

# BoilerWorx™

## WINDOWS BASED SOFTWARE FOR THE FIREYE E340 BOILER OPERATING CONTROL

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### DESCRIPTION

#### What Does BoilerWorx™ Do?

BoilerWorx software enhances the operation of the E340 boiler control by presenting graphically superior information about the functions and operation of your boilers. BoilerWorx operates in the Windows 95, 98, NT and XP environments and allows you to:

- View up to six (6) boilers simultaneously
- Zoom in on any individual boiler for complete information
- Export REAL TIME data to a spreadsheet in selectable intervals
- Connect locally using E500 Communication Interface or EC485
- Connect remotely using a modem and the public telephone system
- Improved modem operation with Ver. 2.2C
- Configure all E340 set-points
- Maintain any number of sites in the Serviceman's Phonebook
- View pressures and temperatures on color coded gauges
- Direct connect allows modbus connection to Flame-Monitor
- Automatic pop-up screen if lockout detected
- Telephone call-out available to send numerical message to pager

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### GETTING STARTED

Fireeye assumes the user has a basic understanding in the use of the Windows operating environment, particularly configuring and setting up modems. BoilerWorx is designed to conform to TAPI communication interface standards which is supported by Windows. Almost all functions of the modem are handled by Windows and not BoilerWorx. A later section in this manual describes the basic modem setup procedure, but this is no substitute for the modem manufacturer manual or the Windows manual. Many installations of BoilerWorx require no additional modem configuration. If problems do arise, consult the section entitled "Setting Up Your Modem" and your Windows documentation.

## SYSTEM REQUIREMENTS

To use BoilerWorx for Windows, your computer must have Windows successfully installed and must meet the following minimum requirements:

- IBM 486-66 (Pentium preferred) PC or better
- 16 MB installed memory (32 MB recommended)
- 20 MB available disk space
- 2X CD-ROM drive
- 256-color VGA (640 x 480) resolution, optimized for 800 x 600
- One available COM Port or Internal Modem installed

## ORDERING INFORMATION

Part Number	Description
E720W-CD	BoilerWorx Software package with Compact Disc
ED610	Multi-port connector with terminal strip and phone jacks
ED512-2	2 foot cable with RJ12 connectors for connection to ED610
ED512-4	4 foot cable with RJ12 connectors for connection to ED610
ED512-8	8 foot cable with RJ12 connectors for connection to ED610
EC485	RS232 to RS485 connector with DB25 connector
E500-1	Communication Interface

## INSTALLATION

1. Insert the BoilerWorx compact disc in CD-ROM drive.  
If the auto-start feature of Windows is not enabled, do the following:
  - Select Start, then Run.

To install from the compact disc, select BROWSE and select the CD-ROM drive. Click on SETUP and select OPEN.

2. Follow the onscreen prompts and select the defaults for installation
3. Start BoilerWorx from the "Programs" menu.
4. See Installation Problems for additional information.



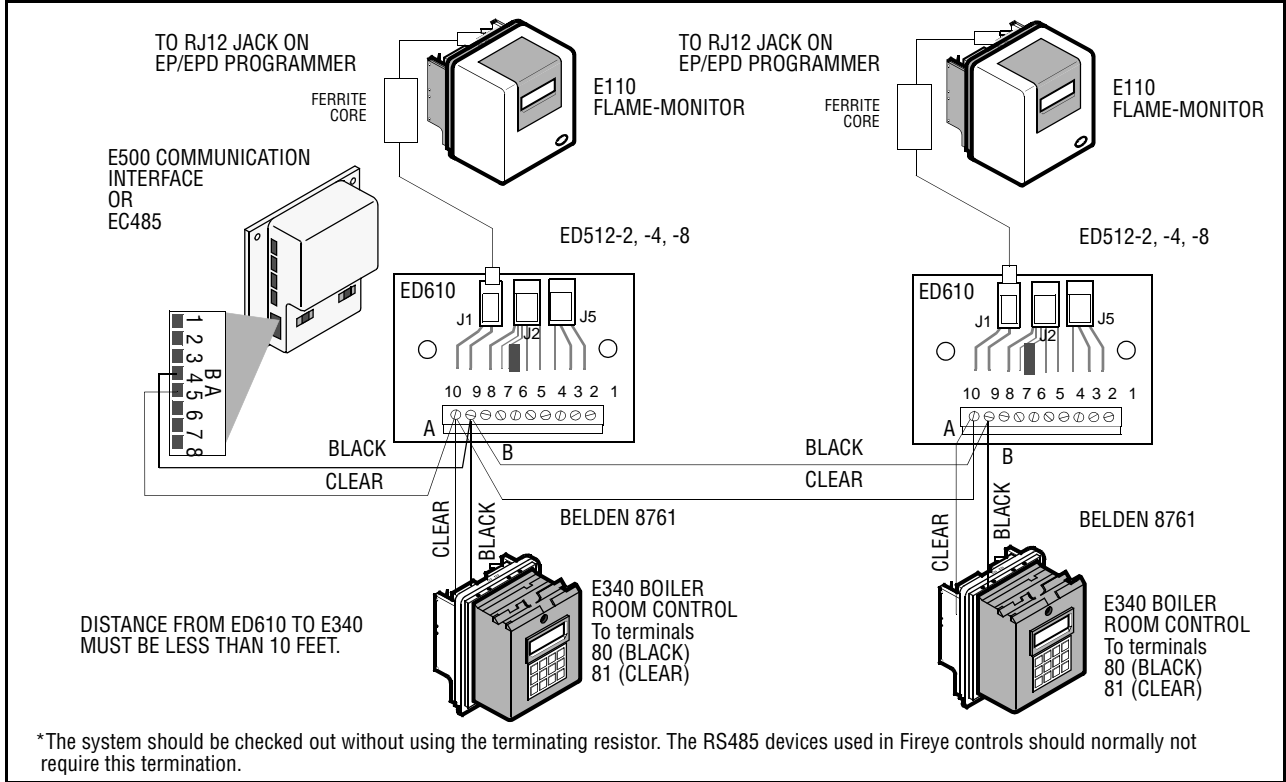
**WARNING: Selection of this software should be made by a competent professional. Inappropriate application of this product could result in an unsafe condition hazardous to life and property.**

### BEFORE CONNECTING WITH BOILERWORX

The site to be connected must be properly prepared to assure the installed equipment satisfies the requirements of BoilerWorx. If direct connection is to be used, the baud rate of the E340 boiler controls and E500 Communication Interface must be set at 4800 baud. The CTS delay of the E340 should be set to at least 150. Each E340 and E110 system must have a separate and unique DEVICE address. The RS485 wiring used for communications must meet EIA specifications. In addition, product of the latest engineering code should be installed. Refer to bulletins E-3401, E-1101, E-5001 and SN-100 for further information.

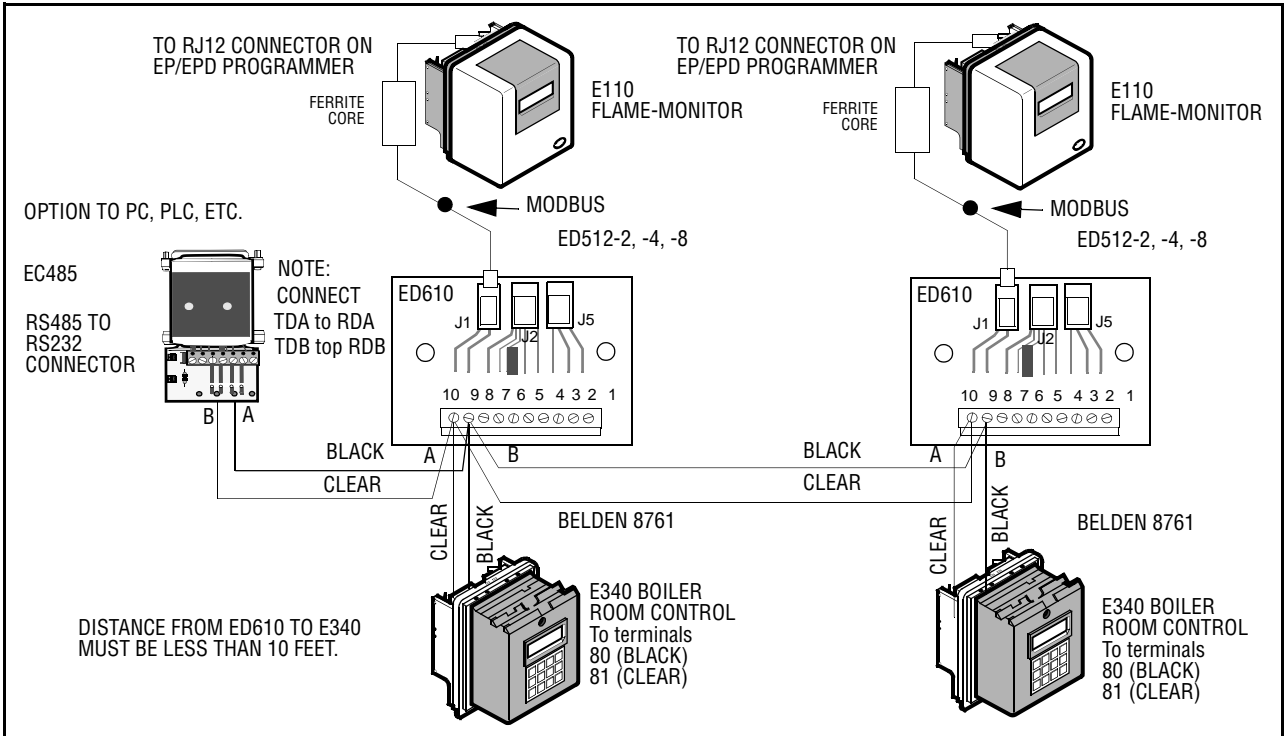
A typical wiring arrangement might consist of connecting the E110 Flame-Monitor system to an ED610 using ED512 cables and connecting the communication terminals located in the E340 wiring base to the same ED610 and then multi-dropping this using twisted shield pair (TSP) to the next system. Refer to the figure below.

**FIGURE 1. Connection Method using E500**



BELDEN 8761	TERMINAL CONNECTIONS		
	E500	ED610	E340
BLACK	4 (B)	9	80
CLEAR	5 (A)	10	81

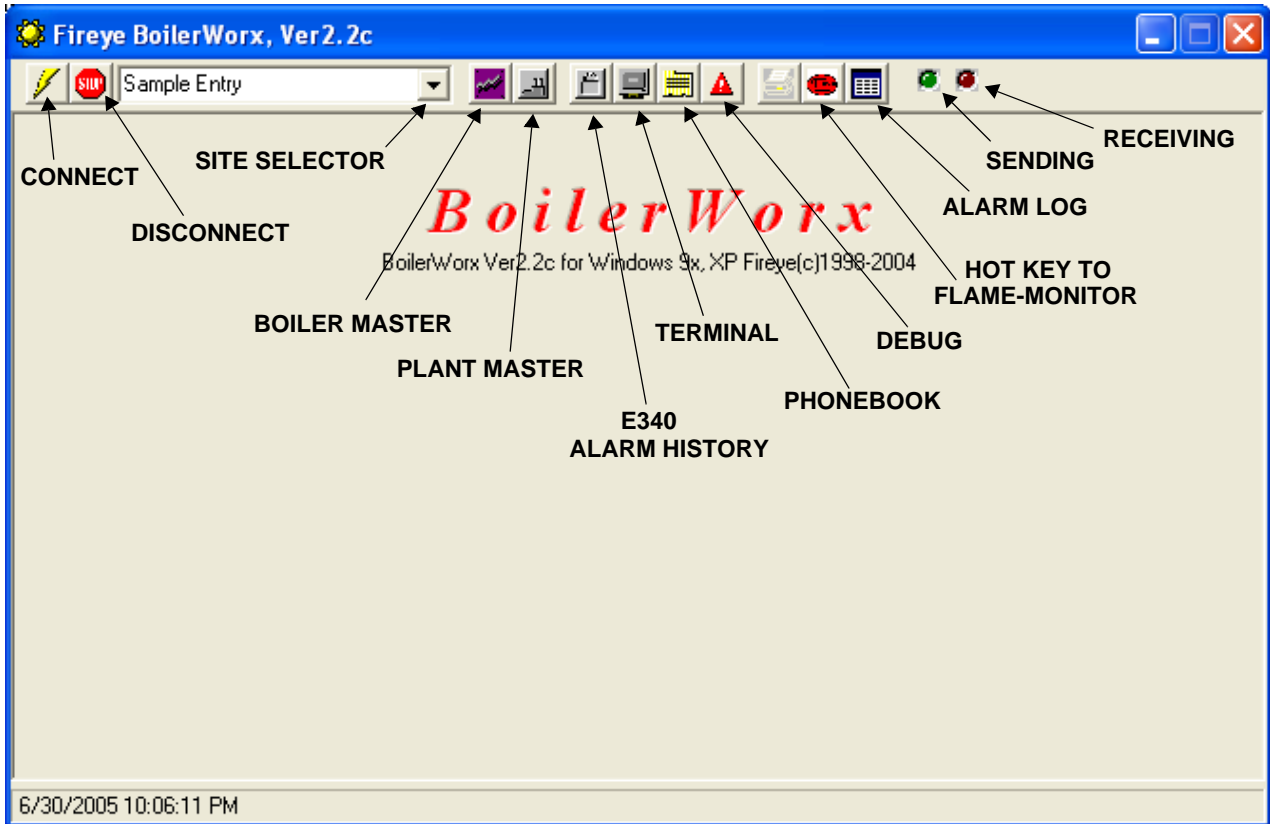
**FIGURE 2. Direct Connection Providing Modbus to Flame-Monitor**



## OPERATION

After the introduction screens are displayed and BoilerWorx initializes, the main background is displayed. The toolbar located at the top of the screen contains a drop down box that displays the site connected, the Lightning Bolt (connect), the Stop Sign (disconnect), and other icons that perform various functions, such as PlantMaster, Terminal, Phone Book and Debug. Two LED indicators are provided to show the status of the serial communications sending and receiving. Balloon help is provided by and activated by placing the mouse arrow over each of the items for a short period of time.

FIGURE 3. Main Background Screen

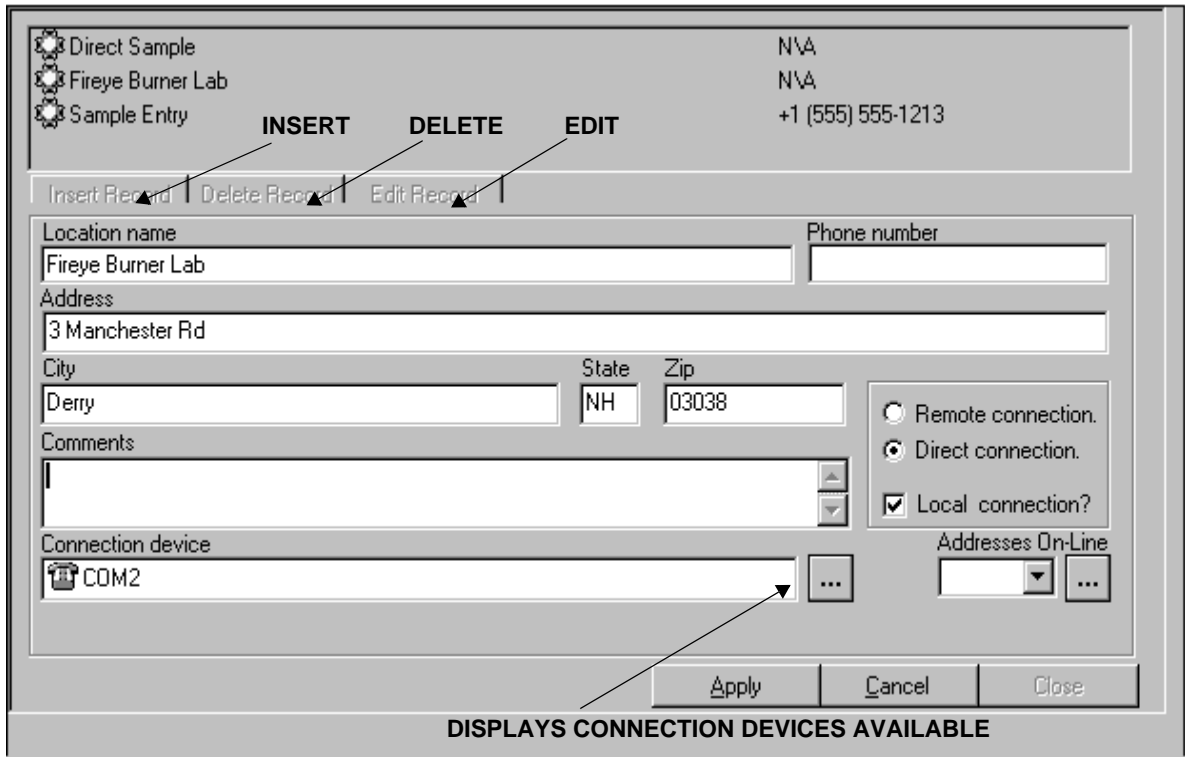


The status bar at the bottom of the screen displays the current date and time and will also display other key information after a connection is made such as the device address and alarm indication.

## PHONEBOOK

Before attempting to connect to any site location, information about the site must first be entered into the BoilerWorx Phone Book. The Phone Book is accessed by clicking on the folder icon located on the main screen toolbar. BoilerWorx stores the information you enter about each site in a database format. Included in the BoilerWorx are two examples of a direct connect location as well as a remote location. An unlimited number of sites can be entered into the Phone Book. The only limitation is available disk space. Records or sites can be inserted, deleted or edited.

**FIGURE 4. Phone Book Screen**



To add a new site click on the Insert Record tab. This will bring up a blank form where you enter specific site information. Site information includes location name and location address for identification and the method of connection and whether it is local or remote. The location name is used in the main screen drop down box. For remote connection, be sure a modem has been previously configured for BoilerWorx. Refer to “Setting Up Your Modem” if necessary. Click on the connection device selection button and BoilerWorx will display resources available for the connection mode selected.

BoilerWorx offers 3 methods of communication, remote connection using the E500 Communication Interface as shown in Figure 4, direct connection using the E500 Communications Interface and direct connection through an RS232 to RS485 adapter. With the latter direct connection, BoilerWorx automatically communicates with any connected Flame-Monitors and in the event of a lockout, will provide a popup screen indicating the lockout cause.

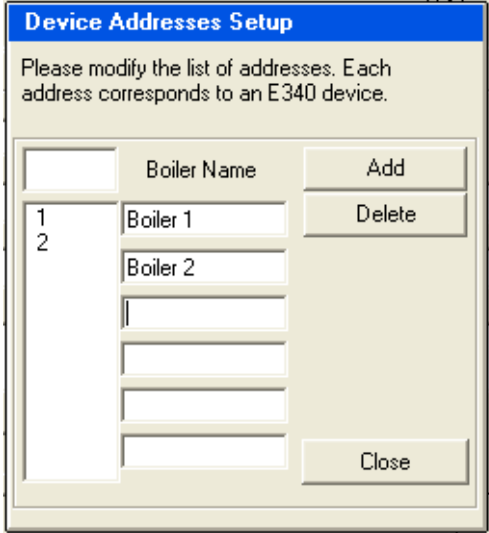
For remote connection both the E500 box and Remote connection option are selected, for direct connection with the E500, both the E500 and Direct connection option are selected and for direct using RS485, only the Direct option is selected.

The available remote call-out feature when a lockout is detected is only available in the Direct method using RS485.



For direct connection, a list of COM ports will be displayed and for remote connection the installed modem or modems will be displayed. If direct connection is selected, be sure to select the proper COM port and for remote connection your installed modem must be indicated.

BoilerWorx must also know the logical addresses of the E340 controls located at the site. Click on the Address On-Line selection button that will cause the Device Address Setup dialog box to appear.



Here, you will enter the addresses of the E340's located at the site and click ADD as you enter them. The addresses can be added in any order as they are sorted by BoilerWorx. If an error is made, simply select the address and click on DELETE.

Each boiler address can be given a unique name. Simply click in the box and enter the name to be displayed. When complete, click on the CLOSE button of the Address Device Setup box.

If remote connection is selected the telephone number for the site must be entered. Click in the phone number text box. Enter the full phone number including the area code. When done, BoilerWorx will convert the phone number to canonical format to conform to TAPI specification. If the telephone number is an extension line having less than the standard seven numbers, you must first enter +1 followed by the area code, in brackets,

followed by the extension number, i.e. +1[603]1510.

A Comment text box is provided that enables you to enter any notes about the site. When complete entering the site data into the Phone Book, click APPLY and then CLOSE to return to the main screen.

Existing site information can be edited by first selecting the site followed by the Edit Record tab. The site data is now open for revision. When complete, the database will be updated with the new information., Click on the APPLY button followed by CLOSE to return to the main screen.

## CONNECTING TO A SITE



From the main screen, click on the Site Selector down arrow to display a list of sites from the Phone Book and select the site to be connected. Click on the Lightning Bolt to initiate the connection procedure. For a remote connection, a status box will appear indicating that BoilerWorx is dialing the telephone number.

BoilerWorx will now dial the number associated with this site and wait up to 1 minute for the E500 to respond. If there is no response, the procedure will be terminated, a message box will be

displayed and BoilerWorx will return to the main screen. After the E500 picks up or answers the call, the BoilerWorx modem and the E500 modem begin a handshaking process. The E500 modem is 1200 baud. It is necessary that the BoilerWorx modem be configured to operate at this low speed. Refer to "Setting Up Your Modem" for more information.

After a short delay the Operation in Progress box will change to indicate that handshaking was successful and BoilerWorx is now waiting for the pre-amble from the E500.



After an internal delay built into the E500 to allow the telephone connection to stabilize, the E500 pre-amble will be sent to the pc and BoilerWorx will display this information on the main screen below the Operation in Progress box.



After an established connection, BoilerWorx will now allow you the option of continuing on with normal operation or entering Terminal mode. In Terminal mode, you can query the E500 as to the status of the units located at that site and verify that all equipment is functioning properly.

Simply hitting the space bar or enter key on the keyboard or selecting No with the mouse will cause BoilerWorx to advance. If nothing is selected within 10 seconds, BoilerWorx will assume NO and proceed to the next process automatically and begin retrieving data from the E340 addresses specified in the Phone Book. Selecting Yes will cause BoilerWorx to enter Terminal mode which is a terminal emulator that will allow you to interrogate the E500 directly. See the section on Terminal Mode and refer to bulletin E-5101 for additional information.

The Operation in Progress box will again be displayed with a status bar that continually fills as data is being retrieved from the E340's at the connected site. There are two LED's located on the main screen toolbar placed to give you visual feedback regarding sending and receiving data. Due to the amount of data and speed of the modem, it takes approximately 1 minute per controller to receive all the information.

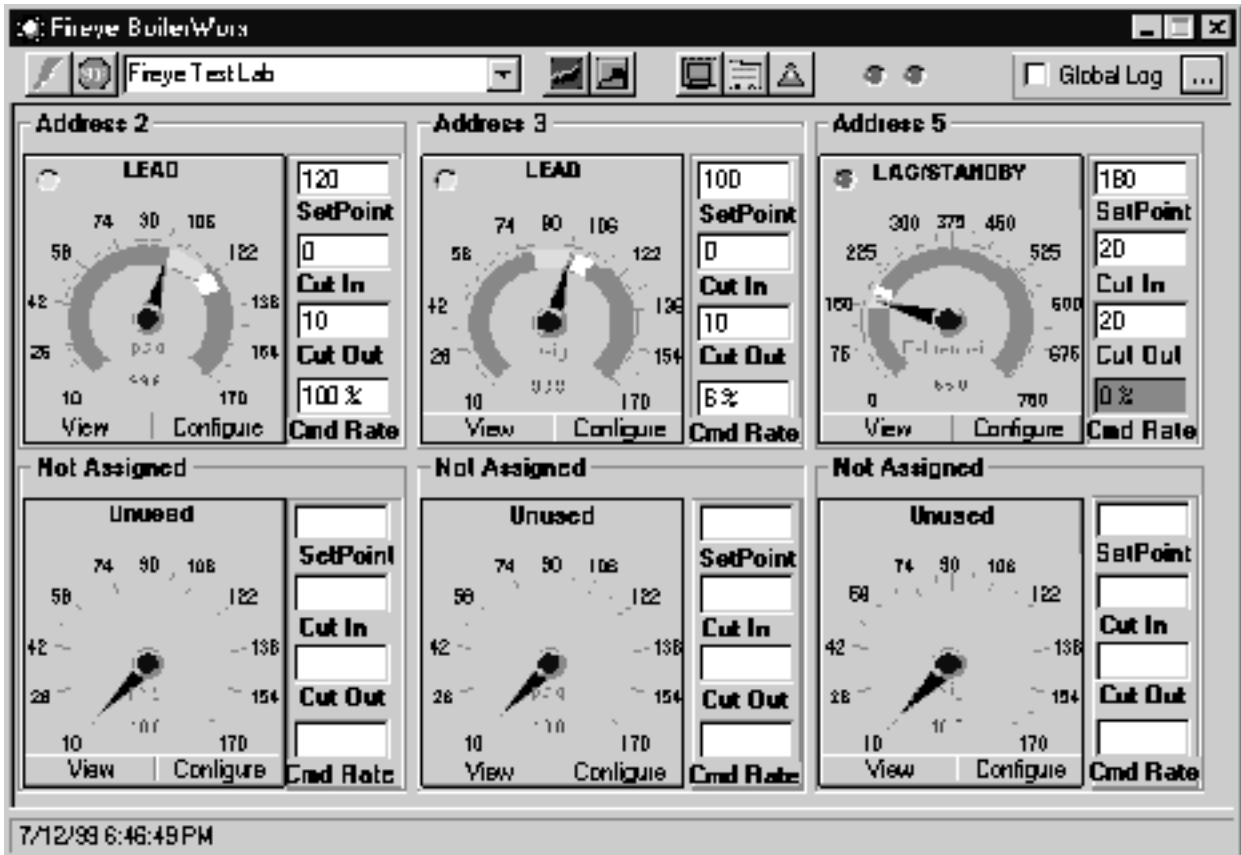




After the status bar is filled, indicating all current data from the E340's has been received, the Plant Master screen is now displayed. Plant Master can also be displayed by clicking on the Plant Master icon located on the main screen toolbar. See Figure 1. This is usually done from other screens such as View and Configure and will be described in later sections. The Plant Master screen displays the control variable gauge of each of the connected E340's along

with setpoint information and current firing rate position. On each gauge are two LED's. The green LED, located in the upper left corner, when illuminated, indicates the fuel valve of that particular boiler is open, and of course the boiler is firing. In the upper right corner of each gauge is a red LED. When visible and lit, this indicates there is an alarm on that particular boiler. This LED remains hidden and unlit if no alarm is present. Also, if the command rate box is grayed out, this indicates the operating control for that particular boiler is open and the boiler is off line

FIGURE 5.

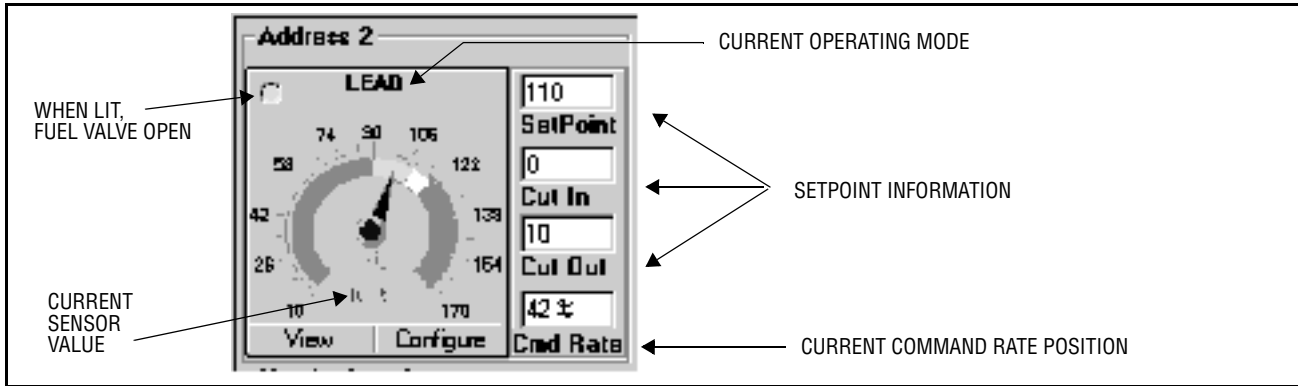


The Plant Master screen displays data from the E340's that are specified in the site description in the Phone Book. Since the Plant Master screen has the capability to display up to six E340 controls, all other gauges will display as Unused with the address as Not Assigned. If a specified address is not communicating properly, the address will be displayed, but its operating mode will be displayed as Unused.

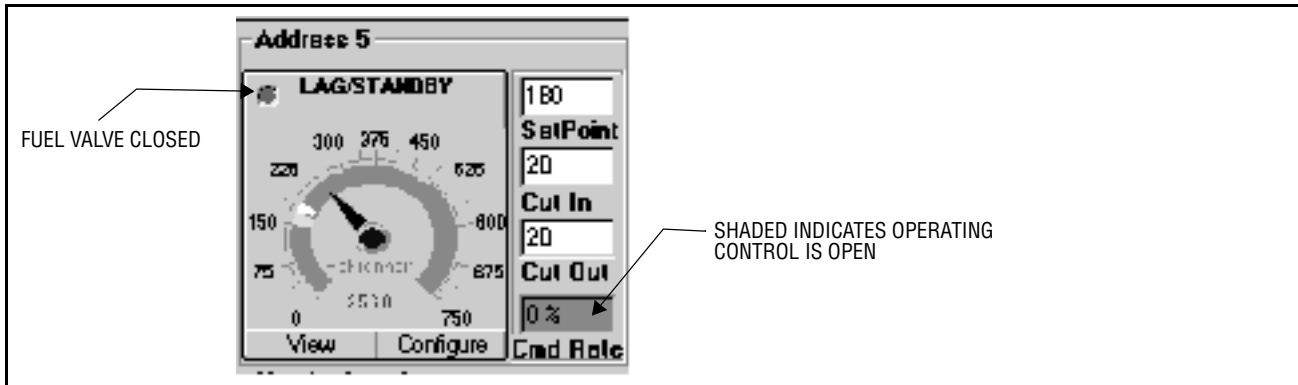
Under normal operating conditions, the Plant Master screen is used to move to other screens and is always the return destination from other screens.

### PLANT MASTER GAUGE DESCRIPTION

Each gauge on the plant master screen represents the control variable of the E340. Figure 3 shows 2 gauges configured as steam for address 2 and 3 and 1 gauge for address 5 configured as water. Each gauge is color coded to highlight the various setpoints and their ranges.



The gauge is scaled in accordance with the installed sensor. The yellow portion extends from the setpoint to the cutout point. The green section spans the modulating range, extending from the setpoint to the point of setpoint minus the mod range setting. The red section on the control variable gauge represents any point above the cutout point below the modulating range. (There is no low alarm limit for the control variable).

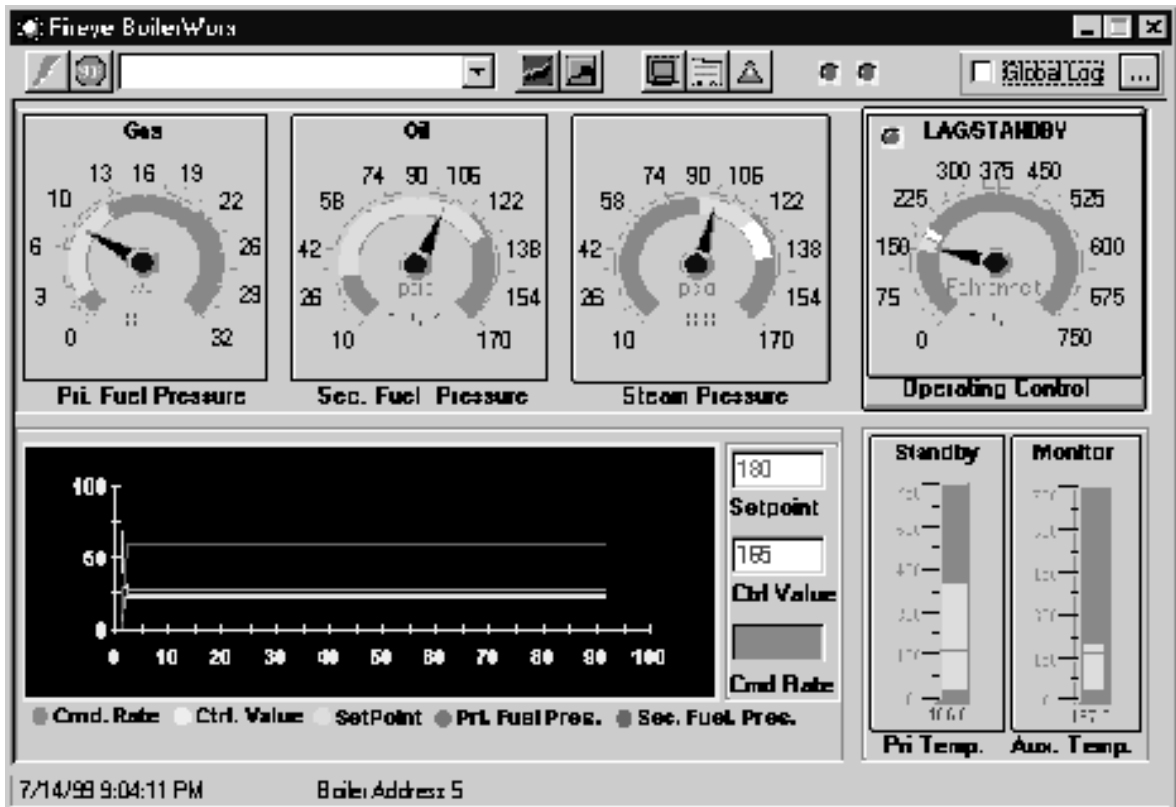


## VIEW SCREEN

From the Plant Master screen, any of the connected boilers can be ZOOMED-IN by clicking on the VIEW button. This button is located within the control variable gauge. The VIEW screen displays a gauge for each of the pressure and temperature sensors of the E340 regardless if they are used or unused. Each gauge is scaled and labeled according to the current setup configuration data received from the E340.

Since the E340 can be operating in any one of 4 operating modes at any given time with the control variable being either steam pressure or water temperature, a gauge is displayed indicating the current control variable and scaled to that sensor's units of measurement.

FIGURE 6. View Screen



The View screen also contains a color-coded chart that displays relative values for the control variable, command rate, set point, primary and secondary pressure sensors. The chart is continuously updated with new values received from the site. When the chart scrolls to its maximum position on the right, the chart will reset itself and begin re-charting from its mid-point position. The values of each of the sensors are displayed relative to 100% of their respective maximum value.

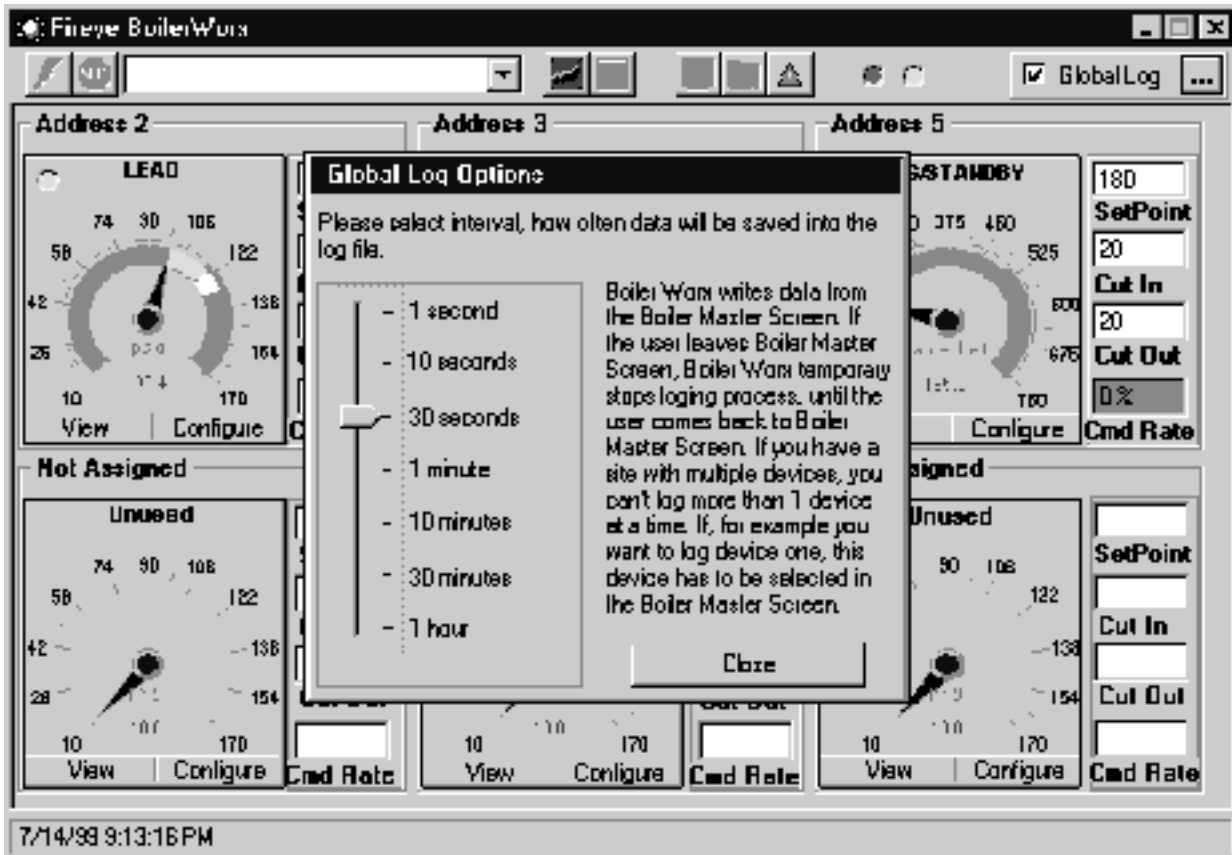
Within the trend chart are three informational boxes textually displaying the setpoint, control value and command rate. A grayed out command rate box indicates the boiler is currently off line in the Standby mode.

The status bar indicates the address of the E340 that data is being requested and received from and will also indicate the status of the E340 alarm. A red LED in the upper right corner of the operating gauge also indicates an alarm condition.

## GLOBAL LOGGING

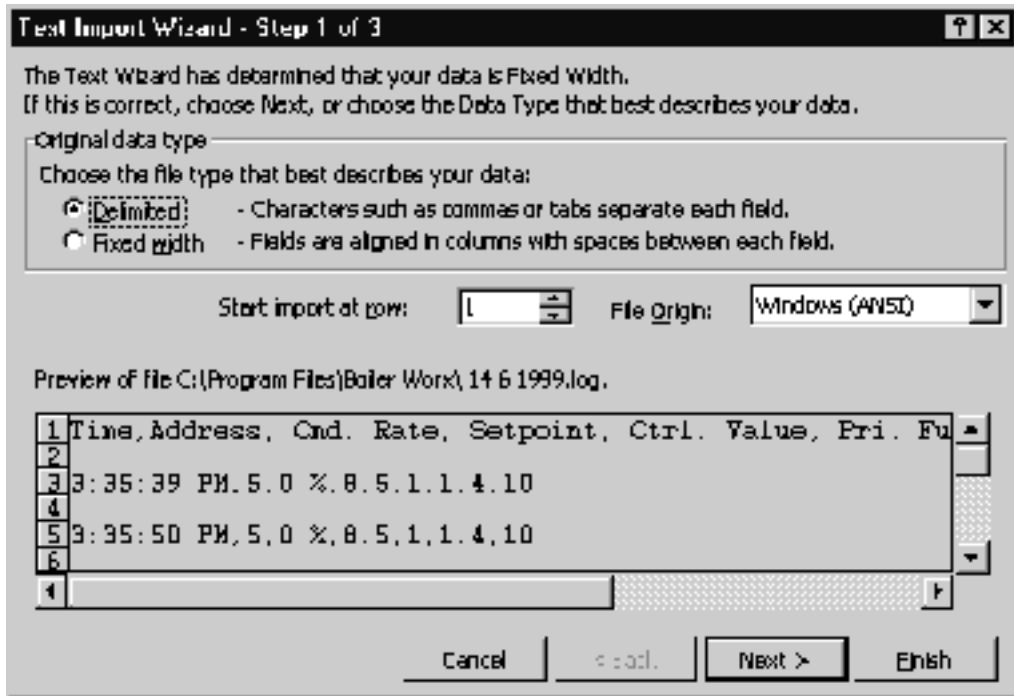
BoilerWorx provides the capability to data log the information from each of the connected boilers at a selectable time interval. The data is saved to a distinct file located in the same directory as the BoilerWorx program. The file is identified as ddmmyy.log. The data file can be later recalled into a spreadsheet such as Excel or Lotus and will be explained later. To enable global logging, click on the check box located on the toolbar of the main background screen. A selection box will appear that allows you to determine the data logging interval.

**FIGURE 7.** Log Interval Selection

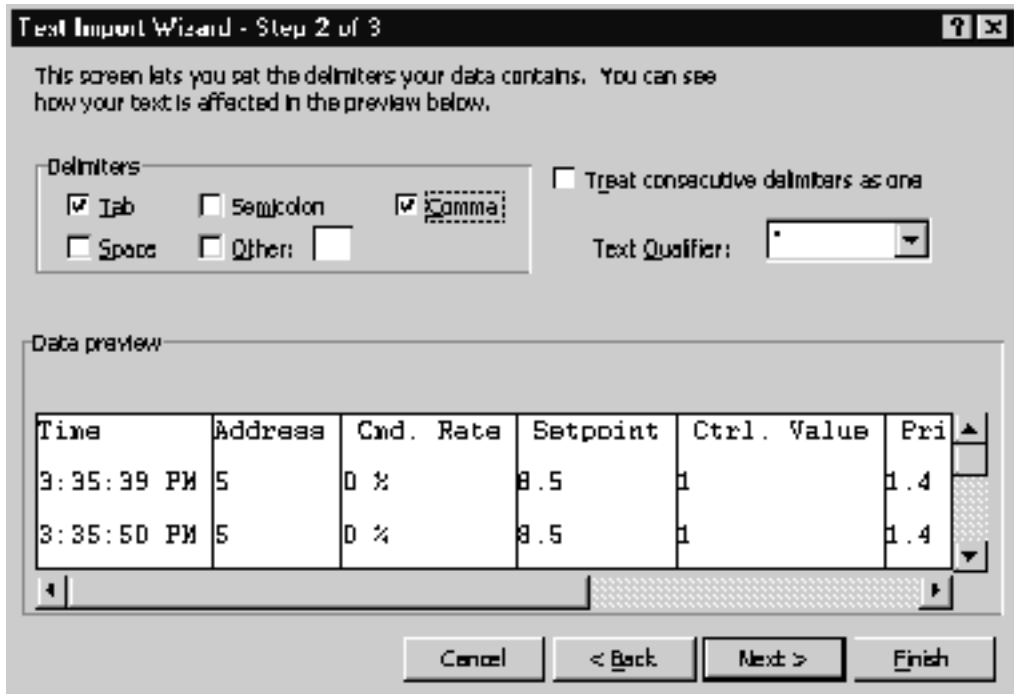


Interval times from 1 second to 1 hour are available. Shown above is an interval of 30 seconds. To select a time interval, grab the indicator on the slide bar and move it the desired time. When selected, click close. The data logging interval may be changed by clicking in the button located to the right of Global Log. This will force the Global Log Option screen to appear and allows you to change the interval. Global logging does not have to be activated in order to change the interval.

The data logged is saved in a comma delimited format. To import into a spreadsheet, open the file from the usual manner. For example, the Wizard in Excel will recognize the data as delimited and will open a box requesting a verification of the option. Click on delimited, followed by Next.



A screen now appears asking you what type of delimiter is being used. Since the save data is comma delimited, select the Comma option, followed by Next.



After selecting Comma the data should look properly formatted into columns. Click on either Next for more options or Finish to complete the process. The first column may not fit into the standard size column provided. In Excel, you can double click on the column boundary to automatically widen the column to fit the data or consult your spreadsheet manual.

TIME	Address	Cmd. Rate	Setpoint	Ctrl. Value	Pri. Fuel Pressure	Sec. Fuel Pressure
3:35:39 PM	5	0%	8.5	1	1.4	10
3:35:50 PM	5	0%	8.5	1	1.4	10
3:36:01 PM	5	0%	8.5	1	1.4	10
3:36:11 PM	5	0%	8.5	1	1.4	10
3:36:22 PM	5	0%	8.5	1	1.4	10
3:36:32 PM	5	0%	8.5	1	1.4	10
3:36:43 PM	5	0%	8.5	1	1.4	10
3:36:53 PM	5	0%	8.5	1	1.4	10
3:37:04 PM	5	0%	8.5	1	1.4	10

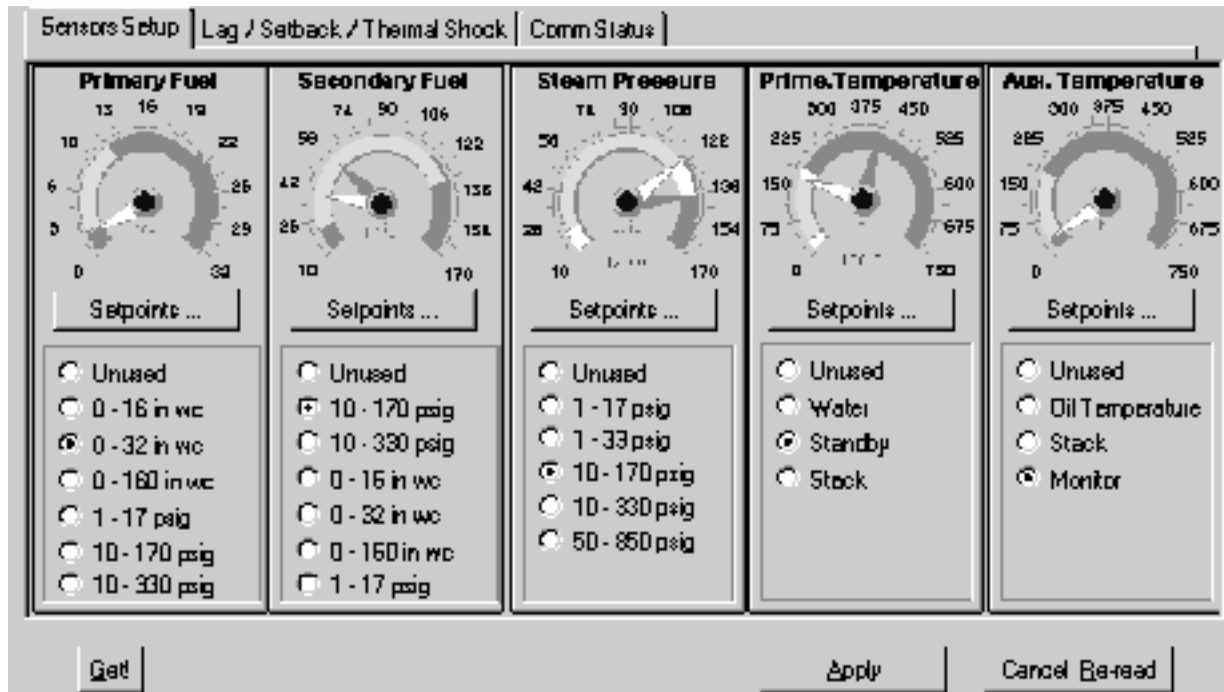
The data can now be viewed and charts developed to represent boiler operation over a given period of time. Wizards within the spreadsheet program can help you. To retain the data, save it as a spreadsheet and not as text or as the same name it was imported.

To return back to the Plant Master screen, click on the Plant Master icon located on main background screen toolbar.

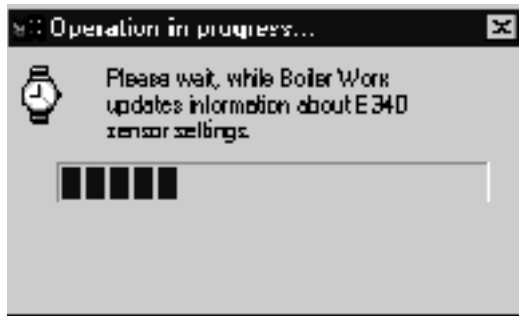
## CONFIGURING THE SET-POINTS

The set-points of any of the connected boilers can be reviewed or configured. To access this option, click on the CONFIGURE button. See Figure 3. This button is located within the control variable gauge of the Plant Master screen.

FIGURE 8. Configure Screen

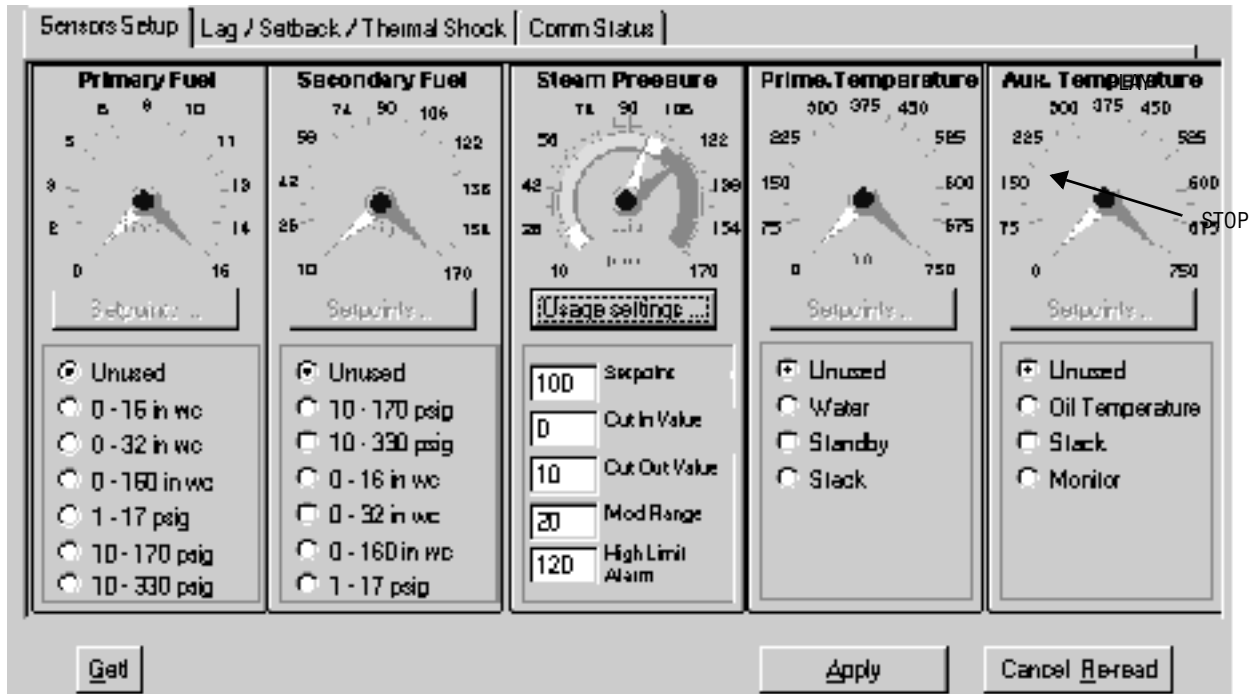


**FIGURE 9. Updating Information**



As the configure screen opens, the data from the selected E340 is retrieved in order to update the registers within BoilerWorx. A process bar will appear indicating data is being received and will disappear when complete.

From the configure screen you are now able to set input sensors to their desired active or inactive state. You must know the password of the E340 to be allowed to change or alter the operation of the boiler. Clicking on any of the SetPoint buttons will bring up the corresponding alarm settings for that sensor or in the case of a control variable will display the setpoint, cut in, cut out and modulating range as well as the high limit alarm. to change a value, click inside the box of the variable to be changed. Using the keyboard, remove the current value and enter the new desired value.



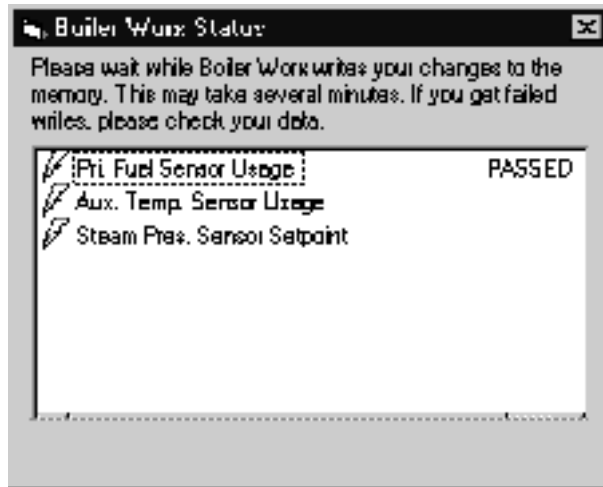
After the sensor is set for the desired settings, the Apply button is pressed to initiate sending the data to the E340.

**NOTE:** Remaining in the Configure Screen for longer than 3 minutes will cause the E500 to disconnect itself from the phone line.

**FIGURE 10. Security Level Dialog Box**



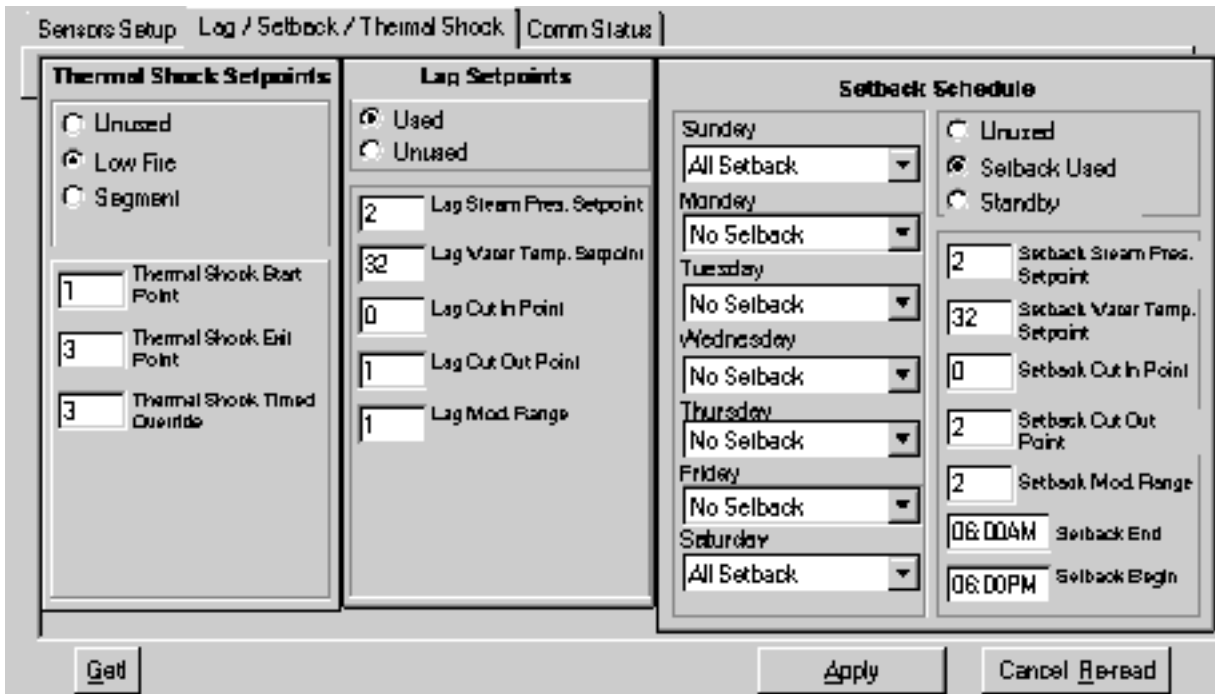
A Security Level box is displayed where you must enter the password programmed into the E340. Click the mouse inside of Level 1 and enter the Level 1 password. Then either click inside or use the Tab key to get to the Level 2 and enter the Level 2 password.



When complete click Apply to send the data to the E340. Another box will appear showing you the status and acceptance of the data being sent to the E340.

### LAG/SETBACK/THERMAL SHOCK

Clicking on this tab will bring up the current settings for lag, setback and thermal shock for review on configuration.



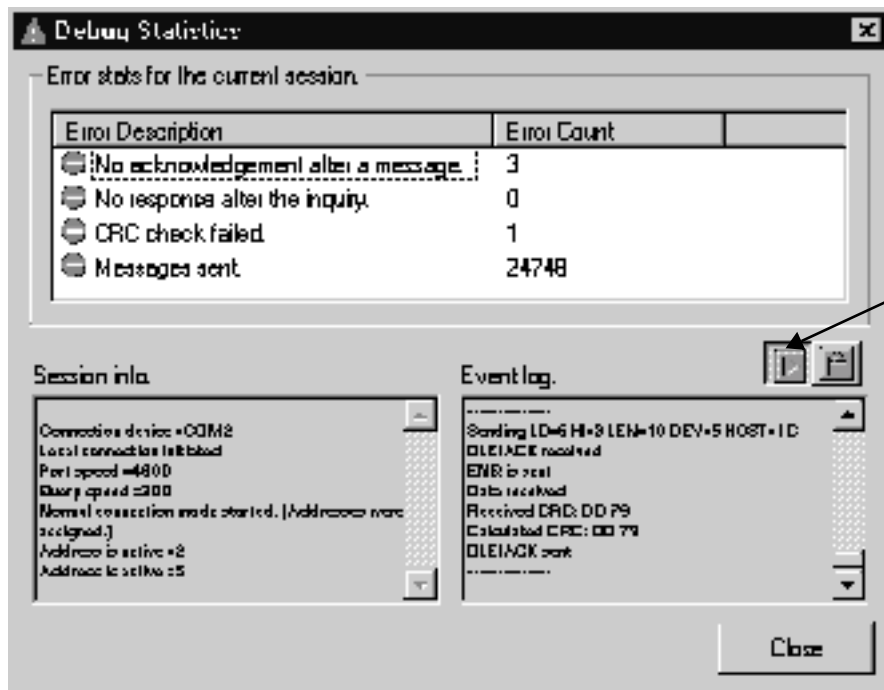


To change the usage of any of these items, click the appropriate option button. To change any set-point value, click inside the box of the value to be changed, erase the current value, and enter the desired value with the keyboard. To change the daily setback mode, click on the arrow next to the appropriate day. A drop box will appear, allowing you to select the desired mode. When complete, click Apply to initiate the changes to the E340. Again the password of the E340 must be known for the changes to take effect.

Click on the PlantMaster icon located on the toolbar to exit the Configure Screen.

### DEBUG STATISTICS

BoilerWorx provides a screen that will show the connection status of the current operation. To access click on the Debug icon located on the toolbar. See Figure 1.

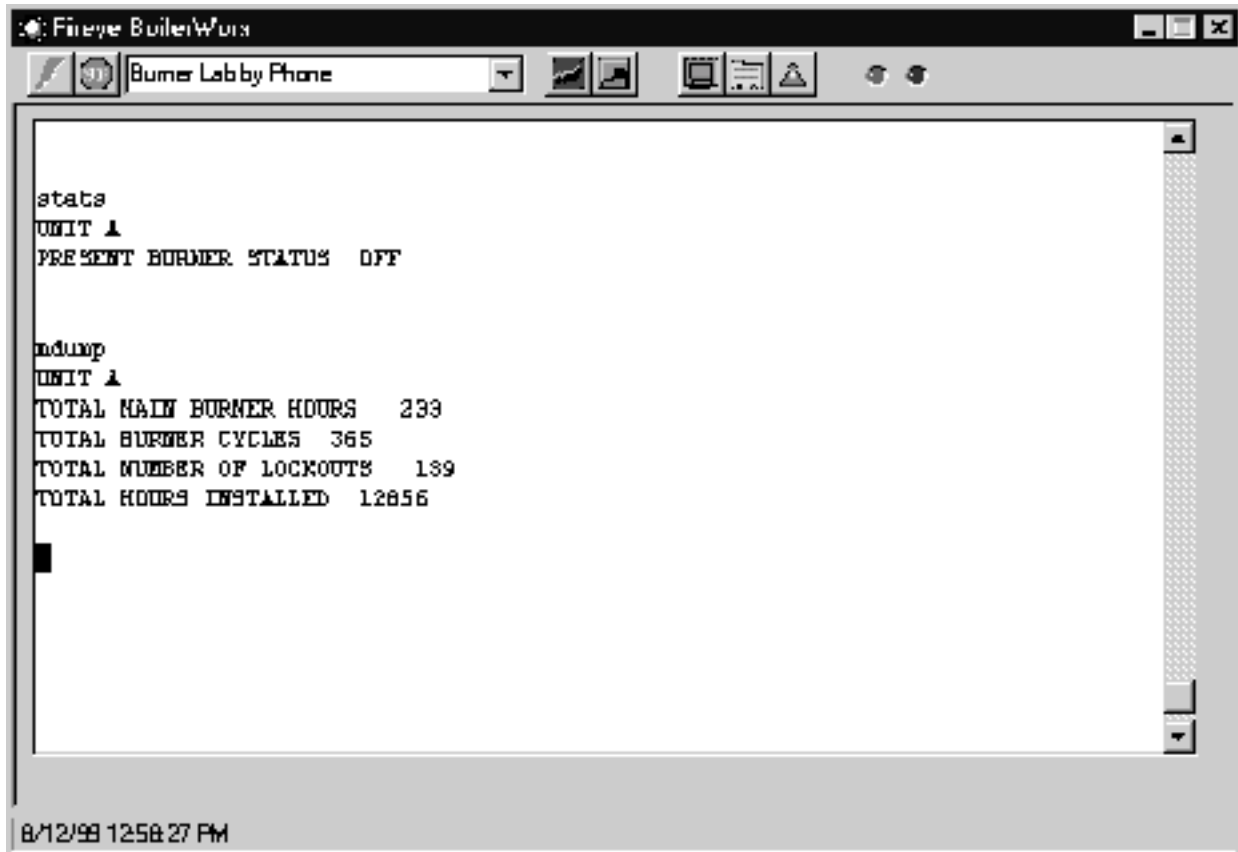


The Session Info shows the detail of the connected site. Information includes connection mode, E500 description, baud rate and address found. The Error Description shows the communication throughout the current session. This includes total messages sent, failed CRC messages, no acknowledgments and no responses. The magnitude of the errors in relation to the amount of messages sent gives you an indication of the stability of the connection and hook-up method of the site. The event log shows actual data being sent and received to and from each device located at the site.

To activate the Event Log, click on the Play button. Data continues to scroll up, with the most recent information being visible. The last 32 kilobytes of data are held in a scroll back buffer. This data can be selected and sent to text editor by clicking on the Stop button and then right clicking inside the Event Log window. Click Select All and then Copy to move the data to the windows clipboard. The Debug screen can be minimized and left running by clicking anywhere outside of the Debug screen. Clicking Close removes the Debug screen from memory.

### TERMINAL MODE

Terminal mode is available to allow access to the Flame-Monitor units connected to the E500. If the Flame-Monitors are connected on the RS485 lines, each Flame-Monitor must have its own unique address different from any device connected to the network. Refer to bulletin E-1101 for additional information. To access Terminal Mode, click on the screen icon located on the main screen toolbar.



If the cursor is not visible, click in the upper left hand corner of the terminal view screen. Commands may now be entered to obtain status information of the Flame-Monitor and E340 devices. Refer to bulletin E-5101, E500 Communication Interface, for additional information. Terminal Mode is not accessible if devices are connected using only the EC485 converter.

Terminal mode is useful to initially check out a new site to determine if all devices are properly connected and responding. Useful commands are LHVAC, used to determine and confirm E340 devices connected. If Flame-Monitors are connected on the same RS485 link, the LEPD command will confirm the proper connection of these devices.

To exit Terminal mode, click on the Plant Master icon, located on the toolbar.

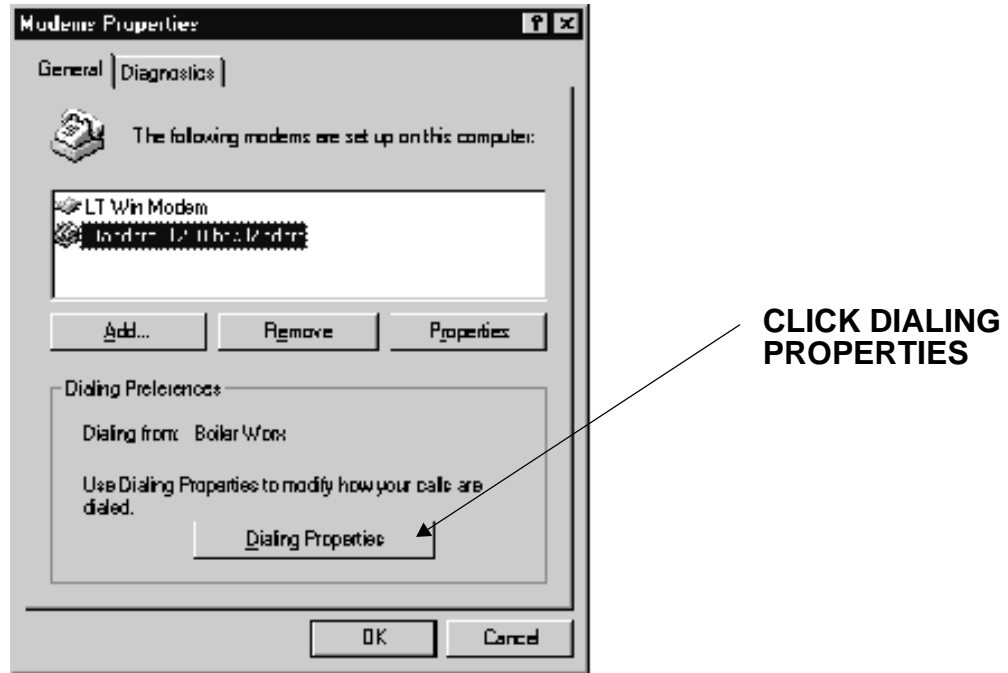
### SETTING UP YOUR MODEM

BoilerWorx works best when your modem is setup to operate with as little intelligence as possible. That is, built-in modem features such as data compression, error checking, FIFO registers, and hardware/software handshaking are not used. If your modem is not currently installed, refer to your modem guide for these instructions. Windows makes it easy to install a modem, particularly if your modem is listed as 'Plug N Play. It is recommended to let Windows detect your modem automatically during installation. If Windows cannot detect your modem, consult the modem manufacturer for an updated driver.

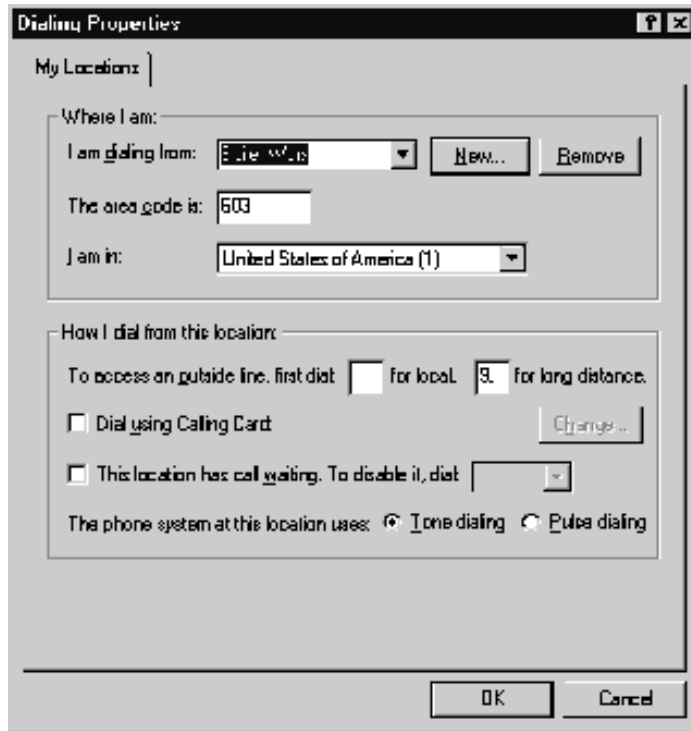
BoilerWorx requires your modem to be configured privately for its own use and also to not interfere with the modem's default settings or have other devices interfere with it. To access the modem properties, click on the Start button and move to SETTINGS and from there, select CONTROL PANEL.



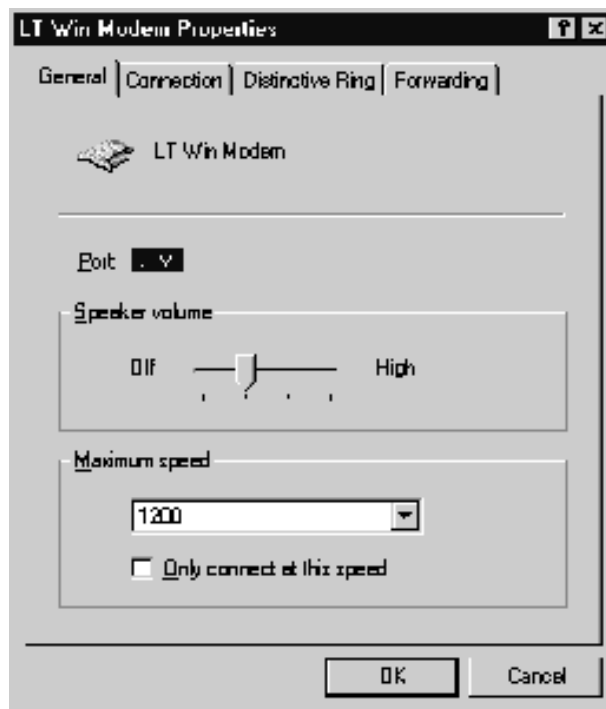
From within CONTROL PANEL, click on MODEMS. A screen showing all installed modems and access to their properties will now be visible.



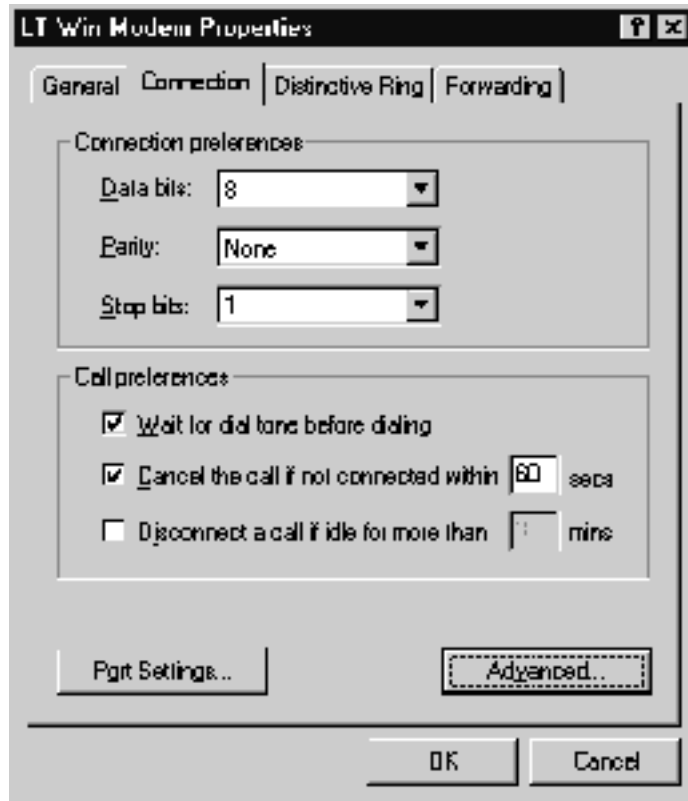
For illustrative purposes, the figure shown above displays two modems, while most systems will usually only have one modem installed. Click on the modem installed or in the case of multiple modems installed, click on the modem BoilerWorx will be using and then click on DIALING PROPERTIES.



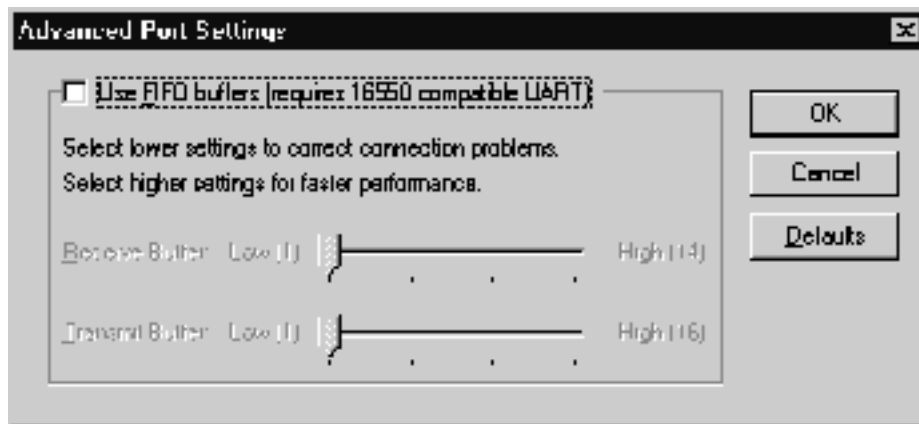
It is necessary to configure the modem as dialing from Boiler Worx. This is accomplished by clicking on NEW. A dialog box will now open allowing you to create a new location entitled 'Boiler Worx'. It is very important to have a space between Boiler and Worx. You are now allowed to specify other parameters such as area code, access codes and dialing method. Click on OK when done to return to the MODEM PROPERTIES screen. Click now on PROPERTIES to access the CONNECTION PROPERTIES screen.



Due to the relatively slow modem speed (today's standards), relatively speaking of course, of the E500, the Boiler Worx modem must have a maximum speed set at 1200 Baud. This will prevent unnecessary handshaking from taking place between the pc and the E500 and therefore prevent any errors from trying to connect at higher speeds. Be sure not to check the 'Only connect at this speed' checkbox. When done, click on the CONNECTION tab located on the top part of the screen.

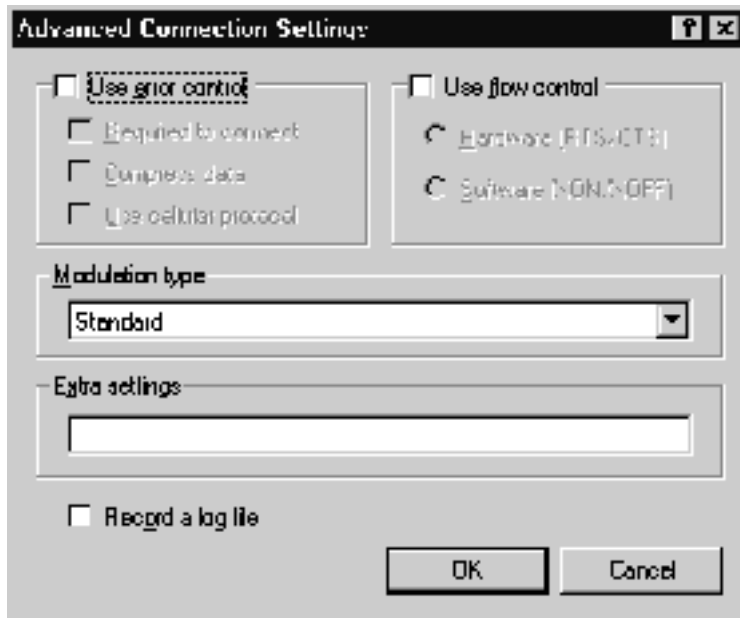


From this screen, be sure data bits are set for 8, parity at none and 1 stop bit. The call preferences should be set as shown. When done click on PORT SETTINGS.



Simply uncheck the 'Use FIFO buffers' and click on OK.

From the CONNECTION screen, click on the ADVANCED button to access the ADVANCE CONNECTION SETTINGS screen as shown below.



Uncheck both the 'Use error control' box and the 'Use flow control' box. When done click OK to return to the CONNECTIONS screen. Click OK to return to the MODEM PROPERTIES screen and from there click CLOSE to return to the CONTROL PANEL screen. Close the CONTROL PANEL screen to save the settings. The modem should now be properly configured for BoilerWorx.





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## NOTICE

When Fireeye products are combined with equipment manufactured by others and/or integrated into systems designed or manufactured by others, the Fireeye warranty, as stated in its General Terms and Conditions of Sale, pertains only to the Fireeye products and not to any other equipment or to the combined system or its overall performance.

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## WARRANTIES

FIREEYE guarantees for *one year from the date of installation or 18 months from date of manufacture* of its products to replace, or, at its option, to repair any product or part thereof (except lamps, electronic tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. **THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES AND FIREEYE MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.** Except as specifically stated in these general terms and conditions of sale, remedies with respect to any product or part number manufactured or sold by Fireeye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireeye be liable for consequential or special damages of any nature that may arise in connection with such product or part.



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