

## Application note

### NEP-5000 turbidity SDI-12 option

*Use with H-22+ & H-500XL loggers*

Version: 20221009

Status: Final

Confidentiality: Not confidential

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Author: Vic Grosjean

## Document history

The Observator range is in continuous development and so specifications may be subject to change without prior notice. When in doubt about the accuracy of this document, contact the Observator Group.

### Reference documents

| Type of document / tool | Product type and name (incl. url)                                       |
|-------------------------|---|
| Software                | <a href="#">NEP-5000</a>  |
| CFG files               | <a href="#">NEP-5000</a>  |
| Datasheet               | <a href="#">NEP-5000</a>  |
| Manual                  | <a href="#">NEP-5000</a>  |
| Application notes       | <a href="#">NEP-5000-SDI-12 option with Campbell logger</a>             |
|                         | <a href="#">NEP-5000-SDI-12 option for H-522+ &amp; H-500XL loggers</a> |
|                         | <a href="#">NEP-5000-SDI-12 option with HydrosSpider logger</a>         |
|                         | <a href="#">NEP-5000-SDI-12, RS485 and analogue: wiper operations</a>   |
|                         | <a href="#">NEP-5000 multi-point calibration</a>                        |
|                         | <a href="#">NEP-5000 firmware updating procedure</a>                    |
|                         | <a href="#">Pressure calibration</a>                                    |
|                         | <a href="#">Shroud installation</a>                                     |
| Videos                  | <a href="#">Temperature calibration</a>                                 |
|                         | <a href="#">Wiper replacement</a>                                       |
|                         | <a href="#">NEP-5000</a>  |

### Revision history

| Date       | Amendments   | Company, position                         |
|------------|--|---|
| 2019-02-06 | Initial document creation: Completed simple reading of turbidity section | Observator Australia, Document Controller |
| 2019-02-14 | Completed reading of turbidity after optical wipe section                | Observator Australia, Document Controller |
| 2019-03-17 | Added reference documents  | Observator Australia, Document Controller |
| 2019-04-05 | Removed advanced operation sections                                      | Observator Australia, Document Controller |
| 2019-07-03 | Quality review   | Observator Australia, Operation Manager   |
| 2020-01-30 | Updated document format  | Observator Australia, Document Controller |
| 2020-03-08 | Updated basic operation section  | Observator Australia, Document Controller |
| 2022-10-09 | Update video links   | Observator Australia, Document Controller |

**Procedure sign-off:**

| Date       | Company, position                         | Status   |
|------------|---|----------|
| 2019-02-14 | Observator Australia, Document Controller | Finished |
| 2019-12-06 | Observator Australia, Managing Director   | Approved |
| 2020-03-05 | Observator Group, Communication Officer   | Approved |

**Distribution list**

| Date | Company, position |
|------|-------------------|
|      |                   |

## Summary

The NEP-5000 family of sensors offers a comprehensive list of functionalities using its built in SDI-12 interface. The list below shows a few common scenarios for which the sensor can be used in SDI-12 mode. Please select the most appropriate methods for your application. Each scenario consists of sensor information using the NEP-5000 configuration software and WaterLOG® system H-522+ & H-500XL family logger's setup configurations (using keypad, serial terminal) including each recommended electrical wiring.

### 2. "Basic operations"

- 2.1. "Simple reading of turbidity (general use)"
- 2.2. "Reading of turbidity using auto-range or single feature after an optical wipe (recommended option)"

Important note: All examples and procedures that are discussed in this document are best applied to firmware version C2.032 and above.

Important note: End users may request NEP-5000 settings from the factory according to the above scenarios during the time of ordering.

Important note: All sensor configurations that are described below require the user to connect to the sensor's calibration software. Please refer to the NEP-5000 manual.

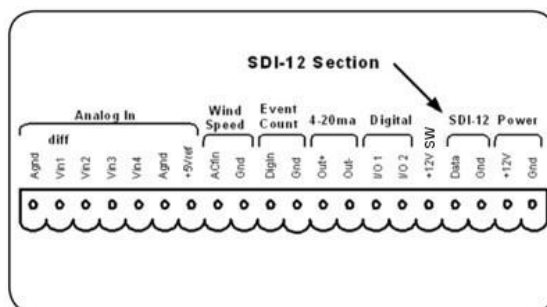
Important note: Advanced users may directly download, update and load our configuration file "example" to test their logger (use the keypad "System Config Opts" menu in "System Setup"):

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## 1 Wiring diagrams

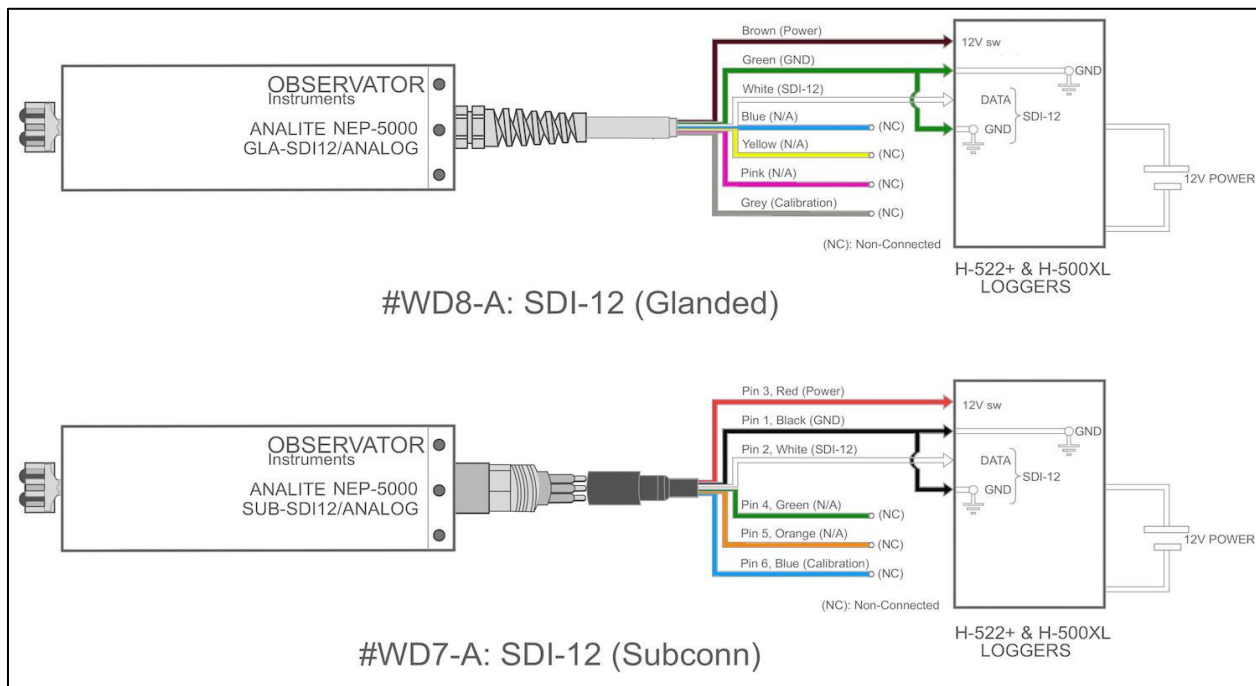
This chapter describes the required wiring to connect H-522+ & H-500XL loggers to your NEP-5000 turbidity probe using SDI-12 communication protocol.



Use the following NEP-5000 sensor wiring for the following scenarios:

### 2. "Basic operations"

- 2.1. "Simple reading of turbidity (general use)"
- 2.2. "Reading of turbidity using auto-range or single feature after an optical wipe (recommended option)"



## 2 Basic operations

### 2.1 Simple reading of turbidity (general use)

#### 2.1.1 Setting up your NEP-5000 family turbidity sensor for simple turbidity readings (general use)

This setup requires the user to have the following:

- NEP-5000 family sensor.
- NEP-5000 calibration module (calibration kit).  
Or request these settings during time of ordering.
- 12V Direct Current (DC) power supply.
- NEP-5000 user manual.

#### 2.1.2 Mode of operation

The logger powers up the sensor, using one of its power control switches and waits for the sensor to boot up (allowing total time of about twenty seconds to accommodate the power on the wipe feature).

Note: That in this scenario the sensor will automatically carry out an optical clean (wipe) soon after the boot up. Once the fifty seconds of boot up and wiping time has elapsed, the logger issues a measure command (aM!) followed by read command (aD0!) to retrieve the newly measured turbidity value.

#### 2.1.3 The following settings must be applied to the NEP-5000, using the Personal Computer configuration software

The sensor configurations that are shown below requires users to connect to the sensor using its calibration software.

- Turbidity measuring range = auto or desired single range.  
In calibration software under “Sensor Stage” > “Sensor calibration”.
- Data acquisition time = 10 seconds or more if auto-range is selected or four seconds when single range is selected.  
In calibration software under “Output Stage” > “SDI12 tab”.
- SDI12 address = 0 (default) or any desired address.

- Communication protocol of the sensor = SDI12.

**Range Calibration**

SET Operating Range  
☐ LOW NTU   ☐ Medium NTU   ☐ High NTU   ☒ **Auto**   Set

Range transition settings

| NTU  | To   | NTU | Use              |
|------|------|-----|------------------|
| 0    | 97   |     | Use Low range    |
| 103  | 995  |     | Use Medium range |
| 1005 | 3000 |     | Use High range   |

Auto populate from calibration data

Auto-Range

↓

**OutPut Control**

Analog Update rate: 200   ☐ Freeflow Digital   ☐ Polled Digital   COM Type: 3.6V\_Serial   ☒ SDI12

Fixed Communication settings 1200,7,E,1

SDI12 Address: 0   accusation time

Start Measurement (aM) command data acquisition period: 10 Seconds

Use aDIO command to retrieve data.

\*\*\*\*\*SDI12 Supported\*\*\*\*\*  
 \*\*\*\*Acknowledge Return a <CR><LF> Eg- 111<CR><LF>

**Range Calibration**

SET Operating Range  
☐ LOW NTU   ☐ Medium NTU   ☒ **High NTU**   ☐ Auto   Set

2 point calibration.

| 0NTU (Input RAW) | TopEnd NTU (Input RAW) | TopEnd NTU Value |
|------------------|------------------------|------------------|
| 156              | 3540                   | 3000             |

☐ 3rd calibration or higher point calibrations

Single Range

↓

**OutPut Control**

Analog Update rate: 200   ☐ Freeflow Digital   ☐ Polled Digital   COM Type: 3.6V\_Serial   ☒ SDI12

Fixed Communication settings 1200,7,E,1

SDI12 Address: 0   accusation time

Start Measurement (aM) command data acquisition period: 4 Seconds

Use aDIO command to retrieve data.

\*\*\*\*\*SDI12 Supported\*\*\*\*\*  
 \*\*\*\*Acknowledge Return a <CR><LF> Eg- 111<CR><LF>

To commit above settings to permanent memory please press set followed by save calibration.

- Wiper operation set to power on wipe.  
In calibration software under “Wiper Control”.

General   Sensor Stage   OutPut Stage   **Wiper Control**   Internal\_Sensors

Wiping mode Set

Basic Motor Controls

Single\_direction\_Wipe   SET

Wiper Timeout: 10

☒ **Wipe On PowerUp**

Wiping Options

Wiper Option OR Autowipe(in seconds 60000max): OFF

Power On Raw Output(Analog out)  
 Analog RAW out value during sensor startup.

0



### 2.1.4 Setup/configuring information for logger H-522+ & H-500XL

The logger can be configured using the built-in key pad or the terminal commands. Please select the most appropriate option for your preference.


- Section 1, to 6 shows how to program using built-in key pad.
- Section 7 to 13 shows how to program using terminal menu.

#### 1. Reset the logger

This section describes how to reset the logger to its default factory calibration setup. Doing so will remove all other previous SDI-12 instructions in the logger.

#### Using keypad

- In the main menu, select “Sensor Input Setup” by pressing on the right arrow.

A black rectangular button with a blue border containing the text "Sensor Input Setup" in green and a right-pointing arrow in green.

- Press on the bottom arrow until you reach the “SDI-12 Task Option” menu. Then use the right arrow to “Enter”.

A black rectangular button with a blue border containing the text "SDI-12 Task Option" in green and a right-pointing arrow in green.A black rectangular button with a blue border containing the text "SDI-12 Tasks Table" in green and a right-pointing arrow in green.

- Press on the bottom arrow until you reach the “Reset to Defaults” function, then select “Enter” to reset the tasks to factory default.

A black rectangular button with a blue border containing the text "Reset to Defaults" in green.A black rectangular button with a blue border containing the text "Enter" in green.

## 2. System setup after logger reset

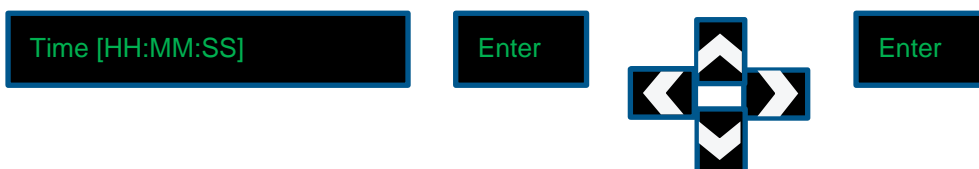
This section describes how to setup the basic system configuration of the logger.

### Using keypad

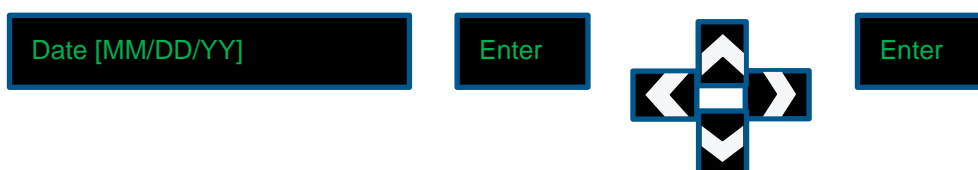
- In the main menu, select “System Setup” by pressing on the right arrow.



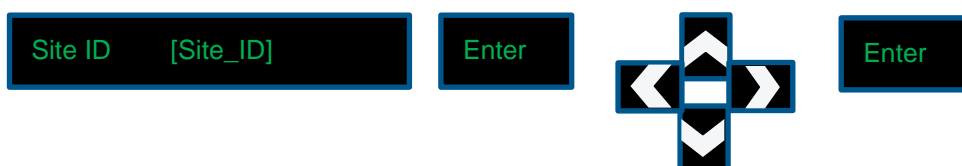
- In “Time”, press “Enter” and use the arrows to modify the time & press “Enter”.



- Press on the bottom arrow until you reach the “Date” menu, press “Enter” and use the arrows to modify the date & press “Enter”.



- Press on the bottom arrow until you reach the “Site ID” menu, Press “Enter” and use the arrows to modify the site ID number & press “Enter”.



## 3. Logger setup for measurement interval

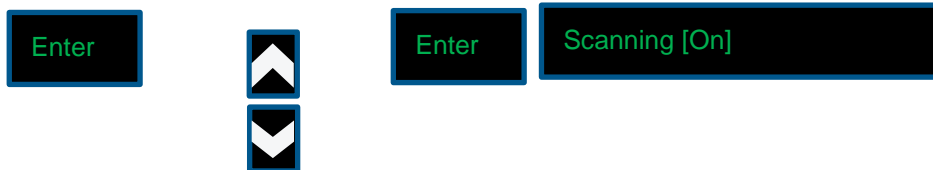
This section describes how to set up the scanning interval/measurement interval of the logger.

### Using keypad

- In the Main menu, select “Scan Setup” by pressing on the right arrow.



- Enable the “Scanning” to “On” by pressing on “Enter”, use the arrows and “Enter”.



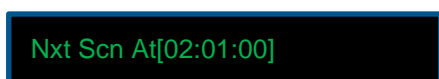
- Press on the bottom arrow until you reach the “Scan Rate” menu. Press “Enter” and use the arrows to modify the scanning interval to 10 minutes and press “Enter”.



Note 1: User should not select a scanning interval of less than five min, otherwise it does not leave enough time to change the value manually using the keypad.

Note 2: Please pay attention to your SDI-12 full operation cycle when selecting the scan rate. If scan rate is less than the full operation cycle, the logger may display intermittent behaviours.

- You can now check when the next scan will occur by pressing on the bottom arrow until you reach the “Nxt Scn” menu.



#### 4. Setup sensor power control switch

This section describes how to use the logger's power control output to shut down the sensor during sleeping and power up during measurement/scanning times. This helps to conserve the power and helps to restart the sensor in the event of failure (SDI-12 bus, wiper jam and etc...).

##### Using keypad

- In the main menu, select "System Setup" by pressing on the right arrow.



System Setup    ->

- Press on the bottom arrow until you reach the "Advanced Options" menu and select the right arrow to enter in the "Advanced Options" menu.



Advanced Options    ->

- Press on the bottom arrow until you reach the "AutoOff Enabled/Disabled" menu, press "Enter" to enable it. This feature will cut the power to the sensor once the measurement is complete before the logger goes into sleep-mode.



Enter



AutoOff Enabled

- Press on the top arrow until you reach the "Sys TimeOut" menu, press "Enter" and use the arrows to enter the time in seconds that you want to allocate before the logger goes into sleep-mode.



Sys TimeOut [300] Sec

Note: This value should always be superior to one hundred seconds.

- Press on the bottom arrow until you reach the "Excite Warmup [00]Sec" menu, press "Enter" and use the arrows to select twenty seconds and press "Enter". This delay forces the logger to wait for twenty seconds allowing the sensor to boot up and complete its optical wipe operation.



Enter




Enter



Excite Warmup [20]Sec

- Press on the bottom arrow until you reach the “+12VX On” menu, press “Enter” and use the arrows to select “At scan” and press “Enter”. This feature automatically turns on the sensor power prior to the scanning sequence. Also note that the “AutoOff” feature must be set to turn off the sensor once the scanning is complete.



#### 5. Powers up delay (warm up delay) also show about offset time

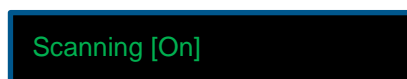
This delay allows time for the sensor to boot up and complete an optical clean (about twenty seconds in average). If power on the wipe condition is not selected, the warm up time may be reduced to four seconds. The logger has to input twenty seconds of scan offset delay time if the warm up time is set to twenty seconds.

#### Using keypad

- In the Main menu, select “Scan Setup” by pressing on the right arrow.



- Make sure the “Scanning” is “On” (if not, select “Enter”, “top arrow” and “Enter” again).



- Press on the bottom arrow until you reach the “Scan Offset Tm” menu. Press “Enter” and use the arrows to modify the offset interval to twenty seconds in minute and seconds and press “Enter” to save the value.

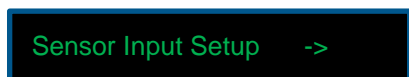


## 6. Setup the measurement information

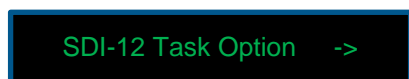
This shows how to setup the parameter, the number, the name, SDI-12 address and SDI-12 measurement command (aM!) followed by data read command (aD0!).

### Using keypad

- In the main menu, select “Sensor Input Setup” by pressing on the right arrow.



- Press on the bottom arrow until you reach the “SDI-12 Task Option” menu. Then, enter in the “SDI-12 Task Table” menu using the right arrow.



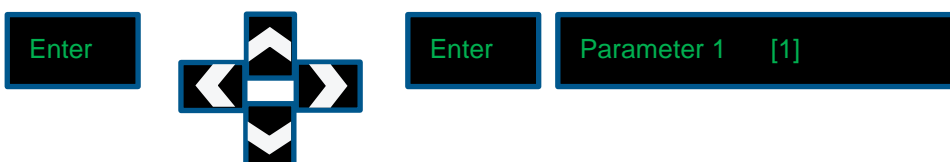
- Select the right arrow to enter in “Value 1” menu. Press “Enter” and use the arrows to select “0” and press “Enter”.



- Press on the bottom arrow until you reach the “Address 1” section. Press “Enter” and use the arrows to select “1” and press “Enter”.



- Press on the bottom arrow until you reach the “Parameter 1” section. Press “Enter” and use the arrows to select “1” and press “Enter”.



**Note:** Setting up the parameter name can only be performed in terminal mode. Please refer to **Section 13** “Setup the measurement information” for the full terminal procedure.

You have now completed the sensor setup in basic mode via built-in display. Please run the setup and verify.

To verify your setup, enter in the “SDI-12 Task Table”, you can evoke by pressing the right arrow. Press on the bottom arrow until you reach the “Scan Task 1” section. Then press “Enter” to activate the measurement. Select the top arrow to view the measured turbidity value displayed for “Value 1”.

#### Disclaimer:

The above setup and tests verify that the logger is capable of reading data from the NEP-5000 sensor.

Please refer to the appropriate logging options and appropriate source options to evoke the above setup in automated manner or contact your logger company provider.

### 7. Login to the data logger using terminal program

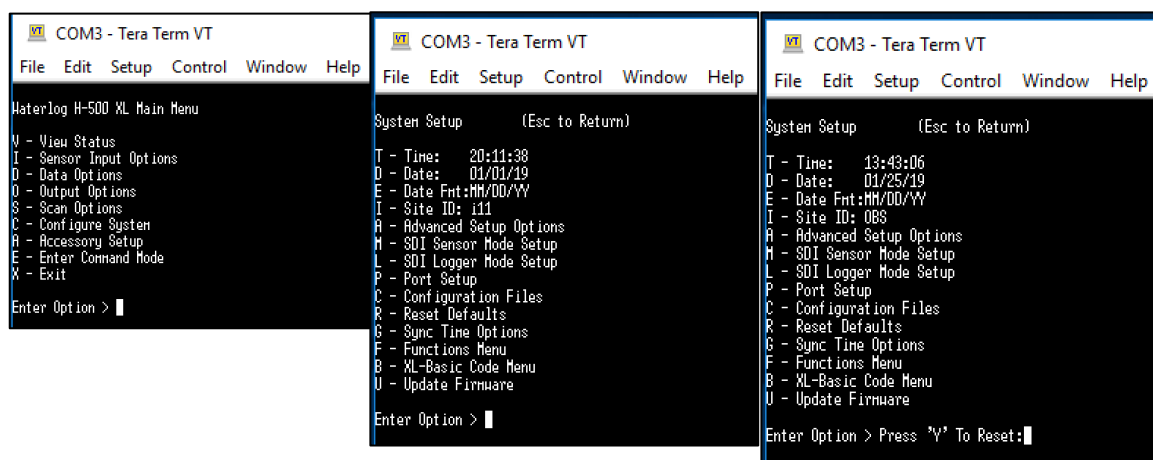
- Connect your probe to the data logger.
- Connect your computer to the data logger using the Universal Serial Bus (USB) to RS232 cable.
- Download the “[Tera Term](#)” terminal program onto your Windows desktop.
- Launch “[Tera Term](#)” and select “Esc”.

### 8. Reset the logger

This section describes how to reset the logger to its default factory calibration setup. Doing so will remove all other previous SDI-12 instructions in the logger.

#### Using terminal

- In the Main menu, select “Configure System” by selecting “C” then select “Reset Defaults” by selecting “R”. Finally confirm your choice with “Y”.



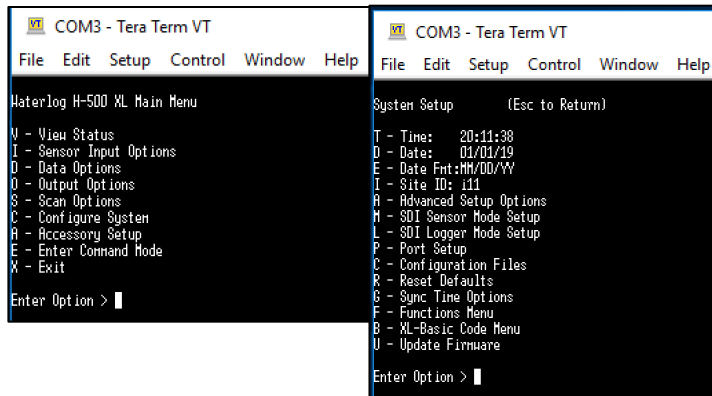
Note: Resetting to default will change the serial port back to RS-232-1.

## 9. System setup after logger reset

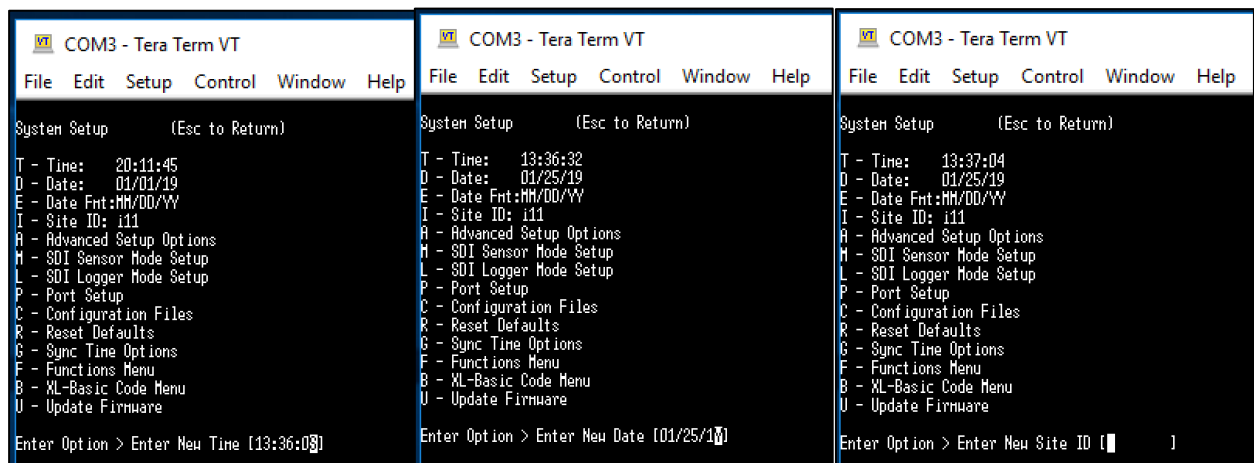
This section describes how to setup the basic system configuration of the logger.

### Using terminal

- In the main menu, select “Configure System” by selecting “C”.



- Configure the following:
  - Configure the “Time” by selecting “T”, enter the “Time” and press “Enter”.
  - Configure the “Date” by selecting “D”, enter the “Date” and press “Enter”.
  - Configure the “Site ID” by selecting “I”, enter the “Site ID” and press “Enter”.





## 10. Logger setup for measurement interval

This section describes how to setup the scanning interval or measurement interval of the logger.

### Using terminal

- In the main menu, select “Scan Options” by selecting “S”.

| VT COM3 - Tera Term VT              | VT COM3 - Tera Term VT              |
|-------------------------------------|-------------------------------------|
| File Edit Setup Control Window Help | File Edit Setup Control Window Help |
| Waterlog H-500 XL Main Menu         | Scan Options (Esc to Return)        |
| V - View Status                     | Current Time: 19:36:15              |
| I - Sensor Input Options            | Next Scan: 00:03:44                 |
| D - Data Options                    | S - Scanning: On                    |
| O - Output Options                  | R - Scan Rate: 00:10:00             |
| S - Scan Options                    | O - Scan Offset Time: 00:01         |
| C - Configure System                | N - Next Scan At: 19:39:59          |
| A - Accessory Setup                 | F - Start A New File:               |
| E - Enter Command Mode              |                                     |
| X - Exit                            |                                     |
| Enter Option > █                    | Enter Option > █                    |

Configure the following:

- Configure “Scanning” by selecting “S”. Enable the “Scanning” to “On” by using the top/bottom keyboard arrows and “Enter”.
- Configure “Scan Rate” by selecting “R”. Type the new scanning interval of “ten minutes” and press “Enter”.

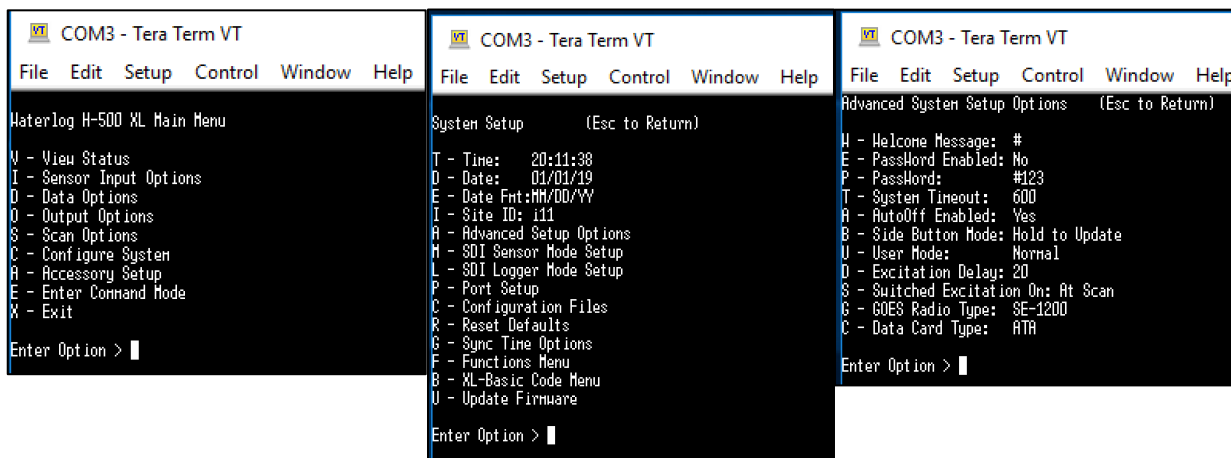
| VT COM3 - Tera Term VT                   | VT COM3 - Tera Term VT                        |
|--|---|
| File Edit Setup Control Window Help      | File Edit Setup Control Window Help           |
| Scan Options (Esc to Return)             | Scan Options (Esc to Return)                  |
| Current Time: 19:36:22                   | Current Time: 19:56:27                        |
| Next Scan: 00:03:37                      | Next Scan: 00:03:32                           |
| S - Scanning: On                         | S - Scanning: On                              |
| R - Scan Rate: 00:10:00                  | R - Scan Rate: 00:10:00                       |
| O - Scan Offset Time: 00:01              | O - Scan Offset Time: 00:01                   |
| N - Next Scan At: 19:39:59               | N - Next Scan At: 19:59:59                    |
| F - Start A New File:                    | F - Start A New File:                         |
| Enter Option > Select Scanning Mode [On] | Enter Option > Enter New Scan Rate [00:10:00] |

## 11. Setup sensor power control switch

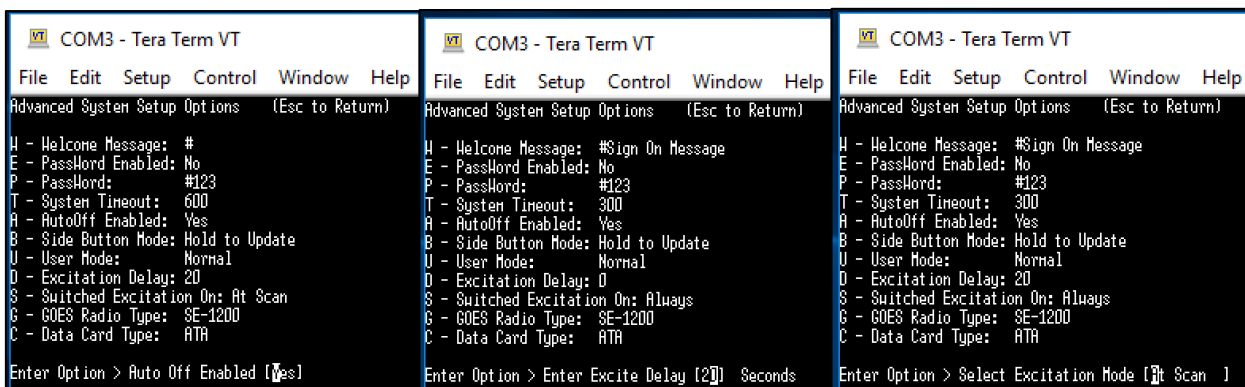
This section describes how to use the loggers power control output to shut down the sensor during sleeping and power up during measurement/scanning times. This helps to conserve the power and helps to restart the sensor in event of failure (SDI-12 bus, wiper jam and etc...).

### Using terminal

- In the main menu, select “Configure System” by selecting “C”, then, select “A” for “Advanced Setup Options”.



- Configure the following:
  - Configure “AutoOff Enabled” by selecting “A”. Enable the “Auto Off” to “Yes” by using the top/bottom keyboard arrows and “Enter”. This feature will cut the power to the sensor once the measurement is complete before the logger goes into sleep-mode.
  - Configure “Excitation Delays” by selecting “D”. Enter “20” seconds Excitation Delay and press “Enter”. This delay forces the logger to wait for 20 seconds allowing the sensor to boot up and complete its optical wipe operation.
  - Configure “Switched Excitation On” by selecting “S”. Set the Excitation “At scan” by using the top/bottom keyboard arrows and “Enter”. This feature automatically turns on the sensor power prior to the scanning sequence. Also note that the “AutoOff” feature must be set to enable in order to turn off the sensor once the scanning is complete.

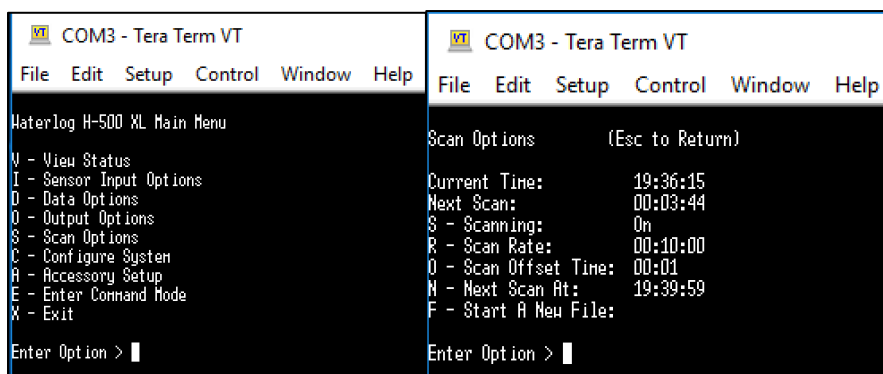


## 12. Setup the powers up delay (warm up delay) also show about offset time

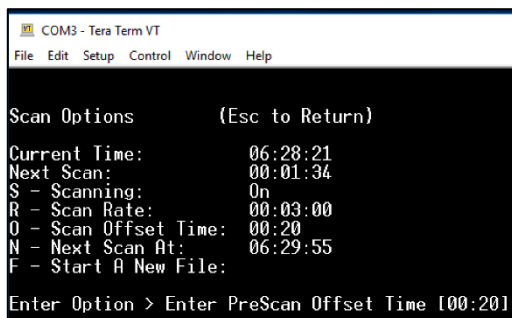
This delay allows time for the sensor to boot up and complete an optical clean (approximately twenty seconds is the average time). If power on the wipe condition is not selected, the warm up time may be reduced to four seconds. The logger has to input twenty seconds of scan offset delay time if the warm up time is set to twenty seconds.

### Using terminal

- In the main menu, select “Scan Options” by selecting “S”. Then, select “Scan Offset Time” by selecting “O”.



- Set the new “Scan Offset Time” to “20 seconds” and press “Enter”.

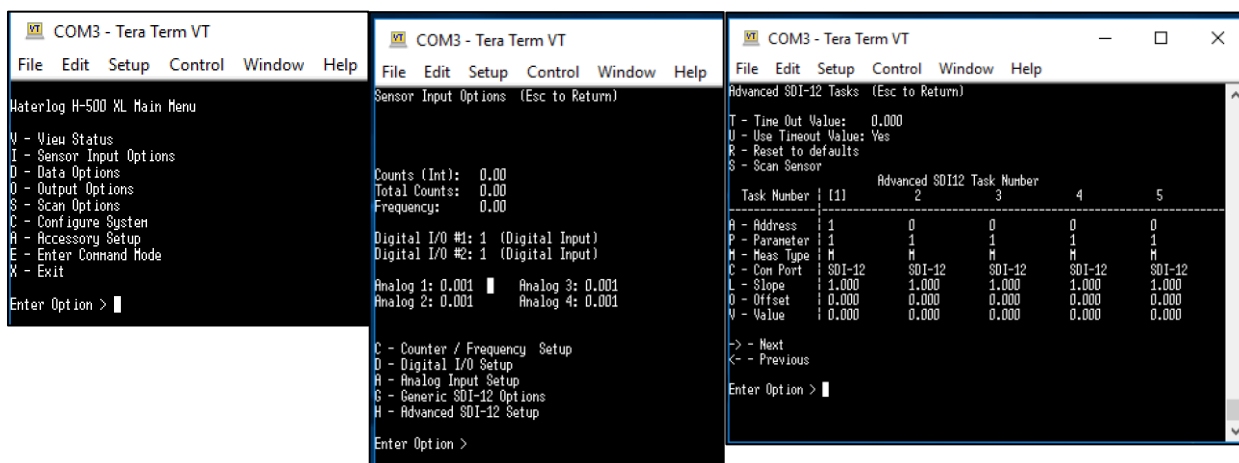


### 13. Setup the measurement information

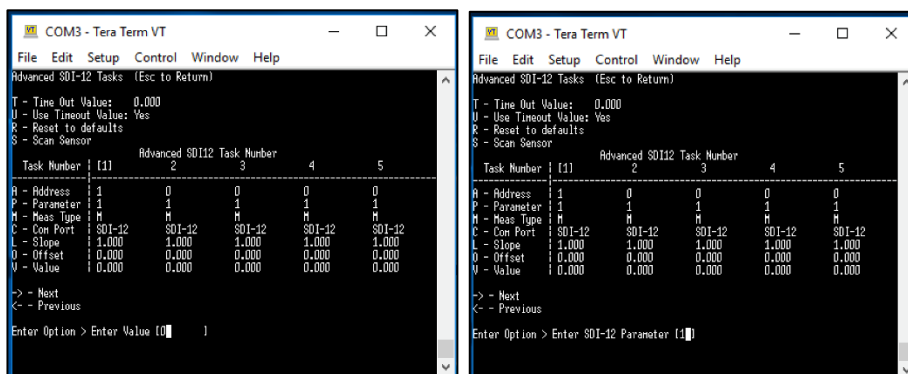
This shows how to setup the parameter number & name, SDI-12 address and SDI-12 measurement command (aM!) followed by data read command (aD0!).

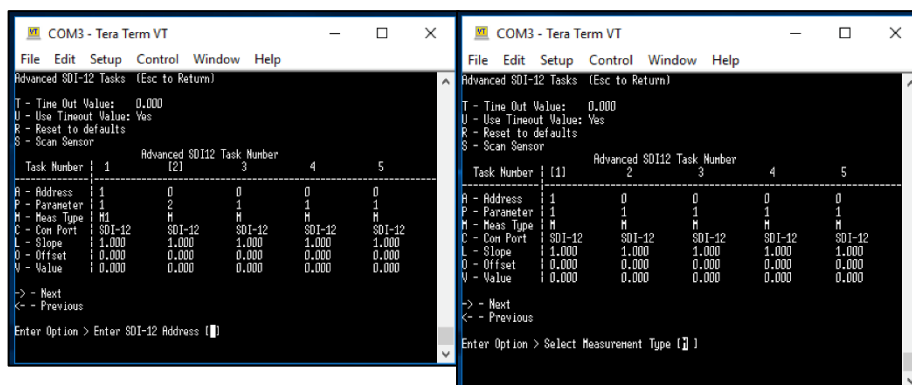
#### Using terminal

- In the main menu, select “Sensor Input Options” by selecting “I”, then, select “Advanced SDI-12 Setup” by selecting “H”.

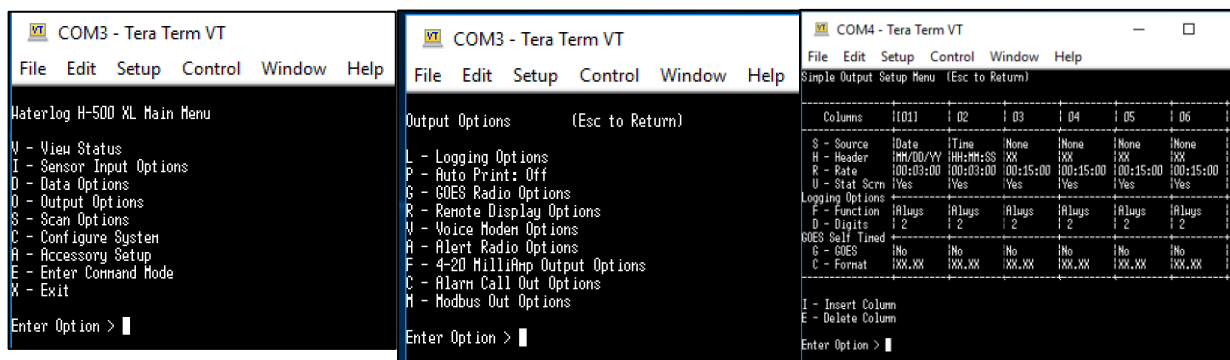


- Configure the following for task [1]:
  - Select “Value” by selecting “V”. Type the new “Value”: “0” and press “Enter”.
  - Select “Parameter” by selecting “P”. Type the new “Parameter”: “1” and press “Enter”.
  - Select “Address” by selecting “A”. Type the new “Address”: “1” and press “Enter”.
  - Select “Meas Type” by selecting “M”. Select the new “Measurement” type: “M” using the top/bottom keyboard arrows and Press “Enter”. The logger will automatically issue a D-command following a measurement.





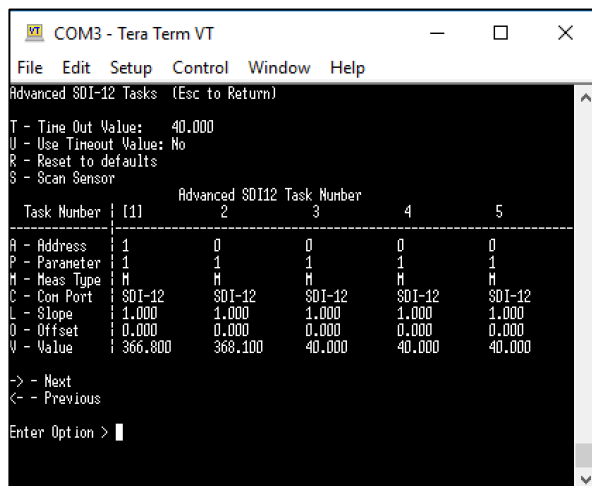
- To change the parameter name, in the main menu, select “Output Options” by selecting “O”, then, select “Logging Options” by selecting “L”.



- Use the arrows to select the column you wish to modify, then proceed as follow for each task name you wish to set up:
  - Select “Header” by typing “H”. Enter the new header name and press “Enter”.
  - Select “Source” by typing “S”. Use the arrows to select the task name and press “Enter”.
  - Select “Rate” by typing “R”. Use the arrows to type the scanning rate as defined in **Section 10**: “Logger setup for measurement interval”.

You have now completed the sensor setup in basic mode via terminal mode. Please run the setup and verify.

To verify your setup, return to the “Advanced SDI-12 Setup” and select “S” to scan the sensor. The turbidity value will be displayed in value 1.



#### Disclaimer:

The above setup and tests verify that the logger is capable of reading data from the NEP-5000 sensor.

Please refer to appropriate logging options and appropriate source options to evoke the above setup in automated manner or contact your logger company provider.

## 2.2 Reading of turbidity using auto-range or single feature after an optical wipe (recommended option)

### 2.2.1 Setting up your NEP-5000 family turbidity sensor for stable turbidity readings and allowing wiper control via SDI-12

This setup requires the user to have the following:

- NEP-5000 family sensor.
- NEP-5000 calibration module (calibration kit).  
Or request these settings during time of ordering.
- 12V DC power supply.
- NEP-5000 user manual.

### 2.2.2 Mode of operation

The logger powers up the sensor using one of its power control switches and waits for the sensor to boot up (takes approximately four seconds).

After the boot up delay has elapsed, the logger will send a SDI-12 wipe command (0M1!) followed by 16 seconds of wipe completion delay. Once the wipe completion delay has elapsed, the logger issues a measure command (aM!) followed by automatic read command (aD0!) to retrieve the newly measured turbidity value.

### 2.2.3 Use Personal Computer configuration software

The sensor configurations that is shown below requires users to connect to the sensor using its calibration software.

- Turbidity measuring range = Auto or desired single range.  
In calibration software under “Sensor Stage” > “Sensor calibration”
- Data acquisition time = 4 seconds or more if auto range is selected or two seconds when single range is selected.  
In calibration software under “Output Stage” > “SDI12 tab”.
- SDI12 address = 0 (default) or any desired address.

- Communication protocol of the sensor = SDI12.

**Range Calibration**

SET Operating Range  
☐ LOW NTU ☐ Medium NTU ☐ High NTU ☒ **Auto** Set

Range transition settings

| NTU  | To | NTU  | Use              |
|------|----|------|------------------|
| 0    | To | 97   | Use Low range    |
| 103  | To | 995  | Use Medium range |
| 1005 | To | 3000 | Use High range   |

Auto populate from calibration data

Auto-Range

↓

**OutPut Control**

Analog Update rate: 200 ☐ Analogue ☐ Freeflow Digital ☐ Polled Digital

COM Type: 3.6V\_Serial ☒ SDI12

Fixed Communication settings 1200,7,E,1

SDI12 Address: 0 accusation time

Start Measurement (aM) command data acquisition period: 10 Seconds

Use aDUI command to retrieve data.

**Range Calibration**

SET Operating Range  
☐ LOW NTU ☐ Medium NTU ☒ **High NTU** ☐ Auto Set

2 point calibration.

| ONTU (Input RAW) | TopEnd NTU (Input RAW) | TopEnd NTU Value |
|------------------|------------------------|------------------|
| 156              | 3540                   | 3000             |

☐ 3rd calibration or higher point calibrations

Single Range

↓

**OutPut Control**

Analog Update rate: 200 ☐ Analogue ☐ Freeflow Digital ☐ Polled Digital

COM Type: 3.6V\_Serial ☒ SDI12

Fixed Communication settings 1200,7,E,1

SDI12 Address: 0 accusation time

Start Measurement (aM) command data acquisition period: 10 Seconds

Use aDUI command to retrieve data.

OR

- Wiper operation set not (untick) to power on wipe. In calibration software under "Wiper Control".

General | Sensor Stage | OutPut Stage | **Wiper Control** | Internal\_Sensors

**Wiping mode Set**

Basic Motor Controls

Single\_direction\_Wipe SET

Wiper Timeout: 10

☐ **Wipe On PowerUp**

Wiping Options

Wiper Option OR Autowipe(in seconds 60000max): OFF

Power On Raw Output(Analoge out)  
 Analoge RAW out value during sensor startup.  
 0



## 2.2.4 Setup/configuring information for logger H-522+ & H-500XL

The logger can be configured using the built-in key pad or the terminal commands. Please select the most appropriate option for your preference.


- Section 1 to 6 shows how to program using the built-in key pad.
- Section 7 to 13 shows how to program using the terminal menu.

### 1. Reset the logger

This section describes how to reset the logger to its default factory calibration setup. Doing so will remove all other previous SDI-12 instructions in the logger.

#### Using keypad

- In the main menu, select “Sensor Input Setup” by pressing on the right arrow.

A black rectangular screen with a blue border. The text "Sensor Input Setup" is displayed in green, followed by a green right-pointing arrow "->".

- Press on the bottom arrow until you reach the “SDI-12 Task Option” menu. Then use the right arrow to “Enter”.

A black rectangular screen with a blue border. The text "SDI-12 Task Option" is displayed in green, followed by a green right-pointing arrow "->".A black rectangular screen with a blue border. The text "SDI-12 Tasks Table" is displayed in green, followed by a green right-pointing arrow "->".

- Press on the bottom arrow until you reach the “Reset to Defaults” function, then select “Enter” to Reset the tasks to factory default.

A black rectangular screen with a blue border. The text "Reset to Defaults" is displayed in green.A black rectangular screen with a blue border. The text "Enter" is displayed in green.

## 2. System setup after logger reset

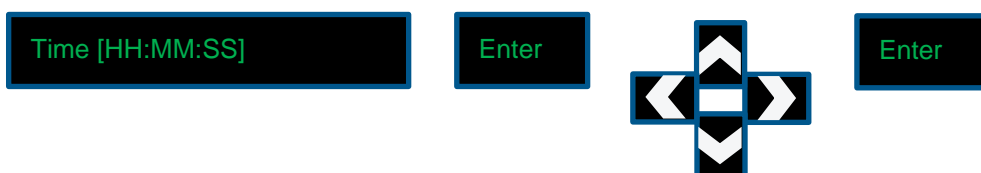
This section describes how to setup the basic system configuration of the logger.

### Using keypad

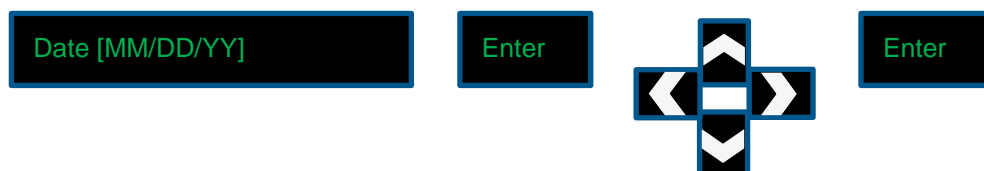
- In the main menu, select “System Setup” by pressing on the right arrow.



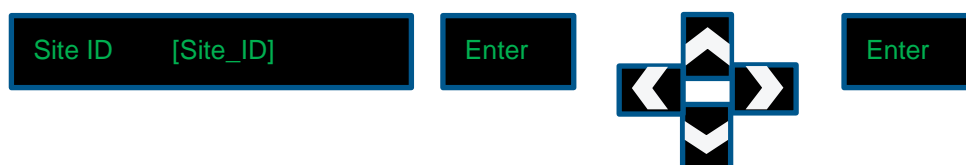
- In “Time”, press “Enter” and use the arrows to modify the time & press “Enter”.



- Press on the bottom arrow until you reach the “Date” menu. Press “Enter” and use the arrows to modify the date & press “Enter”.



- Press on the bottom arrow until you reach the “Site ID” menu, press “Enter” and use the arrows to modify the site ID number & press “Enter”.



### 3. Logger setup for measurement interval

This section describes how to set up the scanning interval/measurement interval of the logger.

#### Using keypad

- In the main menu, select “Scan Setup” by pressing on the right arrow.



- Enable the “Scanning” to “On” by pressing on “Enter”, use the arrows and “Enter”.



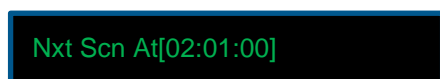
- Press on the bottom arrow until you reach the “Scan Rate” menu. Press “Enter” and use the arrows to modify the scanning interval to 10 minutes and press “Enter”.



**Note 1:** The user should not select a scanning interval of less than five minutes, otherwise it does not leave enough time to change the value manually using the keypad.

**Note 2:** Please pay attention to your SDI-12 full operation cycle when selecting the scan rate. If the scan rate is less than the full operation cycle, the logger may display intermittent behaviours.

- You can now check when the next scan will occur by pressing on the bottom arrow until you reach the “Nxt Scan” menu.



#### 4. Setup sensor power control switch


This section describes how to use the logger's power control output to shut down the sensor during sleeping and power up during measurement/scanning times. This helps to conserve the power and helps to restart the sensor in event of failure (SDI-12 bus, wiper jam and etc...).

##### Using keypad

- In the main menu, select "System Setup" by pressing on the right arrow.

A black rectangular keypad display with a blue border. The text "System Setup" is on the left and a right-pointing arrow ">" is on the right, both in green.

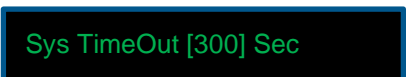
- Press on the bottom arrow until you reach the "Advanced Options" menu, then, select the right arrow, to enter in the advanced options menu.

A black rectangular keypad display with a blue border. The text "Advanced Options" is on the left and a right-pointing arrow ">" is on the right, both in green.

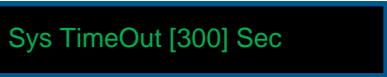
- Press on the bottom arrow until you reach the "AutoOff Enabled/Disabled" menu. Press "Enter" to enable it. This feature will cut the power to the sensor once the measurement is completed before the logger goes into sleep-mode.

Two black rectangular keypad displays with blue borders. The left display shows the word "Enter" in green. The right display shows the text "AutoOff Enabled" in green.

- Press on the top arrow until you reach the "Sys TimeOut" menu, press "Enter" and use the arrows to enter the time in seconds that you want to allocate before the logger goes into sleep-mode.

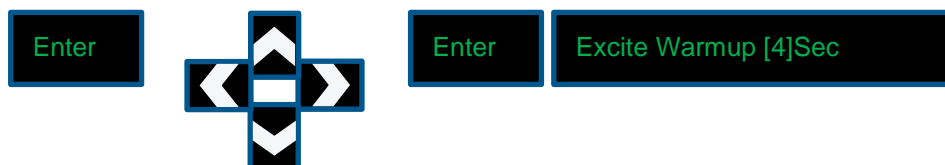
A black rectangular keypad display with a blue border. The text "Sys TimeOut [300] Sec" is in green.

- Press on the bottom arrow until you reach the "Excite Warmup [00]Sec" menu, press "Enter" and use the arrows to select four seconds and press "Enter". This delay forces the logger to wait for a minimum of four seconds allowing the sensor to boot up and complete its optical wipe operation.

A black rectangular keypad display with a blue border. The text "Sys TimeOut [300] Sec" is in green.

**Note:** This value should always be superior to one hundred seconds.

- Press on the bottom arrow until you reach the “Excite Warmup [00]Sec” menu, press “Enter” and use the arrows to select four seconds and press “Enter”. This delay forces the logger to wait for a minimum of four seconds allowing the sensor to boot up and complete its optical wipe operation.



- Press on the bottom arrow until you reach the “+12VX On” menu. Press “Enter” and use the arrows to select “At scan” and press “Enter”. This feature automatically turns on the sensor power prior to the scanning sequence. Also note that the “AutoOff” feature must be set in order to turn off the sensor once the scanning is complete.



#### 5. Setup the powers up delay (warm up delay) also show about offset time

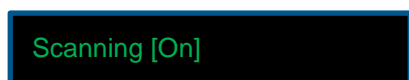
This delay allows time for the sensor to boot up and complete an optical clean (averaging about four seconds). If power on the wipe condition is not selected, the warm up time may be reduced to four seconds. The logger has to input four seconds of scan offset delay time if the warm up time is set to four seconds.

#### Using keypad

- In the main menu, select “Scan Setup” by pressing on the right arrow.



- Make sure the “Scanning” is “On” (if not, select “Enter”, “top arrow” and “Enter” again).



- Press on the bottom arrow until you reach the “Scan Offset Tm” menu. Press “Enter” and use the arrows to modify the Offset interval to four seconds in minute and seconds and press “Enter” to save the value.



## 6. Setup up the measurement information

This shows how to setup the parameter, the number, the name, SDI-12 address and SDI-12 measurement command (aM!) followed by data read command (aD0!).

Note: Setting up the output Functions require both terminal and keypad access. Please refer to **Section 13** "Setup the measurement information" and follow the procedure.

## 7. Login to the data logger using terminal program

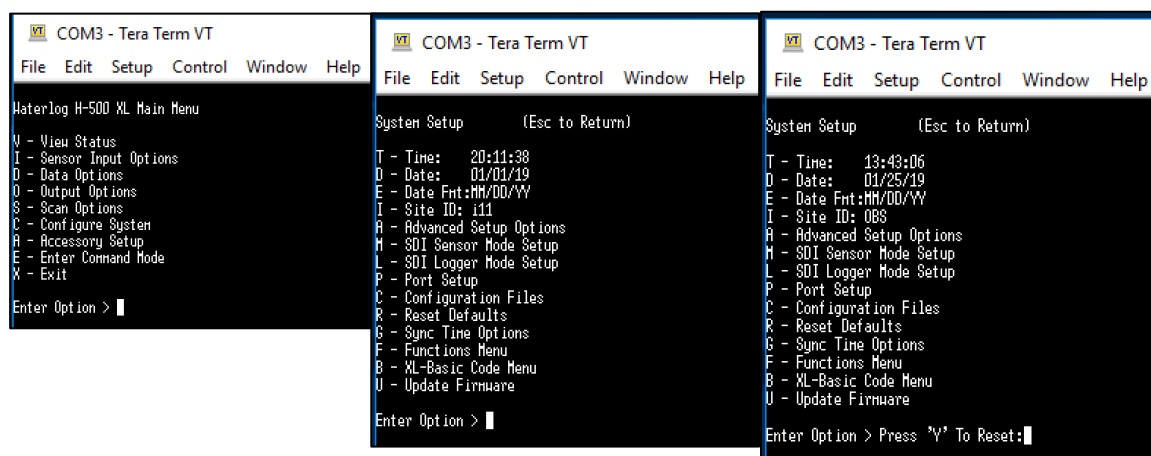
- Connect your probe to the data logger.
- Connect your computer to the data logger using the USB to RS232 cable.
- Download the "Tera Term" terminal program onto your Windows desktop.
- Launch "Tera Term" and select "Esc".

## 8. Reset the logger

This section describes how to reset the logger to its default factory calibration setup. Doing so will remove all other previous SDI-12 instructions in the logger.

### Using terminal

- In the main menu, select "Configure System" by selecting "C" then select "Reset Defaults" by selecting "R". Finally confirm your choice with "Y".



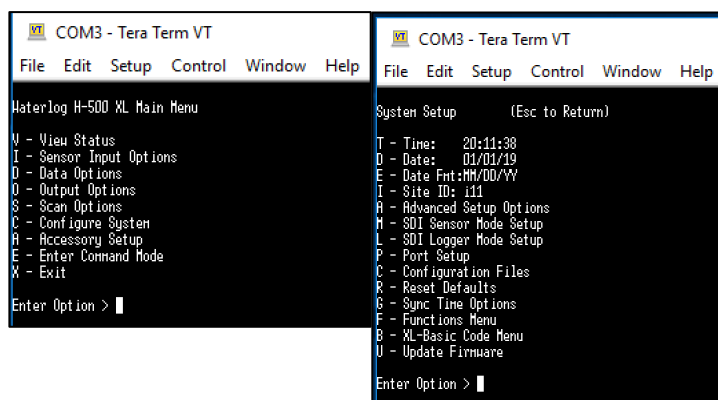
Note: Resetting to default will change the serial port back to RS-232-1.

## 9. System setup after logger reset

This section describes how to setup the basic system configuration of the logger.

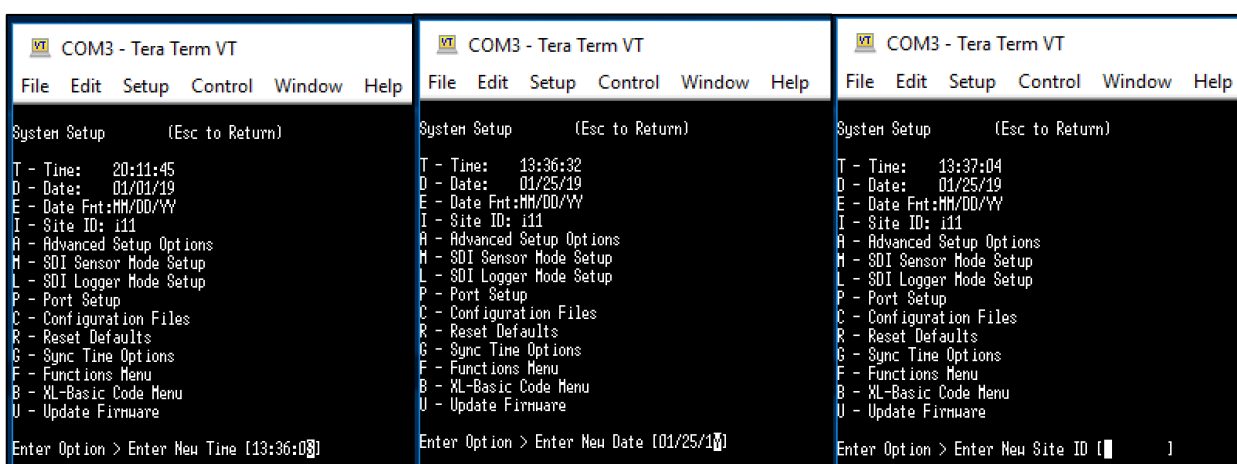
### Using terminal

- In the main menu, select “Configure System” by selecting “C”.



The first screenshot shows the 'Waterlog H-500 XL Main Menu' with options V (View Status), I (Sensor Input Options), D (Data Options), O (Output Options), S (Scan Options), C (Configure System), A (Accessory Setup), E (Enter Command Mode), and X (Exit). The second screenshot shows the 'System Setup (Esc to Return)' menu with options T (Time), D (Date), E (Date Fmt), I (Site ID), A (Advanced Setup Options), M (SDI Sensor Mode Setup), L (SDI Logger Mode Setup), P (Port Setup), C (Configuration Files), R (Reset Defaults), G (Sync Time Options), F (Functions Menu), B (XL-Basic Code Menu), and U (Update Firmware).

- Configure the following:
  - Configure the “Time” by selecting “T”, enter the “Time” and press “Enter”.
  - Configure the “Date” by selecting “D”, enter the “Date” and press “Enter”.
  - Configure the “Site ID” by selecting “I”, enter the “Site ID” and press “Enter”.



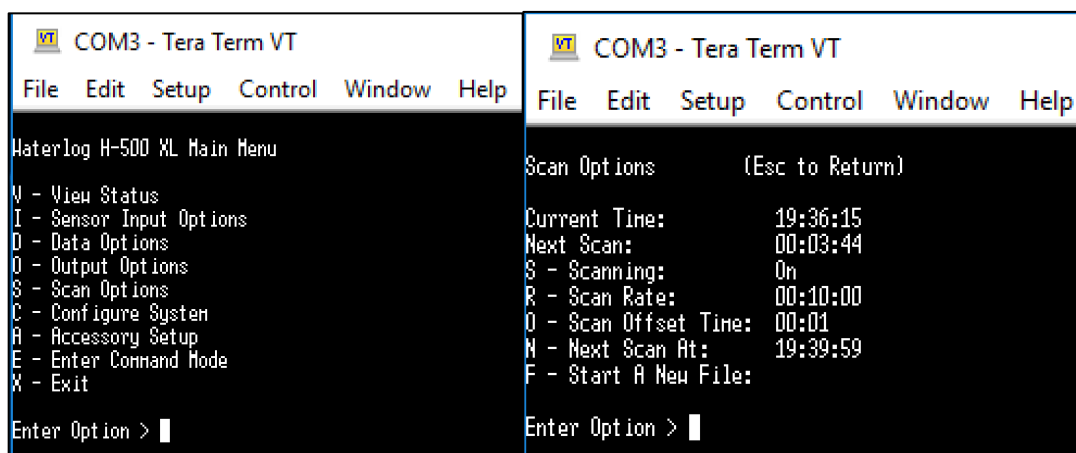
The three screenshots show the 'System Setup (Esc to Return)' menu. The first shows the current settings: T - Time: 20:11:45, D - Date: 01/01/19, E - Date Fmt: MM/DD/YY, I - Site ID: i11. The second shows the 'Enter New Time [13:36:08]' prompt. The third shows the 'Enter New Date [01/25/19]' prompt. The fourth shows the 'Enter New Site ID [ ]' prompt.

## 10. Logger setup for measurement interval

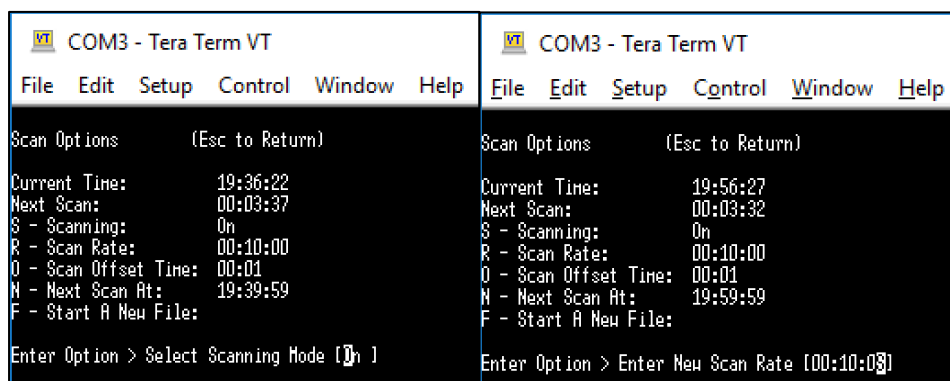
This section describes how to set up the scanning interval or measurement interval of the logger.

### Using terminal

- In the main menu, select “Scan Options” by selecting “S”.



- Configure the following:
  - Configure “Scanning” by selecting “S”. Enable the “Scanning” to “On” by using the top/bottom keyboard arrows and “Enter”.
  - Configure “Scan Rate” by selecting “R”. Type the new scanning interval of “10 minutes” and press “Enter”.



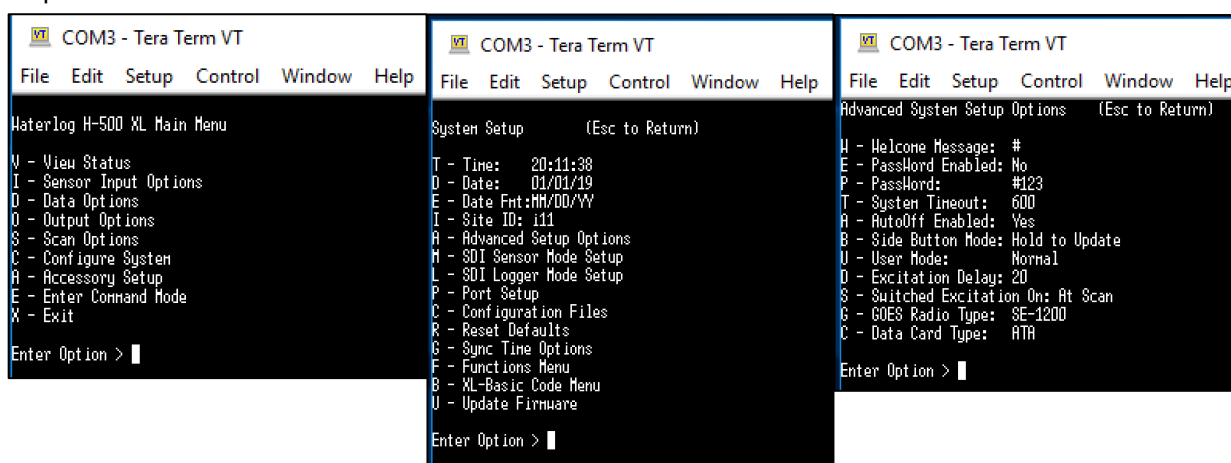


## 11. Setup sensor power control switch

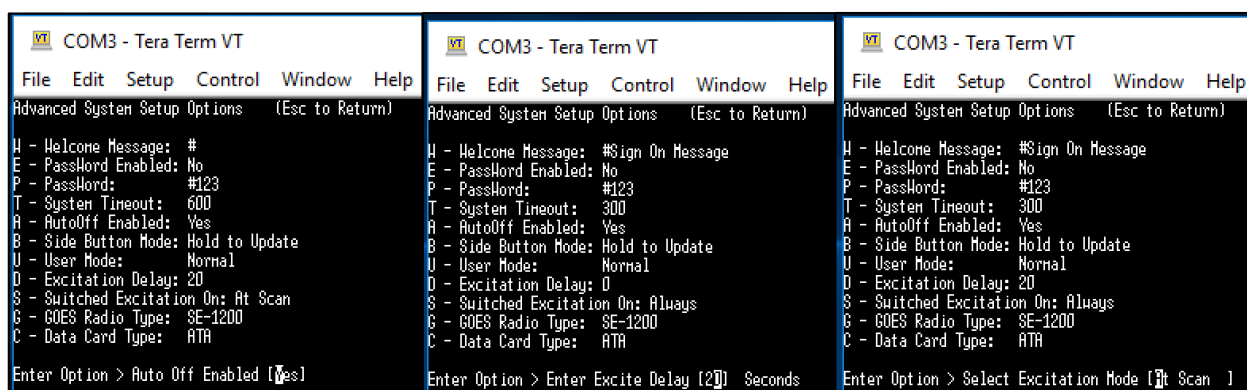
This section describes how to use the loggers power control output to shut down the sensor during sleeping and power up during measurement/scanning times. This helps to conserve the power and helps to restart the sensor in event of failure (SDI-12 bus, wiper jam and etc...).

### Using terminal

- In the main menu, select “Configure System” by selecting “C”, then, select “A” for “Advanced Setup Options”.



- Configure the following:
  - Configure “AutoOff Enabled” by selecting “A”. Enable the “Auto Off” to “Yes” by using the top/bottom keyboard arrows and “Enter”. This feature will cut the power to the sensor once the measurement is complete before the logger goes into sleep mode.
  - Configure “Excitation Delays” by selecting “D”. Enter “20” seconds excitation delay and press “Enter”. This delay forces the logger to wait for twenty seconds allowing the sensor to boot up and complete its optical wipe operation.
  - Configure “Switched Excitation On” by selecting “S”. Set the excitation “At scan” by using the top/bottom keyboard arrows and “Enter”. This feature automatically turns on the sensor power prior to the scanning sequence. Also note that the “AutoOff” feature must be set in order to turn off the sensor once the scanning is complete.

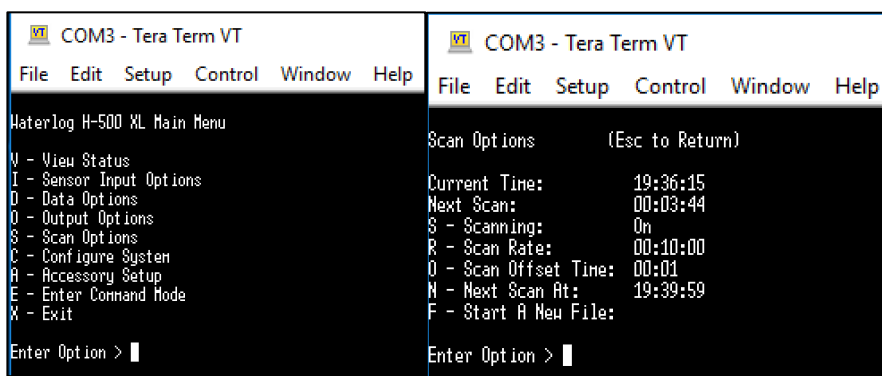


## 12. Setup the powers up delay (warm up delay) also show about offset time

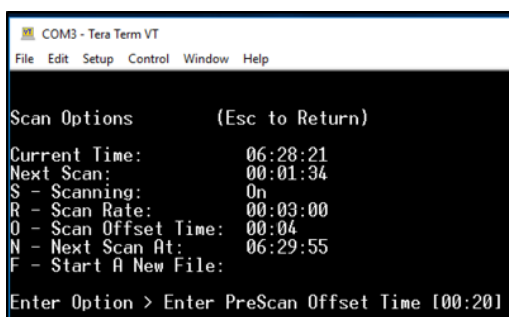
This delay allows time for the sensor to boot up and complete an optical clean (averaging about twenty seconds). If power on the wipe condition is not selected, the warm up time may be reduced to four seconds. The logger has to input twenty seconds of scan offset delay time if the warm up time is set to twenty seconds.

### Using terminal

- In the main menu, select “Scan Options” by selecting “S”. Then, select “Scan Offset Time” by selecting “O”.



- Set the new “Scan Offset Time” to “4 seconds” and press “Enter”.



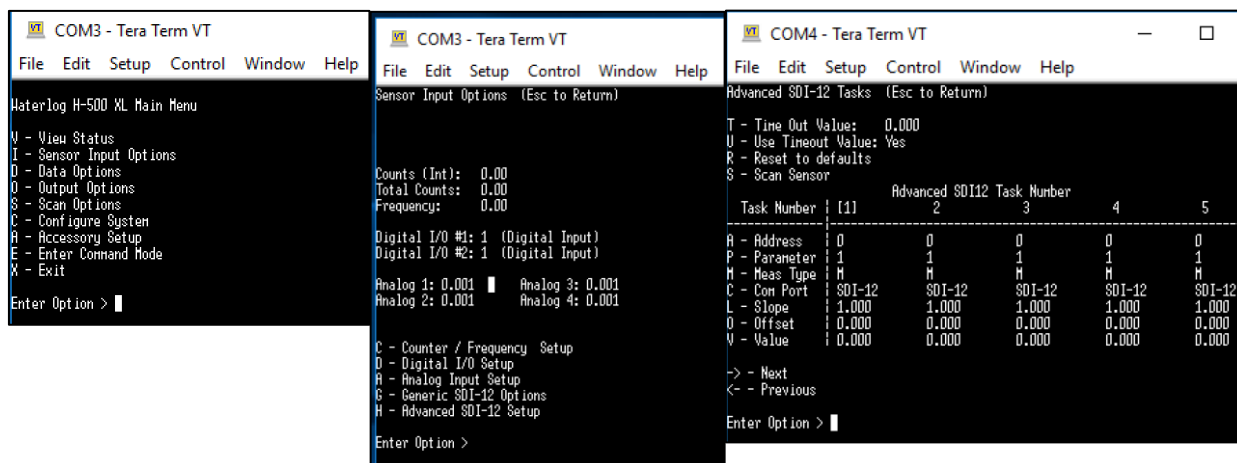
### 13. Setup the measurement information

This shows how to setup parameter number & name, SDI-12 address and SDI-12 measurement command (aM!) followed by data read command (aD0!).

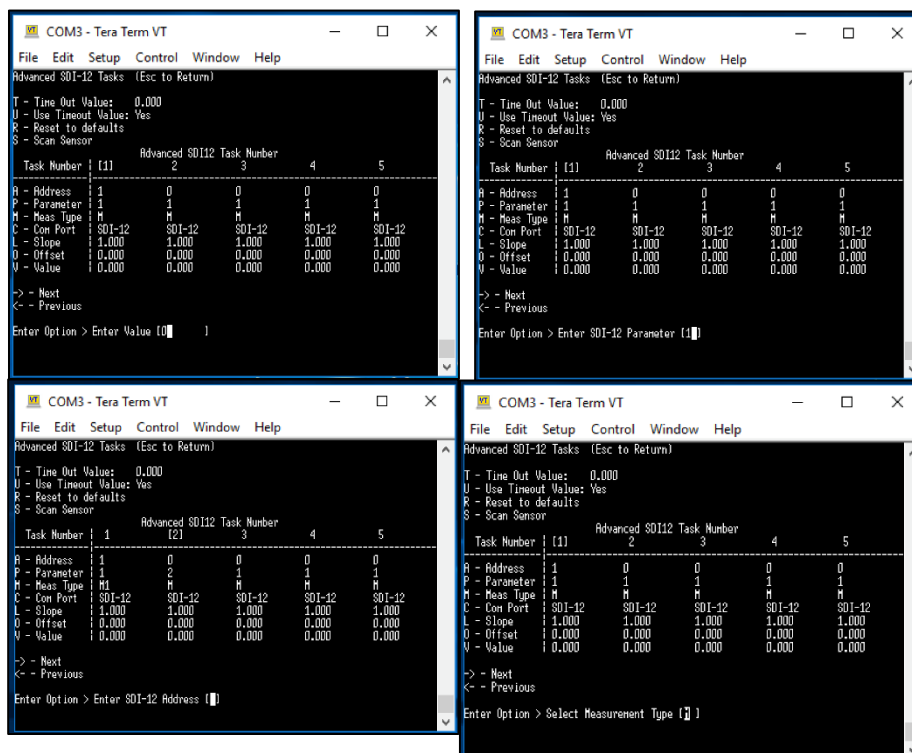
Note: Setting up the output functions require both terminal and keypad access.

#### Terminal section

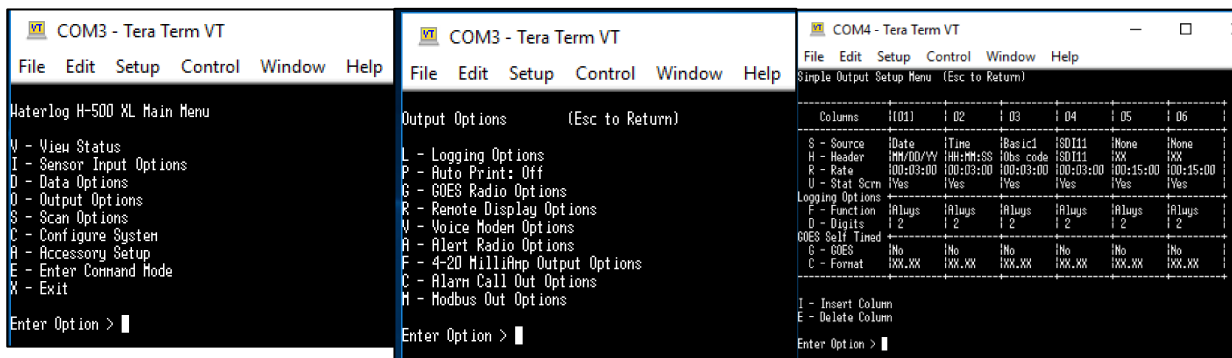
- In the main menu, select “Sensor Input Options” by selecting “I”, then, select “Advanced SDI-12 Setup” by selecting “H”.



- Configure the following for all tasks (we will load a Basic program instead of using the task table in this section):
  - Select “Value” by selecting “V”. Type the new “Value”: “0” and press “Enter”.
  - Select “Parameter” by selecting “P”. Type the new “Parameter”: “1” and press “Enter”.
  - Select “Address” by selecting “A”. Type the new “Address”: “0” and press “Enter”.
  - Select “Meas Type” by selecting “M”. Select the new “Measurement” type: “M” using the top/bottom keyboard arrows and press “Enter”.



- To change the parameter name, in the main menu, select “Output Options” by selecting “O”, then, select “Logging Options” by selecting “L”.



- Use the arrows to select the column you wish to modify, then proceed as follows for each task name you wish to set up:
  - Select “Header” by selecting “H”. Enter the new header name and press “Enter”.
  - Select “Source” by selecting “S”. Use the arrows to select the task name and press “Enter”.
  - Select “Rate” by typing “R”. Use the arrows to type the scanning rate as defined in **Section 10** “Logger setup for measurement interval”.

Output function may be entered as follows to load the Basic program 1 performing a single wipe every three minutes followed by a measurement reading:

|            | [01]     | 02       | 03          | 04              |
|------------|----------|----------|-------------|-----------------|
| S - Source | Date     | Time     | Basic1      | SDI11           |
| H - Header | MM/DD/YY | HH:MM:SS | "Code name" | Turbidity value |
| R - Rate   | 00:03:00 | 00:03:00 | 00:03:00    | 00:03:00        |

### Keypad section

Follow the following instruction to load the basic program to issue a wipe command followed by a measurement.

- Download the "[Wipe.bas](#)" file from the link.
- Copy "[Wipe.bas](#)" file onto an empty USB key (format the key as necessary).
- Plug the USB key onto your logger.
- In the logger main menu, select "System Setup" by pressing on the right arrow.

System Setup ->

- Press on the bottom arrow until you reach the "XL-Basic Options" menu, then, select the right arrow, to enter in the "XL-Basic Options".

XL-Basic Options ->

- Press on the bottom arrow until you reach the "Load From USB Drive?" menu, then, select "Enter".

Load From USB Drive? ->

Enter

- Press "Enter" to erase current programs.

Erase Current Pgms?

Enter

- Press the bottom arrow to select the "Wipe.bas" for program 1.

File = Wipe.bas

Enter

- Wait and press “Enter” for program 2-5. The program will warm up and start scanning. You should hear the sensor performing a wipe.

Warming Up 5 ...

Scanning ...

You have now completed the sensor setup, please wait until the system has performed a few scans, then check the turbidity value in your data file to verify that the turbidity value was logged properly on a normal scan rate basis.

```
COM4 - Tera Term VT
File Edit Setup Control Window Help
View Last 15 Lines Of Current Data File... Please Wait...
02/13/19 17:24:00 0.00 403.35
Press Any Key To Continue
```

You can also use an “SDI-12 Verifier” to check the commands are running properly:

The screenshot shows the SDI-12 Verifier (Monitor) interface with a menu bar (File, Configure, Mode, Transmit, Sensors, Hardware, Stop, Help) and a log of data. Two red arrows point from text boxes to specific lines in the log:

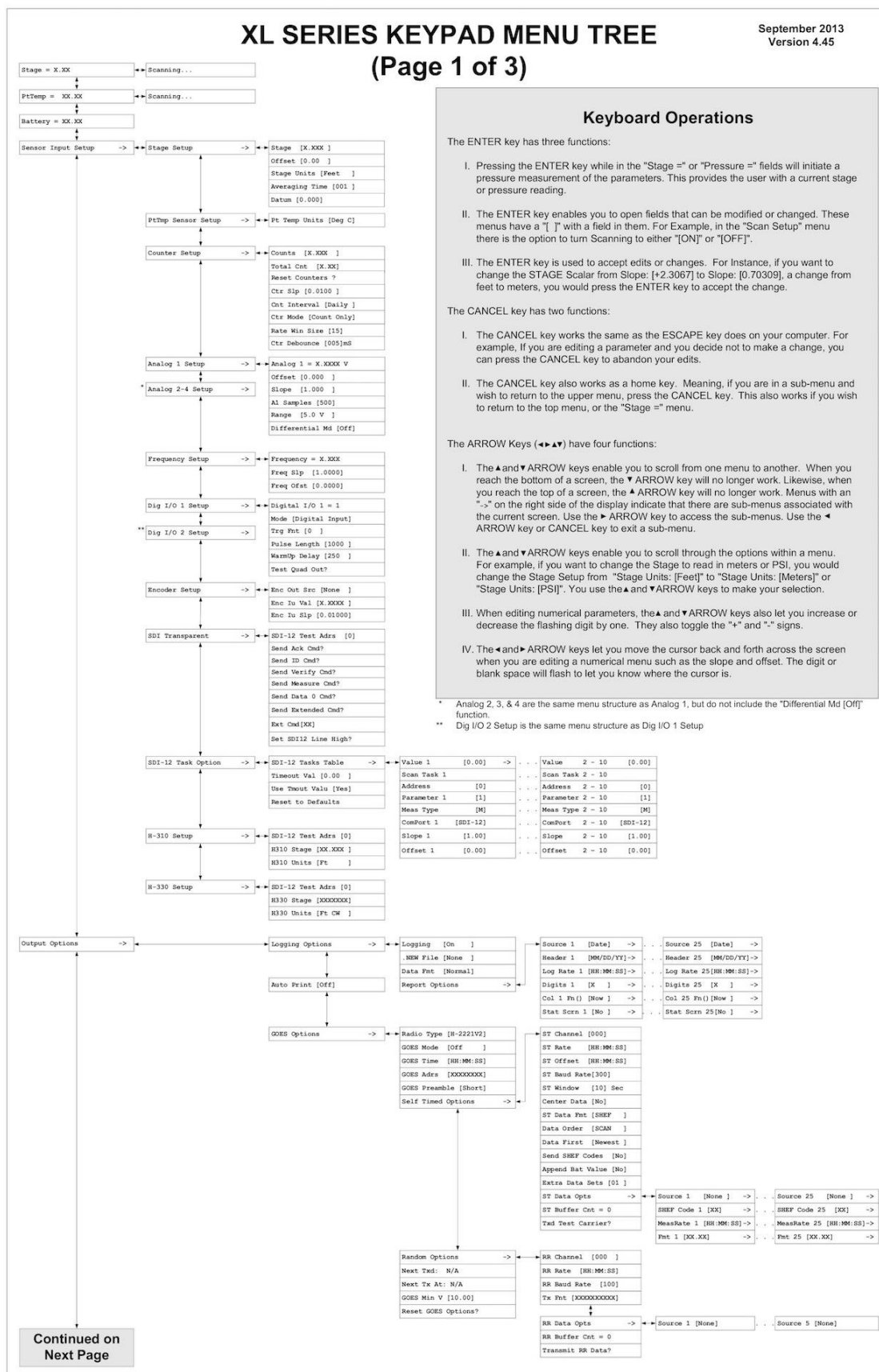
- The first arrow points to the line: `17:48:16 break: 15.5 ms 00:00:00.010 ID0!1+404.31`, with a corresponding text box stating "Turbidity value = 404.31".
- The second arrow points to the line: `17:51:16 break: 15.5 ms 00:00:00.010 ID0!1+403.81`, with a corresponding text box stating "Turbidity value = 403.81".

### 3 Appendix A: Logger commands

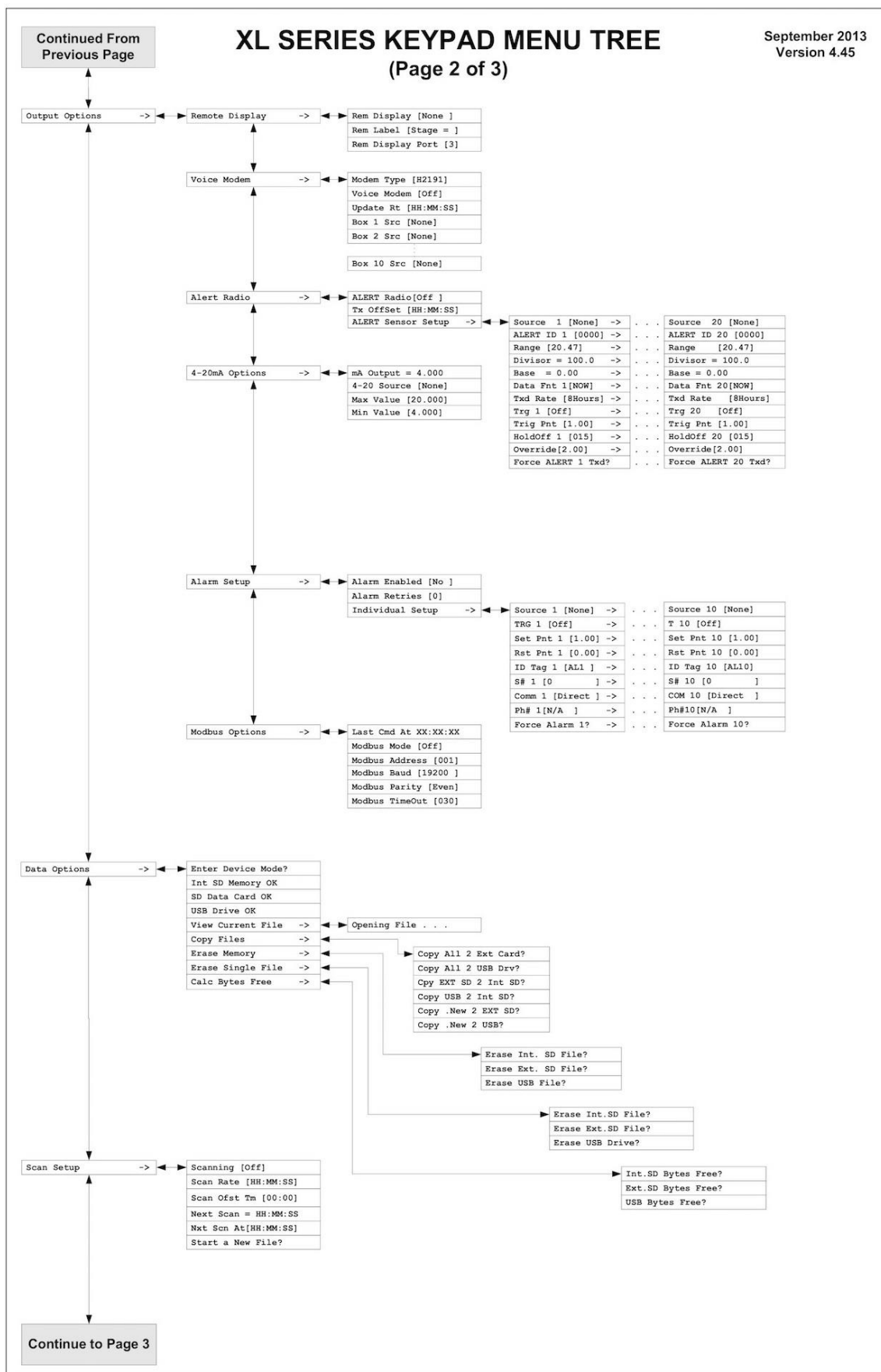
Here is a non-exhaustive list of command to be used for SDI-12:

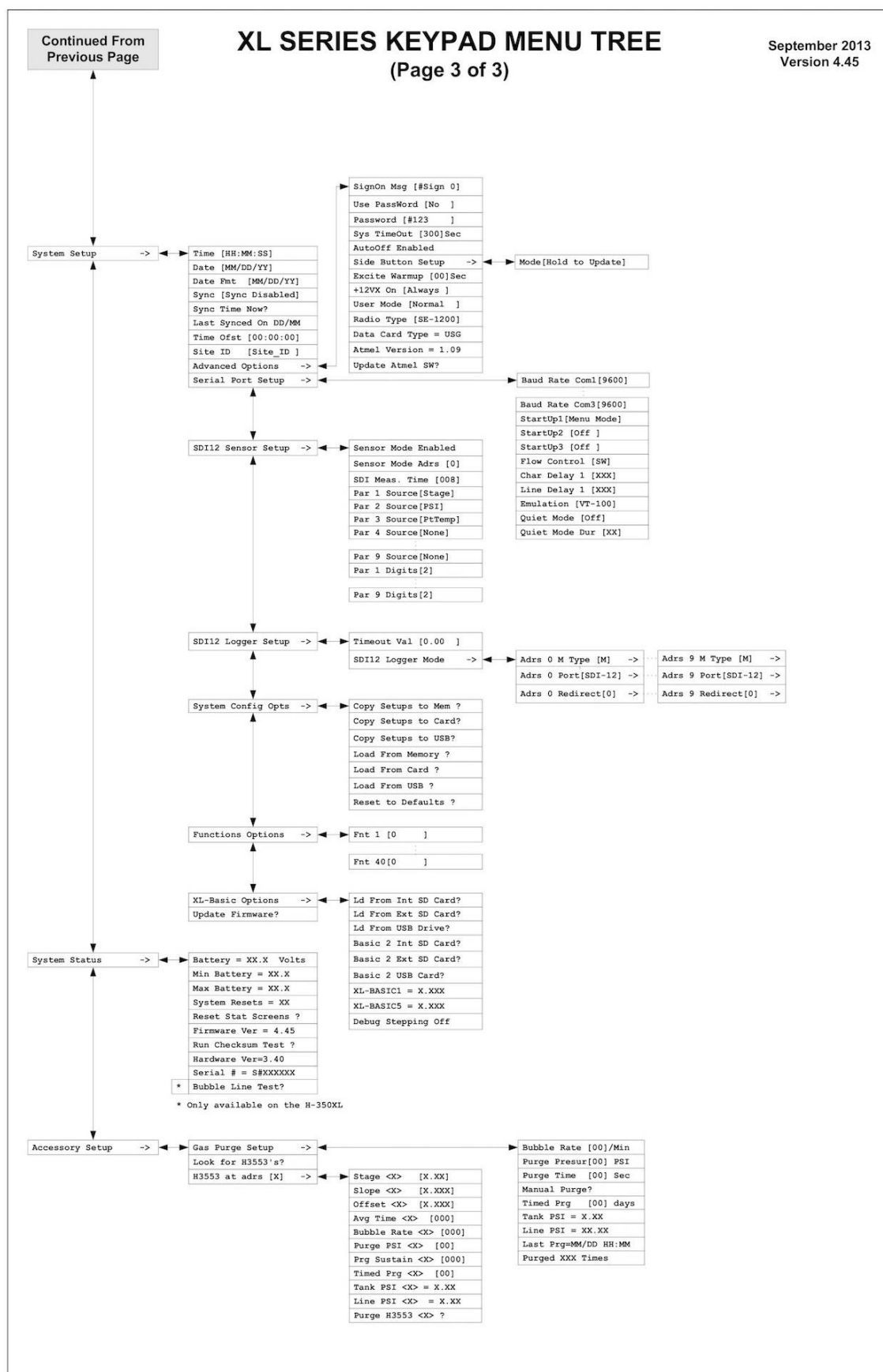
| Commande | Function   | Return   |
|----------|--|--|
| aM!      | Start measurement  | 20011<CR><LF> aM! atttn<CR><LF>  |
| aM1!     | ***Wipe command***<br><br>Wipe action will be completed in 16s | a0161<CR><LF> Eg- 20161<CR><LF>  |
| aM2!     | High range<br>(5,000NTU)                                       | a0010<CR><LF>  |
| aM3!     | Medium range<br>(400NTU)                                       | a0010<CR><LF>  |
| aM4!     | Low range (40NTU)  | a0010<CR><LF>  |
| aM5!     | Auto range   | a0001<CR><LF>  |
| aM6!     | Start statistical measurement                                  | 20066<CR><LF> aM6! atttn<CR><LF>   |
| aD0!     | ***Single measurement read***<br>Send data command             | a+NTU<CR><LF>  |
| aD1!     | **** Full statistical measurement read****                     | a+TT.TT+MMMM.MM+AAAA.AA+LLLL.LL+SSSS.SS<CR><LF><br>Eg- 1+23.58+714.53+714.52+714.24+714.85<CR><LF> |

## 4 Appendix B: Logger keypad menu tree









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