Operator's Manual
SD385 NOMAD Portable Signal Analyzer
Part Eight

Legacy Manual

COGNITIVE VISION, INC.
7220 Trade Street, Suite 101
San Diego, CA 92121-2325 USA

analyzers@cognitivevision.com
www.cognitivevision.com

Tel: 1.858.578.3778 / Fax: 1.858.578.2778
In USA: 1.800.VIB.TEST (842.8378)

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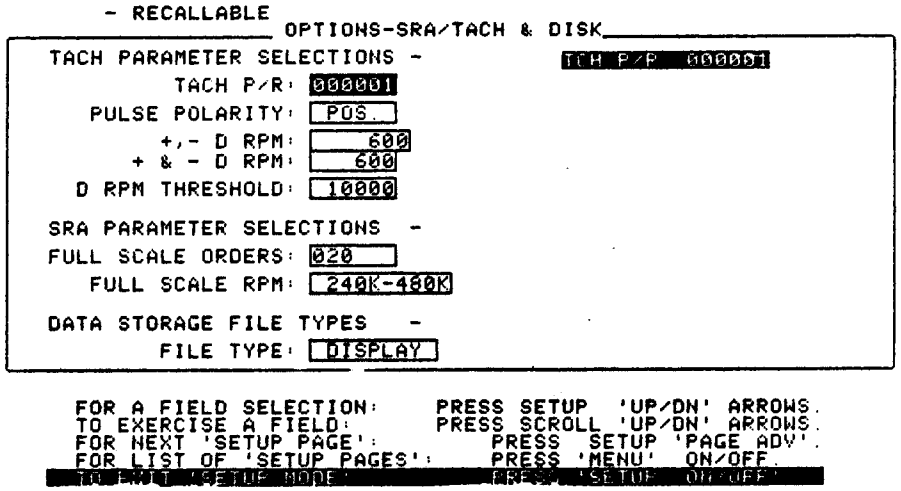
SRA/TACH & DISK OPTION CONTROL (Setup Page 9)

3-3.9 Setup Page 9 -- OPTIONS-SRA/TACH & DISK

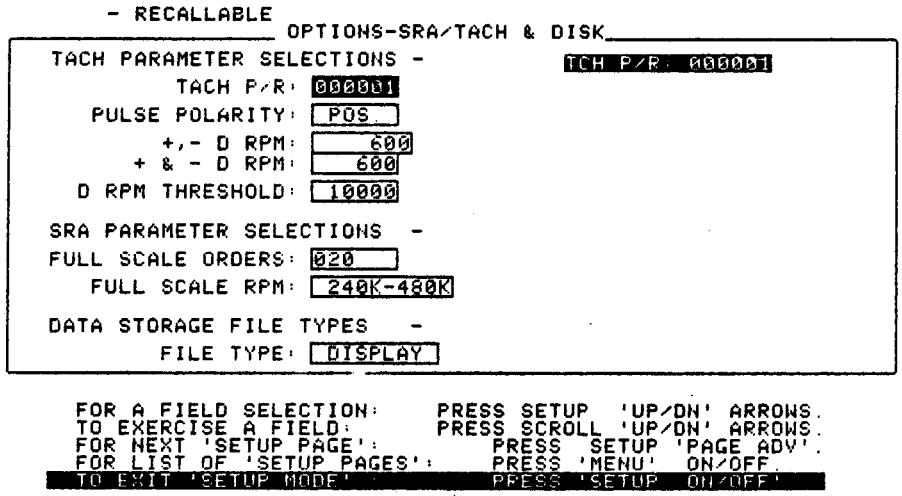
This Setup Page will be displayed only if one or both of the following options are installed: SIGNATURE RATIO/TACH (-3 Option), or DATA STORAGE (-4 Option).



To access this Setup Page (from the data display), press the SETUP group SETUP ON/OFF button. This displays the Setup Page listing. Next, place the RV on selection 9, SRA/TACH & DISK OPT. Now, press the SCROLL group MENU button and Setup Page 9 will appear on the display. If a Setup Page appears instead of the Setup Page Listing when SETUP ON/OFF is pressed, or if Setup Page 8 is already on the display, the PAGE ADV button can be used to access Setup Page 9.

TACH PARAMETER SELECTIONS -

TACH P/R:



Numerical Entry Field for Entering Tachometer Pulses-Per-Revolution.

Located on the front panel is a BNC connector labeled EXT TRIG. This BNC connector accepts the tachometer input. The TACH P/R Numerical Entry Field is for matching the pulses-per-revolution from the tachometer input. Values from 0.0001 to 99,999 pulses-per-revolution can be entered via the front panel ENTRY keypad. Since the displayed rpm is derived using this value, the correct PPR value has to be entered for the rpm readout to be accurate.

The relationship of the Pulses-per-Revolution value and the minimum and maximum rpm are as follows:

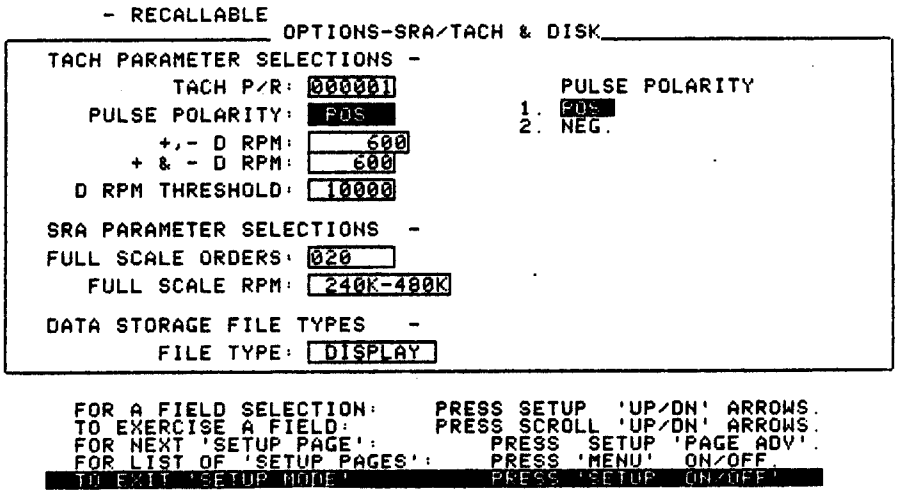
$$11.695 \leq (RPM)(PPR) \leq 19.6186 \times 10^{5}$$

The 11.695 value is to prevent the rpm counter from overflowing at low (RPM)(PPR) products, and the 19.6186×10^{5} value is to maintain a 1% accuracy at high (RPM)(PPR) products.

Tach input is specified from 1 Hz to 10kHz or 60 to 600,000 pulses per minute:

$$RPM = \frac{\text{Pulses/Minute}}{\text{PPR}} \quad \text{therefore, rpm range is} \quad \frac{60}{\text{PPR}} \rightarrow \frac{600{,}000}{\text{PPR}}$$

PULSE POLARITY



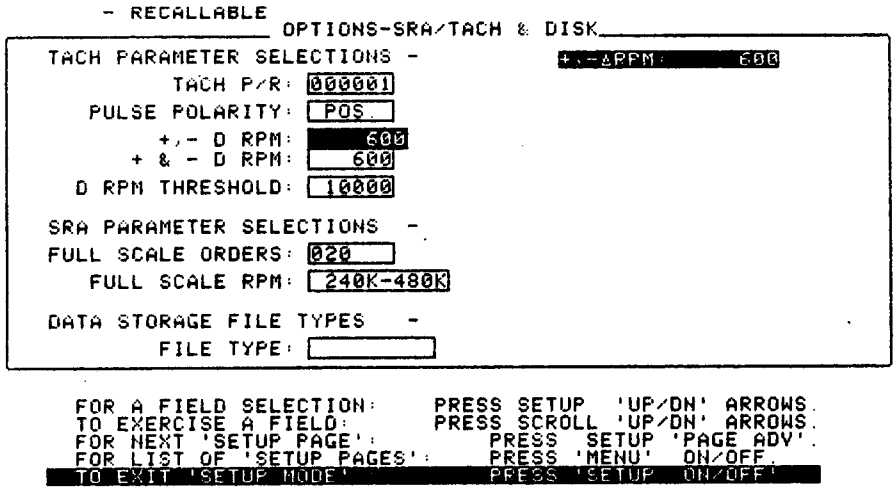
Control Menu for Selecting Tach-Input Pulse Polarity.

Determines whether triggering will occur on positive-going or negative-going edge of the input signal.

NOTE

Negative polarity should only be used for pulses that are negative and have a duty cycle of 10% or less. Negative pulses with a duty cycle greater than 10% should not be used.

+,- D RPM:



Numerical Entry Field for Assigning the Numerical Value for the Waterfall +,-Δ RPM Update Mode.

This Numerical Entry Field is for entering the rpm value that will initiate data acquisition into the Waterfall Memory when the selected Waterfall Update Mode is +,-Δ RPM (Waterfall UPDATE MODE Control Menu, selection 6). This allows the Waterfall Memory update rate to be controlled on the basis of an rpm change from an external tach signal. The amount, and direction of the rpm change is determined by the entered value. Values can be either positive (increasing) or negative (decreasing), but not both. For example, if a D RPM of +50 is entered, then each increase of 50 rpm will cause data acquisition to occur. If a D RPM of -50 is entered, then each decrease of 50 rpm will cause data acquisition to occur. In addition to selecting the Waterfall +,-Δ RPM Update Mode, there is another Numerical Entry that must be made. Located just below the next Numerical Entry Field is a Numerical Entry Field labeled "D RPM THRESHOLD." The entered D RPM THRESHOLD value determines whether or not <u>initial</u> data acquisition will take place. For example:

Initial data acquisition into the Waterfall Memory can only take place once the tach signal reaches or passes through the entered D RPM THRESHOLD. If the tach signal never reaches or passes through the entered D RPM THRESHOLD, data acquisition will never occur. However, once the D RPM THRESHOLD has been reached, the entered + or - D RPM value will initiate data acquisition, and will be referenced to the value of the tach signal that last caused acquisition. In other words, once the assigned D RPM THRESHOLD value has been reached, it no longer has any affect on data acquisition.

Scenerio:

D RPM THRESHOLD of 600 rpm is entered. +,- D RPM value of +50 is entered. A tach signal of 700 rpm is applied, and then the tach signal is increased to 765 rpm. Nothing happens. Here's why:

Even though the +,- D RPM value of +50 was exceeded, initial acquisition will not occur because the rpm value of the tach signal did not pass through the entered D RPM THRESHOLD (600 rpm).

Repeat same scenerio except:

This time the 700 rpm tach signal is decreased to 300 rpm, and then increased to 375 rpm. Initial data acquisition will occur at 350 rpm (when increased from 300 to 375) and, subsequently, will take place every time the tach signal increases by 50 rpm (+50). Here's why:

The tach signal passed through the D RPM THRESHOLD of 600 rpm on its way down to 300 rpm. At this point nothing has happened yet because acquisition has been set to take place with every increase of 50 rpm. When the tach signal is increased to 375 rpm, initial acquisition was triggered at 350 rpm, the first 50 rpm increase.

Repeat same scenerio except:

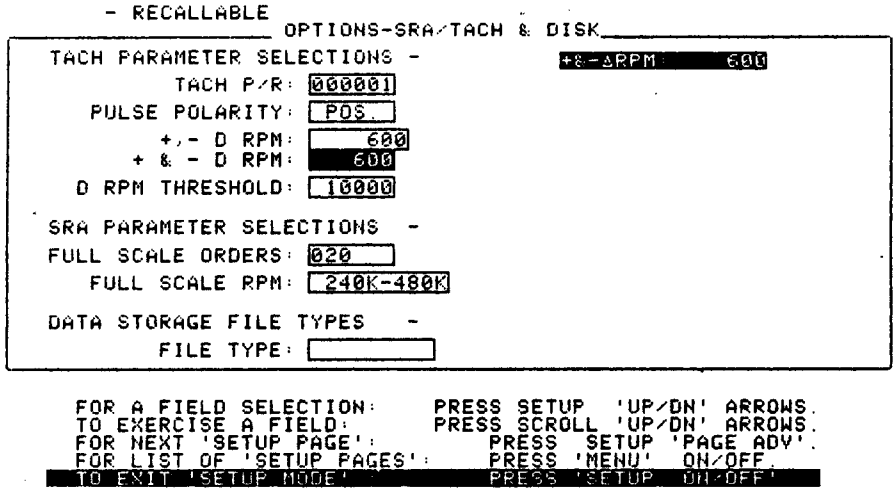
+,- D RPM value of -50 is entered. Again, the 700 rpm tach signal is decreased to 300 rpm. Initial data acquisition occurs at 600 rpm. Once the tach signal reaches 300 rpm, data acquisition will have occurred six more times. Here's why:

550 rpm is the first 50 rpm decrease encountered after passing through the D RPM THRESHOLD of 600 rpm. The next acquisition takes place at 500 rpm, then 450 rpm, 400 rpm, 350 rpm and, finally, 300 rpm. See that?

NOTE

Acquired signals may show a delta rpm greater than the selected delta rpm if the rpm is changing faster than the instrument can process the signals.

+ & - D RPM:



Numerical Entry Field for Assigning the Numerical Value for the Waterfall +&-Δ RPM Update Mode.

This Numerical Entry Field is for entering the rpm value that will initiate data acquisition into the Waterfall Memory when the selected Waterfall Update Mode is +&-Δ RPM (Waterfall UPDATE MODE Control Menu, selection 7). This allows the Waterfall Memory update rate to be controlled on the basis of an rpm change from an external tach signal. The amount of the rpm change is determined by the entered value. If all of this sounds familiar, its because this Control is almost the same as the previous Control (+,- D RPM). The difference being that the entered D RPM causes data acquisition to occur in <u>either</u> direction. For example, if a D RPM of 50 is entered, then data acquisition will occur with either an increase <u>or</u> decrease of 50 rpm. In addition to selecting the Waterfall +&-Δ RPM Update Mode, there is another Numerical Entry that must be made. Located just below this Numerical Entry Field is a Numerical Entry Field labeled "D RPM THRESHOLD." The entered D RPM THRESHOLD value determines whether or not <u>initial</u> data acquisition will take place. For example:

Initial data acquisition into the Waterfall Memory can only take place once the tach signal reaches or passes through the entered D RPM THRESHOLD. If the tach signal never reaches or passes through the entered D RPM THRESHOLD, data acquisition will never occur. However, once the D RPM THRESHOLD has been reached, the entered + & - D RPM value will initiate data acquisition, and will be referenced to the value of the tach signal that last caused acquisition. In other words, once the assigned D RPM THRESHOLD value has been reached, it no longer has any affect on data acquisition.

The following is a sample scenerio that attempts to describe how this works.

Scenerio:

D RPM THRESHOLD of 600 rpm is entered.

+ & - D RPM value of 50 is entered.

A tach signal of 700 rpm is applied, and then the tach signal is increased to 765 rpm. Nothing happens. Here's why:

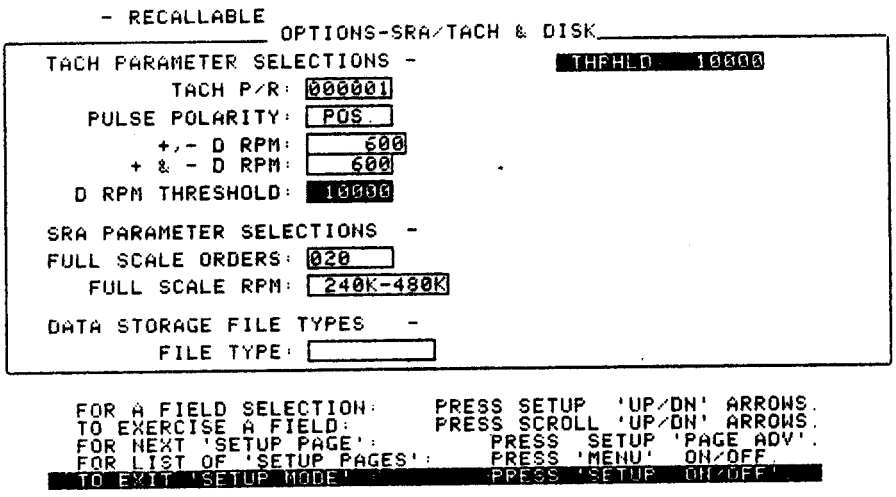
Even though the + & - D RPM value of 50 was exceeded, initial acquisition will not occur because the rpm value of the tach signal did not pass through the entered D RPM THRESHOLD (600 rpm).

Repeat same scenerio except:

This time the 700 rpm tach signal is decreased to 300 rpm, and then increased to 500 rpm.

Initial data acquisition will occur at 600 rpm and, subsequently, will take place every time the tach signal decreases or increases by 50 rpm.

D RPM THRESHOLD:



Numerical Entry Field for Assigning the D RPM THRESHOLD Value for the Waterfall +,- D RPM and + & - D RPM Update Modes.

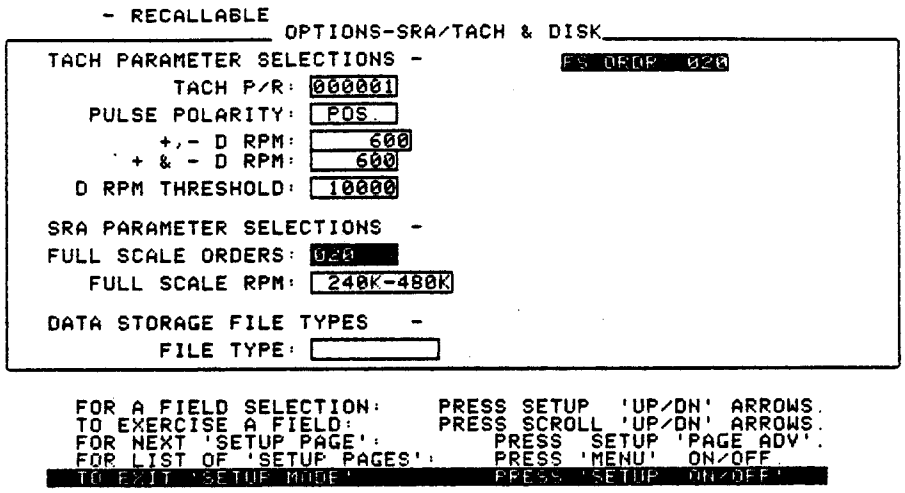
This Numerical Entry Field is the D RPM THRESHOLD mentioned in the two previous Numerical Entry Field descriptions on this Setup Page (+,- D RPM and + & - D RPM) and Waterfall UPDATE MODE selections 6 and 7 (+,-Δ RPM and +&-Δ RPM).

This Numerical Entry Field determines the rpm threshold level that will cause <u>initial</u> data acquisition to occur when the Waterfall UPDATE MODE selection is either +,- Δ RPM or + & - Δ RPM. If the Waterfall Memory is placed in HOLD while rpm data acquisition is in progress, and then LOAD is selected, the next data to be acquired will be the selected D RPM (not the D RPM THRESHOLD) from the last acquisition prior to selecting HOLD. If the Waterfall Memory is erased while in a D RPM mode, the Waterfall will automatically be placed in HOLD, and the D RPM THRESHOLD will again have to be reached for data acquisition to occur. To reset a D RPM Waterfall Update Mode so the D RPM THRESHOLD has to be reached for initial data acquisition to occur, de-select and re-select the appropriate D RPM Update Mode while the Waterfall Memory is in HOLD.

Values from 1 to 999,999 rpm can be entered in 1 rpm increments via the ENTRY keypad.

SRA PARAMETER SELECTIONS -

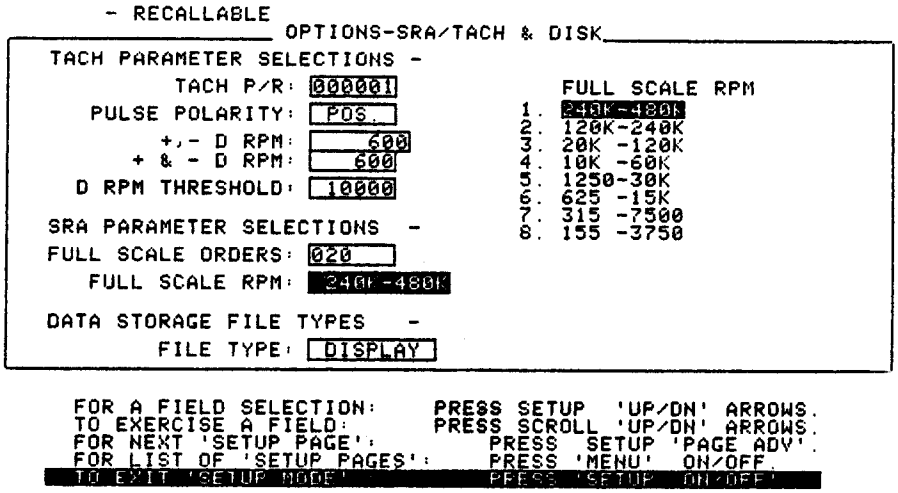
FULL SCALE ORDERS:



Numerical Entry Field for Selecting the Number of Displayed Orders.

The value entered for this Numerical Entry Field determines the highest order visible on the full scale display of the SD385, when acquiring data via the SIGNATURE RATIO ADAPTER Option. The SIGNATURE RATIO ADAPTER Option is turned on by selecting SRA OPTION on the SAMPLING SOURCE Control Menu on the ACQUISITION PAGE. This does not affect F.S. Orders for data taken otherwise (EXT-SD346 or INTERNAL).

FULL SCALE RPM:



Control Menu for Selecting the Effective RPM Range of the SRA Option.

When the selected Sampling Source is SRA OPTION (SAMPLING SOURCE Control Menu on Setup Page 1), the analysis range of the unit will be full scale rpm (rpm x full scale ORDERS). Therefore, the selected rpm range is not the rpm input; it is rpm input x full scale orders.

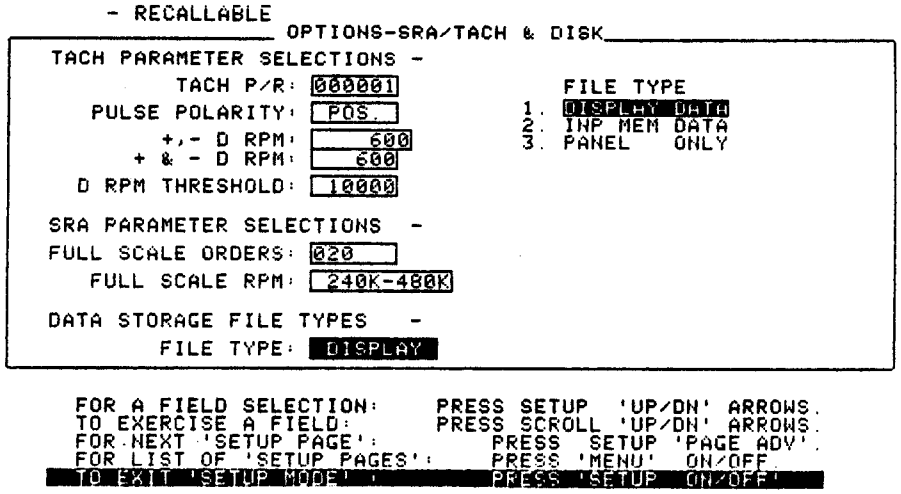
The SRA Option rpm ranges are limited to tach inputs ranging from 5 Hz to 10kHz. If the tach range required to track the indicated rpm range is outside these limits, an error message will be generated to prompt the operator.

NOTE

The SRA Option cannot track above a full-scale rpm of 480,000.

DATA STORAGE FILE TYPES -

FILE TYPE:



Control Menu for Selecting File Type.

This control menu is used to select the data to be included when storing a file on the disk.

1. DISPLAY DATA — File will contain the current analyzer configuration, any user-entered text, and whatever data is required to reproduce the current display. Exceptions to this are CTIME and RT 10 Octave and 30 1/3 Octave. In CTIME, only the current Input Memory ensemble is stored. To store the contents of the entire Input Memory, use the next selection, INP MEM DATA. 10 Octave and 30 1/3 Octave can only be stored from the Average Memory.

2. INP MEM DATA — File will contain the current analyzer configuration, any user-entered text, and either one or two Input Memories depending upon whether a single or dual channel function is selected. Memories can have up to 32K samples each. If either memory is not completely full, only the valid data will be stored and recalled.

3. PANEL ONLY — File will contain only the current analyzer configuration.

Data Storage Operation

To store a file:

On the ENTRY keypad, press FILE then ENT. A blank, reverse video field will appear just inside the upper right corner of the display grid. In addition, the following prompt will appear at the top of the display:

FILE STORE ENTER NAME, PRESS ENT TO STORE, CLR TO ABORT

A filename of up to 24 characters can be entered using the front-panel Text Entry buttons (the Text Entry feature is enabled for this purpose). After selecting a filename, press the ENT button. The next available file will be created and filled with data as selected via the FILE TYPE menu.

To recall a file:

On the ENTRY keypad, press FILE then RCL. The statement "FILE RECALL" will appear at the top of the display, and a prompt will appear just inside the upper right corner of the display grid as follows:

FILE #:

Using the numbered keys on the ENTRY keypad, select the desired file number, then press the ENT button. The selected file will be recalled.

To delete a file:

On the ENTRY keypad, press FILE then CLR. The statement "FILE ERASE" will appear at the top of the display, and a prompt will appear just inside the upper right corner of the display grid as follows:

FILE #:

Using the numbered keys on the ENTRY keypad, select the desired file number, then press the ENT button. The selected file will be deleted. However, no disk space will be recovered, and the file number will not be available for use again. The only real effect is to make the data inaccessible.

To format a disk:

Press the DISK I/O group DISK button. On the ENTRY keypad, press CLR. The statement "PRESS ENT TO FORMAT DISK, CLR TO ABORT" will appear at the top of the display. Press the ENT button. The previously described statement will be replaced with the following statement:

FORMATTING DISK PLEASE WAIT

New disks must be formatted in this manner before they can be used in the SD385. Formatting a disk containing previously stored data will erase the data making all the disk space available.

To check the contents of a disk:

Press the DISK I/O group DISK button, then press the CURSOR group LIST button. A disk directory list will appear on the display showing each file number and the text that was entered when the file was stored.

FRONT PANEL

3-3.10 Operation of the Front Panel

The SD385 is as menu and display oriented instrument. All display configurations, data acquisition modes, primary functions, I/O parameters, and options (if any) are selected via Setup Pages and Menus. Selections and changes to the Setup Pages and menus are accomplished via the RV. The menus and the RV are controlled by the front-panel buttons.

Figure 3-FRNT-1 is an illustration of the front panel of the SD385.

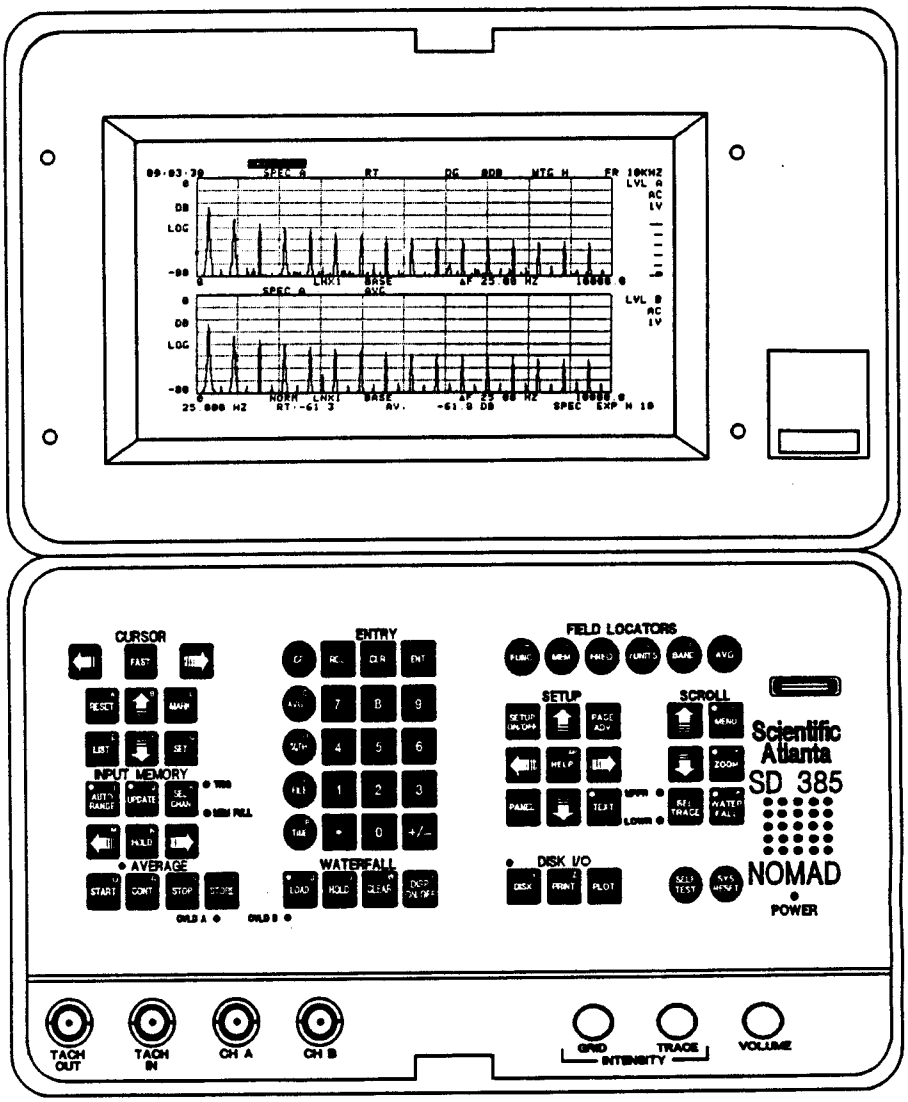


Figure 3-FRNT-1. The SD385 Front Panel

The following is a description of the front panel controls:

Trace and Grid Intensity Controls and Beeper Volume Control

The Trace and Grid Intensity controls are used for an externally connected monochrome monitor only. These controls have no effect on the built-in, Optional EL display. The Trace knob controls the intensity of the entire display. The Grid Intensity knob controls the intensity of the grid only.

The Beeper Volume knob controls the front-panel button beeper volume.

Channel Overload/Level Indicators

There are two LED indicators on the front panel located just below the AVERAGE group labeled OVLD A and OVLD B. These LEDs indicate the level of the input signal as compared to the full scale (FS) input level selection. When lit, the LEDS indicate a signal level that exceeds the selected full scale input level. When an overload LED lights, the A/D converter is clipping the input signal of the corresponding channel.

Front-Panel Buttons

When a front-panel buttons is pressed, the instrument will respond with an audio feedback signal (a subtle "beep") and, if the button has an LED indicator in the upper right hand corner, the LED will light confirming selection of the button you just pressed. Keep in mind that some of the buttons don't have LED indicators and some of the buttons are locked out during certain functions. Therefore they may, or may not, respond with an audio feedback signal during these conditions. Figure 3-FRNT-2 is an illustration of the SD385 Front Panel separated into groups.

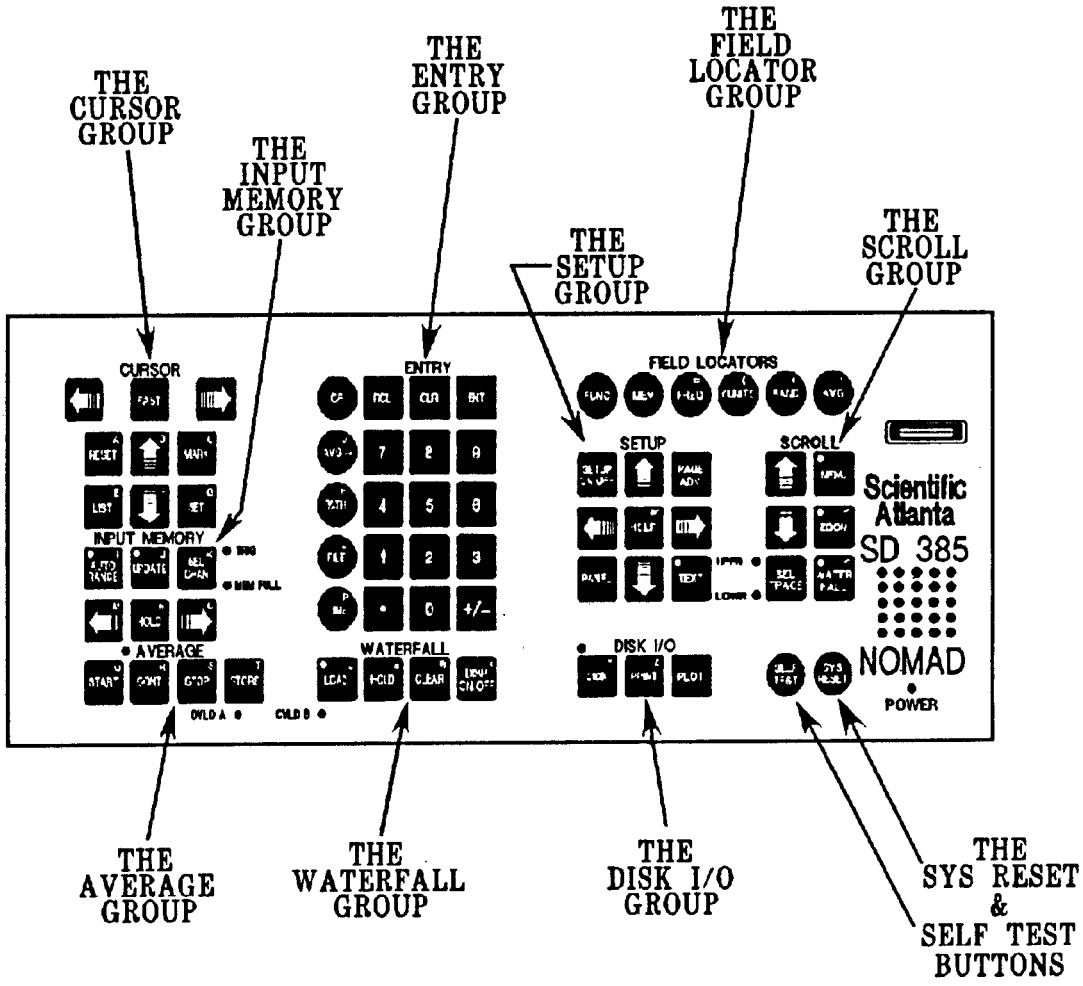


Figure 3-FRNT-2. The SD385 Front Panel Button Groups

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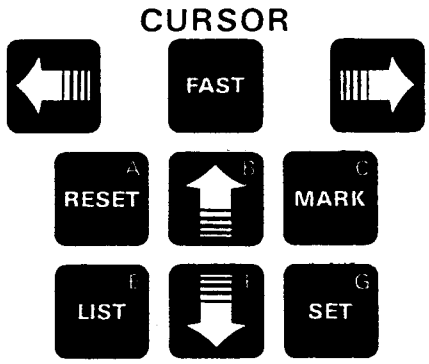
CURSOR GROUP

3-3.10.1 Operation of the CURSOR Group



This group of buttons is used to position the Data Cursor, Reset the Data Cursor, Mark points of interest on the display, List these points of interest and enable certain Cursor related functions such as ΔX and ΔP.

FAST Button

The FAST button, when pressed simultaneously with one of the LEFT/RIGHT directional buttons, causes the cursor to move ten times faster.

LEFT/RIGHT Buttons

The LEFT/RIGHT directional buttons control movement of the Data Cursor, and in the case of the Waterfall feature, the Record Cursor. Pressing either button once will move the Data Cursor one cell, left or right, depending upon which of the buttons is pressed. Pressing either button without releasing will cause a line cursor to appear on the display. The line cursor will move in the indicated direction until the button is released. When the button is released, the line cursor will disappear.

UP/DOWN Buttons

The UP/DOWN directional buttons, when in a dual trace mode, move the cursor from one trace to another. When the Waterfall feature is enabled, the UP/DOWN directional buttons determine which line (record) the Record Cursor is pointing to and which line the Data Cursor resides.

RESET Button

The RESET button resets the Data Cursor to the beginning (extreme left) of the display.

LIST Button

The LIST button allows 1 of 5 special information lists to be displayed, determined by Cursor Mode (Normal or Harmonic), Analysis Band (Octave), or by the button pressed prior to the LIST button (PANEL or MARK buttons).

If the LIST button is pressed without pressing another button, one of three different data lists will be displayed. The actual list displayed depends upon the following conditions:

LIST is pressed and the Cursor Mode is <u>not</u> Harmonic and the Analysis Band is <u>not</u> Octave. Result:

The right half of the display will be blanked and a PEAK FIND List will appear. The PEAK FIND List consists of X and Y axis values for all data points that exceed the amplitude of the Data Cursor position. Up to 15 values can appear on the list.

LIST is pressed and the Cursor Mode is Harmonic (HMNC from the CURSOR MODE Control Menu). Result:

The right half of the display will be blanked and a HARMONIC LIST will appear. The HARMONIC LIST consists of the Order number, the X and Y axis values of the fundamental cursor and each multiple of the fundamental cursor. Up to 15 values can appear on the list.

LIST is pressed and the selected Analysis Band is one of the four Octave Band selections (15 1/3 OCT, 5 OCTAVE, 30 1/3 OCT or 10 OCTAVE from the ANALYSIS BAND Control Menu). Result:

The right half of the display will be blanked and an OCTAVE LIST will appear. The OCTAVE LIST consists of each Octave Band Number and the X and Y axis values that correspond to each Band Number. Up to 15 values can appear on the list. When 30 1/3 OCT is selected, the 15 values that appear on the list will depend upon the location of the Data Cursor. If the Data Cursor is located in the first half of the display, the OCTAVE LIST will contain the first 15 Octave values. If the Data Cursor is located in the last half of the display, the OCTAVE LIST will contain the last 15 Octave values.

If the SETUP group PANEL button is pressed, and then the LIST button is pressed, the display grid will be blanked and the "LIST OF PANEL ID'S" will appear on the display. Operation of the PANEL LIST feature is included with the description of the SETUP group buttons. Up to 6 PANEL ID's can be entered.

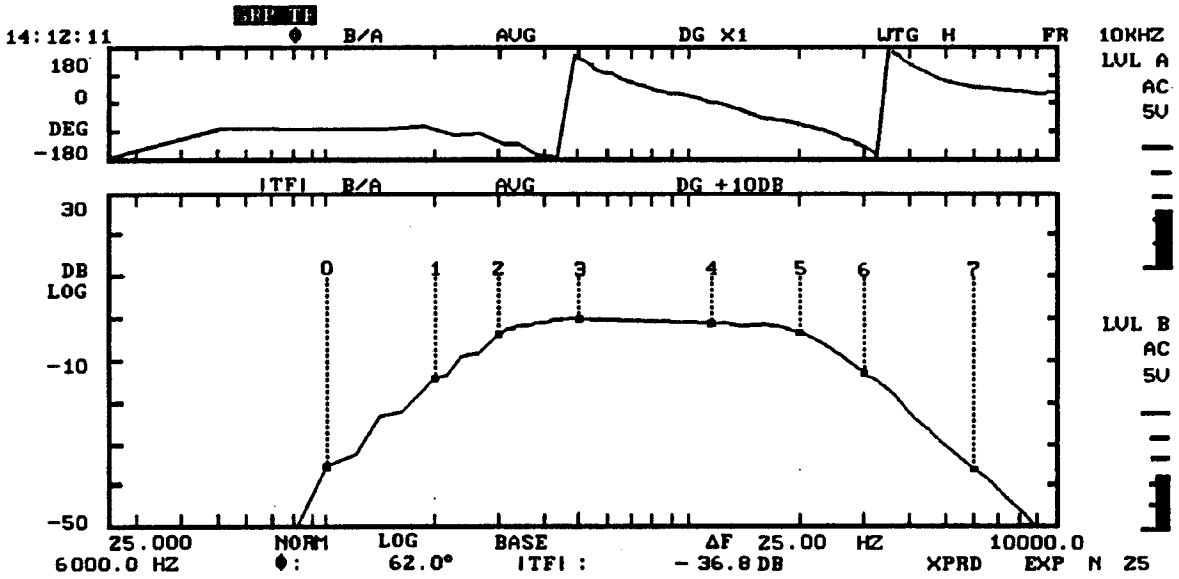
If the MARK button is pressed, and then the LIST button is pressed, the display grid will be blanked and the MARK LIST will appear on the display. Up to 10 values can be entered on the MARK LIST. A description of the MARK button is next.

MARK Button

The MARK button provides a means for selecting and listing up to 10 data points (numbered from 0 to 9) on the display. The marked data points appear on the display as intensified dots. Figure 3-FRNT-3 is a typical example of how the MARK feature can be used. The list that accompanies the sample display lists both the X and Y axis values for each marked data point. Since the sample shown in Figure 3-FRNT-3 is Transfer Function and Phase, the Phase value of each marked data point, in degrees, is also included.

The sample display in Figure 3-FRNT-3 shows the Transfer Function Gain and Phase characteristics of a Band-Pass filter. The marked data points in Figure 3-FRNT-3 reveal some important characteristics about the frequency response of the filter. For instance, the roll-up and roll-down slopes of the filter skirts in dB per octave are defined by points 1 and 2 and points 7 and 8. Points 3 and 6 define the -3 dB points of the Band-Pass corner frequencies and points 4 and 5 define points within the flat Band-Pass region of the filter.

The example shown in Figure 3-FRNT-3 is the result of a digital plot. The Digital Plotter feature of the SD385 has a selection titled "SCREEN + LIST." When a plot is performed with SCREEN + LIST selected, the results will be as shown in the example in Figure 3-FRNT-3. However, this isn't exactly how it will appear on the display. While the display and Mark list are the same, you won't be able to view the marked display and the Mark listing simultaneously. An example of what appears on the display will be described with the operation part of this description that follows Figure 3-FRNT-3.



MARK	LIST X	Y(U)	Y(L)
0	100.00	-69.0	-37.3
1	200.00	-131.0	-13.3
2	300.00	153.0	-2.9
3	500.00	59.6	.0
4	1150.0	-45.5	-.2
5	2000.0	-147.0	-2.8
6	3000.0	130.0	-13.1
7	6000.0	62.7	-36.8
8	---		
9	---		

Figure 3-FRNT-3. MARK Data and MARK Listing Digital Plot Example

Operation of the MARK feature is as follows: First, move the data cursor to the first desired data point, press MARK, press 0 then ENT on the ENTRY group keypad. Use this same procedure for any remaining Mark entries (up to ten can be entered, numbered from 0 to 9). To display the corresponding list of Mark entries, press the MARK button, then press the LIST button. To exit the Mark listing, press the SEL TRACE button.

Figure 3-FRNT-4 is an example of the same Marked display as shown in the digital plot in Figure 3-FRNT-3. Note that while the data is the same, the format is slightly different.

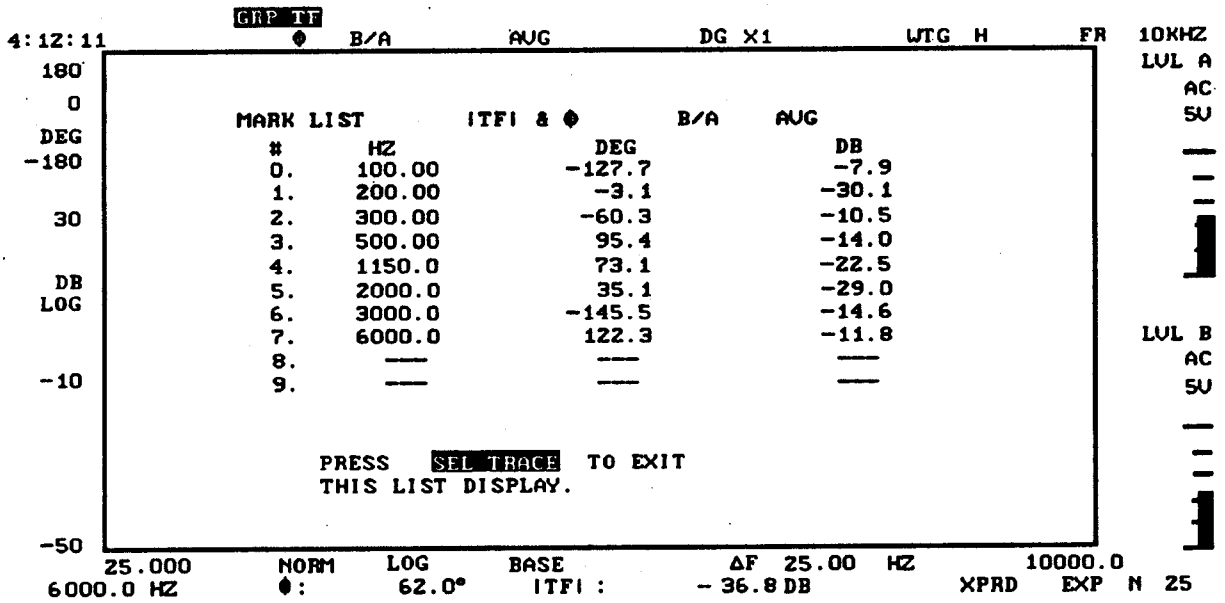


Figure 3-FRNT-4. MARK Data and MARK Listing Display Example.

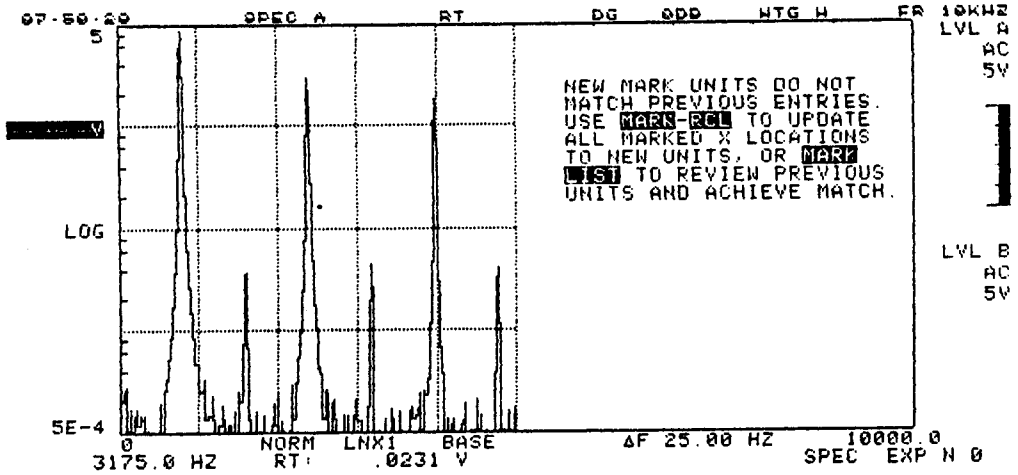
Before continuing, there are some things you should know about the Mark feature.

* To clear a single Mark entry, press MARK, press the number of the Mark to be cleared on the ENTRY keypad, then press CLR. To clear all of the Mark entries, press MARK, then press CLR.

* To update a single Mark entry, press MARK, press the number of the Mark to be updated on the ENTRY keypad, then press RCL. To update all of the Mark entries, press MARK, then press RCL.

* As previously stated, each time a Mark entry is made, an intensified dot will appear on the display at the selected data point. If another display function is selected, the intensified dots from the previous Mark entry will still be present. In other words, if Mark entries are made on a Spectrum display and the display function is changed to Time, the intensified dots will still be on the display. The Mark listing will reflect the values entered while in the Spectrum Mode. This can be remedied by pressing MARK-CLR to clear the Mark entries or by pressing MARK-RCL to update the Marked data points to reflect the Time Domain X and Y axis values.

* If the X or Y axis units are changed or if the display function is changed as previously described, and you attempt to enter another Mark or update a single Mark, the following message will appear on the display:



What this means is that all the Mark entries must be updated by pressing MARK and then RCL or all of the old Marks must be cleared and new ones entered.

SET Button

The SET button is used with the ENTRY group keypad to perform certain Data-Cursor related functions. These functions are as follows:

"SET-ENT"

Pressing the CURSOR group SET button and then the ENTRY keypad ENT button causes a permanent line cursor to appear along with the already-present Data Cursor. Operation of the Data Cursor will not change; the only difference is the presence of the permanent line cursor. The permanent line cursor can be removed by pressing SET and then CLR.

"SET-1-ENT" ΔX

Pressing the CURSOR group SET button and then the number "1" and ENT on the ENTRY keypad causes a stationary line cursor to appear at the Data Cursor location, and establishes a left boundary. Once the "SET-1-ENT" sequence of buttons is pressed, the Data Cursor cannot be moved to the left of the established boundary. The X axis value of the boundary, regardless of its position on the display, will be zero. The Data Cursor X axis readout, located in the lower left-hand corner of the display, will be designated "Delta X" (X meaning whatever X axis units are selected) and will be referenced to the established boundary. The display shown in Figure 3-FRNT-5 is an example of the "SET-1-ENT" ΔX feature.

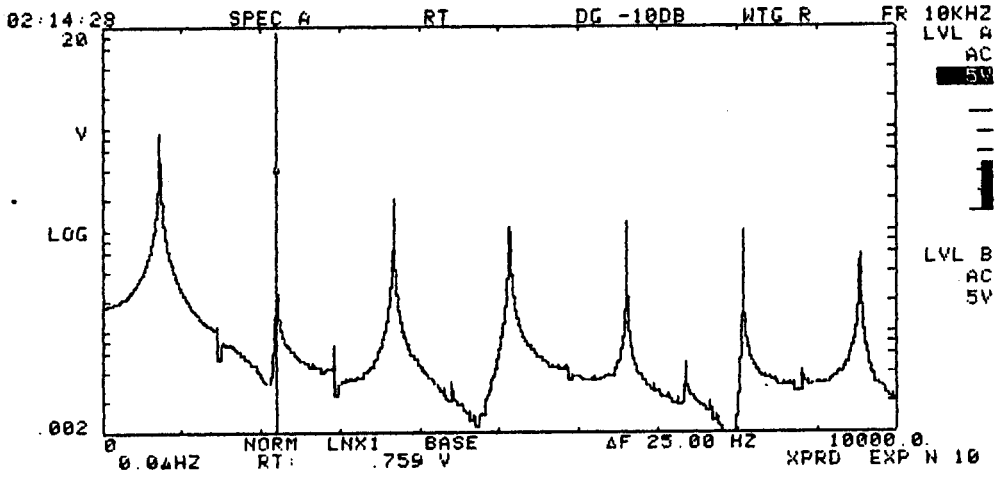


Figure 3-FRNT-5. "SET-1-ENT" ΔX Example

"SET-2-ENT" ΔX

Pressing the CURSOR group SET button and then the number "2" and ENT on the ENTRY keypad causes a stationary line cursor to appear at the Data Cursor location and establishes a right boundary. Once the "SET-2-ENT" sequence of buttons is pressed, the Data Cursor cannot be moved to the right of the established boundary. The X axis value of the boundary, regardless of its position on the display, will be zero. The Data Cursor X axis readout, located in the lower left-hand corner of the display, will be designated "Delta X" (X meaning whatever X axis units are selected) and will be referenced to the established boundary. The display shown in Figure 3-FRNT-6 is an example of the "SET-2-ENT" ΔX feature.

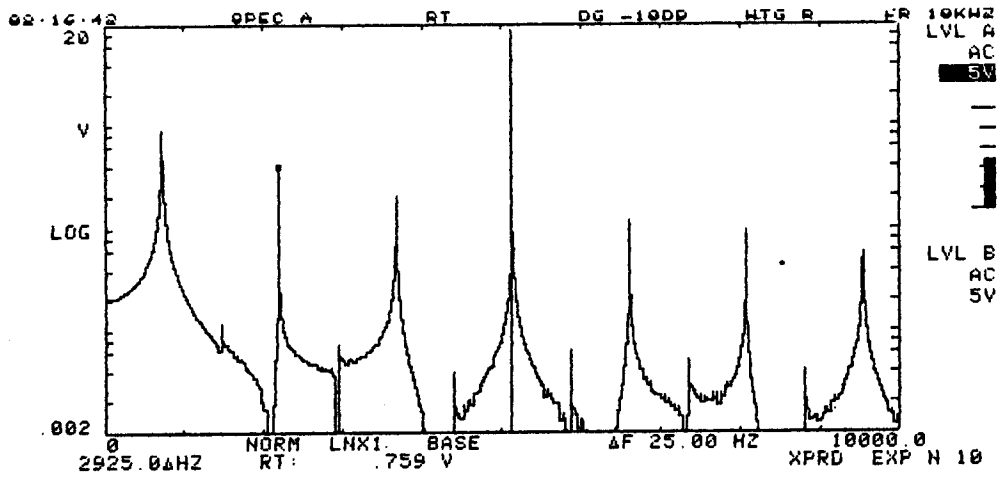


Figure 3-FRNT-6. "SET-2-ENT" ΔX Example

"SET-1-ENT" with "SET-2-ENT"

This function of the SET feature is used to establish two reference boundaries (right and left) for the Data Cursor. Once these boundaries are established, movement of the Data Cursor is restricted to the area between the boundaries. The boundaries are defined by placement of the Data Cursor. To establish the boundaries, position the Data Cursor to the area desired for the left boundary. Press SET-1-ENT. Now, position the Data Cursor to the area desired for the right boundary. Press SET-2-ENT. To clear the left and right boundaries, press SET-1-CLR, then press SET-2-CLR. The display shown in Figure 3-FRNT-7 is an example of the "SET-1-ENT, SET-2-ENT" feature.

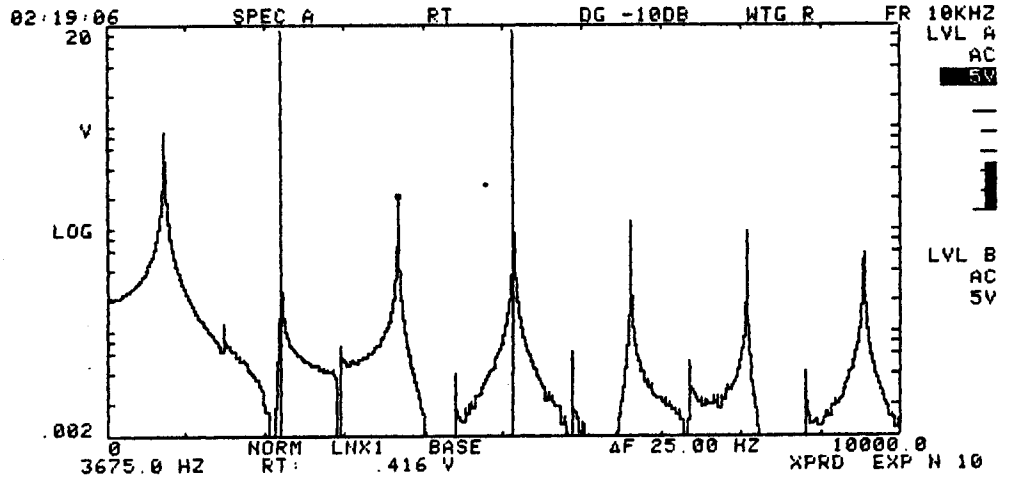


Figure 3-FRNT-7. "SET-1-ENT, SET-2-ENT" Example

"SET-3-ENT"

Pressing the CURSOR group SET button and then the number "3" and ENT on the ENTRY keypad establishes the reference location for the Harmonic (HMNC) Cursor Mode and/or Frequency Domain X axis ORDERS. To establish a reference location, move the Data Cursor to the signal on the display that is to be designated as the fundamental component. Select the Harmonic (HMNC) Cursor Mode and/or Frequency Domain X axis ORDERS. If the Harmonic Cursor Mode is selected, movement of the fundamental cursor now has a resolution that is 1/256th of the Normal (NORM) DATA Cursor. This allows fine-tuning of the multiple cursors that appear when the Harmonic (HMNC) Cursor Mode is selected. Align the multiple cursors, and then press SET-3-ENT. A stationary line will appear at the reference location and the multiple cursors will be frozen in their present position. The fundamental cursor now has the same resolution as the Normal Data Cursor and can be moved without affecting the fine-tuning of the multiple cursors. To exit this mode, press SET-3-CLR. The display shown in Figure 3-FRNT-8 is an example of the "SET-3-ENT" feature illustrating both the Harmonic Cursor Mode and Frequency Domain X axis ORDERS. Also included in Figure 3-FRNT-8 are the locations of the Cursor Mode control field and the Frequency Domain X axis units control field.

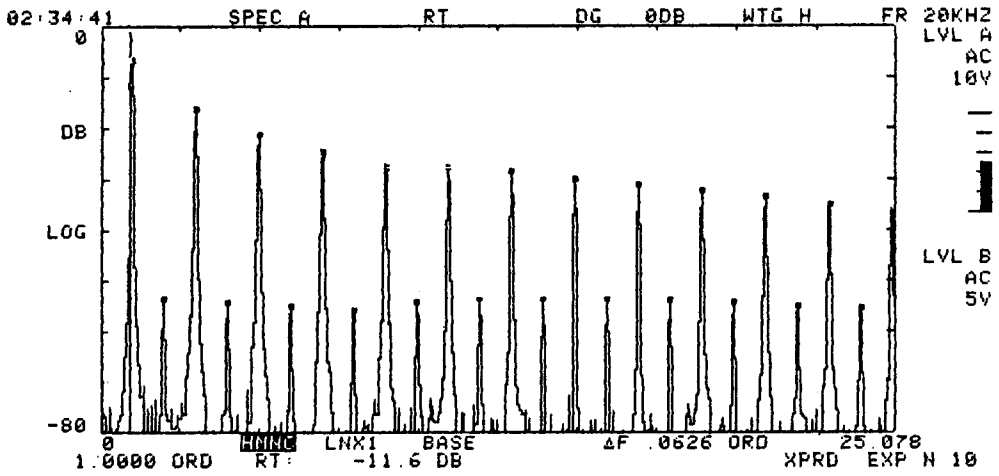


Figure 3-FRNT-8. "SET-3-ENT" Display Example

"SET-1-ENT" ΔXΔP

As previously described, the SET-3-ENT feature is used in conjunction with the Harmonic (HMNC) Cursor Mode. The Harmonic Cursor Mode is selected via the CURSOR MODE menu. Another Cursor Mode that can be used with the SET feature is the ΔP Mode. The ΔP Cursor Mode, when selected, provides a summation of the rms value of the power level of all the displayed data to the left of the Data Cursor, regardless of its position on the display. Changing the position of the Data Cursor will vary the indicated power level. The ΔP power level indication appears on the far right edge of the display grid and is sometimes referred to as the "overall" signal. When ΔP is used with the SET-1-ENT feature, all the display data to the left of the stationary line cursor (the left boundary) is blanked and the ΔP rms level will be referenced from the left boundary to the Data Cursor. Figure 3-FRNT-9 is an example of the "SET-1-ENT" ΔXΔP feature showing the ΔP overall signal.

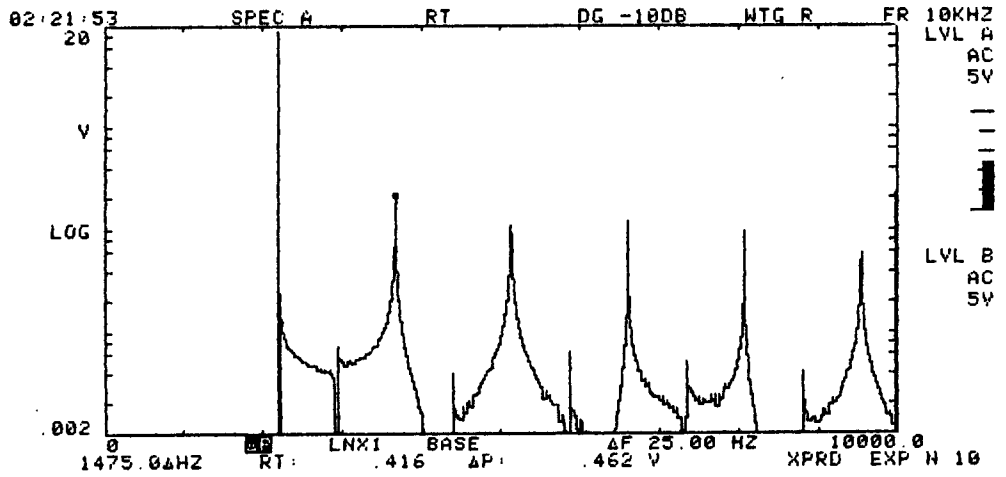


Figure 3-FRNT-9. "SET-1-ENT" ΔXΔP Example

"SET-2-ENT" ΔXΔP

This feature is almost the same as the SET-1-ENT ΔXΔP feature except, when ΔP is used with the SET-2-ENT feature, all the display data to the right of the stationary line cursor (the right boundary) is blanked and the ΔP rms level will be referenced from the left edge of the display grid to the right boundary. Movement of the Data Cursor, in this case, will not vary the indicated power level. Figure 3-FRNT-10 is an example of the "SET-2-ENT" ΔXΔP feature.

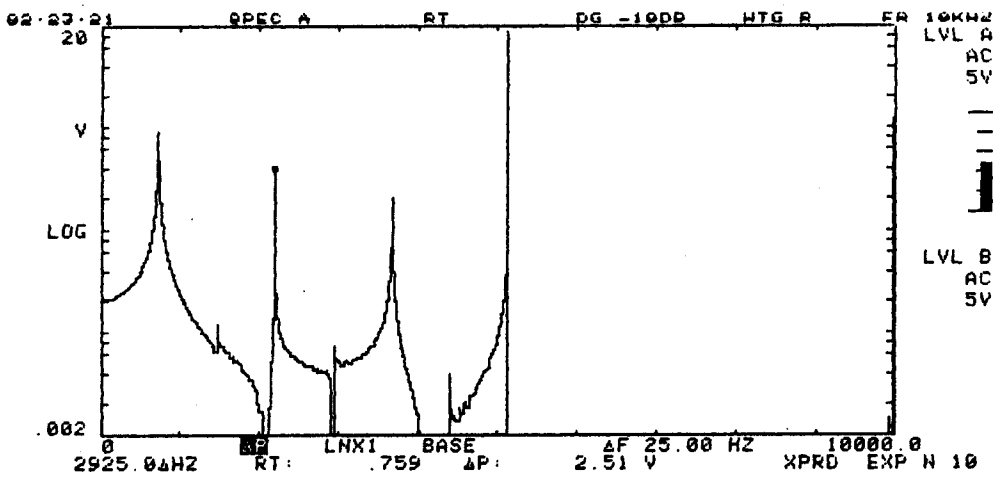


Figure 3-FRNT-10. "SET-2-ENT" ΔXΔP Example

"SET-1-ENT" "SET-2-ENT" ΔP

When the ΔP Cursor Mode is selected with this feature, display data outside the reference boundaries will be blanked and the ΔP rms level is referenced to the data contained within the selected left and right boundaries. Figure 3-FRNT-11 is an example of this feature.

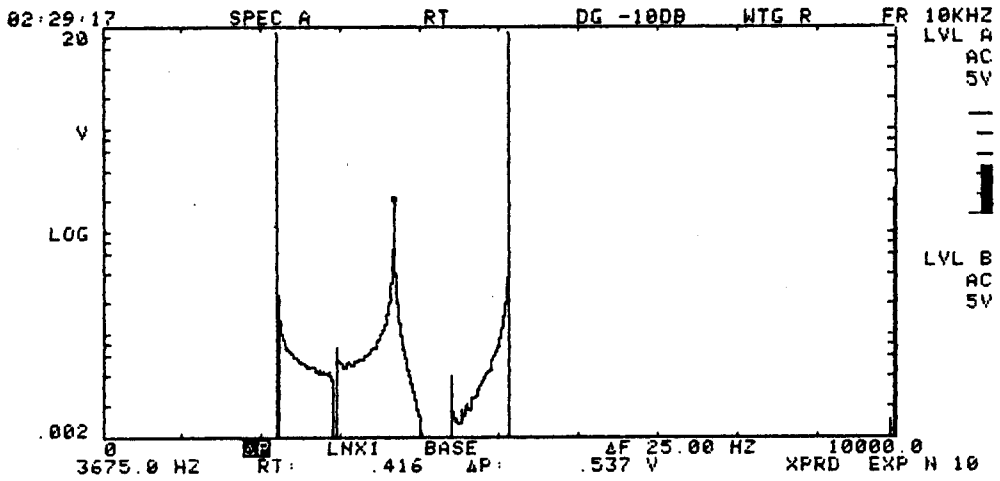


Figure 3-FRNT-11. "SET-1-ENT" "SET-2-ENT" ΔP Example

"SET-4-ENT"

The SET-4-ENT feature is used with FFT Weighting selection 4, FORCE RESPONSE. This weighting applies a zero-fill from a user-defined location to the end of memory. The location is defined by placing the Data Cursor on the desired location and then performing a "SET-4-ENT." A SET-4-ENT can performed only when Channel A Time Domain data is being displayed.

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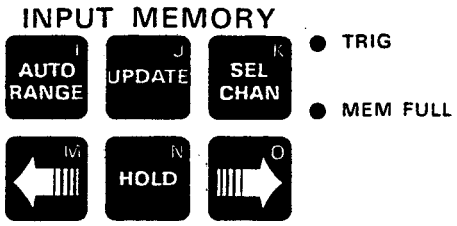
INPUT MEMORY GROUP

3-3.10.2 Operation of the INPUT MEMORY Group



This group of buttons is used to Auto-Range the Input Level(s), Update the Input Memory, select the channel or channels for data acquisition, place the Input Memory in Hold, and scan through the contents of the selected Input Memory.

AUTO RANGE Button

The AUTO RANGE button, when pressed, automatically selects the input level(s) to the maximum, non-overloaded full-scale value. For two-channel instruments, Auto-Ranging will be performed on both channels, regardless of the selected function. It is not recommended to use the Auto-Ranging feature while performing analysis of transient signals.

UPDATE Button

What happens when the UPDATE button is pressed depends upon the status of the UPDATE button LED, and how many times the button is pressed. For example, if the LED on the UPDATE button is off, the Input Memory or Memories (depends upon the number of channels acquiring data) is/are in HOLD. Pressing the UPDATE button once causes the Input Memory/Memories to start acquiring data and the LED on the UPDATE button to light. Pressing the UPDATE button twice (when the LED is off) will cause the Input Memory/Memories to fill and then go into HOLD automatically (the button LED will be lit during data acquisition). If the UPDATE button is pressed when it's LED is already lit, the Input Memory/Memories will continue to acquire data until full, and then go into HOLD automatically.

The method of acquisition depends upon the Update Mode selection. This control menu is located on Setup Page 1. Three other settings, also located on Setup Page 1, have an effect on Input Memory loading. These are: TRIG THRESHOLD, TRIG DELAY and B REL TO A DELAY. B REL TO A DELAY is available only with two-channel instruments.

SEL CHAN Button

If a single channel function is selected, this button is used to designate either Channel A or Channel B for data acquisition. This button has no effect if a two-channel function is selected.

HOLD Button

The HOLD button, when pressed, stops the updating process, freezes the display data and causes the current contents of the Input Memory to be "held" until the next update is directed (regardless of whether or not the Input Memory is full).

INPUT MEMORY LEFT/RIGHT Buttons

These buttons are used to scan through, and view the entire contents of the Input Memory. Pressing the HOLD button enables the Input Memory Scanning feature. This allows the operator to scan through the entire contents of the Input Memory using the LEFT/RIGHT directional buttons.

The capacity of the Input Memory (per channel) is 32,768 Time Domain samples. What appears on the data display is a block of Time Domain samples (if a Time function is selected for display) or data points representing a portion of the total 32,768 samples. The number of samples appearing on a single display depends upon the selected number-of-lines of resolution (RESOLUTION menu on Setup Page 2). The selected resolution assigns the number of data points to a time segment which determines the number of frequency points output by the FFT. Any single Time Domain display will contain a block size of 256 (100 lines), 512 (200 lines), 1024 (400 lines) or 2048 (800 lines) Time Domain samples.

The Input Memory scanning feature can be enabled at any time, regardless of the selected function, by pressing the HOLD button. In order to view the entire contents of the Input Memory on a single display, two conditions must be met. First, a TIME Function must be selected (Setup Page 3). Next, compressed X-axis data distribution must be selected via the X-AXIS control menu located on Setup Page 4, or directly via the RV. A good example of this feature is Selection 3 on the TIME FUNCTION control menu, CTIME & TIME (Figure 3-FRNT-12). This selection provides the capability of viewing the same channel of Time Domain data in a compressed and non-compressed state. When this TIME FUNCTION is

selected, compressed X-axis is automatically selected for the upper trace. Once the Input Memory is enabled and loaded, pressing the HOLD button will cause the contents of the Input Memory to be displayed in the upper trace. The data displayed in the lower trace is that portion of the Input Memory designated by the location and the width of the upper-trace block cursor. The width of the block cursor is equal to one standard memory period. This allows you to view the entire contents of the Input Memory, one memory period at a time, by stepping through the Input Memory using the block cursor. Movement of the block cursor is controlled by the INPUT MEMORY LEFT/RIGHT directional buttons.

If the Input Memory is enabled with another Time Function selected, and compressed X-axis is not selected, the Input Memory will acquire data as previously described, but the instrument will display one memory period rather than the entire contents of the Input Memory.

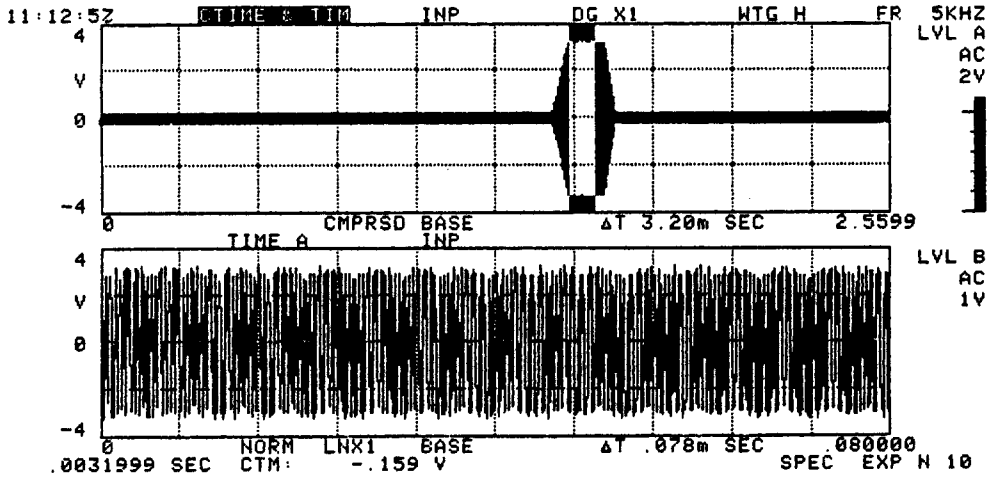


Figure 3-FRNT-12. Compressed Time Display Example

Basically, there are two things that affect the acquisition of data into the Input Memory. These are: The Update Mode (UPDATE MODE menu on Setup Page 1), and the number of channels selected by function (Function selections on Setup Page 3).

The method of acquiring data in the Input Memory will vary depending upon the UPDATE MODE control menu selection. The following information describes what takes place for each UPDATE MODE selection.

FREE RUN

This selection causes data to be loaded from RIGHT to LEFT on the display. Hence, the newest data appears on the extreme right of the data display. The Input Memory will be full when the LED on the UPDATE button turns on. If the HOLD button is pressed before the LED on the UPDATE button turns on, the display will reflect a mix of new and old data from the Input Memory. If the HOLD button is not pressed, the Input Memory will continue to update in a circular manner until being placed in Hold.

SINGLE(AMP) TRIG (Internal Single Trigger)

Just as with FREE RUN, this selection causes data to be loaded from RIGHT to LEFT on the display. Hence, the newest data appears on the extreme right of the data display. The Input Memory is automatically placed in Hold when trigger requirements are met and the Input Memory is full. The trigger is generated internally by the amplitude of the input data exceeding the selected threshold level. The threshold level is assigned via the TRIG THRESHOLD parameter on Setup Page 1 or the % TH button located on the ENTRY keypad.

REPEAT(AMP) TRIG (Internal Repeat Trigger)

This selection causes data to be loaded from RIGHT to LEFT on the display. Hence, the newest data appears on the extreme right of the data display. The Input Memory is updated in 2 kword blocks (4096 bytes) when a valid trigger is detected. The data will stop loading in the absence of a valid trigger, or when the Input Memory is placed in Hold, or when the Input Memory is full. The Input Memory is automatically placed in Hold when trigger requirements are met, and the Input Memory is full. The trigger is generated internally by the input data exceeding the selected threshold level.

SINGLE(EXT) TRIG (External Single Trigger)

This selection operates the same as Internal Single Trigger except the trigger is generated externally via the rear-panel EXT TRIG BNC connector (J6).

REPEAT(EXT) TRIG (External Repeat Trigger)

This selection operates the same as Internal Repeat Trigger except the trigger is generated externally via the side-panel EXTERNAL SAMPLE CLOCK BNC connector.

Performing an Average when Compressed X-axis data is being displayed (with the Input Memory in HOLD) will cause the block cursor to scroll, automatically, from left to right, one data block at a time. Averaging will cease when the Average Target Count is reached, or when the Average is stopped manually by pressing the the AVERAGE group STOP button, or the entire length of the Input Memory has been scrolled through. Pressing the AVERAGE group CONT button after the average is stopped will cause the auto-scrolling feature to continue from that point. If the AVERAGE group START button is pressed, the block cursor will be reset to the extreme left edge of the display grid.

Using ZOOM with the Input Memory Scanning Feature

The Input Memory contains many times more data than is required for a single FFT block. For example, with 2 channel acquisition selected and 400-line resolution selected, there is 16 times more data than is required to produce a 400 line spectrum.

The Zoom feature described in Setup Page 2 provides increased frequency resolution by processing data over a longer period of time (more samples). To select Input Memory Zoom, change the Analysis Band from BASE to ZOOM. The analyzer will process (zoom) a block of data whose size is determined by the selected ZOOM MULTIPLIER and "Zoom in" on the frequencies around the selected Center Frequency. The Center Frequency may be entered using the numbered buttons on the ENTRY keypad to select the desired Center Frequency and then pressing the ENT button, or by moving the data cursor to the signal of interest and pressing the ENTRY group keypad CF and ENT buttons. Each new Center Frequency entered or each new Zoom Multiplier entered will produce a new display. The beginning of the block of samples used is indicated by the block cursor on a Compressed Time display. If there are too few data from the block cursor to the end of the Input Memory to do the selected zoom, the remaining data in front of the block cursor will also be used to perform the zoom. Due to the number of data samples in the Input Memory (32k) and the selected resolution, there is a limit to the amount of zoom that can be selected. The limits are as follows:

Resolution	Maximum Zoom
800 lines	8
400 lines	16
200 lines	32
100 lines	64

This mode is intended for detailed frequency analysis of data captured in Input Memory, and is implemented for 1 and 2 channel Spectrum, Transfer Function and the Power Functions. Time and Statistics functions are not provided in this mode, except for selection 1 on the TIME FUNCTION menu, TIME & SPEC. Using this selection, you can view the Time-Domain Input Memory data in the upper trace and the Zoomed Spectrum data in the lower trace.

AVERAGE GROUP

3-3.10.3 Operation of the AVERAGE Group

This group of buttons is used to Start the Averaging process, Continue the Averaging process, Stop the Averaging process and Store Averaged Data.

START Button

When the operator of the SD385 presses the AVERAGE group START button he is, fundamentally, telling the analyzer "accumulate signal data in the Average Memory." The averaging process that takes place depends, primarily, upon three things: Average Data (TIME, SPEC, AMP, XPRD), the number of channels selected by function (i.e., selecting a two channel mode such as 2 CH SPECT will cause averaging to take place on both channels regardless of the number of channels selected for display) and the Average Mode (SUM, EXPO, PEAK, +1).

Average Data selects the type of data to be averaged.

The number of channels, selected by function, designates how many Average Memories will be acquiring data. There is an Average Memory for both channels on instruments with the 2 Channel Option.

The Average Mode tells the analyzer how to accumulate the data.

The Average Mode is selected via the AVERAGE MODE menu. This menu can be accessed via Setup Page 2 or directly from the display as shown in Figure 3-FRNT-15.

If SUM averaging is selected, the averaging process will terminate when the selected ensemble count (AVG N) or time duration (AVG T) "target" is reached.

If EXPO averaging is selected, SUM averaging is performed until the selected ensemble count (AVG N) target is reached, then averaging continues exponentially with a selected time constant (the selected N). Exponential averaging will continue indefinitely until terminated by pressing the STOP button.

If AVG T is selected, the Average Number that appears on the display will, initially, indicate the Average time duration, in seconds. Once the AVG T target is reached, the number will change to reflect the number of ensembles averaged during the selected time period. This applies to both SUM and EXPO averaging. This is also shown in Figure 3-FRNT-15.

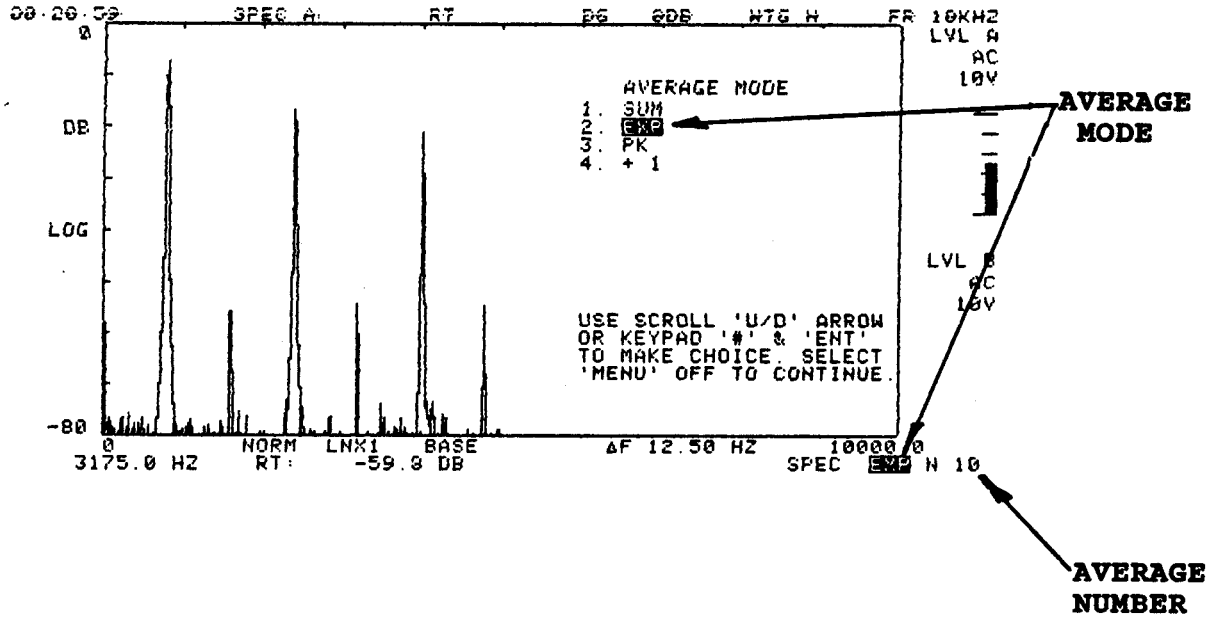


Figure 3-FRNT-15. Average Mode and Average Number Example

In Peak (PK) averaging, the analyzer compares the amplitude of new signal data, at each cell location, with the old data in the Average Memory. The larger value is kept in the Average Memory, the smaller value is discarded. If AVG N is selected, Peak Averaging will continue indefinitely until terminated by the operator. If AVG T is selected, Peak Averaging will terminate when the selected time duration is reached.

In + 1 averaging, ensembles of data are processed manually by pressing the START button first, and then the CONT button each time an average is desired. Each time the CONT button is pressed, a new ensemble will be processed, up to the number of averages selected. This is always a SUM average. The analyzer will not process new data beyond the count selected (AVG N), or the time selected (AVG T).

If data in an un-erased target memory is not compatible with current analyzer settings, the analyzer will refuse to start or continue the average. Incompatible settings will be noted via a displayed message. An example of the displayed message is shown in Figure 3-FRNT-16. Note in the example that a list of analyzer settings is displayed. If the incompatibility is related to one of the settings in the list, the guilty setting will be high-lighted. If the incompatibility is something other than the settings on the list, a high-lighted message will appear just below the list, defining the incompatibility. The message shown in the example resulted from an attempt to average more ensembles than were selected while in the + 1 Mode.

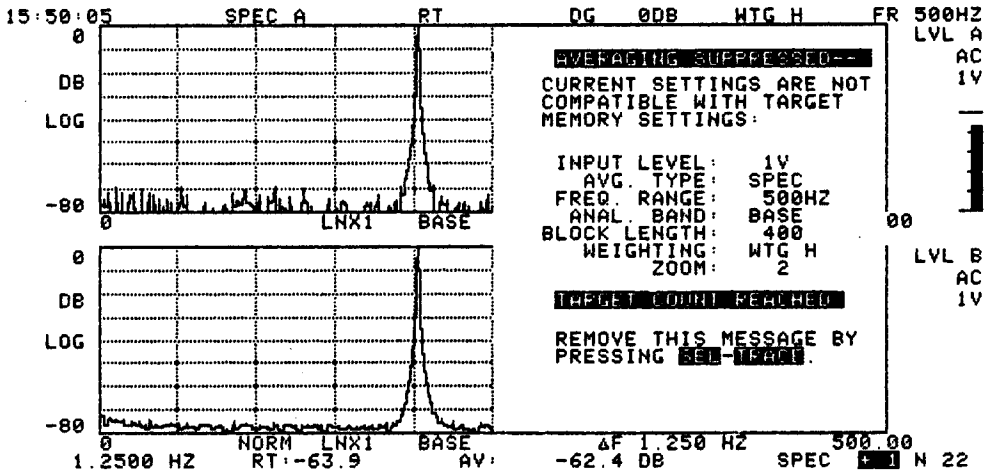


Figure 3-FRNT-16. Example of the AVERAGING SUPPRESSED Message

CONT Button

When the START button is pressed, any data already held in the Average Memory will be erased and a new average will be initiated. If the STOP button is pressed while an average is in progress, the averaging process will, just as you suspected, stop and the Average Memory will be in a temporary "hold" status. As long as no control changes are made while the average process is stopped, the average can be resumed by pressing the CONT button.

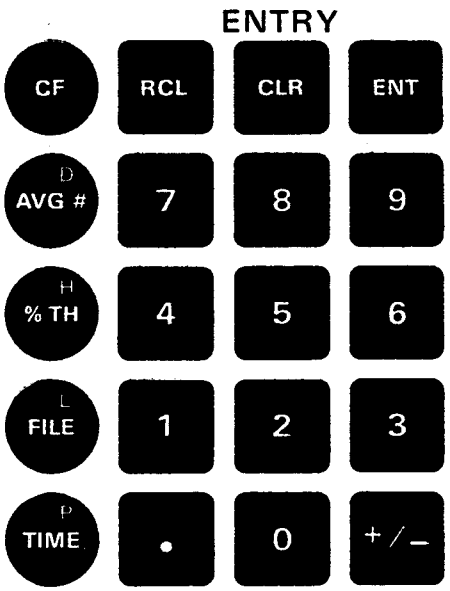
STOP Button

The STOP button stops the averaging process.

STORE Button

The STORE button, when pressed, causes data in the average memory or memories indicted by channel(s) selected to be copied to the equivalent storage memories.

3-3.10.4 Operation of the ENTRY Keypad



This group of buttons is used to select and enter the Zoom Center Frequency, select and enter an Average Target Count, select and enter a % Threshold, store and recall Files on the disk, enter the time of day and select and enter numerical values for all instrument numerical entry control fields and recall these values whenever applicable.

CF Button

The CF button is part of the ZOOM Analysis Band feature and is used to enter the ZOOM Center Frequency. This is accomplished as follows:

Press the CF button. A numerical entry control field will appear in the upper right corner of the display grid as shown in Figure 3-FRNT-17. There will already be a numerical value present. This value is the Data Cursor position. If the Data Cursor is already positioned at the desired Center Frequency, pressing the ENT button will assign the value of the Data Cursor position as the Center Frequency. If you want to enter a value other than the Data Cursor position, a Center Frequency value can be entered using the numbered buttons on the keypad and then pressing the ENT button. Existing numerical values can be cleared or recalled using the CLR and RCL buttons while the CF control field is on the display.

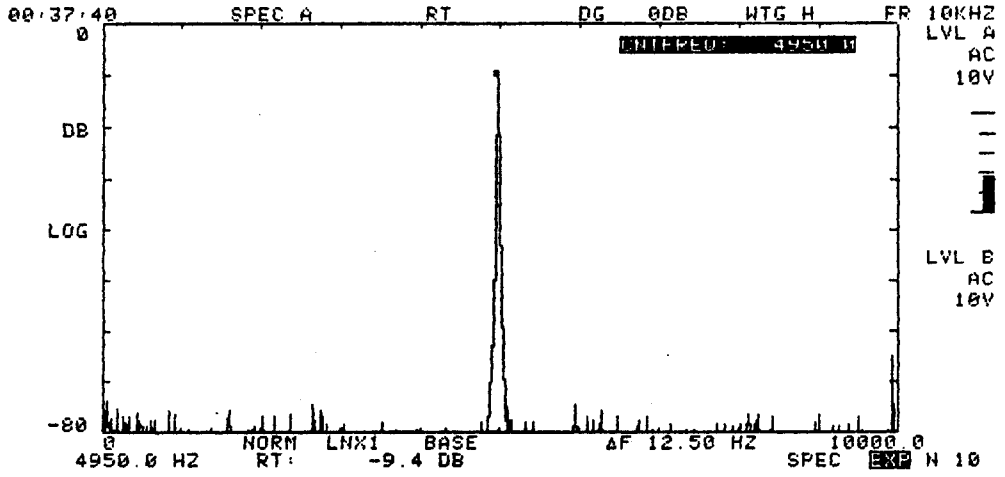


Figure 3-FRNT-17. CF Button Display Example

AVG # Button

The AVG # button allows the operator to enter the number of ensembles to averaged (AVG N) or the average time duration (AVG T) in seconds. This is accomplished as follows:

Press the AVG # button. A numerical entry Control Field will appear in the upper right corner of the display grid as shown in Figure 3-FRNT-18. There will already be a numerical value present. This value is the last value entered by the operator or the instrument default value (10). New values can be entered using the numbered buttons on the keypad and then pressing the ENT button. Existing numerical values can be cleared or recalled using the CLR and RCL buttons while the AVG # Control Field is on the display.

The example shown in Figure 3-FRNT-18 says "AVG N" indicating that Average Target Count (number of ensembles to be averaged) is selected. Values from 1 to 999 can be entered for AVG N. If Average Target Time (Average Time in seconds) is selected, the AVG # Control Field will say "AVG T." Values from 1 to 2000 can be entered for AVG T. Selection between AVG N and AVG T can be accomplished using the "AVERAGE TARGET COUNT" and "AVERAGE TARGET TIME" numerical entry Control Field located on Setup Page 1 or by direct access via the Control Field and Control Menu shown in Figure 3-FRNT-19.