP Block Diagram" on page 26. See the processing diagram in "Process Overview" on page 42.

The maximum number of entries in the Signal Database is specified in the E3238s Resources file with the variable `signalDatabaseSize`. By default, the maximum number is 500,000. When this limit is reached, no new signals are added to the database.

The signal processing activity and channel control appears in "Configure > Signal Processing Configuration" on page 267.

Types Pull-Down Menu (Right-Side of Signal Database Pane)

Depending on the selection from this menu, different headings/columns of information are displayed from the signal database:

"Signal Database Column Headings for All Types

"Signal Database Column Headings for Recorder

"Signal Database Column Headings for DF

Signal Database Column Headings for All Types

Time is the date and time that the signal was identified.

Frequency is the frequency associated with the signal. This can mean different things for different types of signals.

Duration is a value whose definition depends on the signal class and/or type as determined by the user-defined library. For typical signals, it is the time the signal was "up", but for a DF signal it may mean something else.

Class is one of the three signal processing activities:

- Signal Identification
- Location (for example, Agilent N6854A Geolocation Server software)
- Collection

Type is a designation given the signal by the library used to process this signal. It is used to sort signals in the database with the Type Menu.

When the All Types selection is active, only the common characteristics are displayed in the listing.

Signal Database Column Headings for Recorder

Time is the date and time that the signal was identified.

Frequency is the frequency associated with the signal. This can mean different things for different types of signals.

Duration is a value whose definition depends on the signal class and/or type as determined by the user-defined library. For typical signals, it is the time the signal was "up", but for a DF signal it may mean something else.

Signal Database Column Headings for DF

Time is the date and time that the signal was identified.

Frequency is the frequency associated with the signal. This can mean different things for different types of signals.

Duration is a value whose definition depends on the signal class and/or type as determined by the user-defined library. For typical signals, it is the time the signal was "up", but for a DF signal it may mean something else.

Quality is the quality of the signal...

Azimuth is the azimuth of the signal...

Bandwidth is the bandwidth...

Site Lat is the latitude...

Site Long is the longitude...

Heading is the heading...

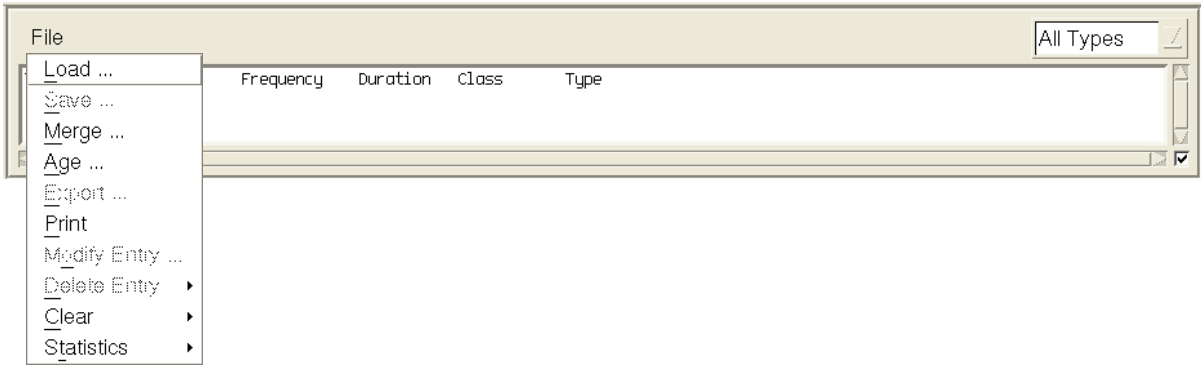
Reports Pull-Down Menu When the view is set to DF, a Reports Pull-Down Menu is available that allows the DF signals in the database to be displays as a DF Activity Report that can be printed.

By Frequency displays the report with signals sorted by frequency.

By Azimuth displays the report with signals sorted by azimuth.

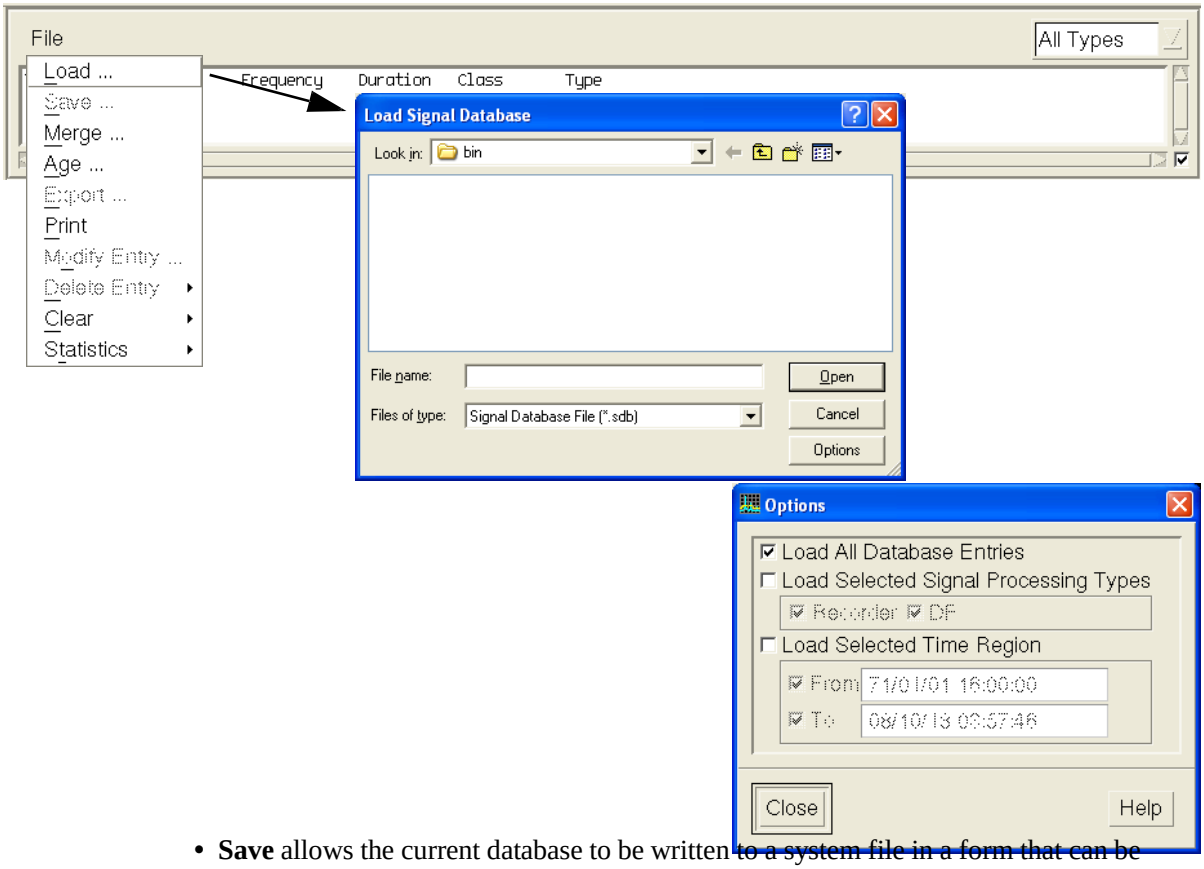
File Pull-Down Menu allows you to perform file manage operations: save, load, merge, or export a signal database file (`.sdb`).

Figure 106 View > Signal Database > File



- **Load** loads a previously-saved database file and replaces the current contents of the Signal Database Pane.

View > Signal Database > File > Load (Options)



- **Save** allows the current database to be written to a system file in a form that can be reloaded.

- **Merge** allows you to load a previously-saved file, adding it to the current contents of the database.
- **Export** causes the contents of the signal database to be saved to a file in comma-separated variable (.csv) format; this format supports use with a spreadsheet.
- **Print** appears in the menu if a printer is configured for the system (the file print exists in the e3238s directory) and the `textPrintCommand` is given within it.
- **Modify Entry** exists only if it has been implemented in the user-defined library for a given signal type. The action it allows is defined by that code.
- **Delete Entry** is used to delete the selected entry.
- **Clear** is used to delete entries in the Signal Database Pane.

Note

Database Loss This message appears when information in the Signal Database Pane may be lost because the user selected to exit while unsaved database data exists.

Save allows you to save the information using the Save/Load/Merge/Export Signal Database commands.

Lose means to continue the exit process without saving the signal database information; the contents of the current database are lost.

View > Visual Alarms Pane

View > Visual Alarms Pane

This pane is used to display visual alarm indicators as well as text that could describe the situation and give instructions as defined in "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Visual Setup (Visual Alarm Task)" on page 407.

Note To make visual alarms viewable, add the Visual Alarms pane to the Agilent N6820ES Signal Detection and Monitoring Solutions window using the "Display > Layout" on page 512.

This area (inside the dashed line) displays the alarm icons for the active alarms.

This area displays alarm information when a triggered alarm icon is clicked. The information is the alarm's number, its name/description, and instruction text, if any has been defined.

Each icon represents an alarm that has a visual "task" defined and selected in the Tasks section of the dialog box for "Search > Alarms Setup > Modify Single-Alarm" on page 363.

This icon represents a triggered alarm. Clicking on this icon displays the alarm information in area #2. It may also be set to rearm the alarm's trigger.

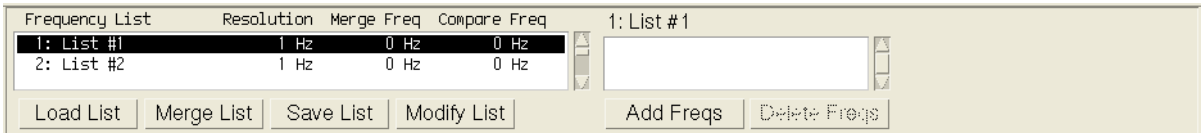
This icon represents an alarm that is not triggered.

Note If an alarm's trigger type is "Once," and the Clear Alarm parameter is set, the trigger may be cleared (rearmed) by clicking the alarm's icon in this pane.
See "Search > Alarms Setup > Modify Single Alarm > Control" on page 367 and "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Visual Setup (Visual Alarm Task)" on page 407.

Tip Audio alarms may also be used to sound an alert when an alarm occurs. See "Search > Alarms Setup > Modify Single Alarm > Alarm Tasks > Audible Setup (Audio Alarm Task)" on page 412.

View > Frequency Lists Pane

View > Frequency Lists Pane



The **Frequency Lists Pane** is used to create, display, and modify frequency lists.

"View > Frequency Lists > Frequency List (Heading)" on page 197
"View > Frequency Lists > Resolution (Heading)" on page 198
"View > Frequency Lists > Merge Freq (Heading)" on page 198
"View > Frequency Lists > Compare Freq (Heading)" on page 198
"View > Frequency Lists > Load List (Button)" on page 199
"View > Frequency Lists > Merge List (Button)" on page 199
"View > Frequency Lists > Save List (Button)" on page 200
"View > Frequency Lists > Modify List (Button)" on page 201
"View > Frequency Lists > Add Freqs (Button)" on page 202
"View > Frequency Lists > Delete Freqs (Button)" on page 203

To use frequency lists

Frequency lists are used in a number of ways:

- as alarm criteria (for example, in list #1, or not in list #1)
- as a trace grid (See "Display > Trace > Grid Type" on page 531.)
- Lists can be changed by an alarm task (values added to or deleted from a list)
- Lists also can be used in user-defined programs. So frequency list information could be employed as a source of information for an energy feature calculation or to specify energy filter activity.

Parameters Affecting Frequency List Entries

The three parameters that affect how frequency entries are entered and used are:

Resolution - entries are rounded to the nearest multiple of this value.

- **Merge Frequency** - provides another "resolution" parameter. The combination of the Resolution and Merge settings allows a strategy where one parameter (Resolution) can be used as a base which is never exceeded and the other (Merge) can be adjusted according to need. Frequency values

may be manually added/deleted in the Frequency List Pane or as the result of an alarm task. Any new values are rounded by both Resolution and the Merge frequency settings before they are entered in a list.

- **Compare Frequency** - A value used to evaluate alarm criteria.

Left-Side Pane, List Table The left-side text area of the Frequency List

Pane is a table of frequency lists:

- As many as 10 lists may be defined, but the number of frequencies within a list is unlimited.
- A list is identified by both a number and a name or label.
- The contents of a selected list appears in the text area on the right.
- A list may be defined by loading information from a file on the system disk. Use **Load List** to replace the list contents or **Merge List** to combine the contents of a file with the selected list.
- A list's name, Resolution, Merge Freq, and Compare Freq settings are changed with **Modify List**.

Right-Side Pane, List Contents The right-side text area of the Frequency List Pane shows the entries of the selected list (highlighted) at the left. You may add or delete entries to this list with **Add Freqs** and **Delete Freqs**.

View > Frequency Lists > Frequency List (Heading)

Frequency List contains a column of lists that are identified by a number and name. The name may be modified with **Modify List**.

See "View > Frequency Lists > Modify List (Button)" on page 201.

Since the list number is part of the identifier, the name need not be unique. These identifiers appear in the dialog box (under Description, Feature, Frequency) for "Search > Alarms Setup > Modify Single-Alarm" on page 363 and in "Display > Trace (Setup)" on page 515.

View > Frequency Lists > Resolution (Heading)

Resolution is the spacing of the frequency values in the list. For example, given a resolution of 100 Hz, valid frequency values exist only every 100 Hz. When other values are added to the list, they are rounded up or down to a multiple of 100.

The Resolution value may be changed by clicking a list entry and then clicking **Modify List** below it.

See "View > Frequency Lists > Modify List (Button)" on page 201.

View > Frequency Lists > Merge Freq (Heading)

Merge Freq is the frequency value used to sort new (added) entries into valid list values. This is typically equal to or greater than the Resolution value.

The Merge Freq value may be changed by clicking a list entry and then clicking **Modify List** below it.

See "View > Frequency Lists > Modify List (Button)" on page 201.

View > Frequency Lists > Compare Freq (Heading)

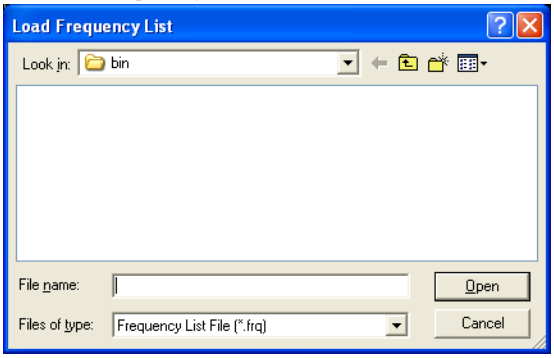
Compare Freq is used to determine whether a frequency value exists in the list during the process of checking alarms. Consider this to be the "footprint" of the energy's frequency for the sake of determining whether the alarm value exists in the list. The comparison checks for existence of entries in the list freq ± compare_freq/2 where freq is the frequency of the energy that caused the alarm. The value of Compare Freq is typically equal to the Merge Freq or larger.

The Compare Freq value may be changed by clicking a list entry and then clicking **Modify List** below it.

See "View > Frequency Lists > Modify List (Button)" on page 201.

View > Frequency Lists > Load List (Button)

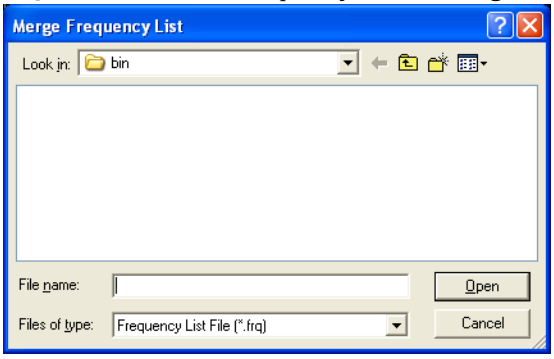
View > Frequency Lists > Load List



Load List is used to load a file containing a frequency list. When a frequency list is loaded from a file, the list's Resolution, Merge, and Compare frequency settings are replaced by those in the file.

Frequency Lists > Merge List (Button)

Figure 111 View > Frequency Lists > Merge List



Merge List is used to select and load a frequency list file, adding (merging) its contents to those already in the selected list. When the list is merged, the Resolution, Merge, and Compare frequency values in the file are ignored.

The file merging process is different from other load processes, however. When a frequency list file is merged with one of the frequency lists in the "View > Frequency Lists Pane" on page 196, the name and parameter information in the file are ignored and the frequency values are added to the selected list according to the Resolution and Merge Frequency rounding values that are active for the selected list.

A frequency list file is an ASCII file containing:

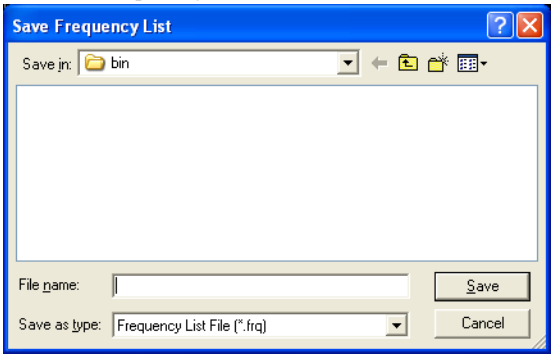
- a name (like "List #1")
- a resolution value
- a merge value
- a compare value
- a list of frequency values (in Hz)

```
name:Pagers
resolution:-1
merge:12500
compare:-1
929512500
929537500
929562500
929612500
929662500
929712500
929737500
```

The negative values for Resolution and Compare indicate that the Merge value is used for these settings.

View > Frequency Lists > Save List (Button)

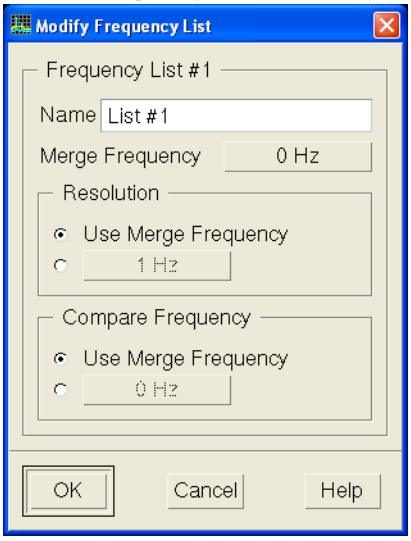
View > Frequency Lists > Save List



Save List allows you to save the selected list as a file. You can also preserve the list information by saving the current state with "File > Save Mission Setup" on page 96.

View > Frequency Lists > Modify List (Button)

View > Frequency Lists > Modify List



Modify Frequency List dialog box is used to change the Name, Merge Frequency, Resolution, or Compare Frequency values of the selected frequency list.

Name is an identifier or short description. It appears with the list number wherever frequency lists are listed (alarm criteria and trace grid).

Merge Frequency is a rounding value used to place frequencies in a list.

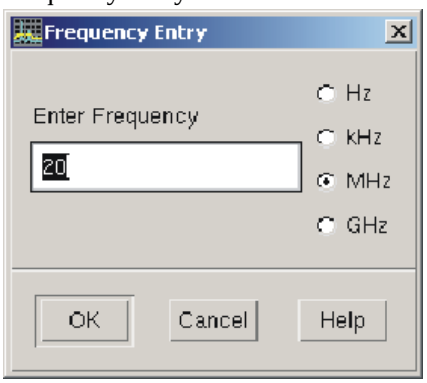
Resolution is one of two rounding values used to place frequencies in a list.

Compare Frequency is used to compare values in the list to alarm criteria.

To change frequency list settings

1. In the Frequency Lists Pane, select the frequency list entry you wish to modify (click on it and it becomes highlighted).
2. Click **Modify List** at the bottom of the pane. The dialog box shown above appears. This dialog box was designed to make it easy to use the merge frequency value for both the resolution and compare frequency settings.
3. Make the necessary changes. To use a value other than the Merge Frequency value for either Resolution or Compare Frequency, 202 Agilent N6820ES Signal Detection and Monitoring Solutions click the 1-of-N (radio) button beside the labeled button and enter the new value in the Frequency Entry dialog box.

Frequency Entry

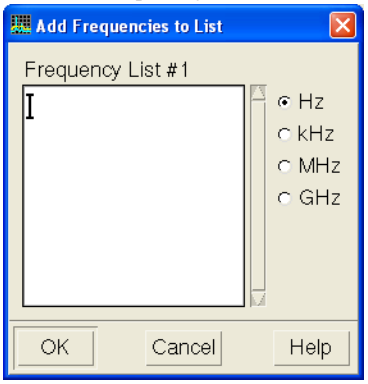


4. Click **OK**.

A resolution or merge value of 0 Hz allows any frequency to be entered. When you change a list's merge value, existing entries in the list are not modified to fit the multiple pattern; only new entries are constrained.

View > Frequency Lists > Add Freqs (Button)

View > Frequency Lists > Add Freqs



Add Freqs allows you to add frequency values to the selected list.

To add one or more frequency values to a list:

1. Select the frequency list entry you wish to modify from the Frequency Lists Pane (page 105) (click an entry and it becomes highlighted).
2. Click the Add button at the bottom of the pane (the dialog box shown above appears).
3. Click in the text area of the dialog box and enter the new values.
4. Click a button at the right side to select frequency units.
5. Click **OK**.

Note

The new values must be a multiple of the merge frequency. Values that are within 1/2 the merge range of an existing entry create no new entry. Values more than 1/2 the merge range above or below an existing entry are entered at the next multiple above or below the entry. New entries are added at the closest multiple of the Merge Freq.

These values aren't saved unless you save the state (see "File > Save Mission Setup" on page 96) or save the individual list as a file.

The number of entries in a frequency list is unlimited.

View > Frequency Lists > Delete Freqs (Button)

Delete Freqs deletes selected frequency values from the list.

To delete one or more frequency values from a list:

1. Select a list in the left pane. Its entries appear in the right pane.
2. Select one or more frequency values that you wish to delete. You can use the Shift or Ctrl buttons with the mouse button to select multiple entries. Shift is used to select contiguous selection and Ctrl for non-contiguous selection.
3. Click **Delete**.

Defining or Changing Frequency List Files

A frequency list can be stored on the system disk. These files have a .frq extension and are in ASCII format. Such a file can be created or modified with an editor like Notepad.

Each list the following attributes:

- a name (like "List #1")
- a resolution value
- a merge value
- a compare value
- a list of frequency values (in Hz)

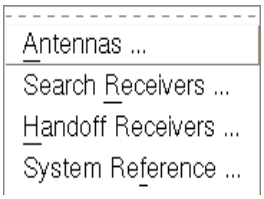
Note

Frequency lists are part of the mission state which may be saved and recalled from the "File Pull-Down Menu" on page 91. They may also be saved as individual files that can be recalled. If you create frequency lists in the pane and don't save the mission state or save the work in files, the frequency list information is lost when the program stops running.

The information saved in the state file is the frequency information; not filenames containing the frequency lists.

View > Frequency Lists > Delete Freqs (Button)

The Configure Menu



The Configure menu contains entries used to define the configuration of the installed hardware. For information about the components in this system, see System Block Diagram (page 23).

A The dash-line indicates that this is a **tear-off menu**. Click the top of the menu and the menu gets its own window so that it does not disappear after a selection.

1. Antenna Configuration (page 226)
2. Search Receivers (page 227)
3. Handoff Receiver Configuration (page 271)
4. System Reference (page 274)

The installed hardware is defined by commands in the `e3238s.n6841.cfg` file. These commands are executed when the program first runs and must correctly define the installed hardware before you can use the program to change hardware settings.

See Hardware Configuration (page 16) and the *N6820ES Installation and Configuration Reference* for details.

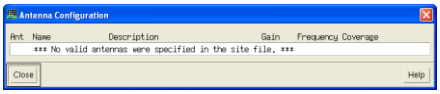
Note

Configuration changes interrupt searching and data may be lost.

To save a hardware configuration for later recall or to load a previously saved hardware configuration, see the discussion of Mission Setup Sections (page 132).

Antenna Configuration

Toolbar Icon
Path: Configure, Antennas ...



This box is used to display information about the antennas. If your system has more than one antenna, you may use an RF switch module to select one. See Switch Configuration (page 228).

Antennas are configured using the site file. See the default site file, d.e3238s.site for information about the file syntax. At startup, the N6820ES Signal Monitoring System reads the site file and uses the antenna configuration described there.

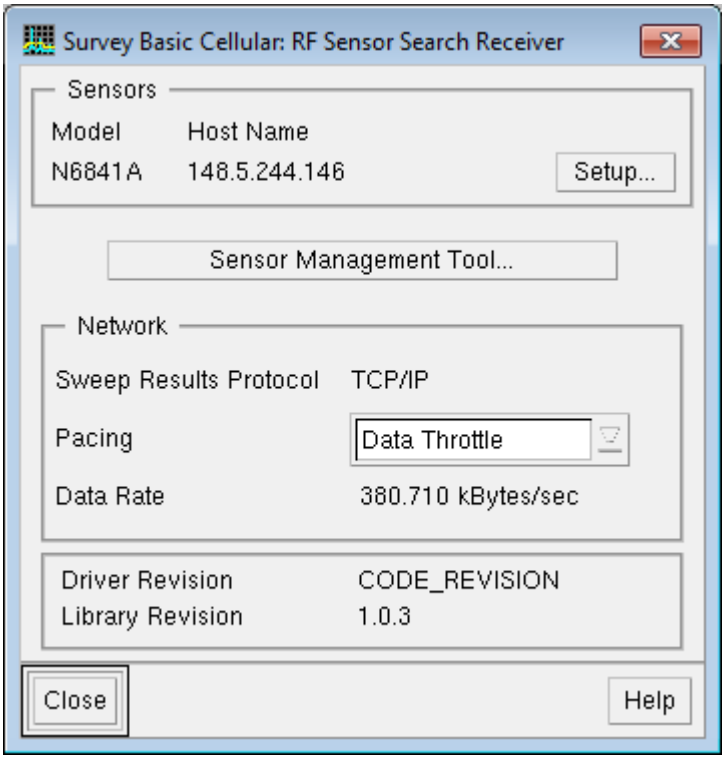
For information about the components in this system, see “Hardware Configuration” on page 16.

Notes

- To define/view connections between antennas and the search receiver, see Switch Configuration (page 228).
- Antennas are selected for use in the General Search Setup (page 290) dialog box.

N6841A RF Sensor Setup

Toolbar Icon
Path: Configure, Search Receivers



This dialog box allows you to view and configure settings for the N6841A RF Sensor Search Receiver.

1. Model and Host Name: Displays the model number and network host name (or IP address) of the RF Sensor. The host name is specified in the configuration file typically located at C:\E3238s\N684x_RF_Sensor\e3238s.n6841.cfg.
2. Setup: The setup button displays specific settings for one RF Sensor. In a multiple channel system, a Setup button will appear for each RF sensor.
3. Sensor Management Tool: Press this button to start SMT, a software tool to configure and manage RF sensors.
4. Sweep Results Protocol: Displays the network being used to transfer spectrum sweep results from the RF Sensor to the N6820ES application. Default is "TCP/IP". This can be switched to "UDP" by changing parameter in the configuration file (typically C:\E3238s\N684x_RF_Sensor\e3238s.n6841.cfg) UDP may allow slightly faster sweep rates, but lost data will not be re-transmitted.
5. Pacing: Selects the pacing method used to control the RF sensor sweep rate. Pacing automatically adapts the sweep rate to match the network performance and the ability of the N6820ES application to process

sweep results. The possible setting are:

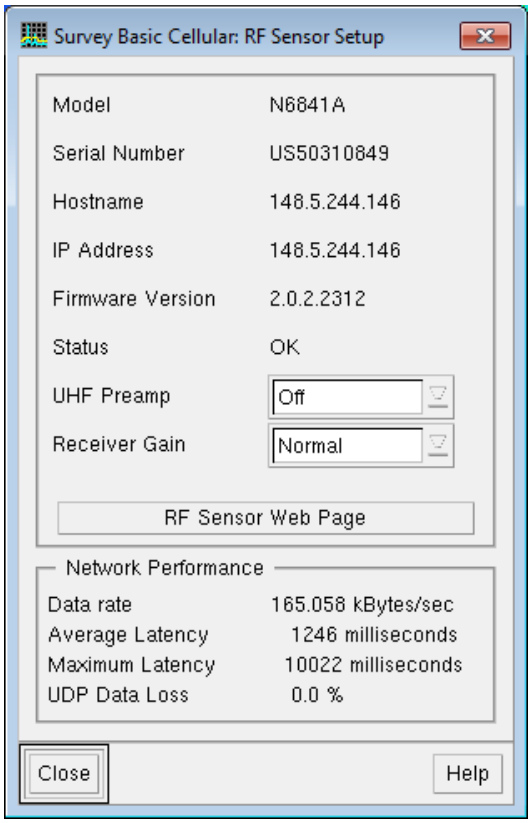
- Sweep Handshake: The next sweep is not started until after the data from the previous sweep has been delivered to the N6820ES application. This handshake will reduce sweep rate performance.
- Data Throttle: The RF Sensor sweeps as fast as possible, but the rate at which it can transmit network data is regulated by the N6820ES application. The data rate throttle is automatically reduced whenever loss of network data is detected, or when the N6820ES application is too busy to process data. This setting provides optimum sweep rate performance.
- Add Averages: The RF Sensor sweeps as fast as possible, but the number of averages is adjusted by the N6820ES application to pace the system. This has the effect of automatically increasing the number of averages specified in the Search Setup dialog box. Because spectrum averaging is performed in the RF Sensor's FPGA, increasing the number of averages reduces the network data rate. This setting provides optimum sweep rate performance and optimizes probability-of- intercept. Peak Averaging Type is recommended.
- None: Pacing is disabled. This is not recommended when using UDP because it may results in excessive data loss.

6. Data Rate: This reports the measured rate of network data received from the RF Sensor.

7. Driver Revision: Revision of the RF Sensor platform driver software.

8. Library Revision: Revision of the lower level RF Sensor library software.

N6841 RF Sensor Setup



This dialog box allows you to view and configure settings for a specific RF Sensor Search Receiver. The settings in this dialog box are common to all receivers.

1. Model, Host Name, IP Address: Displays the model number, network host name, and IP address of the RF Sensor. The host name is specified in the configuration file typically located at C:\E3238s\N684x_RF_ Sensor\e3238s.n6841.cfg.
2. Firmware Version: Displays the version of the software installed in the RF Sensor. Use the Agilent RF Sensor Management Tool to update this software.
3. Status: Reports the RF Sensor status. This should normally display "OK". "Over Temperature" indicates the operating temperature has been exceeded. "Frequency Unlock" indicates a hardware failure. "Time questionable" indicates the sensor is configured to use GPS or IEEE 1588 as a time sync source, but the time is not accurate. Use SMT or the RF Sensor web page to get more information.
4. UHF Preamp: Setting this "On" enables the RF Sensor UHF pre-amplifier for frequencies between approximately 750 MHz and 1800 MHz. Select "On" to optimize sensitivity in this band. Select "Off" to reduce overloads.
5. Receiver Gain: Controls the distribution of gain and attenuation between the RF and IF amplifiers in the RF Sensor.
    a. "Normal: This is the nominal setting recommended for most applications. "Low Noise: Use this setting to improve sensitivity in a quiet RF environment. This may increase intermodulation distortion.

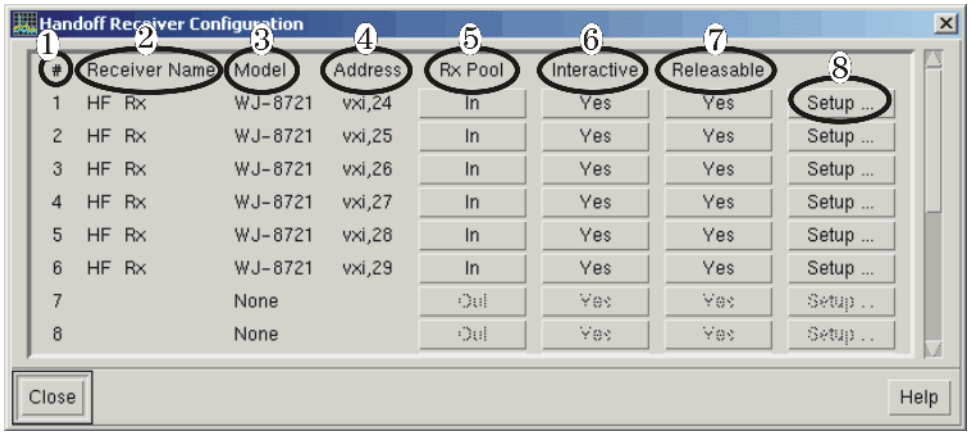
b. "Low Distortion: Use this setting to reduce intermodulation distortion in a busy RF environment. This may increase noise.

6. RF Sensor Web Page: Use this button to quickly launch a web browser to view the RF Sensor web page.

7. Network Performance: This box reports measured network performance parameters for this RF Sensor.

Handoff Receiver Configuration

Toolbar Icon
Path: Configure, Handoff Receivers



This dialog box allows you to configure the installed handoff receivers as specified in the `e3238s.n6841.cfg` file.

1. **#** (receiver number): This number is specified in the e3238s.n6841.cfg file as part of the resource name used to define each of the parameters described below:

   For Windows

   ```
   handoffRx1.driver:          C:/e3238s/HD_8712.dll
   handoffRx1.interface:       rs232,COM1,9600
   handoffRx1.label:           HF  Rx
   ```

   This number is used in the Handoff Receiver Pane (page 70) and the Handoff Log Pane (page 75) to identify individual handoff receivers. Each receiver may also be assigned a name as described in the following discussion.

2. **Receiver Name**: The handoff receiver name is specified in the `e3238s.n6841.cfg` file by the `handoffRx1.label` line. It may also be specified with a command in the Command Line Pane (page 115).

   The name may be as long as 31 characters.

3. **Model**: The handoff receiver model is specified in the `e3238s.n6841.cfg` file by the `handoffRx1.model` line. It may also be specified with a command in the Command Line Pane (page 115).

4. **Address**: This number is specified in the `e3238s.n6841.cfg` file by the `handoffRx1.interfaceParm` line. It may also be specified with a command in the Command Line Pane (page 115).

5. **Rx Pool**: The receiver pool is a status indicating availability.

   In means the receiver is available for signal handoff.

   Out means the receiver is *not* available for signal handoff.

   - You can remove a handoff receiver from the pool to gain direct control for manual operation. While it is out of the pool, the search receiver will not assign signals to it.
   - Any receiver that is taken out of the pool should be reset when it is returned to the pool. Open the handoff receiver setup dialog box and click the **Reset Receiver** button.
   - If a signal is handed off with a frequency or detection type that is not supported by any of the installed handoff receivers, it is assigned a status of **unable**. See Handoff Status (page 76).
   - If a handoff occurs with a frequency or detection type that is supported only by a handoff receiver that is out of the pool, the signal is assigned **pending** status until the receiver is returned to the pool. If detection type is the only constraint, changing the detection type to a value supported by one of the installed receivers (**in** the pool) allows it to be assigned to another receiver.
   - To change the detection value for a pending entry in the handoff log, see Detection (page 84).

6. **Interactive Yes/No**: Interactive receivers allow the handoff receiver parameters (frequency, detection, duration, priority) to be changed by the user while the receiver is processing a signal or while it is unassigned.

   When a receiver is interactive, buttons with up/down arrows appear on the pane that may be used to adjust settings or values while listening to the output.

   Yes means the controls are active in the Handoff Receiver Pane (page 70).

7. **Releasable Yes/No**: Releasable receivers allow the user to release a signal being monitored before completion of the specified duration. When a receiver releases a signal, the receiver is available for another signal assignment.

   A user can release a receiver when the signal is determined to be of no interest or its examination is complete and the receiver can be reassigned.

   When this setting is **No**, the Release button does not appear in the handoff receiver pane. See Handoff Receiver Pane (page 70).

8. **Setup**: Setup is different for each type of handoff receiver. This button calls the dialog box appropriate for the installed model.

   When the Setup and control buttons (up/down arrow buttons) do not appear in the receiver pane, it is because the Interactive setting is No.

Handoff Receiver Information

To display help text for a handoff receiver, click the Setup button and then click the Help button in the dialog box that appears. The handoff receiver must appear as a resource in the `e3238s.n6841.cfg` file.

See Also

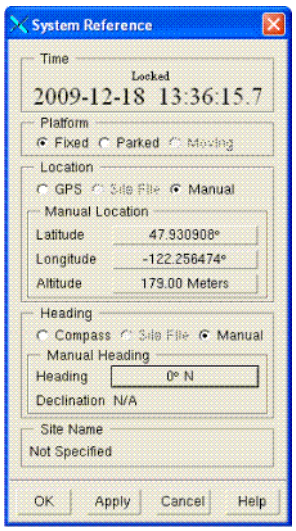
The *Installation & Configuration Reference* for information on installing hardware and editing configuration commands in the 'e3238s.n6841.cfg' file.

Note

The default number of handoff receivers is 16. This may be changed to support as many as 100 receivers by setting the `maxHandoffRxs` parameter in the `E3238s` resource file.

System Reference

Toolbar Icon
Path: Configure, Handoff Receivers



System Reference, in addition to displaying the system time, displays whether the platform is fixed, parked, or moving. Whether the location of the system is obtained from the GPS or from manual latitude, longitude, and altitude values input by the user. The heading can also be derived from either the compass or from a manual heading and a declination value input by the user.

Time [From Computer]

This is the current timestamp taken from the computer in the form of year, month, day, hour, minute, second, and tenth of a second.

Platform

- **Fixed** is used for fixed sites or other relatively permanent installations such as antenna towers and buildings. The platform is only measured at startup time.
- **Parked** is used for vehicle mounted systems where they will be driving from one location to another and then parking to do their measurements. In this mode, the initial platform location is set just like it is in the Fixed mode. However, the platform location is updated each time the sweep is started; only the very first segment is used.
- **Moving** is not currently supported and will be implemented in a future release due to the algorithm development to combine multiple azimuths based on different locations.

This mode will be used for vehicle mounted systems where they will be measuring while driving. In this mode, the platform location will be continually updated with every segment's location data.

Location

- **Manual** is selected when you want to manually enter the latitude, longitude, and altitude of the current platform.
- **GPS** is selected when the latitude, longitude, and altitude is supplied from the GPS system for the current platform.

  GPS Location is the latitude, longitude, and altitude of the sensor (antenna / DF system) making the measurements.

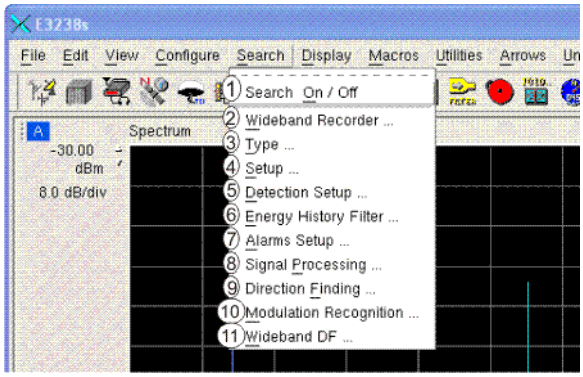
  Any location on Earth can be described with latitude and longitude values. These two values can be used to specify a position on a map (also referred to as "coordinates" on a map).
- Latitude and Longitude are two angles, measured in degrees, "minutes of arc" and "seconds of arc" and are denoted by the symbols (°, ', "). For example, 45° 40' 19" means an angle of 45 degrees, 40 minutes, and 19 seconds. A degree contains 60 minutes of arc and a minute contains 60 seconds of arc.
  - **Latitude** is represented as lines of different size circles on a globe of the Earth. The longest circle is along the equator (and has a latitude value of zero). While at the north pole and south pole, the lines of latitude, represented as circles, shrink to a point and have a latitude value of 90° at the north pole and −90° at the south pole.
  - **Longitude** ("meridians") are represented as constant lines that extend from the north pole to the south pole on a globe of the Earth; like the pieces of an orange after it has been peeled.
    (See http://www-istp.gsfc.nasa.gov/stargaze/Slatlong.htm.)
  - **Altitude** specifies the height position of the antenna in meters, relative to sea level; the altitude can be below sea level or above sea level.

Heading

- **Manual** is selected when the user manually enters the heading and overrides heading from the system.
- **Compass** is selected when heading is from the system compass.

  Compass Heading:
  - **Heading** specifies the direction that the platform being used is pointing toward or facing relative to true north; the heading can be thought of as the "direction you are pointing or heading". When a GPS system is used, the heading is corrected by the GPS system to be true north (°).
  - **Declination** specifies the correction between magnetic north and true north.
    Site Name is a field that allows you to assign a unique/custom name to the site being used as the reference.

The Search Menu



The Search menu contains entries used to configure the search parameters and to start and stop search activities. This is a **tear-off menu**. Click the top of the menu and the menu gets its own window so that it does not disappear after a selection.

1. Search On/Off (page 286) starts or stops sweeping (searching).
2. Search Type (page 287) defines whether the search has one or more bands.
3. Search Setup depends on the Type selection.
   - General Search Setup (page 290) defines a single-band sweep.
   - Directed Search Setup (page 291) defines a multi-band sweep.
4. Energy Detection (page 309) is used to define criteria used to intercept (detect) energy: threshold, peak and bandwidth criteria.
5. Energy History Filter (page 332) is used to limit the number of entries in the energy history which improves performance.
6. Alarms Setup (page 336) is used to define alarms and the tasks associated with them, such as snapshot capture and signal handoff.
7. Direction Finding (page 395) is only available when the optional DF library is installed.
8. Modulation Recognition (page 402) is only available when the optional Mod Rec library is installed.

Search On/Off

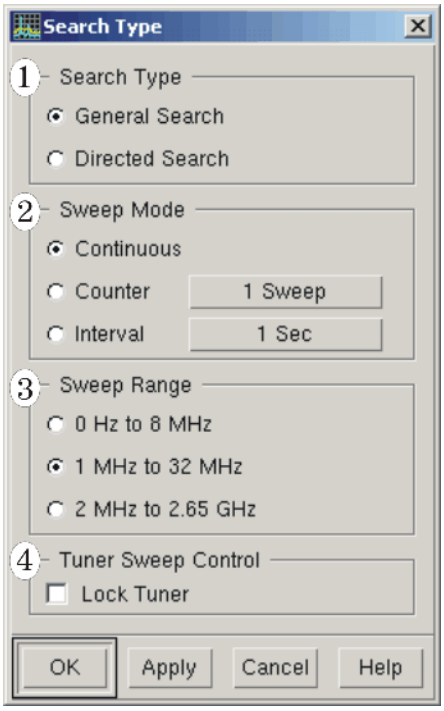
Toolbar Icon (Red = off, Green = on)
Path: Search, Search On/Off

This entry in the Search menu is a toggle key used to start and stop searching. When search is off, other parts of the application and other programs run faster but no energy or alarm processing occurs.

- To define a search, see General Search Setup (page 290).
- For a description of the main window, see Introduction (page 9).

Search Type

Toolbar Icon
Path: Search, Type ...



1. Search Type This defines whether the sweep parameters are set for the entire sweep or by bands. This selection affects the Search Setup dialog box and should be made before doing any configuration of the search setup.

General search sweeps between two frequency values. You can specify antenna, attenuation, RBW, shape factor, and averaging. This method is used to characterize the spectral environment as is typical at the beginning of a new mission. See General Search Setup (page 290).

Directed search extends the concept of general search. The sweep is broken up into *bands*, where each band has its own start and stop frequencies and different selections for antenna, attenuation, RBW, shape factor, and averaging can be specified for each band. In addition, sweep ratio, description, and active status can be specified for each band.

Directed search is used to optimize resources by allowing the search receiver configuration to be tailored to specific parts of the spectrum after the general search has identified areas of interest. See Directed Search Setup (page 291).

Directed search allows:

- skipping parts of the spectrum to improve sweep speed
- using optimized antennas for certain bands
- optimizing RBW, averaging, and shape factor for each band

- scanning some bands more often than others to increase the revisit rate on high-priority bands

2. Sweep Mode This allows you to sweep continuously or stop periodically based on sweep count.

Continuous specifies that the search sweep is not automatically stopped.

Counter specifies that the search stops after the specified number of sweeps.

- To set the count, see Sweep Count Entry on page 285.
- To restart the search, click the Search On/Off button. See page 282.

Interval specifies the amount of time between individual sweeps.

- To set the interval time, see Sweep Interval Entry on page 285.
- The maximum interval time is 1 hour (3600 seconds).

Note

When the time for a single sweep is greater than the specified sweep interval, this setting has no effect on the sweep rate.

When the sweep interval is very large, the system may appear to be stopped.

3. Sweep Range Sweep Range appears only when the configuration includes multiple tuners. See Multiple Tuner Switch Configuration (page 232).

This selection appears when a single-channel system has multiple tuners. Each choice corresponds to one of the tuners installed.

- The 0-4MHz entry corresponds to no tuner; the values represent the baseband span of the ADC installed (either 0-4 MHz or 0-8 MHz).
- The 2 MHz to 32 MHz entry corresponds to a WJ9119 tuner.
- The 2 MHz to 2.65 GHz entry corresponds to an 89431 tuner.

These selections are defined in the `e3238s.n6841.cfg` file. See also, Multiple Tuner Switch Configuration (page 232).

4. Tuner Sweep Control This allows you to lock the tuner so that the IF output can be operated with a DDC receiver.

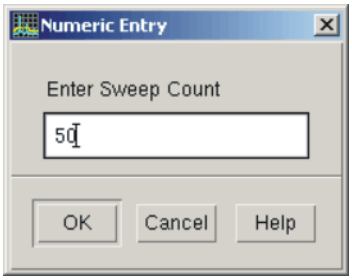
Lock Tuner allows you to stop the system from sweeping by *parking* the tuner LO at a fixed frequency. This should be used when the tuner's IF output is used to create fft spectral data AND stream IQ for audio or recording simultaneously. Locking the tuner does not stop the search; it restricts the search to the span of the tuner.

When the **Lock Tuner** button is checked, the tuner's local oscillator does not sweep frequency. This is required when the tuner output is shared with a DDC.

Note

Locking the tuner causes the N6820ES software to not check the search frequency parameters to see if they are valid. If, in the General Search Setup dialog box, you set a start or stop frequency outside the tuner's range, the values will not be corrected by the software until the tuner is unlocked.

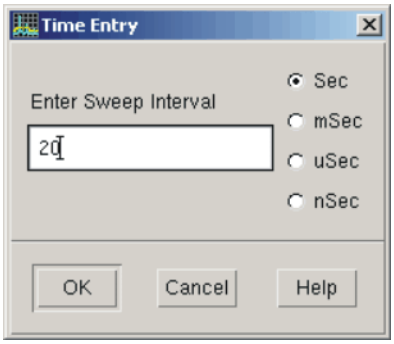
Sweep Count Entry



This dialog box allows you to enter a value for sweep count.

The sweep count is the number of sweeps after which sweeping stops. This occurs when the Sweep Mode is *Counter* which is selected in the Search Type dialog box.

Sweep Interval Entry

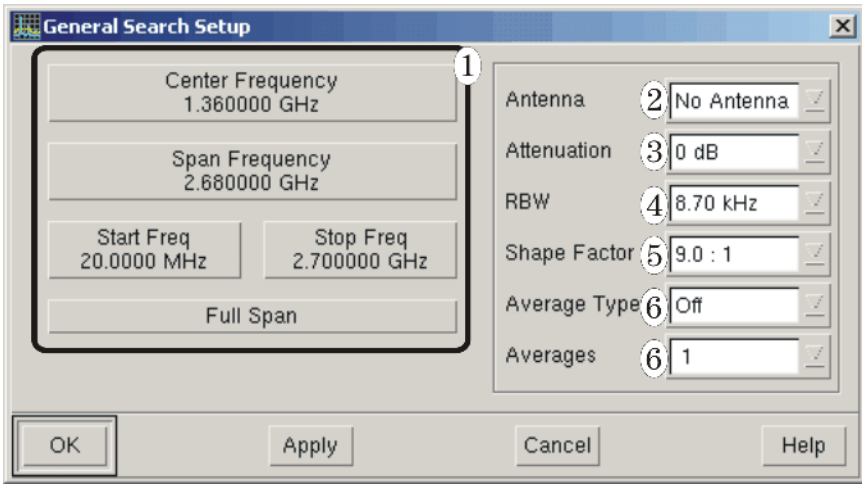


This dialog box allows you to enter a value for sweep interval.

The sweep interval is the time between individual sweeps. This occurs when the Sweep Mode is *Interval* which is selected in the Search Type dialog box.

General Search Setup

Toolbar Icon
Path: Search, Type, General; Search, Setup



This dialog box is used to set up **general** search sweeps. Set the Search Type (page 287) to General before selecting Search, Setup.

1. Frequency Entry (page 295)
2. Antenna (page 298)
3. Tuner Attenuation (page 299)
4. RBW (page 300)
5. Shape Factor (page 300)
6. Averaging (page 301)

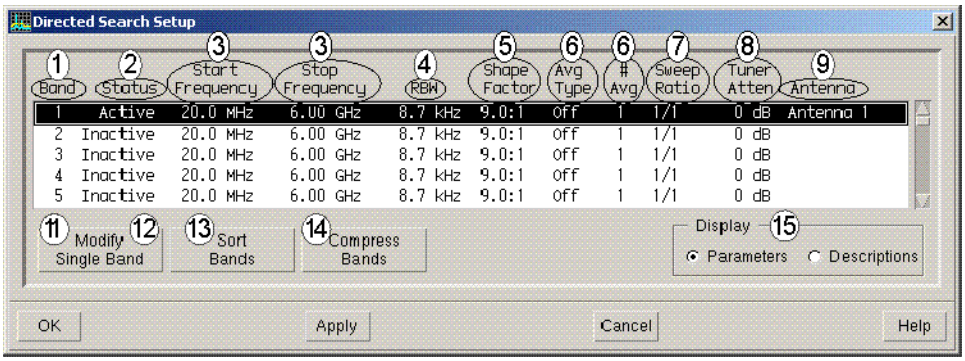
- **OK** makes the specified changes and closes the dialog box.
- **Apply** makes the specified changes and leaves the dialog box open.
- **Cancel** closes the dialog box; no changes are applied.

Note

Sweep frequencies may also be specified via marker positions. See Marker Popup Menu (page 69).

Directed Search Setup

Toolbar Icon
Path: Search, Type, Directed; Search, Setup



This dialog box is used to set up search sweeps. It's appearance depends on the Search Type (page 287). You should select the search type before configuring the sweep.

To print this, see Printing the Directed Search Band Table (page 308).

1. Band number (1 to 100; use Scroll Bars (page 133) to scroll list)
2. Status (page 298)
3. Frequency Entry (page 295)
4. RBW (page 300)
5. Shape Factor (page 300)
6. Averaging (page 301)
7. Sweep Ratio (page 303)
8. Tuner Attenuation (page 299)
9. Antenna (page 298)
10. Description (page 294) (not displayed in above figure; see Display (page 307))
11. Single-Band Search Setup (page 293) (if only 1 band is selected)
12. Multi-Band Search Setup (page 305) (if more than 1 band is selected)
13. Sort Bands (page 306)
14. Compress Bands (page 307)
15. Display (page 307)

- **OK** makes the specified changes and closes the dialog box.
- **Apply** makes the specified changes and leaves the dialog box open.
- **Cancel** closes the dialog box; no changes are applied.

Note

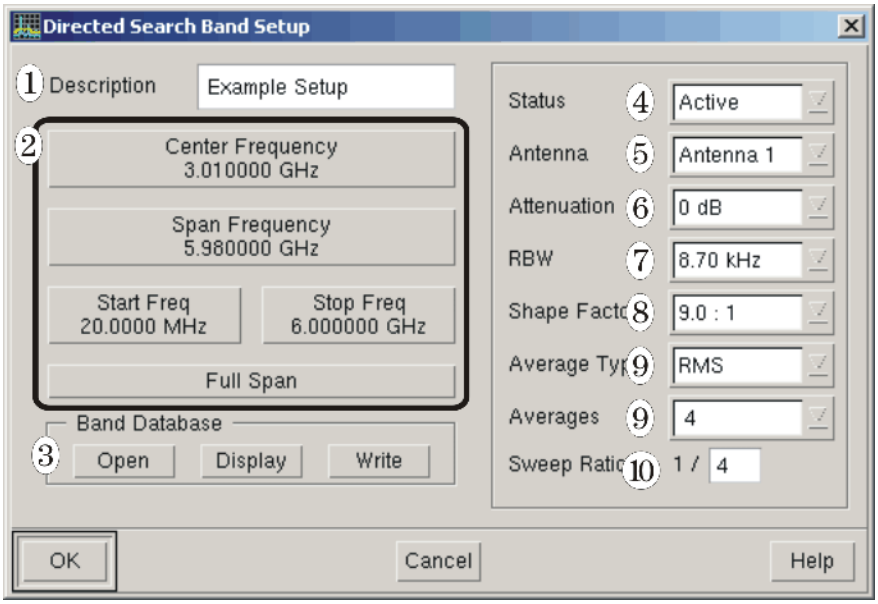
To save a search setup for later recall or to load a previously saved search setup, see the discussion of Mission Setup Sections (page 132).

To change parameter values for one or more bands,

1. Select the band(s) to modify.
   - To select one band, click anywhere on the line (in the list) and then click the Modify-Single-Band button (or double-click the line).
   - To select multiple bands:
     - To select *contiguous* lines, click and hold the left mouse button, then move it up or down the list; or click the first, then press and hold the Shift key and click the last.
     - To select *non-contiguous* lines, press and hold the Ctrl key and click the lines.
   - To select *all* bands:
     i. Press the Ctrl+Home key. This takes you to the top of the list and selects the first line.
     ii. Press Shift-Ctrl+End.
2. Click the Modify-Single-Band button. ("Single" is "Multiple" if more than one band is selected.) This displays the Single-Band Search Setup (page 293) or the Multi-Band Search Setup (page 305) dialog box.
3. Modify the parameters you wish to change. (See dialog boxes noted in previous step.)
4. Click OK.

Single- Band Search Setup

Path: Search, Type, Directed; Search, Setup



This dialog box appears when one entry in the directed search setup list is selected (click any parameter in the row) and you click the Modify Single Band button. It calls a dialog box that allows you to modify all the parameters that appear in the list for a single band.

1. Description (page 294)
2. Frequency Entry (page 295)
3. Band Database (page 296)
4. Status (page 298)
5. Antenna (page 298)
6. Tuner Attenuation (page 299)
7. RBW (page 300)
8. Shape Factor (page 300)
9. Averaging (page 301)
10. Sweep Ratio (page 303)

- **OK** makes the specified changes and closes the dialog box.
- **Cancel** closes the dialog box; no changes are applied.

Sweep frequencies may also be specified via marker positions. See Marker Popup Menu (page 69).

Description

This field allows you to describe the band or add a comment. The description appears in the list when “Description” is selected in the *Display* section of the Directed Search setup dialog box.

This text also appears, along with the band number, when the mouse’s Directed Search Band feature is used in a trace. See the discussion of the Mouse’s Left Tab (page 466).

The description text can contain as many as 39 characters. To change the description:

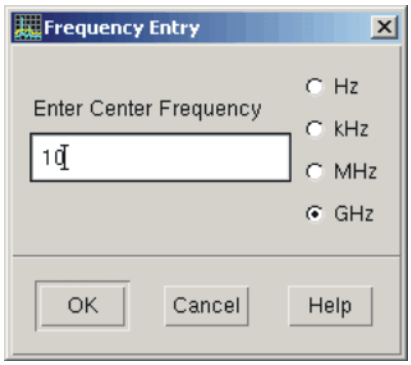
1. Move the cursor into the text box; it should change into a text cursor that looks like an I-beam.
2. Position the cursor between characters and click.
3. You can now add characters by typing or delete them by pressing the Delete or Backspace keys.

To replace several characters at once, “wipe” them by moving the cursor across them while holding down the mouse button and then releasing it. All selected characters are replaced by whatever you type.

Note

Band descriptions may be deleted when you compress the bands. See Compress Bands (page 307).

Frequency Entry



This dialog box appears when you click a button to enter a frequency or a bandwidth. To enter a value:

1. Enter the frequency value in the text box. The mouse cursor must be somewhere in the Frequency Entry dialog box while you type.
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

If the frequency values are outside the frequency range of the selected Antenna (page 298) a warning message is displayed.

When the search type is **directed**, the sweep may be defined by more than one frequency band. Frequency bands may overlap and gaps in the frequency coverage are allowed. If the frequency bands overlap, the other parameters are evaluated so that the sweep occurs smoothly, using the more stringent settings.

Example When two bands share a frequency range but have different RBW or average settings, the lower RBW value and the higher number of averages are used.

The Directed Search Setup list can be “cleaned up” so that overlapping frequencies are broken out. See Compress Bands (page 307).

When the search type is **general**, the frequency span may be quickly changed using the Tune-to-Trace entry in the Trace Popup Menu (page 456).

Note Using the Frequency Entry dialog box you can set a search limit frequency that is outside of the tuner’s range. If the tuner is unlocked, the N6820ES software corrects the out-of-range entry as soon as the “Apply” button is clicked. If, however, the tuner is locked, the values are not checked and the erroneous value is not corrected. When the tuner is later unlocked, the values are checked and the erroneous value is corrected

Band Database

The **band database** feature is used to define bands by selecting a definition from a list. You can add band definitions to a database (list) or create new ones. The band database is a computer file containing comma-separated-values (csv) that define the band setup. An example is the frequency.csv file included with this product. These files can be loaded into the text editor to print or change. The information fields are description, start frequency, stop frequency, RBW, and shape factor.

Open This button calls the Filename Entry (page 140) dialog box that lets you load a comma-separated variable (csv) signal database file like `frequency.csv`.

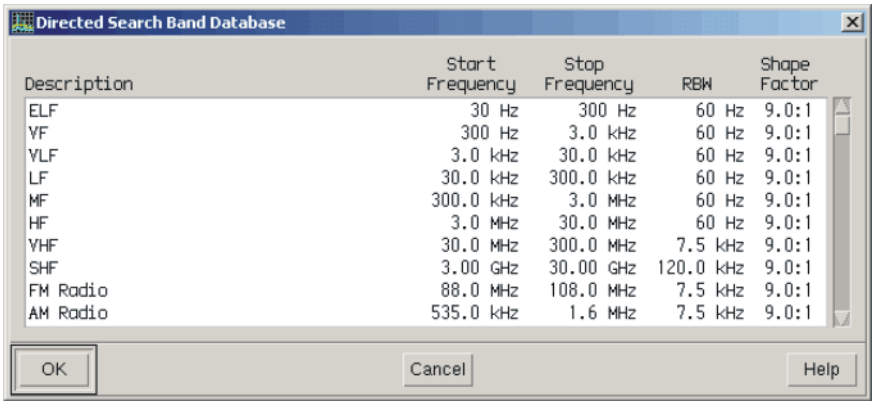
To read a band definition from an existing database:

1. Click **Open** and select the database file (frequency.csv may be found in `C:\e3238s`).
2. Click **Display**, which opens a dialog box. See following illustration.
3. Double-click anywhere in line of the entry you want from the database. (Or click once on the line and then click **OK**.)

You can make a new band database by specifying a filename that doesn't already exist and then adding band definitions to it.

- To create a new database file, click **Open** and specify a filename that does not already exist.
- To add an entry to a database, set up the band definition including comments, and click **Write** instead of Display.

Display After a database has been opened, this button displays the database to read an entry into the Band Setup dialog box.



To display a database listing:

1. If "Display" is ghosted, open a database file. (See previous discussion on how to open a database file.)
2. Click the Display button to display the database.
3. Click anywhere on the line of the band description you want to use. (The dashed focus line around a selection indicates that only one list item may be selected at a time.)
4. Click OK (or double-click in the previous step).

Write Use this button to add the band defined in the setup dialog box to an open database file. A search band database file *must* be open before you can add to it.

Status

This field exists only when the Search Type (page 287) is **directed**.

- **Active** means the parameters defined in this band are a part of the search.
- **Inactive** means that this band are not part of the search.

Antenna

This is a list of active antennas to choose from. The N6841A RF Sensor has a built-in 2 X 1 solid state RF switch and therefore, two different antennas can be specified with no external switching. See System Block Diagram (page 23) for more information.

The antennas' active status, name, gain, and frequency range are assigned in Antenna Configuration (page 226). Only **active** antennas appear in the list.

If the search frequency span is not within the antenna's frequency range (as specified in the antenna configuration), a warning message is displayed.

When the search type is *directed*, different antennas may be used for different parts of the spectrum by using multiple bands to define the sweep and specifying a different antenna for each band.

Note

If a band has 'no antenna' specified, the search receiver uses the last antenna specified (it doesn't switch).

Tuner Attenuation

Specifies the amount of attenuation used.

If your system has more than one search receiver (multiple channels) see Muti-Channel Attenuation Offset (page 526).

Attenuation Ranges

- **N6841A RF Sensor** attenuation range is from -16 to 34 dB

A negative attenuation value is gain.

The attenuation should be selected so that signal energy at the ADC input do not result in an overload condition. This also assumes you know what signal levels to expect from the antenna.

Notes

- Tuner overloads are *not* detected by the N6820ES system.
- ADC overloads *are* detected; they are indicated in the application window by changing the Trace Identifier (page 54) background color to red. Also, if the marker is on and its location is in a sweep segment created with overloaded ADC data, “OVLD” appears in the Marker Readout (page 61).
- When an ADC overload is detected, the tuner is probably overloaded, too. You should increase the tuner attenuation to bring the ADC input signal to just below the range setting.

For more information, see Antenna Configuration (page 226), System Block Diagram (page 23), and ADC Input Range under Setting Sweep Measurement Parameters (page 27).

RBW

Resolution bandwidth (RBW) is the smallest bandwidth energy that the analyzer can resolve (distinguish from other energy around it). Smaller resolution bandwidths give better resolution but also require more memory and may slow the sweep, depending on the installed equipment and other settings, like averaging. See Setting Sweep Measurement Parameters (page 27).

Advanced Note

The RBW resource size is set in the e3238s resource file. The default resource is 8,000,000 points. Each magnitude value is 4 bytes so this is roughly equivalent to 32 MB of memory. This setting limits the RBW×span value; as RBW gets smaller, the span that can be stored decreases. For smaller RBW settings the memory usage may be calculated by dividing the span by the bin spacing. See the discussion in Application Resources (page 17) and the discussion of data storage versus RBW in Setting Sweep Measurement Parameters (page 27).

Bin Spacing is the frequency spacing between spectral components in an IF output signal. RBW is derived from the values of shape factor and bin spacing such that, given the shape factor filter characteristic, bin spacing is proportional to **resolution bandwidth** (RBW). When the search setup is saved with Save Mission Setup (page 129), the values saved are shape factor and **bin spacing**; not RBW.

Shape Factor

Shape Factor is a characteristic of a bandpass filter defined as the ratio of the bandwidth at 3dB to the bandwidth at 60dB. Shape factor is sometimes called *selectivity*.

The shape factor setting affects the resolution bandwidth values available; when you change the shape factor, the list of values for RBW change. You should always select shape factor before selecting the RBW.

See the discussion under Setting Sweep Measurement Parameters (page 27).

Averaging

Averaging is used to increase the probability of intercepting a signal of interest. Select the type of averaging used and the number of averages to take.

Average Type

- **Off** means no averaging is used. The number of averages has no effect until one of the other types is selected.
- **RMS** (root mean squared) is a power average that reduces the variance of each point's *magnitude*. It does not lower the noise floor. Using larger numbers of averages results in larger reduction of random energy but can also slow the sweep rate. See the following advanced note on overlap processing.

  $$AVG_{rms} = \sqrt{\frac{1}{n}\sum_{i=1}^{n} X_i^2}$$

  where n is the number of samples to average together

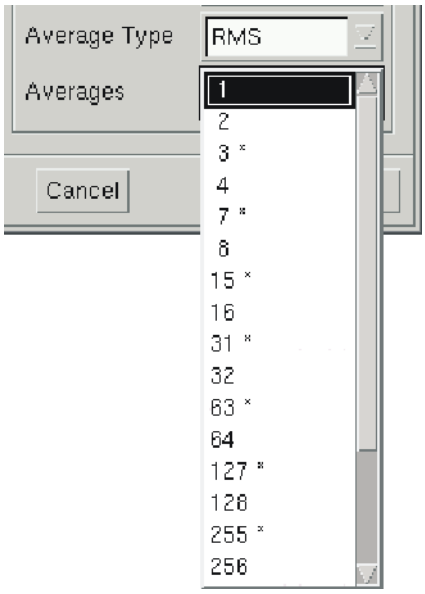
  Use RMS averaging to find energy in a noisy environment or to find weak energy near the noise floor. Do *not* use RMS averaging to search for transient signals.

  For RMS averaging, the larger the number of averages, the more the noise variance is reduced and the easier it is to distinguish weak signals *if* they are not transient. Increasing the number of averages may also slow the sweep rate, depending on the equipment installed and other settings, like RBW.

- **Peak** averaging displays the largest amplitude value for each frequency value. The number of averages is the number of samples taken. Use this averaging type for transient signals.

  For Peak averaging, the number of averages specifies how many samples to take while keeping track of the largest signal values. Increasing the number of averages increases the probability of intercepting a transient signal.

Averages This is the number of samples taken to calculate the selected average type. This number is used differently for each type of averaging. See the discussion under Setting Sweep Measurement Parameters (page 27). The menu values that are marked with an asterisk (*) indicate values that permit overlap processing, described in the next section.

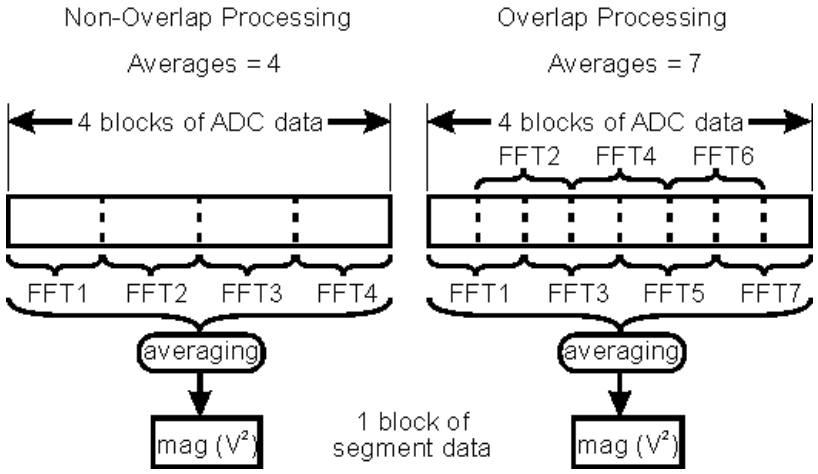


Overlap Processing

The N6841A RF Sensor uses *overlap processing* to offer more averaging without impacting measurement speed.

Advanced Note

Averaging is performed by collecting multiple blocks of data (the number of blocks is determined by the number of averages selected) and passing it all to the onboard FPGA. The FPGA performs as many FFTs and average calculations as required before sending the spectral data over the network to the host PC. See the following figure.



Each block is converted to magnitude data with the FFT function and the results are averaged together to get the trace value. The number of FFTs is always the same as the number of averages.

Sweep Ratio

This field exists only when the Search Type (page 287) is **directed**.

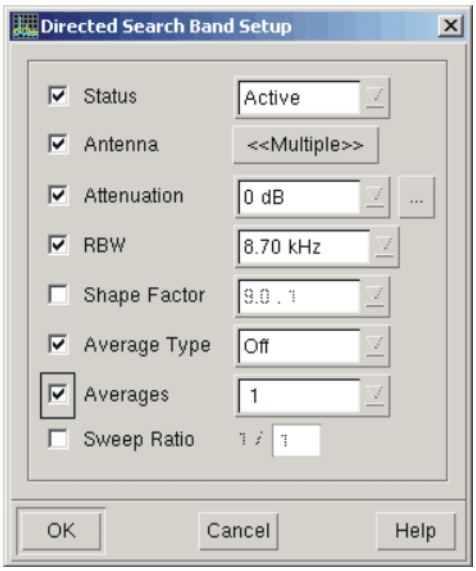
The **sweep ratio** specifies how often the band is swept with respect to the overall sweep rate. This allows you to sweep one band more often than another.

1/1 is the highest setting. Choosing a number like 5 results in a ratio of 1/5, which means the band is swept once every 5 times that a band set at 1/1 is swept. To improve the sweep rate for a band, set its sweep ratio to 1/1 and

set the other bands' sweep ratios to a number greater than one. The bigger the number, the more times a band is skipped being swept and the more time is spent sweeping bands with lower sweep ratios.

Multi-Band Search Setup

Path: Search, Type, Directed; Search, Setup



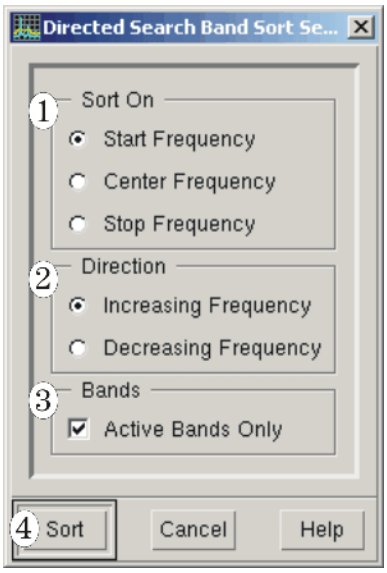
This dialog box functions the same as the Single-Band Search Setup (page 293) except that you can't modify frequency or description information.

To modify a field for more than one band:

1. Select the bands to modify (in the Directed Search Setup (page 291) dialog box).
2. Click Modify Multiple Bands (in the Directed Search Setup (page 291) dialog box).
3. Click the button left of the field name; the labels on the pull-down lists become active.
4. Pull down the option list and select a new value.
5. Repeat the previous two steps for any other parameters you wish to modify.
6. Click OK.

Sort Bands

Path: Search, Type, Directed; Search, Setup, Sort



This dialog box allows you to pick the sort criteria and direction of the sort and allows limiting it to active bands.

1. **Sort On** is a list of sort parameters. This is the primary sort value. Pick the parameter you want the bands sorted by.
   - **Start Frequency** sorts the bands by the value of their start frequency.
   - **Center Frequency** sorts the bands by the value of their center frequency.
   - **Stop Frequency** sorts the bands by the value of their stop frequency.

   If two bands have the same primary sort value (for example, if you select Start Frequency and the bands have the same start frequency), the sort algorithm uses the secondary sort value to determine the order. See the following list:
2. **Direction** specifies either increasing or decreasing frequency values.
3. **Bands** allows you to include or exclude the bands whose status is inactive.
4. **Sort**: After setting the above parameters, click this button to perform the sort.

Compress Bands

This button reorganizes the Directed Search Setup list so that bands with overlapping frequencies are redefined. This breaks out the parameters so that changes in sweep parameters other than frequency are more easily identified.

Band compression may break up existing bands and create new bands or it may combine existing bands. After the compression, there may be more bands or fewer. See following note.

Note

Band Descriptions may be deleted by the sort. If you compress the bands and don't like the results, click the Cancel button and no change will be made. To start over, open the Search Setup dialog box.

If the compression creates new bands and the total number of bands exceeds 100, an error message is displayed that recommends manually changing the bands.

Display

The Display selection allows you to choose what is displayed in the search band list.

Parameters means all of the search band parameters appear in the list. When this is selected, band descriptions are not displayed.

Descriptions means the descriptions are displayed in the list. When *Descriptions* is selected, the parameters that are not displayed are:

- average type
- number of averages
- sweep ratio
- tuner attenuation
- selected antenna

Printing the Directed Search Band Table

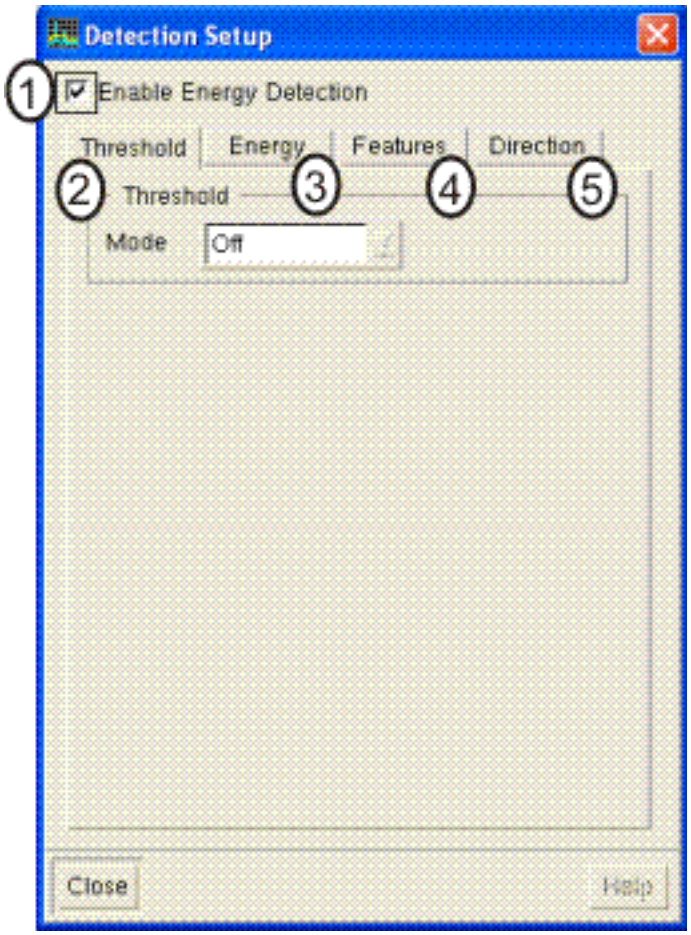

The Drag-and-Drop Cursor

To print all or part of the search band table:

1. Make sure the text editor pane is active. See Display Layout (page 422) to add or remove panes from the main window.
2. Put the table heads in the text file (optional).
   a. Click on any column head in the table (like RBW) with the middle mouse button.
   b. Hold the button down (the cursor turns into the drag-and-drop icon).
   c. Drag it to the text editor pane.
   d. Release the mouse button.
3. With the mouse cursor in the text editor pane, press the Enter key to move the text cursor (looks like "I") to the beginning of a new line.
4. Select the bands you wish to print.
   - To select all bands:
     - Click the first band, scroll to the end and Shift+click the last band.
     - Click and hold on the first band, move the mouse cursor to just below the table window (the list scrolls up), release when the last band is selected.
     - Press Ctrl+Home on the keyboard (move to top of list and selects first band), then press Shift+Ctrl+End.
   - To select contiguous bands, click a line in the table with the left mouse button and hold, drag the mouse either up or down to select contiguous bands, and release the button when you get to the last one you want.
   - To select non-contiguous bands, press and hold the Ctrl key and then click individual bands.
   - To deselect bands, press and hold the Ctrl key and click selected bands.
5. Using the middle mouse button, click any of the selected bands and hold the button down (the cursor turns into the drag-and-drop icon).
6. Move the mouse to the text editor pane.
7. Release the mouse button.
8. Print the file from the text editor as described under File Menu (page 114).

Energy Detection

Toolbar Icon
Path: Search, Detection Setup...



If your system has more than one search channel installed (option EMC) see also the discussion on Energy Detection Dialog Box (page 522).

This dialog box is used to set parameters that detect a signal of interest in the measured frequency span. It has two tabs, Threshold and Energy.

It has four components:

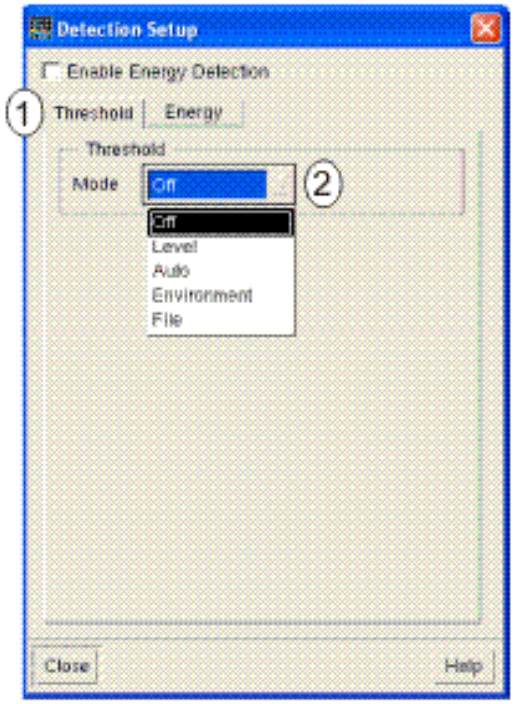
1. Energy Detection – a check box that controls whether energy detection is active. When detection is active, detection entries are made in the Energy History Pane (page 88).
2. Threshold Tab – This tab displays controls that allow you to control the threshold for energy detection.
3. Energy Tab - This tab allows you to control the values used to define transmitted energy.
4. Features Tab - This is allows you to control optionally loaded features.

5. Direction Tab - This tab allows you to control the energy analysis of the direction finding option.

Tip No energy is passed to the Energy History Pane (page 88) or the Alarms if "Energy Detection" isn't enabled. See Process Overview (page 33).

Threshold Setup

Path: Search, Detection Setup, Threshold, Off



Threshold Modes **Off** means the threshold is not applied. In this case energy bandwidth is calculated using the bandwidth criteria described in Energy Criteria (page 320).

Level (page 311) specifies one value for the entire search range.

Auto (page 313) specifies threshold values based on sweep values to approximate the real-time noise floor.

Environment (page 315) uses threshold values defined by measuring the environment (can be stored in a file).

File (page 318) uses threshold values stored in a file.

Channel (page 319) specifies that the threshold values are derived from another receiver channel. This menu option is only available if multiple search receivers are enabled in the `e3238s.n6841.cfg` file.

Tip

- Pick a threshold *before* turning on the energy detection. If you turn on Energy Detection before turning on a threshold, the energy criteria settings are used, by themselves, to define energy. This may create unexpected results, like one detected signal whose bandwidth is the same as the entire sweep span.

General Information

Threshold is an amplitude reference that affects the trace display and energy detection. It also plays a role in determining a signal's measured bandwidth. See Energy Criteria (page 320).

The threshold settings affect a trace depending on the trace type:

- For a *spectrum* trace, the threshold is represented as either a line at the threshold value or as a value below which the trace line is not displayed. This is selected in the Trace Setup (page 424) dialog box.
- A color spectrogram trace is not affected by the threshold setting.
- If the trace type is spectrogram, the threshold *must* be on for the trace display be meaningful. See Trace Setup (page 424).

The threshold definition is used, with the energy criteria, to define what signals are detected. If threshold is off, only energy criterion is used. See Energy Detection (page 309).

The selected threshold mode appears on the Mode button. To change the mode:

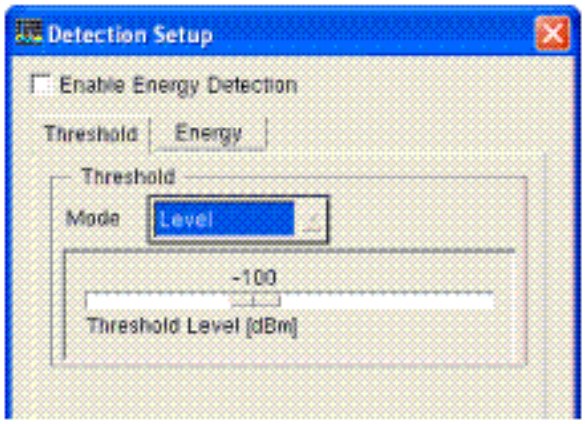
1. Click the mode button; a list of options appears
2. Click the new mode; the dialog box changes to reflect the selected mode

Changes made to threshold settings are implemented immediately, and appear in the traces (if Threshold Presentation isn't "Off" in Trace Setup (page 424)) so you can see the effects of changes.

To change the color of the threshold line, see Colors (page 471).

Level

Path: Search, Detection Setup, Threshold, Level



Threshold Level is a slider control used to specify one value for threshold for the entire search range.

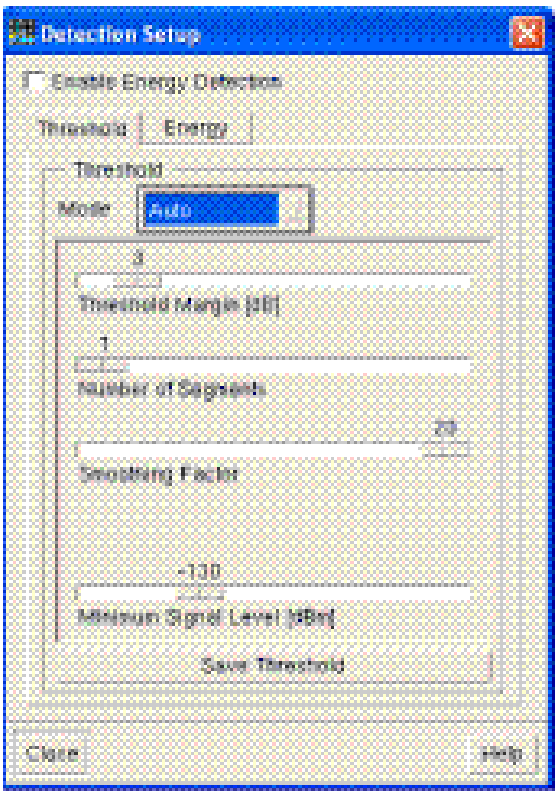
To change the level setting:

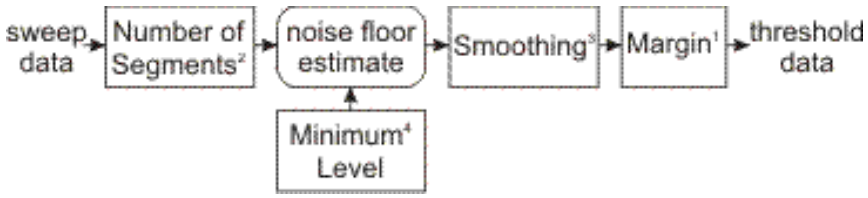
- Click and drag it horizontally with the mouse.
- Click it and then use the keyboard's left-arrow and right-arrow keys.
- To move it 1 dB, click in the area between the slider button and the end of the slide bar. Holding the mouse button down scrolls the value.
- To jump the button to a spot on the slide bar, position the mouse cursor where you want it to be and click the middle mouse button. Holding the mouse button down allows you to drag the slider button.

For information on other threshold modes, see Threshold Setup (page 310).

Auto

Path: Search, Detection Setup, Threshold, Auto





Auto threshold approximates the noise floor of the environment in real time. This creates a time-varying or non-level noise floor. The Auto threshold calculations make its sweep slightly slower than Level threshold.

A sweep is composed of anywhere from 1 to 8192 steps or *data segments* that are placed end-to-end to form a trace. Each of these steps is broken into a user-defined number of *threshold segments* and an average is calculated for each. These average values are used as the threshold value for the entire segment.

The threshold value for each segment is the energy value smoothed with a moving average, bounded by the calculated average value and the user-specified minimum energy level, and raised by the user-specified margin value.

The user-specified smoothing value is used to calculate a moving average, where the value is the number of segments either side of the segment whose threshold value is being calculated. If the smoothing value is set to 1, no smoothing is applied.

Threshold Margin Range: 0 to 30 dB. This specifies the difference between the calculation values and the threshold values used, in dB above the trace.

Number of Segments Range: 1 to 20. This specifies the number of threshold segments per sweep segment. The larger the number, the more the threshold tracks the trace.

Smoothing Factor This specifies the number of points used in a moving average. The threshold line is created using a moving average and limited by the noise floor estimate calculated for each threshold segment.

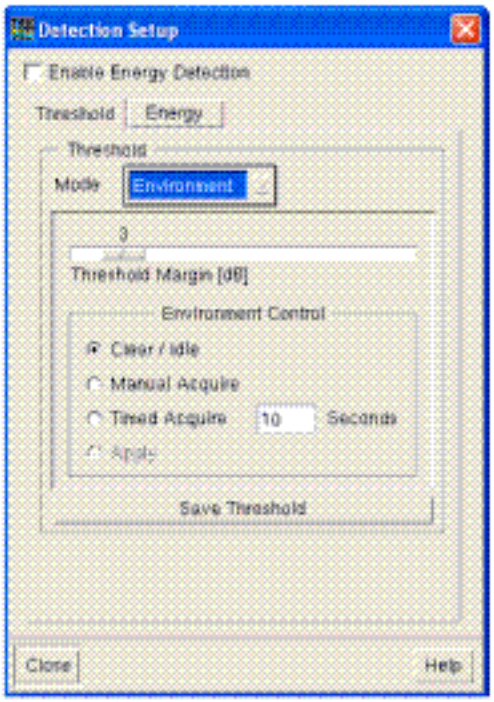
- To create a threshold that tracks the noise floor as close as possible, choose the largest number of segments and the smallest smoothing value. This combination can be used to detect the most energy, depending on the threshold margin setting.
- To get the smoothest threshold line, choose the smallest number of segments and the largest smoothing factor. This combination may “hide” valid signals.

Minimum Signal Level Range: -200 dBm to 50 dBm. This specifies the smallest amplitude value used in the calculation. Calculated values less than this are changed to the minimum value.

For information on other threshold modes, see Threshold Setup (page 310).

Environment

Path: Search, Detection Setup, Threshold, Environment



This threshold is a sample of the sweep raised by a margin value.

Threshold Margin This slider control is used to specify how much to raise the threshold above its original value. The selected value is only used at the time you acquire the threshold data. After the data is acquired, this slider control has no effect in the current threshold.

Environment Control This is a group of controls used to create a threshold based on measurements taken with the N6820ES Signal Intercept and Collection Software.

- Clear/Idle is a radio button that clears an existing threshold definition and idles (deactivates) the creation process.
- Manual Acquire is a radio button that starts acquiring environment data and creating a threshold definition. To end the acquisition, click Apply.
- Timed Acquire is a radio button used to acquire environment data for a given period of time. The time is entered in the Seconds text box beforehand. When the time period elapses, the threshold definition is automatically applied. To change the time value, click in the text box and enter the new value.
- Apply is active when Manual or Timed Acquire are used. It is used to end a Manual Acquire and can end a Timed Acquire before the specified time elapses.

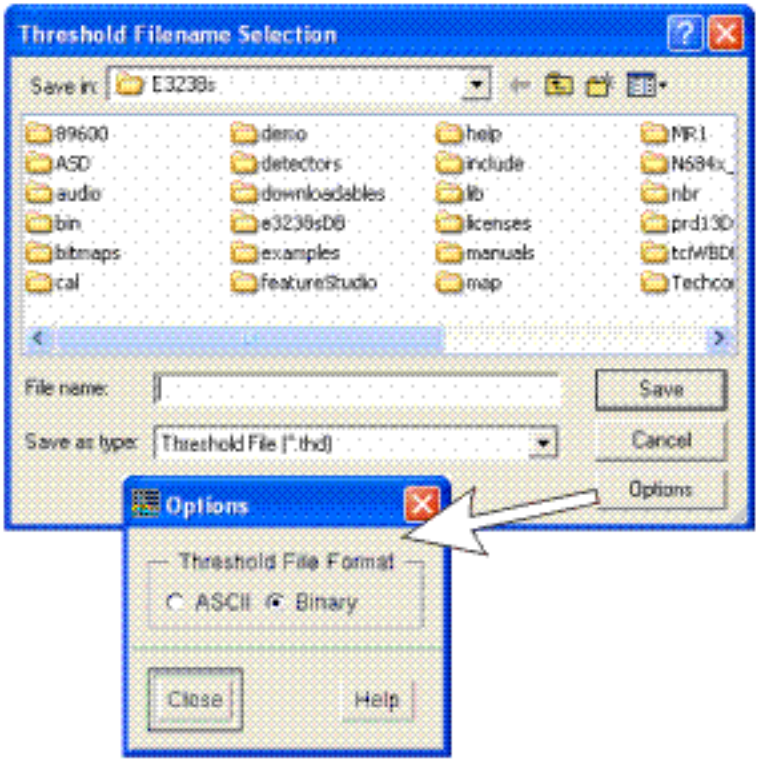
Save Threshold This button calls the Save Threshold (page 317) dialog box, which allows you to save the current threshold definition. Files created this way may be recalled with the threshold type: File (page 318).

For information on other threshold modes, see Threshold Setup (page 310).

Save Threshold

Path: Search, Detection Setup, Threshold, File, Save Threshold

This dialog box is part of the Energy Detection (page 309) when the threshold type is Environment. It is called by pressing the Save Threshold button.



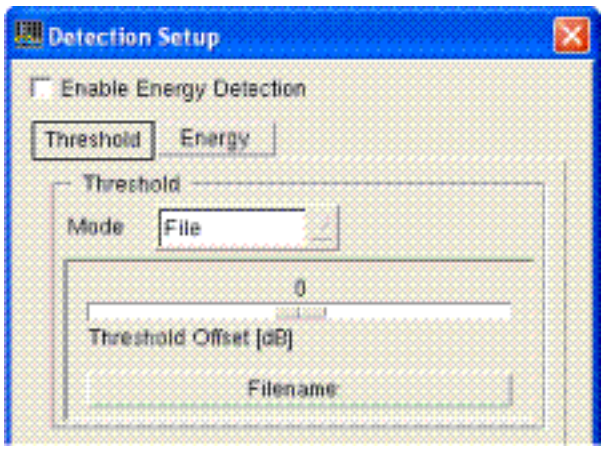
This dialog box is much the same as most other Filename Entry (page 140) dialog boxes except that it allows you to specify saving the file in binary or ASCII format.

The default format is binary, which has a 3:1 file size advantage. Binary files cannot be edited or modified.

Saving in ASCII format creates a file that may be viewed and modified with an editor such as vi or emacs. The commands that define the threshold are described in Appendix A: User-Defined Threshold (page 559).

File

Path: Search, Detection Setup, Threshold, File, Save Threshold



This threshold type uses a file from the system disk as a threshold. Threshold files are created by saving to file in the Threshold Environment (page 315) dialog box or they may be created as described in Appendix A: User-Defined Threshold (page 559).

Threshold Offset This slider is used to add an offset value to the definition loaded with the Filename button. The offset value may be positive or negative.

Filename This button calls the Filename Entry (page 140) dialog box, which allows you to specify a file containing a threshold definition. Such a file may be created in the Appendix A: User-Defined Threshold (page 559) mode with the Save Threshold button or with an editor as described in Appendix A: User-Defined Threshold (page 559).

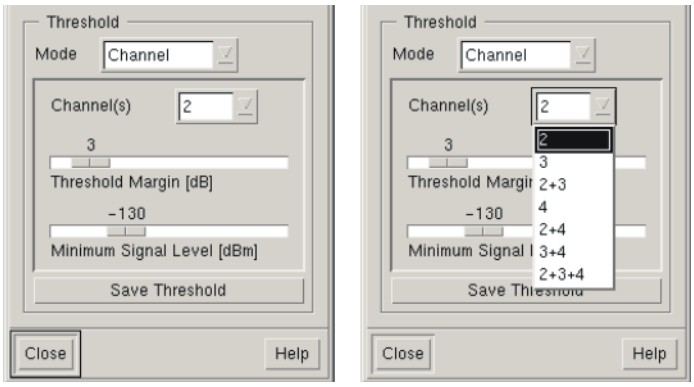
Note

You may specify a threshold file when the Threshold Mode is not *File* but the specified file is not loaded until the Threshold Mode is set to *File*.

When a mission setup has a threshold filename specified, and the mission setup is saved, what is saved is the filename; not the threshold data. If that state file is loaded later, be sure the threshold file is also present (e.g., when creating a quick configuration to be used on other systems).

For information on other threshold modes, see Threshold Setup (page 310).

Channel



This threshold type uses energy levels from secondary search receiver channels as a threshold. For these additional channels to be available, the system must be configured for multi-channel operation as described in the *Installation and Configuration Reference* under Multi-Channel Hardware Installation.

When the channel option is selected, the Energy Detection (page 309) dialog box displays the Threshold Channel menu shown above. When you click on the Channels menu, you can select which channels the energy threshold is derived from. In the example above, the system is set up with four receivers. Receiver 1 is directed to Trace A.

The menu allows you to choose a single channel for a threshold value, or to choose a combination of channels. If a combination is chosen, the threshold value is the highest value of the combined channels

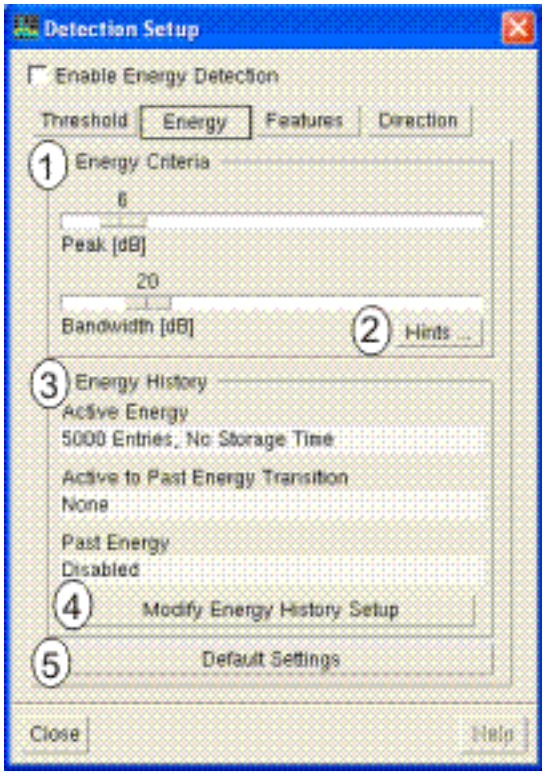
Threshold Margin This slider control is used to specify how much to raise the threshold above its original value. The selected value is only used at the time you acquire the threshold data. After the data is acquired, this slider control has no effect in the current threshold.

For information on other threshold modes, see Threshold Setup (page 310).

Energy Setup

Energy Setup

Path: Search, Detection Setup, Energy



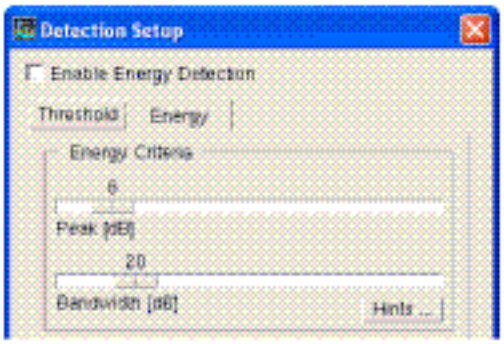
The Energy History tab contains five areas or buttons:

1. Energy Criteria - Determines the criteria that a signal must meet to qualify as "detected energy."
2. Hints - Allows you to specify areas of a bandwidth to search.
3. Energy History - This area displays a summary of the current energy history. It also allows you to modify the Energy History setup.
4. Modify Energy History - Allows you to modify the Energy History Setup.
5. Default Settings button - Clicking this button returns all setting in the Energy Setup tab to their default settings.

Tip Clear unwanted energy history entries either with the Clear Energy History (page 148) (clears *all* entries) or with the Delete Entry selection from the Energy History > Right-Click Menu (page 106) (clears single entries).

Energy Criteria

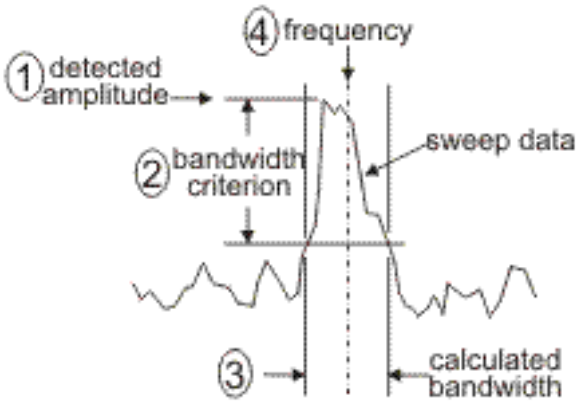
Path: Search, Detection Setup, Energy



Peak is an amplitude value used to define how much larger a signal must be than the threshold (see Threshold Setup (page 310)) or any of the nearby nulls to qualify as "detected energy."

This parameter setting affects marker peak searches and may be used to trigger alarms. See "Amplitude" under Single-Alarm Setup (page 338).

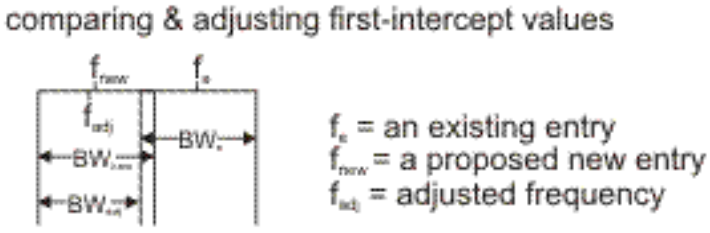
Bandwidth is amplitude setting used to calculate a signal's bandwidth.



The Bandwidth criterion is an amplitude value used to determine the bandwidth of the detected energy.

1. The detected frequency and amplitude are used as a reference point.
2. The bandwidth criterion setting (in dB) is used to calculate bandwidth.
3. The calculated bandwidth is the narrower of following two cases:
   - where the sweep data falls to a level equal to the detected amplitude value minus the specified bandwidth criterion.
   - where the sweep data crosses the threshold on either side of the detected frequency.
4. The frequency value listed in the energy history is the value at the center of the calculated bandwidth (not the detected peak's frequency).

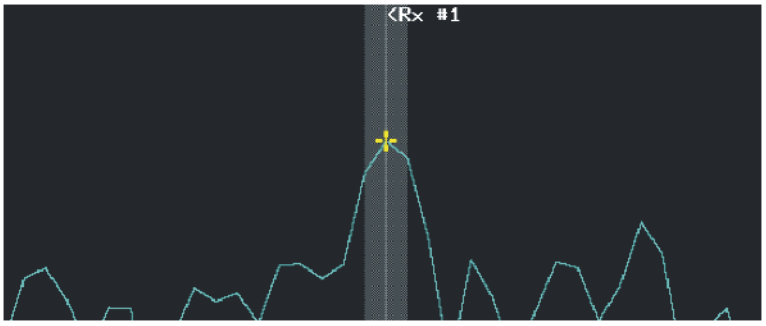
The frequency and bandwidth values (f_{new} and BW_{new}) are passed to the energy history. To enter the data correctly, it must be determined whether this should be added as a new entry or used to update an existing entry.



Energy history entries are organized by their frequency value. Each entry represents a range with no overlap of range between entries. The first-intercept frequency and bandwidth values for each entry are kept and used for comparison with proposed new entries as follows:

- If f_{new} falls within the range of an existing entry, the new data is used to update the existing entry.
- If f_{new} does not fall in the range of an existing entry and there is no overlap, a new entry is added using the first-intercept values "as-is".
- If f_{new} does not fall in the range of an existing entry but the range represented by BW_{new} overlaps the range of an existing entry, the new bandwidth is modified so that there is no overlap (BW_{adj}), the frequency is modified to be at the center of the new bandwidth range (f_{adj}), and a new entry is added having first-intercept values of f_{adj} and BW_{adj}.

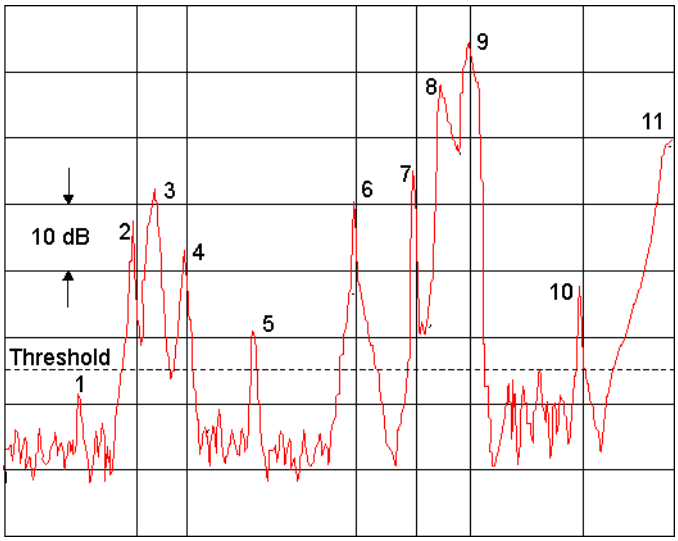
When the trace grid type is *Handoffs* (handoff frequencies) or *Energy History*, the bandwidth value is displayed visually in the trace pane as a band of color either side of the grid line. You may have to zoom in on the signal to see it if the bandwidth is very small compared to the frequency range being displayed in the trace. See figure below. See Trace Setup (page 424) to pick grid type and Mouse Features (page 507) for information on how to zoom scale.



Notes

- The handoff queue is a first-in-first-out list that shifts out the oldest entries when it gets full. See Handoff Log Pane (page 75).
- Advanced: To increase the number of entries in the handoff list, modify the resource `handoffLogViewLength`. See Handoff Log Pane (page 75).
- For information on the different ways signals can be handed off, see Handoff Log Pane, Handoff Source (page 77).

Example This example illustrates how these parameter settings affect energy detection.



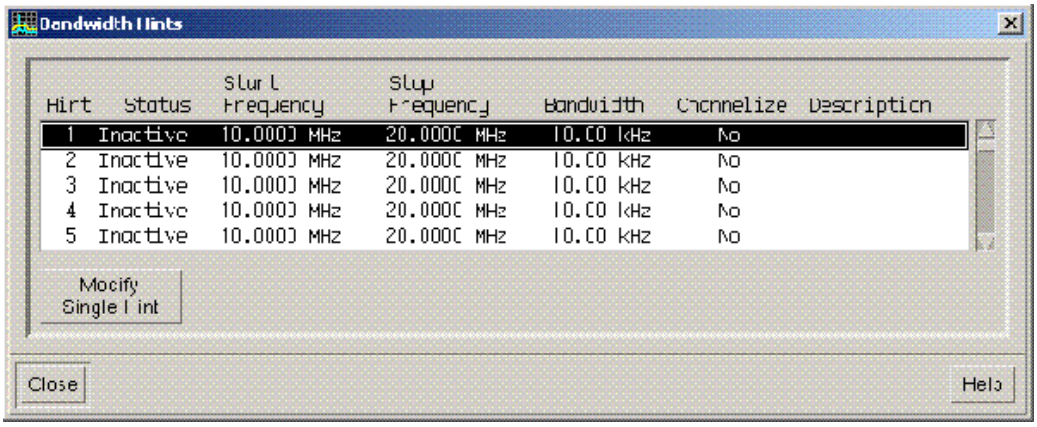
Peak Criterion = 15 dB

1. This peak is below the threshold setting; it does not meet the peak criteria.
2. This peak meets the peak criteria.
3. This peak meets the peak criteria.
4. This peak meets the peak criteria.
5. This peak exceeds the threshold level but by less than the specified peak criteria, so it does not meet the peak criteria.
6. This peak meets the peak criteria.
7. This peak meets the peak criteria.
8. The amplitude of a peak must exceed the lowest nearby null by the peak criteria; the null above this one is not 15 dB below the peak, so it does not meet the peak criteria.
9. Since the previous peak is not a detectable peak, the null used to define a peak is the one between 7 and 8. Therefore, this peak meets the peak criteria.
10. This peak exceeds the threshold level but by less than the specified peak criteria, so it does not meet the peak criteria.

Since there is no null above this peak, it does not meet the peak criteria.

Bandwidth Hints

Path: Search, Detection Setup, Energy, Bandwidth Hints ...



This dialog box is used to define parts of the spectrum where signals have known center frequencies and bandwidths. It allows you to specify the bandwidth and, optionally, frequency values that are recorded in the New Energy Log and the Energy History for energy detected in these bands. When a new peak is detected (one not yet in the Energy History), the values recorded for frequency and bandwidth may be those calculated in the Energy Detection process or predefined values in Bandwidth Hints.

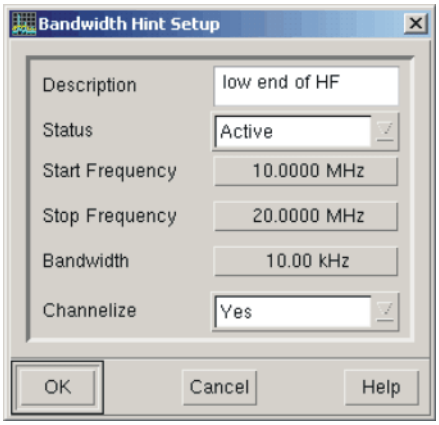
To change parameter values for one or more table entries,

1. Select the hint(s) to modify.
   - To select one hint, click anywhere on the line (in the list) and then click the Modify-Single-Band button (or double-click the line).
   - To select multiple hints:
     - To select *contiguous* lines, click and hold the left mouse button, then move it up or down the list; or click the first, then press and hold the Shift key and click the last.
     - To select *non-contiguous* lines, press and hold the Ctrl key and click the lines.
   - To select *all* hints:
     i. Press the Ctrl+Home key. This takes you to the top of the list and selects the first line.
     ii. Press Shift-Ctrl+End.
2. Click the Modify-Single-Hint button. ("Single" is "Multiple" if more than one hint is selected.) This displays the Single-BW-Hint Setup (page 325) or the Multiple-BW-Hints Setup (page 326) dialog box.
3. Modify the parameters you wish to change. (See dialog boxes noted in previous step.)

Click OK.

Single-BW-Hint Setup

Path: Search, Bandwidth Hints ...



Bandwidth hints are defined in Single-BW-Hint Setup (page 325).

This dialog box appears when one entry in the Single-BW-Hint Setup (page 325) dialog box is selected (click anywhere in the row) and you click the Modify Single Hint button. It calls the dialog box displayed above, which allows you to define or modify a bandwidth hint entry.

Description This field allows you to describe the bandwidth hint or add a comment. To enter or change text in the description, click anywhere in the text box and then type. The mouse cursor must be within the bounds of the dialog box while typing. The number of characters is limited to 32.

Status **Active** means when new energy is detected between the start and stop frequency values, the bandwidth value in the bandwidth hints table is used instead of the calculated bandwidth. Also, if Channelize is on, the value used for the energy's center frequency in the Energy History Pane (page 88) and the New Energy Log is calculated to be the center of the band.

Start Frequency This value defines the beginning of the frequency range for which bandwidth values are specified rather than measured. When you click the Start Frequency button, the Frequency Entry (page 295) dialog box appears.

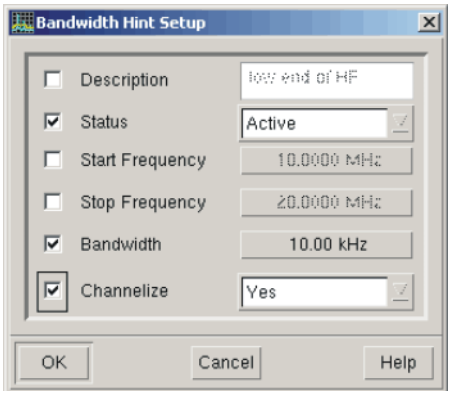
Stop Frequency This value defines the end of the frequency range for which bandwidth values are specified rather than measured. When you click the Stop Frequency button, the Frequency Entry (page 295) dialog box appears.

Bandwidth This is the bandwidth value used in the energy statistics when the hint is active. When you click the Bandwidth button, the Frequency Entry (page 295) dialog box appears.

Channelize **Yes** means the signal's center frequency is a specified value rather than the measured value. The value is that of the band's center. The bands are laid out from the start frequency to the stop frequency. There are as many bands as will fit between the two, with any excess in the last one extending beyond the stop frequency. For more information about the automated search process, see Process Overview (page 33).

Multiple-BW-Hints Setup

Path: Search, Bandwidth Hints ..., (select 2 entries), Modify Multiple Hints

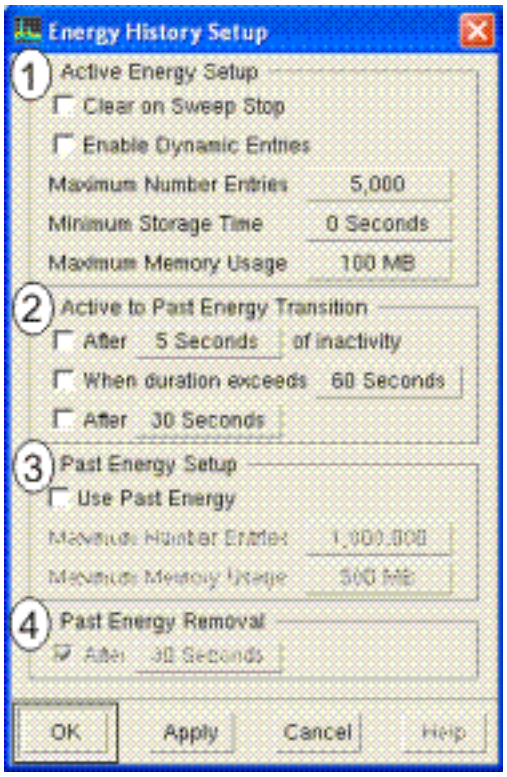


This dialog box functions the same as the Single-BW-Hint Setup (page 325) dialog box.

To modify a field for more than one hint:

1. Select the hints to modify (in the Directed Search Setup (page 291) dialog box).
2. Click Modify Multiple Bands (in the Directed Search Setup (page 291) dialog box).
3. Click the button left of the field name; the labels on the pulldown lists become active.
4. Pull down the option list and select a new value.
5. Repeat the previous two steps for any other parameters you wish to modify.
6. Click OK.

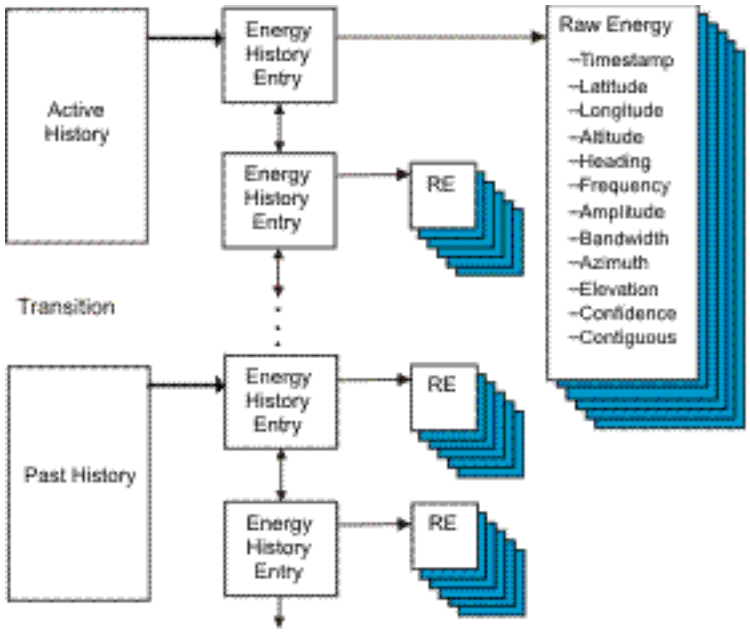
Energy History Setup



The Energy History Setup Dialog Box is divided into four sections:

1. Active Energy Setup (page 324)Active Energy Setup (page 328) - This area controls how active energy events are entered into the energy history.
2. Active to Past Energy Transition (page 325)Active to Past Energy Transition (page 329)- This area controls the transition of an entry from active to past energy.
3. Past Energy Setup (page 329) - This area controls how large a memory space is devoted to past energy events.
4. Past Energy Removal (page 330) - This area controls how long (in seconds) past energy entries are retained.

When energy is detected during the energy detection process an entry is placed in the Active Energy list. The entry will stay in the Active Energy list until removed by any of several methods.



Active Energy Setup

The Active Energy Setup area has the following controls.

Clear on Sweep Stop When selected, the Active Energy list is cleared when the sweep is stopped. If Past Energy is enabled, the Active Energy list entries are copied to the Past Energy.

Enable Dynamic Entries When selected, an Active Energy Entry is allowed to change its bandwidth and center frequency on subsequent intercepts as long as it doesn't overlap adjacent entries in the Active Energy list. The default mode is to set the center frequency and bandwidth only on the first detection.

Maximum Number Entries Clicking this button displays a dialog box that allows you to select the maximum number of simultaneous entries in the Active Energy list. When this limit is reached a warning dialog box appears and the pending entry is discarded. Overall system performance can be affected by entering too large of number.

Minimum Storage Time Clicking this button displays a dialog box that allows you to set the amount of time to store the raw energy information for each Active Energy entry. The raw energy information consists of the timestamp, location information (Latitude, Longitude, Altitude, and Heading), Frequency, Amplitude, and Bandwidth. For every new intercept, a Raw Energy entry is created until the minimum storage time is reached. Once the minimum storage time is reached, a new Raw Energy entry is not created, but the oldest is over written. A value of zero turns off the storage of Raw Energy entries.

Maximum Memory Usage Clicking this button displays a dialog box that allows you to set the maximum memory size that the Active History can grow to. It includes the size of all the Raw Energy entries created.

Active to Past Energy Transition

The second area of the dialog box is labeled "Active to Past Energy Transition." This area controls how Active Energy entries are removed from the Active Energy list.

There are three selection boxes in this section. Clicking on a selection box in this area enables the criteria. Multiple criteria can be selected.

After X Seconds of inactivity Commonly called the Age Filter. When this is selected, if an Active Energy hasn't been detected in a specified time, it is removed and placed in the Past Energy list. Clicking on the Seconds button in this selection displays a dialog box that allows you to specify the permitted length of inactivity.

When duration exceeds X Seconds Commonly called the Duration Filter. When this is selected, if an Active Entry has been detected continuously for a specified time, it is removed and placed in the Past Energy list. Clicking on the Seconds button in this selection displays a dialog box that allows you to specify the permitted duration.

After X Seconds Commonly called the Observation Filter. Once an Active Energy has existed for a specified time, it is removed and placed to the Past Energy list. Clicking on the Seconds button in this selection displays a dialog box that allows you to specify the permitted duration.

Note In previous releases of this software this functionality was implemented using Post Filters. The two methods can coexist. When they are used together, the Post Filters are executed before these built-in filters are executed.

Past Energy Setup

The third frame, labeled "Past Energy Setup," controls the setup of the Past Energy list.

Use Past Energy Selecting this enables the Past Energy list. If it is disabled, all Active Energy that would pass to the Past Energy list is deleted.

Maximum Number Entries This sets the maximum number of simultaneous entries in the Past Energy list. Once this limited is reached, the oldest entries are removed. Clicking on the button in this selection displays a dialog box that allows you to specify the maximum number of entries.

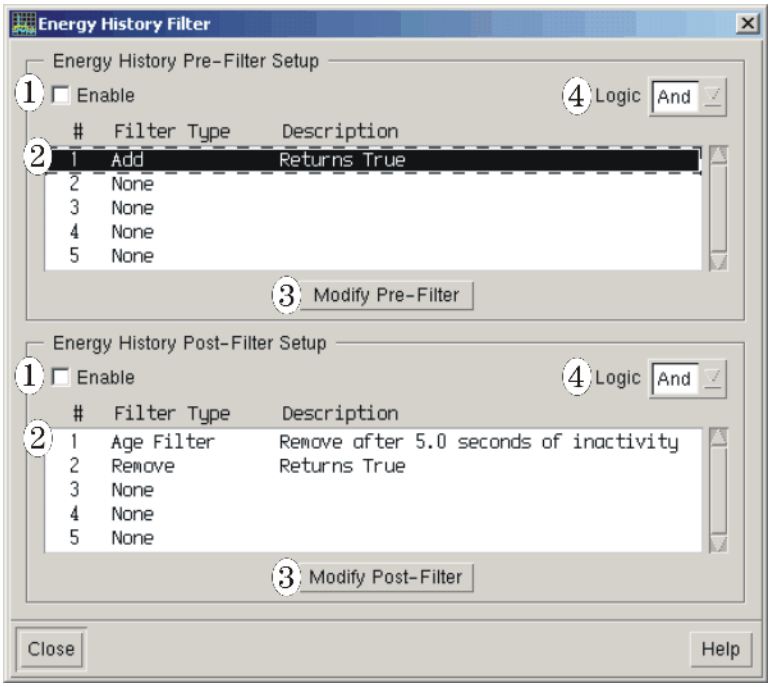
Maximum Memory Usage This sets the maximum memory size that the Past History can grow to. It includes the size of all the Raw Energy entries created. Once this limited is reached, the oldest entries will be removed. Clicking on the button in this selection displays a dialog box that allows you to specify the maximum memory size.

Past Energy Removal

After X Seconds When selected, any Past Energy that has been present for longer than X seconds is removed. If it is unselected, the Past Energy will grow to either the maximum allowable number or maximum memory size and then the oldest entries are removed. Clicking on the button in this selection displays a dialog box that allows you to specify the permitted duration.

Energy History Filter

Toolbar Icon
Path: Search, Energy History Filter
Option: ASD, User Programming

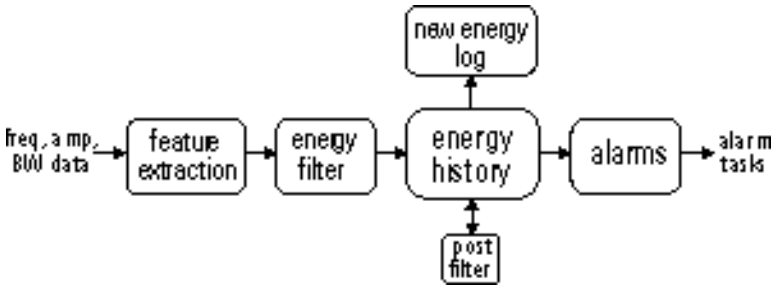


Background

Energy features (characteristics such as frequency, amplitude, bandwidth, number of detections, etc.) may be filtered with user-defined, library programs before and after they enter the Energy History database. These programs are discussed in the *N6820ES ASD Programming Guide* (\E3238s\manuals\program_guide.pdf).

The dialog box shown above is used to control both the pre-filtering and post-filtering configuration. The top half contains the pre-filter controls and the bottom half contains the post-filter controls. The filters shown in the list area are example programs furnished with option ASD.

The figure below shows the process diagram centered on the Energy History block. The entire system process is discussed under Process Overview (page 33).



The filter programs are written to limit the number of entries in the Energy History by either:

- blocking their entry with the energy filter, also called *pre-filter*
- removing existing entries with the *post-filter*

As many as 16 filter functions may be loaded but the maximum number of *active* filters is 5 of each type (pre-filter and post-filter). Each library program may contain both (or either) pre-filter and post-filter functions.

The library program(s) must be listed in the `e3238s.n6841.cfg` configuration file as in the following example:

```
energyHistoryFilter: C:/e3238s/lib/filterAGE.dll, \
                     C:/e3238s/lib/filterTEST.dll
```

Dialog Box Components

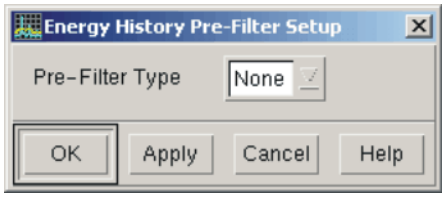
1. The **Enable** button is used to turn the filtering on and off.
2. The filter list shows which filters are loaded, describes their function and parameter settings, if there are any.
3. The **Modify Filter** buttons are used to choose which filter functions are used and specify their parameter values. If no filter functions are listed or selected, this button appears ghosted to show that it is inactive. For more information about the filter modifications, see:
   - Energy History Pre-Filter (page 334)
   - Energy History Post-Filter (page 335)
4. The **Logic** buttons define whether all filter conditions must be met or any one condition is sufficient to (for the pre-filter) be added to the Energy History list or (for the post-filter) to be removed from the Energy History list. The filter functions return either ‘keep’ or ‘discard’ results. The filter functions are called sequentially until the selected logic function is satisfied, as follows.
   - **And** means, for the signal to be added to (pre-filter) or removed from (post-filter) the Energy History list, all listed filter functions must be satisfied. The first one to return a ‘discard’ result is the last one called.
   - **Or** means the signal may be (pre-filter) added to or (post-filter) removed from the Energy History list when it satisfies *any* listed filter function. The first one to return a ‘keep’ result is the last one called.

Adding or Changing a Filter

To add a filter function to the list or change parameter values:

1. Click the filter listing you wish to change. The row is highlighted as shown in the first figure above.
2. Click the *Modify Filter* button. Another dialog box appears that allows you to add or change the filter function and specify its parameter values, if there are any. See Energy History Pre-Filter (page 334) or Energy History Post-Filter (page 335).

Energy History Pre-Filter



This dialog box appears when you click the Modify Pre-Filter button in the Energy History Filter (page 332) dialog box.

Note

The entries in the option menu depend on the libraries that were loaded when the N6820ES program started running. The libraries used to create the figure above were loaded with the following two lines in the `e3238s.n6841.cfg` file:

For Windows

```
energyHistoryFilter: C:/e3238s/lib/filterAGE.dll, \
                     C:/e3238s/lib/filterTEST.dll
```

The energy history filter library files may contain either pre-filter or post-filter definitions or both.

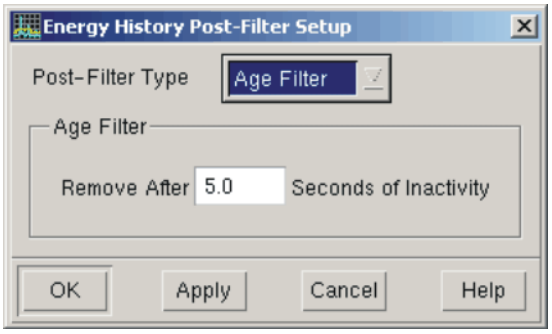
The contents of this dialog box are determined by the library program written by someone other than the people that developed the N6820ES system. The figure above illustrates an example program provided with option ASD, User Programming.

For information about how your filters work, see the documentation provided with the library programs.

For information about how to create energy history filter programs, see the *N6820ES ASD Programming Guide*[1].

[1] See the \E3238s\manuals\program_guide.pdf file.

Energy History Post-Filter



This dialog box appears when you click the Modify Post-Filter button in the Energy History Filter (page 332) dialog box.

Note

The entries in the option menu depend on the libraries that were loaded when the N6820ES program started running. The libraries used to create the figure above were loaded with the following two lines in the `e3238s.n6841.cfg` file:

For Windows

```
energyHistoryFilter: C:/e3238s/lib/filterAGE.dll, \
                     C:/e3238s/lib/filterTEST.dll
```

The energy history filter library files may contain either pre-filter or post-filter definitions or both.

The contents of this dialog box are determined by the library program written by someone other than the people that developed the N6820ES system. The figure above illustrates an example program provided with option ASD, User Programming.

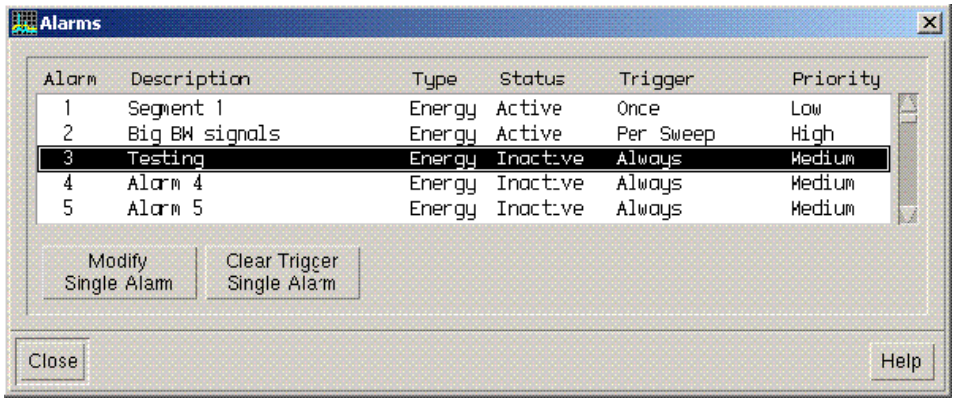
For information about how your filters work, see the documentation provided with the library programs.

For information about how to create energy history filter programs, see the *N6820ES ASD Programming Guide*[1].

[1] See the \E3238s\manuals\program_guide.pdf file.

Alarms Setup

Toolbar Icon
Path: Search, Alarms Setup ...



This dialog box is used to define alarms. There may be as many as 100 alarm definitions. These may be saved and recalled as part of the Mission Setup. To save just the alarms, deselect all other parts of the mission definition in the Save Mission Setup (page 129) dialog box.

The list of alarms contains 100 entries. Each of these can be defined individually and the Description, Status, Trigger, and Priority settings can be modified in groups. To move up and down through the list, use the Scroll Bars (page 133) at the right side of the list area.

The columns of the list are fields defined in the dialog box you call. For more information about these fields, see Single-Alarm Setup (page 338).

To change the definition of one or more alarms:

1. Select the alarm to modify.
   - To select one alarm, click anywhere on the line (in the list) and then click the Modify-Single-Alarm button (or double-click the line).
   - To select multiple alarms:
     - To select *contiguous* lines, click the first entry, press and hold the Shift key and click the last.
     - To select *non-contiguous* lines, use the Ctrl key and click the entries.
   - To select *all* alarms:
     i. Press the Ctrl+Home key. This moves to the top and selects the first line.
     ii. Press Shift-Ctrl+End.
2. Click the Modify-Single-Alarm button. (“Single” is “Multiple” if more than one alarm is selected.) This displays the Single-Alarm Setup (page 338) or the Multiple-Alarm Setup (page 379) dialog box.
3. Modify the parameters you wish to change.

4. Click OK.

Clear Trigger is used to rearm a triggered alarm. When an *energy* alarm's trigger type is "Once," the alarm status changes from Active to Triggered when the alarm triggers.

To rearm the alarm's trigger:

1. Select the alarm by clicking anywhere in the row.
2. Click the "Clear Trigger" button.

When you clear the alarm the alarm's status changes back to "Active" indicating that it will cause an alarm when the defined alarm condition occurs.

- To save the alarm definitions, see Save Mission Setup (page 129).
- To load a set of previously-saved alarm definitions (part of a Mission state), see Load Mission Setup (page 127).
- For information about how the system detects energy, see Process Overview (page 33).

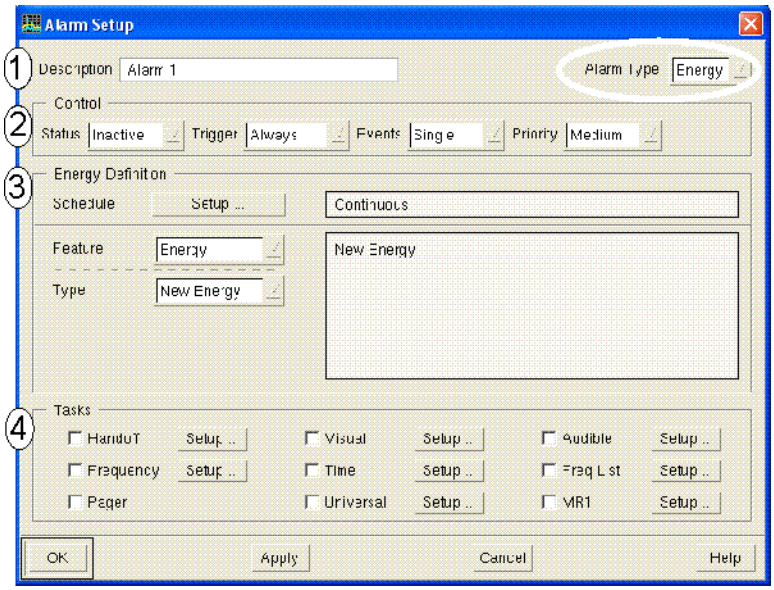
Single- Alarm Setup

This dialog box is used to configure individual alarm definitions. The features shown vary depending on the alarm *Type* selection that is selected in the upper right-hand corner of the dialog box (see figure below). The two types are:

- Energy
- Signal

For an explanation of the difference between Energy Alarms and Signal Alarms, see Search System (page 33).

The following figure is an example *Energy Alarm Setup*. Minor differences exist when the Alarm Type is *Signal*, as explained in the discussions of each component.



The discussion is broken into the following components:

1. Description and Alarm Type (page 338)
2. Control (page 340)
3. Definition (page 342)
4. Tasks (page 354)

Description and Alarm Type

Description This is a text entry you can use to describe the alarm with up to 32 characters. It can be used as a name or a place to hold a brief comment. The description appears in the alarms list. See Alarms Setup (page 336).

To change the description:

1. Move the cursor into the text box; it should change into a text cursor that looks like an I-beam.
2. Position the cursor between characters and click.
3. You can now add characters by typing or delete them by pressing the Delete or Backspace keys.

To replace several characters at once, “wipe” them by moving the cursor across them while holding down the mouse button and then releasing it. All selected characters are replaced by whatever you type.

Alarm Type This is used to define the alarm as either an *Energy* or a *Signal* alarm.

- *Energy* alarms are defined by criteria found in the Energy History.
- *Signal* alarms are defined by criteria found in the Signal Database.

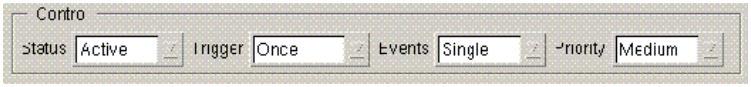
See Process Overview (page 33) for more information.

The differences between Energy and Signal alarm types are as follows:

- In the Control block, the Trigger choices are different. See Alarm Control (page 340).
- Also in the Control block, energy alarms may be defined by multiple events; signal alarms are defined as single events.
- In the Definition block, the Feature choices are different. Energy alarm features are those found in the Energy History Pane (page 88). Signal alarm features are those found in the Signal Database Pane (page 107).

Control

These settings are the high-level definition of the alarm.



Status The alarm *status* defines whether the alarm definition is checked. This parameter appears in the Alarms Setup (page 336) dialog box. You can modify this value for several alarms in the Multiple-Alarm Setup (page 379) dialog box.

- **Active** means when the criteria described by the alarm definition is met, the alarm is triggered and recorded in the alarm log, and any associated tasks are launched. See Tasks (page 354).

  When an active *energy* alarm with trigger type "Once" is triggered, the status displayed in the Alarms Setup (page 336) dialog box changes from "Active" to "Triggered." To clear the trigger, see Alarms Setup (page 336).

- **Inactive** means this alarm definition is ignored when energy is detected.

Trigger This setting constrains the number of alarms triggered by limiting when an active alarm condition is checked.

- **Always:** The alarm occurs whenever the energy criteria is met, without constraint.
- **Per Sweep:** The alarm occurs only the first time the alarm is triggered in a sweep. The trigger is re-armed at the beginning of each sweep.

  This selection is available only when the Alarm Type is Energy.
- **Once:** The alarm functions differently depending on the Alarm Type:
  - *Energy*: The alarm occurs only the first time the alarm conditions are met. You must manually clear the trigger before it can trigger again. See "Clear Trigger" in the Alarms Setup (page 336) dialog box.
  - *Signal*: The alarm triggers only once per database entry.
- **Signal Up** the alarm occurs when the signal transitions from not-present to present in the signal database.

  This selection is available only when the Alarm Type is *Signal*.

Note Do not use Signal Up when the signal type includes a character string because the signal-up transition occurs before the string is decoded. In this case, use Once or Always. See Signal Id under Definition (page 342).

- **Signal Down** the alarm occurs when the signal transitions from present to not-present in the signal database.

  This selection is available only when the Alarm Type is *Signal*.
- **Signal Up/Down** the alarm occurs when the signal transitions to either present or not-present in the signal database.

This selection is available only when the Alarm Type is *Signal*.
To trigger an alarm on new energy, see New Energy under Definition (page 342).
To modify this parameter for more than one alarm, see Alarms Setup (page 336).

Events An alarm is composed of one to four *events*; usually only one is used. This selection specifies whether the alarm is composed of one event or more than one. Each event is defined by a set of feature parameters. When the Events setting is Single, the alarm definition is the same as the event definition.

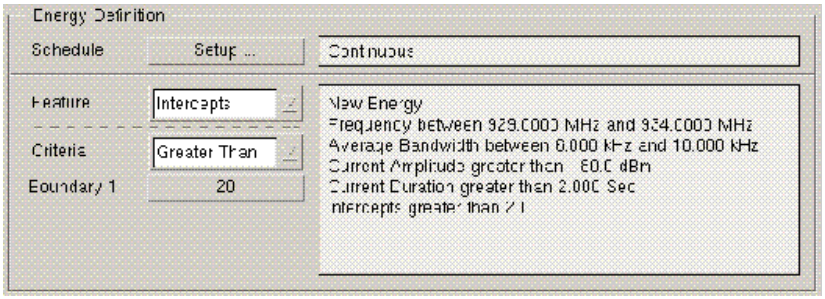
- **Single** means only one event need be defined to describe an alarm. This is the default selection.
- **Multiple** means as many as four events may be defined and logically combined to define an alarm condition. The first event is the same event used for single event.

Multiple-event alarms can be used when more than one set of energy settings are required to detect an alarm condition. See Multiple-Event Alarm Setup (page 377) for more information.

Priority This defines the importance of an alarm. This information is used to settle contention for a limited resource such as a handoff receiver. The alarm with the higher priority gets whatever it needs to complete the defined task.

To modify this parameter for more than one alarm, see Alarms Setup (page 336).

Definition



Schedule This selection specifies when the alarm conditions are monitored.

- **Continuous** means the alarm is always monitored.
- **Band**: the alarm is monitored between start and stop times specified in hours and minutes. See Schedule Setup (page 350).
- **Hourly**: the alarm is monitored starting at a specified number of minutes past the hour for a duration specified in minutes. See Schedule Setup (page 350).
- **Daily**: the alarm is monitored starting at a time specified in hours and minutes, for a duration specified in hours and minutes. See Schedule Setup (page 350).

Feature An alarm performs one or more tasks when one or more entries in the Energy History database satisfies (matches) the alarm's criteria.

An alarm definition is composed of from one to four events, each of which may be defined by one or more signal features. Usually, an alarm is defined by one event, but as many as four may be used. See Multiple-Event Alarm Setup (page 377). To define an alarm condition:

1. Select a signal feature
2. Select a feature Type (page 351) (depends on feature)
3. Select the Criteria (page 351) (greater than, etc.)
4. Select the boundary values (depends on criteria)

An energy feature is a measured characteristic, like frequency or amplitude. Energy feature statistics are tracked and displayed in the Energy History Pane (page 88). Signal statistics are tracked in the Signal Database Pane (page 107).

For Energy Alarms, features used to define the alarm criteria are:

- Energy Types
- Frequency
- Bandwidth*
- Amplitude*
- Duration*
- Intercepts
- Detections
- Occupancy
- Location

- Confidence
- Count
- Power
- Universal
- Custom features. See Search System (page 33).

*statistic *profile* includes current, minimum, average, and maximum values

Notes

- User-defined feature extraction is supported with option ASD, User Programming. See Process Overview (page 33).
- If you define an alarm that depends on custom feature values, make sure that it is enabled in the Energy Detection dialog box. No values are calculated for features that are disabled in the Energy Detection dialog box. See Energy Detection (page 309).

For Signal Alarms, features used to define the alarm criteria are:

- Signal Id
- Location
- Collection

Energy Types

The alarm criteria may be defined based on various energy conditions or types. When the selected alarm Feature is Energy, a button appears beneath it labeled Type. The types of energy are as follows:

- **New Energy** means that the alarm is triggered only when the energy characteristics meet the alarm criteria on the first intercept.

  Care should be taken when using New Energy since most of the feature values are being initialized. For example, First Energy is incompatible with setting intercepts > 1 because this combination cannot occur.

- **Once Energy** means that the alarm is triggered the first time the alarm definition is satisfied, which does not necessarily occur on the first intercept (for instance, when the alarm definition specifies intercepts > 4).

  This selection constrains the number of alarms triggered to (at most) one per energy history entry. If an entry is removed (e.g., by post filter activity) and returns, the alarm condition for Once is reset such that the limiting effect of this selection is reduced.

  The alarm can be constrained further by setting the alarm's trigger to Once. See Trigger (page 340).

- **Each Energy** means the energy triggers the alarm every time it reappears; i.e., it goes away and comes back (there was no intercept on the previous sweep and there is one on the current sweep).

- **Any Energy** means any energy that meets all the alarm criteria can trigger the alarm without regard to whether it has been detected before.

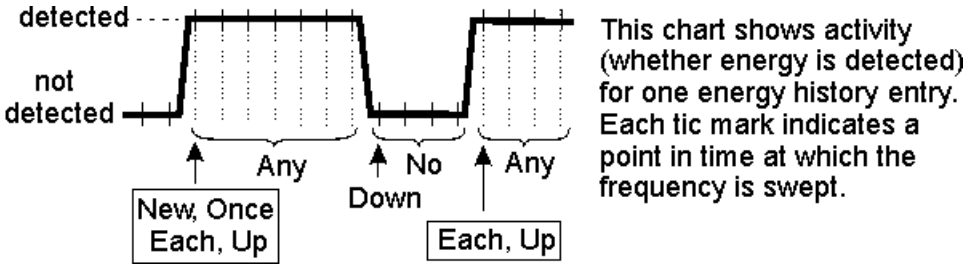
- **No Energy** means the alarm is triggered when the energy, as defined by an entry in the Energy History Pane (page 88), is not detected *and* its other statistics, as previously recorded in the Energy History, meet the alarm criteria. See also, ASD Impact on Search Processing Loop (page 36).

- **Energy Up** means that the alarm is triggered when the status transitions from not detected to detected. This has the same effect as selecting Each Energy.

- **Energy Down** means that the alarm is triggered when the status transitions from detected to not detected (i.e., detected on the previous sweep and not detected in the current sweep).

The following figure illustrates how the energy types affect alarm triggering.

The default Energy Type is *Once*. See also, Feature Value Ranges (page 349).



All Feature types depend on information in the Energy History Pane (page 88). For the special case in which an entry does not exist where you want one, you may manually add an entry with the Add feature in the Energy History > Right-Click Menu (page 106). To change the Energy selection, click the button and select from the list.

Frequency

When the alarm Feature is Frequency, two buttons appear beneath it.

- **Type** is a list as follows:
  - **Current** means the measured frequency value of the current energy intercept.
  - **Energy History** indicates the first-intercept value of the energy history entry. See the discussion on comparing and modifying first-intercept values under Energy Criteria (page 320).
  - **Criteria** allows you to pick ranges as defined in Criteria (page 351).

  Pick an entry from the list and set the appropriate boundary values with Frequency Entry (page 295).

Bandwidth

This parameter specifies the bandwidth characteristics of the alarm event. The energy bandwidth is determined either by the *Bandwidth Criteria* setting in the Energy Detection (page 309) dialog box, or by the parameters in the Single-BW-Hint Setup (page 325) dialog box, when the energy falls into an active frequency range.

When Bandwidth is the selected Feature, buttons appear beneath it labeled **Type** and **Criteria**. Set the boundary values with Frequency Entry (page 295).

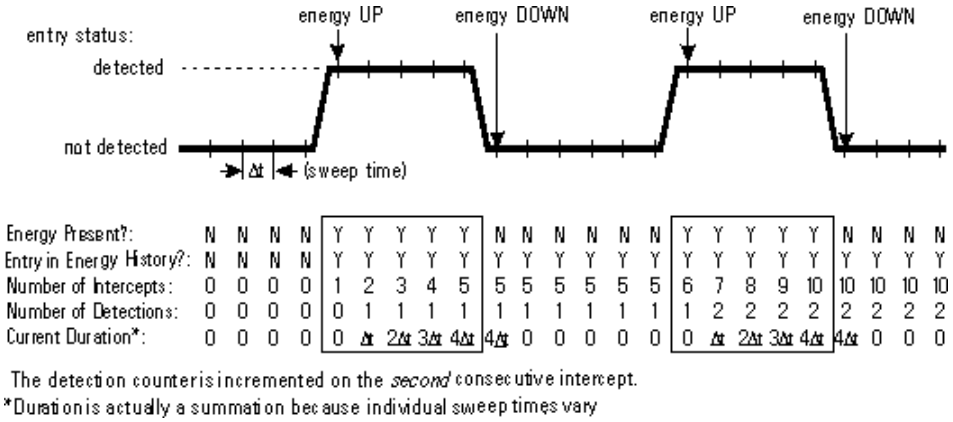
Amplitude

When Amplitude is the selected Feature, buttons appear beneath it labeled **Type** and **Criteria**. Set boundary values with Amplitude Entry (page 352).

Duration

Specifies the time energy is detected on every sweep. This differs from Intercepts in that intercepts is the number of sweeps in which the energy was detected. See the following illustration.

Timing Diagram



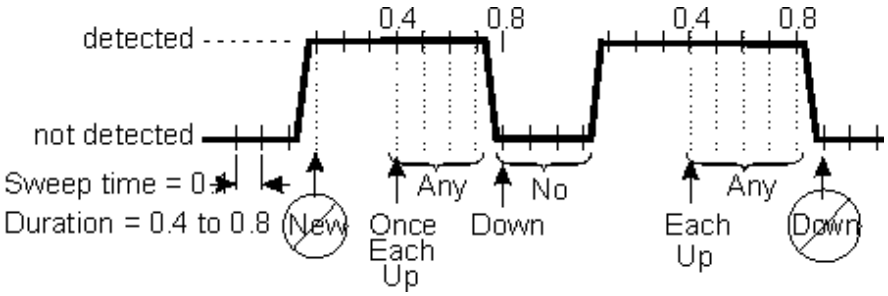
Energy Present?:	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N
Entry in Energy History?:	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of Intercepts:	0	0	0	0	1	2	3	4	5	5	5	5	5	5	5	6	7	8	9	10	10	10	10	10
Number of Detections:	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Current Duration*:	0	0	0	0	0	Δt	2Δt	3Δt	4Δt	4Δt	0	0	0	0	0	0	Δt	2Δt	3Δt	4Δt	4Δt	0	0	0

The detection counter is incremented on the *second* consecutive intercept.
*Duration is actually a summation because individual sweep times vary

When Duration is the selected Feature, buttons appear beneath it labeled **Type** and **Criteria**. Set the boundary values with Duration Entry (page 353).

- Of the four statistic types, *current* and *maximum* duration values are updated on every sweep in which energy is detected.
- *Minimum* and *average* duration values are updated when the energy goes away.
- The first time the energy appears it generates maximum and average values, but no values for minimum or average duration.

The Duration feature interacts with the Energy feature. The following figure shows when each energy type alarms when Duration is set to between 0.4 and 0.8 seconds.



Intercepts

Specifies how many times the energy has been detected (see the Timing Diagram (page 346)). This is tracked by counting the number of updates for an entry in the Energy History Pane (page 88). Set the boundary values with Numeric Entry (page 353).

Detections

This specifies the number of times the energy has appeared for an uninterrupted period of time and then goes away (see the Timing Diagram (page 346)). This is tracked by monitoring activity in the Energy History Pane (page 88). Each time energy appears that was not present on the previous sweep, the Detections value is incremented.

When the sweep is stopped or the sweep parameters are changed with the energy still active, the Detections value is decremented, since the energy didn't go away. When the energy is detected on one sweep and the sweep is stopped before it is detected again, the Detection value is zero. Set the boundary values with Numeric Entry (page 353).

Occupancy

This specifies what percentage of the time the energy has been detected. Set the boundary values with Numeric Entry (page 353).

Signal Id

This is the signal type. This is determined by MR1 Modulation Recognition and registered in the Signal Database.

This is available only when the Alarm Type is *Signal*.

Also, a signal type may include specific setup criteria, which may be defined in a Setup dialog box. For example, an alarm may be defined such that an FSK signal causes an alarm only when a certain symbol rate is detected.

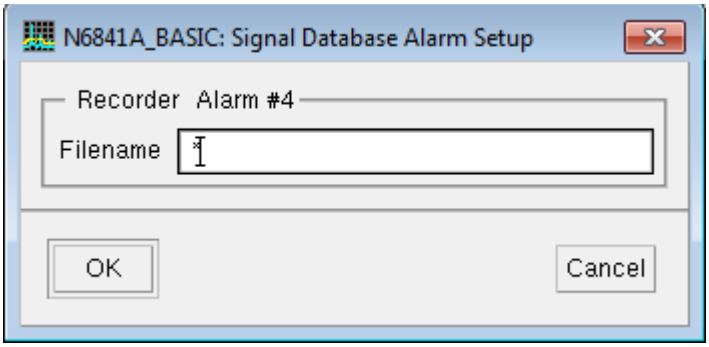
Location

This is signal source information such as is provided by Agilent's N6854A Geolocation Server software. The type and setup details are defined by the user and depend on the area being monitored. Detailed setup guidance is provided in this manual..

This is available only when the Alarm Type is *Signal*.

Collection

This is information associated with the collection of IQ signal data. This alarm format will notify the user when a recording has been made that contains a specific text string in the file name. This string is established during the setup of the Energy Alarm which creates the recording. See the example below.



If, for example, you wanted to initiate an alarm alerting the operator that 10 recordings had been made from a specific Alarm, the "Counter" field of the file name setup could be used as a string criterion in a collection alarm. As the number of recordings from any alarm increments, the counter will increment in each file name. When the counter reaches "10", the Collection Signal Alarm will trigger.

Collection is available only when the Alarm Type is *Signal*.

Note To see a graphic representation of the frequency and amplitude criteria as currently specified for all active alarms, see Grid Types under Trace Setup (page 424).

Feature Value Ranges The following tables show valid feature values, types, and boundaries for each of the Energy Feature types.

New Energy (Alarm criteria checked first time energy is detected)

Frequency	Current energy frequency
Bandwidth	Current, Min, Max, and Avg are initial BW
Amplitude	Current, Min, Max, and Avg are initial Ampl
Duration	Current, Min, Max, and Avg are set to zero
Intercepts	Always 1
Detections	Always 1
Occupancy	Always 100%

Once, Each, Up, or Any Energy (alarm triggered each time energy is detected)

Frequency	Current energy frequency
Bandwidth	Current, Min, Max, or Avg Bandwidth
Amplitude	Current, Min, Max, or Avg Amplitude
Duration	Current, Min, Max, and Avg Duration
Intercepts	≥ 1
Detections	≥ 0
Occupancy	between 0% and 100%

vg BW Amplitude	−600 dBm or Min, Max, or Avg Ampl
Duration	0.0 or Min, Max, or Avg Duration
Intercepts	≥1
Detections	≥0
Occupancy	between 0% and 100%

No Energy (Alarm processed when energy is not detected)

Frequency

Energy History frequency

Bandwidth

Energy

History

BW

or

Min,

Max,

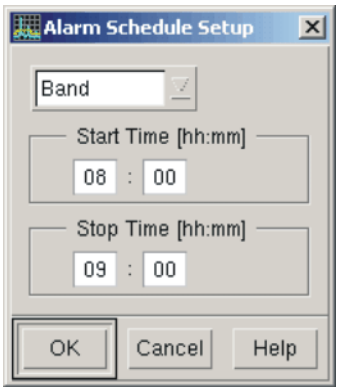
or

Avg

Schedule Setup

This dialog box allows you to enter a schedule value for an alarm definition. It appears when you click the Schedule Setup... button in the Single-Alarm Setup (page 338) dialog box. The appearance of this dialog box varies depending on the schedule mode selected. Time values are in a -hour format.

The following illustration is an example.



To define a schedule:

1. Click the mode button. The list of mode types appears.
2. Click the entry for the type of schedule you want to use.
3. Change the numbers in the text boxes to set the start/stop or start/duration values as described in Definition (page 342). (The Continuous schedule has no numeric parameters.)
4. Click OK to finish the entry and apply the values.

Notes

- You can use Band to specify start and stop times within a 24-hour day but the band can't span midnight. When the start time is in one day and the stop time is in the next, (i.e., stop < start) the values are switched such that they fall within the same day.
- To specify a schedule that spans midnight, use Daily which uses a start time and duration.

Type

The four energy characteristic types are Current, Minimum, Average, and Maximum. These are the energy statistics displayed in the Energy History Pane (page 88).

- **Current** is the value from the most recent sweep.
- **Minimum** is the smallest value recorded.
- **Average** is the average of all recorded values.
- **Maximum** is the largest value recorded.

Criteria

The entries in this list define type of range limits used to define the alarm value as follows:

- **Any** means the alarm event definition is satisfied by energy detected anywhere in the swept frequency range. No boundary values are required.
- **Greater Than** means the range is defined as all values greater than a value. When "Greater Than" is selected, another button labeled Boundary 1 appears beneath it that is used to enter the value.
- **Less Than** means the range is defined as all values less than a specified value. When "Less Than" is selected, another button labeled Boundary 1 appears beneath it that is used to enter the value.
- **Between** means the range is defined as all values between two specified values. When "Between" is selected, two more buttons appear beneath it that are used to enter the values. These are labeled Boundary1 and Boundary 2.
- **Except** means the range is defined as all values *outside* a range specified by two values. When "Except" is selected, two more buttons appear beneath it that are used to enter the values. These are labeled Boundary1 and Boundary 2.
- **In List** appears when the feature being defined is Frequency. This means the frequency must "match" an entry in the specified frequency list. "Match" means the frequency lies within the merge range of a listed frequency. See Frequency Lists Pane (page 118).

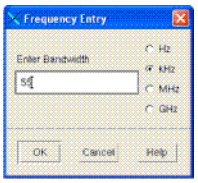
Note

When a match occurs, the frequency value used as the alarm frequency is that of the frequency list entry, *not* the frequency of the detected energy. For example, for detected energy at 1,000,370 Hz and a list entry of 1 MHz with a merge range of 1 kHz, there is a match and the alarm frequency is 1 MHz; not 1,000,370 Hz.

- **Not In List** appears when the feature being defined is Frequency. This means the frequency list entries are frequencies to ignore; energy at these frequencies do not trigger the alarm. The frequency value is compared with the specified frequency list entries using the merge range of the list. If the frequency value falls in the range of a frequency list entry ±merge_ range. See Frequency Lists Pane (page 118).

Frequency Entry

This dialog box is used to enter a frequency or bandwidth value. The Frequency Entry dialog box (shown below) appears when you click a frequency button.

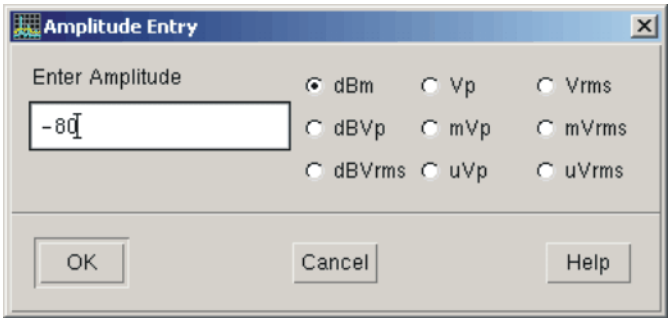


To change the value:

1. Enter the frequency value in the text box. (The mouse cursor must be somewhere in the Frequency Entry dialog box while you type.)
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

Amplitude Entry

This dialog box is used to enter an amplitude value. It appears when you click an amplitude button in a dialog box.



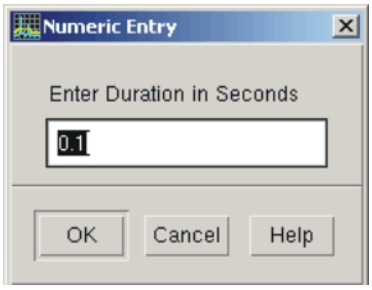
To change the value:

1. Click the amplitude button you want to change. The Amplitude Entry dialog box appears. (See previous figure.)
2. Enter the amplitude value in the text box. (The mouse cursor must be somewhere in the Amplitude Entry dialog box while you type.)
3. Click one of the amplitude units radio buttons.

4. Click OK, or press the Enter/Return key.

Duration Entry

This dialog box is used to enter a duration value as part of an alarm event definition. It appears when the Feature is Duration, Criteria is Greater Than, and you click the Boundary button in Single-Alarm Setup (page 338).

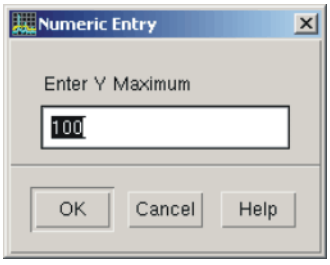


To change the value:

1. Enter the number of seconds in the text box. (The mouse cursor must be somewhere in the entry dialog box while you type.)
2. Click OK, or press the Enter/Return key.

Numeric Entry

This dialog box allows you to enter a numeric value as part of an alarm event definition. (Note that the text above the text box will change to be appropriate to the type of value you must enter.)



To change the value:

1. Enter the number in the text box. (The mouse cursor must be somewhere in the entry dialog box while you type.)
2. Click OK, or press the Enter/Return key.

User-Defined Feature Boundary Entry

This dialog box allows you to enter a floating-point value as part of an alarm event definition. The value is a boundary for a user-defined feature. The units and range of acceptable values is defined by the library program.

To change the value:

1. Enter the number in the text box. (The mouse cursor must be somewhere in the entry dialog box while you type.)
2. Click OK, or press the Enter/Return key.

Tasks

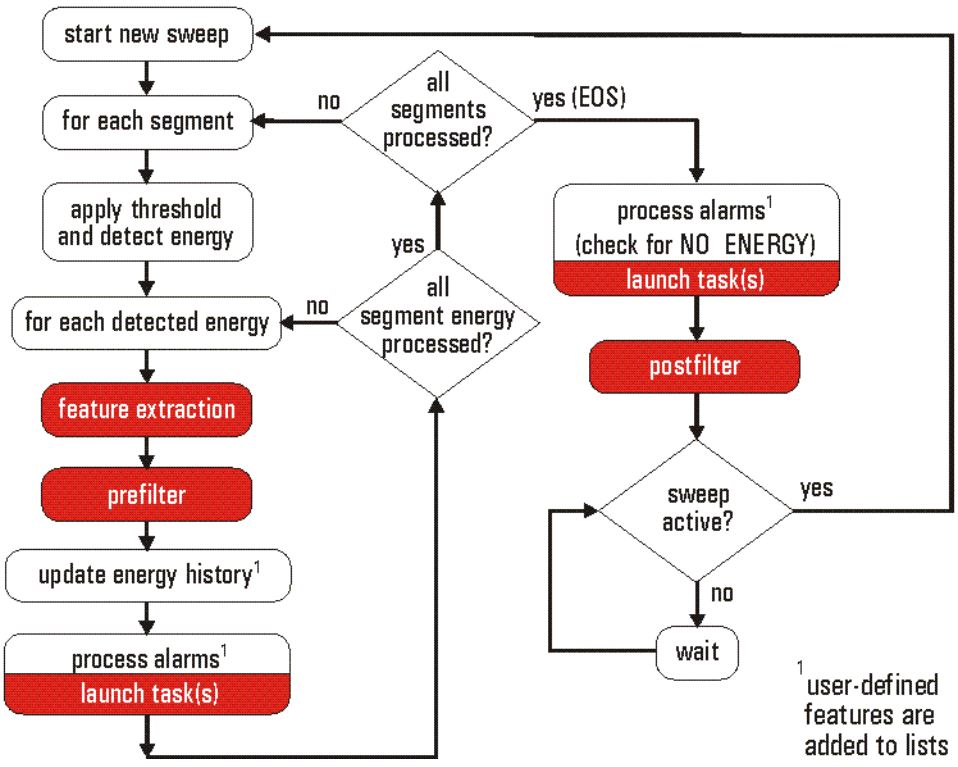
This part of the Single-Alarm Setup (page 338) dialog box is used to specify the tasks to launch when an alarm is triggered.

The supported tasks are:

- Handoff Task (page 355)
- Visual Task (page 357)
- Audio Task (page 358)
- Frequency Snapshot Task (page 359)
- Time Snapshot Task (page 360)
- Frequency List Alarm Task (page 367)
- DF Alarm Task (page 367)
- MR1 Alarm Task (page 374)
- Perform a user-defined task. See Alarm Tasks in *N6820ES ASD Programming Guide*[1].

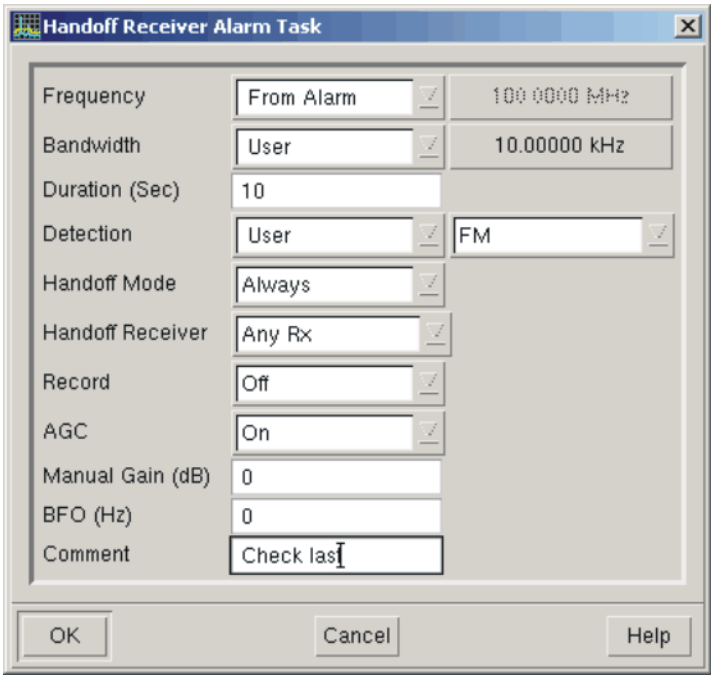
Alarm Processing Timing

Alarm tasks are launched as soon as the critical energy information is intercepted rather than waiting for the end of a sweep. Each sweep is composed of multiple data segments that are processed individually, from interception through alarms, before the next segment is measured. See the following process diagram.



[1] See the \E3238s\manuals\program_guide.pdf file.

Handoff Task



This dialog box is used to specify the handoff receiver and its settings as part of an alarm definition. To activate handing off a signal when an alarm triggers, click the button associated with this task in the Single-Alarm Setup (page 338) dialog box. See the discussion under Process Overview (page 33).

Frequency and Bandwidth

These frequency values may come from the alarm (the frequency of the energy that caused the alarm) or it may be a user-specified value.

If the Control, Events setting is Single, your choice is between Alarm and User. If the Events setting is Multiple, the value may specified by any of the four events used to define an alarm condition. See *Events* under Control (page 340).

To change this parameter:

1. Click the appropriate button. An option list appears.
2. Click one of the entries in the menu. If you select "User," the button to its right becomes active.
3. To select a user-defined frequency value, click the button and select a new value in the Frequency Entry (page 295) dialog box.
4. Click "OK."

Duration

This selection specifies how long the handoff receiver should monitor the signal in seconds. This value may be changed after the signal is handed off. See Handoff Log Pane (page 75) for more information.

Detection This selection specifies the type of detection used by the handoff receiver. This may have some impact on which receiver the signal is handed to. The detection type can be changed after the signal is handed off. See Handoff Log Pane (page 75) for more information.

When the Alarm Type is Signal (see description on Description and Alarm Type (page 338)) this entry appears as shown below.

The detection mode is either **User** or **From Alarm**

- **User** is used to specify a user-defined selection as is normal for Energy alarms.
- **From Alarm** specifies using the detection type derived by a Signal I.D. alarm.

Handoff Mode This selection specifies whether the handoff occurs for every alarm that occurs (*always*) or occurs only for signals that are not listed in the handoff log (*new*).

When the handoff mode is *new*, a signal frequency is checked against all frequency values in the handoff log defined by the logged signal's detected frequency *and* its bandwidth. A signal is new only when it does not fall within the bandwidth of any signal in the handoff log.

Handoff Receiver This selection specifies which handoff receiver should be used to monitor the signal. The label includes the name of the handoff receiver designated in the `e3238s.n6841.cfg` file with the `handoffRx.label` command.

Record Specifies whether or not to record the audio signal from the handoff receiver. This applies only when an audio recorder system is connected to the handoff receiver's audio output; it is not part of the N6820ES system.

AGC Controls the Automatic Gain Control (on/off) if the receiver has it.

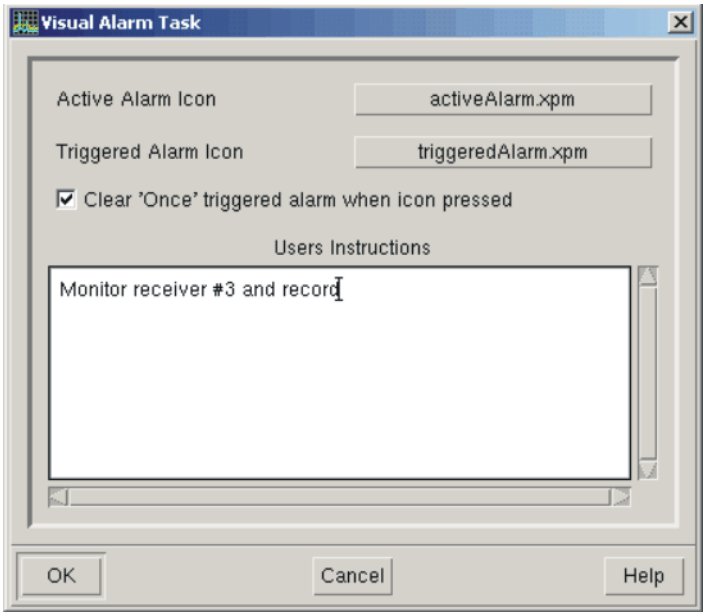
Manual Gain Specifies the initial gain in dB for the receiver.

BFO Specifies the initial beat frequency offset (BFO) for the receiver.

Comment This a comment field that may be used to record notes. Limit: 15 characters.

Visual Task

This dialog box is used to define the icons and text that appear in the Visual Alarms Pane (page 112) as part of an alarm definition.



Panes are added to or removed from the main window in the Display Layout (page 422) dialog box. Icons appear in the pane only if they are active. The icons are graphic (picture) files stored on the system disk.

Only alarms with an *active* status have an icon displayed in this pane. When the alarm is triggered, the icon changes and whatever text was entered for that alarm is displayed in the text area.

There are two picture (icon) files associated with an active alarm, but only one is displayed at a time. The Active Icon Filename button is used to specify the icon file used when the alarm is not triggered. When the alarm triggers, that icon is replaced with another icon, selected with the Triggered Icon Filename button.

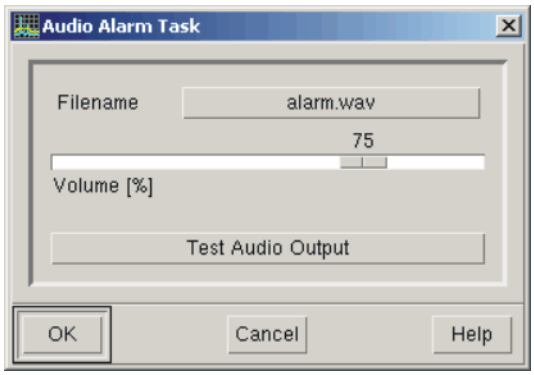
For more information about the dialog box that appears when you click these buttons, see Filename Entry (page 140).

Note

For an overview of this task and its place in the system, see Process Overview (page 33).

Audio Task

This dialog box is used to specify a sound file and the volume settings required to cause an audible alarm.



Filename Calls the Filename Entry (page 140) dialog box to specify the sound file used when this alarm is triggered.

The Windows audio API supports .wav, .avi, and any other files supported by your Windows multi-media player.

Volume (%) This slider control sets the volume of the sound signal.

Test Audio Output Press this button to try the audio task setup.

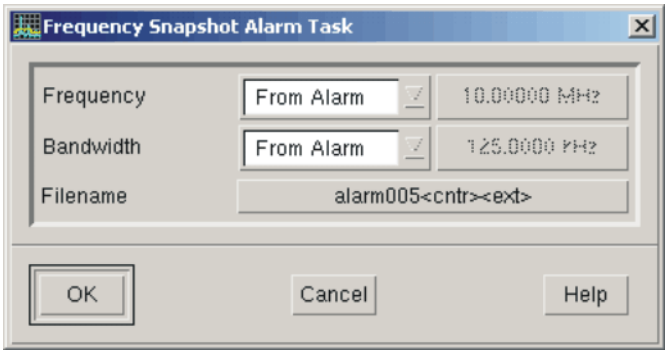
Note

The system audio may also be redirected, like the GUI display, to another XWindows system when the program is started. See the discussion Exporting Display and Audio under Starting the Program (page 19) for more information.

For an overview of this alarm task and its place in the system, see Process Overview (page 33).

Frequency Snapshot Task

This dialog box defines the snapshot capture criteria.



Frequency and Bandwidth

These frequency values may come from the alarm (the frequency of the energy that caused the alarm) or it may be a user-specified value.

If the Control, Events setting is Single, your choice is between Alarm and User. If the Events setting is Multiple, the value may specified by any of the four events used to define an alarm condition. See *Events* under Control (page 340).

To change this parameter:

1. Click the appropriate button. An option list appears.
2. Click one of the entries in the menu. If you select "User," the button to its right becomes active.
3. To select a user-defined frequency value, click the button and select a new value in the Frequency Entry (page 295) dialog box.
4. Click "OK."

Notes

- If the bandwidth selection is "From Alarm," the captured data bandwidth is twice measured bandwidth, to assure an adequate representation of the entire signal (not just to its 6 dB points). The measured bandwidth value appears in the Energy History Pane (page 88) and the Alarm Log Pane (page 87). See also, Calculate Bandwidth under Energy Detection Process (page 34).
- The frequency capture occurs at the end of the sweep in which the alarm conditions are met. The captured data is taken from the current sweep data before the next sweep begins.

Filename

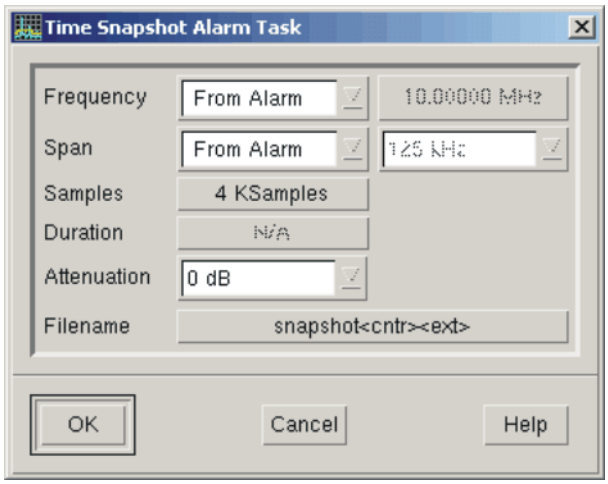
This button displays the current definition of the snapshot filename construct. Click the button to open a dialog box in which you can redefine the construct in terms of a variety of parameters. See Alarm Snapshot Filename (page 362).

Data files are saved in the Snapshot Directory (page 136) with the name given.
See the *ASD Programming Guide*[1] for information on the snapshot data format.

[1] See the \E3238s\manuals\program_guide.pdf file.

Time Snapshot Task

This dialog box is used to capture a piece of time data when an alarm is triggered. See notes.



Frequency and Span

These frequency values may come from the alarm (the frequency of the energy that caused the alarm) or it may be a user-specified value.

If the Control, Events setting is Single, your choice is between Alarm and User. If the Events setting is Multiple, the value may specified by any of the four events used to define an alarm condition. See *Events* under Control (page 340).

To change this parameter:

1. Click the appropriate button. An option list appears.
2. Click one of the entries in the menu. If you select "User," the button to its right becomes active.
3. To select a user-defined frequency value, click the button and select a new value in the Frequency Entry (page 295) dialog box.
4. Click "OK."

Notes

- If the span selection is "From Alarm," the span used is *twice* the measured bandwidth, to assure an adequate representation of the entire signal (not just between its 6 dB points).
- The capture occurs at the end of the current sweep and sweeping is suspended until the capture is complete. The time required is a function of the span used and number of samples specified.
- The data can be demodulated and played with a companion product called Snapshot Radio.

Samples

This is the number of ADC samples you wish to capture. The size of the capture file is determined by the ADC memory (installed) and data precision setting. See ADC Configuration (page 257). This setting, combined with the sample rate, determines the duration.

Duration

This is the amount of time represented by the data file. The value depends on the span (which determines sample rate).

When the span is specified as “from alarm” the duration can’t be specified because the sample rate isn’t known until the alarm is triggered.

Attenuation This is the tuner (downconverter) attenuator setting used to collect the time data. When the capture is complete, the setting returns to whatever is specified in Tuner Attenuation (page 299).

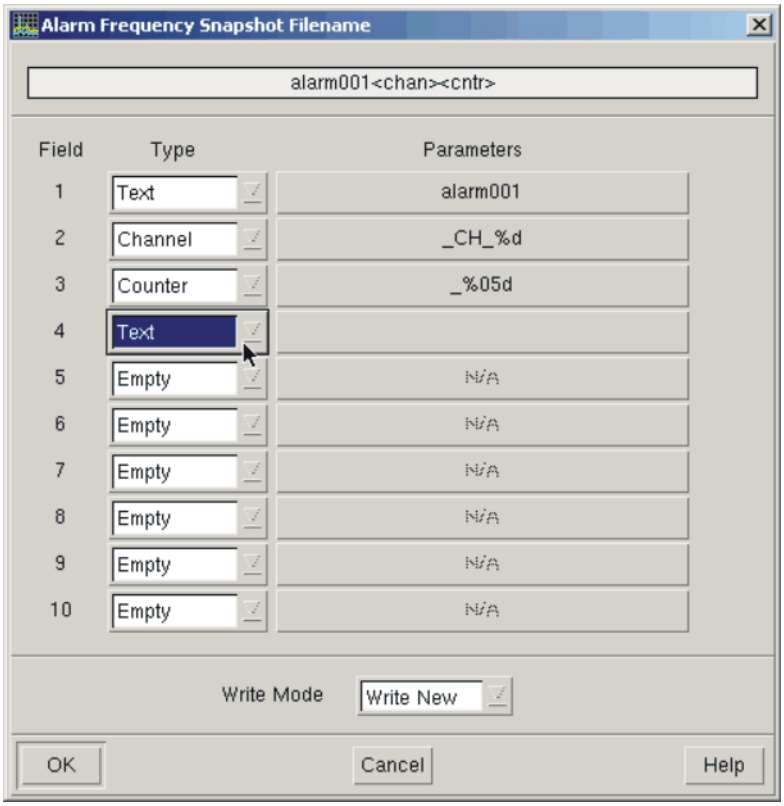
Filename This button displays the current definition of the snapshot filename construct. Click the button to open a dialog box in which you can redefine the construct in terms of a variety of parameters. See Alarm Snapshot Filename (page 362).

Data files are saved in the Snapshot Directory (page 136) with the name given.

See the *ASD Programming Guide*[1] for information on the snapshot data format.

[1] See the \E3238s\manuals\program_guide.pdf file.

Alarm Snapshot Filename



This dialog box is used to define the alarm snapshot filename using the parameters shown in the figure above. The text field at the top shows the current construct. Data files are saved in the Snapshot Directory (page 136).

The filename is made up of as many as ten fields which may contain the following individual components. To define a snapshot filename:

1. In one of the 10 fields (rows) specify a parameter type by clicking one of the buttons in the Type column and selecting from the list. shown above. The field types are described in the following discussion.
2. (Optional) Some of the parameters can be modified. To do so, click the button next to the one you clicked in step one and make the changes.
3. Repeat as necessary to define the other fields in the snapshot filename.

Empty This disables the field.

Text This is any fixed string. The default text for an alarm snapshot the alarm number for frequency snapshots and the word “snapshot” for time snapshots.

To change the text field, click the button which displays the current setting. In the figure above, the button displays the “alarm001” string. See Text Field Entry (page 447).

Counter **Counter** is an integer value that increments with each filename created. See Counter Field Entry (page 447)

Date Places the date and time in the filename. See Date Field Entry (page 448)

Frequency For time snapshots, only. Specifies the center frequency at which the data is taken. To collect time data, the downconverter is parked at the marker frequency.

Sample Rate For time snapshots, only. Specifies the effective sample rate at which the data is taken.

Span For time snapshots, only. This is the span value specified in the Time Snapshot Task (page 360).

Duration For time snapshots, only. Specifies the time over which the data was taken.

This value may calculated rather than specified directly. See the discussion under Time Snapshot Task (page 360).

Priority This is the alarm's priority as specified in the alarm setup. See the discussion of Control in the Single-Alarm Setup (page 338) section.

The choices are Low, Medium, High, and Critical.

Channel Specifies the search receiver channel used to gather the data. Most search systems are single-channel. The N6841A RF Sensor provides the ability to have more than one search channel (up to four) and facilitate simultaneous acquisition of snapshots across all channels.

Extension This is the typical period-three-letter filename extension that most filenames use. See Filename Extensions (page 133).

- Time snapshot files get the extension .cap (short for capture).
- Frequency snapshot files get the extension .fss (for frequency snapshot)

There is no choice here other than whether or not to use the appropriate extension (and we recommend that this always be the last field). But, if you want a different extension, you can specify a text field containing the characters you want.

The snapshot file data format is described in the *Command Reference*[1].

Write Mode Specifies how the file is created on the disk.

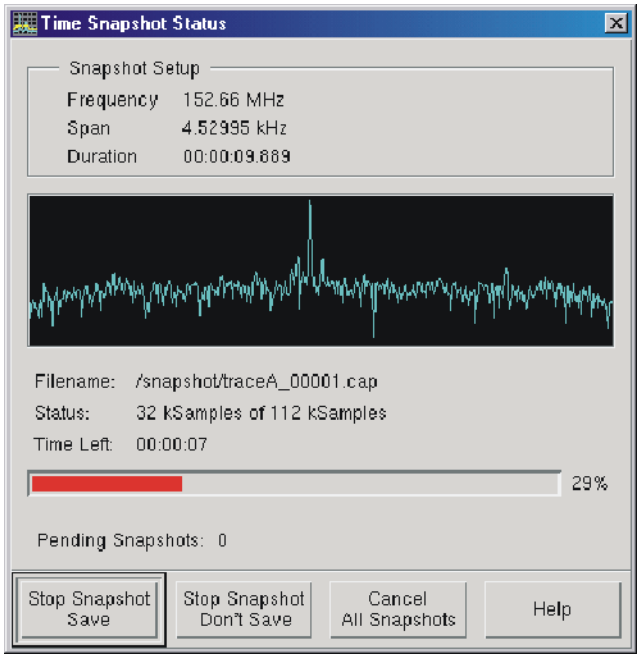
- **Write Once** means that the specified filename is used only the first time the snapshot button is clicked. When a file with the same name already exists, no snapshot data is collected. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of collecting only one file, you must use filename fields that do not change.
- **Write Over** means that, if the filename exists, the data in the file is replaced with new data. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of having only one file that is overwritten, you must use filename fields that do not change.

[1] See the \E3238s\manuals\command_ref.pdf file.

- **Write New** means that the new files do not overwrite existing files. When a file with the same name exists, an extension is added in the form _1, _2, etc. So if a file named alarm001.cap exists and the filename definition specifies that another file of that name is created, the new file is named alarm001.cap_1 and the next would be alarm001.cap_2.

Time Snapshot Status

This dialog box appears when a time snapshot capture begins if the time to capture and write the data to disk is more than one second. The time is a function of the number of samples and span requested.



The snapshot process may be started in two ways:

- As an alarm task; see Tasks (page 354). To set up the alarm snapshot, see Time Snapshot Task (page 360).
- From the camera icon in a trace pane. See Marker Snapshot (page 64) and Trace Snapshot Setup (page 438).

Snapshot Setup Indicates the specified frequency and span values and the duration value calculated from them.

Note

- *All* search activity stops while time snapshot data is collected.
- The total time to complete the operation also includes the time required to write the data to disk, which depends on the IO path back to the controller and typically occurs at a rate of about 3 MB per second.

Filename This indicates the name given the file when it is saved to disk.

Status This is a running update of the number of samples taken and the total requested. This is also indicated graphically by the slider gauge and percentage reading.

Time Left This indicates the time remaining on the snapshot in progress.

Pending Snapshots This shows the number of snapshot requests are waiting to be processed.

Stop Snapshot Save

This stops the collection of time data and writes the collected data to the disk. This allows the operator to terminate the snapshot early if necessary; e.g., the signal goes away. Note that the process may continue for some time while the data is moved from the snapshot memory to the disk.

If another snapshot is pending, its collection begins after the stopped snapshot data is saved to disk.

Stop Snapshot Don't Save

This button stops the collection such that no data is written to disk. This allows the operator to terminate the snapshot more quickly than the Stop/Save button.

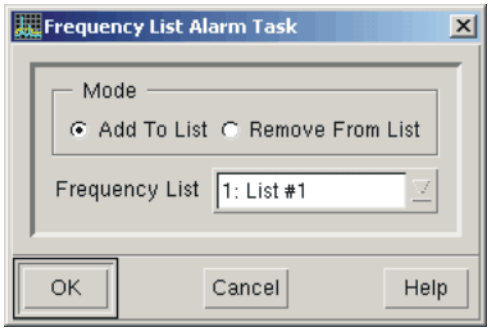
If another snapshot is pending, its collection begins immediately.

Cancel All Snapshots

This stops the snapshot in progress without saving the data and clears the pending queue. This allows you to resume the search operation quickly.

Frequency List Alarm Task

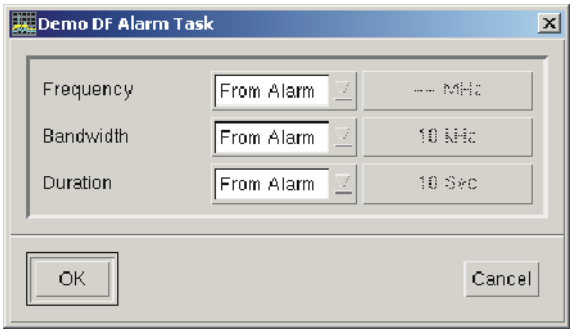
This dialog box is used to modify a system frequency list by either adding a frequency to the list or removing one. The controls allow you to select one or the other as well as the list to be modified.



There is a parameter called *Compare Frequency* that determines how the alarm criteria is compared to the values in a frequency list. See the discussion under the Frequency Lists Pane (page 118).

DF Alarm Task

This dialog box is used to initiate a direction finding task when the alarm conditions are met.



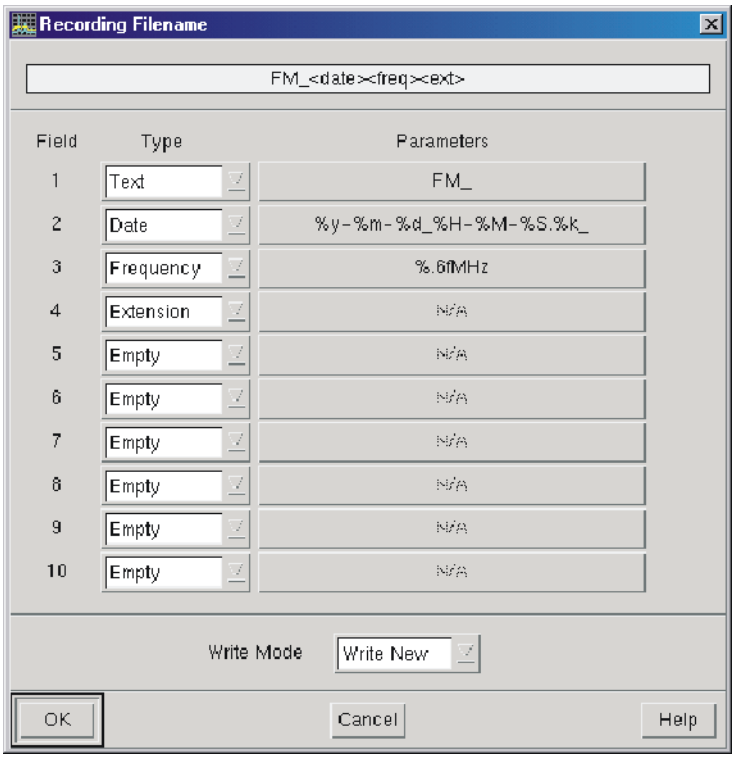
The DF Alarm Task dialog box has three parameters that the user can specify. One, two, or all three of these parameters can match the ones used to trigger the alarm; or any or all of them can be specified separately.

Frequency The frequency of the signal given to the DF task.

Bandwidth The bandwidth of the signal given to the DF task.

Duration The duration of the signal given to the DF task. This is a three element menu. The choices are From Alarm, From User, and Up/Down. The first two selections operate as described above. The third option allows you to specify that the DF task be active when the signal transitions up or down.

Recording Filename



This dialog box is used to define the filename when recording is enabled. The text field at the top shows the current construct. Data files are saved in the Snapshot Directory (page 136).

The filename is made up of as many as ten fields which may contain the following individual components. To define a snapshot filename:

1. In one of the 10 fields (rows) specify a parameter type by clicking one of the buttons in the Type column and selecting from the list. shown above. The field types are described in the following discussion.
2. (Optional) Some of the parameters can be modified. To do so, click the button next to the one you clicked in step one and make the changes.
3. Repeat as necessary to define the other fields in the snapshot filename.

Empty This disables the field.

Text This is any fixed string. The default text for an alarm snapshot the alarm number for frequency snapshots and the word “snapshot” for time snapshots.

To change the text field, click the button which displays the current setting. In the figure above, the button displays the “alarm001” string. See Text Field Entry (page 447).

Date Places the date and time in the filename. See Date Field Entry (page 448)

Frequency For time snapshots, only. Specifies the center frequency at which the data is taken. To collect time data, the downconverter is parked at the marker frequency.

Sample Rate For time snapshots, only. Specifies the effective sample rate at which the data is taken.

Duration For time snapshots, only. Specifies the time over which the data was taken.

This value may calculated rather than specified directly. See the discussion under Time Snapshot Task (page 360).

Priority This is the alarm's priority as specified in the alarm setup. See the discussion of Control in the Single-Alarm Setup (page 338) section.

The choices are Low, Medium, High, and Critical.

Azimuth Specifies the line of bearing as is provided by a direction-finding system. See Azimuth (Text) Entry (page 372).

Extension This is the typical period-three-letter filename extension that most filenames use. See Filename Extensions (page 133).

- Time snapshot files get the extension .cap (short for capture).
- Frequency snapshot files get the extension .fss (for frequency snapshot)

There is no choice here other than whether or not to use the appropriate extension (and we recommend that this always be the last field). But, if you want a different extension, you can specify a text field containing the characters you want.

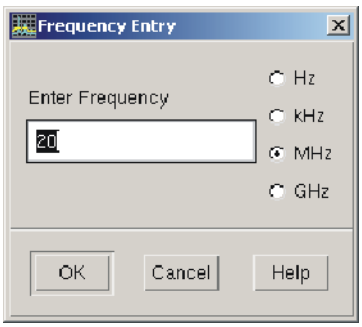
The snapshot file data format is described in the *Command Reference*[1].

Write Mode Specifies how the file is created on the disk.

- **Write Once** means that the specified filename is used only the first time the snapshot button is clicked. When a file with the same name already exists, no snapshot data is collected. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of collecting only one file, you must use filename fields that do not change.
- **Write Over** means that, if the filename exists, the data in the file is replaced with new data. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of having only one file that is overwritten, you must use filename fields that do not change.
- **Write New** means that the new files do not overwrite existing files. When a file with the same name exists, an extension is added in the form _1, _2, etc. So if a file named alarm001.cap exists and the filename definition specifies that another file of that name is created, the new file is named alarm001.cap_1 and the next would be alarm001.cap_2.

[1] See the \E3238s\manuals\command_ref.pdf file.

Frequency Entry

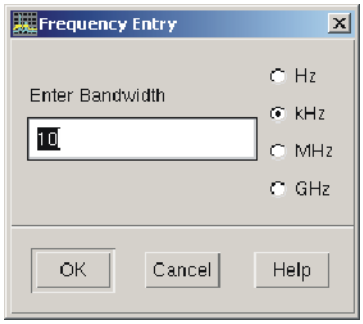


This dialog box appears when you click a button to enter a frequency or a bandwidth.

To enter a value:

1. Enter the frequency value in the text box.
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

Bandwidth Entry

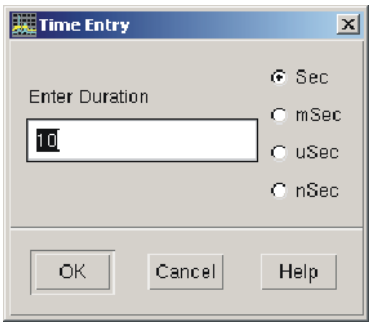


This dialog box appears when you click a button to enter a bandwidth value.

To enter a value:

1. Enter the frequency value in the text box.
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

Duration Entry

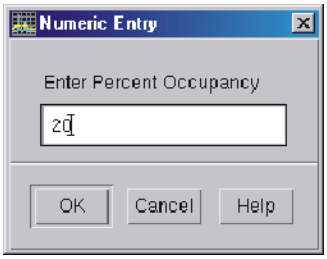


This dialog box appears when you click a button to enter a (time) duration value.

To enter a value:

1. Enter the duration value in the text box.
2. Click one of the frequency units radio buttons or type s, m, u, or n to select Sec, mSec, uSec, or nSec, respectively. You can also enter floating-point numbers in the form 1.23e-4.
3. Click OK, or press the Enter/Return key.

Numeric Entry



This dialog box appears when you click a button to enter a numeric value.

To enter a value:

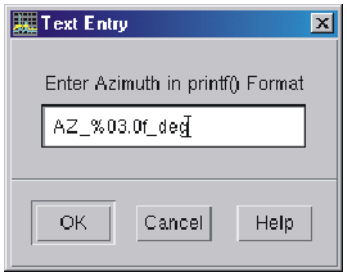
1. Enter the value in the text box.

   Integer values (such as intercepts or detections) allow only numeric characters (0-9) and the + and - characters.

   Floating-point numbers may (such as percent occupancy) consist of the characters 0-9, +, -, and e or E which indicates exponential (scientific) notation such as 3.45e6.

2. Click OK, or press the Enter/Return key.

Azimuth (Text) Entry

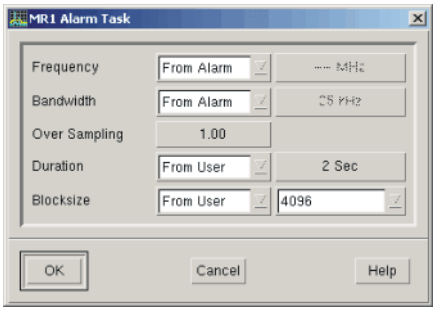


This dialog box is used to define part of a recording filename. To enter a value:

1. Enter the azimuth filename definition in the text box. The format is specified in printf() syntax. As shown above, the entry **`AZ_%03.0f_deg`** breaks down as follows:
   - **`AZ_`** and **`_deg`** are text; what you see is what you get.
   - **`%03.0f`** is printf() syntax specifying a floating-point value of at least three digits, no digits after the decimal. The leading zero causes values less than 99 to be padded with one or more leading zeros.
2. Click OK, or press the Enter/Return key.

MR1 Alarm Task

This dialog box is used to initiate a Module Recognition task when the alarm conditions are met.



The MR1 Alarm Task dialog box has five parameters that the user can specify. These parameters are associated with the task that is added to the modulation recognition Mod Rec Pending List (page 403). Several of these parameters can match the ones used to trigger the alarm; and some of them can be specified separately. Select “From Alarm” to obtain the value from the energy of the signal that generated the alarm. Select “From User” to force the parameter to a fixed value.

Frequency The frequency of the signal given to the Mod Rec task.

Bandwidth The bandwidth of the signal given to the Mod Rec task. The Bandwidth value and the Oversampling value determine the sample rate.

Oversampling The oversampling rate of the signal given to the Mod Rec task. The Oversampling value and the Bandwidth value determine the sample rate. This value is a decimal number between 0.5 and 4.

Duration The duration of the pending request given to the MR1 task. This is a three element menu. The choices are From Alarm, From User, and Up/Down. The first two selections operate as described above. The third option allows you to specify that the MR1 task be dropped when the signal energy transitions up or down.

The duration value limits the age of the request for modulation recognition and limits the time spent processing the modulation recognition task. It is similar to the Aging value in the Mod Rec Pending List (page 403), but also applies after a signal is assigned to a channel for processing.

The Up/Down setting allows you to remove the Mod Rec request immediately if the energy transitions from present to not present.

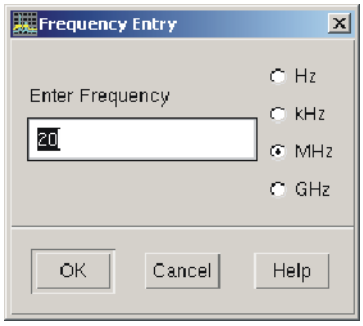
Blocksize This menu defines the blocksize of data processed by the Mod Rec task from 1024 complex pairs to 1,048,576 complex pairs in powers of two.

A blocksize of at least 4096 complex pairs is required to recognize some digital modulation formats.

A blocksize of 8192 complex pairs improves recognition of signals with a narrow bandwidth relative to the sample rate.

Larger blocksizes take longer to process.

Frequency Entry

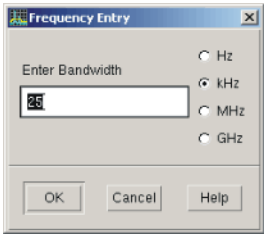


This dialog box appears when you click a button to enter a frequency or a bandwidth.

To enter a value:

1. Enter the frequency value in the text box.
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

Bandwidth Entry

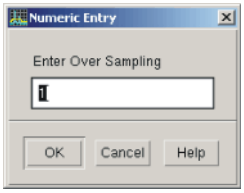


This dialog box appears when you click a button to enter a frequency or a bandwidth. This value and the Oversampling value determine the sample rate for modulation recognition processing.

To enter a value:

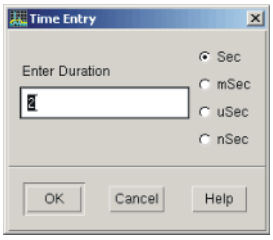
1. Enter the frequency value in the text box.
2. Click one of the frequency units radio buttons or type h, k, m, or g to select Hz, kHz, MHz, or GHz, respectively. You can also enter floating-point numbers in the form 1.23e4.
3. Click OK, or press the Enter/Return key.

MR1 Over Sampling Entry



This numeric entry field allows you to specify the oversampling rate. (Can be set from 0.5 to 4). This value and the Bandwidth value determine the sample rate for modulation recognition processing.

MR1 Duration Entry



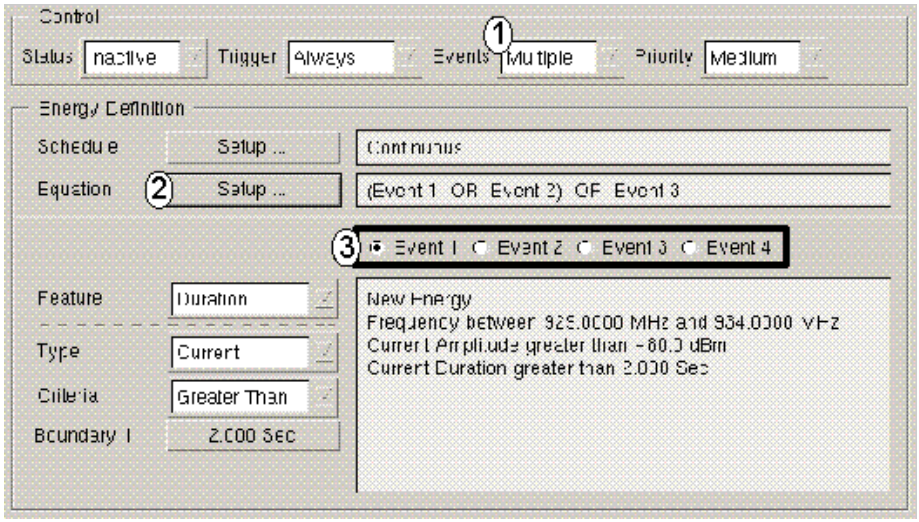
This dialog box appears when you click a button to enter a duration value. The duration value limits the age of the request for modulation recognition and limits the time spent processing the modulation recognition task. It is similar to the Aging value in the Mod Rec Pending List (page 403), but also applies after a signal is assigned to a channel for processing.

To enter a value:

1. Enter the duration value in the text box.
2. Click one of the frequency units radio buttons or type s, m, u, or n to select Sec, mSec, uSec, or nSec, respectively. You can also enter floating-point numbers in the form 1.23e-4. Numeric values greater than 9999 are converted to scientific notation.
3. Click OK, or press the Enter/Return key.

Multiple-Event Alarm Setup

Path: Search, Alarms, select an alarm, set Events = Multiple



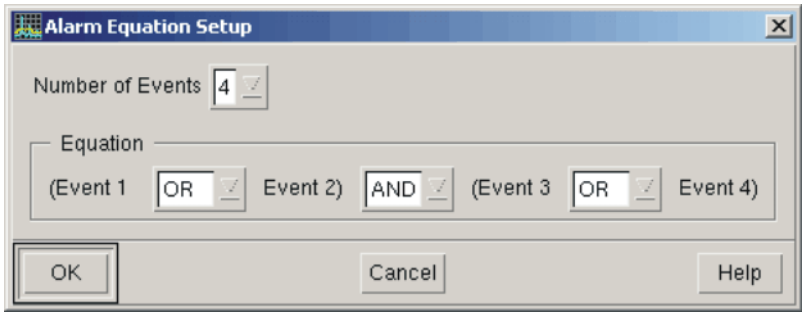
To define an alarm composed of multiple events:

1. Change the Events selection in the Single-Alarm Setup (page 338) dialog box to “Multiple.” Two components are added to the Definition pane, as above.
2. Click the Equation Setup button and specify the number of events and how they are logically combined to define the alarm event.
3. Click an Event Select Button and define it as discussed in Definition (page 342).

   Repeat this last step for each of the events that make up the alarm definition.

Equation Setup

Path: Search, Alarms, select an alarm, set Events = Multiple, Equation Setup



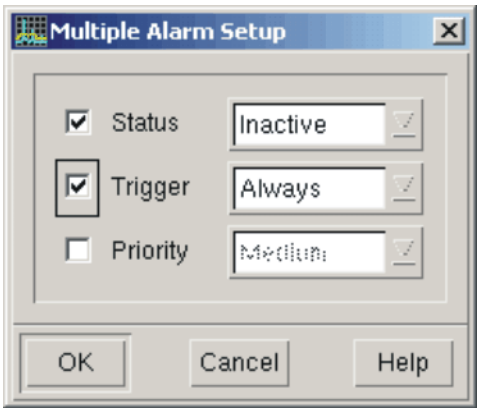
This dialog box is used to define an alarm with two to four event conditions. Each event has its own energy characteristics definitions and the events are combined logically to form an equation with AND/OR operators.

Logical results depend on the logic operators as follows:

- **And** means the alarm condition is satisfied when the events defined on *both* sides of the logic button are true.
- **Or** means the alarm condition is satisfied when *either* event next to the logic button is true.
- Parentheses are used to show precedence. Operations inside the parentheses are performed first. The precedence settings cannot be changed.

Multiple- Alarm Setup

Path: Search, Alarms, select 2 or more alarms, Modify Multiple Alarms

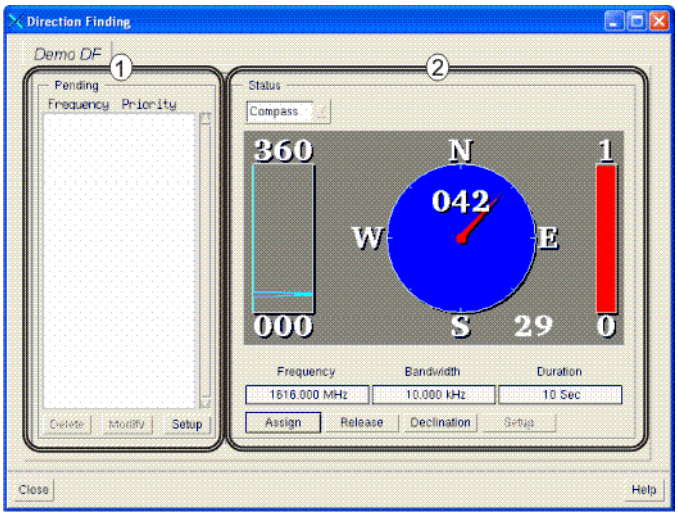


This dialog box is used to modify parameters for more than one alarm. It is part of the Alarms Setup (page 336) dialog box.

1. Select 2 or more alarms as described under Alarms Setup (page 336).
2. Click the selection buttons to specify which of the three parameters you wish to modify.
3. Change the parameter settings for the selected parameters.
4. Click OK.

Direction Finding

Toolbar Icon
Path: Search, Direction Finding ...
Option: EDF



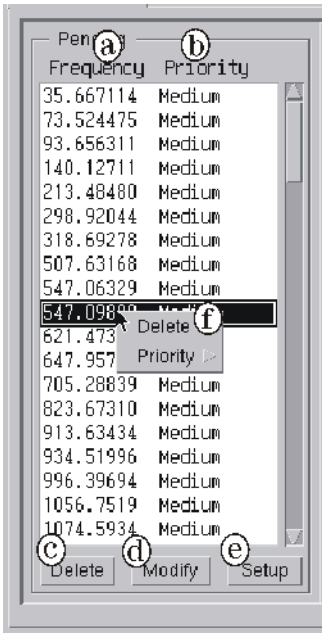
This window displays the processing associated with direction finding activity.

Note that direction finding is not available with option -113. See Software Options (page 10).

The Direction Finding dialog box is composed of two major sections:

1. DF Pending List (page 396)
2. DF Status Display (page 398)

DF Pending List



The DF Pending List displays a list of signals that are waiting to be processed by a Direction Finding subsystem. Signals in the pending list from the main screen by clicking the marker button Task DF (page 65). You can also configure an alarm task to place a signal in the Pending List as described in DF Alarm Task (page 367).

a. Frequency of the DF assignment in the pending list.

b. Priority of the DF assignment in the pending list. This can be changed by selecting it and clicking the Modify button or right-clicking as shown above.

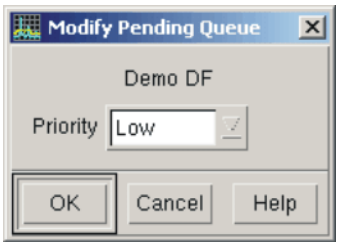
c. Delete removes the highlighted entry from the Pending List. If no entry is selected (highlighted), this button is ghosted (indicates that it is.

d. Modify displays a dialog box used to change the priority of the selected item(s). See DF Modify Pending Signal (page 397).

e. Setup displays the DF Setup Pending Signal (page 397) dialog box. This allow you to set queue parameters: Aging, Max Queue Length, and Merge Frequency.

f. The Pending List popup menu is displayed by selecting one or more signals in the list, then right-click (and hold) the highlighted signal. This pop-up menu is used to delete the entry from the list or change its priority.

DF Modify Pending Signal

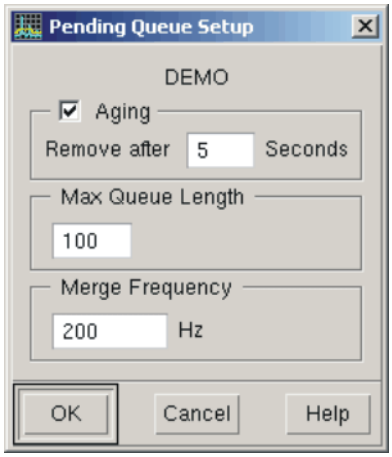


This dialog box is used to change the priority of a signal waiting in the DF Signal Processing Pending queue.

When the dialog box displays, click on the Priority menu to select the desired priority, then click OK.

DF Setup Pending Signal

This dialog box defines the properties of the DF Signal Processing Pending Queue.



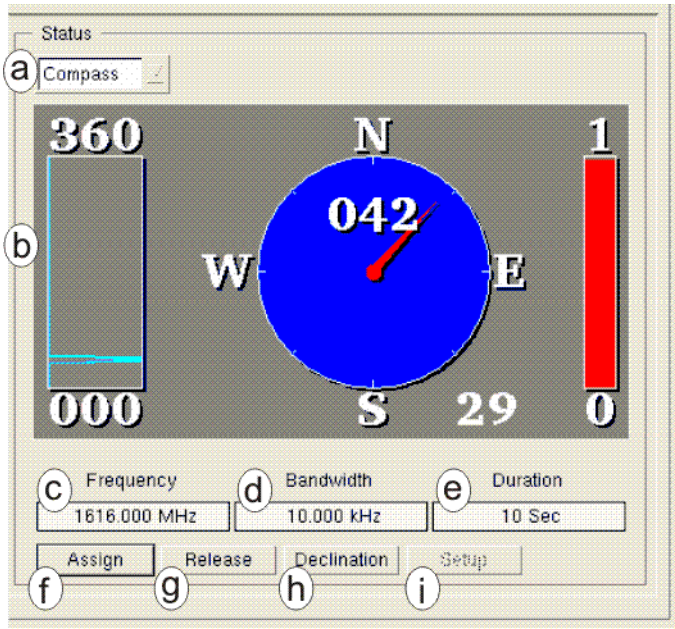
Aging Specifies whether signals are removed from the pending queue after a period of time and the time value. This allows you avoid processing signals that are known to have short duration after they have been in the pending queue too long. Aging can also be accomplished by setting the DF Alarm Task (page 367) duration value.

Max Queue Length Specifies the maximum number of entries allowed in the pending signal queue. When the system has more entries for the pending list than are allowed by this setting, the new entries are ignored.

Merge Frequency Specifies a frequency range within which multiple entries are recognized as one. If a new signal appears within this range of any of the assigned (active) or pending entries, the new entry is ignored.

This value is applied to both the high and low sides of the tuned frequency, not centered on it.

DF Status Display



The DF Status Display displays the results of the DF process. The DF Status Display is composed of:

a. **DF Display Menu** selects the manner in which the results of the DF task are displayed. See DF Display Menu (page 399)

b. **Status Display** displays the results of the DF task.

c. **Frequency Display** displays the center frequency of the currently active signal.

d. **Bandwidth Display** displays the bandwidth of the currently active signal.

e. **Duration Display** displays the duration of the currently active signal.

f. **Assign Button** displays the Assign DF (page 399), which is used to change the attribute(s) of a selected channel.

g. **Release Button** changes the status of an assigned channel from *active* to *idle*.

h. **Declination Button** displays the DF Declination Entry (page 401), which is used to describe the system's declination.

i. **Setup Button** displays the DF Setup dialog box which is used to set parameters for the DF process.

   This dialog box varies depending on the DF subsystem installed. See the operation documentation for your DF system.

DF Display Menu

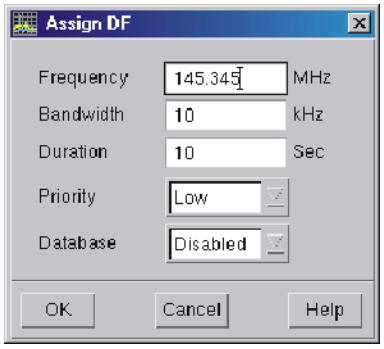
The Display Menu controls how the results of the DF Process are displayed in the DF Status Display Window. The menu has three selections:

Compass The Compass selection displays a compass rose which shows the direction determined for the processed signal. To the left of the compass rose is a histogram showing signal strengths through a full 180 degrees. To the right of the compass rose is a signal quality bar. The signal quality bar indicates, on a scale of 0 to 1, the quality of the signal indicated by the compass rose.

Histogram The Histogram display shows signal activity through a full 360 degrees. The left side of the display is 0 degrees and the right side of the display is 360 degrees. The Histogram display differs from the Direction display in that, signals that are detected remain displayed as time passes.

Direction The Direction display shows recent signal activity through a full 360 degrees. The left side of the display is 0 degrees and the right side of the display is 360 degrees. The Direction display differs from the Histogram display in that, as time passes with no new activity the signal indications shrink and disappear.

Assign DF



Frequency specifies the frequency of the signal to be assigned for direction finding processing.

Bandwidth Entry specifies the frequency of the signal to be assigned for direction finding processing.

Duration specifies the time to be spent processing the assignment.

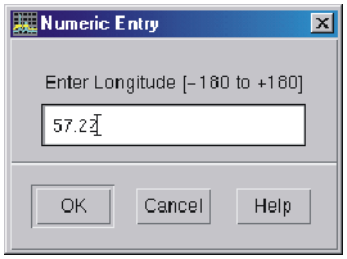
- When this is set to 0, a single DF pass is performed.
- Values larger than 0 cause multiple DF passes, the average of which is entered in the signal database, when **Database** is enabled.

When multiple readings were used to determine the end result, a **quality** value (based on standard deviation) is also entered with the result.

Priority. defines the channel's priority level within the channel list. The available values are: Low, Medium, High, Critical. Changing the priority could be used to avoid having the channel assignment changed (bumped) by a signal with a higher priority.

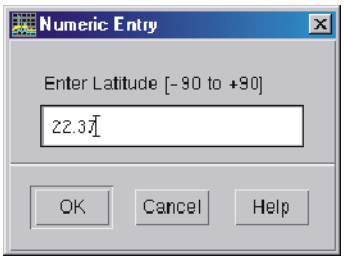
Database specifies whether the results are added to the Signal Database.

DF Longitude Entry



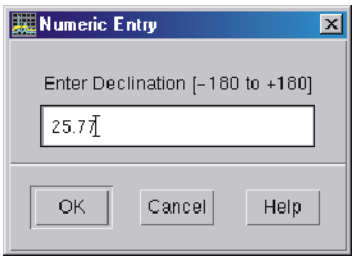
This numeric entry dialog box is used to specify the system's longitude. Enter a value from +180 to -180.

DF Latitude Entry



This numeric entry dialog box is used to specify the system's latitude. Enter a value from +90 to -90.

DF Declination Entry



This numeric entry dialog box used to specify the system's declination. Enter a value from +180 to -180.

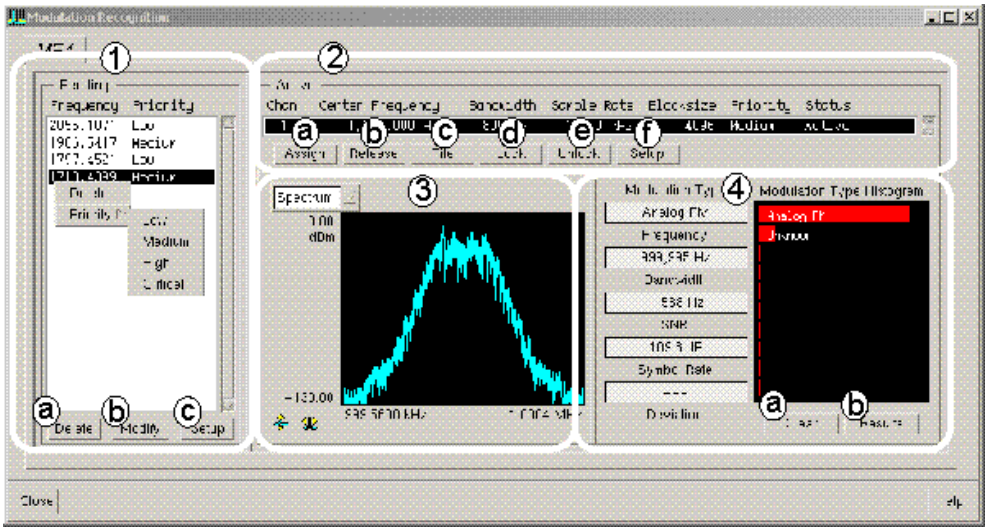
The magnetic declination (or magnetic variation) at any point on the earth is an angle that must be added or subtracted in converting between the direction of the indicator on a magnetic compass and the direction of the earth's lines of longitude.

Modulation Recognition

Toolbar Icon
Path: Search, Modulation Recognition ...
Option: MR1

This section describes the MR1 modulation recognition library. This window displays the processing associated with modulation recognition activity.

Note that modulation recognition is not available with option -113. See Software Options (page 10).



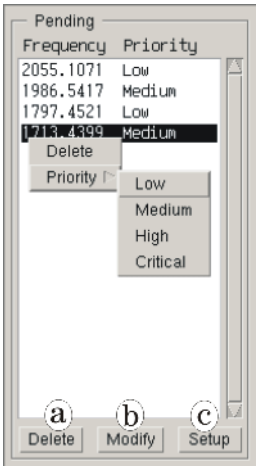
Note This dialog box may be created by a user-defined library that differs from the library used to create the box documented here. If so, what appears here may differ from the your dialog box.

The Module Recognition dialog box is composed of four major sections:

1. Mod Rec Pending List (page 403)
2. Active List (page 404)
3. Monitor Display (page 413)
4. Results (page 414)

Mod Rec Pending List

The Pending List displays a list of signals that are waiting to be assigned to a Modulation Recognition process. You place signals in the pending list from the main screen by clicking on the marker button Task Mod Rec (page 66). You can also configure an alarm task to place a signal in the Pending List as described in MR1 Alarm Task (page 374).



Frequency shows the pending signal's frequency.

Priority shows the pending signal's current priority. This can be changed with the Modify button or using the popup menu.

The Pending List popup menu is displayed by selecting one or more signals in the list by clicking on it, then right-clicking on that highlighted signal. This pop-up menu allows you to delete the entry from the Pending List or change that entry's priority.

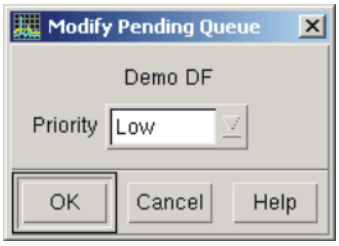
Beneath the Pending List are three buttons:

a. **Delete** Clicking on this button removes the highlighted entry from the Pending List. If no entry is selected (highlighted), this button has no effect.

b. **Modify** Clicking on this button displays a dialog box used to change the priority of the selected item(s).

c. **Setup** Clicking on this button displays the Mod Rec Setup Pending Signal (page 404) dialog box. This allow you to set queue parameters: Aging, Max Queue Length, and Merge Frequency.

Mod Rec Modify Pending Signal

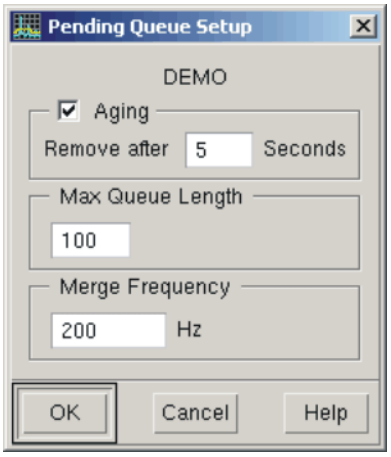


This dialog box is used to change the priority of a signal waiting in the Signal Processing Pending queue.

When the dialog box displays, click on the Priority menu to select the desired priority, then click OK.

Mod Rec Setup Pending Signal

This dialog box defines the properties of the Signal Processing Pending Queue.



Aging Specifies whether signals are removed from the pending queue after a period of time and the time value. This allows you avoid processing signals that are known to have short duration after they have been in the pending queue too long. Aging can also be accomplished by setting the MR1 Alarm Task (page 374) duration value.

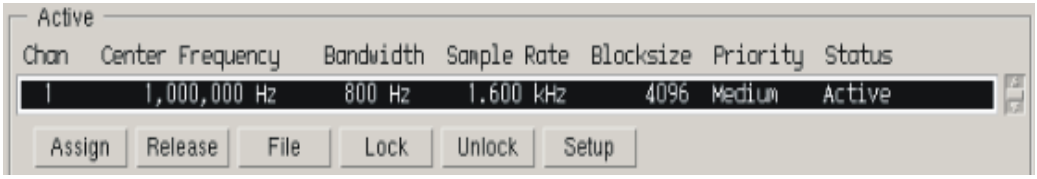
Max Queue Length Specifies the maximum number of entries allowed in the pending signal queue. When the system has more entries for the pending list than are allowed by this setting, the new entries are ignored.

Merge Frequency Specifies a frequency range within which multiple entries are recognized as one. If a new signal appears within this range of any of the assigned (active) or pending entries, the new entry is ignored.

This value is applied to both the high and low sides of the tuned frequency, not centered on it.

Active List

This is the list of current signal processing channel assignments.



The Active frame displays the currently active signals being processed by the Mod Rec software. It is composed of a channel list and several buttons. These are described in the following paragraphs.

The Channel list is composed of:

Chan is the channel number. Channels are assigned to signal types when the `N6820ES` program first starts. The MR1 library is limited to one channel.

Frequency describes the channel's tuned center frequency. This may be from a signal alarm or it may be assigned manually by clicking the entry and then clicking the Assign Channel(s) (page 390) button.

Bandwidth describes the channel bandwidth. This value can be taken from a signal alarm or it can be assigned manually.

Sample Rate describes the rate at which the signal is sampled. This rate is calculated from the bandwidth and oversampling. This rate can be changed by specifying oversampling.

Blocksize is the size of the data block upon which the modulation recognition process works. The blocksizes range from 1024 complex pairs to 1,048,576 complex pairs in powers of two.

Priority defines the channel's priority level.

Note

Locked channels begin processing when the sweep *starts*. Channels that are *not* locked begin processing when they are *assigned*. If you stop the sweep and restart it, unlocked channels will *not* start processing when the sweep restarts. When channels are manually assigned, lock them to assure that they start and run properly.

Status the channel is either *Active* (processing) or *Idle* (unassigned).

Idle-to-Active transition occurs when:

- Signal assignment enters the Pending list (if not locked)
- Manual assignment or reassignment occurs
- Sweep is turned On (if locked and a frequency is associated with it)

Active-to-Idle transition occurs when:

- Age release occurs (if not locked).
- No-signal (if not locked; also has a time delay like age)
- Manual release occurs
- Sweep is turned Off (i.e., the search receiver stops sweeping)

The buttons on the Active frame are:

a. **Assign** displays the Modulation Recognition Assign (page 407) dialog box, which is used to change the attribute(s) of a selected channel.

b. **Release** changes the status of an assigned channel from *active* to *idle*.

c. **File** displays the Playback Control (page 392) dialog box which allows you to process a previously captured signal. The playback files must be first selected and loaded with the Assign Mod Rec dialog box.

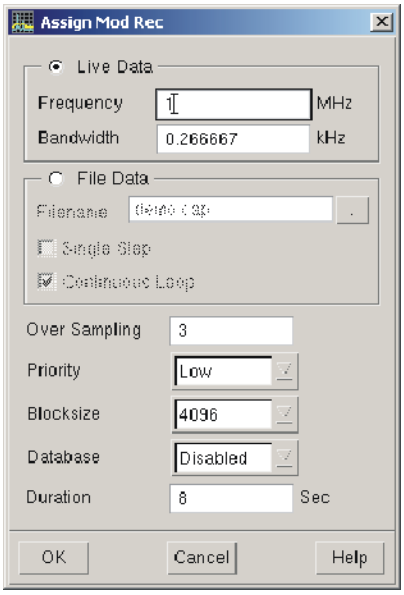
d. **Lock** changes the priority of a channel so that it won't be assigned a different frequency.

e. **Unlock** changes the priority of a locked channel so that it may be reassigned.

f. **Setup** displays the Modulation Setup dialog box, which is used to set parameters for the recognition process. See Signal Recognizer Setup (page 410).

Modulation Recognition Assign

This dialog box allows you to change the Modulation Recognition channel's parameters or to process a captured signal stored in a file.



The Live Data Clicking this button assigns live data to the channel. Clicking on this button also activates the Frequency and Bandwidth boxes.

Frequency Entry. Click in this box, then type in the frequency of the signal you are assigning to the Modulation Recognition process.

Bandwidth Entry. Click in this box, then type in the bandwidth of the signal you are assigning to the Modulation Recognition process.

File Data button Clicking on this button to assigns time data from a snapshot capture file to the channel. Clicking on this button also activates the Filename, Single Step, and Continuous Loop option in the dialog box.

Filename Entry. Click in this box, then type the filename of the file that you wish to assign to the Modulation Recognition process. You can also use the Filename browser button to pop up the filename browser box.

Single Step Button. Click on this button to play the data recorded in the file through the Modulation Recognition process a single time.

Continuous Loop. Click this button to play the data recorded in the file through the Modulation Recognition process repeatedly.

Over Sampling This numeric entry field allow you to specify the oversampling rate. (Can be set from 0.5 to 4.) The actual sample rate is proportional to the bandwidth multiplied by the oversampling setting, but is limited to the capabilities of the ADC.

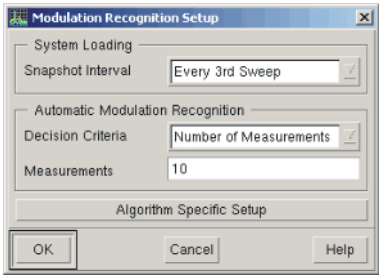
Priority Menu This menu defines the channel's priority level within the channel list. The available values are: Low, Medium, High, Critical. Changing the priority could be used to avoid having the channel assignment changed (bumped) by a signal with a higher priority.

Blocksize Menu This menu defines the blocksize of data processed by the Mod Rec task from 1024 complex pairs to 1,048,576 complex pairs in powers of two. A blocksize of at least 4096 complex pairs is required to recognize some digital modulation formats. A blocksize of 8192 complex pairs improves recognition of signals with a narrow bandwidth relative to the sample rate. Larger blocksizes take longer to process.

Database Menu This menu allows you to enable saving the results of the Mod Rec task signal information in the signal database.

Duration Entry This entry allows you to specify the maximum length of time to process the modulation recognition assignment. Processing can end earlier than the duration time if Database is enabled and the signal is identified.

Modulation Recognition Active Setup



The Modulation Recognition Active Setup dialog box allows you to set or specify the following values.

Snapshot Interval This menu specifies how often the system stops the search to take a snapshot (collect time data). To take the snapshot the system reconfigures the tuner and ADC, which interrupts the sweep. The values allowed are every sweep, every second, third, fifth, tenth, and 20th sweep.

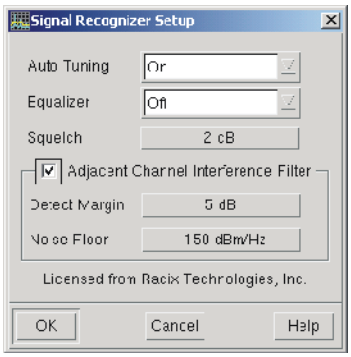
Decision Criteria This menu specifies whether the recognition process uses a specific number of measurements (specified in the box just beneath) to assess the signal of interest, or uses a simple majority vote.

- **Number of Measurements** when this menu option is selected, the Mod Rec task processes that number of measurements. It then classifies the modulation type based on the type that is reported most frequently.
- **Simple Majority** when this menu option is selected, the Mod Rec task continues making measurements until more than half the results report the same modulation type. If no type attains a majority, the measurements continue until the duration expires.

Measurements This numeric entry box specifies the number of measurements the recognition process uses to determine the modulation type.

Algorithm Specific Setup. This button displays the Signal Recognizer Setup (page 410) Dialog Box.

Signal Recognizer Setup



This dialog box controls the parameter settings for the modulation recognition algorithm being used. In the MR1 library the parameters are:

Auto Tuning When Auto Tuning is ON, the algorithm can recognize signals that are not centered within the frequency span. For this feature to function properly there should be no other signals within the frequency span and the signal of interest should occupy at least 1/10 of the frequency span.

When Auto Tuning is OFF, the Mod Rec task must be assigned with an accurate frequency (within 5% of the frequency span) and the signal should occupy at least 33% of the frequency span.

Equalizer This enables a “blind” equalizer. This process builds and applies an equalization filter. The equalization filter can improve detection of high-density digital modulation types that have become distorted. This equalization filter can slow Mod Rec processing, so it should only be used when the modulation type “Unknown Digital” is reported. See Modulation Type (page 414).

Burst Detect Burst Detect enables the recognition signals with bursts of modulation, such as Time Division Multiple Access (TDMA) signals. When Burst Detect is On, the modulation recognition algorithm only analyzes the portion of the time record that contains the burst. When Burst Detect is Off, the entire time record is processed. A larger BlockSize may be needed when Burst Detect is On.

Squelch Sets the minimum signal-to-noise ratio (SNR) for modulation recognition results. Signals with an SNR below this value are classified as unknown. A default value of 2 dB is recommended. In difficult environments (for example, installations rich in computer spurs) larger values can help reduce the number of false identifications. Squelch values larger than 5 dB inhibit the recognition of low SNR signals.

Adjacent Channel Interference Filter Allows recognition of signals when adjacent channels are occupied. When enabled, the NRC algorithm constructs a tight filter around the signal nearest the frequency span’s center and processes that signal. The signal of interest should occupy at least 10% of the frequency span. In this mode the NRC algorithm cannot estimate the channel's noise level, so you must enter a **Noise Floor** value for the SNR computation (described below).

When the Adjacent Channel Interference Filter is off, the algorithm uses the spectrum outside the signal-of-interest to automatically estimate the noise level.

Note Adjacent Channel Interference Filter can be used only on signals with single-peak spectra. *It cannot be used on FSK or other multi-peak signals* because it selects the peak nearest the frequency span center as the signal-of-interest and rejects the other valid signal peak or peaks.

Detect Margin When the Adjacent Channel Interference Filter is enabled, this value is used to determine the presence of signal. Detect Margin is the level in dB above the Noise Floor value required for a signal to be detected and recognized. A default value of 5 dB is recommended. If you need to recognize only strong signals, this value can be raised by several dB to increase throughput.

Noise Floor When the Adjacent Channel Interference Filter is enabled, the algorithm uses this value as a noise level estimate for the channel. This noise level is used in the computation of SNR and is the reference level for Detect Margin. Units are in dB of noise power density.

To measure the noise floor, use the procedure described in Measuring the Noise Floor (page 412).

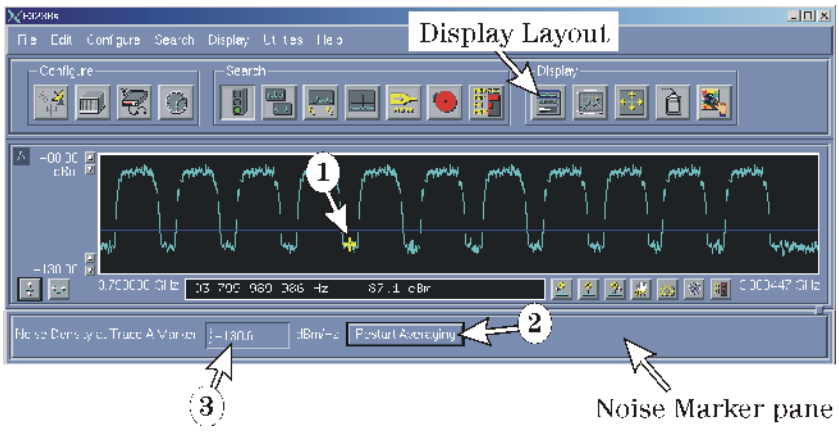
Measuring the Noise Floor

Agilent provides a special marker pane that can be used to measure the noise floor. To display this pane, click the Display Layout (page 422) button and select the Noise Marker entry for the pane beneath the Trace A pane.

Note

You must enable the Noise Marker Pane by uncommenting out the following line in the C:\E3238s\e3238s.n6841.cfg file.

```
userPane: C:\e3238s\lib\noiseMarker.dll
```



The following procedure assumes that Trace A is displayed and the marker in Trace A is on. To determine the noise floor:

1. Position the marker on the noise floor between signals.
2. Click the Restart Averaging button and wait for two or three sweeps to occur.
3. Read the Noise Density value from the Noise Marker pane, then enter this value into the Noise Floor entry box of the Signal Recognizer Setup (page 410).

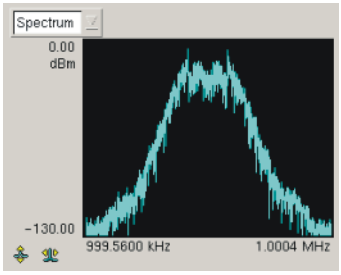
The Noise Density measurement requires averaging of accumulated values gained on successive sweeps. With every sweep you should see less change in the Noise Density value.

The averaging is an exponential algorithm. If you have changed the feed or sweep rate recently, there will be a lot of measurement data that is unusable. To clear this information, click on the Restart Averaging button.

Note that just moving the marker restarts the averaging process. If you haven't changed the signal or sweep setup, you don't need to click the Restart Averaging button

Monitor Display

The Monitor Display section of the Module Recognition screen shows the spectrum of the current active signal.



The Display section has the following elements:

- Spectrum Menu
- Display window
- Trace Scale Values
- Amplitude Autoscale Button
- Frequency Full Scale Button

Spectrum Menu This display currently has only one entry, Spectrum.

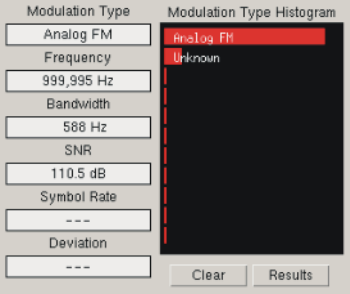
Display Window The Display Window displays the spectrum of the signal being processed by the Mod Rec task.

Trace Scale Values The numbers at the left side of the trace screen describe the amplitude range of the spectrum trace type. The numbers at the bottom of the trace screen describe the frequency range of the trace. These values can be changed by clicking on any of the values, or by clicking the scale buttons.

Amplitude Autoscale Button  This button appears in the bottom-left corner of a trace pane. It sets the minimum and maximum amplitude values so that all of the trace is displayed. This button does *not* change the frequency span.

Frequency Full Scale Button  This button appears in the bottom-left corner of a trace pane. It sets the trace's frequency scale to match that of the snapshot bandwidth.

Results



The Results frame displays the result of the modulation recognition process. The results are displayed as a histogram, or bar chart. The following displays show the current status of the active signal:

Modulation Type This is the best estimation of the type of modulation being used by the signal. The modulation type and notes related modulation types are listed in Modulation Types.

Frequency This is the center frequency of the signal.

Bandwidth This is the bandwidth of the signal.

SNR This is the signal-to-noise ratio of the signal. When the Adjacent Channel Interference Filter in the Signal Recognizer Setup (page 410) is off, the SNR is automatically computed from the noise level of the spectrum adjacent to the signal. When the Adjacent Channel Interference Filter is on, the SNR is relative to the value entered for ACI Noise Floor.

Symbol Rate This is the symbol rate for digital modulation formats.

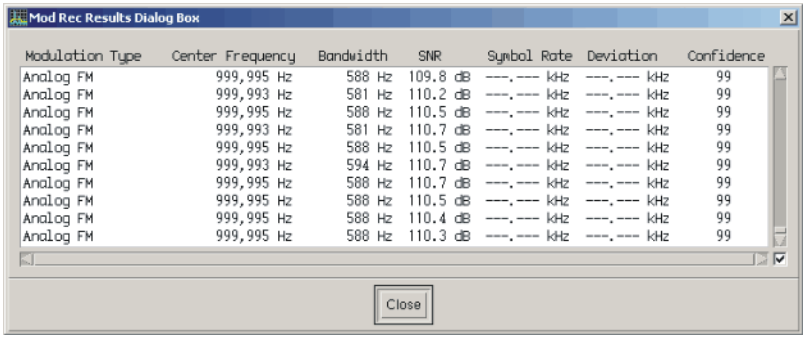
Deviation Deviation is the peak frequency deviation for FSK formats. This value can be converted to FSK tone spacing using the following rules:

- **MSK or FSK:** Multiply the deviation value by 2
- **4-FSK:** Multiply the deviation value by 2/3
- **8-FSK:** multiply by 2/7

Clear/Refresh Beneath the histogram are located the following buttons.

- **Clear** Clicking the Clear Button clears the results display and the results list.
- **Results** Clicking the Results button pops up the Mod Rec Results Dialog Box.

Results Dialog Box



The Modulation Recognition Results Dialog Box displays a scrolling list of results of the Mod Rec task. This dialog box displays the same information as that displayed to the left of the Histogram, but in form that allows you to scroll back through entries. This information is captured in the signal database if the signal database is enabled.

Modulation Types

The MR1 library attempts to categorize signals as one of the following types:

Analog Modulation Types:

Modulation Type	Description
AM (Amplitude Modulation)	Amplitude modulated RF carrier. Usually carries speech, music, or other audio. Can also carry analog data, such as telemetry, fax, or imagery such as slow-scan television (SSTV). Wider bandwidth AM (wider than normal audio bandwidths of 4 – 25 kHz) probably carries data. May be identified as Pure Carrier during silences or low-level modulation inputs.
AM DSBSC (Amplitude Modulation/Double Side-Band Suppressed Carrier)	Similar to AM, but with the carrier suppressed to achieve greater power efficiency. Requires special carrier-insertion receiver processing to retrieve intelligible speech/traffic. May be identified as NOISE or UNKNOWN during silences or low-level modulation inputs.
LSB (Lower Single Side-Band)	Similar to AM, but with carrier and the upper side-band suppressed. More likely to carry speech than any form of analog data. May be identified as NOISE or UNKNOWN during silences or low-level modulation inputs.
USB (Upper Single Side-Band)	Similar to AM, but with carrier and the lower side-band suppressed. More likely to carry speech than any form of analog data. May be identified as NOISE or UNKNOWN during silences or low-level modulation inputs.
Analog FM (Analog Frequency Modulation)	Frequency modulated RF carrier. Usually carries speech, music, or other audio. Can also carry analog data, such as telemetry, imagery, or sensor data. Can also carry digital data, such as multi-tone modulations or multi-level FSK if other than 2, 3, 4, or 8FSK. May be identified as Pure Carrier during silences or low-level modulation.
Manual Morse	Morse code at word-per-minute (WPM) rate ranging from 35 WPM to 150 WPM. May be identified as Pure Carrier during tune-up (long dash), and NOISE or UNKNOWN during long keying pauses.
Machine Morse	Morse code at word-per-minute (WPM) rate ranging from 35 WPM to 150 WPM. May be identified as Pure Carrier during tune-up (long dash), and NOISE or UNKNOWN during long keying pauses.
Noise	This message indicates that the algorithm failed to detect any signal structure, or found only very weak structure with noise characteristics dominating. Often indicates a very low SNR input.

Analog Modulation Types- cont.

Modulation Type	Description
Pure Carrier	Unmodulated carrier, indicative of idle signal or signal during tune-up. Other modulation types may be identified as Pure Carrier if the Bandwidth (which controls Sample Rate) is too large.
Unknown	This message indicates that algorithm detected signal structure, but could not find a clear match to any of the supported modulation types. Often indicates low SNR or co-channel interference (overlapped signals). Can also indicate signal distortion, such as caused by multipath reception. Some modulation types may be identified as Unknown if the Bandwidth (which controls sample rate) is too small, causing a portion of the signal spectrum to be missed.
Unknown Digital	This message indicates that algorithm acquired carrier and symbol sync, but was unable to resolve the constellation of the signal due to severe spreading of the constellation points. Constellation spread is usually caused by low SNR, co-channel interference, distortion effects such as multipath reception, or combinations of these factors. The signal could be any form of QAM or any form of PSK, or an unsupported digital signal. Enabling the Equalizer (page 410) filter may allow detection.

Digital Modulation Types - Phase Shift Keying:

Modulation Type	Description
BPSK (Binary Phase-Shift Keying)	Two-level phase-shift keying (PSK) used to transmit digital data at 1 bit per symbol. Related to QPSK, 8PSK. Used in satellite links.
QPSK (Quadrature Phase-Shift Keying)	Four-level phase-shift keying (PSK) used to transmit digital data at 2 bits per symbol. Used in satellite links.
PI/4 QPSK	Modified QPSK with a 45-degree constellation phase-reference shift on alternate symbols. Widely used (for example by IS-136 “digital AMPS” cellular) to transmit digital data at 2 bits per symbol with tighter sidelobes than standard QPSK.
8 Level PSK	Eight-level phase-shift keying (PSK) used to transmit digital data at 3 bits per symbol
16 Level PSK	Sixteen-level phase-shift keying (PSK) used to transmit digital data at 4 bits per symbol. Requires high SNR at the receiving node to achieve a reliable data link.

Digital Modulation Types – Frequency Shift Keying:

Modulation Type	Description
FSK (Frequency-Shift Keying	Two-level frequency-shift keying (FSK) used to transmit digital data at 1 bit per symbol by switching between two frequencies. Also called Binary FSK (BFSK). Includes coherent (continuous phase) FSK and non-coherent FSK, without distinction. Covers a wide range of modulation index (D/B), ranging from D/B=0.35 to D/B=20. D/B represents the frequency deviation to bit rate ratio. The frequency deviation (also called frequency shift) is the separation between the mark and space frequencies, and the bit rate is the signal keying rate. Related to MSK.
MSK Minimal-Shift Keying	Minimal-shift keying (MSK) is defined as binary FSK with D/B value less than or equal to 0.6. This is a modern, spectrally efficient (narrowband) form of FSK. This includes Gaussian minimal-shift keying (GMSK) such as used by GSM, as well as staggered QPSK (SQPSK) signals.
3 Level FSK	Three-level frequency-shift keying used to transmit digital data at 1 bit per symbol. The third state is used either as a resting frequency or to send parity information to help detect or correct errors
4 Level FSK	Four-level frequency-shift keying used to transmit digital data at 2 bits per symbol using 4 frequencies. Used by some paging protocols.
8 Level FSK	Eight-level frequency-shift keying used to transmit digital data at 3 bits per symbol. Used in the HF radio Automatic Link Establish (ALE) protocol.

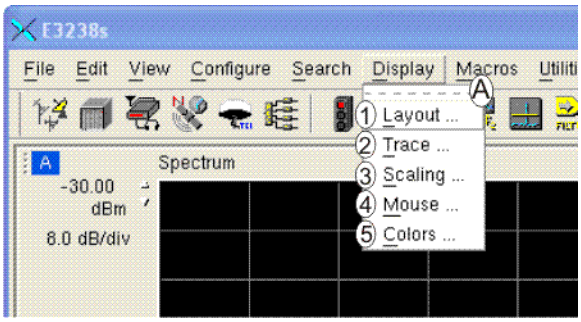
Digital Modulation Types – Other:

Modulation Type	Description
OOK (On-Off Keying)	Two-level pulse amplitude modulation (PAM) used to transmit digital data at 1 bit per symbol. Also referred to as two-level amplitude shift keying (ASK). Includes signals with two nonzero amplitude levels, as well as those where one of the amplitude levels is zero, corresponding to a signal OFF state.

Modulation Types

4PAM	Four-level pulse amplitude modulation (PAM) used to transmit digital data at 2 bits per symbol. Also referred to as four-level amplitude shift keying (ASK). Includes signals with four nonzero amplitude levels, as well as those where one of the amplitude levels is zero, corresponding to a signal OFF state.
16 QAM	Quadrature amplitude modulation (QAM) with a square (4 x 4)16-level constellation, used to transmit digital data at 4 bits per symbol. Often found on digital modems or high-capacity digital data links.
32 QAM	Quadrature amplitude modulation (QAM) with a non-square 32-level constellation, used to transmit digital data at 5 bits per symbol. Constellation is 6 x 6 with the four corners removed. Often found on digital modems or high-capacity digital data links.
64 QAM	Quadrature amplitude modulation (QAM) with a square (8 x 8) 64-level constellation, used to transmit digital data at 6 bits per symbol. Requires higher SNR for reliable data communications. Often found on digital modems or high-capacity digital data links.
128 QAM	Quadrature amplitude modulation (QAM) with a non-square 128-level constellation, used to transmit digital data at 8 bits per symbol. Requires high SNR and a low distortion channel for reliable data communications. Often found on digital modems or high-capacity digital data links.
256 QAM	Quadrature amplitude modulation (QAM) with a square (16 x 16) 256-level constellation, used to transmit digital data at 8 bits per symbol. Requires high SNR and a low distortion channel for reliable data communications. Often found on digital modems or high-capacity digital data links.
V.29	A form of Quadrature amplitude modulation (QAM) often used for facsimile transmissions.

The Display Menu



This menu contains entries used to configure the display.

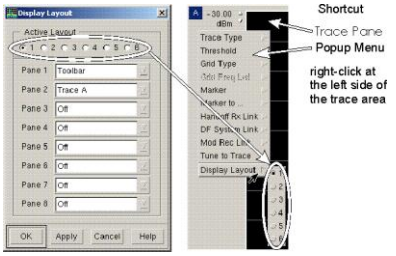
A This is a **tear- off menu**. Click the top of the menu and the menu gets its own window so that it does not disappear after a selection.

1. Display Layout (page 422) is used to add or remove panes.
2. Trace Setup (page 424) is used to configure the traces.
3. Trace Scaling (page 458) is used to set trace scaling.
4. Mouse (page 466) is used to set mouse features in trace panes.
5. Colors (page 471) is used to set trace color configurations.

To save a display setup for later recall or to load a previously saved display setup, see the discussion of Mission Setup Sections (page 132).

Display Layout

Toolbar Icon
Path: Display, Layout



The Display Layout controls what is displayed in the application window. For information about the N6820ES window, see N6820ES Main Window (page 45).

Active Layout

The buttons at the top are used to quickly change the window configuration. Each of the 6 buttons may be defined by the user to specify a set of panes for the window; i.e., the content of the active panes. This allows you to store several of your “favorite” display configurations and quickly change from one to another.

To define one of the six layouts:

1. Select a layout number at the top.
2. Change the panes to the desired configuration. (Select from the option menu.)
3. Click either Apply or OK.

You can pick the active layout with a shortcut from any trace pane as shown at the right in the figure above. See *Display Layout* in Trace Popup Menu (page 456).

Layout configurations are saved as part of the mission state file in the “Display” section. You can set the active layout configurations and then save it with Save Mission Setup (page 129). To save only the display configuration settings, disable all but the Display section. You can also define more than one set of 6 settings, saving each as a mission state file under a unique name and then load whichever you need with the Load Mission Setup (page 127) command.

Pane Types

The window may contain as many as eight **panes**. The types of panes are:

- A Trace Pane (page 52)
- The Handoff Receiver Pane (page 70)
- The Handoff Log Pane (page 75)
- The Text Editor Pane (page 113)
- The Command Line Pane (page 115) (part of option ASD)
- The Tool Bar (page 50)
- The New Energy Log Pane (page 86)
- The Alarm Log Pane (page 87)
- The Energy History Pane (page 88)
- The Signal Database Pane (page 107)
- The Visual Alarms Pane (page 112)
- The Frequency Lists Pane (page 118)

Note

If the command line is not in the list of panes, edit the `E3238s` file and change "False" to "True" in the line that reads:

*commandLineEnabled: False

If a pane is on but does not appear in the window, the window is not large enough to show all the active panes.

To Add a Pane

With this dialog box displayed, a pane may be added to the application window as follows:

1. Click a pane button that is off. A list appears.
2. Click the list item you wish to add.
3. Click "OK."

To Change a Pane

You can change the contents of a pane as follows:

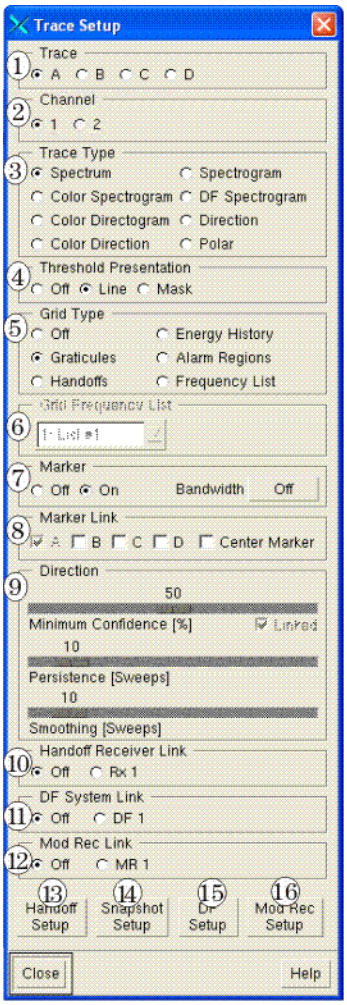
1. Click the pane button you wish to change. A list appears.
2. Click the new pane type. If the item name is ghosted, it is already being displayed in another pane. Open that pane and turn it off, first.
3. Click "OK."

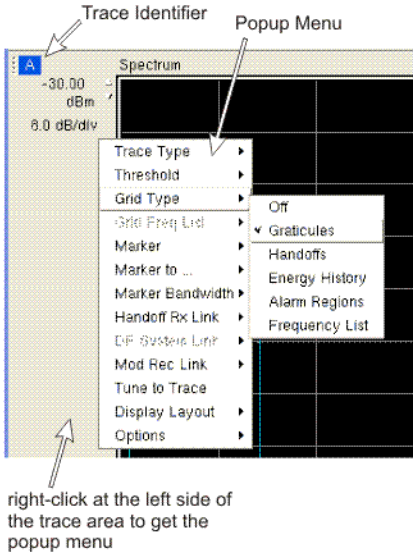
To Delete a Pane

To delete (remove) a pane from the application window, follow the procedure given above for changing a pane and select "Off" as the pane type.

Trace Setup

Toolbar Icon
Path: Display, Trace (or click the Trace Identifier (page 54))





This dialog box is used to change the configuration of the trace elements. Trace elements may also be changed with the Trace Popup Menu (page 456).

1. Trace Selection (page 426)
2. Channel (page 426)

3. Trace Type (page 427)
4. Threshold Presentation (page 428)
5. Grid Type (page 429)
6. Grid Frequency List (page 431)
7. Marker On/Off (page 431)
8. Marker Link (page 433)
9. Direction
10. Handoff Receiver Link (page 434)
11. DF System Link (page 451)
12. Mod Rec Link (page 453)
13. Trace Handoff Settings (page 435)
14. Trace Snapshot Setup (page 438)
15. Trace DF Setup (page 452)
16. Trace Mod Rec Setup (page 454)

Note

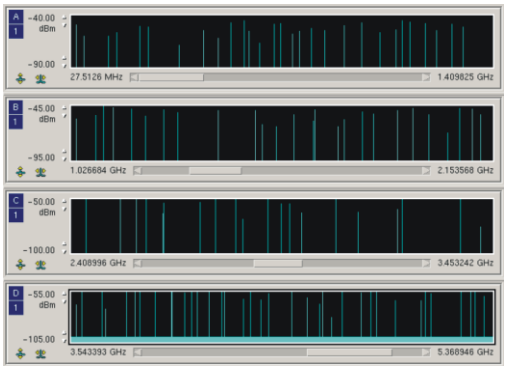
Elements numbered 9 through 12, and 14 and 15 appear only when their corresponding software option has been installed and activated in the e3238s.n6841.cfg configuration file. See Hardware Configuration (page 16).

Software Option Elements

If you have installed certain software options, these options can provide additional elements to the Trace Setup dialog box. These options include handoff receivers, which adds the Handoff Receiver Link (page 434) and the Trace Handoff Settings (page 435). The Direction Finding option adds the DF System Link (page 451) and the Trace DF Setup (page 452). Finally, the Modulation Recognition option adds the Mod Rec Link (page 453) and the Trace Mod Rec Setup (page 454).

Trace Selection

The settings displayed in the Trace Setup dialog box depend on which trace is selected at the top of the dialog box. The letters A, B, C, and D correspond to the trace panes with the same names. See Trace Identifier (page 54). One and only one trace may be selected at a time.



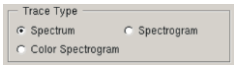
Tips

- Always select the trace before changing any other selection in this dialog box.
- To add or remove a trace pane from the window, see Display Layout (page 422).
- To select a trace, click the corresponding radio button. The button that appears to be filled is “selected.”
- To display the settings for a particular trace, select the trace.

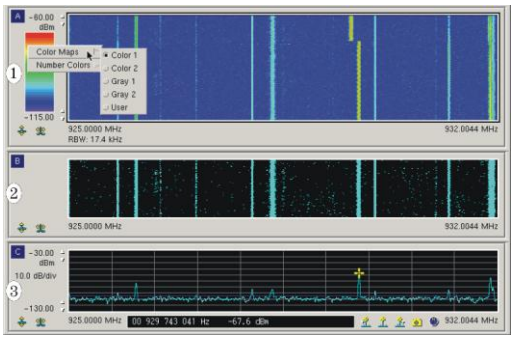
Channel

This selection specifies which search receiver channel data is displayed in the trace pane. Multiple search channels are supported by the N6841A RF Sensor.

Trace Type



This selection defines the trace type for the selected trace. It may also be selected from the Trace Popup Menu (page 456).



1. A **color spectrogram** trace displays frequency versus amplitude using color or shades of gray to indicate amplitude levels. The threshold configuration has no effect on this trace and no grids are used. When the marker is on, it appears as a vertical line in a color spectrogram trace.
   - When you click the right mouse button in the color bar at the left side of this trace, a popup menu appears with which you may select the type of *Color Map* and the *Number of Colors*. See illustration.
   - The Color Maps include two color maps and two gray-scale maps.
   - Number of Colors ranges from 2 to 128, depending on the resource variable maxSpectrogramColors. See the discussion of resources in Application Resources (page 17) and Color Maps under Starting the Program (page 19).
   - Both the color map used and the number of colors in a color spectrogram can be specified in the Colors (page 471) dialog box.
2. A **spectrogram** trace displays frequency versus whether the amplitude is above the threshold setting; a boolean value, True or False. The Y axis is time. Each sweep is a straight line that moves up slightly as the next sweep begins so that a history of signal activity is displayed.

   When you select spectrogram, make sure the threshold is on. See Threshold Setup (page 310). When the marker is on, it appears as a vertical line in a spectrogram trace.

3. A **spectrum** trace displays frequency versus amplitude, one sweep at a time. The threshold may appear as a line. See Threshold Presentation (page 428).

   To change the color of the spectrum line, see Colors (page 471).

Note

Changing the horizontal size of the application window erases all existing spectrogram traces. Changing the vertical size of the trace pane affects only how many spectrogram traces are displayed.

Advanced Note

The amount of time represented in the spectrogram depends on the value of the `spectrogramBackingStoreSize` resource. It is limited by the amount of installed memory (RAM) and has an effect on display speed. If the display needs to be repainted, only the lines saved in memory are re-displayed. See the discussion in Application Resources (page 17).

Threshold Presentation

This selection may also be made from the Trace Popup Menu (page 456).

A Threshold Setup (page 310) can be displayed on the trace in several ways.

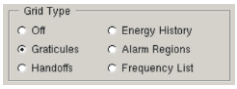
- **Off** means that no indication of threshold level is displayed.
- **Line** means the threshold level is represented with a line.
- **Mask** means the trace is not displayed when the signal amplitude is less than the threshold level.

Note

When the trace type is spectrogram, the threshold settings are inactive.

The threshold line is a *layer* in the trace pane. The color may be changed and the relative order of the layers changed in the Display, Colors (page 471) dialog box.

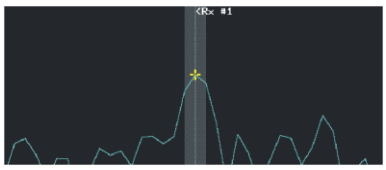
Grid Type



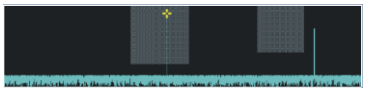
The trace **grid** is the line pattern in the trace area background.

- **Off** means no grids are displayed.
- **Graticules** means that the trace display has a rectangular grid.
- **Handoffs** means that vertical lines appear at frequencies of signals that have been handed off. Also, *active* signals are flagged as shown in the following illustration and the width of the vertical lines indicates the bandwidth criteria setting. See Signal Handoff Status (page 76) and Energy Criteria (page 320).

  The "grid" lines are removed when the handoff log is cleared. See Clear Log (page 146).

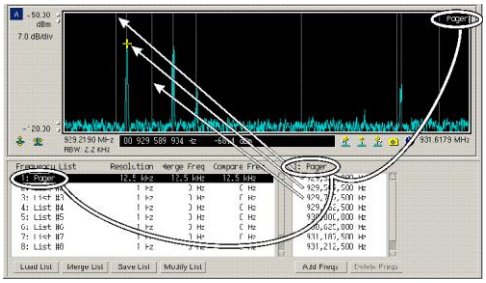


- **Energy History** means that vertical lines appear at the frequencies of the signals in the Energy History pane. See the figure in the discussion of Energy History > Tools > Marker Link (page 104). To clear or reset the grid lines, use Clear Energy History (page 148) in The Edit Menu (page 145).
- **Alarm Regions** means that parts of the spectrum monitored by *active* alarms' amplitude and frequency settings are colored with the grid color in the trace. See following figure. If multi-event alarms are defined, each event's region is displayed. See Multiple-Event Alarm Setup (page 377) for more information.



- **Frequency List** means that vertical grid lines appear in the trace as defined in one of the frequency lists. The name of the list appears in the upper right-hand corner of the trace as shown in the following figure.

  The frequency lists may be viewed and managed in the Frequency Lists Pane (page 118). Since entries in the lists can be added or deleted by alarm tasks or user-defined library calls, these grid lines may change dynamically. To select the list that defines the grids, see Grid Frequency List (page 431).

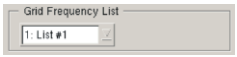


Note

The grid lines are a *layer* in the trace pane. Grid color and layering (whether the grid overlays other layers) are defined in the Display Colors (page 471) dialog box.

Energy history signals are defined by the threshold and signal criteria settings in the Energy Detection (page 309) dialog box.

Grid Frequency List



This menu allows you to select one of the defined frequency lists as a grid. Frequency lists may be defined with any ASCII editor such as vi, saved in a file, and loaded in the Frequency Lists Pane (page 118).

Besides defining trace grids, frequency lists may be used as alarm criteria or in user-defined libraries such as feature extraction.

Frequencies may be added or deleted to/from a list by an alarm task. See Frequency List Alarm Task (page 367).

Marker On/Off

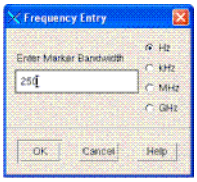
A marker is part of the Trace Pane (page 52). It is used to read frequency and amplitude information from a trace. When the marker is on, the Marker Readout (page 61) and Marker Function Buttons (page 63) appear below the trace. The frequency information may be used to select signals to handoff. Marker functions (peak searching) are affected by the threshold settings. The left mouse button can be used to display a marker if it is off. See Mouse (page 466).

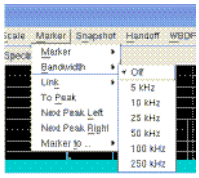
When the trace type is *spectrum*, a marker appears as a small cross hair symbol on the trace. When the trace type is *spectrogram*, the marker is a vertical line.

When a marker is on, a Marker Readout (page 61) appears below the trace as well as the marker search buttons and the marker handoff button. The text in the marker readout may be dragged to the text editor with the middle mouse button. See Mouse (page 466). The position of the marker may be changed by pointing and clicking the mouse or by using the Marker Function Buttons (page 63). The marker frequency may be assigned to a handoff receiver by dragging it with the middle mouse button.

When the marker is off and the frequency scale is zoomed (the span displayed in the trace is smaller than the entire scan) a horizontal scroll bar appears below the trace. You can change the spectrum displayed by moving the scroll bar. See Scroll Bars (page 133). When the marker is on, the scroll bar is not displayed. See Trace Popup Menu (page 456) for another way to access trace marker control.

Marker Bandwidth





The Marker Bandwidth button displays the Marker Bandwidth dialog box. The Marker menu in a trace pane displays the Marker Bandwidth menu. Both the dialog box and the menu allow you to specify a bandwidth associated with a marker. This bandwidth is shown on the spectrum trace as a pair of lines, one on either side of the marker, that display the defined bandwidth.

The Marker Bandwidth menu gives a choice of six predefined bandwidths. The Marker Bandwidth dialog box allows you to set an arbitrary bandwidth.

Marker Link

The Marker Link feature allows the markers in multiple traces to move together. Each trace has a marker link selection. Marker links operate as a one-way link, so that if trace A has a link to Trace B, any marker movement in Trace A causes the marker in Trace B to follow it. However, any marker movement in Trace B will not occur in Trace A unless Trace B has also had its marker linked to Trace A.

The Marker Link feature also affects linking for handoffs, signal processing, direction finding, and modulation recognition (if those options are active). If Trace A has a marker link to Trace B and a handoff link to Rx 1, and Trace B has a handoff link to Rx 2, any marker movement in Trace A moves the marker in trace B and retunes the both Rx 1 and Rx 2 handoff receivers.

Center Marker allows linked traces to keep their new marker values in the center of the X-axis. When the Center Marker box is selected, the link traces will have their x-axis scale adjusted to keep the marker in the middle of the trace. This will occur only if the linked trace span is greater than the link's source trace, the x-axis of the traces are identical, or the frequency ranges of the traces overlap enough so that markers are visible in both traces.

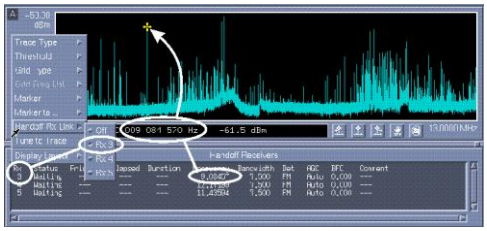
Handoff Receiver Link

This selection can also be made very quickly from the Trace Popup Menu (page 456).

The marker can be used to tune a handoff receiver. This selection determines which handoff receiver is linked to the trace marker.

When a trace's marker is linked to a handoff receiver, you can tune the handoff receiver to any frequency in the trace by moving the marker to it; i.e., point and click or by using the "peak" buttons.

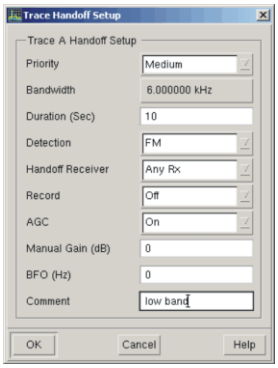
The handoff receivers are identified by number as they are assigned in the Handoff Receiver Configuration (page 271) dialog box. This effect can be extended to selecting signals in the Energy History Pane (page 88) if the Energy History's Marker Link is established with the same trace as the handoff receiver link. See Energy History > Tools > Marker Link (page 104) and the following figure.



Note that the frequencies are the same for the marker and the first handoff receiver. When trace A is linked to receiver 3, changing the marker position changes the receiver's frequency.

Trace Handoff Settings

Path: Display, Trace Setup, Handoff Setup



The trace markers may be used to handoff signals. When a signal is handed off from the trace marker, the trace's marker frequency is used to specify the carrier center frequency for the handoff receiver. This dialog box is used to specify the other handoff settings. For more detail about handoff parameters, see Handoff Log Pane (page 75).

Priority This is the priority assigned to a signal when it is handed off. When more than one signal is waiting for a handoff receiver (pending), this setting determines which goes first. When the priority of two pending signals is the same, the signal with the earlier request goes first. When a signal is put in the handoff queue with a higher priority than the signal currently being monitored, the *active* signal is *bumped*. See Handoff Status (page 76) for descriptions of *pending*, *active*, and *bumped*.

- For more information, see Handoff Priority (page 79).
- Priority also can be set for signals handed off from the Alarms Handoff Task (page 355) dialog box.
- To change this value for a pending entry in the handoff log, see Handoff Log Popup Menu (page 83).

Bandwidth The handoff receiver's bandwidth. When you click this button, the Frequency Entry (page 295) dialog box appears, which allows you to change the value.

The marker's frequency value is used as the carrier center frequency to tune the handoff receiver.

Duration Specifies how long the handoff receiver should monitor the signal. Values in the list range from one second to 24 hours. This value may be changed after the signal is handed off.

- For more information, see Handoff Duration (page 80).
- To change this value for a pending entry in the handoff log, see Handoff Log Popup Menu (page 83).

Detection The detection type used to demodulate the signal. The types available depend on the handoff receivers installed. The standard types are:

- None
- AM: amplitude modulation
- FM: frequency modulation
- CW: continuous wave
- LSB: lower side band
- USB: upper side band
- Log: log modulation
- Pulse: pulse modulation

See Handoff Detect (page 81) for more information.

Handoff Receiver A list of installed handoff receivers that can be used to specify a particular radio, or “Any Radio”. To change the selection, click the button to display the list and select the radio to which you want this trace to be handed off.

For information about the installed handoff receivers see Handoff Receiver Configuration (page 271).

Record A button used to specify whether to record the handoff receiver output. This applies only if you have an audio recorder system connected to the handoff receiver’s audio output; it is not part of the N6820ES system.

AGC is a button used to specify whether to use the handoff receiver’s automatic gain control (AGC) feature. This applies only if the specified handoff receiver has an AGC feature. For information about a handoff receiver’s features, see Setup under Handoff Receiver Configuration (page 271).

Manual Gain A button used to specify the handoff receiver’s IF gain when the automatic gain control (AGC) is off. This applies only if the specified handoff receiver has an adjustable manual gain feature. For information about a handoff receiver’s features, see Setup under Handoff Receiver Configuration (page 271).

To change the value, click the button and the Amplitude Entry (page 352) dialog box appears.

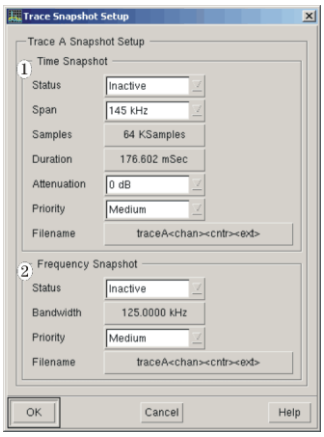
BFO This button is used to specify a frequency value for the handoff receiver’s beat frequency oscillator (BFO) feature. This applies only if the specified handoff receiver has a BFO feature. For information about a handoff receiver’s features, see Setup under Handoff Receiver Configuration (page 271).

To change the value, click the button and the Frequency Entry (page 295) dialog box appears.

Comment This text area is used to record a brief comment about the handoff setup that is saved in the handoff log. Limit is 15 characters. See Handoff Log Pane (page 75).

Trace Snapshot Setup

Path: Display, Trace Setup, Snapshot Setup
Or: Right-click the camera icon at the bottom of the Trace Pane



This dialog box is used to configure the trace snapshot feature. This feature is used to collect either time or frequency data in a specific trace. The snapshot's center frequency depends on the position of the trace marker, so the trace's marker *must* be on. Snapshot data can also be collected by an alarm task as described in Tasks (page 354).

Note

The snapshot configuration is unique for each trace pane. If you have more than one trace pane displayed, be aware that you must configure each trace's snapshot setup individually. The default trace snapshot status is *Inactive*.

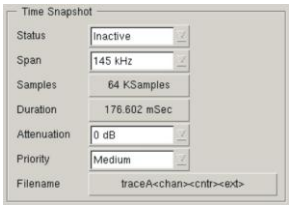
The snapshot is triggered by the button with the camera icon. This button appears at the bottom of the trace when the trace's marker is turned on.

Right-click the camera icon to display the setup dialog box shown above.

The trace snapshot setup dialog box is divided into the following panes:

1. Time Snapshot (page 439) settings
2. Frequency Snapshot (page 442) settings

Time Snapshot



Time snapshots collect ADC sample data (time domain) and store it in a file on the controller's system disk. The ADC setup is defined follows:

The frequency parameter is taken from the position of the marker in the trace in which the snapshot button was pushed. This value is used to configure the search receiver to capture time data containing the marker frequency.

Status A button that specifies whether to collect time snapshot data.

- **Active** status means that data is collected.
- **Inactive** status means that no data is collected.

The default setting is Inactive.

To change the status, click the button.

If the status is *Active*, data is collected when the snapshot button is clicked and the data is written to a system file as specified under Filename. Time data is given a `.cap` extension.

Span A list of frequency values that specify the span of the time data around the marker frequency. The range depends on which ADC is installed.

To change this setting, click the button and select the new value.

Samples The number of samples to be taken for the time data snapshot. Clicking this button displays the Snapshot Duration (page 441) dialog box.

The range of values allowed depends on the ADC model, its configuration, and, if an E9830A is installed, its configuration. For more information, see ADC Configuration (page 257) and Snapshot Memory (page 261).

When the ADC Data Precision is set to 32-bit, each sample is 4 bytes. A sample size of 2Msamples creates an 8MB file.

When the ADC Data Precision is set to 16-bit, each sample is 2 bytes. A sample size of 2Msamples creates an 4MB file.

To change the Samples setting, click the button and select the new value.

Duration Specifies how much time is spent collecting data, given the values specified for span and number of samples. You may pick either the amount of time spent collecting data or the number of samples collected.

Duration is a function of the span (which determines the sample rate) so when the duration is specified, the number of samples taken varies with the span.

Conversely, when the number of samples is specified, the duration varies with the span.

Clicking this button displays the Snapshot Duration (page 441) dialog box.

Attenuation Specifies the attenuation setting for the front-end tuner (downconverter) to be used during the time capture. This list of values depends on the tuner installed. If the tuner attenuation is not adjustable, this value is not used. For more information about your installed tuner, see Tuner Configuration (page 235).

Normally, the tuner attenuation is specified as part of the Search Setup. See General Search Setup (page 290) or Directed Search Setup (page 291) and Tuner Attenuation (page 299).

Priority Determines the order in which snapshot requests are processed when more than one request occurs. When the priority of two snapshot requests is the same, the one that occurred first is processed first and the other is put in a queue. When a snapshot is in process and another request occurs with a high priority, the current snapshot is stopped and the new request begins processing.

The choices are Low, Medium, High, and Critical.

Note

None of the changes made in the setup dialog box take effect until you click the OK button. Also, no snapshots can be collected while this dialog box is open.

The capture occurs at the end of the current sweep and *sweeping is suspended until the capture is complete*. While the data is being collected, a window appears with the message “Saving the snapshot” and information about percent complete. The time required to collect the data is a function of the span used and number of samples specified.

Snapshot files may be loaded and analyzed with the `snapview` Snapshot Viewer program. See Snapshot Viewer (page 455).

Filename This button displays the current definition of the snapshot filename construct. Click the button to open a dialog box in which you can redefine the construct in terms of a variety of parameters. See Trace Snapshot Filename (page 444).

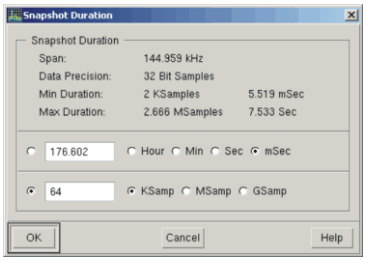
Data files are saved in the Snapshot Directory (page 136) with the name given.

See the *ASD Programming Guide*[1] for information on the snapshot data format.

[1] See the \E3238s\manuals\program_guide.pdf file.

Snapshot Duration

Path: Display, Trace Setup, Snapshot Setup, Samples



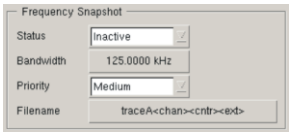
This dialog box is used to specify the size of the time snapshot capture. You may specify either the time *or* the number of samples to collect.

Duration is a function of the span (which determines the sample rate) so when the duration is specified, the number of samples taken varies with the span.

Conversely, when the number of samples is specified, the duration varies with the span.

The size of the captured file is limited by the hardware configuration. See the technical discussion under Snapshot Directory (page 136).

Frequency Snapshot



Frequency snapshots collect spectrum data (frequency domain) and store it in a file on the controller's system disk. This is, essentially, the same data as is displayed in a trace pane. The ADC setup is defined follows:

The frequency parameter is taken from the position of the marker in the trace in which the snapshot button was pushed.

Status Specifies whether to collect frequency snapshot data.

- **Active** status means that data is collected.
- **Inactive** status means that no data is collected.

If the status is *Active*, data is collected when the snapshot button is clicked and the data is written to a system file in the Snapshot Directory (page 136) as specified under Trace Snapshot Filename (page 444).

Bandwidth This is a frequency value that specifies the amount of spectral data to be collected around the marker frequency.

To change this value, click the button and enter a new value in the Frequency Entry (page 295) dialog box.

Priority Determines the order in which snapshot requests are processed when more than one request occurs. When the priority of two snapshot requests is the same, the one that occurred first is processed first and the other is put in a queue. When a snapshot is in process and another request occurs with a high priority, the current snapshot is stopped and the new request begins processing.

The choices are Low, Medium, High, and Critical.

Filename This button displays the current definition of the snapshot filename construct. Click the button to open a dialog box in which you can redefine the construct in terms of a variety of parameters. See Trace Snapshot Filename (page 444).

Data files are saved in the Snapshot Directory (page 136) with the name given.

See the *ASD Programming Guide*[1] for information on the snapshot data format.

Notes

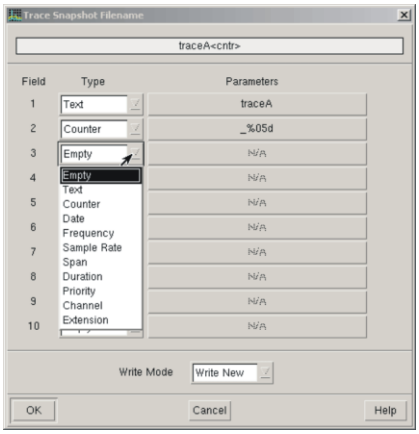
- None of the changes made in the setup dialog box take effect until you click the OK button. Also, no snapshots can be collected while this dialog box is open.

[1] See the \E3238s\manuals\program_guide.pdf file.

- Frequency snapshot requests do not interrupt the search sweep to collect data.
- Snapshot files may be loaded and analyzed with the `snapview` Snapshot Viewer program. See Snapshot Viewer (page 455).

Trace Snapshot Filename

Path: Display, Trace Setup, Snapshot Setup, Filename



This dialog box is used to define the trace snapshot filename construct using the parameters shown in the figure above. The field at the top shows the current construct. Data files are saved in the Snapshot Directory (page 136).

The filename is made up of as many as ten fields which may contain the following individual components. To define a snapshot filename:

1. In one of the 10 fields (rows) specify a parameter type by clicking one of the buttons in the Type column and selecting from the list shown above. The field types are described in the following discussion.
2. (Optional) Some of the parameters can be modified. To do so, click the button next to the one you clicked in step one and make the changes.
3. Repeat as necessary to define the other fields in the snapshot filename.

Empty This disables the field.

Text This is any fixed string. The default text for a trace snapshot the trace name; i.e., traceA, traceB, etc.

To change the text field, click the button displaying the current setting. As shown above the button displays the “traceA” string. See also, Text Field Entry (page 447).

Counter **Counter** is an integer value that increments with each filename created. See Counter Field Entry (page 447).

Date Places the date and time in the filename. See Date Field Entry (page 448).

Frequency For time snapshots, only. Specifies the center frequency at which the data is taken. To collect time data, the downconverter is parked at the marker frequency.

Sample Rate For time snapshots, only. Specifies the effective sample rate at which the data is taken.

Span For time snapshots, only. This is the span value specified in the Trace Snapshot Setup (page 438).

Duration For time snapshots, only. Specifies the time over which the data was taken.

Priority Specifies the priority given in the Trace Snapshot Setup (page 438).

The choices are Low, Medium, High, and Critical.

Channel Specifies the search receiver channel used to gather the data. Most search systems are single-channel. Option EMC provides the ability to have more than one search channel.

Extension This is the typical period-three-letter filename extension that most filenames use.

- Time snapshot files get the extension .cap (short for capture).
- Frequency snapshot files get the extension .fss (for frequency snapshot).

There is no choice here other than whether or not to use the appropriate extension (and we recommend that this always be the last field). But, if you want a different extension, you can specify a text field containing the characters you want.

The data format of these file types is described in the *ASD Programming Guide*[1].

Write Mode Specifies how the file is created on the disk.

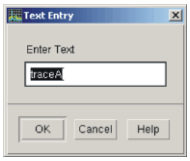
- **Write Once** means that the specified filename is used only the first time the snapshot button is clicked. When a file with the same name already exists, no snapshot data is collected. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of collecting only one file, you must use filename fields that do not change.
- **Write Over** means that, if the filename exists, the data in the file is replaced with new data. If the filename consists of fields that change (e.g., counter or date) then new files are created. To get the effect of having only one file that is overwritten, use filename fields that do not change.

[1] See the \E3238s\manuals\program_guide.pdf file.

- **Write New** means that the new files do not overwrite existing files. When a file with the same name exists, an extension is added in the form _1, _2, etc. So if a file named traceA.cap exists and the filename definition specifies that another file of that name is created, the new file is named traceA.cap_1 and the next would be traceA.cap_2.

Text Field Entry

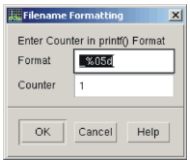
Path: Display, Trace Setup, Snapshot Setup, Filename, Text Parameter



This dialog box allows you to use a text string as part of the snapshot filename.

Counter Field Entry

Path: Display, Trace Setup, Snapshot Setup, Filename, Counter Parameter



This dialog box allows you to enter a counter field in the snapshot filename. This is typically used to create new filenames when the **Write Mode** is Write New.

Format A text field that contains format information using the printf() syntax.

Examples: _%05d puts an underscore character at the beginning of the field, followed by the counter number (represented by the % sign) and the format is a (d) decimal which is five places with leading numbers occupied by zeros. Result is `_00001`, `_00002`, etc.

If you leave out the 0 you get spaces; i.e., _%5d creates fields like: `_    1`, `_    2`.

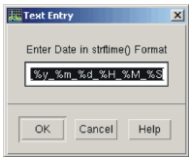
Counter A text field that specifies the value of the next counter value used. You can use this to specify a count that starts at any number or, after taking several snapshots, you can check it to determine the next counter value used.

If the value specified here would create a filename that is currently in use, the counter value is incremented such that a new filename is created.

If the Write Mode is Write Over, the counter does *not* increment.

Date Field Entry

Path: Display, Trace Setup, Snapshot Setup, Filename, Date Parameter

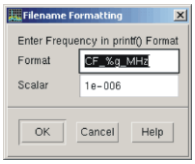


This dialog box allows you to define the date/time field when it is used in the creation of a snapshot filename.

This text line uses the strftime() syntax. The default `_%y_%m_%d_%H_%M_%S` gives the year (last 2 digits), month (2 digits), day, hour (24-hour clock), minute, and seconds with the underscore character between each.

Frequency Field Entry

Path: Display, Trace Setup, Snapshot Setup, Filename, Frequency Parameter



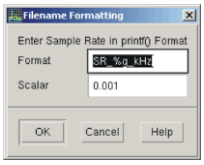
This dialog box allows you to define the frequency field when it is used in the creation of a snapshot filename.

Format A text field that contains format information using the printf() syntax.

Scalar This field allows you to make the units suffix in the format line work properly.

Sample Rate Field

Path: Display, Trace Setup, Snapshot Setup, Filename, Sample Rate Parameter



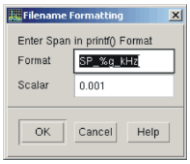
This dialog box allows you to define the sample rate field when it is used in the creation of a snapshot filename.

Format A text field that contains format information using the printf() syntax.

Scalar This field allows you to make the units suffix in the format line work properly.

Span Field

Path: Display, Trace Setup, Snapshot Setup, Filename, Span Parameter



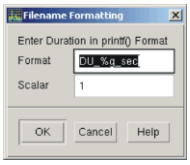
This dialog box allows you to define the span field when it is used in the creation of a snapshot filename.

Format A text field that contains format information using the printf() syntax.

Scalar This field allows you to make the units suffix in the format line work properly.

Duration Field

Path: Display, Trace Setup, Snapshot Setup, Filename, Duration Parameter



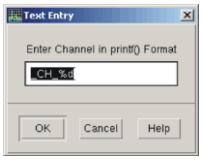
This dialog box allows you to define the duration field when it is used in the creation of a snapshot filename.

Format A text field that contains format information using the printf() syntax.

Scalar This field allows you to make the units suffix in the format line work properly.

Channel Field

Path: Display, Trace Setup, Snapshot Setup, Filename, Channel Parameter



This dialog box allows you to define the channel field when it is used in the creation of a snapshot filename. The entry is a text field that contains format information using the printf() syntax.

This identifies the search “channel” with which the snapshot data was collected in a system that has option EMC, multi-channel search.

DF System Link

This selection is available only when the DF option is installed. This selection can also be made very quickly from the Trace Popup Menu (page 456).

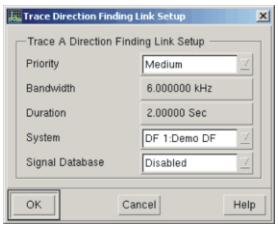
When one or more **direction finding** system(s) are integrated with the N6820ES Signal Monitoring System, the marker can be used to task a DF system. This setting is used to define which DF system is linked to the specified trace.

When a trace's marker is linked to a DF system, you can assign the DF system to any frequency in the trace by moving the marker to it; i.e., point and click or by using the "peak" buttons.

When the marker is moved to a new frequency the DF system is tuned to it and the processing results are displayed in the Direction Finding (page 395) dialog box.

Trace DF Setup

Path: Display, Trace Setup, DF Setup



Priority Determines the order in which DF requests are processed when more than one request occurs. The choices are Low, Medium, High, and Critical.

When the priority of two requests is the same, the one that occurred first is processed first and the other is put in a queue.

When a request is in process and another request occurs with a higher priority, the current processing is stopped and the new request begins processing.

Bandwidth This is a frequency value that specifies the amount of spectral data to be collected around the marker frequency.

To change this value, click the button and enter a new value in the Frequency Entry (page 295) dialog box.

Duration Specifies how much time is spent calculating DF information.

System Specifies which system is linked to this trace (when there is more than one DF system integrated with the N6820ES Signal Monitoring System).

Signal Database Specifies whether to put the DF processing results in the signal database. This information is displayed in the Signal Database Pane (page 107).

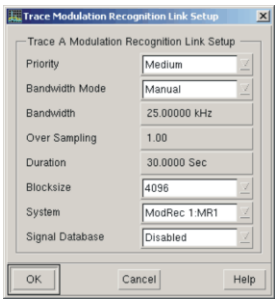
Mod Rec Link

This selections is available only when the Mod Rec option is installed. When one or more **modulation recognition** channel(s) are integrated with the N6820ES Software, the marker can be used to task a Mod Rec process. This setting is used to define which Mod Rec channel is linked to the specified trace.

When a trace's marker is linked to a Mod Rec channel, you can assign the channel to any frequency in the trace by moving the marker to it; i.e., point and click or by using the "peak" buttons.

Trace Mod Rec Setup

Path: Display, Trace Setup, Mod Rec Setup



Priority Determines the order in which DF requests are processed when more than one request occurs. The choices are Low, Medium, High, and Critical.

When the priority of two requests is the same, the one that occurred first is processed first and the other is put in a queue.

When a request is in process and another request occurs with a higher priority, the current processing is stopped and the new request begins processing.

Sample Rate This is a frequency value that specifies the amount of spectral data to be collected around the marker frequency.

Duration Specifies how much time is spent calculating modulation information.

Block Size Specifies the number of ADC samples in the processing block.

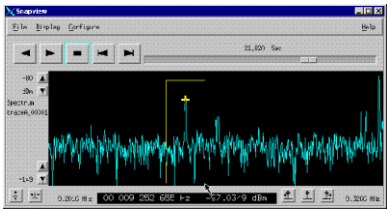
System Specifies which modulation recognition system is linked to this trace (when there is more than one such system integrated with the N6820ES Software).

Signal Database Specifies whether to put the DF processing results in the signal database. This information is displayed in the Signal Database Pane (page 107).

Snapshot Viewer

A separate application is supplied with the N6820ES Software that allows you to view snapshot data, either time or frequency.

To start the program in Windows, select Start, Programs, Agilent E3238S, Snapshot Viewer.



Feature Highlights

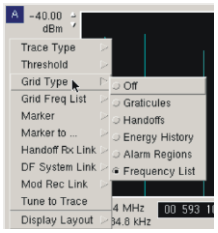
- Frequency snapshot data are displayed one segment at a time.
- Time snapshots may be viewed in either time or frequency domains.
- To move quickly to a place in a large record, drag the slider control above the trace area.
- You can step through the data or auto-play it.
- The marker can be positioned anywhere in the trace by positioning the cursor and clicking the left mouse button. Also, Marker-To-Peak and Marker-To-Next-Peak buttons are provided below the trace display area.
- Zoom trace scaling may be done with the right mouse button, as shown in the figure above; click and hold the right mouse button in one corner of the desired scale box, drag it to the opposite corner, and release it. To reverse/undo the scale change, double right-click anywhere in the trace area.

Data processing features:

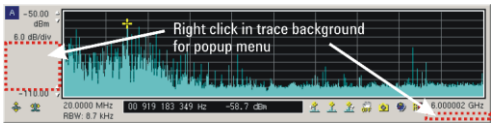
- Resolution
- Averaging
- Overlap processing
- Window type

Trace Popup Menu

Path: Click right mouse button in trace background



This menu appears when you move the mouse cursor to the background of the trace you wish to change and click the right mouse button. This allows you to change trace setup easily. See also, Trace Setup (page 424).



The trace background area is around the outside of the trace's display area, not including the area occupied by labels (like amplitude and frequency). If the marker is off so that the marker readout area is unoccupied, clicking between the frequency labels also displays the menu. If the trace type is spectrogram, no amplitude scale labels appear but the spots they *would* occupy are dead.

Trace Type: See Trace Type (page 427).

Threshold: See Threshold Presentation (page 428).

Grid Type: See Grid Type (page 429).

Grid Freq List: is active only when the Grid Type is *Frequency List*. See Grid Frequency List (page 431).

Marker On/Off: See Marker On/Off (page 431).

Marker to ... allows you to quickly set one of the sweep settings (e.g., center frequency) to the frequency of the marker. See Marker Popup Menu (page 69).

Handoff Rx Link: See Handoff Receiver Link (page 434).

DF System Link: When this menu item is selected, the marker's frequency is used to perform direction finding processing. This has the same effect as clicking on the Task DF button. See Task DF (page 65).

Mod Rec Link: When this menu item is selected, the marker's frequency is used to perform modulation recognition processing. See Task Mod Rec (page 66).

Tune to Trace: If the trace span is not the same as the span of the search receiver, as defined in the Search, Setup dialog box, *Tune to Trace* changes the start and stop frequencies in the sweep setup to match the start and stop frequencies of the trace. This gives you the highest update rate (shortest revisit time) very quickly.

To return to the previous sweep range, enter the frequency values in the Search, Setup dialog box, or (if the start and stop frequencies of the previous trace scale matched the sweep span) you can double-click the right mouse button in the trace area to return to the previous trace scale. Then repeat the tune-to-trace function.

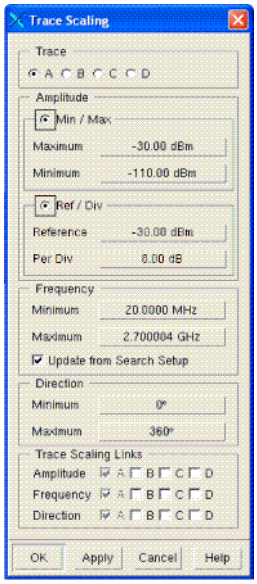
This entry is active only when the Search Type (page 287) is *General*.

See also, *Trace Scaling* for the right mouse button under Mouse (page 466).

Display Layout: allows you to choose 1 of 6 pre-defined display layouts. See *Active Layout* under Display Layout (page 422).

Trace Scaling

Toolbar Icon
Path: Display, Scaling (see note)



This dialog box is used to enter values for the amplitude and frequency scales of a trace.

Note

This dialog box is displayed by clicking any of the 4 trace scale labels (either amplitude or frequency).

The Trace Scaling selections are made in one of the following areas. Note that the Amplitude selections Min/Max and Ref/Div are mutually exclusive. Selecting one de-selects the other.

Trace

Trace Selection (Scale) (page 460) selects the trace for which scale values are displayed in the rest of the dialog box.

Amplitude

Clicking the Maximum Amplitude (page 460) entry allows you to set the upper amplitude scale value.

Clicking the Minimum Amplitude (page 461) entry allows you to set the lower amplitude scale value.

Ref/Div

Clicking the Reference (page 462) entry allows to set the upper value of the trace scale in the Ref/Div mode.

Clicking the Per Div (page 463) entry allows you to set the value of each graticule division on the trace screen.

Frequency

Clicking the Maximum Frequency (page 464) entry allows you to set the upper frequency value.

Clicking the Minimum Frequency (page 465) entry allows you to set the lower frequency value.

Update from Search Setup clicking in this box synchronizes the display to the search setup. That is, the trace x-axis scaling is changed to match the maximum sweep range of the search. This setting is by default active.

Direction

Clicking the Minimum button allows you to enter the a minumum value in degrees that bounds the lower value of a directional search.

Clicking the Maximum button allows you to enter a maximum value in degrees that bounds the upper value of a directional search.

Trace Scaling Links

Clicking a selection box links that trace's scaling to the currently selected trace. Any changes to the currently selected trace are matched by changes in the linked trace. In the illustrated example, the current trace is "A." If the trace scaling link for trace "B" were clicked, that trace's scaling is linked to trace "A."

Trace Scaling links are one-way. If trace "A" has a link to trace "B," any scaling change in trace "A" will occur in trace "B." However, any scaling change in trace "B" will not occur in Trace "A."

Activation Buttons

- **OK** makes the specified changes and closes the dialog box.
- **Apply** makes the specified changes and leaves the dialog box open.
- **Cancel** closes the dialog box; no changes are applied.

Note

The trace is displayed with dBm coordinates. If other units are specified, they are converted to dBm on the display trace.

See also: Amplitude Autoscale Button (page 59), Frequency Full Scale Button (page 60), and Mouse Features (page 507).

Trace Selection (Scale)

These radio buttons indicate which trace's scale settings are displayed in the button labels.

To Change Scale

Perform the following steps:

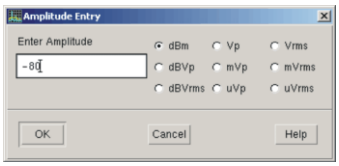
1. Select the button to indicate the trace to be changed.
2. Click the scale button you wish to change for the specified trace.
3. Enter a value and select units.
4. Click OK.

Advanced Note

The default behavior of trace selection is one-of-many. If you want to scale more than one trace at a time, edit the `E3238s` resource file and change "True" to "False" in the line that reads:

*scale_active_trace.radioBehavior: True

Maximum Amplitude



This dialog box allows you to enter a value for the top of the amplitude scale in a trace pane.

1. Select the trace you wish to scale. See Trace Selection (Scale) (page 460).
2. Click the Maximum Amplitude button. The Amplitude Entry dialog box appears. See figure.
3. Click in the text-entry area.
4. Type the new value.
5. Select the units.
6. Click OK.

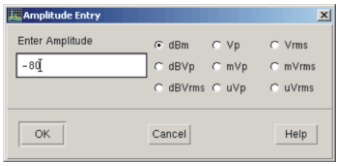
Note

The trace is displayed with dBm coordinates. If other units are specified, they are converted to dBm on the display trace.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

See also: Amplitude Autoscale Button (page 59).

Minimum Amplitude



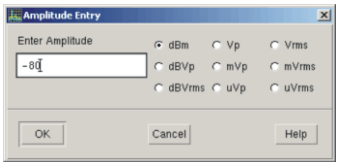
This dialog box allows you to enter a value for the minimum amplitude scale in a trace pane.

1. Select the trace you wish to scale. See Trace Selection (Scale) (page 460).
2. Open the Minimum Amplitude dialog box.
3. Click in the text-entry area.
4. Type the new value.
5. Select the units.
6. Click OK.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

See also, Amplitude Autoscale Button (page 59).

Reference



This dialog box allows you to enter a value for the top of the amplitude scale in a trace pane in the Ref/Div mode.

1. Select the trace you wish to scale. See Trace Selection (Scale) (page 460).
2. Click the Ref/Div button.
3. The Amplitude Entry dialog box appears. See figure.
4. Click in the text-entry area.
5. Type the new value.
6. Select the units.
7. Click OK.

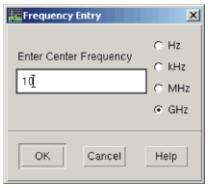
Note

The trace is displayed with dBm coordinates. If other units are specified, they are converted to dBm on the display trace.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

See also: Amplitude Autoscale Button (page 59).

Per Div

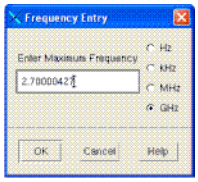


This dialog box allows you to enter a value for the maximum frequency scale in a trace pane.

1. Select the trace you wish to scale. Trace Selection (Scale) (page 460).
2. Click the Ref/Div button.
3. Click the Per Div entry.
4. Click in the text-entry area.
5. Type the new value.
6. Select the units.
7. Click OK.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

Maximum Frequency



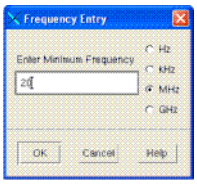
This dialog box allows you to enter a value for the maximum frequency scale in a trace pane.

1. Select the trace you wish to scale. Trace Selection (Scale) (page 460).
2. Open the Maximum Frequency dialog box.
3. Click in the text-entry area.
4. Type the new value.
5. Select the units.
6. Click OK.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

See also: Frequency Full Scale Button (page 60).

Minimum Frequency



This dialog box allows you to enter a value for the minimum frequency in a trace pane.

1. Select the trace you wish to scale. See Trace Selection (Scale) (page 460).
2. Open the Minimum Frequency dialog box.
3. Click in the text-entry area.
4. Type the new value.
5. Select the units.
6. Click OK.

Scale settings may also be changed with the mouse. See Mouse Features (page 507).

See also: Frequency Full Scale Button (page 60).

Mouse

Toolbar Icon
Path: Display, Mouse

This dialog box defines the mouse button functionality in the trace panes, and in the trace panes only. For example, turning off **drag-and-drop** for the middle mouse button does not affect drag-and-drop between other panes (like the Search Setup dialog box and the Text Editor Pane; see Printing the Directed Search Band Table (page 308); or between the Handoff Log pane and a Handoff Receiver pane; see Handoff Log Popup Menu (page 83)).

Each button may control as many as four functions through use of the keyboard's Shift, Ctrl, and Alt keys. To use the shifted functions, first press the appropriate key and then click the mouse button.

For information about general mouse use, see Mouse Features (page 507). The Mouse dialog box has four tabs, Left, Middle Right, and Wheel.

Left Tab

- **Off** means the left mouse button has no function.
- **Marker** means that the left button affects the position of the trace marker. The following comments assume the cursor is in a trace pane's display area.

  If a trace does not have a marker turned on, pressing the left mouse button while the cursor is in a trace pane displays a marker while the mouse button is held down. The marker's frequency position follows the horizontal position of the mouse and the vertical position follows the signal's amplitude.

  If the trace's marker is on, the marker's horizontal position changes to that of the cursor. The marker's frequency and amplitude values appear in the marker readout at the bottom of the trace pane. See Trace Pane (page 52).
- **Directed Search Band** is available only when the Search Type (page 287) is *directed*. When you click the left mouse button in the trace area, the marker appears at the frequency associated with the cursor position and text appears at the top of the trace displaying the band number and its description field. See the discussion of Description under Single-Band Search Setup (page 293).

- **Delta Marker** is a marker feature that allows you to measure the difference in frequency and amplitude between two points in a trace. The measured values appear in the marker readout below the trace. See Marker Readout (page 61).
- **Delta Threshold Marker** is a marker feature that allows you to display the threshold level and its delta from the actual spectrum in the marker readout area of the trace. This feature only works for the Spectrum display type. See Marker Readout (page 61)

The left mouse button is also used to identify a list of entries in the handoff log to change settings as discussed in Mouse Features (page 507).

Middle Tab

- **Off** means the middle mouse button has no function.
- **Drag and Drop** means the middle button can be used to move information from the trace area to another pane.
  - From the marker readout to the text editor.
  - From the trace area to the handoff receiver.
  - From the trace area to the Signal Processing Pending Queue.

Right Tab

- **Off** means the right mouse button has no function.
- **Trace Scaling** means the right mouse button can be used to redefine the trace scales. To return to the previous scale, double-click the right button. See Zoom Scale for details.

  When the trace type is *spectrum*, both amplitude and frequency scales are affected. When the trace type is *spectrogram*, only the frequency scale is affected.
- **TraceFrequency Scaling** means the right mouse button provides zoom scaling that is limited to the frequency scale. The operator clicks the mouse button where they want one end of the frequency scale, then drags the cursor to the desired scale, then releases the button.
- **Search Rx Tuning** is available only when the Search Type (page 287) is *general*. This function allows you to use the mouse to change the trace scaling *and* change the start and start frequencies of the search sweep. This zoom method lets you quickly reset start and stop frequencies to focus on a signal of interest and maximize the revisit rate.

  See also, Tune To Trace under Trace Popup Menu (page 456).
- **Handoff New Energy** means the mouse button can be used to handoff new signals within the frequency limits specified by the rectangle.
- **Handoff All Energy** means the mouse button can be used to handoff all signals within the frequency limits specified by the rectangle.

Signal detection is described in Process Overview (page 33).

Wheel Tab

- **Off** means the mouse wheel has no function.
- **Marker** means that the mouse wheel controls the movement of the marker. If the marker is enabled, moving the wheel up will move the marker to the right one pixel at a time. Moving the wheel down will move the marker to the left one pixel at a time.

- **Amp Ref Scale** means that the mouse wheel controls the scaling of the amplitude reference in the selected trace pane. Moving the wheel up will increase both the trace pane's minimum and maximum values by 1 dB if the difference between the minimum and maximum values is greater than 10 dB or 0.1 dB if the difference is less than 10 dB. Moving the wheel down will decrease both minimum and maximum values. The choice of amplitude scaling mode, either Min/Max or Ref/Div, has no effect on this action.
- **Amp Zoom** means that the mouse wheel controls amplitude zooming in the selected trace pane. If the marker is off, moving the wheel up, will increase the pane's maximum and decrease the pane's minimum each by 1 dB if the difference between the two values is greater than 10 dB or 0.1 dB if the difference is less than 10 dB. Moving the wheel down will have the opposite affect. If the Marker is on, the affect will be the same except that the scaling range will be centered on the marker value.
- **Freq Zoom** if the marker is off, moving the wheel up increases the displayed frequency range by 1 grid (10%). Moving the wheel down decreases the displayed frequency range by 1 grid (10%).

  If the marker is on, the marker frequency is placed in the center of the display and the previous frequency range is changed by 10% in the direction of the mouse wheel direction.
- **Freq Pan** when the mouse wheel is moved up, the start and stop frequency are both increased by 1 grid (10%), moving down decreases both the start and stop frequency by 1 grid (10%).

Other Mouse Actions

Besides the actions specified by the Trace Mouse Function dialog box, the mouse buttons and wheel can be used in several other ways. See also, Mouse Features (page 507).

More Mouse Wheel

The mouse wheel can be used in the trace scaling labels:

- **Vertical Scale Labels** If the amplitude scaling mode is Min/Max, moving the wheel within in the vertical scale labels will either increase or decrease by 1 dB or.1 dB (dependent on the amplitude range) for that particular label.

  If the amplitude scaling mode is Ref/Div, moving the wheel in the vertical scale labels will either increase or decrease both Min and Max values by 1 dB or.1 Db (dependent on the amplitude range.)

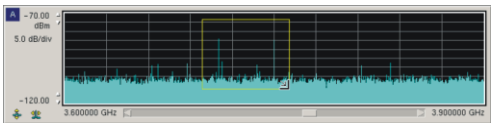
- **Ref/Div** Moving the wheel over the Ref/Div label places the Ref/Div value on a 1/2/5 sequence between.1 dB and 20 dB per div. Subsequent wheel movement will change the Div value in a 1/2/5 sequence.

- **Horizontal Scale Labels** Moving the wheel in the horizontal scale labels will either increase or decrease the frequency value for that particular value only by half a grid (5%).

The mouse wheel can be used throughout the N6820ES software. The following areas accept the mouse wheel inputs:

- Signal Database
- Energy History Database
- Log Views
- Option Menus
- Scroll Bars

Zoom Scale



To zoom a trace scale with the right mouse button be sure the right mouse button is set to *Trace Scaling*. Then perform the following steps:

1. Imagine a box that defines the new scale settings.
2. Place the mouse cursor at one corner of the box.
3. Click and hold the right mouse button.
4. Move the cursor to the opposite corner of the box (see figure).
5. Release the mouse button.

You can zoom more than once. The scale values associated with each zoom selection are saved so that you can “unzoom” back through the settings.

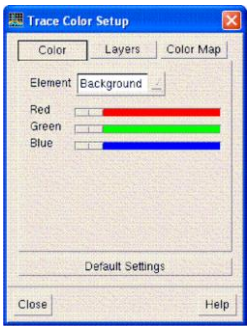
To return to the previous scale, double-click the right mouse button in the trace display. If the scale has been zoomed more than once, each double-click returns the scale to the previous scale setting in the order they were changed.

To quickly set the trace scale to match the hardware sweep range, click the Frequency Full Scale Button (page 60).

To change the sweep settings to match the zoomed trace frequencies, use Tune To Trace under Trace Popup Menu (page 456). This maximizes the revisit rate on a zoomed trace by changing the search sweep setup such that the start and stop frequencies match those of the trace’s scale. When you do this the trace is no longer zoomed. To return the sweep to it’s previous start and stop frequencies, see General Search Setup (page 290).

Colors

Toolbar Icon
Path: Display, Colors



This dialog box has three tabs that are used to specify:

1. trace elements Color (page 472)
2. trace elements Layering (page 473)
3. defining the Color Spectrogram (page 474)
4. changes all color settings to default values

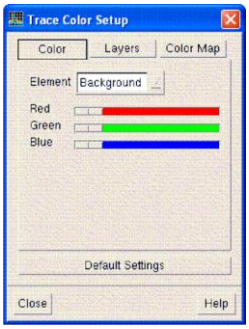
Note

There is no color configuration for other pane types. Advanced users can change colors in the `E3238s` resource file. See Application Resources (page 17).

Color settings are saved as part of the Display state. See Save Mission Setup (page 129).

Color

This pane is used to define the colors of all the elements.



Element is a list of the trace elements. The list is:

- Background
- Trace (shown selected above)
- Marker
- Grid
- Labels
- Threshold

The Red, Green, and Blue sliders are used to set the color mix after an element is selected from the list.

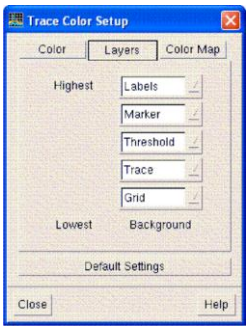
To define the color mix for a trace element:

1. Select the element you wish to change from the pulldown list.
2. Change the slider settings for the colors.

- For a description of the trace elements, see Trace Pane (page 52).
- To change the status of trace elements, see Trace Setup (page 424).
- To change the threshold settings, see Threshold Setup (page 310).

Layering

This pane is used to define the layering order of the trace elements from highest to lowest. The higher elements overlay the lower ones such that if two elements are drawing on the same part of the screen (use the same **pixel**), the element with the higher layer setting is the one that "gets" the pixel.

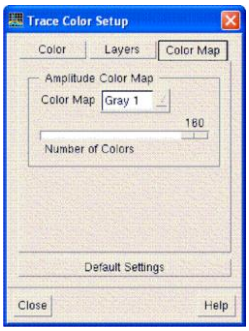


To raise the layer order of one element above that of another:

1. Click the option button of the layer level you wish the trace element to have. (To raise Marker to the layer occupied by Threshold, click the button Labeled "Threshold.")
2. Select the trace element from the pulldown list.
3. Check the new order of the layering.

Color Spectrogram

This pane is used to define the number of colors (or shades of gray) in the color maps. These are used when the Trace Type (page 427) is Color Spectrogram.



Color Map The color map menu contains 2 color maps, 2 gray-scale maps and 1 user-defined map. The user-defined map is defined by pressing the **User Color Map Setup** button and working in the User Color Map Setup (page 475) dialog box.

Number of Colors This slider allows you to set the number of "colors" in the color spectrogram between 2 and the maximum amount allowed.

To change the number of colors for all color maps click the slide bar button, hold it down, and move it right or left to select the number of colors. Clicking in the slider area on either side of the slider button changes it by one.

The maximum value is set with the maxSpectrogramColors resource value. See the discussion in Application Resources (page 17).

The number of colors used in a color spectrogram may be selected from the popup menu that appears when you click the right mouse button in the color bar at the left side of a color spectrogram trace. See the discussion and illustration under Trace Type (page 427).

User Color Map Setup This button appears in the Colors (page 471) only when the following resource is defined in the `E3238s` resource file:

```
*userColorMapEnabled:   True
```

(The default value is `False`.)

When clicked, the User Color Map Setup (page 475) dialog box is displayed.

User Color Map Setup

Path: Display, Colors, User Color Map Setup
(`E3238s` must contain `*userColorMapEnabled: True`)

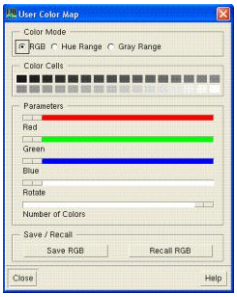
This dialog box is used to define the colors in a trace color spectrogram.

Note

Make sure the *Color Map* selection in the Color Spectrogram pane is *User*. Otherwise, the only control that has any effect is Number of Colors.

Edit Mode

The dialog box changes appearance based on the selected Edit Mode. The following figure illustrates the RGB mode.



RGB Edit Mode

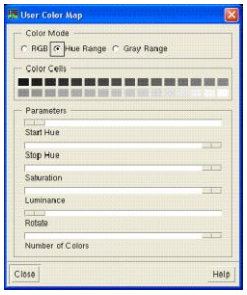
RGB mode allows you to define the individual color cells in the standard red/green/blue color scheme. To define a color cell:

1. Select the number of colors with the bottom slider. Notice that the number of cells in the Color Cells pane changes with the slider.
2. Click on the cell you wish to define. (See cursor in figure above.)
3. Set the color with the Red, Green, and Blue sliders.
4. Click the next cell and repeat.

You can save a definition or recall a previously-saved map with the buttons in the Save/Recall pane at the bottom of the dialog box. These buttons appear only when the Edit Mode is *RGB*. Clicking either button displays the Filename Entry dialog box as discussed in Filename Entry (page 140).

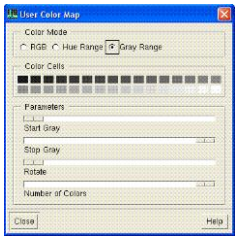
Hue Range

Hue Range mode allows you define a color map with colors determined by selecting the start and stop hues as well as the overall saturation and luminance. You can also rotate the cycle of values with the *Rotate* slider.



Gray Range

Gray Range mode allows you to define a color map with shades of gray determined by selecting the start and stop gray values. You can also rotate the cycle of values with the *Rotate* slider.



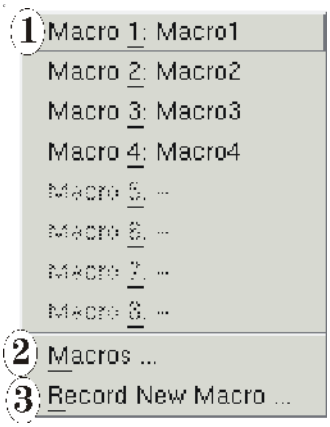
Note

If the Color Map selection is not *User*, the Color Cells display the setup but the controls have no effect.

User-defined color maps are *not* saved as part of the mission state.

The Macros Menu

The Macros Menu contains entries that allow you to create, edit, and launch macro operations.



The Macro menu allows you to define operations and associate those operations with function keys or additional toolbar buttons.

The Macro Menu entries are:

1. Macro Entries (page 479) allows you to execute macros.
2. Macros ... (select) (page 480) allows you to edit existing macros.
3. Record New Macro (page 482) allows you to create and record new macros.

Introduction

A macro file (.mcr) is a superset of a state file (.sta). It can include all of the state commands that are in a state file; additionally it can contain action commands like start, stop, markerToPeak, etc. You can assign a state file to a Function key or a macro toolbar button.

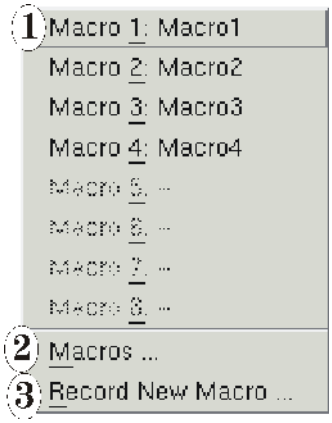
A macro is always saved in a file and executed from a file.

There are situations in which a macro, recorded with the macro facility must be adjusted to produce the desired result. Macros are based on the change of system state. If an action results in a change of state, the difference in states is what is captured in the macro.

For instance, if you record a macro in which the search sweep span is defined by specifying the center frequency and a frequency span, what is recorded in the macro is not the action of setting the span frequency relative to the center frequency, but the absolute result of the operation, that is, the absolute start frequency and the stop frequency.

This may not be the desired effect. If it is not, the macro must be modified. The macro facility has a macro editor that allows the user to edit the content of the macro and test it at the same time. For our example, the startFrequency and stopFrequency commands need to be replaced by the spanFrequency command to achieve the desired effect.

Macro Entries



The first eight entries in the Macro menu are reserved for user-defined macros. If there is an action associated with that menu entry, that entry is active. If there is no action yet associated with a menu entry, that entry is greyed out. In the illustration, the entries 1 through 4 are associated with action, while entries 5 through 8 are not.

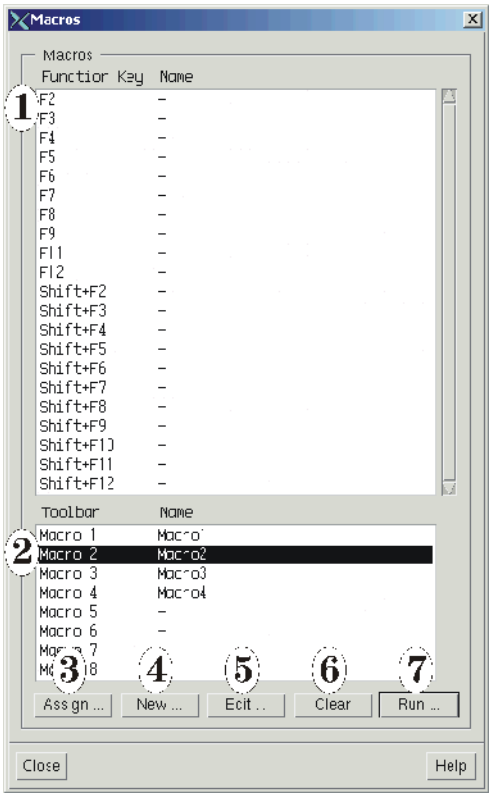
Clicking on an active menu entry immediately executes that associated macro.

Note that creating or loading a macro creates a toolbar button with the name of the macro, as well as a menu entry. Clicking on the macro toolbar button has the same effect as clicking the menu entry.

Macros can be defined in the N6820ES configuration file, `e3238s.n6841.cfg`. Macros defined in this file are loaded at software startup and are immediately available for use.

Macros can also be defined by clicking the Record New Macro (page 482) menu entry.

Macros ... (select)

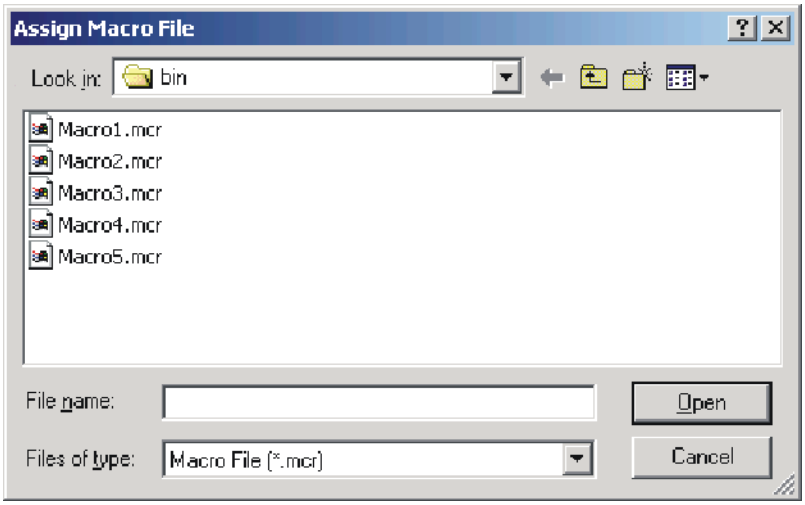


The Macro dialog box allows you to associate a state file with a macro entry, record new macros, edit existing macros, and run previously saved macro files. The Macro dialog box is composed of:

1. **Function Key Area** displays the available function keys and the macro names associated with them. Clicking an entry in the list selects that entry.
2. **Macro Area** displays the available macros and the names associated with those macros. Clicking an a macro entry in the list selects that entry.
3. **Assign Macro (page 481)** opens the macro filename dialog box allowing you to select a state file you wish to associate with the selected function key or macro. This allows to load state files immediately, rather than going through the File menu and file dialog boxes.
4. New Macro (page 481) opens a filename dialog box. If you select a macro that already exists, that macro is opened in the macro editor box. If you enter an unused macro name, a new empty macro of that name opens in the macro editor dialog box.
5. **Edit Macro (page 484)** opens the macro editor box. This button is only available when an assigned macro or function key is selected.
6. **Clear** the association between a function key or a macro entry and the state file or macro to which it has been associated. The macro file is not deleted.

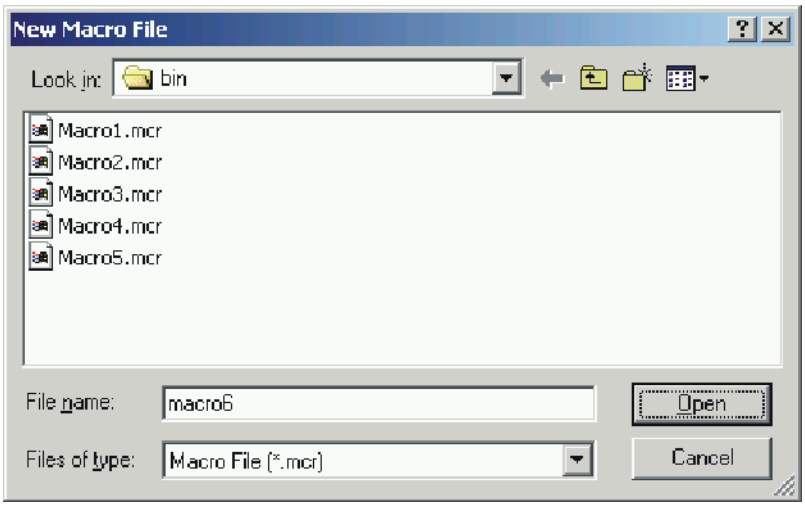
7. **Run** opens the macro filename dialog box. This allows you to run state files immediately, rather than going through the File menu and file dialog boxes.

Assign Macro



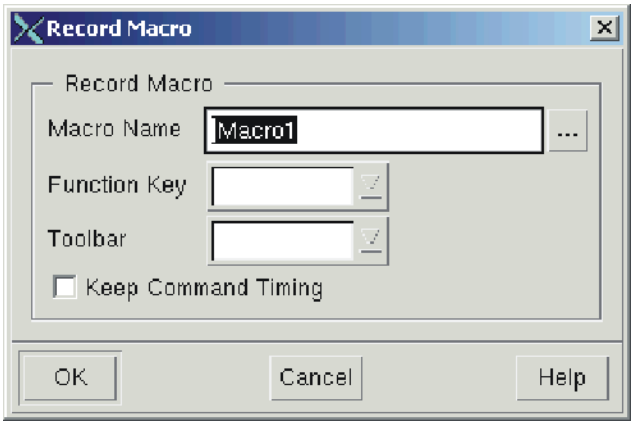
Clicking the Assign button opens the Macro filename dialog box. This box lists the macro (.mcr) or state (.sta) files in the currently active directory. Clicking on a filename selects that filename. Clicking on the Open button associates that filename with the Function Key or Macro button that was selected when the Assign button was clicked.

New Macro



Selecting the New button in the Macro dialog box displays the New Macro filename dialog box. This box lists the macro (.mcr) or state (.sta) files in the currently active directory. Clicking on a filename selects that filename. Clicking on the Open button opens that macro or state file in the Macro Editor box. Entering an unused name creates a new macro by that name and opens the Macro Editor box.

Record New Macro



This dialog box allows you to record macros from actions performed to an operating N6820ES system.

- **Macro Name** This box displays the macro name automatically generated by the software. The software selects the first unused name from a range of Macro1 to Macro256 in the current directory. Alternately, you can click the "..." button to the right of the text entry box and browse for another name or another directory.
- **Function Key** This drop down menu allows you to select a Function key to assign to the macro.
- **Toolbar** This drop down menu allows you to specify a toolbar button name to assign to the macro.
- **Keep Command Timing** Clicking in this box preserves the pause times between commands (start, stop, markerToPeak, etc.). This does not preserve pauses between state commands (startFrequency, rbw, markerMode, etc.).

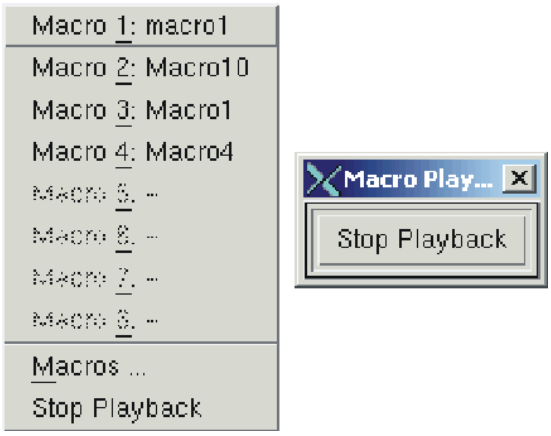
Only one macro can playback at a time. You cannot record and playback at the same time.

Stop Recording

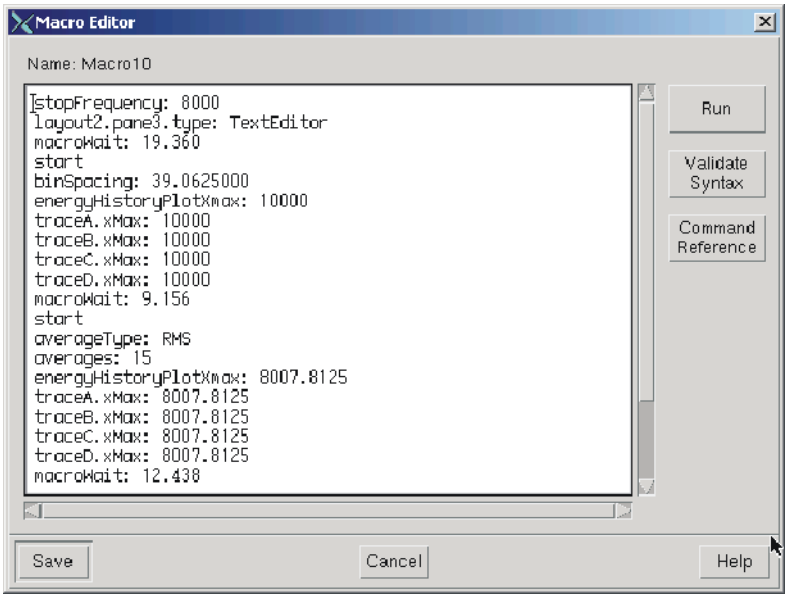
When you begin recording a macro, there are two ways to end recording. The last entry in the macro menu changes to Stop Recording and a Stop Recording dialog box appears on the screen. Clicking either one stops the macro recording.

Stop Playback

When a macro is playing, there are two ways to halt the macro playback. The last entry in the macro menu changes to Stop Playback and a Stop Playback dialog box appears on the screen. Clicking either one stops the macro recording.



Edit Macro



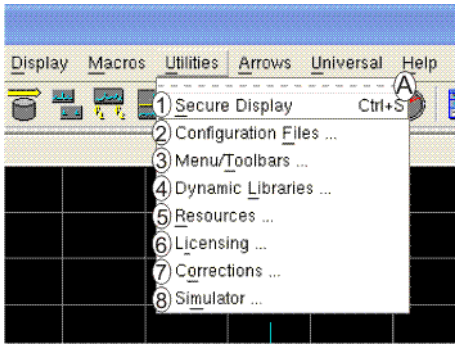
The Macro editor screen allows you to view and edit macros.

The following buttons are provided on the Edit Macro pane:

- **Run** Clicking this button saves the contents of the editor window to a temporary file, then runs that code. Remember to save any code changes using the Save button before exiting the Edit Macro process.
- **Validate Syntax** Clicking on this button scans the code looking for syntax errors. If the validate process detects errors, it highlights the first error it encounters and displays error message.
- **Command Reference** Clicking this button pops up the Command Reference (page 116) box, allowing you a quick reference to valid command forms.
- **Save** Clicking on this button saves the current contents of the Edit Macro screen to the displayed filename.
- **Cancel** Clicking on this button cancels the current editing session. All unsaved changes are abandoned.

The Utilities Menu

The Utilities Menu contains entries that allow you to control access to the N6820ES software.



The Secure Display entry in the File Menu has text to its right. This is an *accelerator* description. It allows you to activate the feature very quickly, using the keyboard. You can define new accelerators and change existing ones as described under Accelerator Keys (page 508)

The Utilities Menu entries are:

1. Secure Display hides the display.
2. Configuration Files displays the files that configure the software.
3. Menu/Toolbars controls access to menu entries.
4. Socket Connections displays the system names and IP addresses of processes connected to the N6820ES system.
5. Loaded Libraries lists the library extensions that are loaded.
6. Resources lists the X Window application resource values.
7. Licensing displays the licensing information for this copy of the N6820ES software.
8. Corrections allows you to apply corrections for various hardware (time source, antennas, tuners, etc.).
9. Simulator controls the Simulator setup.

1. Secure Display (page 483) hides the display.
2. Configuration Files (page 484) displays the files that configure the software.
3. Menu/Toolbars (page 485) controls access to menu entries.

4. Socket Connections (page 487) displays the system names and IP addresses of processes connected to the N6820ES system.
5. Loaded Libraries (page 492) lists the library extensions that are loaded.
6. Resources (page 493) lists the X Window application resource values.
7. Licensing (page 494) displays the licensing information for this copy of the N6820ES software.
8. Corrections (page 495) allows you to apply corrections for various hardware (time source, antennas, tuners, etc.).
9. Simulator (page 499) controls the Simulator setup.

Secure Display

Accelerator: Ctrl+S
Path: Utilities, Secure Display

Secures the display from unauthorized viewing.

To reactivate normal display operation, enter the password of the user logged in and running the program.

Note

Windows XP security policy can interfere with the use of no password in locations other than the main console logon. To resolve this issue, disable it as follows:

Control Panel...
  Administrative Tools...
    Local Security Policy...
      Local Policies...
        Security Options...

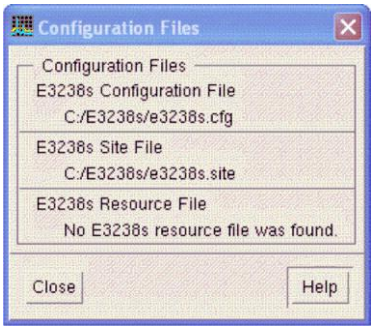
If the entry listed below is listed as 'Enabled', double-click it and select 'Disabled':

> Accounts: Limit local account use of blank passwords to console logon only:

When this is disabled, user accounts that have no password can recover the secured display without entering a password.

Configuration Files

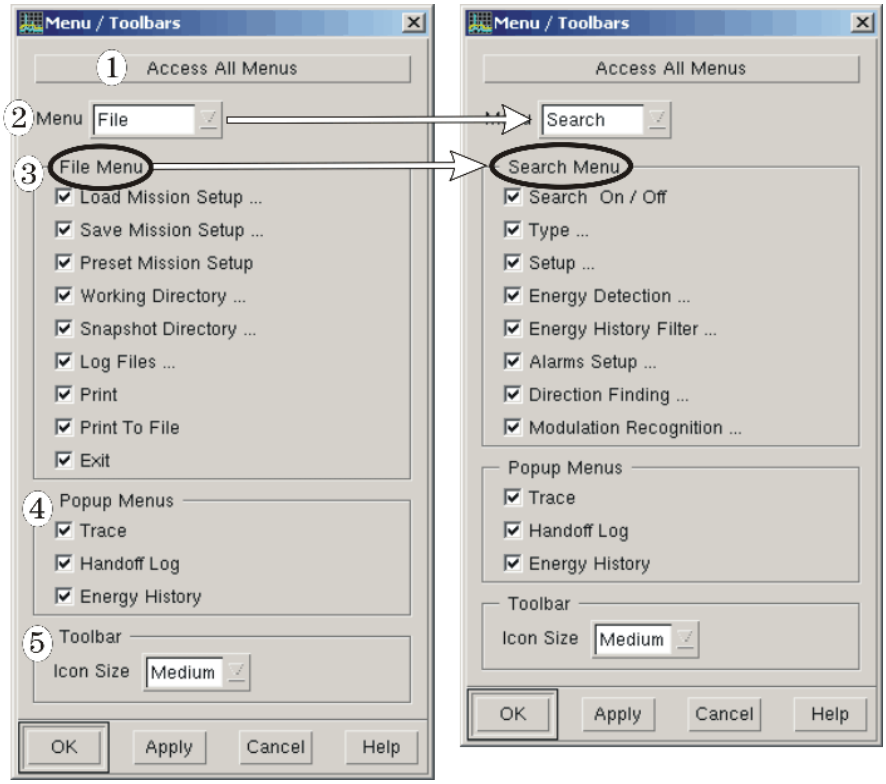
Path: Utilities, Configuration Files



This dialog box displays the pathnames of the files used to configure the operation of the N6820ES software. The Site file and Resource file are not required to configure the software, and these files can be reported as not found.

Menu/Toolbars

Path: Utilities, Menu/Toolbars, (password)



This dialog box controls user access to the system features available through the menus and toolbar. The system administrator can use this dialog box to disable entries in the main menu bar and popup menus. Inaccessible features appear ghosted in the menus and have no button in the Tool Bar (page 50).

1. **Access All Menus** activates access to all entries in all menus when clicked.
2. **Menu** is an option list used to display any of the menu bar entry menus. The list to choose from is the list of names in the menu bar. The selected entry is a menu, and its entries appear for individual selection below the button.
3. **File Menu** is the list of entries in the current selection (File) in the Menu list.
4. **Popup Menus** are menu entries that appear when you click the mouse "somewhere special." See Mouse Features (page 507).

Note The state defined in this dialog box is *not* saved in a state file. The disableAccess command[1] may be used in the configuration file (e.g., e3238s.n6841.cfg) to specify an initial configuration but care should be taken to
restrict user access to the file so that the operator limitations are not circumvented. See the *Command Reference* for detailed information.

[1] `\E3238s\manuals\command_ref.pdf`

To change access control:

1. Click the **Menu** option button to display the list of menu bar entries.
2. Click the entry in which you wish to change access. The entries for that menu appear in the lower part of the dialog box.
3. Click the checkbox buttons to allow or restrict access.
4. To make in other menus, repeat the previous steps.
5. Click OK.

To quit without changing menu access, click **Cancel**.

Password Protection

If a password account is created, access control may be changed only when that user's password is used (before displaying this dialog box, the user is prompted for a password; see Access Password (page 489)).

If a password account was not created, changes to the access control dialog box are not restricted. To define the initial state of Access Control, see the e3238s.n6841.cfg file.

Note

Only top level menus are controlled. You cannot selectively change access to submenus. The initial access state may be defined with `disableAccess` commands placed in the `e3238s.n6841.cfg` file.

Access Control settings are *not* saved as part of the Mission Setup; see Save Mission Setup (page 129). To do so would allow a way to circumvent access control.

User-defined menus (part of option ASD) can be controlled like any other.

Access Password

Path: Utilities, Access Control

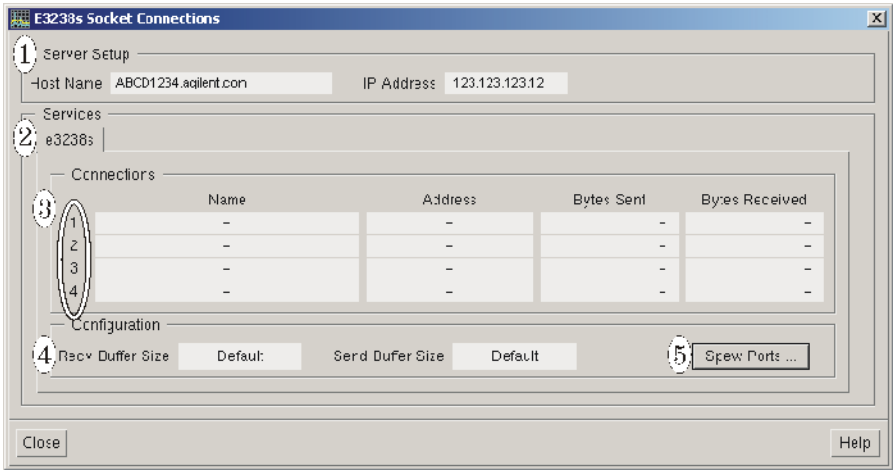
This dialog box appears if a password account exists for the user 'e3238s' and you click File, Access Control. You must enter a password before the Access Control dialog box appears.

Enter the password associated with the user name 'e3238s'. If the password hasn't been setup, access to this menu is granted without a password.

To add a user or change the password, see the system administrator.

Socket Connections

Path: Utilities, Socket Connections
Option: ASD User Programming



There are no controls in this dialog box; it merely displays information.

This Socket Connection dialog box displays:

1. **Server Setup** displays the socket server configuration settings (see Configuring the Socket Server below)
2. **Services** displays, as a series of tabs, the services that are available through the socket connections.
3. **Connections** displays the names and IP addresses of machines that currently have a socket connection.
4. **Configuration** displays the sizes of the socket server's receive buffer size and send buffer size.
5. **Spew Ports** displays the Spew Port Status (page 492).

Configuring the Socket Server

By default, this feature is inactive in the File menu. The Socket Server is activated and configured with the following commands (from the `e3238s.n6841.cfg` file):

```
socketServer:                Enabled
maxServices:                 1
maxClientSockets:            0
socketServerTimerInterval:   5
e3238sService:               e3238s
e3238sServiceMaxConnections: 4
e3238sServiceDataBufferSize: 512
e3238sServiceSendBufferSize: 0
e3238sServiceRecvBufferSize:    0
```

To activate the Socket Server, put them in the `e3238s.n6841.cfg` configuration file so that they are executed when the program starts.

Example

The example program `client` in the `C:\e3238s\examples\sockets` directory allows another process/workstation to make a socket connection and issue commands. The commands that subscribe to the information types start with "spew" as `spewAlarm`. See the following example.

To subscribe to N6820ES data,

First: Both machines must have a line in the /etc/services file:

```
e3238s       7011/tcp
```

Then:

1. Check that socketServer: Enabled is in the e3238s.n6841.cfg file.
2. Start the e3238s program.
3. In another window or on another machine, run client, specifying the machine running the N6820ES program.

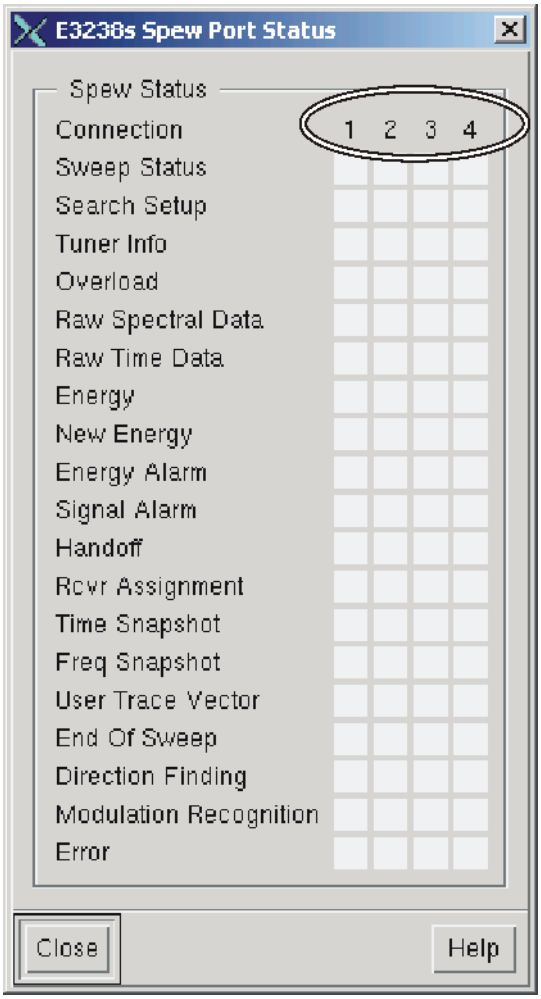
   ```
   client -f Internet -m mar87s1
   ```

   `client` is an example program in option ASD that shows how to program a sockets interface (look for client.c). If you run this on another machine, socketServerSocketFamily: must be Internet. Unix works only when both processes run on the same UNIX machine; Internet works for either case.
4. Issue a spew command; the previous figure shows the results of using the following commands ("Enter Command:" is a prompt from the client program):

   ```
   Enter command: spewSearchSetup: On
   Enter command: spewAlarm: On
   Enter command: spewTimeSnapshotFilename: On
   ```

For a general discussion of the socket server, see Process Overview (page 33). See the *E3238 ASD Programming Guide* (program_guide.pdf) or *Command Reference* (command_ref.pdf) for information on the spew commands. The PDF files are in the \E3238s\manuals directory.

Spew Port Status



The Spew Port Status box lists the types of information to which each connected machine is subscribed. The numbers at the top of each column corresponds to the connections numbered in the status display Socket Connections (page 490).

Spew Information Types

The types of information that are provided via a sockets subscription service, popularly known as “spew” information, are as follows:

- **Sweep Status** is a report sent when the sweep status changes (starts or stops) indicating whether the sweep is active.
- **Search Setup** is a report sent when the search configuration changes. Current configuration settings may be determined by using query commands. This report is triggered when any of the following parameters are changed:
  - Search type (directed/general)
  - Start/stop frequencies
  - Bin spacing

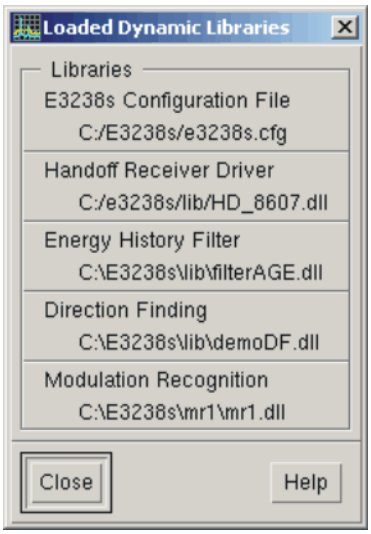
  - RBW
  - Antenna
  - Attenuation (tuner)
  - Average mode
  - Number of averages
  - Band number (directed search)
  - Band status (directed search)
  - Sweep interval (directed search)

- **Tuner Info** is a report sent when any of the tuner setup parameters are changed.
  - Tuner span (start/stop frequencies)
  - ADC span
  - ADC sample frequency
- **Overload** indicates an ADC overload occurred; the ADC input signal voltage exceeded the range setting during the time this data segment was being sampled. Information sent to the subscriber includes the frequencies associated with the segment's first and last values.
- **Raw Spectral Data** is the frequency-domain (magnitude in V_{pk}^2) data from the measurement hardware (tuner/ADC/DSP). See Spew Raw Data in the *N6820ES ASD Programming Guide*.
- **Raw Time Data** is the ADC (time domain) data for each segment.
- **Energy** is a report sent when energy is detected. Information sent is time stamp, frequency, bandwidth, and amplitude.
- **New Energy** is a report sent when new energy (not already listed in the Energy History) is detected. Information sent is time stamp, frequency, bandwidth, and amplitude.
- **Energy Alarm** is a report indicating that an energy alarm has occurred. Information included in the report:
  - Alarm number
  - Alarm name/description
  - Time stamp
  - Mode (cause; e.g., signal present)
  - Frequency
  - Bandwidth
  - Amplitude
  - Detections (number of)
  - Duration
  - Intercepts (number of)
- **Signal Alarm** is a report indicating that a signal alarm has occurred.
- **Handoff** is a report indicating that a handoff entry has been put in the receiver queue. Information in this report includes:
  - Frequency
  - Bandwidth (of the signal causing the handoff)
  - Amplitude (of the signal causing the handoff)
  - Duration - time receiver stays tuned to frequency
  - Priority
  - Detection type

  - Receiver (which one to use)
  - BFO
  - AGC (on/off)
  - Gain (if AGC off)
- **Rcvr Assignment** is a report describing handoff receiver assignments including:
  - Receiver (a number identifying which receiver got the assignment)
  - Frequency to which to tune
  - Bandwidth (of the signal that caused the handoff)
  - Detection type
- **Time Snapshot** is the name of a file containing time snapshot data.
- **Freq Snapshot** is the name of a file containing frequency snapshot data.
- **User Trace Vector** is a type of data used to display trace data on a remote process without the huge volume of frequency data used for normal trace displays.
- **End Of Sweep** sends no data. When this tag is received it indicates that the search receiver has completed the sweep.
- **Direction Finding** is the data provided by the optional direction finding library.
- **Modulation Recognition** is the data provided by the optional modulation recognition library
- **Error** is the text of any error dialog boxes shown on any of the N6820ES screens.

Loaded Libraries

Path: Utilities, Libraries ...
Options: ASD, User Programming



This dialog box lists the startup configuration file (e3238s.n6841.cfg) and the user-defined libraries that are currently loaded.

Hardware Configuration File

This entry specifies the file used when the program begins execution to define the system hardware. It also defines the libraries to be loaded as discussed in the following. See Hardware Configuration (page 16).

Other Libraries In Use

Libraries are used to support custom features such as:

- handoff receiver drivers
- energy feature extraction
- energy history filters
- creating additional exported data types
- signal type identification
- menu bar menus
- window panes
- generic (other user-defined programs)

To change the libraries that are loaded, you must change the `e3238s.n6841.cfg` file, then stop and restart the `e3238s` program.

Library programs are part of option ASD (User Programming). They are created under the guidelines described in the documentation provided.

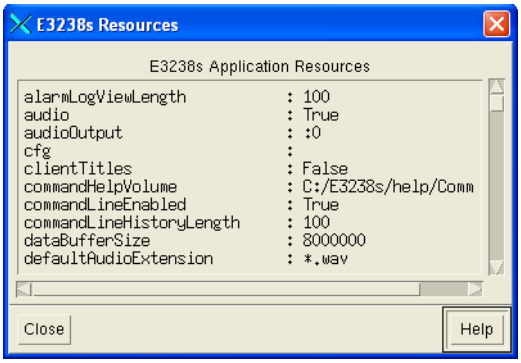
See Also

Process Overview (page 33)

The *Installation & Configuration Reference* for information on installing hardware and editing configuration commands in the 'e3238s.n6841.cfg' file.

Resources

Path: Utilities, Resources . .



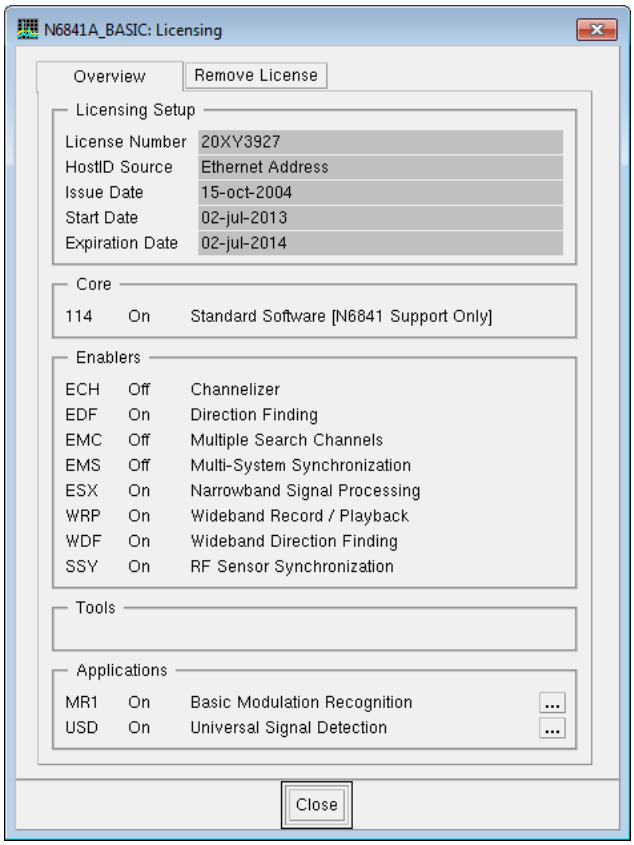
This dialog displays the X Windows application resource settings and the main resource file used to define them.

To create a file containing the default values for these parameters, see File, Print To File, Fallback Resources ...

See also Application Resources (page 17).

Licensing

Path: Utilities, Licensing

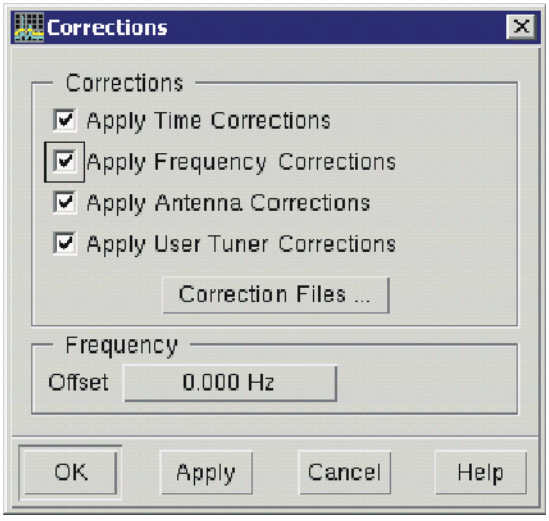


The dialog box displays the licensing information for the N6820ES software. The dialog box displays the host license information and a list of the software that the license enables.

In the host information is the license number, the hardware identity to which the license is locked (host ID or dongle), the ID itself, the license date and the expiration date.

Corrections

Path: Utilities, Corrections



The corrections utilities allows the N6820ES system to apply corrections for a variety of time, frequency, phase, and other hardware artifacts.

Note

If "[Partial]" appears after one of the corrections names in this dialog box, the N6820ES software was unable to find some correction files that are normally installed with the system or extracted from the tuner. This may indicate a need to re-install the N6820ES system software. Until this is done, the system will apply other, more general, corrections.

The available corrections include:

- Apply Time Corrections (page 499) this section allows users to apply corrections for time snapshot capture and Mod Rec results.
- Apply Frequency Corrections (page 499) this selection allows users to apply power spectrum corrections to their N6841A RF Sensor.
- Apply Antenna Corrections (page 499) this selection allows users to apply corrections to compensate for antenna and antenna lead variations.
- Apply User Tuner Corrections (page 501) this allows users to apply corrections specific to external up or down converters.
- Correction Files (page 501) lists the corrections files currently being used by the N6820ES system.
- Frequency Offset (page 501) allows you to correct for a downconverter that is not recognized or controlled by the N6820ES system.

Apply Time Corrections

When this is activated, the N6820ES system applies corrections to time-domain data. Time-domain data includes Time Snapshot file data and time records used by the MR1 Modulation Recognition option.

Time corrections compensate for the RF response of the tuner and the amplitude and phase response of analog and digital filters in the ADC. Time Corrections do not affect search spectrum data.

Time Corrections are enabled by default when the MR1 option is enabled. Time corrections should enabled when using MR1 Modulation Recognition to recognize digitally modulated signals[1] and when using the N6820ES system to collect time capture files of digitally modulated signals that will be demodulated by another system.

Apply Frequency Corrections

When this is activated, the N6820ES system applies frequency-domain amplitude corrections to the search spectrum. These corrections compensate for the RF response of the tuner and the response of the analog and digital filters in the tuner and ADC. When enabled, search spectral data is corrected before being sent to energy processing or display processing.

Use Frequency Corrections when amplitude accuracy and response flatness are important.

Notes

- Frequency Corrections do not affect time snapshots or signal processing. Also, Frequency Corrections do not affect frequency accuracy.
- You may want to disable corrections when using an Environment Threshold that was captured with Frequency Corrections disabled.
- At narrow resolution bandwidths (less than 1 kHz) Frequency Corrections may reduce search speed slightly.
- Frequency Corrections must be selected to enable Antenna Corrections or Tuner Corrections.

Apply Antenna Corrections

Selecting this box directs the N6820ES system to apply antenna corrections to the search spectrum. These corrections compensate for the RF response of each antenna. To use this feature, you must:

- Supply a calibration file for each antenna
- Turn on Apply Frequency Corrections
- Turn on Apply Antenna Corrections
- Select the antenna in Search Setup

Antenna calibration files are usually located in the C:\E3238s\cal directory. These text files list the antenna frequency response in dB. For an example of the file format, see `C:\E3238s\cal\d.antenna1.cal`. After creating a

[1] Especially wide-bandwidth signals.

calibration file, add (or un-comment) lines in the N6820ES configuration file (usually C:\e3238s\e3238.cfg) to load the antenna calibration file. For example, the following line will load “antenna1.cal” and apply it to the first antenna of search receiver 1:

```
searchRx1.antenna1.calFile:    antenna1.cal
```

Apply User Tuner Corrections

Clicking in this box directs the N6820ES system to apply user-supplied tuner corrections to the search spectrum. Corrections compensate for the RF response of the tuner or block downconverter. To use this feature, you must

- Supply a calibration file for each tuner
- Turn on Apply Frequency Corrections
- Turn on Apply User Tuner Corrections

Tuner calibration files are usually located in the C:\E3238s\cal directory. These text files list the tuner frequency response in dB. For an example of the file format, see C:\E3238s\cal\d.tuner1.cal. After creating a calibration file, add (or un-comment) lines in the E3538s configuration file (usually c:\e3238s\e3238.cfg) to load the tuner calibration file. For example, the following line will load “tuner1.cal” and apply it to the first tuner of search receiver 1:

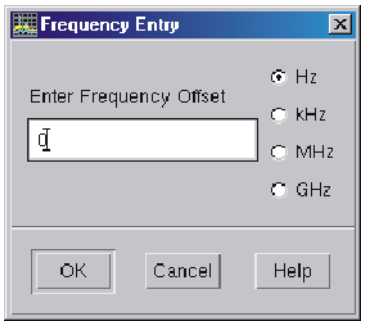
```
searchRx1.tuner1.userCalFile:  tuner1.cal
```

Correction Files

This button displays a list of the correction files that have been loaded by the N6820ES software.

The other entries are the antenna calibration files listed in the configuration file.

Frequency Offset

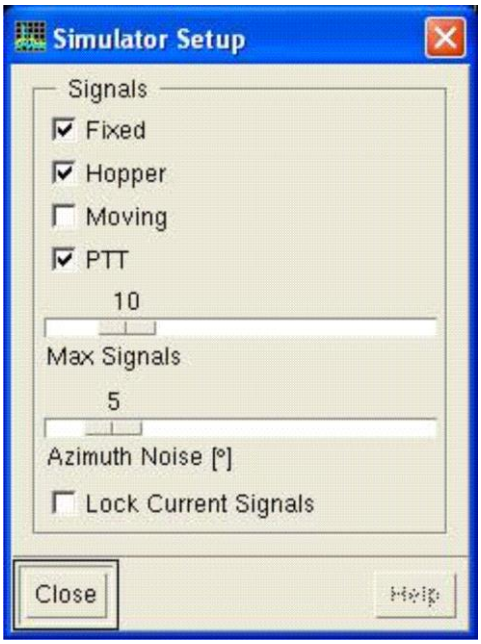


Frequency Offset adjusts the displayed frequency values to account for an external frequency conversion device such as a block downconverter or spectrum analyzer.

This parameter value should be 0 when using a block downconverter that is supported and controlled by the N6820ES software.

Simulator

Path: Utilities, Simulator



When the command line switch `-noHardware` is specified, the N6820ES simulates the RF environment. The Simulator dialog box allows you to configure some aspects of the simulated environment.

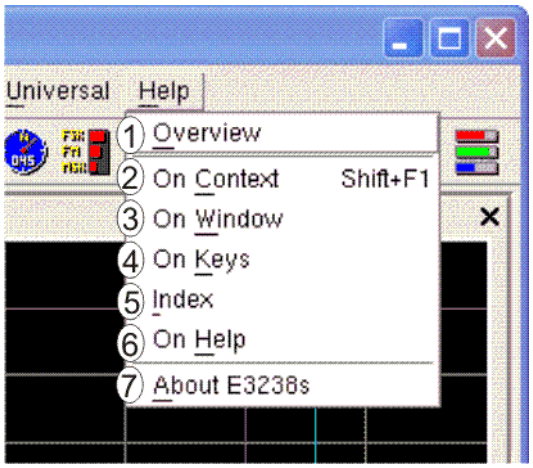
The Max Signals slider allows you to select how many simultaneous signals are in the simulated environment. The duration of each simulated signal is random.

Selecting the Lock Current Signals option causes the current simulated signals to not change.

If you have configured the N6820ES with a WDF license, the following setup options are available:

- Fixed - Selecting this option causes the simulation of a fixed-frequency, fixed-duration signal.
- Hopper - Selecting this option causes the simulation of a fixed-direction, changing frequency signal.
- Moving - Selecting this option causes the simulation of a changing-direction, fixed-frequency signal.
- PTT - Selecting this option causes the simulation of a fixed-frequency signal that alternates between two different directions.
- Azimuth Noise - This slider selects the amount of variability of the returned azimuth (direction) values.

The Help Menu

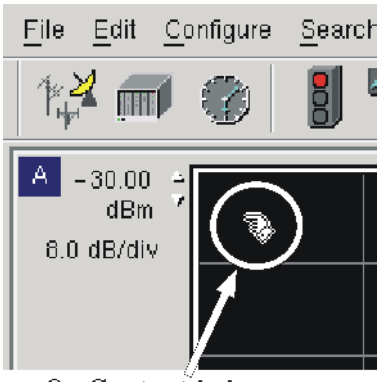


This menu contains entries that provide help information. Help is also called whenever you press the F1 function key.

1. Process Overview (page 33) provides an introduction to the system process or data flow.
2. On Context (page 506) provides context-sensitive, quick help on items in the window that you select with the mouse.
3. N6820ES Main Window (page 45) provides information about the N6820ES window.
4. On Keys (page 507) provides information about using the mouse, function keys, mnemonics, and accelerator keys.
5. On Index (page 511) provides the entry point into the online help text, starting at the introduction.
6. On Microsoft HTML Help (page 512) provides information on using the online help features. Two online help systems are provided. If you are running the N6820ES on a local Windows system, the Microsoft HTML help viewer is provided. If you are running the N6820ES remotely, a less full-featured online help viewer is provided. For information on using the less full-featured help viewer, see On Help (page 507).
7. About N6820ES (page 510) provides the software version number and lists installed options.

On Context

Accelerator: Shift+F1



On Context help cursor

Clicking this entry causes the mouse cursor becomes a pointing hand. You can then move that hand so that the pointing finger is over any element on the screen. When the hand points to the screen element about which you want information, clicking it displays help for that screen element.

On Keys

This entry in the Help menu covers a range of special topics:

- Mouse Features (page 507) discusses features of the mouse pointer.
- Accelerator Keys (page 508) discusses using and defining accelerator keys.
- Function Keys (page 509) discusses using and defining function keys.
- Mnemonics (page 509) discusses keyboard-based navigation (operation without a mouse).

Mouse Features

The mouse can be used to make some tasks easier. The mouse has special features within a trace pane that are discussed in Mouse (page 466).

To change the double-click speed, use the multiClickTime resource parameter. See “Application Resources” in the *Installation and Configuration Reference*.

Pointers to mouse features:

- Zoom scale; see Mouse (page 466)
- Handoff a Signal (page 507)
- Copy Marker Readout (page 61)
- Activate/move a marker; see Marker On/Off (page 431)
- Handoff a signal in a trace; see Handoff a Signal (page 507)
- Handoff an entry in the handoff log; see Handoff Source (page 77)
- Control handoff receivers; see Handoff Receiver Pane (page 70)
- Activate popup menus:
  - Trace Popup Menu (page 456)
  - Handoff Log Popup Menu (page 83)
  - Color Spectrogram Popup Menu; see Trace Type (page 427)
  - Trace Snapshot Setup Popup Menu; See Trace Snapshot Setup (page 438)

Handoff a Signal

The middle mouse button can handoff a signal from either the trace or the handoff log.

From a Marker

The following procedures assume that at least one trace pane and the handoff receiver panes are displayed. See Trace Pane (page 52) and Handoff Log Pane (page 75). To control which panes are active, see Display Layout (page 422). It also assumes that the left mouse button controls the trace marker and the middle mouse button performs **drag-and-drop**.

If a marker is on in the trace, perform the following steps:

1. Move the marker to the frequency you wish to hand off.
2. Position the mouse cursor anywhere in the trace.
3. Click the middle mouse button and hold it.
4. Move the cursor to the handoff receiver you want to handle the signal (in the Handoff Log Pane (page 75)).

5. Release the middle mouse button.

From a Trace

If a marker is not on in the trace, perform the following steps:

1. Position the mouse cursor near the frequency you wish to hand off.
2. Click the *left* mouse button and hold it (marker appears).
3. Move the marker to the exact frequency (horizontally).
4. Click and hold the *middle* mouse button.
5. Release the left button (optional).
6. Move the cursor to the handoff receiver pane (in the Handoff Log Pane (page 75)).
7. Release the middle mouse button.

From the Handoff Log

Only *completed* signals can be handed off. See Handoff Status (page 76).

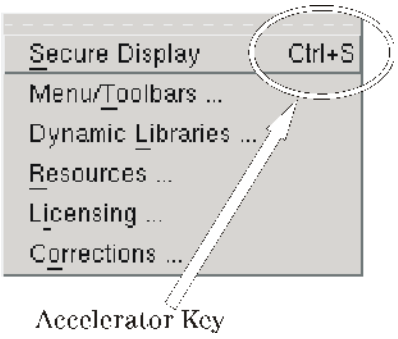
Perform the following steps:

1. Click (and hold) anywhere on the log entry with the middle mouse button.
2. Drag the mouse pointer to the handoff receiver control box.
3. Release the mouse button.

For information about other ways to handoff signals, see the discussion under the Handoff Log Pane, Handoff Source (page 77).

Accelerator Keys

An accelerator is a key or key-combination that invokes an action. If an action has an accelerator, it is shown with the action's label (in a menu, for example).



Accelerator keys may be defined in the `E3238s` resource file, `C:>/E3238s/E3238s`.

Function Keys

The function keys are above the number keys on the system keyboard. They are labeled F1, F2, ... F12. They are a special type of accelerator key that can perform **functions** without using Shift, Ctrl, or Alt. They *can* be combined with the Shift, Ctrl, and Alt keys to offer more options.

Assigning actions to function keys is described in The Macros Menu (page 477).

Mnemonics

Keyboard **mnemonics** allow you to navigate the N6820ES menu bar with the keyboard instead of a mouse. Note that each key on the keyboard is unique. For example, modifier keys such as the left Alt key and the right Alt key can and do function differently.

To activate keyboard-based navigation, press function key F10.

To use the keyboard, move the *focus* to the element you wish to activate and press Enter. The *focus* is the element (button or menu item) that will be activated when you press Enter. It is identified with a black box around the element.

- **Tab** moves the focus to the next field.
- **Shift+Tab** moves the focus to the previous field.
- **Ctrl+Tab** moves the focus to the next field; useful in the text editor. A tab here goes into the text editor file while Ctrl+Tab is interpreted as a keyboard navigation instruction.
- The keyboard arrow keys allow you to move within a field.

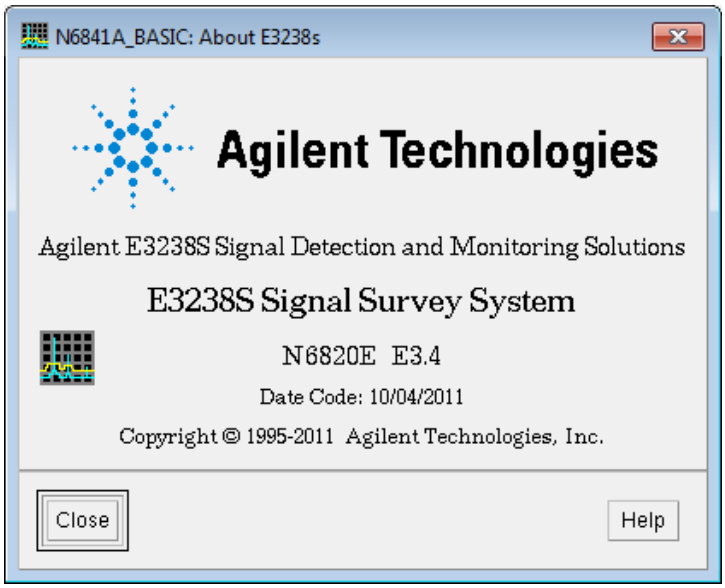
Windows Keyboard Mapping

In Windows you can map keyboard keys to keyboard functions using Exceed. To map keys:

1. Select Start, Programs, Hummingbird Connectivity 10, Exceed, XConfig.
2. Select the Mouse, Keyboard and other Input Devices Icon from the dialog box.
3. Enter the keyboard mapping or mouse operation that you prefer in the dialog boxes.
4. Validate and apply the changes by clicking the green checkmark in the toolbar or by selecting the “Validate and Apply Changes” entry in the Actions menu.

About N6820ES

Path: Help, About N6820ES



This information describes the installed N6820ES Signal Surveyor 4D Software.

- **Version** is the released software version.
- **Date Code** is the month/day/year that the executable was created.

On Index

The On Index menu item provides an entry point into the online help text, starting at the introduction. This provides an entry to the help system that is not linked to a specific window, pane, menu, or dialog box.

On Help

To learn about using help, choose one of the following hyperlinks:

- Using the Help Viewer
- To find a help topic
- To browse through the help topics

Using the Help Viewer

The Help Viewer displays the online help and provides navigation buttons. The two buttons on the top left side allow you to move back and forward through previously viewed topics. The four buttons located within the topic pane, above and below each topic, allow you to jump to the table of contents, index, next or previous topic. An additional button at the bottom allows you to close the Help Viewer.

The colored, underlined text within a topic pane is a hyperlink. Click on a hyperlink to jump to another topic.

To find a help topic

- To view the table of contents, click the TOC button, and then scroll through the list using the scroll bar on the side. The table of contents is a list of important topics.
- To view the list of index entries, click the Index button. Click on a letter to jump to that area of the index or scroll using the scroll bar on the side. Topics are often indexed under more than one entry.

To browse through the help topics

- To view the next topic in the browse sequence, click the Next button. Topics are arranged in a browse sequence in the same order as the table of contents.
- To view the previous topic in the browse sequence, click the Prev button.
- To view the topic that was previously displayed, click the Back button. Each time you display a new topic, the help system remembers the previous topics so you can go back.
- To view the topic that was displayed prior to clicking the Back button, click the Forward button.

On Microsoft HTML Help

Using the HTML Help Viewer

- On the left side of the window is the **Navigation** pane. It contains four navigational tabs: the **Contents** tab, the **Index** tab, the **Search** tab, and the **Favorites** tab.
- On the right side of the window is the **Topic** pane. It displays the selected help topic, or the default help topic.
- The third pane is the **toolbar**, which is located below the help window title bar.

Getting more out of help

Here are some tips on how to find more information when using the HTML Help Viewer:

- To link to another topic, a Web page, a list of other topics, or a program, click the colored, underlined words.
- To see if a word or phrase contained in a topic is in the index, select the word, and then press F1.
- If you are viewing content from the Web in the Topic pane, you can click **Stop** or **Refresh** on the toolbar to interrupt a download or refresh a Web page.
- If you use a particular help topic often, you can add it to your favorites list.
- Right-click the **Contents** tab or Topic pane for shortcut menu commands.

To find a help topic

In the Navigation pane, click one of the following tabs:

- To browse through a table of contents, click the **Contents** tab. The table of contents is an expandable list of important topics.
- To see a list of index entries, click the **Index** tab, and then type a word or scroll through the list. Topics are often indexed under more than one entry.
- To locate every occurrence of a word or phrase that may be contained in a help file, click the **Search** tab, and then type the word.

Note

Click the contents entry, index entry, or search results entry to display the corresponding topic.

To create a list of favorite help topics

1. Locate the help topic you want to make a favorite topic.
2. Click the **Favorites** tab, and then click **Add**.

Note

To return to a favorite topic, click the **Favorites** tab, select the topic, and then click **Display**.

If you want to rename a topic, select the topic, and then type a new name in the **Current topic** box.

To remove a favorite topic, select the topic and then click **Remove**.

To copy a help topic

1. In the Topic pane, right-click the topic you want to copy, and then click **Select All**.
2. Right-click again, and then click **Copy**. This copies the topic to the Clipboard.
3. Open the document you want to copy the topic to.
4. Position your cursor where you want the information to appear.
5. On the **Edit** menu, click **Paste**.

Note

If you want to copy only part of a topic, select the text you want to copy, right-click, and then click **Copy**.

To print the current help topic

Right-click a topic, and then click **Print**.

Note

If you print from the **Contents** tab (by right-clicking an entry, and then clicking **Print**) you will see options to print only the current topic, or the current topic and all subtopics.

To get help in a dialog box

Click **Help** in the dialog box or press F1.

To hide or show the Navigation pane

On the toolbar, click **Hide** or **Show** to close or display the Navigation pane, which contains the **Contents**, **Index**, **Search**, and **Favorites** tabs.

Note

If you close the Help Viewer with the Navigation pane hidden, it will appear that way when you open the Help Viewer again.

Using accessibility shortcut keys in the Help Viewer

The following keyboard shortcuts can be used for navigation in the HTML Help Viewer. The help author who builds a compiled help (.chm) file can specify which buttons appear on the Help Viewer toolbar, so some of these options may not be available in your version of the viewer.

For the Help Viewer:

To	Press
Close the Help Viewer.	ALT+F4
Switch between the Help Viewer and other open windows.	ALT+TAB
Display the Options menu.	ALT+O
Change Microsoft Internet Explorer settings. The **Internet Options** dialog box contains accessibility settings. To change these settings click the **General** tab, and then click **Accessibility**.	ALT+O, and then press I
Hide or show the Navigation pane.	ALT+O, and then press T
Print a topic.	ALT+O, and then press P
Move back to the previous topic.	ALT+LEFT ARROW, or ALT+O, and then press B
Move forward to the next topic (provided you have viewed it just previously).	ALT+RIGHT ARROW, or ALT+O, and then press F
Turn on or off search highlighting.	ALT+O, and then press O
Refresh the topic that appears in the Topic pane (this is useful if you have linked to a Web page).	F5, or ALT+O, and then press R
Return to the home page (help authors can specify a home page for a help system).	ALT+O, and then press H
Stop the viewer from opening a page (this is also useful if you are linking to the Web and want to stop a page from downloading).	ALT+O, and then press S
Scroll through a topic.	UP ARROW and DOWN ARROW, or PAGE UP and PAGE DOWN
Scroll through all the links in a topic or through all the options on a Navigation pane tab.	TAB

For the **Contents** tab:

To	Press
Display the **Contents** tab.	ALT+C
Open and close a book or folder.	PLUS SIGN and MINUS SIGN, or LEFT ARROW and RIGHT ARROW
Select a topic.	DOWN ARROW and UP ARROW
Display the selected topic.	ENTER

For the **Index** tab:

To	Press
Display the **Index** tab.	ALT+N
Type a keyword to search for.	ALT+W, and then type the word
Select a keyword in the list.	UP ARROW and DOWN ARROW
Display the associated topic.	ALT+D

For the **Search** tab:

To	Press
Display the **Search** tab.	ALT+S
Type a keyword to search for.	ALT+W, and then type the word
Start a search.	ALT+L

For the **Favorites** tab:

To	Press
Display the **Favorites** tab.	ALT+I
Add the currently displayed topic to the Favorites list.	ALT+A
Select a topic in the Favorites list.	ALT+P, and then UP ARROW and DOWN ARROW
Display the selected topic.	ALT+D
Remove the selected topic from the list.	ALT+R

Note

There are also shortcut menu commands that can be accessed through the keyboard.

Shortcut keys also work in secondary and pop-up windows.

Every time you use a shortcut key in the Navigation pane, you lose focus in the Topic pane. To return to the Topic pane, press F6.

Using the shortcut menu commands

There are several commands on the shortcut menu that you can use to display and customize information.

Command	Description
Right-click in the table of contents, and then click **Open All**.	Opens all books or folders in the table of contents. This command only works if the **Contents** tab is displayed.
Right-click in the table of contents, and then click **Close All**.	Closes all books or folders. This command only works if the **Contents** tab is displayed.
Right-click, and then click **Print**.	Prints the topic.

Note

These commands can be accessed through the keyboard. You can click SHIFT+F10 to display the shortcut menu, and then click the appropriate shortcut keys. Or, you can enable Mousekeys. Use a Mousekey combination to display the shortcut menu, and then click the appropriate shortcut keys.

To use full-text search

1. Click the **Search** tab, and then type the word or phrase you want to find.
2. Click **List Topics**, select the topic you want, and then click **Display**.

To highlight words in searched topics

When searching for words in help topics, you can have each occurrence of the word or phrase highlighted in the topics that are found.

- To highlight all instances of a search word or phrase, click **Options** on the toolbar, and then click **Search Highlight On**.

Note

To turn off this option, click **Options** on the toolbar, and then click **Search Highlight Off**.

If you are viewing a long topic, only the first 500 instances of a search word or phrase will be highlighted.

To customize the Help Viewer

There are a few ways to easily change the size and position of the Help Viewer and the panes in the viewer:

- To resize the Navigation or Topic pane, point to the divider between the two panes. When the pointer changes to a double-headed arrow, drag the divider right or left.
- To proportionately shrink or enlarge the whole Help Viewer, point to any corner of the Help Viewer. When the pointer changes to a double-headed arrow, drag the corner.
- To change the height or width of the Help Viewer, point to the top, bottom, left, or right edge of the Help Viewer. When the pointer changes to a double-headed arrow, drag the edge.
- To reposition the Help Viewer on your screen, click the title bar and drag the Viewer to a new position.

Note The Help Viewer will appear with the last size and position settings you specified when it is opened again.

To change formatting or styles for accessibility

1. On the **Options** menu, click **Internet Options**, and then click **Accessibility**.
2. In the **Accessibility** dialog box, select the options you want, and then click **OK**.

Note These changes do not apply to the Navigation pane or toolbar of the Help Viewer.

This will also change your accessibility settings for Internet Explorer.

To change the font size of a topic

- On the **Options** menu, click **Internet Options**, and then click **Fonts**.

Note These changes do not apply to the Navigation pane or toolbar of the Help Viewer.

This will also change your font settings for Internet Explorer.

To change colors in the Topic pane of the Help Viewer

1. In Microsoft Internet Explorer, on the **View** menu, click **Internet Options**.
2. On the **General** tab, click **Colors**.
3. In the **Colors** dialog box, select the options you want, and then click **OK**.
4. To apply the new color settings, in the **Internet Options** dialog box, click **OK**.

Note

These changes do not apply to the Navigation pane or toolbar of the Help Viewer.

This will also change your color settings for Internet Explorer

Appendix A: User-Defined Threshold

The threshold is part of the Process Overview (page 33). The threshold may be defined by creating an ASCII file containing commands as defined in the following text. This file can then be loaded as described in the File (page 318).

The file has a header of either ASCII or BINARY.

```
block, f1, delta_f, numpoints, p1, p2, ... p[numpoints]
   f1:         Starting frequency
   delta_f:    Frequency spacing between each point
   numpoints: Number of frequency points
   p[]       : Amplitude data points in Vp squared
```

If the frequency spacing of the threshold file does not match that of the measured data, the threshold is expanded or interpolated, as appropriate.

```
level, f1, f2, level_dbm
   f1:         Starting Frequency
   f2:         Stopping Frequency
   level_dbm: Amplitude level in dBm

slope, f1, f2, start_dbm, stop_dbm
   f1:         Starting Frequency
   f2:         Stopping Frequency
   start_dbm: Starting amplitude level in dBm
   stop_dbm:  Stopping amplitude level in dBm
```

Example:

```
ASCII
Level, 0, 1800000000, -100
Slope, 900000000, 905000000, -100, -90
Slope, 905000000, 910000000, -90, -50
Level, 910000000, 940000000, -50
Slope, 940000000, 945000000, -50, -90
Slope, 945000000, 950000000, -90, -100
```

Note

All entries are case insensitive.

If any entries overlap, the earlier entry in the file will be overwritten.

T