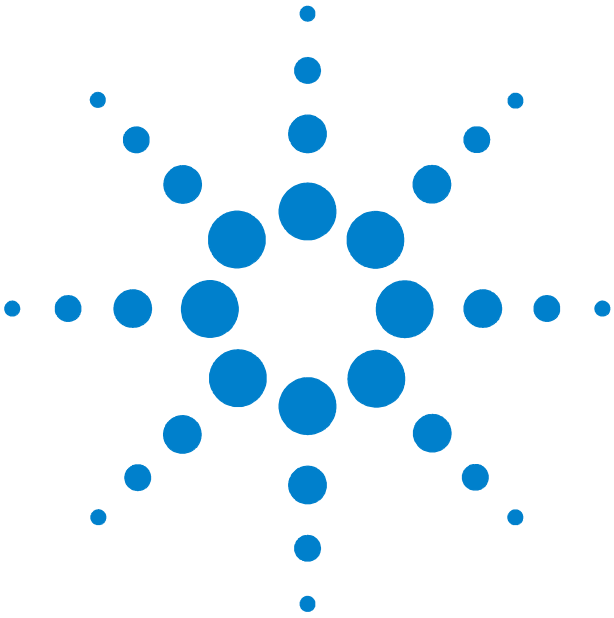


Agilent Technologies Wideband Recorder

Preliminary User's Guide

Agilent Technologies

Notices

Trademarks

Windows NT ® and Windows® are U.S. registered trademarks of Microsoft Corporation.

Manual Part Number

Preliminary

Edition

Preliminary edition, August 2001

Printed in USA

Agilent Technologies, Inc.
8600 Soper Hill Road
Everett, WA 98205

Warranty

The material contained in this document is provided "as is," and is subject to being changed without notice in future editions. Further, to the maximum extent permitted by applicable law, Agilent Technologies disclaims all warranties of merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any of the products to which it pertains. Should Agilent Technologies have a written contract with the user and should any of the contract terms conflict with these tersm the contract terms shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

In This Guide...

This user's guide contains information on installing and using the Agilent Technologies Wideband Recorder.

1 Installing the Wideband Recorder

This chapter describes how to install the hardware and software for the Wideband Recorder.

2 Using the Wideband Recorder

This chapter describes the Wideband Recorder's block diagram and user interface. It also tells how to use Wideband Recorder with the E3238 system.

3 Socket Command Interface

This chapter describes the commands that allow an E3238 system to control the Wideband Recorder via the socket interface.

Wideband Recorder at a Glance

The Agilent Technologies Wideband Recorder (WBR) uses high-speed disk drives to record gap-free time data into a circular buffer. Once the circular buffer is full, the newest data overrides the oldest data so the most recent data is always available. Using an Agilent E1438A and two Agilent N2216A's with two 73 GB disk drives (292 GB total disk capacity), you can record over three hours of data at a 5 MHz bandwidth.

The Wideband Recorder's user interface lets you view a spectrogram of the wideband data stored in the circular buffer and select just the narrowband signals you want. The selected signals are then filtered, rezoomed, and recorded to the host computer's hard drive, all without interrupting the recording of new wideband data.

The Wideband Recorder's socket command interface lets the Agilent E3238 system request recordings. You can use the E3238S Command Line pane to generate a recording request or you can use the E3238 system's alarm tasks to automatically generate recording requests. Each recording request is sent to the Wideband Recorder via LAN.

Contents

1 Installing the Wideband Recorder

If your system was integrated at the factory, you do not need to perform the procedures in this chapter. In this case. the only installation required is to connect cables to peripherals (display, keyboard, disk drive, and mouse).

To install the Wideband Recorder, do the following:

1 Check that your system meets the minimum requirements.

See "System Requirements" on page 8.

2 Install the Wideband Recorder hardware.

See "Installing Hardware" on page 10.

3 Install the Wideband Recorder software.

For HP-UX, see "Installing the Wideband Recorder on HP-UX" on page 20.

For Windows, see "Installing the Wideband Recorder on Windows" on page 34.

System Requirements

The system must contain the following:

- VXI Mainframe with option 918 (backplane shield kit)
- One of the following controllers and operating systems:
  - E1498A (V743/100) VXI HP-UX Embedded Controller with HP-UX 10.20
  - E9850A or E9851A Windows NT® Embedded Controller with Windows NT 4.0, service pack 4
- One of the following VXI ADC modules:
  - E1437A
  - E1438A/B
  - E1439A/B
- One or two of the following data disk modules:
  - N2216A option 1 or 2 data disk
  - E1562E/F data disk
- E1485C VXI DSP (with one or more Motorola 96002 DSP cards installed)
- Display: 1280 x 1024 resolution

Optional Hardware

The following components are optional:

- E3249B VXI System Disk
- bc350/357 VXI-C Time and Frequency Processor (IRIG)
- WJ 9119 VXI Tuner
- WJ 9119-1 VXI Tuner
- E2730A VXI Tuner
- CS-5040 VXI Tuner

Table 1 Tuner-ADC Combinations

	E1437A ADC	E1438A/B ADC	E1439A/B ADC
Recording Bandwidth	4 MHz	5 MHz	4.64 MHz
IF Bandwidth			
No Tuner	8 MHz	40 MHz	37.109375 MHz
WJ 9119 VXI Tuner	4 MHz	4 MHz	NS*
WJ 9119-1 VXI Tuner	6.88 MHz	8 MHz	NS*
E2730A VXI Tuner	NS*	NS*	36 MHz
CS-5040 VXI Tuner	NS*	NS*	36 MHz
F_1 - F_2			
No Tuner	0 - 8 MHz	0 - 40 MHz	52 - 88 MHz
WJ 9119 VXI Tuner	0.5 - 32 MHz	0.5 - 32 MHz	NS*
WJ 9119-1 VXI Tuner	1 - 32 MHz	1 - 32 MHz	NS*
E2730A VXI Tuner	NS*	NS*	2 - 2,700 MHz
CS-5040 VXI Tuner	NS*	NS*	100 - 22,000 MHz

* NS = Not Supported

Installing Hardware

CAUTION To protect circuits from static discharge, observe anti-static techniques whenever handling the VXI modules.

Before installing the VXI modules, turn off the power to the VXI mainframe and disconnect the power cord. This avoids damaging the modules during installation.

1. Set up your VXI mainframe. See the *Getting Started with VXI* manual and the documentation that came with your hardware.
2. Install the controller module into the mainframe's slot 0. See Figure 4 on page 12.
3. If installing an optional system disk, tuner, or time and frequency processor, see "Installing Optional Hardware" on page 15.
4. Set the DIP switches on E1437A, E1438A/B, or E1439A/B ADC module to logical address 129.

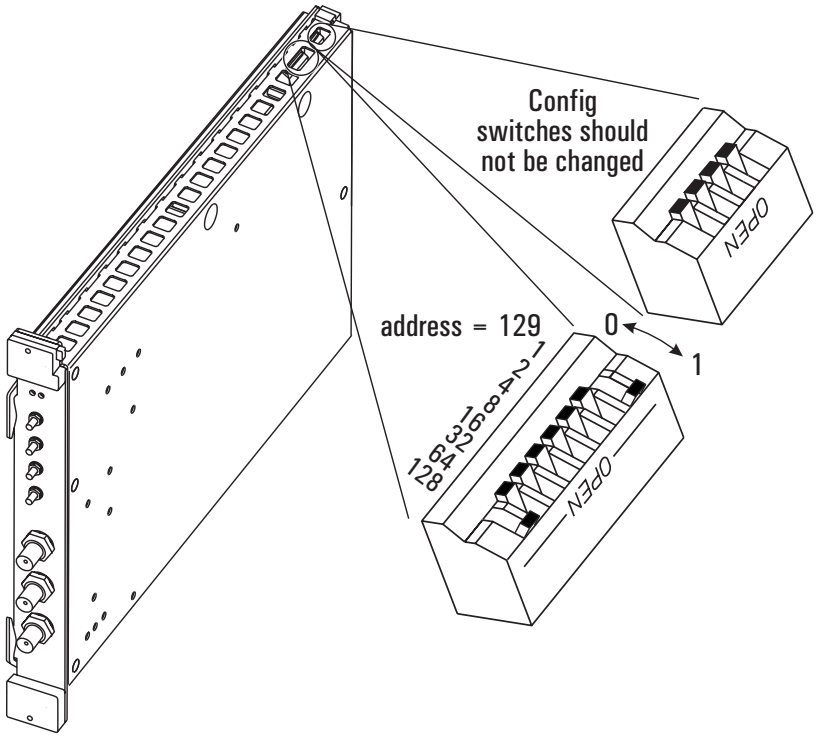


Figure 1 E1437A/E1438A/E1439A Logical Address Setting

5. Install the ADC module into the mainframe to the right of the controller module. See Figure 4 on page 12.

6 Set the DIP switches on the N2216A or E1562E/F data disk as follows:

Note: The optional second data disk is configured in step 10.

a Set the VXI logical address to 144.

Each module in the system must have a unique logical address and it must be within the E1485C module's servant area.

b Set the hardware address to 1111 1100.

c Set the internal SCSI device address switches to 0.

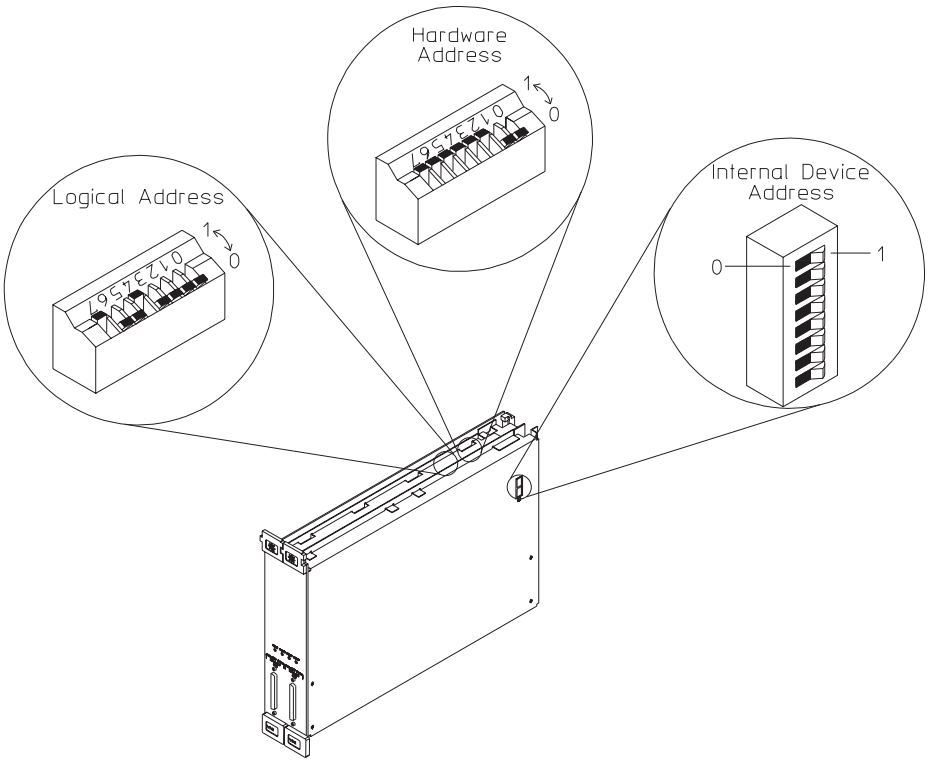


Figure 2 N2216A or E1562E/F DIP Switches

7 Install the data disk into the VXI mainframe to the right of the ADC module. See Figure 4 on page 12.

8 Set the DIP switches on the E1485C VXI DSP as follows:

a Set the VXI logical address (LA) to 128.

b Set the servant area switch setting (SASS) to 16 (a range of addresses) (Servant Area = LA through LA+SASS = 128 through 144)

c Set the other switches as shown in Figure 3.

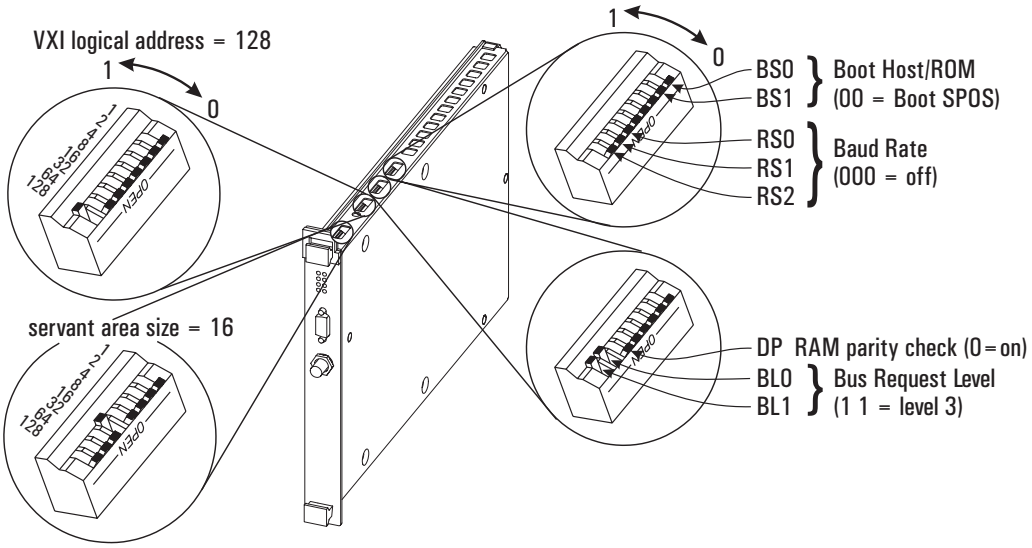


Figure 3 E1485C Settings

9 Install the DSP module into the VXI mainframe to the right of the data disk module.

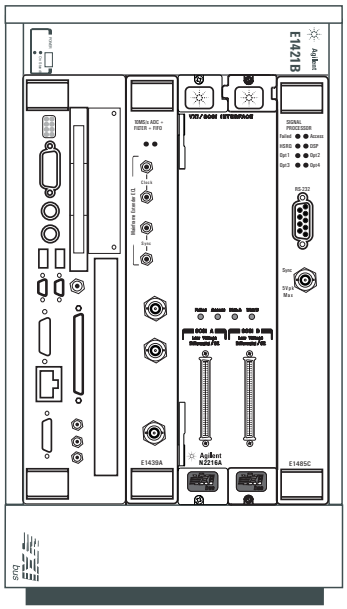


Figure 4 Wideband Recorder Hardware

10 If installing a second data disk in the mainframe, set the DIP switches on the second N2216A or E1562E/F data disk as follows:

a Set the VXI logical address to 143.

Each module in the system must have a unique logical address and it must be within the E1485C module's servant area.

b Set the hardware address to 1110 1100.

c Set the internal SCSI device address switches to 1000 1000.

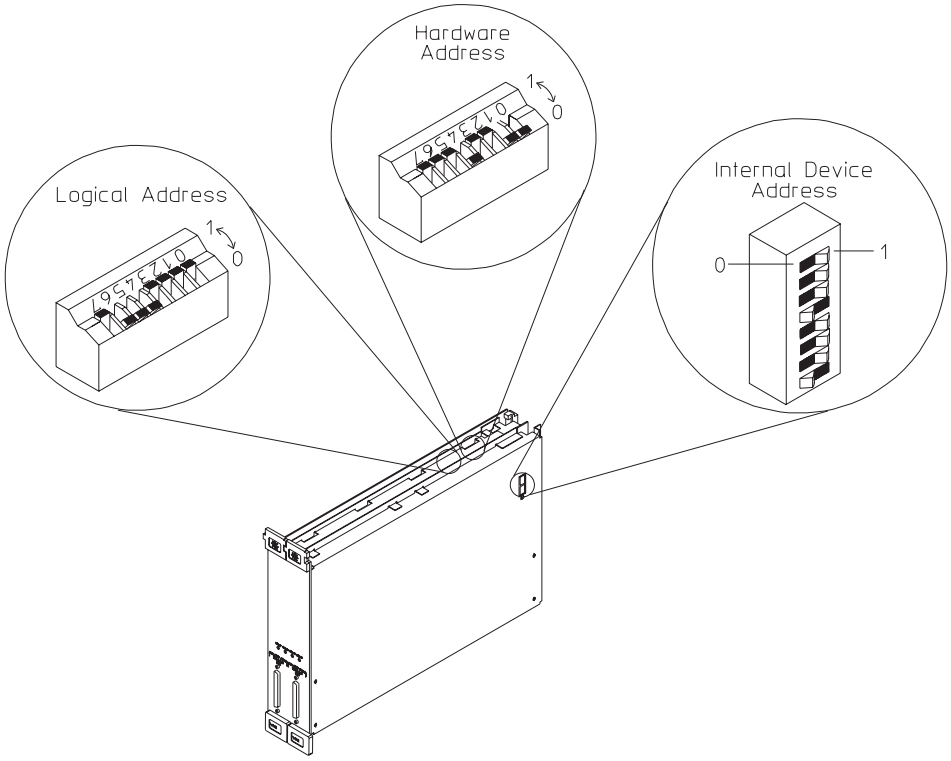


Figure 5 Second N2216A or E1562E/F DIP Switches

11 If installing a second data disk module in the mainframe, install to the right of the DSP module and connect to the first data disk module using SCSI cables.

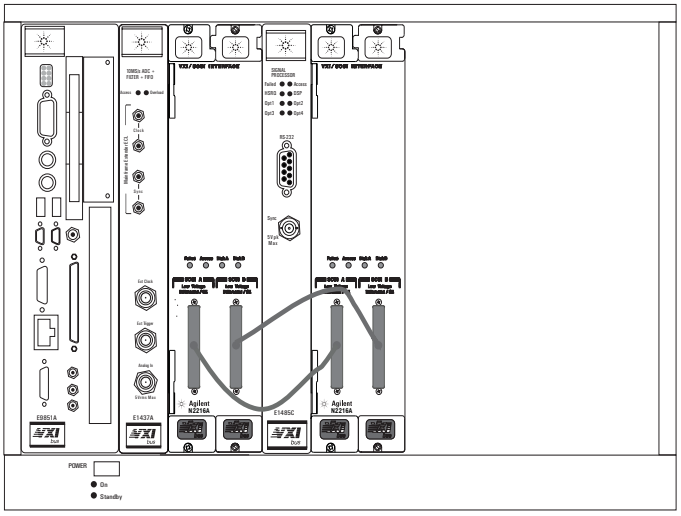


Figure 6 Wideband Recorder Hardware with Two Data Disk Modules

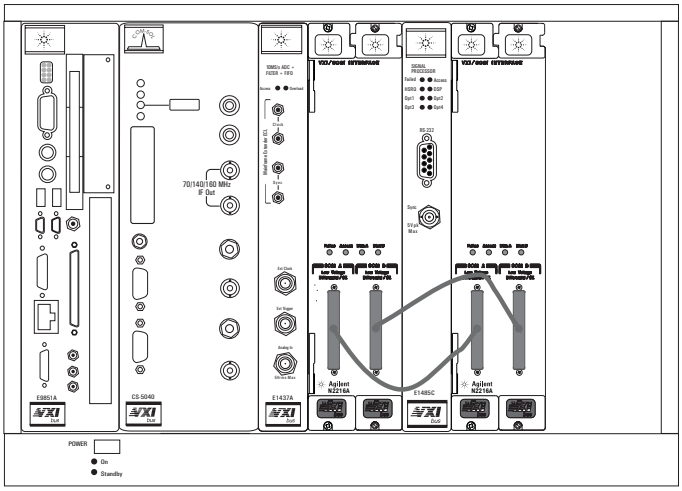


Figure 7 Wideband Recorder Hardware with Tuner and Two Data Disk Modules

12 Secure the modules by tightening the captive screws that hold each module into the mainframe. This must be done to insure that performance specifications are met.

The hardware installation is now complete. To install the software, go to "Installing the Wideband Recorder on HP-UX" on page 20 or "Installing the Wideband Recorder on Windows" on page 34.

Installing Optional Hardware

E3249B VXI System Disk

The E3249B module should be installed next to the right of the controller module and the SCSI cable connected between the two. This module has no VXI address settings. The DAT and disk each have a SCSI address that should be set to 3 for the DAT and 6 for the disk as shown. Also, a SCSI terminator (C2904A) should be connected to either SCSI connector.

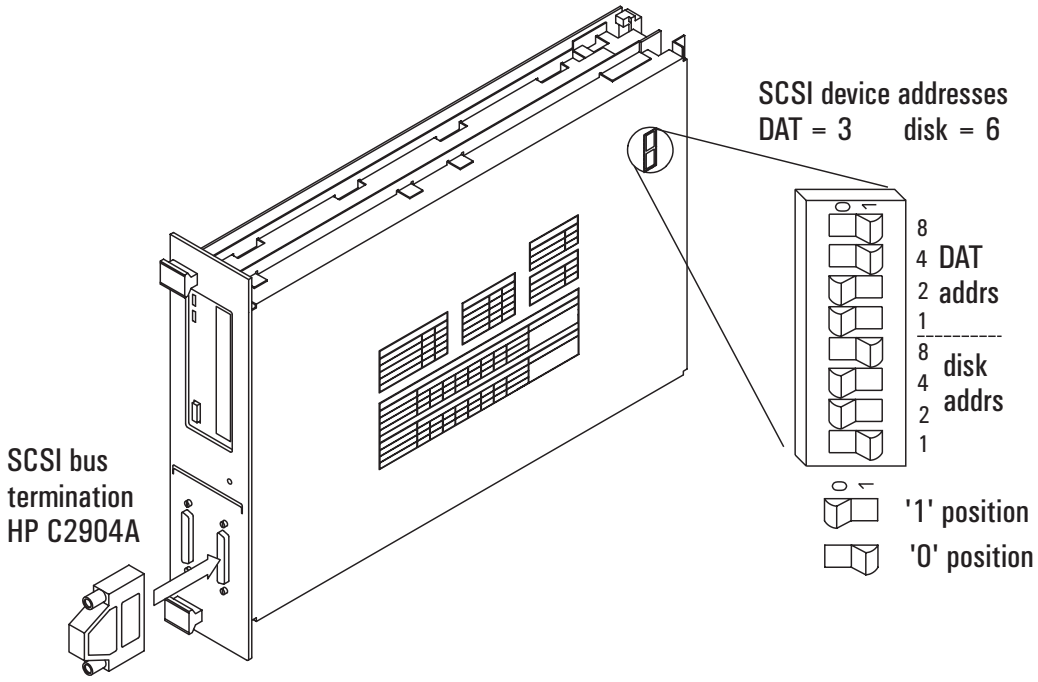
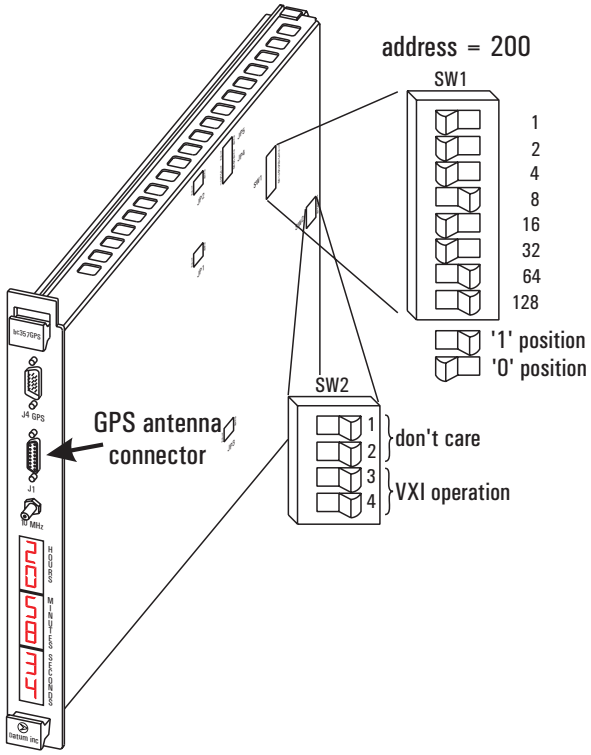


Figure 8 E3249B SCSI Device Address Settings

bc350/357VXI-C Time and Frequency Processor (IRIG)

This VXI module provides accurate time stamp information. The model bc357VXI also has a GPS satellite receiver for a source. This module may be installed in any chassis slot. Set the address to 200.



Jumpers	
JP1 time code	1-2: DC levelshift
	3-4: modulated
JP2 GPS mode	1-2: single-ended 1pps
	3-4: differential 1pps
JP3 GPS sensor	1-2: ACUTIME Smart Antenna or SV-6
	3-4: TANS
JP4 RS422 mode	3-4: 5-6: have an aux. RS422 output port
	3-4: RS422 ports are daisy-chained 5-6: such that IRIG signal is passed on
JP5 RS422 load	1-2: puts 100Ω load between diff input lines
	3-4: no load added

Figure 9 bc350/357VXI-C Time and Frequency Processor Settings

Watkins-Johnson WJ9119 or WJ9119-1 VXI HF Tuners

Configure the modules as shown in Figure 10. Install the LO module in the VXI mainframe to the right of the controller module and optional system disk if installed. Install the RF module to the right of the LO module.

- Set the logical address of the LO module to 140.
- Set the logical address of the RF module to 142.

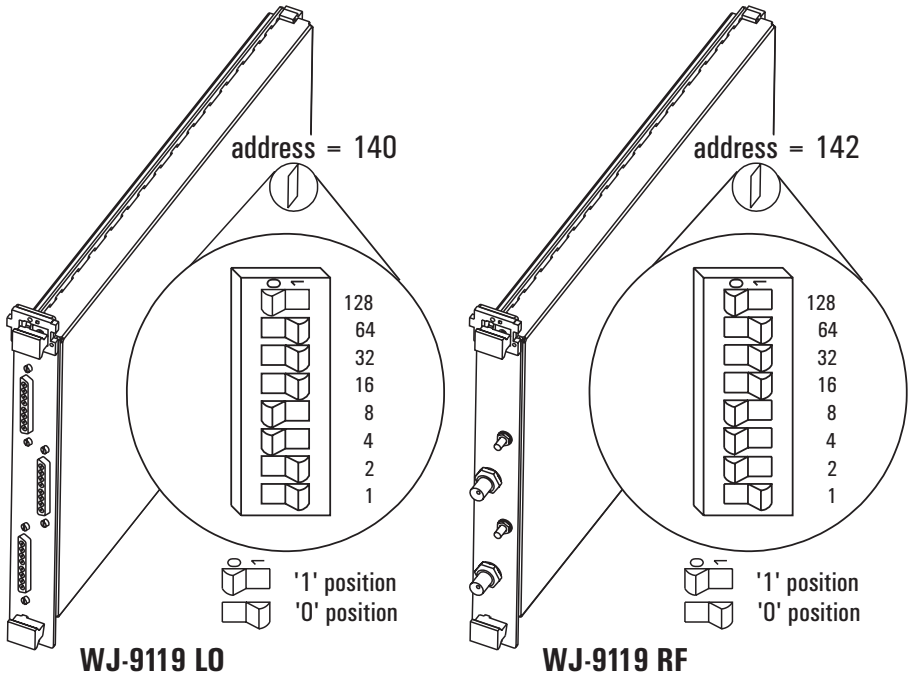


Figure 10 WJ9119 or WJ9119-1 VXI HF Tuner Address Settings

E2730A RF Tuner

Set the module's logical address as shown in Figure 11. Install it in the VXI mainframe to the right of the controller module and optional system disk if installed.

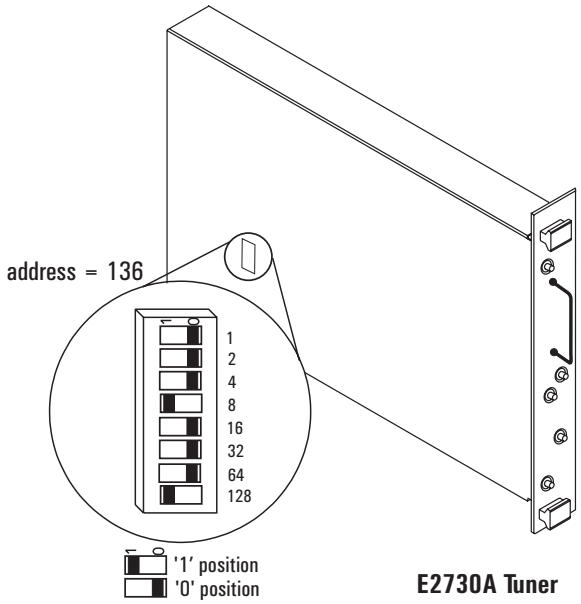


Figure 11 E2730A RF Tuner Address Settings

Communication Solutions CS-5040 Microwave Tuner

Set the module's logical address as shown in Figure 12. Install it in the VXI mainframe to the right of the controller module and optional system disk if installed.

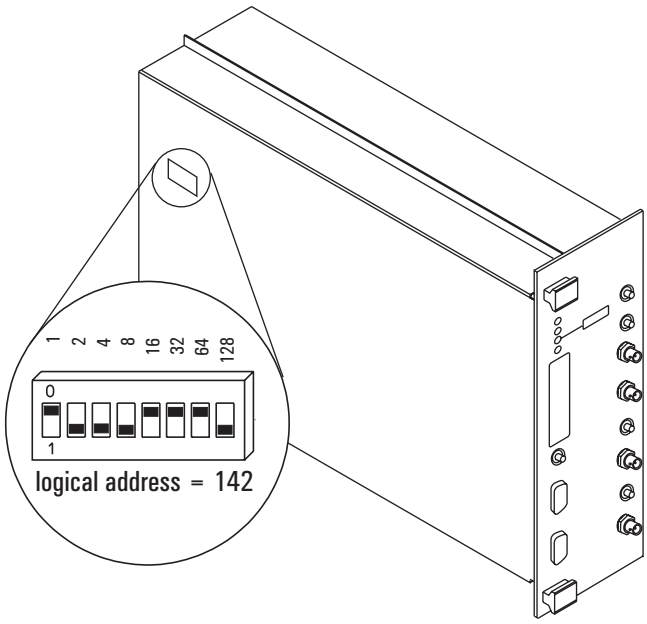


Figure 12 CS-5040 Microwave Tuner Address Settings

Installing the Wideband Recorder on HP-UX

NOTE As mentioned at the beginning of this chapter, none of the installation procedures given here need be performed on systems delivered direct from the factory. All software on a new system is installed and tested before it is shipped.

To install the Wideband Recorder on HP-UX, do the following:

1. Install the Wideband Recorder software.

   See "Installing the Wideband Recorder Software" on page 21.

2. Edit the Wideband Recorder's codeword, configuration, and resource file.

   See "Editing the Wbr File" on page 22.

3. If you will be using the E3238 system with the Wideband Recorder, configure the E3238 system.

   See "Configuring the E3238 System" on page 24.

4. Verify that you have the correct version of SICL installed.

   See "Verifying SICL Version" on page 25.

5. Enable the HP-UX file system to support large files.

   See "Enabling Large-File Support" on page 26.

6. Start the Wideband Recorder.

   At the terminal prompt type:

   ```
   /opt/wbr/wbr
   ```

Installing the Wideband Recorder Software

1. Login through CDE (Common Desktop Environment) as root.
2. Open a terminal window.
3. If you have not set up a user account for running the Wideband Recorder software, create an account using SAM (System Administration Manager). Recommended: create the user **vxi** and the group **users**.
4. Load install media (DAT or CD-ROM) into drive.
5. For your install media, enter the following commands at the command line prompt:

   For DAT drive:

   ```
   /usr/sbin/swinstall -x reinstall=true -s /dev/rmt/0mn "*"
   ```

   For CD-ROM drive (Note: the second line assumes the CD-ROM's SCSI address is 2):

   ```
   mkdir /SD_CDROM
   /etc/mount -o cdcase /dev/dsk/c0t2d0 /SD_CDROM
   /usr/sbin/swinstall -x reinstall=true -s /SD_CDROM/hp-ux/wbr.dep "*"
   /etc/umount /SD_CDROM
   ```

The following files are now installed in the `/opt/wbr` directory:

```
Readme.txt - readme file
d.Wbr - default codeword, configuration, and resources file
bin/updateE1437.exe - E1437 update
bin/updateE1438.exe - E1438 update
bin/updateE1439.exe - E1439 update
bin/wbr.exe - Wideband Recorder application
downloadables/spos - E1485 operating system
downloadables/wbrdld.dld - E1485 executable code
downloadables/e1437_fw.dat - E1437 firmware
downloadables/e1438_fw.dat - E1438 firmware
downloadables/e1439_fw.dat - E1439 firmware
e3238s/taskWBR.sl - E3238s user alarm task shared library
e3238s/taskWBR.dll - E3238s user alarm task dynamic linked library
manuals/Data_Recorder.pdf - pdf file of this book
```

Editing the Wbr File

The Wbr file contains the codeword, configuration, and resource information for the Wideband Recorder. To modify the Wideband Recorder's codeword, configuration, or resource information, copy the d.Wbr file from the `/opt/wbr` directory to your home directory. Open the Wbr file with a text editor and edit the file as appropriate.

Codeword

The Wideband Recorder is a licensed application that requires a license-specific codeword. The unique codeword must appear in the Wbr file in your home directory.

To install the codeword, open the Wbr file with a text editor then enter the license number and codeword from the Wideband Recorder's license certificate.

The codeword section of the Wbr file looks something like this:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Codeword
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
*licenseNumber:            LSD8773756900106
*codeword:                 BE7DB69441DF19FF
!
```

You may use space or tab characters between the colon and the codeword but be sure **no** white space characters exist after the codeword.

Configuration

The configuration sections of the Wbr file must match the installed Wideband Recorder hardware. If you are sharing the E3238 system's tuner, the configuration sections must also match the E3238's tuner. Open the Wbr file with a text editor and edit the hardware configuration sections, making sure they match the Wideband Recorder's hardware and E3238's tuner (if shared).

Resources

The X Windows system uses resource files, which allow you to control various application variables. To customize the resources, open the Wbr file with a text editor and modify.

When the Wideband Recorder is started, the window manager searches a number of places for resource files (as listed below). It loads the variable definitions of each file, changing the values when a variable is redefined by the next resource file found. With this method, the last file read has the highest precedence.

The resource file search order is as follows:

1. Resources specified in the `/usr/lib/X11/app-defaults/Wbr` file.
2. The `Wbr` file in the directory named by the environment variable `XAPPLRESDIR`, or if the variable is not set, in your home directory.
3. Resources loaded into the RESOURCE_MANAGER property of the root window with `xrdb`; these resources are accessible regardless of the machine on which the client is running.

   If no resources are loaded in this way, the resource manager looks for a `.Xdefaults` file in your home directory; these resources are only available on the local machine.
4. Next, the contents of any file specified by the shell environment variable `XENVIRONMENT` is loaded.

   If this variable is not defined, the resource manager looks for a file named `.Xdefaults-hostname` in your home directory, where *`hostname`* is the name of the host where the client is running. These methods are used to set machine-specific resources.
5. Any values specified on the command line with the `-xrm` option are loaded for that instance of the program and override any previously-defined variable settings.

Configuring the E3238 System

If you plan to use an E3238 system to automatically generate recording requests, you must do the following:

If your E3238 system is on HP-UX

1. Copy taskWBR.sl from the Wideband Recorder's `/opt/wbr/e3238s` directory to the E3238 system's library directory (`/opt/e3238s/lib`).
2. Edit the E3238 system's e3238s.cfg configuration file and add the path and filename for taskWBR.sl to the userAlarmTask entry. For example,

   ```
   userAlarmTask: /opt/e3238s/lib/taskWBR.sl
   ```

   If more than one user alarm task libraries are to be loaded, separate each by a comma.
3. Edit the E3238 system's services file (`/etc/services`) and add the following entry:

   ```
   wbr      7015/tcp
   ```

   This entry must be in the services file for both the E3238 system and the Wideband Recorder system. The entry is usually added to the Wideband Recorder's services file when the Wideband Recorder software is installed. Verify that the entry exists in the Wideband Recorder's services file.

If your E3238 system is on Windows

1. Copy taskWBR.dll from the Wideband Recorder's `/opt/wbr/e3238s` directory to the E3238 system's library directory (`C:\E3238s\lib`).
2. Edit the E3238 system's e3238s.cfg configuration file and add the path and filename for taskWBR.dll to the userAlarmTask entry. For example,

   ```
   userAlarmTask: C:\E3238s\lib\taskWBR.dll
   ```

   If more than one user alarm task libraries are to be loaded, separate each by a comma.
3. Edit the E3238 system's services file (`C:\WINNT\system32\drivers\etc\services`) and add the following entry:

   ```
   wbr      7015/tcp
   ```

   This entry must be in the services file for both the E3238 system and the Wideband Recorder system. The entry is usually added to the Wideband Recorder's services file when the Wideband Recorder software is installed. Verify that the entry exists in the Wideband Recorder's services file.

Verifying SICL Version

This software was tested and verified running SICL version C.03.06a. Any later versions should be compatible. To find the version of SICL, execute the following:

```
what /opt/sicl/lib/libsicl.sl
```

You should get a response something like this:

```
SICL:  isicl, Version E.01.01
```

Two SICL commands are extremely useful:

- **iclear** resets the VXI hardware
- **ivxisc** queries the resource manager and prints the system configuration to the screen

To reset the VXI hardware, use:

```
/opt/sicl/bin/iclear vxi
```

When an iclear is done, messages are written to the console. A window in the default .x11start file has the console remapped to it via the -C option. The file `/usr/lib/X11/Xconsoles` may need to be created. This file controls which displays on the local system are allowed to redirect input and output from the system console, `/dev/console`. Refer to the hpterm(1) manual page for more information. A "*" in this file allows all local displays to redirect console information.

To display the VXI system configuration, use:

```
/opt/sicl/bin/ivxisc
```

Enabling Large-File Support

The Wideband Recorder requires a /snapshot directory that has been enabled to support files larger than 2 GB. This directory can exist on a logical volume or on a separate dedicated disk drive. The full documentation on large files is located in a white paper at `/usr/share/doc/lg_files.txt` or `/usr/share/doc/lg_files.ps`.

You may use SAM to manage the file system or follow the examples below. If at all possible, the snapshot files should be stored to an `hfs` file system rather than a `vxfs` file system since writing to an `hfs` system is almost twice as fast.

To Add a Disk for Snapshots

The following steps describe how to add a disk drive to store large (>2 GB) snapshots files that will be located at the /snapshot directory.

The SCSI address is 6 for the new disk drive in this example.

1 Make sure that device files exist for the drive.

```
brw-r-----   1 bin  sys   31 0x006000 Mar 15 12:14 /dev/dsk/c0t6d0
crw-r-----   1 bin  sys  188 0x006000 Mar  8 14:50 /dev/rdsk/c0t6d0
```

(If they don't exist, create them.)

2 Create an hfs file system that supports large files on the drive.

```
/usr/sbin/mkfs -F hfs -o largefiles /dev/dsk/c0t6d0
```

3 Make a mount point for the new logical volume.

```
mkdir /snapshot
chmod 777 /snapshot
```

4 Mount the new file system.

```
mount /dev/dsk/c0t6d0 /snapshot
```

5 Automatically mount the new file system at boot time.

```
vi /etc/fstab
```

6 Add the following line:

```
/dev/dsk/c0t6d0 /snapshot hfs defaults 0 2
```

To Create a Logical Volume on the Disk

Example: We want to create a logical volume to store large (>2 GB) snapshots that will be located in the `/snapshot` directory

1 Find out how much free space is available.

```
vgdisplay /dev/vg00
```

Its output:

```
--- Volume groups ---
VG Name                     /dev/vg00
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      9
Open LV                     9
Max PV                      16
Cur PV                      1
Act PV                      1
Max PE per PV               2500
VGDA                        2
PE Size (Mbytes)            4
Total PE                    2169
Alloc PE                    2036
Free PE                     133
Total PVG                   0
```

2 Create a logical volume.

```
lvcreate -L 4000 /dev/vg00
```

3 Create a file system .

```
newfs -F hfs -o largefiles /dev/vg00/rlvol10
```

-or-

```
newfs -F vxfs -o largefiles /dev/vg00/rlvol10
```

4 Make a mount point for the new logical volume.

```
mkdir /snapshot
chmod 777 /snapshot
```

5 Mount the new file system.

```
mount /dev/vg00/lvol10 /snapshot
```

6 Automatically mount the new file system at boot time.

```
vi /etc/fstab
```

7 Add the following line:

```
/dev/vg00/lvol10 /snapshot hfs defaults 0 2
```

To Remove a Logical Volume on the Disk

1 Unmount and remove the drive from the LVM group:

```
umount /dev/vg00/lvol10
lvremove /dev/vg00/lvol10
```

2 Edit `/etc/fstab`; delete the following line.

```
/dev/vg00/lvol10 /snapshot hfs defaults 0 2
```

3 Remove the snapshot directory.

```
rmdir /snapshot
```

To Allow Large Files (>2GBytes)

Example: To allow large files in the logical volume that contains the /snapshot directory.

Note: This works only on an hfs (non-journaled) file system.

1 Find the volume:

```
bdf
```

Its output:

```
Filesystem          kbytes    used   avail %used Mounted on
/dev/vg00/lvol3      86016   18461   63352   23% /
/dev/vg00/lvol1      47829   22799   20247   53% /stand
/dev/vg00/lvol8     163840  132483   29460   82% /var
/dev/vg00/lvol7     409600  340148   65172   84% /usr
/dev/vg00/lvol6     253952  192989   57500   77% /tmp
/dev/vg00/lvol4    4059369       9 3653423    0% /snapshot
/dev/vg00/lvol5     770048  536959  218599   71% /opt
/dev/vg00/lvol9    2048000 1238502  758966   62% /home
```

2 Find out who is using the logical volume if mounted.

```
fuser /snapshot
```

Its output:

```
/snapshot:     1313c    1395c    1398c
```

-or-

```
/snapshot:
```

No processes may be accessing the directory of interest; terminate any that are.

3 Unmount the logical volume.

```
umount /dev/vg00/lvol4
```

4 Allow large files.

```
fsadm -F hfs -o largefiles /dev/vg00/lvol4
```

5 Mount the logical volume.

```
mount /dev/vg00/lvol4 /snapshot
```

To Increase a Logical Volume Size

Example: To increase the size of the logical volume that contains the /snapshot directory.

1 Find the volume:

```
bdf
```

Its output:

```
Filesystem          kbytes    used   avail %used Mounted on
/dev/vg00/lvol3      86016   18461   63352   23% /
/dev/vg00/lvol1      47829   22799   20247   53% /stand
/dev/vg00/lvol8     163840  132483   29460   82% /var
/dev/vg00/lvol7     409600  340148   65172   84% /usr
/dev/vg00/lvol6     253952  192989   57500   77% /tmp
/dev/vg00/lvol4    4059369       9 3653423    0% /snapshot
/dev/vg00/lvol5     770048  536959  218599   71% /opt
/dev/vg00/lvol9    2048000 1238502  758966   62% /home
```

2 Find out how much free space is available:

```
vgdisplay /dev/vg00
```

Its output:

```
--- Volume groups ---
VG Name                     /dev/vg00
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      9
Open LV                     9
Max PV                      16
Cur PV                      1
Act PV                      1
Max PE per PV               2500
VGDA                        2
PE Size (Mbytes)            4
Total PE                    2169
Alloc PE                    2036
Free PE                     133
Total PVG                   0
```

3 Find out who is using the logical volume if mounted:

```
fuser /snapshot
```

Its output:

```
/snapshot:     1313c    1395c    1398c
```

-or-

```
/snapshot:
```

No processes may be accessing the directory of interest.

4 Unmount the logical volume.

```
umount /dev/vg00/lvol4
```

5 Increase the size of the logical volume.

```
lvextend -L larger_size /dev/vg00/lvol4
```

6 Extend the file system.

```
extendfs /dev/vg00/rlvol4
```

7 Mount the logical volume.

```
mount /dev/vg00/lvol4 /snapshot
```

Backup and Recovery Procedures

Create a Bootable Recovery Tape

When you have completely configured the system and verified operation, you should create this tape. This provides a system recovery option that boots from the tape and returns the system disk to a state known to function:

1 Login through CDE as root.

2 Put a DAT tape in the drive and wait for the Access LED to go dark.

3 Run

```
/opt/ignite/bin/make_recovery -A -C -d /dev/rmt/0mn
```

-A Specifies that the entire root disk/volume group is to be included (all).

-C Causes the system to create a system status file reflecting the current state of the system. This supports using check_recovery to determine whether the system has changed such that an up-to-date recovery tape should be made.

-d Specifies the device file of a DDS tape drive where the system recovery tape is to be created. A no-rewind device is required. The default is /dev/rmt/0mn (the n indicates no-rewind).

If ignite is not installed on the system, you can download it from the web. To read about and download this software, go to:

`http://www.software.hp.com/products/IUX/download.html`

Recovery Procedure

This procedure returns your system to the state recorded in the previous step.

CAUTION This procedure erases all information on the system disk and replaces it with the image recorded in the previous step. You may wish to backup data or configuration changes made since the tape was created.

1 Place the recovery tape in the drive.

2 Halt the system (/etc/reboot -qh) and cycle the power.

3 Press the Esc key to abort the boot process.

4 Select the DAT drive as the boot source.

5 A warning is displayed to inform you that the disk is about to be erased and asking to confirm before continuing. Answer yes.

This process takes 1 or 2 hours to rebuild the disk. The system will reboot and bring up a CDE login.

Backup Data Files To Tape

1 Connect a DAT (Digital Audio Tape) drive to the workstation's SCSI bus.

2 Insert a DAT tape into the drive.

3 As root, use SAM (System Administration Manager) to backup files of interest to the DAT tape. You can invoke SAM from the command line via:

```
su
sam
```

Restore Data Files From Tape

1 Insert the DAT tape used in the backup into the DAT drive.

2 As superuser, use SAM (System Administration Manager) to restore files of interest from the DAT tape. You can invoke SAM from the command line via:

```
su
sam
```

NOTE If your system has never had a SCSI DAT drive configured, you should use SAM to add the tape driver to the HP-UX kernel. You can also use SAM to create and configure the appropriate device files for the drive.

If you are unfamiliar with SAM, refer to the online man (manual) page or the HP-UX system administration manual for more detail.

Installing HP-UX Operating System

To completely rebuild your system from scratch follow this procedure. You will be installing HP-UX 10.2, I/O Libraries and C-ANSI C. After completing this procedure, return to: "Installing the Wideband Recorder Software" on page 21.

1 Close the Wideband Recorder application.

2 At an operating system command prompt, type:

```
su <Enter>
/etc/reboot -hq <Enter>
```

and wait for the message that says it is OK to cycle power. Then turn the power off on the VXI mainframe.

3 Connect a CD-ROM drive to the workstation's SCSI bus.

4 Put the HP-UX INSTALL and CORE OS CD-ROM into the CD-ROM drive.

5 Turn the VXI mainframe power on. As the boot process begins, this message appears on the display:

```
System Search Started
Press [Esc] to discontinue the Auto Boot process.
```

Press [Esc] key on the keyboard in response to the prompt. You should be prompted with the “MAIN MENU” and a list of choices. Select the following choice from the “MAIN MENU”:

```
Select 1 - Boot From a Device
```

After selecting this choice, you should see the following message:

```
Scanning for boot devices.  Please wait...
```

You should then be prompted with the “BOOT FROM DEVICE” menu that lists the available boot devices. Select the entry that specifies the CD-ROM drive in which the HP-UX install media is inserted. For example the entry should appear something like:

```
Key  Boot Device
1    SCSI.2.0 TOSHIBA CD-ROM XM-5401TA
```

The workstation should now begin to boot from the CD-ROM drive.

6 If your workstation has a DIN keyboard, you will first be prompted to confirm the localization language for your keyboard. As of this writing, the choice for US English was:

```
45) PS2_DIN_US_English
```

Enter the number at the prompt and press <Enter>. You may be asked to re-confirm the choice.

You should then be greeted with a “Welcome to the HP-UX installation process!” message. This menu driven utility leads you through the installation of the HP-UX operating system. Scroll to the [Install HP-UX] option and press <Enter>.

Respond to the prompts as appropriate for your desired system configuration. Refer to the HP-UX installation documentation or system administration manuals for details on system configuration options.

As of this writing (with HP-UX 10.20), these values yield an acceptable default system configuration:

Would you like to enable networking?	[n]
Whole-System Configuration	[Standard LVM Configuration]
Primary Swap Size	[400 MB] ~*10% of your system disk size.*
Secondary Swap Size	[None]
Software Selection	[CDE Runtime Environment]
Software Language	[English]
Locale Setting	[default (C)]
File system file name length	[Long]
/home Configuration	[Minimal]
Make volatile dirs separate	[True]
Create /export volume	[False]

When prompted for the Disk Parameters/FS Parameters entry, select the disk that will serve as the system disk. Note that all information on this disk will be erased. Modify the <FSParameters> to allocate more space to the /homevolume. At least 200 MB* is recommended. Note that this can be

changed after the system is booted via the Logical Volume Manager (LVM) within SAM. Refer to the HP-UX System Administration manuals for details.

When prompted whether to interact with SD-UX, reply **no**.

Do you want to interact with SD-UX swinstall? [No]

The installation process will now build the HP-UX file system on the target disk drive and install the appropriate file sets off of CD-ROM. This process may take 40 to 50 minutes. When loading is finished, the system will reboot and ask more configuration questions. See next step.

7 Respond to the "Welcome to HP-UX!" prompts as appropriate for your desired system configuration. Refer to the HP-UX installation documentation or system administration manuals for further details on system configuration options.

As of this writing (with HP-UX 10.20), the following responses result in a desirable default system configuration:

- Link system to a network? [no]
- System name [Enter desired name, recommend max length = 8 chars]
- Timezone? [As appropriate]
- Timezone area? [As appropriate]
- Time correct? [As appropriate]
- Root password? [respond "yes" to set root password, remember for later]
- Font server? [no]

If you need to need to change these settings in the future, run "`/sbin/set_parms`" as root. Once you have completed the dialog above, the workstation will reboot and you should be greeted with a CDE (Common Desktop Environment) login prompt.

Congratulations, you are finished installing the HP-UX operating system.

* This value assumes a system disk capacity of 4 GB. Select a value commensurate with your system disk size.

Installing the Wideband Recorder on Windows

NOTE As mentioned at the beginning of this chapter, none of the installation procedures given here need be performed on systems delivered direct from the factory. All software on a new system is installed and tested before it is shipped.

Installation procedures assume you have a CD drive attached to the controller. If you do not have an internal CD-ROM drive, you may add an external SCSI CD drive or access a drive on another machine through a network share.

To install the Wideband Recorder on Windows, do the following:

1. Install the VXI/VISA driver (provided with the VXI interface or embedded controller).

   See "Installing the VXI/VISA Software" on page 35.

2. Install the Hummingbird Exceed software (provided with the Wideband Recorder).

   See "Installing Hummingbird Exceed Software" on page 35.

3. Configure the X Windows Server.

   See "Configuring the X Windows Server" on page 38.

4. Configure the Windows display properties.

   See "Configuring the Display Properties" on page 40.

5. Install the Wideband Recorder software.

   See "Installing the Wideband Recorder Software" on page 40.

6. Edit the Wideband Recorder's codeword, resources, and configuration file.

   See "Editing the Wbr File" on page 41.

7. If you will be using the E3238 system with the Wideband Recorder, configure the E3238 system.

   See "Configuring the E3238 System" on page 42.

8. Start the Wideband Recorder.

   Click Start, Programs, Agilent Wideband Recorder, Wideband Recorder.

Installing the VXI/VISA Software

VISA (Virtual Instrument Software Architecture) is an industry-standard I/O library used to develop programs that control VXI modules. Bundled systems delivered direct from Agilent Technologies should have the VXI/VISA software pre-installed. If not, install the VISA software that is provided with the embedded controller module. Perform the "typical" installation as defined in the installation instructions.

NOTE Version 2.01 of the NI-VISA VXIplug&play driver is required to run the Wideband Recorder application. To verify the version of your VISA driver, see the file `Readme.txt` in the `C:\VXIPNP\WinNT\NIvisa` directory.

Installing Hummingbird Exceed Software

The Wideband Recorder requires an X Windows server on the Windows controller. The Exceed X Windows server from Hummingbird Communications is provided on a separate CD with the Wideband Recorder.

Install the software as follows:

1. Insert the CD in the controller's drive and proceed through the install process to the point requiring selection of the Setup Type. Choose Custom.
2. Proceed to the point where the list of Installed Components is specified.
   a. Click on Deselect All.
   b. Scroll down the list of components and add the X Development Tools entry to the list by clicking it.
   c. Click Next.
3. In the font selection dialog box, select the 100 dpi font.
4. Proceed to the step concerning Site Information.

   The Hummingbird software provided with the Wideband Recorder comes with a license for installation on one workstation.

   a. Enter the serial number from the Hummingbird CD package in the top field.
   b. The site/volume license number in the second field is not required. Leave it blank.
   c. Enter any contact name in the bottom field.
5. Proceed through the installation process to Password selection. Setting a password in not recommended.
6. Proceed to the point where Performance is optimized, then click Next.

   The optimization process takes several minutes during which various graphics appear on the display. *Do not move the mouse or press any keys on the keyboard while the program runs.*

Optimizing GUI performance after installation

If the Exceed software was installed without following the installation procedure on the previous page, do the following to optimize GUI performance:

1 Click Start, Programs, Exceed, Xconfig to open the Exceed configuration group.

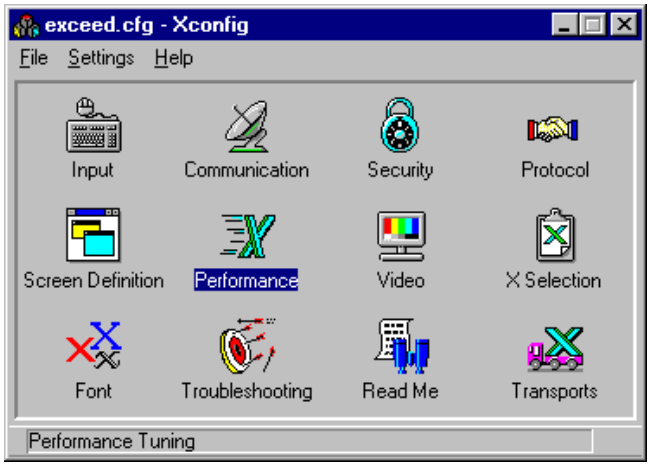


Figure 13 Exceed Configuration Group

2 Double-click the Performance icon to display the Performance dialog box.

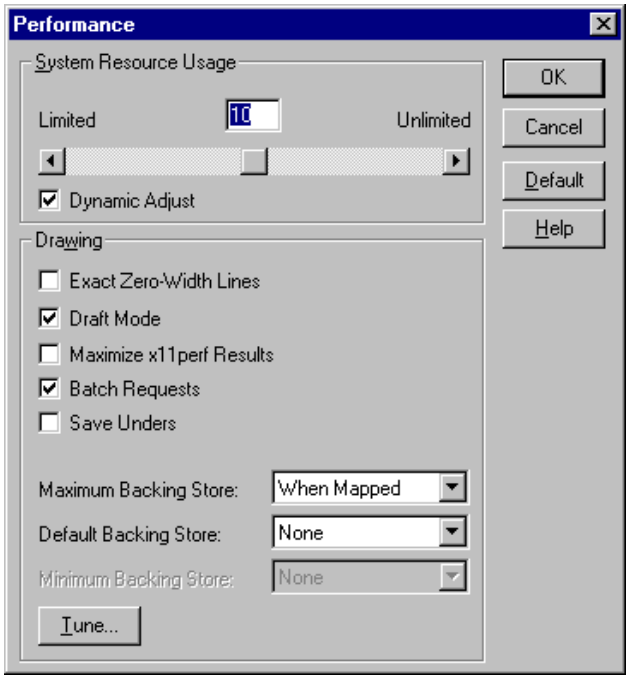


Figure 14 Performance dialog box

3 Click the Tune... button to display the Xperf dialog box.

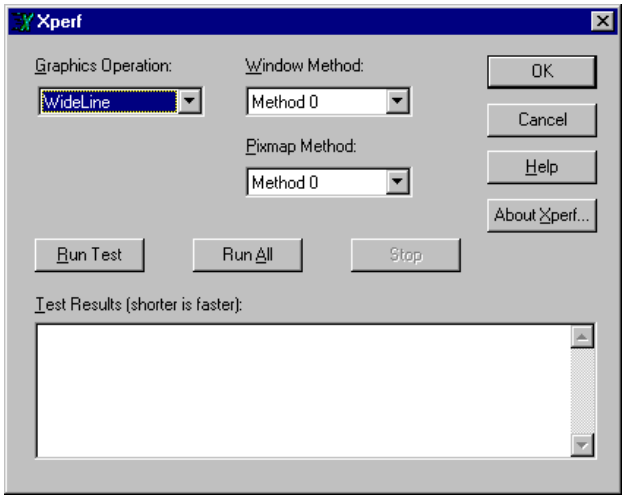


Figure 15 Xperf dialog box

4 Click the Run Test button.

The optimization process takes several minutes during which various graphics appear on the display. *Do not move the mouse or press any keys on the keyboard while the program runs.*

5 When the test finishes the results are displayed. Click OK to close the Xperf results dialog box. Click OK to close the Performance dialog box.

Configuring the X Windows Server

1 Click Start, Programs, Exceed, Xconfig to open the Exceed configuration group.

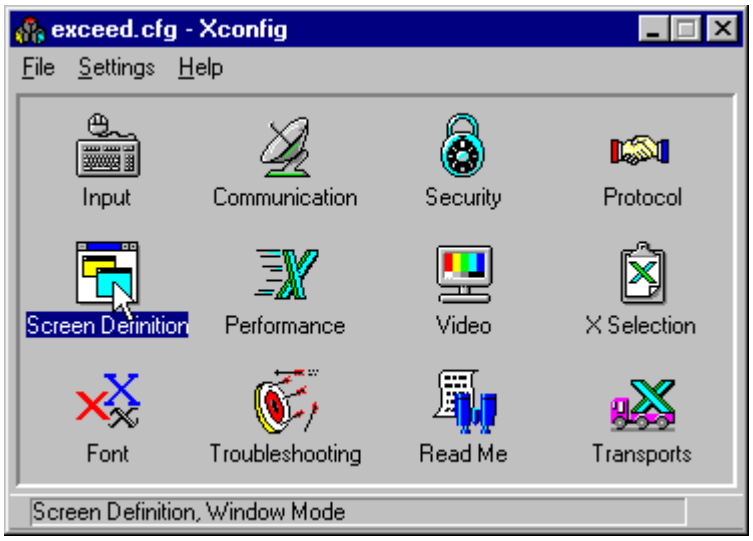


Figure 16 Exceed Configuration Group

2 Double-click the Screen Definition icon, to display the Screen Definitions dialog box.

3 Select the Common Settings tab.

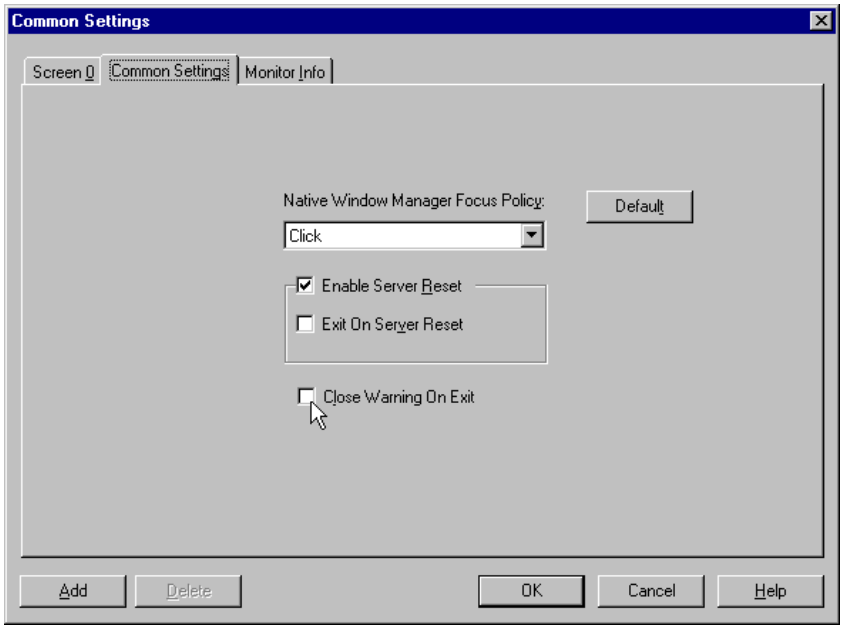


Figure 17 Xconfig Screen Definitions, Common Settings tab

4 Deselect Close Warning On Exit. This disables a warning message that appears when you close Exceed.

5 Select the Screen 0 tab.

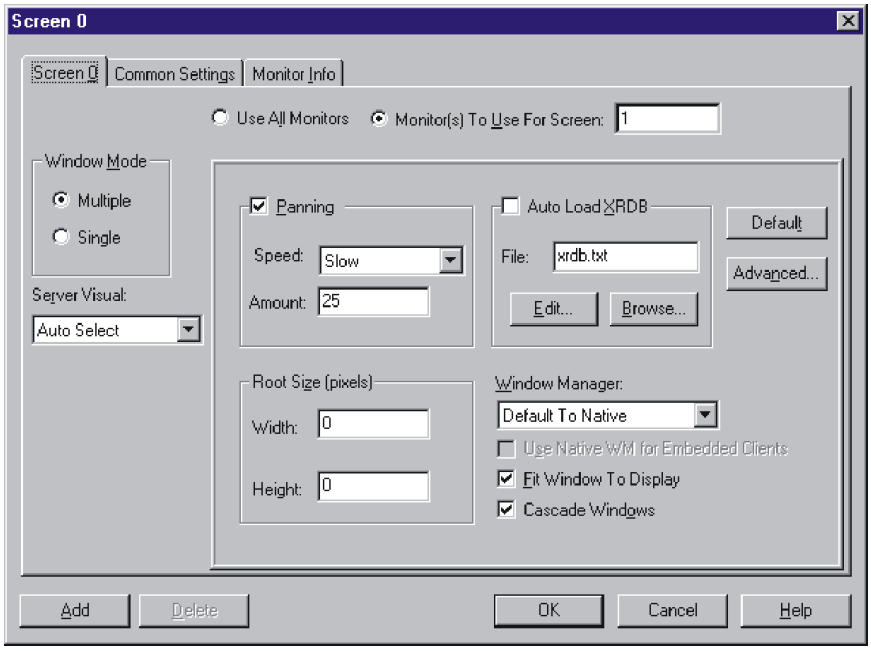


Figure 18 Xconfig Screen Definitions, Screen 0 tab

6 In the Server Visual drop down list, select either Auto Select or Pseudo Color. This helps the X server make color selections.

7 Under the Window Manager, make sure Fit Window to Display is selected. This ensures that the application window does not exceed the size of the display.

8 Click OK to save the settings and close the dialog box.

Refer to the Exceed User's Guide for more information about installing, configuring, and administering the Exceed software.

Configuring the Display Properties

When the display is configured to show window contents while dragging, dragging one X Windows dialog box across another erases parts of the bottom box. This results in a smearing effect that lasts until the mouse button is released.

To avoid temporarily erasing the under-laying dialog box:

1. Right-click anywhere in the desktop background, then select Properties to display the Display Properties dialog box.
2. Click the Plus! tab.
3. Deselect the Show window contents while dragging option.

Installing the Wideband Recorder Software

1. Place the Wideband Recorder CD-ROM in your CD-ROM drive. If auto-run is enabled for your CD-ROM drive, Windows automatically starts the installation program when the CD is loaded. If the installation program does not auto-start, run **`setup.exe`** in the WinNT subdirectory on the CD.
2. Proceed through the installation process as directed.

During installation, the following files are installed in either the default directory, `c:\wbr`, or the directory you selected during installation:

```
Readme.txt - readme file
Wbr - codeword, configuration, and resources file
d.Wbr - default codeword, configuration, and resources file
bin\updateE1437.exe - E1437 update
bin\updateE1438.exe - E1438 update
bin\updateE1439.exe - E1439 update
bin\wbr.exe - Wideband Recorder application
downloadables\spos - E1485 operating system
downloadables\wbrdld.dld - E1485 executable code
downloadables\e1437_fw.dat - E1437 firmware
downloadables\e1438_fw.dat - E1438 firmware
downloadables\e1439_fw.dat - E1439 firmware
e3238s\taskWBR.sl - E3238s user alarm task shared library
e3238s\taskWBR.dll - E3238s user alarm task dynamic linked library
manuals\Data_Recorder.pdf - pdf file of this book
```

Editing the Wbr File

The Wbr file contains the codeword, configuration, and resource information for the Wideband Recorder. To modify the Wideband Recorder's codeword, configuration, or resources, open the Wbr file with a text editor and edit the file as appropriate. A default copy of the Wbr file (`d.Wbr`) is also provided as a backup.

Codeword

The Wideband Recorder is a licensed application that requires a license-specific codeword. The unique codeword must appear in the Wbr file in the Wideband Recorder's root directory (e.g., `C:\wbr`).

To install the codeword, open the Wbr file with a text editor then enter the license number and codeword from the Wideband Recorder's license certificate.

The codeword section of the Wbr file looks something like this:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Codeword
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!
*licenseNumber:            LSD8773756900106
*codeword:                 BE7DB69441DF19FF
!
```

You may use space or tab characters between the colon and the codeword but be sure **no** white space characters exist after the codeword.

Configuration

The configuration sections of the Wbr file must match the installed Wideband Recorder hardware. If you are sharing the E3238 system's tuner, the configuration sections must also match the E3238's tuner. Open the Wbr file with a text editor and edit the hardware configuration sections, making sure they match the Wideband Recorder's hardware and E3238's tuner (if shared).

Configuring the E3238 System

If you plan to use the E3238 system to automatically generate recording requests, you must do the following:

If your E3238 system is on HP-UX

1. Copy taskWBR.sl from the Wideband Recorder's `wbr\e3238s` directory to the E3238 system's library directory (`/opt/e3238s/lib`).
2. Edit the E3238 system's e3238s.cfg configuration file and add the path and filename for taskWBR.sl to the userAlarmTask entry. For example,

   ```
   userAlarmTask: /opt/e3238s/lib/taskWBR.sl
   ```

   If more than one user alarm task libraries are to be loaded, separate each by a comma.
3. Edit the E3238 system's services file (`/etc/services`) and add the following entry:

   ```
   wbr      7015/tcp
   ```

   This entry must be in the services file for both the E3238 system and the Wideband Recorder system. The entry is usually added to the Wideband Recorder's services file when the Wideband Recorder software is installed. Verify that the entry exists in the Wideband Recorder's services file.

If your E3238 system is on Windows

1. Copy taskWBR.dll from the Wideband Recorder's `wbr\e3238s` directory to the E3238 system's library directory (`C:\E3238s\lib`).
2. Edit the E3238 system's e3238s.cfg configuration file and add the path and filename for taskWBR.dll to the userAlarmTask entry. For example,

   ```
   userAlarmTask: C:\E3238s\lib\taskWBR.dll
   ```

   If more than one user alarm task libraries are to be loaded, separate each by a comma.
3. Edit the E3238 system's services file (`C:\WINNT\system32\drivers\etc\services`) and add the following entry:

   ```
   wbr      7015/tcp
   ```

   This entry must be in the services file for both the E3238 system and the Wideband Recorder system. The entry is usually added to the Wideband Recorder's services file when the Wideband Recorder software is installed. Verify that the entry exists in the Wideband Recorder's services file.

Configuring the VXI/VISA Interface

NOTE When the Wideband Recorder software is installed, it configures the VXI/VISA interface. Therefore, you do not need to follow this procedure if you installed the VXI/VISA software before the Wideband Recorder software. Conversely, if you installed the VXI/VISA software after the Wideband Recorder, you will need to follow this procedure.

Registry Changes

Disable DMA transfers. This circumvents a known problem with the National Instruments interface.

To disable DMA transfers, run the Windows registry editor "regedit" (Start, Run, regedit), and set the "DisableMiteDMA" value to 1 in the following registry key:

```
- HKEY_LOCAL_MACHINE
  - SOFTWARE
    - National Instruments
      - NI-VXI for WIN32
```

For additional information, see the "Readme.txt" file that was provided with the National Instruments software or see the National Instruments web-site (www.ni.com).

Recovery Procedure

E9850A or E9851A

To reinstall the operating system, peripheral drivers, and I/O software on the controller's hard drive, see the E985x VXI Embedded Pentium Controller Information readme file (E985x.htm) located on the E9850A CD or the Agilent I/O Libraries CD.

2 Using the Wideband Recorder

The Agilent Technologies Wideband Recorder (WBR) uses high-speed disk drives to record gap-free time data into a circular buffer. Once the circular buffer is full, the newest data overrides the oldest data so the most recent data is always available. Using an Agilent E1438A and two Agilent N2216A's with two 73 GB disk drives (292 GB total disk capacity), you can record over three hours of data at a 5 MHz bandwidth.

NOTE The maximum recording bandwidth is 4 MHz for an E1437A, 5 MHz for an E1438A/B, and 4.64 MHz for an E1439A/B.

The Wideband Recorder's user interface lets you view a spectrogram of the wideband data stored in the circular buffer and select just the narrowband signals you want. The selected signals are then filtered, rezoomed, and recorded to the host computer's hard drive, all without interrupting the recording of new wideband data.

The Wideband Recorder's socket command interface lets the Agilent E3238 system request recordings. You can use the E3238S Command Line pane to generate a recording request or you can use the E3238 system's alarm tasks to automatically generate recording requests. Each recording request is sent to the Wideband Recorder via LAN.

CAUTION Starting or configuring the Wideband Recorder clears all data in the circular buffer and terminates all pending recording requests.

Wideband Recorder as a Stand-alone System

The Wideband Recorder can operate as a stand-alone system. The system can be HF, VHF/UHF, or microwave depending on the selected tuner and ADC. The wideband signals are stored in the circular buffer. From this stored wideband data, you can select narrowband signals for filtering, rezooming, and recording to the host computer's hard drive.

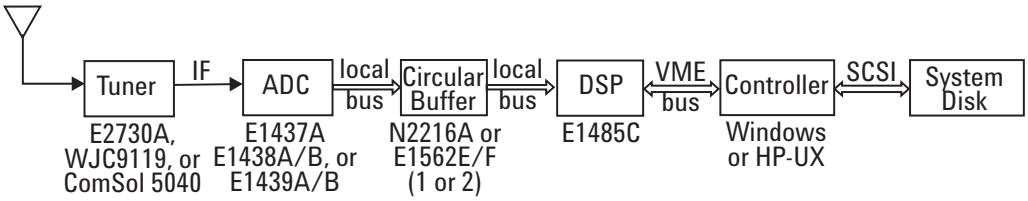


Figure 19 Wideband Recorder Block Diagram

The tuner is optional and its input is connected to a signal source such as an antenna feed. The tuner translates (downconverts) a finite portion of the electromagnetic spectrum to a lower intermediate frequency (IF). This IF signal represents the same information that is in the RF input signal and is compatible with the digital signal processing techniques used later in the signal flow.

The analog-to-digital converter (ADC) converts the analog IF signal from a tuner or antenna to a digital representation of the signal. The ADC determines the maximum recording bandwidth and is 4 MHz for an E1437A, 5 MHz for an E1438A/B, and 4.64 MHz for an E1439A/B.

The N2216A or E1562E/F Data Disk acts as a circular buffer storing the wideband data from the ADC. The system can contain one or two data disks, each with one or two disk drives for a maximum of 4 disk drives. Therefore, the record size using two 73 GB N2216A option 2 data disks is 292 GB.

The digital signal processor (DSP) provides ADC signal conditioning (windowing, conversion, scaling...) and time-to-frequency domain translation via FFT (Fast Fourier Transform).

The controller orchestrates the activity of the Wideband Recorder and processes the data. It is responsible for the high level control of all elements in the system. It interfaces and communicates with the peripherals. It stores data to and retrieves data from the system disk. It can also be connected to a network to provide expanded communication and remote control.

The host computer's hard drive acts as the system disk and it provides permanent storage for the narrowband data.

Wideband Recorder with E3238S

The Wideband Recorder can receive narrowband recording requests from as many as four E3238 systems. However, only one E3238 system can be configured as the Wideband Recorder's shared tuner, which sets the Wideband Recorder's available frequency band. If one of the other E3238 systems requests a recording that is outside the selected frequency band, the Wideband Recorder ignores the request.

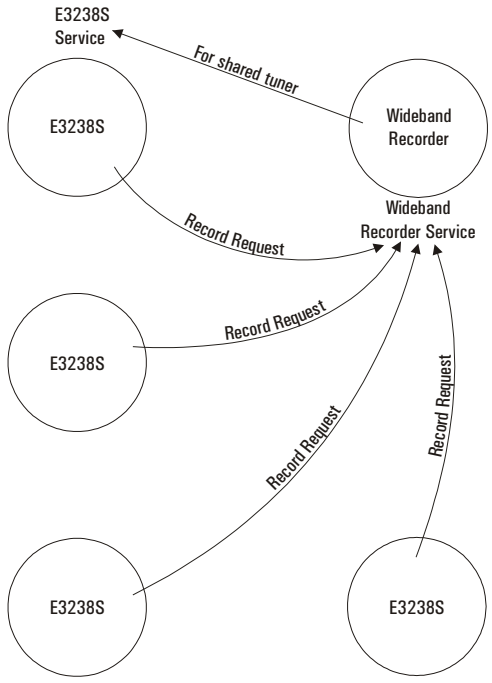


Figure 20 Using multiple E3238 systems with the Wideband Recorder

If an E3238 system is sharing its tuner with the Wideband Recorder, the E3238 system must be running and its tuner parked before the Wideband Recorder can be configured and started. If the E3238 system's frequency range is changed, the Wideband Recorder stops recording and preserves the data on the circular buffer until it is reconfigured and restarted.

After the E3238S and Wideband Recorder systems are configured, the Wideband Recorder can start recording wideband data to the circular buffer. In normal operation, the data recorder is started and continues to record data much like a tape recorder. If an E3238 system detects a signal of interest, it uses an alarm task to generate a narrowband recording request. The alarm task can be generated by any of the E3238 system's signal/energy alarm conditions. The recording request is sent to the Wideband Recorder via LAN. The request includes the narrowband record's priority, start time, duration, frequency, and bandwidth. The narrowband record is stored on the system disk in E3238 system snapshot format.

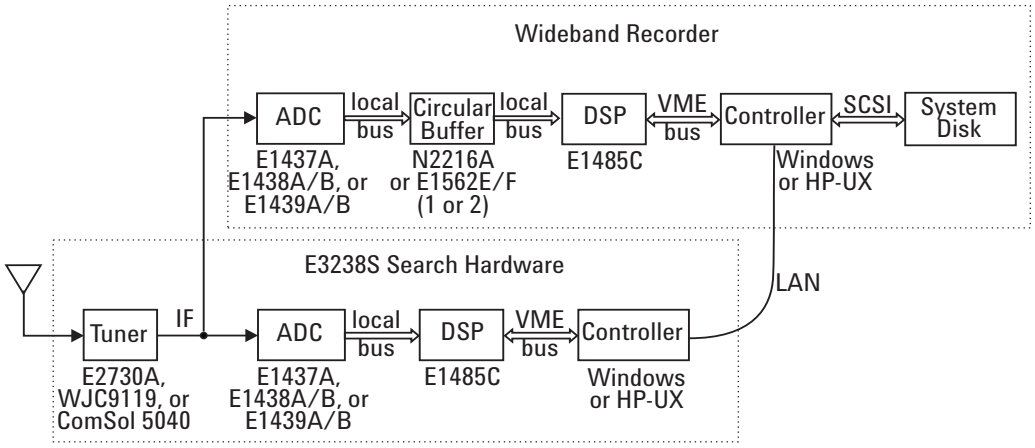


Figure 21 E3238S and Wideband Recorder Block Diagram

The tuner is optional and its input is connected to a signal source such as an antenna feed. The tuner translates (downconverts) a finite portion of the electromagnetic spectrum to a lower intermediate frequency (IF).

The analog-to-digital converter (ADC) converts the analog IF signal from a tuner or antenna to a series of (digital) numbers. The ADC in the Wideband Recorder determines the maximum recording bandwidth and is 4 MHz for an E1437A, 5 MHz for an E1438A/B, and 4.64 MHz for an E1439A/B. If the search hardware's span is greater than the Wideband Recorder's span, the Wideband Recorder's span covers the lower end of the search span. For example, the maximum span of the search hardware with a WJ9119-1 tuner is 6.88 MHz. The maximum span of the Wideband Recorder with an E1437A is 4 MHz. Therefore, if the tuner's span is 100 MHz to 106.88 MHz, the Wideband Recorder would only record 100 MHz to 104 MHz.

The N2216A or E1562E/F Data Disk acts as a circular buffer storing the wideband data from the ADC. The Data Recorder can contain one or two data disks, each with one or two disk drives for a maximum of 4 disk drives. Therefore, the record size using four 73 GB data disks is 292 GB.

The digital signal processor (DSP) provides ADC signal conditioning (windowing, conversion, scaling...) and time-to-frequency domain translation via FFT (Fast Fourier Transform).

The controller orchestrates the activity of the system and processes the data. It is responsible for the high level control of all elements in the system. It interfaces and communicates with the peripherals. The Wideband Recorder's controller receives recording requests from the E3238 system's controller and records narrowband data to the system disk.

The system disk provides permanent storage for the narrowband data.

Accessing the Wideband Recorder from an E3238 system

1 Start the E3238 system and set its start and stop frequencies. If the E3238 system is sharing its tuner with the Wideband Recorder, lock the E3238's tuner by checking the Lock Tuner button in the Search Type dialog box.

2 Start the Wideband Recorder.

- On HP-UX, type `/opt/wbr/wbr` at the terminal prompt.
- On Windows, click Start, Programs, Agilent Wideband Recorder, Wideband Recorder.

3 If the Wideband Recorder will be sharing the E3238 system's tuner, configure the Wideband Recorder's connection to the tuner.

When the Wideband Recorder is started, the Wideband Recorder Configuration dialog box appears. If the dialog box has been closed, open the dialog box by clicking the Configure button on the Wideband Recorder window.

a On the Wideband Recorder Configuration dialog box, scroll down to the E3238s Tuner Connection section.

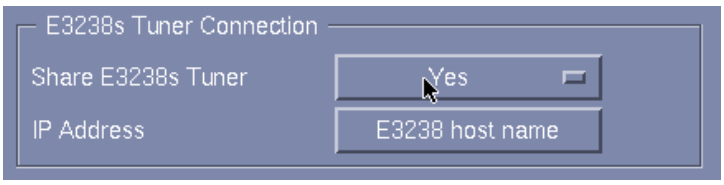


Figure 22 Wideband Recorder Configuration dialog box

b Click the Share E3238s Tuner button and select Yes.

c Click the IP Address button and enter the E3238 system's IP address or host name in the Text Entry dialog box.

4 On the E3238 system's toolbar, click the Alarm button. The Alarm dialog box appears.

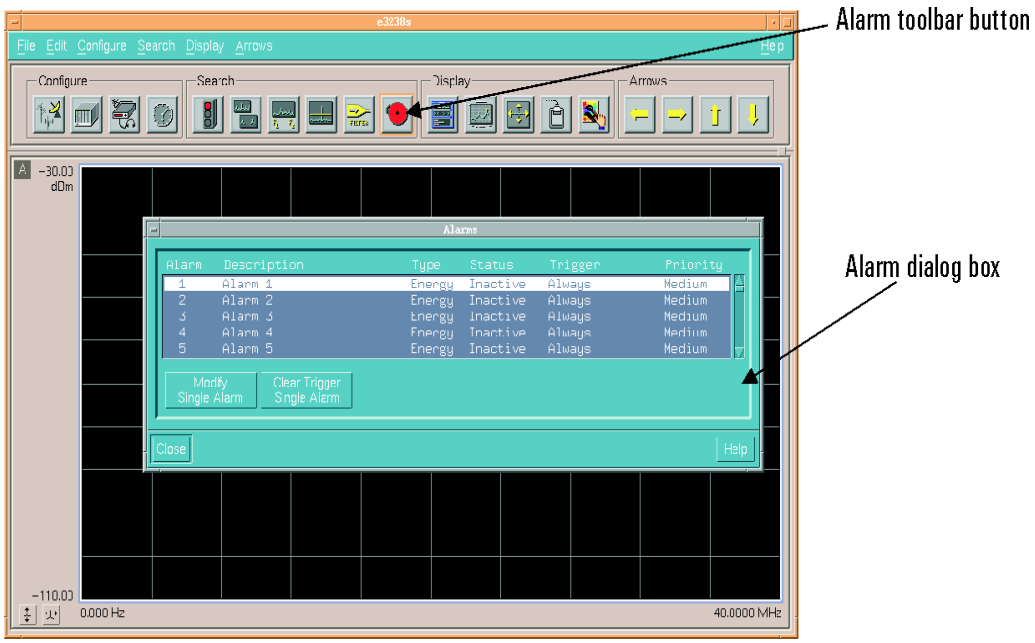


Figure 23 E3238S Window and Alarm dialog box

5 Click the Modify Single Alarm button. The Alarm Setup dialog box appears.

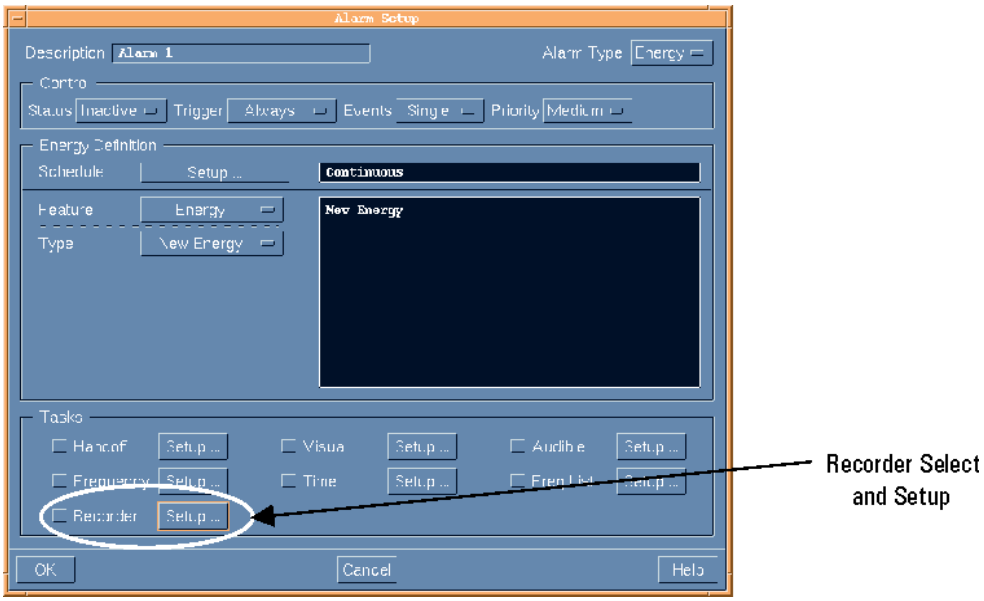


Figure 24 E3238S Alarm Setup dialog box

6 Click the box beside Recorder in the Alarm Setup dialog box to enable recorder tasks.

7 Click the Recorder Setup button. The Recorder Alarm Task dialog box appears.

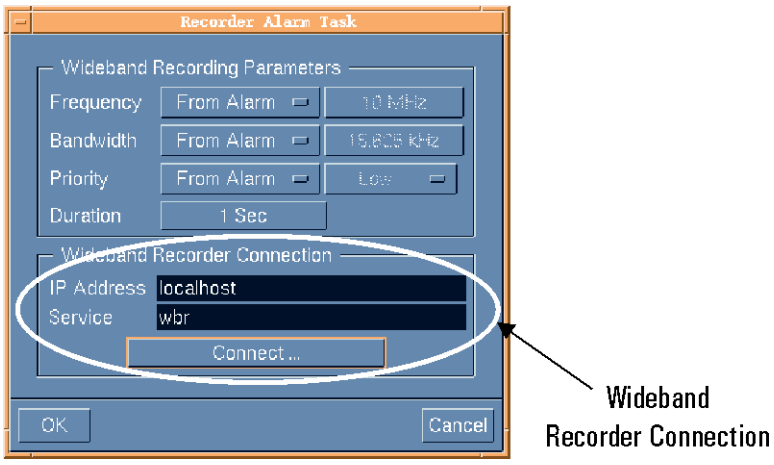


Figure 25 E3238S Recorder Alarm Task dialog box

8 Click the Connect button. A Text Entry dialog box appears.

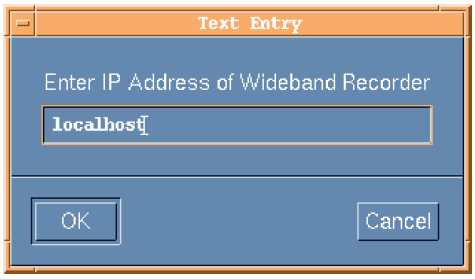


Figure 26 E3238S Text Entry dialog box

9 Enter the Wideband Recorder's IP address or host name, then click OK.

10 On the Wideband Recorder, click the State button and check that the E3238S connections are listed in Record Connections pane.

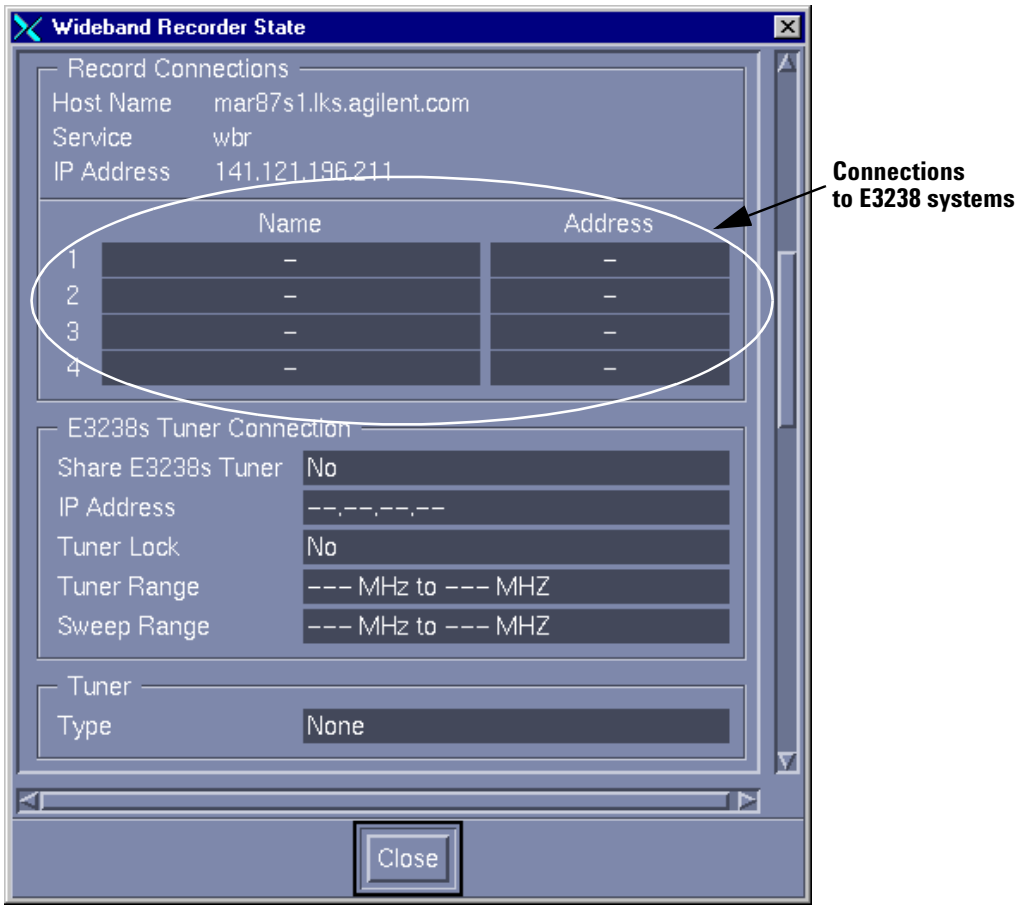


Figure 27 Wideband Recorder's State dialog box

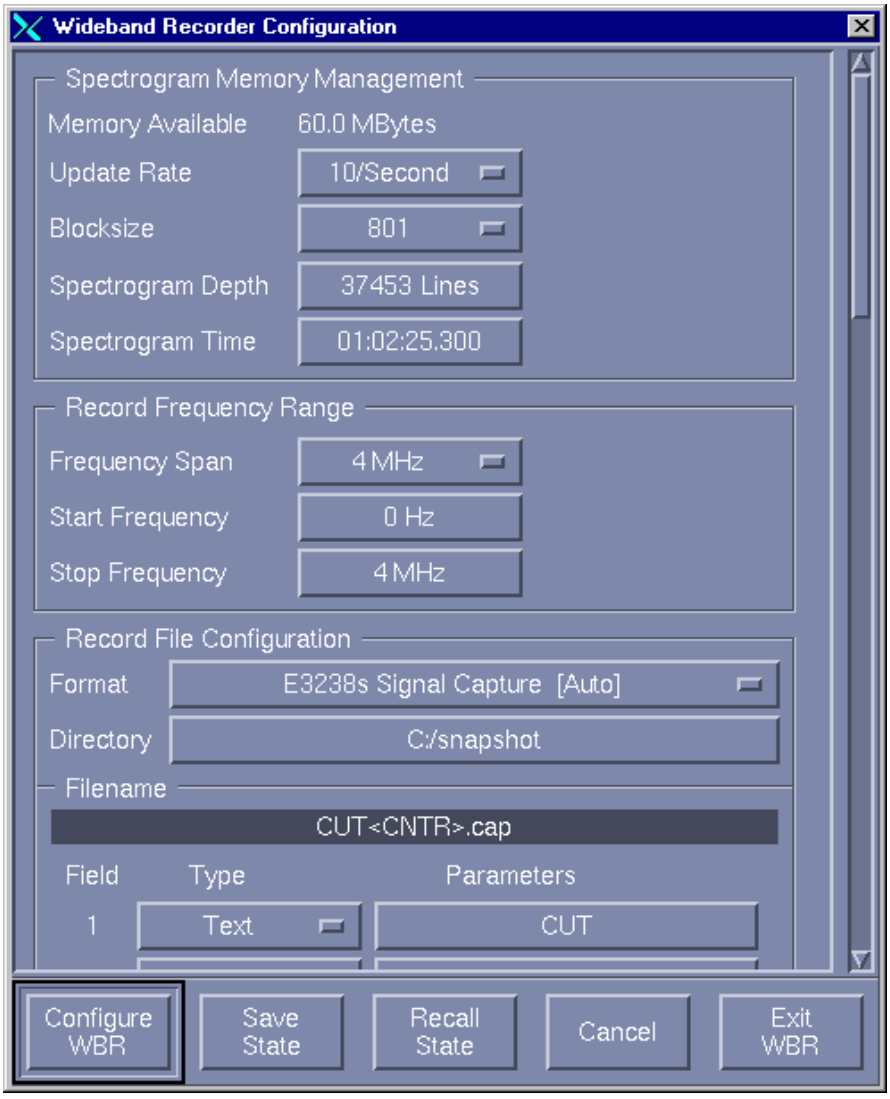
11 Synchronize the time between the Wideband Recorder system and the E3238 system. Use one of the following methods:

- Manual using the System Clock
- IRIG using bc350/357 VXI modules
- NTP (Network Time Protocol)

NOTE There are many methods to enable NTP on Windows NT. One method is to use "Time Service" from the Windows NT Server Resource Kit, Supplement 4.

The Wideband Recorder is now ready to be used with an E3238 system. To complete configuration and use the Wideband Recorder, see "Wideband Recorder Configuration Dialog Box" on page 53 and "Wideband Recorder Window" on page 65.

Wideband Recorder Configuration Dialog Box



The **Configuration** dialog box displays all configuration information and allows you to change some parameters. This dialog box appears when you start the Wideband Recorder. In addition, you can display this dialog box by clicking the Configure button on the Wideband Recorder window. If a recording is in progress, the Configure button is ghosted until you stop the recording by clicking the Stop button on the Wideband Recorder window.

Wideband Recorder Configuration buttons

The **Configure WBR** button implements the selected settings and closes the Configuration dialog box.

CAUTION Configuring the Wideband Recorder terminates all pending narrowband recordings and clears all wideband data.

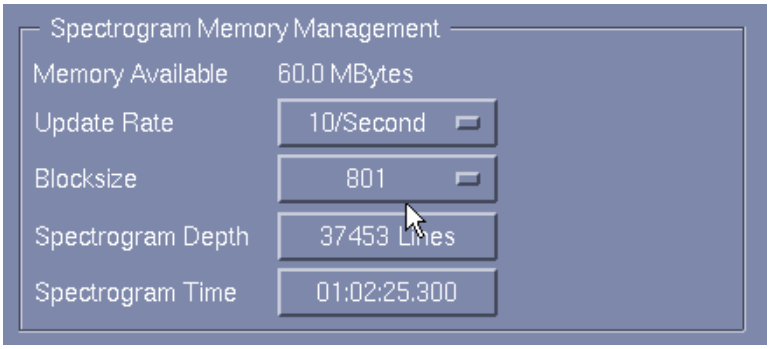
The **Save State** button saves the current configuration settings for recall later.

The **Recall State** button loads a file containing saved configuration settings.

The **Cancel** button closes the Configuration dialog box without implementing any changes.

The **Exit WBR** button terminates the Wideband Recorder application.

Spectrogram Memory Management pane



Memory Available displays the amount of memory allocated for the display. You can change the amount of memory allocated by editing the Wbr file. Use the following equation to determine the amount of memory to allocate:

`maxMemory = blocksize × 2 × spectrogram depth`

The **Update Rate** button specifies the rate at which a line of information is updated on the display. This effects the amount of spectrogram time that can be displayed such that:

`Spectrogram Time = depth/update rate`

The **Blocksize** button specifies the number of frequency points that can be displayed in the spectrogram trace such that:

`blocksize = memory/2 × depth`

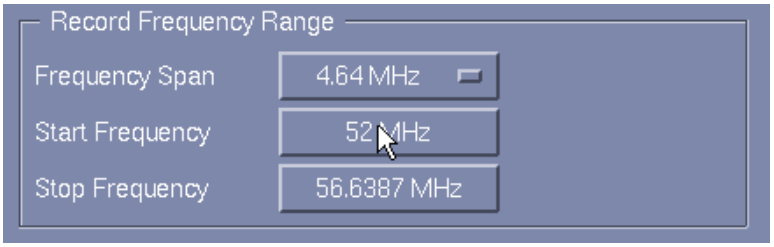
The **Spectrogram Depth** button specifies the number of lines displayed in the spectrogram trace such that:

`depth = memory/2 × blocksize`

The **Spectrogram Time** button specifies the amount of time displayed in the spectrogram trace such that:

`Spectrogram Time = depth/update rate`

Record Frequency Range pane



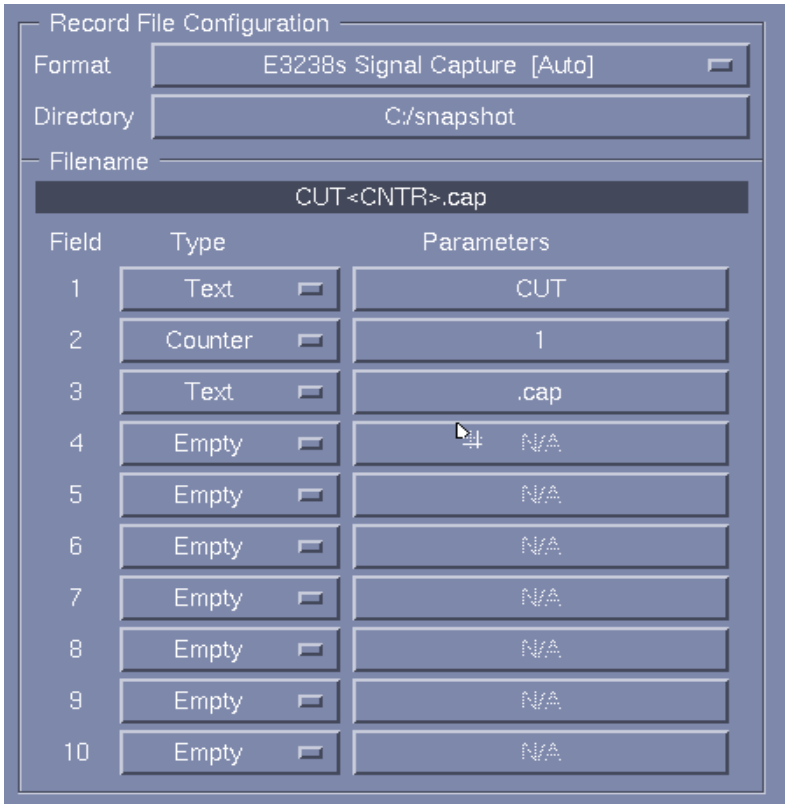
The **Frequency Span** button specifies the record's frequency span. The maximum frequency span depends on the ADC module. The following lists the maximum frequency span for the supported ADC modules:

- E1437 = 4 MHz
- E1438 = 5 MHz
- E1439 = 4.638 MHz

The **Start Frequency** button specifies the record's start frequency. This button is ghosted if the Wideband Recorder is sharing the E3238 tuner.

The **Stop Frequency** button specifies the record's stop frequency. This button is ghosted if the Wideband Recorder is sharing the E3238 tuner

Record File Configuration pane



The **Directory** button specifies the directory on the system disk for storing recorded files. The default directory is `/snapshot` on HP-UX and `c:\snapshot` on Windows. You can change the default directory by editing SnapshotDir in the Wbr file.

The **Format** button specifies the record's file format. Each record is saved as a series of complex time samples. Each sample consists of a real and imaginary pair. The following formats are supported:

- E3238s Signal Capture [Auto]
- E3238s Signal Capture [16 Bit Integer Complex]
- E3238s Signal Capture [32 Bit Integer Complex]
- 16t [16 Bit Integer Complex]
- 32t [32 Bit Integer Complex]
- 32f [32 Bit Float Complex]

The E3238s Signal Capture formats use the same format as the E3238 system. The format consists of a 512 bit header, as defined by E3238s, followed by the binary time data. This data is either 16 or 32 bit integer samples. The Auto mode selects 16 bits if the bandwidth is greater than 250 kHz and 32 bits if the bandwidth is less than 250 kHz.

The 16t, 32t, and 32f formats save only the binary time data as 16 bit integers, 32 bit integers, or 32 bit floats respectively, without a header.

Filename displays the record's filename format, which is defined using Type and Parameters in the ten Fields. This allows a unique filename to be automatically generated for each record.

Field displays the record's filename fields. Up to ten fields may be used to define the record's filename format. The **Type** buttons specify the type for each filename field and the **Parameters** buttons specify the parameters for the selected type. The following types can be selected in any field:

- **Empty** means this field is not used in the filename.
- **Text** specifies using a character string as part of the filename. In Windows, the text parameters cannot contain a colon (:). If a colon is used, a warning message is displayed and the colon is replaced with an underscore (_).
- **Counter** specifies using a numeric counter as part of the filename. The counter parameters for each field are unique and have their own starting counter value.
- **Date** specifies using the record's date as part of the filename. The date parameters use the function strftime, which uses percent (%) delimited characters (directives) to specify how the time field is displayed. For the complete list of directives, see the HP-UX or Windows programming manuals. The following are the most common and useful directives:
  - %a Abbreviated weekday name
  - %A Full weekday name
  - %b Abbreviated month name
  - %B Full month name
  - %c Date and time representation appropriate for locale
  - %d Day of month as decimal number (01 - 31)
  - %H Hour in 24-hour format (00 - 23)
  - %I Hour in 12-hour format (01 - 12)
  - %j Day of year as decimal number (001 - 366)
  - %m Month as decimal number (01 - 12)
  - %M Minute as decimal number (00 - 59)
  - %p Current locale's A.M./P.M. indicator for 12-hour clock

- %S Second as decimal number (00 - 59)
- %U Week of year as decimal number, with Sunday as first day of week (00 - 53)
- %w Weekday as decimal number (0 - 6; Sunday is 0)
- %W Week of year as decimal number, with Monday as first day of week (00 - 53)
- %x Date representation for current locale
- %X Time representation for current locale
- %y Year without century, as decimal number (00 - 99)
- %Y Year with century, as decimal number
- %z Time-zone name or abbreviation; no characters if time zone is unknown
- %z Time-zone name or abbreviation; no characters if time zone is unknown

The following directive is also implemented:

- %k Milliseconds as decimal number (000 - 999)

The default value is _%y_%m_%d_%H_%M_%S for Windows and _%y_%m_%d_%H:%M:%S for HP_UX.

Example: If you use the default value and the recording started on August 21, 2001 at 10:29:30 a.m., the filename field is 01_08_21_10_29_30 on Windows or 01_08_21_10:29:30 on HP-UX.

- **Frequency** specifies using the record's center frequency as part of the filename. The frequency parameters use the function printf, which uses %f or %g directives to format the frequency value. For the complete list of options with these directives, see the HP-UX or Windows programming manuals. The actual frequency value that is passed to the printf function must first be multiplied by the scalar value. The default value is CF_%g_MHZ and the default scalar value is 1.0e-6.

  Example: If the frequency is 12.345 MHz and the default values are used, the filename field is CF_12.345_MHZ. If the values are CF_%09.3f_KHZ and 1.0e-3, the filename field is CF_12345.000_KHZ.

- **Bandwidth** specifies using the record's bandwidth as part of the filename. The bandwidth is the aliased protected bandwidth of the signal. The bandwidth parameters use the function printf, which uses %f or %g directives to format the bandwidth value. For the complete list of options with these directives, see the HP-UX or Windows programming manuals. The actual bandwidth value that is passed to the printf function is first multiplied by the scalar value. The default value is BW_%g_KHZ and the default scalar value is 1.0e-3.

Example: If the bandwidth is 15.625 kHz and the default values are used, the filename field is CF_15.625_KHZ. If the values are BW_%09.3f_KHZ and 1.0e-3, the filename field is CF_00015.625_KHZ.

- **Sample Rate** specifies using the record's sample rate as part of the filename. The sample rate of the signal is 1.28 times the aliased protected bandwidth. The sample rate parameters use the function printf, which uses %f or %g directives to format the sample rate value. For the complete list of options with these directives, see the HP-UX or Windows programming manuals. The actual sample rate value that is passed to the printf function is first multiplied by the scalar value. The default value is SR_%g_KHZ and the default scalar value is 1.0e-3.

  Example: If the bandwidth is 15.625 kHz, the sample rate is 20.000 kHz, and using the default values, the filename field is SR_20.000_KHZ. If the values are SR_%09.3f_KHZ and 1.0e-3, the filename field is SR_00020.000_KHZ.

- **Duration** specifies using the record's duration as part of the filename. The duration parameters use the function printf, which uses %f or %g directives to format the duration value. For the complete list of options with these directives see the HP-UX or Windows programming manuals. The actual duration value that is passed to the printf function is first multiplied by the scalar value. The default value is %g_sec and the default scalar value is 1.0.

  Example: If the duration is 1.125 seconds and the default values are used, the filename field is 1.125_sec. If the values are %09.3f_msec and 1000.0, the filename field is 01125.000_msec.

- **Priority** specifies using the record's priority as part of the filename. The priority parameters are Low, Medium, High, or Critical.

NOTE

The filename should have at least a Counter or Date field. If not, a unique filename may not be generated.

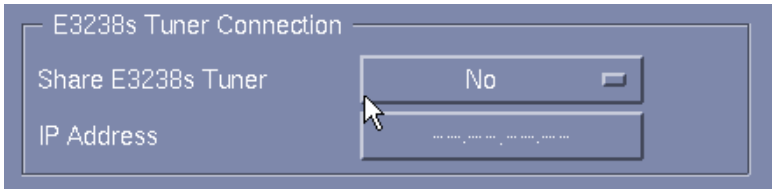
If a unique filename can not be created, the Wideband Recorder appends a counter value to the end of the filename. If a unique filename still can not be generated, the pending record request is deleted.

If the file system becomes full, any pending recording requests are saved until there is room in the file system or the data is no longer available to be saved.

Example

If you select Text for Field 1 and type "record" for its parameter then select Counter for Field 2 and type "1" for its parameter, the filename for the first recording will be "record1", the second recording will be "record2", and so on.

E3238s Tuner Connection pane



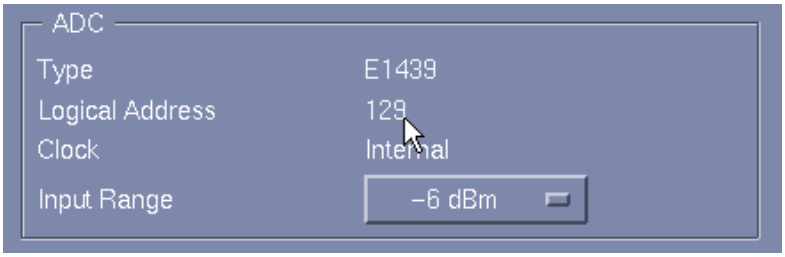
The **Share E3238s Tuner** button specifies whether or not the Wideband Recorder's input signal comes from the E3238 system's tuner output. See "E3238S and Wideband Recorder Block Diagram" on page 48.

The **IP Address** button specifies the network name or IP address of the E3238 controller. This allows the Wideband Recorder to get the tuner information from the E3238 so it can adjust it's own frequency scale. The network name or IP address is ghosted if Share E3238s Tuner is No.

Tuner pane

Type displays the Tuner module's model number. You can change the model number by editing tunerModel in the Wbr file.

ADC pane



Type displays the ADC module's model number. You can change the model number by editing adcType in the Wbr file.

Logical Address displays the ADC module's logical address. You can change the address by editing adcLogicalAddress in the Wbr file.

Clock displays whether the ADC module's clock reference is internal or external. You can change the clock reference by editing adcUseExternalClock in the Wbr file.

The **Input Range** button specifies the ADC input range. To maximize dynamic range, you should set the value to just above the largest signal expected at the ADC input.

Disk pane

Logical Address displays the disk module's logical address. You can change the address by editing discLogicalAddress in the Wbr file.

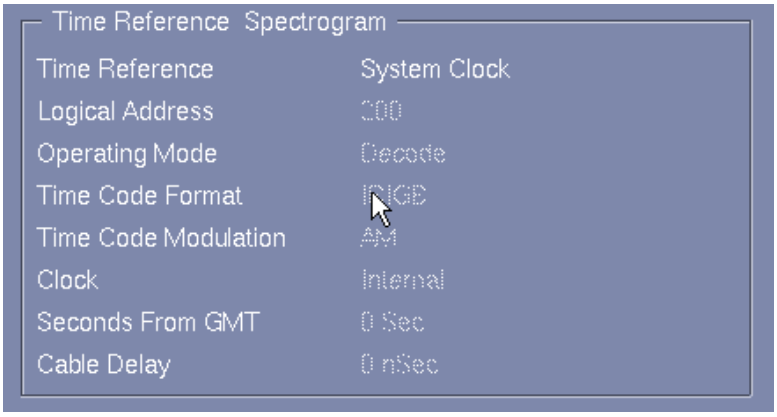
Configuration displays the number of disk drives installed. A disk module can contain one or two disk drives. Using two disk modules, up to four disk drives can be installed. The Wideband Recorder determines the number of installed disks during configuration. Therefore, the number of disks displayed in this window is not valid until after you click on the Configure WBR button.

DSP pane

Logical Address displays the DSP module's logical address. You can change the address by editing dspLogicalAddress in the Wbr file.

TTL Trigger Line displays the DSP module's TTL trigger line on the VXI backplane. TTL 1 should be used unless it is being used by another application. You can change the trigger line by editing ttlTriggerLine in the Wbr file.

Time Reference Spectrogram pane



Time Reference displays the source of the time information. The source can be the system clock or an optional IRIG module. You can change the source by editing timeReference in the Wbr file.

Logical Address displays the IRIG module's logical address. You can change the address by editing irigLogicalAddress in the Wbr file.

Operating Mode displays the IRIG module's operating mode. You can change the operating mode by editing irigOperatingMode in the Wbr file.

Time Code Format displays the IRIG module's signal encoding format. You can change the format by editing irigTimeCodeFormat in the Wbr file.

Time Code Modulation displays the IRIG module's signal modulation type. You can change the modulation type by editing irigTimeCodeModulation in the Wbr file.

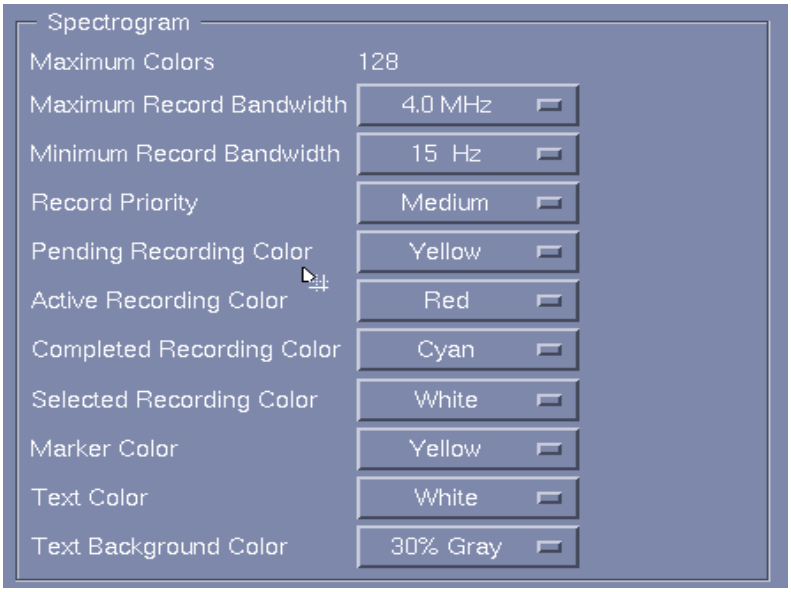
Clock displays whether the IRIG module's clock reference is internal or external. You can change the clock reference by editing irigClock in the Wbr file.

Seconds From GMT displays the IRIG module's offset time in seconds from GMT (Greenwich Mean Time). This allows you to adjust the time to GMT if your time source is not on GMT. You can change the offset time by editing irigSecondsFromGMT in the Wbr file.

Cable Delay displays the IRIG module's cable delay in nanoseconds. This allows you to correct for the delay caused by using a long cable from the IRIG module to the Wideband Recorder. You can change the delay by editing irigCableDelay in the Wbr file.

NOTE The ADC is started from the host processor. This allows the Wideband Recorder to use the workstation system clock rather than the DSP clock to timestamp the first ADC sample. Using a bc350VXI IRIG module, the absolute accuracy is less than one millisecond.

Spectrogram pane



Maximum Colors displays the maximum number of colors. This number can be changed by editing maxColors in the Wbr file.

The **Maximum Record Bandwidth** button specifies the maximum bandwidth for all recording.

The **Minimum Record Bandwidth** button specifies the minimum bandwidth for all recordings.

The **Record Priority** button specifies the record priority.

The **Pending Recording Color** button specifies the color for the pending recording area.

The **Active Recording Color** button specifies the color for the active recording area.

The **Completed Recording Color** button specifies the color for the completed recording area.

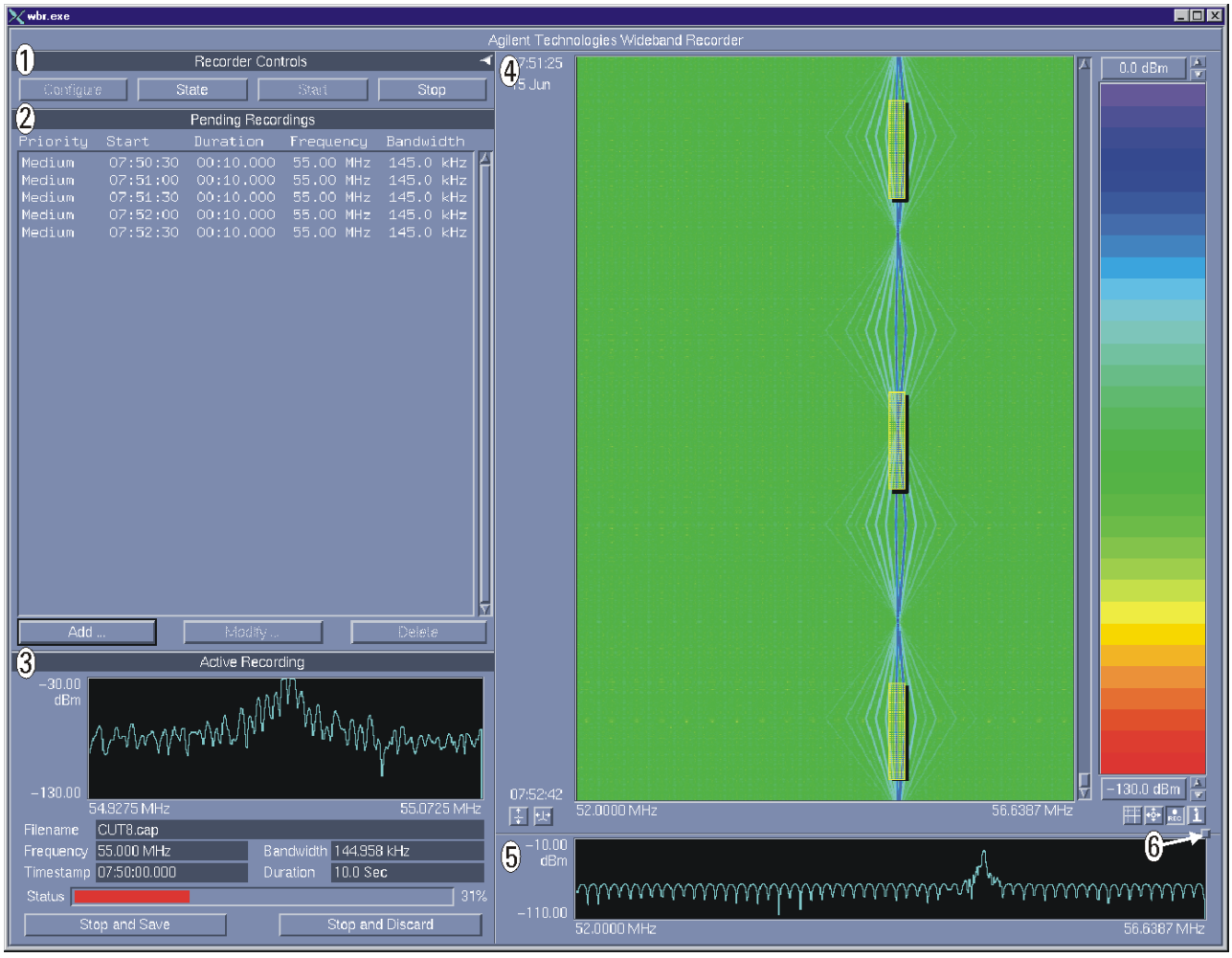
The **Selected Recording Color** button specifies the color for the currently selected recording area.

The **Marker Color** button specifies the marker color.

The **Text Color** button specifies the text color.

The **Text Background Color** button specifies the text background color.

Wideband Recorder Window



This window is the main user interface for the Wideband Recorder. It allows you to configure, start, and stop the Wideband Recorder, and to select narrowband signals for recording to the system disk.

1 "Recorder Controls" on page 66

2 "Pending Recordings pane" on page 67

3 "Active Recording pane" on page 68

4 "Spectrogram pane" on page 69

5 "Spectrum pane" on page 74

6 "Sash button" on page 74

Recorder Controls

CAUTION Starting or configuring the Wideband Recorder clears all data in the circular buffer and terminates all pending recording requests.

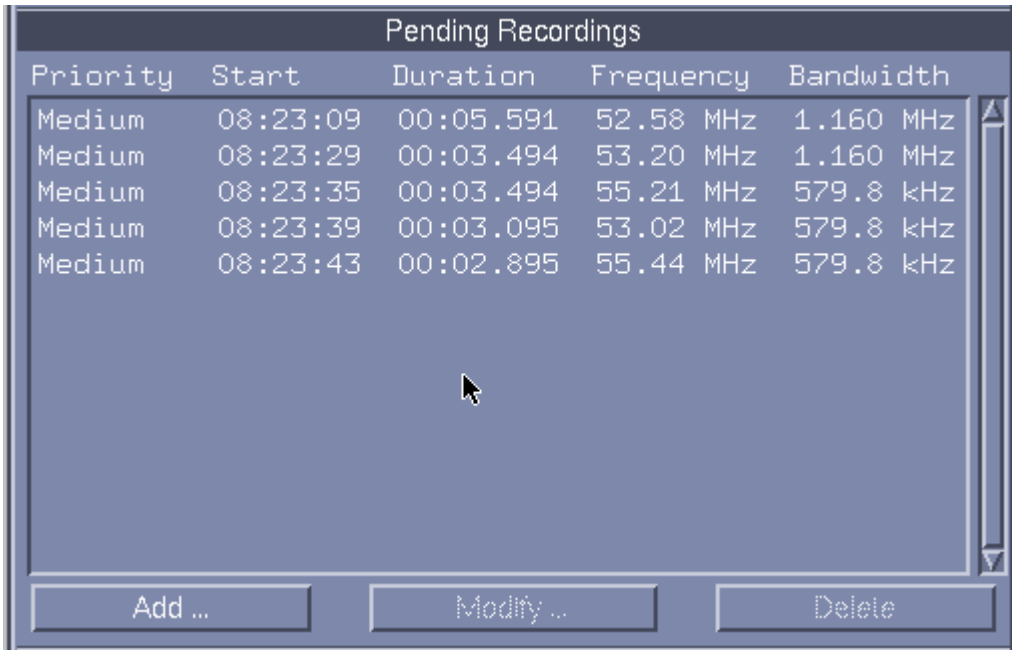
The **Configure** button displays the "Wideband Recorder Configuration Dialog Box" on page 53. If a recording is in progress, this button is ghosted until you stop the recording by clicking the Stop button.

The **State** button displays the State dialog box, which displays the Wideband Recorder's current configuration. You do not have to stop the current recording to access the State dialog box.

The **Start** button clears all data on the circular buffer then begins a new recording. Once the circular buffer is full, the newest data overwrites the oldest data. The amount of data that can be recorded before the oldest data is overwritten depends on the size of the circular buffer and the bandwidth.

The **Stop** button stops recording wideband data to the circular buffer. If a recording is in progress, you must stop the recording to access the Configuration dialog box.

Pending Recordings pane



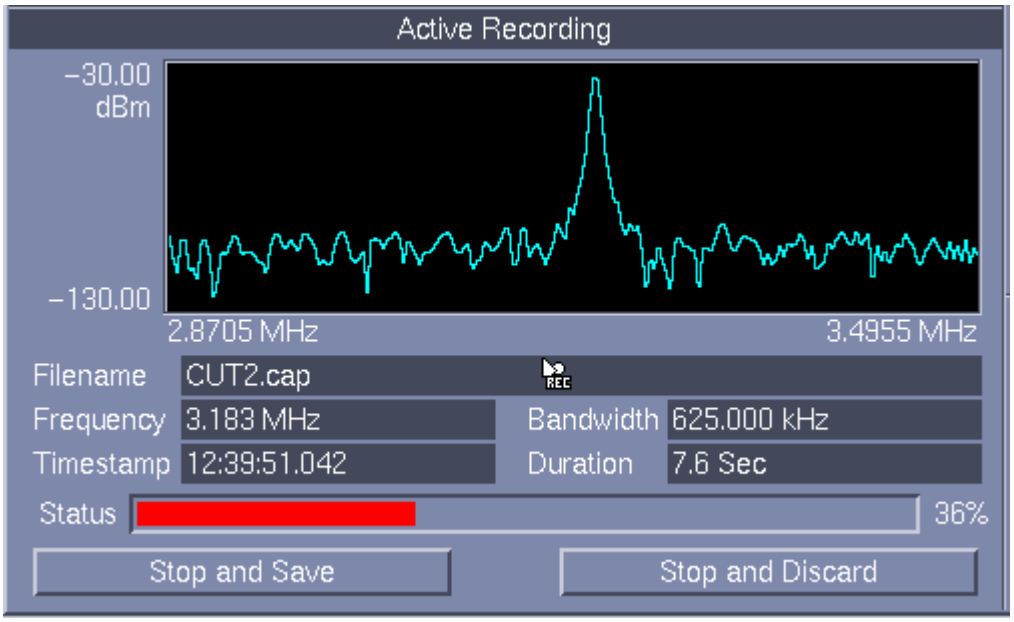
The **Pending Recordings** pane lists all pending narrowband recordings and their priority, start time, duration, frequency, and bandwidth. The narrowband data is recorded to the system disk.

The **Add** button displays the Add Recording Request dialog box, which lets you add a new narrowband recording to the pending recording list. You can also add a recording using the Record button. See Figure 29, “Using the record button,” on page 73.

The **Modify** button displays the Modify Recording Request dialog box, which allows you to change the parameters of the selected pending recording.

The **Delete** button removes the selected pending recording from the list.

Active Recording pane

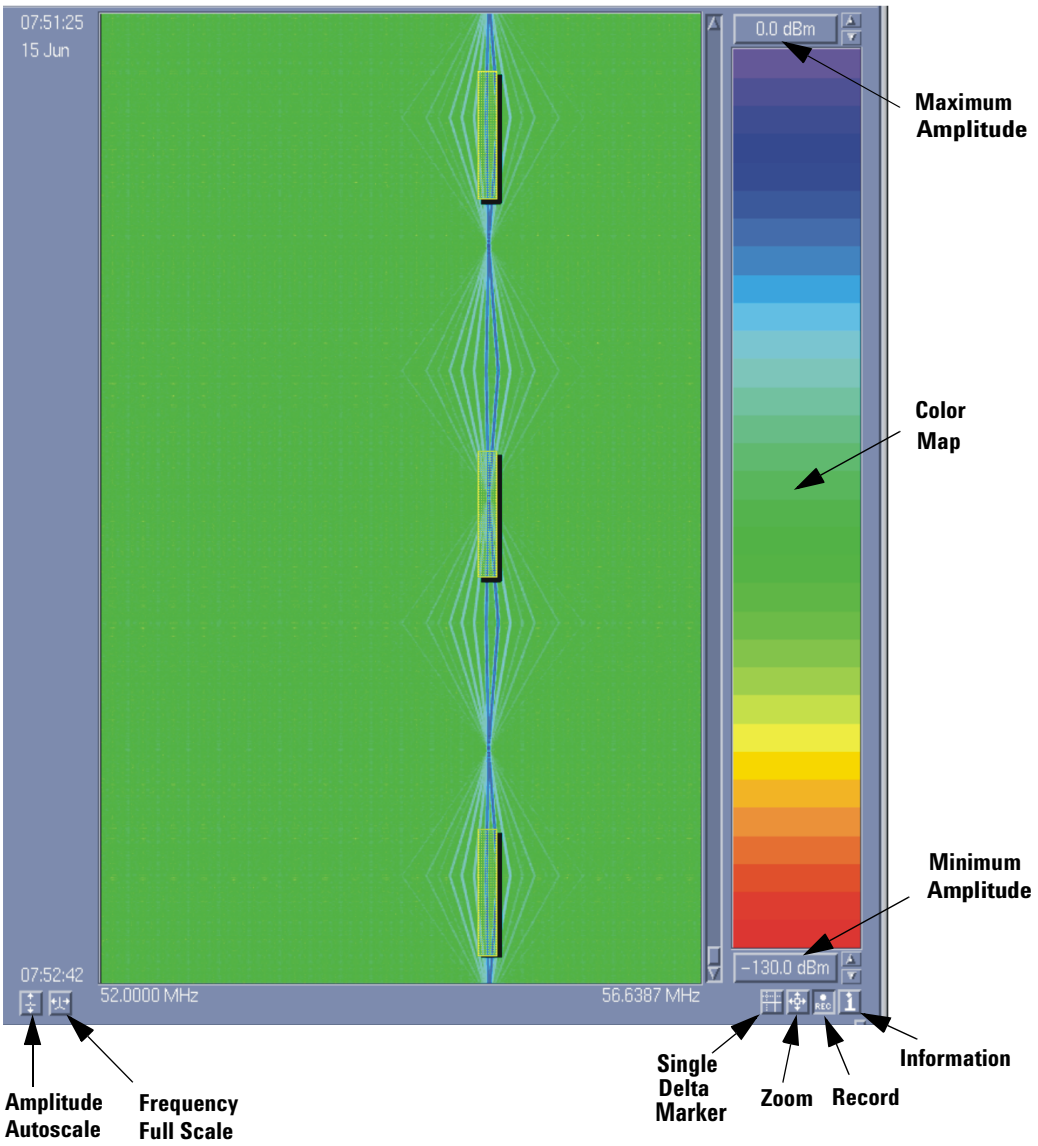


The **Active Recording** pane displays the current narrowband recording and allows you to stop the recording. This pane displays the recording's spectrum trace, filename, frequency, timestamp, bandwidth, duration, and recording status.

The **Stop and Save** button terminates the current narrowband recording and saves the recorded data to the displayed filename.

The **Stop and Discard** button terminates the current narrowband recording and discards the recorded data.

Spectrogram pane



The **Spectrogram** pane displays the recorded wideband data in a spectrogram. A spectrogram shows frequency on the horizontal axis, time on the vertical axis, and amplitude according to the Color Map.

The vertical slider bar allows you to view the entire wideband recording. If the displayed frequency is scaled smaller than the hardware's frequency span, a horizontal slider bar appears below the spectrogram that allows you to view the full scale frequency.

NOTE Once the circular buffer is full, the newest data overwrites the oldest data. The amount of data that can be recorded before the oldest data is overwritten depends on the size of the circular buffer and the bandwidth.

The **Color Map** shows the range of colors or gradients of gray that illustrate the amplitude levels in the spectrogram.

To select a different color map:

1 Move the mouse cursor to the color map.

2 Click and hold the right mouse button. A popup menu appears.

3 Move the mouse cursor to Color Map then release. A popup menu appears.

4 Move the mouse cursor to the desired color map, then click the mouse button.

To change the number of gradients:

1 Move the mouse cursor to the color map.

2 Click and hold the right mouse button. A popup menu appears.

3 Move the mouse cursor to Number Colors then release. A popup menu appears.

4 Move the mouse cursor to the desired number, then click the mouse button.

The **Amplitude Autoscale** button automatically sets the minimum and maximum amplitude values.

The **Frequency Full Scale** button sets the trace frequency scale to match the measurement hardware. This button does *not* change the frequency span.

NOTE

The trace frequency and amplitude scaling can also be changed by editing the Trace Scaling dialog box. To display the Trace Scaling dialog box, click either a frequency or amplitude readout or one of the amplitude buttons. In addition, you can change the amplitude scaling by clicking the up or down arrows next to the maximum and minimum amplitude buttons.

The **Single Delta Marker** button measures the delta time between the marker and a selected point.

To use the single delta marker:

1 Click the Single Delta Marker button.

2 Position the mouse cursor over the spectrogram.

3 Click and hold the left mouse button then position the mouse curser at the selected reference point in the spectrogram. The reference point's time and frequency are displayed in a readout below the spectrogram.

4 Press and hold the shift key while moving the curser to desired second position. The delta time and frequency are displayed in the readout below the spectrogram.

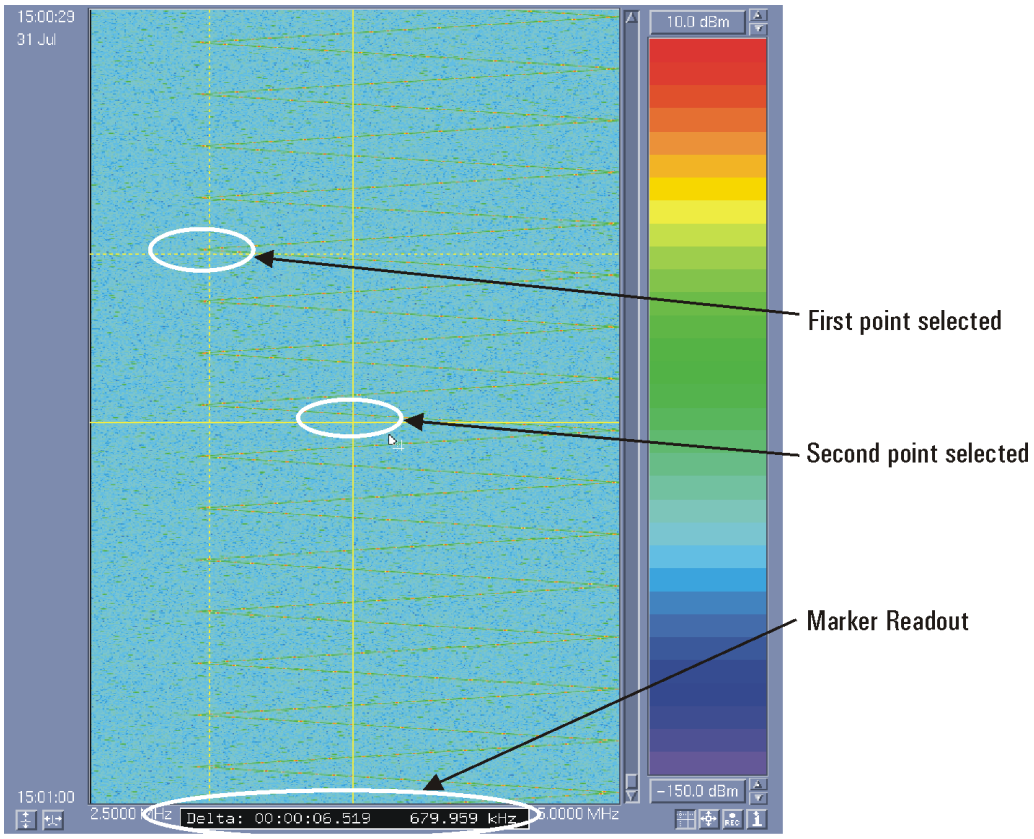


Figure 28 Using the Delta Marker button

The **Zoom** button allows you to zoom in on an area of the spectrogram.

To zoom in using the Zoom button:

1. Click the Zoom button.
2. Position the mouse cursor at the desired start frequency and time on the spectrogram.
3. Click and hold the left mouse button.
4. Move the mouse cursor to the desired stop frequency and time, then release the mouse button. The display zooms to the selected area.

The **Record** button allows you to graphically select a narrowband of data from the recorded wideband data in the spectrogram for recording to the system disk. The new narrowband data appears in the pending recording list. See "Pending Recordings pane" on page 67.

To add a new recording using the Record button:

1. Click the Record button.
2. Position the mouse cursor at the desired start frequency and time on the spectrogram.
3. Click and hold the left mouse button.
4. Move the mouse cursor to the desired stop frequency and time, then release the mouse button. A box appears showing the recording.

To delete a recording:

1. Position the mouse cursor over the narrowband recording.
2. Click and hold the right mouse button. A popup menu appears.
3. Move the mouse cursor to Stop & Save or Stop & Delete then release. A popup menu appears.
4. Move the mouse cursor to Yes, then click the mouse button.

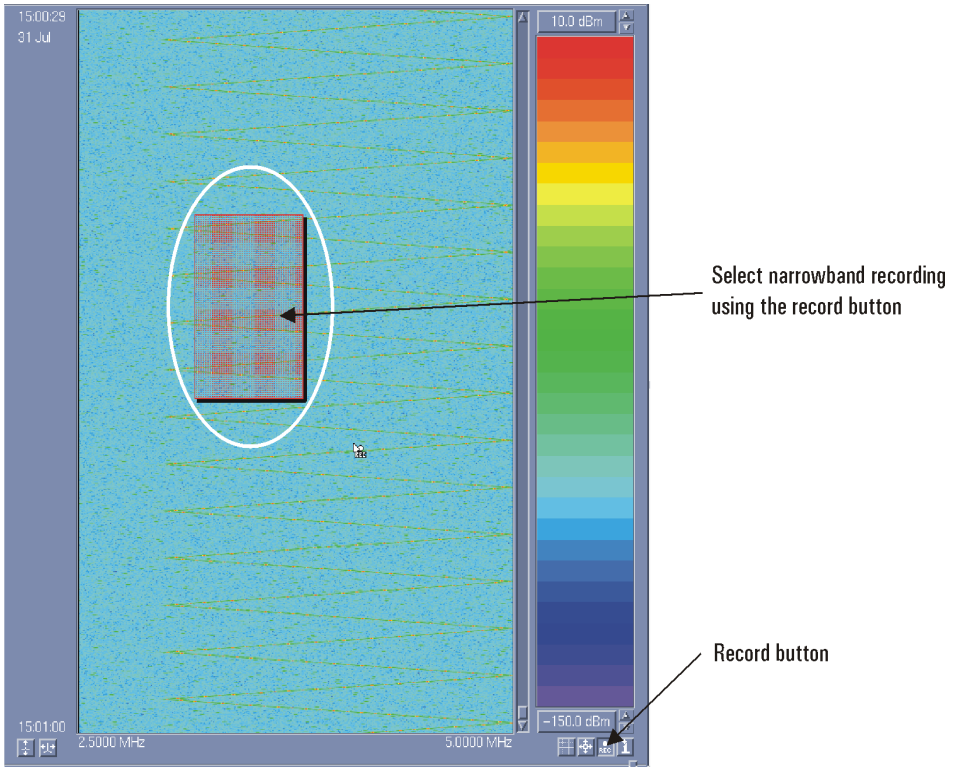


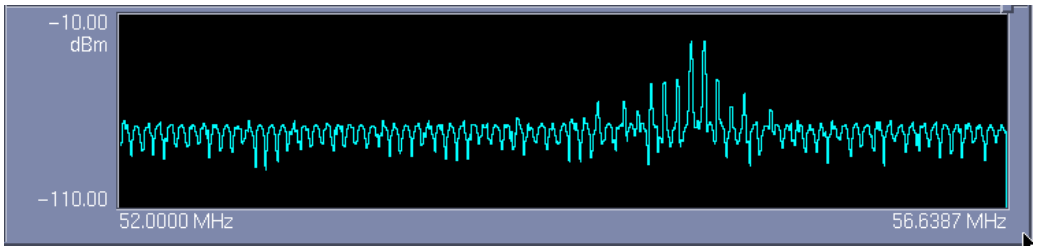
Figure 29 Using the record button

The Information button displays a dialog box containing a narrowband record's priority, frequency, bandwidth, start time, and duration.

To display the information dialog box:

1. Click the Information button.
2. Position the mouse cursor over a narrowband recording in the spectrogram.
3. Click and hold the mouse button.
4. Release the mouse button when you are done viewing the information dialog box.

Spectrum pane



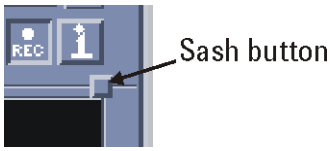
The Spectrum pane displays the area currently being recorded, one sweep at a time.

To change the trace scaling:

1 Click on one of the trace scale readouts (amplitude or frequency). The Trace Scaling dialog box appears.

2 Edit the Trace Scaling dialog box, then click OK.

Sash button



The Sash button allows you to vertically resize the Spectrogram and Spectrum panes relative to each other.

To resize the panes:

1 Move the mouse cursor to the sash button. The cursor becomes a plus sign.

2 Click and hold the left mouse button.

3 Move the mouse up or down. While the button is held down, the pane's vertical height tracks the vertical position of the cursor and the panes above and below change size.

4 Release the mouse button when the pane size is correct.

NOTE Panes without sash buttons can be resized by editing the application's resource file: `Wbr`.

3
Socket Command Interface

The Wideband Recorder has a socket command interface. The taskWBR library provides commands that allow an E3238 system to control the Wideband Recorder via the socket interface. The E3238 system implements the taskWBR library as a user alarm task. The taskWBR library is provided as a shared library for HP-UX and a dynamic linked library for Window. See page 24 or page 42 for instructions on activating the appropriate library. For information on how the E3238 system communicates via sockets, see the *E3238S AS9 Programming Guide*.

In addition to controlling the Wideband Recorder via E3238 user alarm tasks, the commands can be entered in the E3238S Command Line pane.

rec

Syntax

```
rec: priority, startTime, duration, frequency, bandwidth
```

Description

This command adds a narrowband recording request using the following parameters:

`priority`: 0-3 with 3 being the highest priority.
`startTime`: time related to epoch (1/1/70 12:00 AM)
`duration`: in seconds
`frequency`: center frequency in Hertz
`bandwidth`: in Hertz

del

Syntax

```
del: startTime, frequency
```

Description

This command removes a pending narrowband recording request based on the following parameters:

`startTime`: time related to epoch (1/1/70 12:00 AM)
`frequency`: center frequency in Hertz

Index

L

M

N

O

P

R

S

T

U

V

W

X

Z