Operator's Manual SD222 Portable 2-Ch Analyzer (Part One)

Legacy Manual

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SERIAL _____

OPERATOR'S MANUAL

SD222
Portable
2-Channel Analyzer

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Section 1

General Information

Using the Manual

This manual has been organized so that it can provide an overview of how the SD222 works and also act as a reference document for particular functions. Spend a little time reviewing the manual to discover some of the powerful features available on the SD222. The instrument's operator interface is quick and easy to master yet contains features available on far more complex instruments.

The main reference sections are chapter 2 for setting up and operating the instrument and chapter 3 for a description of the various processes.

`Items in this type style appear on the analyzer's LCD display.` **Items in this type style refer to analyzer's hardware.**

ON/OFF Switches

The power source for the SD222 FFT Analyzer/DSO is an internal NiCad battery pack which is recharged via a socket on the back panel of the instrument. To turn it on, press simultaneously the two **ON** keys on the front panel. Two key presses are required to avoid inadvertent powering up of the machine. To remove power, press the **OFF** key.

At power-up the internal processor is reset and self-test is carried out to ensure that all memory is functioning correctly and that no stored data has been corrupted. A battery separate from the rechargeable NiCad cells will protect stored data for around 10 years. After self-test which takes about 2 seconds, the instrument is ready for use.

Battery Charging

It is important, as with any battery powered instrument, to maximize battery life. The SD222 has a number of features to ensure that battery charge is not wasted.

If the instrument is left powered for 10 minutes without a key being pressed, it then switches itself off automatically. If, however, the machine is left in a state where it is waiting for a trigger, then power will not be automatically removed. This prevents the machine powering down when, for example, one-shot trigger has been selected and a suitable trigger is being awaited. The automatic shutdown can be disabled if desired. In addition, when the instrument is not processing or collecting data, then the internal electronics are switched into low power mode.

The instrument monitors battery condition and will put a low battery indication, **BAT**, on the screen when there is approximately two hours run time remaining before recharge is required. To prevent a very low battery charge condition causing permanent damage to the internal batteries, the instrument will automatically power down when there is a dangerously low charge level remaining.

When the instrument is powered up after a manual or automatic shutdown, all settings and data are reloaded exactly as before power was removed. Switching the instrument off and on does not affect operation in any way.

It is possible to run a discharged instrument directly from a battery charger set at a current output of 450 mA. Battery charging is explained in detail in section 5.

Time and Frequency Domains

The SD222 acts as both a digital storage oscilloscope and as an FFT Analyzer with powerful waveform processing capability. The instrument can be used both for detailed system analysis and for storing processed data on multiple test points. Several hundred points can be maintained depending on the length of the storage records selected.

It is often very useful to observe an input signal in the time domain to ensure that it is of the form expected. You can then be confident that the results of the selected process are correct. Sophisticated instruments like the SD222 are an aid to system analysis and not a substitute for human intuition. The SD222 offers you a powerful range of analysis tools, in both the time and frequency domains, enabling you to carry out your job effectively.

One striking feature of the instrument is the small number of keys for operating the instrument. Very powerful time and frequency processes can be carried out without the confusion caused by arrays of buttons, and the danger of pressing the wrong button is avoided as all key presses will result in the selected action being displayed on the screen.

Section 2

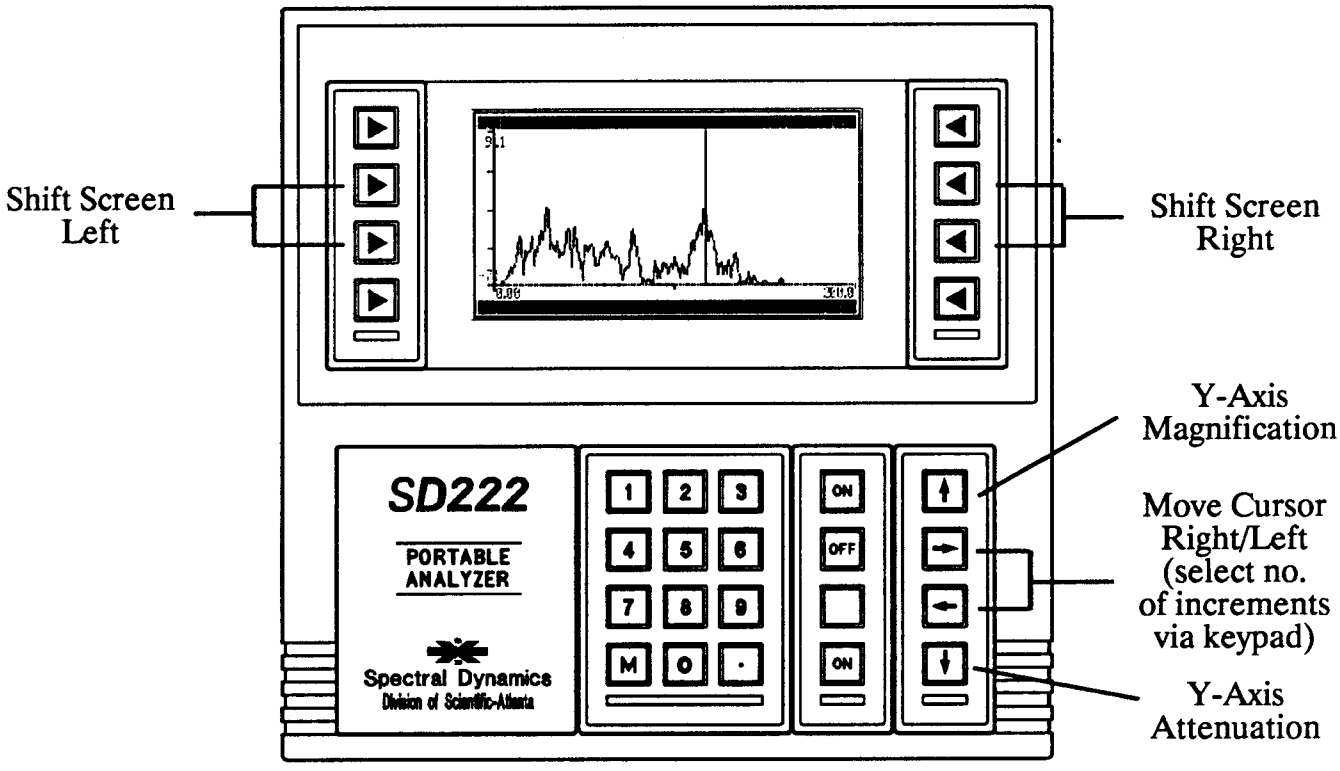
Operating Instructions

Operational Overview

All control, measurement, processes and display formats are selected by use of 8 menu keys (4 situated on each side of the display) and 4 cursor keys allowing up, down, left and right movement of inverse video cursors. For set-up, a menu will be selected using one of the 8 menu keys. The selected menu will then display all the options available, and the option required is selected by use of the four cursor keys. The various menus are described in detail in this chapter. All menus have the OK option at the bottom right hand corner which will always exit from that menu to the level above.

Settings on the 8 option screens are selected by simply pressing the cursor keys to move the inverse video cursor to the desired selection. A column is selected using left and right cursor with the heading of the selected column being shown in inverse video. Up and down cursors select the setting in that particular column. When leaving a column, or indeed an entire screen, the chosen settings are latched. When returning to a particular screen, the previously selected settings are displayed for checking or for modification if desired.

Control of the SD222 has been designed to be extremely straightforward, and a few minutes spent experimenting with the various functions will quickly reveal the simplicity of the instrument's operation.



Display Control Keys

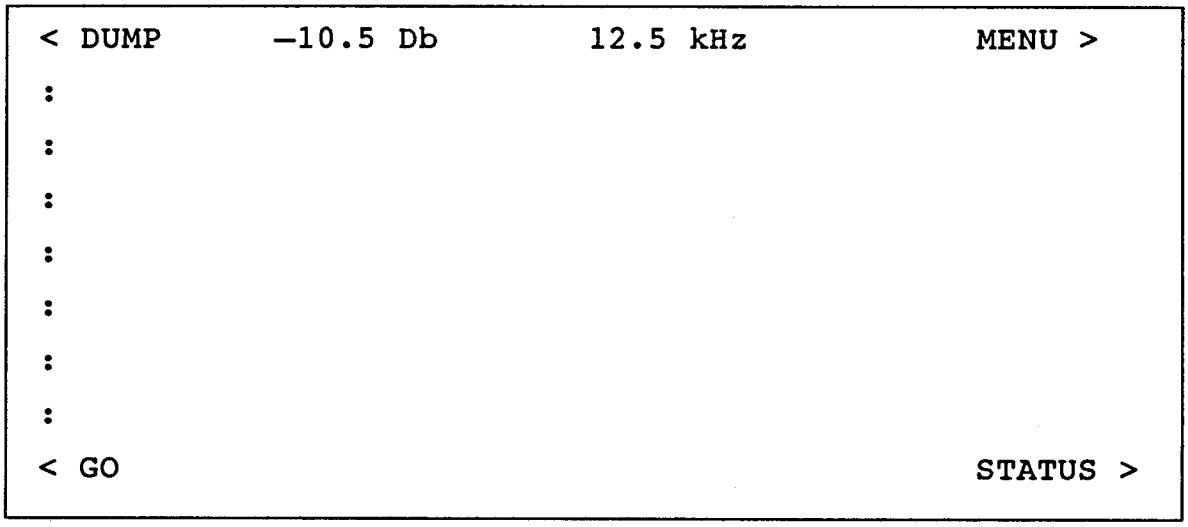
The Main Display Screen

The Display Screen has 5 main features.

- Fully annotated single and dual channel X-Y plot of the selected process
- Left and right panning of data for display of full records
- Cursor read-out of X and Y data, on two channels if selected, to full resolution of instrument
- Y-axis magnification of processed data
- Store option for desired traces

Display Control

At power-up, the SD222 will display the screen format which was current when the instrument was last being used. The settings which were previously selected are likewise reloaded. The display will appear as in the following figure (assuming one channel display was selected).



DISP (Display) Screen

Display Screen Options

Four options are available in the display screen. Press one of the **ARROW** keys to enter these sub-screens.

The bottom right `STATUS` option displays all current settings for the instrument and so allows a quick check to be carried out. When in the `STATUS` sub-menu, press `OK` option to return to return to the display screen.

The top right `MENU` option will display a table of possible menus for changing the various settings of the instrument. Again the `OK` option returns to the display screen.

The top left DUMP option will dump the current screen contents via the RS-232 to an Epson type graphics printer for hardcopy filing. DUMP can be aborted by pressing any key. If the current screen display has been recalled from memory, then the ID NO and date and time of storage are also dumped. Status information is always dumped after the display.

The bottom left GO option starts the selected measurement, processing and display process (assuming a suitable trigger is present) and this will continue until any other key is pressed. Press any key to stop the measurement/display process so that the results can be inspected.

Panning the Display

Data for channel A, channel B, or both channels, as selected by the DISP (display) option in the MENU screen, can be displayed. The display is fully annotated and can show a maximum of 240 points in the horizontal axis.

When a record length or process is greater than the length which can be seen on the screen, the pan keys (the two center keys on each side of the display) will horizontally scroll the data through the viewing area with each key press. Scrolling will automatically stop at the beginning and end of the data record.

Display Cursor

As the resolution of the instrument is far greater than that which can be displayed on the screen, a vertical cursor provides a digital readout of the X and Y values on both channels.

When a single channel display is selected, the cursor readout shows in the banner at the top of the screen. When both channels are selected, channel A information is shown in the banner at the top of the screen and channel B in the banner at the bottom.

The cursor can be shifted to the left and the right by use of the cursor keys. Cursor movements are only enabled when data acquisition has ceased. Remember that pressing any key will stop the acquisition process for inspection of data.

The number of points that the cursor moves on the display for each press of a cursor key is selected by pressing a number on the keypad. For example, to move quickly from one side of the screen to the other, simply press "9" and the cursor will shift 9 places per key press. Any number between 1 and 9 is acceptable (with 0 being regarded the same as 1). To focus on a particular section of the display, press "0" or "1" for a single step increment per key press.

Y-Axis Magnification

In all processes except Coherence and Octave Analysis, the amplitude of the processed data can be magnified using the **UP ARROW** cursor key and reduced using the **DOWN ARROW** cursor key. This is desirable when the output of a particular process is low in amplitude. The magnification is latched until settings for the process, or the process itself is changed. Y-axis annotation is modified to reflect the magnification selected.

If AUTOSCALE has been selected in the UTILITIES screen, the Y- axis magnification automatically optimizes the display. It can be adjusted using the cursor keys in the normal way.

Harmonic Cursors

In Autospectrum and Cross-spectrum processes, display harmonic cursors by simply pressing the decimal point "." key on the numeric keypad. This is explained more fully under these processes in chapter 3.

Advisory Messages

Some processes require intensive "number crunching" and, with large record lengths, can take a few seconds to calculate. During calculation a letter P (for Processing) appears on the top right side of the screen. In repetitive trigger modes (e.g. NORMAL) this letter will appear to flash as each input record is processed and displayed.

When a number of averages has been selected in the process domain, the average count appears on the screen as each interim average is displayed. The letter P also appears to indicate that it is an interim process average. Likewise when time domain averaging has been selected, the average count with the letter T appears (to indicate an interim time average). When both time and process averages have been selected, the time average count T increments followed by the process average count P.

In addition, messages will appear on the screen to alert the operator to abnormal conditions. When an input level on either channel exceeds the sensitivity range selected, the message A OVER, B OVER or AB OVER will indicate that channel A, channel B or both channels respectively have overloaded. The messages are removed when the input level returns in range. These messages are particularly useful when a process is being carried out and the time domain data is not being observed.

A low battery warning BAT will appear when the instrument has about 2 hours to run on its present battery charge.

The letter W appears when the analyzer is waiting a trigger signal.

STATUS Screen

The STATUS screen is accessed from the main display screen and gives an instantaneous check list of all parameters of the instrument's operation. It is self-explanatory. It should be noted that the last item MFREE is an indication of the free memory space available for storage of records. This is explained in the section on the MEM (Memory) screen.

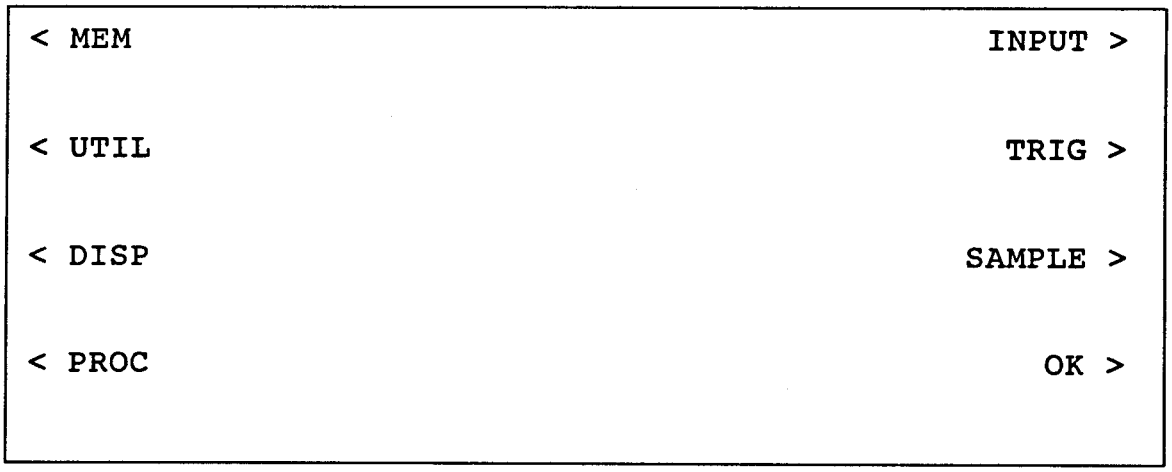
If the current signal on the display has been recalled from memory, then the corresponding ID NO is displayed. The time and date indicate when that record had been stored. If new data is being displayed the ID NO is blank.

STATUS		ID NO:	
TIME	11:09:52	MODE	NORMAL
DATE	27:01:88	DELAY	OFF
RS232	96,n,8,1	T AVS	1
SENS A	5 V	P AVS	1
COUP A	DC	PROC	ASPECT
SENS B	MM/SEC	WINDOW	RECT
COUP B	DC	SCALE	1.00e+0
LENGTH	256	CLOCK	INT
FREQ	20 kHz		
FILTER	ON	MFREE	99%
SOURCE	CH A		
LEVEL	50 %		
SLOPE	+ve		
			OK >

STATUS Screen

MENU Screen

The MENU screen is accessed by selecting this option from the main display screen. It provides 8 options. Pressing the OK key returns to the display screen as usual.



MENU Screen

The 3 options in the right hand side above the OK key, INPUT, TRIG (Trigger) and SAMPLE, provide the settings for the data acquisition process.

INPUT - selects channel sensitivity (or input range)
- selects channel coupling

TRIG (Trigger) - defines how a reading sequence (or record)is initiated
- selects internal or external source

SAMPLE - selects input frequency bandwidth
- selects record length (number of data points acquired)
- selects internal filters on or off
- selects internal of external sample clock source

The 4 options on the left hand side define the processing and functional operation of the instrument.

MEM (Memory) - allows data records and instrument settings to be stored and recalled

UTIL (Utilities) - enables instrument functions such as screen contrast, RS232 modes, real- time clock, number of automatic integrations, automatic shutdown and display modes to be adjusted

DISP (Display) - selects channel A, channel B or both

PROC (Process) - - defines the analysis program which the instrument is to carry out.

All the options are described in detail in subsequent sections of this chapter.

INPUT Screen

The INPUT screen enables the input sensitivity and input coupling of both channels to be selected.

SENS A	COUP A	SENS B	COUP B
AUTO	ACCEL	AUTO	ACCEL
5 V	DC	5 V	DC
2 V	AC	2 V	AC
1 V	GND	1 V	GND
500mV		500mV	
200mV		200mV	
100mV		100mV	
50mV		50mV	
20mV		20mV	
10mV		10mV	
5mV		5mV	
			OK >

INPUT Screen

Channel Sensitivity Selection

Channel sensitivity covers three decades (±5 V to ±5 mV). The sensitivities on the INPUT screen are bipolar. For example, a range of 5 V means +5V to –5V total range. Channel sensitivity is selected in the normal way using cursor keys.

When the amplitude of the input signal is unknown, the AUTO (Autorange) option is useful in that it automatically adjusts the input range of the instrument to match the input signal. When AUTO is selected, the instrument will start at the highest sensitivity (5 mV) and take a record (assuming suitable triggering) at decreasing sensitivity levels until the input signal no longer causes saturation of the input amplifiers. This sensitivity level is then latched and the instrument will continue to gather data and process until stopped by pressing any key. Pressing the GO key again, causes the instrument to autorange again.

This feature is very useful when a signal which has been stable at a particular amplitude level suddenly step changes up or down while it is being analyzed. Simply pressing the GO button even while data acquisition and processing is taking place, will cause the machine to autorange to the new signal level.

Input Coupling Selection

Four input coupling selections are possible, namely DC, AC, ACCEL (Accelerometer) and GND (Ground). On DC, the input signal is coupled directly to the input amplifiers, whereas on AC the signal is passed through a high pass filter with a –3 dB point of 1 Hz. The GND option grounds the input signal internally.

The ACCEL option selects the 4 mA accelerometer interface enabling standard accelerometers to be powered from the internal driver. The accelerometer inputs are AC coupled with a –3 dB point of 0.1 Hz. A description of the interfaces is given in section 5.

TRIG (Trigger) Screen

The TRIG (trigger) screen selects the signal condition which starts the sampling process on both channels. The triggering provided is very flexible, and can be generated internally in the instrument or externally.

LEVEL	MODE	SOURCE	DELAY
50	NORMAL	CH A	OFF
+SLOPE	1 SHOT	CH B	PRE-T
-SLOPE	FREE	EXT TR	50
			POST-T
			0
			B-DEL
			0
			OK

TRIG (Trigger) Screen

LEVEL - Trigger Level and Slope Selection

The level and slope of the internal trigger function are set by positioning the inverse video cursor in the desired position in the left hand column. When positioned over the first element, a prompt appears on the screen indicating that the desired trigger level in the range 0 – 100 be entered via the keypad. This means that a trigger level of 0 is equivalent to negative full scale point and 100 is positive full scale point. A level of 50 is equivalent to triggering at exactly half scale (0V in the input range). The +SLOPE selection means that the instrument will trigger when the signal crosses the level traveling in a positive direction, and – SLOPE will enable triggering when the signal is travailing in a negative direction.

MODE - Trigger Mode Selection

The repetition of the data acquisition is controlled by the trigger MODE. In NORMAL mode, a data record will be gathered and displayed when the input signal satisfies the trigger selections, and will be repeated immediately the next satisfactory trigger is received. In 1 SHOT, (one-shot) the instrument is "armed" and, on receipt of a suitable trigger, will capture and display a record, and then stop. In FREE (Free Run), data is continually acquired and displayed, regardless of any triggering condition.

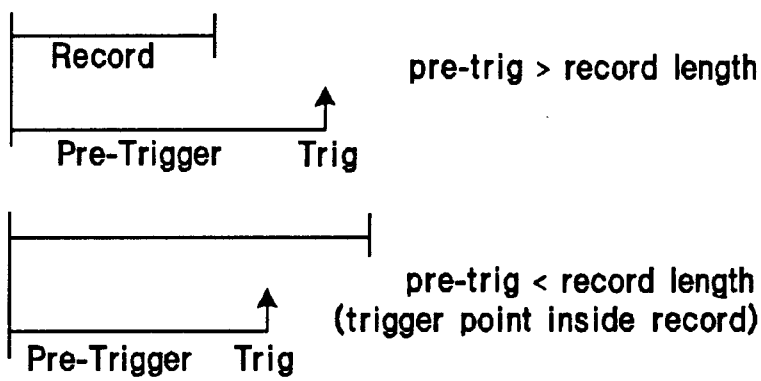
SOURCE - Trigger Source Selection

In internal trigger, the source of the trigger can be routed from either input channel A or input channel B. This is selected in the SOURCE column.

An external source can provide the trigger when EXT TR is selected. A TTL level signal should be applied to the EXT TR input on the connector panel. Any duty cycle can be accepted, but trigger will occur on the rising edge of the signal. The input is protected against overvoltage and has an internal pull- up resistor, allowing drive from open-collector sources if desired. A more detailed description is contained in section 5.

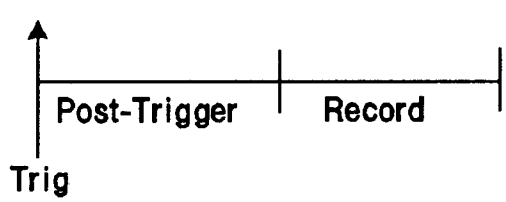
DELAY - Trigger Delays

The DELAY column enables the acquired data to either precede, overlap or come after the selected trigger point. In PRE-T (Pre- Trigger), data is being continually captured and the record can be up to 4096 points before the trigger position. If the PRE-T setting is greater than the record length, the trigger point will not be included in the acquired record. If the PRE-TRIG setting is less than the record length, the data record will overlap the trigger point. This mechanism is particularly useful when capturing transients in 1 SHOT mode.



Pre-Trigger

In POST-T (Post-Trigger), the record is always captured following a delay after the trigger point. This mechanism is useful when the signal of interest occurs some time after a suitable trigger. Any post-trigger delay can be set up to 4096 points.



Post-Trigger

When one signal is always subject to a delay relative to another signal (e.g. sound traveling from a loudspeaker to a microphone), channel B can be delayed so that two signals can be made to appear coincident. A delay of up to 4096 points can be selected using B-DEL (B Delay).

SAMPLE Screen

The SAMPLE screen controls the frequency band of the data acquisition process, the record length (i.e. the number of data points selected - this is the same for both channels), internal anti-aliasing filters ON or OFF, and the source of the sample clock (INTERNAL or EXTERNAL).

FREQ	LENGTH	FILTER	CLOCK
40 kHz	256	ON	INT
20 kHz	512	OFF	EXT
10 kHz	1024		
5 kHz	2048		
2 kHz	4096		
1 kHz			
500 Hz			
200 Hz			
100 Hz			
25 Hz			
			OK >

SAMPLE Screen

FREQ - Input Frequency Selection

The FREQ column indicates frequency options in the range 40 kHz to 100 Hz. It is important to understand the significance of the frequency selected.

The cut-off frequency of the anti-aliasing filters is set to the frequency selected in the FREQ column. The sample clock however, runs 2.56 times faster. For example, a frequency setting of 20 kHz will set the filters to 20 kHz cut-off but the sampling rate would be 51.2 kHz per channel. If the record length were set to 4096 in this example, the total time for the record would be 80 msec.

If desired, the filters can, of course, be switched off so that the instrument behaves exactly as a 100 kHz sampling rate digital oscilloscope, but with far greater resolution than conventional instruments. In a spectral process the frequency selected will equal the frequency band displayed.

There is one important point to note in the frequency selection. Due to a limitation of the internal anti- aliasing filters at high frequencies, the 40 kHz frequency operates without anti- aliasing filters. Take care when using this frequency band to avoid unwanted aliased frequencies.

The sample rate at 40 kHz is, as before, 40 kHz x 2.56 = 102.4 kHz.

LENGTH - Record Length Selection

The LENGTH (record length) column selects the number of data points to be collected. In the time domain, this is the number of points shown. However, for spectrum analysis, as the spectrum is "mirrored" in the upper half of the output spectrum, less than half the number of points are displayed.

For example, if an AUTOSPECTRUM is selected with a record length of 1024 points, a spectrum containing 400 lines will result. The number of points displayed in a spectral process is always LENGTH/2.56.

FILTER - Filter ON/OFF

The anti-aliasing filters can be switched in and out using the filter ON and OFF options. No anti-aliasing is available on the 40 kHz frequency range.

CLOCK - Internal/External Sample Clock

The source of the sample clock can be selected as INT (Internal) or EXT (External). In INT clock, the sample clock is governed by the frequency defined in the FREQ column (sample clock rate is 2.56 times the frequency selected).

However, in certain applications it may be desirable to synchronize the sample clock to an external source (for example, a pulse encoder attached to a rotary shaft). In this case the EXT clock source should be selected and a TTL logic level (rising edge active) be applied to the **EXT CLOCK** input connector. This input is overvoltage protected and has an internal pull-up resistor for open-collector drive.

External clock is most useful when processing signals which are being derived from a rotating shaft which is varying in speed and it is desired to sample always at the same points on the shaft. A more detailed description of the external clock input is contained in section 5.

DISP (Display) Screen

The DISP (Display) screen enables one channel or two channels of information to be displayed on the screen as desired. It also enables the option of linear or logarithmic display to be selected in spectral processing, and scaled engineering units to be selected.

DISPLAY	AMP	UNITS	SCALE
CH A	LINEAR	VOLTS	1.00e+0
CH B	LOG	EU	1.00e+0
CH A+B			
			OK >

DISP (Display) Screen

DISPLAY - Channel Display Selection

In the time domain, channel A or channel B can be displayed individually (with greater visual resolution), or both channels can be displayed together.

In processing modes, however, data is assigned to the upper channel and lower channel. For example, in Autospectrum, the amplitude is assigned to upper channel and the phase information to lower channel. Amplitude or phase can be displayed individually, or both together as selected in the DISP screen. The assignments for each process are defined in the individual process descriptions.

AMP - Linear/Logarithmic Amplitude Display

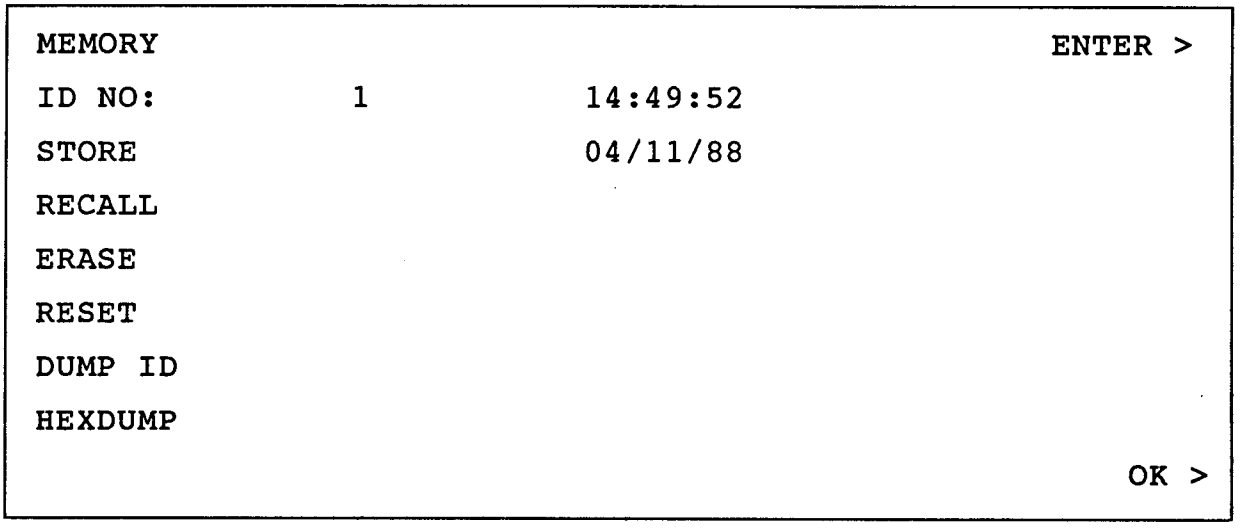
In Autospectrum and Cross-spectrum processes, the results can be displayed in linear or logarithmic format as selected by LINEAR and LOG respectively in the AMP (Amplitude) column. The logarithmic display is calculated from the linear display using the formula 20LOG(Vlinear).

UNITS, SCALE - Display Units Selection

When VOLTS is selected in the UNITS column, voltage (or dBV logarithmic) is displayed. However, scaled outputs can be displayed when EU (Engineering Units) is selected, and scaling factors are entered in the SCALE column.

MEM (Memory) Screen

The MEM (Memory) Screen enables both time and processed data records to be stored at locations in battery-protected memory as specified by identity numbers (ID NO). The settings of the instrument for that process are also stored, as well as the time and date of the reading. Records can be stored, recalled, downloaded via the RS232 interface, and re-processed if required.



MEM (Memory) Screen

STORE - Storage and Retrieval of Data

Records, both time or process domain, are stored according to an ID Number. Use the following procedure to store a record.

1. Select ID NO.
2. Enter number via keypad.
3. Select STORE.
4. Press ENTER.
5. Press OK to view data.

A record is recalled in exactly the same way except that RECALL is selected instead of STORE. To overwrite a particular ID Number, do *not* change the ID NO and simply select STORE.

The instrument contains its own memory management system so that records of different lengths can be stored, even between existing records, without any danger of overwriting those records. For example, if a record of length 512 is stored at ID NO 4 and there are already records stored at 3 and 5, storing a record of length 1024 at ID NO 4 will not corrupt ID numbers 3 and 5.

The time and date of when a record was stored is kept with the record. When a record at a particular ID Number is recalled, the time and date of storage of that record is shown on the screen. ID Number's can also be reviewed without having to recall the data. By entering an ID Number and pressing the ENTER key, the time and date of the recording will be displayed. This can be repeated for any ID Number. A selected ID Number can then be recalled to the display if desired. If an ID Number has been erased, no time and date information will appear indicating that the ID Number is empty.

ID Number's can be overwritten at will or erased by selecting ERASE and pressing ENTER. Alternatively the complete memory can be cleared by selecting RESET and pressing ENTER. This function checks that the operator really does intend to clear memory in case he has inadvertently pressed the wrong key.

Leaving the MEM screen in the usual way using the OK key exits directly to the display screen and not to the MENU screen. This is to prevent the operator recalling a record and then, inadvertently or otherwise, modifying the settings before the record has been displayed.

Depending on record length, up to 500 records can be stored. An indication of the memory available is shown in the STATUS screen.

Records can also be stored automatically using the AUTOSTORE option (selectable in the UTILITIES screen).

Reprocessing of Stored Data

A very useful feature of the MEM screen is that stored time domain data can be re-processed as required. To reprocess data, the data must have been stored as time domain data using the CHDATA option in the PROC screen. This data can have been averaged before storing.

Any process can be carried out on stored time domain data. For example, a record stored at ID NO 5 can be recalled using the RECALL option. AUTOCORRELATION could then be selected from the PROC (Process) screen and by simply pressing M-GO, the autocorrelation of the recalled data will be computed. As can be seen, post-processing using the M-GO option has been carried out. Use the following procedure.

1. Select ID NO.
2. Enter number via keypad (5).
3. Select RECALL.
4. Press ENTER.
5. Select the PROC (Process) screen and select ACORR process.
6. Return to display and press the M key followed by GO.

DUMP ID - Downloading Stored Data to Host Computer

The DUMP ID option will transmit the stored record at ID NO via the RS232 interface in Intel Hex Record format. This is for compatibility with signal analysis and archiving software packages. The format of the transmitted data is shown in Appendix A. The HEXDUMP option will transmit all stored records.

Storage of Settings

If you wish to store settings only for use at a later date, use a short record length (256 is selected and some dummy data stored). In this way little memory is used and settings are retained.

UTIL (Utilities) Screen

The UTIL (Utilities) Screen enables general functional adjustments to be made to the instrument. UTIL allows modification of screen contrast, RS232 interface parameters, time and date, accelerometer integration, autoscaling, time-out enable and filled display mode.

```
UTILITIES                                          MODIFY >
CONTR              4
INTEGR             0
AUTO SC            OFF
FILL               OFF
STORE              MAN
TIMEOUT            ON
TIME               h: 12        m: 32        s: 48
DATE               D:  3        M: 11        Y: 88
RS232         9600              N            8          1
                                                        OK >
```

UTIL (Utilities) Screen

Modification of parameters in the UTIL screen is slightly different from the other screens in that the cursor keys are used to simply place the reverse video cursor over the parameter to be changed, and then the MODIFY option key is pressed until the desired value appears. When all values have been adjusted, pressing the OK key exits from the screen in the usual way.

CONTR - Screen Contrast Modification

Screen contrast can be adjusted in eight steps from 0 to 7, where 0 is the lightest and 7 the darkest.

INTEGR - Integration Selection

Different levels of integration can be automatically selected by modifying the INTEGR option in the UTILITIES screen. No integration, single integration and double integration can be selected.

INTEGR enables integrated results to be obtained from a process selected in the PROC screen. For example, if one level of integration were selected and ASPECT selected in the PROC screen, then a spectrum integrated once would result. If the input were on acceleration signal, then the velocity spectrum would result. Two integrations would give displacement. Integration is shown on the display by I1 or I2, indicating single or dual integration.

If you wish to observe a single integrated signal then this can be done using the INT option, as described in section 3.

AUTO SC - Autoscale Enable/Disable

Automatic scaling of the Y-axis can be enabled or disabled by modifying AUTO SC to ON or OFF. If autoscaling is ON, the **UP ARROW** and **DOWN ARROW** cursor keys can still be used for Y-axis magnification and attenuation in the usual way.

FILL - Display Fill Enable/Disable

In spectral processes, a solid (filled) display or line display can be selected. FILL selected ON will give a histogram type display while FILL OFF will give a line display.

STORE - Autostore

The AUTOSTORE option can be turned ON or OFF in the UTILITIES screen. Autostore modifies use of the **M** key. When autostore is OFF, the **M** key is used for reprocessing data (the M-GO function). When autostore is ON, the **M** key is used to store data without reverting to the MEM (Memory) screen.

AUTOSTORE is enabled by modifying the STORE option to AUTO and disabled by modifying it to MAN (Manual).

TIMEOUT - Enable/Disable

Automatic shutdown can be disabled by setting the TIMEOUT option to OFF in the UTIL screen. If the instrument is switched off manually, the automatic shutdown is re-enabled.

TIME and DATE Modification

TIME and DATE are adjusted according to 24-hour clock format. To enable exact synchronization of the clock, the desired time should be set in advance using the MODIFY key. The clock will be frozen at the setting specified. The OK key is then pressed to start the clock at the precise time.

RS232 - Baud Rate Selection

RS232 operation can be modified in terms of baud rate, parity, number of data bits and number of stop bits. Available baud rates are 19200, 9600, 4800, 2400 and 1200. Parity can be off (indicated by N - no parity - in the display), even (indicated by E) or odd (indicated by O). Number of data bits can be 7 or 8, and number of stop bits 1 or 2.

PROC (Process) Screen

The PROC (Process) screen allows the desired processing algorithm to be selected. The left column enables the process option to be selected while the second column defines the type of window which is used in the spectral and correlation processes. The windows do not affect other processes. The number of averages in the time and process domains is selected in the two right hand columns.

PROCESS	WINDOW	TIME AV	PROC AV
CH DATA	RECT	1	1
CHA-CHB	HANNING		LINEAR
DIFF	HAMMING		EXPON
INT	FLAT-TOP		PEAK
ASPECT			
DSPECT			
XSPECT			
ACORR			
XCORR			
COHER			
RMS			
TRANS			
more			OK >

PROC (Process) Screen – 1st part

The process, window (if required), and number of averages are selected in the normal way. A detailed description of the various processes is contained in section 3. Select more in the process column and it automatically jumps to the second part of the screen.

PROCESS	WINDOW	TIME AV	PROC AV
more			
MOTOR			
OCT/3 S	RECT	1	1
OCT/3 L	HANNING		LINEAR
OCT/1 S	HAMMING		EXPON
OCT/1 L	FLATTOP		PEAK
OCT CAL			OK >

PROC (Process) Screen – 2nd part

Note

The MOTOR option appears *only* with the SD222-M model.

Post-Processing

Post-processing is achieved very simply on the SD222 by use of the **M** (memory) key on the numeric keypad. Post- processing is used when different processes are to be carried out on the same input data. If a different process were to be selected and the GO key pressed, new data would be acquired as input to the chosen process. To carry out different processes on the same input data, press the M key before the GO key. In this case, no new data is acquired and the selected process is carried out on the previously acquired data. This operation can be repeated as often as desired and is especially useful when a very intermittent signal has been captured. For example, an autospectrum may have been displayed and you want to process the autocorrelation of the same input data.

1. Exit from the display to the PROC screen and select ACORR instead of ASPECT.
2. Return to the display screen
3. Press **M** on the numeric keypad followed by GO.

GO carries out a process with new data while M-GO carries out a process on previously acquired data. Pressing the **M** key is reflected by an M symbol on the screen - pressing any key other than GO cancels the M function if it has been incorrectly pressed.

Autostore (Automatic Data Storage)

Data records can be stored automatically using the AUTOSTORE option. This option is enabled by modifying the STORE option in the UTILITIES menu from MAN (Manual) to AUTO. The **M** key is now used to store data records with a single key stroke as described below. The M-GO post-processing option is disabled while AUTOSTORE is enabled.

With AUTOSTORE, time and process domain records can be stored by ID NO in the instrument's memory without having to transfer to the MEM (Memory) screen each time. Records are stored in sequence at each press of the **M** key.

To initialize an AUTOSTORE sequence, select the ID NO at which the sequence should begin in the MEM screen in the usual way. The STORE option in the UTILITIES screen is, of course, set to AUTO. Data, whether time domain or processed, is gathered in the usual way by pressing the GO key.

When you wish to store the displayed record, simply pressing the **M** key will store the data at first ID NO. The ID NO is displayed on the screen to indicate where the data has been stored. More data can be gathered and on each press of the **M** key, data will be stored at the next higher ID NO. The procedure can be repeated until the memory is full (indicated by MEM FULL on the screen). ID NO's are overwritten as encountered by the automatic ID NO increment.

Use the following procedure to autostore.

1. Select AUTOSTORE by modifying STORE option to AUTO in the UTILITIES screen.
2. Select the ID NO at which the sequence should start (in the MEM screen).
3. Gather data, and process as required.
4. Press **M** key to store
5. Repeat steps 3 and 4 as often as desired.
6. Deselect AUTOSTORE option when complete.

The M-GO function is only enabled if the AUTOSTORE option is disabled in the UTILITIES screen. If AUTOSTORE is enabled, then the **M** key is used for the automatic storage of data.

Engineering Units

The output of any process can be displayed either in volts or engineering units (EU). Whereas as many signals are measured in volts, it is often desirable to scale the output to a known input range. For example, an accelerometer might be calibrated in terms of g/V or a displacement transducer in mm/V. The parameter is generalized as EU (Engineering Units) in the instrument and the scale factors are entered via the SCALE column in the DISP (Display) screen. Scale factors are entered independently for each channel. The upper scale factor relates to channel A and the lower to channel B. When EU is selected in the UNITS column of the DISP (Display) screen the vertical axis in all processes will be annotated to reflect the scale factors specified.

Scale factors are entered as floating point numbers in the range 1.00e-9 to 1.00e + 9. To allow for this range, screen annotation and cursor readout are in exponential format (e.g. 3.45e3 represents the value 3450). Logarithmic scaling is displayed as dBE and calculated as 20logEU. Exponential display format indicates that EUs have been selected as opposed to volts. The scale factors are entered via the keypad in the normal way. Note that the negative sign of a negative exponent (e.g. 2.25e-2) is entered using the decimal point as there is no negative sign on the keypad.