■ SIMPLE LOGGER®
  DC MODULE

L320
L410
L430

ENGLISH   **User Manual**

AEMC®
INSTRUMENTS

Owner's Record

The serial number for the Models L320, L410 and L430 is located on the side of the case. Please record this number and purchase date for your records.

SIMPLE LOGGER DC MODULE

MODEL #: _____

SERIAL #: _____

PURCHASE DATE: _____

DISTRIBUTOR: _____

Table of Contents

** <u>IMPORTANT NOTICE BEFORE OPERATING</u> **

A scale must be set prior to saving
a downloaded DC Logger file
for the logger to function correctly

To create scales with the Logger connected:

The first time a DC logger is used with a fresh install of the Simple Logger software a scale must be set for each different DC logger model. Once a scale is set for a specific model, the software will default to this scale each time that model is connected. To set a scale for the model in use, connect the logger and a <u>Scale</u> menu will appear. Click on <u>Scale</u> and the scaling window for the model used will appear. From the scaling window you may set a custom scale or open a predefined scale from the <u>File-Open</u> menu. The predefined scale is in the directory for the Simple Logger software.

To create scales without the Logger connected:

Go to <u>Scaling</u> from the <u>File</u> menu and select the range for the model used. From the scaling window you may create a custom scale and save it using the <u>File-Save</u> Command. The predefined scales are saved in the directory for the Simple Logger software.

A scale may be set prior to or after downloading, but before saving.

INTRODUCTION

⚠ **WARNING** ⚠

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Read the instruction manual completely and follow all safety information before operating this instrument.
- Use caution on any circuit: Potentially high voltages and currents may be present and may pose a shock hazard.
- Read the specifications section prior to using the data logger. Never exceed the maximum voltage ratings given.
- Safety is the responsibility of the operator.
- For maintenance, use only original replacement parts.
- NEVER open the back of the instrument while connected to any circuit or input.
- ALWAYS connect the leads to the logger before inserting the leads to the test voltage
- ALWAYS inspect the instrument and leads prior to use. Replace any defective parts immediately.
- NEVER use the Simple Logger® Models L320, L410, L430 on electrical conductors rated above 600V Cat. III.

1.1   International Electrical Symbols

This symbol signifies that the instrument is protected by double or reinforced insulation. Use only specified replacement parts when servicing the instrument.

This symbol on the instrument indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument. In this manual, the symbol preceding instructions indicates that if the instructions are not followed, bodily injury, installation/sample and product damage may result.

Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.

1.2   Definition of Measurement Categories

Cat. IV: For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

Cat. III: For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.

Cat. II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

1.3   Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.4   Ordering Information

Simple Logger® Model L320 - DC Current
(4 to 20mA Input)... **Cat. #2113.97**

Simple Logger® Model L410 - DC Voltage
(0 to 100mVDC Input)... **Cat. #2114.05**

Simple Logger® Model L430 - DC Voltage
(0 to 10VDC Input).. **Cat. #2114.07**

All DC Simple Loggers® are supplied with software (CD-ROM), 6 ft DB-9 RS-232 serial cable, 9V Alkaline battery and user manual.

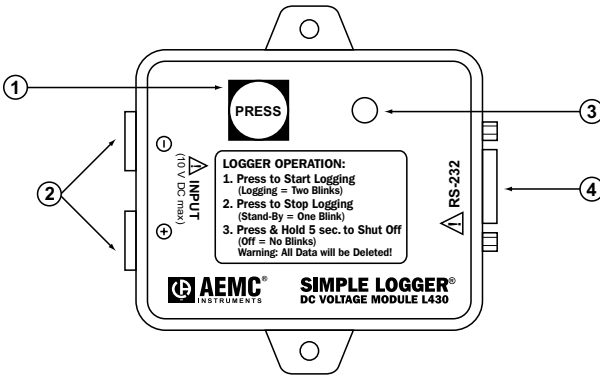### 1.4.1   Accessories and Replacement Parts

Two 5 ft Voltage Leads with Clips....................................... **Cat. #2118.51**

Order Accessories and Replacement Parts Directly Online
*Check our Storefront at **www.aemc.com** for availability*

PRODUCT FEATURES

Models L410 and L430:

(1) Start/Stop Button   (3) Red LED Indicator

(2) Input Safety Plugs   (4) RS-232 Interface

Model L320:
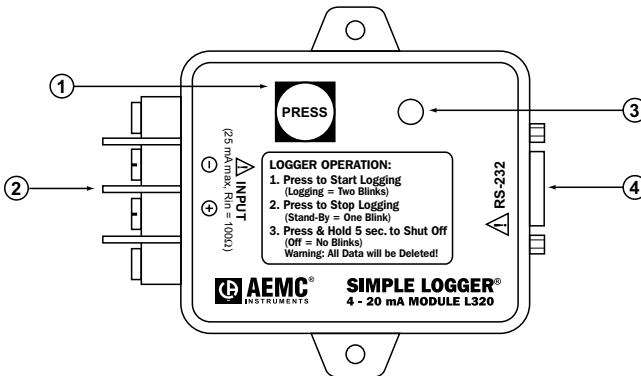
(1) Start/Stop Button   (3) Red LED Indicator

(2) Input Terminal Strip   (4) RS-232 Interface

2.1   Indicators and Buttons

The Simple Logger® has one button and one indicator. Both are located on the front panel. The PRESS button is used to start and stop recordings and to turn the logger on and off.

The Red LED indicates the status of the logger:

- **Single Blink:**   STAND-BY mode
- **Double Blink:**   RECORD mode
- **Continuously On:** OVERLOAD condition
- **No Blinks:**   OFF mode

2.2   Inputs and Outputs

The left side of the Simple Logger® incorporates 4mm safety banana jacks for the Models L410 and L430 and a screw connector for the Model L320.

The right side of the logger has a female 9-pin "D" shell serial connector used for data transmission from the logger to your computer.

2.3   Mounting

Your Simple Logger® is equipped with clearance holes in the base plate tabs for mounting. For less permanent mounting, the Velcro® pads (supplied loose) can be attached to the logger and the surface to which the logger will be mounted.

SPECIFICATIONS

3.1   Electrical Specifications

Number of Channels: 1

Measurement Range: L320: 0 to 25mA_{DC}
                       L410: 0 to 100mV_{DC}
                       L430: 0 to 10V_{DC}

Input Connection: L320: two post screw terminal strip
                        L410 and L430: recessed safety banana jacks

Input Impedance: L320: 100Ω
                        L410 and L430: 1MΩ

L320: 8 Bit (12.5µA min resolution)

Scale Range	Maximum Input	Resolution
100%	25.5mA	0.1mA
50%	12.75mA	0.05mA
25%	6.375mA	0.025mA
12.5%	3.1875mA	0.0125mA

L410: 8 Bit (50µV min resolution)

Scale Range	Maximum Input	Resolution
100%	102mV	0.4mV
50%	51mV	0.2mV
25%	25.5mV	0.1mV
12.5%	12.75mV	0.05mV

L430: 8 Bit (5mV min resolution)

Scale Range	Maximum Input	Resolution
100%	10.2V	40mV
50%	5.1V	20mV
25%	2.55V	10mV
12.5%	1.275V	5mV

Reference condition: 23°C ± 3K, 20 to 70% RH, Frequency 50/60Hz, No AC external magnetic field, DC magnetic field ≤ 40A/m, battery voltage 9V ± 10%.

Accuracy: 1% ± 2cts

Sample Rate: 4096/hr max; decreases by 50% each time memory is full

Data Storage: 8192 readings

Data Storage Technique: TXR™ Time Extension Recording™

Power: 9V Alkaline NEDA 1604, 6LF22, 6LR61

Battery Life Recording: Up to 1 year recording @ 77°F (25°C)

Output: RS-232 via DB9 connector (1200 Baud)

3.2   Mechanical Specifications

Size: 2-7/8 x 2-5/16 x 1-5/8" (73 x 59 x 41mm)

Weight (with battery): 5 oz (140g)

Mounting: Base plate mounting holes or Velcro® pads

Case Material: Polystyrene UL V0

3.3   Environmental Specifications

Operating Temperature: -4 to 158°F (-20 to 70°C)

Storage Temperature: -4 to 176°F (-20 to 80°C)

Relative Humidity: 5 to 95% non-condensing

3.4   Safety Specifications

$C\,\epsilon$

Working Voltage: EN 61010, 30V Cat. III

*All specifications are subject to change without notice

OPERATION

4.1   Software Installation

Minimum Computer Requirements
- Windows® 7, 8, 8.1, 10
- Processor - 486 or higher
- 8MB of RAM
- 8MB of hard disk space for application, 400K for each stored file
- One 9-pin serial port; one parallel port for printer support
- CD-ROM drive

1.   Insert the Simple Logger® CD into your CD-ROM drive.

If auto-run is enabled, the Setup program will start automatically. If auto-run is not enabled, select Run from the Start menu and type in **D:\SETUP** (if your CD-ROM drive is drive D. If this is not the case, substitute the appropriate drive letter).
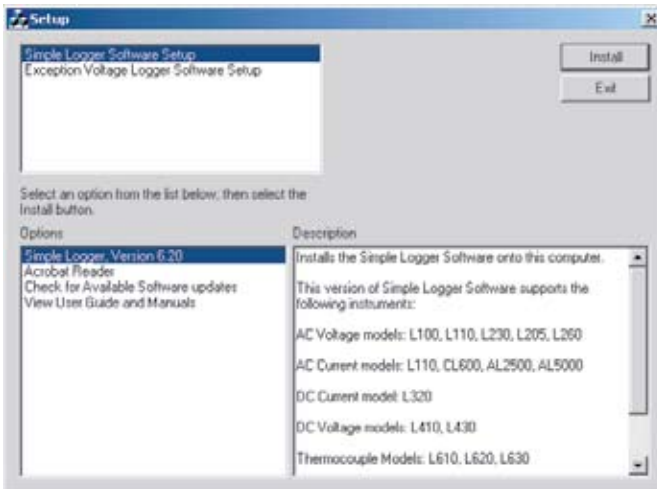
2.   The **Set-up** window will appear.

Figure 1

There are a several options to choose from. Some options(*****) require an internet connection.

- **Simple Logger, Version 6.xx** - Installs the Simple Logger® software to the computer.

- *****Acrobat Reader** - Links to the Adobe® web site to download the most recent version of Adobe® Acrobat Reader. *Acrobat Reader is required for viewing PDF documents supplied on the CD-ROM.*

- *****Check for Available Software Updates** - Opens the AEMC Software update web site, where updated software versions are available for downloading, if necessary.

- **View User Guide and Manuals** - Opens Windows® Explorer for viewing of documentation files.

3. To install the software, select **Simple Logger Software Setup** in the top section of the Set-up window, then select **Simple Logger, Version 6.xx** in the Options section.

4. Click the **Install** button and follow the on-screen prompts to install the software.

4.2   Recording Data

- Connect the logger to the circuit to be tested.
  NOTE: Be sure to **observe the polarity** or you may not get a reading.

- Press the **PRESS** button on the top of the logger to begin the recording session. The LED indicator will double-blink to indicate that the recording session has started.

- When the desired recording session has finished, press the **PRESS** button to end the recording. The LED indicator will single-blink to indicate the recording session has ended and the logger is in Stand-by.

- Remove the logger from the circuit under test and transport it to the computer for data downloading. See the User Guide on the CD-ROM for downloading instructions.

4.3   Using the Software

Launch the software and connect the RS-232 cable from your computer to the logger.

NOTE: A language will need to be selected upon the first launch.

Select *Port* from the menu bar and select the Com port (COM 1, 2 3 or 4) you will be using (see your computer manual). Once the software automatically detects the baud rate, the logger will communicate with the computer. (ID number of the logger and number of points recorded displayed).

Select *Download* to display the graph. (Takes about 90 seconds.)

Select *File* from the menu bar, then Scaling and the Range of your logger.

4.3.1   Scale and Engineering Unit Programming

The Simple Logger® Models L320, L410, and L430 allow the operator to program the values for scale and engineering units from within the software.

This permits the user to display the recorded data on the graph or in the tabular listing directly, in the units appropriate to the measurement, rather than mathematically converting a voltage or a current to the proper scale and value after the graph is displayed.

Scales can be programmed from two locations in the software:

• *File* **menu option:** Use this option to create a library of scales to use with DC voltage and DC current loggers. This will allow the user to select a number of predefined scales.

• *Scale* **menu option:** Use this option to create scales for loggers connected to the serial port for downloading.

The Simple Logger® software allows the operator to define up to 17 points along the scale for DC current measurement and up to 11 points for DC voltage measurement type loggers.

Any combination of points may be used to create the scale, which allows the user to plot both linear and non-linear data. (See Figures 2 and 3).
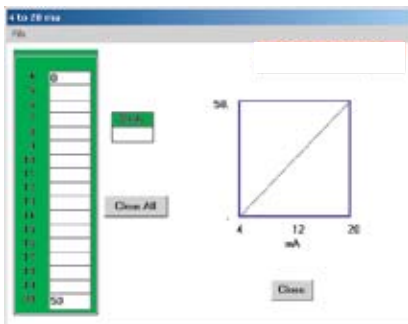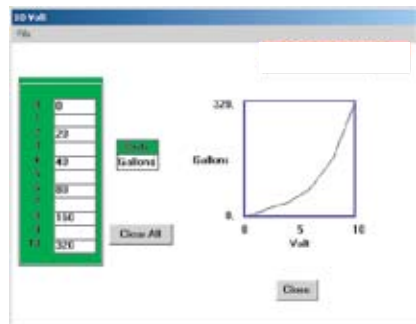

Figure 2   Figure 3

4.3.2   Creating a Library of Scales

- Select **File** and then **Scaling** from the main menu.

- Select the type of logger to be scaled from the choices presented.

- A window similar to Figure 4 will appear as soon as you make your selection. This window shows the programmable scale points and the programmable units field. The left screen provides the scale and unit programming, while the right side displays the profile of the pro-grammed scale in relationship to the actual input to the logger.
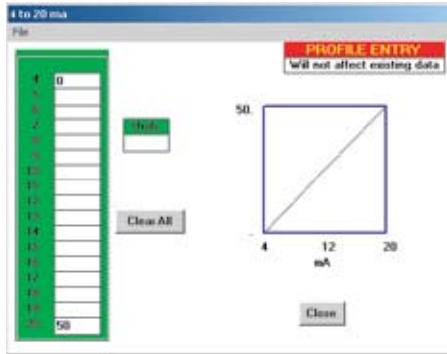

Figure 4

Scale values entered here will not effect the current graph, should one be on the screen. This window is strictly for creating templates to be used at a later date with newly downloaded loggers.

Creating and storing the scales and units here will save you time later on, especially for frequently used scale settings.

Two buttons are available from within this window:

- **Clear All button:** This will clear all scale numbers entered and any units entered allowing you the opportunity to start over again.

- **Close button:** Returns to the main menu without saving the data.

Perform the following steps to create a Template:

- Click in any of the blank slots and type in a number (up to 5 characters) to enter a scale value. The minus sign and decimal point can be used as valid characters (e.g. -10.0 would be a valid 5 character number).

   As you enter numeric data in the scale slots, the scale profile will appear on the small graph in the right side of the window. Both linear and non-linear profiles are acceptable.

- Once the scale is defined, click in the *Units* box to program the engineering units to be displayed on the graph. Up to 5 alphanumeric characters may be typed in this box (e.g. PSIG or GPM, etc.).

- After all the data is entered and you are satisfied with the template, click on **File** at the top left side of the dialog box window.

- Choose one of the available options:
    - **Open:** Retrieves a previously stored template.
    - **Save:** Saves the current template you just created for future use.
    - **Print:** Prints a copy of the scale and unit programming window as seen on the screen.

4.3.3   Creating Scales for Connected Loggers

- Connect the Simple Logger® to the computer's serial port for downloading. See main manual for downloading instructions.

- Once the proper port is selected, data will appear in the update box at the top right hand side of the screen. This is an indication that the software has made connection to the logger. The *Scale* command will also appear on the task bar if the logger detected allows scale and engineering unit programming.

- A screen similar to Figure 5 will appear. The left side of the screen provides the scale and unit programming, while the right side displays the profile of the programmed scale in relationship to the actual input to the logger.
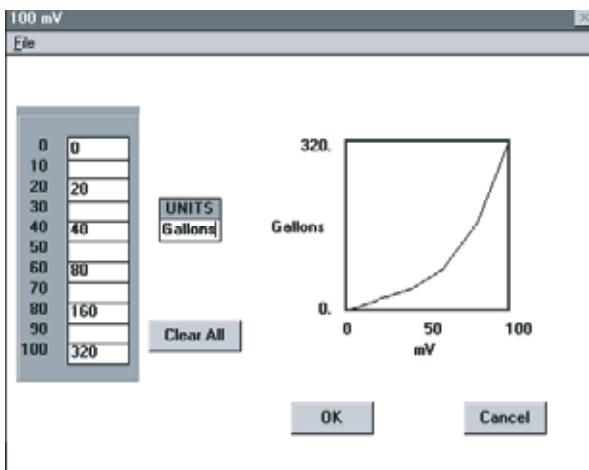

Figure 5

- The operator may set the scale by programming as few as two points, the low end and the high end, or by entering as many points as necessary to define the scale up to 17 points for the 4-20 mA logger and up to 11 points for the DC voltage loggers. The points entered do not have to be linear but should be an accurate representation of the relationship of the DC signal to the scale points.

- To enter a scale value in any of the slots, click on the slot and type in a number up to 5 characters. The minus sign and decimal point may be used as valid characters (e.g. -25.4 would be a valid 5-character number).

- Once the scale is defined, click in the Unit box to program the engineering units to be displayed on the graph. Up to 5 alphanumeric characters may be typed in this box.

- Once you have entered the correct scale and unit data, click on OK to proceed. The screen in Figure 6 will appear giving you the opportunity to save the entered data for future use. Click on Yes to save the data or No to bypass saving the data and use one time only.

- If you click Yes, a dialog box will open similar to Figure 7 where you can type in the name (up to 8 characters) you wish to use for the file.

- Click on OK to save the file and plot the graph with the new scale and unit data or click on Cancel to discard it and return to the scale and unit programming screen.
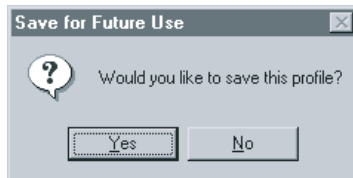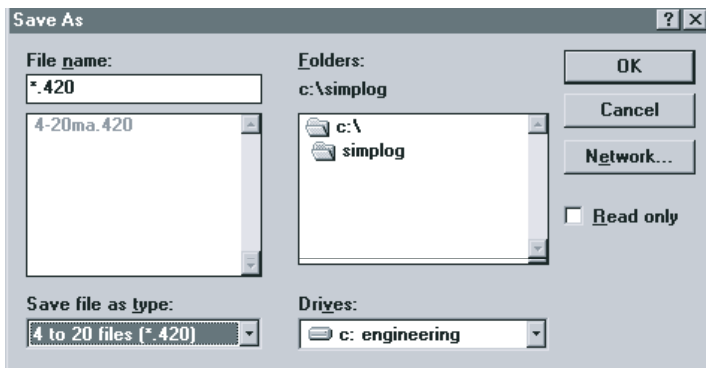

Figure 6

Figure 7

MAINTENANCE

5.1   Battery Installation

Under normal conditions, the battery will last up to a year of continuous recording unless the logger is restarted very frequently.

In the OFF mode, the logger puts almost no load on the battery. Use the OFF mode when the logger is not in use. Replace the battery once a year in normal use.

If the logger will be used at temperatures below 32°F (0°C) or is frequently turned on and off, replace the battery every six to nine months.

1. Make sure your logger is turned off (no blinking light) and all inputs are disconnected.

2. Turn the logger upside down. Remove the four Phillips head screws from the base plate, then take off the base plate.

3. Locate the two-wire (red/black) battery connector and attach the 9V battery to it. Make sure that you observe polarity by lining up the battery posts to the proper terminals on the connector.

4. Once the connector is plugged onto the battery, insert the battery into the holding clip on the circuit board.

5. If the unit is not in record mode after installing the new battery, disconnect it and press the button twice then reinstall the battery.

6. Reattach the base plate using the four screws removed in Step 2.

Your logger is now recording (LED blinking). Press the **PRESS** button for five seconds to stop the instrument.

⚠ **NOTE:** For long-term storage, remove the battery to prevent discharge effects.

5.2   Cleaning

The body of the logger should be cleaned with a cloth moistened with soapy water. Rinse with a cloth moistened with clean water. Do not use solvent.

APPENDIX A

Importing .TXT Files into a Spreadsheet

Opening a Simple Logger .TXT file in Excel

The following example used with Excel Ver. 7.0 or higher.

1. After opening the Excel program, select *"File"* from the main menu and then select *"Open"*.

2. In the dialog box that appears, browse and open the folder where your logger .TXT files are stored. This will be located in **C:\Program Files\Simple Logger 6.xx** if you accepted the default choice offered by the logger installation program.

3. Next, change the file type to *"Text Files"* in the field labeled <u>Files of Type</u>. All the .TXT files in the logger directory should now be visible.

4. Double-click on the desired file to open the Text Import Wizard.

5. Review the selections in the first wizard screen and make sure that the following choices are selected:

    Original Data Type: Delimited
    Start Import at Row: 1
    File Origin: Windows (ANSI)

6. Click the *"NEXT"* button at the bottom of the Wizard dialog box. The second wizard screen will appear.

7. Click on *"Comma"* in the Delimiters box. A check mark should appear.

8. Click the *"NEXT"* button at the bottom of the Wizard dialog box. The third wizard screen will appear.

9. A view of the actual data to be imported should appear in the lower section of the window. Column 1 should be highlighted. In the Column Data Format window, select *"Date"*.

10. Next, click on *"Finish"* to complete the process and import the data.

11. The data will now appear in your spreadsheet in two columns (A and B) and will look similar to that shown in Table A-1.

A	B
8	**Arms**
35401.49	3.5
35401.49	5
35401.49	9
35401.49	13.5
35401.49	17
35401.49	20
35401.49	23.5
35401.49	27.5
35401.49	31
35401.49	34.5
35401.49	38

Table A-1 - Sample Data Imported into Excel.

Formatting the Date and Time

Column 'A' contains a decimal number that represents both date and time. Excel can convert this number directly as follows:

1. Click on column 'B' at the top of the column to select the data, then click on *"Insert"* from the main menu and select *"Columns"* from the drop-down menu.

2. Next, click on column 'A' at the top of the column to select the data, then click on "*Edit"* from the main menu and select *"Copy"* to copy the entire column.

3. Click on cell 1 of column 'B' and then click on *"Edit"* and select *"Paste"* to insert a duplicate of column 'A' into column 'B'. This is necessary if you want to show the date and time in two separate columns.

4. Next, click on the top of column 'A', then click on *"Format"* and select *"Cells"* from the drop-down menu.

5. In the dialog box that opens, select the *"Date"* option from the category list on the left. Select the date format you desire and click on *"OK"* to format the column.

6. Click on the top of column 'B', then click on *"Format"* and select *"Cells"* from the drop-down menu.

7. In the dialog box that opens, select the *"Time"* option from the category list on the left. Select the time format you desire and click on *"OK"* to format the column.

Table A-2 shows a typical spreadsheet with date, time and value displayed. It may be necessary to change the column width to see all the data.

A	B	C
12/02/04	11:45 AM	17
12/02/04	11:45 AM	20
12/02/04	11:45 AM	23.5
12/02/04	11:45 AM	27.5
12/02/04	11:45 AM	31
12/02/04	11:45 AM	34.5
12/02/04	11:45 AM	38
12/02/04	11:45 AM	41.5
12/02/04	11:45 AM	45.5
12/02/04	11:46 AM	49
12/02/04	11:46 AM	52

Table A-2 - Shows Date, Time and Value

APPENDIX B

Time-Extension Recording (TXR™)

Time extension recording is an automatic process that updates the sample rate and the number of stored data points based on the length of the recording. The maximum number of stored data points is 8192.

When the data logger starts a new recording session, it does so at its fastest sample rate of 4096 points per hour (0.88 seconds per point). The Simple Loggers® can record at this rate for two hours. If the recording session continues beyond two hours, the time extension recording technique becomes active.

Beginning with the sample, after the completion of two hours of recording, the logger continues recording by selectively overwriting previously stored data. The Simple Logger® also halves its sample rate to 2048/hr (1.76 seconds per point) for the new stored values to be compatible with the previously recorded values.

Recording continues for the next two hours at this new rate until the remaining 4096 storage points are filled.
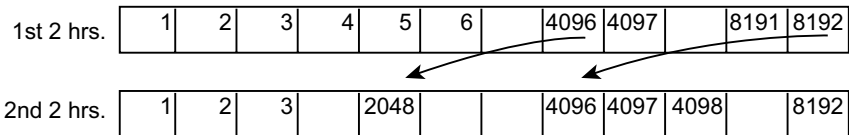
1st 2 hrs.	1	2	3	4	5	6		4096	4097		8191	8192

2nd 2 hrs.	1	2	3		2048			4096	4097	4098		8192

Table B-1 - Time Extension Memory Allocation

The time extension recording process of selectively overwriting previously stored data and halving the sample rate for new stored data continues every time the memory fills up. Table B-2 shows the relationship between recording time and sample rate for the data logger using this technique.

Sample Rate per hr.	Seconds Per Sample	Total Recording Time (hrs)	Total Recording Time (days)
4096	0.88	2	0.083
2048	1.76	4	0.167
1024	3.52	8	0.333
512	7.04	16	0.667
256	14.08	32	1.333
128	28.16	64	2.667
64	56.32	128	5.333
32	112.64	256	10.667
16	225.28	512	21.333
8	450.56	1024	42.667
4	901.12	2048	85.333
2	1802.24	4096	170.667
1	3604.48	8192	341.333

Table B-2 - Sample Rate vs Recording Time

Recording continues in this manner until the battery wears out or recording is stopped. For convenience in data analysis, the recording interval takes on values of fifteen minutes, one-half hour, one hour and so on.

Like automatic scaling, time extension recording is practically invisible to the user. For best results, set the logger to standby mode when the measurement is completed, both to avoid including unwanted information in the plot, and to provide maximum resolution for the period of interest.

Repair and Calibration

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:

You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA

Phone: (800) 945-2362 (Ext. 360)
          (603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

Technical and Sales Assistance

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, mail, fax or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
200 Foxborough Boulevard
Foxborough, MA 02035 USA

Phone: (800) 343-1391
          (508) 698-2115
Fax: (508) 698-2118
E-mail: techsupport@aemc.com
www.aemc.com

NOTE: Do not ship Instruments to our Foxborough, MA address.

Limited Warranty

The Simple Logger® Model L320/L410/L430 is warranted to the owner for a period of two years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

For full and detailed warranty coverage, please read the Warranty Coverage Information, which is attached to the Warranty Registration Card (if enclosed) or is available at www.aemc.com. Please keep the Warranty Coverage Information with your records.

What AEMC® Instruments will do:
If a malfunction occurs withing the warranty period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

REGISTER ONLINE AT:
www.aemc.com

Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
            (603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

Caution: To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

Notes:

AEMC®
INSTRUMENTS

08/18

99-MAN 100212 v14