Installation and Operation Manual
ProSeries Model SPS390
Dynamic Signal Analyzer
Part Six

Legacy Manual

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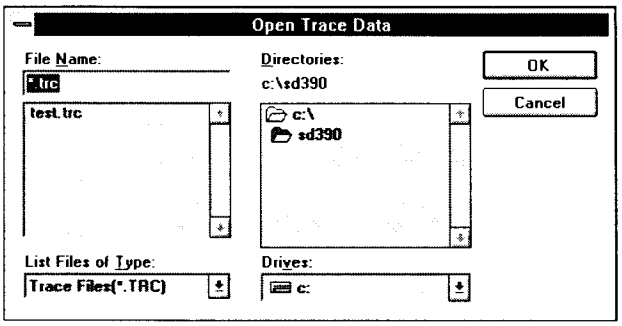
3–11.9.1 Open Trace Data



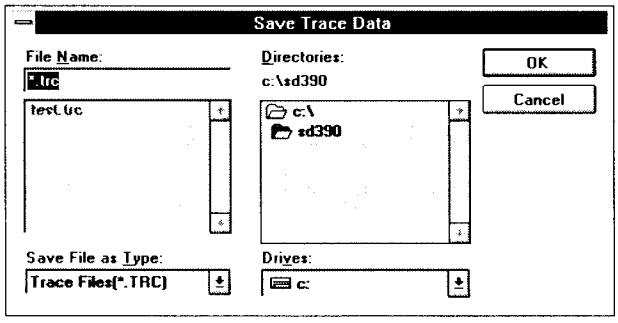
The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current data files to be displayed in the **Files** box. All data files have the default extension **.trc**. You can select one of the existing data files by selecting a file in the **Files** box, then pressing **OK**.

If you have saved a data file with a different extension than **.trc**, you can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the* **Cancel** *button.*

3–11.9.2 Save Trace Data



The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current data files to be displayed in the **Files** box. All data files have the standard default extension **.trc**. You can select an existing file to which to save the current data by selecting a file in the **Files** box, then pressing **OK**. You will then be reminded that the data previously stored in the existing file will be replaced by the new data, and will have the chance to cancel the operation.

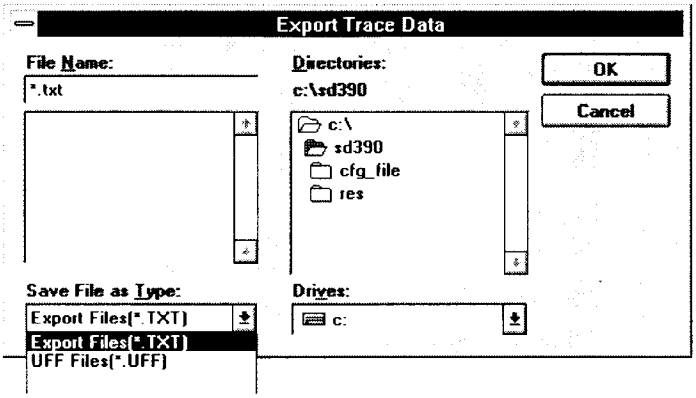
You can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The **.trc** extension will automatically become part of the filename.

The disk drive and directory to which the file will be saved can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the* **Cancel** *button.*

3–11.9.3 Export Trace Data



The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current export files to be displayed in the **Files** box. All export files have the default extension, **.txt**. A **.uff** extension can be selected. You can select one of the existing data files by selecting a file in the **Files** box, then pressing **OK**.

If you have saved an export file with a different extension than **.txt**, you can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

Header information is automatically included as part of each export file; this header replicates the important descriptions found in the Info box. The following figure shows a sample export trace data file transferred to Excel®. The same header information as in the export trace data file can be viewed by reading the file into windows **NotePad**.

IIII.TXT

	A	B	C	D	E
1	Ch 1 Full Scale	:5Vrms			
2	Cal Factor	:100mV/EU			
3	Display	:Magnitude Spectrum			
4	Frequency Span	:1KHz			
5	Resolution	:400 Lines			
6	Weighting	:Hanning			
7	Overlap	:MAX			
8	Averager	:Cross Properties			
9	Method	:Exponential			
10	Target Count	:10 Ensembles			
11	Current Count	:0 Ensembles			
12					
13	0.001323				
14	0.007044				
15	0.011537				
16	0.007936				

☞ *This operation can be canceled by clicking on the* **Cancel** *button.*

☞ *The removable floppy diskette is drive* **A:** *and can be used for transporting Export files to other systems.*

➲ ***SPS390 HINT:*** *For more information on wild cards, disks, directories, and files, see the Microsoft Windows Users Guide provided with this system.*

3–11.10 LOAD/SAVE EXTENDED MEMORY

There are two dialogs which allow you to save and load data from/to the SPS390 extended recorder memory:

- Load Extended Recording
- Save Extended Recording

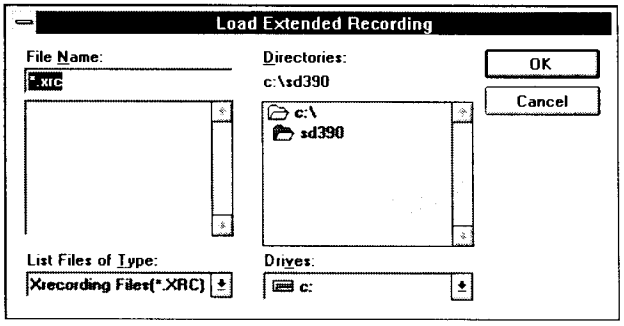
These options are accessed from the **File** menu. You are prompted to supply named files which contain the extended recorder memory data.

The number of files that can be saved is limited by the available disk storage.

3–11.10.1 Load Extended Recording

The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current XRec data files to be displayed in the **Files** box. All XRec data files have the default extension, **.xrc**.

You can select one of the existing XRec files by selecting a file in the **Files** box, then pressing **OK**.



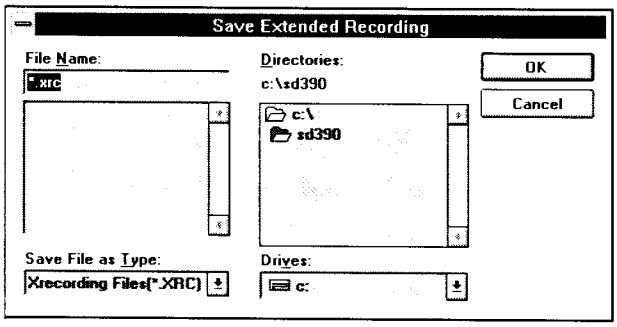
If you have saved an XRec data file with a different extension than **.xrc**, you can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the* **Cancel** *button.*

Data from an extended recording disk file can be loaded at any time. However, all current data, acquisition and analysis parameters are replaced by the saved data and saved parameters. These parameters may not be compatible with the current settings, and may invalidate the current averager and displays. Therefore, it is good practice to stop acquisition before loading this data, although this function will automatically stop acquisition (and averaging) if active. Parameters that were in effect when the data was saved are also loaded at this time.

3–11.10.2 Save Extended Recording



The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current XRec data files to be displayed in the **Files** box. All XRec data files have the standard default extension, **.xrc**. You can select an existing file to save the current Extended Recorder Memory data by selecting a file in the Files box, then pressing **OK**. You will then be reminded that the data previously stored in the existing file will be replaced by the new data, and will have the chance to cancel the operation.

You can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The **.xrc** extension will automatically become part of the filename.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the* **Cancel** *button.*

➲ ***SPS390 HINT:*** *For more information on wild cards, disks, directories, and files, see the Microsoft Windows Users Guide provided with this system.*

Storing 500k samples of extended recorder data takes 1.5 minutes and uses 1,000 kbytes of disk storage

Remember that **Save Extended Recording** is a global command that saves the extended record from all active memories, not just the "hot" compressed time trace windows.

3–11.11 Load/Save Averager Data

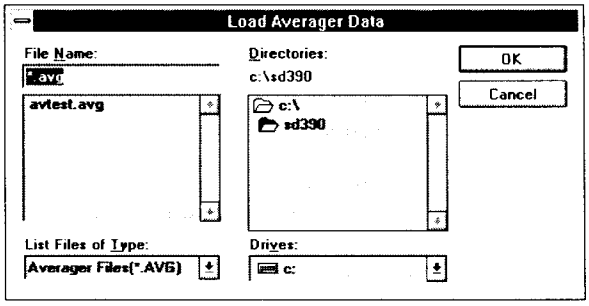
Two Dialogs allow you to load and save data to/from the SPS390 averager memory:

- Load Averager Data
- Save Averager Data

These options can be enormous time-savers, as they allow the user to save all components of a frequency response function to disk for later display and analysis, without having to display and save each one individually. The options are accessed from the **File** Menu. You are prompted to supply named files which contain the averager data.

The number of files that can be saved is limited by the available disk storage.

3–11.11.1 Load Averager Data



The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current averager data files to be displayed in the **Files** box. All averager data files have the default extension, **.avg**.

You can select one of the existing averager files by selecting a file in the **Files** box, then pressing **OK**.

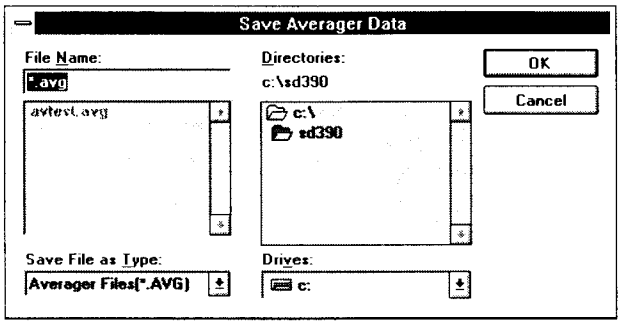
If you have saved an averager data file with a different extension than **.avg**, you can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the **Cancel** button.*

Data from an averager disk file can be loaded at any time. However, all current data, acquisition and analysis parameters are replaced by the saved data and saved parameters. These parameters may not be compatible with the current settings, and may invalidate the current averager and displays. Therefore, it is good practice to stop acquisition before loading this data, although this function will automatically stop acquisition (and averaging) if active. Parameters that were in effect when the data was saved are also loaded at this time.

3–11.11.2 Save Averager Data



The **Save Averager Data** feature provides a convenient method for saving all components of a Frequency Response Function (FRF) to disk for later display and analysis, without having to display all, or even any, of the FRF elements individually. This feature is available whenever cross properties averaging is performed. (To perform cross properties averaging, first select **Cross Properties** as the Mode on the **Mode Configuration** dialog, and then perform any averaging measurement.)

When **Save Averager Data** is selected, the SPS390 stores the active and reference channel power spectra as well as the real and imaginary parts of the cross spectrum between the active and reference channels. From this data, all standard FRF displays, such as FRF magnitude, phase, coherence, and Nyquist, can be formed upon recall. Therefore, it is not necessary to call up and save each of the nine FRF displays individually.

The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current averager data files to be displayed in the **Files** box. All averager data files have the standard default extension, **.avg**. You can select an existing file to save the current averager data by selecting a file in the **Files** box, then pressing **OK**. You will then be reminded that the data previously stored in the existing file will be replaced by the new data, and you will have the chance to cancel the operation.

You can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The **.avg** extension will automatically become part of the filename.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the **Cancel** button.*

Remember that **Save Averager Data** is a global command that saves the averager data from all active memories, not just the hot average display window.

3–11.12 Load/Save Waterfall Memory

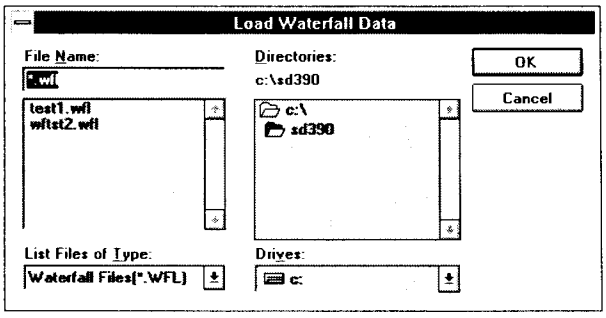
There are two Dialogs which allow you to Save and Restore data from/to the SPS390 Waterfall Memory:

- Load Waterfall Data
- Save Waterfall Data

These options are accessed from the **File** Menu. You are prompted to supply named files which contain the Waterfall Memory data.

The number of files that can be saved is limited by the available disk storage.

3–11.12.1 Load Waterfall Data



The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current waterfall data files to be displayed in the **Files** box. All waterfall data files have the default extension, **.wfl**. You can select one of the existing Waterfall data files by selecting a file in the **Files** box, then pressing **OK**.

If you have saved a Waterfall data file with a different extension than **.wfl**, you can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The **.wfl** extension will automatically become part of the filename.

The disk drive and directory from which the file will be read can also be changed by selecting the desired drive and directory from the Directories entry box.

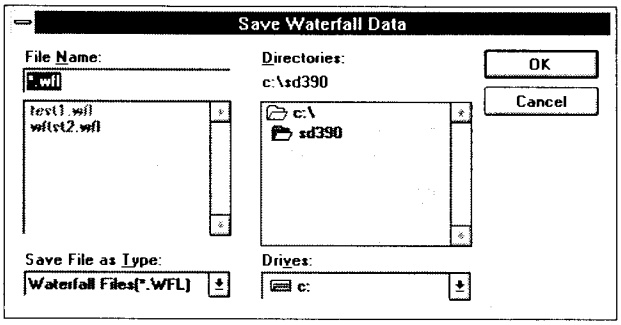
☞ *This operation can be canceled by clicking on the* ***Cancel*** *button.*

Data from a waterfall data disk file can be loaded at any time. However, all current data and acquisition and analysis parameters are replaced by the saved data and saved parameters. These parameters may not be compatible with the current settings, and may invalidate the current averager and/or waterfall memory and associated displays. Therefore, it is good practice to stop acquisition before Loading this data, although this function will automatically stop all acquisition functions if active.

3–11.12.2 Save Waterfall Data

The wildcard file name template is displayed in the **File Name** entry box, which causes a list of current waterfall data files to be displayed in the **Files** box. All waterfall data files have the standard default extension, **.wfl**. You can select an existing file to save the current waterfall memory data by selecting a file in the **Files** box, then pressing **OK**.

You will then be reminded that the data previously stored in the existing file will be replaced by the new data, and have the chance to cancel the operation.



You can modify the wildcard search, or directly enter the desired filename in the **File Name** entry box by entering the filename from the keyboard.

The **.wfl** extension will automatically become part of the filename.

The disk drive and directory from which the file will be saved can also be changed by selecting the desired drive and directory from the **Directories** entry box.

☞ *This operation can be canceled by clicking on the* ***Cancel*** *button.*

➲ ***SPS390 HINT:*** *For more information on wild cards, disks, directories, and files, see Microsoft Windows Users Guide provided with this system.*

Data from a waterfall data disk file can be loaded at any time. However, all current data and acquisition and analysis parameters are replaced by the saved data and saved parameters. These parameters may not be compatible with the current settings, and may invalidate the current averager and waterfall memory and associated displays. Therefore, it is good practice to stop acquisition before Loading this data, although this function will automatically stop all acquisition functions if active.

Remember that **Save Waterfall Data** is a global command that saves the waterfall data from all active waterfall memories, not just the hot waterfall display window.

NOTES

3–12 DISPLAY WINDOWS

3–12.1 Description

Display windows are used to display traces. In addition to displaying the trace, they also display information about the type of trace, the channels involved in the trace and the X- and Y-axis units. Display windows also have a built-in standard cursor mechanism that can be used to display the value of a trace at a particular point or spectral line, in the case of a spectrum trace.

Display windows can be individually manipulated (moved and resized) or grouped together (cascaded or tiled). They can be iconized — shrunk to a small picture — temporarily to reduce screen clutter or maximized to fill most of the screen.

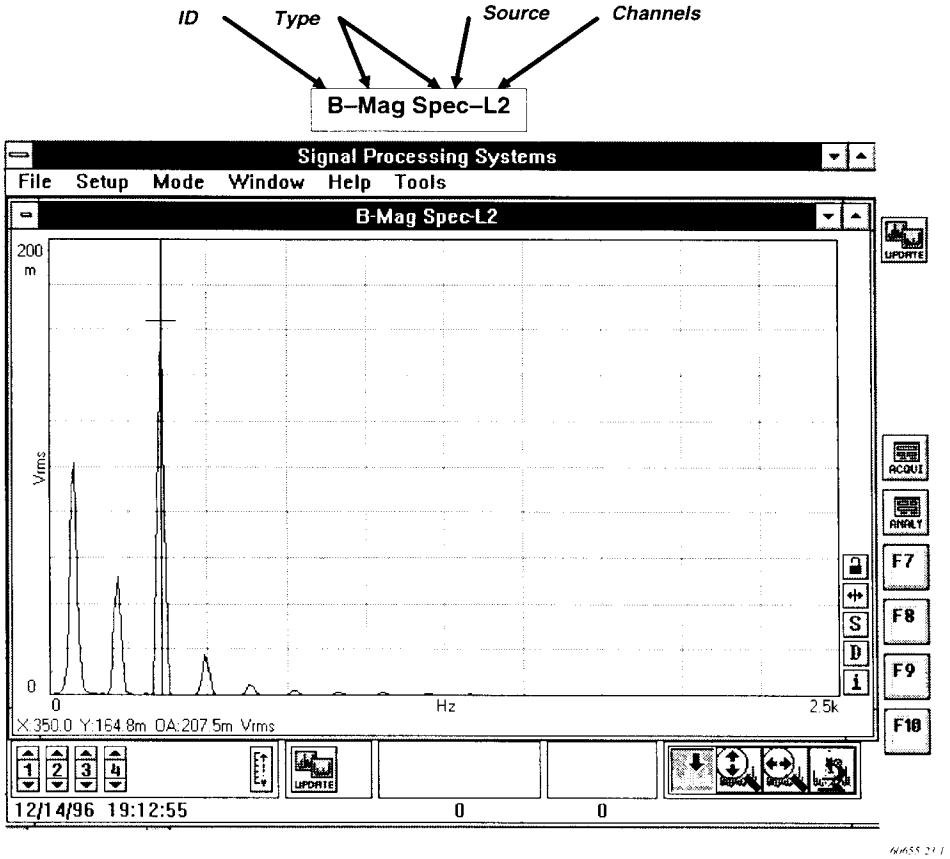
In most circumstances, data is being processed in accordance with the specified analysis parameters even if it is not being displayed.

3–12.2 Display Window Features

Every display window has certain features that provide you with important information about the trace being displayed.

Title

The title for each display window appears in the window title bar. The format for each display window title consists of four fields, separated by hyphens as follows:



ID

A single letter from A to I, assigned automatically and unique (only one display window has an ID letter "A," for example).

Type

An abbreviation of the trace type, as specified by the **Display Function** selected in the **Display Setup** dialog when the display was created or last modified.

Source

The trace source can be any one of the following as specified by the **Source** selected in the **Display Setup** dialog when the display was created or last modified.

- **L—Live**
- **A—Average**
- **S—Store**
- **W—Waterfall**
- **F—Recalled Disk File**

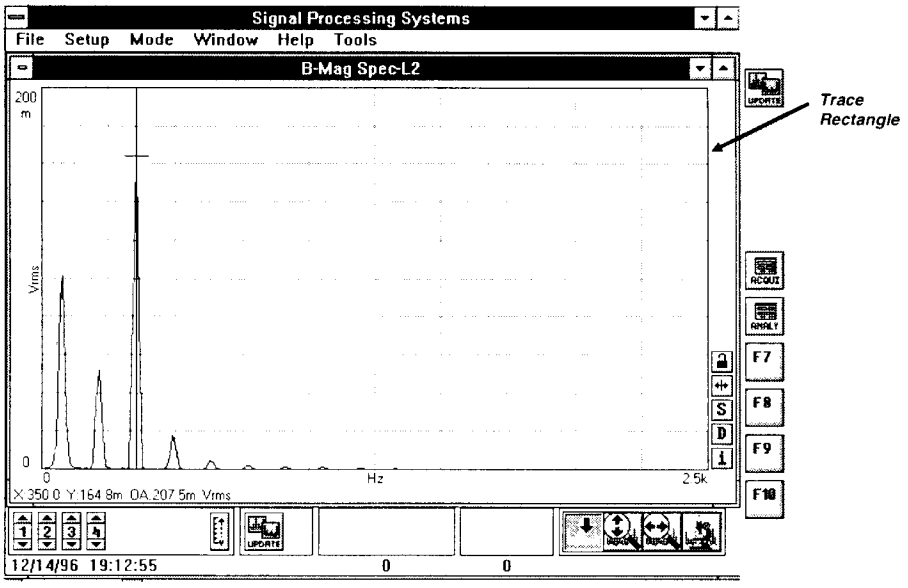
Channels

The channels involved in the trace as specified in the **Display Setup** dialog when the display was created or last modified. Either a single channel number (e.g., 1) or a channel/reference pair (e.g., 2/1) depending on the display type.

The background color of the title bar indicates whether the display is an active window. There is only one active window at a time.

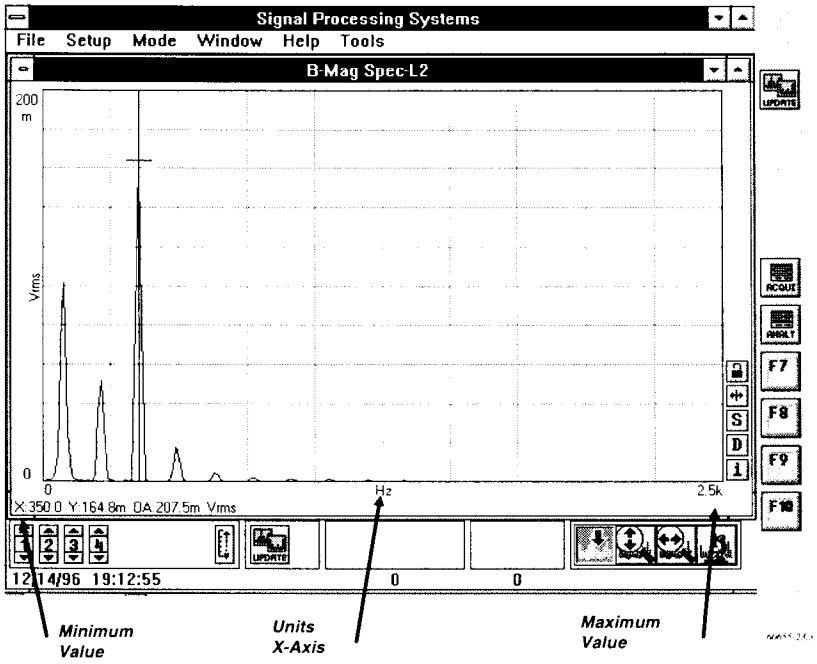
Trace Rectangle

The trace rectangle serves as a frame for the trace, which is displayed horizontally within the trace rectangle.



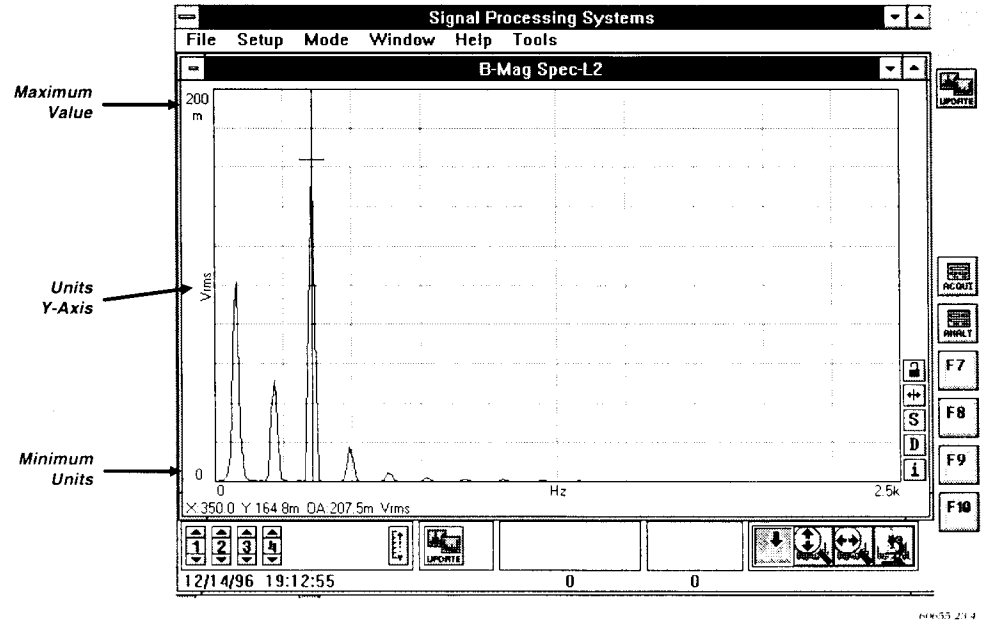
X-Axis Annotation

The X-axis units, minimum value, and maximum value are written at the bottom of the trace rectangle. Values are expressed in exponential notation, unless "Shorthand Notation" is selected.



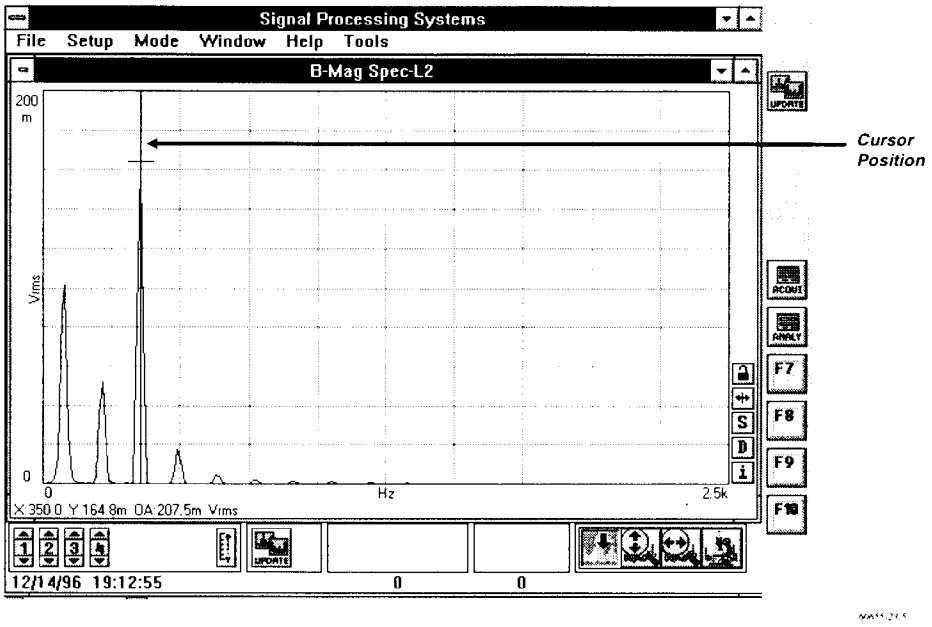
Y-Axis Annotation

The Y-axis units, minimum value, and maximum value are written at the left side of the trace rectangle.



Cursor Position

The cursor position refers to the coordinates of the trace point/line intersecting the cursor symbol and is displayed at the bottom left hand corner of the display window. Typically, the X- and Y-axis values, plus the overall (OA) level in the selected axis units are displayed for cursor readout. For orbit displays, time is displayed as the third cursor value. For Nyquist displays, frequency is displayed as the third cursor value. For Octave displays, the octave band and overall level are displayed as the third and fourth cursor values, respectively.



Wherever the cursor point intersects a data point shown on the display, a cursor readout is provided. The cursor readout is located to the left and below the trace rectangle. The cursor readout is provided in the operator's selected units set on the **Display Setup** dialog.

Frequency Domain Displays

On frequency domain displays, the cursor readout will provide the X and Y values for the intersected data point. Typically, the numbers presented for the intersection point are the precise values for the calculated FFT function presented. However, the cursor readout can be effected by the selection of **Interpolate X/Y** values or **shorthand** notation on the **Display Setup** or **Preferences** Page (see section 3-11.1.5 and 3-11.1.6).

Computing the Overall Level

On magnitude spectrum displays the calculated overall level for the data presented is displayed and annotated with OA to indicate this calculated value. The overall level value presented is the overall level for just the data being displayed on the subject window. The X-axis scaling will effect the calculated value. In this way an operator can compute the overall level in a segment of the frequency span that is set on the **Acquisition** dialog.

$$\text{AO Level} = \sqrt{\sum_{i=a}^{b} V_i^2 / (\text{Wtg Fcm Factor})}$$

a = left display edge bin #
b = right display edge bin #
H Wtg Fcn Factor = 1.5
FT Wtg Fcn Factor = 3.386

NOTE: EU values can be substituted for V.

Total Harmonic Distortion

If harmonic markers are invoked on a magnitude spectrum, a fourth value is presented on the cursor line. The value that is computed and displayed is the total harmonic distortion. The total harmonic distortion is the percentage of amplitude of the fundamental that is distorted by the total harmonic content measured. A precise alignment of the harmonic markers to the peaks of the harmonic signals is required for an accurate measurement of total harmonic distortion.

Time Domain Displays

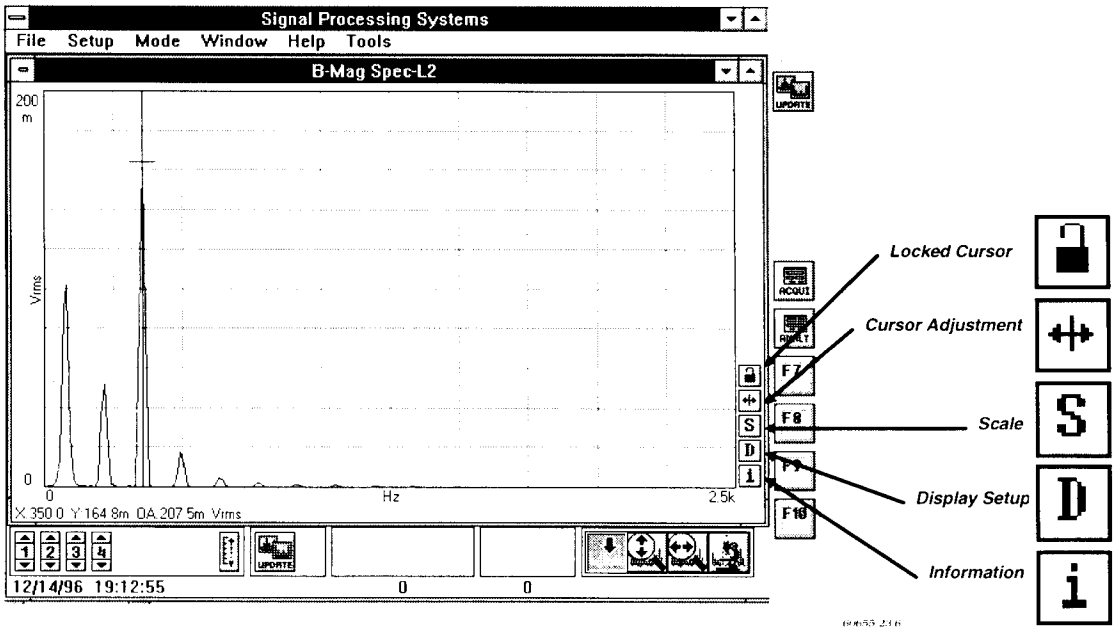
On time domain displays, the values are the actual sample point measured by the A/D converter.

Other Cursor Readout functions

Many other functions can be invoked with the use of the cursor. These functions become active when used in conjunction with the Marker functions. For more information on cursor readout see section 3-11.7.1, How to Invoke Markers

Display Controls

There are five display controls available for all display windows:



➢ **Locked Cursors Control**

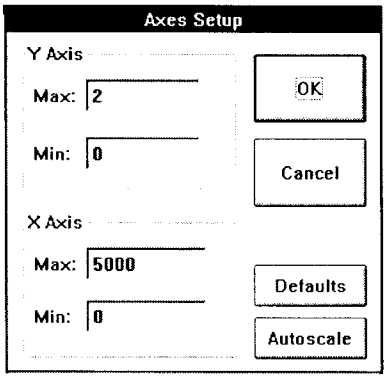
Selection of the cursor lock will invoke simultaneous cursor movement on like-domain multiple displays, with more than one display on the screen. When this icon is selected, the active display will become the master in a master-slave relationship.

➢ **Cursor Adjustment Control**

The cursor adjustment hides the display cursor arrow and allows movement of the data cursor using the trackball, or external mouse.

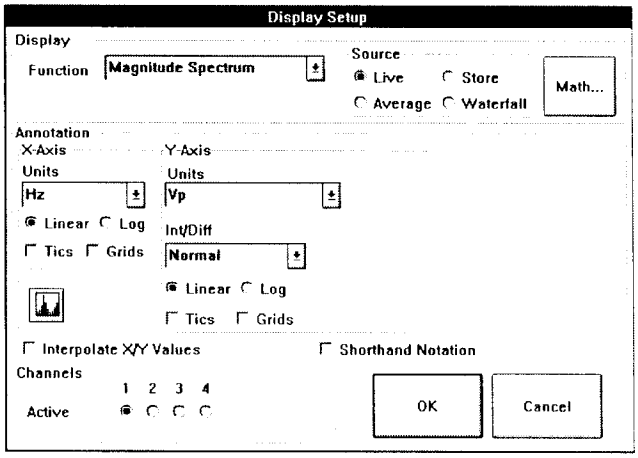
➢ **Scale Control**

Selecting **Scale** invokes the **Axes Setup** menu for the current display.



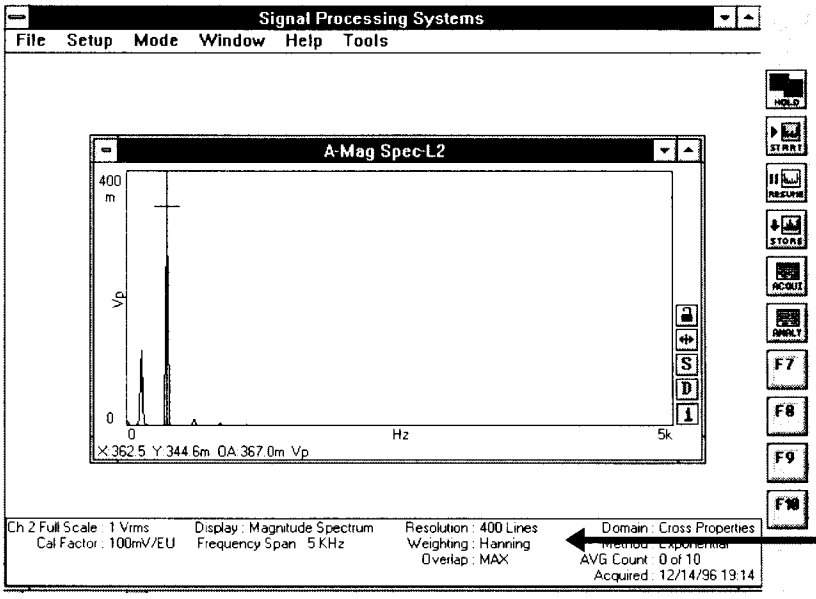
➢ **Display Setup Control**

Selecting display invokes the **Display Setup** menu for the *current* display.



➢ **Information Control**

With the display cursor arrow on this icon and the trackball button held down, display information will appear on the screen as shown in the following example.



For compressed time displays, there is an additional limits control when the SPS390 is in **HOLD** and data is available in the extended recorder memory for Playback. For waterfall displays, a Waterfall Record/Profile Selection control is available. For waterfall cascade displays, Z–Axis controls are also available.

☞ *Depending upon the size of the display, all or some of these controls may be visible.*

3–12.3 How To Create a Display Window

Display windows are created by using the **New Display** command (**Alt+N**)in the **Setup** menu.

The SPS390 allows up to nine display windows. After nine displays have been created, you cannot create more without first disposing of some of the existing display windows.

Before discussing modification and removal of display windows, it is necessary to introduce the concept of the active display window.

3–12.4 The Active Display Window

There is always a "privileged" display window at all times, unless there are no display windows at all. This window is called the *active* or "hot" display window. Any display window may be made active by clicking anywhere on it with the trackball cursor. The active display window can be distinguished from other display windows by its highlighted title bar and is always completely visible ("on top of") all the other display windows.

3–12.5 How To Remove the Active Display Window

There are a variety of methods for removing the active display window. Two that use only the trackball are:

Click on the control-menu box located in the upper left-hand corner of the display window (the active display window is the only one with a control-menu box). Choose Close —

 Close icon

or

— double click on the control-menu box.

3–12.6 How To Modify a Display Window

The settings for the active display window can be changed using the **Display** command (**Alt+D**) in the **Setup** menu. When this command is issued, the **Display Setup** dialog is invoked with all parameters defaulted to the current settings for the active display window. When the values in the dialog are changed and the **OK** button is clicked, the settings for the active display window are updated and the display window immediately changes to reflect the new settings.

3–12.7 How To Iconize a Display Window

It is sometimes desirable to get a display window "out of the way" without removing it. This can be done by iconizing it—changing it to an icon, or picture object, which resides near the bottom of the screen. The icon is labeled with the same title as the original display window so it can be restored later.

To iconize a display window, click in the minimize box located in the upper right-hand corner of the *active* display window. You may need to retile the other display windows using the **Tile** command (**T**) or (**Alt+T**)under the **Window** Menu or move them around in order to see the new display window icon. To restore an iconized display window to its original size and location, double click on its icon.

 Iconize icon

3–12.8 How To Maximize a Display Window

It is also sometimes desirable to make a display window as large as possible in order to inspect finer trace details. This can be done by maximizing it. When a display window is maximized, it fills up most of the screen and hides all other display windows, including iconized display windows.

To maximize a display window, click in the maximize box located in the upper right-hand corner of the display window. You will note that the display window "disappears" and that its contents now fill up the entire frame window. In addition, the title of the display window is appended to the frame window title and a new icon appears at the right-hand side of the Main Menu bar. This is the restore icon. Clicking on it restores the display window to its original size and location.

 Maximize icon

 Restore icon

3–12.9 How To Group a Display Window

Display windows can also be organized as a group using the **Window** Menu options **Tiles** and **Cascade**. See that section for details on grouping display windows.

3–12.10 How To Move a Display Window

Display windows can be moved independently of one another by clicking and holding on their title bars, then dragging the outline of the display window to the desired position. You cannot drag a display window outside the boundaries of the frame window.

3–12.11 How To Resize a Display Window

Display windows can be resized by clicking and holding on one of their four sides or four corners and dragging in the direction of the cursor until the outline is the desired size. When the trackball button is released, the display window will expand or contract to the size of the outline.

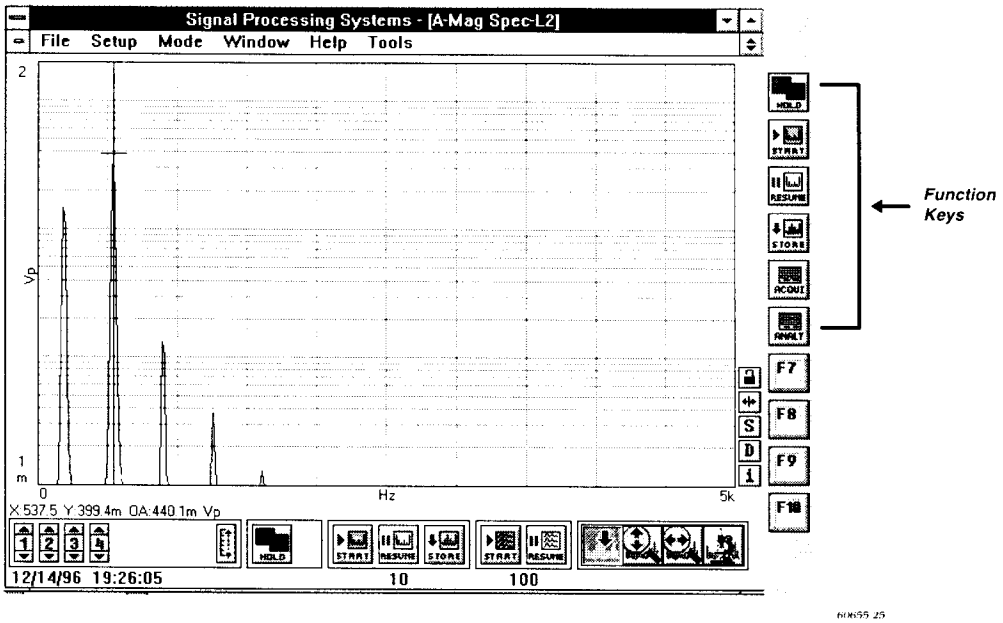
Display windows have a minimum allowable size and cannot be made smaller than this size using the resizing cursors. If an attempt is made to make the display window smaller than this minimum size, the display window will "bounce back" to the minimum size.

NOTES

3–13 FUNCTION KEY AREA

3–13.1 Function Key Controls

There are six controls located in the Function Key Area. These keys are "short-cuts" to the acquisition parameters and analysis parameters. You can click on the control in the Function Key Area just as if it were the control in the control area or a menu selection.



3–13.2 Keyboard Function Keys

If you have the SPS390 keyboard connected, the controls in the Function Key Area can also be activated by using the keyboard function keys (**F1–F6**). F1 corresponds to the uppermost function key control while **F6** corresponds to the lowest. **F5** and **F6** invoke the Acquisition and Analysis dialogs, respectively.

The keyboard function keys are only active when the main SPS390 window is active. If the function keys do not respond, ensure that the SPS390 title bar is highlighted (located above the main menu), indicating that the main window is active. To make the SPS390 main window active, click on the SPS390 title bar.

3–13.3 Summary

To perform one of the functions specified by the function keys, you can either:

- Click on the control in the control area, or
- Click on the control in the function key area.

NOTES

3–14 SCREEN CONTROL AREA

3–14.1 Screen Control Group

The control group activates the operational functions of the SPS390. The operational functions include:

- Gain selection and overload control/autoranging
- Update and hold
- Averager controls
- Waterfall controls
- Cursor controls
- Frequency control
- Display controls

These functions can be activated by:

- Moving the trackball cursor over the desired function, then pressing the trackball selector button, *or*
- Pressing the designated function keys on the optional keyboard.

The appearance of all SPS390 controls reflects the operation that will be performed upon activating the control rather than on the current mode of the SPS390. For example, when the update/hold control displays "Hold", the SPS390 is in update mode and vice-versa.

3–14.2 Overload Control Group

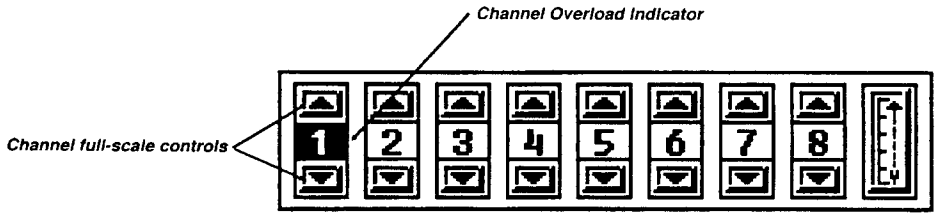
At the very left of the control area is the overload control group. Each overload control consists of two channel gain controls (one labeled with an up arrow, one with a down arrow), and an overload Indicator (labeled with the channel number). The number of controls indicates the number of channels available with your SPS390. The presence of these controls does not reflect whether the channel is active or inactive.

These controls are used to detect channel overloads and then to adjust the channel gain to remove the overload condition (channel underflow conditions are not indicated by the SPS390). The values of these controls are on the **Acquisition Setup** dialog and listed in the display info box.

In addition to the individual gain controls, there is one master AutoRange control that will select the most appropriate gain for each channel without saturating the input.

Channel gain should be set for the full amplitude range of the signal to be analyzed, but without overload. Full utilization of the input level range will optimize A/D conversion and result in more accurately resolved data.

An overload condition occurs when the signal input voltage exceeds the full-scale maximum for a channel. This results in a "clipping" of the signal, which distorts the channel data. Clipping appears as false "pulses" in the data displays and will result in false amplitude and spectral displays. The controls in the overload control group provide a convenient means for resetting the channel full-scale voltage in response to overload without having to invoke the **Acquisition Setup** dialog to do so. However, initial settings should be made on the **Acquisition Setup** dialog and then adjusted by the gain controls as required.



3–14.2.1 Channel Full-Scale Controls

There are two channel full-scale controls: the increase channel full-scale control at the top, labeled with an up-arrow, and the decrease channel full-scale control at the bottom, labeled with a down-arrow. By clicking with the trackball cursor on the appropriate control, you either increase or decrease the full-scale range for the indicated channel.

3–14.2.2 Channel Overload Indicator

The channel overload indicator is labeled with the channel number. During a channel overload condition, the indicator is highlighted (on color systems, it changes from gray to red). When the overload condition is cleared, the indicator returns to its normal appearance.

3–14.2.3 Audio Overload Indication

The SPS390 initialization file contains an entry which will enable an audible signal during overload. The default condition has the audible tone enabled at a frequency of 1000 Hz when an overload condition is detected on any active channel. The audible tone can be turned off or its frequency changed from the Preferences Setup menu.

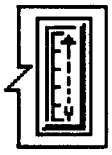
3–14.2.4 Overload Condition

When an overload condition is indicated, click on the channel gain up arrow control until the indicator clears.

During free run operation, overloaded signals are added to the averager. When an overload occurs while triggering is enabled, the current data will automatically be rejected from the averager.

☞ *When the SPS390 is put into **HOLD**, the overload signals on all channels are cleared.*

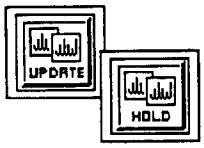
3–14.2.5 AutoRange Control



AutoRanging for each active channel can be activated by clicking on the AutoRange selector to the right of the individual channel gain controls. When AutoRanging is activated and acquisition is resumed, the SPS390 will acquire data according to parameters set on the **Acquisition Setup** dialog. The SPS390 will choose the highest gain setting for each channel that will not cause clipping. This value will then be used for the gain until AutoRanging is activated again, or if the gain is manually changed via the channel gain controls or full scale voltage parameter on the **Acquisition Setup** dialog.

AutoRanging requires approximately 500 data points of a continuous signal to determine an accurate setting. Therefore, AutoRanging at low frequencies could take several seconds.

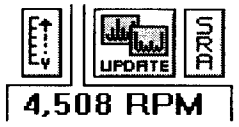
3–14.3 Update/Hold Control

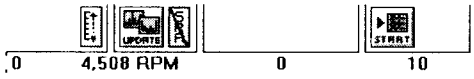


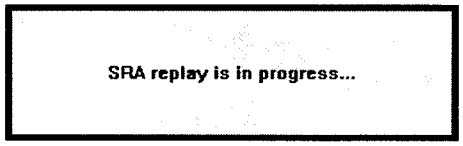
The **UPDATE/HOLD** control is located in the control area between the overload control group and the averager control group. It controls the global data acquisition mode for the SPS390.

If the **Update/Hold Control** has been selected into the **Hold** condition and the **Signature Ratio Option** (SRA) has been activated a new control appears to the right of the **Update/Hold** button. This button is the SRA replay button. This button allows for recalculations of Signature Ratio held data under different processing parameters, than were used during the initial capture of the SRA data. If an SRA "Replay" of data is in progress the SRA button has a diagonal line through it to

indicate the Cancel SRA replay status of the icon. Pressing the SRA replay cancel button may take up to 5 seconds to actually stop the replay.







3–14.3.1 Update Control

Clicking on the **UPDATE** control places the SPS390 in update mode; the SPS390 can acquire new signal data to its recorder memory and will update the appropriate display window traces provided that triggering conditions have been met.

☞ *See the sections on triggering in the description of the* ***Acquisition Setup*** *dialog and recorder memory.*

Although data is acquired synchronously, displays are updated synchronously. Therefore, live displays may show data from slightly different times. When the SPS390 is placed in **HOLD**, all displays are updated from the same instant in time.

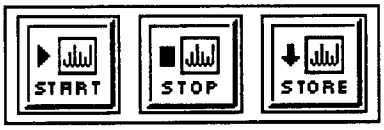
3–14.3.2 Hold Control

Clicking on the **HOLD** control places the SPS390 in hold mode. Signal acquisition is suspended and data for all displays are re-displayed coherently (i.e., the SPS390 continues to display the data most recently acquired, not necessarily displayed, just before the SPS390 was placed in hold mode). When in **HOLD**, data in the SPS390 recorder memory can be reviewed by manipulating cursors available on compressed time displays

☞ *See the sections on extended recorder and cursors for more information on how to manipulate data in playback.*

When the SPS390 is placed in hold mode, the averager automatically stops and all display windows displaying data from the averager display the most recent results of the Averager. To restart averaging, you must use the controls provided in the Averager Control Group to restart the averager, after the SPS390 is placed back in update mode.

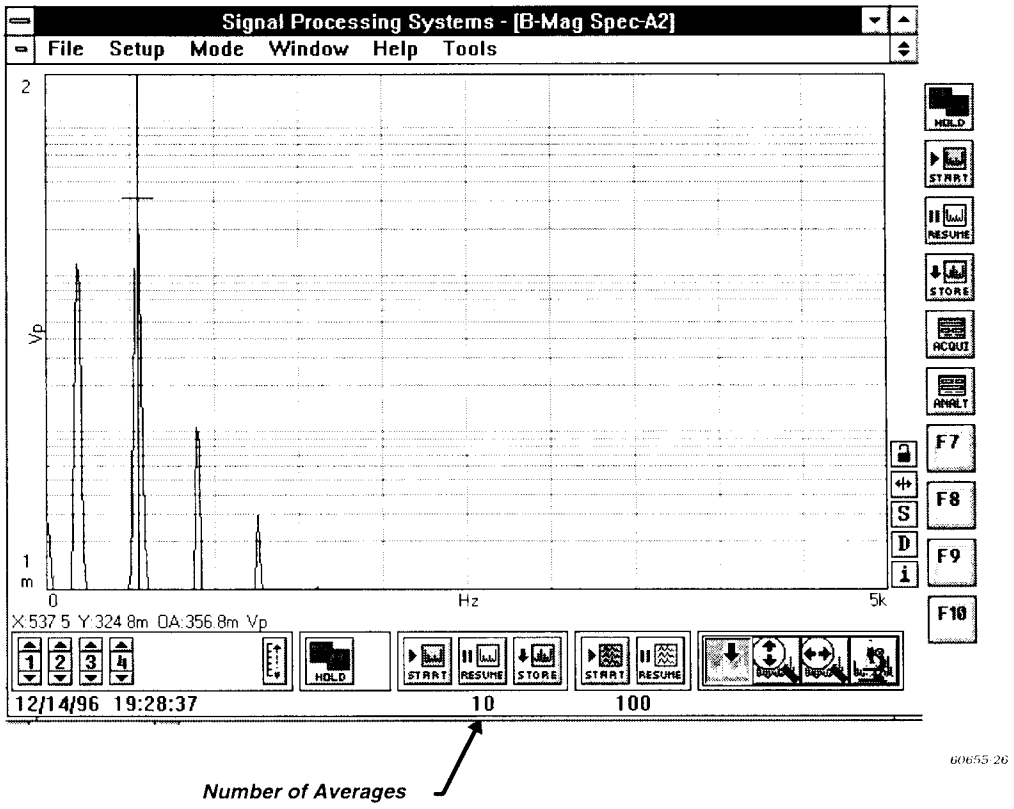
3–14.4 Averager Control Group



The averager control group lies within the control area between the update/hold control and the waterfall control. This group consists of three averager controls: average **START**, average **STOP/RESUME/SINGLE**, and average **STORE**.

The averager controls are dynamic. That is, different controls appear and disappear depending on the current state of the averager. Only valid averager controls are displayed. Thus, it is not possible to perform an invalid averager operation.

The number of averages in the current averager memory is displayed on the screen, near the averager controls, at all times. In the example shown below, 10 averages were taken.

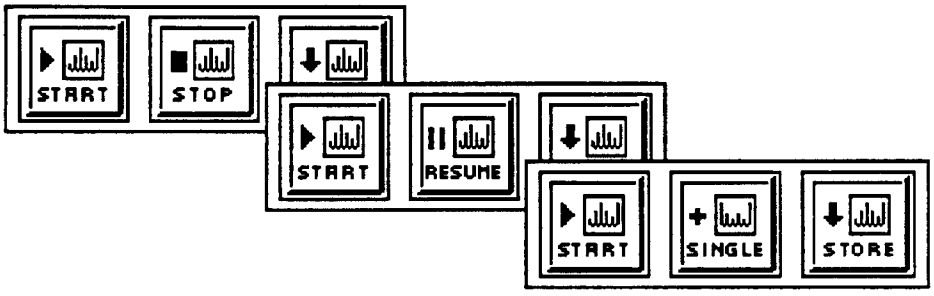


For linear averaging, the number corresponds to the average number when averaging was halted. For exponential averaging, it corresponds to the current average count until the desired exponential number is reached; then that number is shown as exponential averaging continues.

3–14.4.1 Average Start Control

This control starts the SPS390 data averager. If the averager is currently running, activating the start control is analogous to an average "reset." The current contents of the averager are cleared and the averager starts over.

3–14.4.2 Average Stop/Resume/Single Control



This control is actually several controls, depending upon the current averager status.

Stop Control

The stop control appears when the averager is running (but not in the Single average method, as specified in the **Analysis Setup** dialog).

☞ *Clicking on the **STOP** control pauses the averager to prevent incoming data from being averaged.*

Resume Control

The resume control appears when the averager has been stopped by use of the stop control. You cannot resume the averager if it has stopped by meeting the stop criterion as defined in the **Analysis Setup** dialog.

☞ *Clicking on the **RESUME** control will restart the averager from the state it was in when the stop control was activated.*

Single Control

The single control appears when the averager mode is single as specified in the **Analysis Setup** dialog.

*Clicking on the **SINGLE** control causes one block of analyzer data to be added to the current average.*

3–14.4.3 Store Control

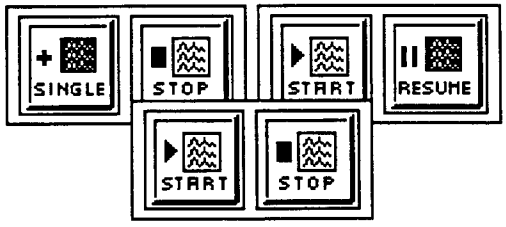
The **STORE** control is used to store the current averager contents to the averager store memory. The data from the current averager in the selected Domain for each active channel, as specified in the **Analysis Setup** dialog, is stored in the averager store memory.

Changing most acquisition or analysis parameters while the averager is active will automatically stop the averager. The averager must then be manually restarted. If the averager is manually stopped, before a target count is reached, the full scale voltage range can be changed and the averager process resumed without invalidating the accumulated average.

The averager operates on normalized data; therefore, the current voltage range is always accounted for. However, the Y-axis amplitude value of the displayed averager trace does not change when the input full scale range is changed. You must use the display expand or autoscale control to change the viewing window scale.

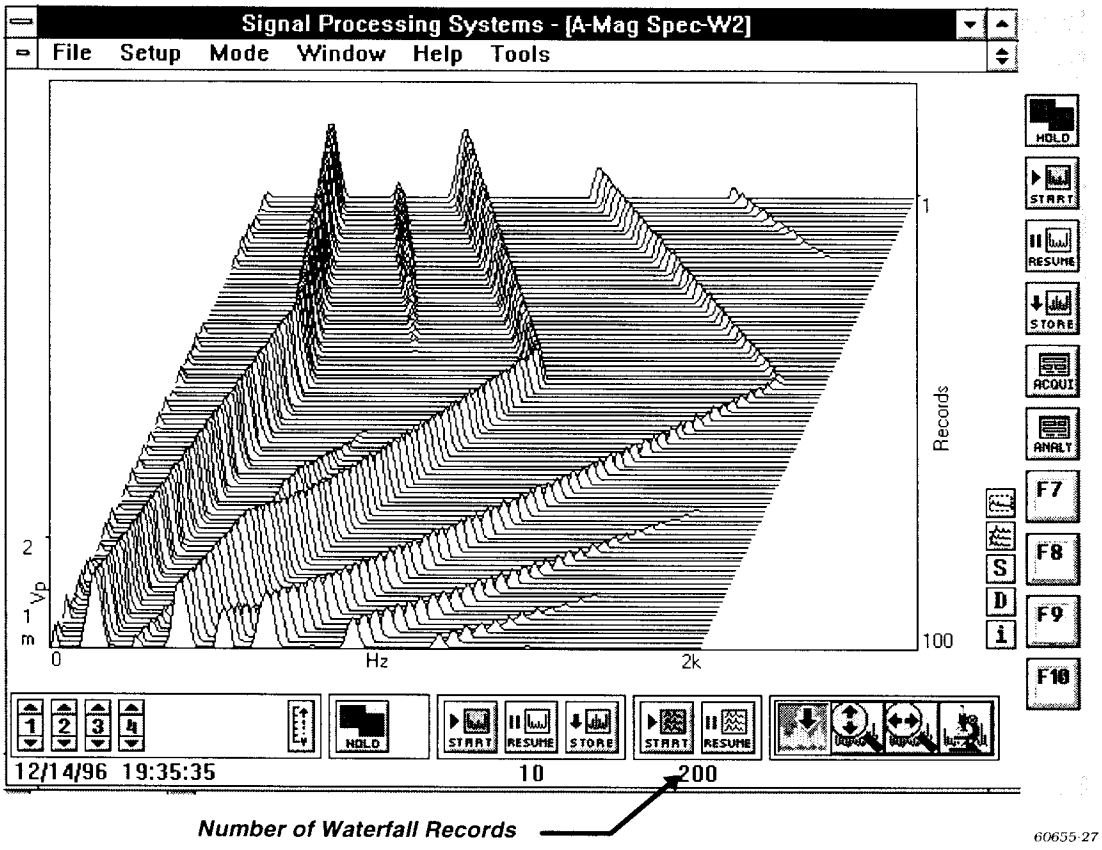
3–14.5 Waterfall Control Group

The waterfall load controls are located in the control area between the averager control group and the cursor controls. This group controls the loading of data into waterfall memory and consists of four waterfall controls: waterfall **START**, waterfall **STOP**, waterfall **RESUME**, and waterfall **SINGLE**.



The waterfall controls are dynamic, that is, different controls appear and disappear depending on the current state of the analyzer. Only valid waterfall controls are displayed. Thus, it is not possible to perform an invalid waterfall load operation.

The number of waterfall records in the current array is displayed beneath the waterfall **START/STOP** controls. This number (the same for all active waterfall channels) shows the total number of records available for display per active waterfall channel.



It is not necessarily the number of records being currently displayed. In the example shown, 200 records have been taken and are available for display, but only 100 records are shown on the screen. The operator can scroll through 100 additional records, using the simple scroll controls. The first records taken ("oldest" in time) have the smallest record numbers; in this case, records 1 through 100 are the first 100 records placed in the waterfall array.

3–14.5.1 Waterfall Start Control

The waterfall **START** control starts loading data into waterfall memory from the waterfall source according to the specified load parameters as specified on the **Waterfall Setup** dialog box. If data loading is currently in effect, activating the start control is analogous to a waterfall memory "reset" of the current contents of the waterfall memory are cleared and waterfall loading starts over from the beginning of memory.

3–14.5.2 Waterfall Stop Control

The **STOP** control appears when data is actively being loaded into waterfall memory (except for Single Load). Clicking on this control "pauses" waterfall load procedure to prevent incoming data from entering waterfall memory. When **STOP** is pressed, each active waterfall display is refreshed with the most recent waterfall data.

3–14.5.3 Waterfall Resume Control

The **RESUME** control appears when waterfall load has been stopped by use of the **STOP** control. You cannot resume loading waterfall memory if it has stopped by meeting the number of records to load in **Stop When Full** load method, as specified in the **Waterfall Setup** Dialog. Clicking on the **RESUME** control will restart loading waterfall memory from the state it was in when the **STOP** control was activated, without clearing the previous contents of waterfall memory. This control is not available when waterfall load is set to **SINGLE**.

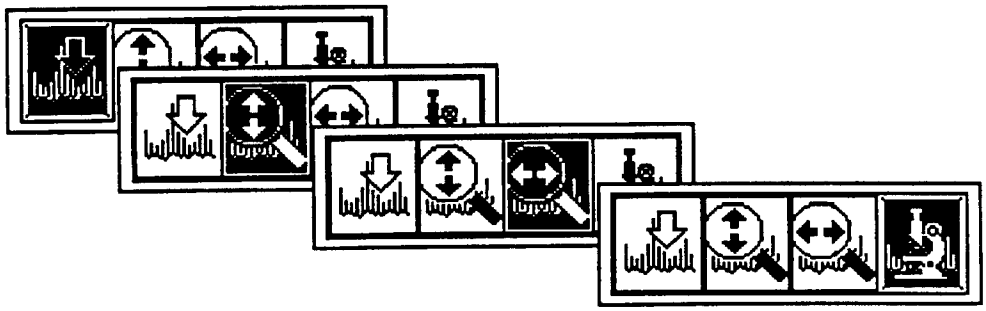
3–14.5.4 Waterfall Single Control

The **SINGLE** control appears when the waterfall load control is Single (as specified in the **Waterfall Setup** Dialog) and data has been loaded into waterfall memory by the **START** control. Clicking on the **SINGLE** control causes one more block of data to be added to the waterfall memory from the specified data source. The **STOP** control is used to stop single loading and to allow the contents of waterfall memory to be cleared by presenting the **START** control, rather than the **SINGLE** control.

The appearance of the waterfall control reflects the operation that will be performed upon activating the control rather than on the current mode of the SPS390. Thus, when the control displays "Stop," the SPS390 waterfall is in the update mode and vice-versa.

Note that data is loaded into the waterfall memory at the SPS390 DSP processing rate, not the updated display rate. Thus, when placing the waterfall cascade display into the Stop mode, the screen will be repainted with records much more closely spaced in time than originally displayed. A "live" waterfall display may show only every tenth record being stored, in as much as up to 148 records/second can be processed and stored into the waterfall array.

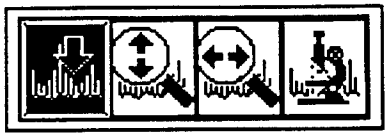
3–14.6 Cursor Control Group



The cursor control group contains three controls that determine the type of cursor available to the display windows. One, and only one, cursor type, or frequency control (see next section) is active at any given time. Selecting one cursor type, or the frequency control, will deactivate all other cursor type or frequency control selections. The current mode is indicated by highlighting of the corresponding cursor or frequency control.

There are three display cursor types: standard, or running cursor, horizontal display expand, or vertical display expand.

3–14.6.1 Standard Cursor Control



The **Standard Cursor** is useful for obtaining a numeric read-out of trace coordinates. The standard cursor is displayed as a vertical line with a (+) symbol at the intersection of the X and Y coordinates at the current cursor position. The coordinates of the trace where the cursor symbol is shown are displayed at the bottom of the display window.

Typically, the X and Y axis values and the overall (OA) level, in the axis units, are displayed for cursor read-out. For orbit displays, time is displayed as the third cursor value. For Nyquist displays, frequency is displayed as the third cursor value. For octave displays, the octave band and overall level are displayed as the third and fourth cursor values, respectively.

When the standard cursor is active, the cursor can be moved in two granularities: coarse (general positioning) and fine (specific line or point positioning).

Coarse Positioning

The cursor line indicator appears as a thick downward-pointing arrow. Clicking within the trace rectangle will move the cursor select Line to that location. Use this method to place the cursor in the general vicinity of interest.

Fine Positioning

The position of the standard cursor can be fine tuned (line by line) by selecting the display controls on the desired display window, and moving the trackball (or mouse) right or left.

If there is no movement of the trackball within 10 seconds of selecting the display control cursor, cursor movement will revert back to coarse positioning.

When using the standard cursor on a compressed time display when the SPS390 is in **HOLD**, all LIVE displays are updated with the block of data that follows the compressed time cursor. This allows you to enter playback mode and access data that has been acquired to the extended recorder memory.

3–14.6.2 Vertical Display Expand Cursor

The vertical display expand cursor is useful for shrinking and expanding the trace display along the vertical axis. Use of this cursor has no effect on the state of the analyzer; it only modifies the display.

In this mode, there are actually two related cursors available, depending on whether the cursor is within the trace rectangle or not.

Vertical Display Expansion

If the cursor is within the trace rectangle, it appears as a magnifying glass with two vertical arrows inside pointing outward. Clicking with this cursor decreases both the minimum and maximum y-axis limits for a bipolar display by one range (ranges

are defined as values of the form 1, 2, 4, 5 x 10n). The minimum absolute value for a limit is the next range greater than 1/10,000th of the absolute value of the original limit.

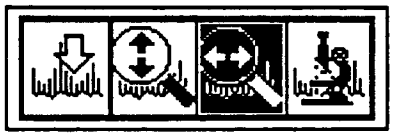
For a unipolar display (one whose minimum limit is always 0.000), the minimum limit does not change. For a bipolar display (whose limits are -n.nnn and +n.nnn), both limits decrease symmetrically so that 0.000 is still the vertical center of the display.

Vertical Display Contraction

If the cursor lies outside the trace rectangle, it appears as a magnifying glass with two vertical arrows inside pointing inward. Clicking with this cursor causes the display to revert to displaying the full-scale vertical range (as derived from acquisition setup dialog's full scale and sensitivity settings).

It is recommended that the cursor control be left in the standard cursor mode to prevent accidental frequency changes or display expansion/contraction.

3–14.6.3 Horizontal Display Expand Cursor



The horizontal display expand cursor is useful for shrinking and expanding the trace display along the horizontal axis. Use of this cursor does not alter the data. Instead, it modifies the number of spectral lines or time points of the trace being displayed.

In this mode, there are actually two related cursors available, depending on whether the cursor is within the trace rectangle or not.

Horizontal Display Expansion

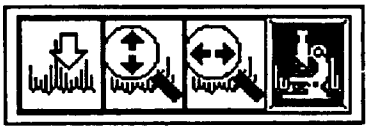
If the cursor is within the trace rectangle, it appears as a magnifying glass with two horizontal arrows inside pointing outward. Clicking with this cursor causes the number of spectral lines or time points currently being displayed to be halved, with the cursor position becoming the new center of the display. The process may be repeated until the number of spectral lines or time points would fall below the minimum number of 12 spectral lines or time points.

Horizontal Display Contraction

If the cursor lies outside the trace rectangle, it appears as a magnifying glass with two horizontal arrows inside pointing inward. Clicking with this cursor causes the display to revert back to displaying the full number of spectral lines or time points (as specified in the **Analysis Setup** Dialog).

The standard cursor will not automatically maintain its position when using horizontal display expansion. Instead, the user must manually reset the standard cursor after every expansion operation.

3–14.7 Frequency Control



The frequency control is used to increase or decrease the frequency range when the SPS390 is in spectrum baseband mode or octave mode, or to select the center frequency and frequency span when in spectrum zoom mode. (These modes are set by the analysis mode selector and zoom mode setting in the sampling method group of the acquisition setup dialog.)

Selecting the frequency control deactivates the cursor control modes and displays a frequency indicator in the selected trace window. The frequency indicator is a right or left arrow in baseband mode, or a magnifying glass in zoom.

The frequency control is really just a shorthand method for changing the frequency span and center frequency settings of the acquisition setup dialog. Since these settings are global, it does not matter which display window is used to perform the cursor operations since all display windows are simultaneously affected. Thus, it is not possible to perform one operation (e.g., Zoom In) in one display window and its opposite (Zoom Out) in another display window, or to change the baseband frequency in only one window.

3–14.7.1 Spectrum Baseband and Octave Modes

In these modes, there are two related frequency indicators displayed, depending on whether the indicator is within the left or the right half of the trace rectangle.

Frequency Span Increment

If the indicator is in the right half of the trace rectangle, it appears as a right-pointing arrow with the word "FRQ" inside. Clicking when this indicator is activated increases the frequency span limit up to the next "range" frequency.

Frequency span limits are in the ranges from 1 Hz to 100 kHz for 2-channel operation or 1 Hz to 40 kHz for 3- to 8-channel operation in a 1, 2, 4, 5 sequence.

The sequence is 1.25 kHz, 2.5 kHz, 5 kHz, 10 kHz, and 20 kHz for the octave mode.

Frequency Span Decrement

If the indicator is in the left half of the trace rectangle, it appears as a left-pointing arrow with the word "FRQ" inside. Clicking with this indicator activated decreases the frequency span limit to the next lower "range" frequency.

Frequency span limits are in the ranges from 100 kHz down to and including 1 Hz for 2-channel operation or 40 kHz down to and including 1 Hz for 3- to 8-channel operation.

The sequence is 20 kHz, 10 kHz, 5 kHz, 2.5 kHz, and 1.25 kHz for the **Octave** mode.

3–14.7.2 Zoom Mode

In spectrum **Zoom** mode, there are also two related indicators displayed, depending on whether the indicator is within the trace rectangle or not.

Zoom In

If the indicator is *within* the trace rectangle, it appears as a magnifying glass with a "+" symbol inside. Clicking with this indicator activated decreases the frequency span to the next lower range frequency (frequency ranges are of the form 1, 2, 4, 5 x 10n Hz down to and including 5 Hz (or to the lowest span permitted by the amount of XRec memory). In addition, the center frequency changes to the frequency indicated by the position of the indicator within the trace rectangle. Thus, if the indicator is in the center of the trace rectangle at the click, the center frequency does not change. If the indicator is to the left of center, the center frequency will decrease; if it is to the right of center, it will increase. In **Zoom** mode, the center frequency is constrained as follows:

span/2 < center frequency < 100 kHz - span/2 (2 channels)
span/2 < center frequency < 40 kHz - span/2 (3–8 channels)

Zoom Out

If the indicator is *outside* the trace rectangle, it appears as a magnifying glass with a "–" symbol inside. Clicking with this indicator activated restores the zoom span and center to those in effect when the user last clicked while the Zoom-In indicator was active. If the total number of clicks using the Zoom-Out indicator exceeds the total number of clicks using the Zoom-In indicator, the zoom frequency span is automatically set to the maximum (100 kHz for 2-channel operation, 40 kHz for 3- to 8-channel operation) and the center frequency is set to half the span (50 or 20 kHz, respectively).

In zoom mode, the frequency control is not available for displays whose sources are storage memory (see the section on the **Display Setup** Dialog).

3–14.8 Display Controls

There are five display controls available for all display windows:

- Locked Cursor
- Cursor Adjustment
- Scale
- Display Setup
- Information

For compressed time displays, there is an additional limits control when the SPS390 is in **HOLD** and data is available in the extended recorder memory for playback. For waterfall displays, there is a waterfall record/profile selection control which allows further waterfall data selection in waterfall data recall mode. For waterfall cascade displays, Z-Axis controls are also available.

3–14.8.1 Locked Cursors Control

The cursor can be controlled from one display and automatically move to the same X coordinate in "similar" displays. Each display has a padlock icon, which can be opened or closed. A closed padlock indicates that the cursor is locked on this display, and it can either control other "similar" locked displays or be controlled from other "similar" locked displays. An open padlock indicates that the cursor action only affects this trace. You open and close the padlock by clicking on this icon.

"Similar" displays are traces that agree in type (time, spectrum, orbit, Nyquist, compressed time, etc.), resolution (or block size), and frequency. For example, when two time displays and two frequency displays are locked, the cursors for the time displays move in unison, and the cursors for the frequency displays move in unison, but the time and frequency cursors move independently of one another.

3–14.8.2 Cursor Adjustment Control

The cursor adjustment button allows fine tuning of the standard cursor. When the standard cursor is selected from the cursor controls, pressing this button allows you to move the cursor line by line (or point by point) left and right, by moving the trackball left and right. If a keyboard is available, you may move the cursor using the left and right arrow keys. When the desired cursor location is found, press the trackball button to stop the cursor and return to coarse positioning mode.

If the fine tune cursor select button is pressed and there is no trackball movement within 10 seconds, the cursor mode returns to coarse positioning.

For very dense displays, the cursor may not appear to be moving. This is due to the fact that many physical data points may be plotted on the same pixel of the viewing area. However, the cursor read-out values indicate the exact data coordinates in the selected units.

3–14.8.3 Scale Control

Selecting the scale function button "**S**" causes the **Scale** dialog to be activated. The scale dialog allows you to set specific minimum and maximum values for each axis to AutoScale the data, or to return to the default full-scale values.

To manually scale the axes, you may enter specific minimum and maximum values for the X and/or Y axis in the designated fields of this dialog, then press **OK**. Illegal or out of range (i.e., negative frequency values) will be ignored, and the previous value will remain unaltered. Some types of displays (i.e., coherence displays) will not allow manual scaling. To exit this dialog without changing the previous values, click over **Cancel**.

Alternatively, you may AutoScale the data in the display window to fill the maximum area of the window, by clicking over **AutoScale**. The new minimum and maximum values for each axis will be displayed in their corresponding fields, you may AutoScale the data any time and as often as required.

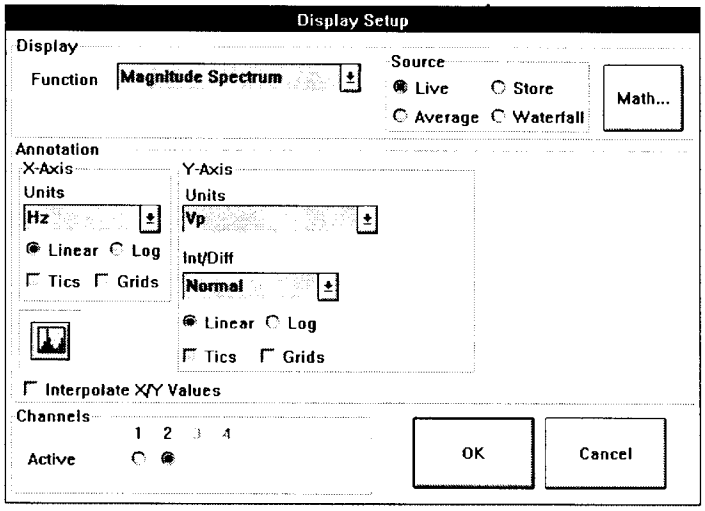
You may also use this dialog to return to the default full-scale axes limits by clicking over **Defaults**.

Once AutoScale is selected, display expand is disabled. You can return to the default scaling limits by selecting display control.

AutoScaling only adjusts the amplitude (Y) Axis, except for orbit and Nyquist traces. Use the appropriate axis Display Control to return the default scale for the desired axis.

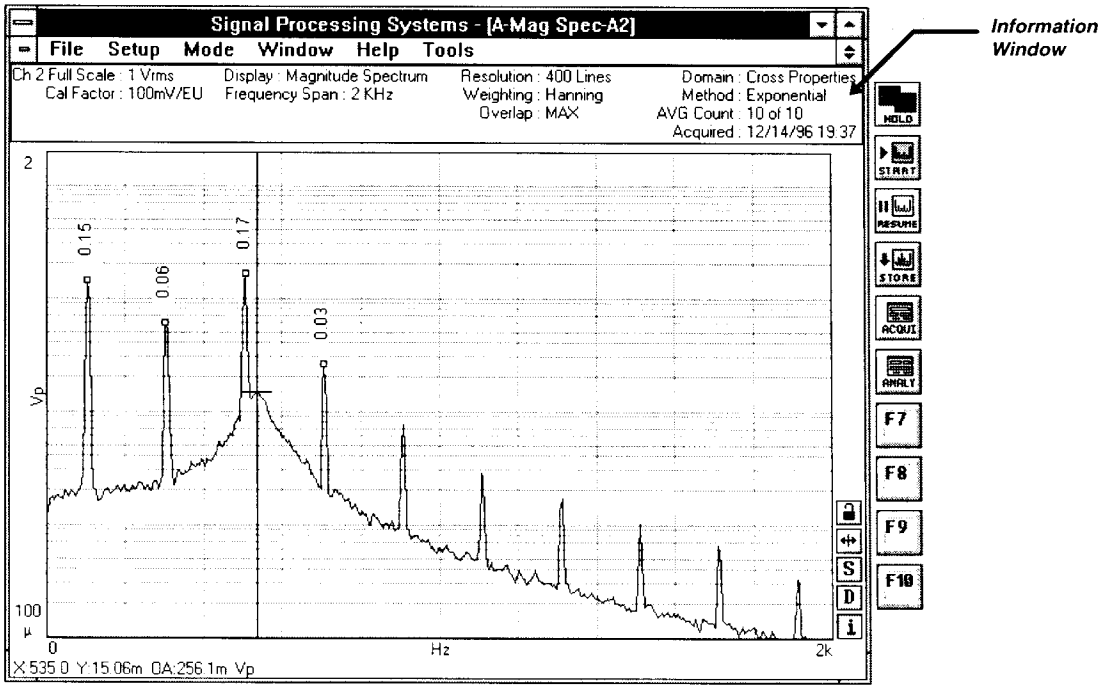
3–14.8.4 Display Setup

The display setup button "**D**" invokes the **Display Setup** dialog to allow you to modify the display parameters of the trace.



3–14.8.5 Information

The "**i**" button is located at the bottom right-hand corner of the display window. Clicking on the button brings up a pop-up window at the top of the screen containing additional information about the trace. In addition, the trace file name is highlighted in the Display Title box.



3–14.8.6 Limits

The limits selector button only appears on compressed time displays when the SPS390 is in **HOLD** and there is data available in its extended recorder memory. Setting limits allows you to place markers at specified start and end locations of recorder memory to delimit the range of data to be analyzed in playback mode.

Pressing the **Limits Control** button causes the limits cursor () to appear in the trace window. Move this cursor to the desired starting position on the compressed time display and press the trackball button to select the start point. Then drag the cursor to the desired end position, and press the trackball button to select the end point. While dragging the cursor, the desired range will be displayed in inverted video.

To cancel the current operation, move the limits cursor outside of the trace window. When the cursor symbol changes to "Click to Cancel," then press the trackball button.

To cancel the Limits (i.e., remove the current limits settings), double click on the limits button.

For more information on the use of limits, see the section on playback.

When using display expand or contract, the limits are retained, but may lay outside the expanded area. In this case, the entire display area is inverted.

If all compressed time displays are closed, the limits still remain active until update is pressed.

3–14.8.7 Waterfall Record/Profile Section

The use of this dialog is discussed in the waterfall record/profile selection section of the waterfall display options.

3–14.8.8 Waterfall Cascade Z Axis Controls

For waterfall cascade displays, Z–Axis controls are also available. The use of these controls are discussed in the waterfall display section of this manual.

4–THEORY OF OPERATION

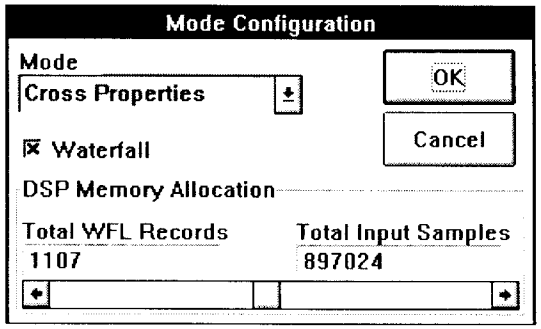
4–1 CONCEPT OF OPERATIONS

This section contains the SPS390 functional block diagram and discussions of analyzer related topics.

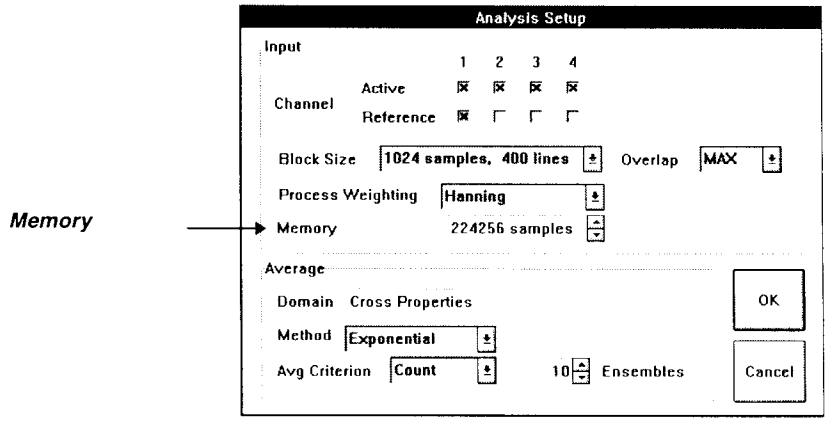
4–1.1 Extended Recorder Memory

In the SPS390, a minimum of 8192 samples per channel is always allocated for extended recorder memory. The maximum number of samples is dependent upon the system configuration (either 8 MB, 4 MB or 1 MB of DSP RAM) and selected analysis parameters, such as analysis mode, the number of active channels, and FFT resolution.

The *total* amount of memory *available* for the extended recorder can be proportioned using the memory allocation control on the **Mode** Menu.



The maximum number of samples per channel is calculated each time a dependent parameter changes, and can be obtained by pressing the up arrow on the memory control field of the **Analysis Setup** dialog.



If RPM readout is selected in the acquisition Setup dialog box, the same number of samples will be allocated for the tach buffer as the number of samples per active channel.

Some typical figures for maximum samples per channel in the spectrum and cross properties modes are:

Spectrum Mode							
8 MB				**4 MB**			
1 CH	2 CH	4 CH	8 CH	1 CH	2 CH	4 CH	8 CH
3,714,048	1,854,464	925,696	460,800	1,808,384	902,144	448,512	222,208
Cross Properties Mode							
8 MB				**4 MB**			
1 CH	2 CH	4 CH	8 CH	1 CH	2 CH	4 CH	8 CH
NA	1,851,392	922,624	457,728	NA	899,072	445,440	219,136

* The numbers in this table are typical (in samples). Actual numbers will vary according to the specific configuration of the SPS390.

This memory is always active and is the input memory buffer, regardless of whether it is used explicitly for extended recording. All of this memory can be used for pretrigger, and all but "blocksize" can be used for post trigger (negative and positive trigger delays). As data is acquired, the input memory is filled in a circular manner (i.e., when full, new data again starts entering into the beginning of memory).

In Free Run with a frequency span of 20 kHz or less, memory is continually refilled until HOLD is pressed. When displaying live data, the data (or FFT) is from the last previously acquired block. When Hold is pressed, all data in the Extended recorder memory is available.

In Free Run with a frequency span of 40 kHz or greater, only the *blocksize* number of samples is acquired into the Extended Recorder Memory, and then acquisition is paused for processing of this data. After processing, acquisition is resumed, starting again at the beginning of Extended Recorder Memory. Therefore, in this mode, only blocksize samples of Extended Recorder Memory are used.

There is currently no explicit provision for a "Stop when memory is full" condition. This can be accomplished by setting a single trigger negative delay equal to the selected memory size. You must make sure that a threshold is passed to trigger. This method must be used to acquire more than 1 blocksize into the Extended Recorder Memory when using frequency ranges of 40 kHz and greater.

4–1.1.1 Extended Recorder Memory and Triggering

In the triggered mode, for all frequency ranges, data is continually acquired into extended recorder memory until a trigger is detected.

When a nonrepetitive trigger is detected for a negative delay, one more block is acquired, then the system stops acquiring data. The last block (or FFT of) is displayed for LIVE displays, and all input memory prior to the end of the block is available.

When a nonrepetitive trigger is detected for a positive delay, the number of samples specified as the positive delay is acquired, and then the system stops acquiring data. The last block (or FFT of) is displayed for *live* displays, and all input memory prior to the end of the block is available.

For repetitive triggers, the extended memory is continually filled with new data while the trigger event is in the process of being detected. For frequency ranges of 20 kHz and less, extended memory may contain varying numbers of trigger events (which include the pre- or post-trigger samples), if the trigger event is less than the amount of memory in extended recorder memory.

If this condition exists, the extended recorder memory does not contain discrete events with a specific positive or negative delay number of samples, but also contains data that is acquired while waiting to detect the trigger.

For 40 kHz and greater, extended recorder memory will only contain one trigger event, plus the data acquired leading up to the event if the event is less than the maximum pre- or post-trigger delay.

4-1.1.2 Extended Recorder Memory and Zoom

The extended recorder memory is also used to achieve pseudo-real time zoom above 10 kHz (when center frequency + 1/2 frequency span exceeds 10 kHz). Data is first acquired into the extended memory and then immediately retrieved to perform the zoom spectrum calculation. Therefore, the amount of allocated XRec memory will directly determine the minimum zoom span. If the zoom span is expressed in terms of a zoom factor (e.g., for a 400-Hz span at an analysis range of 40 kHz, the zoom factor is
40 kHz/400 Hz or 100), the amount of memory required is approximately:

(BlockSize + 80) (zoom factor) (2)

samples per channel. From this example, and a blocksize of 1024 (400-line resolution), the amount of XRec memory required is approximately 220,800 samples per channel, which is well within the range of the SPS390.

If the required amount of memory is not available, the minimum zoom span will automatically be limited. You can determine this minimum value from the frequency span parameter on the acquisition dialog.

When the prime requirement for using the SPS390 is zoom, it is good practice to set XRec memory to the maximum value. If sufficient memory is not available for the desired zoom, changing the mode, channel, and blocksize parameters will allow further changes in memory size.

When pseudo-real time zoom is active, it may take a long time to acquire and process the data. For example, to acquire 441,600 samples of data at a frequency range of 40 kHz (102 kHz sample rate), it will take approximately 4 seconds just to acquire the data. The data must then be processed by the zoom transform algorithm, which will take a few additional seconds. Displays and averages will not be available until this processing is finished.

4–1.1.3 Viewing Extended Recorder Memory While Acquiring Data

LIVE compressed time displays are available for 20 kHz and below. These displays show the most current data entering from the right, moving to the left. All extended recorder memory is displayed, compressed to 512 min/max pairs. That is, the total available memory (e.g., 32768 samples) is divided by 512 × 2 to yield a compression ratio (e.g., 32). From each compressed block of data, the min and max values are displayed on the screen. The cursor can be moved to indicate the amplitude and relative time of a sample. Display expand is also available. While in a trigger mode, LIVE compressed time displays are "Not Available" until the trigger is detected.

☞ *For 40 kHz and greater, only 1 blocksize is displayed in the compressed time display.*

4–1.1.4 Manipulating XTIME Data—Playback

The system must be placed in HOLD to review extended memory data in "playback mode." At least one compressed time display (with cursors) must be available for selecting playback position and limits.

Moving the cursor on a compressed time display in HOLD will update other "LIVE" displays with data to the right of the cursor. The amount of data is determined by the current blocksize analysis parameter. You may change any analysis parameter (except the channel list) while in "playback" mode. This will invalidate the current AVGR, but it will allow examining "LIVE" data from the extended memory with different parameters, and will allow re-averaging. Changing the channel list will invalidate the Extended Recorder Memory.

Changing any acquisition parameter (except EU) has no effect on the extended recorder memory or displays. Changes to the acquisition parameters do not take effect until UPDATE is pressed.

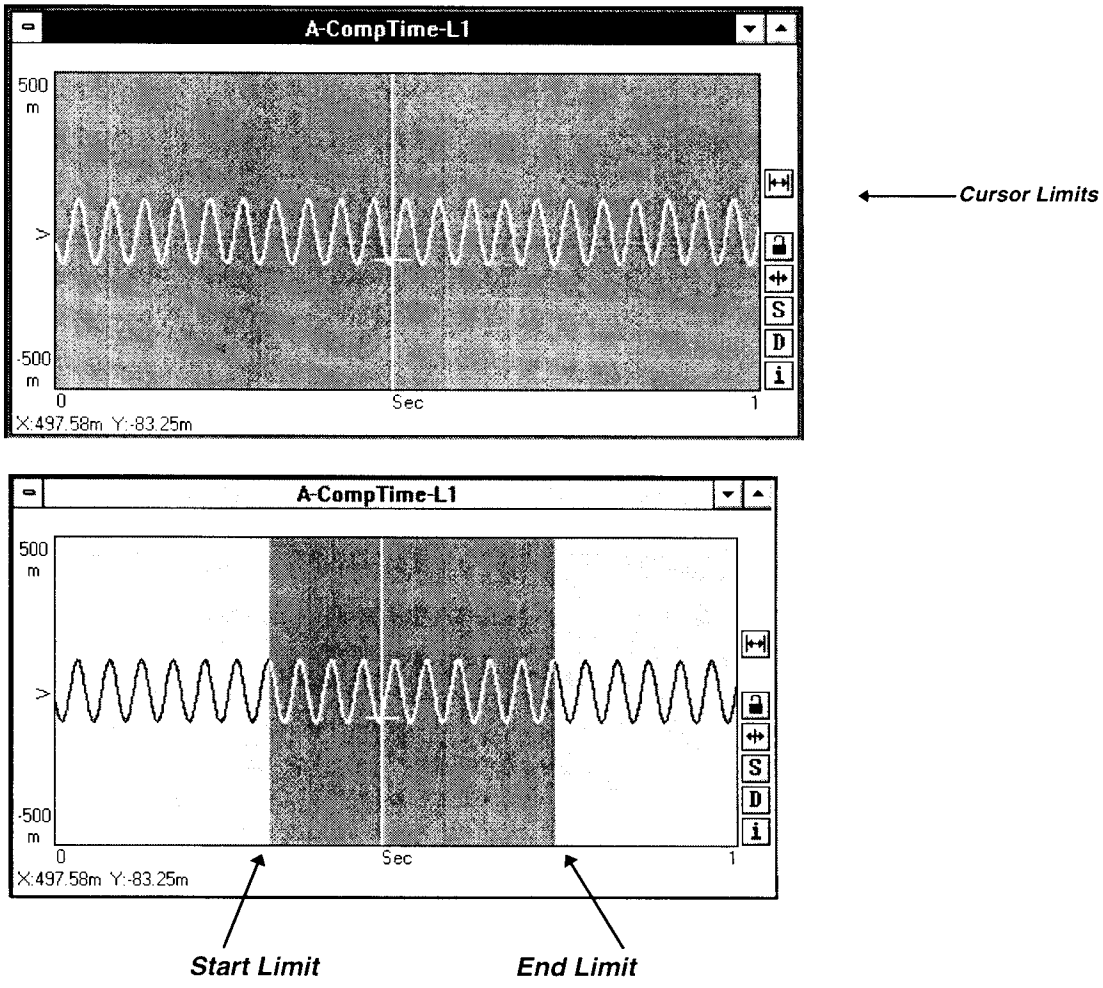
4–1.1.5 Averaging XTIME Data

Single (+1) Averaging from XREC

Simply select **Manual Averaging** from the **Analysis** dialog and then position the cursor to the desired section of extended recorder memory. Use the **Start** and **+1** buttons as you would for LIVE data.

Continuous Averaging from Extended Recorder Memory

You are able to automatically average data in extended memory by selecting start and end limits via the limits cursor. The section of data between the start and end points (rounded to the next lowest blocksize) is displayed inverted, and will be used for averaging when AVG START is pressed while in HOLD. The number of averages will be automatically calculated based on the section of data, blocksize and overlap. This number WILL NOT be reflected on the Analysis Dialog. The Dialog will show the selected "Real Time" target. You must use the INFO box on any real time display (the current Compressed Time display is most convenient) to see the calculated Target count while in playback. The limits can be repositioned, and/or new analysis parameters can be selected, and the averager can be restarted.



4–1.1.6 Save/Recall XREC Data

The system must be in HOLD when extended recorder memory data is saved or recalled. If not, when the **Save** or **Recall** selection is made, the system is put into **HOLD**. Save XREC will save all extended recorder memory data from all active channels into the named file. The current acquisition and analysis parameters are also saved with the file. When extended recorder memory data is restored from a file, the current state of the machine could change, as the acquisition and analysis parameters that were stored with the data are loaded into the machine.