Laureate™ XLog2 Datalogging Software Operator Manual

PC-based data logging with Laurel meters and transmitters. Compatible with Ethernet, USB, RS485 and RS232 connections, Modbus RTU, Modbus ASCII, and Custom ASCII protocols.

LAUREL Electronics Inc.
3183-G Airway Ave, Costa Mesa, CA, 92626, USA
Tel: (714) 434-6131 Fax: (714) 434-3766 Website: www.laurels.com

1. OVERVIEW

When a PC running Laurel's XLog2 datalogging software is connected to Laureate meters and transmitters, readings can be written to disk in the form of text files or .xls Microsoft Excel files. User settable parameters include the logging time interval in seconds, header data with or without time and date, and password protection for the setup files. Readings can also be displayed on the PC monitor the form of up to 64 simulated panel meters in up to 4 groups (or windows) of up to 16 meters each. The simulated meters can display actual meter readings or virtual readings, which are mathematical combinations of actual readings. The on-screen position and appearance of the simulated meters is user selectable to achieve meaningful groupings.

The physical data connection between the PC and the instruments can be via RS232, RS485, USB, Ethernet or WiFi. Please see the communication ordering options listed below. With an Ethernet or WiFi connection, remote real-time data can be viewed and logged over the Internet. User-selectable communication protocols are Modbus RTU, Modbus ASCII or Custom ASCII for serial data links, and Modbus TCP for Ethernet or WiFi. Custom ASCII is simpler than Modbus and is recommended when all instruments on the same data line are Laureates and do not use Ethernet or WiFi. The Custom ASCII protocol cannot be used with Ethernet.

**Serial Communication Ordering Options for Panel Meters:**

0........None
1........RS232 (single RJ11 jack)
2........RS485 (dual RJ11 jacks)
4........RS485 (dual RJ45 jacks)
5........USB (type B jack)
6........USB-to-RS485 converter (type B jack for USB, RJ11 jack for RS485)
7........Ethernet (RJ45 jack)
8........Ethernet-to-RS485 converter (RJ45 jack for Ethernet, RJ11 jack for RS485)
A.......WiFi with built-in antenna
B.......WiFi with external antenna
C.......WiFi with built-in antenna and converter to RS485 bus (via RJ11 jack)
D.......WiFi with external antenna and converter to RS485 bus (via RJ11 jack)

Serial Communication Ordering Options for DIN Rail Mounted Transmitters:

LT.....Main board with RS232 or RS485 communications (jumper selectable)
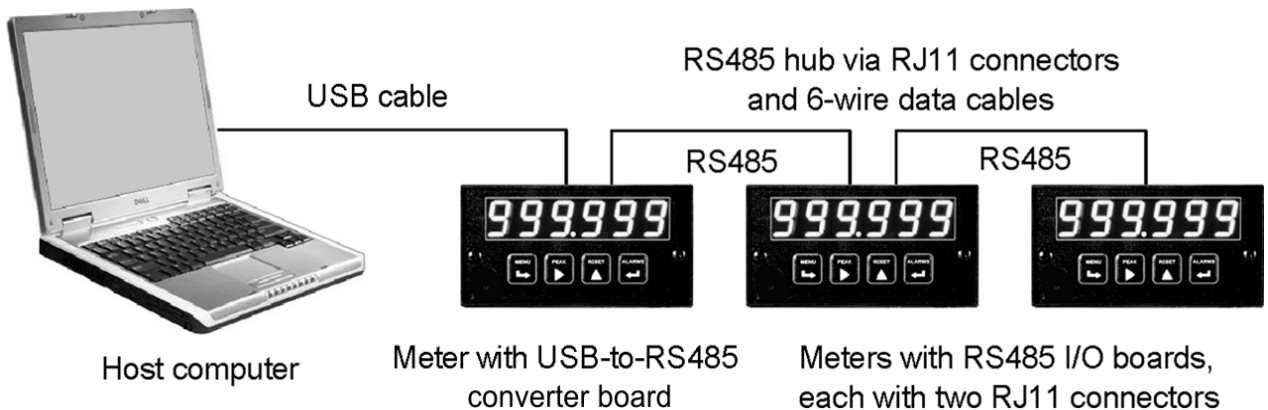**LTE**...Main board with Ethernet communications

Note that LT and LTE transmitters also provide an isolated analog output (4-20 mA, 0-20 mA, 0-10V or -10V to +10V) analog output and dual solid state relays as a standard feature.

Single Instrument Connected to a PC

USB or RS232 cable

Meter with USB or RS232
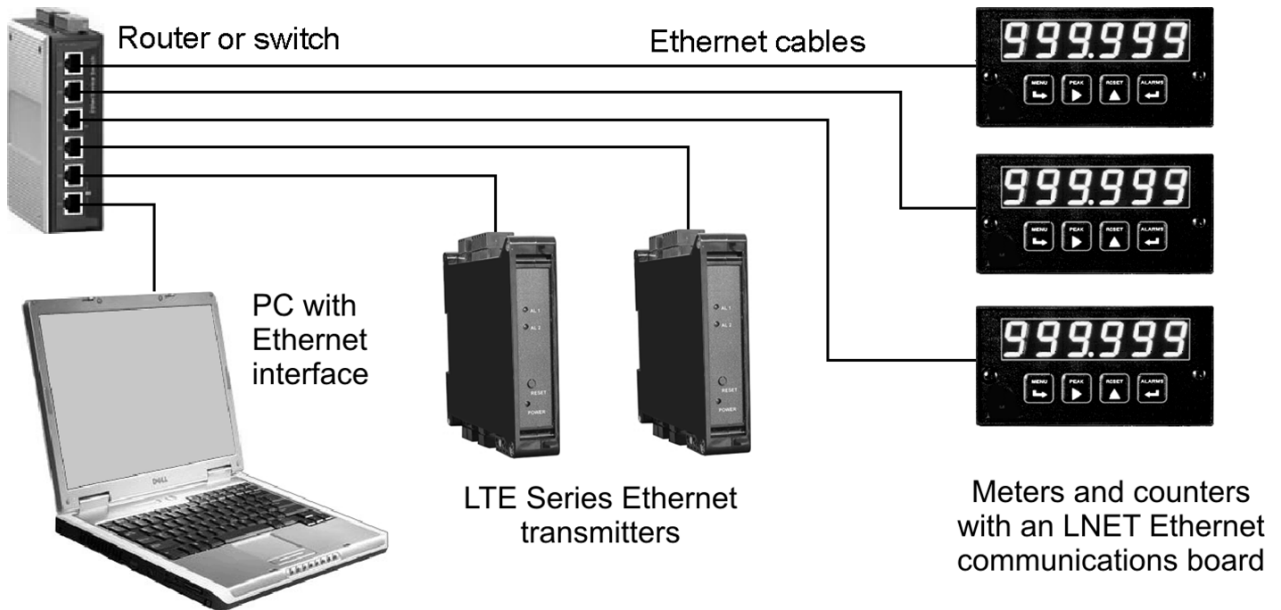serial interface board

Host computer
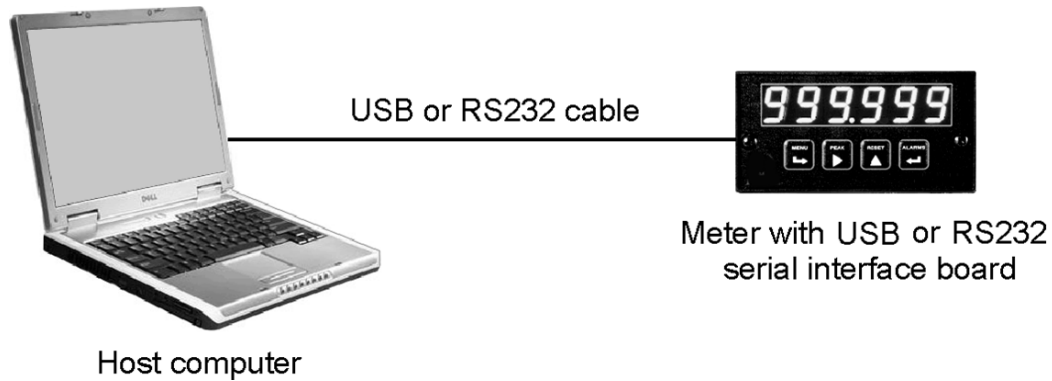
- **For connection to a PC RS232 port,** the instrument can be a Laureate meter with an RS232 interface board (ordering option 1), which uses Laurel's CBL01 RS232 cable. The instrument can also be a Laureate LT series transmitter whose data output has been jumpered for RS232 and uses Laurel's CBL04 RS232 cable. The PC must be set to the appropriate COM port and digital address (the default address is 1).

- **For connection to a PC USB port,** the instrument can be a Laureate meter with a USB interface board (ordering option 5), which uses Laurel's CBL05 USB cable. The PC must be set to the USB selected COM port and address (the default address is 1).

- **For connection to a PC via Ethernet,** the instrument can be a Laureate meter with an Ethernet interface board (ordering option 7) or a Laureate LTE transmitter. A standard Ethernet cable with RJ45 connectors can then be used to connect the Ethernet jack of the meter or transmitter to the same LAN to which the Host PC is connected. Laureate Ethernet Nodes are then automatically discovered by XLog2 Datalogging Software.

- **For connection to a PC via WiFi,** use the same procedures as for cabled Ethernet.

Multiple Instruments Connected to a PC

RS485 hub via RJ11 connectors
and 6-wire data cables

USB cable

RS485   RS485

Host computer   Meter with USB-to-RS485   Meters with RS485 I/O boards,
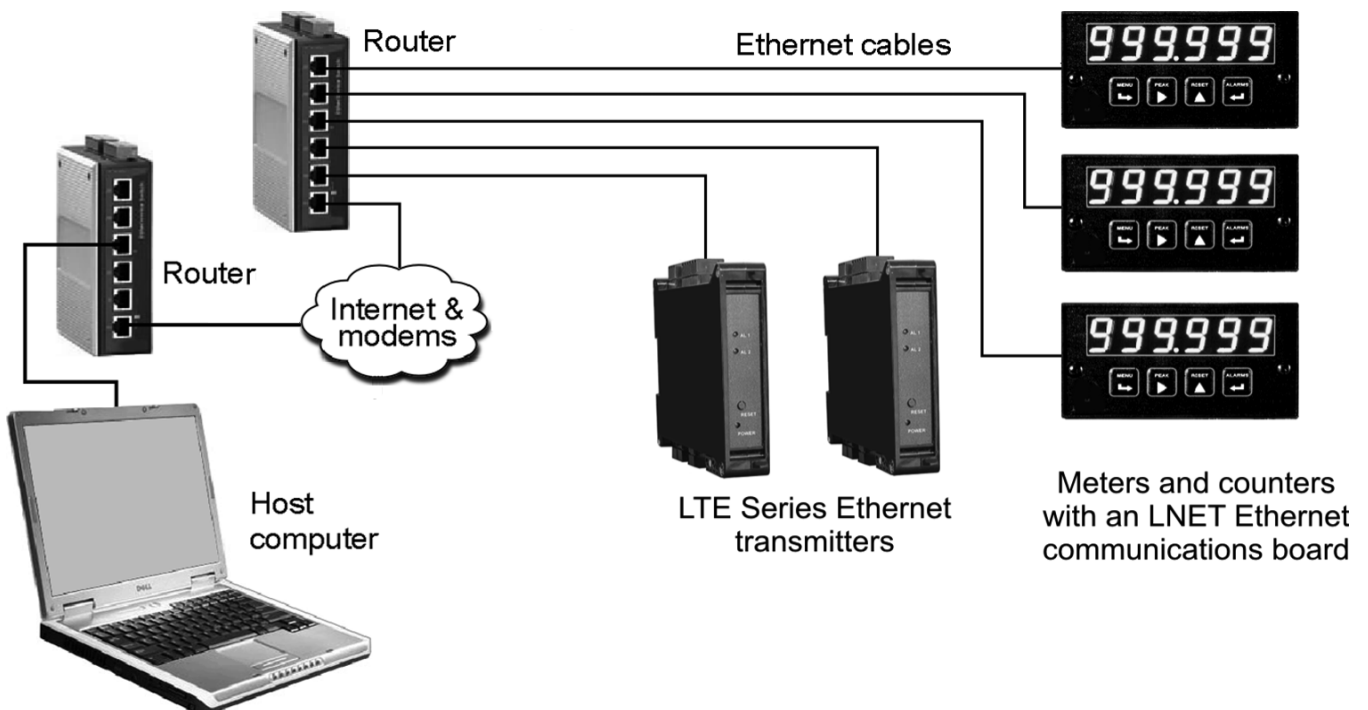converter board   each with two RJ11 connectors

- **For connection to a PC USB port,** up to 31 actual instruments can be interfaced to a PC USB port if the USB signal is converted to an RS485 signal. This can be achieved by Laurel's CBL06 adapter cable or by a USB-to-RS485 converter board (ordering option 6) in the first meter. The CBL06 cable supports half-duplex RS485 communications. An additional 30 Laureate meters with an RS485 interface board (ordering option 2) can then be daisy chained to the first meter using Laurel's CBL03 RS485 data
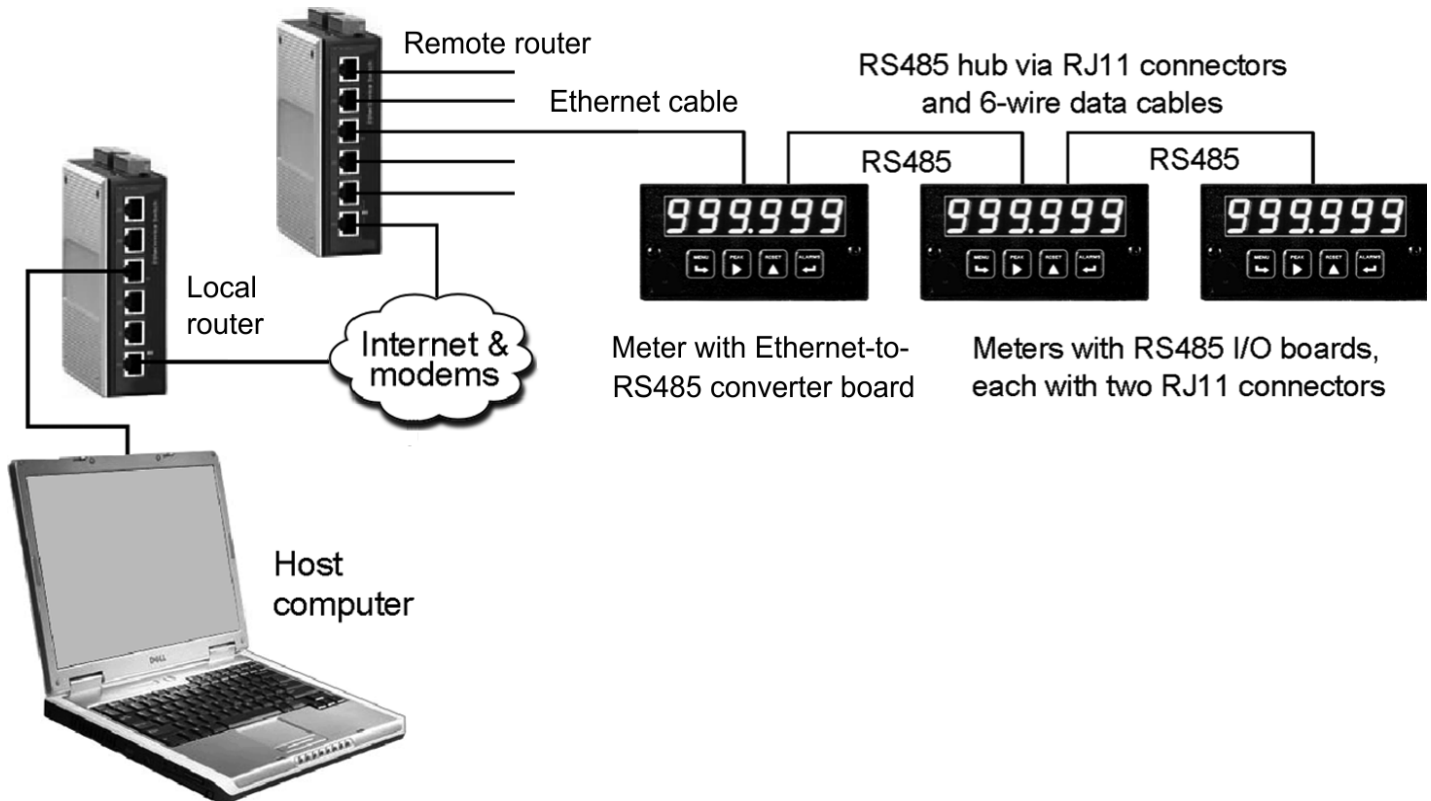
cables. Daisy chaining of meters without a hub is made possible by dual RJ11 jacks wired in parallel on each RS485 interface board.

Router or switch   Ethernet cables

PC with Ethernet interface

LTE Series Ethernet transmitters

Meters and counters with an LNET Ethernet communications board

- **For connection to an Ethernet LAN,** a PC and multiple Laureate instruments can be plugged into the same LAN using Ethernet cables. The instruments can be Laureate meters with an Ethernet interface board (ordering option 7) or LTE transmitters. Laureate Ethernet Nodes are then automatically discovered by XLog2 Datalogging Software along with any Devices attached to the Nodes by an RS485 bus.

Router   Ethernet cables

Router

Internet & modems

Host computer

LTE Series Ethernet transmitters

Meters and counters with an LNET Ethernet communications board

- **For connection via the Internet,** the PC can be plugged into a local LAN, and remote instruments can be plugged into a remote LAN. Laureate Ethernet Nodes and any Devices attached to them via an RS485 bus are automatically discovered by XLog2 Datalogging Software when the IP address of the remote router is supplied.

- **For connection of multiple meters to a single Ethernet line,** a first Laureate meter can be equipped with an Ethernet-to-RS485 converter board (ordering option 8). This board has an RJ45 jack to connect to a LAN via an Ethernet cable plus an RJ11 jack to connect to an RS485 bus with up to 30 additional meters. These meters must be equipped with an RS485 interface board (ordering option 2). The connection between the meters is via Laurel's CBL03 RS485 Data Cable for Meters. Daisy chaining of meters without a hub uses two RJ11 jacks wired in parallel on each RS485 interface board. Laureate Ethernet Nodes and any Devices attached to them are automatically discovered by Datalogging Software when the PC and first Laureate meter are on the same LAN. Node discovery over the Internet requires that the IP address of the remote router be supplied.

2. COMPLEMENTARY SOFTWARE AND MANUALS

The Use of XLog2™ Datalogging Software requires prior setup of the meters and transmitters to be datalogged or displayed, and prior configuration of Ethernet Nodes if Ethernet is used. Please refer to the following documentation and software, which are downloadable from our website at no charge:

1. **Instrument User Manuals.** Available for 1/8 DIN Laureate panel instruments (analog or pulse input) and DIN rail mountable Laureate transmitters (LT or LTE series, analog or pulse input). Items to be set up include jumpers for signal input ranges and communication outputs, user selectable operating modes, digital scaling, digital filtering, setpoints for relay operation, communication parameters, analog output selection and scaling, and digital addresses. The manuals explain Items #1, #2 and #3, which apply to counters and can be displayed on a PC and be datalogged. The manuals are downloadable from http://www.laurels.com/download-manuals.htm.

2. **Instrument Setup Software.** This Windows-based software greatly facilitates programming of 1/8 DIN Laureate panel instruments compared to programming via front panel keys. It is required for programming of DIN rail mountable Laureate transmitters without front panel keys. Setup parameters include selection of operating modes, digital scaling, digital filtering, setpoints for relay operation, communication parameters, analog output selection and scaling, and digital addresses. Instrument Setup Software is downloadable from http://www.laurels.com/download-software.htm.

3. **Ethernet Manual.** Explains different types of Ethernet networks and use of Node Manager Software to discover Laureate Ethernet Nodes on a LAN or WAN and then configure these Nodes. Also explains the alternate use of Web Server Software in which is built into each Node. Downloadable from http://www.laurels.com/download-manuals.htm.

4. **Node Manager Software.** Windows-based software used for discovery and configuration of Laureate Ethernet Nodes. It configures each Node by setting up communication parameters, naming the Node and associated devices, entering email addresses for alarm notification and data requests, selecting the Node's time zone for time-stamping of emails and streaming data, and upgrading the Node's firmware. Downloadable from http://www.laurels.com/download-software.htm.

Note that Node Manager Software, Datalogging Software, and Instrument Setup Software use the same core software modules to discover and establish communications with Laureate Ethernet Nodes and any devices attached to them via an RS485 bus. Node Manager Software includes additional modules to configure the individual Nodes, while Instrument Setup Software includes modules to set up the individual instruments.

3. XLOG2 SOFTWARE INSTALLATION

Always notify

Set User Account Control (UAC) to "Never notify" so that Datalogging Software can create directories. The UAC change slider, illustrated to the right, can be reached as follows:

- **Under Windows 7,** click on the Windows Start button in the lower left of the desktop and enter "UAC" in the search field.

- **Under Windows 8,** navigate to Control Panel, then to the "User Accounts and Family Safety" section, and click on "Change User Account Control Settings."

- **Under Windows 10,** click on the Windows Start button in the lower left of the desktop, then on "Settings", and enter "UAC" in the search field.

Reboot your computer for the changed UAC setting to take effect.

Never notify

To install XLog2, go to *http://www.laurels.com/download-software.htm*. Click on the self-extracting file *XLog2.2.0.exe* and save that file in your Windows *Downloads* directory. Double click on the saved file and specify an unzip directory, like *C:\Temp*. This will unzip three files: *logging.CAB*, *setup.exe* and *SETUP.LST*. Double-click on *setup.exe*. This will install your executable file *logging.exe* in the directory *C:\Program Files (x86)\LOGGING*. Open that directory with Windows Explorer, copy *logging.exe,* and paste a shortcut on your computer desktop. To run XLog2 software, double-click on that shortcut.

To update XLog2, Revisit *http://www.laurels.com/download-software.htm* from time to time to ensure that your installed revision is the latest. You can reinstall XLog2 without uninstalling the older version.

The directory C:\XLogData will be created as the default data directory when you use XLog2 for the first time, but another directory can also be used to store your logged data.

Context-sensitive online help is obtained for each XLog2 screen by clicking on a blank portion of the screen and pressing the F1 key.
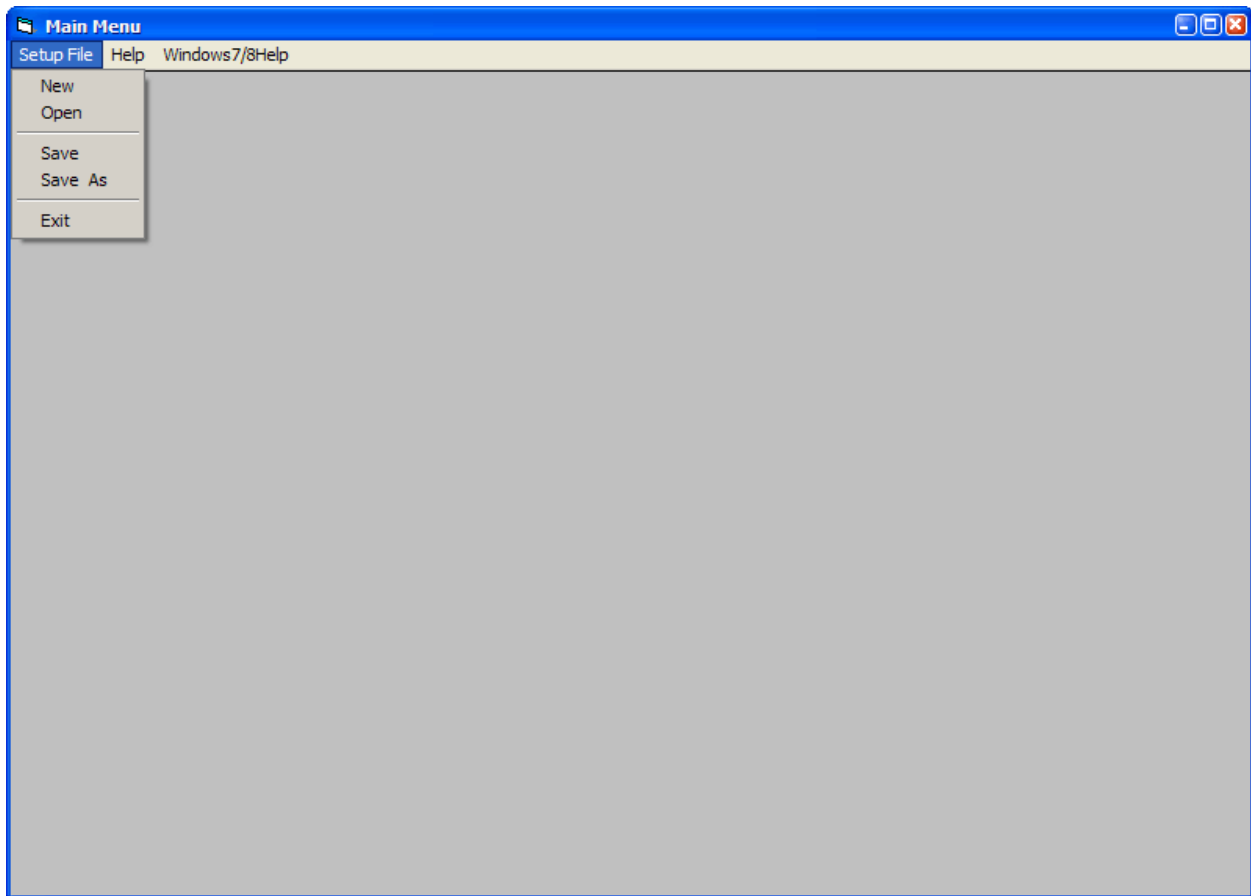
4. XLOG2 SOFTWARE OPERATION

1. INITIAL SPLASH SCREEN
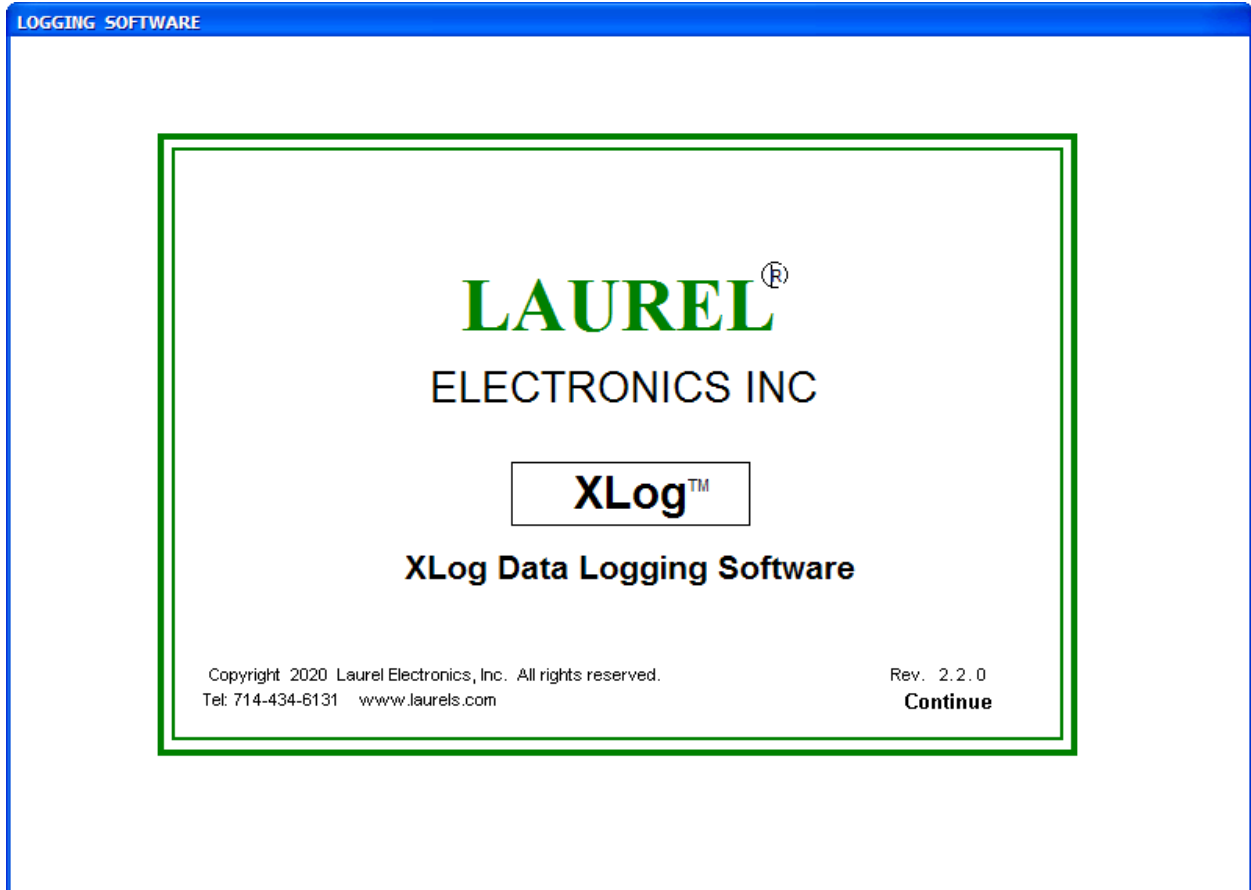
After clicking on the XLog2 shortcut icon, the above splash screen will appear for a few seconds. The software revision described in this manual is Revision is 2.2.0.

2. MAIN MENU SCREEN

Use the Main Menu screen to make a new connection to instruments, to open a previously saved XLog2 setup file, or to save a new or modified XLog2 setup file. Click on *New* to make a new network connection. Click on *Exit* to close XLog2. You will be prompted to save your work.

The XLog2 program automatically creates a directory named *C:\XLogData* to store data when you first run XLog2, but another directory can also be used to store your logged data.

3. NETWORK SELECTION
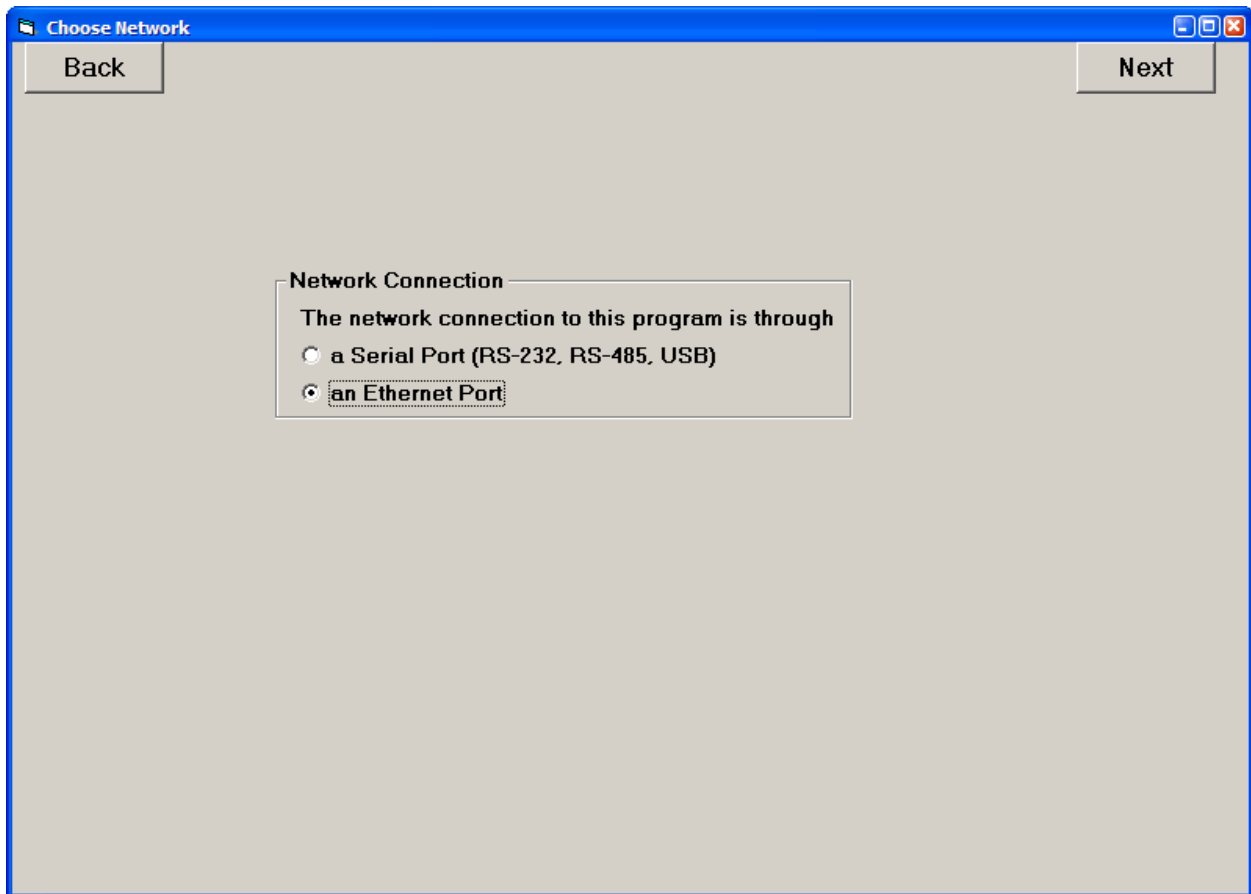
The Choose Network screen allows you to specify if the connection from the computer running XLog is via a Serial Port (RS232, RS485, USB) or an Ethernet Port.

Serial Port requires knowledge of the connected instruments so that the following parameters can be entered on the *Display and Logging Assignment* screen.

Caption…...The name assigned to the Meter to be displayed on the Meter face on the display screen and on the Header record of the Log file.

Type…..…. DPM (analog input), Counter/Timer (pulse input), or Weight Meter

Address….The instrument's serial communication address.

Data………The Data items to be displayed and/or logged: Reading, Peak, Valley, and Items 2 and/or 3 for the Counter/Timer.

Ethernet Port does not require knowledge of the connected instruments because XLog discovers all of the Ethernet Nodes and all Devices connected to each Node. All parameters are displayed on the Ethernet Discovery screen for easy selection.

Press 'Next' to proceed to the Settings screen for the selected Port.
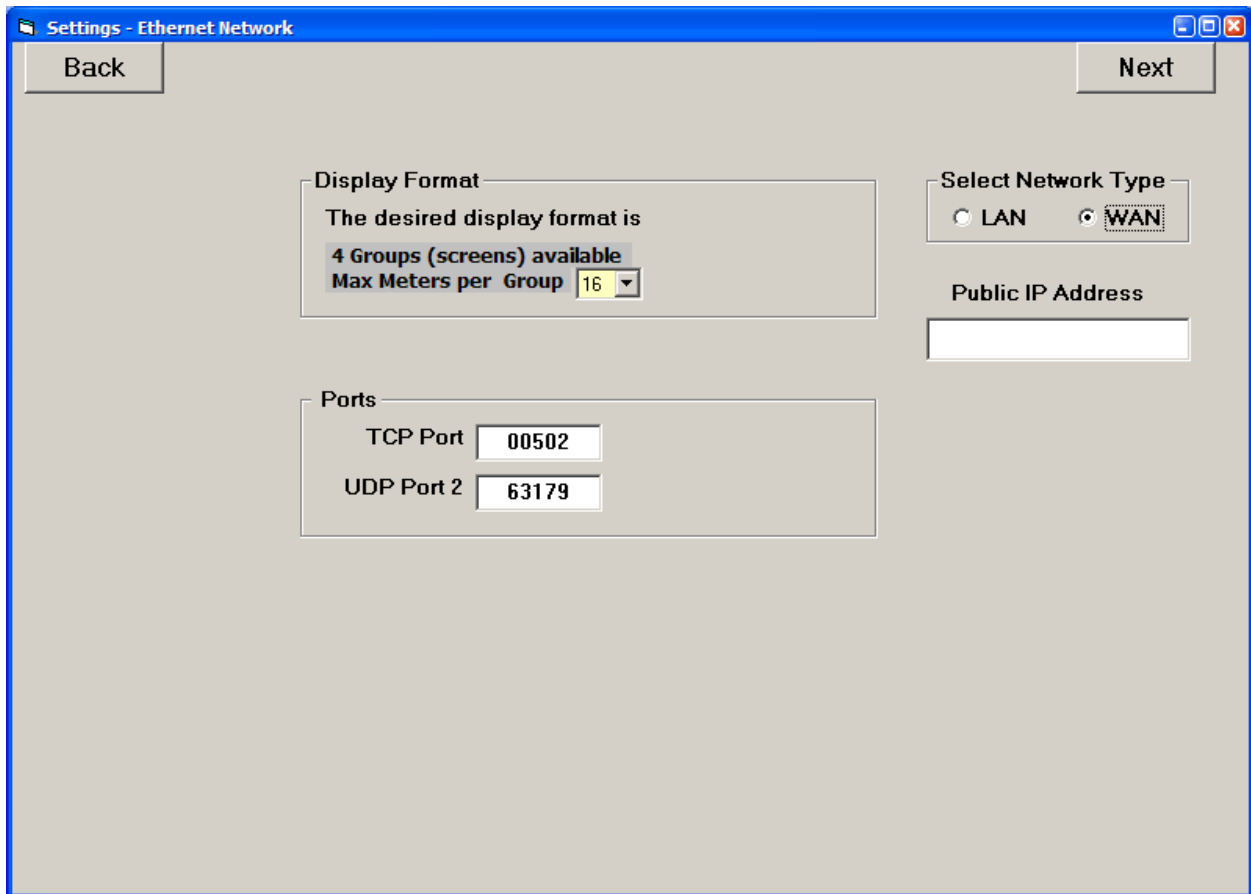
5. SETTINGS – SERIAL NETWORK
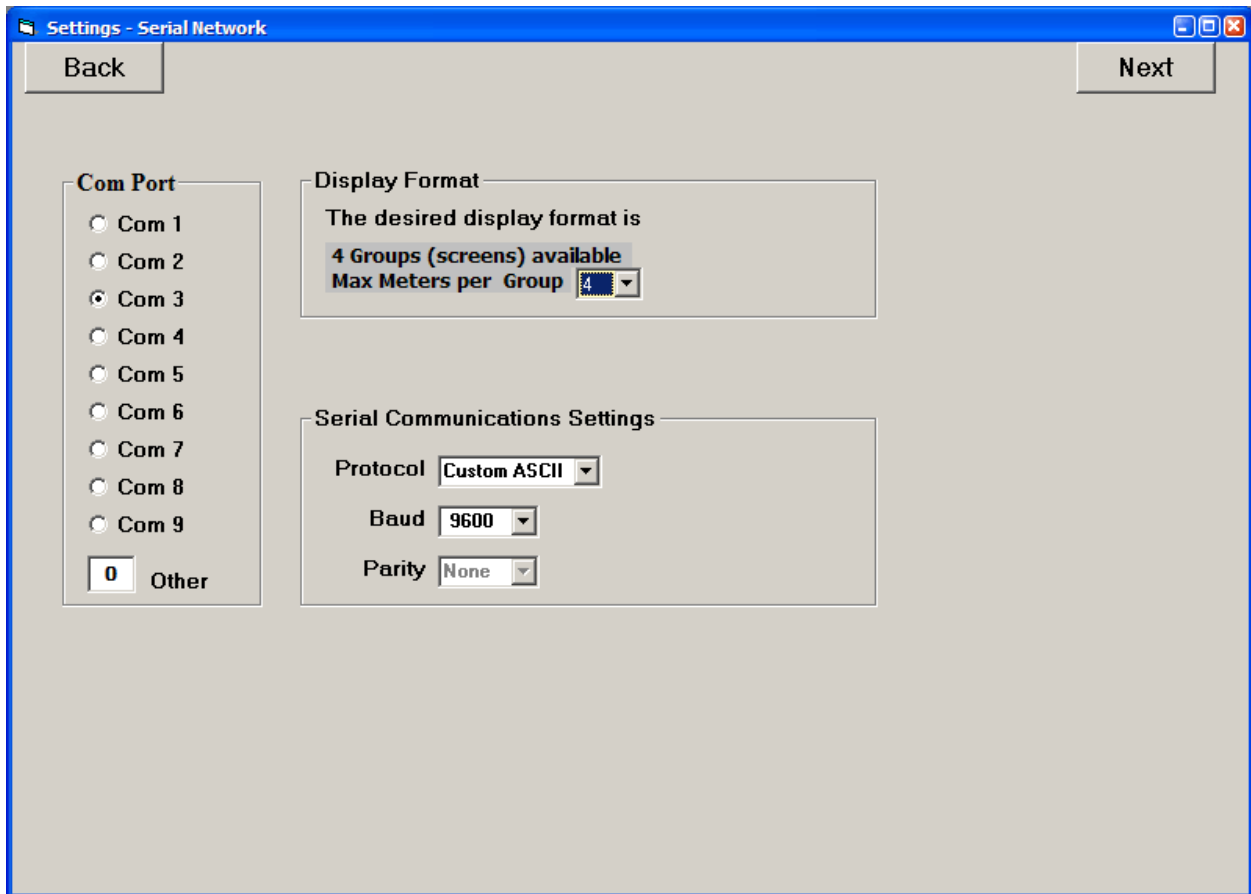
The Settings – Serial Network screen appears when 'a Serial Port (RS-232, RS-485, USB)' has been chosen in the Choose Network screen. It allows setup of the following:

1. **Com Port.** Prior knowledge is required. Use Windows Device Manager to look up the Com port assigned by your PC. With Windows XP, click on *Start > Settings > Control Panel > System > Hardware > Device Manager > Ports (COM & LPT)*.

2. **Maximum number of meter faces** (1, 4, 9, 16) to be displayed on the PC screen in each of four available groups (or screens).

3. **Serial Communications Protocol.** Choices are Custom ASCII, Modbus RTU, and Modbus ASCII. The Custom ASCII protocol is the simplest and is recommended when there is no compelling reason to use Modbus.

4. **Baud rate.** Choices range from 300 to 19200 baud. The default is 9600.

5. **Parity.** Choice for Modbus are None, Odd, Even. The Custom ASCII protocol uses None only.

**Press 'Next'** to proceed to the Display and Logging Assignment screen.

6. SETTINGS – ETHERNET NETWORK

The Settings – Ethernet Network screen appears when 'an Ethernet Port' has been chosen in the Choose Network screen. It allows setup of the following:

1. **The Maximum number of meter faces** (1, 4, 9, 16) to be displayed on the PC screen in each of four available groups (or screens).

2. **The Network Type** as either LAN (direct connection to a Local Area Network) or WAN (connection via the Internet). When WAN is selected for datalogging over the Internet, a box will appear for entering the public IP address of the remote router in xxx.xxx.xxx.xxx format. This IP address is required for discovery of remote Nodes and Devices.

3. **Port numbers,** which serve as passwords for two-way packet transmissions. Enter 502 for the TCP Port. You may also add a UDP Port 2, which will be in effect in addition to the primary UDP Port, which is 63179 but could be blocked by a network administrator.
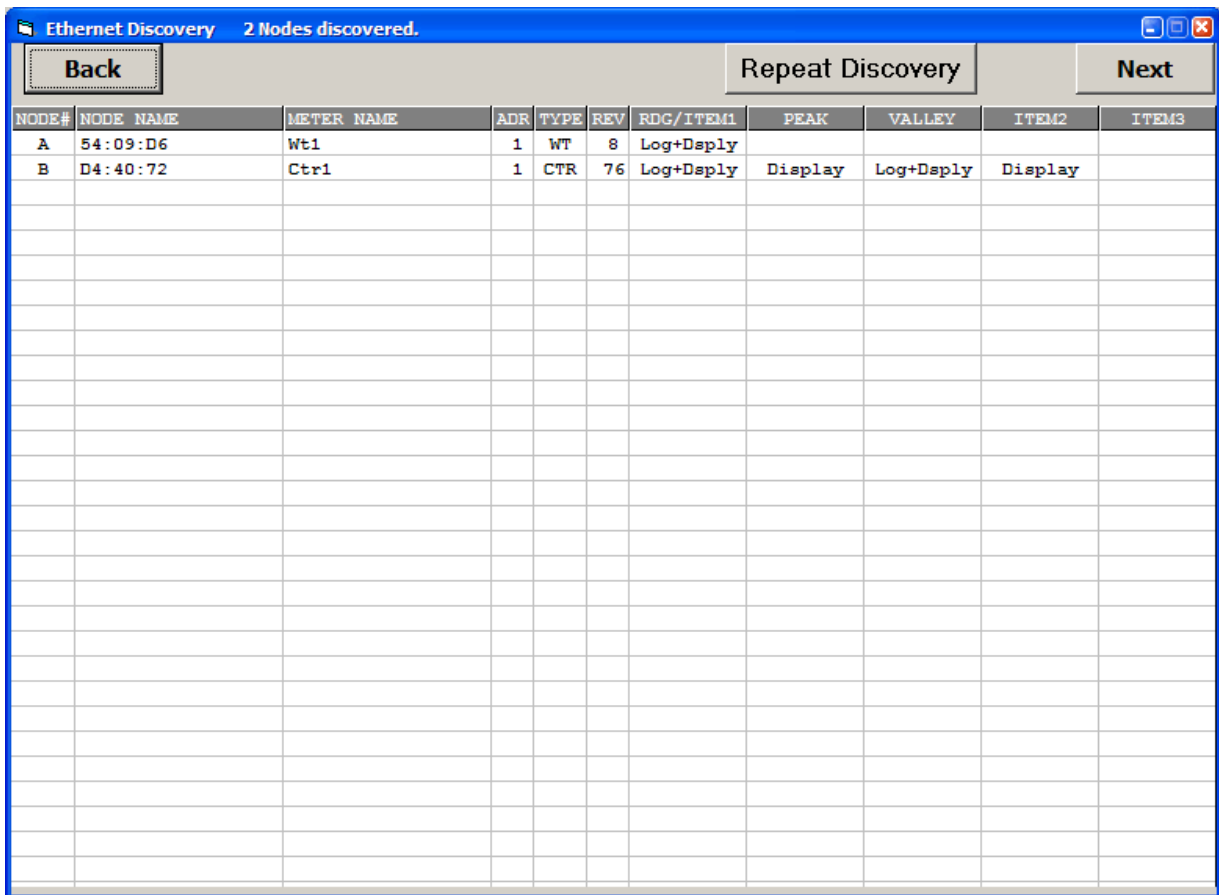
Press 'Next' to proceed to Ethernet Discovery. You may be presented with the Windows Security Alert to the right. Click on *Unblock*.

- 12 -
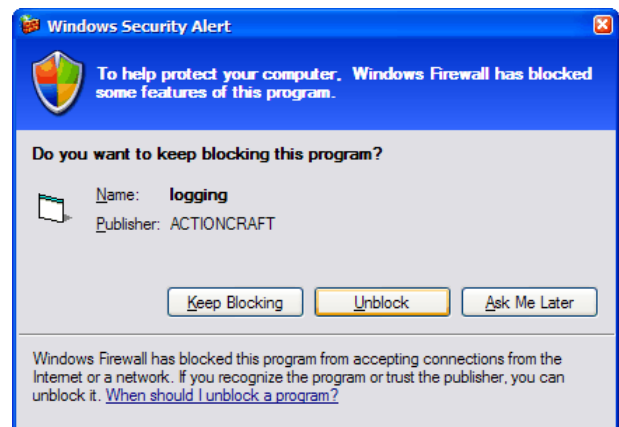
7. SERIAL DEVICE DISCOVERY

If the Devices to be datalogged are on a non-Ethernet serial RS485 line, the digital address of each device needs to be entered manually into Datalogging Software using the "Display and Logging Assignment" screen shown on page 14, along with certain other data. There can be from 1 to 31 Devices per RS485 line. A unique address must have been previously entered into each Device using front panel keys or Instrument Setup Software.

8. ETHERNET DEVICE DISCOVERY

NODE#	NODE NAME	METER NAME	ADR	TYPE	REV	RDG/ITEM1	PEAK	VALLEY	ITEM2	ITEM3
A	54:09:D6	Wt1	1	WT	8	Log+Dsply				
B	D4:40:72	Ctr1	1	CTR	76	Log+Dsply	Display	Log+Dsply	Display	

(Ethernet Discovery   2 Nodes discovered.   Back   Repeat Discovery   Next)

If the Devices to be datalogged are on Local Area Network, Device discovery is automatic. The Ethernet Discovery screen displays all discovered Ethernet Nodes and Devices associated with each Node, and allows setup parameters to be associated with each. Devices can be the single meter or transmitter which hosts the Ethernet Node, or multiple Devices attached to the Node via an RS485 bus. There can be from 1 to 31 Devices (meters and/or transmitters) per Node.

Click on the cells of the last 5 columns to select the action to be taken for each Device. Choices brought up in sequence are: *Log+Display*, *Display Only*, *Log Only*, *Read Only*, and ∗∗∗ for no action.

Click on Next when the selections are complete. This will open the Display and Logging Assignment screen, where the selections may be modified, the display and logging order changed, and Virtual Meters added.

Grid column headings:

NODE#..............The letter assigned by XLog to the Node and to all meters connected to that Node.

NODE NAME....The name assigned to the Node. The default name is "Node" followed by the Node's unique MAC address. Node Manager Software can be used to assign a different name to facilitate recognition.

METER NAME..The name that will be displayed for the Device on the XLog data screens and in logging headers. Descriptive names can be assigned using Node Manager Software.

ADR……………The serial communication address for the Device. This can be 1-31 with the Custom ASCII protocol and 1-247 with the Modbus protocol. For an Ethernet Network, this address is prefaced by the Node#.

TYPE…………..The type of meter or transmitter, either DPM (analog input meter or transmitter), WT (weight meter), or CTR (pulse input counter or transmitter).

REV…………….The Device's firmware revision number.

RDG/ITEM1……The main numerical value normally displayed by a meter or sent by a transmitter. Analog input meters and transmitters can only have one item for display (plus Peak and Valley), while pulse input counters and transmitters can have up to three items for display (plus Peak and Valley).

PEAK…………..All Laureate meters and transmitters can capture the peak (or maximum) reading since last reset.

VALLEY……….All Laureate meters and transmitters can capture the valley (or minimum) reading since last reset.

ITEM2………….In pulse input counters and transmitters, up to three numerical values can be selected for display and datalogging. Named Item1, Item2 and Item3, these are explained in their respective instrument manuals. In a counter, the item to be displayed can be selected by pressing a front panel key. The item can also be selected via serial communications. For example, in the A+B totalizer mode of the dual-channel counter, the sum of A+B is Item1, Total A is Item2, and Total B is Item3. When a counter is reset, Item1 is always displayed.

ITEM3………….Please see ITEM2 above.

9. DISPLAY AND LOGGING ASSIGNMENT

The Display and Logging Assignment screen is used to define the parameters to be displayed and/or logged. Each line represents either a Hardware meter (listed first) or a Virtual meter (listed next). A pop-up Data Entry form appears by clicking anywhere on the grid line and is used to make or edit parameters for that meter. The columns on the Data Entry form match the grid column headings.

Column headings:

ID .... V number which determines the order in which meters are displayed and listed in log files. Automatically assigned as Meters are added to the grid, but may be altered at any time to reflect the user's preferred order.

GP .... Group number which is determined by the V number according to the table shown at the top of this screen. There can be 4 groups of screens with 16, 9, 4 or 1 meters per group.

CAPTION .... Name assigned to the Meter for display on the PC screen and on the Header record of the Log file. Entered manually, can be edited at any time.

TYPE .... The meter type, which can be DPM (analog input), WT (weight meter), CTR (pulse input counter). 'Virtual" is automatically entered when 'Virtual' has been checked in the Data Entry form.

ADDR.......... Serial communications address. Programmed via a meter's front panel or via Instrument Setup Software. Not required for a single instrument.

DATA .... The items to be displayed and logged. These are Reading, Peak, Valley, plus Item2 and Item3 for pulse input counters.

ACTION ...... Selects how the Data is recorded. Selections are Display, Log, Both, Read Only, or None.

Headings Applicable to Virtual meters:

SETPT 1...... The value that determines the Alarm 1 status.

SETPT 2...... The value that determines the Alarm 2 status.

DEC PT ...... Determines the decimal point of the displayed reading.

FORMULA .. Mathematical formula which determines the reading of a Virtual meter as a function of selected readings form Hardware and other Virtual meters. A time integration function can also be applied to totalize readings over time.

For Virtual Meters, Setpoints and Decimal Points must be entered on the Data Entry form. Enter the Decimal Point first and then the Setpoint 1 and 2 values. Enter a suffix H or L to indicate whether the Setpoint is High or Low. An Equation must be entered to determine the displayed value. Any mathematical formula using the following symbols may be used:

() Parentheses used to resolve ambiguities
* Multiplication
/ Division
+ Addition
- Subtraction

Equations are evaluated in the above order. Values from Hardware and Virtual meters may be used in the equation by using the meter ID number with the V prefix. For example, 100*V2/(V3/2+V4). To use the most current values in the equation, the meter ID for the Virtual meter equation should be higher than the meter ID's used in the equation. The equation is limited to 40 characters, so spaces should not be used in long equations.

Virtual meters may display running time by entering an R prefix to a multiplier. If the number is 1 (R1), then the time is in seconds. If the number is 1/60 (R1/60), then the time is in minutes, etc. To display running time as Clock Time, enter a C prefix (C1) instead of an R.

Virtual meters may display the time integral of a value by entering a T prefix to the equation. For example, adding a T to the above equation, such as T100*V2/(V3/2+V4), results in the time integral in value-seconds. If the example value is in Watts, it can display Watt-hours by dividing by 3600, such as T100*V2/((V3/2+V4)*3600). Time starts when the Program screen is displayed, but Virtual meters having time equations with R, T or C prefixes are displayed with a RESET command button on the meter face. Clicking the RESET button causes the Time or Time Integral to start again from time zero. To simultaneously reset several meters, click on the group tab RESET button, which activates the Meter Reset screen, then follow the Help instructions.

Click on 'Check Com' to check communications. If these check out as OK, 'Next' is enabled, and click on 'Next'.

10. LOGGING SETUP

The Log Setup screen provides selection of the logging record parameters, the name of the Data File to be logged, and whether the Data File is to be a text file or an Excel file.

'Log to' allows you to select if the log file is a text file readable by a text editor (extension .df1) or an Excel file readable by the MS Excel (extension .xls). The file will be located in the application directory /Files. The log file name will be as specified under 'Data File Name'.

'Data File Name' is a drop-down box which provides choices for the selected file type:
- Text File: Create New Data File; Open existing Data File; No Data File (display data only).
- Excel File: Create New Excel Workbook; Open Existing Excel Workbook; No Workbook (display data only). If 'Create New' is selected, then any directory can be selected as the location for the Data File/Excel Workbook. The default directory is c:\XLogData.

Header Records may be selected to consist of the Date and Time Stamp Only or a Full Record Header containing the Date and Time Stamp plus each of the Meter Names. Regardless of which is chosen, the program screen provides the option of including or omitting the Header. The date and time are obtained from the computer.

Data Records may be configured to include or omit independently a Date Stamp, a Time stamp, Alarm Data and Leading Zero Suppression of the reading.

Data Logging Intervals may be selected to be from 1 second to 9999 seconds. The actual logging interval will depend on the number of meters being logged, the number of readings per meter, and the Network type. Entering 0000 results in the minimum logging interval.

A Separator character may be chosen to separate the data values in the record. Any printable character may be entered into the box. For space, enter 'sp'. For tab, enter 'tab'.

'Save' and 'Save As' command buttons allow you to save the Setup File that contains all configuration parameters entered on all screens. You will be given the option to password protect the file. The Setup File is located in the application directory/Files and has the extension .sf1. The Setup File can also be saved from the Main Menu screen. With 'Save As', any directory can be selected as the location for Save File. The default directory is C:\XLogData.

Click on 'Next" to proceed to the Program screen and actual datalogging.

11. LOGGING OPERATION
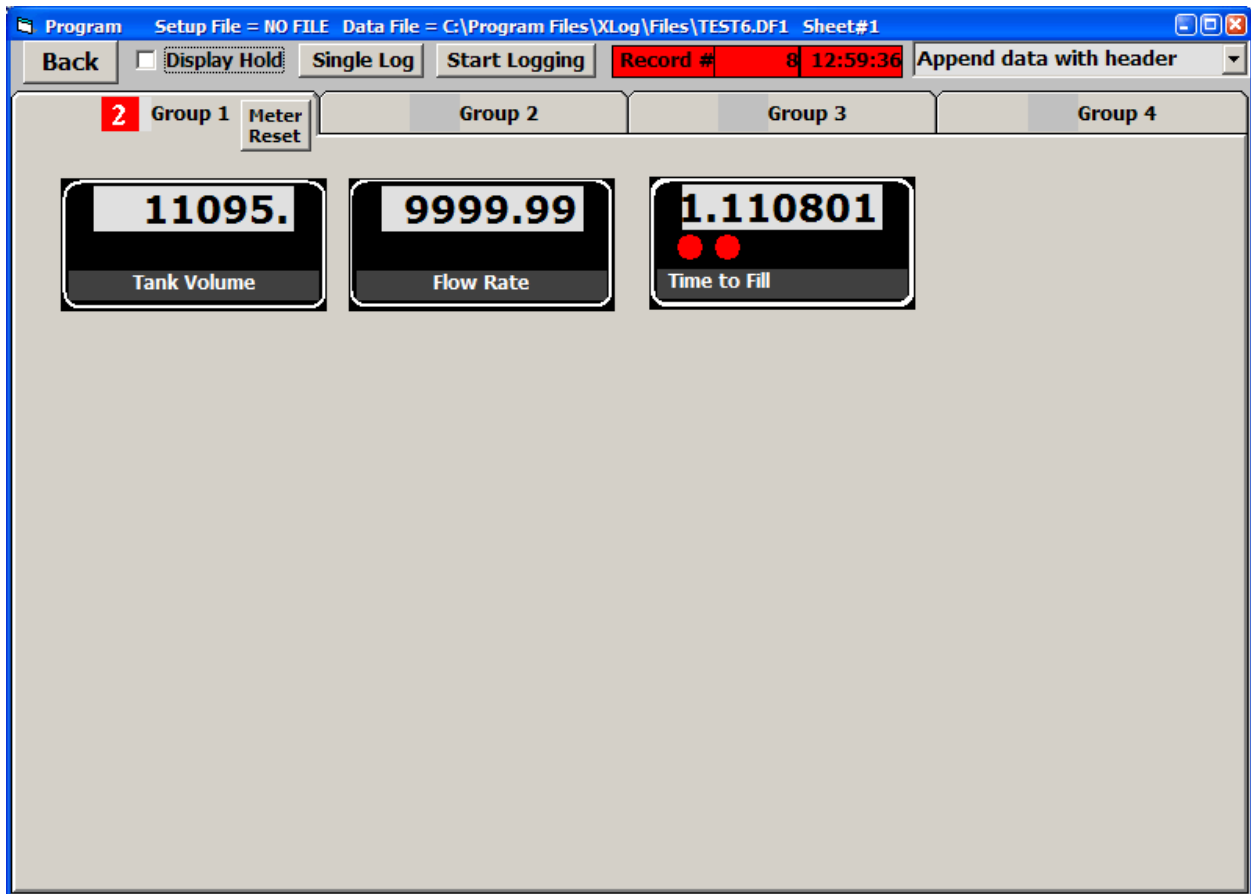
The Program screen displays all of the Meter faces selected for display in 4 groups of either 16, 9, 4 or 1 as selected on the Settings screen.

Before logging to file, make one of three selections presented in the upper right of the screen: 1) Overwrite any existing data (erases file before writing), 2) Append data with Header, or 3) Append data without Header.

Click on 'Start Logging' to start logging to file.

Click on 'Stop Logging' to stop logging to file.

Click on 'Single Log' to log individual records on command.

The readings on the Meter faces are updated continuously whether logging is in process, but they may be held by checking the 'Display Hold' box. When the box is unchecked, the readings begins updating again. The status of this check box has no effect on the logging process.

The total number of alarms is shown in a red box for the selected Group. The number of alarms is shown even for the tabs whose Meters are currently hidden.

The number and time of the last record are displayed in red cells at the top of the screen. If the data is being logged to a text file, the logged data can only be observed from the Meter faces. If the data is being logged to an Excel file, the Excel screen may be visible in the background and can be brought to the foreground by clicking the Excel symbol on the Task bar. Clicking the symbol again returns the Program screen to the foreground, which is necessary to Stop Logging.

Virtual Meters that have a time function in their equation (R, T or C prefixes) are displayed with a RESET command button on their Meter face. Time starts when the Program screen is displayed, but clicking this RESET command button causes the Time or Time Integral to start again from time zero. To simultaneously reset several meters, click on the group tab RESET button which activates the Meter Reset screen, and follow its Help instructions (F1 key).

Rev. 20 July 2021