3. Collecting SOE Data

As previously stated, pressing the **SOE Collector** button will initiate the SOE display shown in Figure 4.

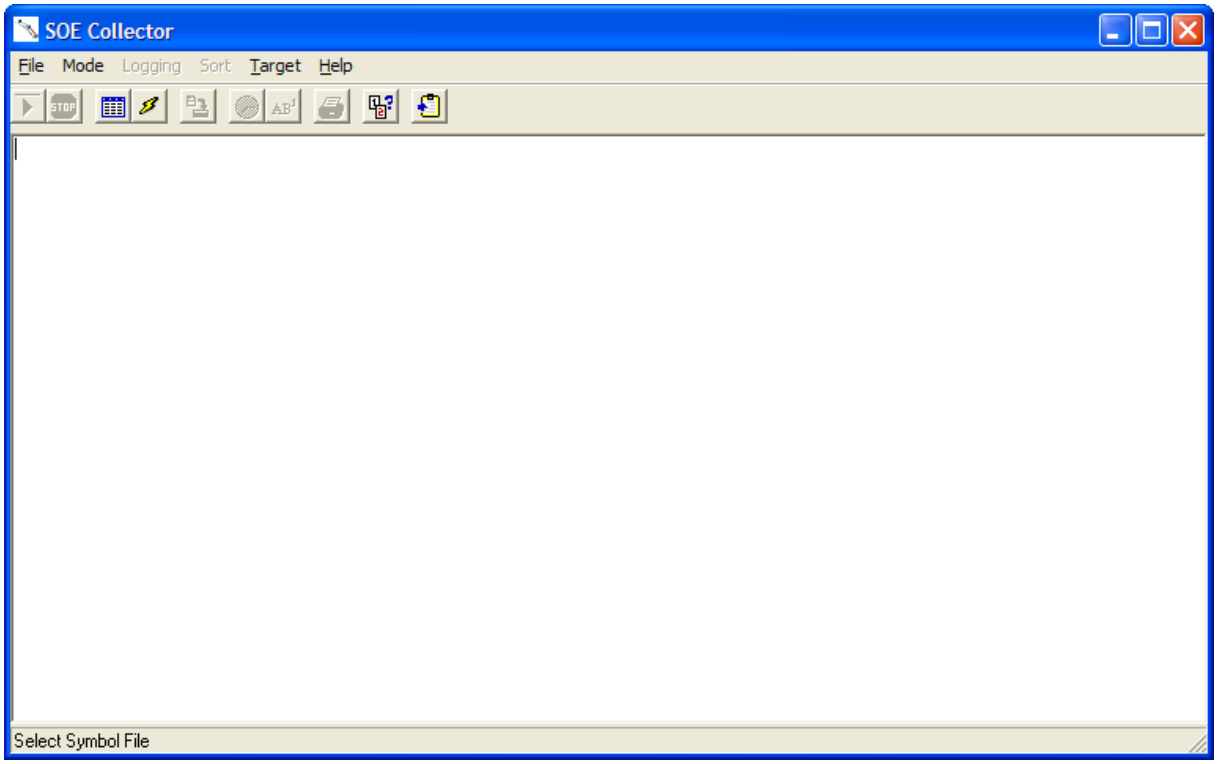

Figure 4 SOE Collector

To start collecting SOE data, the user must first implement a number of actions as detailed below:

1. Configure the SOE communications port.
2. Select the appropriate SOE symbol file
3. Select the SOE target ID.
4. Select the sort mode (time or tag).
5. Select the SOE log file.
6. Start collecting SOE data.

Each action mentioned above is described in the following paragraphs.

3.1. SOE Communications Port Configuration

The ports on the Trusted TMR Communications Interface module may be configured to allow SOE data collection using serial comms or via the Ethernet. The required method is chosen by first selecting the **Configure Port** option from the **File** menu.

Selecting serial ports COM 1 and 2 enable the selection of Baud rate and parity.

Selection of Ethernet permits the selection of the target system IP address and port number. In almost every case, the port number should be left at 2000.

Note that the Communications Interface must have a Modbus slave configured in the parameters for the module in the system configuration. The disconnection timeout must be set to 300 seconds to prevent the connection from being lost during data retrieval. In the Communications Interface Modbus Slave window, select a Modbus Slave and check **Use This Slave**. The defaults will work with the SOE collector. Refer to product description PD-8151B Trusted Communications Interface.

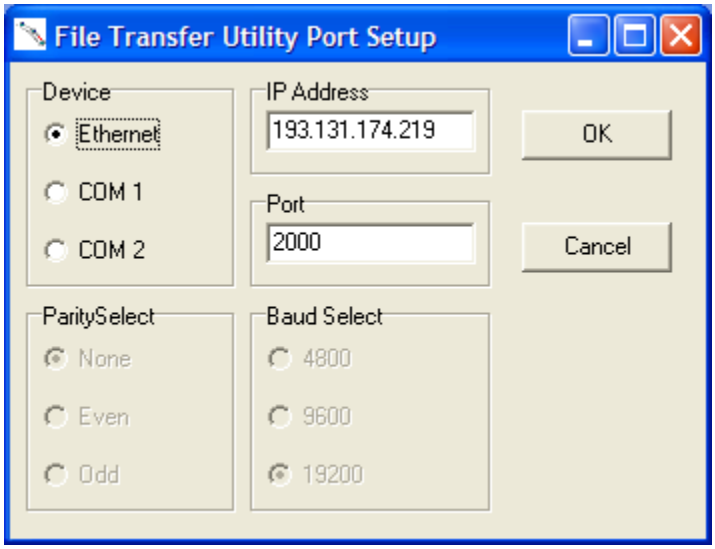

Figure 5 Port Configuration Window

3.2. SOE Symbol File Selection

Tag, true/false state information and description text is retrieved from database files produced by the IEC 61131 TOOLSET as part of the program creation/compilation process. The Trusted system only contains memory run-time addresses and state information. The file that contains the bulk of the information is called 'appli.tst' and is found in the same directory as the user's application. For example, if the application is called 'TFAT_1', then the 'Appli.tst' file would be found in 'C:\Trusted\Toolset\apl\TFAT_1'. Other files used by the SOE Collector include 'appli.dlo' and 'appli.dco' which contain the variable dictionaries. The application must be fully compiled to generate these files.

The symbol files are made available to the SOE Collector by initiating the **Select Symbol File** option from the **File** menu. Once the file has been loaded, the file path is displayed in the

status banner at the bottom of the **SOE Collecto**r window. If the application is changed and recompiled, the SOE Collector will need to be loaded with the new copies of the files.

If the SOE collector is left running permanently as an event logger, it should be stopped whilst the application is compiled, otherwise it will hold some of the application files open. The buffers in the system will store the SOE events during this compilation.

3.3. SOE Target ID Selection

The Controller is allocated a Target, or Modbus Slave, ID, in the appropriate Modbus Slave configuration in the System Configuration Tool.

In the SOE Collector, the Target ID is selected using the **Set ID** option, which may be found in the **Target** menu.

3.4. SOE Sort Mode

Prior to starting the collection process, the user may select the order in which SOE data is presented.

The user may select **Sort By Time**, or **Sort By Tag** using the appropriate button on the button bar or the menu options under **Sort**.

If **Sort By Time** is selected, the SOE data is displayed in time order with the most recent event shown at the top of the display.

If **Sort By Tag** is selected, the SOE data is displayed in alphabetical order. In addition, groups of events for the same tag are sorted in time order.

3.5. SOE Log File Selection

All SOE entries may optionally be logged to a log file held on the user's Engineering Workstation. To enable a log file, the user must select the **Log File** option which may be found in the **Logging** Menu.

Entries are appended to the end of the file as they are collected. There is no sorting of tag information, even if **Sort By Tag** is selected.

3.6. SOE Collection Mode

The Communications Interface has a large buffer of events. It is possible to gather this buffer first until the collector has caught up with current events, but this can take a long time. Therefore there is an option under the **Mode** menu for choosing how much of this buffer is collected.

From Now Ignore all buffered events and only collect real time events

All Buffered	Gather the entire buffer first before waiting for real time events
25 % of Buffer	Gather the last quarter of the buffer first
50 % of Buffer	Gather the last half of the buffer first
75 % of Buffer	Gather the last three-quarters of the buffer first

3.7. Start SOE Collecting

Once the procedures detailed above have been completed, the user may start the collection process. If any buffered events have been selected in 3.6, events currently buffered in the Trusted TMR Communications Interface module will be collected and added to the SOE display. Once the SOE Collector has retrieved all buffered events, it will regularly poll for new events. All new events will be added to the display.

To initiate the collection of SOE data, the user must select the **Start Collecting** option from the **File** menu

The collection of SOE data is stopped by selecting the **Stop Collecting** option which is also in the **File** menu.

The initial collection process can take a long time before events are displayed on the screen. The program is parsing through events gathered before the end of the log, and it will display log entries once the date and time of events is past the end of the current log.

If the SOE or PH collector is running when the system application is compiled in the Toolset, then the dictionary files appli.tst, appli.dco and appli.dlo will be locked by the collector and the compilation will fail. If it is necessary to keep the collector running during a long compilation, copy the files to another location. Note that if the dictionary is changed in a way that affects event variables, the SOE collector will need to be stopped to load the new symbol files.

3.8. Additional SOE Features

Additional features of SOE include the following:

1. Copy to Clipboard
2. Print
3. Save to File

3.8.1. Copy to Clipboard

It is possible to copy the contents of the current display to the Windows clipboard for pasting into other applications. This is achieved by using the **Copy to Clipboard** option from the **File** menu. The text copied may then be pasted into other Windows applications, e.g. Excel.

3.8.2. Print

The current display may be sent to a user selected printer using the **Print** menu option from the **File** menu.

3.8.3. Save to File

The current display may be saved as a text file using the **Save** menu option from the **File** menu.

3.9. SOE Example Display

An example of an SOE display is shown in Figure 6 below.

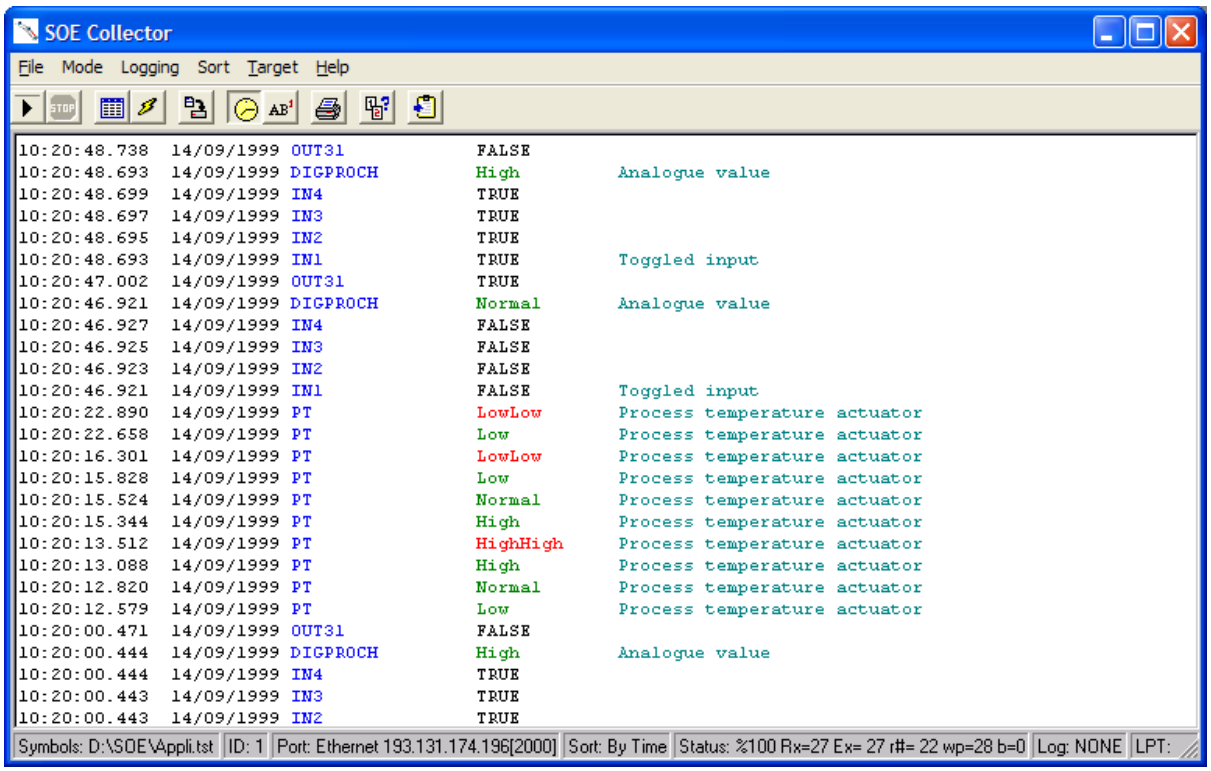

Figure 6 SOE Display

Different colours may be used for the display point status. This is achieved by appending a colour specifier to the True/False strings declared for the point in the IEC 61131 TOOLSET dictionary. For example, to make 'TRUE' appear in green, the true text would be set to 'TRUE_g' where '_g' is the specifier for green.

Colour specifiers available to the user are detailed in Table 1 below.

_r	red
_g	green
_y	yellow

_b	blue
_w	white
_m	maroon
_l	lime
_p	purple
_o	olive
_s	silver
_t	teal

Table 1 SOE Colour Specifiers

3.10. Assigning Variables for SOE

The SOE collector provides the user with two options. The user may tag changes for a Boolean variable which only has two states. However, the collector will also allow the user to add “Channel state” changes. These channel state changes are described in the **ANALOGUE SOE VARIABLES** paragraph.

Note: All SOE variables must either be defined as INPUT or OUTPUT. Intermediate application variables can be assigned for SOE collection using the SOE board, if they are configured as outputs in the dictionary as below.

3.10.1. Boolean SOE Variables

To select Boolean variables for collection by the SOE, the user must first open the **Data Dictionary** within the IEC 61131 TOOLSET, then select the variable to be included in the SOE log. This will initiate the window shown in Figure 7.

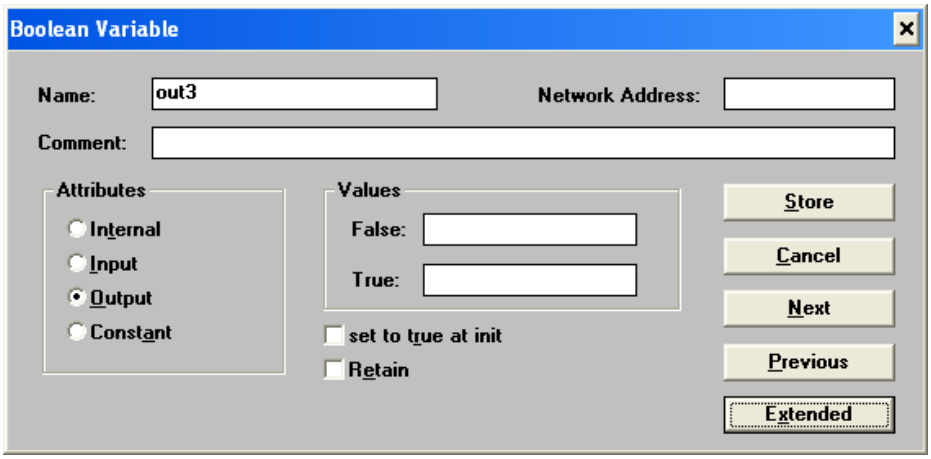

Figure 7 Boolean Variable Setup

With the above dialogue box open, the user must name the variable by entering the appropriate data in the **Name:** box. If the variable is, for example, a field device driven by an output from the System, the user must enable the **Output** option, then select the **Extended** button. This will initiate the window shown in Figure 8.

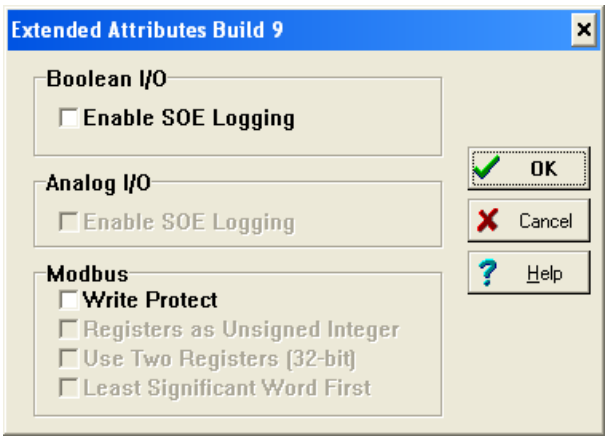

Figure 8 Boolean Extended Attributes

The user should enable the **Boolean I/O** - **Enable SOE logging** option to provide the variable with SOE attributes. The user must select the **OK** button, then select **OK** to exit the next window.

This variable must be attached to an I/O board within the application program for the System. To select the appropriate board to which the variable is to be attached, the user must determine the module and channel driving the output.

Double-clicking the mouse on this output channel will provide the user with a list of unattached variables as shown in Figure 9.

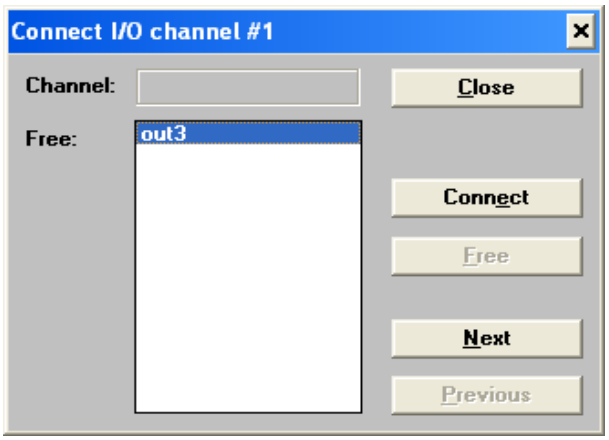

Figure 9 Unattached variable connection

The variable may now be attached to this channel by selecting the **Connect** button.

3.10.2. Intermediate SOE Variables

To select intermediate variables for collection by the SOE, the user must first declare an **SOE** board from the board library within the IEC 61131 TOOLSET I/O connection.

Double-click on a free number in the **I/O Connection**. Select **Boards**, find soe and select **OK**. This will enter an SOE board in the **I/O Connection** table as shown in Figure 10 below.

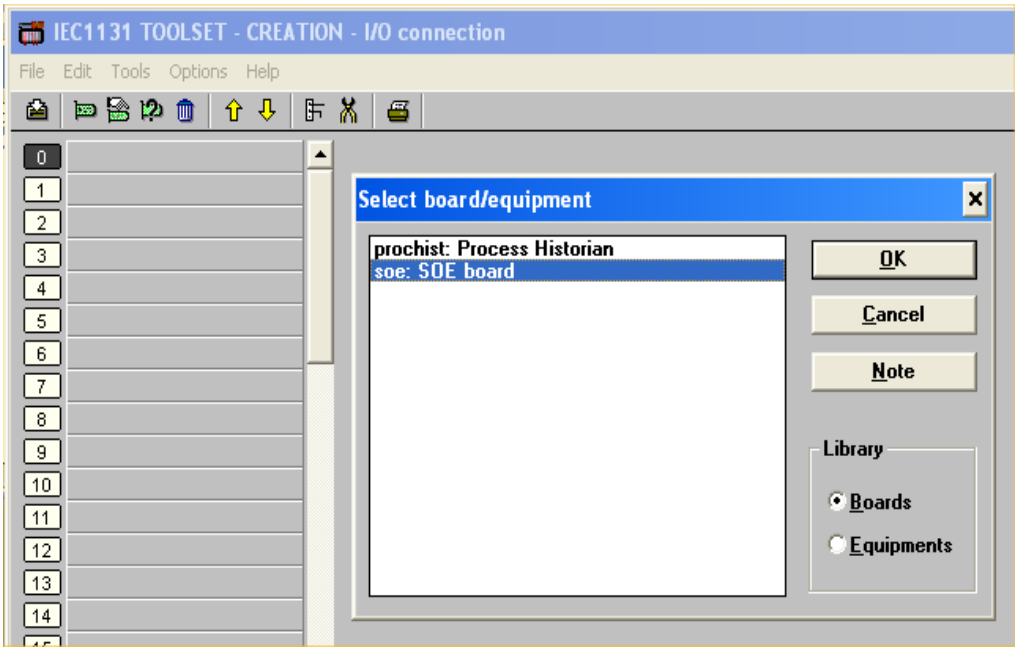

Figure 10 Entering an SOE board

Once defined, the user enables SOE logging by attaching the intermediate variable to a channel on this board.

Note: Intermediate SOE variables have to be declared as outputs in the dictionary.

Double-click on the appropriate channel of the SOE board**.** This will display all the internal output variables available for SOE collection as shown in Figure 11 below.

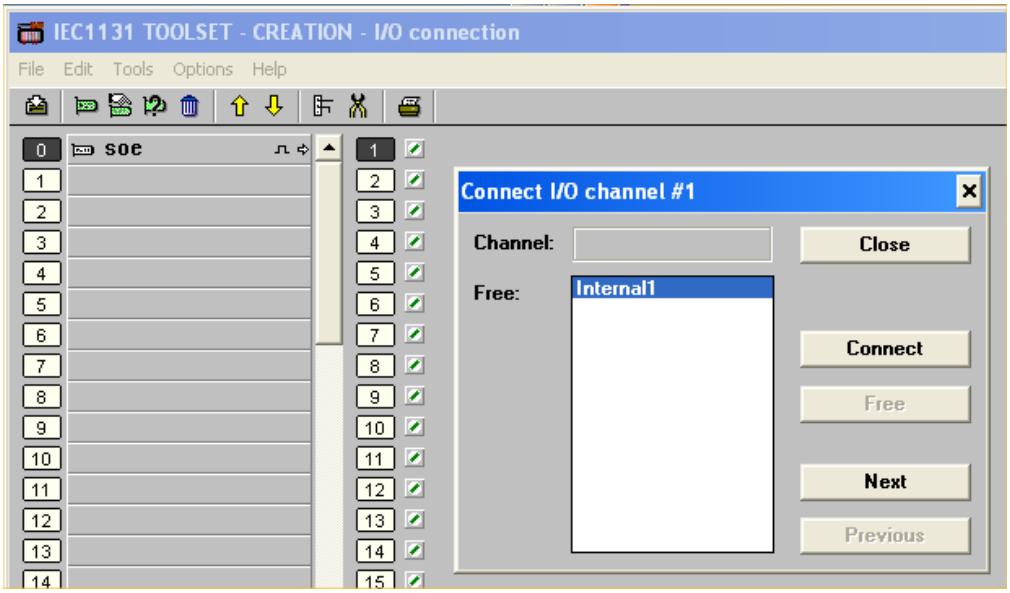

Figure 11 SOE Board Connection

The variable may now be attached to this channel by selecting the **Connect** button or by double-clicking on the tagname.

3.10.3. Analogue SOE Variables

The Trusted SOE collector also allows the user to enter analogue variables to the SOE log. This will allow the user to attach a channel state to an SOE tag. To do this the user must create the variable within the IEC 61131 TOOLSET Data Dictionary. Creating or selecting this variable will initiate the dialogue box shown in Figure 12 below.

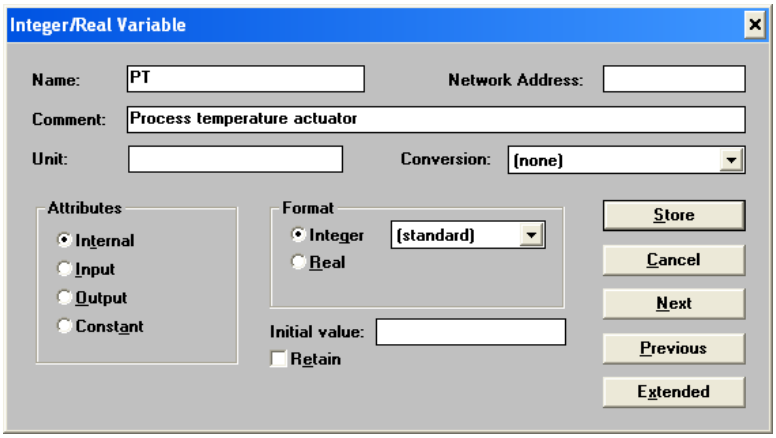

Figure 12 Analogue Variable Setup

With the above window open, the user must name the variable by entering the appropriate data in the **Name** and **Comment** boxes. For the purpose of this example, the variable is a process temperature actuator forming an input to the System.

Input and **Integer** must be enabled, then the user must select the **Extended** button. This will initiate the window shown in Figure 13 below.

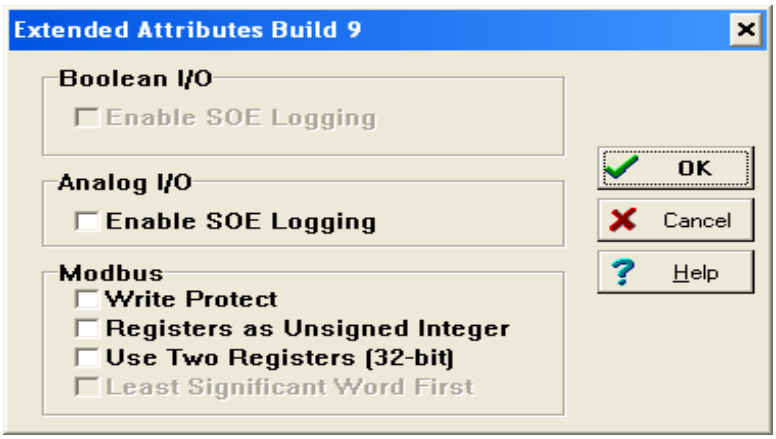

Figure 13 Analogue Extended Attributes

The user should enable the **Boolean I/O Enable SOE logging** option to provide the variable with SOE attributes. The user must select the **OK** button, then select **OK** to exit the next window.

Unlike a Boolean SOE variable which may be attached to any I/O board within the application program, an analogue SOE variable must be attached to the **STATE** rack of a High Integrity I/O board as defined in the application program and shown in Figure 14 below.

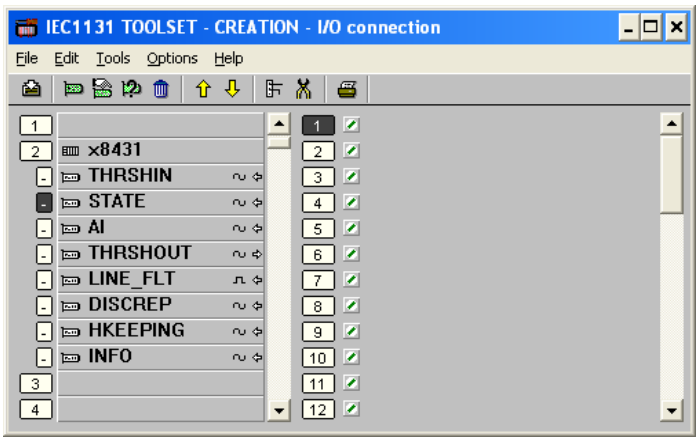

Figure 14 STATE I/O Connection board

Double-clicking the mouse on the selected channel will provide the user with a list of unattached variables as shown in Figure 15 below.

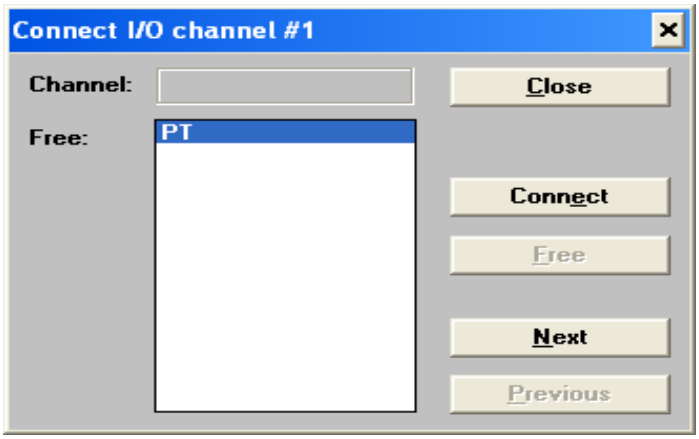

Figure 15 STATE board connection

The variable may now be attached to the channel by selecting the **Connect** button. By default, each channel attached to the STATE rack of a High Integrity I/O board only has seven values. These states are defined in the SOE Collector as shown in Table 2 below.

0	Under Range
1	Low Low
2	Low
3	Normal
4	High

5	High High
6	Over Range

Table 2 SOE State Definitions

The SOE collector will display the string defined above for each state as changes occur.

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4. Collecting Process Historian (PH) Data

Pressing the **Process Historian** button in Figure 3 will initiate the PH display shown in Figure 16 below.

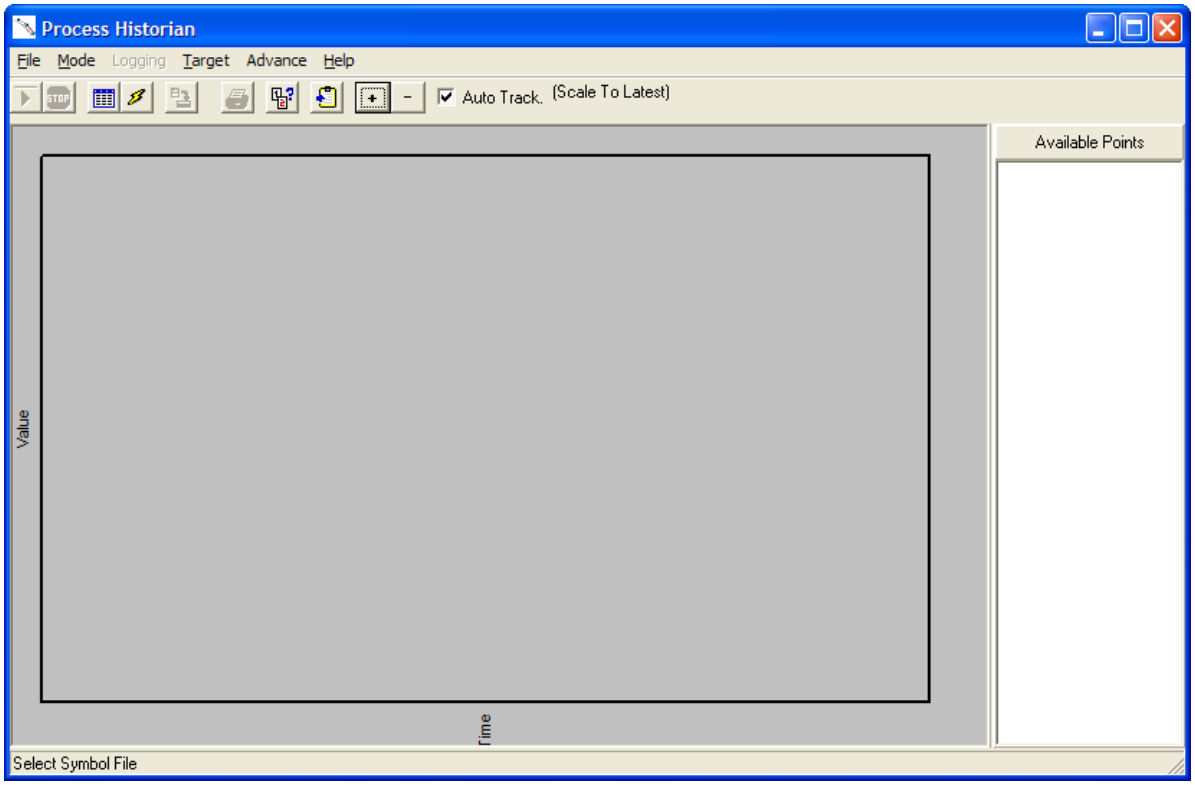

Figure 16 Process Historian Collector

To start collecting PH data, the user must first implement a number of actions as detailed below:

1. Configure the PH communications port.
2. Select the appropriate PH symbol file.
3. Select the PH target ID.
4. Select the PH log file.
5. Start collecting PH data.

Each action mentioned above is described in the following paragraphs.

4.1. Date Format

Note that Process Historian will only recognise PC local date formats in the form month/day/year. In regions where the local date format is different, set the short date

format to mm/dd/yyyy. This may be set in **Control Panel** | **Regional and Language Options**, **Regional Options** tab, **Customize…**, **Date** tab, **Short date format**. Type mm/dd/yyyy into the **Short date format** entry box. Click **Apply**.

4.2. PH Communications Port Configuration

The ports on the Trusted TMR Communications Interface module may be configured to allow SOE data collection using serial comms or via the Ethernet. The required method is chosen by first selecting the **Configure Port** option from the **File** menu.

Selecting serial ports COM 1 and 2 enable the selection of Baud rate and parity.

Selection of Ethernet permits the selection of the target system IP address and port number. In almost every case, the port number should be left at 2000.

Note that the Communications Interface must have a Modbus slave configured in the parameters for the module in the system configuration, and that the disconnection timeout must be set to 300 seconds to prevent the connection from being lost during data retrieval. In the Communications Interface Modbus Slave window, select a Modbus Slave and check **Use This Slave**. The defaults will work with the SOE collector. Refer to product description PD-8151B.

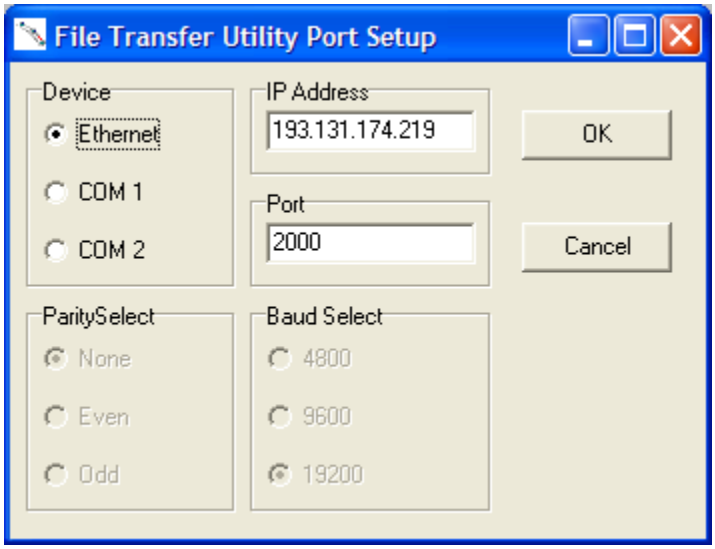

Figure 17 Port Configuration Window

4.3. PH Symbol File Selection

Tag, state information and description text is retrieved from database files produced by the IEC 61131 TOOLSET as part of the program creation/compilation process. The Trusted application only contains memory run-time addresses and state information. The file that contains the bulk of the information is called ‘appli.tst’ and is found in the same directory as the user’s application. For example, if the application is called ‘TFAT_1’, then the ‘appli.tst’

file would be found in 'C:\Trusted\Toolset\apl\TFAT_1'. The application must be fully compiled to generate this file.

The symbol file is made available to the PH Collector by initiating the **Select Symbol File** option from the **File** menu. Once the file has been loaded, the file path is displayed in the status banner at the bottom of the **Process Historian** window. If the application is changed and recompiled, the PH Collector will need to be loaded with the new copy of the appli.txt file.

4.4. PH Target ID Selection

The Controller is allocated a Target, or Modbus Slave, ID, in the appropriate Modbus Slave configuration in the System Configuration Tool.

In the PH Collector, the Target ID is selected using the **Set ID** option, which may be found in the **Target** menu.

4.5. PH Log File Selection

All PH entries may optionally be logged to a log file held on the user's Engineering Workstation. To enable a log file, the user must select the **Log File** option which may be found in the **Logging Menu**.

Entries are appended to the end of the file as they are collected.

4.6. PH Start Collecting

Once the procedures detailed above have been completed, the user may start the collection process. Any events currently buffered in the Trusted TMR Communications Interface module will be collected and added to the PH display. Once the PH Collector has retrieved all buffered events, it will regularly poll for new events. All new events will be added to the display.

To initiate the collection of PH data, the user must select the **Start Collecting** option from the **File** menu.

The collection of PH data is stopped by selecting the **Stop Collecting** option which is also in the 'File' menu.

If the SOE or PH collector is running when the system application is compiled in the Toolset, then the dictionary files appli.tst, appli.dco and appli.dlo will be locked by the collector and the compilation will fail. If it is necessary to keep the collector running during a long compilation, copy the files to another location. Note that if the dictionary is changed in a way that affects event variables, the SOE collector will need to be stopped to load the new symbol files.

4.7. Additional PH Features

4.7.1. Auto Advance

It is possible to extend the data collected for each point in real time even though no new state information is reported by Trusted. Each point's data set may be extended by selecting one of the **Advance** menu items. This option is useful if the data rate is very slow, but is irrelevant for rapid updates. It provides a guessed trend of where the collector expects the point to be.

4.7.2. Print

The current display may be sent to a user selected printer using the **Print** menu option from the **File** menu.

4.7.3. Auto Track

Enabling this option forces the display to follow the most recent data point received. This option must be disabled if the user wishes to zoom/scroll around the current data.

4.7.4. Zoom/Pan

Pressing the '+' or '-' keys zooms the display in or out respectively. Holding the right-hand mouse button pressed and dragging in the direction required 'pans' the display. Mouse-clicking on a point on the line provides a readout window of the value at that moment (this requires the mouse point to be precisely on the line). Left-mouse dragging a rectangle on the graph zooms the vertical axis to the height of the rectangle.

4.8. PH Example Display

An example of a PH display is shown in Figure 18 below.

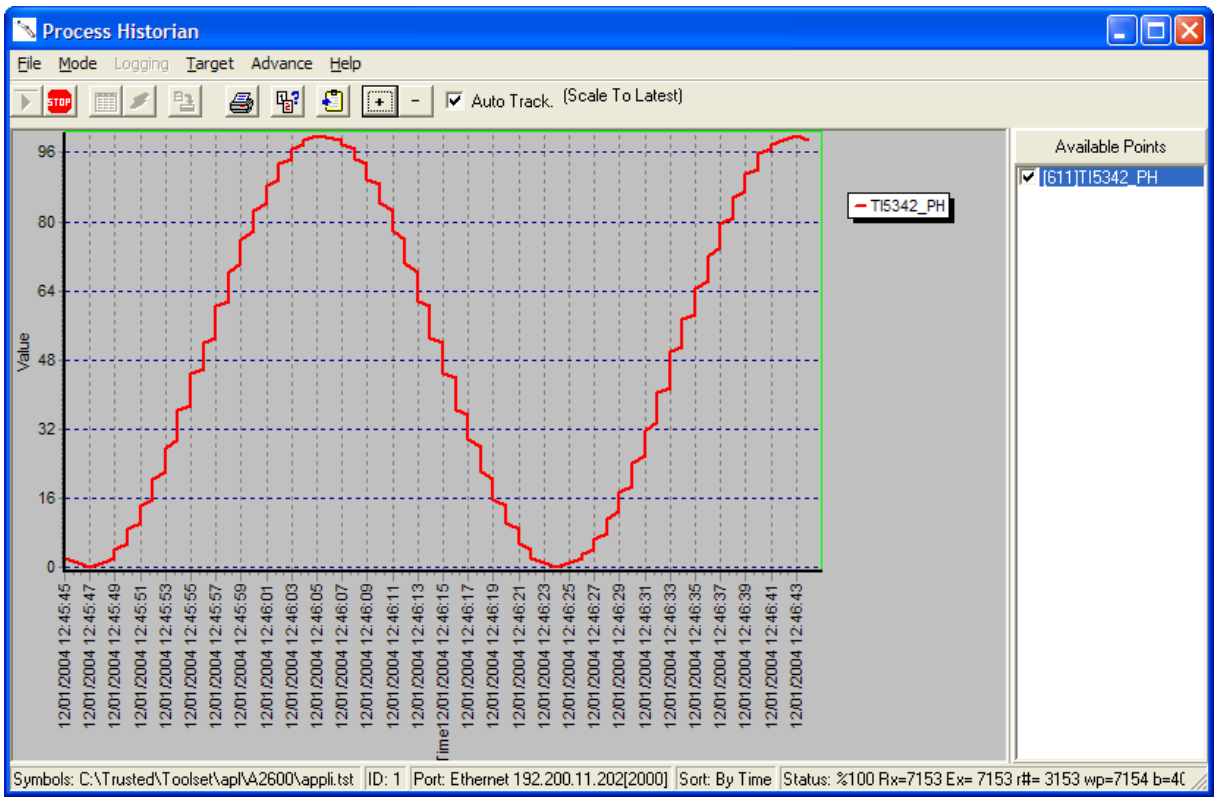

Figure 18 PH Data Display

The example shown displays a single channel from the set of all analogue channels available.

Note: The list box at the right of the display provides the names of the available tags.

4.9. Assigning variables for PH

Process Historian deals with analogue tags only and is intended to compliment SOE. Tags must have the suffix '_PH' at the end of the tagname and must be connected to a **prochist** board. A Modbus address is not necessary.

4.9.1. PH Connection

To configure a tag for connection to Process Historian it should be configured as an output. Figure 19 shows a tag created to connect to a prochist board. The tag may be a real or integer. There is no need to enter extended attributes. The tagname must end with _PH.

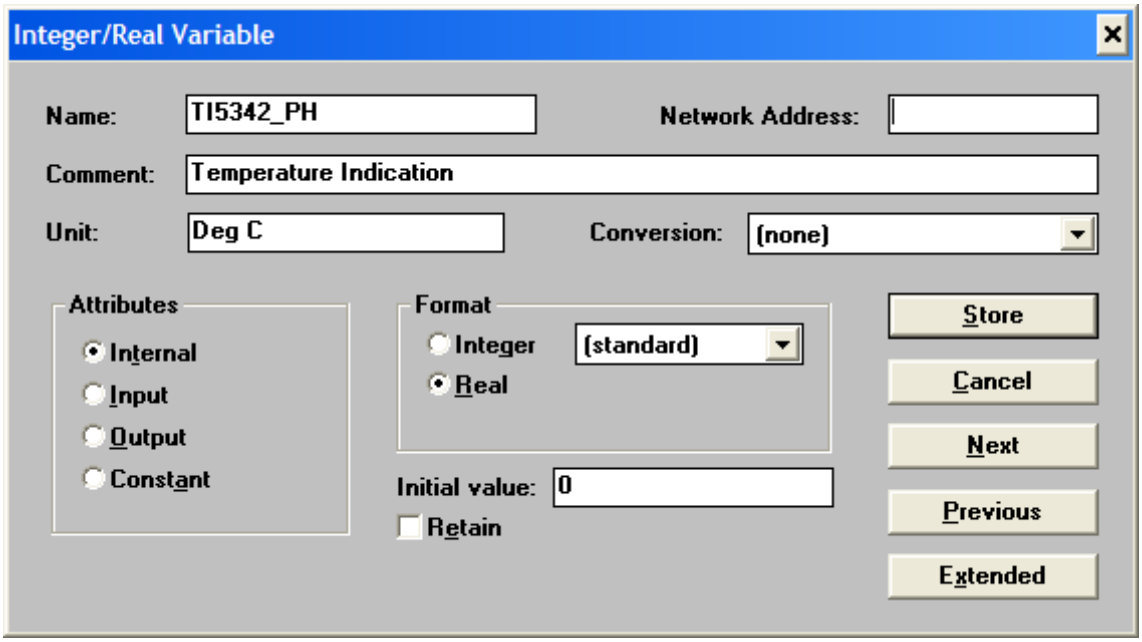

Figure 19 Analogue Output PH Tag

A prochist board must be declared within the IEC 61131 TOOLSET I/O connection.

Double-click on a free number in the **I/O Connection**. Select **Boards**, find **prochist** and select **OK**. This will enter a prochist board in the **I/O Connection** table as shown in Figure 10 above.

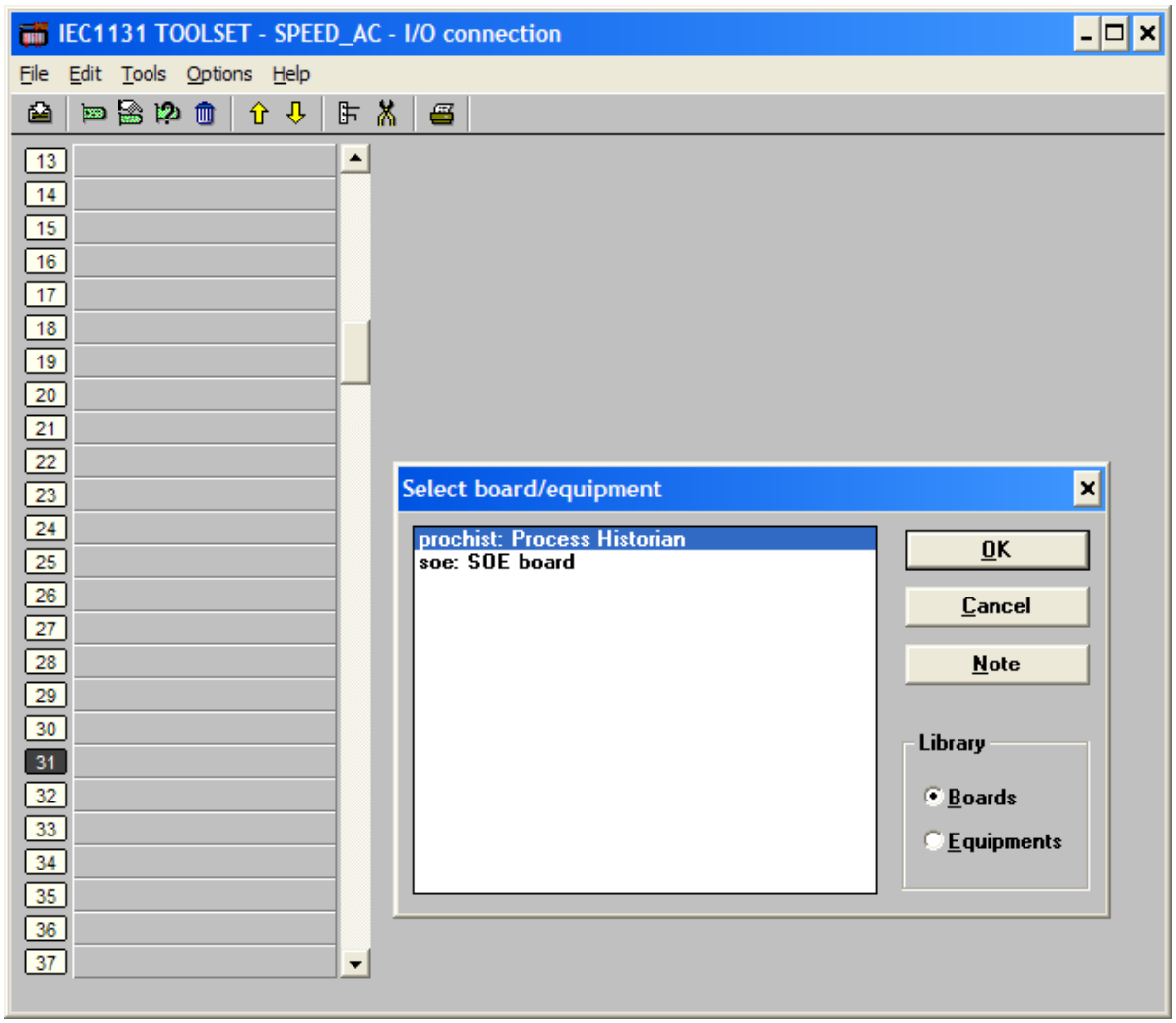

Figure 20 Entering a prochist Board

Once defined, the user enables process historian logging by attaching the variable created above to a channel on this board.

Double-click on the appropriate channel of the **prochist** board**.** This will display all the unconnected output variables available for PH collection as shown in Figure 21 below.

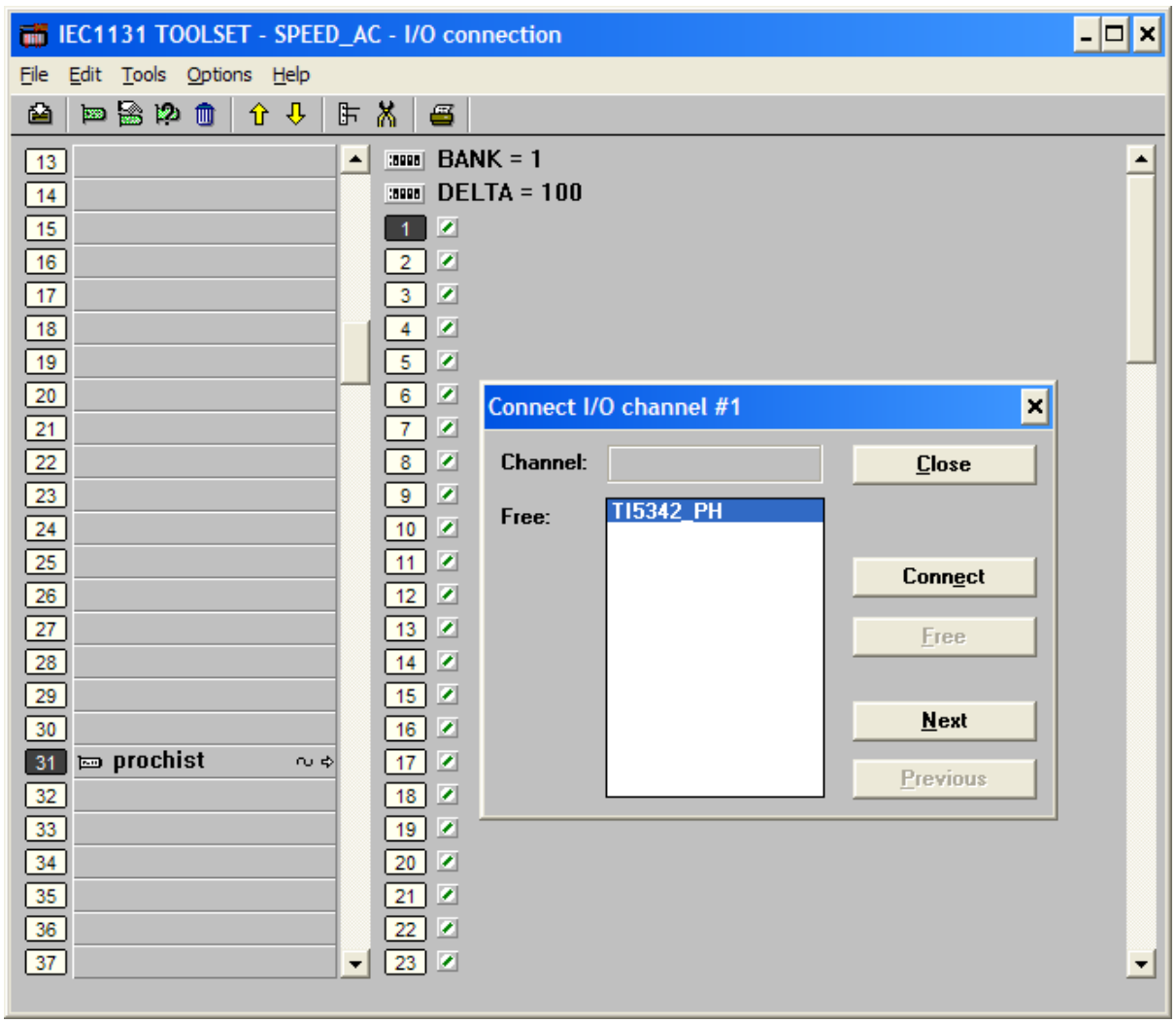

Figure 21 SOE Board Connection

The variable may now be attached to this channel by selecting the **Connect** button or by double-clicking on the tagname.

The prochist board has two parameters.

BANK Index number of the prochist board. Each prochist board should have a unique index.

DELTA Change required in each connected tag before a change is logged (i.e. event hysteresis). This value may be in floating point.

5. SOE and Initial States

The following should be noted when using SOE data collection by any method.

- 'Native' output modules (P8451/-61/-71 etc.) never record the initial state of an output as an SOE event.
- Non-native output modules (e.g. Regent modules) record an initial state of TRUE as an SOE event.
- All inputs supporting SOE will always record an event if the initial input state is TRUE.
- No SOE is recorded if a variable is locked, either input or output.
- At an MP handover, Regent outputs, Peer to Peer outputs, MP complex equipment definition board TTMRP_2 and SOE board points that are TRUE at an MP handover will generate an SOE event.