4100MB
E/4100MB

Installation and Configuration Manual

tyco
Fire Protection Products

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1 General

1.1 Introduction

The 4100MB provides a MODBUS interface to one or more 4100 panels on a network, connecting via a 4100 Host interface card using RS232.

The 4100MB can operate as:

1. A MODBUS slave passing device status information received from the 4100 panels to one or more MODBUS masters.
2. A MODBUS master polling a Linear Heat Detector (LHD) using MODBUS/TCP and using the LHD information to update points in the 4100 panel.

Both can be active at the same time but normally only one or the other would be used.

The MODBUS map of the 4100MB is configured using the **4100MB Programmer** and a serial port connection to the 4100MB. The **4100MB Programmer** also provides debugging capability and outputs diagnostic information to its “Messages” window.

The 4100MB is available in two models:

1. Base unit providing 2 electrically isolated serial RS232/RS422/RS485 MODBUS connections to MODBUS master.
2. Base unit plus a CCU3/E Ethernet card providing an Ethernet interface for -
   - 4 x MODBUS/TCP connections to MODBUS masters.
   - 1 x MODBUS/TCP connection to a LHD operating as a MODBUS slave.

1.1.1 MODBUS Slave Operation

For MODBUS slave operation, the user configures a mapping table in the 4100MB specifying which 4100 panel status indicators are mapped to which MODBUS inputs / registers. Two serial MODBUS interfaces are available on the 4100MB. They can be configured for RS232, RS485 or RS422 operation. MODBUS/TCP operation is also supported by the E/4100MB.

Coils may be configured in the MODBUS mapping table with an associated command which can be triggered by the MODBUS master to control points in the 4100 panel. E.g. a SET ON/OFF command may be sent to a Relay device.

1.1.2 LHD Mode

If LHD mode is enabled, the 4100MB polls a MODBUS slave over Ethernet for coil data. It maps the coil data it receives to 4100 panel points and if the state of the point changes it is sent to the 4100 panel using a SET ON/OFF command.

1.2 Ordering Configurations:

1.2.1 4100MB - Part Number: 557.202.508

Base version with 2 serial MODBUS interfaces. Each can be independently configured for RS232, RS485 or RS422 operation.

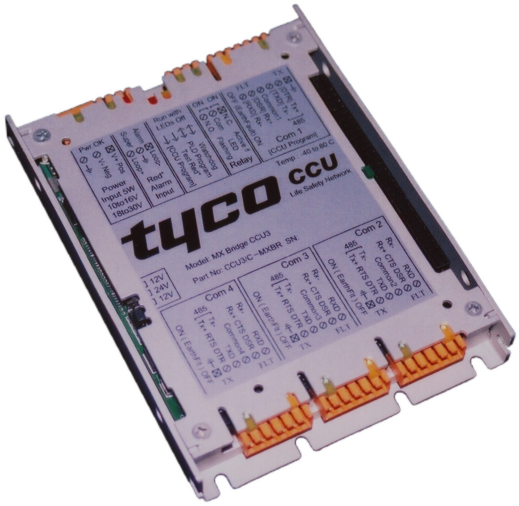


Figure 1: 4100MB - **557.202.508**

1.2.2 E/4100MB - Part Number: 557.202.509

Base 4100MB with a CCU3/E expansion card fitted to provide an Ethernet connection for MODBUS TCP.

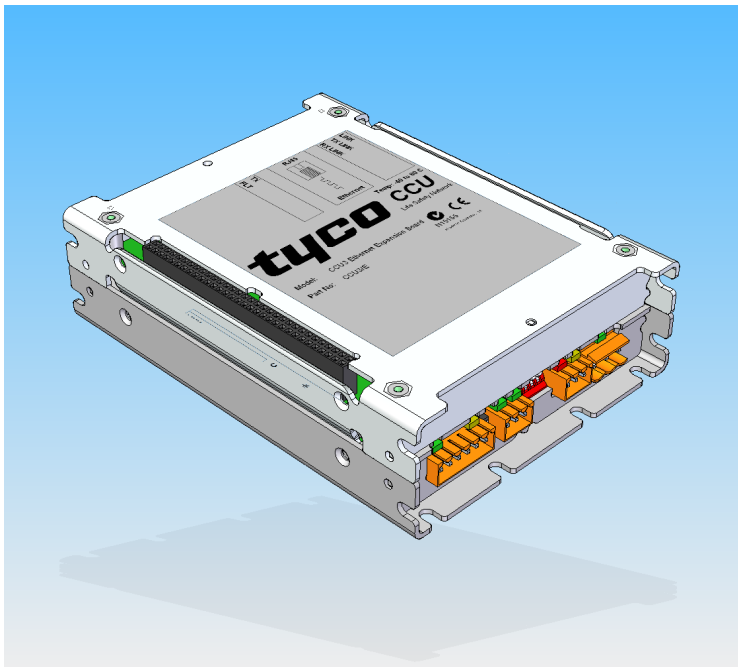


Figure 2: E/4100MB - **557.202.509**

All references to the 4100MB in this manual also apply to the E/4100MB unless otherwise stated.

1.3 Specifications

<table>
<tr><th>Specification</th><th>Description</th></tr>
<tr><td>Environmental</td><td>-40°C to +85°C, RH <80% Non-condensing.</td></tr>
<tr><td>Input Voltage</td><td>18 – 30 VDC (Nominal 24V)</td></tr>
<tr><td>Power Consumption</td><td>5 Watts (200mA at 24VDC)</td></tr>
<tr><td>Communication</td><td>4 x Fully isolated serial RS232/RS422/RS485 ports. Clamped to Earth for deviations >±25V</td></tr>
<tr><td>Relay Output</td><td>The relay is normally energised, it de-energises for fault conditions and loss of power to the 4100MB.
The LED is constantly illuminated while the relay is energised and flashes while the relay is de-energised.
<table>
<tr><td rowspan="3">Maximum Ratings</td><td>30VDC</td><td>1A (resistive)</td></tr>
<tr><td>110VDC</td><td>0.3A (resistive)</td></tr>
<tr><td>125VDC</td><td>0.5A (resistive)</td></tr>
</table>
</td></tr>
</table>

1.4 System Requirements for 4100MB Programmer

The minimum requirements for the computer system are:

- 8 MB of disk space for installation.
- Windows® 7 operating system
- Microsoft® Windows compatible pointing device (such as a mouse)
- An RS232 communications port for programming the 4100MB.

Running the Setup.exe application will install the 4100MB Setup and test programs. Shortcuts for these programs are added to the Start menu under “Programs | Tyco | SimplexMB”.

The default installation path is “Program Files (x86)\TEPG\CCU3-4100MB” for Windows 7 systems.

The 4100MB Setup program “SimplexMB.exe” is used to configure and program the 4100MB.
The MODBUS Test program “Modbus.exe” can be used to read the MODBUS data from the 4100MB to verify correct programming.
The LHD Simulator program “LHDSim.exe” can be used to test LHD operation.

2 Installation

2.1 Parts Supplied

Quantity	Description
1	4100MB base unit.
4	M4 x 6 Screws for fixing 4100MB to bracket.
4	6-32 UNC x 3/8 Screws for mounting bracket to panel.
4	Shake proof, external star washers suitable for above UNC.
1	Legacy style mounting bracket (Part Number: CCUBRKT).
1	5.08 x 3 way connector for 4100MB power connection.
2	3.5 x 3 way connector for 4100MB supervision relay connection.
2	3.5 x 6 way connectors for 4100MB COM ports.
1	Cable for connecting 4100MB to RS232 card of 4100 panel (Part Number: CCU3/4100MB).
1	4100MB Programming cable (Part Number: CCU3/PROG).
1	CD with 4100MB software.
1	Complimentary Screwdriver.
1	CCU3/E Ethernet module (E/4100MB **557.202.509** only)

2.2 You will need

Quantity	Description
1	Power Source – either external or from fire panel.
1	Interface cable for MODBUS communication.

2.3 Module Layout

There are four serial ports on the 4100MB. Each is electrically isolated, however deviations >±25V will be clamped to earth. For this reason it is important to connect the 4100MB enclosure to earth.

Com1 on the 4100MB connects to the output of an RS232 card on the 4100 motherboard.
Com2 is the programming and debugging port for connection to a Windows PC.
Com3 and Com4 are available for serial MODBUS connections. They can be configured for RS232, RS485 or RS422 operation.

Refer to Figure 3: Base 4100MB and Connections for details.

There are 4 DIP switches next to the Relay connector. They are used for factory testing and should all be in the UP position.

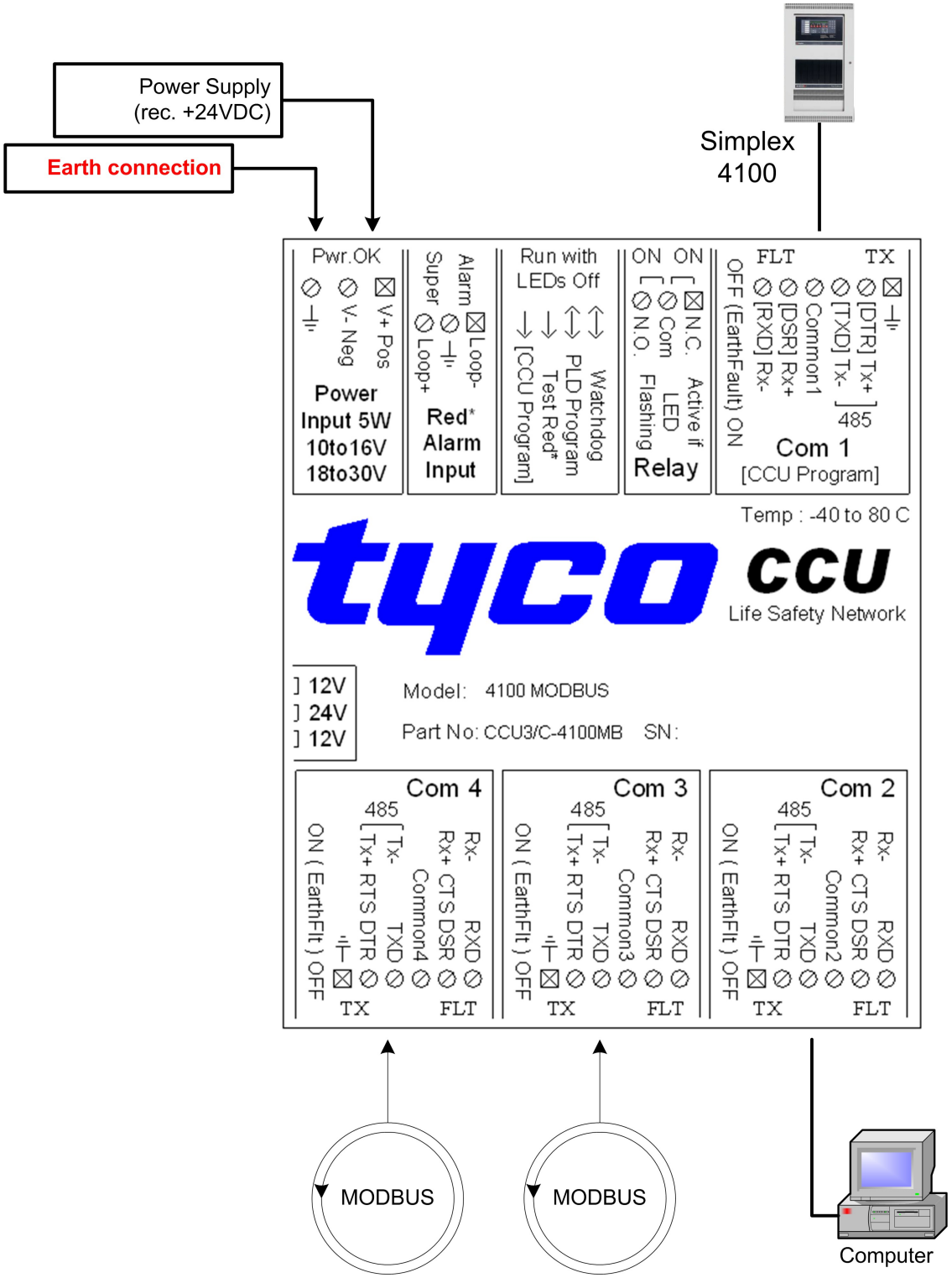


Figure 3: Base 4100MB and Connections

2.4 Mounting the 4100MB

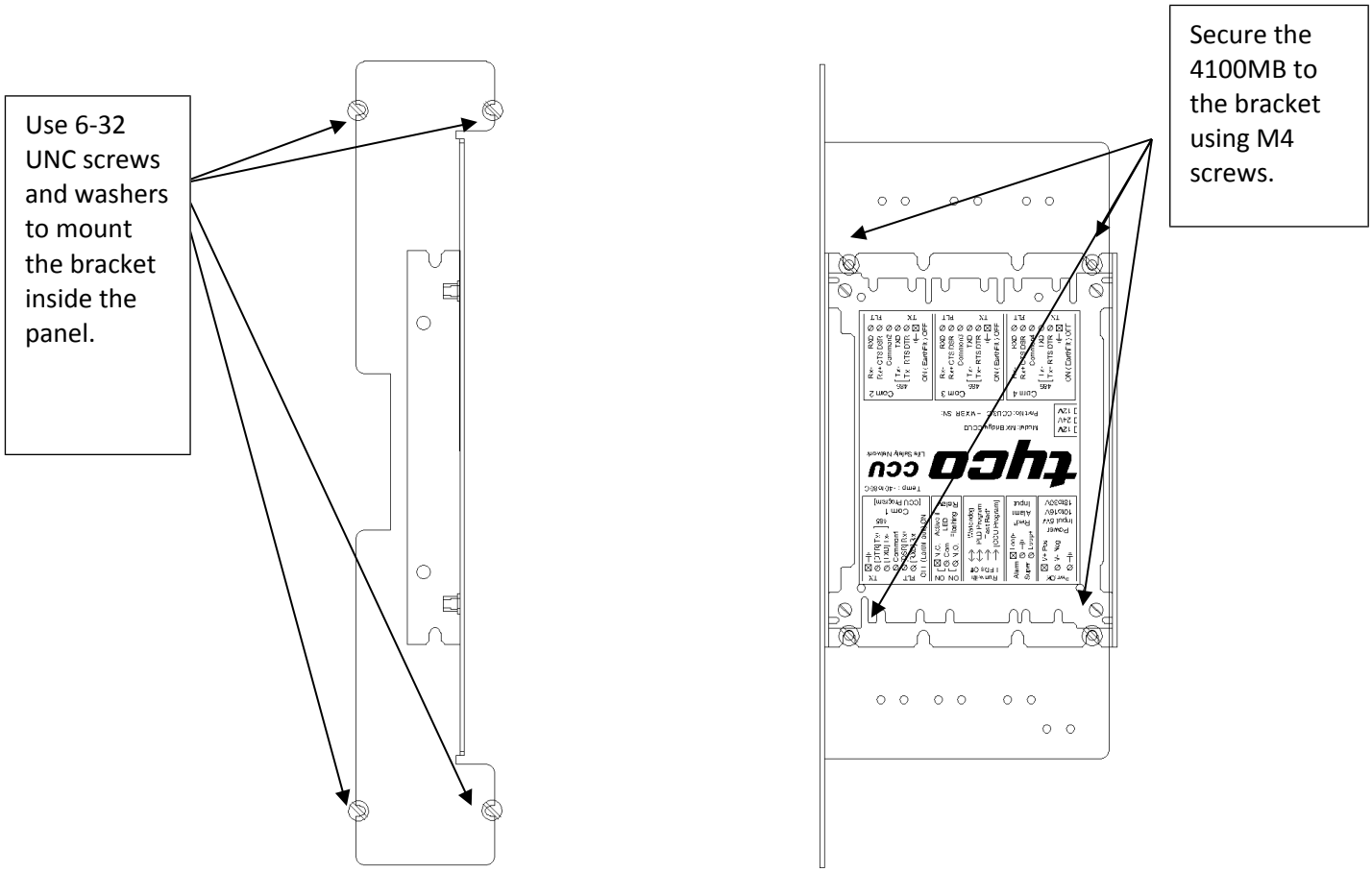


Figure 4: Mounting the 4100MB inside the Panel Enclosure

Mount the 4100MB to the bracket using the provided M4 screws. The power plug side should point downwards. The small holes on the brackets are for cable management.

To mount the bracket inside the fire panel enclosure, use 6-32 UNC x $^{3}/_{8}$ screws and the shake proof external star washers provided.

2.5 Connecting Power to the 4100MB

Connect the 24V DC power source to the supplied 3-way terminal block and plug this into the power socket of the 4100MB. Power can be obtained from the 4100 panel, for example from the AUX PWR terminals on the SPS. Include the current consumption of the 4100MB in the panel's PSU and battery calculations.

Pin connections are:

Pin number	Function
V+	24V
V-	COM
	Earth

Table 1: 4100MB Power Connections

2.6 Earth Connection

For correct installation and protection of the 4100MB device it must be mounted on an earthed metal plate. This is important for correctly dissipating any static discharge on the communication lines (as caused by an electrical storm) and thereby helping prevent damage to the unit.

2.7 Serial Port Connections

2.7.1 Connecting the 4100MB to the Simplex Panel

Use Cable Part Number: CCU3/4100MB Provided

To connect the 4100MB to a Simplex Panel use the following table and wiring diagram.

4020/4100 Host						4100MB Com1		
4020		4100			Signal	Signal	Com1 Pin	Colour
Port A TB1	Port B TB1	Port A TB1	Port B TB2	DB25 Pin				
1	6	8	1	2	TXD	RXD	6	Black (Blue Pair)
3	8	6	3	3	RXD	TXD	3	Blue
2	7	7	2	4	RTS	CTS	5	Black (Red Pair)
4	9	5	4	5	CTS	RTS	2	Red
5	10	4	5	7	GND	GND	4	Green

Table 2: Connection to Host Panel

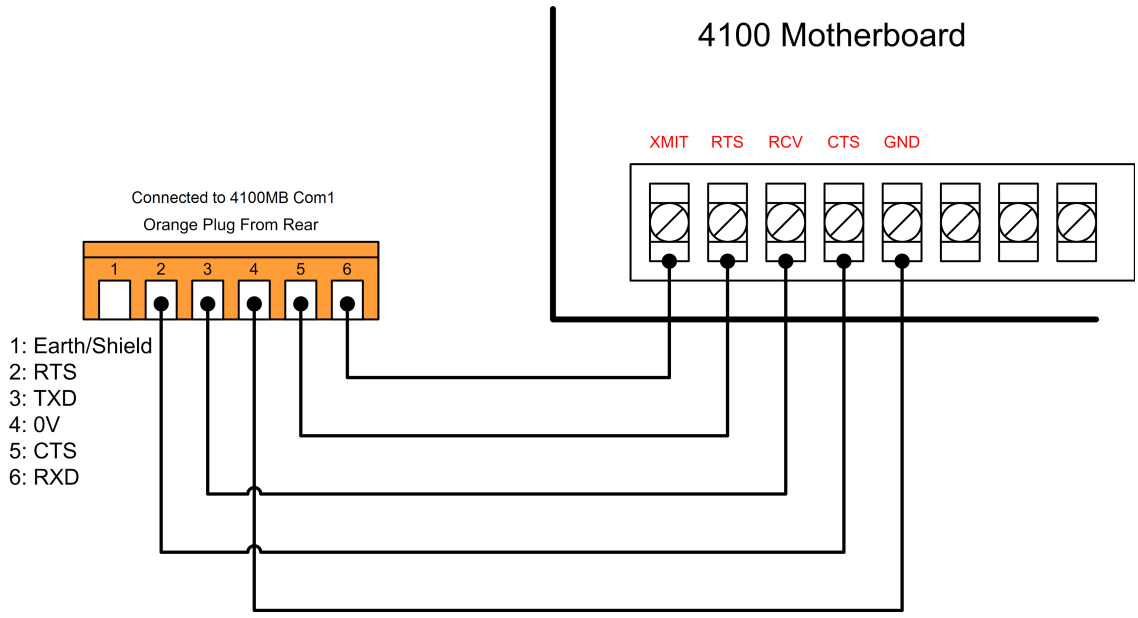
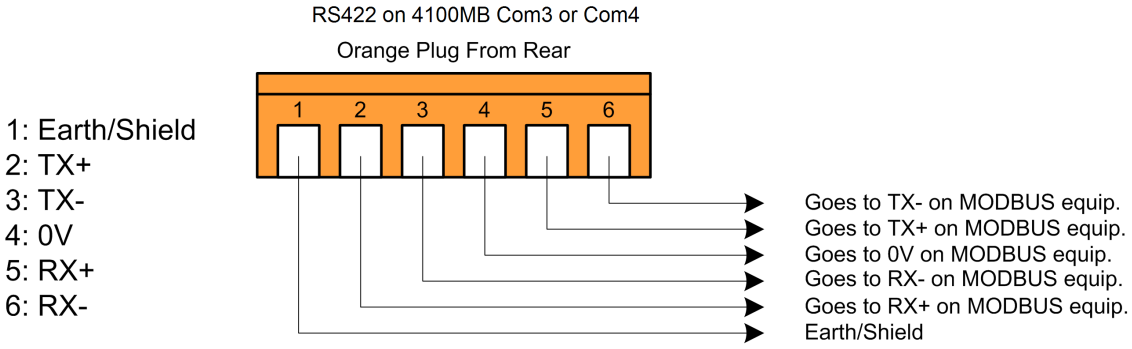


Figure 5: Connection of 4100MB to Terminals on 4100 Motherboard.

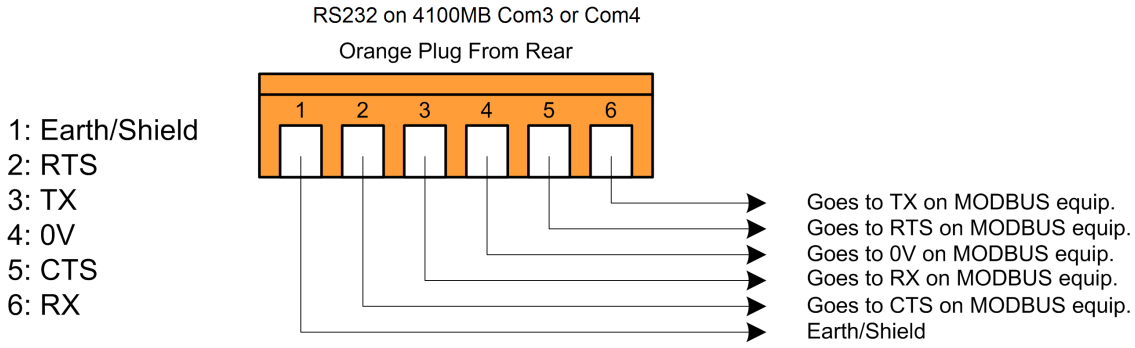
2.7.2 Connecting the 4100MB to the MODBUS Master

Each serial MODBUS interface can be configured for RS232, RS485 or RS422 operation.



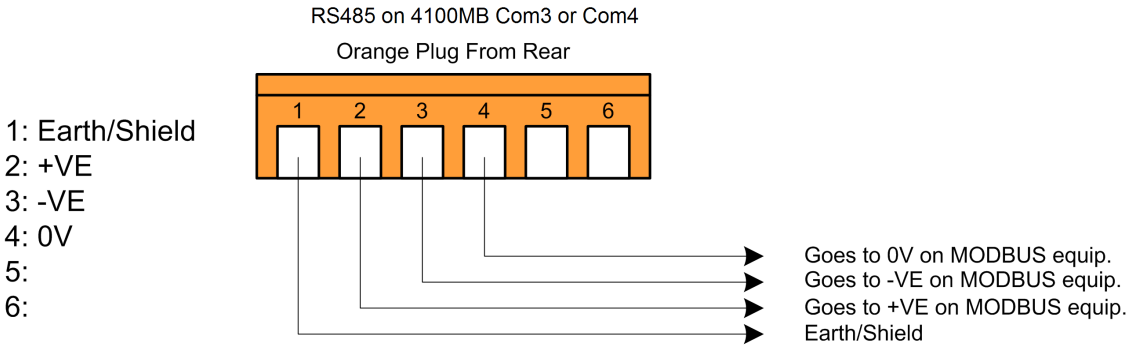
Pinout for Cable Connection from the 4100MB to a MODBUS RS422 Master	
MODBUS RS422	*4100MB Com3 or Com4 Pin Number*
NC	1
RX+	2
RX-	3
0V	4
TX+	5
TX-	6

Table 3: RS422 Cable Connections



Pinout for Cable Connection from the 4100MB to a MODBUS RS232 Master	
MODBUS RS232	*4100MB Com3 or Com4 Pin Number*
Earth/Shield	1
CTS	2
RX	3
0V	4
RTS	5
TX	6

Table 4: RS232 Cable Connections



Pinout for Cable Connection from the 4100MB to a MODBUS RS485 Master	
MODBUS RS485	*4100MB Com3 or Com4 Pin Number*
Earth/Shield	1
+	2
-	3
0V	4
NC	5
NC	6

Table 5: RS485 Cable Connections

2.7.3 Connecting the 4100MB to a PC for Programming / Diagnostics

Use Cable Part Number: Cable: CCU3/PROG Provided

Pinout for Cable Connection from the 4100MB to the PC COM Port	
PC COM Port DB9 Pin Number	*4100MB Com2 Pin Number*
NC	1
6	2
2	3
5	4
4	5
3	6

Table 6: Connection between 4100MB and PC COM Port

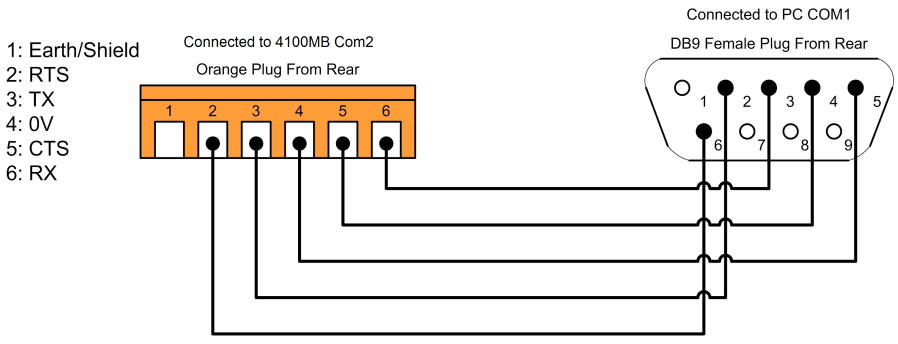


Figure 6: Connection between 4100MB and PC COM Port

2.8 Expansion Cards

2.8.1 CCU3/E Expansion Card

The E/4100MB **557.202.509** unit is supplied with the CCU3/E Ethernet card already fitted to the 4100MB base module.

2.9 Normal and Fault Indications

2.9.1 Operation of LEDs

Each communications port has a Green and a Yellow LED. The green LED flashes when data is transmitted on the corresponding port. The yellow LED is lit when there is a supervision failure on the port or it is unable to make a connection. If a port has been disabled in the software then neither LED will light.

Com1 (Connection to 4100 Panel):

- Green LED Flashes to indicate Data Transmission.
- Yellow LED indicates Supervision failure.

Com2 (Programming Connection to PC):

- Green LED Flashes to indicate Data Transmission.
- Yellow LED is not used.

Com3 and Com4 (Serial MODBUS):

- Green LED Flashes to indicate Data Transmission.
- Yellow LED indicates Supervision failure.

2.9.2 E/4100MB Ethernet Card LEDs

The following LEDs are provided on the CCU3/E expansion card:

- A standard 10BaseT Ethernet link LED.
- A standard 10BaseT receive activity LED.
- A standard 10BaseT transmit activity LED.
- A green MODBUS LED, indicating a MODBUS/TCP connection is currently active.
- A yellow MODBUS supervision LED, illuminated when there is a MODBUS/TCP supervision fault. This fault is available only when both serial MODBUS ports are disabled.

2.9.3 Supervision Relay

The relay on the 4100MB is normally energised and will de-energise under a number of fault conditions. This could be connected to an input on the 4100 if annunciation of faults is required. The green LED adjacent to the relay is constantly illuminated when the relay is energised and flashing when the relay is de-energised.

The relay is de-energised under the following fault conditions.

- Power loss to the 4100MB.
- Configuration checksum error.
- The 4100MB is refreshing events from the panel. New alarms cannot be received while this is in progress.
- A supervision fault on the serial connection to the 4100 panel.
- A serial MODBUS supervision fault. This fault is available only when the serial MODBUS ports are enabled.
- A MODBUS/TCP supervision fault. This fault is available only when both serial MODBUS ports are disabled.
- A sequence number fault on the connection to the 4100 panel. The relay activates for 30 seconds in the event of this fault.
- LHD TCP connection offline. This fault is active only when LHD operation is enabled.
- LHD polling error. This fault is active only when LHD operation is enabled.

2.9.4 4100 Panel Connection Considerations

The CLIST command is used to read the current state of the points from the 4100 panel. This command can take a long time to execute, especially with large networks. While this command is in progress new events cannot be received from the panel.

For this reason, if the panel indicates a sequence fault the 4100MB won't attempt to recover potentially lost events. This means that the link to the 4100 panel needs to be as short and reliable as possible.

3 Configuring the 4100 Panel

3.1 Programming the RS232 Interface

A free serial port on a RS232 Interface card in the 4100 panel is required for connection to the 4100MB. Either Port A (Upper Terminal Block) or Port B (Lower Terminal Block) may be used.

This card needs to be entered into the 4100 configuration and the properties set to specific values for correct operation with the 4100MB. Add the 4100–0113/6038 – 2120/RS232 Interface to the configuration in the correct bay/slot.

The example below shows a project where the 4100-0113 RS232 Interface card has been mounted in Box1 – Bay1–Slot1 – Address3.

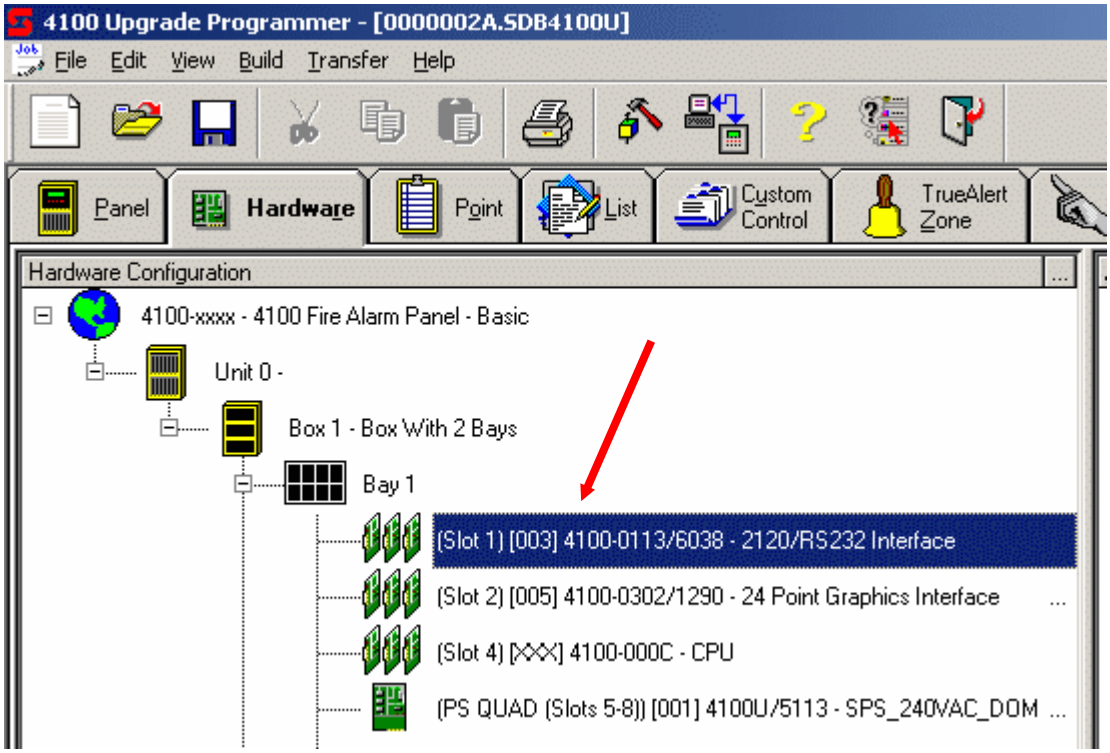


Figure 7. 4100-0113 RS232 Interface Card

Select the properties for the 4100-0113 RS232 Interface card by right clicking on it and selecting ‘Properties’. Go to the port tab (PortA or PortB) for the port that is to be connected to the 4100MB. Set the Communication settings to 9600, No Parity, 8 Data bits and 1 Stop Bit.

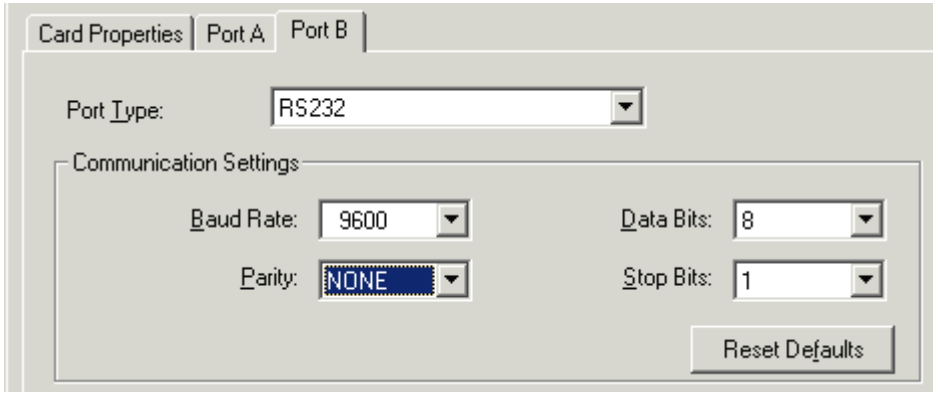


Figure 8. Port Communication parameters

Once you have done this click on the ‘Port Data’ button to edit the Port's data configuration. Ensure that the ‘Device Type’ in the ‘Gen. Info’ tab is set to COMPUTER.

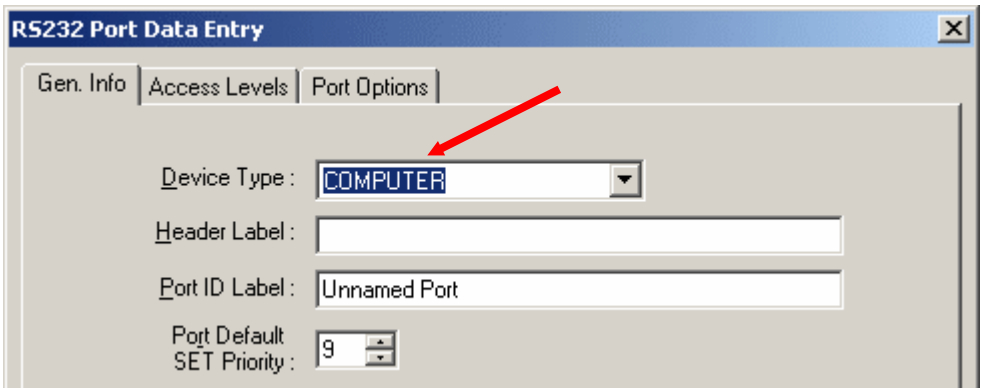


Figure 9. Port Data Configuration Parameters, Gen.Info Tab

On the Access Levels Tab set the Access Levels for Alarm Silence, System Reset, Change Time Date, Arm/Disarm Keys, Fire Alarm Acknowledge, Priority 2 Acknowledge, Supervisory Acknowledge, Trouble Acknowledge and Alarm List/Display Time to **Level 1**.

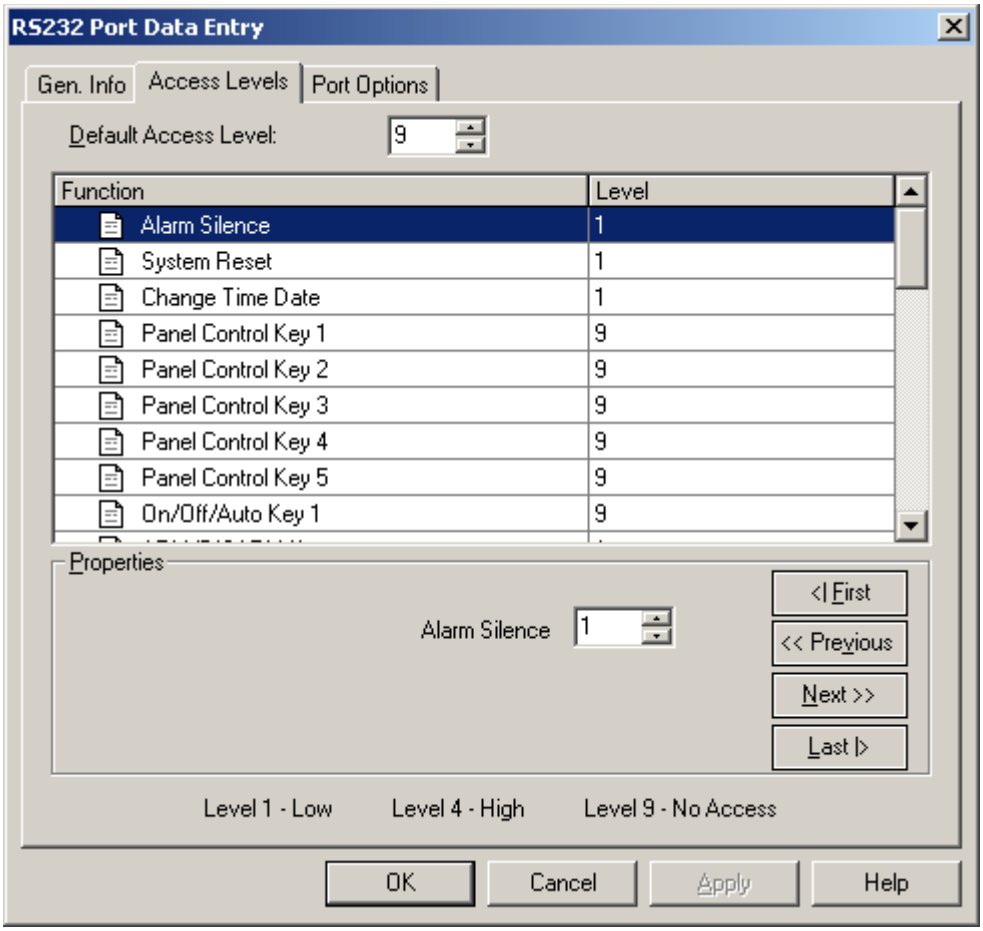


Figure 10. Port Data Configuration Parameters, Access Levels Tab

To allow the MODBUS master to send Set On/Off commands via the CCU3-4100MB the Default Access Level of the RS232 port must be set equal or higher than the On/Off/Auto Keys access level. This allows the CCU3-4100MB to send the command without first logging on to the panel.

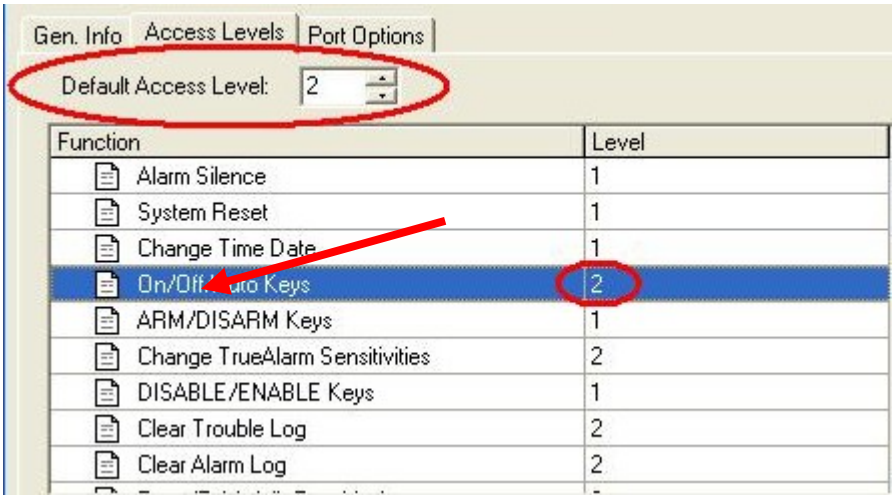


Figure 11. Access Level for On/Off/Auto Keys

Ensure that the 'Address' setting is 'Off' in the 'Port Options' tab. 'Protocol' must also be set to 'On'.

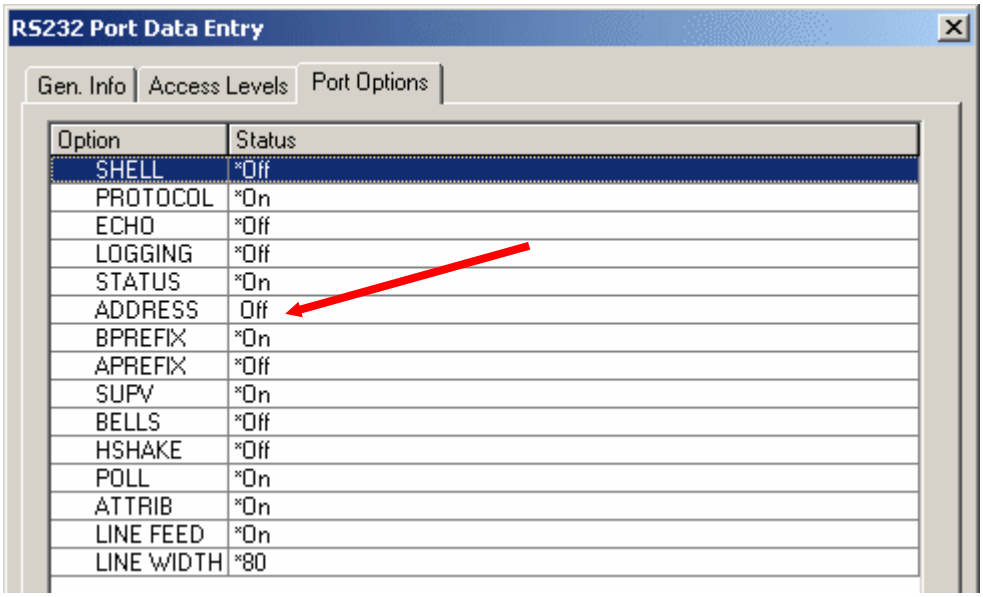


Figure 12. Port Data Configuration Parameters, Port Options Tab

Click OK to save the Port settings.

Enable the required events in the Port Vectoring configuration. These are Fire Alarms, Troubles, Supervisories, Priority 2 Alarms, System Reset, Alarm Silence, Control Events, Utility Events and PSEUDO Events.

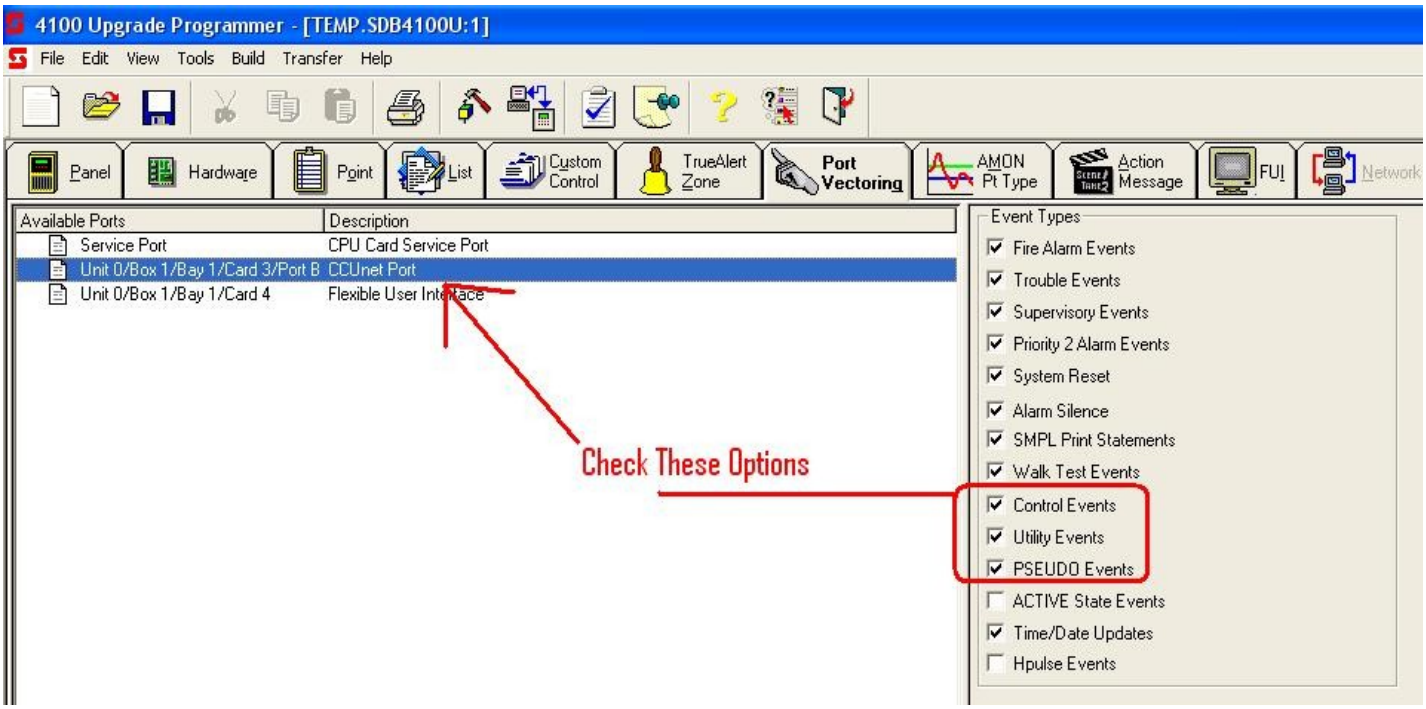


Figure 13. Port Vectoring

On completion select **File | Export | Export XLG point data** from the main menu to generate a 'Card Detail' report. This will be imported into the 4100MB programmer to populate the device list.

If you have an older version of the 4100 programmer that does not support the XLG point data export Appendix B: Importing a 4100 Card Detail Report describes how to generate and import a Card Detail report.

This completes the 4100-0113 RS232 Interface Card configuration. When completed, program your panels and verify the configuration is satisfactory.

3.2 Programming for Point Status Transfer

3.2.1 PLC/SCADA MODBUS Interface - Device/Point Status

The following steps should be taken to allow the 4100 panel to transfer device/circuit status information to one or more MODBUS masters.

This application will send point status information such as Fire, Priority 2, Trouble (Fault), Supervisory (Isolate), Disable, On/Off condition to the PLC/SCADA.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the Hardware tab.
3. Configure addressable IDNet points, hardwired monitor, relay or signal circuits as required. Add/edit point information such as point type and custom label.
4. On completion select **File | Export | Export XLG point data** from the ES Panel Programmer main menu to generate a 'Card Detail' report. This will be imported into the 4100MB programmer to populate the Panel Devices list.

5. Configure the MODBUS map in the 4100MB. Refer to Chapter 5.5 Map Configuration.

3.2.2 PLC/SCADA MODBUS Interface – Event Control

The following steps should be taken to initiate an event to a 4100 control point from one or more MODBUS masters.

This application will allow the PLC/SCADA to generate event requests to control outputs on the Simplex panel.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the Hardware tab.
3. Choose a user-defined digital pseudo point (Ex. P752). If there is no unused digital pseudo available, click the + on the DPSEUDO icon from the Available Hardware window then drag and drop the 4100-xxxx – 256 Point Digital Pseudo to the system CPU bay inside the Hardware Configuration window.

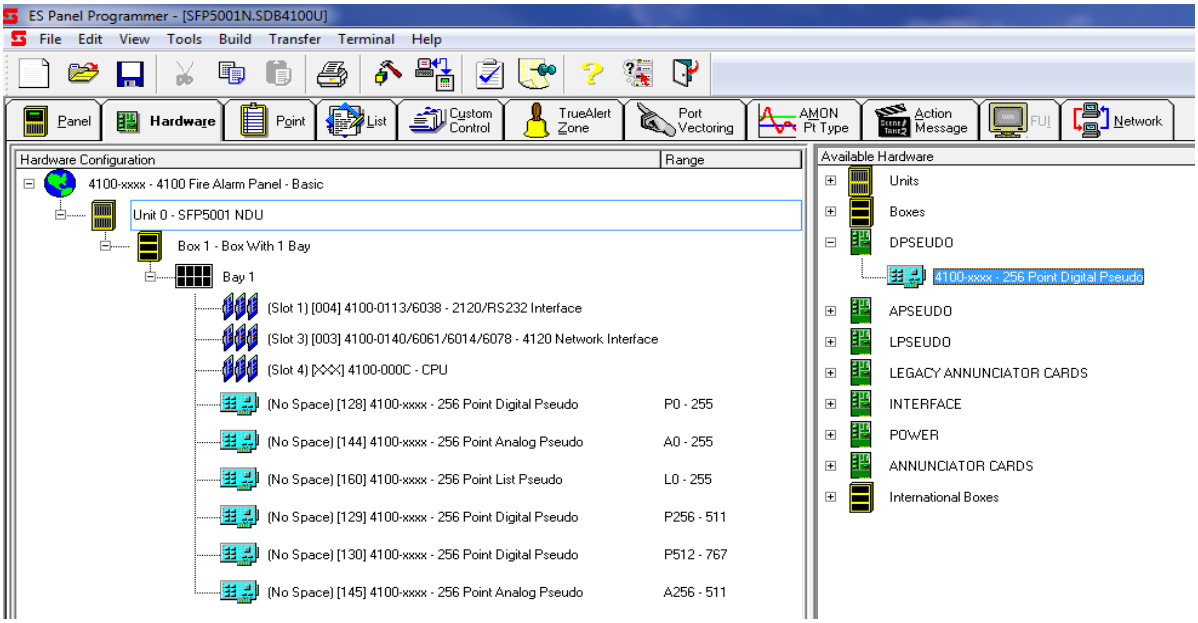


Figure 14. User Defined Digital Pseudo Point

4. Double-click the newly added 4100-xxxx – 256 Point Digital Pseudo icon and select Point Editing tab.

5. Click on the digital pseudo (ex.P752), under Properties select FIRE point type. In the Custom Label textbox, type in preferred point label (ex. DGI-1042 IMS DECLARED FIRE) and click OK to complete. Additional “Event Control” digital pseudos can be created if necessary.

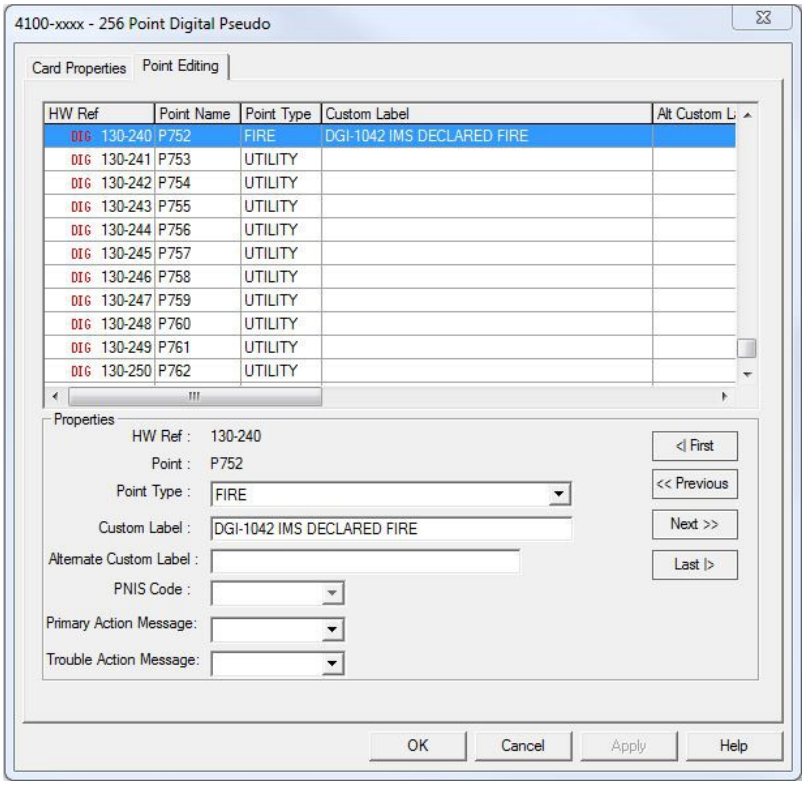


Figure 15. Digital Pseudo Point Options

6. On completion select **File | Export | Export XLG point data** from the ES Panel Programmer main menu to generate a 'Card Detail' report. This will be imported into the 4100MB programmer to populate the Panel Devices list.
7. Configure the MODBUS map in the 4100MB. Refer to Chapter 5.5 Map Configuration.

3.2.3 Command Control

This application will allow the PLC/SCADA to send command requests such as turn ON/OFF a relay/signal circuit directly to the Simplex panel.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the Hardware tab and configure control points such as relay circuits or signal circuits as required. Add/edit point information such as point type and custom label.
3. On completion select **File | Export | Export XLG point data** from the ES Panel Programmer main menu to generate a 'Card Detail' report. This will be imported into the 4100MB programmer to populate the Panel Devices list.
4. Configure the MODBUS map in the 4100MB. Refer to Chapter 5.5 Map Configuration.

3.2.4 Analogue Values

The following steps should be taken to allow the 4100ES/ESi host panel to monitor the analogue value of a 4-20mA device or a TrueAlarm detector and relay the real-time analogue value via the 4100MB to one or more MODBUS masters.

This example can be used when the operation requires the Simplex panel to report a gas alarm condition when a non-Simplex hydrocarbon gas detector is in alarm. On system reset, all activated HCG points will clear.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the AMON Pt Type tab. Right click mouse and add analogue monitor point type.
3. Type a unique point type name (Ex. HCG), select FIRE alarm type and decimal point then hit Next>.

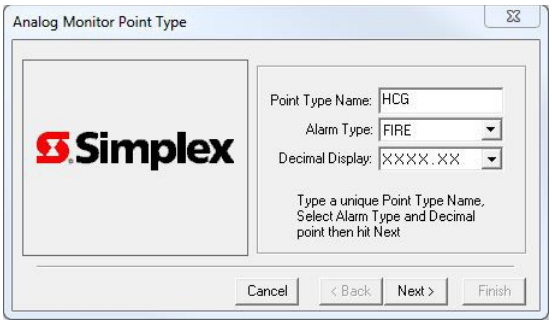


Figure 16. Analog Monitor Point

4. Type Engineering Unit Text (Ex.LEL, PPM), 4mA and 20mA values then hit Next>.
5. Select the Threshold(s) you want to receive an alarm, then enter Threshold Unit Values. Click Finish.
6. Open the Hardware tab and select addressable loop.
7. Program an Analogue Monitor ZAM, then select the point type created in step 3 and type custom label (Ex. FDH-7001-XP21 HYDROCARBON GAS DETECTOR).
8. Click Apply then OK.
9. Configure any other Analogue Monitor ZAMs required.
10. Build job.
11. On completion select **File | Export | Export XLG point data** from the ES Panel Programmer main menu to generate a 'Card Detail' report. This will be imported into the 4100MB programmer to populate the Analogue Values list.
12. Configure the Analogue and MODBUS maps in the 4100MB. Refer to Chapters 5.5 Map Configuration and 5.6 Analogue Values.

3.3 Linear Heat Detector Interface

3.3.1 LHD Fire Alarm Status Point

The following programming steps should be taken to enable the 4100MB to instruct a digital pseudo in the Simplex panel to turn on or off when the state of the coil mapped to the pseudo point changes.

Remember, the point type given to a digital pseudo will determine how the Simplex panel reacts to its on/off condition. This application is used when the operation requires the Simplex panel to report a fire alarm condition when a linear heat detector is activated. On system reset, all activated LHD points will clear.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the Hardware tab and choose a user-defined digital pseudo point (Ex. P601). If there is no unused digital pseudo available, click the + on the DPSEUDO icon from the Available Hardware window then drag and drop the 4100-xxxx – 256 Point Digital Pseudo to the system CPU bay inside the Hardware Configuration window.
3. Double-click the newly added 4100-xxxx – 256 Point Digital Pseudo icon and select Point Editing tab.
4. Click on the digital pseudo (ex.P768), under Properties select FIRE point type. In the Custom Label textbox, type in preferred point label (ex. LHD104222 IN ALARM) and click OK to complete. Additional “LHD Alarm” digital pseudos can be created if necessary.

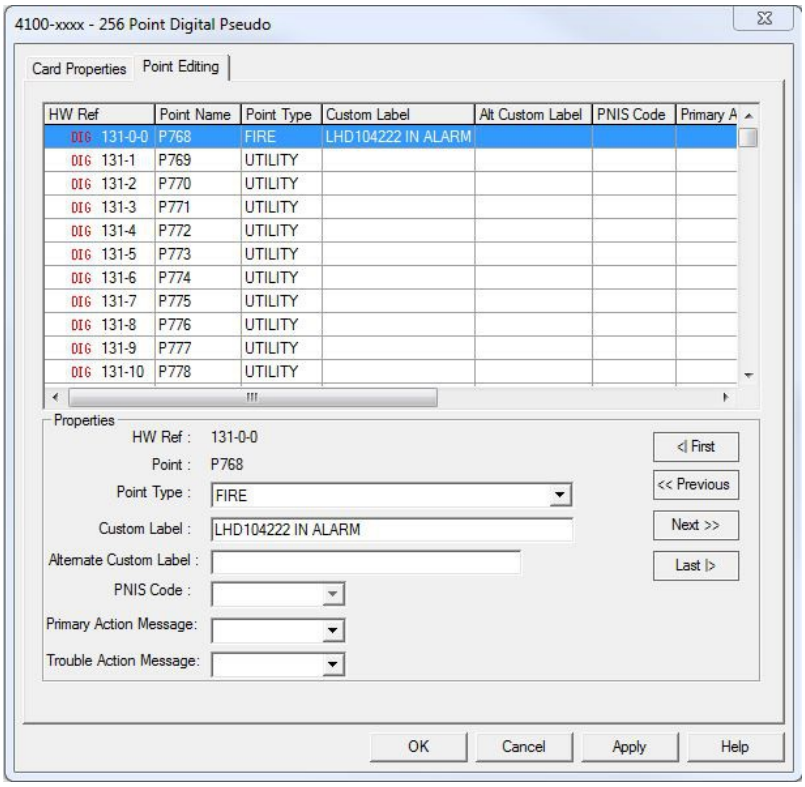


Figure 17. Digital Pseudo Point Options

5. Open the List tab. Press Insert key or right-click mouse and select Add List…
6. Locate the digital pseudo point and click to highlight then press the space bar to add the selected point into the list. Other “LHD” digital pseudos can be tagged into the same point list if necessary.

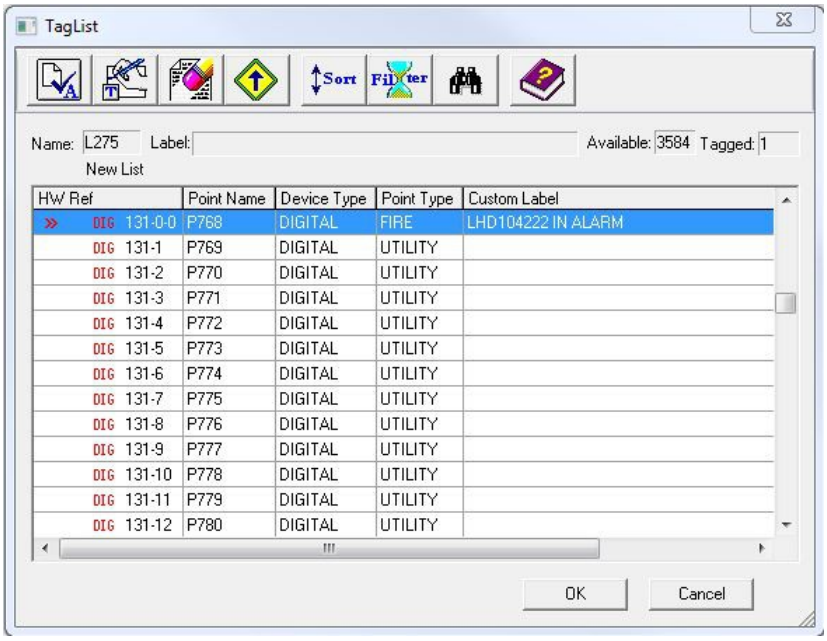


Figure 18. Pseudo Point Tag List

7. Click OK and type in Point List label (Ex.LHD ALARM EASTBOUND).
8. Open the Custom Control tab.
9. Select a Program Block.
10. Right-click mouse on selected program block and select Add Equation…
11. Type LHD ALARM SYSTEM RESET WINDOW TIMER as label.
12. Place the mouse cursor in front of the [INPUTS] line on the Equations window and click Add… button. Add the following SMPL input statement:

    [INPUTS]
    STATUS ON
    A14 | ANALOG | TIMER | SYSTEM RESET WINDOW TIMER
    [END INPUTS]

13. Place the mouse cursor in front of the [OUTPUTS] line from the Equations window and click the Add… button. Add the following SMPL output statement:

    [OUTPUTS]
    PULSE ANALOG
    Axxx | Analog Timer | ANALOG | TIMER | CUSTOM CONTROL - TIMER
    A15 | Analog Timer SetPoint | ANALOG | ANALOG | SYSTEM RESET WINDOW TIMER SETPOINT
    [END OUTPUTS]

Note: Axxx can be any unused user-defined analog pseudo (Ex. A280).

14. Right-click mouse on selected program block and select Add Equation.
    Type LHD ALARM RESET as label.

15. Place the mouse cursor in front of the [INPUTS] line on the Equations window and click Add… button. Add the following SMPL input statement:

    [INPUTS]
    STATUS ON
    Axxx | ANALOG | TIMER | CUSTOM CONTROL - TIMER
    [END INPUTS]

16. Place the mouse cursor in front of the [OUTPUTS] line on the Equations window and click Add… button. Add the following SMPL output statement:

    [OUTPUTS]
    HOLD OFF PRI=8,9
    Lyyy | LIST | DPSEUDO | LHD ALARM EASTBOUND
    [END OUTPUTS]

    Note 1: Lyyy must be the point list created in Steps 5 & 6.
    Note 2: Ensure the control priority level for the point list Lyyy is PRI=8,9 otherwise potential LHD alarm reset problem could arise between the Simplex panel and the 4100MB.

17. Configure the LHD map in the 4100MB. Refer to Chapter 5.7 LHD Configuration.

3.3.2 LHD Fault Status Point

This application is used when the operation requires the Simplex panel to report a fault condition when the status of a linear heat detector becomes unhealthy.

1. Launch the ES Panel Programmer and open an existing job or create a new job.
2. Open the Hardware tab and choose a user-defined digital pseudo point (Ex. P1988). If there is no unused digital pseudo available, click the + on the DPSEUDO icon from the Available Hardware window then drag and drop the 4100-xxxx – 256 Point Digital Pseudo to the system CPU bay inside the Hardware Configuration window.
3. Double-click the newly added 4100-xxxx – 256 Point Digital Pseudo icon and select Point Editing tab.
4. Click on the digital pseudo (ex.P1988), under Properties select TROUBLE point type. In the Custom Label textbox, type in preferred point label (ex. LHD104222 UNHEALTHY) and click OK to complete. Additional “LHD Unhealthy” digital pseudos can be created if necessary.
5. Configure the LHD map in the 4100MB. Refer to Chapter 5.7 LHD Configuration.

4 4100MB Operation

4.1 Supported MODBUS Commands

Table 7: Supported MODBUS Commands lists the MODBUS commands supported by the 4100MB. All MODBUS coil, input and register commands access the same data from the 4001MB. Function 5 **(Force Single Coil)** is valid only for the configurable part of the map, and then only if the coil is used to represent a Simplex panel point.

MODBUS Command	Map Used
(1) Read Coil Status	Entire MODBUS map
(2) Read Input Status	Entire MODBUS map
(3) Read Holding Registers	Entire MODBUS map
(4) Read Input Registers	Entire MODBUS map
(5) Force Single Coil	MODBUS map configurable part only
(6) Preset Single Register	Entire MODBUS map
(15) Force Multiple Coils	Entire MODBUS map
(16) Preset Multiple Registers	Entire MODBUS map

Table 7: Supported MODBUS Commands

4.2 MODBUS/TCP Connections

A maximum of 4 simultaneous MODBUS/TCP connections is supported by the E/4100MB. The TCP connections include a timeout so that if no poll is received for 4 seconds the connection will be reset.

4.3 MODBUS Map Format

The MODBUS Map of the 4100MB consists of a customisable segment followed by a pre-defined segment. The bits in the pre-defined segment are fixed. Each bit of the customisable segment may be defined to represent:

- Any bit from the pre-defined segment of 4100MB system points.
- An event from a Panel Device. The bit can be set on any or all of Alarm, Priority 2, Trouble, Supervisory, Utility, Control, Disable event types.

Programming of the mapping from the 4100 panel devices to the MODBUS map address is done using the 4100MB programmer.

4.3.1 Map Type.

The Map Type controls the size and location of both the customisable and pre-defined segments of the MODBUS Map.

- Standard Mode – The standard map consists of a customisable segment starting at register address 1 followed by the pre-defined segment at register address 2049. Refer to section 4.4 for a detailed description of the map.

- AUTRONICA Mode – Changes the operation of the MODBUS map to a mode compatible with AUTRONICA panels. This mode treats the map as one word register for each point, each register stores a word value representing the current device state.

- Legacy Mode – This mode is compatible with projects implemented with 4100MB V3.07 or earlier. The customisable segment for these projects starts at register address 1 and is smaller. The pre-defined segment starts at register address 1025. Refer to Appendix A: Legacy Mode MODBUS Map for a detailed description.

  Note: This mode is included for legacy support and should not be used in new designs.

4.3.2 4100MB System Points

The following table lists the 4100MB system points that can be assigned into the customisable segment.

4100 Name	Title	Description
X9000	Unused Entry - 0	In laying out the MODBUS map there may be bits in the configurable map that are not assigned. This entry can be used to reserve space in the map for these bits. This bit will be forced to 0.
X9001	Unused Entry - 1	This bit will be forced to 1 in the configurable map.
X0000	Common Alarm	The 4100MB keeps an internal list of the panel events, updated as new messages are received. This bit will be set if there is any Alarm event in the internal event list.
X0001	Common Pri2 Alarm	This bit will be set if there is any Pri2 Alarm event in the internal event list.
X0002	Common Trouble (Fault)	This bit will be set if there is any Trouble event in the internal event list.
X0003	Common Supervisory	This bit will be set if there is any Supervisory event in the internal event list.
X0004	Common Utility	This bit will be set if there is any Utility event in the internal event list.
X0005	Common Control	This bit will be set if there is any Control event in the internal event list.
X0006	Common Disable	This bit will be set if there is any Disable event in the internal event list.
X0008	Timed Watchdog	Toggles at a configurable time interval.
X0009	CPP Supervision Fault	Supervision status of the link between the 4100 panel and the 4100MB. Set if no message is received from the 4100 panel for 50 seconds.
X0010	MODBUS 0 Supervision Fault	Supervision status of the link between the MODBUS serial master 0 and the 4100MB. Set if no message is received from the MODBUS master for 50 seconds.
X0011	MODBUS 1 Supervision Fault	Supervision status of the link between the MODBUS serial master 1 and the 4100MB. Set if no message is received from the MODBUS master for 50 seconds.
X0015	Toggle Watchdog	Toggles every time a read command is received from a MODBUS master.
X0016	CPP Sequence Number Error	Set for 30 seconds when the sequence number received from the 4100 panel does not match the next expected value.
X0017	LHD Interface Fault	Set if there is no TCP connection to the LHD controller or no reply has been received to 6 sequential requests from the 4100MB to the MODBUS slave.
X0018	Refresh Command Active	The 4100MB is refreshing events from the 4100 panel. New alarms cannot be received while this is in progress.
X0019	MODBUS TCP Fault	Set if no serial MODBUS ports have been enabled and there are no TCP connections.
X0032	Panel Common Alarm	Same as X0000 Common Alarm
X0033	Panel Common Pri2 Alarm	Same as X0001 Common Pri2 Alarm
X0034	Panel Common Trouble	Same as X0002 Common Trouble (Fault)
X0035	Panel Common Supervisory	Same as X0003 Common Supervisory

4100 Name	Title	Description
X0036	Panel Common Utility	Same as X0004 Common Utility
X0037	Panel Common Control	Same as X0005 Common Control
X0038	Panel Common Disable	Same as X0006 Common Disable
X0040	Panel No Response	Same as X0009 CPP Supervision Fault.
X0041	Panel Restarted	Set for 10 seconds after either a warm start or cold start message is received from the host panel.
X0896	No Panels Configured	No panels have been added to the Fire Panel list in the configuration program.
X0897	Panel 1 Configured	A map of which panels are present in the system. If the connected Simplex panel is not networked then these bits are meaningless as the connected panel will have no network node number. This map is set up using the configuration program.
X0898	Panel 2 Configured	
...		
X1023	Panel 127 Configured	
X1025	Panel 1 OFFLINE	Each bit is the supervision status of the corresponding panel in the Network Map. The bit is set if no message is received from the panel for a configurable time interval. In order to use these bits it is necessary to program each panel to send a message at a regular interval. One way of doing this is to use a pseudo point that toggles at a regular interval.
X1026	Panel 2 OFFLINE	
X1151	Panel 127 OFFLINE	
X1536 - X1551	Analog[0]	Results from analog polling are stored in these registers. For TrueAlarm devices the current raw analogue value (0-255) is stored in the low byte of the corresponding analogue value map register.
X1552 - X1567	Analog[1]	
...		
X2032 - X2047	Analog[31]	

4.4 Standard Mode MODBUS Map

The following table lists the MODBUS coil/input and register addresses for the customisable segment and predefined data in the 4100MB.

Note: In accordance with standard MODBUS practice all coils/inputs and registers are numbered from 1 upwards.

MODBUS Map Area	Bit Type	Input/Coil Address		Register Address			
		Start	End	Start Register	End Register	Number of Bits	Number of Registers
Customisable Map		1	24000	1	1500	24000	1500
Global Status Bits		32769	32800	2049	2050	32	2
X0000	Global Common Alarm	32769					
X0001	Global Common Priority2 Alarm	32770					
X0002	Global Common Trouble	32771					
X0003	Global Common Supervisory	32772					
X0004	Global Common Utility	32773					
X0005	Global Common Control	32774					
X0006	Global Common Disable	32775					
	Not Defined	32776					
X0008	Timed Watchdog	32777					
X0009	CPP Trouble	32778					
X0010	MODBUS Interface 0 Trouble	32779					
X0011	MODBUS Interface 1 Trouble	32780					
	Not Defined	32781					
	Not Defined	32782					
	Not Defined	32783					
X0015	Toggle Watchdog	32784					
X0016	CPP Sequence Number Error	32785					
X0017	LHD Trouble	32786					
X0018	Event Refresh in Progress	32787					
X0019	TCP Trouble	32788					
Panel Status Bits		32801	32832	2051	2052	32	2
X0032	Panel Common Alarm	32801					
X0033	Panel Common Priority2 Alarm	32802					
X0034	Panel Common Trouble	32803					
X0035	Panel Common Supervisory	32804					
X0036	Panel Common Utility	32805					
X0037	Panel Common Control	32806					
X0038	Panel Common Disable	32807					
	Not Defined	32808					
X0040	Panel Not Responding	32809					
X0041	Panel In Reset	32810					

MODBUS Map Area	Bit Type	Input/Coil Address		Register Address			
		Start	End	Start Register	End Register	Number of Bits	Number of Registers
Commands		32897	32928	2057	2058	32	2
	cmdOperator	32897					
	cmdRefresh	32898					
	cmdRestart	32899					
	cmdAck	32900					
	cmdSilence	32901					
	cmdReset	32902					
	cmdAckAlarms	32903					
	cmdAckPriority2 Alarms	32904					
	cmdAckTroubles	32905					
	cmdAckSupervisories	32906					
	cmdAckAbnormal	32907					
	cmdDisarm	32908					
	cmdArm	32909					
	cmdDisable	32910					
	cmdEnable	32911					
	cmdDetails	32912					
	Reserved	32913	32928				
Command Data		32929	33440	2059	2090	512	32
Command Address		32929	33184	2059	2074	256	16
Command Param		33185	33440	2075	2090	256	16
Timestamp	Number of seconds since 00:00:00:00 Jan 1992	33537	33568	2097	2098	32	2
	Timestamp Byte 0 (LSB)	33537	33544				
	Timestamp Byte 1	33545	33552				
	Timestamp Byte 2	33553	33560				
	Timestamp Byte 3 (MSB)	33561	33568				
Time and Date		33569	33664	2099	2104	96	6
	Year	33569	33584	2099		16	1
	Month	33585	33600	2100		16	1
	Day	33601	33616	2101		16	1
	Hour	33617	33632	2102		16	1
	Minutes	33633	33648	2103		16	1
	Second	33649	33664	2104		16	1
Network Map		33665	33792	2105	2112	128	8
X0896	No Panels Configured	33665					
X0897	Panel 1 Configured	33666					
	...						
X1023	Panel 127 Configured	33792					
Network Status		33793	33920	2113	2120	128	8
	Not Defined	33793					
X1025	Panel 1 OFFLINE	33794					

MODBUS Map Area	Bit Type	Input/Coil Address		Register Address			
		Start	End	Start Register	End Register	Number of Bits	Number of Registers
	...						
X1151	Panel 127 OFFLINE	33920					
Expansion Card Status		33921	33924	2121	2122	32	2
X1152	CARD1_STATUS	33921					
Analog Polling Results		34304	34815	2144	2175	512	32
X1536 - X1551	Analog[0]	34304					
X1552 - X1567	Analog[1]	34320					
X1568 - X1583	Analog[2]	34336					
X1584 - X1599	Analog[3]	34352					
X1600 - X1615	Analog[4]	34368					
X1616 - X1631	Analog[5]	34384					
X1632 - X1647	Analog[6]	34400					
X1648 - X1663	Analog[7]	34416					
X1664 - X1679	Analog[8]	34432					
X1680 - X1695	Analog[9]	34448					
X1696 - X1711	Analog[10]	34464					
X1712 - X1727	Analog[11]	34480					
X1728 - X1743	Analog[12]	34496					
X1744 - X1759	Analog[13]	34512					
X1760 - X1775	Analog[14]	34528					
X1776 - X1791	Analog[15]	34544					
X1792- X1807	Analog[16]	34560					
X1808- X1823	Analog[17]	34576					
X1824- X1839	Analog[18]	34592					
X1840- X1855	Analog[19]	34608					
X1856- X1871	Analog[20]	34624					
X1872- X1887	Analog[21]	34640					
X1888- X1903	Analog[22]	34656					
X1904- X1919	Analog[23]	34672					
X1920- X1935	Analog[24]	34688					
X1936- X1951	Analog[25]	34704					
X1952- X1867	Analog[26]	34720					
X1968- X1983	Analog[27]	34736					
X1984- X1999	Analog[28]	34752					
X2000- X2015	Analog[29]	34768					
X2016- X2031	Analog[30]	34784					
X2032 - X2047	Analog[31]	34800					
End of Map			34815		2175	34816	2176

4.5 Legacy Mode MODBUS Map

This mode is included for legacy support and should not be used in new designs. It allows the user to replace an existing 4100MB without requiring reconfiguration of the MODBUS master. It is documented in Appendix A: Legacy Mode MODBUS Map

4.6 Sending Commands from the MODBUS Map

Commands to the panel can be initiated by the MODBUS master by either writing to bits in the customisable segment or by writing to the command register.

If the MODBUS master is to send SET ON/OFF commands via the 4100MB the Default Access Level of the RS232 port must be set equal or higher than the On/Off/Auto Keys access level. This will allow the 4100MB to send the command without first logging on to the panel.

4.6.1 Individual Coil Commands

Bits in the customisable segment of the MODBUS map may be configured with an associated command which is triggered when the MODBUS master sends a ***Force Single Coil (05)*** command to that address. The commands which may be sent are SET ON/OFF, ENABLE/DISABLE and ARM/DISARM. Refer to section 5.5.3 MODBUS Map Item Options for details.

The 4100MB does not store the force state of the coil received in the command from the MODBUS master – it just generates commands which are queued for sending to the panel. The map bit however will be set if a state change is received from the panel for that 4100 point address.

4.6.2 Command Register Commands

The command register contains bits to select a command to send to the 4100 panel. The Command Address and Command Param registers hold any required parameters for the command. As these parameters are treated as strings all unused registers must be set to the value 0.

To send a command, write any required address and data parameters to the MODBUS map then write the desired command bit to to the command register to trigger the sending of the command. The address, data and command registers can be written in the one packet if you wish. The MODBUS master can use any of the coil or register write commands to initiate a command.

Note that only one bit in the command register should be set at a time.

The supported commands and the 4100 panel commands they map to are listed in Table 8: Supported 4100 Commands.

- Required parameters are denoted using angle brackets eg: <address>.
- Any optional parameters are denoted using square brackets eg: [address].

Bit	Command Name	4100 Command
0	Operator	See description below.
1	Refresh	CLIST
2	Restart	RESTART [address]
3	Ack	Control-A
4	Silence	Control-S
5	Reset	Control-D
6	AckAlarms	ACK [address] F
7	AckPri2 Alarms	ACK [address] P
8	AckTroubles	ACK [address] T
9	AckSupervisories	ACK [address] S
10	AckAbnormal	ACK [address] A
11	Disarm	DISARM <address> ON
12	Arm	DISARM <address> OFF
13	Disable	DISABLE <address> ON
14	Enable	DISABLE <address> OFF
15	Details	SHOW <address>

Table 8: Supported 4100 Commands

The Command Data registers are divided into 2 groups, called Command Address and Command Param registers. For all commands except Operator, any required address parameter should be written to the Command Address registers.

The example in Table 9: Register Data for 4100 Disable Command shows the registers to set to send the command 'DISABLE P576 ON'.

Register Address	Register Name	Value (Hex)	Description
2057	Command Register	20 00	Bit 32910 = cmdDIsable
2058	Command Register	00 00	reserved
2059	Command Address[0]	50 35	'P' '5'
2060	Command Address[1]	37 36	'7' '6'
2061	Command Address[2]	20 4F	<space> 'O'
2062	Command Address[3]	4E 00	'N' <end of operator command>
2063	Command Address[4]	00 00	Padding
...	...	...	...
2074	Command Address[15]	00 00	Padding
2075	Command Param[0]	00 00	Padding
...	...	...	...
2090	Command Param[15]	00 00	Padding

Table 9: Register Data for 4100 Disable Command

The order of the characters for the string parameters in the registers is in 'normal' order when MSB first is used for the MODBUS interfaces. For compatibility reasons if the small (legacy mode) map is selected the opposite order is used – the characters for string parameters in the registers will be in 'normal' order when LSB first is used.

The Operator command allows the MODBUS master to initiate any 4100 command. When this is selected the string data from the Command Address registers is appended to the string data from the Command Param registers and sent to the 4100 panel as one command. Which data is assigned to the Command Address registers and which to the Command Param registers is not important, only the order is. A space character is inserted between the 2 strings.

The string sent to the fire panel is:

Command Param[] <space> Command Address[]

The examples in Table 10: Register Data for 4100 SET Command and Table 11: Alternate Register Data for 4100 SET Command show 2 ways of setting the registers to send the command 'SET P576 ON' using the Operator command.

Register Address	Register Name	Value (Hex)	Description
2057	Command Register	00 01	Bit 32897 = cmdOperator
2058	Command Register	00 00	reserved
2059	Command Address[0]	00 00	Padding
...	...	...	...
2074	Command Address[15]	00 00	Padding
2075	Command Param[0]	53 45	'S' 'E'
2076	Command Param[1]	54 20	'T' <space>
2077	Command Param[2]	50 35	'P' '5'
2078	Command Param[3]	37 36	'7' '6'
2079	Command Param[4]	20 4F	<space> 'O'
2080	Command Param[5]	4E 00	'N' <end of string>
2081	Command Param[6]	00 00	Padding
...	...	...	...
2090	Command Param[16]	00 00	Padding

Table 10: Register Data for 4100 SET Command

Register Address	Register Name	Value (Hex)	Description
2057	Command Register	00 01	Bit 32897 = cmdOperator
2058	Command Register	00 00	reserved
2059	Command Address[0]	50 35	'P' '5'
2060	Command Address[1]	37 36	'7' '6'
2061	Command Address[2]	20 4F	<space> 'O'
2062	Command Address[3]	4E 00	'N' <end of string>
2063	Command Address[4]	00 00	Padding
...	...	...	...
2074	Command Address[15]	00 00	Padding
2075	Command Param[0]	53 45	'S' 'E'
2076	Command Param[1]	54 00	'T' <end of string>
2077	Command Param[2]	00 00	Padding
...	...	...	...
2090	Command Param[15]	00 00	Padding

Table 11: Alternate Register Data for 4100 SET Command

5 The 4100MB Programmer

Run Setup.exe to install the 4100MB programmer and MODBUS test program.

The general procedure for configuring a 4100MB can be summarised as:

1. Configure any expansion cards fitted to the 4100MB.
2. Specify which panels are present in the network and any panel options.
3. Select the required MODBUS map options.
4. Build the Simplex Device list by importing an XLG point data export produced by the Simplex programmer.
5. Build the configurable MODBUS map by adding all required bits and setting any options for them.
6. Specify the addresses to be polled if analogue values are required.
7. Configure the serial MODBUS interfaces.
8. Download the configuration to the 4100MB.

5.1 Opening, Saving and Restoring 4100MB Configurations

The user can clear the current configuration and start a new configuration by selecting **File | New** from the Main Menu.

A configuration is saved by selecting **File | Save** from the Main Menu. All saved files are given the extension '*.sxbx*' by default.

A configuration can be loaded by selecting **File | Open** from the Main Menu.

5.2 Configuring Expansion Cards

The E/4100MB is supplied with a CCU3/E Ethernet expansion card fitted. This card must be added and configured in the 4100MB programmer.

To add a new card to the **4100MB** click the **Add Card** button on the **Expansion Cards** page. Select the new card type, enter a Description and click OK. The description is optional. If required, expand the display to show the expansion cards by clicking on the + symbol. Select the new card and enter any required properties.

To remove a card select the card then press the **Remove Card** button.

5.2.1 Configuring an Ethernet Card

Enter the IP Address, Subnet Mask and Gateway to be assigned to the 4100MB (using numbers). The E/4100MB does not support DHCP or the use of Host names.

5.3 Fire Panels

The fire panel configuration page is used to specify the fire panel list and associated panel options.

The fire panel list specifies which fire panels are present in the network. This map can be used for reference by the MODBUS master. If the 4100MB is connected to a standalone panel the fire panel list can be left empty.

To add a new fire panel to the configuration click the **Add Panel** button. When the **New Panel** screen appears choose the panel type and enter the panel address. Then add a brief description for easy identification.

To remove a panel select it in the panel list then press the R**emove Panel** button.

There are 2 further options on this page.

- **Timekeeper** – When selected the time/date of the 4100MB will be used to update the time/date of the panel. The time/date of the 4100MB can be set either by the MODBUS master writing a value to the Time and Date registers or by enabling SNTP (refer section 5.9.2 SNTP). If the Simplex panel is a 4120 network node, the panel must be configured as the Master Timekeeper otherwise the time/date update of the 4100MB will be overridden by the designated 4120 Network Master Timekeeper.

- **Supervision Timeout** – This is the timeout for the panel monitoring. Each bit of the Network Status map is the supervision status of one Simplex panel. This bit will be set if no message is received from the panel for this configurable time interval. In order to use the panel monitoring it is necessary to program each panel to send a message at a regular interval. One way of doing this is to use a pseudo point that toggles at a regular interval.

5.4 MODBUS Map Options

The size and location of the segments of the MODBUS Map can be configured for different applications.

- **Map Type** – This setting controls the size and location of both the pre-defined 4100MB and the customisable segments of the MODBUS Map. The three options are:
    - **Standard** – The standard map, refer to section 4.4 Standard Mode MODBUS Map for a detailed description.
    - **AUTRONICA** – Changes the operation of the MODBUS map to a mode compatible with AUTRONICA panels. This mode treats the map as one word register for each point, each register stores a word value representing the current device state.
    - **Legacy Mode** – Compatible with projects implemented with 4100MB V3.07 or earlier. **This mode is included for legacy support and should not be used in new designs.**

5.5 Map Configuration

This page is used to define the configurable segment of the MODBUS map. The user selects which bits to add to the map and the order in which they are arranged. This gives the user flexibility in the layout of the MODBUS map.

The configurable map can include bits for Simplex Devices and it may also reference bits from the pre-defined 4100MB map. For instance, the Global Common Alarm bit from the pre-defined map could be mapped to bit 1 in the configurable map.

Blank bits or unused addresses may also be added to the map using the X9000 and X9001 types to pad entries to the desired bit address.

5.5.1 Loading Simplex Panel Devices

Before bits for Simplex devices can be added to the configurable map the Simplex devices list needs to be built.

Select **Edit | Import Devices From Report File** from the main menu to import a previously prepared 4100 Simplex panel XLG point data export file. This will load all the Simplex devices to the Panel Devices list in the Available Devices tree as well as to the Analogue values setup page. Any errors in the import will be logged to the messages window as well as logged to the disk.

If a required device is not present in the Simplex devices list the device may be added manually by selecting **Edit | Add Simplex Address** from the main menu. Enter the Simplex point address (e.g. M3-17-1 for a MAPNET address) and a description for the point.

5.5.2 Editing the MODBUS Map

ADDING BITS:

Add a bit to the configurable map by following the steps below.

- Find the bit that you wish to add to the map on the left hand side in the Available Devices tree. Remember you can expand and collapse branches in the tree by clicking the '+' and '-' symbols.
- Select the bit then the click the **Add to Map** button. The bit should appear in the MODBUS map on the right-hand side of the screen. If the **Add** button is 'greyed out' then a valid bit has not been selected in the Available Devices tree.

The same bit may be added multiple times to the configurable map if required. You can also change the position of entries in the configurable map by dragging them to the desired location.

ADDING MULTIPLE BITS AT ONCE:

Multiple items can be selected in the tree to add to the configurable map.

ADDING UNUSED BITS:

Blank bits or unused addresses may be added to the configurable map by adding one of the **Unused Entry** items from the tree. Select either "X9000 Unused Entry – Force to 0" or "X9001 Unused Entry – Force to 1" depending on which state you want the bit to report as.

REMOVING BITS FROM THE MAP:

To remove a bit from the configurable map select the bit in the map then press the **Remove from Map** button.

CONFIGURING A MAP BIT:

Once you have added a bit to the configurable map you may wish to configure options for that bit. Select the bit in the configurable map you wish to edit then press the **Edit Map Entry** button or alternatively double click the selected item. Refer to Section 5.5.3 MODBUS Map Item Options for details of the options.

5.5.3 MODBUS Map Item Options

The Edit Map Entry screen for items in the configurable map has the following fields.

- **Valid Event Types** – Select which Simplex event types you wish the bit in the configurable map to represent. The choices are Alarm, Priority 2 Alarm, Troubles, Supervisory, Utility, Control and Disables. The default setting of a panel bit in the configurable map is All, where All means that the bit will be set if the device is active in any of these states.
- **Invert Bit** – Inverts the sense of the bit in the map.
- **Writes Trigger Commands** – When enabled a Simplex command can be associated with this map bit. When the MODBUS master writes a value to this bit using function (5) Force Single Coil the selected command for the associated device is sent to the Simplex panel. The choices for the command are:

Write of a '1'	Write of a '0'
Set ON	Set OFF
Arm	Disarm
Enable	Disable

The 4100MB does not store the force state of the coil received in the command from the MODBUS master – it just generates commands which are queued for sending to the panel. The map bit however will be set if a state change is received from the panel for that point.

5.5.4 Exporting and Importing the MODBUS Map

The MODBUS map can be exported to a spreadsheet file in comma separated value (CSV) format. The spreadsheet file can also be imported to define the MODBUS map. Any errors in the import will be logged to the messages window as well as logged to the disk.

Select **Edit | Export MODBUS Map** from the main menu to export the MODBUS map.
The export file format consists of one line with the field names followed by a series of entries describing the map bits. This command can be used on an empty database to create an empty CSV file with the appropriate headings and column order defined. It is recommended that this file be created and used to insert the site specific mapping info.

Select **Edit | Import MODBUS Map** from the main menu to import the MODBUS map. Any existing entries in the map will be cleared before importing the file.

The import/export file fields are:

Field Name	Description
Register	Register number indexed from 1.
Offset	Bit offset in the register (0-15).
Bit Number	Bit number indexed from 1.
Address	Simplex device address or internal 4100MB address mapping to this bit.
Description	Description of the bit.
Comment	An optional additional comment.
State Types	The Simplex event states which will map to this point. This field only applies to Simplex panel points. Allowable values are any combination of: • **F** - Alarm • **P** - Priority 2 Alarm • **T** - Trouble • **S** - Supervisory • **U** - Utility • **C** - Control • **D** - Disable eg: "**TS"** - Trouble and Supervisory events only.
Invert	Set to either '1','true' or 'inv' to invert the state of this bit in the map. This field is not case sensitive. If the field is blank the bit will not be inverted.
Command	The optional Simplex command associated with this bit. Allowable values are: • **SET_ON** • **ARM** • **ENABLE** Leave empty for no command.

Example:

```
Register,Offset,"Bit number",Address,Description,Comment,"State Types",Invert,Command
1,0,1,7:M1-1-0,"FDT-0107-XP07 THERMAL DETECTOR 1",,F,,
1,1,2,7:M1-1-0,"FDT-0107-XP07 THERMAL DETECTOR 1",,T,Inv,
1,2,3,7:P617,"FDT-0107-XP07 ISOLATED",,S,,
```

5.6 Analogue Values

The 4100MB is able to poll the Simplex panel for the analogue value of up to 32 Simplex panel devices. The Simplex panel points are polled round-robin style at approximately 4.5 second intervals. The analogue values may be read from the pre-defined segment or mapped to the customisable part of the MODBUS map.

For TrueAlarm devices the current raw analogue value (0-255) is stored in the low byte of the corresponding analogue value map register.

5.6.1 Loading Simplex Panel Devices

Before addresses for devices can be added to the analogue value map the Simplex Devices list needs to have been built. This is done by loading the Panel Devices list in the Available Devices tree of the Map Configuration page. Refer to section 5.5.1 for details.

The list of available devices shown on the analogue Values page is restricted to devices which have a suitable analogue value.

5.6.2 Editing the Analogue Value Map

ADDING ADDRESSES:

Add an address to the analogue value map by following the steps below.

- Find the address that you wish to add to the map on the left hand side in the Available Devices tree. Remember you can expand and collapse branches in the tree by clicking the '+' and '-' symbols.
- Select the address then the click the **Add to Map** button. The address should appear in the analogue value map on the right-hand side of the screen. If the **Add** button is 'greyed out' then a valid address has not been selected in the Available Devices tree.

ADDING MULTIPLE ADDRESSES AT ONCE:

You may select more than one item in the in the tree to add to the analogue value map.

REMOVING ADDRESSES FROM THE MAP:

To remove an address from the analogue value map select the address in the map then press the **Remove from Map** button.

5.7 LHD Configuration

The Linear Heat Detector mode allows the 4100MB to relay information from a compatible MODBUS slave to the Simplex panel. Typical external devices that may be connected are Linear Heat Detectors and Evacuation systems. Currently MODBUS/TCP is the only interface type supported.

Enabling this mode starts a MODBUS TCP connection in master mode to the MODBUS slave device. The 4100MB polls the MODBUS map of the slave device, bits in this map are then used to trigger ON / OFF commands to devices in the Simplex panel.

The LHD interface is configured by importing a comma separated values (csv) file to specify which bits of the LHD map control which devices on the panel. Any errors in the import will be logged to the messages window as well as logged to the disk.

5.7.1 MODBUS Interface

Select the MODBUS interface to be used to communicate with the LHD. Currently MODBUS/TCP is the only interface supported.

5.7.2 MODBUS Slave IP Address

Enter the IP address of the linear heat detector here. The 4100MB does not support the use of Host names.

5.7.3 LHD Status Point

The 4100MB is able to set a point in the Simplex panel to indicate the status of the connection to the LHD. This point will be set to OFF while the LHD connection is valid.

The status point will be set to ON when:

- The TCP connection to the Linear Heat Detector is lost.
- The Linear Heat Detector does not reply to 6 messages.

5.7.4 Latch Points

Enabling the option latches activated LHD points into an internal map in the 4100MB which is then used to trigger ON / OFF commands to devices in the Simplex panel. The internal map in the 4100MB will be cleared when the “Detector Reset Pulse Timer” pseudo point A16 is received from the Simplex panel.

Latching should generally be enabled in the 4100MB if the MODBUS slave device that is sending alarms does not latch the alarm state itself. This is so that the alarm state in the panel latches until system reset is initiated on the panel.

5.7.5 LHD Configuration File Format

The LHD configuration file format consists of one line with the field names followed by a series of entries mapping the LHD coils to Simplex devices.

The required import file fields are:

Field Name	Description
LHD Coil	LHD Coil number indexed from 1.
LHD Signal	Short Name – used for documentation purposes only
Description	Used for documentation purposes only
Simplex	Simplex device address

Example:

LHD Coil,LHD Signal,Description,Simplex
601,LHD200112_AlarmI,DGZ2001 Alarm - Lane 1 Controller 2,P1023
602,LHD200212_AlarmI,DGZ2002 Alarm - Lane 1 Controller 2,P1024

There is a menu option to generate a blank import file for connection to a Vigilant EWIS system.

5.7.6 Custom Control in the 4100 Panel

To ensure that the 4100 panel doesn't miss any alarms and is in synch with the 4100MB, the 4100MB refreshes any LHD alarms that it has by sending one SET Pxxx ON command every 5 seconds or so. When the 4100MB detects that a system reset has begun in the 4100 panel (it monitors the A16 analog signal) it immediately stops sending alarm refresh data to the 4100 panel and unlatches any latched alarms. In the 4100 panel, at the start of the system reset, Custom Control logic also resets the state of the pseudo points that store the LHD alarms.

To ensure that an alarm refresh sent by the 4100MB at the same time as a system reset is initiated doesn't temporarily put the panel back into alarm, the 4100 panel uses Custom Control to override the SET Pxxx ON state sent by the 4100MB during the 30 second refresh. Refer to section 3.2.3 Linear Heat Detector Setup for examples of the Custom Control needed to handle this. It is essential that the priority associated with commands received from the computer port (CPP RS232 card) is equal to the CPP port SET Priority (Default=9) in the 4100 panel so that Custom Control can use a higher control priority to override the CPP port commands during the system reset period. Simplex SMPL Custom Control priority level is from 2 to 15, 2 being the highest priority and 15 being the lowest with 9 as default priority level.

5.8 MODBUS Interface Setup

Two serial MODBUS ports are available - Comport 4 and Comport 3. For each port the 4100MB is connected as a MODBUS slave and accesses the same data.

MODBUS Interface 0 is the configuration page for Comport 4, MODBUS Interface 1 is the configuration page for Comport 3.

Interface Type – Select the Interface type to match the connection to the master. Unused interfaces can be disabled to prevent the yellow supervision fault LED from showing. If RS485 operation is selected it is important to set the reply delay correctly.

MODBUS Address – The MODBUS slave address must match the value polled by the MODBUS master. Valid addresses range from 1 – 247.

Reply Delay – This is the delay after receiving the master's request before sending the response from the 4100MB. This delay gives the master time to turn off its transmitter when RS485 is being used.

Word Order – This specifies the word order of all data in register commands. The options are most significant byte first (MSB, LSB) and least significant byte first (LSB, MSB). Most significant byte first (MSB, LSB) is the MODBUS default.

The MODBUS commands applicable to this setting are:

- (3) Read Holding Registers
- (4) Read Input Registers
- (6) Preset Single Register
- (16) Preset Multiple Registers

Baudrate, Parity, Data Bits – Set these to match the MODBUS master.

5.9 The Other Options Page

5.9.1 MODBUS/TCP

Word Order – This specifies the word order of all data in register commands used on the MODBUS/TCP connections. The options are most significant byte first (MSB, LSB) and least significant byte first (LSB, MSB). Most significant byte first (MSB, LSB) is the MODBUS default.

The MODBUS commands applicable to this setting are:

- (3) Read Holding Registers
- (4) Read Input Registers
- (6) Preset Single Register
- (16) Preset Multiple Registers

5.9.2 SNTP

The 4100MB is able to synchronise its clock to a SNTP server. 4100MB Time changes will be sent to the host panel if the timekeeper option has been selected on the Fire Panels options page. Daylight Saving is not supported.

Server IP Address – The IP address of the SNTP server to synchronise to. Set to 0.0.0.0 to disable the SNTP system.
Update Interval – The interval between time requests sent by the 4100MB to the SNTP server.
GMT Offset – The offset from Greenwich mean time (also known as UTC) to the local time zone in minutes.

5.9.3 Watchdog

There are 2 watchdog bits available in the 4100MB. The first (X0008 Timed Watchdog) toggles at a programmable time interval. The second (X0015 Toggle Watchdog) toggles every time a MODBUS read command is received.

Watchdog Interval – Sets how often the timed watchdog will toggle. Valid values are from 5 to 1000 seconds.

5.10 AUTRONICA Mode

Selecting **AUTRONICA Mode** changes the way the Submap works to a mode compatible with AUTRONICA panels.

The submap is organised as 5120 registers. Each register stores an integer value representing the current device state of one point.

Value	Device State
1	Normal
3	Alarm/Fire
5	Pre Alarm
7	Trouble
8	Isolate

Table 45 AUTRONICA Device States

The global map is not accessible in this mode.

With Autronica mode, you can add 768 points to your Submap. One Word for one device. If the Word is 1, the state of the device is Normal. If it's 2, the state of the device is Alarm. If it's 4, the state of the device is Pre Alarm. If it's 6, the state of the device is Trouble. If it's 8, the state of the device is Disabled.

Value	State of the device
1	Normal
2	Alarm/Fire
3	Fire Acknowledged
4	Pre Alarm
5	Pre Alarm Acknowledged
6	Trouble
7	Trouble Acknowledged
8	Disabled

5.11 Programming the 4100MB

When the configuring process is complete the work should be saved and then programmed into the actual 4100MB. Programming of the 4100MB allows downloading of the configured database and the current 4100MB firmware.

Normally when only data changes are made, all that is required is to update the data in the 4100MB. If a new version of firmware has been received it will be necessary to update the firmware as well.

To plug the computer into the 4100MB connect the supplied cable from COM2 on the 4100MB to the computer comport.
Refer to Figure 6: Connection between 4100MB and PC COM Port for details of this cable.

CHANGING THE PC COMPORT NUMBER
Before programming is commenced the PC's comport must be set in the **4100MB Programmer** to the port that the 4100MB is connected to. To do this select **Update | Programming Option** from the Main Menu. Then select the comport number and click OK.

PROGRAMMING THE 4100MB
Plug power into the 4100MB and turn the power on. After checking that the connection from the PC to the 4100MB is OK, press the **Update | Firmware** button or select **Update | Data only** from the Main Menu and programming will commence. A success message will be displayed when finished.

5.12 Debugging, Messages Window and Log File

Progress and debugging information from the 4100MB is displayed on the Messages page as well as logged to the file "SimplexMBlog.txt".

When the 4100MB starts up, it logs information to the Messages page including the firmware version and the MODBUS configurations.

The user is also able to monitor MODBUS, LHD or 4100 communications by selecting the appropriate message filter on the left panel. Other information such as the internal event list can also be viewed.

The most obvious way to find out if the communication is working or not is to look at the LEDs on the 4100MB. Any configured COM port on the 4100MB should not have a yellow LED on. If it does, it means that port is not communicating properly.

6 MODBUS Test Program

The MODBUS Test Program can be used to test your 4100MB configuration without requiring the MODBUS master to be operational.

The test program is also installed when you run Setup.exe from the CD to install the configuration program. The default installation path in Windows 7 is C:\Program Files (x86)\TEPG\CCU3C-4100MB\Modbus.exe .

6.1 Connecting the Test Program to the 4100MB

As this program simulates the MODBUS master you need to connect a configured MODBUS port (COM3, COM4 or MODBUS/TCP) on the 4100MB to the computer that this Test Program is running on.

If you are using an RS232 connection to the MODBUS Master, you can use the supplied programming cable (Part Number: CCU3/PROG) to connect the computer to COM3 or COM4.

If RS422 or RS485 is being used for the MODBUS Master connection, you will have to temporarily set MODBUS Interface 0 or 1 to RS232 in the 4100MB Programmer, unless you have a RS422 or RS485 adaptor for the computer. Program the data only to the 4100MB after making this change. The programming cable (Part Number: CCU3/PROG) can then be used to connect the computer to COM3 or COM4.

Note: Ensure this setting is returned to the correct value after testing and before reconnecting the MODBUS Master.

A MODBUS/TCP connection can also be used if the 4100MB and computer are both connected to the same network.

6.2 Running the Test Program

Select **File | Open** from the main menu and open the project file (xxxx.sxbx) used to program the 4100MB.

Next select **Settings | Communications** and enter the settings for the desired connection medium. Press the **Connect** button to start the communications.

The communications page shows details of the MODBUS communications including packets sent/received and any errors. Each of the remaining pages shows a different part of the map.

6.2.1 MODBUS Map

This page shows the configurable part of the MODBUS map. If the project file was loaded then a description of what each coil represents is available by hovering the mouse over the coil.

6.2.2 Global Map

This page shows the status of the Global and Network Map Registers.

6.2.3 Panel Commands

This page can be used to send commands to the Simplex panel. Refer to section 4.6.2 Command Register Commands for information on the use of the address and data fields.

6.2.4 Time and Date

This page reads the current time from the 4100MB. The computer time can also be used to update the 4100MB.

6.2.5 LHD Map

This page shows the state of the map read from the Linear Heat Detector (LHD) controller.

6.2.6 Registers

This page is an alternate view of the complete MODBUS map with the data organised into registers.

6.2.7 Write Commands

This page allows the user to test the individual coil commands feature where writing to a coil triggers a command to the associated Simplex device address. Refer to section 4.6.1 Individual Coil Commands for information on setting up a command for a Simplex panel device.

7 Communication

7.1 MODBUS Communication Parameters

These are configured using the 4100MB Programmer. See section 5.8 MODBUS Interface Setup

7.2 MODBUS Commands

The 4100MB supports the following MODBUS commands:

Code	Description	Maximum Data Length
1	Read Coil Status	2000 coils
2	Read Input Status	2000 coils
3	Read Holding Registers	125 registers
4	Read Input Registers	125 registers
5	Force Single Coil	-
6	Preset Single Register	-
15	Force Multiple Coils	2000 coils
16	Preset Multiple Registers	125 registers

Note: In all MODBUS messages the CRC16 must be calculated using the appropriate formula by the MODBUS master and stored in the last 2 bytes. It is shown as ??? in the following examples.

7.3 MODBUS References

The 0x references and 4x references in this document refer to an optional naming convention for MODBUS data where the first digit of the address denotes the memory area containing the data to be accessed.

Using this convention registers 1 to 125 in the 4100MB may also be referred to as 40001 to 40125 in documentation or MODBUS master programming. Coil addresses 1 to 2000 may also be referred to as 00001 to 02000 and Input addresses 1 to 2000 may also be referred to as 10001 to 12000.

In all cases the commands ***Read Coil Status (01), Read Input Status (02), Read Holding Registers (03) and Read Input Registers (04)*** access the same memory in the 4100MB.

7.3.1 Read Coil Status (01)

Read Coil Status reads the ON/OFF status of bits (0X references) from the MODBUS map.

Bits are addressed starting at zero – Coils 1-16 are addressed as 0-15 in the packet.

The status of the returned bits is indicated as 1 = ON, 0 = OFF. The least significant bit in the first data byte will be the first bit requested, with the other bits following. If the number of bits requested is not a multiple of 8 then additional padding bits will be added at the end of the reply packet. Any bits added as padding will reflect the status of those bits in the MODBUS map.

Request:
This example is a request to read 37 coils starting at coil 20 from the MODBUS slave at address 1.

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	01	Read Coil Status
Starting Address High	00	
Starting Address Low	13	
Number of Points High	00	
Number of Points Low	25	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)		Description
MODBUS Address	11		Slave Address
MODBUS Function	01		Read Coil Status
Number of bytes returned	05		
Data (Coils 27-20)	CD	1100 1101	1 indicates ON, 0 indicates OFF.
Data (Coils 35-28)	6B	0110 1011	
Data (Coils 43-36)	B2	1011 0010	
Data (Coils 51-44)	0E	0001 1110	
Data (Coils 56-52)	1B	0001 1011	
CRC16 (Low)	???		
CRC16 (High)	???		

7.3.2 Read Input Status (02)

Read Input Status reads the ON/OFF status of bits (1X references) from the MODBUS map.

The status of the returned bits is indicated as 1 = ON, 0 = OFF. The least significant bit in the first data byte will be the first bit requested, with the other bits following. If the number of bits requested is not a multiple of 8 then additional padding bits will be added at the end of the reply packet. Any bits added as padding will reflect the status of those bits in the MODBUS map.

Request:
This example is a request to read bits 196 to 217 (References 10197-10218). The command will read 22 bits starting at MODBUS address 196.

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	02	Read Input Status
Starting Bit Address High	00	
Starting Bit Address Low	C4	
Number of Inputs High	00	
Number of Inputs Low	16	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)		Description
MODBUS Address	01		Slave Address
MODBUS Function	02		Read Input Status
Number of bytes returned	03		
Data (Inputs 10204-10197)	AC	1010 1100	
Data (Inputs 10212-10205)	DB	1101 1011	
Data (Inputs 10218-10213)	35	0011 0101	
CRC16 (Low)	???		
CRC16 (High)	???		

7.3.3 Read Holding Registers(03)

Read Holding Registers reads the contents of holding registers (4X references) from the MODBUS map.

Registers are addressed starting at 0 – Registers 1-16 are addressed as 0-15 in the packet.

Request:
This example is a request to read registers 107 to 109 (40108-40110 references). This command will read 3 registers starting at register address 107.

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	03	Read Holding Registers
Starting Address High	00	
Starting Address Low	6B	
Number of Registers High	00	
Number of Registers Low	03	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	03	Read Holding Registers
Number of bytes returned	06	
Data High (Register 40108)	02	
Data Low (Register 40108)	2B	Value = $022B (555 decimal)
Data High (Register 40109)	00	
Data Low (Register 40109)	00	
Data High (Register 40110)	00	
Data Low (Register 40110)	64	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.4 Read Input Registers (04)

Read Input Registers reads the contents of input registers (3X references) from the MODBUS map.

Registers are addressed starting at 0 – Registers 1-16 are addressed as 0-15 in the packet.

Request:
This example is a request to read register 8 (30009 reference).

Field Name	Example	Description
MODBUS Address	01	Slave Address
MODBUS Function	04	Read Input Registers
Starting Register High	00	
Starting Register Low	08	
Number of Registers High	00	
Number of Registers Low	01	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example	Description
MODBUS Address	01	Slave Address
MODBUS Function	04	Read Input Registers
Number of Bytes Returned	02	
Data High	00	
Data Low	0A	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.5 Force Single Coil (05)

Force Single Coil forces a single coil (0X reference) to either ON or OFF.

Bits are addressed starting at zero – Coils 1-16 are addressed as 0-15 in the packet.

The requested ON/OFF state is specified by a constant in the request data field. A value of $FF00 requests the coil to be ON. A value of $0000 requests it to be OFF.

The normal response is an echo of the query message.

Request:
This example is a request to force coil 20 to ON.

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	05	Force Single Coil
Starting Address High	00	
Starting Address Low	13	
Force Data High	FF	Request coil ON
Force Data Low	00	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	05	Force Single Coil
Starting Address High	00	
Starting Address Low	13	
Force Data High	FF	Coil was requested to ON
Force Data Low	00	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.6 Preset Single Register (06)

Presets a value into a single holding register (4X reference).

Registers are addressed starting at 0 – Registers 1-16 are addressed as 0-15 in the packet.

The normal response is an echo of the query message.

Request:
This example is a request to set register 20 (40020 reference) to $0123.

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	05	Preset Single Register
Starting Address High	00	
Starting Address Low	13	
Preset Data High	01	
Preset Data Low	23	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	05	Preset Single Register
Starting Address High	00	
Starting Address Low	13	
Preset Data High	01	
Preset Data Low	23	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.7 Force Multiple Coils (15)

Force Multiple Coils sets a range of bits in the MODBUS map (0X references). The value of these bits will persist until they are rewritten.

Bits are addressed starting at zero – Coils 1-16 are addressed as bits 0-15 in the packet.

The requested ON/OFF state is specified by the corresponding bit in the request data field. A value of 1 requests the coil to be ON. A value of 0 requests it to be OFF.

The normal response is the start address and the number of coils successfully set.

The starting coil number must be a multiple of 8 (0, 8, 16 etc) on the wire.

Request:
This example is a request to force 10 coils starting with coil 17.
The request data contents are two bytes: $CD 01 (1100 1101 0000 0001).
This controls the specific coils as follows.

Coil	24	23	22	21	20	19	18	17							26	25
Value	1	1	0	0	1	1	0	1							0	1

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	0F	Force Multiple Coils
Starting Coil Address High	00	
Starting Coil Address Low	10	
Number of Coils High	00	
Number of Coils Low	0A	
Number of Bytes	02	
Force Data (High)	CD	Coils 24-17
Force Data (Low)	01	Coils 26-25
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field Name	Example (Hex)	Description
MODBUS Address	01	Slave Address
MODBUS Function	0F	Force Multiple Coils
Starting Bit Address High	00	
Starting Bit Address Low	10	
Number of Bits High	00	
Number of Bits Low	0A	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.8 Preset Multiple Registers (16)

Presets values into a sequence of holding registers (4X references).

Registers are addressed starting at 0 – Registers 1-16 are addressed as 0-15 in the packet.

The normal response is the start address and the number of registers successfully written.

Request:
This example is a write to register 1 and register 2 of values $000A and $0102 respectively.

Field	Example	Description
MODBUS Address	01	Slave Address
MODBUS Function	10	Preset Multiple Registers
Starting register High	00	
Starting register Low	00	
Number of Registers High	00	
Number of Registers Low	02	
Byte Count	04	
Data High (Register 1)	00	
Data Low (Register 1)	0A	
Data High (Register 2)	01	
Data Low (Register 2)	02	
CRC16 (Low)	???	
CRC16 (High)	???	

Reply:

Field	Example	Description
MODBUS Address	01	Slave Address
MODBUS Function	10	Preset Multiple Registers
Starting register High	00	
Starting register Low	01	
Number of registers High	00	
Number of registers Low	02	
CRC16 (Low)	???	
CRC16 (High)	???	

7.3.9 Error Responses

When the 4100MB detects an error in the request message, it cancels the process and returns to the master a response message with an exception code. The function code used is the function code in the request message with the high bit ($80) set.

The defined error codes are:

Error Code	Meaning
1	The Function Code received in the request is not an allowable action for the 4100MB.
2	The Address received in the request DATA field is not an allowable address for the 4100MB. Eg: Writing to a location that is read only.
3	A Value contained in the request DATA field is not an allowable value for the 4100MB.

Example:
This example is the error response to a MODBUS function 16 (Preset Multiple Registers) request to an invalid address.

Field Name	Example (Hex)
MODBUS Address	01
MODBUS Function	90
Error Code	02
CRC16 (Low)	???
CRC16 (High)	???

7.3.10 Calculating CRC16

Step 1 – Start with a 16-bit register set to $FFFF. Call this the CRC16 register.

Step 2 – Exclusive OR the first eight-bit byte of the message with the low byte of the CRC16 register, putting the result in the CRC16 register.

Step 3 – Shift the CRC16 register one bit to the right, shifting in a zero for the MSB.

Step 4 – If the LSB in the CRC16 register is 0, repeat Step 3. If the LSB is 1, exclusive OR the CRC16 register with $A001.

Step 5 – Repeat Steps 3 and 4 until eight shifts have been performed. When this is done, a complete eight-bit byte will have been processed.

Step 6 – Repeat Steps 2 ... 5 for the every byte in the message.

Step 7 – Place the CRC16 value in the message.

Appendix A: Legacy Mode MODBUS Map

MODBUS Map Area	Bit Type	Bit Address		Register Address			
		Start Bit	Stop Bit	Start Register	Stop Register	Number of Bits	Number of Registers
Configurable map		**1**	**16384**	**1**	**1024**	**16384**	**1024**
Global Status Bits		**16385**	**16416**	**1025**	**1026**	**32**	**2**
	Global Common Alarm	16385					
	Global Common Priority2 Alarm	16386					
	Global Common Trouble	16387					
	Global Common Supervisory	16388					
	Global Common Utility	16389					
	Global Common Control	16390					
	Global Common Disable	16391					
	Not Defined	16392					
	Timed Watchdog	16393					
	CPP Trouble	16394					
	MODBUS Interface 1 Trouble	16395					
	MODBUS Interface 2 Trouble	16396					
	Configuration Checksum Error	16397					
	Toggle Watchdog	16398					
Panel Status Bits		**16417**	**16448**	**1027**	**1028**	**32**	**2**
	Panel Common Alarm	16417					
	Panel Common Priority2 Alarm	16418					
	Panel Common Trouble	16419					
	Panel Common Supervisory	16420					
	Panel Common Utility	16421					
	Panel Common Control	16422					
	Panel Common Disable	16423					
	Panel Not Responding	16425					
	Panel In Reset	16426					
Commands		**16513**	**16544**	**1033**	**1034**	**32**	**2**
	cmdOperator	16513					
	cmdRefresh	16514					
	cmdRestart	16515					
	cmdAck	16516					
	cmdSilence	16517					
	cmdReset	16518					
	cmdAckAlarms	16519					
	cmdAckPriority2 Alarms	16520					
	cmdAckTroubles	16521					
	cmdAckSupervisories	16522					
	cmdAckAbnormal	16523					
	cmdDisarm	16524					
	cmdArm	16525					
	cmdDisable	16526					
	cmdEnable	16527					
	cmdDetails	16528					

MODBUS Map Area	Bit Type	Bit Address		Register Address			
		Start Bit	Stop Bit	Start Register	Stop Register	Number of Bits	Number of Registers
Command Data		**16545**	**17056**	**1035**	**1066**	**544**	**34**
Command Address		16545	16800	1035	1050	256	16
Command Param		16801	17056	1051	1066	256	16
Timestamp	**Number of seconds since 00:00:00:00 Jan 1992**	**17153**	**17184**	**1073**	**1074**	**32**	**2**
	Timestamp Byte 0 (LSB)	17153	17160				
	Timestamp Byte 1	17161	17168				
	Timestamp Byte 2	17169	17176				
	Timestamp Byte 3 (MSB)	17177	17184				
Time and Date		**17185**		**1075**	**1080**	**96**	**6**
	Year	17185	17200	1075		16	1
	Month	17201	17216	1076		16	1
	Day	17217	17232	1077		16	1
	Hour	17233	17248	1078		16	1
	Minutes	17249	17264	1079		16	**1**
	Second	17265	17280	1080		16	1
Network Map		**17281**	**17408**	**1081**	**1088**	**128**	**8**
	Panels Configured	17281					
	Panel 1	17282					
	...						
	Panel 128	17409					
Network Status		**17281**	**17408**	**1089**	**1096**	**128**	**8**
	Not Defined	17281					
	Panel 1	17282					
	...						
	Panel 128	17409					
IO Card Status		**17537**	**17540**	**1097**	**1098**	**32**	**2**
	CARD1_STATUS	17537					
	CARD2_STATUS	17538					
	CARD3_STATUS	17539					
	CARD4_STATUS	17540					
IO Card Devices		**17569**	**17824**	**1099**	**1114**	**256**	**16**
	CARD1_INPUT_1_ACTIVE	17569					
	CARD1_INPUT_1_SUPV_FAULT	17570					
	CARD1_INPUT_1_UNUSED	17571					
	CARD1_INPUT_1_UNUSED	17572					
	CARD1_INPUT_2_ACTIVE	17573					
	CARD1_INPUT_2_SUPV_FAULT	17574					
	CARD1_INPUT_2_UNUSED	17575					
	CARD1_INPUT_2_UNUSED	17576					
	CARD1_INPUT_3_ACTIVE	17577					
	CARD1_INPUT_3_SUPV_FAULT	17578					
	CARD1_INPUT_3_UNUSED	17579					
	CARD1_INPUT_3_UNUSED	17580					
	CARD1_INPUT_4_ACTIVE	17581					
	CARD1_INPUT_4_SUPV_FAULT	17582					
	CARD1_INPUT_4_UNUSED	17583					

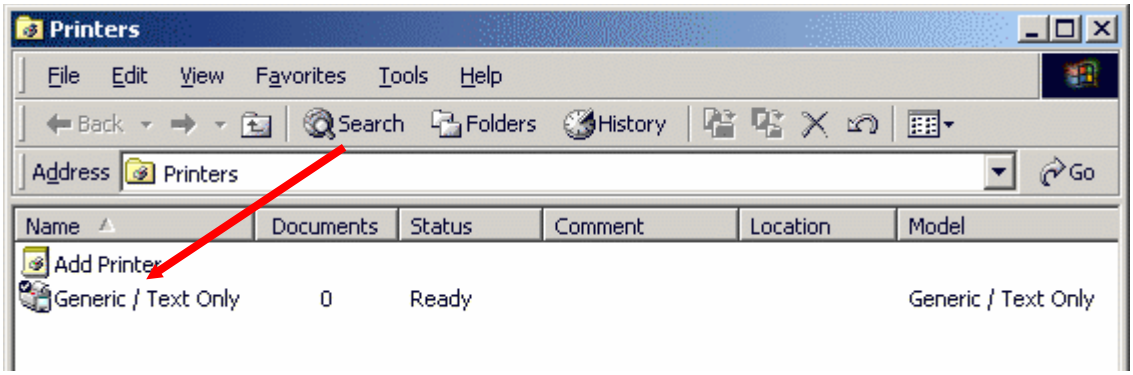
MODBUS Map Area	Bit Type	Bit Address		Register Address			
		Start Bit	Stop Bit	Start Register	Stop Register	Number of Bits	Number of Registers
	CARD1_INPUT_4_UNUSED	17584					
	CARD1_INPUT_5_ACTIVE	17585					
	CARD1_INPUT_5_SUPV_FAULT	17586					
	CARD1_INPUT_5_UNUSED	17587					
	CARD1_INPUT_5_UNUSED	17588					
	CARD1_INPUT_6_ACTIVE	17589					
	CARD1_INPUT_6_SUPV_FAULT	17590					
	CARD1_INPUT_6_UNUSED	17591					
	CARD1_INPUT_6_UNUSED	17592					
	CARD1_INPUT_7_ACTIVE	17593					
	CARD1_INPUT_7_SUPV_FAULT	17594					
	CARD1_INPUT_7_UNUSED	17595					
	CARD1_INPUT_7_UNUSED	17596					
	CARD1_INPUT_8_ACTIVE	17597					
	CARD1_INPUT_8_SUPV_FAULT	17598					
	CARD1_INPUT_8_UNUSED	17599					
	CARD1_INPUT_8_UNUSED	17600					
	CARD1_INPUT_9_ACTIVE	17601					
	CARD1_INPUT_9_SUPV_FAULT	17602					
	CARD1_INPUT_9_UNUSED	17603					
	CARD1_INPUT_9_UNUSED	17604					
	CARD1_INPUT_10_ACTIVE	17605					
	CARD1_INPUT_10_SUPV_FAULT	17606					
	CARD1_INPUT_10_UNUSED	17607					
	CARD1_INPUT_10_UNUSED	17608					
	CARD1_INPUT_11_UNUSED	17609					
	CARD1_INPUT_11_UNUSED	17610					
	CARD1_INPUT_11_UNUSED	17611					
	CARD1_INPUT_11_UNUSED	17612					
	CARD1_INPUT_12_UNUSED	17613					
	CARD1_INPUT_12_UNUSED	17614					
	CARD1_INPUT_12_UNUSED	17615					
	CARD1_INPUT_12_UNUSED	17616					
	CARD1_INPUT_13_UNUSED	17617					
	CARD1_INPUT_13_UNUSED	17618					
	CARD1_INPUT_13_UNUSED	17619					
	CARD1_INPUT_13_UNUSED	17620					
	CARD1_INPUT_14_UNUSED	17621					
	CARD1_INPUT_14_UNUSED	17622					
	CARD1_INPUT_14_UNUSED	17623					
	CARD1_INPUT_14_UNUSED	17624					
	CARD1_INPUT_15_UNUSED	17625					
	CARD1_INPUT_15_UNUSED	17626					
	CARD1_INPUT_15_UNUSED	17627					
	CARD1_INPUT_15_UNUSED	17628					
	CARD1_INPUT_16_UNUSED	17629					
	CARD1_INPUT_16_UNUSED	17630					
	CARD1_INPUT_16_UNUSED	17631					
	CARD1_INPUT_16_UNUSED	17632					
	CARD2 INPUTS	17633	17696	1103	1106	64	4
	CARD3 INPUTS	17697	17760	1107	1110	64	4

MODBUS Map Area	Bit Type	Bit Address		Register Address			
		Start Bit	Stop Bit	Start Register	Stop Register	Number of Bits	Number of Registers
	CARD4 INPUTS	17761	17824	1111	1114	64	4
IO Card Relay Control		**17825**	**17856**	**1115**	**1116**	**32**	**2**
	CARD1_OUTPUT_1	17825					
	CARD1_OUTPUT_2	17826					
	CARD1_OUTPUT_3	17827					
	CARD1_OUTPUT_4	17828					
	CARD1_OUTPUT_5_UNUSED	17829					
	CARD1_OUTPUT_6_UNUSED	17830					
	CARD1_OUTPUT_7_UNUSED	17831					
	CARD1_OUTPUT_8_UNUSED	17832					
	CARD2_OUTPUT_1	17833					
	CARD2_OUTPUT_2	17834					
	CARD2_OUTPUT_3	17835					
	CARD2_OUTPUT_4	17836					
	CARD2_OUTPUT_5_UNUSED	17837					
	CARD2_OUTPUT_6_UNUSED	17838					
	CARD2_OUTPUT_7_UNUSED	17839					
	CARD2_OUTPUT_8_UNUSED	17840					
	CARD3_OUTPUT_1	17841					
	CARD3_OUTPUT_2	17842					
	CARD3_OUTPUT_3	17843					
	CARD3_OUTPUT_4	17844					
	CARD3_OUTPUT_5_UNUSED	17845					
	CARD3_OUTPUT_6_UNUSED	17846					
	CARD3_OUTPUT_7_UNUSED	17847					
	CARD3_OUTPUT_8_UNUSED	17848					
	CARD4_OUTPUT_1	17849					
	CARD4_OUTPUT_2	17850					
	CARD4_OUTPUT_3	17851					
	CARD4_OUTPUT_4	17852					
	CARD4_OUTPUT_5_UNUSED	17853					
	CARD4_OUTPUT_6_UNUSED	17854					
	CARD4_OUTPUT_7_UNUSED	17855					
	CARD4_OUTPUT_8_UNUSED	17856					
End of Map			**17920**		**1120**	**17920**	**1120**

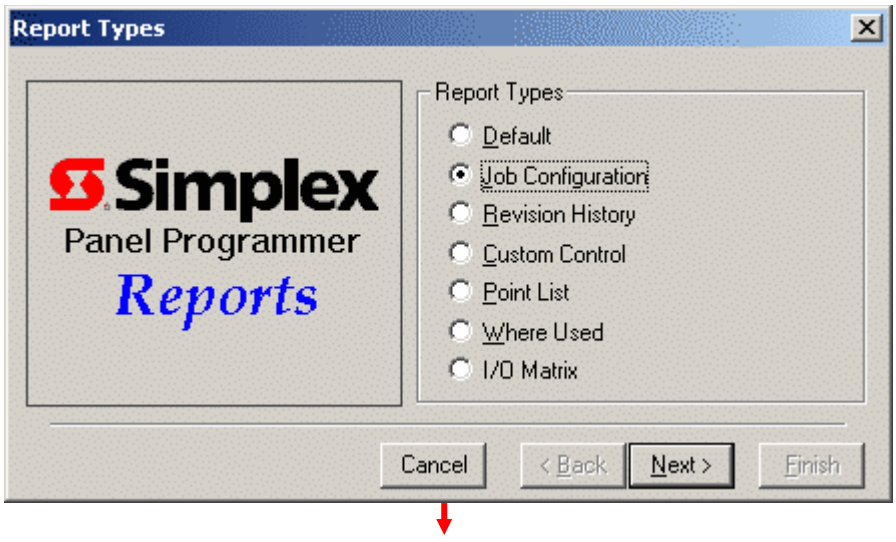
Appendix B: Importing a 4100 Card Detail Report

You may import a report file generated from the 4100 programming software. This will automatically configure the panels in the 4100 Modbus programmer. Follow the steps below.

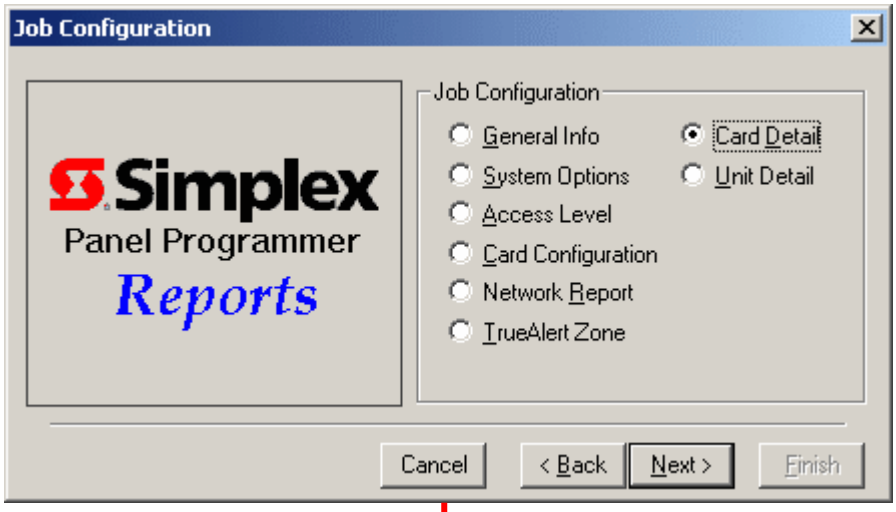
Step 1.
If you are using the DOS based programming software then you may generate a simple text file report. If you are using a 4100U Programmer you must install a **Generic - Text Only** printer in windows that **Prints to File**.



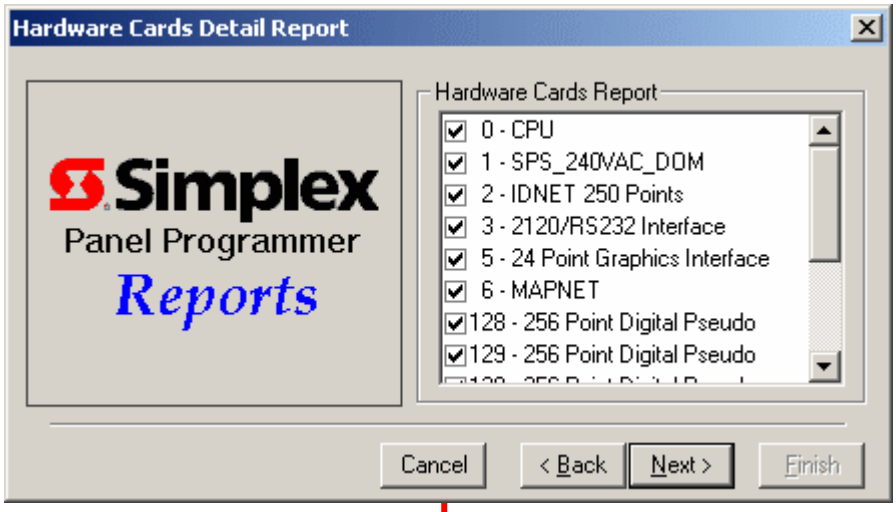
Step 2.
For a DOS programmer simply generate a “Card Detail “ report.
For a windows programmer generate a ‘Standard’ report using ‘Job Configuration’ -> ‘Card Details’ and tick all of the cards shown in the window. Select the Generic – Text Only printer you have installed and enter the file name you wish to save the report as. For example you could use ‘A:\simplex jobs\Job Installation\xlg.txt’ if the PC that has the 4100 Modbus Programmer is not on the same PC that has the 4100 programming software (Hence you will need a floppy disk to transfer the file to the XLG C/S PC).
Use the figures below to guide your through the report generation procedure.



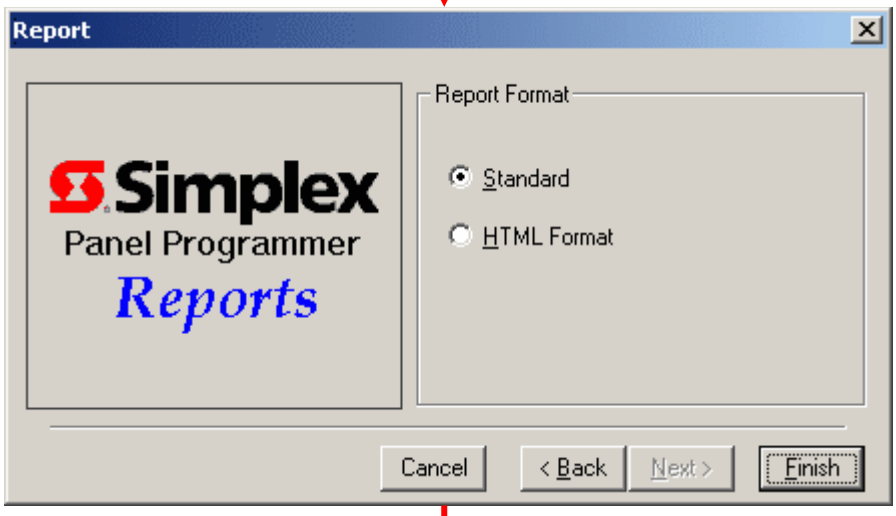
Choose the ‘Job Configuration’ Report Type



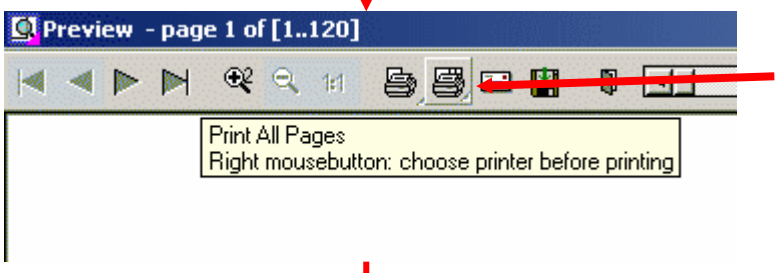
Choose the 'Card Details' option from the Job Configuration report.



Tick all cards that are in the list



Choose the 'Standard' Report format. This will generate a print document for preview.



Right click the 'Print All Pages' button on the toolbar. This will allow you to select the Generic – Text Only printer to print to file.

If you have correctly installed the Generic – Text Only printer to print to file then you should see this window. Enter the full path that you wish to save the file to. For example 'a:\ simplex jobs\Job Installation\xlg.txt'.

Step 3.
A configuration can be loaded by selecting **Edit | Import Report File** from the Main Menu.
Select the report file you have just saved and click Open.

All of the items in the report file shall be added to the list of items that can be added to the Modbus map. Click on the *MODBUS Map* button to see the items that were imported from the report file.