

**LUDLUM MODEL 375 Net-32 version 1.5.1**

**SOFTWARE MANUAL**

**November 2020**



**LUDLUM MEASUREMENTS, INC.**

**501 OAK ST., PO BOX 810**

**SWEETWATER, TX 79556**

**325/235-5494 FAX: 325/235-4672**

## **STATEMENT OF WARRANTY**

Ludlum Measurements, Inc. warrants the products covered in this instruction manual to be free of defects due to workmanship, materials, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M and proportional tubes, and scintillation crystals which are broken due to excessive physical abuse or used for purposes other than those intended.

**There are no warranties, expressed or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face thereof. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages arising from the purchase, use, or inability to use the product.**

## **RECEIVING CONDITION EXAMINATION**

Be sure to verify that the shipping carton is received in good condition with no visible damage. Should the instrument be received in a damaged condition, save the shipping container and the packing material and request an immediate inspection by the carrier.

## **RETURN OF GOODS TO MANUFACTURER**

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

**LUDLUM MEASUREMENTS, INC.  
ATTN: REPAIR DEPARTMENT  
501 OAK STREET  
SWEETWATER, TX 79556  
915-235-5494  
FAX 915-235-4672**

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## 1. GENERAL

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The model 375-Net software monitors and stores the data from up to 32 model 375 instruments. Additional COM ports can be added to a computer via USB to RS-232 converters.

The model 375s output data every 2 seconds regardless if it's connected to a computer. The data includes the current radiation readings and the current status of the instrument. The data is presented in the following format:

The readings displayed on the screen are updated every 2 seconds. The background color of the reading box changes to indicate the status of the instrument.

<b>COLOR</b>	<b>STATUS</b>
Gray	Offline
Green	Online and OK
Yellow	Low Alarm
Red	High Alarm
Orange	Over Range
Purple	Detector Failure
Cyan	Error

The data is logged to a database at a user-specified time interval and is the average of the readings collected during the log interval time. Readings where the model 375 is alarming, a fail condition is present, or the reading exceeds a user-defined value can be logged at a different rate than the normal logging interval.

The data received from the instruments are logged into a Microsoft™ Access database, and can be viewed, queried, and graphed directly from within the program. Microsoft™ Access can also be used to view the data. At midnight, the software automatically archives the data into a new database file at a user-defined location.

If enabled, the data can also be saved into a comma delimited (.CSV) file for import into a spreadsheet or other program for further manipulation.

## 2. FEATURES

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- Ability to view stored data directly from within the program. The data can be queried in the following ways:
  - All Records
  - Status OK
  - Status Not OK
  - Status Alarm
  - Reading above user defined value
- Display live or archived data as a graph directly from the program.
- Display the minimum, maximum, and average reading for a specific day. Also shows number of alarms, alerts, errors, etc.
- E-mail specific persons based on whether an instrument receives an alarm or failure. Separate e-mail addresses for normal working hours and nighttime.
- Normal View/Map View. A user-defined bitmap can be used to display the readings on the map. The map can be scaled to 25%, 50%, 75%, or 100% size. An editor allows the channel locations to be moved to any point on the map.
- A indicator that under each displayed reading that changes color when data is received from the instrument.
- Labels for each channel are user definable.
- A user-defined comment is available for each channel.
- User definable audio alarm.
- Data can be logged at different intervals depending on alarm conditions or readings that exceed a user defined value.
- User-defined location of database, .CSV files, and archive location
- Database queries can be saved to create a new database file.
- Automatic database archive at midnight.

### 3. INSTALLATION

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#### Hardware Requirements:

A Windows™ based PC with enough COM ports for every model 375 that is to be connected. If the computer already has enough COM ports for the number of 375s then no extra hardware is required.

Digi (<https://www.digi.com/products/usb-and-serial-connectivity/usb-over-serial-hubs/edgeport>) makes a USB to RS232 converter that makes it very easy to add 32 COM ports to any computer equipped with a USB ports. A USB hub may be required to connect more than 2 converters depending on the number of available USB ports.

#### LMI Part Number

2310687      8 Port USB to RS-232 Converted  
4396-310      M 375Net-32 8 Port Kit (includes converter)

#### Minimum PC requirements:

400 MHz processor or greater  
128 MB of memory (256 MB recommended)  
CD-ROM drive  
2 GB storage space (More space will allow for more data to be saved)  
SVGA monitor capable of a resolution of 800x600 or greater.  
Windows 7 or greater

#### Software Installation

Insert CD into CDROM drive and run Model\_375\_Net32\_Installer..

The cable that connects the 375 to the RS-232 port requires only two wires (TXD and GND).

	<b>Model 375</b>	<b>PC (9-pin)</b>
<b>TXD</b>	Pin 4	Pin 2
<b>GND</b>	Pin 2	Pin 5

The cable connector has male pins on Model 375 side and female pins on PC side. The communication parameters for each serial channel are:

2400 bps (baud rate)  
No parity  
8 data bits  
1 stop bit  
No handshaking

Every 2 seconds the model 375 sends out 14 bytes with a carriage return and linefeed character ending each message string. The model 375 transmits the data continuously even if no computer is connected to it.

The data that is output from each model 375 is in the following format:

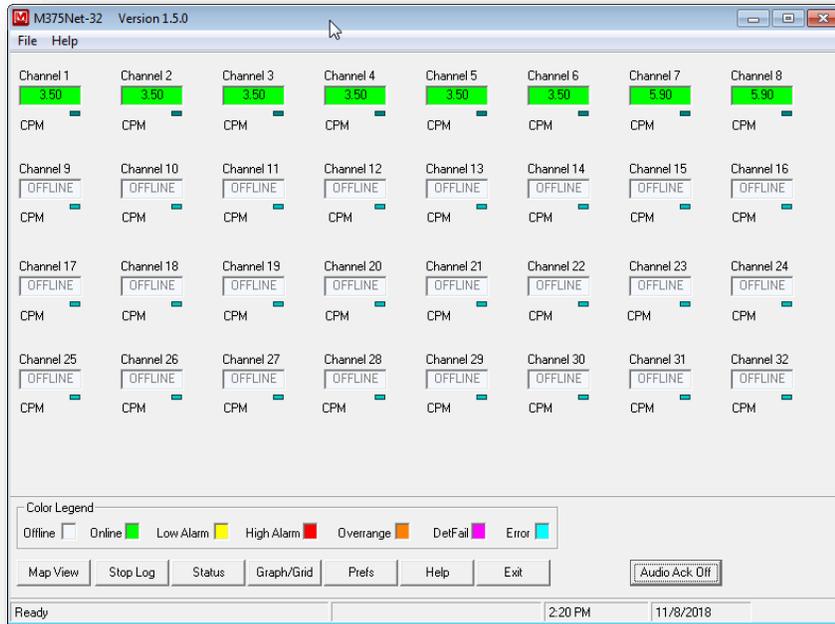
RS-232 Data Format

BYTE1	0		x
BYTE2	x		x
BYTE3	x	OR	x
BYTE4	x		x
BYTE5	.		.
BYTE6	x		0
BYTE7	Audio Status		1=ON
BYTE8	High Alarm Status		1=ON
BYTE9	Low Alarm Status		1=ON
BYTE10	Over Range Status		1=ON
BYTE11	Monitor Status		1=ON
BYTE12	Error Code		
BYTE13	Carriage Return (ODH)		
BYTE14	Line Feed (0AH)		

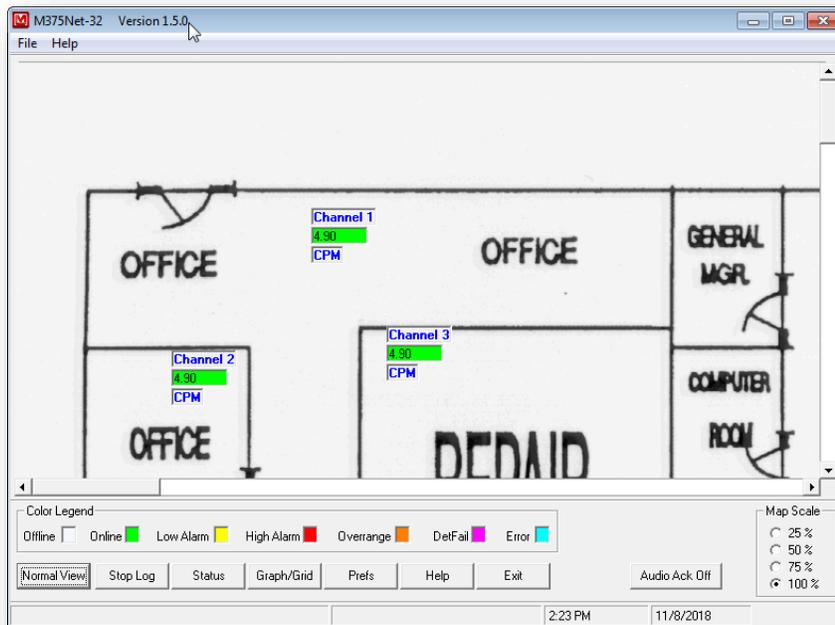
**Error Codes**

- 0 = No error.
- 1 = Got a negative number.
- 2 = The dtc count exceeded 3 bytes.
- 3 = Addition overflow.
- 4 = Ratemeter exceeded 4 bytes
- 5 = Multiplication Overflow.
- 6 = Division by 0.
- 7 = Accumulator Overflow.
- 8 = Shift Overflow.
- 9 = EEPROM write error.

## 4. OPERATION



Main Screen (normal view)



Main Screen (map view)

The main screen consists of a display of 32 channels. This display is updated every 2 seconds and displays the current reading and status for all channels. The background color for each channel changes to indicate the status of the channel. The colors are:

**COLOR      STATUS**

Gray	Offline
Green	Online and OK
Yellow	Low Alarm
Red	High Alarm
Orange	Over Range
Purple	Detector Failure
Cyan	Error

An indicator under each reading box indicates when the software has received data from the model 375.

The labels for each channel can be changed to a user-defined value.

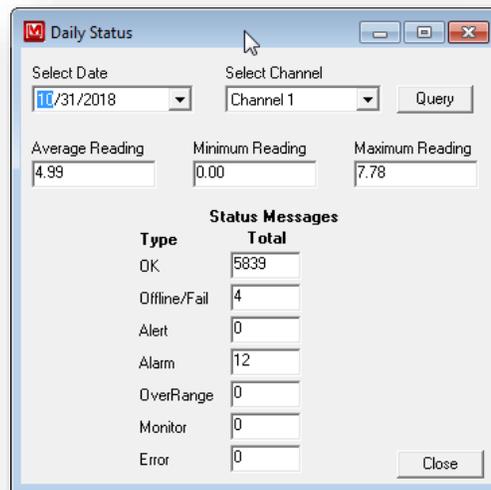
By selecting the Map View, the display changes to show a user-defined map. The location of the channels can be changed in the location editor.

The data can be logged at 3 user-defined intervals:

- Normal Operation
- Alarm Condition
- Reading exceeds user-defined value.

The database stores the channel name, date, time, reading, status, and user-defined comment.

The status button displays the maximum, minimum, and average reading for the selected day. Also displayed is the total number of each type of status event that occurred for that day.

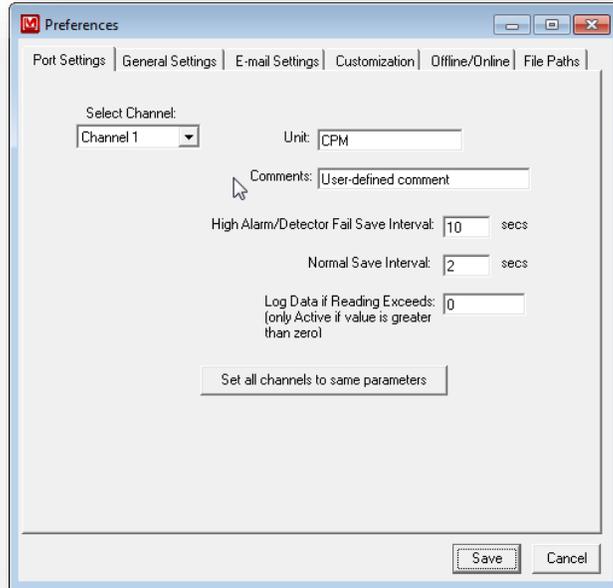


The Stop/Start Log button allows the user to stop and start the logging of data. The default is to start logging the data when the program is run.

The Exit button will end the program.

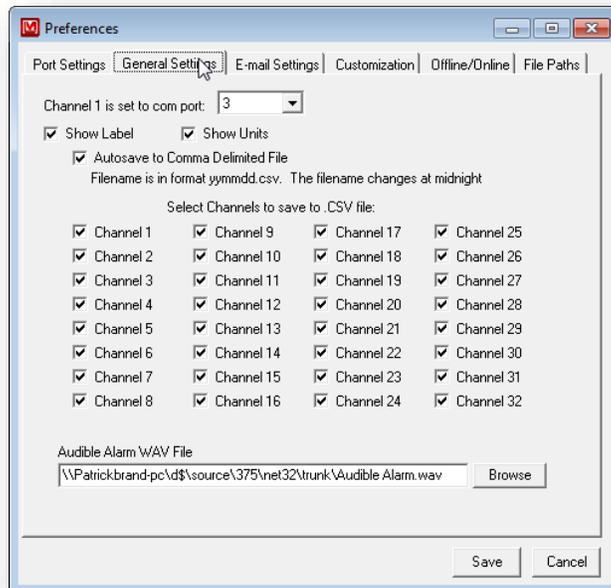
## 5. PREFERENCES

The Prefs button allows the user to change all of the settings and to edit the location of the channels on the user-defined map. The settings are stored in the M375Net.ini file.



### Channel Settings

Each channel has a user definable Unit, Comment, Normal Log Interval, Alarm save Interval. It is also possible to set all channels to the same unit, comment, and log intervals.

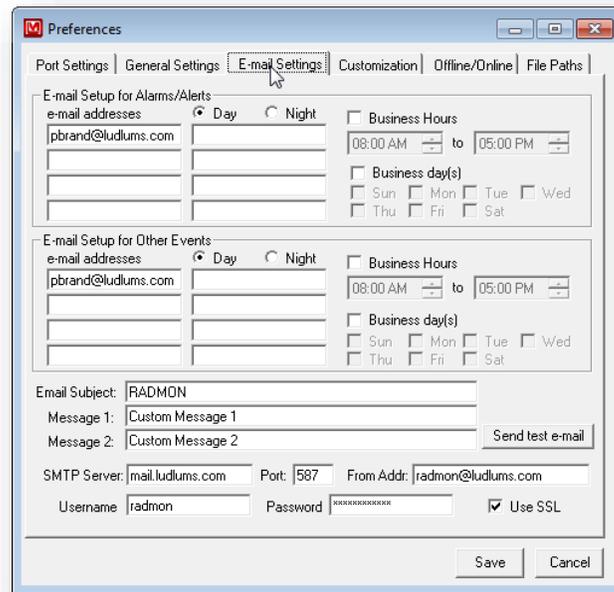


## General Settings

Channel 1 is set to COM port: Use this to determine which COM channel, the first channel on the converter will be. The software will look for each 375 starting with this COM port.

AutoSave to Comma Delimited File: If checked, this will create a comma-delimited file that is updated when the data is logged to the database. The files are stored in the csv directory specified under the file paths. The filename is xx-yymmdd.csv where xx is the channel number and yymmdd is the current date.

Audible Alarm Wave File: This is a user-definable wav file that is played when an alarm sounds. The audio acknowledge button on the main screen will silence the alarm.



## Email Setup

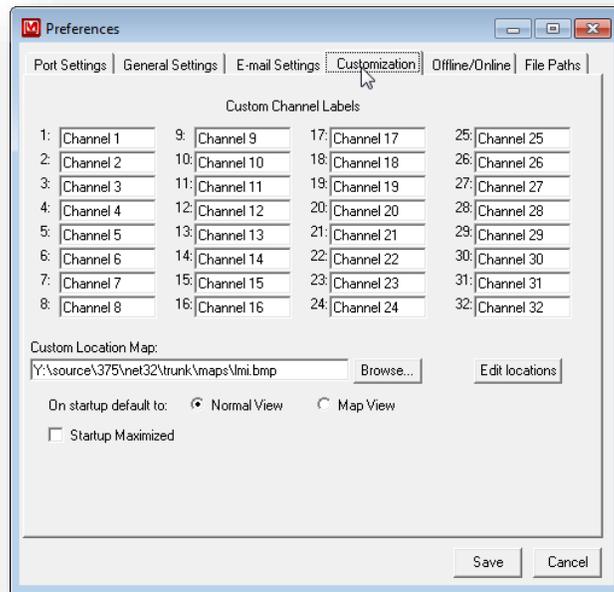
There are 4 separate groups of e-mail addresses with 8 e-mail addresses for each group. The groups are daytime alert/alarm, daytime other event, nighttime alert/alarm, and nighttime other event. The other events include detector failures, errors, offline, and over-range conditions.

To specify the normal business hours check the business hours option and set the start and end hours. If the current time falls between these values then the daytime addresses are used. If the current time falls outside these values then the nighttime addresses are used.

To specify the normal business days check the business day(s) option and click on each day. Days that are not checked are considered to be outside the normal business hours so the nighttime addresses are used.

Email Subject. A user-defined field that determines what the subject line of the email will be.

Custom Message 1 and 2. User definable fields that are added to the email message.



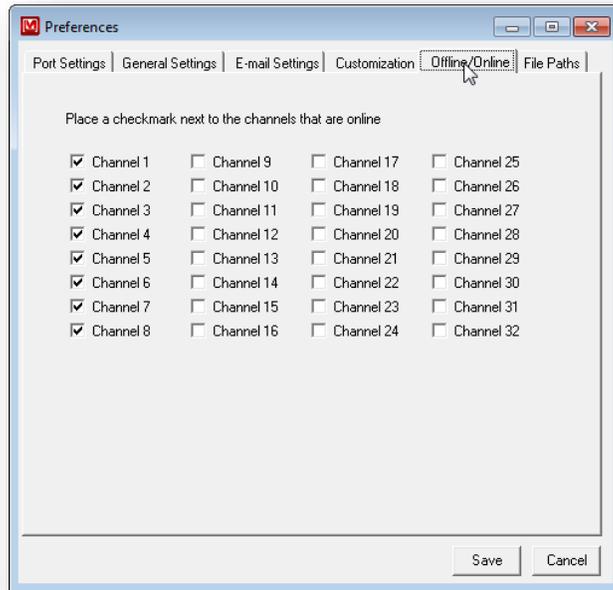
**Customization**

**Custom Channel Labels:** Each channel can have a custom label name that represents it throughout the program.

**Custom Location Map:** This is the bitmap that is used for the Map View.

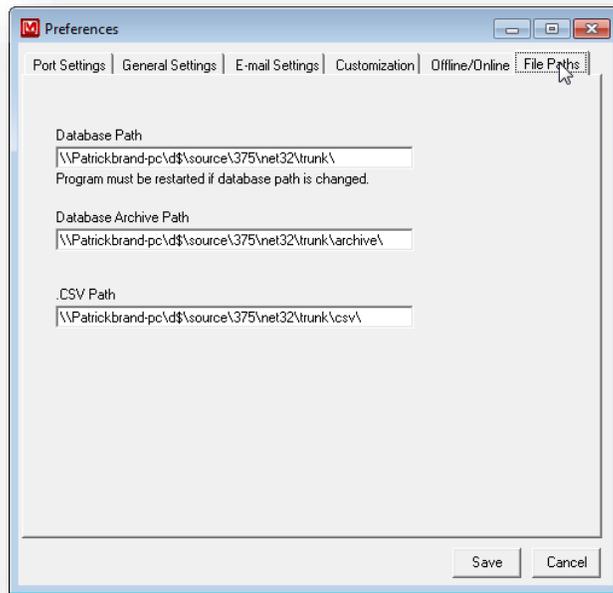
**Default View Mode:** The default view at startup can either be Normal or Map View.

**Edit Locations:** This brings up the Location Editor that allows for the channels to be placed onto the map.



### Offline/Online

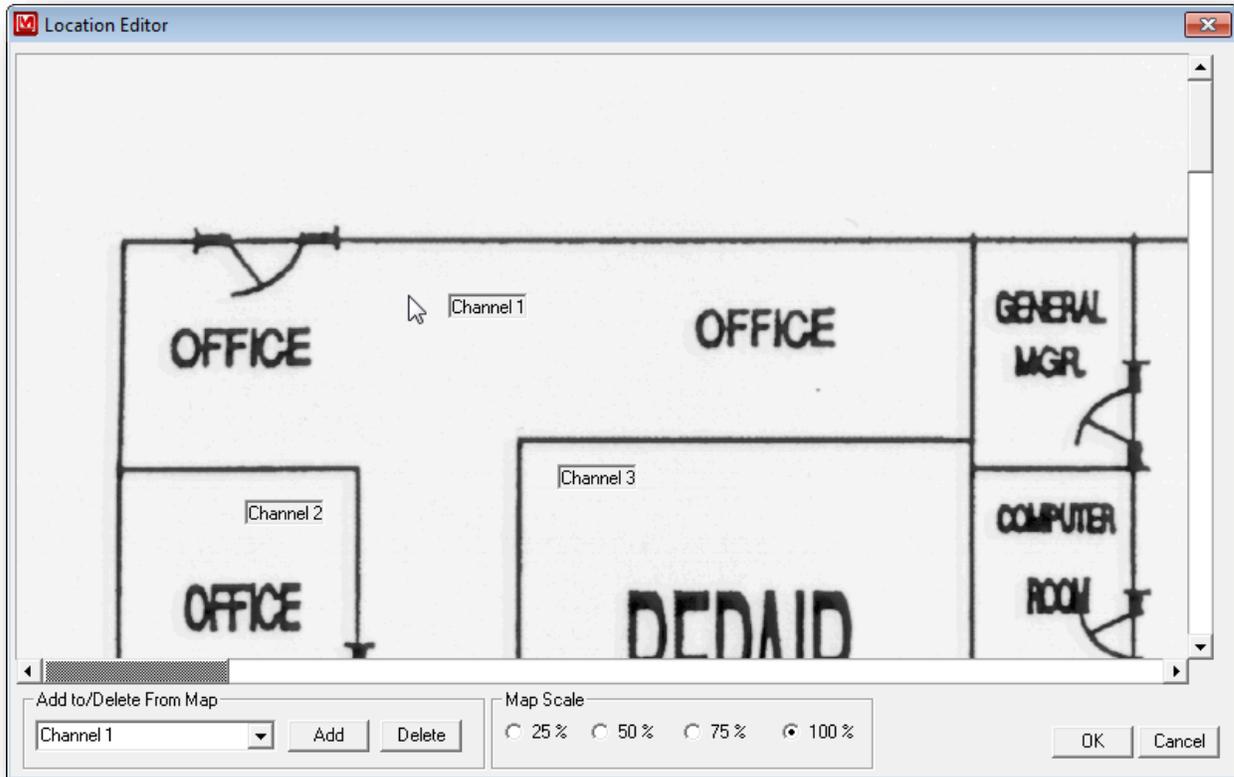
Channels with a checkmark are considered online and will be polled for data. Unchecked channels will not be checked for data.



### File Paths

Change the locations of the live database file, archive path, and .CSV path. The program must be restarted if the location of the live database file is changed.

## 6. LOCATION EDITOR



### Overview

The Location Editor allows for the placement of the channels onto the map. Select the specific channel in the list box. Click Add to add to the map and delete to delete from the map. Use the mouse to drag the channel around the map.

The map file name must be in bitmap (.bmp) format. The user can scan in a blueprint/map of the area and save in bitmap format. Each map is composed of 4 files with each file representing a scale of 100%, 75%, 50% and 25%.

### Creating Map Files

The files must be located in the same directory with filenames corresponding to the following:

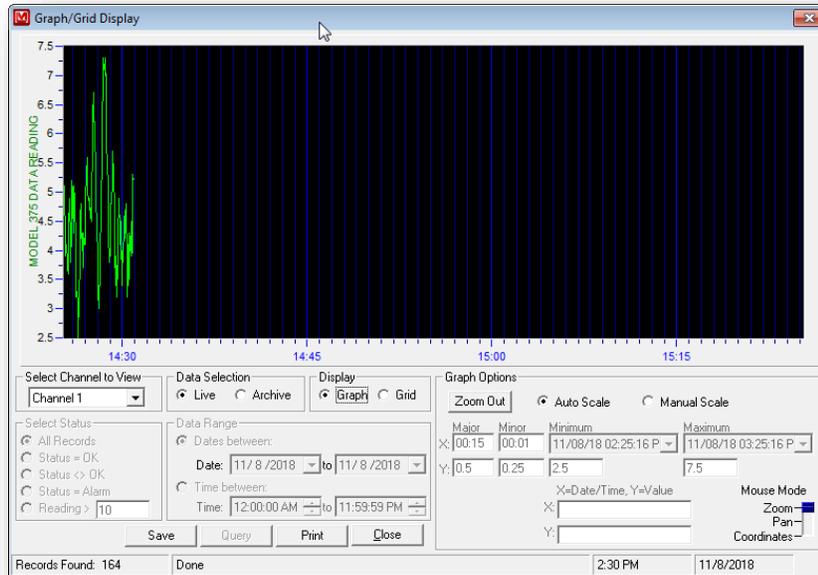
C:\LMI.BMP	(100% scale)
C:\LMI-25.BMP	(25% scale)
C:\LMI-50.BMP	(50% scale)
C:\LMI-75.BMP	(75% scale)

In the preferences for location map you will select C:\LMI.BMP as the filename.

To make the 25% scaled versions of the bitmap start Paint (Start / Programs / Accessories / Paint).

1. Open the bitmap to be used for 100%.
2. Select Image / Stretch/Skew from the pull-down menu.
3. Under the Stretch section change both values to 25%.
4. Save the file as NAME-25.BMP where NAME is the original filename. Repeat steps for the 50, and 75 percent bitmaps.

## 7. VIEWING DATA



The screenshot shows the 'Graph/Grid Display' window in grid view. The main area is a table with the following data:

Port	Date	Time	Status	Reading	Units	Note
Channel 1	11/8/2018	2:26:57 PM	OK	4.10	CPM	User-defined comment
Channel 1	11/8/2018	2:26:55 PM	OK	4.20	CPM	User-defined comment
Channel 1	11/8/2018	2:26:53 PM	OK	4.10	CPM	User-defined comment
Channel 1	11/8/2018	2:26:51 PM	OK	4.30	CPM	User-defined comment
Channel 1	11/8/2018	2:26:49 PM	OK	4.20	CPM	User-defined comment
Channel 1	11/8/2018	2:26:47 PM	OK	3.70	CPM	User-defined comment
Channel 1	11/8/2018	2:26:45 PM	OK	4.30	CPM	User-defined comment
Channel 1	11/8/2018	2:26:43 PM	OK	4.00	CPM	User-defined comment
Channel 1	11/8/2018	2:26:41 PM	OK	4.40	CPM	User-defined comment
Channel 1	11/8/2018	2:26:39 PM	OK	4.30	CPM	User-defined comment
Channel 1	11/8/2018	2:26:37 PM	OK	4.80	CPM	User-defined comment
Channel 1	11/8/2018	2:26:35 PM	OK	4.60	CPM	User-defined comment
Channel 1	11/8/2018	2:26:33 PM	OK	4.60	CPM	User-defined comment
Channel 1	11/8/2018	2:26:31 PM	OK	3.80	CPM	User-defined comment
Channel 1	11/8/2018	2:26:29 PM	OK	3.20	CPM	User-defined comment
Channel 1	11/8/2018	2:26:27 PM	OK	3.20	CPM	User-defined comment
Channel 1	11/8/2018	2:26:25 PM	OK	2.50	CPM	User-defined comment

Below the table, there are control panels: 'Select Channel to View' (Channel 1), 'Data Selection' (Live, Archive), 'Display' (Graph, Grid), and 'Data Range' (Dates between: 11/8/2018 to 11/8/2018). At the bottom, it shows 'Records Found: 51', 'Done', '2:27 PM', and '11/8/2018'.

### Grid/Graph View

This screen displays the data as either a grid or a graph. If “Live” is selected then the data viewed is the live data coming from the channel. If “Archive Data” is selected then the records from the database are used.

When viewing “Live” data the grid and graph are updated according to the log interval set in preferences screen. The grid data is updated with the newest data appearing at the top of the grid and the oldest data appearing at the bottom of the grid.

The graph can be printed by clicking the “Print” button. Clicking the “Save” button will save the current query into a new database.

### **Select Channel to View**

Select which channel to display.

### **Data Selection**

Live data show the current data coming from the instruments, archive data works with previously saved data in the database.

### **Graph Options**

The graph options determine how the grid is displayed by allowing the user to specify automatic or manual scale mode. Automatic scale mode uses information about the current data to automatically adjust the minimum and maximum values of the graph. Manual scale mode allows the user to specify the minimum and maximum values. Changing the Mouse mode allows the mouse to zoom in on the graph, pan the graph display or show the coordinate values where the mouse cursor is located.

### **Select Status**

This determines which records are displayed from the database. Choices are All records, Status is OK, Status is Not OK, Status = Alarm, and Reading exceeds user-defined value.

### **Date Range**

This allows the data to be searched according to a date and/or time range.