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**TITLE**

Direct control of the MSIU

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**SUMMARY**

This document describes the commands that have to be sent to the MSIU to set up scans and receive data.

**SOFTWARE REVISION**

This document is applicable to R2.3 . ( Software Modifications up to SM93 )

**DOCUMENT REVISION HISTORY**

Revision 0 :  For Software Release R2.3

**Introduction.**

The software in the HAL IV Mass Spectrometer Interface Unit ( MSIU ) is normally controlled by Hiden's Windows  application programme "MASsoft"; however the MSIU may be fairly simply controlled directly.

This document describes some simple command scripts that may be downloaded to the MSIU by Windows  Terminal.

This document is not a complete description of all MSIU commands; it should be read in conjunction with the document HA-085-006, HAL MSIU Software Users Manual.

**MID Mode Example**

The file MIDTEST.TXT contains the script to set up a MID scan:

sdel all

sset scan Ascans

sset row 1

sset output  mass

sset start  18.00

sset stop  18.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

sset row 1

sset output  mass

sset start  28.00

sset stop  28.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

sset row 1

sset output  mass

sset start  32.00

sset stop  32.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

pset cycles 3

pset terse 1

pset points 50

lini  Ascans

sjob lget  Ascans

data all

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

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data

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data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

sset state Abort:

data

data

data

data

data

data stop

The functions of these commands are described below:

|  |  |
| --- | --- |
| sdel all | Delete all existing scans |
| sset scan Ascans | Specifies the scan device to be set up. 26 scan devices are allowed: Ascans through to Zscans. |
| sset row 1 | Specifies that we wish to modify the first row of the scan table. Until another row is specified all subsequent scan commands apply to row 1. |
| sset output  mass | Sets the output device to mass. The output device is the device that is scanned. |
| sset start  18.00 | Sets the value at the start of the scan. |
| sset stop  18.00 | Sets the value at the end of the scan. In an MID scan this is equal to the start value. |
| sset step  1.00 | Sets the step size ( increment ) - irrelevent if start = stop as there is only one step. |
| sset input  Faraday | Specifies the input device. E.g. Faraday, SEM, auxiliary1, auxiliary2. |
| sset low  -10 | Sets the low pressure ( N.B.= high gain ) range limit for autoranging. |
| sset high  -5 | Sets the low pressure limit for autoranging. Set the high and low value equal to disable autoranging |
| sset current -5 | Sets the initial range. |
| sset dwell  100% | Sets the dwell time. If the % is omitted sets the absolute dwell in milliseconds. If % is suffixed ( as shown ) sets the percentage of the recomended dwell time for the current range.  The dwell time is the length of time that the input is measured for. The maximum value is 6s ( 6000ms ). |
| sset settle  100% | Sets the settle time. The settle time is the time that the system waits after setting the output device to the start value. Maximum value 6s.  NOTE: There is a third delay value, the hesitate time, that is always set to 100%. This is the delay between points on a non-MID scan. However the hesitate time is never allowed to be longer than the settle time. |
| sset mode 1 | The scan can be set to various "modes" to support systems that can operate with different sets of operational parameters. The modes are:  0  Shutdown  1 RGA  2 +ve ion SIMS  3 -ve ion SIMS  4 -ve ion RGA.  An RGA system only supports modes 0 and 1. |
| sset report 21 | Configures how data is to be reported for this scan-row. See the MSIU Software Users Manual ( HA-085-006 ) and the examples later in this document for details |
| sset row 2 | Start of the definition of the next row of the table |
| ... |  |
| sset report 21 | End of definition of last row of table |
| sset cycles 3 | Sets the number of cycles to measure. If set to 0 will measure until stopped. |
| pset terse 1 | Sets the command format to terse ( omits units in returned values, returns short error codes ) |
| pset points 50 | Sets the maximum number of data points returned per data command. |
| data on | Keep data until read by data command. Data is held in a buffer until read by the data command. If this command is used the buffer can not be re-used until the data has been read. |
| lini  Ascans | Initialises the scan |
| sjob lget  Ascans | Start the measurement. Returns a task and a job number that can be used to stop the measurement. |
| data all | First data command - return all available data from the beginning if possible. |
| data | Read more data ( if available yet ). |
| data |  |
| data |  |
| sset state Abort: | Stop the scan immediately ( if it has not already stopped ).  sset state Stop: stops the scan at the end of the current cycle. |
| data |  |
| data |  |
| data |  |
| data |  |
| data |  |
| data stop | Stops the data command |
| data off | Opposite of data on. |
| lset mode 0 | Switch to Shutdown mode. |

The file MIDTEST.TXT can be sent to the MSIU by terminal. The file HAL4.TRM is a terminal configuration file that sets the correct baud rate ( 19.2K ) and handshake for file transmition.

HAL4.TRM is automatically used when Terminal is started from the Hiden application group. If you have not loaded MASsoft then copy HAL4.TRM  from the floppy disc to a directory called HIDEN. Start Terminal and use File Open to load the settings from HAL4.TRM:

HAL4.TRM is configured to use COM1:, you may need to change it to use COM2:

*Note: MASsoft assumes that the MSIU is connected to COM1, so generally it is better to have your mouse in COM2: if you have a serial mouse.*

Connect the appropriate serial port on the PC ( see above ) to the MSIU's RS232 port ( take care not to connect to the RS422 port by mistake )

Switch on the MSIU and type HELP in terminal. A screen describing MSIU commands should be displayed. If not read the ReadMe file ( CONFIGPC.WRI ) shipped with MASsoft.

You are now ready to download the file MIDTEST.TXT.  In the Transfers menu select Send Text File ...

The Send Text File dialogue is displayed:

Select the file midtest.txt and press OK.

The following data is displayed:

sdel all

sset scan Ascans

sset row 1

sset output  mass

sset start  18.00

sset stop  18.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

sset row 2

sset output  mass

sset start  28.00

sset stop  28.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

sset row 3

sset output  mass

sset start  32.00

sset stop  32.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

pset cycles 3

pset terse 1

pset points 50

data on

lini  Ascans

sjob lget  Ascans

4,3,

data all

[/3/18.00: 7.40349E-7,/42/28.00: 7.51399E-7,

data

/81/32.00: 7.51399E-7,][

data

/120/18.00:-0.74034E-7,

data

/158/28.00:-0.68509E-7,/195/32.00:-0.69614E-7,][/233/18.00:-1.09726E-7,

data

/280/28.00:-1.10831E-7,

data

/316/32.00:-1.07626E-7,]!

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

sset state Abort:

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

data

\*C110\*

data stop

data off

lset mode 0   
 

Note that there are more data commands in MIDTEST.TXT than really required. Issuing a data command after all the data has been read results in the error message \*C110\*.

The eid$ command may be used to get the text of an error message:

eid$ 110

"Command error 110  No data"

Thus the commands sset state Abort: and data stop are redundant; but they are a good idea as part of "clean up" at the end of the scan and are harmless if the scan has already ended. The command "stop 4 3" may be used in place of sset state Abort: The values 4,3 were returned by the sjob command. Do not separate the digits with a comma (,) when sending them to the stop command: stop 4,3 is illegal.

Note that the file MIDTEST.TXT does not turn on a filament or set the multiplier HT voltage. To do this add the lines:

|  |  |
| --- | --- |
| lset mode 1 | The next commands turn on the filament and set the multiplier voltage in RGA mode |
| lset F1 1 | Turn on F1 - 1 = on , 0 = off. |
| lset multiplier 800 | sets the multiplier to 800V, only needed if you use the SEM as an input device. The actual voltage depends on your SEM. |

**Alternative data formats**

To return the data without the time of the start of the scan use

sset report 5

data all

[18.00:-1.03206E-7,28.00:-0.99891E-7,

data

32.00:-1.02433E-7,][18.00:-1.01991E-7,28.00:-1.01438E-7,32.00:-1.00112E-7,]

data

[18.00:-1.01549E-7,28.00:-1.02543E-7,

data

32.00:-1.00665E-7,]!

data

\*C110\*

To only report the measured value, not the mass use

sset report 1

data all

[-0.97018E-7,-0.98676E-7,

data

-0.96908E-7,][-0.98897E-7,

data

-0.99228E-7,-0.99007E-7,]

data

[-1.01107E-7,-0.99228E-7,-0.99781E-7,]!

data

\*C110\*

The parameter brackets contains the cycle, scan and row separators:

pget brackets

"[](){}"

These can be changed.

pset brackets " ; ; ;"

pget brackets

" ; ; ;"

The same data would now return as:

data all

-0.97018E-7,-0.98676E-7,

data

-0.96908E-7,; -0.98897E-7,

data

-0.99228E-7,-0.99007E-7,;

data

-1.01107E-7,-0.99228E-7,-0.99781E-7,;!

The terminal ! can also be changed

pget terminator

"!"

pset terminator " "

**BAR Mode Example**

The file BARTEST.TXT sets up a BAR mode scan

sdel all[18.00:-1.03206E-7,28.00:-0.99891E-7,

data

32.00:-1.02433E-7,][18.00:-1.01991E-7,

sset scan Ascans

sset row 1

sset output  mass

sset start  10.00

sset stop  20.00

sset step  1.00

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

pset cycles 3

pset terse 1

pset points 50

data on

lini  Ascans

sjob lget  Ascans

data all

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

sset state Abort:

data

data

data

data

data

data stop

data off

lset mode 0

This differs from MIDTEST.TXT in that only one scan row is set up and that the scans start does not equal its stop; thus the scan steps from mass 1 to mass 10 at 1 amu intervals.

The data returned is:

data all

[/3/{

data

data

10.00: 7.55045E-7,11.00: 7.55045E-7,

data

12.00: 7.55045E-7,13.00: 7.55045E-7,14.00: 7.55045E-7,

data

15.00: 7.55045E-7,16.00: 7.36592E-7,17.00: 7.55045E-7,

data

18.00: 7.55045E-7,19.00: 7.55045E-7,20.00: 7.36592E-7,}][/340/{

data

data

data

10.00:-0.68145E-7,11.00:-0.66299E-7,

data

12.00:-0.68145E-7,13.00:-0.68145E-7,14.00:-0.68145E-7,

data

15.00:-0.66299E-7,16.00:-0.68145E-7,17.00:-0.66299E-7,

data

18.00:-0.68145E-7,19.00:-0.64465E-7,20.00:-0.64465E-7,}][/672/{

data

data

data

data

data

data

10.00:-1.06356E-7,

data

data

data

11.00:-1.06300E-7,

data

data

data

12.00:-1.06908E-7,

data

data

data

13.00:-1.06218E-7,

data

data

data

14.00:-1.06300E-7,

data

data

data

15.00:-1.04713E-7,

data

data

data

16.00:-1.06300E-7,

data

data

data

17.00:-1.04753E-7,

sset state Abort:

0

data

data

18.00:-1.04753E-7,19.00: 0.00000E+0,}]!

data

\*C110\*

**Profile Mode Example**

The file PROFTEST.TXT sets up a Profile mode scan.

sdel all

sset scan Ascans

sset row 1

sset output  mass

sset start  10.00

sset stop  20.00

sset step  0.05

sset input  Faraday

sset low  -10

sset high  -5

sset current -5

sset dwell  100%

sset settle  100%

sset mode 1

sset report 21

pset cycles 3

pset terse 1

pset points 50

data on

lini  Ascans

sjob lget  Ascans

data all

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

sset state Abort:

data

data

data

data

data

data stop

data off

lset mode 0

This only differs from BARTEST.TXT in that the step size is now 0.05 instead of 1.

The data returned is:

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

data

[/1019/{

data

10.00: 7.51399E-7,10.05: 7.45874E-7,

data

10.10: 7.51399E-7,10.15: 7.40349E-7,

data

10.20: 7.40349E-7,10.25: 7.40349E-7,

data

10.30: 7.40349E-7,10.35: 7.51399E-7,

data

10.40: 7.51399E-7,10.45: 7.51399E-7,

data

10.50: 7.45874E-7,10.55: 7.51399E-7,

data

10.60: 7.51399E-7,10.65: 7.51399E-7,

data

10.70: 7.40349E-7,10.75: 7.40349E-7,

data

10.80: 7.51399E-7,10.85: 7.51399E-7,

data

10.90: 7.51399E-7,10.95: 7.40349E-7,

data

11.00: 7.40349E-7,11.05: 7.40349E-7,

data

11.10: 7.51399E-7,11.15: 7.51399E-7,

data

11.20: 7.40349E-7,11.25: 7.51399E-7,

data

11.30: 7.51399E-7,11.35: 7.51399E-7,

data

11.40: 7.40349E-7,11.45: 7.51399E-7,

data

11.50: 7.40349E-7,11.55: 7.40349E-7,

data

11.60: 7.40349E-7,11.65: 7.51399E-7,

data

11.70: 7.40349E-7,11.75: 7.51399E-7,11.80: 7.51399E-7,

data

11.85: 7.40349E-7,11.90: 7.40349E-7,

data

11.95: 7.40349E-7,12.00: 7.51399E-7,

data

12.05: 7.51399E-7,12.10: 7.45874E-7,

data

12.15: 7.40349E-7,12.20: 7.51399E-7,

data

12.25: 7.40349E-7,12.30: 7.40349E-7,

data

12.35: 7.40349E-7,12.40: 7.40349E-7,

data

12.45: 7.51399E-7,12.50: 7.51399E-7,

data

12.55: 7.40349E-7,12.60: 7.40349E-7,

data

12.65: 7.40349E-7,12.70: 7.51399E-7,

data

12.75: 7.40349E-7,12.80: 7.51399E-7,

data

12.85: 7.40349E-7,12.90: 7.51399E-7,

data

12.95: 7.40349E-7,13.00: 7.40349E-7,

data

13.05: 7.40349E-7,13.10: 7.51399E-7,

data

13.15: 7.51399E-7,13.20: 7.51399E-7,

data

13.25: 7.40349E-7,13.30: 7.40349E-7,

data

13.35: 7.40349E-7,13.40: 7.40349E-7,

data

13.45: 7.40349E-7,13.50: 7.40349E-7,

data

13.55: 7.40349E-7,13.60: 7.51399E-7,

data

13.65: 7.40349E-7,13.70: 7.40349E-7,

data

13.75: 7.40349E-7,13.80: 7.51399E-7,

data

13.85: 7.51399E-7,13.90: 7.51399E-7,

data

13.95: 7.40349E-7,14.00: 7.40349E-7,

data

14.05: 7.51399E-7,14.10: 7.40349E-7,

data

14.15: 7.40349E-7,14.20: 7.40349E-7,

data

14.25: 7.40349E-7,14.30: 7.40349E-7,

data

14.35: 7.51399E-7,14.40: 7.51399E-7,

data

14.45: 7.40349E-7,14.50: 7.40349E-7,

data

14.55: 7.51399E-7,14.60: 7.40349E-7,

data

14.65: 7.51399E-7,14.70: 7.40349E-7,

data

14.75: 7.51399E-7,14.80: 7.51399E-7,

data

14.85: 7.40349E-7,14.90: 7.51399E-7,

data

14.95: 7.51399E-7,15.00: 7.40349E-7,

data

15.05: 7.51399E-7,15.10: 7.45874E-7,

data

15.15: 7.51399E-7,15.20: 7.40349E-7,

data

15.25: 7.51399E-7,15.30: 7.40349E-7,

data

15.35: 7.40349E-7,15.40: 7.40349E-7,

data

15.45: 7.40349E-7,15.50: 7.51399E-7,

data

15.55: 7.40349E-7,15.60: 7.51399E-7,

data

15.65: 7.40349E-7,15.70: 7.40349E-7,

data

15.75: 7.51399E-7,15.80: 7.51399E-7,

data

15.85: 7.40349E-7,15.90: 7.51399E-7,

data

15.95: 7.40349E-7,16.00: 7.51399E-7,

data

16.05: 7.40349E-7,16.10: 7.51399E-7,

data

16.15: 7.40349E-7,16.20: 7.40349E-7,

data

16.25: 7.40349E-7,16.30: 7.40349E-7,

data

16.35: 7.51399E-7,16.40: 7.40349E-7,

data

16.45: 7.51399E-7,16.50: 7.51399E-7,

data

16.55: 7.51399E-7,16.60: 7.40349E-7,

data

16.65: 7.40349E-7,16.70: 7.40349E-7,

data

16.75: 7.40349E-7,16.80: 7.40349E-7,

data

16.85: 7.40349E-7,16.90: 7.51399E-7,

data

16.95: 7.40349E-7,17.00: 7.40349E-7,

data

17.05: 7.40349E-7,17.10: 7.40349E-7,

data

17.15: 7.51399E-7,17.20: 7.40349E-7,

data

17.25: 7.45874E-7,17.30: 7.51399E-7,

data

17.35: 7.51399E-7,17.40: 7.40349E-7,

data

17.45: 7.40349E-7,17.50: 7.40349E-7,

data

17.55: 7.40349E-7,17.60: 7.51399E-7,

data

17.65: 7.40349E-7,17.70: 7.40349E-7,

data

17.75: 7.51399E-7,17.80: 7.40349E-7,

data

17.85: 7.51399E-7,17.90: 7.40349E-7,

data

17.95: 7.40349E-7,18.00: 7.40349E-7,

data

18.05: 7.51399E-7,18.10: 7.40349E-7,

data

18.15: 7.51399E-7,18.20: 7.40349E-7,

data

18.25: 7.45874E-7,18.30: 7.40349E-7,

data

18.35: 7.40349E-7,18.40: 7.40349E-7,

data

18.45: 7.40349E-7,18.50: 7.40349E-7,

data

18.55: 7.51399E-7,18.60: 7.40349E-7,

data

18.65: 7.40349E-7,18.70: 7.51399E-7,

data

18.75: 7.40349E-7,18.80: 7.51399E-7,

data

18.85: 7.51399E-7,18.90: 7.40349E-7,

data

18.95: 7.51399E-7,19.00: 7.40349E-7,

data

19.05: 7.40349E-7,19.10: 7.40349E-7,

data

19.15: 7.51399E-7,19.20: 7.40349E-7,

data

19.25: 7.40349E-7,19.30: 7.40349E-7,

data

19.35: 7.51399E-7,19.40: 7.40349E-7,

data

19.45: 7.51399E-7,19.50: 7.40349E-7,

data

19.55: 7.40349E-7,19.60: 7.40349E-7,

data

19.65: 7.40349E-7,19.70: 7.40349E-7,

data

19.75: 7.51399E-7,19.80: 7.51399E-7,

data

19.85: 7.40349E-7,19.90: 7.40349E-7,

data

19.95: 7.40349E-7,20.00: 7.40349E-7,}][/7079/{

data

data

10.00:-0.64089E-7,

data

10.05:-0.62984E-7,10.10:-0.64089E-7,

data

10.15:-0.65194E-7,10.20:-0.65194E-7,

data

10.25:-0.64089E-7,10.30:-0.66299E-7,

data

10.35:-0.64089E-7,10.40:-0.61879E-7,

data

10.45:-0.61879E-7,10.50:-0.62984E-7,

data

10.55:-0.61879E-7,10.60:-0.61879E-7,

data

10.65:-0.64089E-7,10.70:-0.62984E-7,

data

10.75:-0.62984E-7,10.80:-0.61879E-7,

data

10.85:-0.60774E-7,10.90:-0.62984E-7,

data

10.95:-0.59669E-7,11.00:-5.85649E-8,

data

11.05:-0.60774E-7,11.10:-0.62984E-7,

data

11.15:-0.60774E-7,11.20:-0.60774E-7,

data

11.25:-0.60774E-7,11.30:-0.61879E-7,

data

11.35:-0.64089E-7,11.40:-0.60774E-7,

data

11.45:-0.61879E-7,11.50:-0.62984E-7,

data

11.55:-0.61879E-7,11.60:-0.62984E-7,

data

11.65:-0.60774E-7,11.70:-0.64089E-7,

data

11.75:-0.61879E-7,11.80:-0.66299E-7,

data

11.85:-0.62984E-7,11.90:-0.64089E-7,

data

11.95:-0.62984E-7,12.00:-0.65194E-7,

data

12.05:-0.61879E-7,12.10:-0.62984E-7,

sset state Abort:

0

data

data

12.15:-0.62984E-7,12.20:-0.64089E-7,12.25: 0.00000E+0,}]!

data

\*C110\*

data

\*C110\*

data

\*C110\*

data stop

\*C110\*

data off

lset mode 0 

Note in this case there is much more data and that the sset state Abort: actually does stop the scan.

 filok 1 = on, 0 = off

emok 1 = on, 0 = off

ptrip 1 = on, 0 = off

emission-LED 1 = on, 0 =off

fault-LED 1 = on, 0 = off

F1 1 = on, 0 = off

F2 1 = on, 0 = off

overtemp 1 = on, 0 = off