SIROTEM 3

OPERATOR'S MANUAL

TYPES M, MM, MS AND MMS

Mineral Control Instrumentation
Limited
40 Maple Avenue
FORESTVILLE 5035
SOUTH AUSTRALIA

TELEPHONE: (08) 297 6144
FACSIMILE: (08) 297 9305

SIROTEM 3

OPERATOR'S MANUAL

The information in this manual is valid for Software version 2.0 and applies to the following model numbers:

Type M	Base model
Type MM	With multireceiver option
Type MS	With sync option
Type MMS	With multireciever and sync option

Familiarity with the MKII Sirotem is assumed.

SIROTEM 3 SOFTWARE

The following changes have been made in version 2.1 as compared with version 2.0.

(N.B. When the management processor software is changed to version 2.1, the acquisition processor software must be changed to version 2.2 on the digital board and on both channels of the multireceiver board if fitted.)

1. The serial interface command 'Delete all records' (X) has been removed to eliminate accidental data loss if the host computer software should transmit an unwanted X.

2. Time window series to approximate the Mark II Early Times and Standard Times series have been added. The existing Mark III Composite series remains unaltered. The series to be used can be selected in the Setup and Utilities Menu.

3. A threshold has been added to the sferics facility below which sferics rejections are ignored. The level may be set in the range 0.1 to 9999.9 microvolts.

4. Four new fields have been added to the end of the header information in the data dump. These are:
   Sampling Delay (inadvertently omitted in version 2.0)
   Time Window Series Code (1=Composite, 2=ET, 3=ST)
   Spare
   Spare

5. Coordinate 1 and coordinate 2 have been increased from 4 to 6 digits maximum.

6. The labelling of the results graph has been changed from 'log(V/I)' to 'log(nV/A)'.

7. During calibration, the measured current (auto) is used for normalisation, the sferics facility is assumed to be off and the sampling delay is assumed to be zero regardless of the existing selections. This is intended to simplify the selection of a calibration and to ensure that all calibrations are performed under comparable conditions.

8. The spelling of 'synchronise' has been changed.

9. The inductive calibrations have been reduced from 4 to 2 types as low level calibrations are not provided.

10. When the instrument is synchronised, calibrations are not available and these have been hidden in the Data Acquisition menu.

11. A problem has been overcome which occurred if two records were created with the same run and group number. When a dump was attempted, a single header followed by both sets of data was transmitted.

J.T.P. 28-6-90

SIROTEM 3

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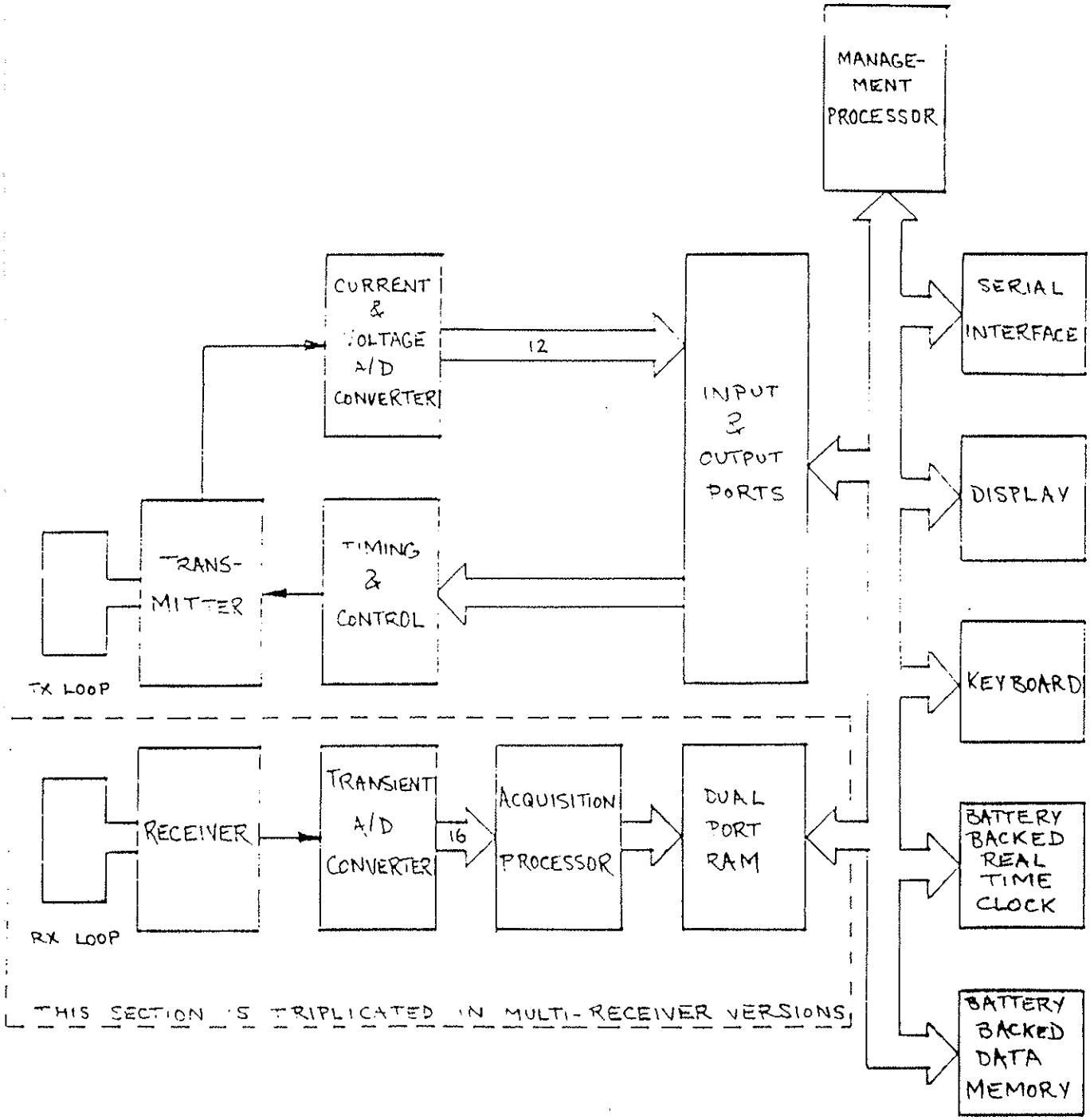
SIMPLIFIED BLOCK DIAGRAM OF SIROTEM 3



2. BRIEF DESCRIPTION

Sirotem 3 is operated from two sealed 15Ahr 12 Volt lead acid batteries carried in a separate battery case. A lead is provided to connect the battery case to the connector on the front panel of the instrument. Also on the front panel is a double pole power switch, a power on indicator LED, a low battery indicator LED and two 10 Amp 3AG fuses. The 'low battery' LED indicates that at least one battery is below 10 Volts and that transmission is inhibited.

The instrument is controlled by a 20 key membrane keyboard in conjunction with a large liquid crystal display which can display menus and results in textual or graphical format. The keyboard contains the following groups of keys:

1. Numeric, decimal, minus

   These keys permit the entry of numeric quantities.

2. Arrows

   The up and down arrows are used for selecting menu items. The left and right arrows are used to shift the cursor when editing numeric inputs, or for selecting one of a list of options.

3. Enter

   Enter is used to conclude the entry of a numeric quantity or to confirm the selection of a menu item.

4. Escape

   Escape is used to return to a higher level of the menu and also to abort a data acquisition run.

5. Clear

   Clear is used to erase a numeric quantity prior to entering a new value and also to delete a displayed data record.

6. Initiate

   Initiate is used to commence a data acquisition run. The run continues for the selected number of windows and stacks. During the run, the transmit (tx) LED flashes once per stack.

An audible click accompanies each key press.

2. BRIEF DESCRIPTION (cont.)

The 10Amp transmitter output and the receiver(s) are accessed via the loop connector on the front panel of the instrument. Connection details are given elsewhere in this manual. Provision is made for 3 input loops. In the base model instrument, acquisition from 3 loops is handled by a multiplexer which switches the 3 loops to the one receiver sequentially for each stack. If the multi-receiver option is fitted, a receiver is provided for each loop and acquisition is simultaneous.

The timing of the data windows and the transmitter on/off times are shown in a separate table. The number of windows and stacks may be freely chosen via the menu.

Following each run, a data record is stored in battery backed random access memory (RAM). Up to 400 records can be stored and each record contains annotation data as well as transient and noise data (in nV/A) for each channel. The stored records are automatically displayed following each run. The operator has the option to delete the record if he so wishes. When the RAM is full, at least one record must be deleted before acquisition can proceed.

The noise recorded for each window is the RMS (root mean square) deviation of the readings for each stack from the mean for all stacks.

If desired, the instrument may be configured to calculate and display apparent resistivity in textual and graphical formats in addition to the normal displays.

A serial interface to a host computer is provided to permit external control of the acquisition and uploading of the data. Details are provided in a separate section of this manual. In addition, result screens in both textual and graphical formats may be copied to an Epson compatible printer.

A battery backed real time clock is included so that the date and time can be automatically included in the annotation for each record.

A record number is included in the annotation and this is automatically incremented for each acquisition. However, it may be reset if so desired via the menu.

A group number is also included. This may be considered in the same way as a group of records on a cassette in Sirotem MK II. There is provision for deleting records by group or date, also single records or all records.

2. BRIEF DESCRIPTION (cont.)

A setup and utilities menu is provided to permit the following functions:

Configure the data acquisition menu to user requirements.

Perform diagnostics on the instrument.

Configure the date entry format.

Select the mains rejection frequency (50 or 60Hz).

Select the serial interface parameters.

Select the synchronisation option if fitted.

Switch between multiplexed and multi-receiver operation.

Switch between textual and graphical display of results.

In addition, the number of free and used records and the battery voltages are displayed.

The transmitter loop current is measured during each transmission and the result is used for calculating the normalised data in nV/A. Provision has been made for the use of an external transmitter in which case the current measurement can be switched from 'auto' to 'manual' and the current is then keyed in by the operator.

Ambient noise may be measured by performing a noise run in which no transmission takes place. In 'auto' current mode, a value of 1 Amp is assumed for normalising the results.

The first sampling window is centred at 50 microseconds after the transmitter turn off. Allowance is made for internal delays such as the propagation through the analogue anti-aliasing filter. In circumstances where an external probe introduces additional delays, these can be compensated for (if known) by keying in an additional sampling delay via the data acquisition menu. A range of 0-9999 microseconds in steps of 1 microsecond is provided for. The default is 0 microseconds.

The gain of the instrument may be selected via the menu system (0.1, 1.0, 10 or 100). Provision is also made for selecting the number of input channels (1-3) whether multiplexed or separate parallel receivers (if the multi-receiver option is fitted).

2. BRIEF DESCRIPTION (cont.)

A number of annotation items can be included if desired. The data acquisition menu can be configured to include or exclude any of these items:

Group number,
Co-ordinate 1,
Co-ordinate 2,
Sferics setting,
Loop size, and
System configuration.

All selected parameters are stored in battery backed memory and continue to be available following a power down/power up sequence.

3.10 Listing data records

The option *List Records*, on the *Main Menu*, allows you to view and print a list of stored records. For each record, the group number, run number, number of channels, run type (see Section 3.7.2) and date are given.

A typical *List Records* screen is shown in Figure 8.

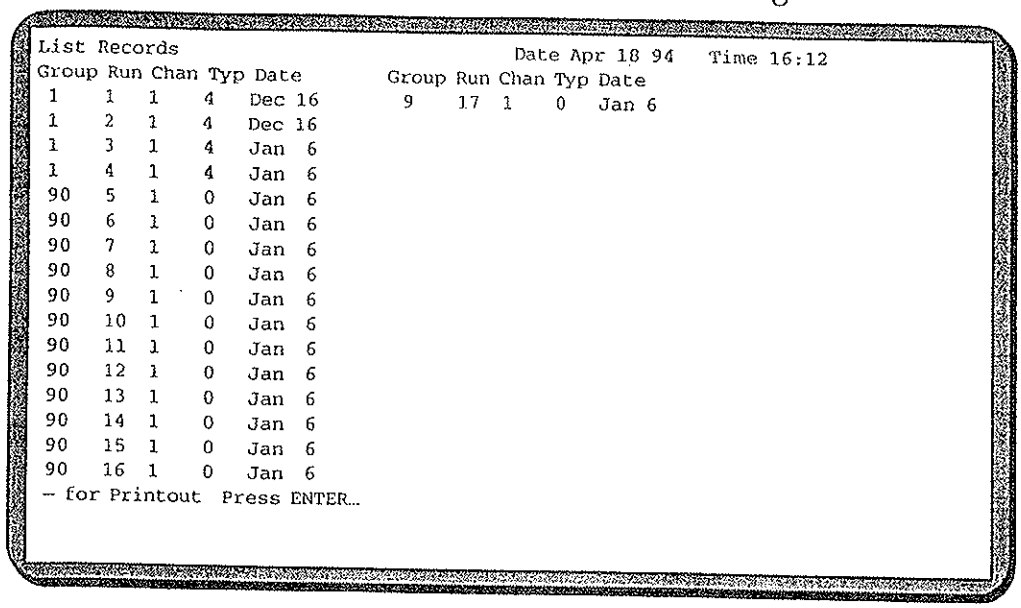


Figure 8: List Records screen

- Press **enter** or **escape** to return to the *Main Menu*.

3.11 Restoring lost data

If data has been accidentally lost (no records show in the *List Records* screen) and the *Dump* and *Delete* functions are inoperable, the data can be restored as follows:

- Select the *Main Menu*.
- Move the Selection Bar to *Dump All*.
- Press **enter**.

The system beeps, and the following message appears on the right of the screen:

> No Records to Display
> Press ENTER to restore records
> Any other key to quit...

- Press **enter** to restore the lost records.

The data (including data which had been deleted) is restored, a process that takes a few minutes. A beep indicates it is completed. The data are sorted in order of:

Date, Time, Run number, Group number, Channels

The restored data can be viewed from the *List Records* screen, and the *Dump* and *Delete* functions can now be used.

3. MENU OPERATION

3.1 Display Areas

The liquid crystal display is divided into several areas which carry certain types of information as follows:

1. Title

   Located at top left corner can be seen the title of each menu, e.g. 'DATA ACQUISITION'. For the top level menu, the title reads 'SIROTEM 3 VERSION X.Y'.

2. Date/Time

   At the top right corner, the date and time (in 24 hour format) are displayed. These are updated only when the screen is repainted.

3. Menu

   Below the title, the list of available selections for a given menu is displayed.

4. Selection Data

   Immediately to the right of the menu is displayed the current selection corresponding to each menu item. This applies in the case of the 'DATA ACQUISITION' and 'SETUP' menus.

5. Help Window

   Below the date can be seen information which varies according to the selected menu item in order to help the operator make the correct selection.

6. Error Window

   Error messages are displayed below the help window. A beep is sounded when an error occurs.

7. Valid Keys

   A list of keys which may be pressed at any given moment is displayed below the error window. A beep is sounded if a non-valid key is pressed.

3.2 Making a Selection

On each menu, one item is always highlighted by a reverse video bar. To select a different item, move the bar up or down using the up or down arrow keys. To make the selection, press the 'ENTER' key. The action which results depends upon the selected item which can be one of four types as follows:

1. Display a lower level menu. e.g. by selecting 'Setup and Utilities'.

2. Perform an action. e.g. by selecting 'Test Screen'.

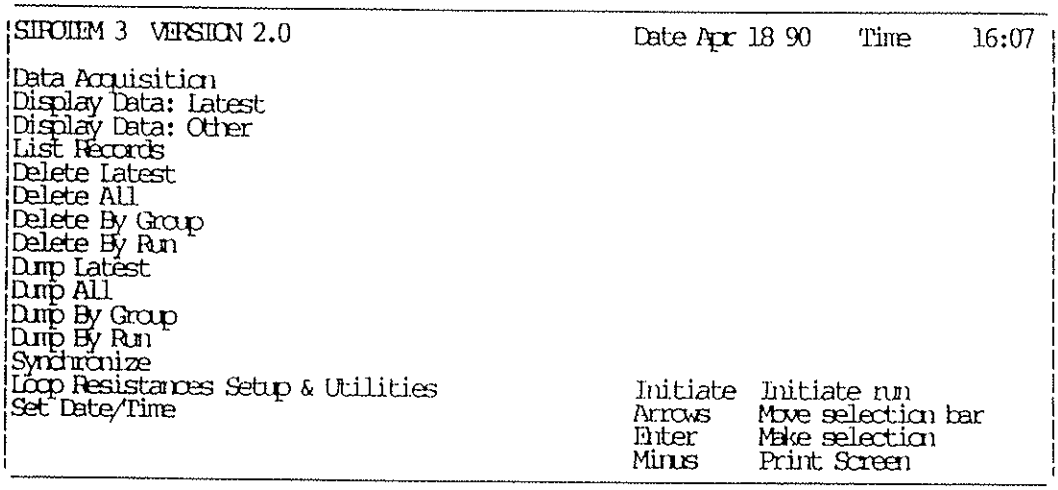
3. Alter a multiple choice parameter. e.g. upon selecting 'Gain', the displayed selection data alters to the next available value. Successive operations of the 'ENTER' key or right arrow key cause the selection to cycle continuously through the values 0.1, 1.0, 10, 100.

4. Alter a numeric parameter. e.g. upon selecting 'Channels', a blinking block cursor moves to the existing data value which is also highlighted by being enclosed in square brackets. A new value can be entered by overtyping the old or if necessary the 'CLEAR' key can be pressed first. The left and right arrow keys may also be used to position the cursor. Upon completion of the entry, 'RETURN' is pressed to accept the new value. The square brackets and the cursor disappear. If the value entered is not valid, the previous entry is retained.

3.3 Menu Details

3.3.1 Main Menu

The Main Menu appears as follows:



1. Data Acquisition
   Display the data acquisition menu.

2. Display Data: Latest
   Display the numerical data from the latest record. Press 'ESCAPE' to return to the main menu. Press the right or left arrow key to switch between textual or graphical display. Press the up arrow key to display the previously stored record (or channel in the case of the multi-channel reception). Press the down arrow key to display the next stored record. Press 'CLEAR' to delete the displayed record. The operator is prompted with the question 'Are you sure?'. Press 'ENTER' to delete or 'ESCAPE' to retain the record.

   If the instrument has been configured to display apparent resistivity, the right and left arrows may be used to cycle forwards or backwards through the following four displays: (1) normal data (textual), (2) normal data (graphical), (3) apparent resistivity (textual), (4) apparent resistivity (graphical).

A typical data display is shown below:

Run No.	3384	Windows	1 to 50	Sferics %	OFF	Date	Apr 18 90	Channel 1 of 1			
Group	1	Stacks	2	Loop Size	25	Time	16:15	Multiplexed			
Run Type	1	Coordinate-1	0	Gain	1.0	Current	1.00	Delay 0 us			
Operator	0	Coordinate-2	0	Turnoff	0	Config	Other				

Win	Data	Noise	Win	Data	Noise	Win	Data	Noise	Win	Data	Noise	Win	Data	Noise
1	-2865 1	8186 0	14	4093 0	0000 0	27	8634-1	4157-1	40	4517-1	8034-1			
2	1433 1	2661 1	15	-3582 0	7163 0	28	2047 0	2302 0	41	4557-1	4957-1			
3	-1842 1	6140 0	16	5116 0	5116 0	29	6396-2	9593-2	42	4397-1	3518-1			
4	1023 1	1023 1	17	2558 0	3837 0	30	4797-1	1215 0	43	4177-1	1029 0			
5	-8186 0	8186 0	18	-2558-1	4861 0	31	9913-1	1599-1	44	1255 0	7195-1			
6	-4093 0	1433 1	19	2047 0	2814 0	32	1407 0	1599 0	45	-4997-2	4177-1			
7	6140 0	8186 0	20	2814 0	9465 0	33	-8234-1	2638-1	46	5296-2	6565-1			
8	-2047 0	0000 0	21	-3134 0	8314-1	34	-8794-2	5356-1	47	3358-1	6875-1			
9	-5116-1	2558 0	22	7035-1	7035-1	35	8794-2	1679-1	48	4747-1	6665-1			
10	4605 0	5116-1	23	2686 0	5116-1	36	1327 0	9593-1	49	-1229-1	4577-1			
11	-5116 0	1023 0	24	5756-1	6396-2	37	-1399-1	5156-1	50	8169-1	4762-1			
12	-5116-1	6651 0	25	1055 0	1375 0	38	3278-1	3518-1						
13	3837 0	1151 1	26	1631 0	2878-1	39	7635-1	8834-1						

← or → for the Graph, ↑for Previous Data, ↓ for Next Data, - for Printout.
ESC for Previous Menu, INITIATE to Start Run, CLEAR to Delete this Data.

The data and noise are expressed in nV/A with a 4 digit mantissa and a 1 digit exponent. For example, 1433 1 represents a reading of 14330 nV/A.

3. Display Data: Other
Display the numerical data from any stored record. The run number must be entered when prompted for. If the record exists, it is displayed. Then press 'ESCAPE' to return to the main menu. If the record does not exist, press 'ENTER' to enter new record number or press 'ESCAPE' to return to the main menu.

4. List Records
Displays a list of stored records. For each record, the group number, the run number, number of channels and date are given. Press 'ENTER' to return to the main menu. A typical list records screen R shown below.

List Records Date Apr 18 90 Time 16:12

Group	Run	Chan	Date	Group	Run	Chan	Date	Group	Run	Chan	Date	Group	Run	Chan	Date
1	3334	1	Apr 18 90	1	3350	1	Apr 18 90	1	3366	1	Apr 18 90	1	3382	1	Apr 18 90
1	3335	1	Apr 18 90	1	3351	1	Apr 18 90	1	3367	1	Apr 18 90	1	3383	1	Apr 18 90
1	3336	2	Apr 18 90	1	3352	1	Apr 18 90	1	3368	1	Apr 18 90				
1	3337	1	Apr 18 90	1	3353	1	Apr 18 90	1	3369	1	Apr 18 90				
1	3338	2	Apr 18 90	1	3354	1	Apr 18 90	1	3370	1	Apr 18 90				
1	3339	3	Apr 18 90	1	3355	1	Apr 18 90	1	3371	1	Apr 18 90				
1	3340	3	Apr 18 90	1	3356	1	Apr 18 90	1	3372	1	Apr 18 90				
1	3341	3	Apr 18 90	1	3357	1	Apr 18 90	1	3373	1	Apr 18 90				
1	3342	3	Apr 18 90	1	3358	1	Apr 18 90	1	3374	1	Apr 18 90				
1	3343	3	Apr 18 90	1	3359	1	Apr 18 90	1	3375	1	Apr 18 90				
1	3344	3	Apr 18 90	1	3360	1	Apr 18 90	1	3376	1	Apr 18 90				
1	3345	3	Apr 18 90	1	3361	1	Apr 18 90	1	3377	1	Apr 18 90				
1	3346	3	Apr 18 90	1	3362	1	Apr 18 90	1	3378	1	Apr 18 90				
1	3347	3	Apr 18 90	1	3363	1	Apr 18 90	1	3379	1	Apr 18 90				
1	3348	3	Apr 18 90	1	3364	1	Apr 18 90	1	3380	1	Apr 18 90				
1	3349	1	Apr 18 90	1	3365	1	Apr 18 90	1	3381	1	Apr 18 90				

- for Printout Press ENTER ..

5. Delete Latest
   Deletes the latest record (or associated records in the case of multi-channel operation). The operator is prompted with the question 'Are you sure?'. Press 'ENTER' to delete or press 'ESCAPE' to retain the record.

6. Delete All
   Deletes all data records. The operator is prompted with the question 'Are you sure?' Press 'ENTER' to delete or 'ESCAPE' to retain. After the action, the main menu is redisplayed.

7. Delete By Group
   Deletes all records in a group or range of groups. The operator is prompted to enter the start group number then the finish group number. Finally the question 'Are you sure?' is answered as above.

8. Delete By Run
   Deletes record(s) for a run or range of run numbers. The operator is prompted to enter the start run number then the finish run number. Finally the question 'Are you sure?' is answered as above.

3.3.1 Main Menu (cont.)

9. Dump Latest
The latest record (or associated records in the case of multi-channel operation) is output via the serial port.

10. Dump All
All stored records are output via the serial port.

11. Dump By Group
Dumps all records in a group or range of groups to the serial port. The operator is prompted to enter the start group number then the finish group number.

12. Dump By Run
Dumps all records in a range of run numbers. The operator is prompted to enter the start run number then the finish run number.

13. Synchronize
Allows the instrument to be synchronized to an external transmitter. Refer to the chapter on synchronization for more details. On instruments without a sync option, this menu item need not appear (see Setup & Utilities).

14. Loop Resistances
Measures and displays the transmitter and receiver loop resistances. Press 'ENTER' to return to the main menu.

15. Setup and Utilities
Displays the Setup and Utilities menu.

16. Set Date/Time
Alter the internal clock. The cursor moves to the date where a new value may be keyed in (format may be mm/dd/yy or dd/mm/yy) followed by time (format hh:mm). Press 'ENTER' to return to the main menu.

3.3.2 Data Acquisition Menu

The data acquisition menu permits the entry of all operating parameters and annotation data. Certain items may be configured out of the menu by using the 'Configure Menu' selection in the 'Setup and Utilities' menu.

A typical Data Acquisition Menu is illustrated below:

```
DATA ACQUISITION                          Date Apr 18 90    Time    16:09

Run Number                  3340
Group Number                1
Coordinate 1                0
Coordinate 2                0
Start Window                1
Final Window                27
Stacks                      1
Gain                        1.0
Sferics %                   OFF
Run Type                    Normal Run

Loop Current (Amps)         1.00
Operator                    0
System Configuration        Other
Loop Size (m/side)          25                Initiate  Initiate run
Channels                    3                 Arrows    Move selection bar
                                              Enter     Make selection
Last Current (Amps)         0.0               ESC       Go to previous menu
Last Turnoff Time (us)      0                 Minus     Print Screen
```

3.3.3 Setup and Utilities Menu

The Setup & Utilities Menu appears as follows:

```
SETUP & UTILITIES                         Date Apr 18 90    Time    16:09

Configure Menu
Diagnostics
Date Format                 mm-dd-yy
Reject Frequency (Hz)       50
Baud Rate                   9600
Data Bits                   8
Stop Bits                   2
Parity                      None
Clear to Send               Ignored
Data set Ready              Ignored
Synchronization             Fitted
Fitted Channels             Multiplexed
Resistivity Display         Yes
Results Display             Textually

                                              Initiate  Initiate run
Data Records                Free = 390  Used = 10  Arrows    Move selection bar
Battery Voltages            1: 12.6 V. 2: 12.5 V   Enter     Make selection
                                              ESC       Go to previous menu
                                              Minus     Print Screen
```

3.3.3 Setup and Utilities Menu

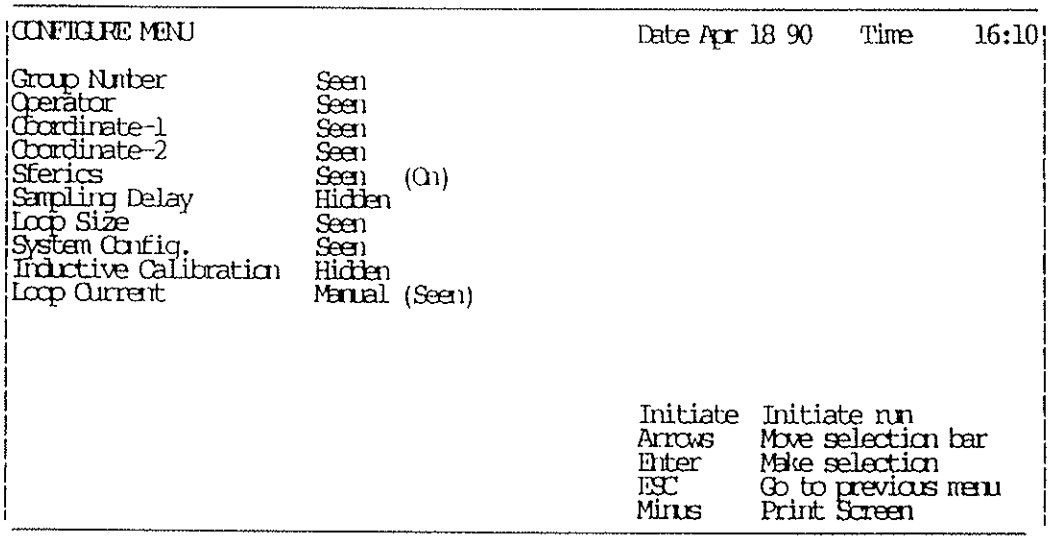
3.3.3.1 Configure Menu

Select whether the following items are seen or hidden on the Data Acquisition menu:

Group Number
Operator
Co-ordinate 1
Co-ordinate 2
Sferics
Sampling delay
Loop size
System configuration
Inductive calibration

Also select whether the loop current operates in 'manual' mode with a keyed-in value or 'auto' mode (normal). Press 'ESCAPE' to return to the utilities menu.

The Configure Menu appears as follows:

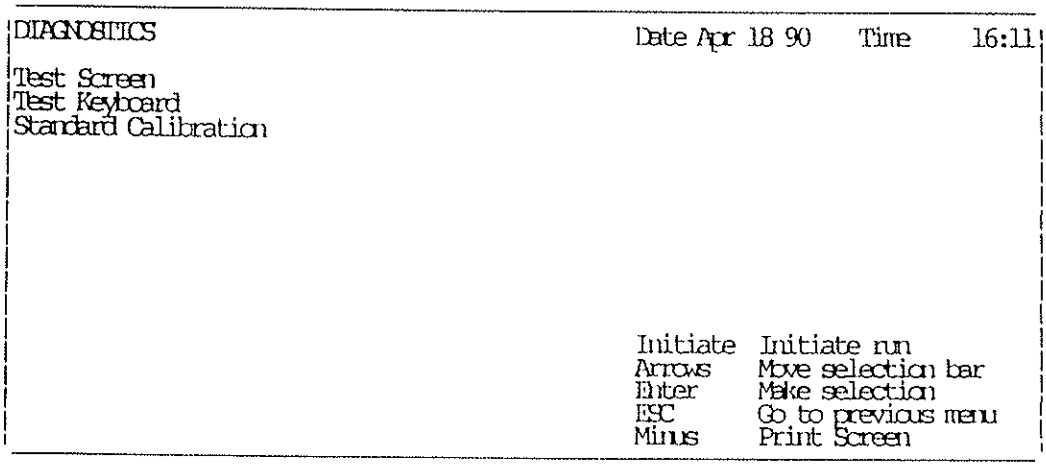


3.3.3.2 Diagnostics

Tests for the display and the keyboard have been provided. In addition, a set of four standard calibrations can be performed automatically. The operator is prompted to choose whether the calibration displays (textual and graphical) are to be dumped to a printer.

3.3.3 Setup and Utilities Menu (cont.)

The Diagnostics Menu appears as follows:



3.3.3.3 Date format

Permits the date entry format to be selected as mm-dd-yy or dd-mm-yy.

3.3.3.4 Reject Frequency

Permits the mains rejection frequency to be selected as 50 or 60Hz.

3.3.3.5 Baud Rate

300, 600, 1200, 2400, 4800, 9600 or 19200 bits/sec.

3.3.3.6 Data Bits

7 or 8.

3.3.3.7 Stop Bits

1 or 2.

3.3.3.8 Parity

None, space, mark, even, odd.

3.3.3.9 Clear to send

Ignored or required on receive.

3.3.3 Setup and Utilities Menu (cont.)

3.3.3.10 Data set ready

Ignored or required on receive.

3.3.3.11 Fitted Channels

Selects between multiplexer or multi-receiver operation.

3.3.3.12 Resistivity Display

Selects whether the apparent resistivity (in textual and graphical format) is calculated and displayed in addition to the normal results.

3.3.3.13 Results Display

Selects whether the initial results display following an acquisition run is textual or graphical.

At the bottom of the menu, the number of free and used records and the battery voltages are displayed.

4. CONTROL VIA THE SERIAL INTERFACE

Provision is made to control the data acquisition and dumping via the serial interface using either the RS232C or RS422A standard.

The following single character commands are recognised:

CR Display prompt '>'on new line.

'D' Dump all records.

'E' Erase latest record (or associated group of records for multi-channel acquisition.

'I' Initiate run.

'L' List latest record (or associated group of records).

'X' Erase all records.

ESC Abort an acquisition run.

Following completion of a command, the prompt is transmitted.

When the following error conditions occur, the indicated error code is transmitted followed by the prompt.

*NR No record (memory empty)
*MF Memory full
*OC Open circuit (transmitter current <0.1mA)
*SC Short circuit (transmitter overload)
*BC Bad code (invalid command)

In addition, the dumping and listing of records can be controlled using XOFF to stop and XON to restart transmission.

5. FORMAT OF A DUMPED RECORD

The record is dumped using ASCII characters in the following format:

Start of record
Annotation block
Data blocks
End of record

The start of record consists of a colon.

The annotation block has the format:
[0,field 1,field 2,....., field 17] cccc
where the checksum cccc is the sum of the ASCII characters between the square brackets expressed in hexadecimal form.

The fields are as follows:

date mm-dd-yy or dd-mm-yy (according to selected format)
time hh:mm
run type
operator number
start window
end window
gain (0 = 0.1, 1 = 1.0, 2 = 10, 3 = 100)
configuration
no. of channels
run no.
group no.
co-ordinate 1
co-ordinate 2
stacks
sferics (0 = OFF, 1 = 25%, 2 = 50%, 3 = 100%, 4 = 200%, 5 = 400%, 6 = 800%)
loop size
current (A)
turn-off time (us)
sampling delay

5. FORMAT OF THE DUMPED RECORD (cont.)

The data blocks have the format:

```
[1,field1,field2,.......fieldn] cccc
[2,field1,field2,.......fieldn] cccc
[3,field1,field2,.......fieldn] cccc
[4,field1,field2.......fieldn] cccc
[5,field1,field2.......fieldn] cccc
[6,field1,field2.......fieldn] cccc
```

where the checksum cccc is the sum of the ASCII characters between the square brackets expressed in hexadecimal form. The number of the data fields (n) equals the number of channels acquired and each is expressed as a four digit mantissa and one digit exponent (with minus sign if appropriate)

The first digit in each block indicates the type of data which follows.

1. Channel 1 readings
2. Channel 1 noise
3. Channel 2 readings
4. Channel 2 noise
5. Channel 3 readings
6. Channel 3 noise

For single channel operation, blocks 3-6 are omitted and for dual channel operation, blocks 5-6 are omitted.

The end of record consists of a semi-colon.

Note that, for readability, carriage returns, line feeds and continuation characters (/) may be included in the blocks. The continuation character indicates that a block is continued on the next line of display. The receiving software should filter out these characters.

5. FORMAT OF THE DUMPED RECORD (cont.)

A sample printout of a dumped block is shown below.

```
:
[0,04-18-90,16:06,1,0,1,27,1,7,3,3339,1,0,0,1,0,25, 1.00,0]0aaf

[1, 0000 0, 4093 0,-8186 0, 8186 0,-8186 0, 1023 1, 8186 0,-6140 0,/
       -1023 0, 4093 0, 1023 0,-6140 0,-1023 1,-1535 0, 2558 0,-2047 0,/
       -2814 0, 3070 0, 2814 0,-3070 0,-3837-1,-2814 0,-1151 0,-1151 0,/
        1215 0,-4477-1, 1599 0]27b7
[2, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0]2561

[3, 4093 0,-4093 0,-2047 1,-1228 1,-4093 0, 6140 0, 2047 0, 4093 0,/
       -5116 0,-1023 0, 3070 0, 8186 0,-2047 0, 4605 0,-2558 0,-3070 0,/
       -3837 0, 4093 0,-1791 0,-1023 0,-4349 0,-3326 0,-1791 0, 1791 0,/
       -6396-2, 1023 0, 1919 0]27d8
[4, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
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        0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0]2563


[5,-4093 0, 2047 1, 8186 0,-8186 0, 4093 0, 6140 0, 1433 1,-1228 1,/
        1023 0,-1023 0,-1023 0, 5116 0, 4605 0, 4605 0, 0000 0, 2558 0,/
       -6396 0, 8442 0, 2558 0, 2047 0,-1791 0, 2814 0,-1279-1,-6396-1,/
       -2558-1, 2302 0,-1535 0]27af
[6, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0, 0000 0,/
        0000 0, 0000 0, 0000 0]2565

;
```

6. NOMINAL DATA WINDOWS

(Times in milliseconds. Sampling delay = 0)

WINDOW	START	MIDDLE	END
1	0.025	0.050	0.075
2	0.075	0.100	0.125
3	0.125	0.150	0.175
4	0.175	0.200	0.225
5	0.225	0.275	0.325
6	0.325	0.375	0.425
7	0.425	0.475	0.525
8	0.525	0.575	0.625
9	0.625	0.725	0.825
10	0.825	0.925	1.025
11	1.025	1.125	1.225
12	1.225	1.325	1.425
13	1.425	1.625	1.825
14	1.825	2.025	2.225
15	2.225	2.425	2.625
16	2.625	2.825	3.025
17	3.025	3.425	3.825
18	3.825	4.225	4.625
19	4.625	5.025	5.425
20	5.425	5.825	6.225
21	6.225	7.025	7.825
22	7.825	8.625	9.425
23	9.425	10.225	11.025
24	11.025	11.825	12.625
25	12.625	14.225	15.825
26	15.825	17.425	19.025
27	19.025	20.625	22.225
28	22.225	23.825	25.425
29	25.425	28.625	31.825
30	31.825	35.025	38.225
31	38.225	41.425	44.625
32	44.625	47.825	51.025
33	51.025	57.425	63.825
34	63.825	70.225	76.625
35	76.625	83.025	89.425
36	89.425	95.825	102.225
37	102.225	115.025	127.825
38	127.825	140.625	153.425
39	153.425	166.225	179.025
40	179.025	191.825	204.625
41	204.625	230.225	255.825
42	255.825	281.425	307.025
43	307.025	332.625	358.225
44	358.225	383.825	409.425
45	409.425	460.625	511.825
46	511.825	563.025	614.225
47	614.225	665.425	716.625
48	716.625	767.825	819.025
49	819.025	921.425	1023.825
50	1023.825	1126.225	1228.625

6. **NOMINAL DATA WINDOWS** (cont.)

(Times in milliseconds, Sampling delay = 0)

WINDOW	START	MIDDLE	END
51	1228.625	1331.025	1433.425
52	1433.425	1535.825	1638.225
53	1638.225	1843.025	2047.825

7. TRANSMITTER ON/OFF TIMES

The SIROTEM transmitter current waveform is square and bipolar, with the off-time equal to the on-time. The off-time is a multiple of 10ms for 50Hz interference rejection, and a multiple of 8.333ms for 60Hz rejection as per the following table:

	ON/OFF TIME	
FINISH WINDOW	50Hz	60Hz
1- 21	10.000ms	8.333ms
22	10.000	16.667
23-25	20.000	16.667
26	20.000	25.000
27	30.000	25.000
28-29	30.000	33.333
30	40.000	41.667
31	50.000	50.000
32	60.000	58.333
33	70.000	66.667
34	80.000	83.333
35	90.000	91.667
36	110.000	108.333
37	130.000	133.333
38	160.000	158.333
39	180.000	183.333
40	210.000	208.333
41	260.000	258.333
42	310.000	308.333
43	360.000	358.333
44	410.000	416.667
45	520.000	516.667
46	620.000	616.667
47	720.000	716.667
48	820.000	825.000
49	1030.000	1025.000
50	1230.000	1233.333
51	1440.000	1441.667
52	1640.000	1641.667
53	2050.000	2050.000

8. SYNCHRONIZATION

All Sirotem 3 models may be used as a master to drive an external high power transmitter with photo-coupler inputs. In this case, a cable connection is required between the interface socket of Sirotem 3 and the slave transmitter.

When the sync option is fitted (Types MS and MSS), Sirotem 3 can act as a slave receiver without external connection to the transmitter, e.g. an MCI stand alone transmitter SATX-1. In this case, additional batteries are provided in the lid of the console so that the instrument may be carried easily without the need for an external battery pack.

To achieve synchronization, the following steps are required:

(1) Connect the lid battery connector to the power socket and switch on.

(2) Turn on the SATX-1 and the Sirotem 3 oven switch. The oven LEDs should come on and will go off again after about five minutes when the ovens are up to temperature. However, it may be necessary to allow about half an hour for the crystal oscillator frequencies to fully stabilize.

(3) Select 'Setup & Utilities' then 'Configure Menu'. Ensure that 'Loop Current' is set to 'Manual'. This makes it possible to key in the transmitter loop current for correct data normalization during subsequent runs.

(4) Select the 'Data Acquisition Menu' and enter the operating parameters as required.

(5) Use a phase cable to connect the 1 MHz clock signal from the interface socket of the Sirotem 3 to the '1MHz IN' socket of the SATX-1. Select the 'phase' position of the 'system display' function switch. Adjust the SATX-1 oscillator to achieve a drift rate of less than 6 degrees per minute (1 microsec per hour). Remove the cable.

(6) Use the tables at the end of this section to determine the number of 10 msec periods (at 50Hz rejection) or 8.33 msec periods (at 60Hz rejection) that are required for receiving the chosen number of windows. Set the SATX-1 channel switch to the value determined from the table.

8. SYNCHRONIZATION (cont.)

(7) On the Sirotem 3 Main Menu, select 'Synchronize'. Set the number of 10 or 8.33 msec periods as determined above. The display should then indicate that the instrument is waiting for sync.

(8) Connect a sync cable from the Sirotem 3 sync socket to the SATX-1 sync in/out socket. Prepare the SATX-1 for transmission and then press 'Initiate'. The sync LED on the Sirotem 3 should come on indicating that sync has been taken.

Sync will be lost and the sync LED will go off under the following conditions:

(1) 'Synchronization' is selected on the Main Menu.

(2) The Final Window is increased to a value requiring an increase in the number of 10 or 8.33 msec periods which has been selected.

(3) The mains rejection frequency is changed.

Synchronization can also be acquired from the primary field of the transmitter loop.

SYNCHRONIZATION TO SATX-1 AT 50Hz REJECTION

SIROTEM 3 FINAL WINDOW	SET SATX CHANNEL SWITCH TO...	SET SIROTEM 3 10 ms PERIODS TO...
1-22	1-5	1
23-26	6-7	2
27-28	8-9	3
30-31	10	5
32	11	6
33-34	12	8
35	13	10
36-37	14	13
38-39	15	18

SYNCHRONIZATION TO SATX-1 AT 60Hz REJECTION

SIROTEM 3	SET SATX CHANNEL SWITCH TO...	SET SIROTEM 3 8.33 ms PERIODS TO...
1-21	1-4	1
22-25	5-6	2
26-27	7-8	3
28-29	9	4
30-31	10	6
32	11	7
33	12	9
34-35	13	12
36	14	15
37-38	15	21

9. CONNECTOR DETAILS

LOOP CONNECTOR

A	Tx+
B	Tx-
C	Rx3-
D	Rx3+
E	Rx2-
F	Rx2+
G	Rx1-
H	Rx1+
I	Ground
J	Ground

POWER CONNECTOR

A	+VB
B	Ground
C	-VB
D	-VB aux
E	Ground
F	+VB aux

INTERFACE CONNECTOR

RS232C (DTE)

1	Protective ground
2	Tx data
3	Rx data
4	Clear to send
5	Request to send
6	Data set ready
7	Signal ground
20	Data terminal ready

RS422A

22	Tx-
23	Tx+
24	Rx-
25	Rx+

EXTERNAL DRIVE

14	OFF/ON
15	Ground
16	NEG/POS

PART NUMBER: 9550-00-0037
FILENAME : STEM3MCI.MAN
DIRECTORY : /INST/STEM3
DATE : 2 MAY 1990