COGNITIVE VISION

Operator's Manual
SD380 SATURN
Signal Analyzer
Part Two

Legacy Manual

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1.3.4 Using Cursor & Measurement Units Controls

After acquiring/processing signal data, the user will wish to take measurement readings, adjust the display for the best presentation, etc. Among the controls used to do this is the DISPLAY TRACE menu. This menu is located in the upper right corner of Setup Page 3. Up to now, the DUAL selection of this menu has been used. The user may, at his option, display only the upper or lower trace.

Adjust the oscillator for an output of 3 kHz at 1V, and press PANEL, 0 and RCL. Display Setup Page 3 and position the RV on the DISPLAY TRACE menu using the CURSOR group directional buttons. Using the SCROLL group directional buttons, select menu item 1 (UPPR) to display only the upper trace and press RESET.

Press the CURSOR RIGHT button twice and the CURSOR UP button once to position the Reverse Video Control Field on the VERTICAL WINDOW field. This control determines the number of decades in a LOG Y display. Press the SCROLL DOWN button to select a 40 dB window, observe the trace. Press the SCROLL DOWN button again to select a 20 dB window. Observe the effect on the trace, this feature allows detailed examination of data that has less variation in amplitude. Press the SCROLL DOWN and CURSOR DOWN buttons to select an 80 dB window and to place the Reverse Video Control Field on the DISPLAY GAIN field.

Press the MENU button to display the DISPLAY GAIN menu. Scroll through the menu and note that the Y-Axis Scaling changes with the Display Gain setting as shown in Figure 1-16. Press 6 and ENT to return the DISPLAY GAIN setting to 0 dB. Press the MENU button to turn the menu off.

Press the Y UNITS locator button. Press SCROLL UP twice to select Volts (V) Y-AXIS UNITS. Press the CURSOR DOWN button to position the Reverse Video Control Field on the Y-AXIS SCALING field. Press SCROLL UP to select Linear (LIN). Note the effect this has on the trace. Slowly decrease the oscillator output level until the displayed signal disappears from the screen. Press SCROLL UP to return to a Logarithmic (LOG) display. The signal should now be approximately one-half the screen height. Greater sensitivity and a wider range of measurement are advantages of logarithmic scaling. Adjust the oscillator for 1V.

Observe that the Y-Axis Scaling full scale number matches the input level as shown in Figure 1-16. Position the Reverse Video Control Field on the INPUT LEVEL field and SCROLL UP to select an input level of 2V. Note that the Y-Axis full scale number changed to match the new input level. Press the Y-UNITS locator button and SCROLL DOWN twice to select DB units. The Y-Axis full scale is now 0 (for 0 dB).

Press the CURSOR RIGHT and MENU buttons. The selected menu item, COUNT-N, automatically stops the averaging process when the AVG TARGET COUNT is reached. When the AVG STOP ON is COUNT-N, Peak and Exponential averaging modes do not have the capability to automatically stop the averaging process. Selection of menu item 2, TIME-T, provides this capability. Press the MENU button to remove the menu listing from the screen.

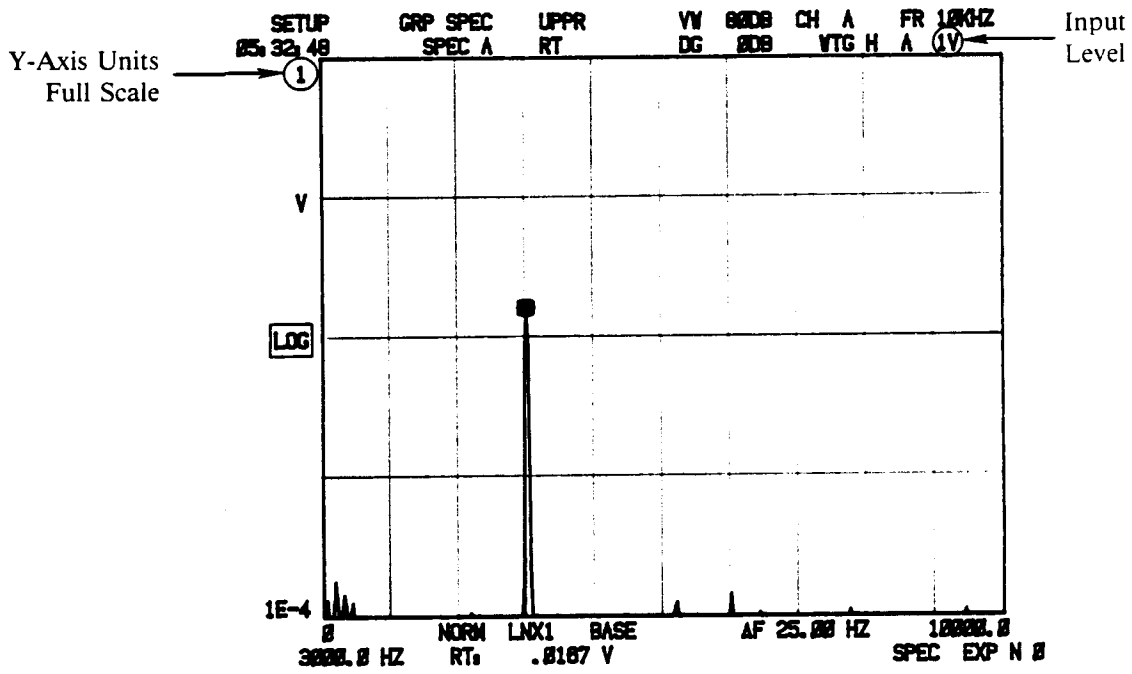

Figure 1-16. Y-Axis Full Scale Display

Display the ACQUISITION PAGE and select the Internal Repeat Trigger (INT REP TRIG) Mode. Press the CURSOR RESET button.

An overload is indicated by the OVLD LEDs lighting up. These indicators are located in the lower left corner of the front panel. Increase the output level of the oscillator until an overload occurs. Press AVERAGE ERASE and START. Note that no data appears in the AVG trace. The instrument, if in a repeat trigger mode, will reject overloaded acquisitions for averaging. Lower the output level of the oscillator until the overload LEDs go out. Now the instrument accepts the data for averaging. Press AVERAGE STOP and ERASE.

There are three separate types of dB Y-Axis Units available on this instrument: DB, DBV and DBR. The current selection, DB, is referenced to the input level in use (Full Scale Input Level is 0 dB). The Y-Axis Scaling full scale number will always track the selected Display Gain.

Press SCROLL DOWN to select DBV. This selection is referenced to 1V (0 dB is one volt), therefore the DBV full scale value is 10 dBV. Position the cursor on the signal and notice the difference in signal level between the DB and DBV displays. There should be approximately a 6 dB difference since: 20 log (2) = 6, and DB is referenced to the 2V input level.

The next Y-Axis Units selection is DBR. The reference for this selection is determined by the VREF and the DB (@ VREF) fields on Setup Page 5, Y CALIB PARAMETERS. Display Setup Page 5 by pressing the SETUP button

three times. The values set by the Panel-0-Recall will result in a reference of 0 dB at 1V, the same reference used in DBV. Press the RESET button to return to the display screen. Press the SCROLL DOWN button to select DBR and compare the cursor Y-axis readout with those of the DB and DBV selections. Return to the DBR selection and display Setup Page 5. Position the RV on the Channel A VREF field using the CURSOR DOWN buttons. Press 2, decimal point, 0 and ENT on the ENTRY group keypad. The DB (@ VREF) value is still 0.0, so the new reference is now 0 dB at 2V, the same as DB. Press RESET and again compare the cursor readouts of the DB, DBV and DBR selections. DB and DBR will have the same value while DBV is 6 dB lower in amplitude.

Using the SCROLL directional buttons, select EU (Engineering Units). The reference for EU is determined by the VREF, EU (@ VREF) and MV/EU fields on Setup Page 5. Frequently the operator will be obtaining signals from transducers which convert some needed quantity (the EU) to mV. These transducers are designed to output some certain mV per each unit of whatever they are measuring. By entering the mV/EU transducer sensitivity on Setup Page 5, and selecting EU Y-Axis Units, the operator effectively obtains a display calibrated in his "own" units. The value of the mV/EU field established by the Panel-0-Recall is 100mV/EU (0.1V/EU), therefore all EU readouts should be ten times the Volts Y-Axis Units readouts. Switch the Y-Axis Units back and forth between V and EU to observe this.

While in the Volts display note the amplitude of the signal. Press the SETUP button to display Setup Page 5 and, using the ENTRY keypad, enter the previously noted signal voltage for CH. A VREF. Position the RV on the EU (@ VREF) field and enter 1.0. The instrument is now calibrated for one EU at the entered voltage. Return to the data display and select EU.

The cursor Y-axis readout will still be indicating ten times the Voltage readout. This is because the SD380 will not use the EU @ VREF for the transducer sensitivity unless the entered value for mV/EU is zero. Return to Setup Page 5 and enter a 0 for mV/EU. Return to the data display and note the readout is now 1.00 EU. SCROLL DOWN to select DB Y-Axis Units.

Another important units oriented capability of this instrument is the Y UNITS OPERATOR menu. This menu has the ability to modify the Y-AXIS UNITS and is available *only* when the Spectrum Group is selected.

In some applications, Y-units of EU^2 or V^2 may be more appropriate. Power Spectral Density measurements with units of V^2/Hz may also be desired. These units are available through the Y-AXIS UNITS field.

Press the Y UNITS locator and MENU buttons. A display similar to Figure 1-17 will appear on the screen. Note the menu instructions located in the bottom right of the screen. They say to use the SCROLL LEFT and RIGHT buttons to access *all* selections.

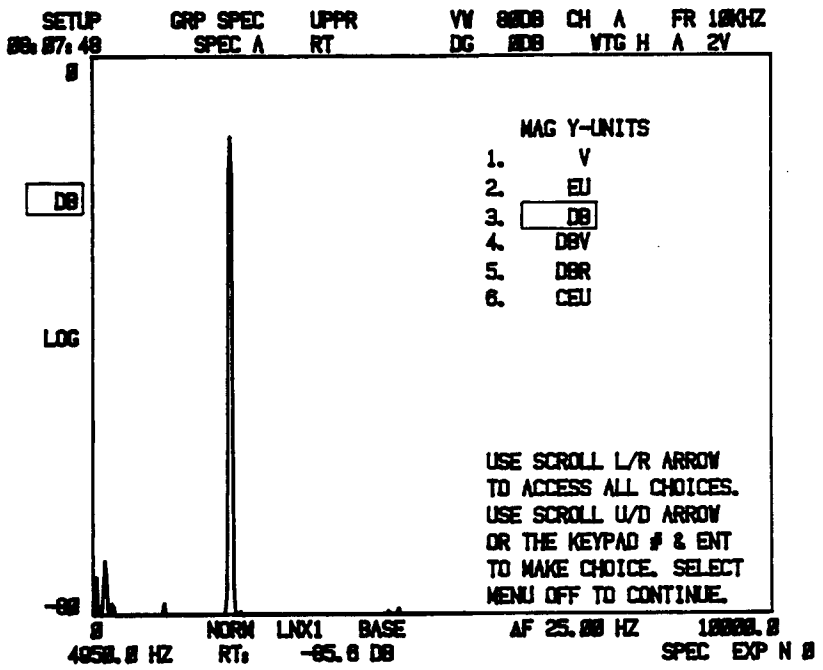

Figure 1-17. MAG Y-Units Menu Display

SCROLL RIGHT to display the MAG² Y-UNITS selections. Figure 1-18 shows the available selections.

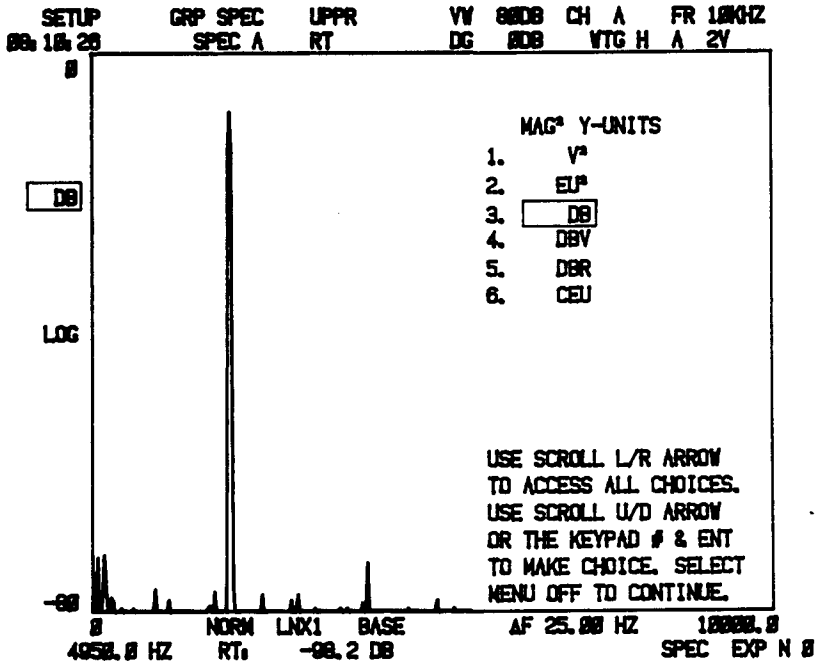

Figure 1-18. MAG² Y-Units Menu Display

SCROLL RIGHT again and the MSD (Magnitude Spectral Density) Y-Units menu will appear as shown in Figure 1-19.

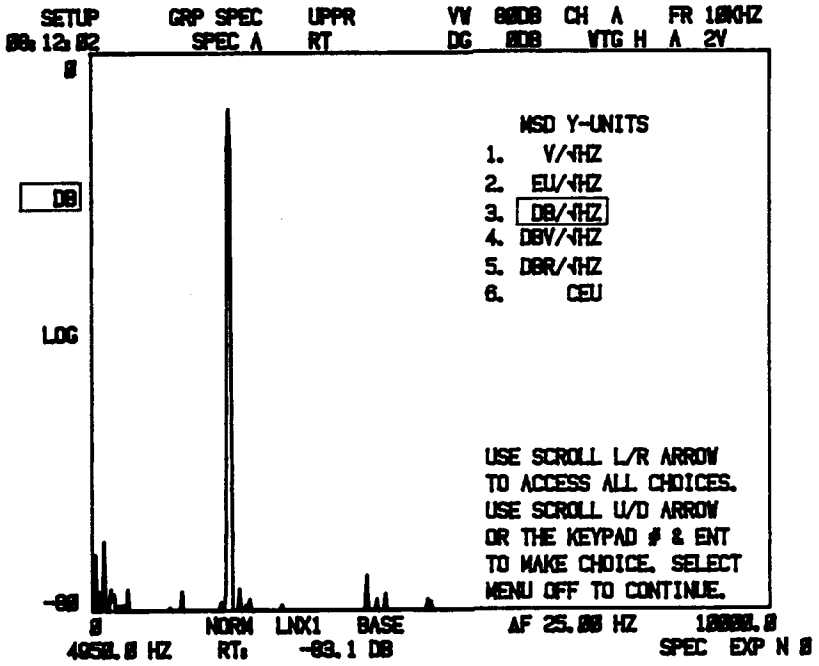

Figure 1-19. MSD Y-Units Menu Display

Scrolling right again will reveal the PSD (Power Spectral Density) Y-Units menu. Figure 1-20 is an example of this display.

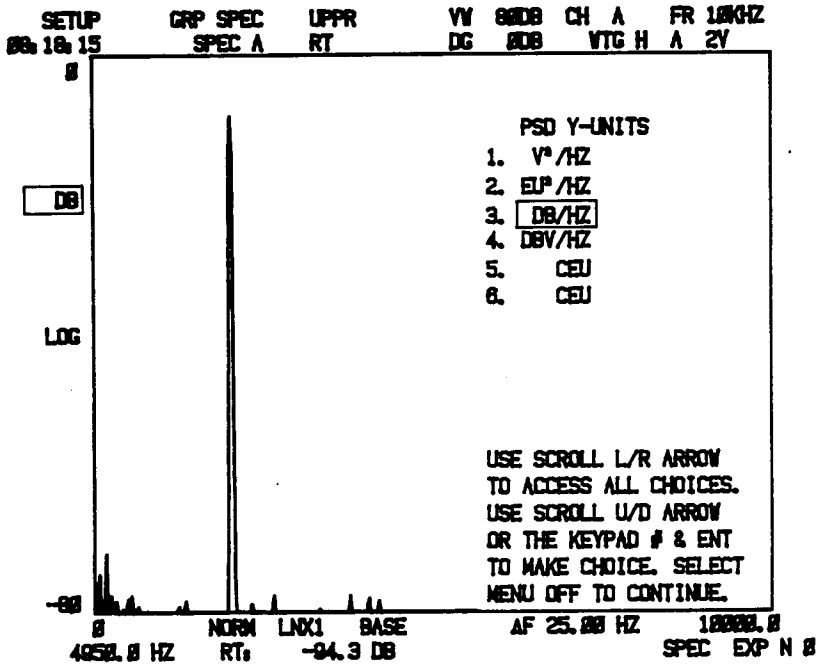

Figure 1-20. PSD Y-Units Menu Display

SCROLL RIGHT to select the MAG Y-Units menu and press the MENU button.

Press the BAND locator and CURSOR LEFT buttons to select the X-Axis Control field. This field allows the selection of various distributions of the X-axis to enhance data observation. Adjust the oscillator for a frequency of 5000 Hz. Position the cursor on the oscillator signal and SCROLL DOWN to select LNX2 (linear "times 2"). The X-axis has now been expanded with the cursor at the center of the screen. Move the cursor and notice the trace moves and not the cursor. SCROLL DOWN again to select LNX4 and once more move the cursor while observing the display.

The next selection is LOG, which provides a logarithmic expansion of the X-axis. Adjust the oscillator for a frequency of 1000 Hz and SCROLL DOWN to select LOG. Place the cursor on the signal located on the graticule line to the right of center. The cursor X-axis readout should indicate 1000.0 Hz as shown in Figure 1-21. Move the cursor to the graticule line left of center, the cursor readout should be 100.00 Hz. The vertical grid lines used in the LOG display mark decade boundaries. For example, if the Full Scale Analysis Range is 500 Hz, the right and left grid lines will represent 50 and 5 Hz respectively.

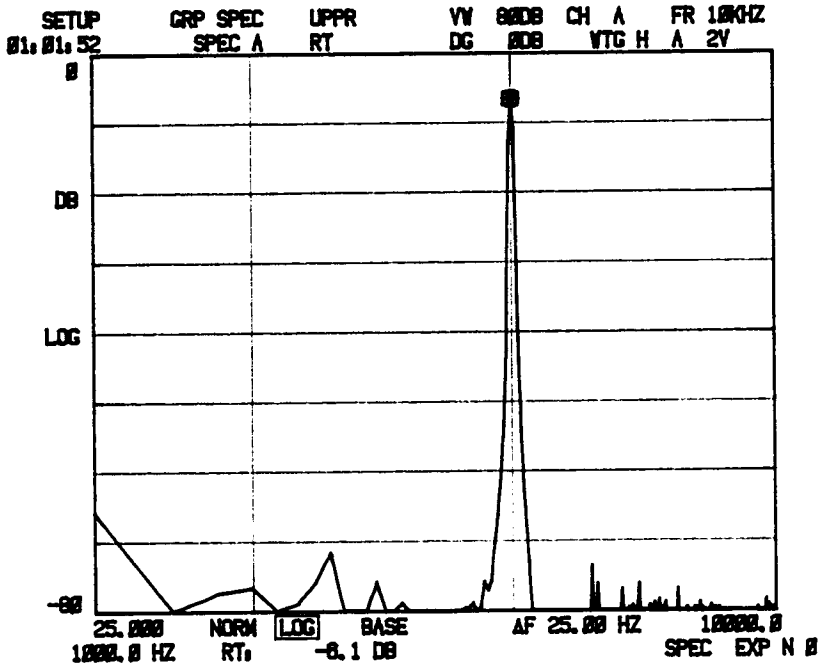

Figure 1-21. LOG Display

Press the SCROLL DOWN button twice and the CURSOR LEFT button once to reselect LNX1 and to position the Reverse Video Control Field on the CURSOR MODE field. The Cursor Mode provides added flexibility in obtaining cursor readouts. The analyzer is currently in the Normal (NORM) Cursor mode. Position the cursor on the signal. In this mode the cursor information line provides the X and Y values for the position of the cursor as shown in Figure 1-22.

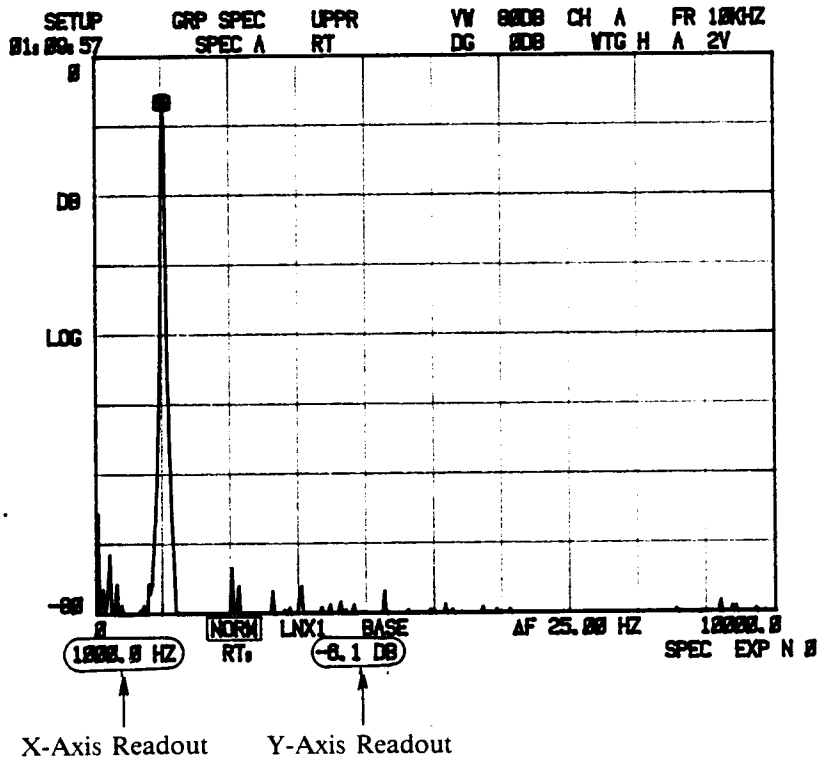

Figure 1-22. NORMAL Cursor Mode Readouts

Slowly increase the output of the oscillator until the channel overload LED lights and harmonics begin to appear on the display. The harmonics are caused by clipping in the A/D converter; a major reason for insuring the proper input range is selected before performing any measurements. The cursor should be positioned on the 1000 Hz tonal, the fundamental frequency in this case. Located in the lower right corner of the CURSOR group is a button labeled SET. This button, in conjunction with the ENTRY keypad, is used to give the instrument reference locations for special measurements.

Press SET, 1 and ENT to enable the DELTA X Mode. A "line cursor" will appear at the cursor location and "0.0ΔHz" will appear at the left side of the cursor information line. Position the cursor on the second harmonic to the left of the fundamental, the ΔHz readout is displaying the difference between the SET 1 reference line and the present cursor position as shown in Figure 1-23. Press SET, 1 and CLR to return to the Normal Cursor Mode.

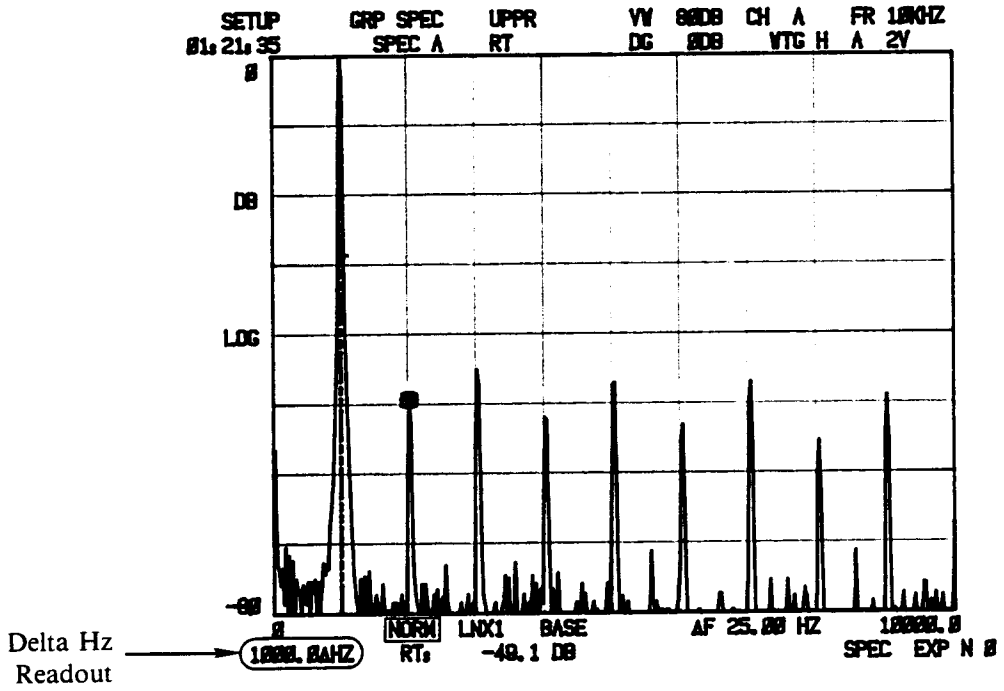

Figure 1-23. Delta X Display

Position the cursor on the fundamental tonal again and SCROLL DOWN to select the Harmonic Cursor Mode. A pattern of intensified dots, or cursors, will appear on the screen at the positions of the harmonics as shown in Figure 1-24. These dots represent integer multiples of the fundamental cursor position. All of the dots may or may not line up with the harmonic tonals. In the Harmonic Mode, the rotary and data cursor manipulations cause fractional adjustments to be made to the fundamental, or reference, cursor location. This allows fine tuning of the cursor to aid in aligning the dots with the harmonic signals. Use the Rotary Cursor to align the dots with the signals and note the increased resolution in the cursor frequency readout. The fractional adjustments to the fundamental cursor location are being used to obtain a high-resolution readout on the frequency of the fundamental.

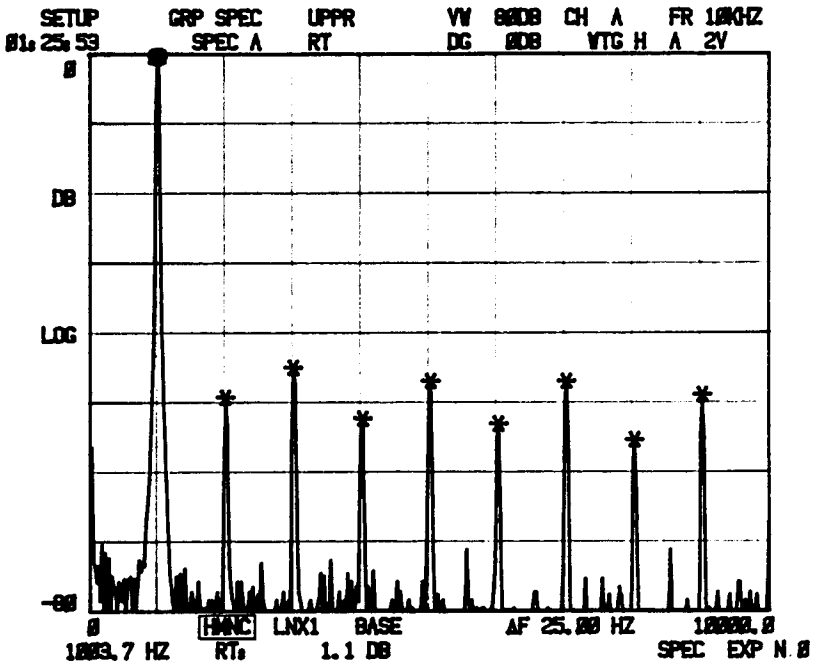

Figure 1-24. Harmonic Cursor Display

To move the cursor around the entire trace, without affecting the cursor alignment, press SET, 3 and ENT. Do so, and try moving the cursor around. Press SET, 3 and CLR and note that the cursor returns to the fundamental position.

Located in the bottom right corner of the panel is a button labeled LIST. Press it and note the listing that appears on the right side of the display screen. This listing will appear *only* when in the Harmonic Cursor Mode and the LIST button is pressed. Figure 1-25 is an example of the Harmonic List.

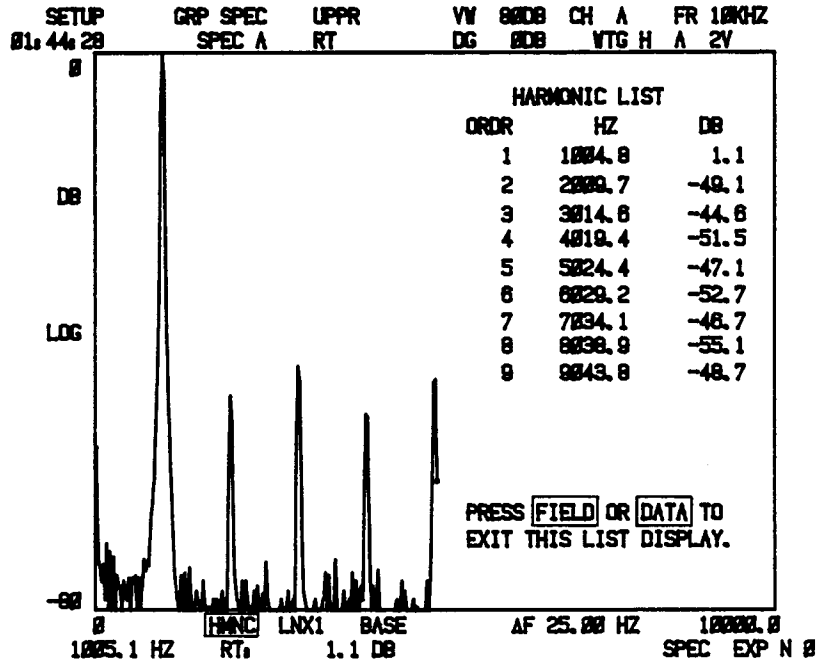

Figure 1-25. Harmonic List Display

Press FIELD to remove the list from the display screen and SCROLL DOWN to select the ΔP (Delta P) Cursor Mode. Note the vertical bar that appears at the right edge of the trace. This is the Overall Bar and is a graphic representation of the "Delta P summation." It is sometimes referred to as the "overall signal." Figure 1-26 is an example of the Overall Bar. An additional readout, ΔP, is also contained in the cursor information line. Slowly adjust the oscillator for an output of 1V while observing the Overall Bar and ΔP readout. Note that the amplitude of the bar decreases with the amplitude of the signal. The overall is a rms summation of the points from the left edge, or zero point, of the trace to the current cursor position. Position the cursor at the extreme left edge of the trace. Gradually move the cursor to the right while observing the bar. The readout increases as more data points are summed. A drastic increase will occur when the cursor reaches the oscillator signal.

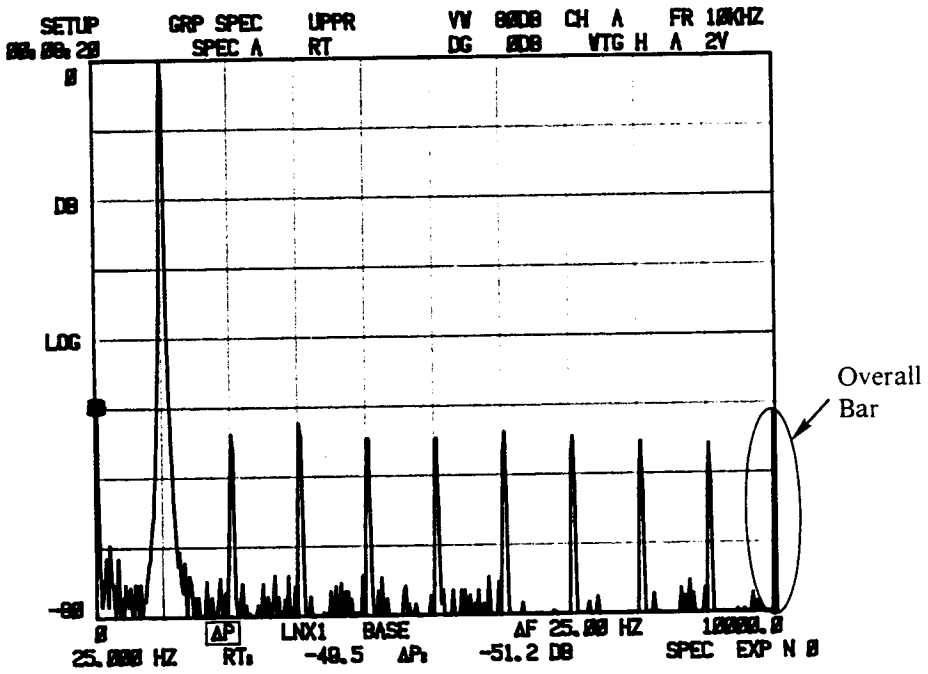

Figure 1-26. The Delta P Display

In some applications it may be desirable to limit the points to be summed in the Delta P Mode. The Set 1 feature may be used to define a new start or reference point. Gradually increase the output amplitude of the oscillator until harmonics begin to appear on the trace. Move the cursor to the 2750 Hz position on the trace and press SET, 1 and ENT. Note that the trace to the left of the reference is zeroed and the Overall Bar has disappeared. Move the cursor to the right and the bar will increase. Only those points to the right of the reference line are summed.

At times, with dynamically shifting data, the power within a set of frequencies is of great interest. An exact and permanent Delta P window can be defined by setting a second reference with the SET 2 feature. Only the area within the two references will be summed. The cursor can be used to take readings on specific points of interest inside the window.

Position the cursor at 7250 Hz (a ΔHz readout of 4500Hz) and press SET, 2 and ENT. Only the data between the reference lines will be summed and displayed. Change the oscillator frequency to 5000 Hz and the output to 1V, the signal should appear in the window. The cursor may be moved to the signal and a readout of that tonal, in addition to the power from 2750 Hz to 7250 Hz, may be obtained.

Press SET, 1, CLR, SET, 2 and CLR to clear the reference lines. Return to the Normal Cursor Mode and select the lower display trace by pressing the MEM SEL locator, CURSOR UP and SCROLL DOWN buttons. The Average Memory is now being displayed. Press AVERAGE START and vary the oscillator frequency to produce four or five tonals on the trace as shown in Figure 1-27. Press AVERAGE STOP.

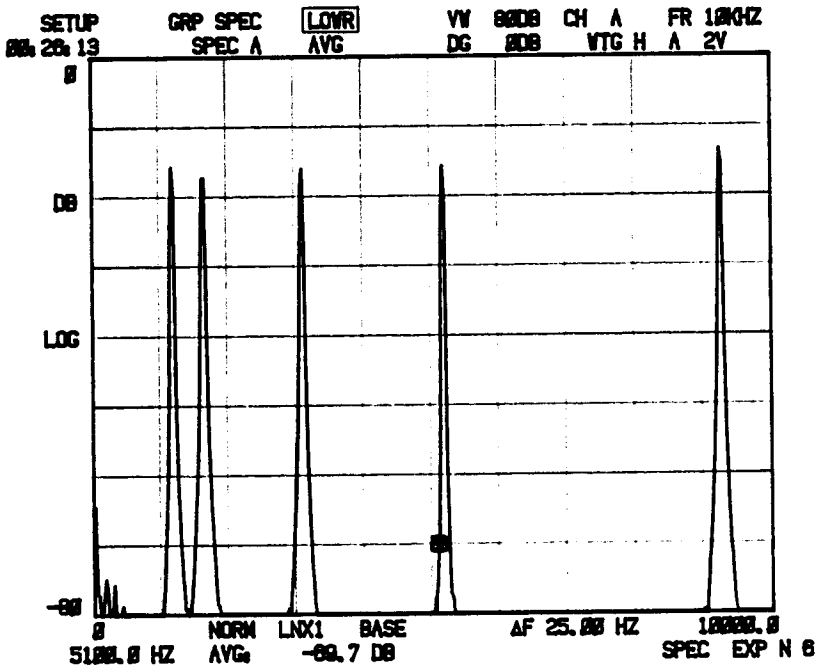

Figure 1-27. Average Memory Data

Located in the CURSOR group is the MARK button. This control allows the operator to mark, or identify, up to ten points of interest, identified as marks 0 through 9. Position the cursor on the left-most tonal and press MARK, 0 and ENT. Move to the next tonal and press MARK, 1 and ENT. Notice that a cursor dot remains at the MARK 0 location. Continue until five positions have been marked.

Press the MARK and LIST buttons to display the Mark List as shown in Figure 1-28. This display is a table of X and Y readouts of the marked points. Press FIELD to exit this display and return to the upper trace to display Real Time data.

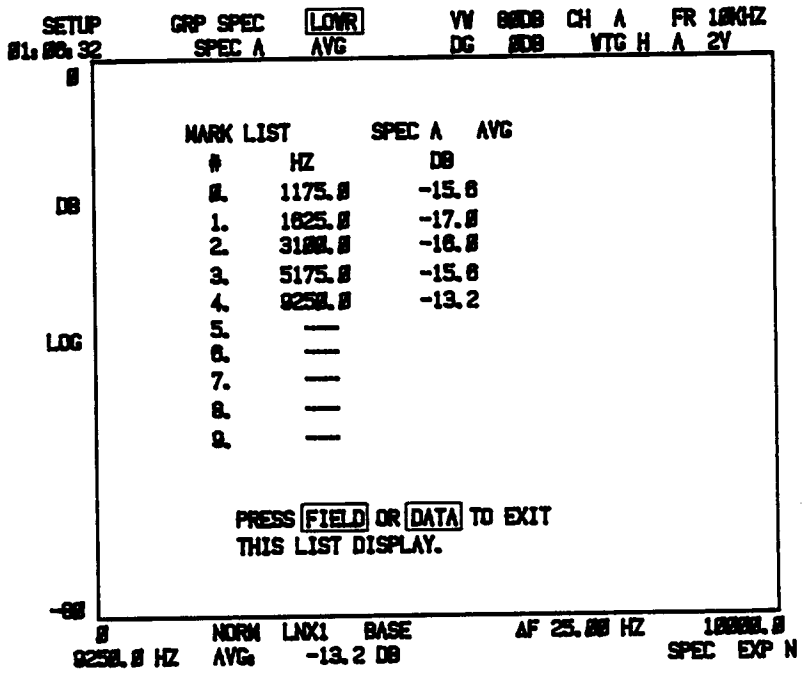

Figure 1-28. Average Memory Mark List Display

Note the additional cursor dots on the display screen. When the Mark feature is being used, it is difficult to determine which of these dots is the Data Cursor and which ones are the marks. (This also occurs when in the Harmonic Cursor Mode and SET 3 is entered.) An additional feature of the SET button allows the operator to identify the current cursor position with a solid vertical line. Press SET and ENT (no number) and the permanent line cursor will appear on the display as shown in Figure 1-29. Press SET and CLR and the line cursor will disappear and the instrument will once again show the current cursor position as a dot.

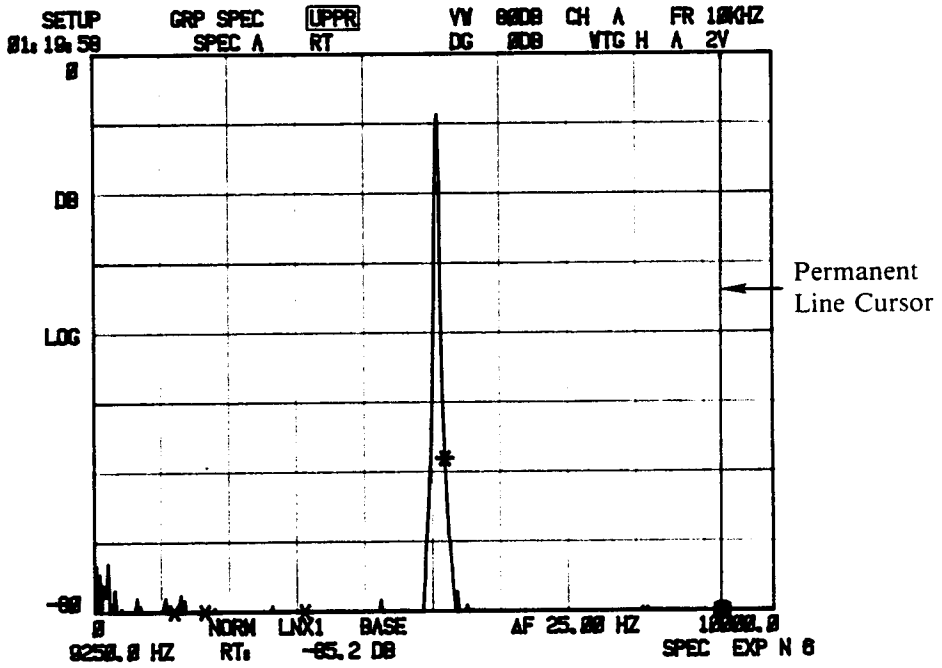

Figure 1-29. The Permanent Line Cursor

Position the cursor on the signal and press MARK, 6 and ENT. A message will appear on the right side of the display screen as shown in Figure 1-30.

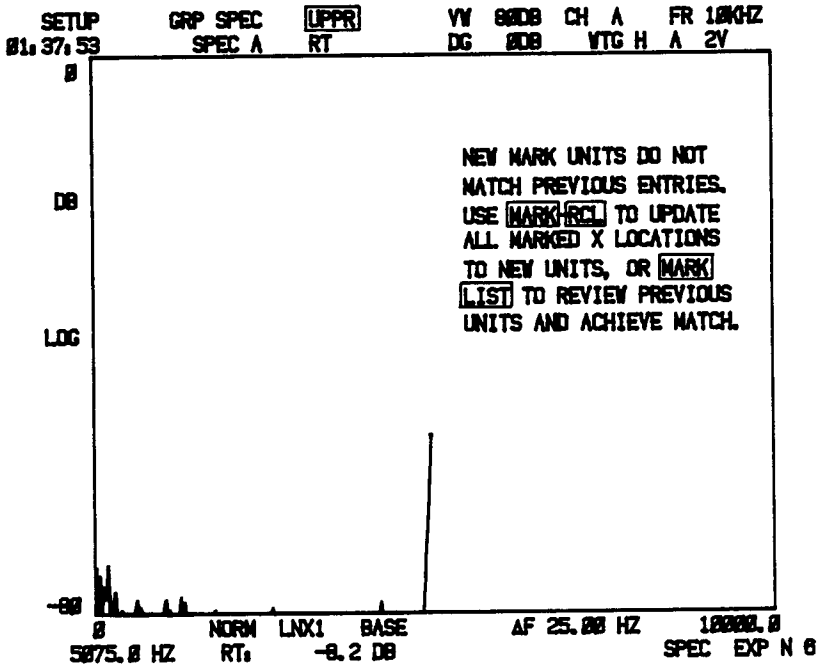

Figure 1-30. Mark List Error Message

The displayed memory has been changed from Average to Real Time and the Mark feature will not update from two different sources. Pressing MARK and RCL will cause *all* of the marks to be updated with new calibration data. Press FIELD, MARK, RCL, MARK and LIST. The Mark List titles have been changed from AVG to RT and the readings are low amplitude as shown in Figure 1-31.

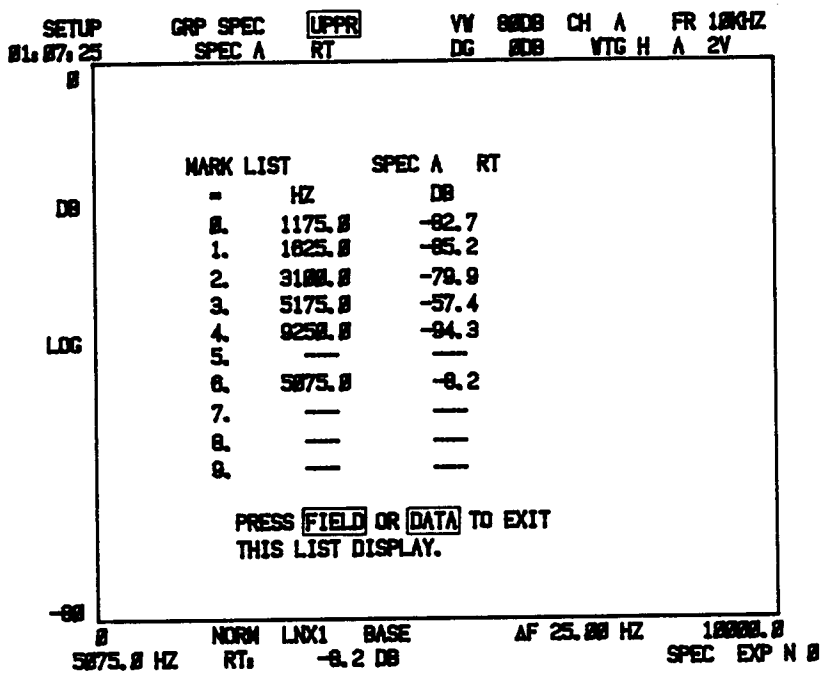

Figure 1-31. Real Time Memory Mark List Display

Press FIELD to return to the data display. Press MARK, 0 and CLR, note that the left-most mark disappears. In this manner individual marks may be cleared. To clear *all* marks simultaneously, press MARK and CLR (no number). Do this and the remaining marks will disappear from the display screen.

Another useful feature is the Tracking Cursor Mode. There are three types of tracking available: TRK1 (Tracking Cursor Mode 1), TRK2 (Tracking Cursor Mode 2) and TRK3 (Tracking Cursor Mode 3).

TRK1 will track any frequency shift of a constant amplitude signal. The signal amplitude should be unique; i.e., no other displayed signal should have the same amplitude as the one desired to be tracked.

TRK2 will track any amplitude variation of a signal as long as the frequency shift does not exceed 10%. The Data Cursor should be placed on the tonal of interest before selecting either of these modes.

TRK3 locates the highest amplitude signal in the trace and tracks it anywhere in the selected frequency band. This feature is useful in the auto-tracking of doppler shift frequencies.

Adjust the oscillator for 1000 Hz, and increase the output to obtain harmonics. Place the cursor on the fourth harmonic. Position the Reverse Video Control Field on the Cursor Mode field and select TRK1 by Scrolling down three times. Note how the cursor has a tendency to jump from harmonic to harmonic. This is because the harmonics have approximately the same amplitude.

Position the cursor on the fundamental tonal and slowly decrease the output of the oscillator to 1V. Vary the oscillator frequency within the range of the display and note how the cursor tracks the tonal.

TRK1 works well with signals that rapidly vary in frequency and are constant in amplitude. However, if the signal's frequency variations cause it to exceed the displayed frequency range, the tracking system will seek a new amplitude to track and will not reacquire the original signal when it is again in the range of the display.

Momentarily increase the frequency of the oscillator to a value above the display range. The cursor will probably lose track and will be randomly tracking the baseline noise. Place the cursor on the tonal and it will again begin tracking.

Press the FUNC locator, CURSOR UP, and SCROLL DOWN buttons to enter the Time display. Adjust the oscillator for a frequency of approximately 200 Hz. Observe the movement of the cursor as the TRK1 algorithm attempts to find a unique amplitude peak to track.

Display Setup Page 1, ACQUISITION PAGE, and select menu item 3, INT REP TRIG (Internal Repeat Trigger), on the TRIGGER MODE menu. Press RESET to return to the data display. Position the cursor on a different peak than the one on which it is now residing. Vary the oscillator frequency while observing the cursor.

This inability of the tracking system to differentiate between similar amplitude signals is the reason TRK1 will not work in the Time Domain Most time domain signals are periodic, thereby causing repetitious amplitudes.

SCROLL DOWN to select TRK2, and position the cursor at the second peak. Vary the oscillator frequency slightly and the cursor will now remain in position. SCROLL DOWN to select the Normal Cursor Mode.

1.3.5 Using the Text Entry Feature

This feature enables the operator to enter text onto the display screen via the front panel buttons or the IEEE interface bus. The front panel TEXT button is used to turn the feature on and off.

Press the TEXT button and note the appearance of the Text Entry Cursor in the upper right corner of the display screen as shown in Figure 1-32.

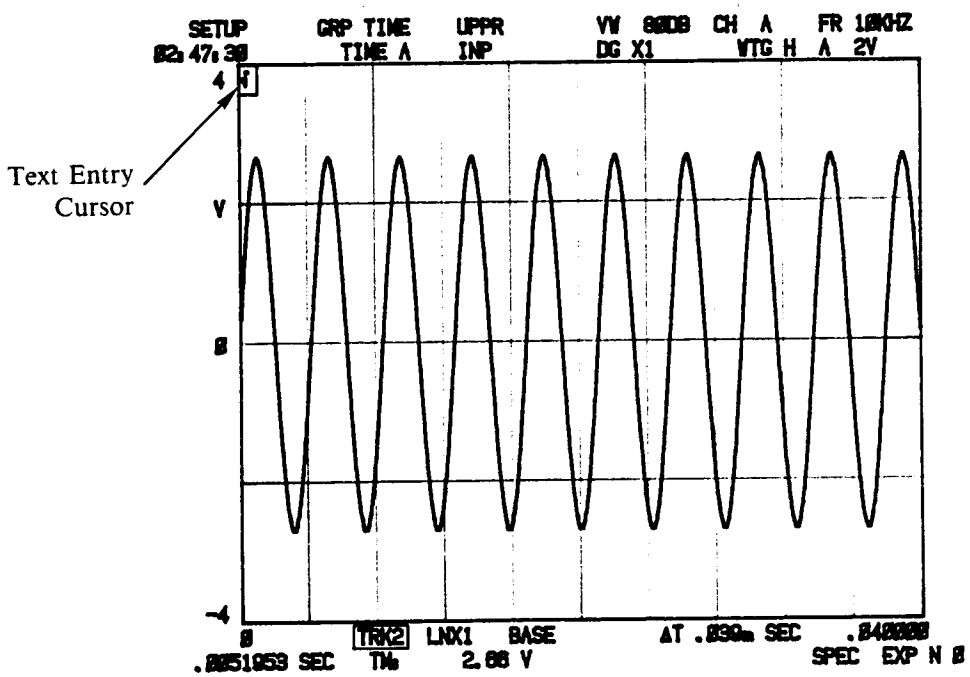

Figure 1-32. Text Entry Cursor

Press the FIELD button and an "A" will appear where the cursor was and the cursor will have moved one space to the right. Located in the upper right corner of the FIELD button is a small letter "A". Other buttons also have small letters and characters in their upper right corners. These buttons, in conjunction with the numerical entry keypad, enable the operator to enter text on the display screen when the Text Mode is selected. The SCROLL group directional buttons control the movement of the cursor (with wrap-around in all directions).

Press the SCROLL DOWN button and the cursor will move down. Press the FIELD button 8 times to place a string of "A's" on line 2. SCROLL LEFT four times and press the CLR and SCROLL DOWN buttons. Four of the "A's" have been cleared from the display. Press RCL and they will reappear at the present cursor position. Press the SCROLL DOWN and RCL button and four more "A's" will appear. In this manner blocks of text may be duplicated and moved to various parts of the screen.

Press the CLR button twice to clear the transfer buffer. Press SCROLL DOWN and RCL and note that no "A's" appear. Press SCROLL UP and CLR twice to clear line 3. Pressing the CLR button erases all text characters to the right of the Text Entry Cursor.

Pressing CLR immediately upon entering the Text Mode will erase all text data permanently. Press the TEXT button to exit the Text Mode and once more to reenter it. Press CLR and note that all entered text is erased. Press RCL and note that the screen still has no text. Press the TEXT button to exit the Text Mode.

1.3.6 Using the Extended Memory

The Extended Memory is an alternate Input Memory of much greater length. Press PANEL, 0 and RCL and adjust the oscillator for an output of 3000 Hz at 0.75V. Select an input level of 2V for channel A.

Located in the INPUT MEMORY group is a button labeled XTND. This button is used to enable the *Extended* Input Memory rather than the *Standard* Input Memory. Press the XTND button and the UPDATE LED will go out, the XTND LED will light and a message stating no input data has been acquired will appear at the top of the display screen.

Press UPDATE and watch the UPDATE LED. Each time it flashes, one full memory period has been loaded into the Extended Memory. Press the HOLD, FREQ locator and SCROLL DOWN buttons to select the 5KHZ analysis range.

Press UPDATE and vary the oscillator frequency. Press HOLD after the UPDATE LED starts flashing. Select the TIME and SPECTRUM display by positioning the Reverse Video Control Field on the FUNCTION GROUP field and pressing SCROLL DOWN. The Time Domain trace displayed is one block, or memory period, of data from the Extended Memory.

The Extended Memory may be accessed, one block at a time, with the Extended Memory Scroll feature. Press the SCROLL group XTND MEM button. The MENU LED should go out and the XTND MEM LED should light. Press the SCROLL RIGHT button and notice that the display traces change.

Continue to SCROLL RIGHT watching the changes in both traces. The display is being advanced one *full* memory period into the Extended Memory with each SCROLL RIGHT.

Press AVERAGE START and observe the Spectrum trace. The instrument will automatically advance through the Extended Memory when averaging is performed. Notice the amount of shift in the signal each time a new memory period is displayed. Press the AVERAGE STOP and XTND MEM buttons.

Display Setup Page 1 and select menu item 1, 75%, on the OVERLAP SELECT menu. Press RESET, XTND MEM and SCROLL RIGHT. The display has been advanced only *one-fourth* of a memory period into the Extended Memory. This results in a 3/4 or 75% overlap of data. Continue to SCROLL RIGHT while observing the data.

Press AVERAGE ERASE and START and again note the amount the signal shifts. It should be approximately one-fourth as much as before. Press the ERASE and XTND MEM buttons and select 0% overlap. Press RESET to return to the data display.

Adjust the output of the oscillator for 3KHz, 0V. Press UPDATE and, after waiting 3 or 4 seconds, rapidly adjust the oscillator output up to 1V and back to 0V to create a "burst" of signal. Press the HOLD button. Press the BAND locator and CURSOR LEFT buttons to position the Reverse Video Control Field on the X-AXIS SCALING field. SCROLL UP to select the CMPRSD (Compressed) X-Axis and press the SCROLL group XTND MEM button. The compressed axis is available only for Time Domain displays of the Extended Memory.

The wide, vertical, reverse video bar on the upper trace is the Block Cursor as shown in Figure 1-33. It represents the current block pointer position in the Extended Memory. The location of the signal "burst" should now be obvious. Position the Block Cursor on the burst with the SCROLL LEFT and RIGHT buttons. Observe the Spectrum trace while moving the Block Cursor.

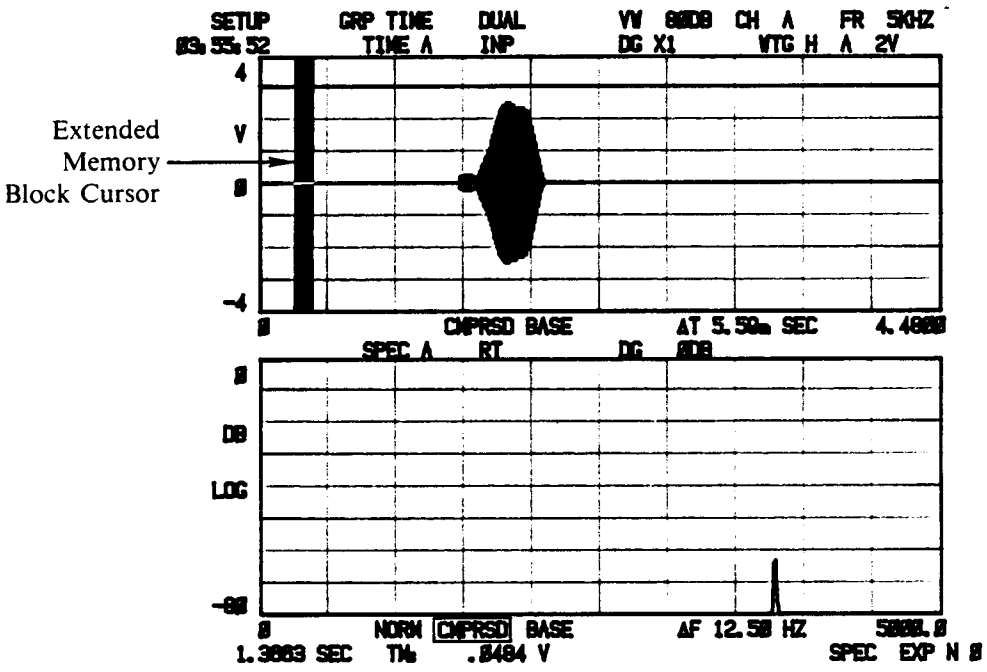

Figure 1-33. The Extended Memory Block Cursor

Once the cursor is positioned on the signal, press XTND MEM to disable the Extended Memory Scroll. SCROLL DOWN to select LNX1 for the X-Axis to observe the non-compressed time data for the selected memory period.

The CTIME & TIME selection (menu item 3) on the TIME FUNCTION menu allows simultaneous viewing of both compressed and non-compressed time data. Press the FUNC locator, 3 and ENT buttons to select the CTIME & TIME function. Figure 1-34 is an example of a CTIME & TIME display.

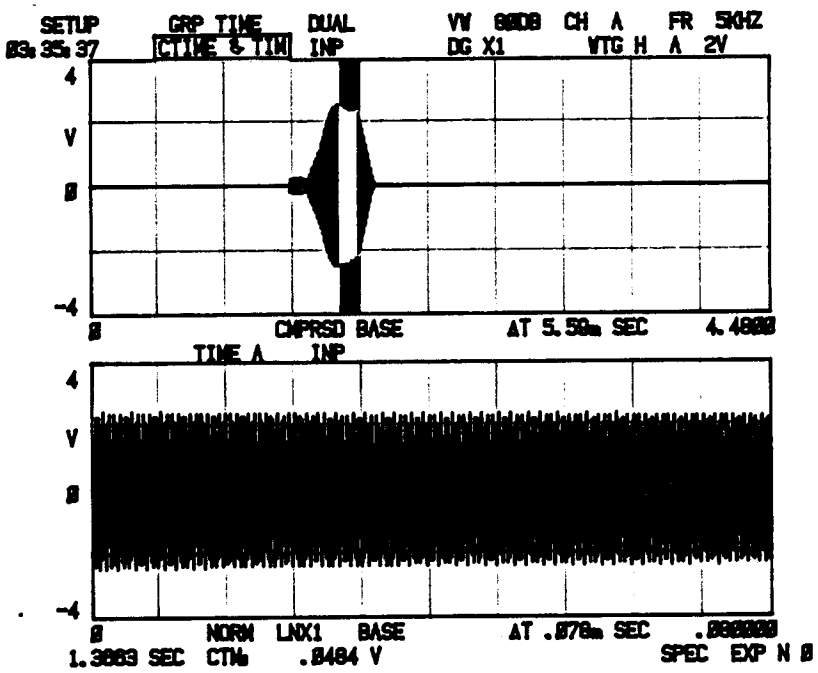

Figure 1-34. CTIME & TIME Display

The lower trace is the non-compressed time data outlined by the Block Cursor in the upper (compressed) trace. Activate the Extended Memory Scroll and move the cursor around in the signal burst to get an idea of the relationship between the two traces.

Press AVERAGE ERASE and START and notice the movement of the cursor. A large portion of the data being averaged is "zero", or no, data. Boundaries can be established that limits the averaging process to a particular area of the Extended Memory. Press the STOP button and, using the Rotary Data Cursor, position the Data Cursor slightly to the left of the burst. Press SET, 1 and ENT to establish the left boundary. Position the cursor slightly to the right of the signal burst and press SET, 2 and ENT to establish the right boundary.

Press ERASE and START and observe the new boundaries during the average. Press the AVERAGE STOP and ERASE buttons. Press the XTND button to disable the Extended Memory feature. Press SET, 1, CLR, SET, 2 and CLR to remove the reference boundaries.

1.3.7 Using the Waterfall

The Waterfall is a data storage feature that stores the analyzer's calibration and trace data. Waterfall loading/updating will not occur when any of the following selections are made:

1. any multi-trace function
2. 800 Lines of Resolution
3. any X-Axis Units other than LNX1; e.g., LNX2, LNX4, LOG or CMPRSD
4. the displayed trace is Time Domain data

Press the PANEL, 0, RCL and UPDATE buttons. Press the MEM SEL locator and CURSOR UP buttons to position the Reverse Video Control Field on the DISPLAY TRACE field. Select the upper trace by pressing the SCROLL UP button twice. Press the WATERFALL group LOAD button and vary the oscillator frequency for approximately 10 seconds, then press WATERFALL HOLD.

In this instrument, both the analyzer and Waterfall are always enabled with one in the "foreground" and one in the "background". The preceding steps executed a Waterfall load with the analyzer in the foreground (displayed). The Waterfall data can be shifted to the foreground, or displayed, by pressing the DISPLY button.

Press the DISPLY button, and the Waterfall display will appear as shown in Figure 1-35.

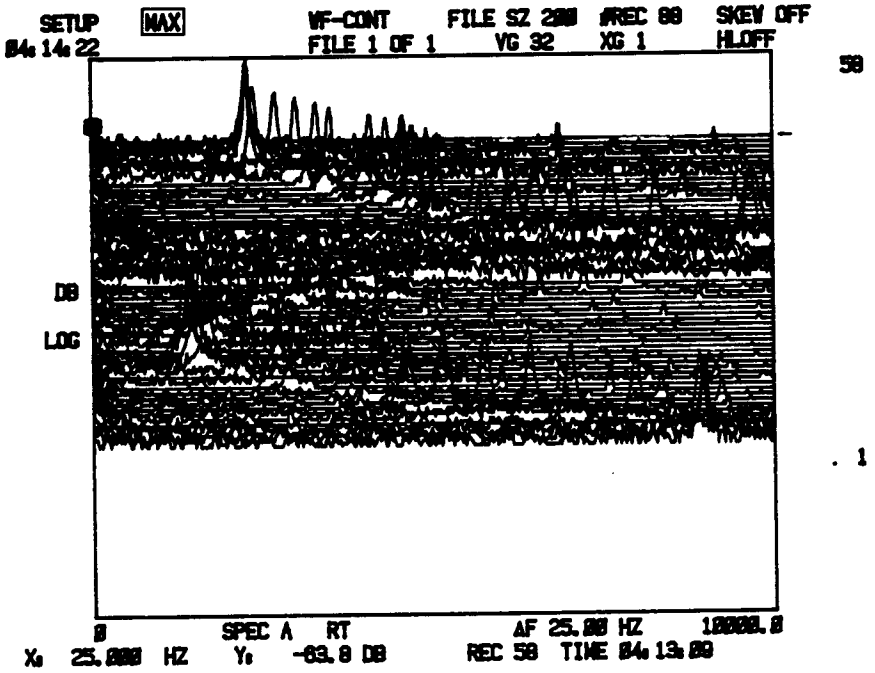

Figure 1-35. The Waterfall Display

Press LOAD and vary the oscillator frequency again while watching the display. Press HOLD.

Press DISPLY to return to the analyzer display. Press the BAND locator and the CURSOR RIGHT buttons once, and the SCROLL DOWN button twice to select 100 lines of resolution. Return to the Waterfall display by pressing the DISPLY button.

Press Waterfall LOAD and note the message displayed at the top of the screen. The instrument will refuse to load data that is not exactly compatible with previously stored data. This is done in order to insure that calibration is maintained. Updating will not occur if any of the following settings are changed during the updating process:

1. X-Axis Units or Gain
2. Y-Axis Units or Gain
3. Display Function
4. Display Trace
5. Display Memory
6. Full Scale Analysis Range
7. Displayed Channel; e.g., switching from channel A to B
8. Number of Lines of Resolution

Press CLEAR and observe the message that appears at the top of the screen. Press CLEAR again while the message is displayed and the current file will be erased. This is done to prevent accidental erasure of any data.

Press LOAD and note the increased rate at which the Waterfall is updating. This is due to the selection of 100 vice 400 lines.

Loading of the Waterfall is also controlled by the UPDATE MODE field. The Reverse Video Control Field should be positioned on the annotation "MAX" located in the upper left corner; this is the UPDATE MODE field. Press HOLD and SCROLL DOWN to select the % LEVEL Update Mode. Display Setup Page 7, PARAMETERS PAGE, and press CURSOR UP, 8, 0 and ENT to enter 80 in the % LEVEL field.

Press RESET to return to the data display screen and adjust the output of the oscillator for 0V. Press LOAD and slowly increase the output of the oscillator until records begin to be loaded into the Waterfall. In the % LEVEL Mode, Waterfall data acquisition does not occur until the amplitude of the data equals or exceeds the entered percentage of full scale Y-Axis. Press HOLD.

SCROLL DOWN to select the AVG RCYCL (Average Recycle) Mode. Press DISPLY, MEM SEL locator, CURSOR UP and SCROLL DOWN to return to the analyzer display and select the lower trace for display. Press the AVG locator, CURSOR RIGHT and SCROLL UP to select SUM Averaging. Return to the Waterfall display and press CLEAR twice.

Press LOAD and vary the oscillator frequency. Note the slow rate at which the Waterfall updates. This is due to the fact that the analyzer acquires and averages 10 data ensembles before a Waterfall update occurs. Press AVG# (located on the ENTRY keypad), 3 and ENT to change the AVG N to 3. Vary the oscillator frequency again. The update rate should increase, as only 3 ensembles are involved in an average. Press HOLD.

To provide more operator flexibility, the Waterfall incorporates three display enhancement techniques: SKEW, HIDDEN LINES and % SUPPRESSION. These three features enable the operator to enhance the displayed data without affecting the data stored in memory.

The SKEW feature provides a right skew of the Waterfall display. This allows the operator to see around peaks that occur in a straight line. This feature will operate in the HOLD mode only. Press CURSOR LEFT to position the Reverse Video Control Field on the SKEW OFF annotation and SCROLL DOWN to obtain a skewed display as shown in Figure 1-36. Press SCROLL DOWN again to return to the normal display.

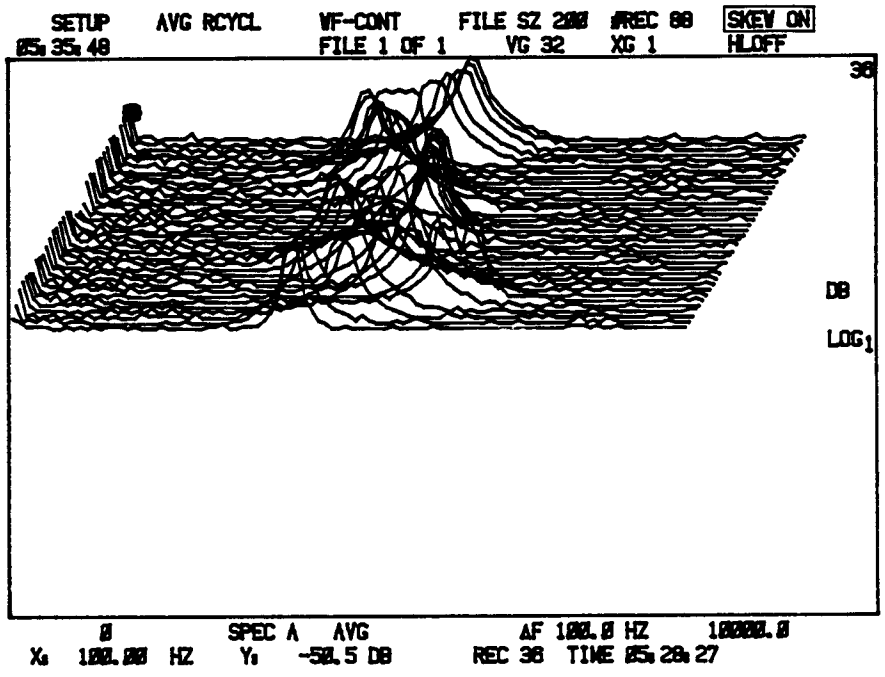

Figure 1-36. SKEW Display

Sometimes there is difficulty in discerning the data pattern because of the blending of all the information on the screen. The Hidden Lines feature blocks data that occur "behind" data peaks. Press CURSOR DOWN and SCROLL DOWN to activate the Hidden Lines display. It is now much easier to extract information from the data as shown in Figure 1-37.

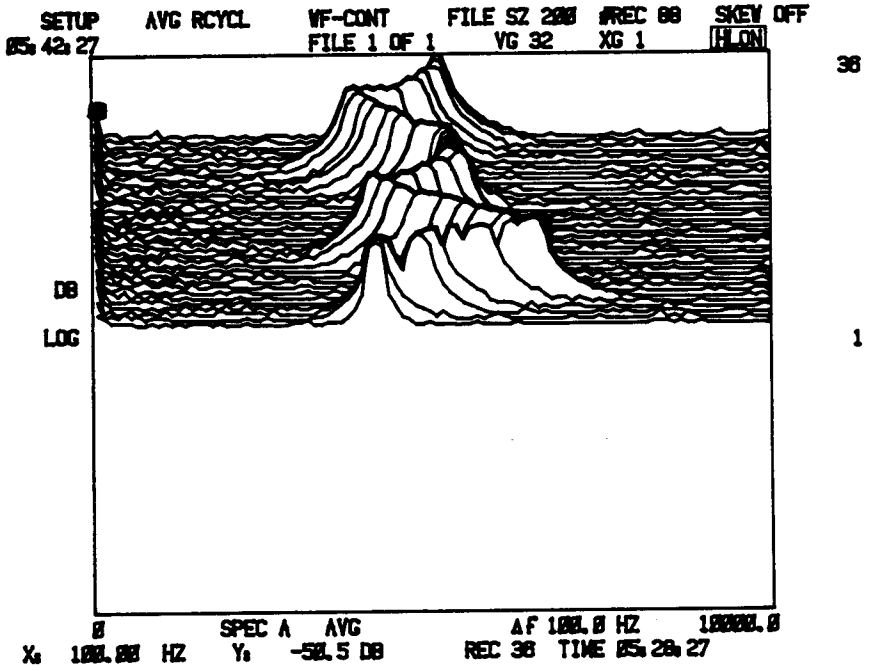

Figure 1-37. Hidden Lines ON Display

Occasionally, important information is difficult to see because of a noisy baseline. The % SUPPRESSION feature suppresses data below a specified % of full scale as shown in Figure 1-38. Press RESET to display Setup Page 7 and CURSOR DOWN twice to position the RV on the % SUPPRESSION field. Press 2, 0 and ENT to enter 20 % Suppression. Return to the Waterfall display and note the difference. Position the Reverse Video Control Field on the UPDATE MODE field by pressing the CURSOR UP and RIGHT buttons. SCROLL UP twice to select MAX.

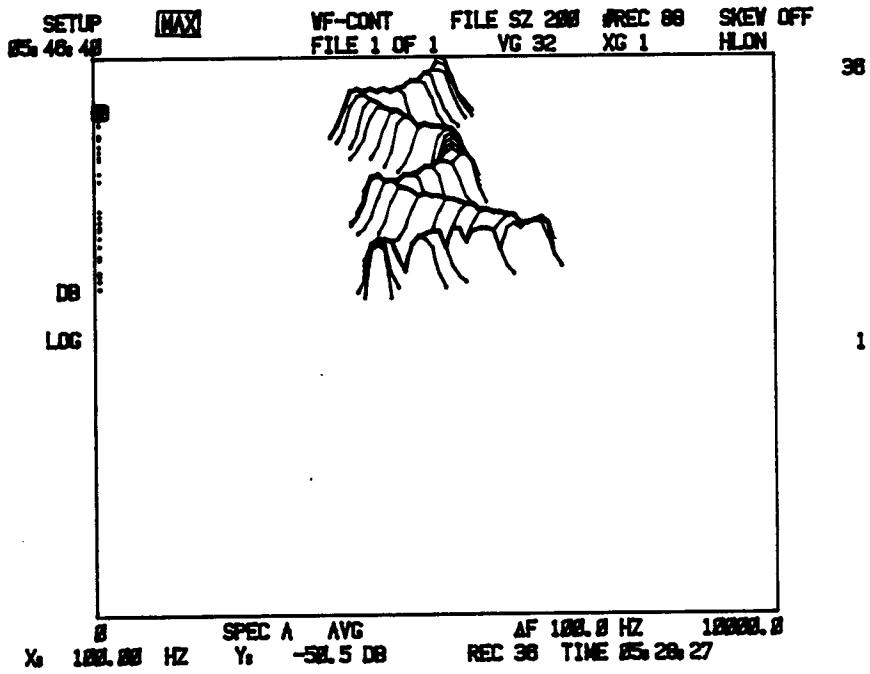

Figure 1-38. 20% Suppression Display

Return to Setup Page 7 and enter 0 for % of Suppression. Press RESET to return to the Waterfall display and CURSOR LEFT twice to position the Reverse Video Control Field on the VERTICAL GAIN field (VG 32). Scroll through the various settings observing the effect on the display. Return to a gain setting of 32.

Press the CURSOR UP and RIGHT to access the RECORDS PER DISPLAY field and scroll through the menu. Although fewer records are displayed on the screen, it is easier to see each individual record without interference from adjacent ones. Press 4 and ENT to select the 10 record display.

Return to the analyzer display and position the Reverse Video Control Field on the DISPLAY TRACE field. Press the SCROLL UP button to select the upper trace for viewing. Press DISPLY to return to the Waterfall display.

Press the CURSOR RIGHT button to access the Waterfall DISPLAY MODE field. SCROLL DOWN to view the various signal trace displays that can be obtained from the Waterfall portion of the instrument: Single records, the peak value detected at each X location and a profile of an X location with respect to TIME, RPM or RECORDS.

Return to the WF-CONT (Waterfall Continuous) mode and press the SCROLL group WATERFALL button. This activates the Waterfall Scroll feature. Note the message that is momentarily displayed at the top of the screen. The Hidden Line feature has been forced off.

Press SCROLL UP to scan through the records one at a time. Press the DATA button to enter the Data Mode. This enables the Cursor directional buttons to control movement of the cursor. Press the CURSOR DOWN button to position the Data Cursor on different records. Notice that movement of the Data Cursor is restricted to only those records fully displayed on the screen. Press the CURSOR RIGHT button to move the Data Cursor along the X-axis of the record (The Rotary Data Cursor also moves the cursor in this axis). Press the FIELD button to exit the Data Mode. This also disables the Waterfall Scroll.

Press SCROLL DOWN twice to select the SINGLE Display Mode, and DATA once. The CURSOR UP and DOWN buttons now allow the operator to step through the Waterfall Memory one record at a time. Only the records displayed on the screen, in this case 10, may be viewed.

1.4 SD380C SPECIFICATIONS

1.4.1 Input

Range	0.01 Vrms to 20.0 Vrms F.S. in a 1-2-5 sequence; manual selection or autoranging on each channel.
Level	LEDs indicate 0.1 F.S. level and input overload on each channel.
Impedance	112 kΩ ±2% shunted by 100 pF. Signal low to case capacitance 0.1μF.
DC Isolation	Input signal low may be floated up to 50 Vrms above chassis ground.
Coupling	DC or AC (−3 dB at 0.7 Hz for AC).
Anti-Aliasing Filter	Digital LPF with nominal 120 dB/octave rolloff with cutoff frequencies selectable in a 1-2-4-5 sequence from 1.0 Hz to 40 kHz alias free. Analog LPFs with cutoff frequencies of 40 kHz, 26.5 kHz, 6.63 kHz, 2.65 kHz, and 663 Hz on each channel for out-of-band rejection.
Sampling Rate	Internally or externally controlled. TTL compatible sample rate input on rear-panel connector. 1 Channel — Up to 102.4 kHz. 2 Channel — Up to 102.4 kHz. 4 Channel — Up to 51.2 kHz.
Triggering	TTL compatible, repetition rate of 1 Hz to 10 kHz, amplitude of ± 300 mV peak to ± 50 V peak (polarity selectable via rear-panel switch S4), pulse duration from 10 μs to 200 ms.
A/D Converter	12 bits each channel.
Test Signal	Replaces input signal with internally-generated periodic signal to test instrument operation.
Extended Memory	Continuous time record can be loaded per channel as follows: 1 CH - 56 k samples 2 CH - 28 k samples each 4 CH - 14 k samples each

	Minimum fill size — 2 k samples per data block for all channels using repeat trigger.
	Entire contents of extended memory can be viewed as compressed display or expanded to selected block size at cursor location.
Channel Amplitude Match	0 - 0.8 Full scale frequency: ± 0.2 dB 0.8 - 1.0 Full Scale frequency: ± 0.3 dB
Channel Phase Match:	When input level is the same for both channels 0 - 0.8 Full Scale frequency: ± 1.5° 0.8 - 1.0 Full scale frequency: ± 3.0°

1.4.2 Trigger Characteristics

Free Run	Continous data acquisition. A new measurement is initiated upon completion of previous one.
Single	A single data acquisition is initiated when the input data signal exceeds the programmed threshold amplitude or an external trigger is applied.
Repeat	A new data acquisition is automatically initiated when the input data signal exceeds the programmed threshold amplitude or an external trigger is applied.
Level	Keypad-entered as TH% from 0 to ±100% selected full scale input voltage setting.
Delay	Regular memory — Programmable trigger delay from −2000 to + 63,000 data samples in one-sample increments relative to threshold level crossing or external trigger pulse.
	Extended memory — Programmable delay in one-sample increments from −9,999 to +64,000 samples for all channels.

1.4.3 Frequency Characteristics

Baseband Ranges

1.0 Hz F.S. to 40 kHz F.S. in a 1-2-4-5 sequence (19 total). NOTE: 20 kHz maximum F.S. frequency in 4-channel mode.

Transform Size

Block Length	Baseband Resolution
256 pts.	100 lines
512 pts.	200 lines
1024 pts.	400 lines
2048 pts.	800 lines

Respective ΔT and ΔF values are part of the display annotation. NOTE: 800 lines limited to one- or two-channel acquisition.

Zoom

Bandwidth — Selectable from 2 to 256 in powers of 2 on any or all channels.

Control — Zoom center established by cursor location or keyboard-entered center frequency.

Resolution — Same number of lines as selected baseband mode. Zoom ΔF is part of display annotation.

Accuracy — $\pm 0.0025\%$ of display center frequency.

1.4.4 Analysis Performance

Dynamic Range

76 dB below selected full-scale input.

Noise Floor

Below 76 dB (averaged) from selected full-scale input.

Spurious Components

Below 70 dB from full scale on the 50 mV range and above. Below 60 dB from full scale on the 10 mV and 20 mV ranges.

Amplitude Linearity

± 0.5 dB or $\pm 0.025\%$ of full scale for bin-centered data to 70 dB below full scale, whichever is greater.

Frequency Response	±0.5 dB at bin center over entire frequency range.
Weighting Windows	Hanning, Flat Top, Rectangular (boxcar), Force-Response Rectangular, Force-Response Exponential 1 (1/E*), Force-Response Exponential 2 ($1/E^{2}$*), Force-Response Exponential 3 ($1/E^{3}$*) and Force-Response Exponential 4 ($1/E^{4}$*). * — Amount the last cell of the Full-Scale Analysis Range is attenuated by.
Overlap Factor	Selectable 0%, 25%, 50%, and 75% for processing extended memory data. Maximum overlap when processing regular memory data.

Typical Real-Time Bandwidth (400 Line Resolution)	
1 CH (Loaded into Waterfall)	7.0 kHz
1 CH (Average w/o live display)	6.5 kHz
1 Ch (Live single trace display)	4.0 kHz
2 CH (Live dual trace display)	2.0 kHz
4 CH (Live quad trace display)	1.5 kHz
1/3 OCTAVE Option (5 Octave)	4.0 kHz

1.4.5 Calibration Parameters

mV/EU	Transducer sensitivity selectable from 0.0001 to 9999 dB & EU Ref. Keyboard-entered calibration values with corresponding reference voltages.
Panel Setups	Non-volatile store and recall of up to six complete operator-defined instrument setups with directory listing. Additional setups can be stored and recalled from optional built-in micro floppy disk.
Calibration Signal	Single tonal, internally generated with an amplitude of − 10 dB from Full Scale and a frequency of 64% of the Full Scale Analysis Range.

1.4.6 Functions Performed

Time Domain	1, 2, or 4 CH — Input time, sync time average.
	2 or 4 CH — Normalized auto-correlation, normalized cross-correlation, impulse response, output response, orbit display.
Frequency Domain	1, 2, or 4 CH — rms spectrum, zoom spectrum, power spectrum, sync spectrum.
	2 or 4 CH (in baseband or zoom mode) — Cross spectrum, transfer function, phase, coherence, coherent output power, Nyquist display.
	Dual-channel math operations of +, −, ×, & ÷.
Amplitude Domain	1, 2, or 4 CH — Probability density histogram, cumulative distribution, block calculation of Mean value, Sigma, Skew, and Kurtosis parameters.

1.4.7 Averager

Domain	Time, frequency or amplitude on any or all channels.
Modes	Summation, exponential, peak, and +1. Peak averaging available in transfer function and power group; stores response for corresponding maximum reference value.
Ensembles	Selectable from 1 to 999 in integer steps.
Seconds	Selectable from 1 to 999 in one-second intervals.
Control	Start, Stop, Erase, and Store (transfers averager contents to store memory).
Store	Stores processed results and calibration data from 256, 512, 1024 and 2048 point transforms.

1.4.8 Waterfall Capabilities

Memory Size	One file of 200 records up to eight files of 25 records each. Files can be stored on optional built-in micro floppy disk.
Record Resolution	100, 200, or 400 lines with 8-bit amplitude.
Tach Input	Range: 1 Hz to 10 kHz (60 to 600,000 pulses per minute). Coupling: ac or dc. Polarity: Positive or Negative. Minimum Pulse Amplitude — ac coupled: 2.5 Vpp at 10% duty cycle; 5 Vpp at 50% duty cycle. Minimum Pulse Amplitude — dc coupled: ±0.35 Vp. Maximum Pulse Amplitude: 100 Vp. Minimum Pulse Width: 9 us ± 1.5 us. RPM Readout Accuracy: From 60 rpm to 60,000 rpm, 0.5%. From 60,000 rpm to 120,000 rpm, 0.75%. From 120,000 rpm to 600,000 rpm, 1.0%. Impedance: 50 kΩ. Pulses/Rev: ENTRY keypad entered via WATERFALL PARAMETERS or SSG/OCTAVE/SRA OPTIONS page TACH P/R menu. Values from 1.0 to 99,999 P/R can be entered.
Record Displayed	10, 25, 50, or 100 consecutive records. Any record as a single, full-resolution trace.
Update Modes	Max rate, % level, N seconds, ΔRPM, Avg recycle, front panel command.
Cursor Readout	X and Y coordinates, time of acquisition, record number and RPM (if applicable) for each record.

1.4.9 Display

Size	7-inch diagonal color raster scan CRT.
Traces	1, 2, 3, or 4 trace displays, depending upon selected function.
1 CH Mixed Displays	SPECTRUM Real Time and Average, SPECTRUM Real Time and Store, SPECTRUM Average and Store, SPECTRUM ZOOM and Baseband, TIME and SPECTRUM, TIME and PDH, Compressed TIME and TIME.
X-Gain	Lin X1, X2, X4, LOG.
Y-Gain	Lin X.1 to X50 in a 1-2-4-5- sequence. Lin attenuation of 0.5, 0.4, and 0.2. Log offset of ±50 dB in 10 dB steps.
View Window	Choose an 80 dB, 40 dB, or 20 dB display window with selectable log offset.
Grids	Electronically generated for non-parallax viewing of Lin or Log displays.
Scaling	Both X & Y grids automatically scaled and annotated in the selected calibration parameter.
Auto-Dim	The CRT will automatically dim 10 minutes after the last front panel button is pressed or the last IEEE command is received. Full intensity will be restored upon pressing a front panel button, moving the data cursor or communicating via the IEEE interface.
Refresh Rate	50 Hz/60Hz, selectable.
Calibration	

Y-Axis Operator				
Units	Mag	Mag^2	$Mag/\sqrt{Hz}$	Mag^2/Hz
V	V	V^2	$V/\sqrt{Hz}$	V^2/Hz
EU	EU	EU^2	$EU/\sqrt{Hz}$	EU^2/Hz
dB	dB	dB	$dB/\sqrt{Hz}$	dB/Hz
	dBV	dBV	$dBV/\sqrt{Hz}$	dBV/Hz
	dBR	dBR	$dBR/\sqrt{Hz}$	dBR/Hz

Text Entry	Convenient front panel entry of alpha & numerical characters on any of 16 lines on the display.

1.4.10 Cursor

Modes	Normal — Single intensified dot with or without line cursor. Harmonic — Displays multiples of cursor fundamental with fine-tune alignment. Track — TRK1 cursor follows stable maximum amplitude tonal with abrupt frequency shifts within analysis band. TRK2 cursor follows tonal with small or gradual frequency shifts and large amplitude changes. TRK3 cursor acquires the highest amplitude tonal in the display and tracks it in the selected analysis band. ΔX — Reads frequency on time interval between defined cursor limits. ΔP — Reads total inband overall rms level or energy between defined cursor limits.
Readouts	X values displayed in one of the following: Frequency: HZ, RPM or ORDERS Time: SECONDS or DEGREES Amplitude: VOLTS, ENGINEERING UNITS or % of FULL SCALE Y values displayed in one of the following: VOLTS, ENGINEERING UNITS, dB, dBv or dBR.
Mark List	Operator can mark up to 10 data points on any one trace and list the X & Y values.
Harmonic List	Tabulates up to 15 harmonics of a Set harmonic cursor pattern.
Peak Plot	Automatically lists on corresponding plot up to 15 peaks above a cursor-defined amplitude.

1.4.11 Output

Video	Compositive video signal and separate H & V with composite sync.
Digital I/O	Complete front panel remote control, with local lock-out, and bi-directional data transfer using IEEE-488 (1978) interface.
Digital Plot	Direct IEEE-488 control of HP-GL digital plotters for recording grids, annotation, and data traces.
Data Format	DEC PDP-11 floating point data format or calculator byte format.

1.4.12 General

Operating Temperature	5°C to 45°C (41°F to 113°F).
Power	105-125/210-250V ac @ 49.95 to 50.05 Hz ***or*** 59.95 to 60.05 Hz = 150 VA.

NOTE

Unit will ***operate*** at 47 to 63 Hz, but will display unacceptable display oscillations and "swimming" if the above line frequencies are not met.

Size	Height — 27 cm (10.5") Width — 43 cm (17") Depth — 58 cm (23")
Weight	Nominal 25 kg (55 lb) net.

Section II

Initial Inspection and Safety Precautions

2.1 INTRODUCTION

This section contains instructions for performing an initial inspection of the Model SD380. General safety precautions are included after the initial inspection. Preparation for use and return shipment procedures including procedures for claiming warranty repairs and repacking for shipment are also described in this section.

2.2 INITIAL INSPECTION

Although the instrument is thoroughly inspected mechanically and electrically before packing for shipment, it must be inspected upon receipt for damage in transit.

2.2.1 Unpacking

Use care in removing the instrument from its shipping container to prevent damage to the front- and rear-panel controls. Save the shipping container and all packing materials until the instrument has been thoroughly inspected for damage and checked for proper operation.

2.2.2 Equipment Furnished

Ensure that each item on the packing list is included with the shipment. Accessory kits may be shipped in separate containers.

2.2.3 Inspection for Physical Damage

Inspect all panels for dents, signs of chipped paint, or scratches. Check for broken or bent connectors, switches, and knobs. Photographs of damage may be helpful in substantiating subsequent claims.

2.2.4 Reshipment Procedure

If the instrument is to be reshipped after receipt, use of the original shipping container and packing materials is recommended. If original packing materials are not available, the following materials should be used:

a. A double wall carton with a test strength of 350 pounds and of sufficient size to accommodate the required packing.

b. Heavy paper or sheets of cardboard to protect all surfaces.

c. Nonabrasive material such as polyurethane or cushioned paper between projecting parts and wall of carton.

d. At least 4 inches of shock-absorbent material such as extra firm polyurethane.

2.2.5 Returned Equipment with Warranty or Damage Claims

If the instrument is found to be damaged in transit or does not operate as specified when received, notify the carrier and the nearest Scientific-Atlanta, Inc., Spectral Dynamics Division sales/service office or representative immediately. The local office will arrange for repair or replacement. A Return Material Authorization (RMA) number will be assigned by the factory to assure identification and tracking of the instrument by Scientific-Atlanta. Be sure to attach a card showing the owner's name, address, telephone number, and a description of the service required.

2.3 SAFETY PRECAUTIONS

The Model SD380 Signal Analyzer presents no hazard to operating personnel if operated in accordance with the instructions contained in this manual.

CAUTION
STATIC CAN DAMAGE COMPONENTS

The circuit cards located in the SD380 contain CMOS components that are electrostatic-discharge sensitive (ESDS) devices. Do not handle ESDS components unless a grounding wrist strap is properly worn and grounded. Do not let clothing or plain plastic materials contact or come in close proximity to ESDS devices.

Electrostatic charges are generated and stored on surfaces of ordinary plastics, most common textile garments, ungrounded people's bodies and many other commonly unnoticed static generators. If an electrostatic charge passes through an ESDS device, catastrophic failure or performance degradation of the device may result.

2.3.1 Explosion Hazard

Do not operate the instrument in any environment where flammable vapors may exist. Operation of any electrical instrument in such an environment constitutes a definite explosion hazard.

2.3.2 Shock Hazard

When connected to a three-contact power receptacle, the three-conductor ac power cable supplied with the instrument grounds the panel and the chassis. This grounding protects the operator from possible injury. To preserve this protection when operating from a two-conductor outlet, use a three-conductor to two-conductor adapter and connect the adapter wire to ground at the power outlet before connecting the instrument. Covers and safety plates should be removed ONLY by QUALIFIED maintenance personnel. Dangerous voltages are present inside this instrument whenever the power cord is connected even when the power switch is off.

2.4 PREPARATION FOR USE

2.4.1 Power Requirements

The SD380 Signal Analyzer is designed to operate on either 115 Vac or 230 Vac. Therefore, before applying power to the instrument, check the following:

a. There are three transformer slide switches (labeled S1, S2 and S3) located on the rear panel. All switches must always be in the same position (either 115 or 230 as determined by the power available).

b. The fuse in fuseholder F1 should be a 10 amp SLO-BLO for either 115 Vac or 230 Vac operation.

c. There is a toggle switch located in the power supply for selecting low-line-voltage operation (Refer to Figure 2-1). For normal operation with both rear-panel slide switches in their proper positions, the toggle switch must be in the 120 volt position. For operation in areas where low line voltage is encountered (such as in Japan), the rear-panel slide switches must be in the 115 Vac position and the toggle switch must be in the 100/110 V position. If low line voltage is experienced in countries that normally employ 230 Vac line voltage, this toggle switch can be utilized in the 100/110 V position even if both rear-panel slide switches are in the 230 Vac position.

d. There is a toggle switch located on circuit card A7 for selecting the display refresh update rate (Refer to Figure 2-1). For operation in areas that use 60 Hz ac power, switch A7S1, Display Refresh Select, should be set to the 60 Hz position. In areas that use 50 Hz power, place A7S1 in the 50 Hz position.

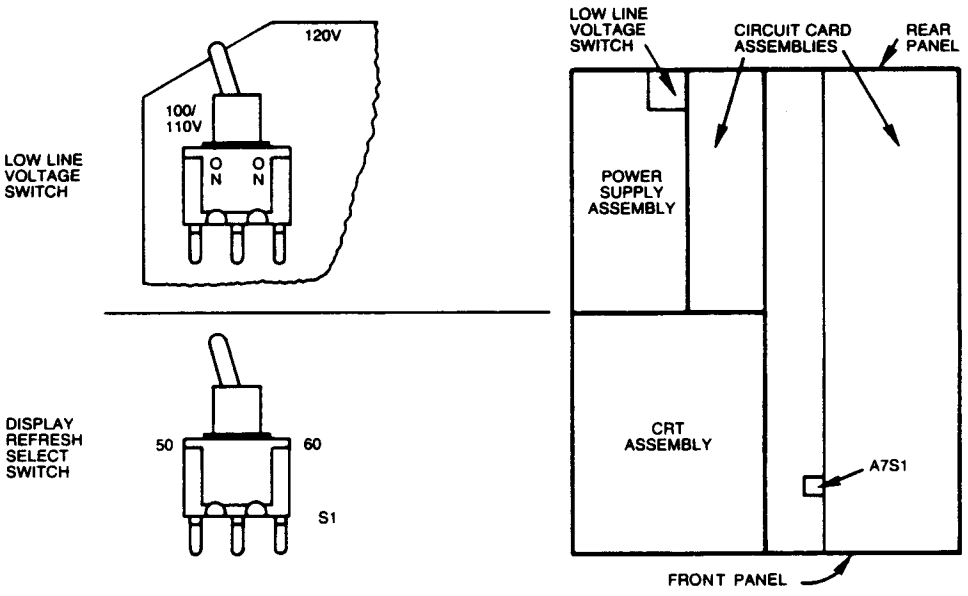

Figure 2-1. Location of Display Refresh Select and Low Line Voltage Toggle Switches

WARNING

Removal of the top cover of the instrument is required for access to the low line voltage switch. Prior to removing the cover, ensure that power to the instrument is turned off and that the power cord is unplugged. After the cover is removed, do not touch any components in the power supply assembly or the crt assembly other than the low line voltage toggle switch.

2.4.2 Mounting

The SD380 is shipped from the factory as a bench instrument with trim in place. Rack-mounting hardware is provided as part of the accessory kit and must be attached before mounting the instrument in a rack.

2.4.3 Cooling

The SD380 requires at least ½'' open space above and 3½'' open space behind the instrument for proper cooling. Never place anything directly on top of the SD380 when the instrument is turned on.

2.5 OPERATOR MAINTENANCE

2.5.1 Introduction

Maintenance performed by the operator consists of cleaning, visual inspection and only limited troubleshooting.

2.5.2 Cleaning

Operator cleaning procedures involve only the exterior surfaces. When the instrument is operating, use only a dry cloth or soft brush. The SD380 is equipped with a LEXAN front panel. The following guidelines should be used in selecting a proper cleaning agent.

WARNING

Only recommended cleaning agents should be used for cleaning the LEXAN front panel. Many commercial cleaning agents contain some form of halogenated, aromatic or ammoniated compounds. These agents will damage the LEXAN front panel and should not be used for cleaning.

The recommended cleaning agents are as follows:

Light cleaning: Denatured alcohol or a mild solution of soap and water.

Heavy cleaning: MS-260 cleaner for plastic, glass and metal. (Miller Stephenson Chemical Co., Inc.)

The following procedure should be performed at least once each month. If the instrument is being used in a dust-filled environment, cleaning may be required each day.

CAUTION

Do not use any air source to remove dust.

a. Turn the instrument off and disconnect the ac power cord.

b. Using a soft brush, remove dust from the front panel and the face of the crt. Remove dust from connectors, slots, switches and the vent fan grill on the rear panel.

c. Using the recommended cleaning agents, wipe the front panel and the face of the crt.

2.5.3 Operating Checks

Table 2-1 lists some possible malfunctions that may be corrected by interpreting the front panel indications and taking the appropriate action.

Table 2-1. Operator Checks

Malfunction Symptoms	Possible Cause
No display and Power Pushbutton/Indicator is in the ON position but not lit.	1. Loose power cord at wall receptacle or at rear of instrument. 2. Fuse is blown. 3. No power at wall receptacle.
No display. Power Pushbutton/Indicator is in the ON position and the lamp is lit.	1. CRT Intensity too low. (The front-panel DISPLAY Group Grid and Contrast controls are turned down.)

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